

# MC Series Drives

Flexible, simple, rugged, robust!



# MC Series | Our promise

## Commitment to Price Leadership

Price leadership is serious business. It takes continuous life cycle management to make price leadership a sustainable strategy. We are always investigating techniques to improve efficiency and take advantage of the latest microprocessor and power module technology. When we achieve efficiency gains or material cost reductions, we pass those savings on to our customers. This simple philosophy has permitted us to build and maintain a very loyal base of customers.

## Commitment to Quality

Design quality is meticulously managed throughout our product's life cycle. Our design engineers are continuously monitoring new technology trends that increase product performance and component reliability. We never stop thinking about process improvements through automation. In fact, we have invested millions in automating our new state-of-the-art manufacturing facility. When you open any product box you will immediately see and feel the attention to every detail.

## Commitment to Innovation

We pride ourselves on delivering products to the market that are designed to meet specific customer needs. Our portfolio of innovative products is broad and covers very simple variable speed applications up through complex motion control. Each product is positioned so our customers pay only for the level of technology necessary for their application.

## Commitment to Simplicity

One of the cornerstones of our design philosophy is to make our products simple to use. Technology only benefits the user if it can be easily understood and applied. Each product is designed to dramatically simplify installation, commissioning and operation for our customers.

## Commitment to Performance

Each Lenze/AC Tech product is in a class by itself when it comes to performance. We are not satisfied with average performance. Our products do not reach the marketplace unless they outperform our competitors and exceed our strict performance requirements. By working closely with our component vendors, we are able to provide that performance for a great value.

## Our Promise

At AC Tech it is not good enough to deliver part of a promise. Our products deliver the entire package; Price Leadership, Quality, Innovation, Simplicity and Performance.



**AC Variable Frequency Drives | Servo Drives & Motors | Gear Reducers | Integral Gear**

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## 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	0-650 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: 40mA 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



## System Protection

- ▶ Input line voltage calibration: automatically or manually optimizes over and under voltage trip levels
- ▶ Thermal overload: Inverse I<sup>2</sup>t motor thermal protection
- ▶ Two critical frequency avoidance ranges: with adjustable bandwidth
- ▶ Automatic restarting after fault for unattended applications
- ▶ Speed reference selection: keypad or analog input
- ▶ Password protection: enable/disable and setting (0000-9999)
- ▶ Monitor mode: enable/disable allows view-only 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

## World Class Control

- ▶ Four preset speeds
- ▶ 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
- ▶ 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
- ▶ Speed reference 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

## 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 airborne 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. And no cooling fans are needed.



### NEMA Type 4X

Identical to type 4 (water-tight) but must also protect from caustic agents. AC Tech manufactures these drives using stainless-steel enclosures and anodized heat sinks which provide superior heat transfer and greater structural integrity.

# MC Series | Ratings & Dimensions

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)
<b>0.25 (0.18kW)</b>	240/120	1Ø	1.4	M(*)103SB	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
<b>0.5 (0.37kW)</b>	240/120	1Ø	2.2	M(*)105SB	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	M(*)205SB	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	M(*)205B	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
<b>1 (0.75kW)</b>	240/120	1Ø	4.0	M(*)110SB	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	M(*)210SB	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	M(*)210B	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	M(*)410B	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	M(*)510B	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
<b>1.5 (1.1kW)</b>	240/120	1Ø	5.2	M(*)115SB	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	M(*)215SB	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	M(*)215B	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
<b>2 (1.5kW)</b>	240	1Ø	6.8	M(*)220SB	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	M(*)220B	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	M(*)420B	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	M(*)520B	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
<b>3 (2.2kW)</b>	240	1Ø	9.6	M(*)230SB	7.50 x 6.12 x 5.12	190 x 155 x 130	M1230SC	M1230SC	7.88 x 7.86 x 5.90	200 x 200 x 150
	240/200	3Ø	9.6/11.0	M(*)230B	7.50 x 6.12 x 5.12	190 x 155 x 130	M1230C	M1230C	7.88 x 7.86 x 5.90	200 x 200 x 150
	240/400	3Ø	4.8/5.5	M(*)430B	7.50 x 6.12 x 5.12	190 x 155 x 130	M1430C	M1430C	7.88 x 7.86 x 4.90	200 x 200 x 124
	590	3Ø	3.9	M(*)530B	7.50 x 6.12 x 5.12	190 x 155 x 130	M1530C	M1530C	7.88 x 7.86 x 4.90	200 x 200 x 124
<b>5 (3.7kW)</b>	240/200	3Ø	15.2/17.5	M(*)250B	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	M(*)450B	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	M(*)551B	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
<b>7.5 (5.5kW)</b>	240/200	3Ø	22/25	M(*)275B	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	M(*)475B	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	M(*)575B	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
<b>10 (7.5kW)</b>	240/200	3Ø	28/32	M(*)2100B	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	M(*)4100B	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	M(*)5100B	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
<b>15 (11kW)</b>	240/200	3Ø	42/48	M(*)2150B	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	M(*)4150B	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	M(*)5150B	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
<b>20 (15kW)</b>	240/200	3Ø	54/62	M(*)2200B	12.75 x 10.26 x 7.74	324 x 261 x 197	M12200C	-----	15.75 x 10.26 x 8.35	400 x 261 x 212
	480/400	3Ø	27/31	M(*)4200B	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	M(*)5200B	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
<b>25 (18.5kW)</b>	240/200	3Ø	68/78	M(*)2250B	15.75 x 10.26 x 8.35	400 x 261 x 212	-----	-----	-----	-----
	480/400	3Ø	34/39	M(*)4250B	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	M(*)5250B	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
<b>30 (22kW)</b>	240/200	3Ø	80/92	M(*)2300B	15.75 x 10.26 x 8.35	400 x 261 x 212	-----	-----	-----	-----
	480/400	3Ø	40/46	M(*)4300B	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	M(*)5300B	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
<b>40 (30kW)</b>	240/200	3Ø	120/104	M(*)2400B	25.00 x 13.00 x 10.50	635 x 330 x 212	-----	-----	-----	-----
	480/400	3Ø	52/60	M(*)4400B	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	M(*)5400B	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
<b>50 (37.5kW)</b>	480/400	3Ø	65/75	M(*)4500B	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	M(*)5500B	19.75 x 10.26 x 8.55	502 x 261 x 217	M15500C	-----	21.00 x 13.72 x 8.35	533 x 348 x 212
<b>60 (45kW)</b>	240/200	3Ø	177/154	M(*)2600B	47.00 x 16.64 x 11.85	1194 x 423 x 301	-----	-----	-----	-----
	480/400	3Ø	77/88	M(*)4600B	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	M(*)5600B	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
<b>75 (55kW)</b>	480/400	3Ø	110/96	M(*)4750B	29.00 x 16.64 x 11.85	737 x 423 x 301	M14750D	-----	37.00 x 18.00 x 13.30	940 x 457 x 338
<b>100 (75kW)</b>	480/400	3Ø	143/124	M(*)41000B	29.00 x 24.42 x 11.85	737 x 620 x 301	M141000D	-----	39.00 x 26.00 x 13.30	991 x 660 x 338
<b>125 (90kW)</b>	480/400	3Ø	179/156	M(*)41250B	29.00 x 24.42 x 11.85	737 x 620 x 301	M141250D	-----	39.00 x 26.00 x 13.30	991 x 660 x 338
<b>150 (110kW)</b>	480/400	3Ø	207/180	M(*)41500B	29.00 x 36.66 x 11.85	737 x 931 x 301	-----	-----	-----	-----

#### NEMA 1

Note 1: "M(\*)" signifies either M1 for the M1000 series or M3 for M3000 series.

#### NEMA 4 and NEMA12

Note 2: Replace the "M1" at the beginning of the model number with "M3" to specify a M3000 series drive.

Note 3: Model numbers ending with "C" are suitable for NEMA 4 and NEMA 12 applications.

Note 4: Model numbers ending with "D" are suitable for NEMA 12 applications.

# MC Series | Features and Benefits

## 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 150 HP (0.18 - 110 kW) and voltages ranging from 115 to 575 VAC.

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.

## 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
- ▶ 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

The choice 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.

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.

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

## 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)



## 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. Motor frequency (Hz) may not make as much sense to your operator as motor speed (rpm) or conveyor speed (fpm) or flow rate (gpm). Displays can be configured to show what you need to see, in the units that you need to see them in. 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!