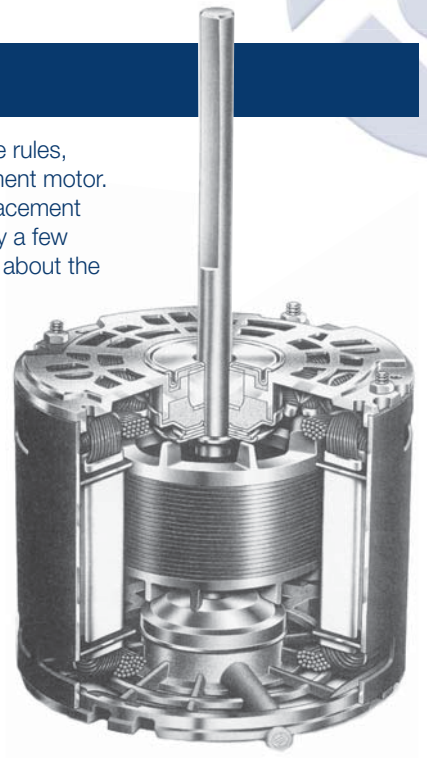
SELECTING A MOTOR



Although selecting a replacement motor isn't a science, there are rules, and rules of thumb, that will provide you with a suitable replacement motor. It should be mentioned that the best method for selecting a replacement motor is to follow the OEM recommendation. It usually takes only a few minutes to select a replacement motor. Things you should know about the original motors are:

1. **FRAME SIZE OR SHELL DIAMETER**
   For example, many HVAC motors are 48 frame, with a body diameter of approximately 5-5/8 inches.

2. **VOLTAGE AND NUMBER OF PHASES**
   Motors will either be single or three phase. The voltage will be one of the following:
   120V (also commonly referred to as 110V or 115V)
   208V (also commonly referred to as 200V)
   230V (also commonly referred to as 220V or 240V)
   460V (also commonly referred to as 440V or 480V)
   575V (also commonly referred to as 600V)

3. **HORSEPOWER AND FULL LOAD AMPS (FLA)**
   For smaller motors used in HVAC equipment, horsepower ratings are not an absolute reference. When determining a motor's strength, it is suggested that a number of factors including FLA and physical stack height also be considered.

4. **SPEED (RPM)** The number of poles (windings) in a motor determines the no load high speed rpm as shown below. The actual speed of the motor will vary based on the fan or blower load, and the horsepower.
   2 poles – 3450 rpm
   4 poles – 1725 rpm
   6 poles – 1075 rpm
   8 poles – 825 rpm

5. **NUMBER OF SPEEDS** Motors will often have multiple speeds, particularly in the case of indoor blower motors. Different speeds may be necessary to adjust airflow for the specific installation, or for different operating modes.

6. **CAPACITOR** Most residential HVAC motors are single phase PSC type (Permanent Split Capacitor) and require a run capacitor to operate. The capacitor should always be replaced when replacing a motor. The original and replacement motor do not need to use the same capacitance value, simply use the capacitor recommended for the replacement motor. Note that some older motors are of the shaded pole design which do not use a capacitor. Three phase motors also do not use a run capacitor.

7. **SHAFT SIZE AND LENGTH** The shaft needs to be able to engage with the blower wheel or fan blade at the same location. For condenser fan blades in particular, it is important that the fan blade be able to mount at the same relative position related to the venturi ring or airflow may be effected.

8. **WIRE LENGTH** For lead connected motors, the conductors need to be able to reach the connection points, or will need to be spliced in the field.

9. **MOTOR SHAFT ROTATION DIRECTION** Rotation direction in this catalog is referenced as "OSE" or "Opposite Shaft End." This means the direction is referenced as when looking at the butt end of the motor. Note: all 3-phase motors are reversible.

10. **APPLICATION / DRIVE TYPE** Most blower motors have open housings and are not suitable for outdoor use as condenser motors. Most small HVAC motors are "direct drive," with some larger applications requiring "belt drive."

11. **MOUNTING**
    Shell-band – A ring fastened around the motor body
    Thru-bolt – Bolts protruding through the motor end(s)
    Shell-screw – Brackets mount with short screws into tapped holes in motor body
    End-boss – Bolts or screws tapped into tapped or untapped recesses in motor end
    Platform – Used for larger motors
    Resilient Ring – A type of platform mounting using rubber rings on motor ends

INDOOR BLOWER MOTORS (120V)

OEM Indoor Blower Motors (120V)

PROTECH

These motors are OEM replacements for Rheem, Ruud, and WeatherKing models; additionally they may be suitable for aftermarket retrofit in many other applications

PART NO	HP	HIGH SPEED (RPM)	NO OF SPEEDS	INPUT VOLTAGE	NO OF PHASES	FREQ (Hz)	ROTATION DIRECTION (OSE)	RUN CAPACITOR (uF/V)	FLA AT 120V (A)
51-21627-01	1/8	825	2	120	1	60	CCW	7.5/370	1.80
51-23101-01	1/8	825	2	120	1	50,60	CCW	7.5/370	2.80
51-27210-01	1/6	825	2	120	1	60	CCW	10/370	3.20
51-20169-02	1/6	1075	2	120	1	60	CCW	5/370	3.30
51-23015-91	1/5	1075	3	120	1	60	CCW	10/370	3.10
51-102175-01	1/5	1075	2	120	1	60	CCW	10/370	1.30
51-102175-02	1/5	1075	2	120	1	60	CCW	5/370	2.60
51-23101-02	1/4	825	2	120	1	50,60	CCW	10/370	4
51-27210-02	1/4	825	2	120	1	60	CCW	20/370	4.50
51-21628-01	1/4	825	2	120	1	60	CCW	10/370	4.50
51-104380-01	1/4	1075	4	120	1	60	CCW	7.5/370	4.0
51-23014-31	1/4	1075	3	120	1	60	Reversible	5/370	4.70
51-102175-03	1/4	1075	2	120	1	60	CCW	12.5/370	3.40
51-104939-01	1/3	825	4	120	1	60	CCW	20/370	5.7
51-23101-03	1/3	825	2	120	1	50,60	CCW	15/370	5.60
51-27210-03	1/3	825	2	120	1	60	CCW	20/370	7.20
51-102175-04	1/3	1075	2	120	1	60	CCW	15/370	5.30
51-23102-04	1/2	825	1	120	1	50,60	CCW	20/370	6.80
51-27210-04	1/2	825	1	120	1	60	CCW	20/370	9.90
51-102424-01	1/2	1075	4	120	1	60	CCW	7.5/370	5.80
51-102994-03	1/2	1075	4	120	1	60	CCW	7.5/370	5.80
51-24042-02	1/2	1075	4	120	1	60	CCW	7.5/370	6
51-102500-01	1/2	1075	4	120	1	60	CCW	7.5/370	6.3
51-104671-01	1/2	1075	4	120	1	60	CCW	7.5/370	6.3
51-24070-01	1/2	1075	4	120	1	60	CCW	15/370	7.10
51-24070-02	1/2	1075	4	120	1	60	CCW	7.5/370	7.10
51-26002-01	1/2	1075	4	120	1	60	CCW	7.5/370	7.1
51-104940-02	1/2	1075	4	120	1	60	CCW	20/370	7.5
51-104940-01	1/2	1075	4	120	1	60	CCW	20/370	7.8
51-103243-01	1/2	1075	4	120	1	60	CCW	15/370	8
51-22858-01	1/2	1075	3	120	1	60	CCW	7.5/370	5.80
51-102994-02	1/2	1075	3	120	1	60	CCW	7.5/370	6.30
51-24272-01	1/2	1075	3	120	1	60	CCW	15/370	7.90
51-24145-01	1/2	1075	3	120	1	60	CCW	15/370	8
51-102175-05	1/2	1075	2	120	1	60	CCW	20/370	7
51-102994-01	1/2	1075	1	120	1	60	CCW	7.5/370	5.80
51-24043-03	3/4	1075	4	120	1	60	CCW	15/370	7.30
51-104342-01	3/4	1075	4	120	1	60	CCW	20/370	8.3
51-104941-01	3/4	1075	4	120	1	60	CCW	20/370	8.4
51-104941-02	3/4	1075	4	120	1	60	CCW	20/370	9.3
51-24043-02	3/4	1075	4	120	1	60	CCW	15/370	9.40
51-25023-01	3/4	1075	4	120	1	60	CCW	15/370	9.50
51-102175-06	3/4	1075	2	120	1	60	CCW	20/370	8.10

SHAFT DIA (IN)	MOTOR BODY DIA (IN)	OVERALL SHAFT LENGTH (IN)	MOTOR BODY LENGTH (IN)	OVERALL MOTOR LENGTH (IN)	MOUNTING	BEARING TYPE	APPLICATION	DRIVE TYPE
1/2	5-5/8	4-7/16	4-1/4	8-5/8	Shell-band	Sleeve	Blower	Direct Drive
1/2	5-5/8	2-3/4	4-1/16	6-13/16	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	2-9/16	4-1/4	6-4/5	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	3	3-13/16	6-13/16	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	4-15/16	2-1/2	5	7-5/8	Shell-band	Sleeve	Blower	Direct Drive
1/2	5-5/8	2-3/4	4-1/4	7	Shell-band	Sleeve	Blower	Direct Drive
1/2	5-5/8	2-3/4	4-1/2	7-1/4	Shell-band	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-1/2	4-5/16	7-13/16	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-5/16	4-1/2	7-4/5	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	4-7/16	4-13/16	9	Shell-band	Sleeve	Blower	Direct Drive
1/2	5-5/8	4-1/2	4-11/16	9-11/32	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	5	4-1/4	9-1/4	Shell-band,Thru-bolt	Sleeve	Blower	Direct Drive
1/2	5-5/8	2-1/2	4-1/2	7-1/16	Shell-band	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-1/4	5-1/16	8-5/16	Shell-band	Ball	Blower	Direct Drive
1/2	5-5/8	2-3/16	4-9/16	6-3/4	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	2-1/16	5-1/4	7-5/16	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	2-1/4	5	7-1/4	Shell-band	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-1/4	5-1/4	8-1/2	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-5/16	5-1/2	8-4/5	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-7/16	4-7/16	7-7/8	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-39/64	3-1/2	4-3/4	8-1/4	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-39/64	3-1/2	4-3/4	8-1/4	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-1/2	4-13/16	8-5/16	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	4-1/2	4-11/16	9-11/32	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-1/2	4-3/4	8-5/16	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-1/2	4-3/4	8-5/16	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-1/2	4-13/16	8-5/16	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-1/2	5-9/16	9-1/16	Shell-band	Ball	Blower	Direct Drive
1/2	5-5/8	4	5-9/16	9-1/2	Shell-band	Ball	Blower	Direct Drive
1/2	5-5/8	3-3/4	5-1/4	9	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-1/2	4-3/4	8-1/4	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-1/2	4-3/4	8-5/16	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-3/4	5-1/4	9-1/16	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-3/4	5-1/4	9-1/16	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	4-1/4	5-1/4	9-1/2	Shell-band	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-1/2	4-3/4	8-5/16	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-39/64	3-3/4	5-11/16	9-1/2	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	4-3/4	5-3/16	10-3/32	Shell-band	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-1/2	5-9/16	9-1/16	Shell-band	Ball	Blower	Direct Drive
1/2	5-5/8	3-1/2	5-9/16	9-1/16	Shell-band	Ball	Blower	Direct Drive
1/2	5-39/64	3-3/4	5-11/16	9-1/2	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	3-3/4	5-13/16	9-9/16	Shell-band,Shell-screw	Sleeve	Blower	Direct Drive
1/2	5-5/8	4	5-1/2	9-1/2	Shell-band	Sleeve	Blower	Direct Drive