marathon™ Motors

SyMAX® Permanent Magnet AC Motors

SB700A

MAX GUARD INSULATION SYSTEM

A Regal Brand

REGAL

SyMAX® Permanent Magnet AC Motors

The Most Sustainable Motor Available Today

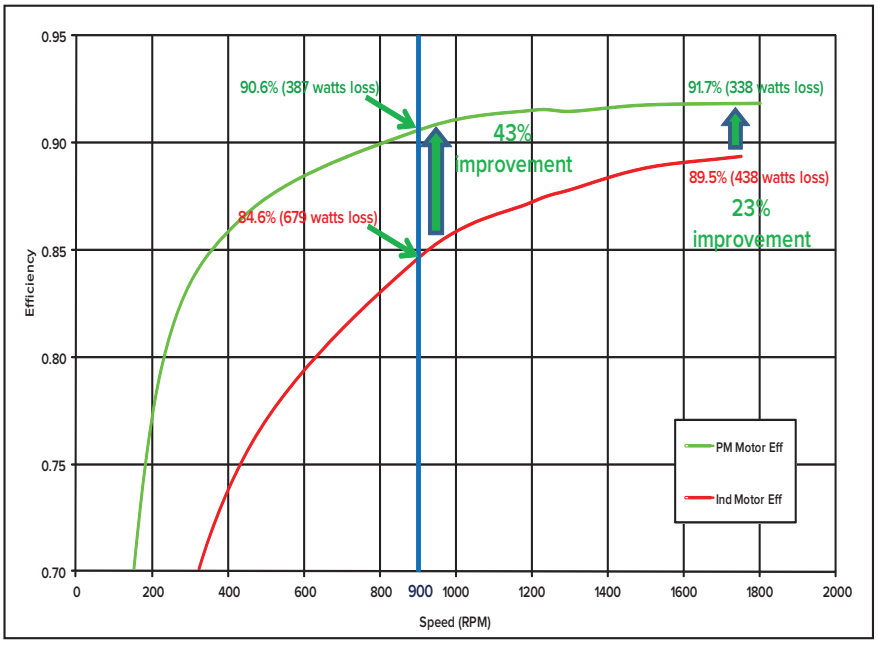
ENERGY SAVINGS

Looking for the next level of efficiency?

SyMAX® PMAC motors deliver impressive energy savings by the elimination of rotor conductor losses, optimized fan design, precision-wound stator and variable speed operation. These Ultra Efficient™ motors exceed European IE4 efficiency levels, 5 years ahead of scheduled implementation, achieving efficiencies 25-35% over NEMA Premium™! The energy savings alone often pays for the motor in as little as two years.

Additionally, the SyMAX® efficiency profile remains flatter than an equivalent induction motor as the speed and load declines, allowing the user to capture even greater energy savings when operated at the application's ideal speed.

Electric motors consume an estimated 25% of all electricity and up to 65% of all electrical energy consumed by industrials. Energy costs are projected to continue to increase in the future. A 1% gain in energy efficiency would reduce carbon emissions by an estimated 80 million tons per year. SyMAX® motors provide a very cost-effective way to reduce our carbon footprint and assure a cleaner environment.



Variable Speed Constant Torque Motor Performance
Efficiency vs Speed
5 HP, 184T SyMAX® PMAC vs NEMA Premium Induction

THE ULTIMATE IN APPLICATION FLEXIBILITY

For retrofit applications, SyMAX® motors are a Direct Drop-In replacement for Induction motors, utilizing the same footprint, shaft height and other critical NEMA or IEC prescribed dimensions.

New or redesigned machinery installations can exploit the higher power density of Permanent Magnet AC, resulting in a 2-3 frame size reduction, while providing the same output torque … or if you prefer, more torque in the same frame size.

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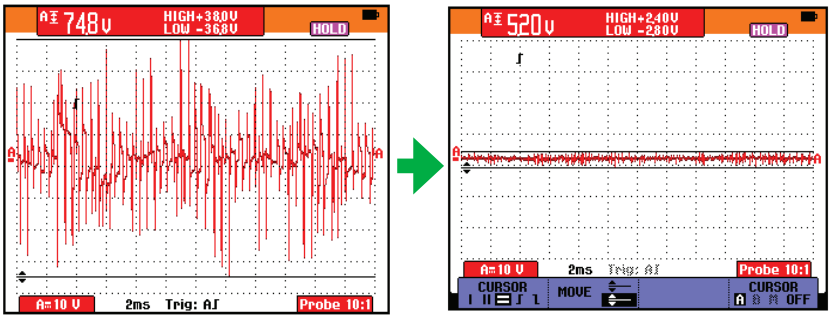
SyMAX®
Commercial 48-56 frame

SyMAX®
Industrial – Cast Iron Severe Duty
NEMA 182-286T – IEC 132-180

BEARING CURRENT REDUCTION

Wider air gap designs, coupled with optional shaft grounding devices assure you of many years of trouble-free service, while delivering the benefits of variable speed operation.



UNSURPASSED RELIABILITY AND LONGEVITY

SyMAX® motors provide the highest level of reliability and longevity, coupled with low maintenance costs, due to their low operating temperature, high ingress protection levels and ultra-precision balancing techniques.

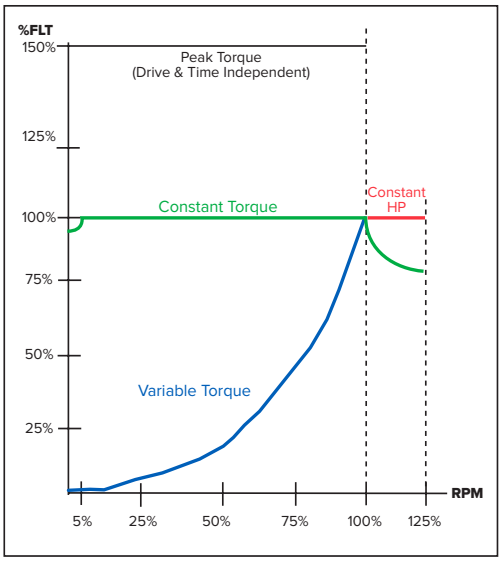
SyMAX® 48-140 frame have Class F insulation system with Class B temperature rise, while 180-280 frame are equipped with Class H system and B rise, resulting in long insulation life.

Hours of Insulation Life

System	Total Temp.	Rise	Life
B	130°C	B	20,000
F	155°C	F B	20,000 103,000
H	180°C	H F B	20,000 103,000 650,000

WIDE SPEED RANGE CONSTANT OR VARIABLE TORQUE

SyMAX® Permanent Magnet AC Synchronous motors offer improved speed and torque regulation, dynamic performance, and higher torque/amp, for those mission critical applications requiring maximum system performance.



Variable Torque operation from 0-base speed
Constant Torque 20:1 sensorless vector
Constant Torque 2000:1 closed loop vector
Constant Power to 125% of base speed

SyMAX® Permanent Magnet AC Motors

	SyMAX® Commercial	SyMAX® Industrial	
NEMA FRAMES	48, 56, 143/145T	182-215T	254-286T
IEC FRAMES	80	112-132	160-180
Electrical and Mechanical Features			
Ingress Protection (IP Code)	IP54	IP54 (IP55 or IP56 optional)	IP54 (IP55 or IP56 optional)
Frame construction	Steel	Cast Iron	Cast Iron
Enclosure	TENV (TEFC optional)	TEFC (TENV optional)	TEFC (TENV or TEBC optional)
End Shield material	Aluminum	Cast Iron	Cast Iron
Fan guard material (TEFC)	Polypropylene	Cast Iron	Cast Iron
Terminal box material	Steel	Cast Iron (Steel optional)	Cast Iron (Steel optional)
Power termination (see note 1)	Flying Leads (terminal board optional)	Flying Leads (terminal block optional)	Flying Leads (terminal block optional)
Standard terminal box position	F1 (IEC F3)	F1 (IEC F3)	F1 (IEC F3)
Auxiliary grounding provision (on frame foot)	None	Standard	Standard
Bearing system, C3 clearance	Sealed	Shielded with bearing caps	Shielded with bearing caps
Shaft seals	None	Slinger (V-Ring or Inpro optional)	Slinger (V-Ring or Inpro optional)
Regreasing provisions	None	Zerk fittings	Zerk fittings
Severe Duty features	None	Interior epoxy paint, dual cycle varnish treatment, terminal box gaskets, brass drain/breather	Interior epoxy paint, dual cycle varnish treatment, terminal box gaskets, brass drain/breather
Exterior paint	Black Powder (electrostatic)	Black Epoxy	Black Epoxy
Overload protection	None	N/C Thermostat	N/C Thermostat
Bearing Current Protection - OPTIONAL	Internal Shaft Grounding Ring	Internal Shaft Grounding Ring	Internal Shaft Grounding Ring
Insulation System	Class F Max Guard	Class H Max Guard	Class H Max Guard
Encoder provisions	Optional	Optional	Optional
Feedback devices - OPTIONAL	Hall effect sensor, encoders	Encoders, resolvers	Encoders, resolvers
Agency Recognition	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE
Division 2 (CSA Certified) - OPTIONAL	No	Class I, Div 2, Groups A,B,C,&/or D	Class I, Div 2, Groups A,B,C,&/or D
End-of-Line production test report	Optional	Standard	Standard
Warranty term	3 years	3 years	3 years
Performance Features			
Efficiency level	NEMA Premium or higher	Ultra Efficient™ (IE4 or higher)	Ultra Efficient™ (IE4 or higher)
Cogging torque	Ultra Low	Ultra Low	Ultra Low
Operating temperature rise (maximum)	Class B rise or less	Class B rise or less	Class B rise or less
Variable Torque speed range (see note 2)	1-100% of base speed	1-100% of base speed	1-100% of base speed
Constant Torque speed range (see note 2)	1-100% of base speed	1-100% of base speed	1-100% of base speed
Constant power speed range (see note 2)	100-120% of base speed	100-120% of base speed	100-120% of base speed
Reserve Torque capability (up to 1 minute)	150%	150%	150%
Duty Cycle	Continuous	Continuous	Continuous
Ambient temperature range	-20 to +40°C	-20 to +40°C	-20 to +40°C
Altitude - maximum	3300 ft (1000 meters)	3300 ft (1000 meters)	3300 ft (1000 meters)
Balance Specification	NEMA Standard (Precision optional)	NEMA Standard (Precision optional)	NEMA Standard (Precision optional)

Note 1 - Optional terminal block (or board) is only available on single voltage motors. Terminal block requires cast iron terminal box.

Note 2 - Speed range is subject to VFD settings and capability. While the motor is fully capable of operating in a variable- or constant-torque mode from zero to base speed, performance characteristics such as speed or torque regulation are a function of the drive. Further, the maximum practical limit for most variable torque applications is 10:1. Constant power operation beyond base speed ("field weakening") is limited to 120% of base speed to protect the VFD from high counter EMF voltages should the drive lose control at high operating speeds. Contact Marathon Electric for specific performance requirements with the proposed VFD.

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