Psychrologix™ Controller W/ DHC

User Manual

For Psychrologix™ version 1.4

Please read this entire document before connecting the Psychrologix™ controller.

Psychrologix™ Controller

*IMPORTANT PLEASE NOTE The Following:
First, a word about thermostats - the Psychrologix™ controller is NOT a thermostat. The Psychrologix™ controller does not control the indoor temperature. It controls the performance of the chiller and the temperature of the circulation loop in response to variable conditions, to optimize dehumidification, efficiency, and automate certain functions.

V18 Dynamic Backup Heat Users Refer to V18 manual for special instructions.

Your indoor equipment such as fan coil units, air handlers, floor heating, etc. will be controlled by traditional means, based on temperature, by a thermostat appropriate for your application. The Psychrologix™ controller is designed to provide dynamic humidity control, maximize efficiency, and to extend and automate many of the capabilities of the standard chiller controller furnished as part of the Chiltrix CX-series chiller heat pumps. If you ordered room fan coil units from Chiltrix they will each have their own thermostat. If you ordered a VMB air handler unit from Chiltrix, depending on the model, you will use either a standard thermostat or a Honeywell 0-10v thermostat. If you are using a different type of ducted air handler, it will connect to whatever thermostat you select based on what the manufacturer recommends. For floor heating you will provide the thermostat controls, pumps, manifolds if and as needed.

Location:
The Psychrologix™ controller is designed for wall mounting and should be located in an area within the building that has conditions that are average for the space. Basically, that means locate it with the same thought process as you would use to locate a conventional central thermostat. If you are using a regular central thermostat, then you can locate the Psychrologix™ controller in the same location. The Psychrologix™ controller needs a 120v power outlet within six feet, and will need to connect to the chiller using a 20AWG twisted pair. The controller can be connected to from the front, or through the back if you want to hide the wires. Note – the controller can be ordered with an external sensor. If using an external sensor, the controller can be located wherever you like but must be within 60 ft. of the remote sensor.

Installers:
Please read this entire manual before connecting the controller. Please note – you should use the standard controller that ships with the Chiltrix chiller for all parameters and adjustments, testing, commissioning. **Only after the chiller is commissioned, tested, working correctly, and placed in Standby Mode, should the final connection and power be applied to the Psychrologix™ controller. Note: make a record of your standard controller settings for later input into the Psychrologix™ controller such as Heating / Cooling EWT loop temperatures, this may also include DHW tank temperature if applicable**. The Psychrologix™ controller will overwrite any functions and parameters setup in the standard controller. Once the Psychrologix™ is set up you will use this controller exclusively. Any changes to the standard controller will be instantly over written by the Psychrologix™ controller.

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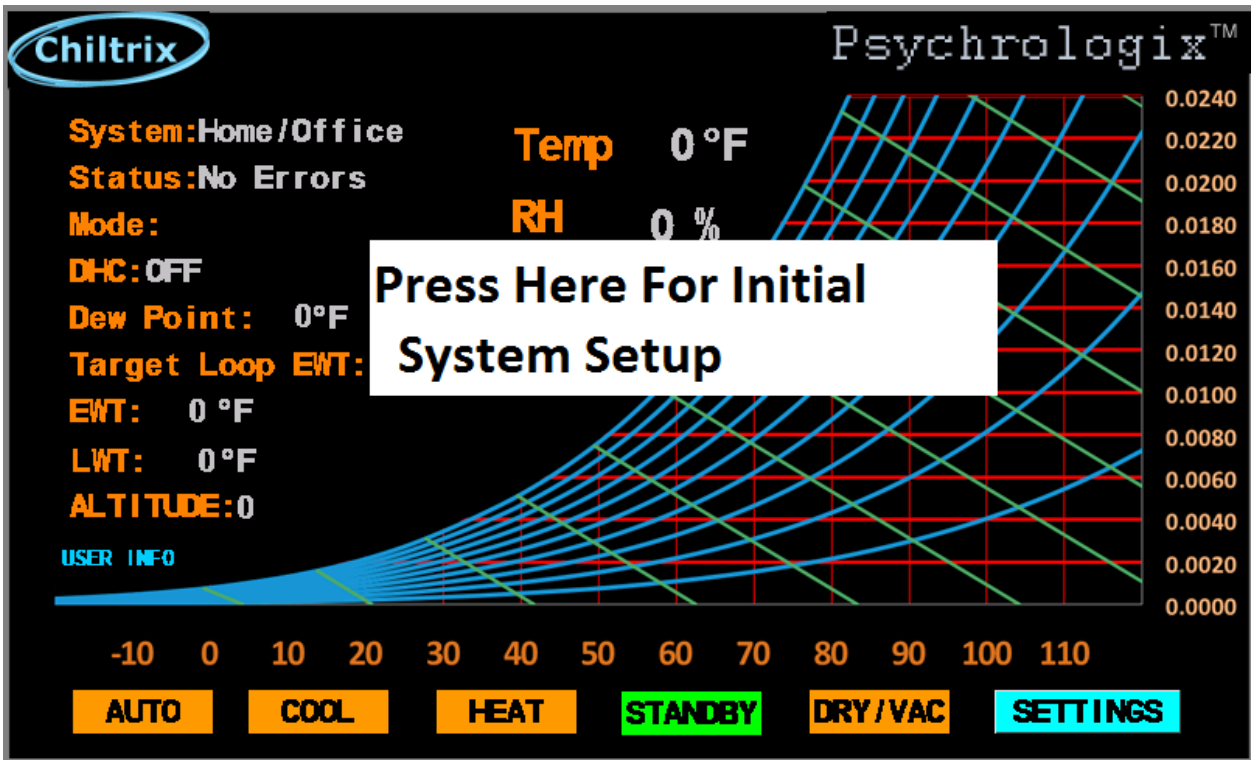
This manual will take you through the various screens of the controller and offer comments and suggestions for each. Please consult with your customer to make sure the system is set up in the best manner considering the customer needs and goals.

BEFORE CONNECTING, PLACE THE CHILLER IN STANDBY USING THE STANDARD CONTROLLER.

When first connecting and powering the Psychrologix™ controller a splash screen will appear and will remain for a short time.

Then the following screen will appear.



NOTE: When using the touch screen always hold your finger on the screen until the selected item changes color.

The controller must be connected to the chiller and the chiller must be turned on. There must be EWT and LWT temperatures displayed, “not zeros” to verify that the wires are connected properly. Touch the “press here for initial setup” screen, this will take you to the “Installer settings” screen.

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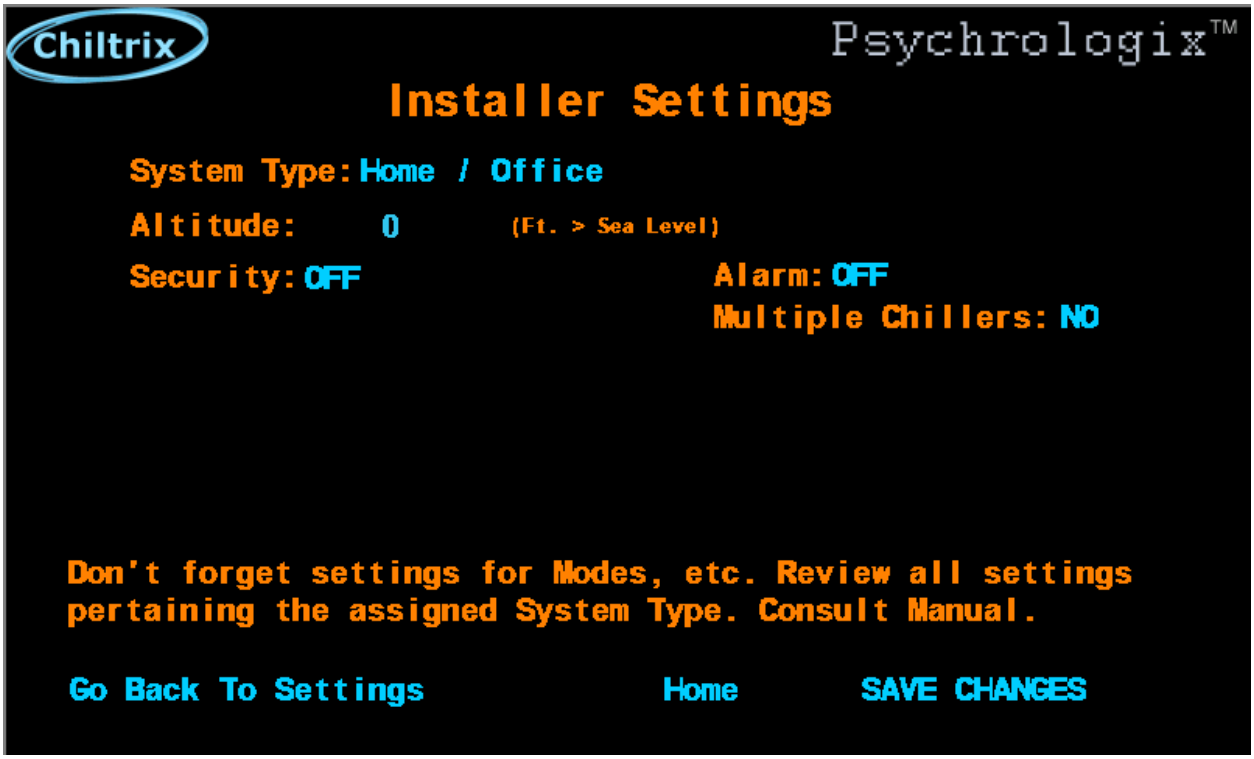
INSTALLER SETTINGS

Select the system type, either Home/Office, or Server Room. Next, you must input the altitude (or elevation) of the installation location. If you are not sure of the altitude, use Google to locate the approximate elevation of your location. **http://www.whatismyelevation.com/**.

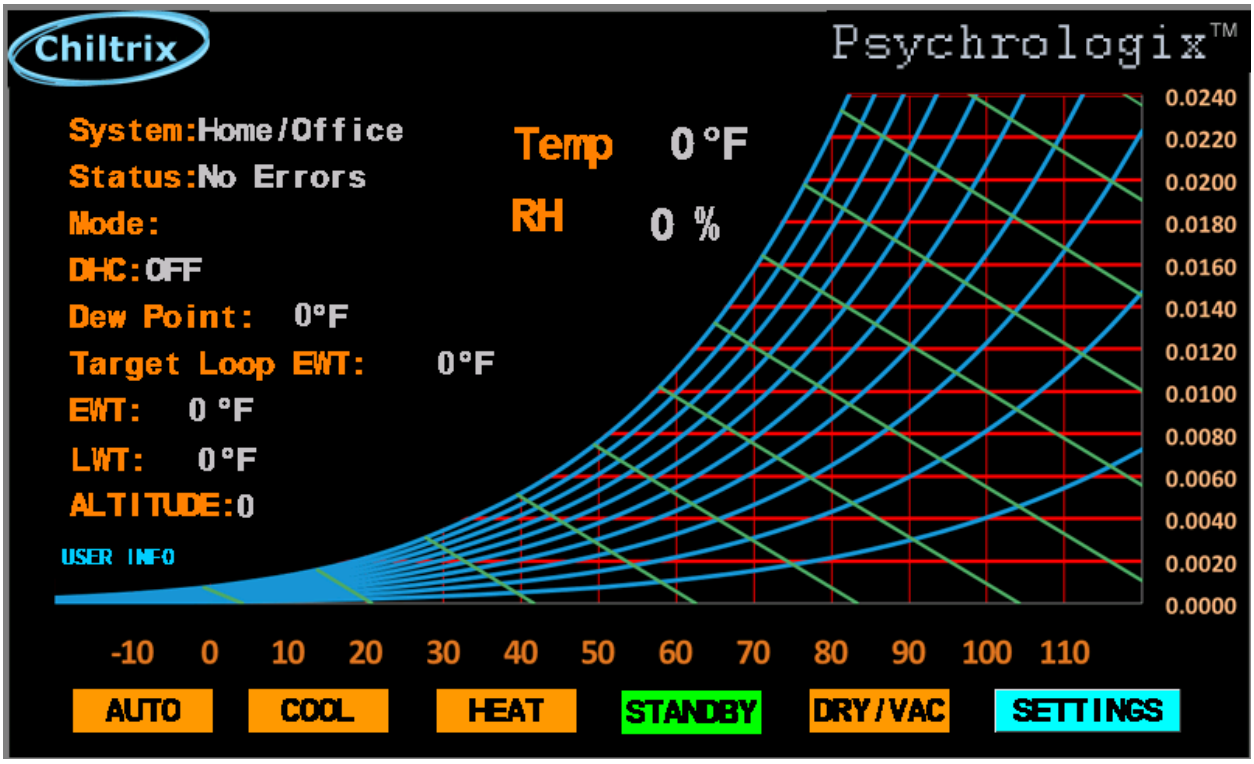


Leave **Security** and **Alarm** off until you are finished with the settings and have commissioned the system. Select **Multiple Chillers** if applicable, otherwise select **NO**. Then **Save Changes** and select **Home**.

Depending on the "system type" selected, touching the "**Home**" button will take you to the appropriate settings screen.

Psychrologix™ Controller

Main Screen (Shown below) as it appears when system type is Home/Office.



Click **User Info** for tips on using the controller. Go to "**Settings"** to begin setting up the controller.

Note: The "STANDBY" button puts the chiller in the standby mode.

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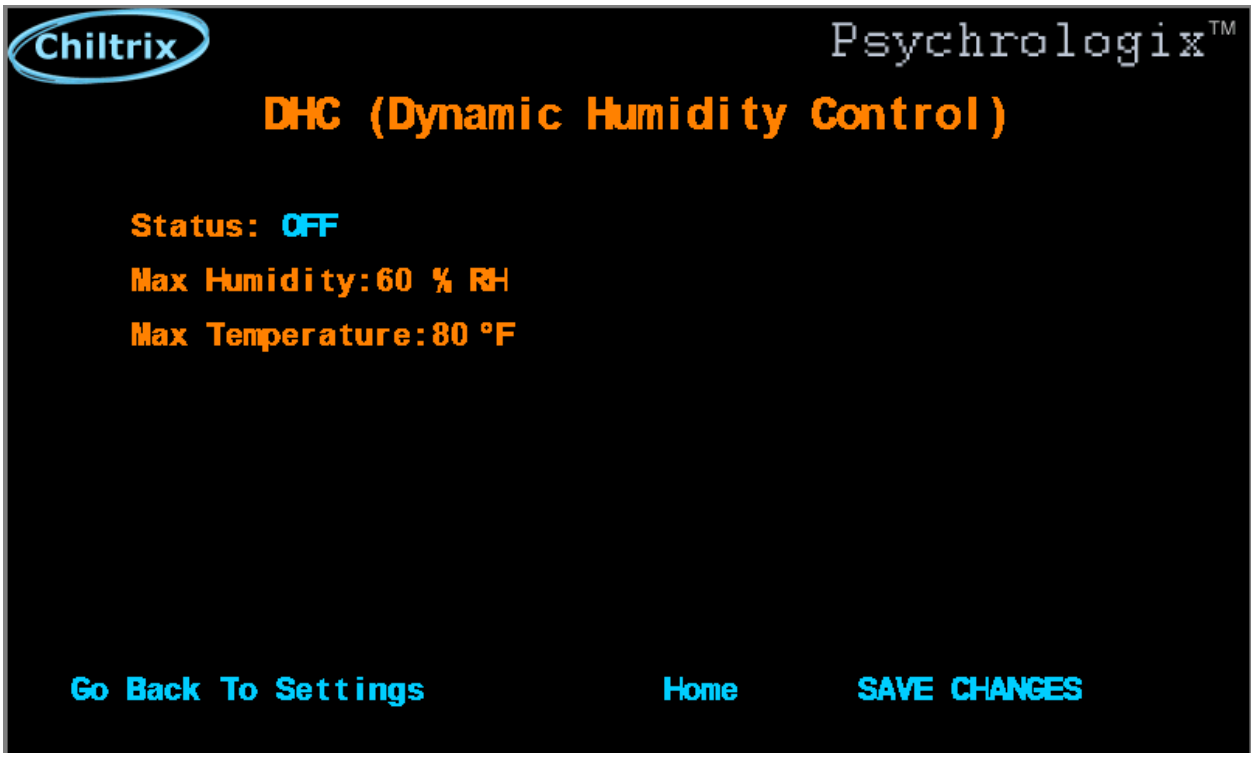
Home/Office Settings Screen

The settings you recorded from the standard controller can be input on this and subsequent screens, as applicable. Tap items in blue to change settings, when finished touch “SAVE CHANGES”.

Note, if using Onboard Dynamic Reset Control, the dynamic controls will override whatever heating settings are input here.

Next, go to **DHC** settings. Touch “DHC”.

DHC (Dynamic Humidity Control)

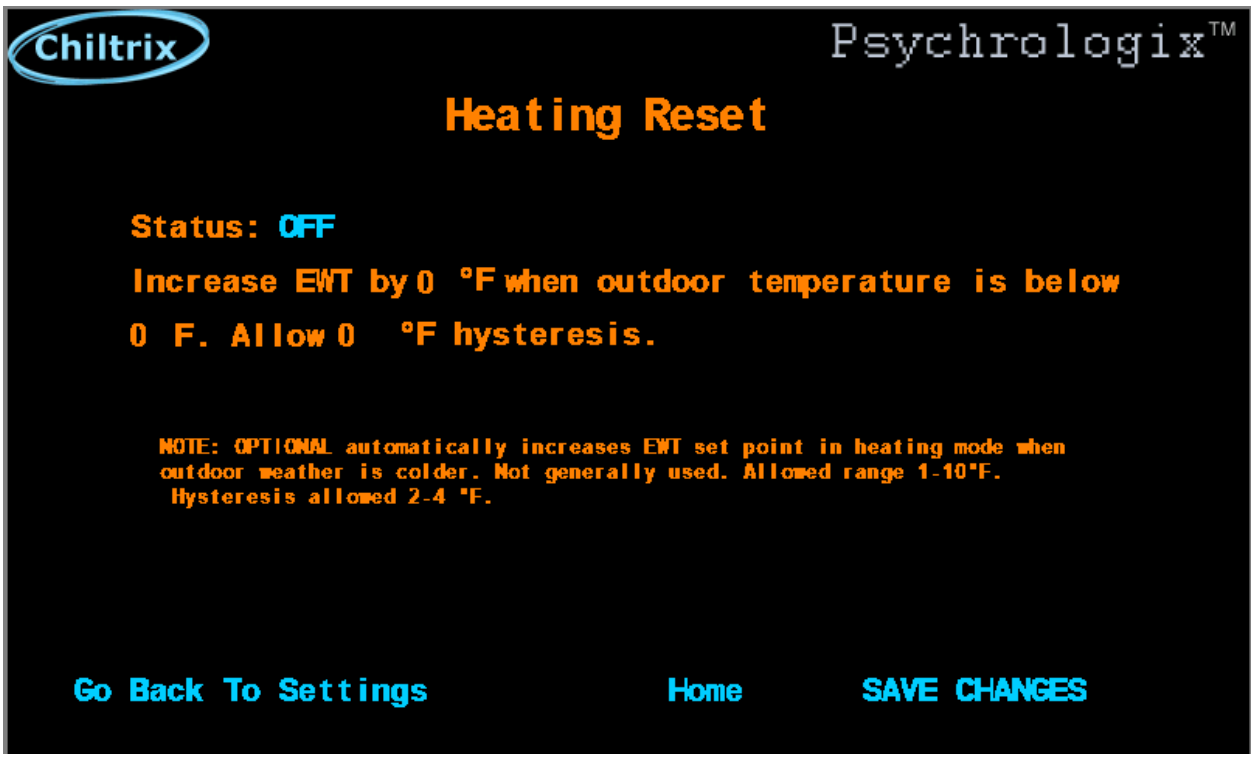


For many users, this is the most important feature of the controller as it can tightly control humidity, prevent over-dehumidification, and save a large amount of energy.

Recommended settings are Max Humidity 60-65% & Max Temperature should generally be set 1-2 degrees higher than the user's indoor thermostat settings. This can be adjusted later after comparing thermostat readings to the controller readings shown on the home page. Differences in temperature may be related to differences in location.

After setting, select "**Save Changes**" and then **"Go Back To Settings"** to select the next parameters.

Heat Reset



From the Settings screen select Heat Reset if applicable. This is an optional setting used by customers with a radiant heating loop. The idea is that at cold temperatures, a radiant design may not deliver enough BTU/ft^2 when the loop is operating at its normal temperature, to heat the room when heat loss is higher (very cold outside). The Psychrologix controller gives you a single-point reset control.

If you want to use it, example settings may be to increase EWT by 5F when outdoor temperature is below 25F. The outdoor temperature is read by the ambient air sensor located on the rear of the outdoor unit. **NOTE: the CX34 also includes an onboard dynamic reset control that allows the user to create a curve so that temperature is dynamically increased as outdoor temperature falls. This may be a better option than the single-point reset offered here. See https://www.chiltrix.com/dynamic-heat-reset/ If you select the onboard dynamic reset control, do not use the Psychrologix heating reset control. Before deciding, see the addendums at the end of this manual for additional "do's and don'ts" regarding limitations or conflicts when using the Psychrologix controller with certain CX34 Onboard features. To continue using the Psychrologix Reset Control:**
Touch "Go Back To Settings" when done with "Heat Reset" to continue.

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Auto Mode - Automatic Change from Heating to Cooling

This is an optional feature that can automatically change the system from cooling/heating/standby. Note, this only controls the chiller. The user must still manually select the correct mode of cooling or heating from the indoor unit (FCU etc.) individual controls or other thermostat, as applicable. You may wish to change these settings from time to time as you get used to how it works.

Example settings are: Cooling set **above 67F**, Heating **below 62F**. There must be at least 4°F of separation between the cooling and heating set points. In general, 5°F or more separation is desired for best performance.

NOTE: the CX34 also includes an onboard dynamic "mode change" feature using external relay control that allows the users to use a standard single stage heat pump thermostat (or other controller with relay outputs) to control the CX34 between heat-coo-off(standby). See the "External T-Stat Control" option in the CX34 manual. For some users, the External T-Stat Control onboard relay option may be a needed option. If you select the CX34 onboard relay control, do not use the Psychrologix Automatic Change Over Control. Before deciding, see the addendum at the end of this manual for additional "do's and don'ts" regarding limitations or conflicts when using the Psychrologix controller with certain CX34 Onboard features.

Touch "Go Back To Settings" when done with "Auto Mode" to continue.

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DRY/Vacation Mode

This mode is manually activated from the main screen when needed. Only “summer” or “winter“ can be set at a time, not both. These settings allow for a large energy savings for an un-occupied building. In summer, a setting of Max Humidity will allow humidity to be controlled without regard to temperature, and in winter, to prevent interior space freeze damage with the minimum amount of energy usage. NOTE – when using this function, the indoor fan coil equipment or air handler should be set on Manual, generally on the Low Speed Fan setting. Example settings:
Summer: Max Humidity 65%
Winter: Set default water temp 45F.

NOTE: the CX34 also includes an onboard dynamic “mode change” by external relay control that allows the user to use a standard single stage heat pump thermostat (or other controller with relay outputs) to control the CX34 between heat-coo-off(standby). See the “External T-Stat Control” option in the CX34 manual. For some users, the External T-Stat Control onboard relay option may be a good option. If you select the onboard relay control, do not use the Psychrologix DRY/Vacation mode as conflicts will occur. Before deciding, see the addendums at the end of this manual for additional “do’s and don’ts” regarding limitations or conflicts when using the Psychrologix controller with certain CX34 Onboard features.

Touch “Go Back To Settings” when done with “Dry/Vacation Mode” to continue.

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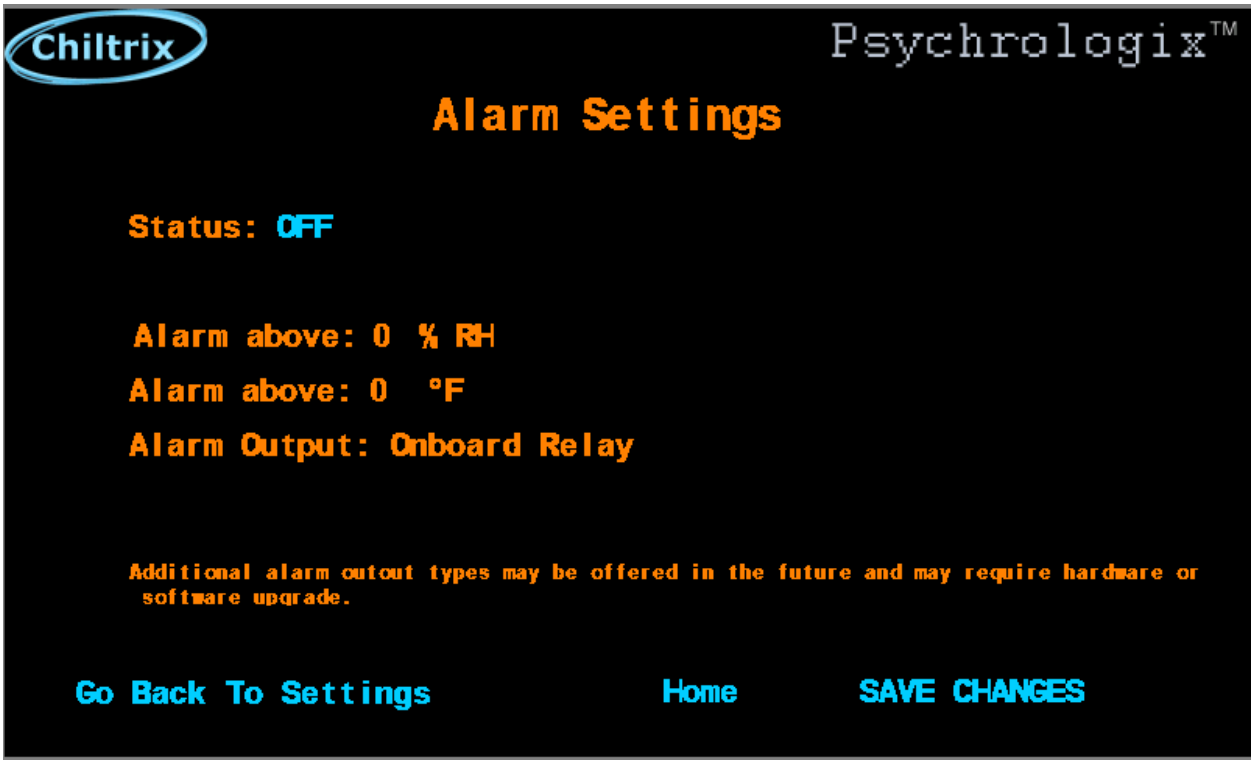
Alarm Function



If the alarm status is turned “on”, you must “SAVE CHANGES” to be able to select the relative humidity and temperature values. You can connect a siren, bell, or other device to the system to notify you when a maximum allowable condition has been exceeded. See page 19 for wiring details. Recommended alarm points would be to set T about 5F above the temperature setting you are targeting with your thermostat (or DHC) and set %RH at 65% (or Max H +2-3% of the DHC function) whichever is greater.

Touch “Go Back To Settings” when done with “Alarm Settings” to continue.

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DHW (Domestic Hot Water)

Note, DHW must first be enabled in the chiller by the installer. If enabled, change the status to ON and set the tank temperature, typically around 115F (Max 120F).

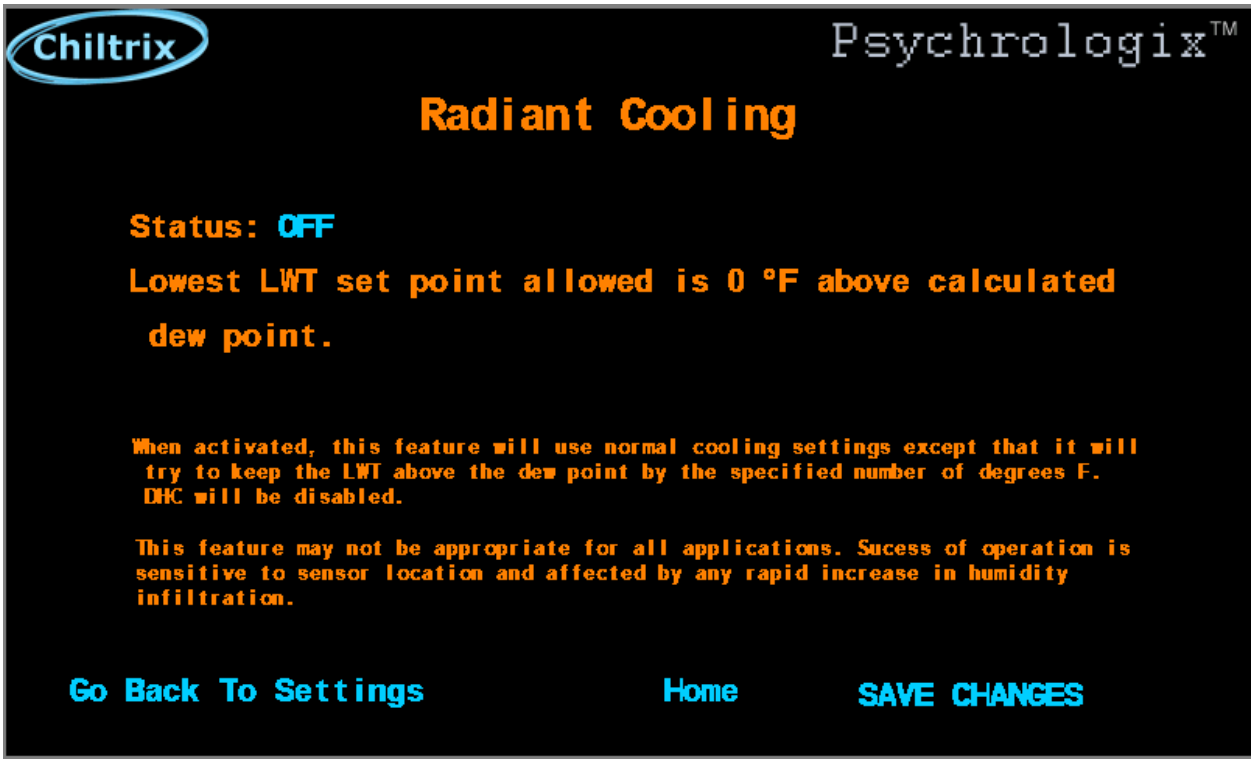
Notes:

DHW must be enabled on the primary chiller if multiple chillers are used.

The DHW function requires a heat exchanger tank and a Chiltrix DHW valve.

Touch “Go Back To Settings” when done with “DHW Settings” to continue.

Radiant Cooling (BETA)

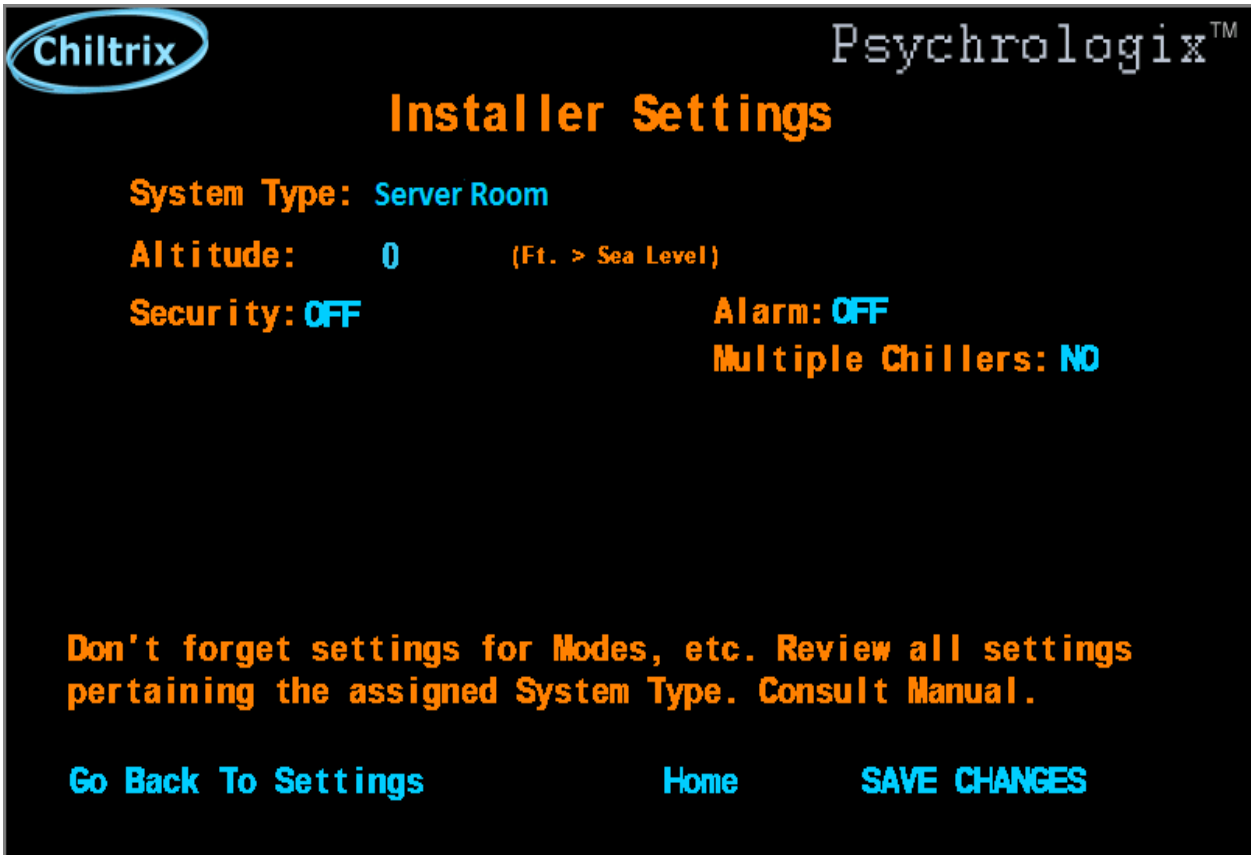


If you wish to provide radiant cooling, it must not produce condensation (does not de-humidify) you may be interested in this feature. Condensation can produce water in places where you do not want it, radiant cooling therefore requires that the loop temperature be above the dew point. The design is intended to keep the cooling loop as cool as possible while remaining above the dew point as a priority. Buffer tank(s), system size, and associated thermal lag, will affect how well this works.

This feature does not replace the use of a traditional dew point control system for radiant cooling, rather it enhances it as a way to limit the operation of the normal dew point control, which produces a higher level of efficiency (EER) by keeping the CX34 outlet temperature (and buffer tank) targeted just above the dew point. You will continue to use the normal radiant cooling dew point control that you already have, such as Tekmar model 557 (with dew point sensor and mixing valve) or other such radiant cooling controller.

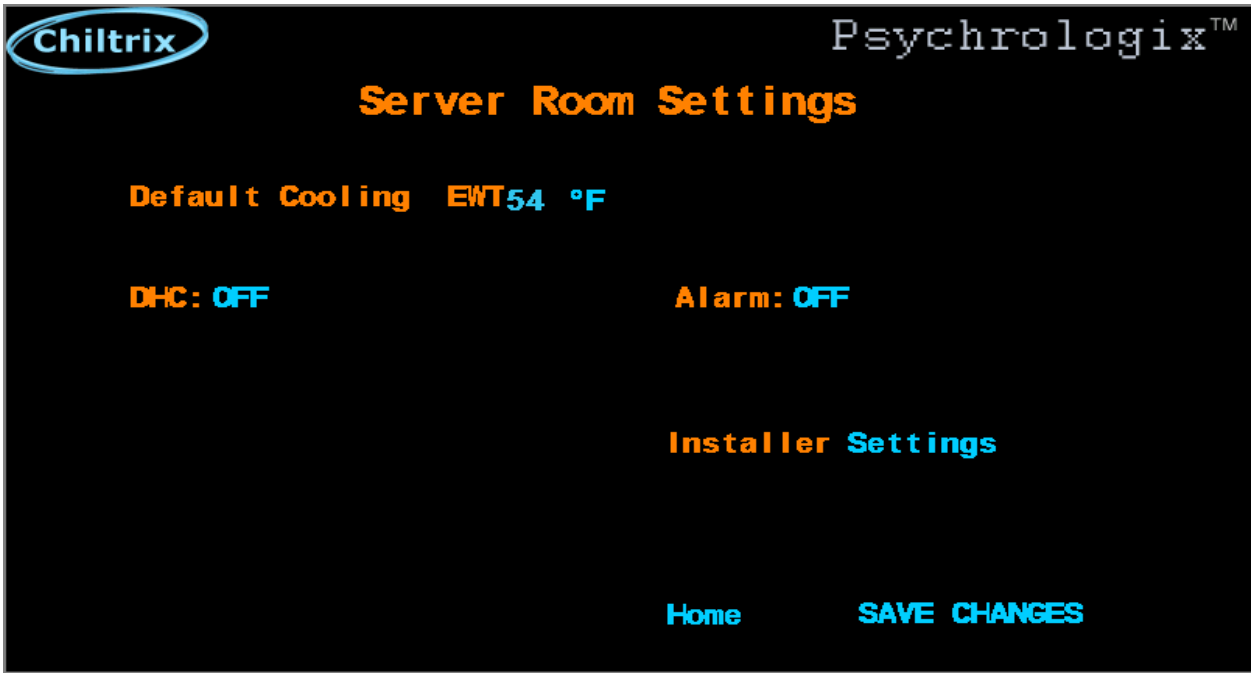
Touch “Go Back To Settings” when done with “Radiant Cooling” to continue.

Server Room Settings



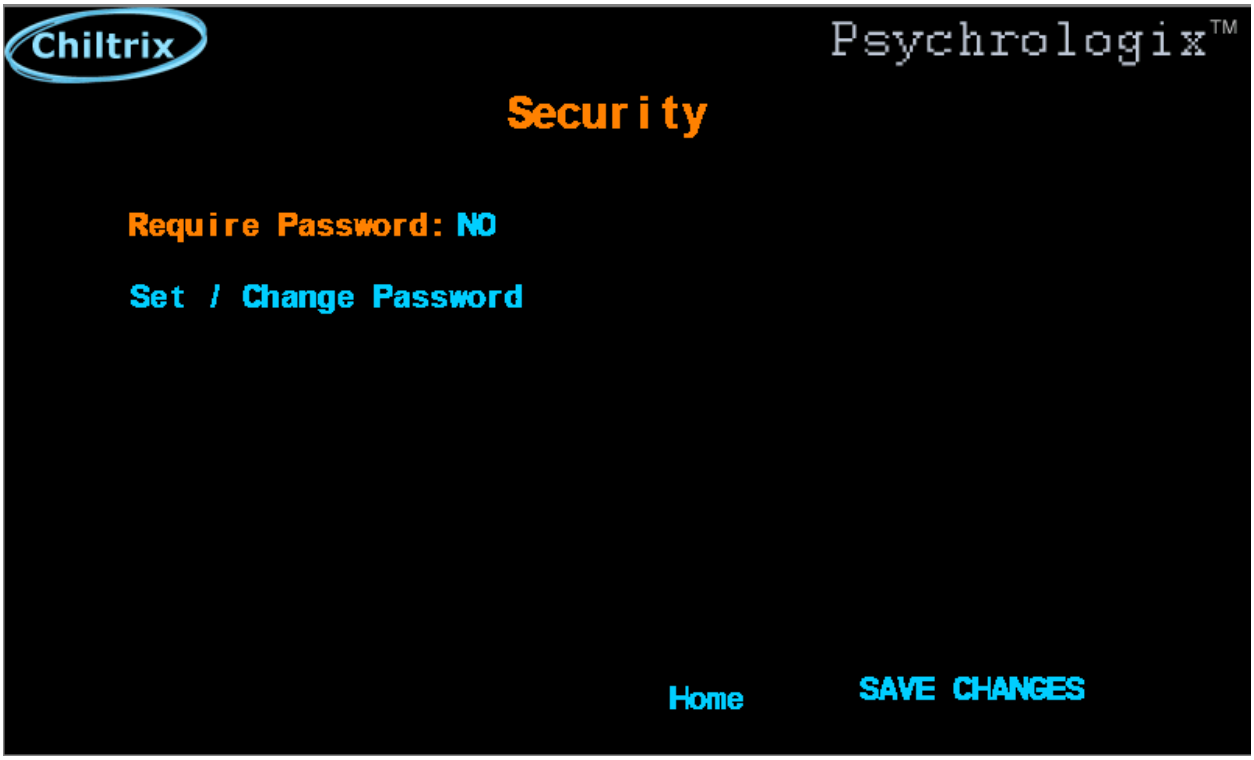
Change system type to “Server Room” and touch “SAVE CHANGES” , then “Go Back To Settings to get to the settings screen.

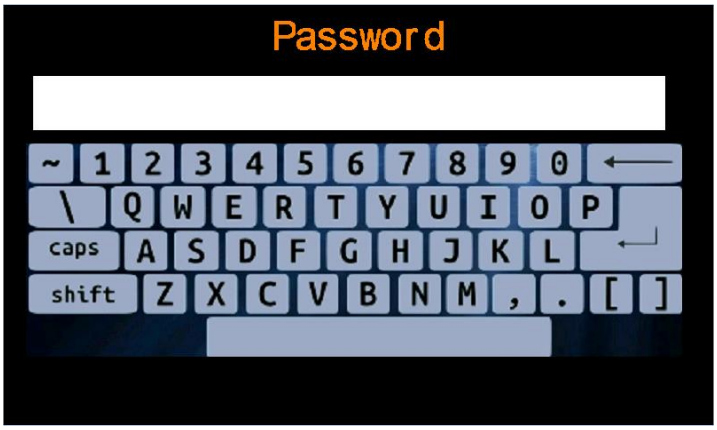
Server Room Settings Screen



If you are using Chiltrix for a server room this would have been selected as the system type on the installer screen. For a server room we suggest to set the default cooling to 44F and turn DHC ON. Make sure to configure the DHC settings. DHC settings should comply with ASHRAE A-1 recommended guidelines for data processing equipment with maximum humidity set at 60% and maximum temperature set at 80F. Make sure your fan coil units are set for the same temperature as the DHC temperature settings. To continue, touch “Installer Settings”.

Security

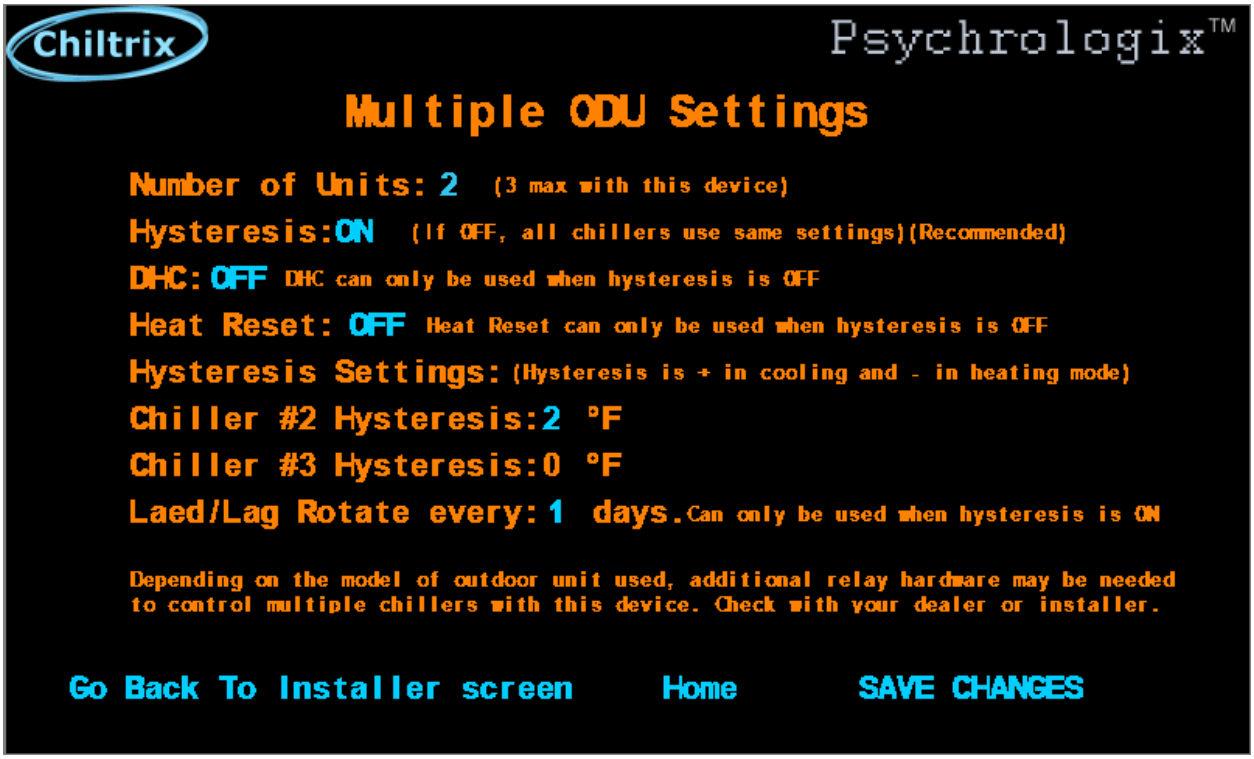




If you wish to enable Security, first set a password. Once enabled, a password will then be required before any settings changes can be mode. However, changing modes from the main screen will not require a password. After entering the password, you can navigate within or between any of the setting screens, however, any return to the Main screen will require the password to be entered before continuing.

Touch “Go Back To Settings” when done with “Security” to continue.

Multiple Chillers (Max 3 chillers)



Note, Hysteresis and Psychrologix Heat Reset must be OFF in order to use DHC. **Further, this feature is not compatible with either the Chiltrix onboard external relay control option, or the onboard Dynamic Outdoor Reset function. See addendums regarding external controls.**

In any case, it is recommended to set Hysteresis to OFF for maximum efficiency. When Hysteresis is enabled, this creates a staging effect where one or more chillers may be OFF unless needed to meet capacity demands. It should be noted, that running two chillers at 50% capacity can be more efficient than running one chiller at full capacity so it is recommended that most users not use the hysteresis function. If using Hysteresis, you can set the lead-lag to one or two days to help balance the running hours of the chillers.

Multiple CX30 units using Psychrologix™ will require a MODBUS proxy installed in second chiller, and any additional chillers. If you are using multiple chillers with the Psychrologix™ controller please see the additional instructions for the MODBUS Proxy connection. CX34 chillers are MODBUS addressable and do not require a MODBUS proxy.

Touch “Go Back To Settings” when done with “Multiple Chillers” to continue.

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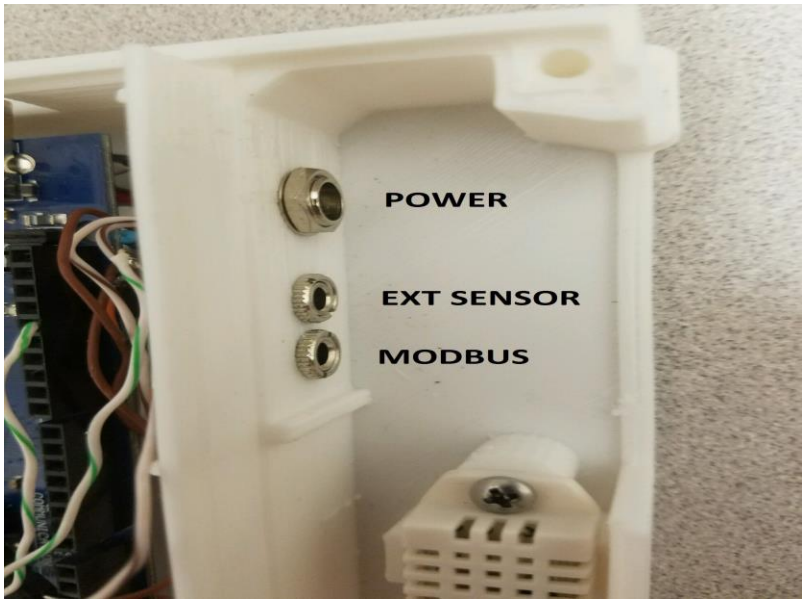
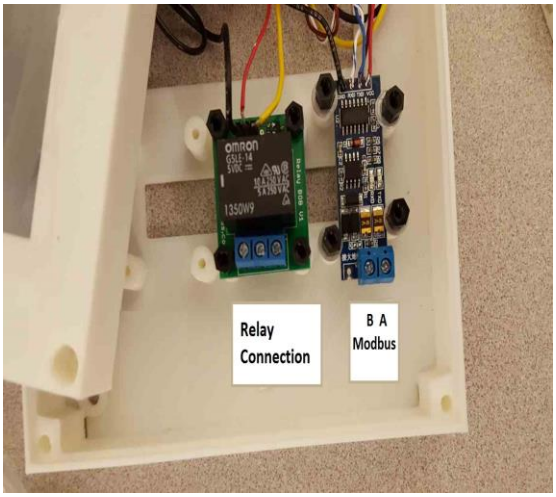
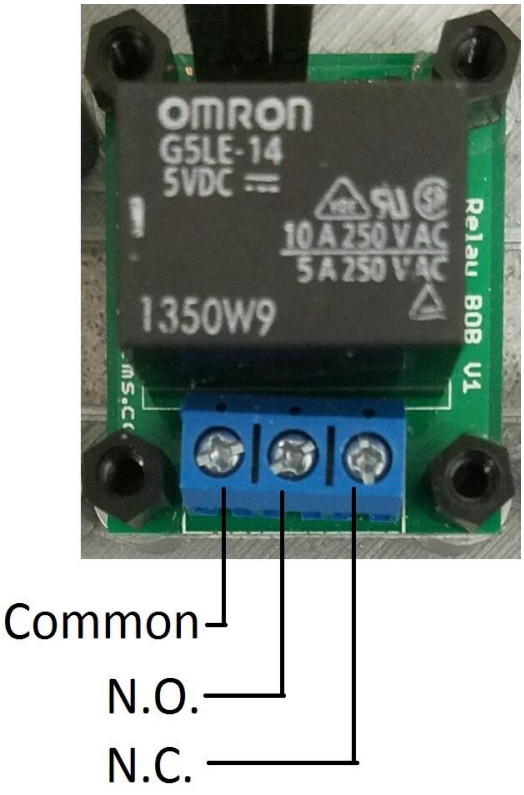
Wiring Diagram for Single Chiller using a Psychrologix™ Controller



Power and Modbus connection (1/4” jack)





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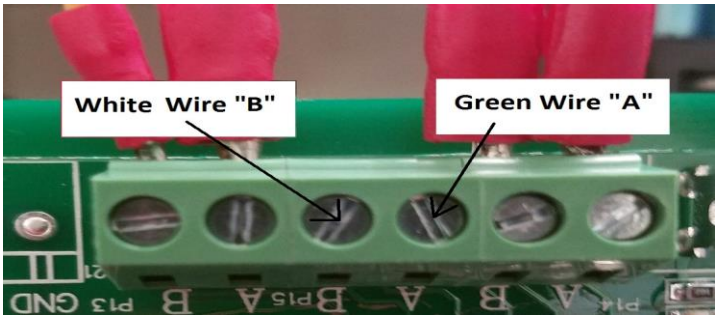
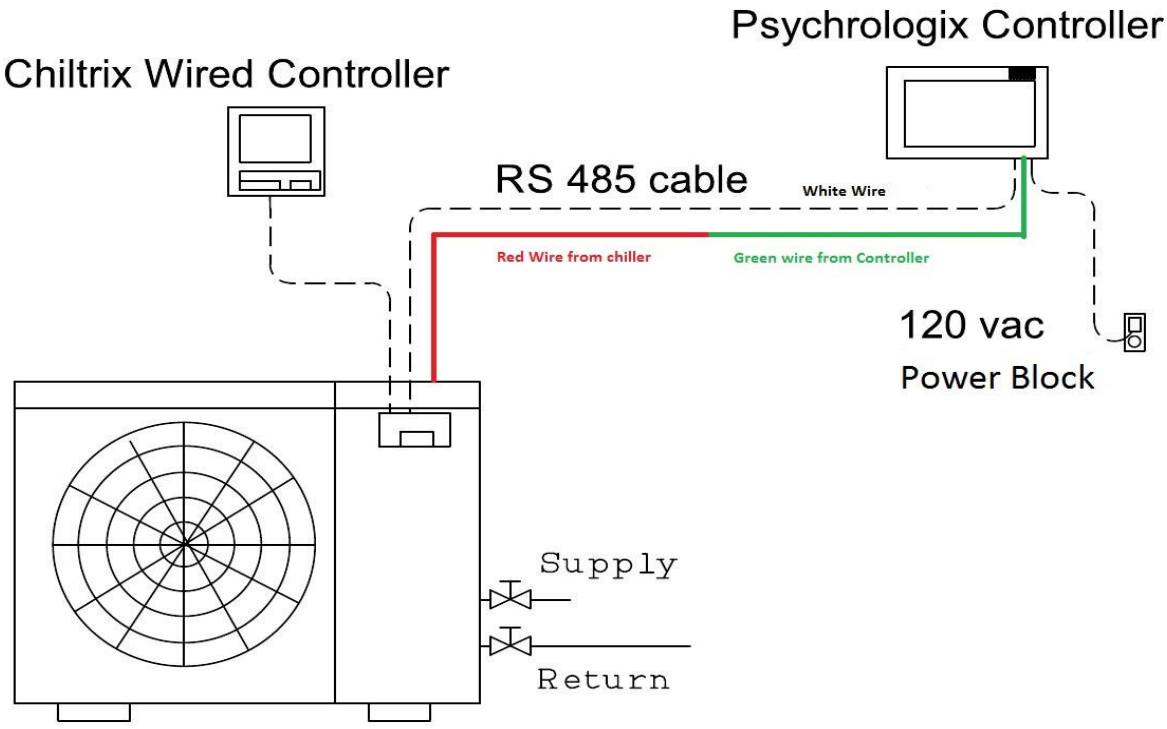
Connections for alarm relay and direct Modbus from back of panel.

Twisted pair wire is connected to a provided ¼' jack plug, (green is "A", white is ""B).

The opposite end is connected to the cable provided in the CX-30 unit marked "RS-484" Red = A, white = B.

Newer CX34 chillers do not have a white and red cable, instead you must extend the green and white cable from the Psychrologix controller to the CX34 main logic board. The Modbus connector is in the left upper corner of the main logic board as shown below.





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ADDENDUM

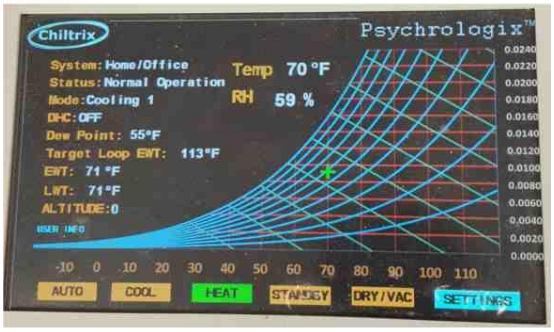
SUPPLEMENT FOR USERS OF CX34 ONBOARD EXTERNAL RELAY CONTROLS

The Chiltrix CX-34-2 Installation and Operation Manual describes the function of an external “T-Stat Control”. The use of this external T-Stat function slightly alters the operation of a Psychrologix Controller in the control loop of the CX-34 system.

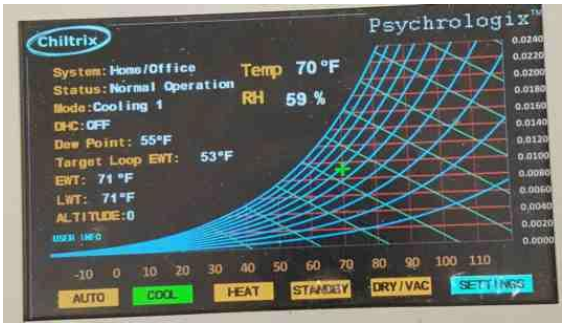
Changes to Psychrologix controller function with Relay T-Stat use:

1. Mode buttons do not function as expected

Since the Relay T-stat now controls the mode (cooling/heating etc.) the mode buttons on the main page of the Psychrologix Controller are overwritten. If the Heat Mode Button is pressed and the T-Stat Relay is asking for Cooling, then the Psychrologix Controller will correctly display Cooling for its Mode, but will display the Heating Target Loop EWT and the Heat button will be green indicating activation. If this is found to be an annoyance, then pressing the Mode button that matches displayed Mode will correct this.



Mode button and Mode display not matching



Press Cool to match Mode corrects display

SUPPLEMENT CONTINUED NEXT PAGE

SUPPLEMENT FOR USER OF ONBOARD EXTERNAL RELAY CONTROL, CONTINUED

2. Standby Button still controls the CX-34 unit

Pressing the Standby Mode Button shuts down the system, as before. Shut down will occur regardless of T-Stat function, in fact, the Psychrologix Controller **must** be in some other Mode besides Standby, for the T-stat to function.

3. All Temperature and Humidity Functions Operate Normally

Dynamic Humidity Control (DHC) and most other functions effectively manipulate the Loop Target Temperature and are not affected by Mode Changes made by the T-Stat Control.

4. The Psychrologix Controller should not be used in "Automatic" Mode

The Automatic Mode is used to control the Selection to Heating or Cooling based on Ambient Air Temperature as sensed by the CX-34's own Temperature Thermistors. It can also be used with an external T-Stat box controller not associated to this External Relay T-stat control. Avoid use of this function when using the External Relay T-Stat function.

5. The Psychrologix Controller should not be used in "Dry/Vacation" Mode

The Dry/Vac Mode is used to control the Selection of Heating or Cooling based its Winter or Summer temperature or humidity settings. It's possible that this mode could be set to summer, while the External Relay T-stat control is calling for Heating. If, under these conditions the Humidity reaches the Summer set point it would likely shut the system down into Modbus standby, over riding the External Relay T-Stat function and the unit would stop.

6. Issues with Psychrologix Controller while External Relay T-Stat is in "Special Standby Mode"

When some Heat Pump Room Thermostats are between temperature set points, they may direct the External Relay-controlled CX34 to go into a special Standby Mode. While in this mode, both the Psychrologix Controller and the Wired Controller will Display what appears to be normal operations, however, while in this mode, the CX-34 will have the fan and compressor, and sometimes the pump, shut down.

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ADDENDUM 2

SUPPLEMENT FOR USERS OF PSYCHROLOGIX CONTROLLER WITH ONBOARD DYNAMIC HEAT RESET CONTROL

Onboard Dynamic Heat Reset control changes the loop temperature during heating mode to conform to a curve that the user develops which adjusts target temperature according to outdoor ambient conditions. As the outside temperature declines, the target loop temperature increases. This behavior over-rides any changes that the Psychrologix controller may try to make during heating mode. This would affect the following functions:

1. **The Default Heating Target temperature**
    a. Default Heating temperature as set on the Psychrologix Controllers Main Settings page will be ignored during operation of this function.
2. **The Automatic Changeover Function**
    a. This function will operate as normal with the exception that the default Heating Target Temperature set on the Setting page will be ignored and replaced by the Heating Target Temperature generated by the dynamically calculated curve.
    b. Since the Reset control pertains only to heating, Cooling functions remain un-effected.
3. **Dry/Vacation mode**
    a. The Onboard Dynamic Heat Reset function will ignore the “Winter” loop temperature setting during this function, rendering this mode inoperative. It is recommended to not use vacation mode for heating is using the Onboard Dynamic Reset function
4. **Psychrologix’s Single-Point Reset Mode**
    a. The calculated corrections this mode will make to the Heating Target Loop Temperature will be ignored while Onboard Dynamic Heat Reset is activated. It is recommended to disable this function if using the Onboard Dynamic Heat Reset function.
5. **Multiple CX34**
    a. Do not turn on Hysteresis, must be off when using Onboard Dynamic Outdoor Reset.