

Marathon



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Marathon Motors Nameplate Information – How To Read The Nameplate

The nameplate is the key to selecting the proper replacement motor.

Motor Specifications (Example)

Agency Symbols

- | | |
|---|--|
| <ul style="list-style-type: none"> 1. MODEL - The ID number 2. DATE CODE - The month and year manufactured 3. MTG. - Mounting 4. FRAME - The size & mounting 5. PART NO. - Customer part number 6. SER. - Serial number 7. TYPE - Electrical type 8. DES. - Code by NEMA or IEC 9. PH - Electrical phase usually 1 or 3 10. INS CL - Insulation Class 11. DUTY - Time rating under load 12. MAX AMB - The allowable surrounding air temperature 13. ENCL - Enclosure (i.e. TEFC) 14. RISE - The temperature rise over ambient expressed in degrees Celsius when the motor operates at nameplated HP or KW 15. IP - Inherent Protection of the enclosure to solids and liquids as defined by IEC 34-5 16. IC - Inherent Cooling 17. CODE - NEMA locked-rotor KVA | <ul style="list-style-type: none"> 18. MTH/YR MFG. - Month and year motor was manufactured 19. WT/LBS - Motor weight in pounds 20. WT/KG - Motor weight in kilograms 21. HZ - Input frequency of the power supply, usually 50 or 60 HZ 22. VOLTS - Voltage rating of the motor at the operating frequency 23. HP - Rated horsepower the motor will produce 24. KW - Rated output in watts 25. F.L. AMPS - The rated load current expressed in amps at nameplated horsepower with nameplate voltage and frequency 26. S.F. - Percentage of the rated horsepower the motor can safely operate at:
Example: 1.15 SF (115% of rated HP) 27. PF / COS - Power Factor / Cosine is the ratio of actual power to the apparent power 28. RPM - Full load speed at rated frequency 29. NOM EFF - Average Efficiency 30. SHAFT END BEARING - Manufacturer drive end bearing number 31. OPP. END BEARING - Manufacturer opposite drive end bearing number 32. SHAFT END BRG - Drive end bearing size 33. OPP - Opposite drive end bearing size |
|---|--|

√ Stock model for Marathon and/or MARS. Prices and Specifications are subject to change without notice.



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General Information

How To Read A Model Number:

Each Marathon Motors motor carries a model number that can be used to define some of the motor's physical and electrical characteristics.

Example (For Fractional): 1PC48C17D2000AP

This is a breakdown of the model on the nameplate:

<u>1</u>	<u>P</u>	<u>C</u>	<u>48</u>	<u>C</u>	<u>17</u>	<u>D</u>	<u>2000</u>	<u>A</u>	<u>P</u>
1	2	3	4	5	6	7	10	11	12

This is a breakdown of the model in the catalog:

<u>48</u>	<u>C</u>	<u>17</u>	<u>D</u>	<u>2000</u>
4	5	6	7	10

Example (For Integral): 2QA215TBDR A 7076 AL L

This is a breakdown of the model on the nameplate:

<u>2</u>	<u>Q</u>	<u>A</u>	<u>215T</u>	<u>B</u>	<u>D</u>	<u>R</u>	<u>A</u>	<u>7076</u>	<u>AL</u>	<u>L</u>
1	2	3	4	5	7	8	9	10	11	12

This is a breakdown of the model in the catalog:

<u>215T</u>	<u>B</u>	<u>D</u>	<u>R</u>	<u>A</u>	<u>7076</u>
4	5	7	8	9	10

- Date Code** - Year of Manufacture
(Not shown in catalog listings.)
- Thermal Protection** (Not shown in catalog listings.)

	UL Recognized Motor Protector <u>Combination</u>	UL Recognized Motor <u>Construction</u>
Automatic Reset	Automatic Reset	Automatic Reset
Q	Yes	Yes
S	No	No
U	No	Yes
W	#	Yes
Manual Reset	Manual Reset	Manual Reset
P	Yes	Yes
Z	No	Yes
X	No	No
None	None	None
V	No	Yes

Motor protector combination is U.L. recognized only if motor is used in direct drive fan duty application, and is under locked rotor condition, or is running under no-load condition.

- Date Code** - Month of Manufacturer (Not shown in catalog listings.)
- NEMA Frame Size** - (Integral motors - T and U designate standard shaft, TS and US designate short shaft)

5. Electrical Type

Single Phase:

- A = Permanent split capacitor
- B = Capacitor start, capacitor run
- C = Capacitor start, induction run
- N = Split phase start, capacitor run
- S = Split phase

Three Phase:

- T = Three phase
- H = Inverter Duty/IEEE841 Inverter Duty
- V = Medium Voltage

DC Power:

- E = Permanent Magnet DC

6. RPM or Speed at 60 Hz (Fractional Only)

- 34=2-Pole, 3600 rpm
- 17=4-Pole, 1800 rpm
- 11=6-Pole, 1200 rpm
- 8 = 8-Pole, 900 rpm

7. Enclosure

- D = Dripproof
- E = Explosion proof, non-ventilated
- F = Totally enclosed, fan cooled
- G = Explosion proof, fan cooled
- O = Open
- P = Partial
- S = Semi-enclosed
- T = Totally enclosed, non-ventilated
- V = Washdown, non-ventilated
- W = Washdown, fan cooled

8. Frame Construction

Integral

- L = Aluminum (Full Frame)
- Y = Aluminum (Full Frame)
- Z = Aluminum (High Mount Down Frame)
- H = Aluminum - Sourced
- R = Rolled Steel (Full Frame)
- W = Rolled Steel (Full Frame)
- X = Rolled Steel (High Mount Down Frame)
- B = Rolled Steel - Sourced
- S = Cast Iron (Full Frame)
- N = Cast Iron (Full Frame)
- P = Cast Iron (High Mount Down Frame)
- C = Cast Iron - Sourced
- D = Stainless Steel

Fractional

- B = Rolled Steel - Sourced
- D = Stainless Steel - Sourced
- U = Frameless - Sourced

9. Style Letter (A, B, C, etc. indicate redesign)

10. Sequence Number

11. Minor Modification Letter(s)

Fractional - 1 letter; **Integral** - 2 letters

12. Manufacturing Code - A code for the factory where the motor was manufactured.

How To Read A Model Number: Continued

Example (“harmonized” motor design):

A	B	C	D	E	F	G	H	I
5	KH	3	6	K	G	142	-	X

A. Rotating Device

B. Type of Winding

- KH - Split Phase
- KC - Capacitor Start, Induction Run
- K - Polyphase
- KCP - Permanent Split Capacitor
- KCR - Capacitor Start, Capacitor Run

C. Lamination Size

3 - 48 frame, 4 - 56 frame

D. Length of Frame

	48 frame	56 frame
2	5.17	5.73
3	5.42	6.63
4	None	None
5	5.80	7.11
6	6.23	None
7	6.63	7.63
8	7.23	8.44
9	Spec.	Spec.

E. Stack Length

A - 5/8"	F - 1-1/4"	L - 1-7/8"	S - 3.0"
B - 3/4"	G - 1-3/8"	M - 2.0"	T - 3-1/4"
C - 7/8"	H - 1-1/2"	N - 2-1/4"	U - 3-1/2"
D - 1.0"	J - 1-5/8"	P - 2-1/2"	W - 4.0"
E - 1-1/8"	K - 1-3/4"	R - 2-3/4"	Q - Spec.

F. Endshield Construction

- G & N - Aluminum
- K - Steel
- C - Cap/Can

G. Sequence Number

H. Current Revision (blank if original)

I. Type of Overload

- X - UL Auto running & locked rotor
- Y - UL Manual running & locked rotor
- S - UL Auto locked rotor
- T - Non-UL Auto running & locked rotor
- U - Non-UL Manual running & locked rotor
- V - Thermostat
- W - UL Motor Parts

√ Stock model for Marathon and/or MARS. Prices and Specifications are subject to change without notice.



Agency Listings

UL and CSA

Marathon Motors's Fire Pump and Explosion Proof motors are UL Listed. Other motor types are UL Recognized, including models with inherent overheating protection as noted (i.e. thermally protected models). Marathon motors are also CSA Certified for both explosion proof and non-explosion proof enclosures.

AC Motors

Non-Explosion Proof	UL File No.	CSA File No.
NEMA 48-449 Frame	E49747	LR2025
All 5K type models numbers	E46035	MC236833
NEMA 500 and 5000 Frame	—	LR2025*
IEC 63-90 Frame	E49747	LR2025
IEC 100-280 Frame	E49747	LR2025 [#]
Thermally Protected motors	E6312	LR2025
Thermally Protected 5K motors	E14133	MC236833
Insulation Systems	E37900	LR2025
* Does not include coverage for use with VFD		
[#] Domestic product only		
Explosion Proof	UL File No.	CSA File No.
NEMA 56-326 Frame	E12044	LR47504
NEMA 364-449 Frame	E12044	LR21839
Fire Pump Motors	UL File No.	CSA File No.
NEMA 143-510	EX5190	LR2025
Class I, Division 2/Zone 2	UL File No.	CSA File No.
NEMA 48-449, 5000 Frame	—	LR21839
European ATEX Zone 2	Intertek Certificate No.	
NEMA 143-449, IEC 112-280	ITS06ATEX45370	

PMDC Motors

Non-Explosion Proof	UL File No.	CSA File No.
NEMA 56-145	E49747	E49747

CE (Conformity Europeanne)

CE marking on the nameplates of Marathon Motors motors is available upon request for most motors rated 600V or less. We do not apply the CE Marking to explosion proof motors. The European "Low Voltage" Directive applies to electric motors. Contact a factory representative for details. Non-explosion proof microMAX™, BlackMax® and BlueMax® (TENV and TEFC) standard (catalog) models have the CE Mark on the nameplate.

ATEX Directive (ATmospheres EXplosibles)

Mandatory by law, the European Union (EU) Directive 94/9/EC requires that electric motors for use in explosive atmospheres carry the CE mark, notified body identifier, Ex symbol, equipment group and category, plus the date code. See "European Installations" for additional details, located on the next page.

NEMA (National Electrical Manufacturers Association)

Marathon Motors motors are manufactured in accordance with all applicable areas of NEMA standards in MG1-2006. When applied in accordance with the "Guidelines for Application of Three Phase Motors on Variable Frequency Drives", **Marathon Motors motors are in**

full compliance with NEMA MG1-2006, Part 31, Section 4.4.2, as pertaining to voltage spikes. 460 volt motors must withstand voltage spikes of up to 1426 volts; 575 volt motors must withstand spikes up to 1788 volts. See "Insulation Systems" for additional detail on this subject.

Commitment to RoHS and WEEE European Directives

European Directive 2002/95/EC "Restriction of Use of Certain Hazardous Substances" (RoHS) and Directive 2002/96/EC "Directives on Waste Electrical and Electronic Equipment" (WEEE) were enacted to control the amount of certain hazardous substances contained in products shipped into the E.U. Restricted substances include lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls and polybrominated dipheynl ethers.

The scope of products covered, affecting motors, is:

- Large household appliances
- Small household appliances
- IT and telecommunications equipment
- Consumer equipment
- Electrical and electronic tools (except large scale stationary and industrial tools)
- Toys, leisure and sports equipment
- Automatic dispensers

The Directives do not currently apply to medical devices, monitoring and control instruments, spare parts for the repair or reuse of electrical and electronic equipment placed on the market before July 1, 2006, and most military and state security equipment.

Regal Beloit Corporation worked closely with suppliers to assure that product falling within the scope of these Directives meets the specified levels of these substances. The Directives took affect July 1st, 2006 however many products were converted in May and June. The products converted are motors in NEMA frame size 145 and below, both AC and DC motors with the following exceptions:

- Sleeve bearing motors
- Brake motors in 56-145 frame will have to be ordered specifically as RoHS compliant.
- Some motors with specialty electro-mechanical components.

Bearings

Frame Size	Standard Type	Comments
48	Shield Ball	
56 - 184T	Sealed Ball	
182 - 444T	Double Shield Ball	
284 - 449TS	Single Shield Ball	
445T - 6805	Double Shield Ball	Direct - coupled loads
445T - 6805	Roller (DE)/Ball	Belted loads

* **Beltting data must be provided on all belted applications**

Standard horizontal motors can be mounted in a vertical shaft down orientation (except brakemotors). Contact a factory representative for shaft up mounting arrangements.

Motors for use in vertical shaft up or shaft down configurations must be reviewed by Engineering before ordering.

Continued on next page.

Marathon Motors motors employ the use of Mobil POLYREX® EM grease, a specially formulated bearing grease designed for electric motors. POLYREX® EM provides superior lubricity, durability and resists corrosion, rust and washout. POLYREX® EM is a registered trademark of Mobil Corporation.

Maximum safe mechanical speed capability is a function of bearing size, type and grease selection, as well as rotor balance specifications. Consult the "Maximum Safe Mechanical Speed Limits" chart in the "Overspeed Capability" section.

Note that these values do not imply maximum constant horsepower RPM.

Efficiency

The efficiency of a motor is the ratio of its useful power output to its total power input and is usually expressed in a percentage. Marathon Motors offers standard, high efficient EAct, and NEMA Premium® efficient (XRI) ratings. Standard efficiency motors may only be used on applications that are exempt from legislated efficiencies. The high efficient motor line is in compliance with the Energy Policy Act of 1992 (EAct) and/or Canadian efficiencies as set by NRCAN. The Energy Independence and Security Act of 2007 (EISA07) will become law on December 19, 2010, requiring current EAct-compliant motors to meet NEMA Premium® efficiencies, and most EAct-exempt motors to meet EAct levels. XRI Premium efficient motors in this catalog meet NEMA Premium® unless otherwise noted.

The XRI® line is a premium efficiency line, which exceeds mandated efficiencies of EAct and /or NRCAN. Unless otherwise noted, XRI® premium efficient motors in this catalog meet NEMA Premium® the newly promoted efficiency levels by NEMA and the Consortium for Energy Efficiency (CEE).

Electrical Type/Starting Method

Motors in this catalog are capacitor start, split phase, permanent split capacitor, or three phase. Capacitor Start motors have high starting torque, high breakdown torque, and relatively low starting current. Split phase motors have medium starting torque and medium starting current. Permanent split capacitor motors have low starting torque and low starting current. Three phase motors have high starting, extra breakdown torque, and typically very low starting current. Single phase motors cannot be applied on variable frequency drives with three phase output.

Enclosure And Method Of Cooling

Marathon Motors motors are available in various enclosures; Dripproof (DP), Dripproof Force Ventilated (DPFV), Totally Enclosed Fan Cooled (TEFC), Totally Enclosed Non-Ventilated (TENV), Totally Enclosed (TEAO) and Totally Enclosed Blower Cooled (TEBC). Application conditions will determine the type of motor enclosure required.

Dripproof motors have open enclosures and are suitable for indoor use and in relatively clean atmospheres. Dripproof motors have ventilating openings constructed so that drops of liquid or solid particles falling on the machine at an angle of not greater than 15 degrees from the vertical cannot enter the machine.

Totally enclosed motors are suitable for use in humid environments or dusty, contaminated atmospheres. Totally enclosed non-ventilated motors are NOT cooled by external means. Totally enclosed fan cooled motors are cooled by external means that are part of the motor

but not in the internal workings of the motor. Totally enclosed air over motors are sufficiently cooled by external means, provided by the customer.

Hazardous Duty™

Hazardous Duty™ motors are totally enclosed (fan cooled or non-ventilated) motors designed for applications in hazardous atmospheres containing explosive gases and/or combustible dusts.

North American installations

North American standards for electric motors generally fall into one of two divisions. Division 1 Explosion Proof motors are UL Listed in accordance with NFPA Class I (Flammable Gases) or Class II (Combustible Dusts) and Groups (gases or dusts), depending upon the atmosphere. Division 2 motors are CSA Certified and are marked similarly to Division 1 equipment. Inverter Duty motors through 449T frames are CSA Certified for use in Division 2 locations.

European installations

Motors for hazardous locations in Europe must meet a different set of standards and require different markings than those of North America. CENELEC sets the standards for equipment in hazardous locations for Europe. Motors for use in explosive atmospheres in Europe are often referred to as flameproof (Zone 1) or non-sparking (Zone 2) motors. These motors must comply with the ATEX Directive. The ATEX Directive covers all electrical equipment used in explosive atmospheres. To ensure compliance with the Directive, equipment must meet the essential ATEX requirements and carry the CE mark on the nameplate. Other information required on the nameplate includes the Ex symbol, group & category, Ex protection method, gas group, and temperature code, example (Ex)II 3 G Ex nA IIC T3).

The tables on the next page describe Marathon Motors's capabilities by Area Classification and by Temperature Code.

IEC Degrees Of Protection vs. Marathon Motor's Standard Construction

The enclosure terminology for an IEC motor is a combination of the IP (Ingress Protection) and IC (Inherent Cooling) codes. Each number in the IP code stands for a different degree of protection.

- IP12 - Dripproof
- IP22 - Dripproof with screens, or die cast aluminum bracket
- IP43 - Totally Enclosed
- IP54 - Totally Enclosed Severe Duty
- IP55 - Totally Enclosed Severe Duty with V-Ring Shaft seals, and/or "Smart Ring" rotating shaft seal and Neoprene gaskets
- IP56 - Totally Enclosed Severe Duty with rotating Shaft seals (eg. Inpro/Seal® VBX bearing isolator) and Neoprene gaskets

√ Stock model for Marathon and/or MARS. Prices and Specifications are subject to change without notice.

Marathon Motors Hazardous Duty Motor Area Classification Chart

Class I Area Classification (Flammable Gases, Vapors or Mists)				Class II Area Classification (Combustible Dusts)			
North America		Europe - ATEX (Category G - Gases)		North America		Europe - ATEX (Category D - Dusts)	
Division 1 Explosion Proof	Division 2 TEFC & TENV	Zone 1 Flameproof	Zone 2 Non-Sparking	Division 1 Explosion Proof	Division 2	Zone 21 Flameproof	Zone 22 Non-Sparking
Group A	Group A	Contact Marathon Motors for ATEX Zone 1 capabilities	Group IIC, Category G	-	-	-	-
Group B	Group B		Group IIC, Category G	-	-	-	-
Group C	Group C		Group IIB, Category G	-	-	-	-
Group D	Group D		Group IIA, Category G	-	-	-	-
-	-	-	-	Group E	-	Category D	Category D
-	-	-	-	Group F	Group F ^①	Category D	Category D
-	-	-	-	Group G	Group G ^②	Category D	Category D

- Group is not applicable to that Division or Zone, or is not defined.

① Group is not available from Marathon Motors.

② Contact factory representative for availability.

Marathon Motors Hazardous Duty Motor Temperature Code Chart

Temperature Codes			Division 1 Explosion Proof/Zone 1 Flameproof		Division 2/Zone 2 Non-Sparking
			Class I Area Classification (Flammable Gases, Vapors or Mists)	Class II Area Classification* (Combustible Dusts)	Class I Area Classification (Flammable Gases, Vapors or Mists)
Temp.	UL/CSA	ATEX	Division 1/Zone 1	Division 1/Zone 21	Division 2/Zone 2
280°C	T2A	T2(280)			
260°C	T2B	T2(260)			XRI® Severe Duty & IEEE-841 @ 1.15 S.F., Class I, Groups A,B,C,D (Sine wave power)
215°C	T2D	T2(215)			Available through Marathon's Mod Central on Totally Enclosed EPAct, XRI®, XRI® Severe Duty or IEEE-841 @ 1.0 S.F. on PWM VFD, Class I, Groups A, B, C, D
200°C	T3	T3			Available through Marathon's Mod Central on Totally Enclosed EPAct, XRI®, XRI® Severe Duty or IEEE-841 @ 1.0 S.F., Sine wave power Class I, Groups A, B, C, D
165°C	T3B	T3(165)	Explosion Proof - Class I, Group D (Group C as noted), Sine wave or PWM power	Explosion Proof - Class II, Groups F & G, Sine wave or PWM power	
160°C	T3C	T3(160)	Available through Marathon's Mod Central on Explosion Proof - Class I, Group C & D @ 1.0 S.F. - Contact Factory	Available through Marathon's Mod Central on Explosion Proof - Class II, Group F & G @ 1.0 S.F. - Contact Factory	
135°C	T4	T4	ATEX compliant motors	ATEX compliant motors	

Division I & II ambient range is -25°C to +40°C

ATEX ambient range is -20°C to +40°C

Consult Marathon Motors for higher ambients

Insulation Systems

Class B – General Purpose motors that employ Class B insulation systems have a total temperature rating of 130°C and maximum allowable temperature rise of 80°C at 1.0 S.F.

Class F – Motors with a Class F system have a total temperature rating of 155°C, with a maximum temperature rise of 105°C at 1.0 S.F. Many Marathon Motors designs utilize a Class F system but limit temperature rise to no higher than “B” rise, providing thermal “headroom” for longer insulation life.

Class H – Class H insulated motors have a total temperature rating of 180°C and maximum allowable temperature rise of 125°C. All Marathon Motors motors that employ a Class H system are designed to operate between “B” and “F” rise, giving the user a generous thermal cushion.

“**CR200**” – Corona Resistant, 200° rated magnet wire is utilized in numerous general purpose and inverter duty motor designs to extend insulation life under the rigors of steep fronted voltage spikes, common with today’s IGBT inverters. Refer to page 17 for product lines that employ the use of CR200 magnet wire.

Motors with the CR200 insulation system can be operated at up to 475 feet from the drive on 460 volt systems, at 3 KHz carrier frequency. For other voltages and/or carrier frequency combinations, contact a factory representative.

MAX GUARD® – All Black Max®, Blue Max®, Blue Chip®, XRI® Severe Duty and XRI®-841 (IEEE841) motors feature the MAX GUARD® insulation system, either in conjunction with Class F or Class H materials. Combining corona-resistant magnet wire (CR200) with our patented “low stress” winding configuration and uncompromising quality standards, MAX GUARD® delivers long, dependable motor life under the adverse thermal and dielectric stresses imposed by IGBT-based variable frequency drives. MAX GUARD® surpasses the requirements of NEMA MG1-2006, Part 31, Section 4.4.2.

460 Volt (or lower) motors equipped with MAX GUARD® can be operated at any distance from the drive and at any carrier frequency. 575 Volt motors can be operated at up to 650 feet cable length at 3 KHz.

Mounting

Most Marathon Motors motors are designed for horizontal mounting (shaft parallel with ground), unless designed otherwise, such as Vertical P Base motors. As a general rule, a horizontal motor can also be mounted in a vertical shaft down orientation. Horizontal motors should never be mounted in a vertical shaft up orientation without consulting your application engineer, as this practice can cause damage to the motor, which is not covered under warranty. Brakemotors should not be mounted vertically (up or down), unless the brake has been specifically designed for such.

Nema Service Factor Ratings

The table below lists the NEMA service factors for single phase, dripproof motors. Totally enclosed and explosion proof motors have 1.0 service factor except where noted.

Single Phase

NEMA SERVICE FACTOR @ RPM LISTED

HP	3600	1800	1200	900
1/12	1.4	1.4	1.4	1.4
1/8	1.4	1.4	1.4	1.4
1/6	1.35	1.35	1.35	1.35
1/4	1.35	1.35	1.35	1.35
1/3	1.35	1.35	1.35	1.35
1/2	1.25	1.25	1.25	1.15
3/4	1.25	1.25	1.15	1.15
1	1.25	1.15	1.15	1.15
1.5 & Up	1.15	1.15	1.15	1.15

Overload Protection

There are four choices in protection: manual (inherent type), automatic (inherent type), thermostats, and none. A manual overload must be physically reset to restart the motor. An automatic thermal overload will stop the motor when it is overloaded or overheated and restart it after the motor has cooled down. None means the motor has no protection. Thermostats are embedded in the winding and connected to the motor starter control circuit. Marathon Motors’s standards are normally closed thermostats, one per phase.



A motor with an automatic reset protector must not be used where automatic restarting (after motor cool-down) would endanger personnel or equipment. Such applications should use a manual reset protector.

Phase/Power Supply

Is the power supply three phase or single phase? Most home and farm applications require single phase motors, while most factories, large commercial and industrial users require three phase motors. Single phase motors can be used on three phase systems. Three phase motors, however, cannot be operated from single phase systems. Motor damage will result.

Rotation

Most motors in this catalog are reversible by electrical reconnection or by physical orientation. Marathon Motors’s standard rotation from the factory for single phase motors is counterclockwise, when viewing the opposite shaft end of the motor.

Speed/Rpm

3600, 1800, and 1200 are the most common 60 HZ synchronous speeds with full load speed equivalents of 3450, 1725, and 1150.

√ Stock model for Marathon and/or MARS. Prices and Specifications are subject to change without notice.



Terminology

Ambient Temperature – Temperature of the medium, such as air, water or earth, into which the heat of the equipment is dissipated.

Across The Line Start – A method of motor starting that applies full line voltage to the motor. The motor is connected directly to the power source.

Base Speed – Nameplate rating where the motor will develop rated HP at rated load and voltage. With AC systems, it is commonly the point where 60 Hz is applied to the induction motor.

Breakaway Torque – The torque required to start a machine from standstill.

Breakdown Torque (BDT) – The maximum torque that an AC motor will develop with rated voltage applied at rated frequency while rotating.

Cogging – A condition in which a motor does not rotate smoothly but “steps” or “jerks” from one position to another during shaft revolution. Cogging is most pronounced at low motor speeds and can cause objectionable vibrations in the driven machine.

Continuous Duty – The continuous rating is the maximum constant load that can be carried continuously without exceeding established temperature rise limitations under prescribed conditions of load and within the limitations of established standards.

Definite Purpose Motor – Any motor design, listed and offered in standard ratings with standard operating characteristics and mechanical construction, for use under service conditions other than usual or for use on a particular type of application (NEMA).

Duty Cycle – The relationship between the operating and resting times or repeatable operation at different loads and/or speeds.

Efficiency – Ratio of power output to power input indicated as a percentage. In motors, it is the effectiveness with which a motor converts electrical power into mechanical power.

Frequency – Number of cycles per second of alternating current 60HZ used primarily in the United States, 50HZ normally used overseas.

Full Load Torque (FLT) – The torque necessary to produce rated horsepower at full load speed.

General Purpose Motor – This motor has a continuous duty rating and NEMA A or B design, listed and offered in standard ratings with standard operating characteristics and mechanical construction for use under usual service conditions without restriction to a particular application or type of application (NEMA).

Inertia – A measure of a body’s resistance to changes in velocity, whether the body is at rest or moving at a constant velocity. The velocity can be either linear or rotational. The moment of inertia (WK²) is the product of the weight (W) of an object and the square of the radius of gyration (K²). The radius of gyration is a measure of how the mass of the object is distributed about the axis of rotation. WK² is usually expressed in units of lb-ft².

Inrush Current – The initial surge of current into the windings. Inrush current can be up to ten times higher than the continuously needed current because there is low initial resistance.

Intermittent Duty – A motor that never reaches equilibrium temperature, but is permitted to cool down (to ambient temperature) between operations. For example, a crane, hoist or machine tool motor is often rated for 15, 30 or 60 minute duty.

Load Sharing – An application condition in which two or more similar-sized AC Induction motors are mechanically connected to each other and powered from the same inverter. Optimum load sharing is achieved with higher slip (NEMA Design B or C) motors.

Locked Rotor Current (LRA) – Steady state current taken from the line with the rotor at standstill, at rated voltage and frequency. This is the current when starting the motor and load across the line.

Locked Rotor Torque (LRT) – The minimum torque that a motor will develop at rest for all angular positions of the rotor, with rated voltage applied at rated frequency.

No Load (Conditions) – The state of a machine rotating at normal speed under rated conditions, but when no output is required from it.

Part Winding Start (PWS) – A method of reduced voltage starting that applies power to only one set of windings, then to the other set as the motor comes up to speed.

Power Factor – Power factor is the ratio of real power (kW) to total kVA, or the ratio of actual power (W) to apparent power (volt-amperes).

Reactance – The opposition to the flow of current made by an induction coil or a capacitor. Performance data expresses stator reactance as X1 and rotor reactance as X2.

Resistance – The opposition to voltage or current in an electrical circuit. Performance data expresses stator resistance as R1 and rotor resistance as R2.

Rotor – The rotating member of a machine with a shaft.

Service Factor (SF) – When used on a motor nameplate, a number which indicates how much above the nameplate rating a motor can be loaded intermittently without causing serious degradation (i.e. a motor with 1.15 SF can produce 15% greater torque than one with 1.0 SF, within temperature constraints).

Continued on next page.

Terminology

Squirrel Cage Induction Motor – When used on a motor nameplate, a number which indicates how much above the nameplate rating a motor can be loaded without causing serious degradation (i.e. a motor with 1.15 SF can produce 15% greater torque than one with 1.0 SF, within temperature constraints).

Shock Load – The load seen by a clutch, brake or motor in a system that transmits high peak loads. This type of load is present in crushers, separators, grinders, conveyors, winches and cranes.

Slip – The difference between the speed of the rotating magnetic field (synchronous speed) and mechanical rotational speed (rotor speed) of AC induction motors. Usually expressed as a percentage of synchronous speed.

Special Purpose Motor – A motor with special operating characteristics, special mechanical construction, or both, designed for a particular application and not falling within the definition of a general purpose or definite purpose motor (NEMA).

Speed Range – The minimum and maximum speeds at which a motor must operate under constant or variable torque load conditions. A 50:1 speed range for a motor with top speed of 1800 RPM means the motor must operate as low as 36 RPM and still operate within specifications.

Starting Torque – The torque exerted by the motor during the starting period.

Stator – The stationary portion of the magnetic circuit and the associated windings and leads of a rotating machine.

Synchronous Speed – The speed of an AC induction motor's rotating magnetic field. It is determined by the frequency applied to the stator and the number of magnetic poles present in each phase of the stator windings. Mathematically, it is expressed as Sync Speed (RPM) = 120 x Applied Frequency (Hz)/Number of Poles per phase.

Torque – A turning force applied to a shaft, tending to cause rotation. Torque is normally measured in "pound-feet" and is equal to the force applied times the radius through which it acts.

Torque-to-Inertia Ratio – The rated motor torque divided by its rotor inertia. Helps determine a motor's ability to accelerate loads and/or respond to commands from a drive to change speed or direction.

Voltage Drop – The reduction in voltage level from the source to the load caused by conductor resistance.

Wye Start Delta Run (YD) – A method of reduced voltage starting that first connects a motor in a wye to reduce voltage, then reconnects the motor in a delta to provide full line voltage.

Formulas & Conversion Factors

$$\text{Horsepower (HP)} = \text{Torque (lb-ft)} \times \text{RPM} / 5252$$

$$\text{Horsepower (HP)} = \text{Torque (lb-in)} \times \text{RPM} / 63025$$

$$\text{Torque (lb-ft)} = \text{HP} \times 5252 / \text{RPM}$$

$$\text{Torque (lb-in)} = \text{HP} \times 63025 / \text{RPM}$$

$$\text{Efficiency} = \text{Power Out} / \text{Power In}$$

$$\text{Synchronous RPM} = 120 \times \text{Frequency} / \# \text{ Poles}$$

$$\text{Ohms} = \text{Volts} / \text{Amperes} (R = E/I)$$

$$\text{Amperes} = \text{Volts} / \text{Ohms} (I = E/R)$$

$$\text{Volts} = \text{Amperes} \times \text{Ohms} (E = IR)$$

$$\begin{aligned} \text{Static Torque (T)} &= F \times R \text{ (lb-ft),} \\ &F = \text{Force (lb),} \\ &R = \text{pulley or drum radius (ft)} \end{aligned}$$

$$\text{Pound-feet (torque)} = .7376 \times \text{Newton-meters}$$

$$\text{Newton-meters (torque)} = 1.3558 \times \text{lb-ft}$$

$$\text{Power (HP)} = \text{Torque (lb-ft)} \times 2\pi \times \text{RPM} / 33000$$

$$\text{Temperature (Celsius)} = 5/9 \times (F^\circ - 32)$$

$$\text{Temperature (Fahrenheit)} = (9/5 \times C^\circ) + 32$$

$$1 \text{ Kilowatt (KW)} = 1.341 \text{ Horsepower}$$

$$1 \text{ Horsepower} = 746 \text{ watts (.746 KW)}$$

$$\text{Brake Torque} = (5252 \times P / N) \times \text{SF}, P = \text{HP}, N = \text{RPM}, \text{SF} = 1.4$$

Use 2.0 to 2.5 SF for cranes and hoists
(consult crane manufacturer or user).

Variable Speed Operation

Variable Speed Operation

Guidelines for Application of General Purpose, Three Phase, Single Speed Motors on Variable Frequency Drives Meets NEMA MG1-2006 Part 30 and Part 31 Section 4.4.2 Unless stated otherwise, motor nameplates do NOT include listed speed range.

Enclosure	Efficiency	Variable Torque	Constant Torque								
			All Frames	56	143-215		254-286		324-365		404-449
NEMA Motors		All Poles	All Poles	2-Pole	4 & 6 Pole	2-Pole	4 & 6 Pole	2-Pole	4 & 6 Pole	2-Pole	4 & 6 Pole
ODP	Standard (EPAct exempt)	10:1	2:1	2:1	2:1	Contact Engineering					
	EPAct compliant	10:1	N/A	2:1	2:1	2:1	2:1	Contact Engineering			
	NEMA Premium	10:1	N/A	10:1	10:1	10:1	10:1	10:1	10:1	2:1	2:1
TEFC	Standard (EPAct exempt)	10:1	2:1	2:1	2:1	Contact Engineering					
	EPAct compliant	10:1	N/A	2:1	10:1	2:1	10:1	2:1	2:1	2:1	2:1
	NEMA Premium	10:1	N/A	2:1	20:1	2:1	20:1	2:1	20:1 (1)	2:1	20:1 (1)
TENV	EPAct compliant	10:1	N/A	N/A	1000:1	1000:1	1000:1	1000:1	1000:1	1000:1	1000:1
	NEMA Premium	10:1	1000:1	1000:1	1000:1	1000:1	1000:1	1000:1	1000:1	1000:1	1000:1
Washdown TEFC	Standard (EPAct exempt)	10:1	10:1 (2)	10:1 (2)	10:1 (2)	N/A	N/A	N/A	N/A	N/A	N/A
	EPAct compliant	10:1	10:1 (2)	10:1 (2)	10:1 (2)	N/A	N/A	N/A	N/A	N/A	N/A
	NEMA Premium	10:1	10:1 (2)	10:1 (2)	10:1 (2)	N/A	N/A	N/A	N/A	N/A	N/A
Washdown TENV	Standard (EPAct exempt)	10:1	1000:1	1000:1	1000:1	N/A	N/A	N/A	N/A	N/A	N/A
	EPAct compliant	10:1	1000:1	1000:1	1000:1	N/A	N/A	N/A	N/A	N/A	N/A
	NEMA Premium	10:1	1000:1	1000:1	1000:1	N/A	N/A	N/A	N/A	N/A	N/A
Explosion Proof	All efficiency levels	Explosion Proof motors must be properly nameplated with inverter duty information prior to use on VFD. See Marathon catalog pages for specific rating capabilities. Motors with automatic overload protectors cannot be used on VFDs.									
IEC Motors		All Frames	63-90			100-225		250-315			
All Enclosures	All efficiency levels	10:1	20:1		Up to 20:1		Up to 2:1				

Notes: (1) 324-449T, 4 & 6 Pole XRI motors are rated for 20:1 C.T. with fan modification; otherwise rated for 2:1 C.T. continuous duty, or 20:1 C.T. 60 minute duty at lowest RPM.

(2) Washdown TEFC motors are rated for 10:1 C.T. 60 minute duty or 2:1 C.T. continuous duty at lowest RPM. Model numbers beginning with 5K are not suitable for use with Variable Frequency Drives.

Application Notes

Bearing currents Marathon Motors recommends that any motors used with Variable Frequency Drives be equipped with suitable means to protect the motor bearings from shaft currents caused by common mode voltages inherent with operation on a non-sinusoidal power supply. Marathon Motors offers several options for motors in non-classified (non-hazardous) locations, including ground brushes, insulated bearings and non-contact shaft grounding rings. For more information on ground brushes and bearing currents, see the VARIABLE SPEED OPERATION section. For installation cost and available options, see the MOD CENTRAL section.

Restricted use DO NOT APPLY THE FOLLOWING MOTORS ON VARIABLE FREQUENCY DRIVES:
 Single Phase motors, Motors with inherent overload protection, Multi-Speed motors, Motors with 1.0 Service Factor on sine wave power.
 Fire Pump motors should not be used with variable frequency power supplies, due to the critical nature of these applications.

Hazardous Locations Consult with Marathon Motors when applying motors and drives into Hazardous Locations, either Division/Zone 1 or Division/Zone 2 areas.
 UL and CSA policies prohibit the installation of bearing protection devices, such as shaft grounding brushes, rings or insulated bearings on motors in Hazardous Locations.

Maximum Cable Lengths from the Motor to Drive

Product Description	3 kHz CARRIER FREQUENCY (PHASE TO PHASE)		
	230 Volt	460 Volt	575 Volt
56-326 NEMA, 100-225 IEC Frames	600 ft.	125 ft.	40 ft.
364-5013 NEMA, 250-315 IEC Frames	1000 ft.	225 ft.	60 ft.
Motors with CR ²⁰⁰ Corona Resistant Magnet Wire	1500 ft.	475 ft.	140 ft.
Motors with MAX GUARD [®] insulation system	Unlimited	Unlimited	650 ft.
Form-wound low voltage motors	Unlimited	Unlimited	650 ft.

* Higher carrier frequencies require shorter cable length to obtain normal (50Khrs) insulation life.

Standard Motor Insulation Systems

CR200 Corona-Resistant Magnet Wire	Max Guard [®]
microMAX [®] inverter duty *4 - in - 1" Three Phase, C-Face with Removable Base Standard Three Phase stock Brakemotors Blue Chip [®] Severe Duty Explosion Proof, EPAct Efficiency Max +	Black Max [®] Vector Duty - All Product Blue Max [®] Vector Duty - All Products PowerWash [™] XT, SXT, and SXT-Plus Washdown Duty - Three Phase Blue Chip [®] XRI Severe Duty Blue Chip [®] XRI-841 (IEEE841 compliant) Automotive Duty "T" Frame Blue Chip [®] Explosion Proof, XRI [®] Premium Efficiency Globetrotter [®] IEC Metric motors

Variable Speed Information

Marathon Motors Vector-Duty and Inverter-Duty motors, unless otherwise stated, are rated for continuous operation in a 40°C ambient and for altitudes up to 3300 feet (1000 meters) above sea level. Special application considerations, such as high or low ambient, intermittent ratings, high altitude, duty cycle rated, extended constant horsepower range, special base speed, voltage or frequency, or any other special requirements, should be reviewed by a factory representative.

It is the responsibility of the startup personnel during commissioning of the VFD/motor system to properly tune the drive to the motor for the specific application. The correct voltage boost and volts/hertz settings are application dependent and unique to each motor design. Procedures for these adjustments should be in your VFD user manual. Many Vector Duty and Inverter Duty motors in this catalog are equipped with thermostats; warranty coverage may be denied if they are not properly utilized.



Power factor correction capacitors should never be installed between the drive and the motor.



Inverter Duty Or Inverter Rated

“Inverter Duty” (often called “Inverter Rated”) motors are suitable for use with Variable Frequency Drives, as long as operation is within the application guidelines published in this catalog. In general, Marathon Motors’s three phase, general purpose, NEMA Design B motors are considered “Inverter Duty”, and meet or exceed the requirements of NEMA MG1, Part 30. As required under Federal law, these motors comply with EPC efficiencies when operating from utility power.

Many of Marathon’s motor product lines have been enhanced to facilitate reliable operation on today’s variable speed drives, including wider constant torque speed range (up to 20:1) and improved insulation systems that withstand voltage spikes common with variable frequency operation.

Inverter Duty (Rated) motors are most often used in 10:1 speed range, variable torque or constant torque applications. A vector control is usually required for operation beyond 10:1 CT.

Refer to “Guidelines for Application of General Purpose, Single Speed Three Phase Motors on Variable Frequency Drives” in this section of this catalog for the allowable speed range and cable length restrictions (from VFD to motor). Additional detail regarding a specific product’s capabilities is available on its catalog page, or by consulting your application engineer.

Vector Duty – “Vector Duty” describes a class of motors that are used in conjunction with Open- (without encoder) or Closed-Loop (with encoder) Vector controls, that provide enhanced performance under low speed operating conditions, or in cases where torque (rather than speed) must be controlled. “Vector Duty” motors can be applied to Volts/Hertz (scalar) drives, as well.

Marathon Motors’s “MAX” family, consisting of Blue Max®, Black Max® and microMAX™ motors, have been specifically designed for optimal operation on vector or volts/hertz controls. These motors feature a wide constant torque (up to 2000:1) and/or constant horsepower (up to 4:1) speed range and are performance-matched to all current technology IGBT drives. Vector Duty motors meet or exceed the requirements of NEMA MG1, Part 31, and are equipped with an enhanced insulation system (MAX GUARD® or CR200) to provide many years of trouble-free service. Consult the catalog page for each product’s capabilities and features. As these motors are specifically designed for operation through an inverter, they are exempt from EPC legislation. Model numbers contain the letter “H” in the “Electrical Type” field.

Variable Torque Loads – Applications include fans, blowers and centrifugal pumps. Torque varies as the square of the speed, and horsepower as the cube of the speed. Operation below base speed significantly lightens the load on the motor. While most variable torque applications do not require the motor to operate below half speed, the motor is fully capable of operation to zero speed. Operation above base speed significantly adds to the load on the motor; therefore, a factory representative must review applications requiring variable torque above base speed. Refer to the application chart found on page 14 for use of general purpose three phase motors on variable frequency drives. Marathon’s microMAX™, Black Max® or Blue Max® motors are not necessarily required for operation of variable torque loads. A bypass circuit is often employed in Variable Torque applications. If this device is intended to be used, selection of a NEMA Design B motor is recommended, to withstand the inrush current during across-the-line starting.

Constant Torque Loads – Applications include conveyors, elevators, hoists, extruders, positive displacement pumps, mixers and converting equipment. Torque remains constant throughout the range of operation, and extra care should be taken in the proper application of motors, especially at very low speeds. Most constant torque applications don’t require operation below 10:1 (i.e. 6 Hz operation on a 60 Hz motor), but an increasing number of applications historically reserved for servo and/or stepper systems are being served with motors capable of operation beyond 20:1, up to 2000:1 (zero speed, constant torque). Refer to the application chart found on page 17 for use of general purpose three phase motors on variable frequency drives.

Continued on next page.

√ Stock model for Marathon and/or MARS. Prices and Specifications are subject to change without notice.



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marathon™
Motors

ME-13

Variable Speed Operation

Constant Torque Loads (Cont'd.)

Applications requiring greater than 20:1 C.T. are ideal for microMAX™, Black Max® or Blue Max® motors. These motors provide full rated torque within their listed speed range, without exceeding a Class F temperature rating while under inverter power (many operate at Class B). Ratings in this catalog have been developed, based on extensive testing on IGBT inverters, set at a minimum 3 KHz (or equivalent) carrier frequency.

Vector Duty and Inverter Duty motors from Marathon Motors are designed for operation at 150% of rated load for one minute, up to the base speed of the motor (overload capability declines to 100% as the motor reaches maximum constant HP speed). These motors accommodate constant horsepower operation to 1-1/2 to 2 times base speed, subject to the motor's maximum safe mechanical speed limit. Refer to the Maximum Safe Mechanical Speed Chart, as well as the performance section for each motor's capability.

Motors rated for zero RPM continuous duty (1000:1 or 2000:1) must be powered by vector drives to produce rated torque without overheating. Optimum zero speed and low-speed full torque performance may require a closed loop vector drive (with encoder feedback).

Constant Horsepower Loads – Applications include coil winders, band saws, grinders, and turret lathes. Operation requires the motor to deliver the same horsepower rating, regardless of shaft speed. Torque increases at low speed and decreases at higher speed. Most general purpose motors can deliver constant horsepower up to 1 1/2 times base speed (consult a factory representative to verify performance). However, many constant HP applications require operation to twice base speed, and some, such as coil winders, up to 4 times base speed. microMAX™, Black Max® and Blue Max® motors are designed for 1 1/2 to 2 times base speed, and the Wide CHP motors, found in Marathon's SB371 Catalog, deliver up to 4 times constant horsepower performance.

Bearing Currents – As stated in NEMA MG1-31.4.4.3, to protect a motor from inverter-sourced shaft voltages, either both bearings must be insulated or the motor shaft must be effectively grounded. Marathon Motors offers several effective means to protect the bearings from inverter sourced EDM (electrical discharge machining). A Shaft Grounding device is standard in Blue Max® motors, in frame sizes 444T and larger. Insulating the motor bearings will not prevent damage to bearings of a connected load, and insulated couplings should be employed to protect the load. Adding a ground brush to a motor with insulated bearings will divert motor shaft currents and help protect the bearings of the connected load. At this time, UL policy prohibits the use of ground brushes or insulated bearings in Hazardous Locations (Div 1 & 2, Zones 1, 2, 21 & 22).

The Marathon Solution to Bearing Currents
Any motor with a "-P" behind the catalog number
and a "P" footnote features a current mitigation device.



Motor Grounding - Frames and accessories of all motors must be grounded in accordance with the National Electric Code (NEC) Article 430. Refer to NEC Article 250 for general information on grounding. Proper grounding of inverter-driven motors is essential to protect personnel and livestock from inverter-sourced common mode voltages, which may reach hazardous levels on the frame of ungrounded or poorly grounded motors.

Low Input Voltage – If, due to lower utility supply voltage, the input voltage from the VFD to the motor is lower than the motor's rated voltage, de-rating of the motor's base frequency, horsepower, full load RPM, and constant HP RPM is required. The revised values can be calculated by multiplying by the ratio of the voltage change. For example, to operate a 460 volt motor from an inverter fed by 50 or 60 HZ, 400 volt utility power, the multiplier is 400/460 or 0.87.

The VFD can be reprogrammed to match the new base point values, allowing the motor to provide rated torque at rated current from the new base speed down to its original minimum Constant torque speed. The motor's CHP range will begin at the new base frequency and will be shortened by the same ratio as described above.

Overspeed Capability – Maximum safe mechanical speed capability is a function of bearing size and type, lubrication, rotor balancing technique and specifications, air gap, enclosure, frame construction and connection to the driven load. In addition, consideration must be given to ambient noise levels, as operation above base speed will increase motor noise and vibration, and reduce bearing life. Under no circumstances should bearing hub temperature exceed 100°C. Belted loads should not exceed 60 Hz operating RPM by more than 25% (NEMA "TS" shafts are not suitable for belted loads). Due to external cooling fans, TEFC (and Explosion Proof Fan Cooled) motors are limited to 4000 RPM maximum speed.

Marathon Motors, through extensive testing in our state-of-the-art laboratory and in actual field experience, has developed a number of high speed motors whose maximum safe mechanical speed exceeds the values in the table below. The following table depicts maximum safe speed limits for continuous operation, direct-coupled, non-explosion proof motors, and does not imply constant horsepower capability. Please consult a factory representative for requirements beyond those listed, or for intermittent duty limits.

**Maximum Safe Mechanical Speed Limits
(ODP, TENV, DPFV OR TEBC ENCLOSURES)
60 Hz base frequency**

Frame Size	2-Pole	4, 6 or 8-Pole
56-184	7200	5400
213-256	5400	4200
284-286	5400	3600
324-326	4000	3600
364-365	4000	2800
404-449	3600	2800
5000 Fr	N/A	CALL
6800 Fr	N/A	CALL

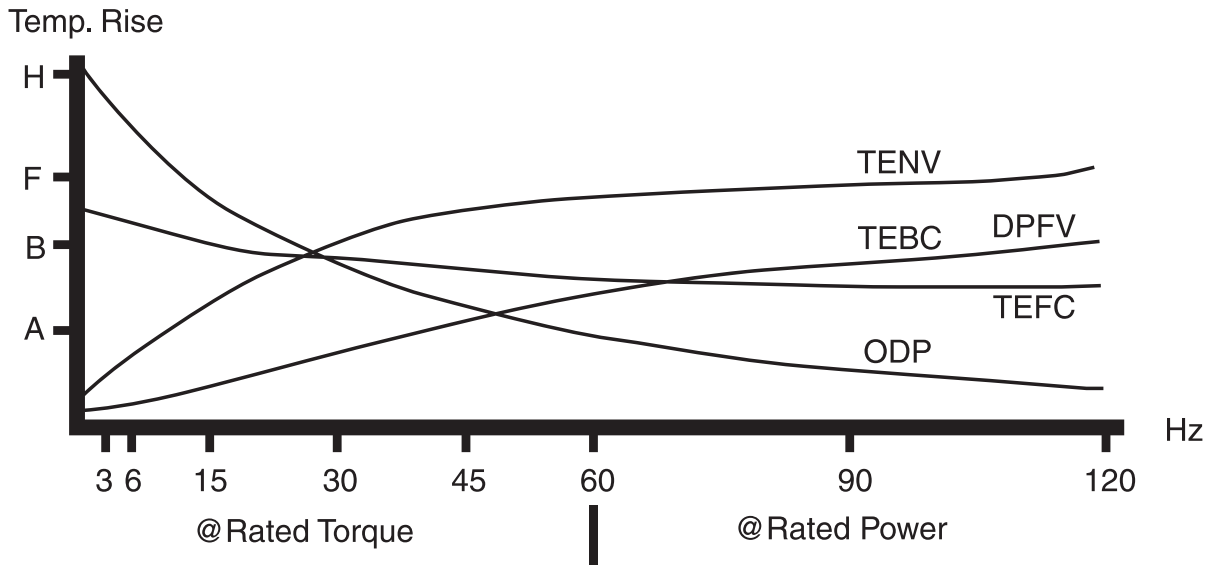
Other Application Consideration

For proper selection, the following should be considered:

- Horsepower or torque requirements at various speeds.
- Desired speed range of the load and motor.
- Acceleration and deceleration rate requirements of the process being controlled.
- Starting requirements including the frequency of starting and a description of the load (reflected inertia at the motor, load torque during starting).
- Whether the application is a continuous process or duty cycle of starts, stops and speed changes.
- A general description of the type of application including the environment in which the VFD system components must operate (determines motor enclosure and/or explosion proof classification).

- Description of the available electrical power supply and wiring.
- Special performance requirements, if any.
- Whether the drive will be configured with a by-pass circuit. In case of its deployment, the motor will operate like its fixed speed counterpart and may require a NEMA B design which limits in-rush current, or selection of a larger motor starter or other protective circuitry.
- Load sharing
- Mounting and other mechanical considerations

Typical Temperature Rise Of Various Enclosures



√ Stock model for Marathon and/or MARS. Prices and Specifications are subject to change without notice.

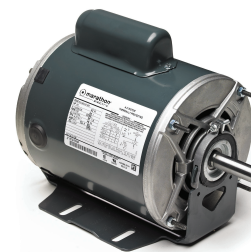


Single Phase

Fan and Blower Duty, Single Phase (NEMA Service Factor), Dripproof

Features:

- Heavy gauge steel frame and base
- Ball bearings (except as noted)
- Thermal protection, as noted
- Capacitor start design for high starting torque
- Capacitor start/capacitor run design for higher efficiency, as noted
- 48Y and 48YZ have 48/56 Fr mounting holes
- Service Factor, as noted
- UL Recognized and CSA Certified



Resilient Base

HP	RPM	VOLTS	FRAME	OVER LOAD	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	"C" DIM.	FOOT NOTES
1/3	1800	115/208-230	56	AUTO	C216	5KC36LN1X	√	6.0/3.2-3.0	18	10.32	20,68
1/2	1800	115/208-230	56	NONE	B1316	5KC49GN0001	√	8.8/4.2-4.4	21	10.38	19
	1800	115/208-230	56	AUTO	B317	056C17D2072	√	8.0/4.1-4.0	20	10.47	CF,19,31
3/4	1800	115/208-230	56	AUTO	B319	056C17D2074	√	10.0/5.2-5.0	23	11.72	CF,19,31
	1800	115/208-230	56	NONE	B318	056C17D2073	√	10.0/5.2-5.0	24	11.72	CF,19,31
1	1800	115/208-230	56	AUTO	C1158	5KC49PN0164X	√	14.7/7.2-7.4	29	11.38	18
	1800	115/208-230	56	NONE	C235	5KC49PN0155	√	13.6/6.7-6.8	31	11.38	5,18
1 1/2	1800	115/208-230	56H	NONE	B336	056C17D5347	√	18.0/9.3-9.	39	12.85	2,5,18,32
	1800	115/208-230	56H	AUTO	C1160	5KCR49SN0150X	√	16.4/8.4-8.2	35	11.90	ES,1,18

General Purpose Three Phase

General Purpose, Three Phase Dripproof, NEMA Premium® XRI® Efficiency

Applications:

General purpose use on compressors, pumps, conveyors, blowers, and other machinery in environments that are relatively clean and dry. Substantial energy savings can be realized when using these high efficiency motors. Guaranteed efficiencies offer an eXtra Return on your Investment when using these premium efficiency motors on high cycle or long run time applications.



Features:

☑ Meets or exceeds NEMA Premium® efficiencies NEMA Premium® models are in compliance with EISA2007

- Motors are suitable for 10:1 VT on all frame sizes and 10:1 CT up to 365T frame (Except where noted)
- 1.15 Service Factor
- Normally closed thermostats, as noted
- Class F Insulation
- Nameplated 60/50 hertz
- UL Recognized, CSA Certified and CE Marked
- Three year warranty



Rigid Base

Suitable for use on VFD per guidelines on page ME-12.

HP	RPM	VOLTS	FRAME	CAT. NO.	MODEL NO.	STOCK	NOM. EFF.	F.L. AMPS	WEIGHT	"C" DIM.	FOOT NOTES	C-FACE KITS
1 1/2	1800	208-230/460	145T	U759	145TTDR6028	√	86.5	4.8-5.6/2.4	35	12.62	TS	A600
2	1800	208-230/460	145T	U760	145TTDR6029	√	86.5	5.8/2.9	37	13.62	TS	A600

Catalog numbers (Cat No.) highlighted in bold blue have efficiency levels that meet EISA requirements

Condenser Fan/Heat Pump, PSC, Open Air Over Thru-Bolt, Shaft Up or Horizontal

Applications:

Direct drive condenser fans mounted vertically, shaft up. Models with open brackets should be mounted where they are shielded from rain. These motors need to be mounted within the airflow of the fan for proper cooling.

Features:

- Frame and shaft end bracket enclosed, except X011, X012, and X208 have open frames and X426 has open frame and brackets
- Single and multi-speed models as noted
- Ball bearings
- Weather resistant reversing plug
- 30" long leads
- Shaft with flat, unless otherwise noted
- 60°C ambient (as noted)
- Shaft slinger
- 1-5/8" Extended thru-bolts on shaft end, except where noted
- Automatic reset thermal protector
- Lug mount kits and other accessories available, see Accessories section
- UL Recognized and CSA Certified
- Capacitor not included

X400



X099



X011



HP	RPM	VOLTS	FRAME	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	FRAME LENGTH	SHAFT DIM.	FOOT NOTES
1/2	1075/1	460	48Y	X400	048A11O2017	√	1.8	194	5	1/2 x 6	35
3/4	1075/1	460	48Y	X099	048A11O2016	√	2.5	223	5 1/2	1/2 x 6	34
1	1075/1	200-230/460	56Z	P190	5KCP49ZN9617T	√	6.7-6.8/3.4	477	9.0	5/8 x 4	

Condenser Fan/Heat Pump, PSC, Open Air Over 48 Frame, Thru-Bolt, All-Angle

Applications:

Direct drive condenser fans for all angle mounting. These motors need to be mounted within the airflow of the fan for proper cooling.

Features:

- Frame and end brackets enclosed
- Single and multi-speed models, as noted
- Ball bearings (except as noted)
- Weather resistant reversing plug
- 30" long leads
- Shaft slinger
- 1-1/2" Thru-bolts on shaft end, 1" thru-bolts on lead end (except as noted)
- Automatic reset thermal protector
- Weep holes with removable plugs on end brackets. Remove bottom plug after installation.
- Lug mount kits and other accessories available (see Accessories section)
- 60°C ambient, as noted
- UL Recognized and CSA Certified
- Capacitor not included



HP	RPM	VOLTS	FRAME	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	FRAME LENGTH	SHAFT DIM.	FOOT NOTES
1/4	1625/1	208-230	48Y	X467	048A47T87	√	2.0-2.0	12	4 1/2	1/2 x 6	21,36
	1075/1	208-230	48Y	X412	048A11T569	√	1.4-1.4	16	4 1/4	1/2 x 6	45
1/3	1075/1	208-230	48Y	X413	048A11T529	√	1.9-1.9	14	4 3/4	1/2 x 6	45
3/4	1075/1	460	48Y	X459	048A11T581	√	2.1	23	6	1/2 x 6	32,45

√ Stock model for Marathon and/or MARS. Prices and Specifications are subject to change without notice.



Condenser Fan/Heat Pump, Single Phase, PSC

56 Frame, Resilient Ring, Thru-Bolt

Applications:

Direct drive condenser fans mounted vertically, shaft up or horizontal. These motors need to be mounted within the airflow of the fan for proper cooling.

Features:

- Enclosed shaft end bracket with vented frame
- Ball bearings
- 30" long leads
- Shaft slinger
- 60°C ambient, as noted
- Automatic reset thermal protector
- Flat & keyway on shaft
- UL Recognized and CSA Certified
- Capacitor not included



Open Air Over, Shaft Up

HP	RPM	VOLTS	FRAME	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	FRAME LENGTH	SHAFT DIM.	FOOT NOTES
1 1/2	1075	208-230/460	56Y	X271	056A1105305	√	7.7-7.6/3.8	43	9 3/4	5/8 x 6	34,45

Commercial Condenser Fan/Heat Pump, PSC

Open Air Over, Belly Band, Shaft Up

Applications:

Heavy duty design for commercial direct drive condenser fans mounted vertically, shaft up. These motors need to be mounted within the airflow of the fan for proper cooling.

Features:

- Open frame and end brackets
- Shaft with flat, unless otherwise noted
- Unique Rain Shield fits over shaft to protect motor in vertical shaft up position
- Shaft slinger
- Automatic reset thermal protector
- Ball bearings
- UL Recognized and CSA Certified
- Capacitor not included



HP	RPM	VOLTS	FRAME	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	FRAME LENGTH	SHAFT DIM.	FOOT NOTES
1	1075	200-230/460	48Y	P195	5KCP39SNB482S	√	5.6/2.8	21	10 5/8	5/8 x 5 1/4 w/key/flat	

Commercial Condenser Fan/Heat Pump, Three Phase
Open Air Over, Rigid Base, Shaft Up or Horizontal

Applications:

Commercial condenser fans may be installed outdoors. These motors need to be mounted within the airflow of the fan for proper cooling. Used on Trane, Carrier, Climtrol and York units, 5 tons and larger.

Features:

- 70°C ambient (except as noted)
- Enclosed shaft end bracket, vented frame
- Continuous duty, air over
- Automatic reset thermal protector
- Shaft slinger
- Threaded lead exit
- Nameplated 60/50 hertz 190/380 volts, at next lower HP
- Double sealed ball bearings
- Flat and keyway on shaft
- Patented VCD™ - Voltage Change Device (as noted)
- Ball Bearings
- UL Recognized and CSA Certified



As Noted



HP	RPM	VOLTS	FRAME	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	FRAME LENGTH	SHAFT DIM.	FOOT NOTES
1/2	850	208-230/460	56HZ	X529	056T8O5531	√	2.9-3.0/1.5	31	14.68	5/8 x 5	VC,5
1	1140	208-230/460	56HZ	X513	056T11O5305	√	4.1-4.2/2.1	29	14.68	5/8 x 5	VC,5
1 1/2	1140	208-230/460	56HZ	X523	056T11O5306	√	5.45-5.4/2.7	36	15.68	5/8 x 5	VC,5
	850	208-230/460	56HZ	X531	056T8O15504	√	7.0-7.0/3.5	47	16.68	5/8 x 5	VC,5
2	1140	208-230/460	56HZ	X525	056T11O5310	√	7.2-6.8/3.4	47	16.68	5/8 x 5	VC,5

Condenser Fan/Heat Pump, Three Phase
Open Air Over, Belly Band/Resilient Ring

Applications:

Commercial condenser fans may be installed outdoors. These motors need to be mounted within the airflow of the fan for proper cooling. Used on Trane, Carrier, Climtrol and York units, 5 tons and larger.

Features:

- 70°C ambient (except as noted)
- Enclosed shaft end bracket, vented frame
- Automatic reset thermal protector
- Nameplate 60/50 hertz 190/380 volts, at next lower HP (except as noted)
- Double sealed ball bearings
- 5/8" Dia. x 5" long shaft with flat and keyway
- Ball bearings
- Threaded lead exit
- Patented VCD™ - Voltage Change Device
- 4 Locating screws 90 degrees apart, 3.33" from outer edge of shaft slinger
- Hubs on both ends will accept resilient base kits
- UL Recognized and CSA Certified
- External shaft slinger on all, internal slinger on 5K models



As Noted



HP	RPM	VOLTS	FRAME	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	FRAME LENGTH	FOOT NOTES
1	1140	200-230/460	56Y	X502	056T11O5302	√	4.0-4.2/2.1	28	10.00	VC
	850	200-230/460	56Y	X507	056T8O5302	√	5.3-5.3/2.6	46	12.00	VC
1 1/2	1140	200-230/460	56Y	X503	056T11O5303	√	5.5-5.4/2.7	35	11.00	VC
	850	208-230/460	56Y	X530	056T8O5307	√	7.5-6.8/3.4	47	11.25	VC
2	1140	208-230/460	56Y	X509	056T11O5304	√	7.2-6.8/3.4	49	12.00	VC

√ Stock model for Marathon and/or MARS. Prices and Specifications are subject to change without notice.

Fan and Blower - Direct Drive, PSC Open Air Over, Resilient Ring, Thru-Bolt Mount

Features:

- Open frames and brackets (except X011 and X012 have enclosed shaft end bracket)
- Single and multi-speed models as noted
- Grommeted lead exit
- Weather resistant reversing plug
- 2-1/4" resilient ring mounting except where noted (base not included, see Accessories section)
- 2 1/2" adapter rings supplied, shipped loose in box
- Extended thru-bolts on shaft end
- 30" long leads
- Automatic reset thermal protector
- Ball bearings
- UL Recognized and CSA Certified
- Capacitor not included



HP	RPM	VOLTS	FRAME	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	FRAME LENGTH	SHAFT DIM.	FOOT NOTES
1/4	1075/3	115	48Y	X000	048A1101798	√	3.4	12	4 1/4	1/2 x 4	32
1/3	1075/3	115	48Y	X002	048A1101769	√	4.6	14	4 3/4	1/2 x 4	32
1/2	1625/3	115	48Y	X016	048A170153	√	5.0	16	5 1/4	1/2 x 4	32
	1075/3	115	48Y	X004	048A1101755	√	6.2	17	5 1/2	1/2 x 4	32
3/4	1075/3	115	48Y	X009	048A110787	√	10.2	20	5 3/4	1/2 x 4	32

Fan and Blower - Direct Drive, PSC Open Air Over, Extended Thru-Bolt, 460 Volt

Applications:

Residential and commercial furnaces, air conditioners, exhaust fans, and other air handling equipment installed in clean and dry environments.

Features:

- Enclosed frame and open end brackets
- Multi-speed capability
- Grommeted lead exit
- Weather resistant reversing plug
- Automatic reset thermal protector
- 7/8" extended thru-bolts on shaft end
- Ball Bearings
- UL Recognized and CSA Certified
- Capacitor not included



HP	RPM	VOLTS	FRAME	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	FRAME LENGTH	SHAFT DIM.	FOOT NOTES
1/3	1075/2	460	48Y	X037	48A1101876	√	1.0	14	4 3/4	1/2 X 6	51
1/2	1075/2	460	48Y	X038	48A1101874	√	1.6	17	5 1/4	1/2 X 6	51
3/4	1075/2	460	48Y	X039	48A1101875	√	2.1	19	5 1/2	1/2 X 6	51

**Fan and Blower, Split Phase, Dripproof
Resilient Base (Single & Two Speed)**

Features:

- Ball bearings (except as noted)
- Service factor, as noted
- Thermal protection, as noted
- Variable torque on two speed motors
- Extended thru-bolts, as noted
- Heavy gauge steel frame and base
- 48Y and 48YZ frame have 48/56 frame mounting holes
- UL Recognized and CSA certified



HP	RPM	VOLTS	FRAME	OVER LOAD	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	"C" DIM.	FOOT NOTES
1/4	1725	115	48YZ	NONE	B302	48S17D2054	√	5	14	9.57	9,20,28
	1725	115	48YZ	AUTO	B303	48S17D2055	√	5	14	9.57	20,32,53
	1725	115	56Z	AUTO	B201	56S17D2047	√	5	14	9.47	8,20,26
	1725	115	56Z	AUTO	4363	5KH39QN5526X	√	5.1	14	9.19	20
	1725	230	48	AUTO	4306	5KH39QN5537X	√	2.5	13	9.09	20
	1725	230	48	NONE	4360	5KH39QN5548	√	2.5	13	8.93	20,31,52
	1725	277	48YZ	NONE	B606	48S17D2116	√	2.1	13	9.47	20,31
	1140/850	115	56	NONE	H300	5KH49SN3048	√	5.8/3.6	30	12.01	20
	1140	115	56	AUTO	H163	5KH46MN6053X	√	5.6	23	10.88	20
	1140	115	56	NONE	H162	5KH46MN6053	√	5.6	27	10.88	19
850	115	56	NONE	H296	5KH49SN3046	√	6.9	30	12.01	20	
1/3	1725	115	48YZ	NONE	B304	048S17D2056	√	5.5	15	9.32	CF,20,31,52
1/2	1725	115	48Y	AUTO	D162	048S17D2087	√	7.2	19	10.09	19
	1725	115	48YZ	AUTO	B208	048S17D2109	√	7.5	20	10.43	CF,19,53
	1725	115	48YZ	NONE	B306	048S17D2058	√	7.5	18	10.32	CF,19,31,52
	1725	115	48YZ	AUTO	B307	048S17D2059	√	7.5	18	10.32	CF,19,31,52

**Fan and Blower - Capacitor Start, Dripproof
Resilient Base (Single & Two-Speed)**

Features:

- Ball bearings
- Heavy gauge steel frame and base
- Service Factor, as noted
- Capacitor start / capacitor run as noted
- Thermal protection, as noted
- 48Y and 48YZ Frame have 48/56 Frame mounting holes
- UL Recognized and CSA Certified



HP	RPM	VOLTS	FRAME	OVER LOAD	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	"C" DIM.	FOOT NOTES
1/3	1725	115/208-230	48YZ	AUTO	B315	48C17D2044	√	5.8/3.1-2.9	17	10.22	20,31,52
	1725	115/208-230	56	AUTO	C216	5KC36LN1X	√	6.0/3.2-3.0	18	10.32	20,50
1/2	1725	115/208-230	56	NONE	B1316	5KC49GN0001	√	8.8/4.2-4.4	21	10.38	19
	1725	115/208-230	56	AUTO	B317	56C17D2072	√	8.0/4.1-4.0	20	10.32	CF,19,31
3/4	1725	115/208-230	56	AUTO	C1156	5KC46LN0149X	√	13.3/6.5-6.6	27	10.78	19
	1725	115/208-230	56	AUTO	B319	56C17D2074	√	10.0/5.2-5.0	23	10.72	CF,19,31
	1725	115/208-230	56	NONE	B318	56C17D2073	√	10.0/5.2-5.0	24	10.72	CF,19,31
1	1725	115/208-230	56	AUTO	C1158	5KC49PN0164X	√	14.7/7.2-7.4	29	11.38	18
	1725	115/208-230	56H	NONE	C235	5KC49PN0155	√	13.6/6.7-6.8	31	11.38	18
1 1/2	1725	115/208-230	56H	NONE	B336	56C17D5347	√	18.0/9.3-9.0	39	12.85	5,18,32
	1725	115/208-230	56H	AUTO	C1160	5KCR49SN0150X	√	16.4/8.4-8.2	35	11.91	ES,1,18

√ Stock model for Marathon and/or MARS. Prices and Specifications are subject to change without notice.



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Motors

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**Fan & Blower - Three Phase, Dripproof
Resilient Base (Single and Two-Speed)**

Features:

- Single and two-speed models, as noted
- Variable torque on two speed ratings
- Ball bearings
- Heavy gauge steel frame and base
- Thermal protection, as noted
- Service Factor, as noted
- Nameplated 60/50 Hz at next lower horsepower (except as noted)
- Patented VCD™, Voltage Change Device where footnoted "VC"
- UL Recognized and CSA Certified



As Noted



HP	RPM	VOLTS	FRAME	OVER LOAD	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	"C" DIM.	FOOT NOTES
1/2	1800	208-230/460	56	AUTO	K1408	5K42HN4089X	√	2.3-2.2/1.1	20	10.05	19
	1800	208-230/460	56	AUTO	G140	056T17D5345	√	2.3-2.4/1.2	22	10.85	VC,19
1	1800	208-230/460	56H	AUTO	G100	056T17D2101	√	3.4-3.4/1.7	24	11.47	5,18
1 1/2	1800	208-230/460	56	NONE	G122	056T17D5329	√	4.8-4.8/2.4	28	11.35	18
3	1800	208-230/460	56HZ	AUTO	G145	056T17D5350	√	9.2-8.6/4.3	48	14.22	Z,VC,5,18

Furnace Blower, Split Phase

Open, PDQ Mounting

Applications:

Designed for replacement of virtually any NEMA 48 and 56 frame belt drive furnace blower motors. PDQ models have 1 1/2" extended splined hub on opposite shaft end for quick and easy positioning of resilient ring to properly fit the pre-existing motor base.

Features:

- Ball bearings
- Reversible rotation connected for CCW rotation from factory
- NEMA service factors
- UL Recognized and CSA Certified



HP	RPM	VOLTS	FRAME	OVER LOAD	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	"C" DIM.	MIN/MAX BASE DIM'S	FOOT NOTES
1/3	1725	115	48Y	AUTO	4731	5KH39QN9696X	√	5.8	15	10.28	7.12" & 8.41"	30

Oil Burner, Split Phase and Capacitor Start
NEMA 48M and 48N Flange Mount

Applications:

Direct replacement motors for residential and commercial oil burners and hot water pressure/steam cleaners.

Features:

- Ball Bearings (except as noted)
- Semi- or totally enclosed steel frame
- 20" Long leads from a 1/2" NPT opening (totally enclosed footnoted with N)
- Split phase and capacitor start designs
- Two-bolt, NEMA N- or M-Flange Direct
- Catalog numbers O010 mounting and O011 have drip-proof enclosures
- 1.0 Service Factor



HP	RPM	VOLTS	FRAME	OVER LOAD	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	"C" DIM.	FOOT NOTES
1/8	1725	115	48N	MANUAL	O600	48S17T286	√	2.8	11	7.7	CF,N,3
1/7	3450	115	48M	MANUAL	O100	48S34S361	√	2.8	11	7.7	CF,3
1/6	3450	115	48M	MANUAL	O102	48S34S2005	√	3.0	11	7.25	3
	1725	115	48N	MANUAL	O601	48S17T290	√	2.7	12	7.59	CF,N,3
1/4	3450	115	48N	MANUAL	O004	48S34S2003	√	4.2	13	8.13	CF,3
	1725	115	48N	MANUAL	O002	48S17S25	√	4.2	12	7.59	3
1/3	3450	115/208-230	48N	MANUAL	O010	48C34D2024	√	5.6/2.7-2.8	14	10.34	2
	1725	115	48N	MANUAL	O003	48S17S24	√	5.0	17	8.34	3
1/2	3450	115/208-230	48N	MANUAL	O011	48C34D2028	√	7.4/3.5-3.7	17	10.84	2

Oil Burner, PSC
NEMA 48M Flange Mount

Applications:

Replacement motors for mini pumps in residential or light commercial furnaces.

Features:

- High efficiency design
- 14" cord for easy connection
- Ultra quiet performance
- UL Recognized and CSA Certified



HP	RPM	VOLTS	FRAME	OVER LOAD	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	"C" DIM.	FOOT NOTES
1/7	3450	115	48M	AUTO	O701	48A34SU1001	√	1.7	8	6.61	3,61

√ Stock model for Marathon and/or MARS. Prices and Specifications are subject to change without notice.



Oil Burner, Split Phase and Capacitor Start

Drip-proof, NEMA 56C, C-Face Footless

Features:

- Ball Bearings
- Automatic reset thermal
- Split Phase and capacitor start designs protector
- NEMA 56C direct mounting
- NEMA Jet Pump Service Factors
- Moderate starting torque
- UL Recognized and CSA Certified



HP	RPM	VOLTS	FRAME	OVER LOAD	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	"C" DIM.	FOOT NOTES
1/3	3600	115/208-230	56C	AUTO	O210	56C34D2114	√	5.6/2.7-2.8	14	10.44	2,115

Refrigeration Fan Motors, Three Phase

Open Air Over, Shaft Up & Horizontal Rigid Base Mount

Applications:

Replacement motor for refrigeration equipment.

Features:

- 70°C ambient
- Enclosed shaft end bracket, vented frame
- Continuous duty
- Automatic reset thermal protector
- Shaft slinger
- Threaded lead exit
- Nameplated 60/50 hertz 190/380 volts, at next lower HP
- Double sealed ball bearings
- Flat and keyway on shaft
- Patented VCD, Voltage Change Device
- Ball Bearings
- UL Recognized and CSA Certified



As Noted

X507 (Footless)

HP	RPM	VOLTS	FRAME	CAT. NO.	MODEL NO.	STOCK	F.L. AMPS	WEIGHT	FRAME LENGTH	"C" DIM.	FOOT NOTES
1/2	850	208-230/460	56HZ	X529	056T805531	√	2.9-3.0/1.5	31	9.62	5/8 x 5	VC,5
1	850	208-230/460	56Y	X507	056T805302	√	5.3-5.3/2.6	46	12.00	5/8 x 5	VC
1 1/2	1140	208-230/460	56HZ	X523	056T1105306	√	5.45-5.4/2.7	36	11.00	5/8 x 5	VC,5
	850	208-230/460	56HZ	X531	056T8015504	√	7.0-7.0/3.5	47	11.50	5/8 x 5	VC,5
2	1140	208-230/460	56HZ	X525	056T1105310	√	7.2-6.8/3.4	47	12.00	5/8 x 5	VC,54

Resilient Ring Kit

Used to mount Resilient Rings onto Hubbed PSC Brackets. Kit includes: 2 rubber resilient rings and 4 split rings.



CAT. NO.	KIT NO.	WEIGHT	NOTES
A110	KIT 110	1	2-1/4" (48 frame)
A114	KIT 114	1	2-1/2" (56 frame)

Shaft Adapter Sleeve

Used to increase the diameter of a shaft to a larger size. Available sizes include converting from a 1/2" dia. shaft with flat to a 5/8" dia. with key and from a 5/8" dia. with key to a 3/4" dia. with key. Kit includes adapter sleeve and key.



CAT. NO.	KIT NO.	TO CHANGE SHAFT	WEIGHT
A105	KIT 105	1/2" to 5/8"	3

Drip Cover Kits

Mounts with two screws into the end bracket. Kit includes: drip cover, mounting screws, washers, and instructions. Contact Marathon Motors to determine compatibility with motor. For vertical shaft down applications.

CAT. NO.	FRAME	KIT NO.	ENCLOSURE	WEIGHT
A197	182T-184T	KIT 197	TEFC (4-IN-1)	3

All Kits Listed on This Page are Stock

√ Stock model for Marathon and/or MARS. Prices and Specifications are subject to change without notice.



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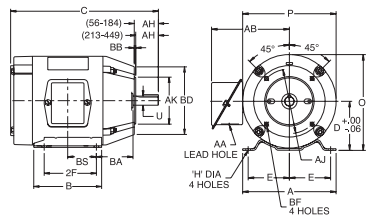
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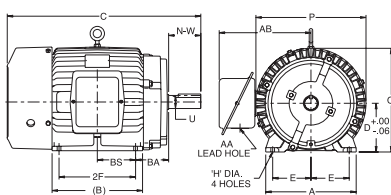
NEMA Quick Reference Dimensional Chart

NEMA Quick Reference Dimensional Chart

Typical C-Face Motor



Typical Rigid Base Motor



NEMA C-Face	BA Dim.
143-5TC	2-3/4
182-4TC	3-1/2
213-5TC	4-1/4
254-6TC	4-3/4

Contact your Marathon sales rep. for "AB", "O", & "P" Dim.

Refer to your Marathon catalog for "C" Dim.

FRAME	D	E	2F	H	U	N-W	AA	AH	AJ	AK	BA	BB (MIN)	BD (MAX)	BF
48	3.00	2.12	2.75	.34 SLOT	.5000	1.50	1/2	1.69	3.750	3.000	2.50	.13	5.62	1/4-20
56	3.50	2.44	3.00	.34 SLOT	.6250	1.88	1/2	2.06	5.875	4.500	2.75	.13	6.50	3/8-16
56H	3.50	2.44	5.00	.34 SLOT	.6250	1.88	1/2	2.06	5.875	4.500	2.75	.13	6.50	3/8-16
143T	3.50	2.75	4.00	.34	.8750	2.25	3/4	2.12	5.875	4.500	2.25	.13	6.50	3/8-16
145T	3.50	2.75	5.00	.34	.8750	2.25	3/4	2.12	5.875	4.500	2.25	.13	6.50	3/8-16
182	4.50	3.75	4.50	.41	.8750	2.25	3/4	2.12	5.875	4.500	2.75	.13	6.50	3/8-16
184	4.50	3.75	5.50	.41	.8750	2.25	3/4	2.12	5.875	4.500	2.75	.13	6.50	3/8-16
182T	4.50	3.75	4.50	.41	1.125	2.75	3/4	2.62	7.250	8.500	2.75	.25	9.00	1/2-13
184T	4.50	3.75	5.50	.41	1.125	2.75	3/4	2.62	7.250	8.500	2.75	.25	9.00	1/2-13
213	5.25	4.25	5.50	.41	1.125	3.00	1	2.75	7.250	8.500	3.50	.25	9.00	1/2-13
215	5.25	4.25	7.00	.41	1.125	3.00	1	2.75	7.250	8.500	3.50	.25	9.00	1/2-13
213T	5.25	4.25	5.50	.41	1.375	3.38	1	3.12	7.250	8.500	3.50	.25	9.00	1/2-13
215T	5.25	4.25	7.00	.41	1.375	3.38	1	3.12	7.250	8.500	3.50	.25	9.00	1/2-13
254U	6.25	5.00	8.25	.53	1.375	3.75	1-1/4	3.50	7.250	8.500	4.25	.25	10.00	1/2-13
256U	6.25	5.00	10.00	.53	1.375	3.75	1-1/4	3.50	7.250	8.500	4.25	.25	10.00	1/2-13
254T	6.25	5.00	8.25	.53	1.625	4.00	1-1/4	3.75	7.250	8.500	4.25	.25	10.00	1/2-13
256T	6.25	5.00	10.00	.53	1.625	4.00	1-1/4	3.75	7.250	8.500	4.25	.25	10.00	1/2-13
284U	7.00	5.50	9.50	.53	1.625	4.88	1-1/2	4.62	9.000	10.500	4.75	.25	11.25	1/2-13
286U	7.00	5.50	11.00	.53	1.625	4.88	1-1/2	4.62	9.000	10.500	4.75	.25	11.25	1/2-13
284T	7.00	5.50	9.50	.53	1.875	4.62	1-1/2	4.38	9.000	10.500	4.75	.25	11.25	1/2-13
286T	7.00	5.50	11.00	.53	1.875	4.62	1-1/2	4.38	9.000	10.500	4.75	.25	11.25	1/2-13
284TS	7.00	5.50	9.50	.53	1.625	3.25	1-1/2	3.00	9.000	10.500	4.75	.25	11.25	1/2-13
286TS	7.00	5.50	11.00	.53	1.625	3.25	1-1/2	3.00	9.000	10.500	4.75	.25	11.25	1/2-13
324U	8.00	6.25	10.50	.66	1.875	5.62	2	5.38	11.000	12.500	5.25	.25	14.00	5/8-11
326U	8.00	6.25	12.00	.66	1.875	5.62	2	5.38	11.000	12.500	5.25	.25	14.00	5/8-11
324T	8.00	6.25	10.50	.66	2.125	5.25	2	5.00	11.000	12.500	5.25	.25	14.00	5/8-11
326T	8.00	6.25	12.00	.66	2.125	5.25	2	5.00	11.000	12.500	5.25	.25	14.00	5/8-11
324TS	8.00	6.25	10.50	.66	1.875	3.75	2	3.50	11.000	12.500	5.25	.25	14.00	5/8-11
326TS	8.00	6.25	12.00	.66	1.875	3.75	2	3.50	11.000	12.500	5.25	.25	14.00	5/8-11
364U	9.00	7.00	11.25	.66	2.125	6.38	2-1/2	6.12	11.000	12.500	5.88	.25	14.00	5/8-11
365U	9.00	7.00	12.25	.66	2.125	6.38	2-1/2	6.12	11.000	12.500	5.88	.25	14.00	5/8-11
364T	9.00	7.00	11.25	.66	2.375	5.88	2-1/2	5.62	11.000	12.500	5.88	.25	14.00	5/8-11
365T	9.00	7.00	12.25	.66	2.375	5.88	2-1/2	5.62	11.000	12.500	5.88	.25	14.00	5/8-11
364TS	9.00	7.00	11.25	.66	1.875	3.75	2-1/2	3.50	11.000	12.500	5.88	.25	14.00	5/8-11
365TS	9.00	7.00	12.25	.66	1.875	3.75	2-1/2	3.50	11.000	12.500	5.88	.25	14.00	5/8-11
404U	10.00	8.00	12.25	.81	2.375	7.12	3	6.88	11.000	12.500	6.62	.25	15.50	5/8-11
405U	10.00	8.00	13.75	.81	2.375	7.12	3	6.88	11.000	12.500	6.62	.25	15.50	5/8-11
404T	10.00	8.00	12.25	.81	2.875	7.25	3	7.00	11.000	12.500	6.62	.25	15.50	5/8-11
405T	10.00	8.00	13.75	.81	2.875	7.25	3	7.00	11.000	12.500	6.62	.25	15.50	5/8-11
404TS	10.00	8.00	12.25	.81	2.125	4.25	3	4.00	11.000	12.500	6.62	.25	15.50	5/8-11
405TS	10.00	8.00	13.75	.81	2.125	4.25	3	4.00	11.000	12.500	6.62	.25	15.50	5/8-11
444U	11.00	9.00	14.50	.81	2.875	8.62	3	8.38	14.000	16.000	7.50	.25	18.00	5/8-11
445U	11.00	9.00	16.50	.81	2.875	8.62	3	8.38	14.000	16.000	7.50	.25	18.00	5/8-11
444T	11.00	9.00	14.50	.81	3.375	8.50	3	8.25	14.000	16.000	7.50	.25	18.00	5/8-11
445T	11.00	9.00	16.50	.81	3.375	8.50	3	8.25	14.000	16.000	7.50	.25	18.00	5/8-11
444TS	11.00	9.00	14.50	.81	2.375	4.75	3	4.50	14.000	16.000	7.50	.25	18.00	5/8-11
445TS	11.00	9.00	16.50	.81	2.375	4.75	3	4.50	14.000	16.000	7.50	.25	18.00	5/8-11
447T	11.00	9.00	20.00	.81	3.375	8.50	3	8.25	14.000	16.000	7.50	.25	18.00	5/8-11
449T	11.00	9.00	25.00	.81	3.375	8.50	3	8.25	14.000	16.000	7.50	.25	18.00	5/8-11
447TS	11.00	9.00	20.00	.81	2.375	4.75	4 NPT	4.50	14.000	16.000	7.50	.25	18.00	5/8-11
449TS	11.00	9.00	25.00	.81	2.375	4.75	4 NPT	4.50	14.000	16.000	7.50	.25	18.00	5/8-11

Footnotes

1	Capacitor Start/Capacitor Run design for reduced amperage
2	Capacitor Start Induction Run design
3	Split Phase design
4	Sleeve bearing
5	56H, 143T, and 145T Combination Base with 12 mounting holes
6	Bolt-on removable base for footless mounting option
7	Shaft extension 1-1/2" long by 1/2" diameter
8	Shaft extension 1-7/8" long by 1/2" diameter
9	Shaft extension 2-1/4" long by 1/2" diameter
10	Shaft extension 2-1/4" long by 5/8" diameter
11	Shaft extension 2-1/4" long by 7/8" diameter
12	With rigid base
13	F1 Mounting only, cannot reassemble to F2
14	Will accept C-Face kit, see Accessory Section
15	Fixed CW Rotation, viewing opposite shaft (or lead end) of motor
16	Fixed CCW Rotation, viewing opposite shaft (or lead end) of motor
17	1.0 Service Factor
18	1.15 Service Factor
19	1.25 Service Factor
20	1.35 Service Factor
21	Double shaft extension 1-1/2" long by 1/2" diameter with flat each end
22	Double shaft extension 1-7/8" long by 5/8" diameter each end
23	Shaft extension 3/8" diameter
24	Motor will NOT accept a Brake kit
25	Motor will NOT accept C-Face Kits
26	5/8" shaft adapter included
27	Drip Cover included
28	Steel Endshields
29	Weep holes with removable plugs on end brackets. Remove bottom plug after installation
30	Resilient ring mount, base not included
31	5/8" Thru-bolts, shaft end
32	3/4" Thru bolts, shaft end
33	Shaft extension 6" long by 5/8" diameter with full flat and key 90° apart
34	1" Thru-bolts, shaft end
35	1-1/8" Thru-bolts, shaft end
36	1-1/4" Thru-bolts, shaft end
37	1-1/2" Thru-bolts, shaft end
38	2" Thru-bolts, shaft end
39	No Thru-bolts, shaft end
40	Space heaters and 100 ohm platinum stator RTDs included
41	1/2" Thru-bolts, opposite shaft end
42	3/4" Thru-bolts, opposite shaft end
43	2-1/2" Resilient Rings included
44	1" Thru-bolts, opposite shaft end
45	60° C ambient
46	65° C ambient
47	Connected for CCW rotation (U.S. standard) facing opposite shaft end. Reversible by reconnection of leads
48	Connected for CW rotation (Canadian standard) facing opposite shaft end. Reversible by reconnection of leads
49	Shaft extension 1-13/16" long by 1/2" diameter with 6-3/8" mounting flange
50	Designed for 50 Hz operation
51	Does not include resilient rings, see Accessory Section
52	1/2" x 1-7/8" Shaft with 1-5/8" Flat
53	1/2" Shaft with 5/8" adapter and Key
54	30 minute duty cycle, not rated for continuous duty
55	Shaft extension 3-13/16" long by 5/8" diameter with 3.5" keyway
56	1-5/8" Thru-bolts, shaft end
57	Open construction
58	Capacitor supplied with motor
59	TEAO construction
60	Foot locating Set Screws on frame, 90 apart
61	10" Leads
62	43" Leads
63	1-1/2" Thru-bolts, opposite shaft end
65	Mounting accessories and resilient ring for pulley end are not included. Use accessory kit 161L131AB1 for resilient ring mounting
67	Capacitor not included, see Accessory Section
68	Rated 60/50 hertz, 190/380 or 380 volt at next lower horsepower
69	50° C Ambient
70	Not Nameplated 50 hz
71	Includes length adapter bracket
72	Usable on 200 Volts at 1.0 service factor
73	No hubs
74	Split phase/capacitor run electrical design
75	Addition of C-Face Kits may result in non-NEMA "BA" dimension. For the resulting "BA" dimension consult chart found in modification section
76	Addition of C-Face Kits in non-NEMA "AH" dimension. "AH" is 2.12, Rework "AH" is 2.38
77	Frame size is drilled with three sets of footholes, 5010, 5011, and 5012 as standard. Foothole drilling for 5009 available upon request, as a build-up
78	Frame size is drilled with two sets of footholes, 5012 and 5013 standard
79	Ball brgs on both ends suitable for direct connection. For belted applications, refer to Customer Service
80	Rolled steel fan guard on 143T-145T
81	24" long #18 SO 2-conductor cord out shell at 11 o'clock position
82	Welded Rigid Base
83	Shaft extension 1-7/8" long by 5/8" diameter with 6-3/8" mounting flange
84	NEMA 145T C-Face mounting with removable 182T rigid base
85	Not tach adaptable
86	2:1 constant torque speed range; RTM for greater torque capability
87	10:1 Constant Torque available as build-up, RTM for price and availability
88	182T base and shaft height, 145TC mounting face and shaft dimensions
89	Threaded NPT opening in conduit box
90	Not UL Recognized
91	Suitable for use on VFD at 208 volt
92	7/8" Thru-bolts, shaft end
93	Permanent split capacitor-switchless
94	1/2" Thru-bolts, shaft end
95	Will not accept drip cover kit
96	3 lead reversible design works with single pole, double throw reversing switch
97	Addition of D-Flange kit will result in non-NEMA "BA" dimension (1/2" longer than NEMA) and non-NEMA shaft extension (1/2" shorter than NEMA).
98	Not UL Listed for Fire Pump applications
99	Suitable for 2:1 CT operation
100	6" shaft extension with 2 flats 90° apart
110	1.20 Service Factor
111	1.30 Service Factor
112	1.40 Service Factor
113	1.50 Service Factor
114	1.60 Service Factor
115	1.75 Service Factor
116	1-3/4" thru-bolt extension on shaft-end
2:1	Suitable for 2:1 CT operation; consult "R164 Rework" table for fan change pricing to upgrade to 10:1 CT
A	NEMA Design A
B	NEMA Design B
C	NEMA Design C
D	Will become build-up item when current stock is gone
E	Design incorporates electronic switch
F	Class F Insulation
H	Class H Insulation
I	Reduced HP @ 120 HZ
N	Totally Enclosed, Non-Ventilated
P	BCP (Bearing Current Protection)
Q	Quick Connect™ terminal board
S	Steel Frame Construction
V	Suitable for 10:1 CT 60 minute duty, otherwise 2:1 CT
X	XRI, Ultra High Efficiency Design
Z	56HZ with 7/8" shaft dia., 3-1/2" shaft height, and slotted 56 frame base
AH	Conforms to GM 7EH and satisfies Ford EM-1 and GM 7EQ
AL	Aluminum Frame Construction
AQ	Conforms to GM 7EQ and satisfies Daimler Chrysler NPEN-100, and Ford EM-1
BI	Class B Insulation
BP	Separate power supply required for blower motor
CD	Suitable for Group C
CF	Consult Factory for Accessory Kit and/or Modification Selection
CT	Suitable for 20:1 CT on Vector Drive, continuous duty or 2000:1
ES	Energy Saver Design
FN	Drive has cooling fan
NE	Exempt from NEMA Premium efficiency requirement
NP	Does not meet NEMA PremiumR efficiency
NS	Single Shielded Ball Bearings
PW	Part Winding Start Capability
RB	Roller Bearing on shaft end for belted load only
SH	Space heaters
SL	Sound level exceeds standard
TS	Normally Closed Thermostats installed
VB	Vibration not met
VC	Voltage Change Device feature for quick voltage changes
YD	12 Leads for WYE-DELTA, Part Winding on low voltage, or across-the-line starting

√ Stock model for Marathon and/or MARS. Prices and Specifications are subject to change without notice.



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