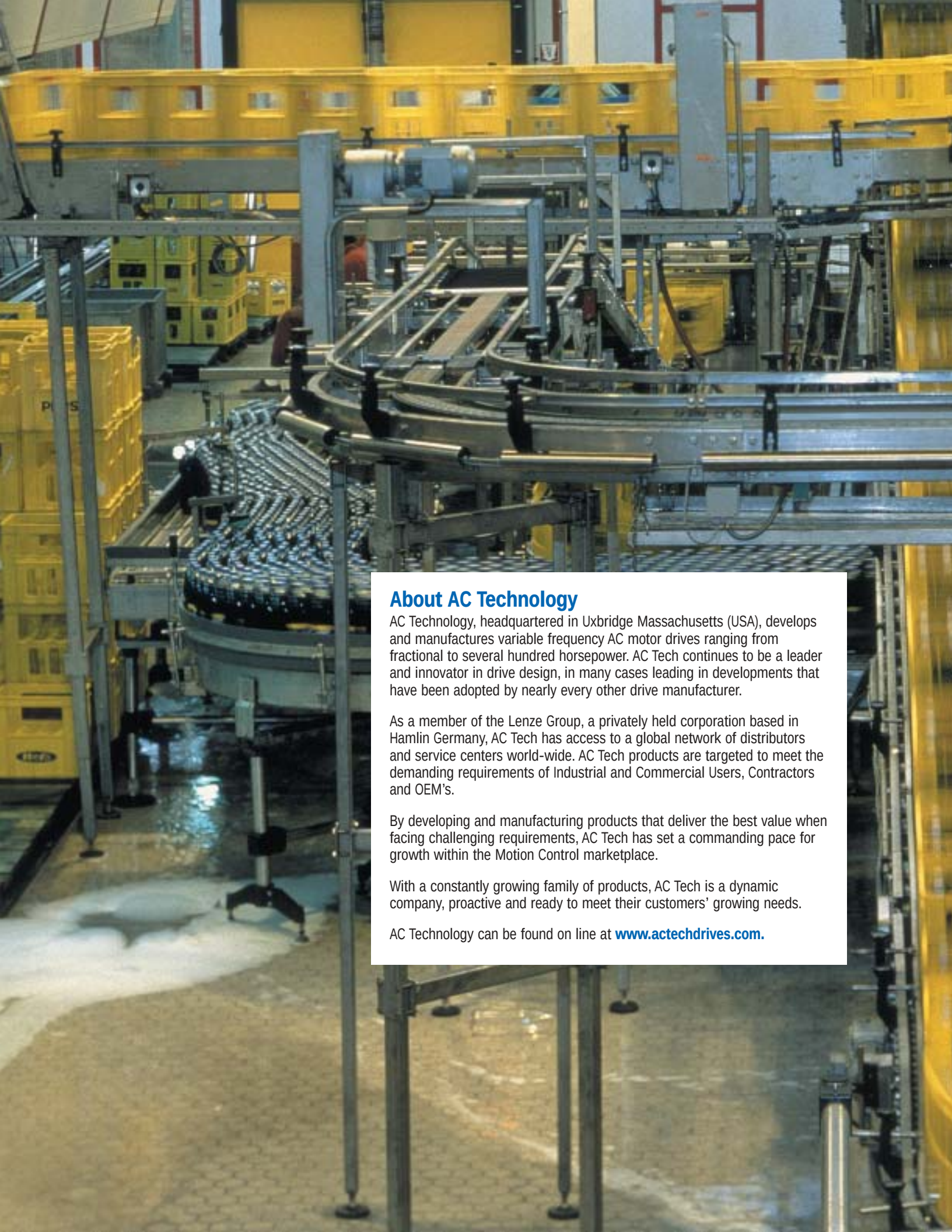
MC Series Drives

AC Tech
member of the Lenze Group
Drive for Global Excellence



About AC Technology

AC Technology, headquartered in Uxbridge Massachusetts (USA), develops and manufactures variable frequency AC motor drives ranging from fractional to several hundred horsepower. AC Tech continues to be a leader and innovator in drive design, in many cases leading in developments that have been adopted by nearly every other drive manufacturer.

As a member of the Lenze Group, a privately held corporation based in Hamlin Germany, AC Tech has access to a global network of distributors and service centers world-wide. AC Tech products are targeted to meet the demanding requirements of Industrial and Commercial Users, Contractors and OEM's.

By developing and manufacturing products that deliver the best value when facing challenging requirements, AC Tech has set a commanding pace for growth within the Motion Control marketplace.

With a constantly growing family of products, AC Tech is a dynamic company, proactive and ready to meet their customers' growing needs.

AC Technology can be found on line at **www.actechdrives.com.**

The AC Tech approach to drive development

As engineers, OEMs and technicians well know, there are no panaceas to motor control. The truth is, different motion control requirements need different tools. We're motion control specialists—so we develop a family of drives that match a wide range of applications, efficiently and cost-effectively.

AC Tech's MC micro drives put a lot of innovation and quality into a small package. The drives programmable functions are easy to access and use and allow you to configure the drive to be easy for the operator to use day-in and day-out. The MC uses leading-edge components and manufacturing techniques to keep the drive running as efficiently as possible for many years of operation. Our drive designs are continually improved upon based on innovations made by our suppliers that permit the MC design to be improved and product quality to be second-to-none, even when compared to the brand-new designs.

This advanced design is available in two versions, each optimized for a particular type of application: the M1000 for general industrial use and the M3000 for process and set-point regulated applications. Both versions offer the same ruggedness, reliability, flexibility and ease of use.

The latest technology

AC Tech's circuit boards are manufactured with surface mount technology including the highly integrated motor control processor that features built-in memory, internal wave shape generation and advanced I/O capability. This leading edge technology results in the highest manufacturing quality.

Advanced power electronics

At the heart of the MC Series are Intelligent Power Modules (IPMs), advanced highly integrated IGBTs that provide very high efficiency and reliability while reducing size and enabling current limits of 180% for twenty seconds and 150% for one minute.

All models can operate at carrier frequencies up to 14 kHz (with full output up to 8 kHz).

Full-featured and rugged

All MC drives are housed in heavy duty steel enclosures, not just covered with a piece of plastic. So you get solid mechanical protection and electrical shielding.

Heavy duty wiring terminals and conduit holes on the bottom of the enclosure provide for secure wiring. The control board has screw terminals with wire protectors for quick, easy, and secure connections.

Easy to program and operate

A 16-character, backlit LCD with adjustable contrast gives clear readouts over a wide viewing angle. Comprehensive operating displays give complete information on drive status. Menu-driven programming in plain English eliminates the frustration and time involved in learning very complex systems that use codes and symbols. Keypads on both the M1000 and M3000 have large, finger-sized buttons for easy operation.

Extensive I/O

The MC Series has extensive I/O capability. Inputs include: potentiometer, 0-10VDC, 4-20mA or floating set point (MOP) speed reference. Outputs include: 0-10VDC or 4-20mA speed and load-indicating outputs, two open collectors, and a 120 VAC auxiliary Form C relay for status indication.

The M1000 industrial drives

The intelligent, versatile and cost-effective choice for industrial applications.

From harsh environments to high torque loads, the M1000 Series microdrives meet the toughest requirements with outstanding reliability, at a low cost. The easy-to-program M1000 offers full features, extensive I/O, and a full array of programmable functions. The M1000 is available in a power range of 1/4 to 60 HP (0.18 - 45 kW) and voltages ranging from 115 to 575 VAC.

Proper enclosures. Rugged steel enclosures are rated NEMA 1, NEMA 12, NEMA 4 and even NEMA 4X in stainless steel.

The right performance. With its Enhanced Torque System (ETS), a highly efficient sine coding algorithm and "auto-voltage boost," the M1000 delivers maximum starting and accelerating torque and tight speed regulation, even under fluctuating load conditions. A built-in, UL-approved thermal overload provides full motor protection.

Easy operation. Setup is a snap thanks to the simple menu-driven, password-protected programming. A comprehensive run mode display gives complete drive status (Run, Stop, Accel, Decel) as well as speed, load, voltage, and control information. Speed display can be calibrated to the engineering units of the application.

M1000 drive features

- Manual boost for high starting torque
- Auto-boost for high torque acceleration at any speed
- Adjustable units display: Hz, RPM, %, /SEC, /MIN, /HR, none
- Slip compensation for tight speed regulation even under fluctuating loads
- Control configuration: local, remote, both, serial communications
- Auxiliary outputs- two open collector outputs and a Form C relay. Functions include Run, Fault, Inverse Fault, Fault Lockout, At Commanded Speed, Above a Preset Speed, Current Limit, Auto/ Manual Mode Indication.
- Forward only, Reverse only, Both
- Modbus® Serial Communication Protocol

M1000 and M3000 options

Expand the capabilities of your MC drive with the following options. All options can be factory installed or field installed.

- Dynamic Braking: for faster stopping or deceleration
- Additional Form-C relay
- Remote Keypad

The M3000 industrial drives

When your process control demands fast acceleration and response.

Designed expressly for use where the motor control is an integral part of a process, the M3000 is rated for constant torque applications but can easily be configured for variable torque applications.

The M3000 is available in the same power ranges and voltages as the M1000.

Proper enclosures. Rugged steel enclosures are rated, NEMA 1, NEMA 12, NEMA 4 and even NEMA 4X in stainless steel.

Easy operation The Auto-Manual key allows the operator to toggle between the drive keypad and the process controller (or speed pot or preset-speed control) for speed reference. The Local/Remote key allows the operator to toggle start/stop command between the keypad and the process controller.

The right performance. The built-in PID control allows the drive to control the motor speed in order to keep another process variable constant. Proportional, Integral and Derivative gains along with all other drive parameters are accessible from the password-protected drive keypad.

Most “process control” drives are designed for variable torque applications where the motor is driving a centrifugal fan or pump. As such, these drives are limited to 110% current for overload situations such as acceleration or responding to a feedback change. The MC3000 is a true Constant Torque drive rated for 180% of rated current for 30 seconds and 150% for one minute; this allows faster response to system changes and the ability to apply the MC3000 to non-centrifugal applications such as compressors, conveyors and other “constant torque” loads.

M3000 drive features

- Speed synchronized automatic restart after fault
- Loss of follower signal action: fault or go to preset speed
- Control configuration: local, remote, serial communications, keypad, terminal strip, PID mode
- Adjustable units display: PSI, CFM, GPM, FPM, IN, FT, Hz, RPM, %, /SEC, /MIN, /HR, none
- Auxiliary outputs - two open collector outputs and a Form C relay: Functions include Loss of Speed Reference Signal, PID High/Low Alarms in addition to those listed for the M1000.
- PID: direct or reverse acting with adjustable Proportional, Integral, and Derivative gains, Signal Calibration, high and low level alarms.
- Sleep mode with adjustable speed threshold and time
- Metasys® Serial Communication Protocol (optional)
- Modbus Serial Communication Protocol (standard)

Available enclosures

NEMA Type 1: A true general purpose enclosure, the most commonly used in industry. The type 1 enclosure allows for a free exchange of air to keep the electronics cool while keeping the enclosure size to a minimum, installation must be in a relatively clean environment.

NEMA Type 12: Intended for environments that contain dust, oil or other air born contaminants. The type 12 enclosure is gasketed to protect the electronics. AC Tech recommends the type 4 enclosure for this duty in the smaller power sizes as we can provide the higher degree of protection at the same price. Type 12 is available in the higher sizes where type 4 would be cost prohibitive.

NEMA Type 4: For "wash-down" duty, the enclosure is gasketed to protect the electronics from water sprayed directly on and around the drive, typically to keep the equipment clean.

NEMA Type 4X: Identical to type 4 (water-tight) but must also protect from caustic agents. Rather than using plastic or fiberglass, AC Tech manufactures these drives using stainless-steel enclosures and anodized heat sinks which provide far superior heat transfer and greater structural integrity.

Display that makes sense

The MC Series keypad display has been designed to make it easy to understand what is happening with the AC motor that is driving your machine or process. Displays can be configured to show you what you need to see, in the units that you need to see them in. Motor frequency (Hz) may not make as much sense to your operator as motor speed (rpm) or conveyor speed (fpm) or flow rate (gpm) or whatever is really happening. Because our displays are in English, programming the MC is easy to understand, often eliminating the need to have the manual in one hand while programming with the other!

Specifications

Output wave form	High carrier frequency, sine coded, pulse width modulated (PWM)
Input voltage ratings	240/120, 240/200, 480/400, 590/480 Vac
Input voltage tolerance	+10%, -15% of rating
Input frequency tolerance	48 to 62 Hz
Output frequency	0-120 Hz (optional to 1000 Hz on M1000)
Carrier frequency	2.5 kHz to 14 kHz (Drive rated at 8 kHz)
Frequency stability	+0.00006% / ˚C
Overload current capacity	180% for 30 seconds, 150% for one minute (at 8 kHz)
Service factor	1.0
Power factor	Near unity
Efficiency	Up to 98.5%
Speed reference follower	0-10 VDC or 4-20 mA
Control voltage	15 VDC
Analog outputs	0-10 VDC, or 2-10 VDC (4-20 mA with 500 ohm impedance). Proportional to speed and load
Digital outputs	Form C relay: 2A at 28 VDC or 120 Vac. Two open-collector outputs: 40 mA at 30 VDC
Serial communications	RS485 networkable, Modbus (standard) and Metasys (optional with the M3000)
Storage temperature	-20˚ to 70˚ C Chassis 10˚– 55˚C Type 1 (IP31) 10˚– 50˚C Type 4 (IP65) 10˚– 40˚C Type 12 (IP54) 10˚– 40˚C
Ambient humidity	Less than 95%, (non-condensing)
Maximum altitude	3300 Feet (1000 meters) w/o derating

MC Series drive features

- Input line voltage calibration: automatically or manually optimizes over and under voltage trip levels
- Anti-stall, frequency foldback: current limit to 180% for 30 seconds, 150% for one minute
- Thermal overload: Inverse I^2t motor thermal protection
- Four preset speeds
- Two critical frequency avoidance ranges: with adjustable bandwith
- Independent Accel and Decel
- DC injection braking timed or continuous on starting or stopping with programmable maximum load level
- Dynamic brake enable/disable (dynamic braking requires option card)
- Base frequency adjustment to calibrate V/Hz to motor requirements with constant or variable torque curves
- Low frequency voltage boost for high starting torque
- Adjustable carrier frequency for quiet and efficient motor operation (2.5 to 14 kHz)
- Automatic restarting after fault for unattended applications
- Coast or ramp stopping
- Auto and Manual mode enable/disable
- Units display calibration and decimal point adjustment
- Load meter calibration
- Adjustable contrast setting for easy viewing of display from any angle
- Two analog inputs: 0-10 V and 4-20 mA with software adjustable filter for external noise reduction
- Speed reference selection: keypad or analog input
- Speed reference calibration
- Speed indicating output signal selection: 0-10 VDC or 4-20 mA
- Speed indicating output signal calibration
- Load indicating output signal selection: 0-10 VDC or 4-20 mA
- Load indicating output signal calibration
- Four programmable terminals for speed reference and control activation
- Programmable terminal for external trip activation or manual reset
- Serial communications enable/disable
- Serial communications address: 1-247
- Password protection: enable/disable and setting (0000-9999)
- Monitor mode: enable/disable allows viewing of password protected parameter settings
- Parameter reset: reset to factory defaults (choice of 50 Hz or 60 Hz factory settings)
- Fault history: View log of eight previous trips with drive status at time of trip
- Fault history reset
- Output frequency to 120Hz (Optional to 1000 Hz on M1000)

HP	Voltage	Input Phase	3 Phase Output Amps	NEMA 1 Model (See Note 1)	H x W x D (inches)	H x W x D (mm)	NEMA 4 & 12 Model (See Notes)	NEMA 4X Model	H x W x D (inches)	H x W x D (mm)
0.25 (0.18kW)	240/120	1Ø	1.4	M1103SB	7.50 x 4.70 x 3.33	190 x 119 x 85	M1103SC	M1103SE	7.88 x 6.12 x 3.63	200 x 155 x 92
0.5 (0.37kW)	240/120	1Ø	2.2	M1105SB	7.50 x 6.12 x 3.63	190 x 155 x 92	M1105SC	M1105SE	7.88 x 7.86 x 3.75	200 x 200 x 95
	240	1Ø	2.2	M1205SB	7.50 x 4.70 x 3.63	190 x 119 x 92	M1205SC	M1205SE	7.88 x 6.12 x 4.35	200 x 155 x 110
	240/200	3Ø	2.2/2.5	M1205B	7.50 x 4.70 x 3.63	190 x 119 x 92	M1205C	M1205E	7.88 x 6.12 x 4.35	200 x 155 x 110
1 (0.75kW)	240/120	1Ø	4.0	M1110SB	7.50 x 6.12 x 4.22	190 x 155 x 107	M1110SC	M1110SE	7.88 x 7.86 x 4.90	200 x 200 x 124
	240	1Ø	4.0	M1210SB	7.50 x 4.70 x 4.33	190 x 119 x 110	M1210SC	M1210SE	7.88 x 6.12 x 4.35	200 x 155 x 110
	240/200	3Ø	4.0/4.6	M1210B	7.50 x 4.70 x 4.33	190 x 119 x 110	M1210C	M1210E	7.88 x 6.12 x 4.35	200 x 155 x 110
	480/400	3Ø	2.0/2.3	M1410B	7.50 x 4.70 x 3.63	190 x 119 x 92	M1410C	M1410E	7.88 x 6.12 x 4.35	200 x 155 x 110
	590	3Ø	1.6	M1510B	7.50 x 4.70 x 3.63	190 x 119 x 92	M1510C	M1510E	7.88 x 6.12 x 4.35	200 x 155 x 110
1.5 (1.1kW)	240/120	1Ø	5.2	M1115SB	7.50 x 6.12 x 4.22	190 x 155 x 107	M1115SC	M1115SE	7.88 x 7.86 x 4.90	200 x 200 x 124
	240	1Ø	5.2	M1215SB	7.50 x 6.12 x 4.22	190 x 155 x 107	M1215SC	M1215SE	7.88 x 7.86 x 4.90	200 x 200 x 124
	240/200	3Ø	5.2/6.0	M1215B	7.50 x 4.70 x 4.33	190 x 119 x 110	M1215C	M1215E	7.88 x 6.12 x 5.25	200 x 155 x 133
2 (1.5kW)	240	1Ø	6.8	M1220SB	7.50 x 6.12 x 5.12	190 x 155 x 130	M1220SC	M1220SE	7.88 x 7.86 x 4.90	200 x 200 x 124
	240/200	3Ø	6.8/7.8	M1220B	7.50 x 6.12 x 5.12	190 x 155 x 130	M1220C	M1220E	7.88 x 7.86 x 4.90	200 x 200 x 124
	480/400	3Ø	3.4/3.9	M1420B	7.50 x 6.12 x 4.22	190 x 155 x 107	M1420C	M1420E	7.88 x 7.86 x 4.90	200 x 200 x 124
	590	3Ø	2.7	M1520B	7.50 x 6.12 x 4.22	190 x 155 x 107	M1520C	M1520E	7.88 x 7.86 x 4.90	200 x 200 x 124
3 (2.2kW)	240	1Ø	9.6	M1230SB	7.50 x 6.12 x 5.12	190 x 155 x 130	M1230SC	M1230SE	7.88 x 7.86 x 5.90	200 x 200 x 150
	240/200	3Ø	9.6/11.0	M1230B	7.50 x 6.12 x 5.12	190 x 155 x 130	M1230C	M1230E	7.88 x 7.86 x 5.90	200 x 200 x 150
	480/400	3Ø	4.8/5.5	M1430B	7.50 x 6.12 x 5.12	190 x 155 x 130	M1430C	M1430E	7.88 x 7.86 x 4.90	200 x 200 x 124
	590	3Ø	3.9	M1530B	7.50 x 6.12 x 5.12	190 x 155 x 130	M1530C	M1530E	7.88 x 7.86 x 4.90	200 x 200 x 124
5 (3.7kW)	240/200	3Ø	15.2/17.5	M1250B	7.88 x 7.86 x 5.94	200 x 200 x 151	M1250C	M1250E	9.75 x 10.26 x 7.20	248 x 261 x 183
	480/400	3Ø	7.6/8.7	M1450B	7.50 x 6.12 x 5.12	190 x 155 x 130	M1450C	M1450E	7.88 x 7.86 x 5.90	200 x 200 x 150
	590	3Ø	6.1	M1551B	7.88 x 7.86 x 5.94	200 x 200 x 151	M1550C	M1550E	7.88 x 7.86 x 5.90	200 x 200 x 150
7.5 (5.5kW)	240/200	3Ø	22/25	M1275B	9.38 x 7.86 x 6.84	238 x 200 x 174	M1275C	M1275E	11.75 x 10.26 x 8.35	298 x 261 x 212
	480/400	3Ø	11.0/12.6	M1475B	9.38 x 7.86 x 6.25	238 x 200 x 159	M1475C	M1475E	9.75 x 10.26 x 7.20	248 x 261 x 183
	590	3Ø	9.0	M1575B	9.38 x 7.86 x 6.25	238 x 200 x 159	M1575C	M1575E	9.75 x 10.26 x 7.20	248 x 261 x 183
10 (7.5kW)	240/200	3Ø	28/32	M12100B	11.25 x 7.86 x 6.84	286 x 200 x 174	M12100C	M12100E	13.75 x 10.26 x 8.35	349 x 261 x 212
	480/400	3Ø	14.0/16.0	M14100B	9.38 x 7.86 x 6.84	238 x 200 x 174	M14100C	M14100E	11.75 x 10.26 x 8.35	298 x 261 x 212
	590	3Ø	11.0	M15100B	9.38 x 7.86 x 7.40	238 x 200 x 188	M15100C	M15100E	11.75 x 10.26 x 8.35	298 x 261 x 212
15 (11kW)	240/200	3Ø	42/48	M12150B	12.75 x 7.86 x 6.84	324 x 200 x 174	M12150C	M12150E	15.75 x 10.26 x 8.35	400 x 261 x 212
	480/400	3Ø	21/24	M14150B	11.25 x 7.86 x 6.84	286 x 200 x 174	M14150C	M14150E	13.75 x 10.26 x 8.35	349 x 261 x 212
	590	3Ø	17.0	M15150B	12.75 x 7.86 x 6.84	324 x 200 x 174	M15150C	M15150E	13.75 x 10.26 x 8.35	349 x 261 x 212
20 (15kW)	240/200	3Ø	54/62	M12200B	12.75 x 10.26 x 7.74	324 x 261 x 197	M12200D	----------	15.75 x 10.26 x 8.35	400 x 261 x 212
	480/400	3Ø	27/31	M14200B	12.75 x 7.86 x 6.84	324 x 200 x 174	M14200C	M14200E	15.75 x 10.26 x 8.35	400 x 261 x 212
	590	3Ø	22	M15200B	12.75 x 7.86 x 7.40	324 x 200 x 188	M15200C	M15200E	15.75 x 10.26 x 8.35	400 x 261 x 212
25 (18.5kW)	240/200	3Ø	68/78	M12250B	15.75 x 10.26 x 8.35	400 x 261 x 212	----------	----------		
	480/400	3Ø	34/39	M14250B	12.75 x 10.26 x 7.74	324 x 261 x 197	M14250D	----------	15.75 x 10.26 x 8.35	400 x 261 x 212
	590	3Ø	27	M15250B	12.75 x 10.26 x 7.74	324 x 261 x 197	M15250D	----------	15.75 x 10.26 x 8.35	400 x 261 x 212
30 (22kW)	240/200	3Ø	80/92	M12300B	15.75 x 10.26 x 8.35	400 x 261 x 212				
	480/400	3Ø	40/46	M14300B	12.75 x 10.26 x 7.74	324 x 261 x 197	M14300D	----------	15.75 x 10.26 x 8.35	400 x 261 x 212
	590	3Ø	32	M15300B	12.75 x 10.26 x 8.25	324 x 261 x 210	M15300D	----------	15.75 x 10.26 x 8.35	400 x 261 x 212
40 (30kW)	480/400	3Ø	52/60	M14400B	15.75 x 10.26 x 8.35	400 x 261 x 212	M14400D	----------	20.25 x 10.26 x 8.35	514 x 261 x 212
	590	3Ø	41	M15400B	15.75 x 10.26 x 8.35	400 x 261 x 212	M15400D	----------	20.25 x 10.26 x 8.35	514 x 261 x 212
50 (37.5kW)	480/400	3Ø	65/75	M14500B	19.75 x 10.26 x 8.55	502 x 261 x 217	M14500D	----------	21.00 x 13.72 x 8.35	533 x 348 x 212
	590	3Ø	52	M15500B	19.75 x 10.26 x 8.55	502 x 261 x 217	M15500D	----------	21.00 x 13.72 x 8.35	533 x 348 x 212
60 (45kW)	480/400	3Ø	77/88	M14600B	19.75 x 10.26 x 8.55	502 x 261 x 217	M14600D	----------	21.00 x 13.72 x 8.35	533 x 348 x 212
	590	3Ø	62	M15600B	19.75 x 10.26 x 8.55	502 x 261 x 217	M15600D	----------	21.00 x 13.72 x 8.35	533 x 348 x 212

Note 1: Model numbers shown are for the M1000 series, please replace the “M1” at the begnning of the model number with a “M3” to specify a M3000 series drive.

Note 2: Model numbers ending with “C” are suitable for NEMA 4 and NEMA 12 applications.

Note 3: Model numbers ending with “D” are suitable for NEMA 12 applications.

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