Temperature Humidity Controller

Specifications

Primary Power, RJ-45 Jack	24Vdc
Backup Power, R/C terminals	24Vac
Max Cable Distance	100ft
Temperature Range	-20 - 60°C
Temperature Accuracy	±1°C typical ±1.8°C maximum
Humidity Range	0 - 100% RH (non condensing) 80% RH Max Operating
Humidity Accuracy	±2% 0-80% typical ±4% maximum
Output Channels	6 Relays (G,Y1,Y2,W1,W2,HUM)
Contact Rating	24Vac/Vdc 1A
Heating Stages	2
Cooling Stages	2
Humidity Stages	1/2
Reheat Support	Standard or Electric
Protocols Supported	GrowNET™

Contents

KEEP THESE INSTRUCTIONS

This product is intended for commercial use only.

REV 02/26

Features

THC series Temperature and Humidity Controllers are designed for intelligent control of standard dry-contact operated HVAC systems plus dehumidifiers in growing environments. Featuring advanced reheat and external humdity control options that are unique to indoor agriculture. Operate heating, cooling, reversing valves, reheat dehumidification and standard humidity equipment using 24VAC control.

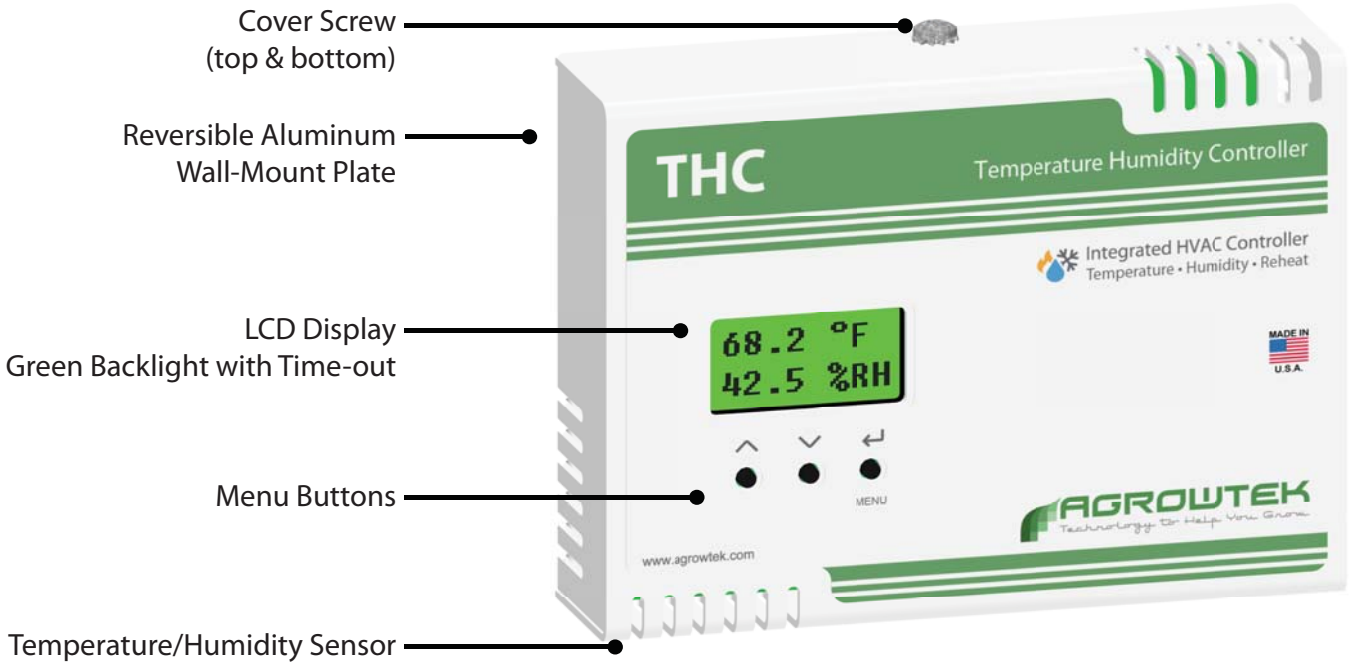
Integration with GrowControl GCX Systems

Connects to GrowControl™ GCX Cultivation Control Systems for operation from a central controller.

- Monitor, log and grapth the THC's temperature and humidity data.
- Operate from a external canopy sensors instead of the internal sensor.
- Schedule changes to the set points.

Backup power and Stand-Alone Operation

The THC controller can operate off of the HVAC system's 24VAC power source to continue operating in the event that the main control system becomes disconnected or looses power. The integrated temperature/humidity sensor, on board clock and internally stored set points allow the unit to seamlessly continue operating and controlling the environment.



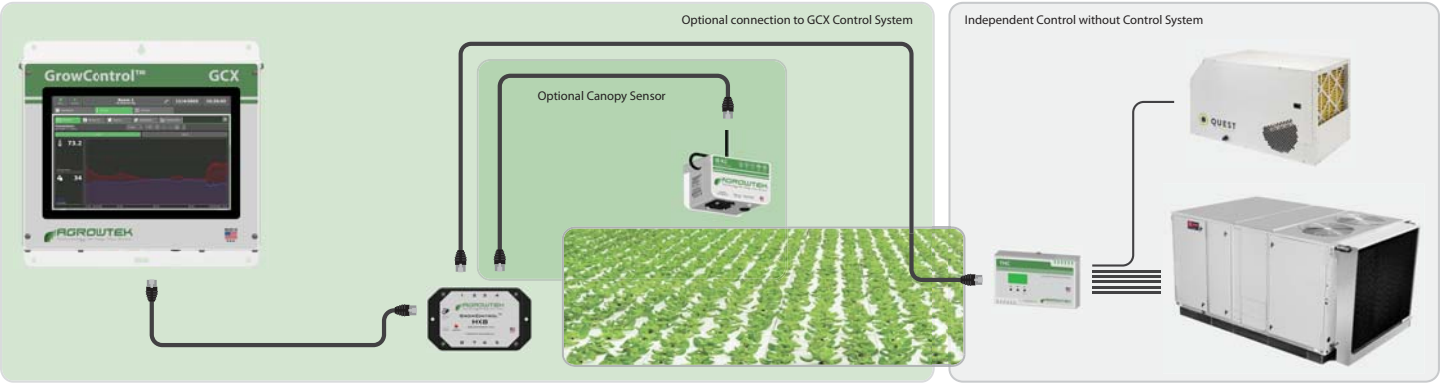
Simple Operation, Powerful Control

LCD display shows local temperature and humidity, output status, time/date and more. Settings are configured quickly and easily via the button driven menus or from the master GrowControl™ GCX controller.

Easy installation with reversible mounting plate for junction box installation or flush wall mounting and bottom cable entry where a junction box is not available. Standard terminal block wiring connections.

GCX System Integration

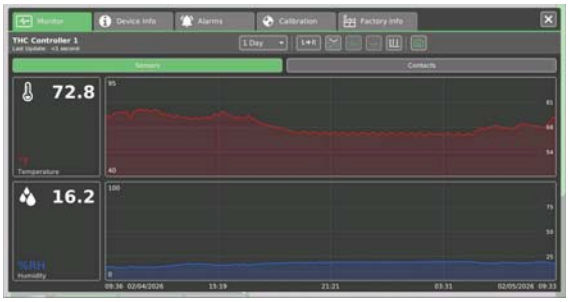
The THC can operate stand-alone like a traditional thermostat or it can be integrated with a GrowControl™ GCX facility control system.



Central Monitoring

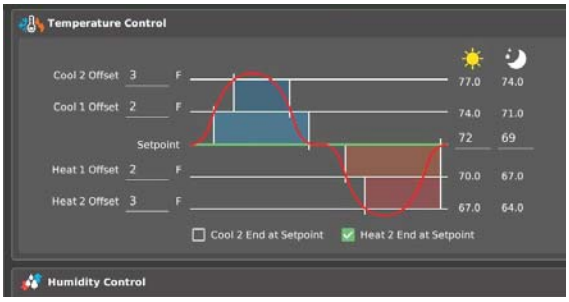
When connected to a GCX, the THC controller will report back the current sensor readings and status of each contact for data logging and real time monitoring in room dashboard.

Contacts can also be manually forced on or off for maintenance from the GCX interface.



Scheduled Set Point Changes

The GCX controller can send updated set points and sun-rise/ sun-set times on any schedule to automate changes in the room environment set points. Easily manage the set points for each room or zone from the GCX system.



Control from Canopy Sensors

Send sensor data to the THC from canopy sensors in the room for a more accurate control of the environment. If the canopy sensors become unavailable or connection to the GCX is lost, the THC reverts to the internal sensor for control.

Warnings & Notices

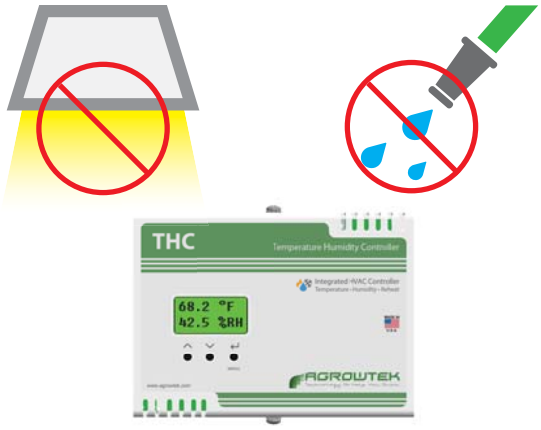
THC controllers are precision electronic instruments which require attention and care to maintain their accuracy and reliability. Failure to operate the sensors properly can cause damange and equipment failure.

⚠ **Do not drill additional holes into the enclosure.**

⚠ **Always cover sensor openings when spraying chemicals or fogging.**

⚠ **Do not spray the sensor with water or chemicals. Protect sensor from direct water exposure.**

⚠ **Do not locate the sensor near HVAC vents, humidifiers, or dehumidifiers, lighting equipment, etc.**



⚠ NOTICE

GrowNET™ ports use standard RJ-45 connections but are NOT compatible the Ethernet network equipment. *Do not connect GrowNET™ ports to Ethernet ports or network switch gear or equipment damage may result.*

⚠ DIELECTRIC GREASE

Dielectric grease is recommended on RJ-45 GrowNET™ connections when used in humid environments. Place a small amount of grease onto the RJ-45 plug contacts before inserting into the GrowNET™ port.

- Loctite LB 8423
- Dupont Molykote 4/5
- CRC 05105 Di-Electric Grease
- Super Lube 91016 Silicone Dielectric Grease
- Other Silicone or Lithium based insulating grease

Installation Instructions

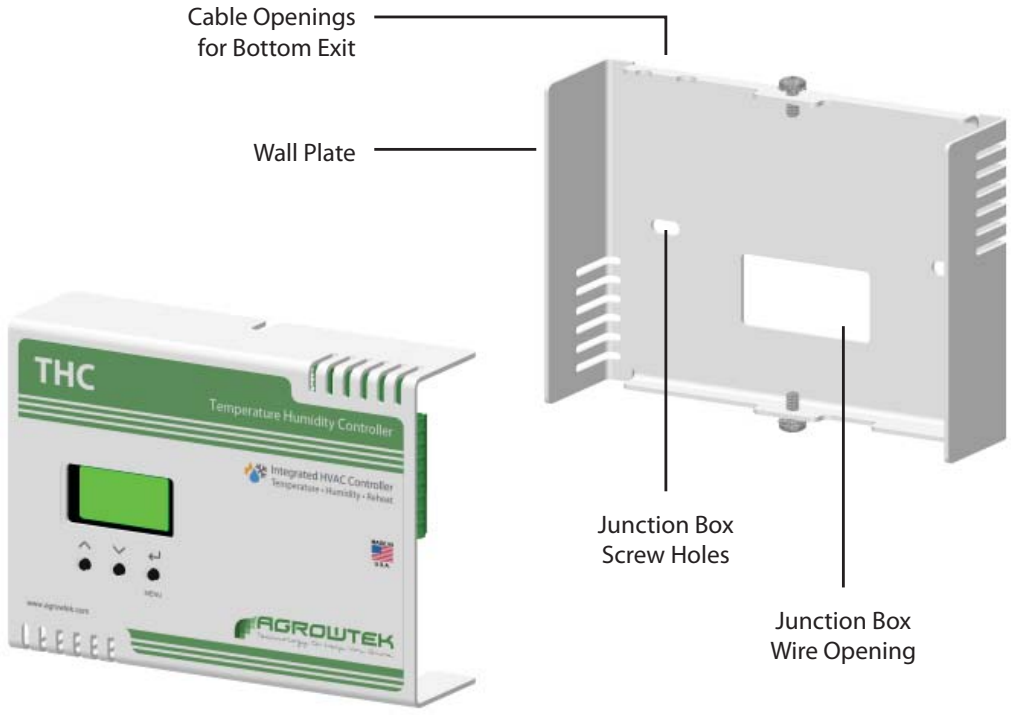
Location Requirements:

- Location must be accessible; ensure unit will not be blocked by other equipment or fixtures.
- The sensor must be located in sufficient air flow for accuracy; do not locate in corners or obstructions.
- Mount away from influences such as ventilation ducts, doorways, windows, lights or hot equipment.
- Mount in a dry location away from mists, sprays, drips, condensation, and rain.
- Mount at operator level, approximately 52-60in. from the floor.

Mount the Wall Plate

The wall plate has a reversible design for mounting to a standard junction box, or to any flat wall surface with cable entry via the bottom of the enclosure.

To install the wall plate for use with bottom cable entry, ensure the two half-circle cut-outs are facing the down position. Otherwise, install the wall plate with the cut-outs in the up position to block the openings.



⚠ NOTICE
Do not over-tighten the cover screws or junction box screws to avoid bending the aluminum enclosure.

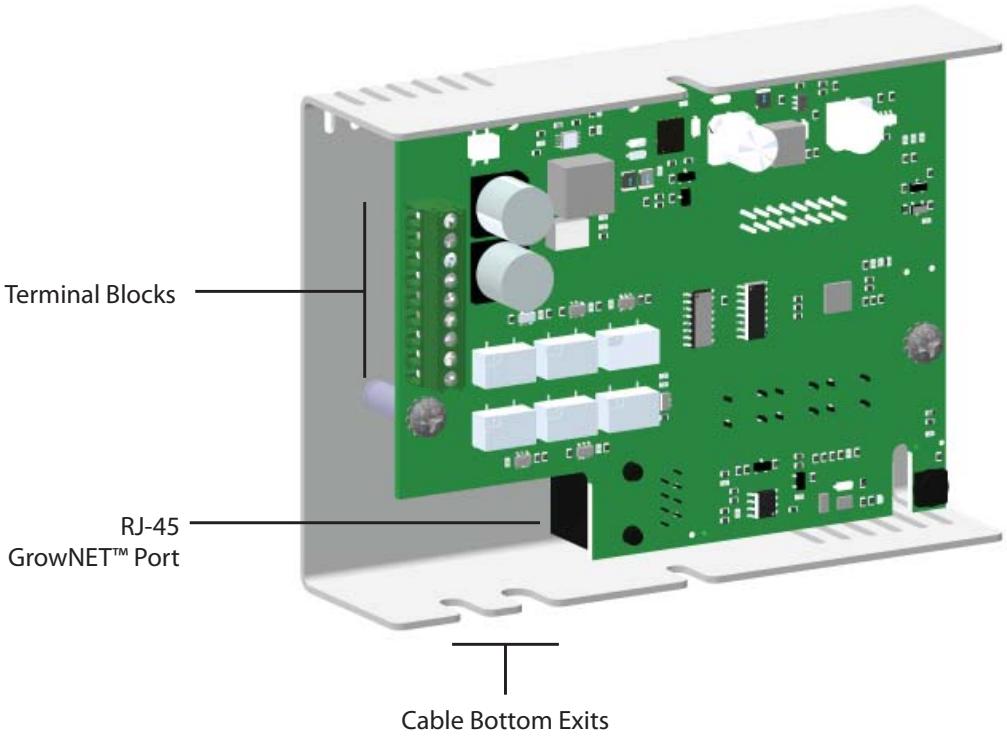
Prepare Connections

Connections consist of low-voltage control signals for HVAC and dehumidifiers, and a RJ-45 cable for connection to a GrowControl™ GCX Cultivation Control System.

GrowNET™ Connection (RJ-45/CAT5)
Connection to a master controller is optional, but provides advanced control features described in the features section. Connection is made with a standard RJ-45 type connection and CAT5 or better cable. Standard Ethernet cables can be purchased from retailers if you prefer not to crimp custom cables.

HVAC System Connections (4, 5, 6 or 7-Wire)
HVAC connections include 24VAC (R), Common (C) and additional signals. The HVAC system provides backup power to the unit in the event that the GrowNET™ cable is not connected. See the example connections in the example wiring diagrams to determine thermostat cable wiring requirements.

Humidity Output Connection (2-Wire)
The humidity output is a single dry-contact that can be programmed to operate a humidifier or a dehumidifier. See connection examples in the example wiring diagrams; use two-conductor thermostat cable.



Cable Routing
Low-voltage and GrowNET™ cables can be routed through conduit using a standard junction box mounting or through the bottom openings if no junction box is used (see wall plate mounting instructions.)

⚠ NOTICE
Ensure cables are routed on the terminal block side of the enclosure and do not damage or short into any components on the PCB.

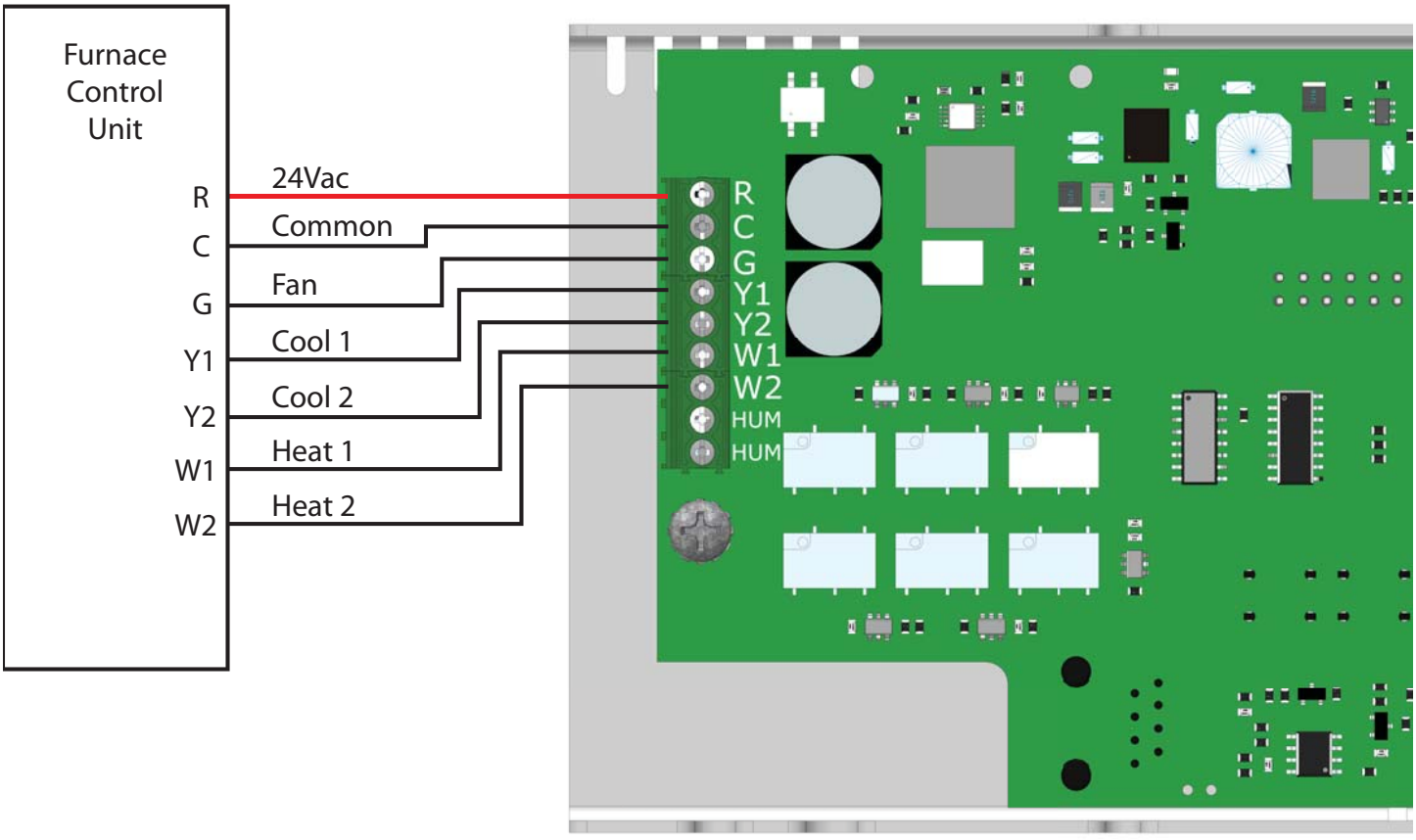
HVAC Wiring

Standard HVAC systems provide 24VAC power from the system's transformer which acts as a backup power source when connected to a GCX system, or as a primary power source when used stand-alone. The 24VAC is also switched by onboard relays (contacts) to the HVAC system's demand signals in order to operate the unit.

Conductors required according to HVAC system stages:

System Type	Signals	Conductors
Single Stage AC Only	R, C, G, Y1	4
Single Stage AC, Single Stage Heat	R, C, G, Y1, W1	5
Dual Stage AC, Single Stage Heat	R, C, G, Y1, Y2, W1	6
Dual Stage AC, Dual Stage Heat	R, C, G, Y1, Y2, W1, W2	7

Connect the HVAC system signals according to the labeling on the PCB and the diagram below.

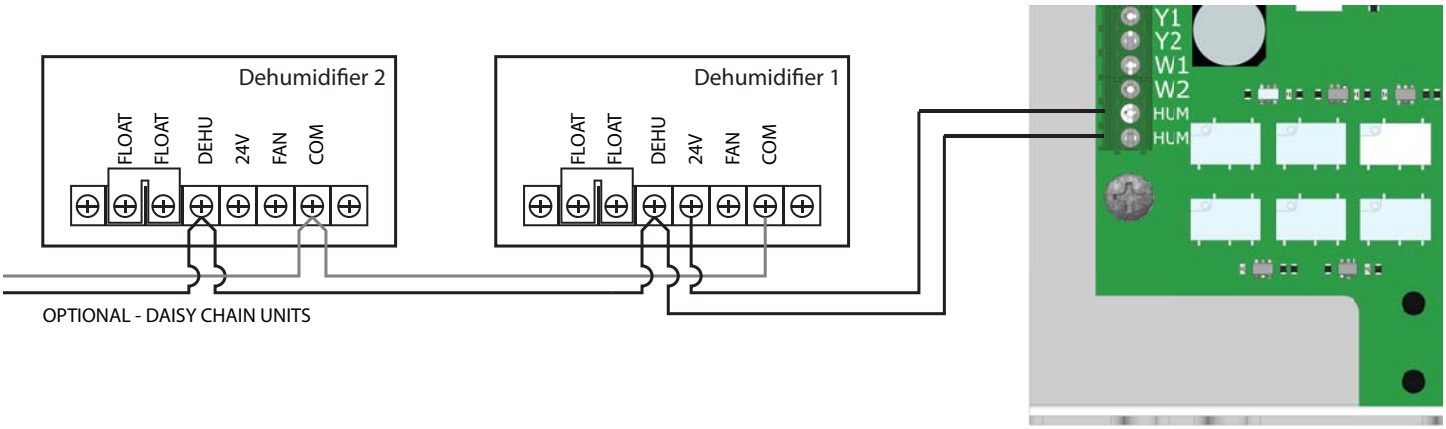


Humidifier/Dehumidifier Wiring

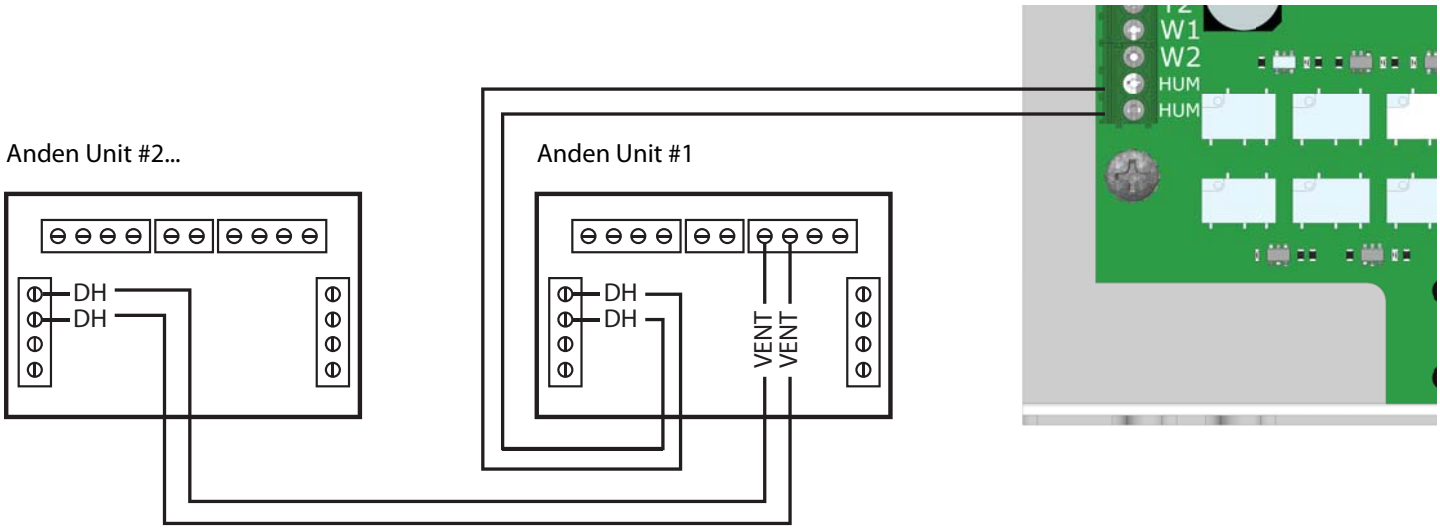
The THC controller is capable of operating either a humidifier or dehumidifier from the dry-contact output. The humidifier or dehumidifier must be compatible with low-voltage control.

Standard dehumidifiers manufactured by common brands such as Quest and Anden typically have a low-voltage external control connection for 24VAC control signals similar to an HVAC system. Units can be daisy-chained from unit to unit according to the manufacturer's instructions.

Quest Models



Anden Models



Anden Setup Procedure for External Control

1. Press any button to activate the display and ensure the unit is set to "OFF."
2. Hold the "MODE" button for three (3) seconds to ther the installer setup menu.
3. "Remote" will be displayed on the screen.
4. Press the "MODE" button until "External Disabled" is shown on the screen.
5. Press "Up" or "Down" to set the display to "External Enabled."
6. Press "MODE" until "Done" is shown on the screen.
7. Press the "ON" button; "External" should be shown on the screen.

How it Works

The THC controller can operate multi-stage heating and cooling equipment as well as humidification and dehumidification equipment. The THC must be properly configured to match the system that is connected. The THC can be configured to operate default conventional HVAC systems, heat pump systems, reheat options and more.

NOTE

Depending on how the THC is configured in the Config Menu, certain menus or menu items may or may not be available to the user. Only the relevant menu items will be displayed.

Set Points

Day & Night Set Points

The THC unit features internal set points for temperature and humidity with independent values for day and night. The day and night periods are configured in the Time menu; see sun-rise and sun-set times. These set points and times can be automatically updated based on a grow schedule when connected to a GrowControl™ GCX control system.

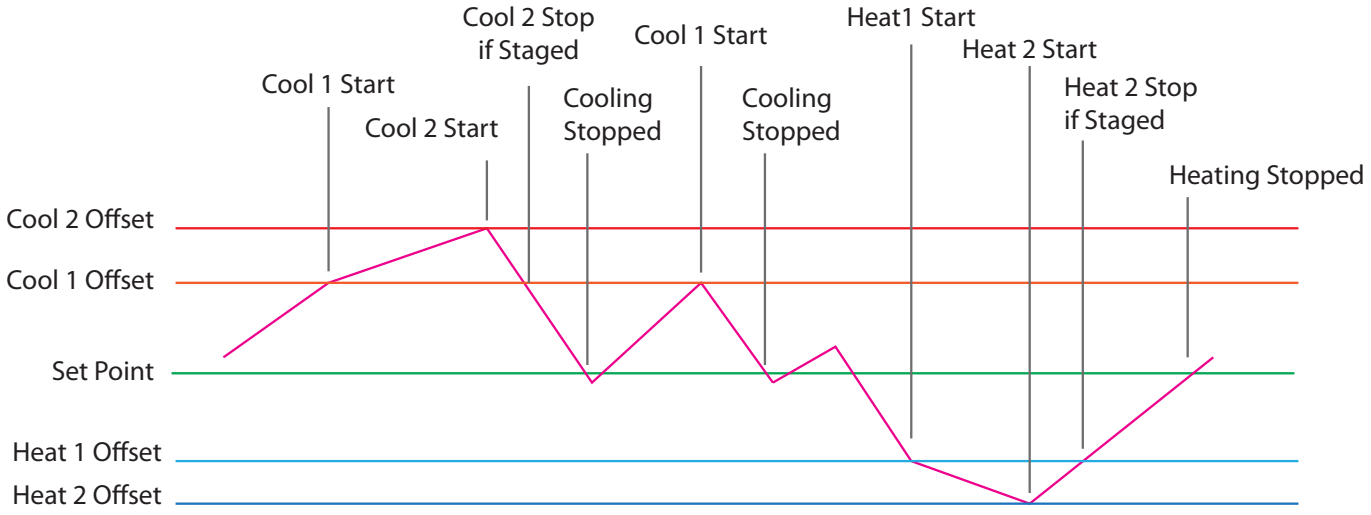
Set Point Offsets

Offsets determine when the heating and cooling (or humidification and dehumidification) stages begin and end relative to the set point.

End Mode

Determines if the second stage of heating, cooling or dehumidification ends at the set point (on target,) or at the offset (staged.)

Mode	Description
Staged	Stage 2 turns off at the stage 1 offset.
On Target	Stage 2 turns off at the target set point.



HVAC Control

The THC is designed to install and operate like a standard dry-contact wall thermostat and can handle various types of systems including gas or electric forced air, boilers, and heat pumps (see Config Menu.)

The THC supports up to two stages of heating and two stages of cooling with fan control.

NOTE
When configured for reheat control, stage 1 or stage 2 heating contact is used; see reheat section.

Humidity Control

The THC has a dedicated humidity control output contact which can be configured for either humidification or de-humidification (default.) The humidity contact is typically used to operate dehumidifiers in a growing space in coordination with standard HVAC equipment.

In addition to the humidity contact, the controller can also operate a reheat contact in order to dehumidify the space. See the reheat section for additional detail.

NOTE
Two stages of dehumidification are available when reheat is enabled and the humidity contact is configured for dehumidification.

Reheat Dehumidification

Two types of Reheat dehumidification systems are supported by the THC; standard and economy.

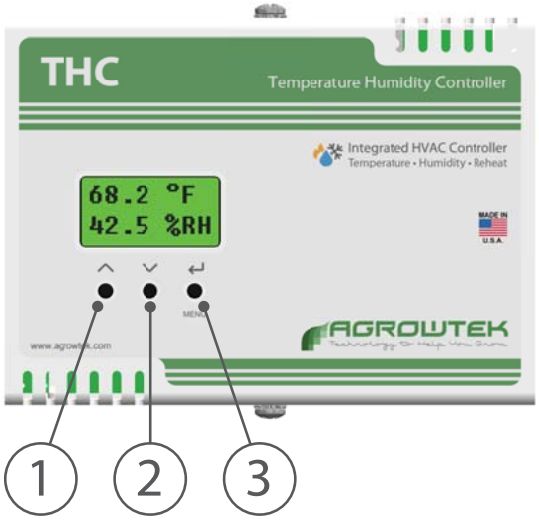
Standard Reheat
Uses output W2 (heat 2) to activate a reheat stage, and the output Y1 (compressor 1) to activate the compressor when dehumidification is required. Reheat turns off if cooling or heating is demanded due to the temperature in the space.

Economy Reheat
Uses output W1 (heat 1) to activate a heat stage, and the output Y1 (compressor 1) to activate the compressor when dehumidification is required. Reheat turns off if cooling or heating is demanded due to the temperature in the space.

NOTE
When two stages of dehumidification are present (humidity contact is a dehumidifier,) the reheat contact is operated as stage 1 and the humidity contact is operated as stage 2 (supplemental dehumidification.)

Operation Instructions

The main screen displays the real-time sensor readings from the internal sensors as well as other information including output status, connection status, date, time and more. Three buttons are located beneath the screen. Each button is labeled to describe it's function; up, down or enter/select.



1. Up Button	Use to scroll up in menus or increment values.
2. Down Button	Use to scroll down in menus or decrement values.
3. Enter Button	Use to enter a menu or confirm an entry.

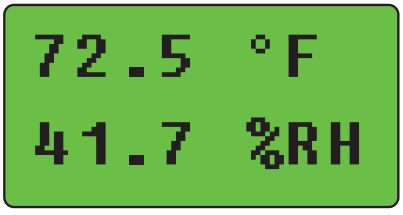
NOTE
Pressing the up/down arrows from the home screen will toggle through the status displays.

NOTE
Pressing the Enter button from the home sensor display will open the main menu.

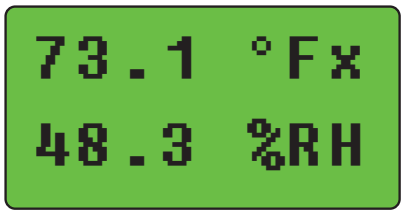
Sensor Display (Home)

The sensor display is the default (home) screen on power-up and when exiting menus.

The sensor display shows the current temperature and humidity reading that the unit is using to control the connected equipment.

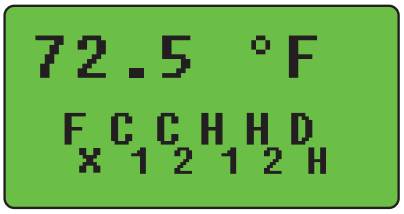


NOTE
The 'x' symbol will be displayed after the temperature units when the THC is connected to a GCX system and external sensor data is being sent to the THC. The 'x' symbol indicates the temperature and humidity on display are from the external sensor. Use the up/down arrows to access the status displays to view the internal sensor readings.



Status Displays

The status displays are accessed using the up or down buttons from the home sensor display. The buttons will increment through various information displays at the top of the screen. The bottom area of the screen displays the active output contacts.



Temperature

Provides the current temperature value from the internal sensor.

Humidity

Provides the current humidity value from the internal sensor.

Time of Day

Provides the current time of day from the internal real-time clock.

Day/Night Status

Indicates whether the controller is using the day or night set points.

Online Status

Indicates whether the THC is online or offline.

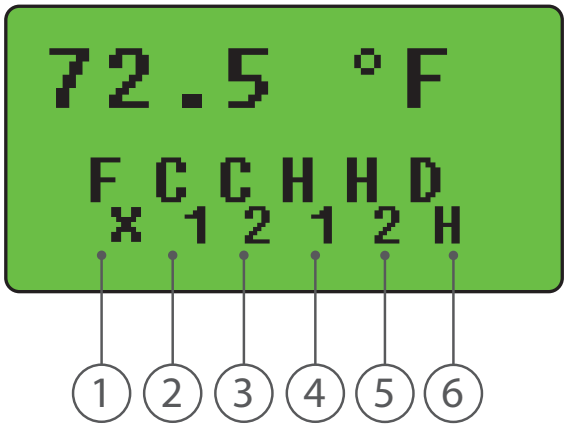
Status	Description
Online	Communicating with GCX main controller.
Offline	Operating from internal settings and onboard sensor.

NOTE
The screen will return to the home display once the user has scrolled through all of the information displays.

Output Status

The bottom area of the status display screen indicates the active output contacts.

If the symbol for the contact is shown, the contact is activated (closed.)



Item	Symbol	Contact	Description
1	Fx	G	Fan
2	C1	Y1	Cooling Stage 1
3	C2	Y2	Cooling Stage 2
4	H1	W1	Heating Stage 1
5	H2	W2	Heating Stage 2
6	DH / HU	HUM	Dehumidifiy / Humidify

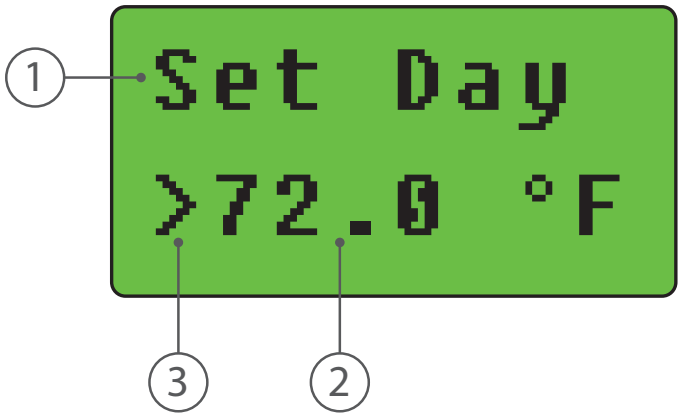
NOTE

If the 'infinity' symbol (∞) is shown next to Fx, the Fan contact is in forced (on) mode and will not turn off until the Fan mode is returned to AUTO mode.

Edit Values

To edit a value in a menu:

1. Navigate to the menu item you want to edit and press the Enter button.
2. A carrot symbol (>) will appear before the value to indicate the value is ready to edit.
3. Use the up/down buttons to modify the value. (Hold the button down to change the value rapidly.)
4. Press the Enter button to confirm the new value.
5. The carrot symbol will disappear to indicate that editing is completed.



Item	Description
1	Name of the value or menu item.
2	The menu item value or mode.
3	Carrot symbol, indicates editing mode.

Main Menu

The main menu is accessed from any home screen display by pressing the Enter button.

The first menu displayed is the Mode menu; press up/down to scroll through the menus then press the Enter button to open the selected menu.

Mode

The mode menu sets the system mode: Auto, Heat, Cool, Off.

Mode	Description
Auto	Operate heating and cooling stages automatically.
Cool	Operate only cooling stages (heat disabled.)
Heat	Operate only heating stages (cooling disabled.)
Off	Do not operate any stages automatically.

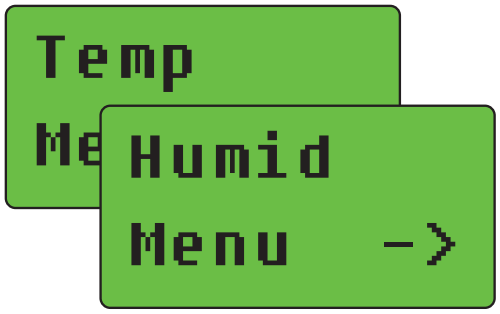
Fan

The Fan menu sets the fan mode: Auto or On.

Mode	Description
Auto	Operate the fan automatically with heat and cool stages.
On	Operate the fan continously.

Temp, Humid Menus

The Temp and Humid menus provides settings for set points.



Time Menu

The Time menu configures the time of day and settings for sun-rise and sun-set.

Config Menu

The Config menu provides configuration settings which control how the unit operates and informs the unit on what type of HVAC components are connected.

Temperature Menu

The temperature menu is where the day and night target set points and offsets are configured. Press Enter to open the Temp Menu and use the up/down buttons to scroll through the menu pages.

NOTE

When connected to a GCX control system, the temperature settings may be updated automatically from the controller according to the scheduled settings configured in the GCX control system.

Day Setpoint

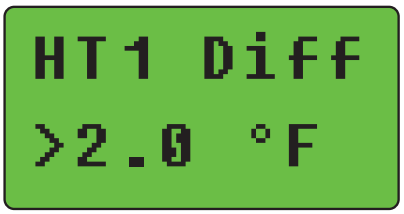
The day set point is adjusted by pressing Enter on the menu item. A carrot symbol (>) appears to indicate that the value is ready to adjust. Use the up/down arrows to adjust the value and press Enter to confirm.

Night Setpoint

The night set point is adjusted by pressing Enter on the menu item. A carrot symbol (>) appears to indicate that the value is ready to adjust. Use the up/down arrows to adjust the value and press Enter to confirm.

HT1, HT2 Differential

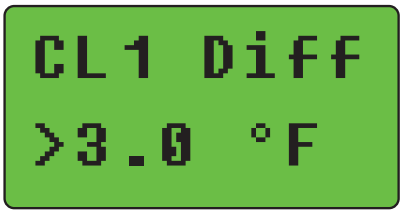
Heat 1 and Heat 2 differential offsets tell the THC when to engage the first and second stages of heating.



Mode	Description
HT1	Heat 1 offset from set point.
HT2	Heat 2 offset from Heat 1 offset.

CL1, CL2 Differential

Cool 1 and Cool 2 differential offsets tell the THC when to engage the first and second stages of cooling.



Mode	Description
CL1	Cool 1 offset from set point.
CL2	Cool 2 offset from Cool 1 offset.

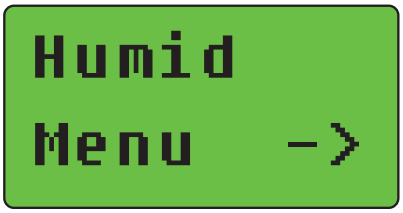
Heat, Cool End Mode

The end mode determines whether the heating or cooling second stage continues to operate until the temperature set point is reached, or until the stage offset is satisfied.

Mode	Description
On Targ	Stage 2 will turn off at the set point.
Staged	Stage 2 will turn off at the offset (where stage 1 started.)

Humidity Menu

The humidity menu is where the day and night target set points and offsets are configured. Press Enter to open the Humid Menu and use the up/down buttons to scroll through the menu pages.



NOTE

When connected to a GCX control system, the humidity settings may be updated automatically from the controller according to the scheduled settings configured in the GCX control system.

Day Setpoint

The day set point is adjusted by pressing Enter on the menu item. A carrot symbol (>) appears to indicate that the value is ready to adjust. Use the up/down arrows to adjust the value and press Enter to confirm.

Night Setpoint

The night set point is adjusted by pressing Enter on the menu item. A carrot symbol (>) appears to indicate that the value is ready to adjust. Use the up/down arrows to adjust the value and press Enter to confirm.

DH1, DH2 Differential

Dehumidify 1 and Dehumidify 2 differential offsets tell the THC when to engage the first and second stages of dehumidification.

Mode	Description
DH1	Dehumidify 1 offset from set point.
DH2	Dehumidify 2 offset from Heat 1 Dehumidify.*

*If two stages of dehumidification are available (external dehu and reheat.)

Dehumidify End Mode

The end mode determines whether the second stage of dehumidification continues to operate until the humidity set point is reached or until the stage offset is satisfied.

Mode	Description
On Targ	Stage 2 will turn off at the set point.
Staged	Stage 2 will turn off at the offset (where stage 1 started.)

Time Menu

The time menu is where the sunrise and sunset times are configured, and where the real-time clock's current time and date is set. Press Enter to open the Time Menu and use the up/down buttons to scroll through the menu pages.

Sunrise

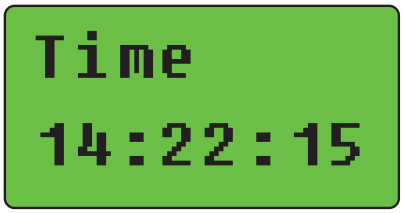
The Sunrise time tells the THC when to begin the day mode and use the day set points for control.

Sunset

The Sunset time tells the THC when to begin the night mode and use the night set points for control.

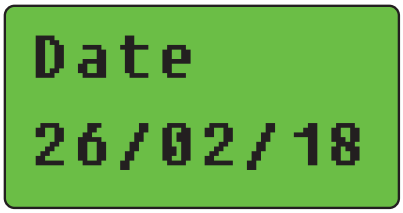
Time

This menu allows the user to manually set the real-time clock's time.



Date

This menu allows the user to manually set the real-time clock's date.

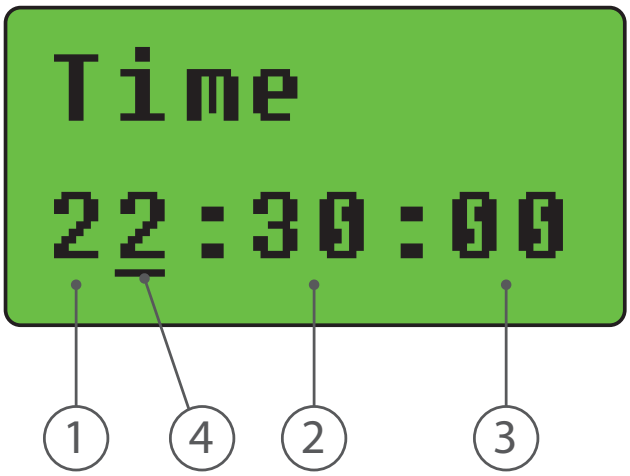


NOTE

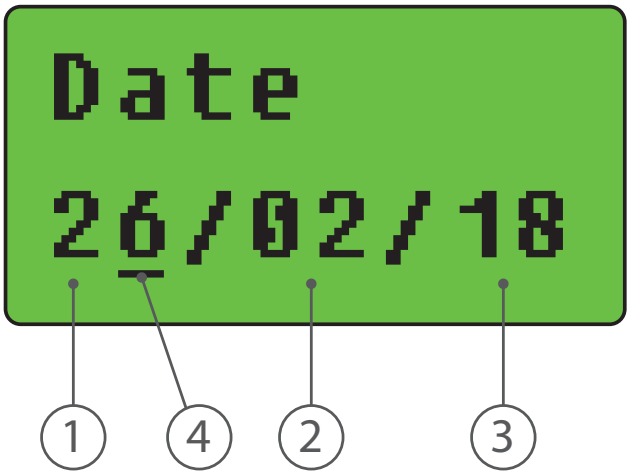
When connected to a GCX control system, the current time and date will be synchronized automatically, and the sunrise and sunset times may be updated according to schedules as set on the GCX.

Adjusting Time Menu Values

1. Press the Enter button when the desired time menu page is displayed; this will begin the editing mode.
2. A cursor will appear below the first field.
3. Use the Up/Down buttons to adjust the value.
4. Press the Enter button to confirm the value and move the cursor to the next field.
5. Continue editing fields until the last field is complete and the cursor is no longer visible.



Number	Description
1	Hours (24-hour format)
2	Minutes
3	Seconds
4	Cursor



Number	Description
1	Year
2	Month
3	Day
4	Cursor

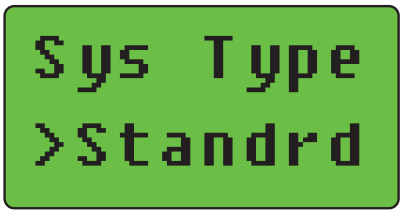
NOTE
Holding down the buttons when editing a value will change it more rapidly.

Config Menu

The time menu contains settings which configure the THC to operate in different ways and according to the type of equipment that is connected to the contacts.

System Type

The THC can operate multiple type of HVAC systems:



Type	Description
Standrd	Standard HVAC system (forced air, boiler.)
HT Pump	Heat pump based system.

Reheat Mode

Reheat can be enabled for dehumidification purposes, if installed.

Mode	Description
Off	Reheat modes are not enabled.
Standrd	Standard, Uses Heat 2 (W2) contact for reheat.
Electrc	Electric, Uses Heat 1 (W1) contact for reheat.

Dehumidification Stage 1

When two dehumidification stages are available, this menu allows selection of which stage will be the primary stage (stage 1.)

Setting	Description
Reheat	Use reheat as the primary dehumidification stage.
Externl	Use the humidity contact as the primary dehumidification stage.

NOTE

This menu will only be available if reheat is enabled and the humidity contact is in dehumidify mode.

Reheat Interrupt Mode

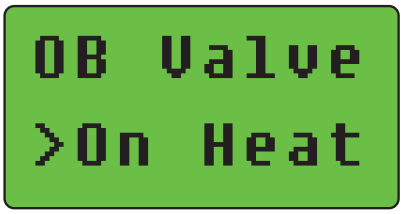
Reheat operation will be interrupted if the temperature conditions are demanding heating or cooling operations in the default configuration. To enable reheat operation when there is heating demand, use the On Cool mode which will only interrupt reheat when there is a cooling demand.

Mode	Description
Default	Interrupt reheat if heating or cooling is demanded.
On Cool	Interrupt reheat only if cooling is demanded.

NOTE
This menu will only be available if reheat is enabled.

Heat Pump Reversing Valve

Systems configured for heat pumps must specify whether the reversing valve contact (W1) should operate with the heating or cooling demand.

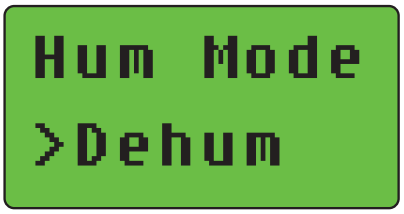


Mode	Description
On Heat	Operate valve with heating demand.
On Cool	Operate valve with cooling demand.

NOTE
This menu will only be available if the System Type is set to Heat Pump.

Humidity Mode

The humidity contact (HUM) can be configured to operate in humidify or dehumidify mode. Select the mode according to the type of equipment connected to the humidity contact (humidifier or dehumidifier.)



Mode	Description
Dehum	Operate dehumidification equipment.
Hum	Operate humidification equipment.

Fan Delay

The fan delay will operate the HVAC system fan contact for a period following the end of the heating or cooling signals to improve efficiency of the system.

Time Options (seconds)
0, 30, 60, 90

Compressor Delay

The compressor delay will inhibit the operation of the HVAC system compressors for a period following their shut down to prevent short-cycling.

Time Options (seconds)
0, 60, 120, 180, 240, 300

LCD Timeout

Set the timeout for the LCD to turn off the backlight.

Time Options (seconds)
5 - 30

Units

Select °F or °C units for temperature display and set points.

To modify the units selection, press the Enter button then use the up or down buttons to toggle between the units. Press the Enter button to confirm once the desired units are displayed.

Device Address

Set Address

The device address is an internal number that the GCX control system uses to communicate with the THC. The address can be manually modified to a specific value, or set the value to 'NONE.'

NOTE
To 'reset' the THC and make it automatically discoverable by a GCX system, set the address to 'NONE.'

Device Info Menu

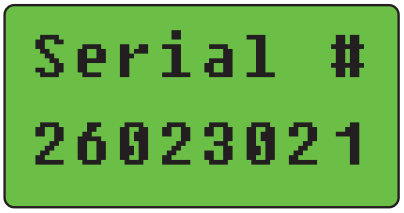
The Device Info menu is located within the Config Menu and contains information about the device including the serial number, hardware and firmware verisons, and date of manufacture.

Device Address

The device address that is in the system memory is displayed here.

Serial Number

The device serial number is displayed here.



Date of Manufacture

The date that the device was manufactured is displayed here.

Hardware Version

The device hardware version number is displayed here.

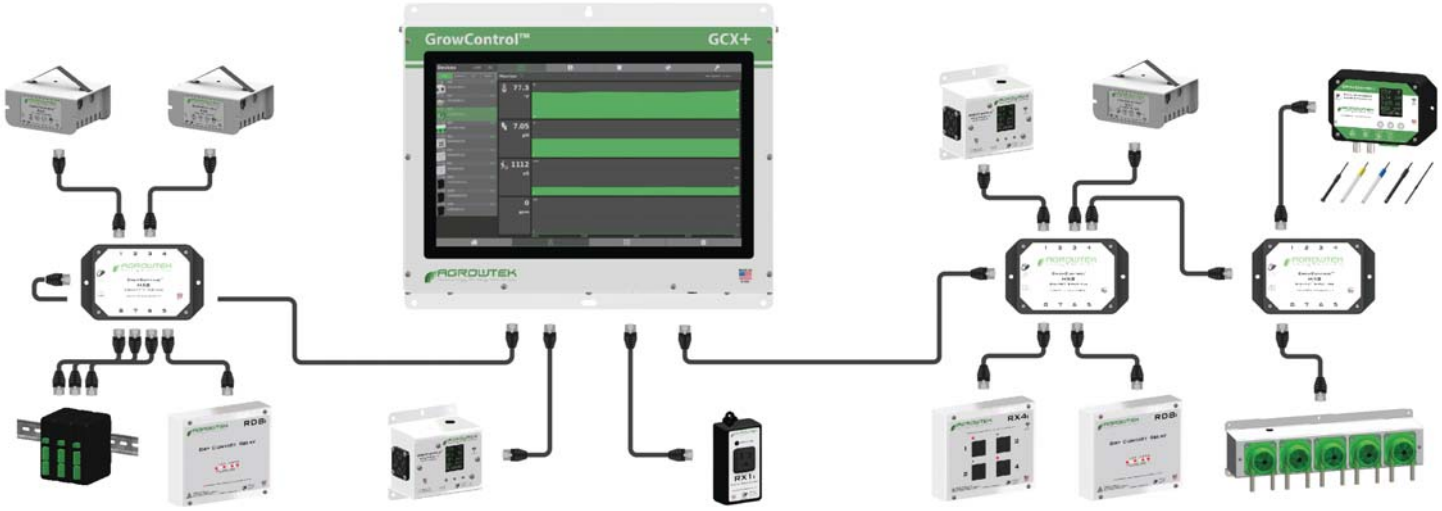
Firmware Version

The firmware version that is installed on the device is displayed here.

Connection to GrowControl™ GCX

All GrowNET™ devices are connected using standard CAT5 Ethernet cable with RJ-45 connections.

Devices can be connected directly to the GrowNET™ ports on the bottom of the controller, or through HX8 GrowNET™ hubs. It is typical to simplify cabling by locating hubs centrally in hall ways and rooms allowing single runs from an 8-port device hub back to a central hub or back to the controller.



Refer to the GCX controller manual for details on adding the device to the system.

GrowNET™ Hubs

HX8 GrowNET ™ hubs expand a single port into eight more ports. Hubs can be daisy-chained to form a network of up to 100 devices per GrowNET™ bus. Individually buffered port transcievers provide excellent signal integrity and extended communication strength and range.

Hubs provide up to 1A of power for operating sensors and most relays directly over the CAT5 cable. A DC jack on the hub provides 24Vdc power to the ports from the included wall power supply. A terminal block power option is also available.

Easy THC Configuration

GrowControl™ GCX control systems integrate seamlessly with the THC.

Manage all of the configuration options from the controller without having to navigate the LCD menus.

See the 'Open Device Configuration ' button on the 'Device Info' tab when monitoring the THC from a GCX system.

Monitoring & Logging

Monitor and log the data from the THC in real time; receive alerts and review system performance.

The GCX can also manually override the contacts on the THC for maintenance or testing.

Automatic Settings Changes

The GCX system can automate changes to the set points by configuring 'HVAC' function blocks.

The function blocks can contain any number of 'rules,' each rule containing its own set points. The rules can then be activated based on the growing schedule.

When a rule is activated with settings that differ from those stored in the THC, the new settings are transmitted to the THC for use.

Storage and Disposal

Storage
Store equipment in a clean, dry environment with ambient temperature between10-50°C.

Disposal
This industrial control equipment may contain traces of lead or other metals and environmental contaminants and must not be discarded as unsorted municipal waste, but must be collected separately for the purpose of treatment, recovery and environmentally sound disposal. Wash hands after handling internal components or PCB's.

Warranty

Agrowtek Inc. warrants that all manufactured products are, to the best of its knowledge, free of defective material and workmanship and warrants this product for 1 year from the date of purchase. This warranty is extended to the original purchaser from the date of receipt. This warranty does not cover damages from abuse, accidental breakage, or units that have been modified, altered, or installed in a manner other than that which is specified in the installation instructions. Agrowtek Inc. must be contacted prior to return shipment for a return authorization. No returns will be accepted without a return authorization. This warranty is applicable only to products that have been properly stored, installed, and maintained per the installation and operation manual and used for their intended purpose. This limited warranty does not cover products installed in or operated under unusual conditions or environments including, but not limited to, high humidity or high temperature conditions. The products which have been claimed and comply with the aforementioned restrictions shall be replaced or repaired at the sole discretion of the Agrowtek Inc. at no charge. This warranty is provided in lieu of all other warranty provisions, express or implied. It is including but not limited to any implied warranty of fitness or merchantability for a particular purpose and is limited to the Warranty Period. In no event or circumstance shall Agrowtek Inc. be liable to any third party or the claimant for damages in excess of the price paid for the product, or for any loss of use, inconvenience, commercial loss, loss of time, lost profits or savings or any other incidental, consequential or special damages arising out of the use of, or inability to use, the product. This disclaimer is made to the fullest extent allowed by law or regulation and is specifically made to specify that the liability of Agrowtek Inc. under this limited warranty, or any claimed extension thereof, shall be to replace or repair the Product or refund the price paid for the Product.