GREENHECK
Building Value in Air.

Document 479653
Generation 2
Constant Pressure/Air Flow Control

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!

Controller with Integral Transducer

Remote Transducer

Controller with Remote Transducer

Table of Contents

Precautions and Warnings

To prevent injury and property damage, follow these instructions. Failure to adhere to installation/operation procedures and all applicable codes may result in hazards as indicated by warning codes outlined below:

DANGER
Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to limited to the most extreme situations.
WARNING
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION
Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.
This is the safety alert symbol. Read and follow instructions carefully to avoid a dangerous situation.
This symbol alerts the user to the presence of “dangerous voltage” inside the product that might cause harm or electrical shock.

Safety Instructions

DANGER
Equipment can start automatically. Lockout/tagout before servicing.
CAUTION
As with all electrical products, read manual thoroughly. Only qualified, expert personnel should perform maintenance and installation. Contact the nearest authorized service facility for examination, repair, or adjustment. Do not disassemble or repair unit unless described in this manual; death or injury to electrical shock or fire hazard may result. Specifications and manual data subject to change. Consult factory for additional information.
DANGER
HAZARDOUS VOLTAGE • Disconnect and lock out all power before installing or servicing equipment. • This equipment may require locking out multiple power sources prior to service. • Install and wire in accordance with all applicable local and national electrical and construction codes.
WARNING
FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN DEATH OR SERIOUS INJURY.

Constant Pressure Control

The Greenheck Constant Pressure Control is designed to maintain a constant level of static pressure or airflow by automatically adjusting the speed of a fan or position of damper. The Constant Pressure Control output is compatible with the Vari-Green® Motor, many variable frequency drives (VFDs), or dampers with modulating actuators.

The Constant Pressure Control is available with duct or room mounted probes for static pressure control, as well as a pitot tube or Greenheck's AMS (Airflow Monitoring Station) for maintaining airflow. Common applications include:

- Multi-story
- Variable volume exhaust systems serving bathrooms
- Residential kitchen hoods or clothes dryers
- Room pressurization and filtered supply/exhaust where constant airflow is required as the filters become dirty

Receiving

Upon receiving the control, check to ensure all items are accounted for by referencing the delivery receipt or packing list. Inspect each crate or carton for shipping damage before accepting delivery. Alert the carrier of any damage detected. The customer will make notification of damage (or shortage of items) on the delivery receipt and all copies of the bill of lading which is countersigned by the delivering carrier. If damaged, immediately contact your Greenheck Representative. 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.

Storage

Controls are protected against damage during shipment. If the control cannot be installed and operated immediately, precautions need to be taken to prevent deterioration of the control during storage. The user assumes responsibility of the control and any 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 - The ideal environment for the storage of control 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.

Removing from Storage

As controls are removed from storage to be installed in their final location, they should be protected and maintained in a similar fashion until the control goes into operation.

Installation

Parts Needed

- Control voltage wiring – 18-20ga recommended
- Pressure tubing – 1/4 inch *(6mm)*
- Fasteners for mounting
- Conduit fittings (1/2 inch *(13mm)* NPSM)

Note: Mounting hole pattern for controller and transducer on pg. 11.

Controller – Integral Pressure Transducer

The controller with integral pressure transducer is a NEMA-4 rated enclosure. Mount the controller in a location where it can be accessed for programming and status viewing. The controller should be mounted in an environment where the temperature remains between 45° and 80° F. *(7° and 27°C)*. This temperature range is due to the temperature compensation range of the integral pressure transducer. If the controller needs to be mounted in a location that will routinely exceed this range, the controller that accepts a remote transducer should be used.

The controller should be mounted with the hinge of the door on top. Keep in mind wiring and tubing lengths when selecting a location.

Controller – Remote Pressure Transducer

The controller with remote pressure transducer is used for applications where the controller must be mounted in areas where the temperature may exceed the compensation range of the pressure transducer. Both the controller and remote pressure transducer are in a NEMA-4 rated enclosure. The pressure transducer should be mounted in an environment where the temperature remains between 45° and 80°F *(7° and 27°C)*

Maximum Recommended Distances		
	Tubing	Wiring
Probe to Transducer	100 feet (30.5m)	N/A
Transducer to Controller	N/A	200 feet (61m)
Controller to Fan/Motor/VFD	N/A	100 feet (30.5m)

Conduit Fittings

Connections - A stepped drill bit can be used to create openings in the conduit fittings. Take care to not damage the components inside the housing when drilling.

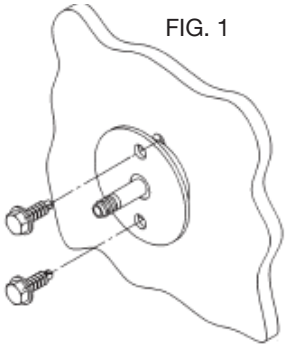
Pressure Probes

A duct static, room static, 2-piece pitot tube and AMS are available from Greenheck. Other pressure probes may be used as well.

Duct Static Probe (FIG. 1)

The duct static probe must be located in the duct where

FIG. 1



you intend to control the static pressure. It should be located a minimum of 10' away from the inlet/outlet of the fan/ damper to ensure stable operation.

The duct static probe is always connected to the "H" port of the control/transducer. The "L" port is the reference port and can remain open to atmosphere or plumbed to another location.

Room Static Probe

The room static probe is used to sample the pressure in an open space such as a room or hallway. The pressure controlled room must be connected to the "H" port. The "L" port is the reference port and can remain open to atmosphere or plumbed to another location.

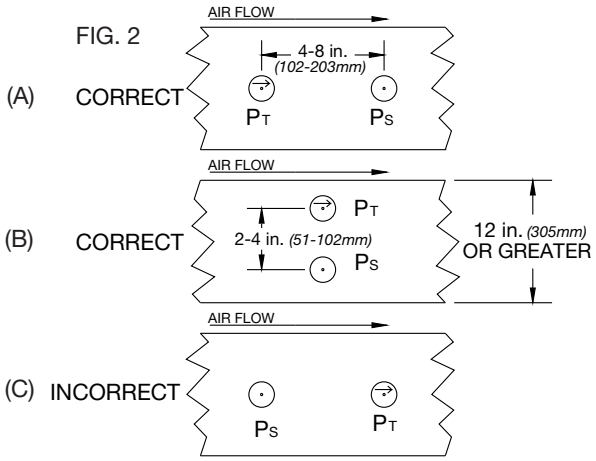
Alternatively, if the controller/transducer is mounted in the space in which the pressure is to be controlled, the "H" port can remain open and the "L" port must be plumbed to another location for reference.

2-Piece Pitot Tube

The 2-piece pitot tube consists of a total pressure (P_T) probe and a static pressure (P_S) probe. These probes should be mounted in a straight section of ductwork located away from elbows or transitions. The total pressure probe can be identified by a 45deg. cut at the end and the arrow identifying airflow direction on the mounting flange.

Examples for mounting the probes are shown in FIG. 2 (A, B, C).

FIG. 2



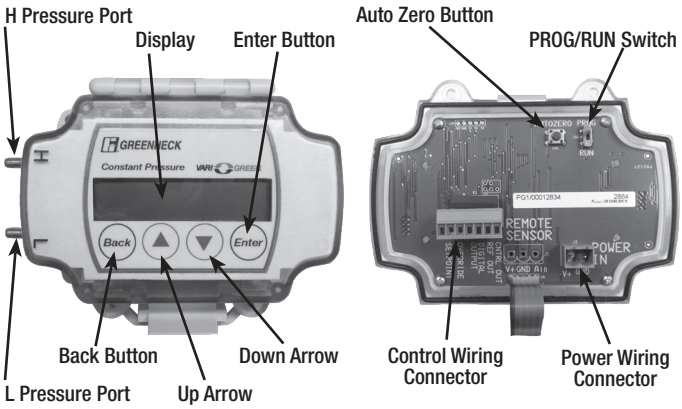
Connect the total pressure probe to the "H" port of the control/transducer and the static pressure probe to the "L" port.

AMS (Airflow Measuring Station)

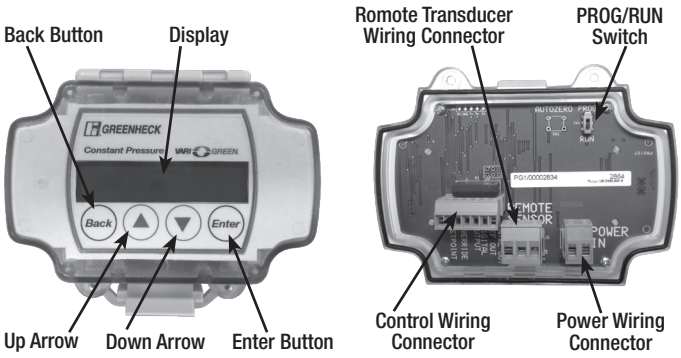
The AMS should be mounted away from elbows and transitions. Connect the "HIGH" port of the AMS to the "H" port and the "LOW" port of the AMS to the "L" port of the control/transducer.

General Operation

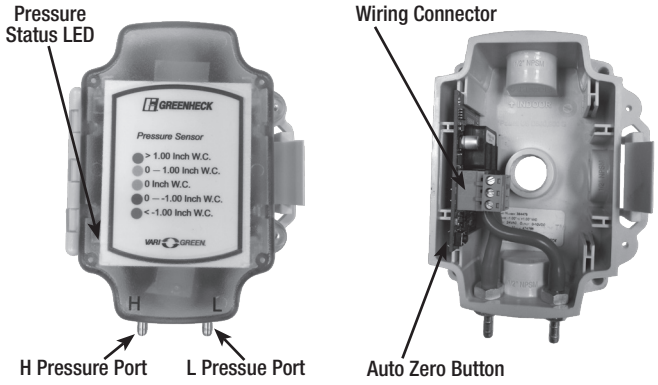
Controller with Integral Transducer



Controller with Remote Transducer



Remote Transducer



Display

The 2-line multi character display is backlit and is used to read the status of the control as well as setting parameters during programming.

Touch Buttons

The buttons on the front of the control are touch sensitive, similar to the touch screen of a smartphone. Gloves must be removed to ensure it senses your finger. In RUN mode, the arrow buttons can be used to display different process variables. In PROG mode, the arrow, enter and back buttons are used to navigate the menus and set parameters. When using the arrows to set parameters, holding the button down will increase the scrolling speed.

LED Status

A status LED exists on the control and remote pressure transducer.

Control:

Green = Normal Operation

Pink = Programming/manual mode

Flashing Yellow = Cutout timer is active

Solid Yellow = Cutout mode is active

Red = Override active

Transducer:

Red = >1.00 in.WC *(>249Pa)*

Green = 0 —1.00 in.WC *(0-249Pa)*

Yellow = 0 in.WC *(0Pa)*

Blue = 0 — -1.0 in.WC *(249Pa)*

Pink = < -1.00 in.WC *(249Pa)*

Pressure Transducer Auto Zero

The integral and remote pressure transducer includes an auto zero function. There is an auto zero button on the inside of the enclosure. If the controller is already installed, remove field tubing and connect the "H" and "L" port of the pressure transducer together with a short piece of tubing (Fig. 3). Press the auto zero button inside the enclosure. When the LED stops flashing, remove the tubing and reconnect the existing field tubing.

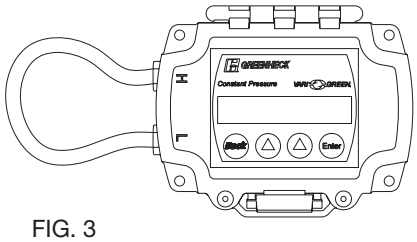


FIG. 3
Pressure tubing connected for auto zero

Inputs/Outputs

The controller contains the following inputs/outputs:

Inputs:

Remote Override (digital, dry contact)

Remote Setpoint (analog, 0-10V or 2-10V)

Remote Transducer (analog, 0-10V), not available on controller with integral transducer.

Outputs:

Fan Speed (analog, 0-10V, 2-10V)

Pressure/Airflow Reference (analog, 0-10V)

Relay (digital, 0.5A rating)

Units:	Imperial	Metric
Length	In. / ft.	mm / m
Flow	CFM	m^3/hr
Pressure	In. WC	Pa
Velocity	FPM	m/hr

RUN/PROG Mode

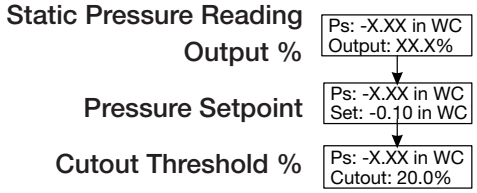
Run and Program mode are set using the selector switch on the inside of the control. Open the control enclosure to access the switch.

RUN Mode

This control has two major functions – constant pressure mode and constant airflow mode.

Constant Pressure Mode - the control will automatically adjust the speed of the fan to maintain a constant static pressure in a duct or room.

The display will show the following variables (touch the arrow buttons to change the display):



Cutout – the cutout feature is available to turn the fan off in times of no demand.

There are three parameters related to the cutout function: Cutout %, Cutout Delay Time and Return from Cutout Pressure Setpoint.

Cutout mode is activated when the fan speed output % is less than the cutout % setpoint. After the Cutout Delay Time has elapsed, the control will turn the output OFF.

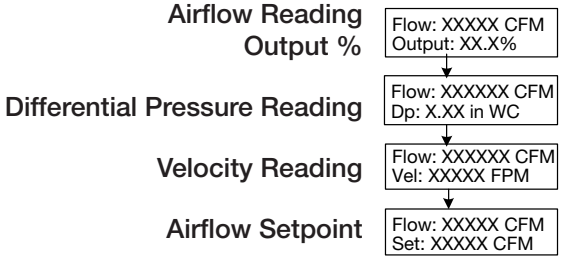
A change in system pressure is needed to turn the output back ON. This value is adjustable to prevent false pressure fluctuations from turning the fan back on.

Inlet Mode:
Measured static pressure must be more **positive** than the return from cutout value.

Outlet Mode:
Measured static pressure must be more **negative** than the return from cutout value.

Constant Airflow Mode – the control will automatically adjust the speed of a fan to maintain a constant airflow rate in a duct.

The display will show the following variables(touch the arrow buttons to change the display):

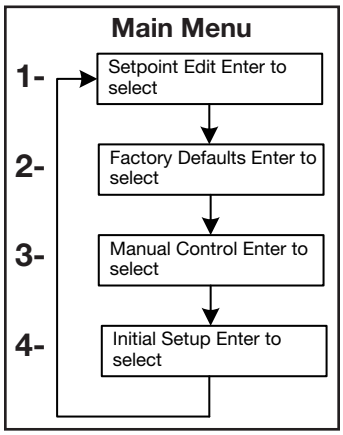


PROG Mode:

Set the control to program mode to adjust initial settings and setpoints. A manual mode also exists to manually set the output of the control.

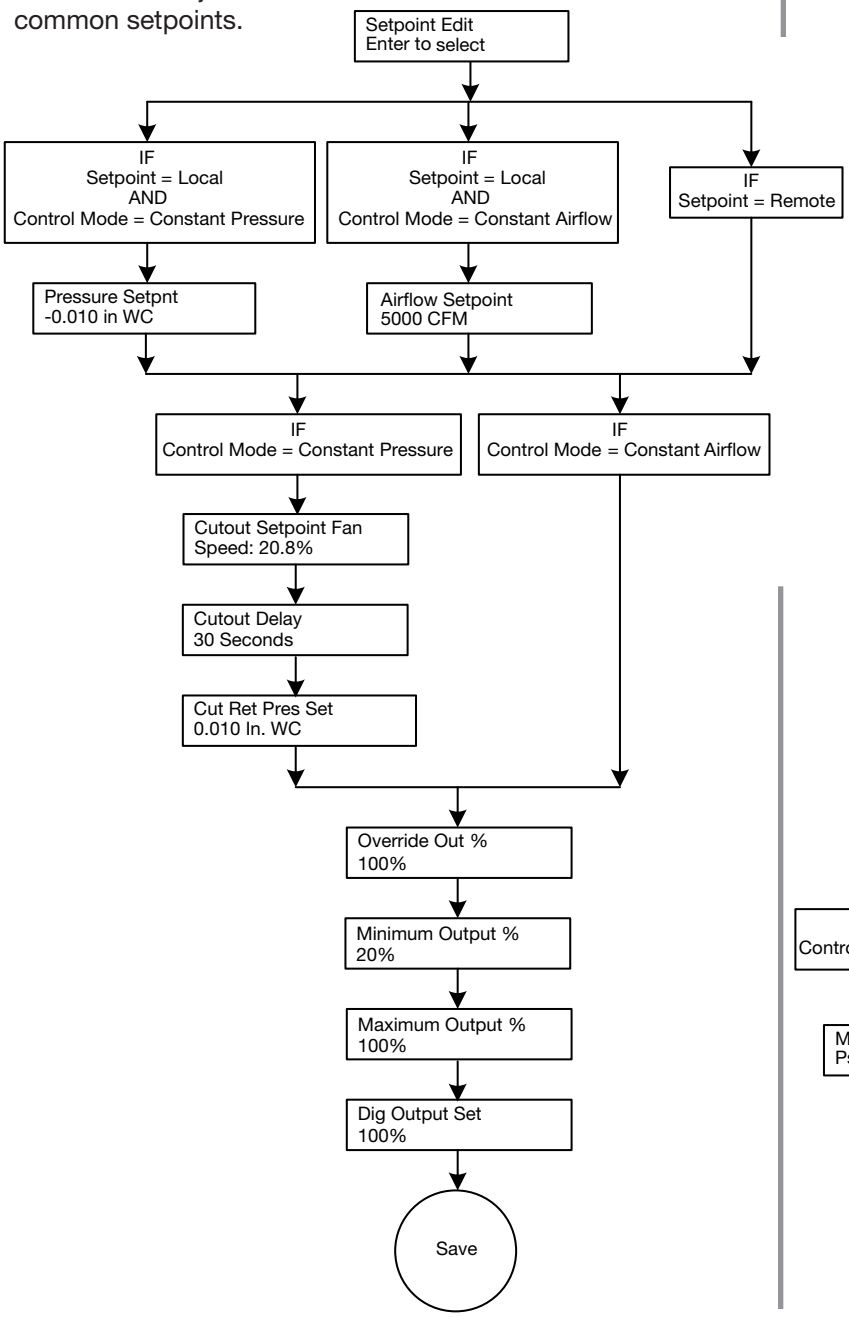
Menu Structure

The structure of the program menu is shown below. A detailed description of the parameters follows the diagram.

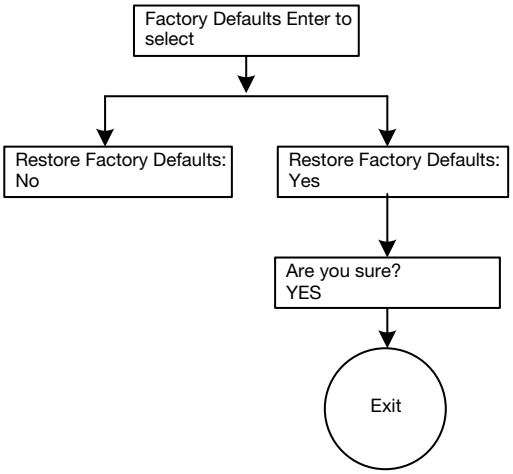


Setpoint Edit Menu Structure:

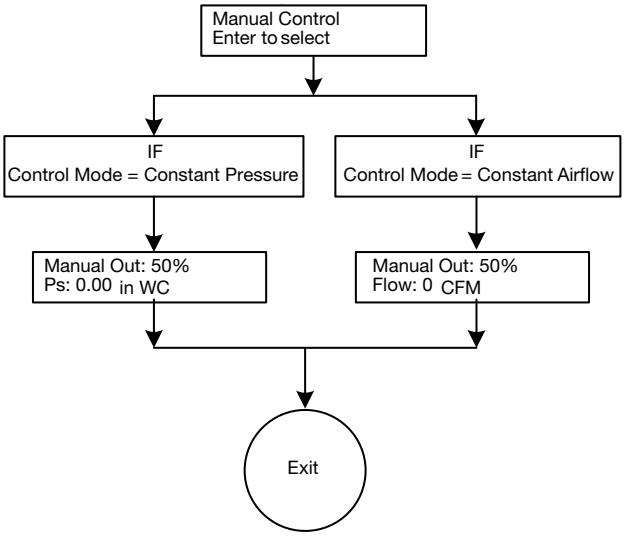
1 - Setpoint Edit – select this menu to adjust common setpoints.



2 - Factory Defaults – select this to reset all parameters to their default values.

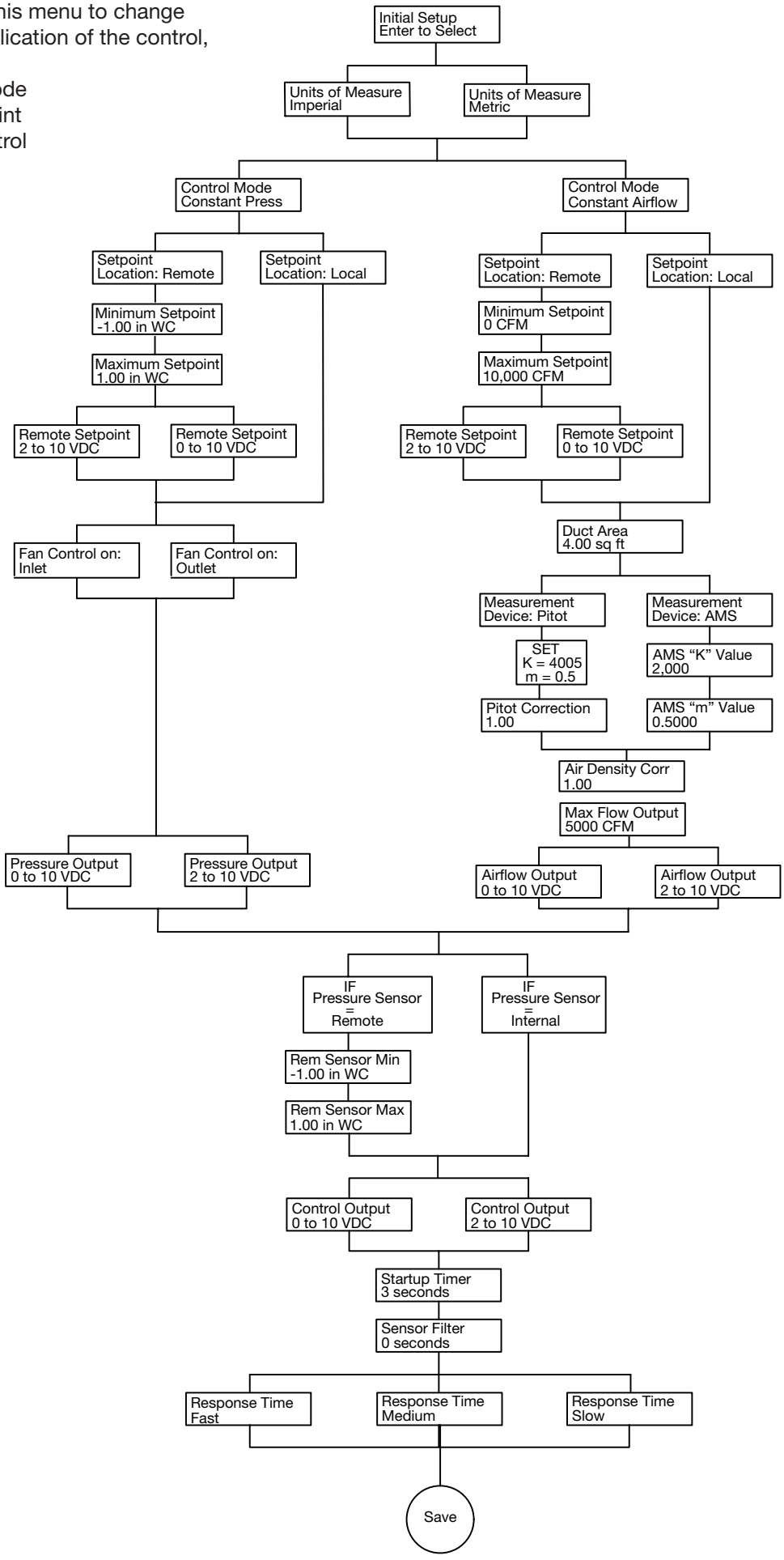


3 - Manual Control – select this menu to operate the fan manually. Use the arrow buttons to adjust speed up and down. The display will also show the live pressure or airflow reading (depending on setting).



4 - Initial Setup – select this menu to change settings related to the application of the control, such as:

- Pressure or airflow mode
- Local or remote setpoint
- Fan inlet or outlet control



Setpoint Edit Menu Parameters			
Parameter Name	**Values**	**Default**	**Description**
Pressure setpoint	-1.00 to +1.00 in WC *(-249 to +249Pa)*	-0.10 in. WC *(-24.9Pa)*	Pressure setting the control will maintain. Only available in [Pressure Mode] **and** when [Local Setpoint] is selected.
Airflow setpoint			Airflow setting the control will maintain. Only available in Airflow mode and when [Local Setpoint] is selected.
Cutout %	20 – 100%	20%	When the output value falls below this setting, the output will turn off after the delay time has elapsed. This is used to turn the fan off in times of no demand. Only available in [Pressure mode].
Cutout delay time	0-300 seconds	30 seconds	The output value must be below the cutout threshold for this amount of time before the fan will turn off. Only available in [Pressure mode].
Cutout return pressure setpoint	-0.250 in WC– 0.250 in WC *(-62.27 to + 62.27Pa)*	inlet mode: 0.01 in. WC *(2.49Pa)* outlet mode: -0.01 in. WC *(2.49Pa)*	This is the threshold that must be passed for the system to turn back on while in cutout mode. • Inlet Mode: Measured static pressure must be more **positive** than the return from cutout value. • Outlet Mode: Measured static pressure must be more **negative** than the return from cutout value. Only available in [Pressure mode].
Override output %	0, 20-100%	100%	When the digital input is closed, the fan output will be set to this value until the digital input is opened.
Minimum output %	20-100%	20%	Sets the minimum output value of the controller during [Run] mode.
Maximum output %	20-100%	100%	Sets the maximum output value of the controller during [Run] mode.
Digital output set %	20-100%	20% (pressure mode) 97% (airflow mode)	The digital (relay) output will close when the fan output is above this value. Useful as a dirty filter switch in [Constant Airflow] mode.

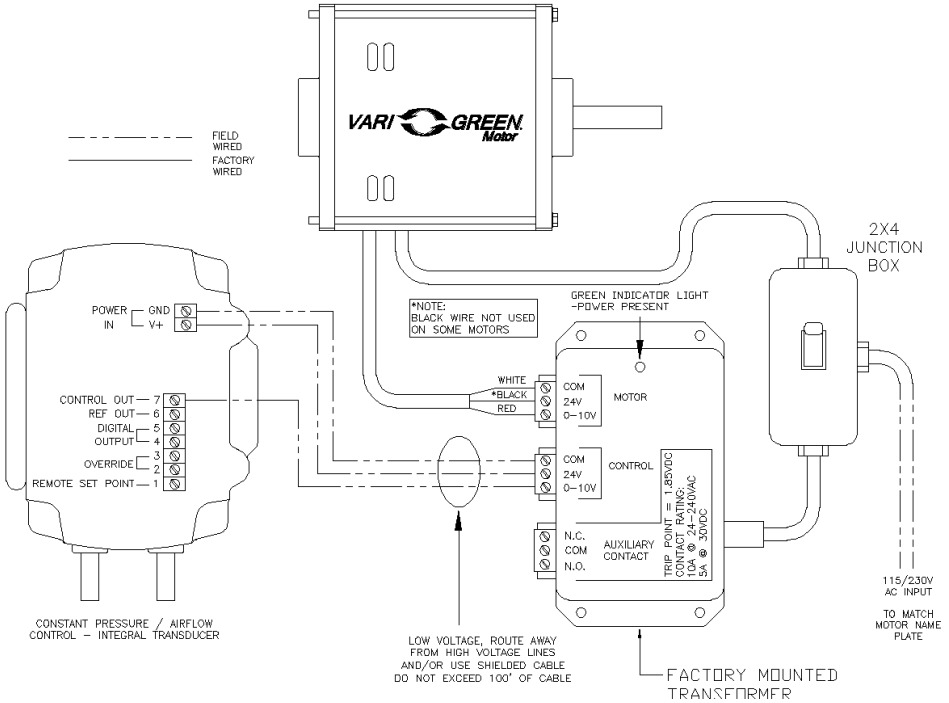
Initial Setup Menu Parameters

Parameter Name	Values	Default	Description
Units	Imperial, Metric	Imperial	Units used for settings within controller
Control Mode	Constant Pressure, Constant Airflow	Constant pressure	This sets the main function of the control.
Setpoint Location	Local, Remote	Local	Determines where the pressure or airflow setpoint will be set. If local, set using the setpoints menu. If remote, connect a 0-10V signal to remotely set the setpoint.
Min Pressure/Flow Setpoint		Bottom end of pressure transducer span	This value will correspond to the minimum voltage (0 or 2V) from the remote setpoint signal. Only available when setpoint is set to [remote].
Max Pressure/Flow Setpoint		Top end of pressure transducer span	This value will correspond to a 10V signal from the remote setpoint signal. Only available when setpoint is set to [remote].
Remote Setpoint Voltage	0-10V, 2-10V	0-10V	Change this setting based on the signal for the remote setpoint. If 0-10V, 0V refers to the minimum setpoint. If 2-10V, 2V refers to the minimum setpoint. Only available when setpoint is set to [remote].
Fan Inlet/Outlet	Inlet, Outlet	Inlet	Set this parameter to match where the pressure probe is located in relation to the fan the control is controlling. Only available in [pressure] mode.
Duct Area	0-100 sq. ft *(0-9.29 sq. m)*	4 sq ft *(0.37 sq. m)*	Input the area of the duct where the pitot tube is located. If using an AMS, input the area from the AMS label. Only available in [airflow] mode.
Measurement Device	Pitot Tube, AMS	Pitot Tube	Select the measurement probe type being used. Only available in [airflow] mode.
AMS “K” value			When AMS is used, set to “K” value on AMS label. Only available in [airflow] mode.
AMS “m” value			When AMS is used, set to “m” value on AMS label. Only available in [airflow] mode.
Pitot Correction Factor	0.50 to 2.00	1.00	Corrects the airflow measurement for the airflow device being used. Adjust the value if using a pitot tube by others. Only available in [airflow] mode.
Air Density Correction Factor	0-5.00	1.00	Adjust this value to match the density of the air flowing through the system. Select the value from the table on pg. 11. Only available in [airflow] mode
Max Flow Output	0-100,000 CFM 0-m^3/hr 169,901	500 CFM 8495 m^3/hr	Sets the top of the span for the reference output in [airflow] mode. Adjust this setting to give more resolution to the remote airflow reading.
Pressure/Airflow Output	0-10V, 2-10V	0-10V	This sets the span of the reference output.
Remote Sensor Min Pressure		-1.00 in. WC *(-249Pa)*	Set this value to the minimum pressure value of the remote pressure transducer. Only available with remote pressure transducer model.
Remote Sensor Max Pressure		1.00 in. WC *(249Pa)*	Set this value to the minimum pressure value of the remote pressure transducer. Only available with remote pressure transducer model.
Control output	0-10V, 2-10V	2-10V	This value will change the span of the control output. Vari-Green motors use 2-10V.
Startup Timer	1-30 Seconds	3 Seconds	The control output will be set to the minimum value at startup for this amount of time.
Sensor Filter	0-10 Seconds	0	Adjust this value if the pressure reading is unstable. Increasing the value increases the stability of the pressure reading.
Response Time	Fast, Medium, Slow	Fast	This value adjusts the response time of the controller. Set to Medium or Slow if the fan is unstable/oscillating.

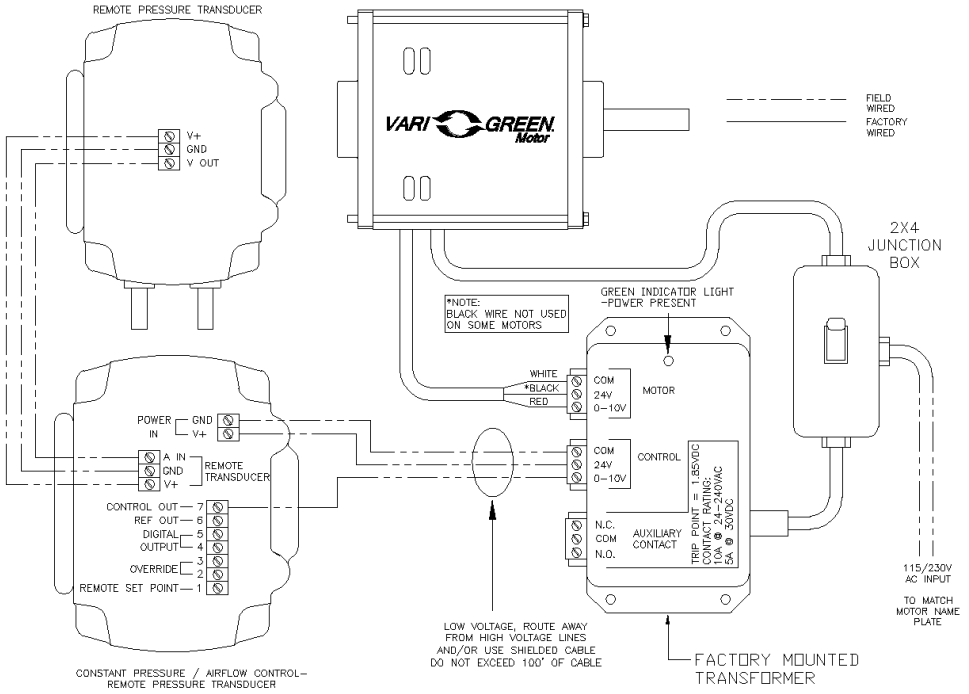
Wiring Diagrams Overview

Note: These diagrams show connections when using a Vari-Green® motor and transformer. Other inputs/ outputs on the control are not shown for clarity.

Integral Transducer:

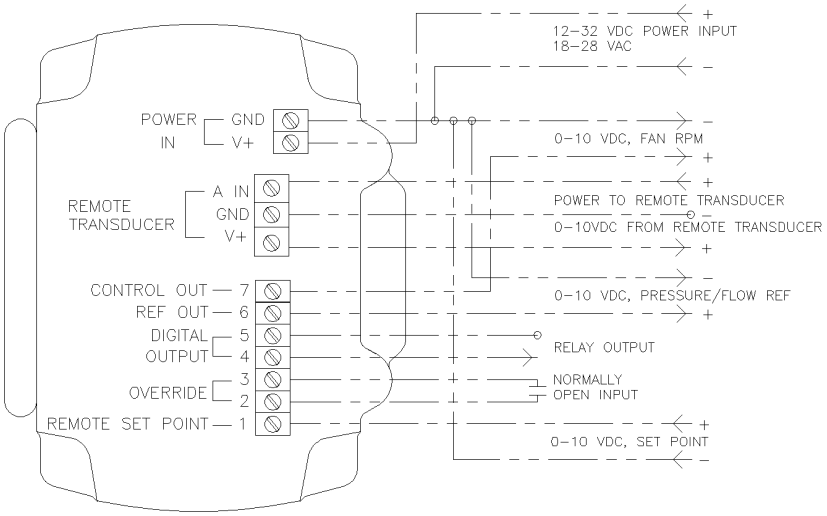


Remote Transducer:

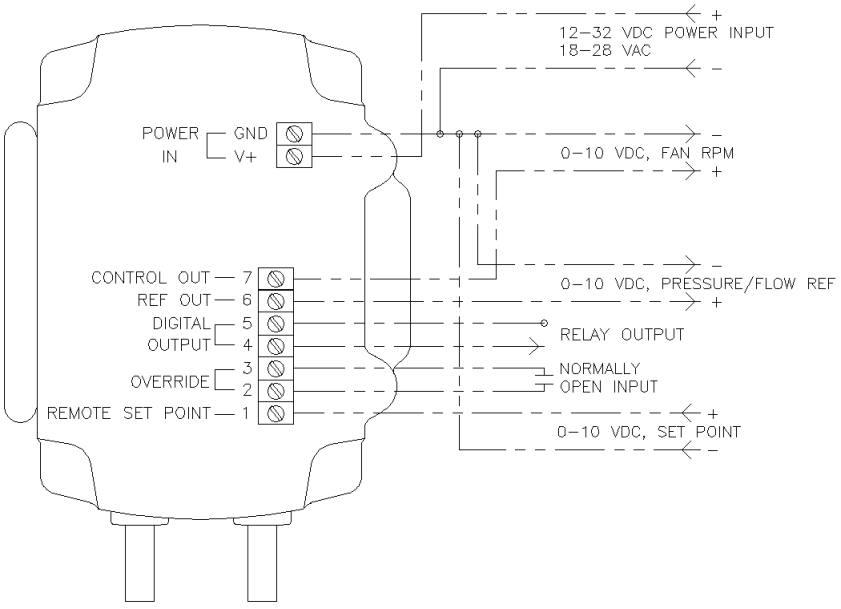


Note: Wiring diagrams show detail of all inputs/outputs available.

PRESSURE CONTROL DETAIL, REMOTE TRANSDUCER



PRESSURE CONTROL DETAIL



Part Number Table

Indiv. Part No.	Description	Photo
385604	Controller with Integral Transducer (+/- 1")	
385605	Controller for Remote Transducer	
385606	Remote Transducer (+/- 1")	
474748	Duct Static Pressure Probe	
474770	Room Static Pressure Probe	
475106	Duct Total Pressure Probe	

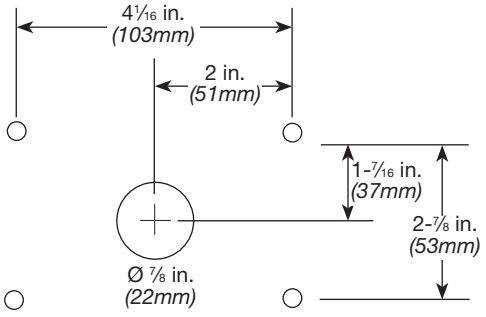
Duct Air Temp	Air Density Correction Factors												
	Elevation Dimensions in feet and *(meters)*												
°F *(Deg.C)*	0 *(0)*	500 *(152.4)*	1000 *(304.8)*	1500 *(457.2)*	2000 *(609.6)*	2500 *(762)*	3000 *(914.4)*	3500 *(1066.8)*	4000 *(1219.2)*	4500 *(1371.6)*	5000 *(1524)*	5500 *(1676.4)*	6000 *(1828.8)*
-40 *(-40)*	0.79	0.81	0.82	0.84	0.85	0.87	0.88	0.9	0.92	0.93	0.95	0.97	0.99
-20 *(-29)*	0.83	0.85	0.86	0.88	0.89	0.91	0.93	0.94	0.96	0.98	0.99	1.02	1.04
0 *(-18)*	0.87	0.88	0.9	0.92	0.93	0.95	0.97	0.99	1	1.02	1.04	1.06	1.08
20 *(-7)*	0.91	0.92	0.94	0.96	0.97	0.99	1.01	1.03	1.05	1.07	1.08	1.11	1.13
40 *(4)*	0.94	0.96	0.98	1	1.01	1.03	1.05	1.07	1.09	1.11	1.13	1.16	1.18
70 *(21)*	1	1.02	1.04	1.06	1.08	1.1	1.12	1.14	1.16	1.18	1.2	1.22	1.25
80 *(27)*	1.02	1.04	1.06	1.08	1.1	1.12	1.14	1.16	1.18	1.2	1.22	1.25	1.27
100 *(38)*	1.06	1.08	1.1	1.12	1.14	1.16	1.18	1.2	1.22	1.25	1.27	1.29	1.32
120 *(49)*	1.09	1.11	1.13	1.16	1.18	1.2	1.22	1.24	1.27	1.29	1.31	1.34	1.37
140 *(60)*	1.13	1.15	1.17	1.2	1.22	1.24	1.26	1.29	1.31	1.34	1.36	1.39	1.41
160 *(71)*	1.17	1.19	1.21	1.24	1.26	1.28	1.31	1.33	1.35	1.38	1.4	1.43	1.46
180 *(82)*	1.21	1.23	1.25	1.28	1.3	1.32	1.35	1.37	1.4	1.42	1.45	1.48	1.51
200 *(93)*	1.25	1.27	1.29	1.32	1.34	1.36	1.39	1.42	1.44	1.47	1.49	1.53	1.55

Specifications

Input Power:	Current Usage:
12-32VDC, 18-28VAC	100 mA Max
Output:	LCD Display:
0-10VDC (PID Output)	Pressure, CFM, Output %
0-10VDC (Pressure or Flow)	Control Modes:
N.O. Digital (configurable)	Pressure (Direct and Rev. Acting)
Input:	Airflow (CFM) (M^3/hr)
Override (Dry Contact)	Mounting:
Setpoint Range:	Four Ext. holes for #10 Screws
-1.00" to +1.00" WC *(+/-249Pa)*	Enclosure Material:
0-10,000 CFM *(16.990 m^3/hr)*	UV-Resistant Polycarbonate, UL94V-0
Accuracy:	Enclosure Rating:
+/- 1.0% FS @ 80F	IP66, NEMA-4
Temperature Compensation Range:	Environmental Operating Range:
45 to 80°F *(7 to 26°C)*	-13 to 175°F *(-25 to 79°C)*
Port Connection:	0-95% RH non-condensing
1/4 inch *(6mm)*Tubing (1/8 to 3/16 inch ID) *(3 to 5mm ID)*	
Burst Pressure:	
1.5psi (either port) *(10.342Pa)*	

Assembly Part Numbers		
Description	Assembly P/n	Includes
Controller w/ Integral Transducer, 1 Duct Static Tap	872982	385604, 474748
Controller w/ Integral Transducer, 1 Room Static Tap	872983	385604, 474770
Controller w/ Integral Transducer, 2 Room Static Taps	872984	385604, 474770 (2)
Controller w/ Integral Transducer, 1 Duct Static and 1 Duct Total Tap	872985	385604, 474748, 475106
Controller, Remote Transducer, 1 Duct Static Tap	872986	385605, 385606, 474748
Controller, Remote Transducer, 1 Room Static Tap	872987	385605, 385606, 474770
Controller, Remote Transducer, 2 Room Static Taps	872988	385605, 385606, 474770 (2)
Controller, Remote Transducer, 1 Duct Static and 1 Duct Total Tap	872989	385605, 385606, 474748, 475106
Controller, Remote Transducer	872990	385605, 385606

Mounting Hole Pattern



Note:
Four (4) #10 screws recommended with 5/32 in. *(4mm)* pilot holes.

Our Commitment

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

Specific Greenheck product warranties are located on greenheck.com within the product area tabs and in the Library under Warranties.

GREENHECK
Building Value in Air.

Phone: 715.359.6171 • Fax: 715.355.2399 • Parts: 800.355.5354 • E-mail: gfcinfo@greenheck.com • Website: www.greenheck.com

