Brushless -vs- Brushed DC Motors

The main difference between a brushed motor and a brushless motor, (besides the differences implied by the names), is that the brushed motor uses an electromagnet system as the rotor surrounded by permanent magnets (and sometimes more electromagnets), and the brushless motor has a magnetic rotor surrounded by electromagnets. A brushless DC motor (BLDC) is a DC (direct current) electric motor that uses an electronically-controlled commutation system, instead of a mechanical commutation system. In a conventional (brushed) DC-motor, the brushes make mechanical contact with a set of electrical contacts on the rotor (called the commutator), forming an electrical circuit between the DC electrical source and the armature coil-windings. As the armature rotates on axis, the stationary brushes come into contact with different sections of the rotating commutator, thus over time wearing out. Brushless commutation with electronics instead of brushes allows for greater flexibility and capabilities not available with brushed DC motors, including speed limiting, "micro stepped" operation for slow and/or fine motion control, and a holding torque when stationary.

Brushless motors offer other advantages over brushed DC-motors, including higher reliability, longer lifetime (no brush erosion), elimination of ionizing sparks from the commutator, and overall reduction of electromagnetic interference. Brushless motors are considered more efficient than brushed DC-motors. This means for the same input power, a brushless motor will convert more electrical power into mechanical power than a brushed motor.

There are many aspects about the two types of magnets and electromagnets of both types of motors (brushless -vs- brushed), which could fill several pages if everything was covered – but we are just focusing on the basics as it relates to solar ventilation.

BOTTOM LINE: In our opinion, don't over-pay or believe in long warranties if the product you are considering utilizes brushed dc motors. Most will not even tell you in their marketing material what kind of motor and those that do, offer a 2yr to 5yr warranty which is realistic. But if another supplier is offering you a +20yr, 25yr or lifetime warranty and uses brushed motors – well then you can expect to have to replace the brushes in 2 to 8yrs. So ask yourself – who will have to put them in? How easy is it to access? How easy is it to replace? It's not realistic to think the company that sold them to you will put them in for free which means even more money out of your pocket.

PROS & CONS of BRUSHED -vs- BRUSHLESS motors:

>Brushed motors are inefficient due to the power losses from imperfect power transfer through the commutator system.
>Brushless motors are much more efficient without these losses.

>Brushed motors have short lifetimes due to the wear of the brushes and commutators. Typically brushes will need to be replace within two to 7 years, depending on the operating temperatures and environment.
>Brushless motors do not use commutation parts so they do not suffer from this.

>Brushed motors require more complicated methods for speed control, lowering voltage reduces speed but also reduces torque (rotational power). Torque vs. speed is such that torque drops sharply at lower speeds.
>Brushless motors are very simple to control speed, rotational power (torque) vs. speed characteristics are opposite those of brushed, where torque is highest at slow speeds.

>Brushed motors run much too fast to be useful to most applications, requiring a gearing system to reduce this speed (torque increases as a side benefit) to make the motor match the application.
>Brushless motors excel in this regard, as they are very frequently used directly without gearing, although some applications requiring high precision or additional torque will use a gearing system.