

MDS

With FM Modules

FM control modules (see FM Controls) provide MDS-MD drive modules with “snap-on” functionality for Indexing (FM-2), Programming (FM-3E), and Advanced Programming (FM-4E). This modular approach allows users to choose the level of advanced machine control they need, based on the applications parameters and not the drive “spec”.

Now programmed using the new PowerTools Pro software. It can also be used with PowerTools FM.

For applications requiring traditional multi-axis control, our MC controller is easily integrated with a single cable connection.



MDS Series

FM-2 INDEXING MODULE

The FM-2 module enhances EN drives by adding positioning capability including Jog, Home, Index functions including Position Tracker™ – Fieldbus Indexing. The FM-2 also includes additional I/O providing 8 digital inputs and 4 digital outputs.

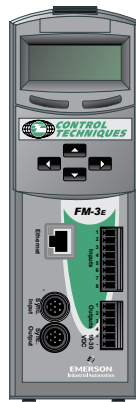


FM-2 Application Examples

- Clutch-brake replacement
- Extend-retract arm
- Indexing table
- Indexing conveyor

FM-3E PROGRAMMING MODULE

The FM-3E Ethernet module transforms the MDS into a fully programmable single-axis motion controller, and adds 8 digital inputs and 4 digital outputs. Profibus (FM-3PB) and DeviceNet (FM-3DN) options are also available.

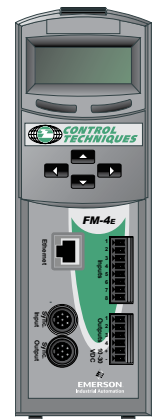


FM-3E Application Examples

- Tension control
- Flying cut off
- Auger filler
- Registration control
- Slip compensation

FM-4E ADVANCED PROGRAMMING MODULE

The FM-4E Advanced Programming module has taken all of the features and flexibility of the FM-3E, and added the ability to create complex motion profiles for sophisticated applications. The FM-4E adds versatility and extends functionality by including high speed data capture, summation of multiple motion profiles, program multi-tasking, and an array of parameters suitable for even the toughest applications. Profibus (FM-4PB) and DeviceNet (FM-4DN) options are also available.



FM-4E Application Examples

- Random infeed conveyor
- Merge conveyor
- Rotary knife
- High speed labeling
- Phase synchronization
- Electronic gearing
- Point-to-point positioning
- Thermoforming
- Web control

MDS TERMINALS AND PINOUTS

MDS Series

Power Module

Drive Module



AC Power	
Terminal	Signal
L1	AC Input
L2	AC Input
L3	AC Input
PE	PE

Digital I/O (J1)	
Pin Number	Signal
1	System Ready Output
2	Shunt Active Output
3	Shunt Fault Output
4	OverTemp Output
5	High VAC
6	Drive Module Fault Output
7	AC Interlock Relay
8	AC Interlock Relay
9	External Shunt Control
10	Fault Reset Input
11	Logic Supply +24VDC
12	Logic Supply 0V Common
13	PE
14	I/O Supply
15	I/O Supply 0V

DC Power	
Terminal	Signal
B+	DC Bus +
SHT	External Shunt Output
B-	DC Bus -

Digital I/O (J6)	
Pin Number	Signal
1	I/O Supply +
2	I/O Supply 0V
3	Drive Enable
4	Input 1
5	Input 2
6	Input 3
7	Input 4
8	Output 1
9	Output 2
10	Output 3

Motor Power	
Terminal	Signal
PE	PE
T	Motor Power T
S	Motor Power S
R	Motor Power R

Serial (J4)	
Pin Number	Signal
3	RS232 TX
2	RS232 RX
6	Serial +5VDC
5	Serial 0V Common
4	RS485+
9	RS485-
1	Shield
7,8	No Connect

Command (J5)	
Pin Number	Signal
15	Analog Command In +
14	Analog Command In -
8	Encoder Out A
9	Encoder Out A/
23	Encoder Out B
24	Encoder Out B/
37	Encoder Out Z
38	Encoder Out Z/
27	Pulse In A
41	Pulse In A/
26	Pulse In B
40	Pulse In B/
25	Pulse In Z
39	Pulse In Z/
20	Pulse In A (single ended)
36	Pulse In B (single ended)
16	I/O Input Drive Enable
1	I/O Input 1
2	I/O Input 2
3	I/O Input 3
4	I/O Input 4
19	I/O Output 1
18	I/O Output 2
17	I/O Output 3
33	I/O Supply +
34	I/O Supply +
31	I/O Supply 0V
32	I/O Supply 0V
29	Analog Out 0V
43	Analog Out Channel 1 +
44	Analog Out Channel 2 +
11	External Encoder +5VDC Power
12	External Encoder Common
28	+15V Power Out (10 mA)
6	RS485 +
21	RS485 -
5, 7, 10, 13, 22, 30, 35, 42	No Connect

Feedback (J7)	
Pin Number	Signal
1	Motor Encoder A
10	Motor Encoder A/
2	Motor Encoder B
11	Motor Encoder B/
3	Motor Encoder Z
12	Motor Encoder Z/
4	Motor Commutation U
13	Motor Commutation U/
5	Motor Commutation V
14	Motor Commutation V/
6	Motor Commutation W
15	Motor Commutation W/
7,8	Encoder +5 VDC Supply
17	Encoder 0V Common
9	Motor OverTemp
16,18-26	No Connect

Feedback Connector below not shown

MDS SPECIFICATIONS AND DIMENSIONS

Power Requirements

AC Input Voltage: 3Ø, 187 to 528 VAC, 47 - 63 Hz
(460 VAC for rated performance)

AC Input Current

MP-1250: 17 Arms (15A @ 100 ms soft start)
MP-2500: 35 Arms (15A @ 100 ms soft start)
MP-5000: 70 Arms (15A @ 100 ms soft start)

Output Continuous Current

MD-404: 4 Arms/2.8 Arms (5 kHz/10 kHz)
MD-407: 7 Arms/5 Arms
MD-410: 10 Arms/6.5 Arms
MD-420: 20 Arms/14 Arms
MD-434: 34 Arms/22 Arms
(Current ratings the same for 460V or 230V operation)

Output Peak Current

MD-404: 8A/5.6A (5 kHz/10 kHz)
MD-407: 14A/10A
MD-410: 20A/13A
MD-420: 40A/28A
MD-434: 68A/44A
(Current ratings the same for 460V or 230V operation)

Continuous Output Power

(Ratings based on 5 kHz, 460V/230V operation)
MP-1250: 12.5 kW/6.25 kW
MP-2500: 25 kW/12.5 kW
MP-5000: 50 kW/25.0 kW
MD-404: 3.3 kW/1.7 kW
MD-407: 5.8 kW/2.9 kW
MD-410: 8.3 kW/4.2 kW
MD-420: 16.7 kW/8.4 kW
MD-434: 28.3 kW/14.2 kW

Switching Frequency: 5 or 10 kHz

Logic Supply: +21.6 to 26.4 VDC,
(Required Accessory)

Encoder Supply Output: +5 VDC, 250 mA

System Efficiency: 90%

Regeneration

Internal Energy Absorption—System Bus Capacitance

Power Modules (460V/230V):

MP-1250: 110 Joules / 236 Joules
MP-2500: 183 Joules / 393 Joules
MP-5000: 293 Joules / 629 Joules

Drive Modules (460V/230V):

MD-404: 8 Joules / 17 Joules
MD-407: 17 Joules / 37 Joules
MD-410: 26 Joules / 55 Joules
MD-420: 37 Joules / 79 Joules
MD-434: 37 Joules / 79 Joules

Integral Transistor connected to an external resistor:

MP-1250: 30 Ohm minimum, 6 kW max
MP-2500: 30 Ohm minimum, 6 kW max
MP-5000: 9 Ohm minimum, 12 kW max

I/O Supply: +10 to 30 VDC

Power Module Control Inputs

Digital:(2) +10 to 30 VDC, 2.8 kOhm,
Sourcing, Optically Isolated

Power Module Control Outputs

Digital:(6) Digital: +10 to 30 VDC, 150 mA,
Sourcing, Optically isolated
Relay Contact:(1) AC Interlock, 24 VDC, 5A

Drive Module Control Inputs

Analog: (1) Analog: +/- 10 VDC 14 bit,
100 kOhm, Differential

Analog Max Input Rating: +/- 14 VDC, Differential
or Each Input with Reference to Analog Ground

Digital: (5) +10 to 30 VDC, 2.8 kOhm, Sourcing,
Optically isolated

Pulse: (1) Pulse, Differential: RS422, 2 MHz/
Channel, 50 % Duty Cycle (1) Pulse, Single
Ended: TTL Schmitt
Trigger

Drive Module Control Outputs

Analog: (2) +/- 10 VDC 10-bit, single ended, 20 mA

Digital: (3) +10 to 30 VDC, 150 mA, Sourcing,
Optically isolated

Motor OverTemperature: (1) 0 to +5 VDC, single
ended

Pulse: Differential: RS422 and TTL
compatible, 20 mA/Channel,
Sink or Source

Cooling Method

MP-1250: Convection
MP-2500: Integral Fan
MP-5000: Integral Fan
MD-404: Convection
MD-407: Integral Fan
MD-410: Integral Fan
MD-420: Integral Fan
MD-434: Integral Fan

Environmental

Rated Ambient Temperature: 32° to 104°F
(0° to 40°C)

Maximum Ambient Temperature: 32° to 122°F
(0° to 50°C) with power derating of 3.5% / 1.8°F
(1°C) above 104°F (40°C)

Rated Altitude: 3280' (1000 m)

Maximum Altitude: For altitudes >3280' (1000 m)
derate output by 1%/328' (100 m)

Vibration: 10 to 2000 Hz @ 2g

Humidity: 10 to 95% non-condensing

Storage Temperature: -13° to 167° (-25° to 75°C)

Ingress Protection: IP-20

Serial Interface

RS232/RS485 Modbus RTU - 9600 to 19.2 kBaud
Internal RS232 to RS485 Converter

Power Module Weight

MP-1250: 8.35 lb (3.78 kg)
MP-2500: 8.35 lb (3.78 kg)
MP-5000: 10.25 lb (4.65 kg)

Drive Module Weight

MD-404: 8.35 lb (3.78 kg)
MD-407: 8.35 lb (3.78 kg)
MD-410: 8.35 lb (3.78 kg)
MD-420: 10.25 lb (4.65 kg)
MD-434: 12.0 lb (5.44 kg)

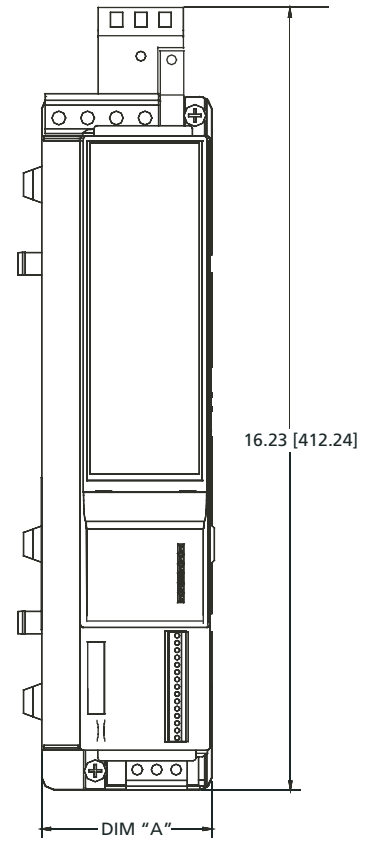
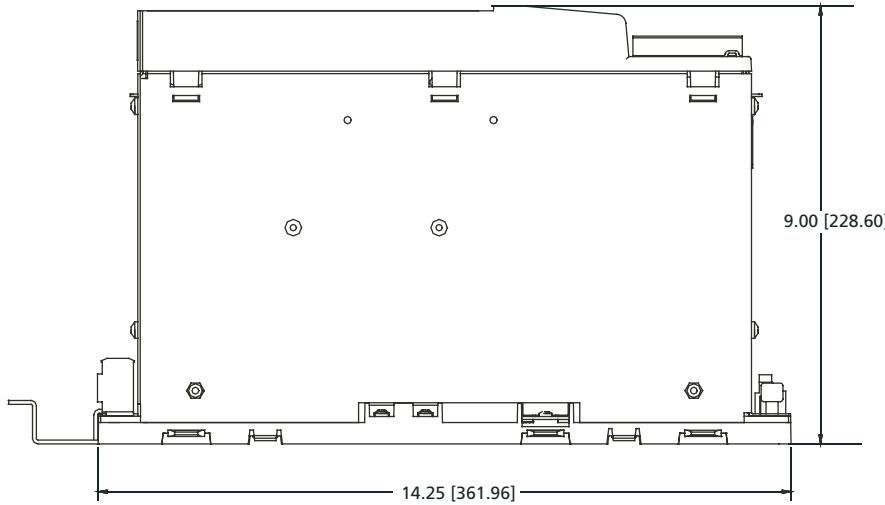
Go to
Power CD
for complete data

MDS Dimensions

POWER MODULES – MP-5000 SHOWN

Go to
Power CD
for complete data

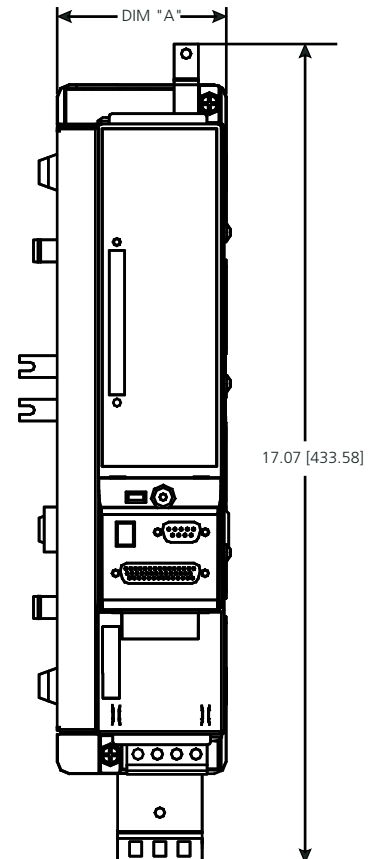
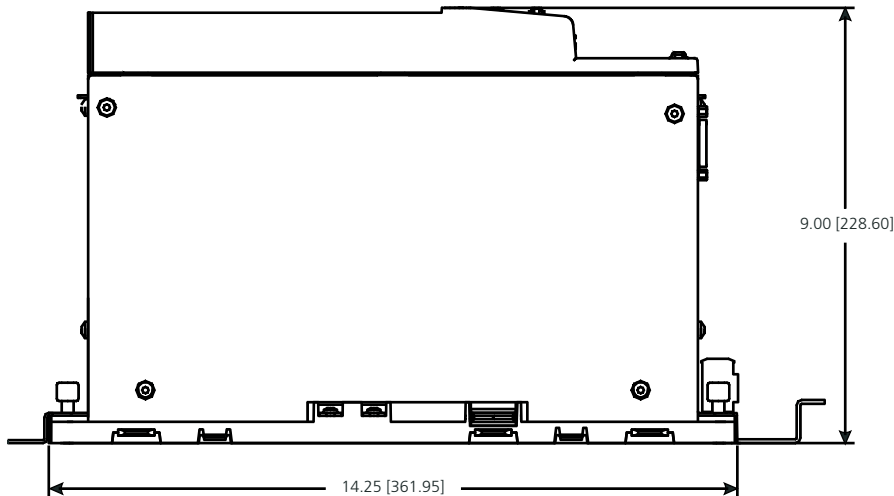
Power Module Model	Dimension A
MP-1250 & MP-2500	2.75 in. [69.85 mm]
MP-5000	3.50 in. [88.90 mm]



MDS Series

DRIVE MODULES – MD-420 Shown

Drive Module Model	Dimension A
MD-404, MD-407 & MD-410	2.75 [69.85]
MD-420	3.50 [88.90]
MD-434	5.49 [139.50]



HOW TO ORDER

Depending on your motor selection, use one of the following drive to motor combination pages, to configure a basic MDS system by selecting one item from each of the four ordering columns, and the fifth column if you are choosing a brake motor. Note that item ② motor selection requires additional input as to flange, and on NT systems connector type. (See the Motor Order String boxes for details.) Items ③ through ⑤ require cable lengths to be provided. ⑥ After selecting each axis combination, a power module will need to be selected to complete the system. The basic systems represented on the following pages can be customized with a variety of components depending on your needs. A guide to Options and Accessories for MDS can be found on the next page, with details in the *Options and Accessories* section.

SELECT SYSTEM AND MOTOR

① Select the MDS Drive Module(s) appropriate to the needs of your application and operating environment, the 4-Amp MD-404, 7-Amp MD-407, 10-Amp MD-410, 20-Amp MD-420, or 34-Amp MD-434.

Note: The current rating for the drive module is the same whether 230V or 460V.

② Select the motor model appropriate to the drive module. (Note there are brake and non-brake models.)

CABLE ORDERING OPTIONS

Motor power, feedback and brake cables with MS style connectors are fully shielded with IP65 molded connectors and are available in standard and custom lengths. For more information on these and other cables, see *Options and Accessories* section.

Standard lengths of 5, 15, 25, 50 and 100 feet are available from stock. Non-standard lengths require additional lead time. **Note: Equivalent FM Motor cable lengths are in meters.**

Feet=xxx or meters=yyy with specified lengths. Example: 005 = 5 feet. For applications involving continuous flexing, flexible cables are available. Cable components such as connector kits and raw cable are also available. See Options section for details or consult factory for special requirements.

③ Motor Power Cables

Using the selection guide, choose the appropriate power cable for the motor.

④ Motor Feedback Cables

From this column, choose the appropriate feedback cable for the motor.

⑤ Motor Brake Cable

Choose a brake cable if a brake motor is selected.

⑥ Power Module Selection

After selecting all of the axis combinations (drive modules and motors), a power module needs to be selected. To select the proper power module, use the Total Axis Power Table below and add up the power (kW) for each axis to determine the system power required. Then, select the power module which has sufficient power.

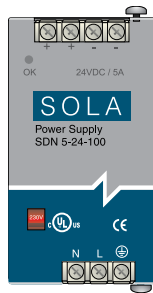
Drive Module	Motor Model	Total Axis Power (kW)
MD-404	MG-316	0.9
	MH-316	1.0
	MH-340	1.6
	MH-455	2.1
	95U2B400	1.6
	95U2E400	2.5
MD-407	MG-316	1.0
	MG-340	1.8
	NT-320	1.0
	NT-330	1.6
	MH-455	2.2
	MH-490	2.2
	95U2E400	3.0
	115U2C300	4.4
	115U2E300	4.4
	142U2C300	4.4
MD-410	MG-455	2.2
	NT-345	2.0
	NT-355	2.4
	MH-490	2.2
	MH-6120	3.8
	115U2C300	3.2
	115U2E300	5.0
	142U2C300	4.8
	142U2E300	6.3
MD-420	MG-455	2.3
	MG-490	3.4
	MG-4120	5.0
	MH-6200	4.1
	MH-6300	4.5
	MH-8250	8.8
	142U2E300	7.1
	190U2D300	12.6
	190U2F200	12.6
MD-434	MH-8500	11.7
	MH-8750	16.5
	190U2D300	13.0
	190U2F200	13.2

Power Module	Input Power	
	3Ø 460V	3Ø 230V
MP-1250	12.5 kW	6.25 kW
MP-2500	25 kW	12.5 kW
MP-5000	50 kW	25 kW



REQUIRED ACCESSORY

The MDS requires an external logic supply to power the internal logic of the Power Module and Drive Modules. Use the table below to determine the current requirements of the application.



Module	Model Number	(A) RMS Current
Power Module	MP-1250	0.30
	MP-2500	
	MP-5000	
Drive Module	MD-404	0.60/Module
	MD-407	
	MD-410	
	MD-420	
	MD-434	0.80/Module
FM Module	All	0.40/FM Module
Synchronization Feedback Encoder	—	0.07/Encoder

Control Techniques offers the following 24 VDC logic-I/O power supplies:

MLP-002-00

2.1 Amp, +24 VDC, universal input 90 to 264 VAC.

MLP-005-00

5 Amp, +24 VDC, universal input 90 to 264 VAC.

MLP-010-00

10 Amp, +24 VDC, universal input 90 to 264 VAC.

OPTIONS AND ACCESSORIES FOR MDS

Control Techniques provides a complete array of options and accessories to complete your system. For details, see the *Options and Accessories* section of the catalog.

Brake Relays

BRM-1

Breakout Board

ECI-44, DEMO-FMIO-000, DEMO-DRIO-000

Diagnostics

DGNE

Logic Supplies

MLP-002-00, MLP-005-00, MLP-010-00

External Shunts/Resistors

(see Power Accessories)

AC Line Filters

MF-1250-20 (MP-1250), MF-2500-35 (MP-2500), MF-5000-65 (MP-5000)

AC Line Reactor

MLR-2580-00 (MP-5000)

Consult Factory for AC Line Reactors used on MP-1250 and MP-2500

Motor Power Filter

MPF-002-00, MPF-003-00

Synchronization Encoders

SCSLD-4, SCSLD-4R

Operator Interface

CTVue, OIT, CTIU

Extended Warranty

Extends Two Year Warranty to Five Years

MDS

230V FM Motor

The FM 230V line is a medium to high inertia line for larger load applications. It is designed to allow use in many applications and offers a wide range of options. The FM line is offered in metric frame sizes, 75 mm, 95 mm, 115 mm, 142 mm and 190 mm. The standard configured motor has a 4096 line encoder, vertical connectors and non-brake. This configuration is designed with low cogging torque to provide smooth operation and excellent velocity regulation. The torque range available is 19.0 lb-in (2.1 Nm) to 364 lb-in (40.1 Nm). All models are rated IP65.

The FM motor is also available with many other options like resolver and Sin/Cos feedback, NEMA flange, different shaft diameters, 90° and rotatable connectors, and a high peak torque option that allows intermittent operation near 5 times their continuous torque levels.



MDS Series



MDS - 230V FM Motor Specifications

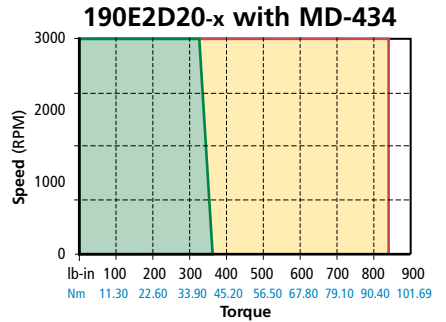
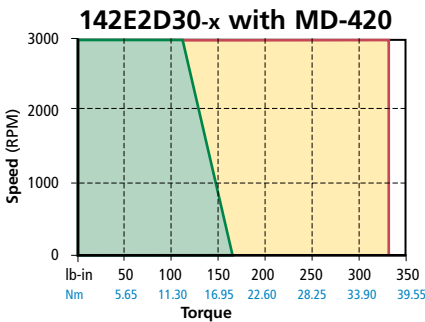
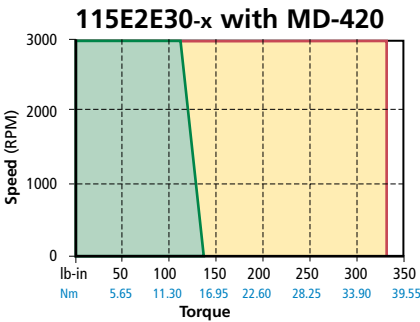
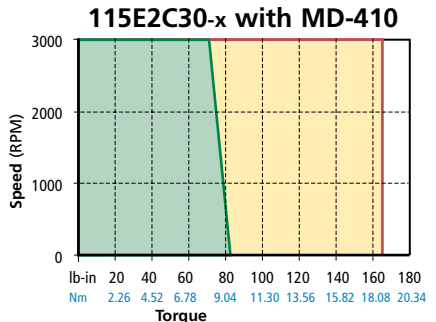
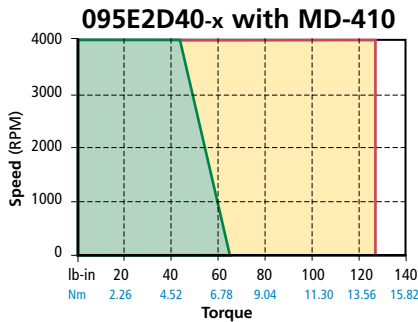
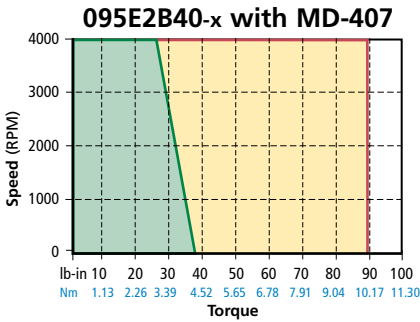
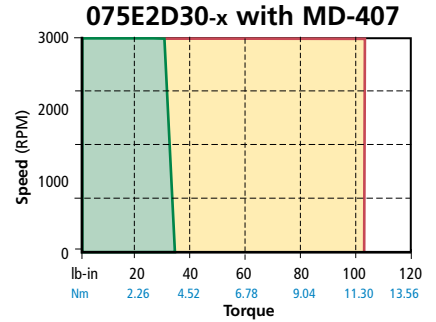
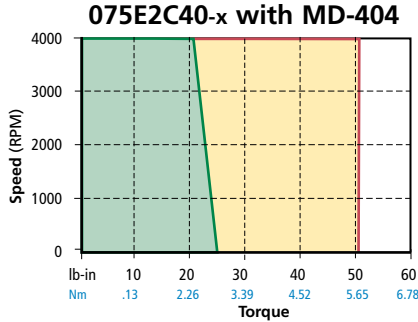
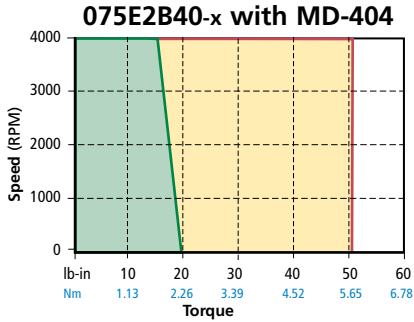
Drive Model	Motor Model**	Cont. Stall Torque lb-in Nm	Peak Stall Torque lb-in Nm	Rated Torque @Rated Speed* lb-in Nm	Rated Power HP kWatts	Max.* Operating Speed RPM	Encoder Resolution lines/rev	Inertia lb-in-sec ² kg-cm ²	Motor Ke Vrms/ krpm	Motor Kt lb-in/Arms Nm/Arms	Motor Weight lb kg
MD-404	075E2B40	19.50	50.98	15.05	0.95	4000	4096	0.001	44	6.37	9.7
		2.23	5.76	1.70	0.71						
MD-404	075E2C40	25.49	50.98	20.36	1.28	4000	4096	0.001	44	6.37	11.4
		2.88	5.76	2.30	0.96						
MD-407	075E2D30	34.57	103.54	30.98	1.47	3000	4096	0.002	57	8.23	13.2
		3.91	11.70	3.50	1.10						
MD-407	095E2B40	38.13	89.21	26.55	1.68	4000	4096	0.003	44	6.37	13.9
		4.32	10.08	3.00	1.26						
MD-410	095E2D40	63.72	127.44	43.37	2.73	4000	4096	0.005	44	6.37	19.1
		7.20	14.40	4.90	2.05						
MD-410	115E2C30	82.31	164.61	71.69	3.39	3000	4096	0.008	57	8.23	25.5
		9.30	18.60	8.10	2.54						
MD-420	115E2E30	135.80	329.22	111.51	5.28	3000	4096	0.012	57	8.23	33.9
		15.35	37.20	12.60	3.96						
MD-420	142E2D30	164.61	329.22	107.97	6.61	3000	4096	0.024	57	8.23	41.6
		18.60	37.20	12.20	4.96						
MD-434	190E2D20	364.27	842.52	326.57	10.31	2000	4096	0.076	85	12.39	74.6
		41.16	95.20	36.90	7.73						

*Rated Speed = Maximum Operating Speed

**See the complete order string in the Servo motor section of this catalog.

MDS - 230V FM Motor Speed Torque Curves

MDS Series



Legend

- Continuous Torque
- Peak Torque

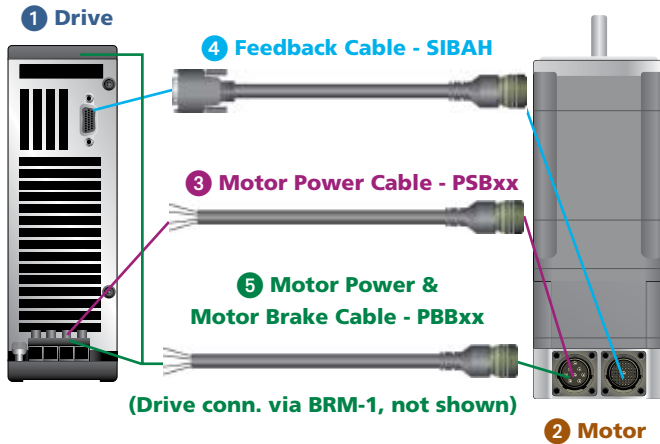
SPECIFICATIONS

Voltage 240 VAC
 Drive Frequency 5 kHz
 Ambient Temperature 40°C (104°F)
 Case Temperature 140°C (284°F)

All performance data listed above has a +/-10% tolerance and is subject to change at any time without notice. For more detailed information on performance data and test conditions please refer to the motor section of the catalog. For brake motor information, complete motor specifications and dimensions please refer to our motor section.

MDS

230V FM Motor Selection



Order String

xxx	E	2	x	xx	x	B	A	CA	A	BCD*	DIA*
↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑

Inertia: A = Standard
 Feedback Device: CA = 4096 Incremental Encoder
 Shaft Key: A = With Key
 Connection Type: B = 90° Connectors
 Brake: 0 = None, 1 = 24 VDC
 Rated Speed: 20 = 2,000 rpm, 30 = 3,000 rpm, 40 = 4,000 rpm, 50 = 5,000 rpm
 Stator Length: A, B, C, D, E, F, G, H
 Peak Torque: 2 = Standard Peak Torque
 Voltage E = 230V
 Frame Size: 075, 095, 115, 142, 190

* Bolt Circle & Shaft Diameter are standard dimensions see FM Motor section for additional options.

For additional motor information see the Servo Motor area in this section for details.
For additional cable options see Options

MDS Series

Servo System Order Guide

1 Drive Model	2 Motor Model	3 Motor Power Cable (yyy=meters)	4 Feedback Cable (yyy=meters)	5 Motor Power/Brake Cable (required w/all brake motors) (yyy=meters)
MD-404	075E2B400 BACAA075140	PSBAA-yyy	SIBAH-yyy	PBBAA-yyy
	075E2B401 BACAA075140		SIBAH-yyy	
	075E2C400 BACAA075140	PSBAA-yyy	SIBAH-yyy	
	075E2C401 BACAA075140		SIBAH-yyy	PBBAA-yyy
MD-407	075E2D300 BACAA075140	PSBAA-yyy	SIBAH-yyy	
	075E2D301 BACAA075140		SIBAH-yyy	PBBAA-yyy
	095E2B400 BACAA100190	PSBAA-yyy	SIBAH-yyy	
	095E2B401 BACAA100190		SIBAH-yyy	PBBAA-yyy
MD-410	095E2D400 BACAA100190	PSBAA-yyy	SIBAH-yyy	
	095E2D401 BACAA100190		SIBAH-yyy	PBBAA-yyy
	115E2C300 BACAA115190	PSBAA-yyy	SIBAH-yyy	
	115E2C301 BACAA115190		SIBAH-yyy	PBBAA-yyy
MD-420	115E2E300 BACAA115240	PSBAA-yyy	SIBAH-yyy	
	115E2E301 BACAA115240		SIBAH-yyy	PBBAA-yyy
	142E2D300 BACAA165240	PSBAA-yyy	SIBAH-yyy	
	142E2D301 BACAA165240		SIBAH-yyy	PBBAA-yyy
MD-434	190E2D200 BACAA215320	PSBBK-yyy	SIBAH-yyy	
	190E2D201 BACAA215320		SIBAH-yyy	PBBBK-yyy