

Vari-Green® Q&A

EFFICIENT | RELIABLE | CONTROLLABLE

Q: What is an EC Motor?

A: An EC Motor is an electronically commutated motor that includes a permanent magnet rotor for increased efficiency and speed controllability.

Q: Why is an EC motor more efficient than a traditional AC induction motor?

A: Two things make an EC motor more efficient:

1. All motors operate with two magnetic fields, one in the rotor and one in the stator. In an AC induction motor, both magnetic fields are generated with electricity. In a Vari-Green® motor, only one magnetic field is created with electricity due to the permanent magnet rotor.
2. The integral control board continuously monitors the load on the motor and adjusts its power consumption accordingly. This makes the motor very efficient at partial load conditions.

Q: What testing does Greenheck perform on its Vari-Green motors?

A: Greenheck performs extensive testing when developing new Vari-Green motors and applications. Temperature, efficiency, and reliability testing are done at elevated ambient conditions to make sure the product is reliable.

Q: Can the motor be controlled with a building management system?

A: Yes, anything that sends a 0-10V signal can control the motor.

Q: What are advantages/disadvantages of using a belt-driven fan?

A: Advantages:

- Speed adjustability

Disadvantages:

- Added power losses and noise/vibration
- Maintenance of belts and bearings
- Belt drive fans weigh more



Q: What are advantages/disadvantages of using a direct drive fan (with standard AC motor)?

A: Advantages:

- No drive losses
- Reduced/minimal maintenance
- Less noise/vibration
- Reduced fan size/weight

Disadvantages:

- Fan speed cannot be adjusted without purchasing an external device

Q: What is an advantage for using a Vari-Green® fan?

A: The advantages of belt and direct drive fans can be combined with none of the disadvantages.

Q: What does a Vari-Green fan cost compared to a belt drive or direct drive fan?

A: A Vari-Green fan is priced competitively with a belt drive fan, usually +/- 10% depending on the fan type and size. A direct drive fan with a standard motor will be less expensive, but some device must be added to provide speed adjustment.

Q: What are the differences in operating costs?

A: Typical operating cost reductions for Vari-Green motors are 30-50% depending on operating conditions.

Q: Do I need to select a variable frequency drive (VFD) with the Vari-Green motor?

A: No. The variable speed drive is built into every motor so no external VFD is needed.

Q: If a VFD is not needed, how is the speed adjusted?

A: Two methods are available to adjust the speed. A dial on the side of the motor can be used to set the speed for system balancing in constant volume applications. A 0-10 V signal can be provided by a control, a remote dial, or a building management system (BMS).

- Q:** Can I connect a 4-20mA signal to control a Vari-Green motor?
- A:** A 500-ohm resistor will convert the current signal into voltage for most Vari-Green motors. There are some Vari-Green Motors (1-10 hp) that can use the 4-20mA as is. Please see the IOM for more detail.
- Q:** Can all Vari-Green motors operate with the dial on motor or the 0-10V input? Do I have to order a new motor if I want to change the control method?
- A:** All Vari-Green motors have the capability to operate with the dial on the motor and the 0-10V input without physically replacing the motor. Other parts may be necessary to convert depending on the exact model, but a new motor is not required.
- Q:** What is the turndown capability?
- A:** 80% of maximum RPM, typically 300 RPM.
- Q:** What kind of motor protection is built in?
- A:** Every Vari-Green motor has built in current overload, locked rotor and thermal protection.
- Q:** Does a motor starter need to be supplied with the fan?
- A:** A motor starter is not necessary due to the built in motor protection, but if the control features of the starter are desired, then one can be supplied.
- Q:** What is the motor offering?
- A:** 1/15th – 2 hp (single-phase), 1-10 hp (three-phase)
- Q:** What fan models have Vari-Green motors available?
- A:** New fans are being added to the Vari-Green family all the time! Please see our catalogs on greenheck.com/vari-green or CAPS® to find the most current list.
- Q:** Can Vari-Green motors be applied to belt drive fans?
- A:** Even though a Vari-Green motor in a direct drive fan can replace the functionality of a belt drive fan, there are some models where direct drive options don't exist. Vari-Green motors are offered in a belt drive configuration on larger fan models. Please see our catalog for current offering.
- Q:** Why do some specifications say that motors above 3/4 HP be 460v three phase?
- A:** This is typically due to the relative inefficiencies of traditional single-phase motors. The high amp draw and large inrush current on startup are reasons why some specifications move into 460V on motors as low as 3/4HP. With the increased efficiencies of the VG motor and its built in soft start, this specification should be re-thought.
- Q:** When is Greenheck going to offer larger Vari-Green motors?
- A:** Greenheck has actually introduced Vari-Green motors for much larger fan sizes. This includes motors up to 10 hp, as well as those having three-phase motors. This effort has resulted in Vari-Green motors being offered in belt drive applications when it makes sense.
- Q:** Can the 230V motors operate on 3-phase power?
- A:** If 3ph 208-230V is available, simply use two of the three legs to connect to the motor. The phase of the incoming power does not affect these motors as it does an induction motor.
- Q:** What is the efficiency of Vari-Green Motors?
- A:** Vari-Green motors are on average 85% efficient and maintain a high level of efficiency at partial load conditions.
- Q:** What do your competitors offer?
- A:** Most of our competitors have an EC motor available. However, Greenheck offers a much broader selection of motor sizes and controls.
- Q:** How long has Greenheck offered Vari-Green motors?
- A:** Greenheck started offering Vari-Green motors in 2009.
- Q:** Will they last longer than the traditional motors used by the industry for years?
- A:** Greenheck has sold over 500,000 Vari-Green motors over the last 12 years. The return rate is less than 1%, which is typical for electric motors. If a motor does fail, we have that motor returned to us for full evaluation of the failure mode. This process has led to many improvements in the motor. Motor life has many variables. One important variable is motor temperature. These motors typically run cooler, especially at reduced speeds when compared to traditional motors. Lower temperature equals longer life.

Q: How easy is it to get replacement motors/parts?

A: Greenheck stocks all motors and controls in Schofield and can arrive the next day. Select items also are stocked in the regional warehouses.

Q: What type of controls do you offer?

A: Greenheck offers remote dial, touch remote, two-speed, constant pressure/airflow, volatile organic compound (VOC), temp/humidity as well as a Hand/Off/Auto (HOA).

Q: Can I use a motorized backdraft damper when operating a Vari-Green motor with a 0-10V signal?

A: Yes. The Vari-Green transformer or the HOA devices not only provide power to the controls, but have a built in auxiliary contact, which can be used to signal a damper to open whenever the fan is running.

Q: Does this VOC control also detect CO2?

A: No. CO2 is not a VOC. The VOC controller will sense the presence of any volatile organic compound (of which there are between 5 and 10 thousand known). VOCs come from a variety of sources including paints, carpeting—even our breathing or eating adds VOCs. Due to this, the VOC controller will not only act on occupancy in a space, but will truly look at the quality of the air in that space.

Q: Doesn't the ASHRAE standard require me to detect CO2?

A: ASHRAE 62.1 does say that CO2 can be used as a method for sensing occupancy, but it doesn't say that it is the only way.

Q: What advantages does detecting VOC have over CO2?

A: It allows for a higher level of air quality by not only sensing occupancy but also sensing chemicals, off-gassing of paints and carpets, perfumes and other items that can affect human productivity.

Q: Does the VOC control need to be recalibrated?

A: Unlike a CO2 sensor, the VOC control does not need recalibrating.

Q: Is the constant pressure control easy to program?

A: Yes, programming is very easy. There are only three buttons on the control and simple programming instructions are included in the Installation and Operation manual included with each control.

Q: Is this control UL approved for dryer exhaust?

A: UL-705 references dryer exhaust duct power ventilators, which are used in single dryer residential applications. When our fans are used in multi-dryer exhaust, this section of the standard does not apply. It makes a general reference to fans move “lint-laden air” for multi-dryer exhaust and requires the motor be out of the airstream. Greenheck's up-blast and down-blast exhaust fans (CUE's and G's) have motors mounted out of the airstream. Therefore, the fan is acceptable for use with dryer exhaust applications in multi-dryer variable exhaust systems.

Q: How can I switch between the two speeds for a two-speed control?

A: There are two methods. One connects a single-pole double-throw (SPDT) switch or relay. The second method sends 115 VAC directly into the two-speed control. These two methods are known as “dry contact” and “wet voltage” inputs and allow for use with many devices.

Q: Can these motors and controls be used for retrofits?

A: Greenheck typically does not sell Vari-Green motors individually for installation into existing fans. We have found it is easier and cheaper to purchase and install an entire fan, so the warranty would remain intact. The Vari-Green controls can be installed to existing fans if desired and can also be used with other fans without VG motors, such as fans operating on a VFD.

Q: How can a field technician gain access to information while on the jobsite?

A: A QR code is located on every fan shipped with a Vari-Green motor. Scan with a smart phone to gain access to instruction manuals, wiring diagrams and other Vari-Green related information.



greenheck.com/vari-green/vari-green-motors

CAPS®

Q: How do I find Vari-Green selections?

A: Vari-Green selections are shown as models with -VG at the end of the model and size. VG selections will appear when selecting a belt or direct drive model (if applicable) in CAPS.

Q: How do I know the fan speed I have, will speed the fan up if necessary in the field?

A: There are two ways. In the selection grid of CAPS, the fan speed column can be compared with the Max Fan Speed column. Another method is to select the min/max speed fan curve from the fan curves tab. It is important to note that the operating BHP and motor nameplate HP cannot be directly compared as in a belt drive fan.

Q: If the selected fan RPM and max RPM are too close, how can I get more horsepower to increase the speed of the fan?

A: For most selections you will be able to bump up the motor HP in the motor tab which will raise the max RPM of the fan. If the selection already gives the largest motor for that size fan, a different fan size must be selected.

Q: The motor data shows a max RPM of 1725, but my caps selection shows a max RPM of 1550. How can we ensure the customer doesn't increase the speed faster than they should?

A: If the max RPM for a given fan/motor combination is less than 1725, the motor will be programmed at the factory to not exceed the max RPM value.

Q: How are the controls selected?

A: There is a section at the bottom in the Configuration/Motor tab in CAPS for selecting Vari-Green controls.

Q: If a device not supplied by Greenheck will be used to send a 0-10V signal to the motor, what controls option should be selected?

A: The 0-10VDC option should be selected. This will configure the motor to accept a 0-10V signal by others. If the motor also requires 24V for 0-10V operation, a factory mounted transformer is available to provide the 24V power to the motor.

Q: How do I select the constant CFM control?

A: Select Constant Airflow under the Configuration/Motor tab in CAPS. An AMS or pitot tube is selectable for flow measurement.

Q: I have an airflow requirement that is above the capability of the current Vari-Green® motor offering but would like to use the constant pressure control. Is that possible?

A: Vari-Green controls can be used to control any device that can accept a 0-10V signal such as a VFD.

Q: Are any tools available to quantify potential energy savings?

A: The operating cost of all fan selections is shown in the selection grid. The hours/year of operation and \$/kWh can be adjusted to meet a specific scenario. A stand-alone excel document can also be used to estimate the potential savings. This is available by selecting the question mark in the top right corner of the Motor tab on a Vari-Green selection. Select Vari-Green and scroll down to the link that says—click here to access the energy savings calculator.

Q: Where can I find catalogs and other Vari-Green literature?

A: Greenheck.com has a page dedicated to Vari-Green motor and control information. It can be found here: greenheck.com/vari-green

