

Installation, Operation and Maintenance Manual

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage!

Temperature and Humidity Controller

The Temperature and Humidity Controller is specifically designed to control a Vari-Green fan motor. The Temperature and Humidity Controller will sense the temperature and humidity in the space and will automatically adjust the speed of a supply or exhaust fan to adjust the ventilation rate accordingly. The temperature measurement will be compared to a field adjustable temperature setpoint, processed through a Proportional/Integral/Derivative (PID) control algorithm to produce a 2 to 10 VDC fan motor control output. The humidity measurement will be compared to a field adjustable humidity setpoint, processed through a PID control algorithm to produce a 2 to 10 VDC fan motor control output. If the unit is in temperature only mode the temperature algorithm's output shall be used to provide the fan motor control output. When the unit is in humidity-only mode the humidity algorithm's output shall be used to provide the fan motor control output. When the unit is in temperature and humidity mode the algorithm with the greatest output shall be used to provide the fan motor control output.

When all active algorithms are satisfied, the output voltage shall be set to its lowest value, 2 VDC. If the temperature is 1°F below the temperature

setpoint in temperature control and the humidity is 3% below the humidity setpoint in humidity control or both in temperature and humidity control, the voltage output may be set to zero (optional cutout mode). The unit will resume normal fan operation if the temperature changes by 1°F or the humidity changes by 5%.



Ventilating based on the temperature and humidity measurements assures that the space will not be over or under ventilated while using the Vari-Green motor technology to operate quietly and efficiently. The Temperature and Humidity Controller has adjustments for setpoint, minimum and maximum fan speed. The fan speed and temperature or humidity level are available as an analog output to be read by a building

General Safety Information

Only qualified personnel should install this product. Personnel should have a clear understanding of these instructions and should be aware of general safety precautions. Improper installation can result in electric shock, possible injury due to coming in contact with moving parts, as well as other potential hazards. Other considerations may be required if high winds or seismic activity are present. If more information is needed, contact a licensed professional engineer before moving forward.

DANGER

Always disconnect, lock and tag power source before installing or servicing. Failure to disconnect power source can result in fire, shock or serious injury.

CAUTION

When servicing the fan, motor may be hot enough to cause pain or injury. Allow motor to cool before servicing.

CAUTION

Precaution should be taken in explosive atmospheres.

Electrical Safety Information

Follow all local electrical and safety codes, as well as the National Electrical Code (NEC) and the National Fire Protection Agency (NFPA). Where applicable, follow the Canadian Electric Code.

1. The rotation of the wheel is critical. It must be free to rotate without striking or rubbing any stationary objects.
2. Motor must be securely and adequately grounded.
3. Do not spin fan wheel faster than maximum cataloged fan RPM. Adjustment to fan speed significantly affects motor load. If fan RPM is changed, motor current should be checked to make sure it is not exceeding the motor nameplate amps.
4. Do not allow the power cable to kink or come in contact with oil, grease, hot surfaces, or chemicals. Replace cord immediately if damaged.
5. Verify that the power source is compatible with the equipment.
6. Never open access doors to a duct while the fan is running.

Receiving

Upon receiving the product check to make sure all items are accounted for by referencing the bill of lading to ensure all items were received. Inspect each crate for shipping damage before accepting delivery. Notify the carrier if any damage is noticed. The carrier will make notification on the delivery receipt acknowledging any damage to the product. All damage should be noted on all the copies of the bill of lading which is countersigned by the delivering carrier. A Carrier Inspection Report should be filled out by the carrier upon arrival and reported to the Traffic Department. If damaged upon arrival, file a claim with carrier. Any physical damage to the unit after acceptance is not the responsibility of Greenheck Fan Corporation.

Unpacking

Verify that all required parts and the correct quantity of each item have been received. If any items are missing, report shortages to your local representative to arrange for obtaining missing parts. Sometimes it is not possible that all items for the unit be shipped together due to availability of transportation and truck space. Confirmation of shipment(s) must be limited to only items on the bill of lading.

Electrical

The motor amperage and voltage ratings must be checked for compatibility to supply voltage prior to final electrical connection. Wiring must conform to local and national codes. Consult local code authorities for specific requirements.

Storage

Product is protected against damage during shipment. If the product cannot be installed and operated immediately, precautions need to be taken to prevent deterioration of the product during storage. The user assumes responsibility of the product and accessories while in storage. The manufacturer will not be responsible for damage during storage. These suggestions are provided solely as a convenience to the user.

Indoor Only

Do not store this product outdoors. The ideal environment for the storage of this product is indoors, above grade, in a low humidity atmosphere which is sealed to prevent the entry of blowing dust, rain or snow. Temperatures should be evenly maintained between 30° to 110°F (-1° to 43°C) (wide temperature swings may cause condensation and "sweating" of metal parts). All accessories must be stored indoors in a clean, dry atmosphere.

Remove any accumulations of dirt, water, ice, or snow and wipe dry before moving to indoor storage. Allow cold parts to reach room temperature to avoid "sweating" of metal parts. To dry parts and packages, use a portable electric heater to get rid of any moisture buildup. Leave coverings loose to permit air circulation and to allow for periodic inspection. The unit should not be stored on the floor.

Inspection and Maintenance During Storage

While in storage, inspect product once per month. Keep a record of inspection and maintenance performed. If moisture or dirt accumulations are found on parts, the source should be located and eliminated.

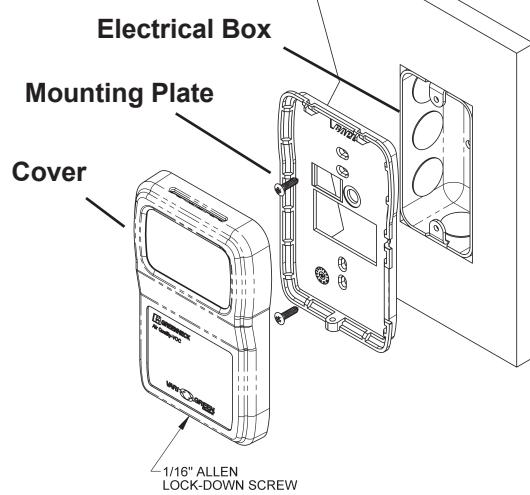
Installation and Setup Guide

This guide provides instructions for how to install, wire and program the control system for use when constant pressure in a duct or room system is required. This does not cover ductwork recommendations or other considerations.

Mounting

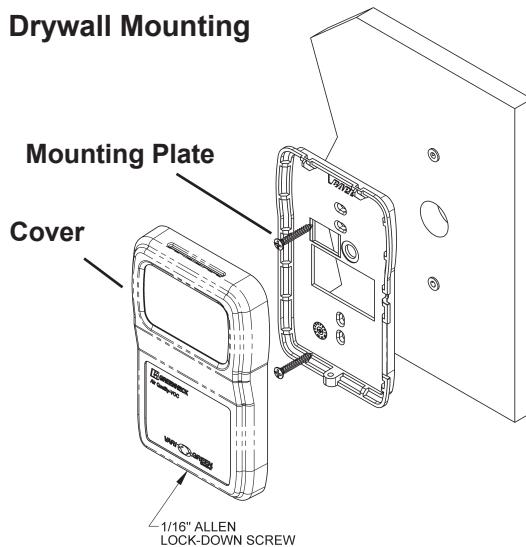
Mount the controller in the space to be controlled. Keep wire lengths between the controller and the fan to 200 feet or less.

Junction Box Mounting



1. Separate the unit from the back plate by driving in the Allen screw until the two pieces come free.
2. Pull the wire through the wall and out of the junction box, leaving about six inches free.
3. Pull the wire through the hole in the base plate.
4. Secure the plate to the box using the #6-32 x 5/8 inch mounting screws provided.
5. Terminate the unit wiring.
6. Mold the foam on the unit's base to the wire bundle to prevent drafts. (see note below)
7. Attach Cover by latching it to the top of the base, rotating the cover down and snapping it into place.
8. Secure the cover by backing out the lock-down screw using a 1/16 inch Allen wrench until it is flush with the bottom of the cover.

Drywall Mounting



1. Separate the unit from the back plate by driving in the Allen screw until the two pieces come free.
2. Place the base plate against the wall where you want to mount the sensor.
3. Using a pencil mark out the two mounting holes and the area where the wires will come through the wall.
4. Drill two 3/16 inch holes in the center of each marked mounting hole, DO NOT punch the holes or the drywall anchors will not hold. Insert a drywall anchor into each hole.
5. Drill one 1/2 inch hole in the middle of the marked wiring area.
6. Pull the wire through the wall and out of the 1/2 inch hole, leaving about six inches free.
7. Pull the wire through the hole in the base plate.
8. Secure the base to the drywall anchors using the #6 x 1 inch mounting screws provided.
9. Terminate the unit wiring.
10. Mold the foam on the unit's base to the wire bundle to prevent drafts. (see note below)
11. Attach cover by latching it to the top of the base, rotating the cover down and snapping it into place.
12. Secure the cover by backing out the lock-down screw using a 1/16 inch Allen wrench until it is flush with the bottom of the cover.

NOTE: In any wall-mount application, the air within the wall cavity can cause erroneous readings. The mixing of room air and air from within the wall cavity can lead to condensation, erroneous readings and sensor failure.

To prevent these conditions, Greenheck recommends sealing the conduit leading to the junction box, filling the junction box with fiberglass insulation or sealing the wall cavity.

Wiring

All wiring for the Greenheck Temperature and Humidity Controller is Class II low-voltage control wiring. See the Wiring Diagram on Page 7 for the wiring overview.

Control box to factory mounted transformer control input.

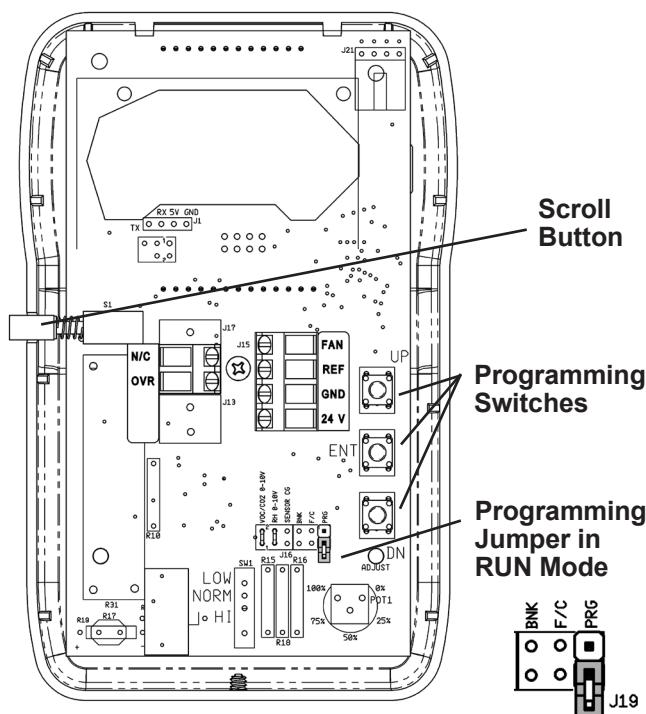
Controller Terminal	Transformer Control Terminal
J15-FAN	0 to 10V
J15-GND	COM
J15-24V	24V

Optional Remote Override

Connect a normally-open switch between terminals J17-OVR and J15-GND on the controller. Closing this switch will activate the remote override feature. Opening the switch will de-activate the override.

Optional Output Reference

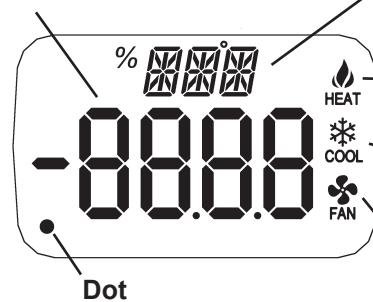
A 0 to 10VDC signal is available from J15-REF to J15-GND. The signal is 15° to 130° F (-10° to 55°C) or 0 to 100% Relative Humidity depending on the value of parameter P10 (see pg 6).



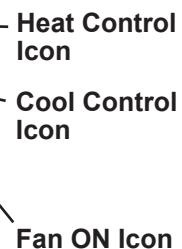
User Interface

A scroll button protrudes through the case. The programming switches and programming jumper are inside the case.

Main Display 0.76 inch 4-digit Numeric



Minor Display 0.34 inch 3-digit Alpha-Numeric



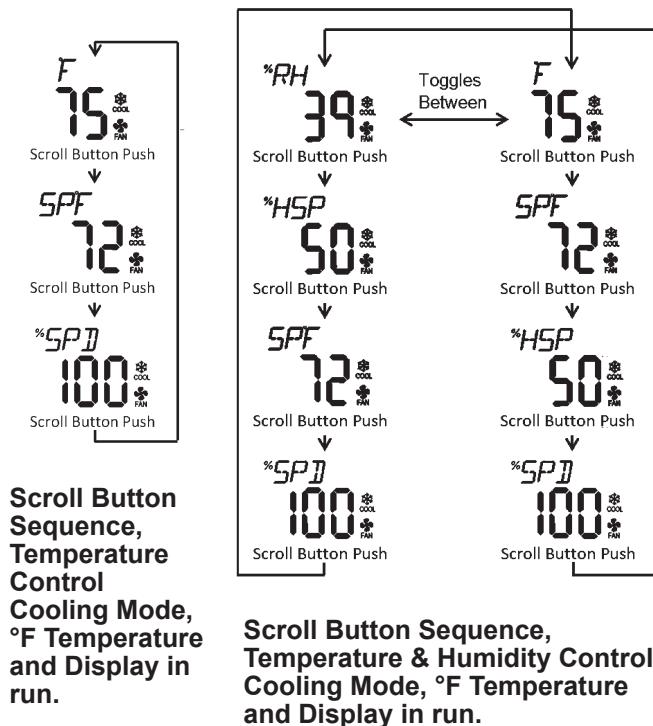
Display Features

The minor display is used to describe the units displayed and the main display shows the numeric value. The fan icon is illuminated whenever the fan output voltage is at or above the minimum specified in parameter P8, Minimum % Fan Speed. The Cool and Heat Icons are illuminated in each control mode respectively. The dot in the lower left is used to signal fan cut-out mode.

Normal Operation (J19 = RUN)

The Greenheck Indoor Air Quality – Temperature/Humidity Controller ships with the following factory setting: Cooling Control, Temperature Setpoint 72°F, Fan Control output at 2 to 10 Volts and Cut-Out Disabled. Pressing the scroll button at any time shows the Temperature setpoint, a second push shows the fan speed in percent.

The scroll button will change the display momentarily to view other information such as setpoints and fan speed. These are for reference only, and cannot be adjusted. The exact sequence will depend on the settings of parameters P0, P1, P2 and P4. For examples, see the two figures below.

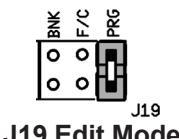


Programming (J19 = PRG)

The unit shall ship with factory default parameter setpoints. Parameter setpoints may be edited in the field by HVAC technicians. During parameter editing, the output voltage shall be set to zero.

General Programming

- Enter the edit mode by removing the unit from its base and placing jumper J19 on the PRG pins. The minor display shall show the parameter name and the major display shall show the parameter number.
- Press the UP or DN switch to select the parameter you wish to edit.
- Press the ENT switch to select the parameter and enter the parameter edit mode. The minor display shall show the parameter name and the major display shall show the parameter value.
- Press the UP or DN switch to change the parameter value. Pressing and holding the switch will scroll through the values.
- If a parameter has more than one sub-menu (see tables pgs 6-7), press the ENT switch to reach the 1st sub-menu and edit the parameter, then push the ENT switch to reach the 2nd sub-menu and edit the parameter. Continue until all sub-menus are edited. Pushing the ENT switch once more will save and return to the parameter menu.
- Return to normal operation by placing jumper J19 on a single pin.



Parameter Descriptions

Temperature Control, Parameter P0

Factory Defaults = On, COOL, Setpoint 72°F

TMP OFF = Temperature control Off

TMP On = Temperature control On

ACT COOL = Cool Mode, operate fan to lower temp

ACT HEAt = Heat Mode, operate fan to raise temp

SP°F # = Temp Setpoint, 15° to 130°F in 1° increments

SP°C # = Temp Setpoint, -10° to 55°C in 0.5° increments
(°C or °F Temp Setpoint is defined by P1 below)

Temperature Units, Parameter P1

Factory Default = F

DEG F = Fahrenheit degrees

DEG C = Celsius degrees

Humidity Control, Parameter P2

Factory Defaults = OFF, Humidity Setpoint 50%RH

HMD OFF = Humidity control off

HMD On = Humidity control on,
operate fan to decrease humidity

%HSP # = Humidity Setpoint,
0 to 100%RH in 1% increments

Restore Factory Default Parameter Values, Parameter P3

Factory Default = OFF

FAC OFF = Entry screen, leave current values

FAC On = Restore factory values

Display Format, Parameter P4

Factory Default = run

DIS OFF = Turn minor and major displays off, leave control mode and fan icons on.

DIS FAn = Unit shows fan speed until scroll button pushed

DIS run = Unit shows temp or humidity values in temp or humidity control. Unit toggles between temp and humidity if both control modes are enabled.

Fan Cutout Timer, Parameter P5

Factory Default = OFF, 30 seconds

CUT OFF = Cutout timer off

CUT On = Cutout timer on

CTM # = Cutout time, 0 to 300 secs in 1 sec increments

The cutout function turns off the fan when the temperature and humidity are below their setpoints for a predetermined amount of time.

Cutout Disabled

The algorithm is run and the FAN output is always between the min and max speed (Parameters P8 & P9).

Cutout Enabled

When the temp and humidity are below setpoint, the cutout timer is started and the dot icon on the display starts flashing. If the timer runs out before the temp and humidity raises above setpoint, then the FAN output is set to zero, the dot icon is on steady and the fan icon is turned off. If the temp and humidity rises above setpoint (1°F or 3%RH), then the dot turns off, the fan icon is illuminated and the FAN resumes algorithm control. The Scroll Button behaves normally during cutout.

Fan Override, Parameter P6

Factory Default = 100% Fan Speed

%OVR # = Fan Speed of 20 to 100% in 1% increments

During normal operation, when the remote override switch is closed, the fan will immediately ramp to P6 speed and stay there until the remote override switch is opened. The override can be activated by any normally-open, voltage-free contact. Closing the contact will activate the override. The fan icon shall turn on and the display will show %OVR and the %Speed.

Manual Fan Speed Override, Parameter P7

Factory Defaults = OFF, 50% Manual Fan Speed

SPD OFF = Algorithm control

SPD On = Manual control

%SPD # = 20% to 100% in 1% increments, or 0%

Parameter P7 continued....

Allows manual control of the fan speed for system setup and commissioning tests. Exiting this parameter returns the controller to normal operation.

When entering this parameter, the value shall be OFF (normal operation). Press the UP button to set the parameter value to On and then press the ENT button. The unit is now in manual control.

The major display shall read 50 for 50% output (5 VDC out). The minor display shall show %SPD.

Pressing the UP button shall increase the displayed value and proportionally change the fan speed. Pressing the DN button shall decrease the displayed value and proportionally change the fan speed.

Allowed values are 0% and 20 to 100%, for 0 VDC and 2 to 10 VDC fan motor control voltage.

The fan speed will remain at the displayed value until the ENT button is pressed placing the unit back to the parameter selection mode.

Minimum Fan Speed, Parameter P8

Factory Default = 20%

Parameter P8 continued...

%MIN # = 20% to 100% in 1% increments

Sets the min fan speed that the controller may control to. Note: the controller will not allow the output min to be set higher than the output max.

Maximum Fan Speed, Parameter P9

Factory Default = 100%

%MAX # = 20% to 100% in 1% increments

Sets the max fan speed that the controller may control to. Note: the controller will not allow the output max to be set lower than the output min.

Analog Output Reference, Parameter P10

Factory Default = Temperature

REF H = Humidity, 0 to 10V for 0 to 100%RH

REF t = Temperature,
0 to 10V for 15° to 130°F (-10° to 55°C)

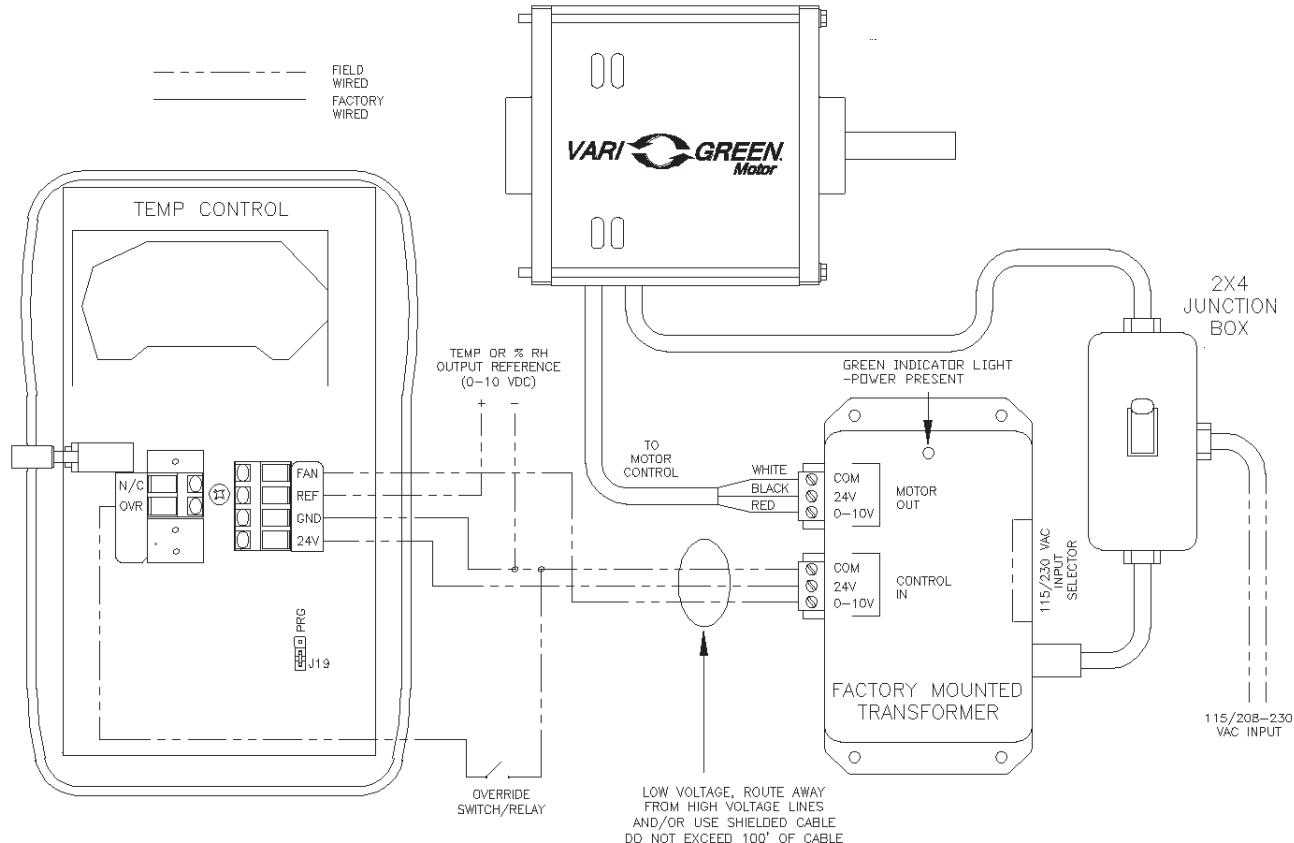
An analog output across J15 terminals "REF" and "GND" for the measured temp or humidity.

Parameter Menu	Sub-Menu 1	Sub-Menu 2	Sub-Menu 3	Description	Factory Default
^{TMP} P0				Page 0, Temperature Control	
	^{TMP} OFF			Temperature Control Off	
	^{TMP} On			Temperature Control On	ON
		^{ACT} COOL	*	Cooling Mode, moving cooling air to space	COOL
		^{ACT} HEAT	*	Heating Mode, moving heating air to space	
			^{SPF} 72	Temperature Setpoint in Degrees Fahrenheit, 15° to 130°, by 1°, Units Controlled by P1	72°F
			^{SPC} 225	Temperature Setpoint in Degrees Celsius, -10° to 55°, by 0.5°, Units Controlled by P1	
^{DEG} P1				Page 1, Temperature Units	
	^{DEG} F			Fahrenheit Degrees	F
	^{DEG} C			Celsius Degrees	
^{HMD} P2				Page 2, Humidity Control	
	^{HMD} OFF			Humidity Control Off	OFF
	^{HMD} On			Humidity Control On	
		^{HSP} 50		Humidity Setpoint, 0 to 100 %RH by 1 %RH	50%
^{FRC} P3				Page 3, Restore Factory Default Menu Values	
	^{FRC} OFF			Entry Screen, Leave Current Values	OFF
	^{FRC} On			Restore Factory Values	
^{DIS} P4				Page 4, Display Format	
	^{DIS} OFF			Turn Minor and Major Display Off, Mode Icons On	
	^{DIS} Fn			Show % Fan Speed	
	^{DIS} run			Show Space Temperature and Humidity, Depends on control mode	run



Parameter Menu	Sub-Menu 1	Sub-Menu 2	Sub-Menu 3	Description	Factory Default
^{CUT} P5				Page 5, Fan Cutout Timer	
	^{CUT} OFF			Fan Cutout Off	OFF
	^{CUT} On			Fan Cutout On	
		^{CUTM} 30		Cutout Timer, 0 to 300 seconds	30
^{OVR} P6				Page 6, Override % Fan Speed	
	^{OVR} 100			20% to 100% Fan Speed, by 1%	100
^{SPD} P1				Page 7, Manual Fan Speed Override	
	^{SPD} OFF			Manual Fan Speed Override Off	OFF
	^{SPD} On			Manual Fan Speed Override On	
		^{SPD} 50*		Manually Set Fan Speed, 20% to 100% in 1% increments or 0%	50
^{MIN} P8				Page 8, Minimum % Fan Speed	20
	^{MIN} 20			Minimum % Fan Speed Value, 20% to 100% in 1% increments	
^{MAX} P9				Page 9, Maximum % Fan Speed	
	^{MAX} 100			Maximum % Fan Speed Value, 20% to 100% in 1% increments	100
^{REF} P10				Page 10, Analog Output Reference	
	^{REF} H			0 to 100 %RH, for 0 to 10 VDC	
	^{REF} t			15° to 130°F or -10° to 55°C, for 0 to 10 VDC, Units Controlled by P1	t

Wiring Diagram



Troubleshooting

Problem	Potential Solution
Fan always at minimum speed	<ul style="list-style-type: none">Blow into the bottom of the unit. Your breath should increase the humidity measurement and raise the temperature measurement. The fan speed should increase within a few minutes.
Fan always at high speed	<ul style="list-style-type: none">Check that the temperature and humidity measurements are decreasing.Setpoint may be incorrect for the persistent load.
Fan Cutout not working properly	<ul style="list-style-type: none">Setpoint may be incorrect for the persistent load.If the controller will not turn the fan off, verify that the measured temperature is at least 0.9°F below and the relative humidity is at least 3% below set point.Verify that the cutout timer has started by looking for the flashing dot.If the controller will not restart the fan, verify that the measured temperature is at least 1°F above the setpoint and the relative humidity is at least 5% above the setpoint.

Warranty

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of one year from the shipment date. Any units or parts which prove defective during the warranty period will be replaced at our option when returned to our factory, transportation prepaid. Motors are warranted by the motor manufacturer for a period of one year. Should motors furnished by Greenheck prove defective during this period, they should be returned to the nearest authorized motor service station. Greenheck will not be responsible for any removal or installation costs.

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Greenheck Vari-Green® Motor catalog provides additional information describing the equipment, fan performance, available accessories, and specification data.

AMCA Publication 410-96, Safety Practices for Users and Installers of Industrial and Commercial Fans, provides additional safety information. This publication can be obtained from AMCA International, Inc. at: www.amca.org.



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