Blue Max® 2000 Vector Duty Motors

marathon® Motors

Features

- Class H MAX GUARD® insulation system
- Constant torque operation from 0 to base speed on vector drive, including TEFC (on V/Hz drives, TEFC motors are limited to 20:1 constant torque)
- Constant horsepower operation to 1.5 times base RPM
- Continuous duty at 40°C ambient
- Optimized for operation with IGBT inverter (NEMA Design A)
- C-Face foot mount through 100 HP (NEMA frame type TC motors)
- Class F N/C thermostats (one per phase)
- Cast iron frame and brackets
- Utilizes double shielded ball bearings with Exxon Polyrex® EM grease
- "Class B" temperature rise on blower-cooled motors
- F1 standard conduit box location, field reversible to F2
- Available with optional encoder installed on opposite drive end
- Electrically reversible
- UL Recognized, CSA Certified, and CE Mark
- Three year warranty (through Marathon Electric)

Applications

Designed for inverter or vector applications. Typical uses include: material handling, machine tools, conveyors, crane and hoist, metal processing, test stands, pumps, compressors, textile processing, and other industrial machinery installed in dusty or dirty environments where cast iron construction is required.

Motor Shipping Schedule

Same or one day *	Up to 7 days	Up to 10 days

Color indicates shipping lead time in business days. Check stock status online.

** Certain heavy and oversized items can be shipped only via LTL. Check our web site for current shipping method constraints by part number.*

Motor Specifications

Part Number *	Price	HP	Base RPM	Volts	Encl.	NEMA Frame	Model No.	F.L. Amps	Weight (lb) *
Y571	$4,183.00	40	1800	230/460	TEFC	324T	324THFPA8028	100 / 50.0	540
Y513	$5,217.00	40	1800	230/460	TEBC	324TC	324THFPA8038	100 / 50.0	620
Y572	$5,175.00	50	1800	230/460	TEFC	326T	326THFS8028	121 / 60.5	540
Y514	$5,979.00	50	1800	230/460	TEBC	326TC	326THFPA8038	120 / 60.0	640
Y573	$6,671.00	60	1800	230/460	TEFC	364T	364THFS8036	147 / 73.5	965
Y515	$7,321.00	60	1800	230/460	TEBC	364TC	364THFS8046	147 / 73.5	1062
Y574	$7,560.00	75	1800	230/460	TEFC	365T	365THFS8036	184 / 92.0	1006
Y516	$8,752.00	75	1800	230/460	TEBC	365TC	365THFS8046	180 / 90.0	1106
Y575	$10,225.00	100	1800	230/460	TEFC	405T	405THFS8036	230 / 115	1308
Y517	$12,216.00	100	1800	230/460	TEBC	405TC	405THFS8046	230 / 115	1429

** Refer to the Motor Shipping Schedule table for shipping information*

Note: Please review the AutomationDirect Terms & Conditions for warranty and service on this product. Warranty service can be arranged through Marathon Electric service centers. See list of service centers on our Web site at www.AutomationDirect.com.

Performance Data (460 Volt)

Part Number	HP	F.L. RPM	F.L. Amps @460V	N.L. Amps @460V	F.L. Torque (lb·ft)	B.D. Torque (lb·ft)	Max. CHP RPM*	Max. Safe RPM	F.L. Effic.	F.L. Power Factor	Rotor Inertia ($lb·ft^2$)	Ohms/Ph - Equiv. Wye Circuit (460 VAC) (at rated operating temp. in 40° C ambient)				
												R1	R2	X1	X2	XM
Y571	40	1770	50.0	20.0	118.0	320.0	2642	3600	91.7	81.5	5.000	0.082	0.077	0.435	0.592	10.280
Y513	40	1770	50.0	20.0	118.0	320.0	2642	3600	91.7	81.5	5.000	0.082	0.077	0.435	0.592	10.280
Y572	50	1780	60.5	26.5	148.0	400.0	2675	3600	92.4	81.0	10.000	0.063	0.046	0.424	0.596	10.000
Y514	50	1765	60.0	25.0	149.0	525.0	3525	3600	93.0	83.5	5.500	0.088	0.092	0.437	0.358	9.662
Y573	60	1782	73.5	28.0	177.0	525.0	2665	2700	91.7	83.0	14.500	0.063	0.042	0.338	0.455	8.850
Y515	60	1782	74.0	28.0	177.0	525.0	2665	2700	91.7	83.0	14.500	0.063	0.042	0.338	0.455	8.850
Y574	75	1780	92.0	40.0	221.0	740.0	2665	2700	94.1	82.0	16.500	0.047	0.031	0.267	0.313	6.275
Y516	75	1780	90.0	33.0	222.0	645.0	2685	2700	93.0	84.0	16.000	0.054	0.038	0.299	0.420	8.203
Y575	100	1785	115.0	38.0	295.0	900.0	2675	2700	94.5	86.5	27.500	0.034	0.021	0.236	0.219	6.820
Y517	100	1785	115.0	38.0	295.0	900.0	2675	2700	94.5	86.5	27.500	0.034	0.021	0.236	0.219	6.816

* Maximum Constant HP RPM is for direct coupled loads.

Blue Max® 2000 Vector Duty Motors

Blower Motor Performance Data (for TEBC Blower Cooled Motors)										
Blower Fits Motor Type				Blower Motor Characteristics						
Part Number	Model No.	NEMA Frame	Encl.	HP (60/50Hz)	RPM (60/50Hz)	Volts	Hz	F.L. Amps	Sound Pressure	Watts
Y513	324THFPA8038	324TC	TEBC	1 / 0.75	1735 / 1460	230/460 – 190/380	60 / 50	3.0 / 1.5	40	850
Y513-A775										850
Y514	326THFPA8038	326TC								851
Y514-A775										852
Y515	364THFS8046	364TC						3.7 / 1.85	68	853
Y515-A775										854
Y516	365THFS8046	365TC								855
Y516-A775										856
Y517	405THFS8046	405TC								857
Y517-A775										858

Encoder shaft-mounted to motor*

A Dynapar Model HS35/HSD38 shaft-mounted encoder can be supplied pre-installed on the selected motor, either TEFC or TEBC type, as shown in the table below. The encoder requires a 5–26 VDC power source**, provides a count of 1024 pulses per revolution (PPR) differential line driver output, and includes a 10-pin connector. A mating connector is supplied with TEFC (totally enclosed fan cooled) motor encoders; the customer is responsible for supplying the wiring cable and determining the connections to the equipment being used in the application. The encoder adds 1 inch to the TEFC motor's "C" dimension as shown in the dimensional diagram.

The TEBC (totally enclosed blower cooled) motor encoders have the mating connector pre-wired, installed and ending in a pigtail located inside a conduit box mounted on the motor. (See Figure 2 under the motor dimensional information on the next page.) The customer is responsible for determining the connections to the equipment being used in their application.

** If connecting the motor to a DURApulse AC drive, a GS3-FB Feedback Card is required for the drive.*

*** When used with a GS3-FB equipped DURApulse AC drive, the GS3-FB will supply power to the encoder.*

Motor Shipping Schedule		
Same or one day *	Up to 7 days	Up to 10 days

Color indicates shipping lead time in business days. Check stock status online.

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Motor Accessories		
Part Number	Price	Description *
A774	$837.00	Encoder kit, replacement, for Blue Max TEFC encoder motors. Dynapar HS35 encoder, 5–26 VDC input, Line Driver output, 1024 pulses per revolution, 1-in bore.
A775	$837.00	Encoder kit, replacement, for Blue Max TEBC encoder motors. Dynapar HSD38 encoder, 5–26 VDC input, Line Driver output, 1024 pulses per revolution. 1-in bore.

** Replacement/spare encoder kit for Blue Max Y5xx-A774 and Y5xx-A775 motors; can also be field installed on Blue Max Y5xx motors; select appropriate encoder kit per motor fan type (TEFC or TEBC).*

Motor with Pre-installed Shaft-Mounted Encoder					
Part Number	Price	HP	Part Number	Price	HP
Y571-A774	$5,138.00	40 (TEFC)	Y574-A774	$8,411.00	75 (TEFC)
Y513-A775	$6,245.00	40 (TEBC)	Y516-A775	$9,745.00	75 (TEBC)
Y572-A774	$6,050.00	50 (TEFC)	Y575-A774	$11,204.00	100 (TEFC)
Y514-A775	$7,000.00	50 (TEBC)	Y517-A775	$13,174.00	100 (TEBC)
Y573-A774	$7,530.00	60 (TEFC)			
Y515-A775	$8,328.00	60 (TEBC)			

Note: Please review the AutomationDirect Terms & Conditions for warranty and service on this product. Warranty service can be arranged through numerous Marathon Electric service centers. See list of service centers on our Web site at www.AutomationDirect.com.

Encoder Connector Pinout

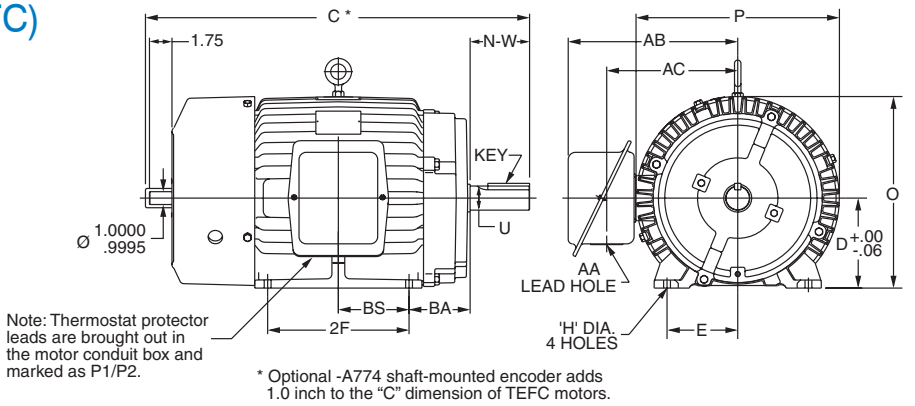
Note: A mating connector is supplied loose for the customer's wiring on encoder equipped TEFC motors and a mating connector pre-wired to a cable and pigtailed in a conduit box on encoder equipped TEBC motors.

Prewired cables TRDA-25CBL-VWD-xx (10, 20, & 30 ft) and replacement MS connectors TRDA-25CON-VWD are available from AutomationDirect.

Blue Max® 2000 Vector Duty Motors

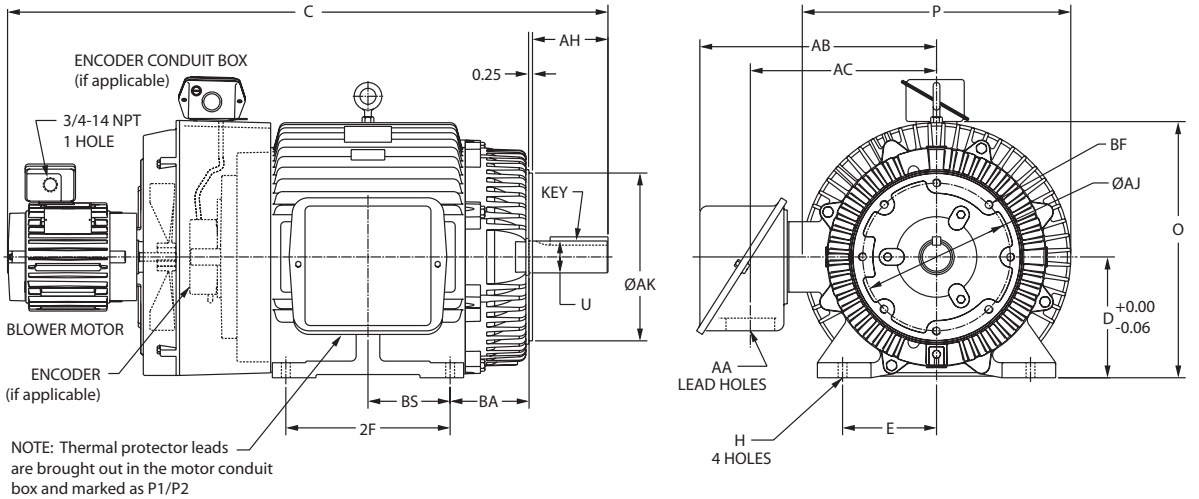
Motor Dimensions

Figure 1 (TEFC)



* Optional -A774 shaft-mounted encoder adds 1.0 inch to the "C" dimension of TEFC motors.

Figure 2 (TEBC)



Motor Dimensions [Inches]																					
Part No.	HP	Fig.	NEMA Frame	C*	D	E	2F	H Min.	O Max.	P Max.	U	AA	AB Max.	AC Max.	AH	AJ	AK	BA	BF	BS	N-W	Key
Y571	40	1*	324T	30.7	8.00	6.25	10.50	0.66	16.6	15.9	2.125	2.0	13.7	10.5	-	-	-	5.25	-	5.3	5.25	.50x.50x3.88
Y513	40	2	324TC	40.4									13.5	10.4	5.00	11.00	12.50		5/8-11		-	
Y572	50	1*	326T	32.4			12.00		17.1	18.3			14.8	11.8	-	-	-		-	6.0	5.25	
Y514	50	2	326TC	41.9					16.6	15.9			13.5	10.4	5.00	11.00	12.50		5/8-11		-	
Y573	60	1*	364T	33.7	9.00	7.00	11.25		19.0	20.0	2.375	3.6	17.9	14.6	-	-	-	5.88	-	5.6	5.88	.62x.62x4.25
Y515	60	2	364TC	42.7					22.6					13.9	5.62	11.00	12.50		5/8-11		-	
Y574	75	1*	365T	34.7			12.25		19.0					14.6	-	-	-		-	6.1	5.88	
Y516	75	2	365TC	43.7					22.6						5.62	11.00	12.50		5/8-11		-	
Y575	100	1*	405T	39.3	10.00	8.00	13.75	0.81	20.9	21.8	2.875		19.8	16.3	-	-	-	6.62	-	6.9	7.25	.75x.75x5.62
Y517	100	2	405TC	49.7					24.1				18.8	14.8	7.00	11.00	12.50		5/8-11		-	

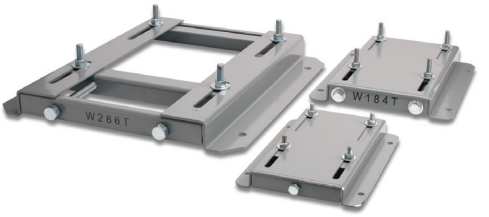
** Optional shaft-mounted encoder adds 1.0 inch to the "C" dimension of TEFC motors # Y57x-A774.*

Note: Dimensions are for reference only. For complete dimensional information, refer to Marathon Electric at www.marathonelectric.com.

STABLE™ Motor Slide Bases

Mounting Slide Bases for 56 to 449T NEMA Motors Features

- Allows adjustment of motor mounting position
- Slide direction is perpendicular to motor shaft
- Double adjusting screws for frames 182T–449T
- Manufactured to precise dimensional standards
- Dimensionally interchangeable with existing major makes
- Heavy-duty steel construction
- Painted with oven-baked primer for better adhesion of customer's paint
- All "D" bolts (motor mounting bolts) are fixed to the exact motor foot pattern
- All "D" bolts are welded into position to prevent spinning and dropping from slots
- Nuts and washers are provided for securing the motor to the slide base



STABLE Motor Slide Bases for 3-Phase Motors

Part Number	Price	Fits Frame Type	Product Wt. (lb)	Fits Motor					
				IronHorse	Marathon				
					micro-MAX ---- Max+	Black Max 230/460V ---- Black Max 575V	Blue Max	XRI GP & NEMA Premium	Powerwash SXT & Jet Pump	Blue Chip XRI 230/460V ---- Blue Chip XRI 575V
MTA-BASE-W56(*	$10.00	56*	2.8	MTPM-P3x-1x18 MTPM-P5x-1x18 MTPM-P7x-1x18 MTPM-0xx-1x18 MTPM-1xx-1x18 MTR(2)(P)-xxx-xxxxx*	Y500 Y502 Y360 Y362 Y364 ---- Y280 Y281 Y282	Y592(-A772) Y534(-A772) Y535(-A772) ---- Y555(-A772) Y556(-A772)	–	E2000 D390 G580 K703 D391 K704 G581 K705 D392 K706 G582 K707 D393A K708A G583A K709A D394A K721A G584A K722A D395A K723A G585A K724A D396A K725A	N344 N410 J066A	–
MTA-BASE-W143T	$18.50	143T/TC	4.6	MTCP-001-3BD18(C)(CK) MTCP-1P5-3BD36	–	Y536(-A772) ---- –	–	E2001A E2003		N454A
MTA-BASE-W145T	$18.50	145T/TC	5.1	MTCP-001-3BD12 MTCP-1P5-3BD18(C)(CK) MTCP-002-3BD18(C)(CK) MTCP-002-3BD36	Y366 Y368 ---- Y284 Y285	Y537(-A772) Y538(-A772) Y551(-A772) ---- Y557(-A772)	–	E2002 E2004A E2006 E2007A		–
MTA-BASE-W182T	$24.50	182T/TC	9.2	MTCP-1P5-3BD12 MTCP-003-3BD18(C)(CK) MTCP-003-3BD36 MTF-002-1C18-182	Y1999 ---- Y286A	Y541A(-A772) ---- Y558A(-A772)	–	E2005 E2009 E2010	G590A C382B C383B	–

**** IronHorse MTR2 56HC motors have double-punched bases to fit on slide base MTA-BASE-W56.***

***** Motors MTC-250-3D18 and MTC-300-3D18 are obsolete, and no longer available.***

Continued on next page.

AutomationDirect AC Motors Selection Overview

General-purpose or inverter-duty motor?

How to choose a general purpose motor vs. an inverter-duty motor

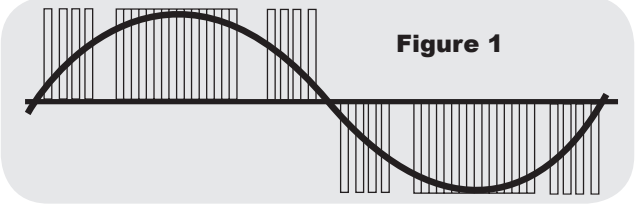
General purpose motors have been around for many years. They are the workhorse of almost every industry. An inverter-duty motor is a much newer concept that was necessary as general purpose motors began to be driven by VFDs (inverters or AC drives). An inverter duty motor can withstand the higher voltage spikes produced by all VFDs (amplified at longer cable lengths) and can run at very slow speeds without overheating. This performance comes at a cost: inverter-duty motors can be much more expensive than general purpose motors. Guidelines for choosing an IronHorse general purpose motor vs. an inverter-duty motor are given below. If your application falls within the guidelines below, there is no need to apply an inverter-duty motor.

NOTE: Marathon inverter-duty motors have limitations as well. Please see the Marathon section for more details.

Background: For many years, AC motors were driven by across-the-line contactors and starters. The electricity sent to the motor was a very clean sine wave at 60Hz. Noise and voltage peaks were relatively small. However, there were drawbacks: they only ran electrically at one speed (speed reduction was usually handled by gearboxes or some other, usually inefficient, mechanical means) and they had an inrush of electrical current (when the motor was first turned on) that was usually 5 to 6 times the normal current that the motor would consume. The speed reduction apparatus was expensive and bulky, and the inrush would wreak havoc with power systems and loading (imagine an air conditioning system in an old house - when the compressor would kick on, the lights would dim; now imagine the same circumstances with a motor the size of a small car).

Note: The following discussion applies only to 3-phase motors.

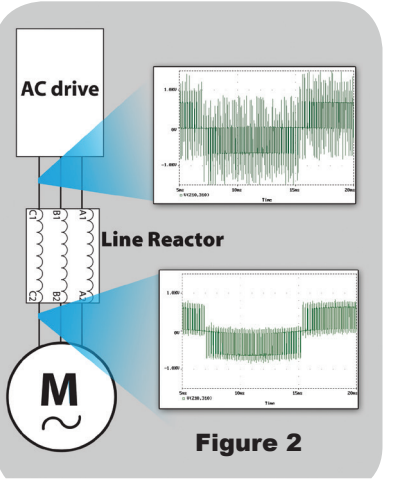
Enter the VFDs (variable frequency drives): Drives were introduced to allow the speed of these motors to be changed while running and to lessen the inrush current when the drive first starts up. To do this, the drive takes the incoming 60Hz AC power and rectifies it to a DC voltage (every drive has a DC bus that is around 1.414 (sqrt of 2) * incoming AC Line Voltage).



This DC voltage is then "chopped" by power transistors at very high frequencies to simulate a sine wave that is sent to the motor [see Figure 1]. By converting the incoming power to DC and then reconverting it to AC, the drive can vary its output voltage and output frequency, thus varying the speed of a motor. Everything sounds great, right? We get to control the frequency and voltage going out to the motor, thus controlling its speed.

Some things to watch out for: A VFD-driven general purpose motor can overheat if it is run too slowly. *(Motors can get hot if they're run slower than their rated speed.)* Since most general purpose motors cool themselves with shaft-mounted fans, if the motor overheats, bearing and insulation life will be reduced. Therefore there are minimum speed requirements for all motors.

The voltage "chopping" that occurs in the drive actually sends high-voltage spikes (at the DC bus level) down the wire to the motor. If the system contains long cabling, there are actually instances where a reflected wave occurs at the motor. The reflected wave can effectively double the voltage on the wire. This can lead to premature failure of the motor insulation. Long cable lengths between the motor and drive increase the harmful effects of the reflected wave, as do high chopping frequencies (listed in drive manuals as carrier frequencies). Line reactors, 1:1 transformers placed at the output of the drive, can help reduce the voltage spikes going from the drive to the motor. Line reactors are used in many instances when the motor is located far from the drive [see Figure 2].



In summary, general purpose motors can be run with drives in many applications; however inverter-duty motors are designed to handle much lower speeds without overheating and they are capable of withstanding higher voltage spikes without their insulation failing. With the increased performance comes an increase in cost. This additional cost can be worth it if you need greater performance.

The considerations for applying IronHorse motors are given below.

Heat considerations

	IronHorse speed ratio	For an 1800 RPM motor, minimum IronHorse speed is:
Variable Torque applications (fans, centrifugal pumps, etc.)	5:1 (EPAct motors) 10:1 (PE motors)	1800/5 = 360RPM 1800/5 = 180RPM
Constant Torque Applications (conveyors, extruders, etc.)	2:1 (EPAct motors) 4:1 (PE motors)	1800/2 = 900RPM 1800/4 = 450RPM

Voltage Spike considerations

	Max cable distance from drive to IronHorse motor	Max cable distance with a 3% line reactor between drive and IronHorse motor
For use with 230V and 460V VFDs*	125 ft	250 ft

** Up to 6kHz carrier frequency*