Selecting an Azure HVAC ECM

The past 20 years have brought significant changes in system design. Motors have seen some of the most dramatic change, largely driven by the need for improved efficiencies. Given the number of replacement options available, identifying suitable replacement product for a failed motor has grown increasingly challenging.

Motor Types

There are three types of motors commonly used in residential AC systems today. Due to installed base, the workhorse in the industry are Permanent Split Capacitor (PSC) motors. These motors feature a design that utilizes two sets of windings. The main windings connect directly to the power supply, while the secondary windings connect to power and a capacitor. This design offers a more efficient operation than previous motor designs, as the capacitor provides extra current at startup and when the motor slows.

As homeowners, manufacturers, and regulators have pushed for improved efficiencies, system design has begun to favor the use of Electronically Commutated Motors (ECM). These are DC motors that operate on AC power. They feature a built-in inverter and microprocessor to manage commutation. PSC motors are typically 60% efficient, whereas ECMs are 80% efficient (a 33% increase). Most ECMs installed in residential systems today are constant torque. This means that they operate at one or more torque settings dictated by the system manufacturer (up to 5 taps settings can be used). These motors offer better long-term function and improved speed control relative to PSC motors. They function without the need of a capacitor.

Today, the most efficient systems are designed with variable speed motors. These motors increase or decrease speed to meet the needs of the system. They may communicate back to the system board to ensure that the correct amount of airflow is passing through the system. These bring an increase in efficiency, up to 90%.

Replacement Selection

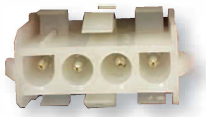
The easiest replacement option from an installation perspective is to identify the OEM part and use it. This is generally best practice when a system is in warranty, but for product out of warranty the fastest option is typically an aftermarket replacement. For PSC motors, using another PSC can be the easiest option to follow, however PSC motors tend to be relatively inefficient and due to the numbers produced, sourcing an exact replacement can take significant time. To simplify the replacement process, MARS has developed the Azure line of ECMs to ensure that an efficient, easy to select and source motor can always be on hand.

To identify an aftermarket replacement motor, you must first clarify the purpose of the original motor – direct drive blower or condenser. Then, identify the type of motor that was installed (PSC, constant torque ECM, or variable speed). A PSC motor will have a capacitor installed. To identify which type of ECM, use the images below to identify the wire harness type and corresponding motor technology.

Constant Torque

16 Pin Variable Speed (2.0 & 2.3)

4 Pin Variable Speed



The last step is to identify the horsepower and voltage. The motor horsepower and voltage can be easily taken from the motor or furnace nameplate.

If using an Azure ECM as a replacement, you can select the appropriate replacement motor using the following table.

APPLICATION	ORIGINAL MOTOR TYPE	HP	VOLTS	AIRFLOW ADJUSTMENT METHOD	MARS NO.
Direct Drive Blower	Variable Speed ECM	1/4-1/2	115/230	Bluetooth built in; configuration done using free Azure app	10856
		1/2-1			10857
	Constant Torque ECM	1/5-1/2	115/230	Bluetooth built in; configuration done using free Azure app	10858
		1/2-1			10859
	PSC	1/8-1/3	115/230/277	Module (08502)	10867[1]
		1/3-1/2	115/230		10865
		3/4-1			10866
Condenser	PSC	1/8-1/3	208-230	Apply 120V – Motor cycles through possible configurations	10874

1) *Features a 5.0" diameter body.*

A few points to aid in selection

- All motors noted above are single phase ECMs, designed for use in traditional residential split HVAC systems, and do not require capacitors.
- Unless noted otherwise all feature a 5.5" diameter body.
- Setting/Optimizing Airflow – All Azure motors feature a simple method to configure or make airflow adjustments in the field. The methods vary depending on the specific motor.