



Motors, what is going on?

PSC

Old style

Constant Torque

X-13

Endura Pro

Constant Airflow

True Variable

Constant CFM

Condenser ECM

Constant Speed(s)

Constant RPM

Are PSC motors going away?

PSC *Permanent Split Capacitor* motors have been the workhorse of the residential industry for over 50 years. These motors are going away, furnaces cannot use them anymore. PSC motors had their day and did an extraordinary job for what they were designed to do.

FER 2019 regulation basically scrubbed the OEM industry of PSC indoor blower motors.. However the regulation doesn't specifically regulate the use of ECM. It simply raised the efficiency bar to a point that made it very difficult to build the HVAC system to meet the regulation using PSC. So it is still possible for OEM to build units with PSC if they can meet the efficiency point set by the regulations.

In the aftermarket world PSC is still predominate. But can be upgraded to ECM with a truck stock motor.

As of this writing even condenser fan motors are beginning a shift to ECM Constant Speed motors.

Constant torque and X13... are they the same?

Constant Torque motors are a step up from a PSC because it can provide the CFM needed at a slightly higher static pressure. It is an ECM motor but it is not a "Variable Speed Motor" They are programmed to operate in Constant Torque mode and are built with typically 5 speed taps that are energized with 24vac.

X13 is the trade name for the first constant torque motor built by Genteq

2013 the next gen replacement for X13 was called Endura Pro.

Then came Evergreen EM

For the FER2019 regulation Ensite was built

US motors and Broad Ocean have their versions also.

They are programmed to operate in Constant torque mode.

What's the difference between Constant Torque & Constant Airflow (Variable) aren't they both ECM?

Both are ECM. The major difference is how they are programed.

There are two notable differences.



Motors, what is going on?

Constant Torque operate to maintain motor torque when static pressure changes. Constant torque motor maintains the programmed torque to the shaft so as Static pressure goes up, CFM goes down and vice versa. Much like a PSC but much more effective and efficient. Airflow is selected and adjusted by simply selecting the desired airflow tap based on the Blower charts and External Static Pressure.

Constant Airflow

Variable Speed, Constant Airflow, or Constant CFM

Maintain CFM selected on system control board.

Static pressure goes up; motor adjusts torque to maintain desired CFM

Static pressure goes down; motor adjusts torque to maintain desired CFM

Constant Airflow motors will maintain set CFM or die trying...

Their upper limit for operation is typically an External Static Pressure of up to .9"wc.

These "True Variable" motors operate to maintain the CFM selected on the OEM control board using dip switches, or jumper pins, or on the OEM user interface through menu selections.

They are commonly built with one of three communication methods between themselves and the OEM control board (Discrete 24v, PWM Pulse Width Modulation, or Serial communication).

Need to have Tools for True Variable Troubleshooting

What are the Variable Speed motor testers do we recommend for techs to have in the field?

GA447

TecInspect

NOR921767

Broad Ocean Motor Tester

SUPECMPRO

ECMPRO Supco Ecm Motor Tester

Constant RPM motors or Constant Speed motors are utilized primarily by OEMs for the condenser fan. Typically one speed is chosen by the OEM to drive the specially shaped fan blades to their optimum rpm and noise level. There is no pin selection or toggle switches to set because tweaking the rpm on a fan blade will not pull any more air through a dirty condenser coil. There are however versions of this motor with two speeds built specifically for an OEM's two stage condensers. Ideally these are installed shaft down to keep the pod dry but sometimes OEMs request them to be inverted shaft up so the module is flipped upside down keeping the pod dry and an umbilical cord is run from the module to the motor on the outside. There are rare manufacturers that will separate the module and the motor keeping the module in the compressor compartment of the condenser.

What is the most common problem with all types of ECM products regardless of manufacturer?

95 percent of the time it's the module that fails.

That failure typically is caused by high static pressure caused by poor ductwork.

New install or retrofit fall in the same category here.

If airflow is not measured and External Static Pressure is proven, then there is a high percentage that the motor will prematurely fail.