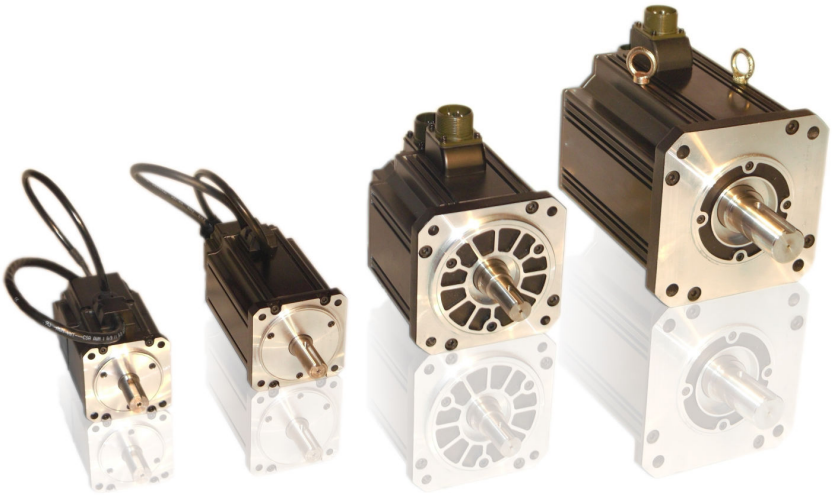
M-Series Servo Motors

ORMEC's M-series AC brushless servo motors provide high torque-to- inertia ratios and excellent continuous torque and peak torque performance in a compact design. These industrial-quality servo motors incorporate high performance neodymium magnets and a highly efficient stator winding design which results in excellent power density.

The M-series servo motors also completely eliminate brush wear maintenance problems, and feature extremely durable construction which includes heavy duty bearings.

Rugged MS connectors provide reliable interconnections to both motor and optical encoder.



ORMEC's M-series servo motors offer continuous stall torques from 1.4 to 248 in-lb (0.16 to 28 N-m)

Features

- ❒ Continuous stall torques from 1.4 to 248 in-lb (0.16 to 28 N-m)
- ❒ High peak torques from 4.4 to 557 in-lb (0.5 to 63 N-m)
- ❒ Output power from 50 to 4,400 watts (0.07 to 5.9 HP)
- ❒ High maximum speeds from 3,000 to 5,000 RPM
- ❒ Incremental encoder resolutions up to 24,000 counts per revolution
- ❒ Optional absolute encoders feature multi-rev operation up to 1,048,576 cts/rev.
- ❒ Class F insulation over Class B temperature rise provides additional thermal headroom for longer winding life under rated operating conditions
- ❒ Minimum torque ripple & cogging for smooth low-speed performance
- ❒ Totally Enclosed Non-Ventilated (TENV) standard IP-65 except shaft opening, optional shaft oil seal is available.
- ❒ Optional fail-safe holding brakes

Motor/Drive Combinations

The performance of these servo motors is a direct function of the factory-matched servo motor/drive combination.

ORMEC's ServoWire® drives provide software controlled all-digital performance for consistent operation that totally eliminates analog potentiometer adjustments. High bandwidth operation and a quality high resolution encoder provide the response and accuracy for demanding applications. Peak torques up to three times the rated torque are available for a few seconds, allowing the motor/drive to handle high inertial loads and heavy duty cycle requirements. Each drive's motor parameters are configured in software for high performance and RMS current limiting.

Absolute Encoder Option

Cost-effective absolute encoder support provides axis position over a range of 65,536 revolutions. In continuous uni-directional operation, the position count continually "wraps" through the full range while maintaining absolute position within the cycle. Position is maintained through power cycles by a lithium battery (optional) on the ServoWire® digital drive. Call ORMEC for ordering information.

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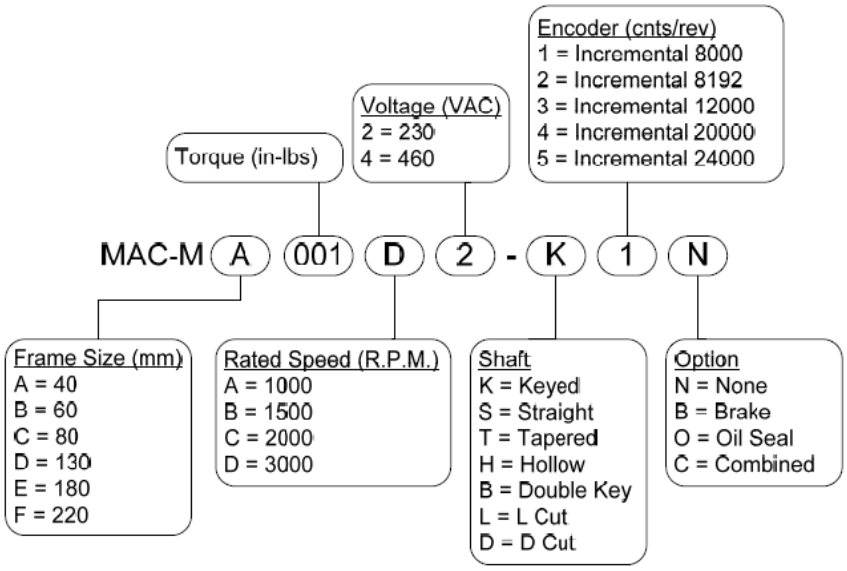
M-Series Servo Motor Model Numbers



Only certain encoder resolutions [shown post quadrature] are available on certain motors, as noted in this chart:

MA	MB	MC	MD	ME	MF
	4096				
8000	8000	8000	8000	8000	8000
8192	8192	8192	8192	8192	8192
	10000	10000	10000	10000	
	12000	12000	12000	12000	12000
	20000*	20000*	20000*	20000*	
			24000*†	24000*†	

* Additional cost

† Maximum speed 3000 RPM

M-Series Compatibility Chart

ORMEC's all-digital drive technology provides the ability to control a variety of servo motors with a single servo drive. The chart (below) provides an overview of ServoWire drive capability with ORMEC's M-series servo motors.

The recommended servo drive (✪) provides sufficient power to provide the continuous torques specified for the corresponding servo motor.

Compatible servo drive (✓) may be used instead of the recommended servo drive to increase the amount or duration of peak torque, and also allow each servo drive model to support a wider range of motors, simplifying the stocking of spare parts.

	Single Ph. Drives (No Regen)		Three Phase Drives - 230VAC (External Regen)							
Servo Drive / Servo Motor	**SAC-x203**	**SAC-x205**	**SAC-x210**	**SAC-x217**	**SAC-x220**	**SAC-x225**	**SAC-x235**	**SAC-x260**	**Input Power Watts***	**amps†**
MAC-MA001D2	✪								55	0.2
MAC-MB003D2	✪	✓							110	0.5
MAC-MB006D2	✪	✓							220	1.0
MAC-MB011D2	✪	✓	✓						380	1.7
MAC-MC016D2		✪	✓						660	2.9
MAC-MC022D2		✪	✓						740	3.2
MAC-MD025B2		✪	✓						495	2.2
MAC-MD025D2		✪	✓						815	3.5
MAC-MD050B2			✪	✓					935	4.1
MAC-MD050D2			✪	✓					1645	7.2
MAC-MD070B2				✪	✓				1430	6.2
MAC-MD070D2				✪	✓	✓			2420	10.5
MAC-MD095B2				✪	✓	✓			1870	8.1
MAC-MD095D2					✪	✓			3130	13.6
MAC-ME100B2				✪	✓	✓			1870	8.1
MAC-ME160B2						✪	✓		3190	13.9
MAC-ME250B2							✪	✓	4840	21.0

✪ Recommended drive model ✓ Compatible drive model

* Power listed is the required incoming line power in watts when the motor is operating at rated output. To determine total incoming power requirements, add up the listed values for each servo motor/drive combination in the system.

† Current listed in amps is the recommended slow-blow fuse capacity for each leg of the three phase power. To select fuses for the system, add the recommended fuse capacities for each servo motor/drive combination in the system.

M-Series AC Brushless Servo Motors

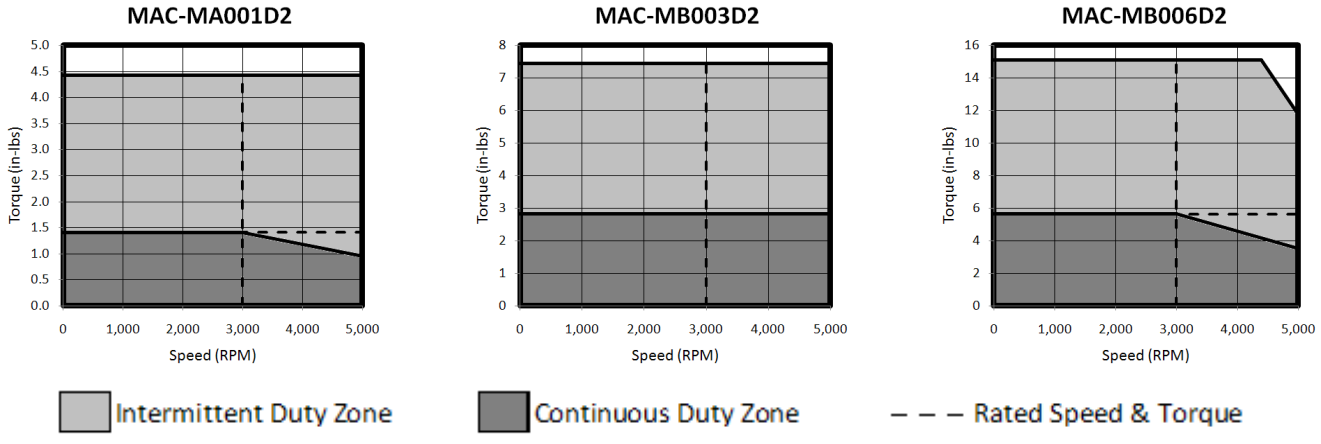
Specifications for Brake Models on page 10

Performance Specifications	Units	MAC-MA001D2	MAC-MB003D2	MAC-MB006D2
Servo Drive Model Number		SAC-x203	SAC-x203	SAC-x203
Rated Torque*	in-lb	1.4	2.8	5.6
	N-m	0.16	0.32	0.64
Rated Speed	RPM	3000	3000	3000
Peak Torque*	in-lb	4.4	7.5	15.1
	N-m	0.50	0.84	1.71
Maximum Speed	RPM	5000	5000	5000
Rated Power	Watts	50	100	200
Rated Torque/Inertia	radians/sec^2	66307	27919	34975
Mechanical Specifications				
Moment of Inertia	in-lb-sec^2 x 10^{-3}	0.0212	0.1009	0.1611
	kg-m^2 x 10^{-4}	0.0240	0.1140	0.1820
Servo Motor Weight	lbs	0.84	1.81	2.38
	kg	0.38	0.82	1.08
Maximum Radial Shaft Load	lbs	33	46	46
	N	148	206	206
Maximum Axial Shaft Load	lbs	9	16	16
	N	39	69	69
Electrical Specifications				
Torque Sensitivity	in-lb/Amp$_{RMS/\phi}$	1.26	1.82	3.68
	N-m/Amp$_{RMS/\phi}$	0.142	0.205	0.416
Servo Drive Input Power	volts AC	230	230	230
Continuous Motor Current	Amps$_{RMS/\phi}$	1.2	1.65	1.63
Peak Motor Current	Amps$_{RMS/\phi}$	3.6	4.95	4.89
Resistance (phase to phase)	Ohms	11.15	2.50	4.15
Inductance (phase to phase)	mH	8.78	7.37	15.21
Poles		8	8	8
Thermal Specifications				
Thermal Time Constant	minutes	7	14	15
Ambient Temperature	degrees C	40	40	40
Insulation Class		F†	F†	F†

* Torques may be limited by the current limits of the servo drive. The next larger drive may be used to increase available torque. Consult an Ormec Applications Engineer for details.

† F-class insulation against B-class temperature rise

Torque vs. Speed Characteristics



M-Series AC Brushless Servo Motors

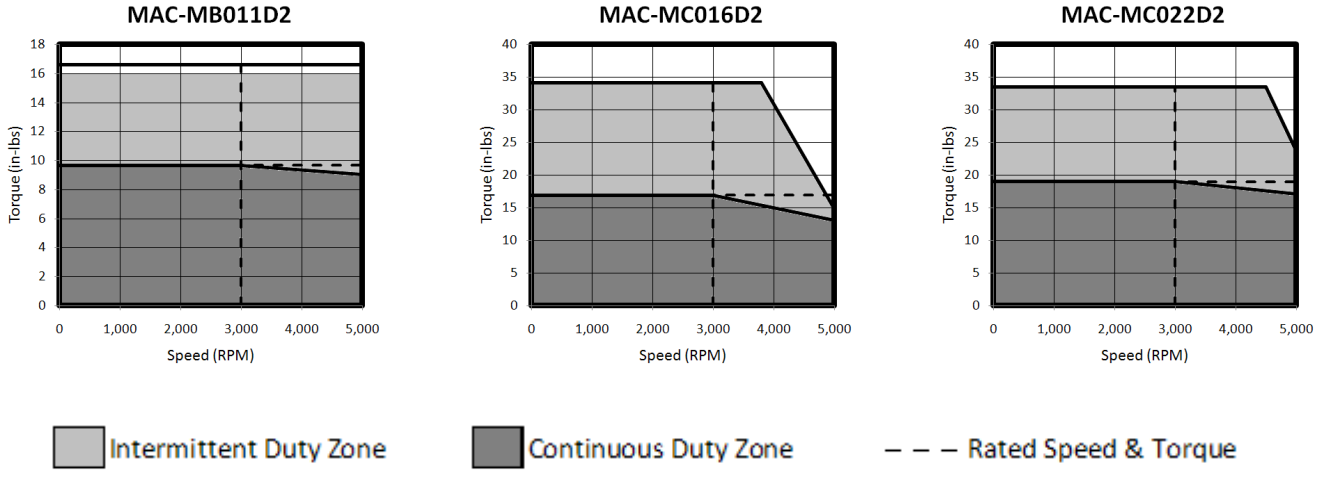
Specifications for Brake Models on page 10

Performance Specifications	Units	MAC-MB011D2	MAC-MC016D2	MAC-MC022D2
Servo Drive Model Number		SAC-x203	SAC-x205	SAC-x205
Rated Torque*	in-lb	9.7	16.9	19.0
	N-m	1.09	1.91	2.15
Rated Speed	RPM	3000	3000	3000
Peak Torque*	in-lb	16.6	34.2	33.5
	N-m	1.88	3.86	3.79
Maximum Speed	RPM	5000	5000	5000
Rated Power	Watts	344	600	675
Rated Torque/Inertia	radians/sec^2	34076	17488	14230
Mechanical Specifications				
Moment of Inertia	in-lb-sec^2 x 10^{-3}	0.2841	0.9665	1.3356
	kg-m^2 x 10^{-4}	0.3210	1.0920	1.5090
Servo Motor Weight	lbs	3.48	5.56	7.01
	kg	1.58	2.52	3.18
Maximum Radial Shaft Load	lbs	46	57	57
	N	206	255	255
Maximum Axial Shaft Load	lbs	16	22	22
	N	69	98	98
Electrical Specifications				
Torque Sensitivity	in-lb/Amp$_{RMS/\phi}$	4.07	4.90	4.84
	N-m/Amp$_{RMS/\phi}$	0.460	0.554	0.546
Servo Drive Input Power	volts AC	230	230	230
Continuous Motor Current	Amps$_{RMS/\phi}$	2.89	3.58	4.83
Peak Motor Current	Amps$_{RMS/\phi}$	8.67	10.74	14.49
Resistance (phase to phase)	Ohms	1.64	1.43	0.87
Inductance (phase to phase)	mH	7.32	9.18	5.94
Poles		8	8	8
Thermal Specifications				
Thermal Time Constant	minutes	16	21	22
Ambient Temperature	degrees C	40	40	40
Insulation Class		F†	F†	F†

* Torques may be limited by the current limits of the servo drive. The next larger drive may be used to increase available torque. Consult an Ormec Applications Engineer for details.

† F-class insulation against B-class temperature rise

Torque vs. Speed Characteristics



M-Series AC Brushless Servo Motors

Specifications for Brake Models on page 10

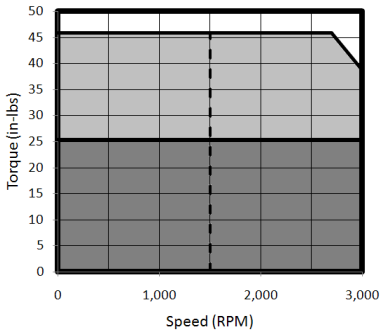
Performance Specifications	Units	MAC-MD025B2	MAC-MD025D2	MAC-MD050B2
Servo Drive Model Number		SAC-x205	SAC-x205	SAC-x210
Rated Torque*	in-lb	25.4	20.9	47.9
	N-m	2.86	2.36	5.41
Rated Speed	RPM	1500	3000	1500
Peak Torque*	in-lb	45.9	36.7	106.3
	N-m	5.19	4.15	12.01
Maximum Speed	RPM	3000	5000	3000
Rated Power	Watts	450	741	850
Rated Torque/Inertia	radians/sec^2	4302	3540	4509
Mechanical Specifications				
Moment of Inertia	in-lb-sec^2 x 10^{-3}	5.8937	5.8937	10.6200
	kg-m^2 x 10^{-4}	6.6590	6.6590	11.9990
Servo Motor Weight	lbs	12.13	12.13	16.62
	kg	5.5	5.5	7.54
Maximum Radial Shaft Load	lbs	163	163	163
	N	725	725	725
Maximum Axial Shaft Load	lbs	81	81	81
	N	362	362	362
Electrical Specifications				
Torque Sensitivity	in-lb/Amp$_{RMS/\phi}$	6.57	5.28	7.55
	N-m/Amp$_{RMS/\phi}$	0.742	0.597	0.853
Servo Drive Input Power	volts AC	230	230	230
Continuous Motor Current	Amps$_{RMS/\phi}$	3.97	4.95	6.47
Peak Motor Current	Amps$_{RMS/\phi}$	11.91	14.85	19.41
Resistance (phase to phase)	Ohms	1.55	0.89	0.77
Inductance (phase to phase)	mH	12.98	7.87	7.76
Poles		8	8	8
Thermal Specifications				
Thermal Time Constant	minutes	24	34	28
Ambient Temperature	degrees C	40	40	40
Insulation Class		F†	F†	F†

* Torques may be limited by the current limits of the servo drive. The next larger drive may be used to increase available torque. Consult an Ormec Applications Engineer for details.

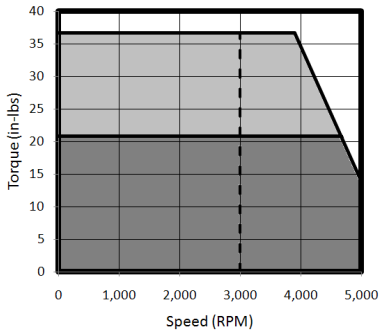
† F-class insulation against B-class temperature rise

Torque vs. Speed Characteristics

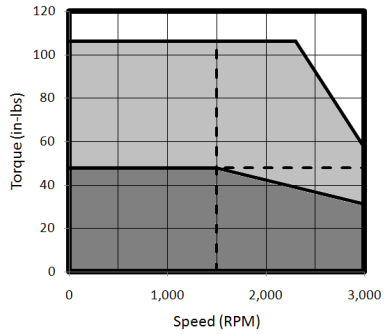
MAC-MD025B2



MAC-MD025D2



MAC-MD050B2



Intermittent Duty Zone Continuous Duty Zone – – – Rated Speed & Torque

M-Series AC Brushless Servo Motors

Specifications for Brake Models on page 10

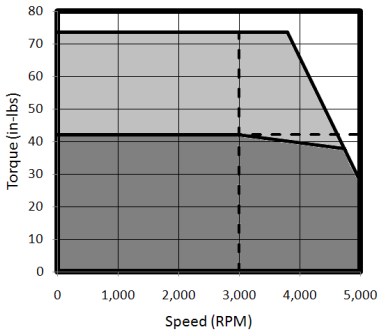
Performance Specifications	Units	MAC-MD050D2	MAC-MD070B2	MAC-MD070D2
Servo Drive Model Number		SAC-x210	SAC-x217	SAC-x217
Rated Torque*	in-lb	42.1	73.2	62.0
	N-m	4.76	8.28	7.00
Rated Speed	RPM	3000	1500	3000
Peak Torque*	in-lb	73.6	178.1	125.8
	N-m	8.31	20.12	14.21
Maximum Speed	RPM	5000	3000	5000
Rated Power	Watts	1494	1300	2200
Rated Torque/Inertia	radians/sec^2	3964	4773	4038
Mechanical Specifications				
Moment of Inertia	in-lb-sec^2 x 10^{-3}	10.6200	15.3463	15.3463
	kg-m^2 x 10^{-4}	11.9990	17.3390	17.3390
Servo Motor Weight	lbs	16.62	21.34	21.34
	kg	7.54	9.68	9.68
Maximum Radial Shaft Load	lbs	163	163	163
	N	725	725	725
Maximum Axial Shaft Load	lbs	81	81	81
	N	362	362	362
Electrical Specifications				
Torque Sensitivity	in-lb/Amp$_{RMS/\phi}$	5.25	7.44	5.27
	N-m/Amp$_{RMS/\phi}$	0.593	0.840	0.595
Servo Drive Input Power	volts AC	230	230	230
Continuous Motor Current	Amps$_{RMS/\phi}$	8.23	10	11.98
Peak Motor Current	Amps$_{RMS/\phi}$	24.69	30	35.94
Resistance (phase to phase)	Ohms	0.41	0.47	0.23
Inductance (phase to phase)	mH	4.11	5.27	2.53
Poles		8	8	8
Thermal Specifications				
Thermal Time Constant	minutes	37	32	41
Ambient Temperature	degrees C	40	40	40
Insulation Class		F†	F†	F†

* Torques may be limited by the current limits of the servo drive. The next larger drive may be used to increase available torque. Consult an Ormec Applications Engineer for details.

† F-class insulation against B-class temperature rise

Torque vs. Speed Characteristics

MAC-MD050D2



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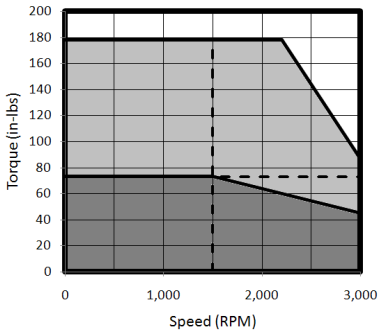
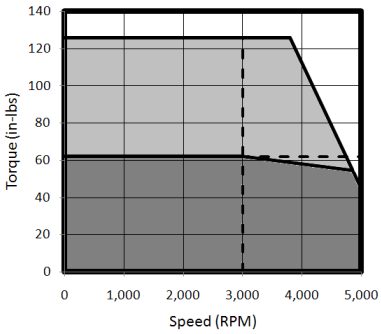


MAC-MD070D2



Intermittent Duty Zone Continuous Duty Zone – – – Rated Speed & Torque

M-Series AC Brushless Servo Motors

Specifications for Brake Models on page 10

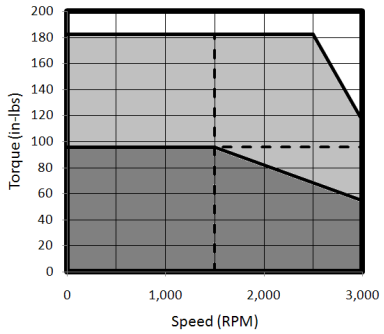
Performance Specifications	Units	MAC-MD095B2	MAC-MD095D2	MAC-ME100B2
Servo Drive Model Number		SAC-x217	SAC-x220	SAC-x217
Rated Torque*	in-lb	95.8	80.2	95.7
	N-m	10.82	9.06	10.81
Rated Speed	RPM	1500	3000	1500
Peak Torque*	in-lb	182.4	140.2	168.4
	N-m	20.61	15.84	19.03
Maximum Speed	RPM	3000	5000	3000
Rated Power	Watts	1700	2847	1699
Rated Torque/Inertia	radians/sec^2	4772	3996	3518
Mechanical Specifications				
Moment of Inertia	in-lb-sec^2 x 10^{-3}	20.0726	20.0726	27.2072
	kg-m^2 x 10^{-4}	22.6790	22.6790	30.7400
Servo Motor Weight	lbs	25.97	25.97	27.34
	kg	11.78	11.78	12.4
Maximum Radial Shaft Load	lbs	163	163	348
	N	725	725	1548
Maximum Axial Shaft Load	lbs	81	81	117
	N	362	362	519
Electrical Specifications				
Torque Sensitivity	in-lb/Amp$_{RMS/\phi}$	7.63	5.00	7.13
	N-m/Amp$_{RMS/\phi}$	0.862	0.565	0.806
Servo Drive Input Power	volts AC	230	230	230
Continuous Motor Current	Amps$_{RMS/\phi}$	12.75	17.16	14.7
Peak Motor Current	Amps$_{RMS/\phi}$	38.25	51.48	44.1
Resistance (phase to phase)	Ohms	0.30	0.15	0.22
Inductance (phase to phase)	mH	3.82	1.82	3.21
Poles		8	8	8
Thermal Specifications				
Thermal Time Constant	minutes	37	45	29
Ambient Temperature	degrees C	40	40	40
Insulation Class		F†	F†	F†

* Torques may be limited by the current limits of the servo drive. The next larger drive may be used to increase available torque. Consult an Ormec Applications Engineer for details.

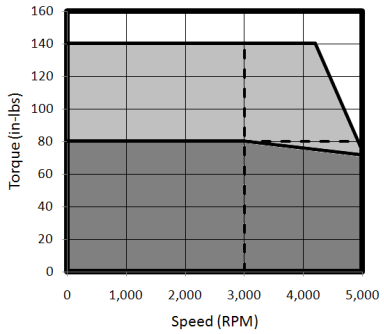
† F-class insulation against B-class temperature rise

Torque vs. Speed Characteristics

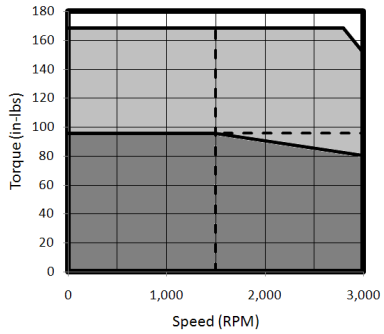
MAC-MD095B2



MAC-MD095D2



MAC-ME100B2



Intermittent Duty Zone Continuous Duty Zone – – – Rated Speed & Torque

M-Series AC Brushless Servo Motors

Specifications for Brake Models on page 10

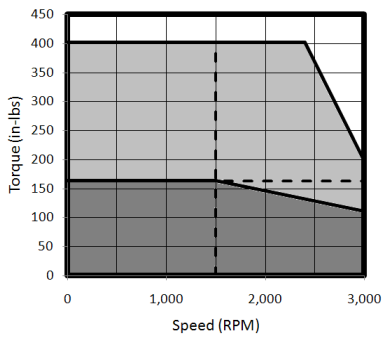
Performance Specifications	Units	MAC-ME160B2	MAC-ME250B2
Servo Drive Model Number		SAC-x225	SAC-x235
Rated Torque*	in-lb	163.4	247.9
	N-m	18.46	28.01
Rated Speed	RPM	1500	1500
Peak Torque*	in-lb	401.4	556.5
	N-m	45.35	62.88
Maximum Speed	RPM	3000	3000
Rated Power	Watts	2900	4399
Rated Torque/Inertia	radians/sec^2	3541	3350
Mechanical Specifications			
Moment of Inertia	in-lb-sec^2 x 10^{-3}	46.1389	73.9922
	kg-m^2 x 10^{-4}	52.1300	83.6000
Servo Motor Weight	lbs	39.02	57.98
	kg	17.7	26.3
Maximum Radial Shaft Load	lbs	348	348
	N	1548	1548
Maximum Axial Shaft Load	lbs	117	117
	N	519	519
Electrical Specifications			
Torque Sensitivity	in-lb/Amp$_{RMS/\phi}$	8.10	8.07
	N-m/Amp$_{RMS/\phi}$	0.915	0.912
Servo Drive Input Power	volts AC	230	230
Continuous Motor Current	Amps$_{RMS/\phi}$	20.6	31.75
Peak Motor Current	Amps$_{RMS/\phi}$	61.8	95.25
Resistance (phase to phase)	Ohms	0.11	0.06
Inductance (phase to phase)	mH	2.04	1.14
Poles		8	8
Thermal Specifications			
Thermal Time Constant	minutes	31	35
Ambient Temperature	degrees C	40	40
Insulation Class		F†	F†

* Torques may be limited by the current limits of the servo drive. The next larger drive may be used to increase available torque. Consult an Ormec Applications Engineer for details.

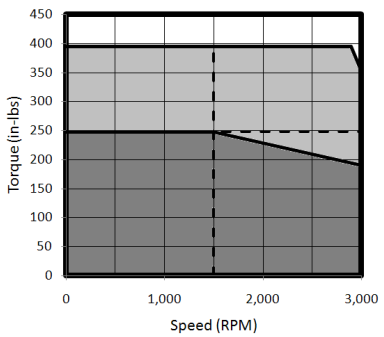
† F-class insulation against B-class temperature rise

Torque vs. Speed Characteristics

MAC-ME160B2



MAC-ME250B2



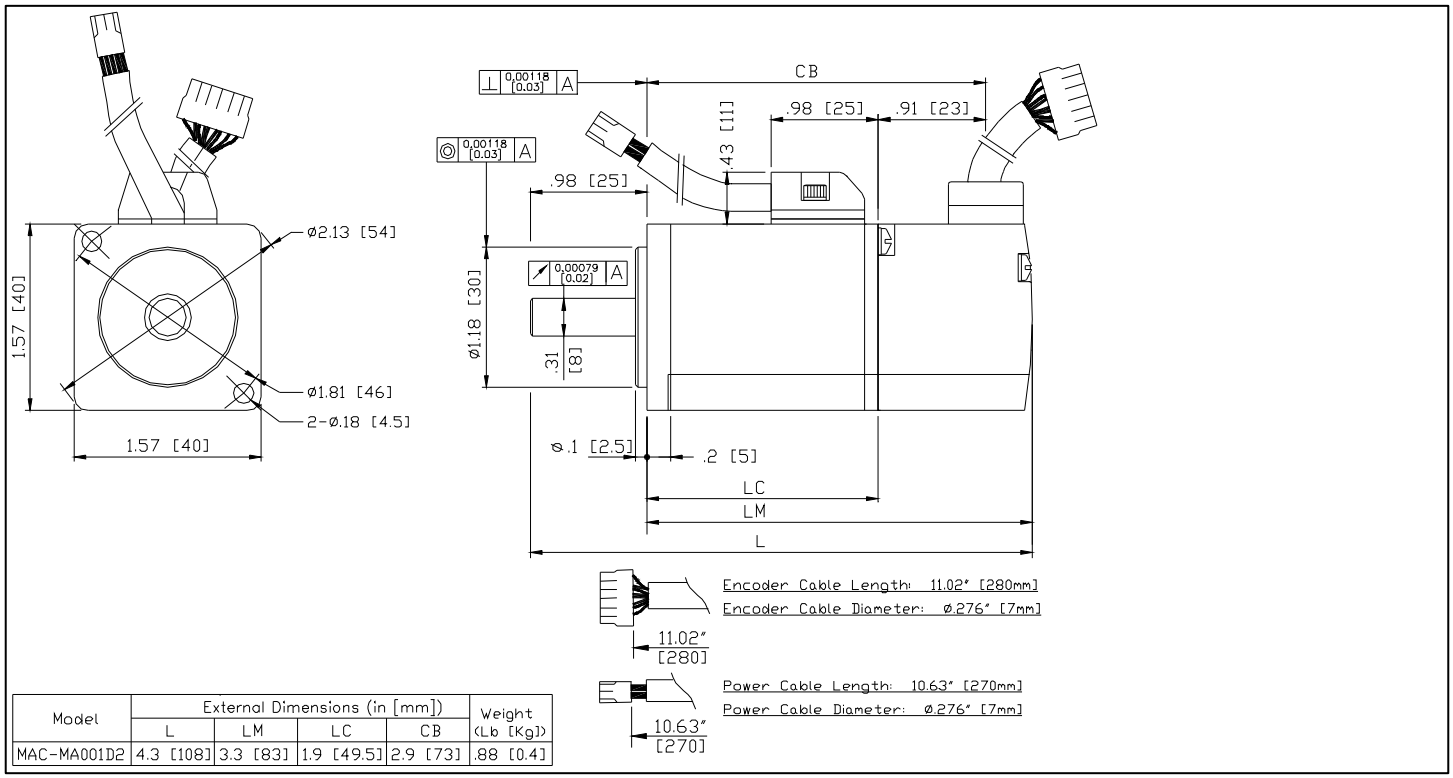
Intermittent Duty Zone Continuous Duty Zone – – – Rated Speed & Torque

Specifications for M-Series Servo Motors with Fail-Safe Brakes

Servo Motor Model		Brake Holding Torque (in-lb / N-m)	Continuous Stall Torque to Inertia Ratio w/brake (rad/sec^2)	Moment of Inertia w/brake* (lb-in-sec^2 x 10^{-3} / kg-m^2 x10^{-4})	Motor Length w/brake (in / mm)	Motor Weight w/brake (lb / kg)	Brake Coil Resistance (Ohms)	Brake Rated Current† (Amps)	Brake Weight (lb / kg)
MAC-MA001D2	English	2.8	66,307	0.0212	5.7	1.61	96	0.25	0.77
	Metric	0.32		0.0240	144	0.73			0.35
MAC-MB003D2	English	13.0	27,919	0.1009	6.4	3.09	89	0.27	1.28
	Metric	1.47		0.1140	162	1.4			0.58
MAC-MB006D2	English	13.0	34,975	0.1611	7.0	3.66	89	0.27	1.28
	Metric	1.47		0.1820	176	1.66			0.58
MAC-MB011D2	English	13.0	34,076	0.2841	8.1	4.76	89	0.27	1.28
	Metric	1.47		0.3210	204	2.16			0.58
MAC-MC016D2	English	28.6	17,488	0.9665	8.6	7.85	64	0.38	2.29
	Metric	3.23		1.0920	218	3.56			1.04
MAC-MC022D2	English	28.6	14,230	1.3356	9.4	9.30	64	0.38	2.29
	Metric	3.23		1.5090	238	4.22			1.04
MAC-MD025B2	English	92.0	4,302	5.8937	9.5	15.52	29.6	0.81	3.40
	Metric	10.4		6.6590	240	7.04			1.54
MAC-MD025D2	English	92.0	3,540	5.8937	9.5	15.52	29.6	0.81	3.40
	Metric	10.4		6.6590	240	7.04			1.54
MAC-MD050B2	English	92.0	4,509	10.6200	10.4	20.02	29.6	0.81	3.40
	Metric	10.4		11.9990	264	9.08			1.54
MAC-MD050D2	English	92.0	3,964	10.6200	10.4	20.02	29.6	0.81	3.40
	Metric	10.4		11.9990	264	9.08			1.54
MAC-MD070B2	English	92.0	4,773	15.3463	11.4	24.74	29.6	0.81	3.40
	Metric	10.4		17.3390	288	11.22			1.54
MAC-MD070D2	English	92.0	4,038	15.3463	11.4	24.74	29.6	0.81	3.40
	Metric	10.4		17.3390	288	11.22			1.54
MAC-MD095B2	English	92.0	4,772	20.0726	12.3	29.37	29.6	0.81	3.40
	Metric	10.4		22.6790	312	13.32			1.54
MAC-MD095D2	English	92.0	3,996	20.0726	12.3	29.37	29.6	0.81	3.40
	Metric	10.4		22.6790	312	13.32			1.54
MAC-ME100B2	English	354.0	3,518	27.2072	12.7	42.33	23	1.04	15.0
	Metric	40		30.7400	322	19.2			6.8
MAC-ME160B2	English	354.0	3,541	46.1389	14.1	54.01	23	1.04	15.0
	Metric	40		52.1300	356	24.5			6.8
MAC-ME250B2	English	354.0	3,350	73.9922	16.0	72.97	23	1.04	15.0
	Metric	40		83.6000	406	33.1			6.8

* Brake is stationary and does not add to motor inertia. † All brakes use a 24 VDC power supply

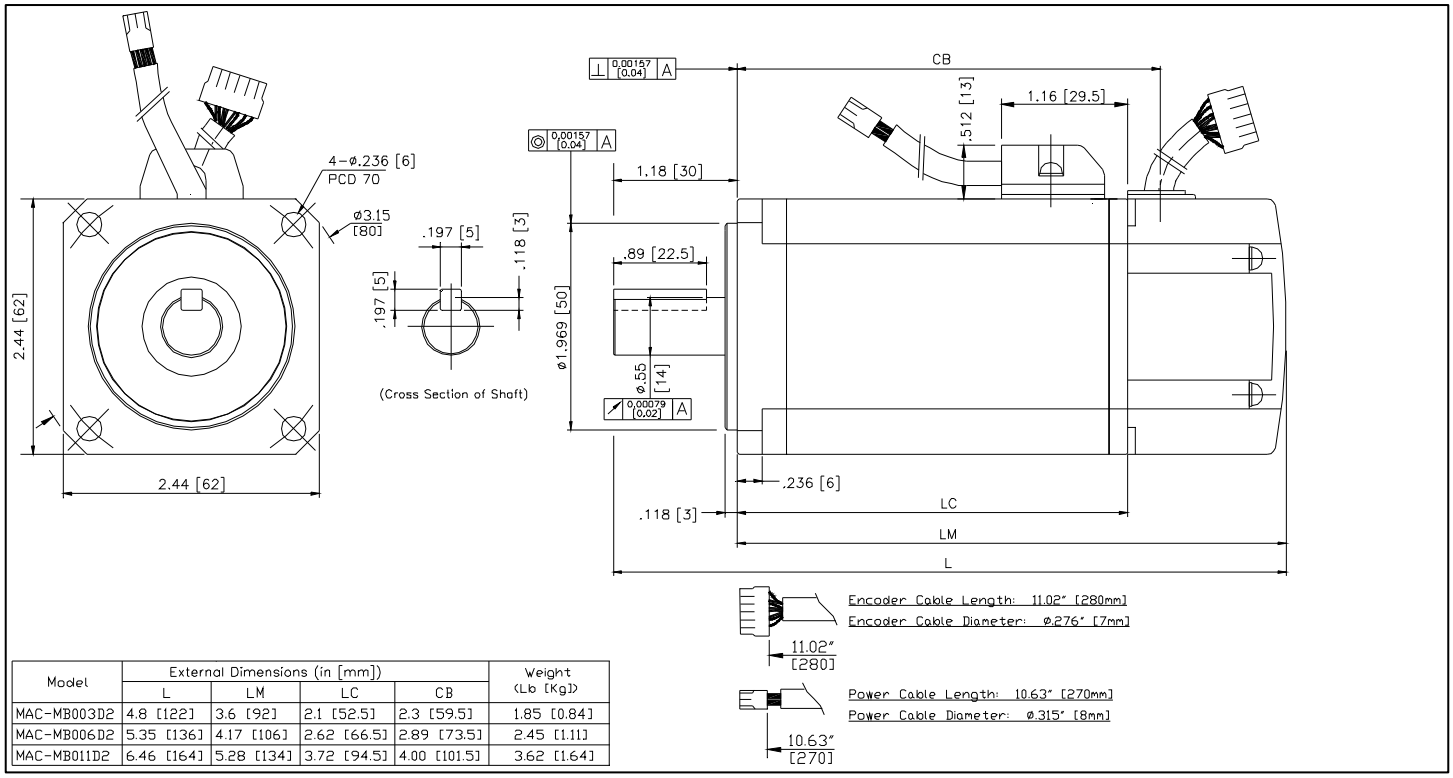
MA001D2 Outline Drawings



Model	External Dimensions (in [mm])				Weight (Lb [Kg])
	L	LM	LC	CB	
MAC-MA001D2	4.3 [108]	3.3 [83]	1.9 [49.5]	2.9 [73]	.88 [0.4]

For length of models with brake option selected, see page 10. Call for design details.

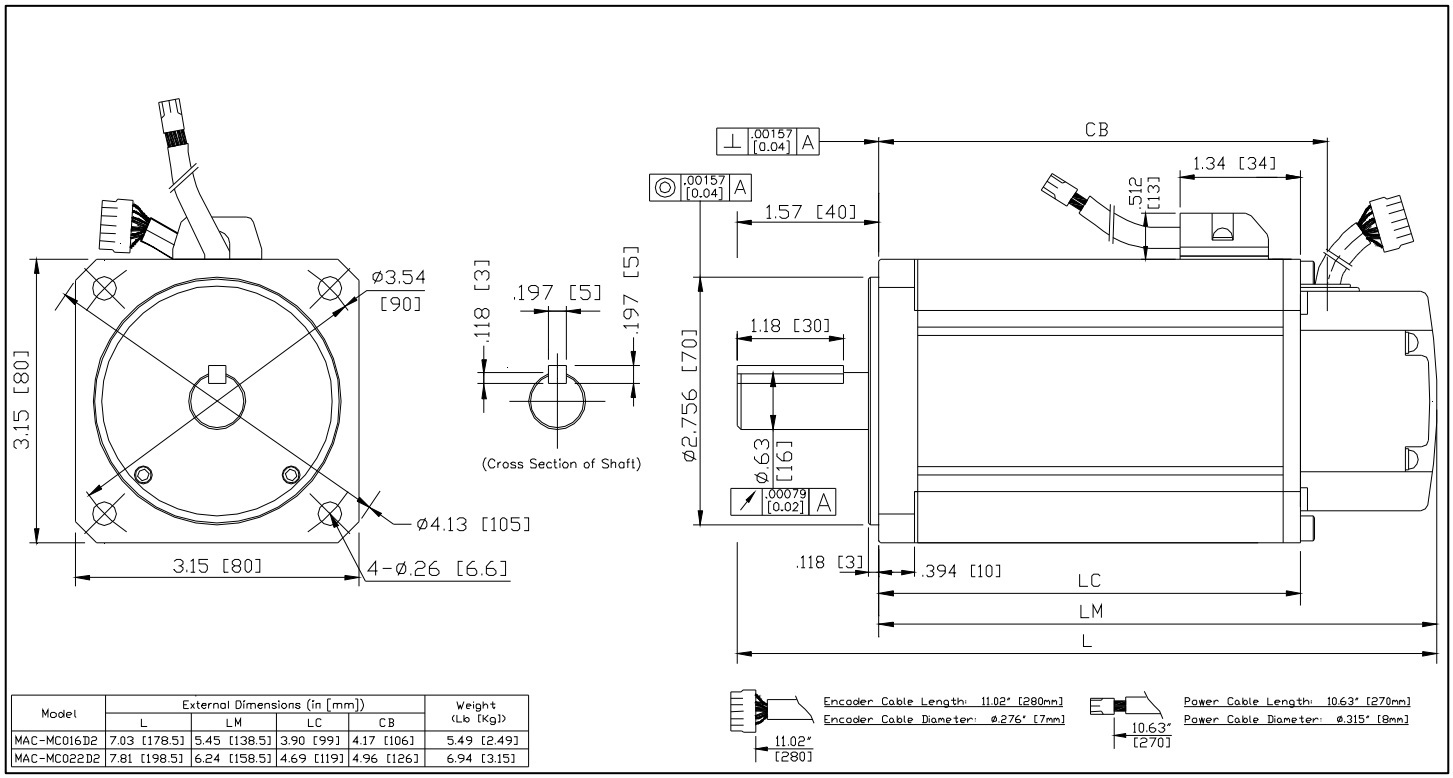
MB003D2, MB006D2, & MB011D2 Outline Drawings



Model	External Dimensions (in [mm])				Weight (Lb [Kg])
	L	LM	LC	CB	
MAC-MB003D2	4.8 [122]	3.6 [92]	2.1 [52.5]	2.3 [59.5]	1.85 [0.84]
MAC-MB006D2	5.35 [136]	4.17 [106]	2.62 [66.5]	2.89 [73.5]	2.45 [1.11]
MAC-MB011D2	6.46 [164]	5.28 [134]	3.72 [94.5]	4.00 [101.5]	3.62 [1.64]

For length of models with brake option selected, see page 10. Call for design details.

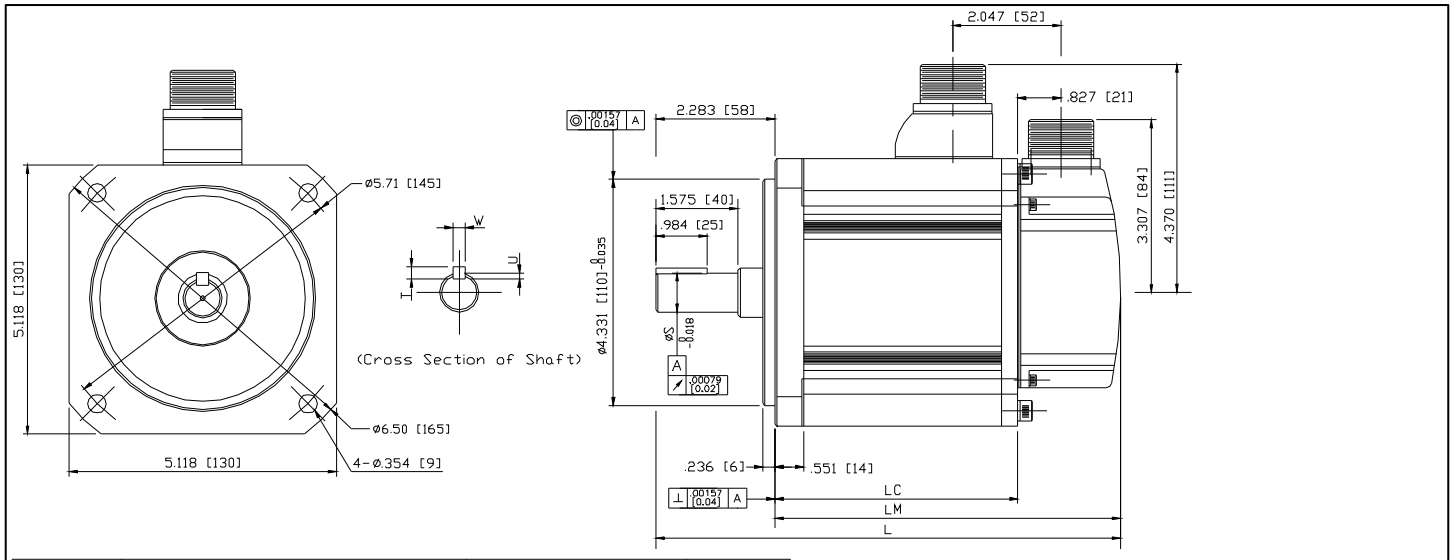
MC016D2 & MC022D2 Outline Drawings



Model	External Dimensions (in [mm])				Weight (Lb [Kg])
	L	LM	LC	CB	
MAC-MC016D2	7.03 [178.5]	5.45 [138.5]	3.90 [99]	4.17 [106]	5.49 [2.49]
MAC-MC022D2	7.81 [198.5]	6.24 [158.5]	4.69 [119]	4.96 [126]	6.94 [3.15]

For length of models with brake option selected, see page 10. Call for design details.

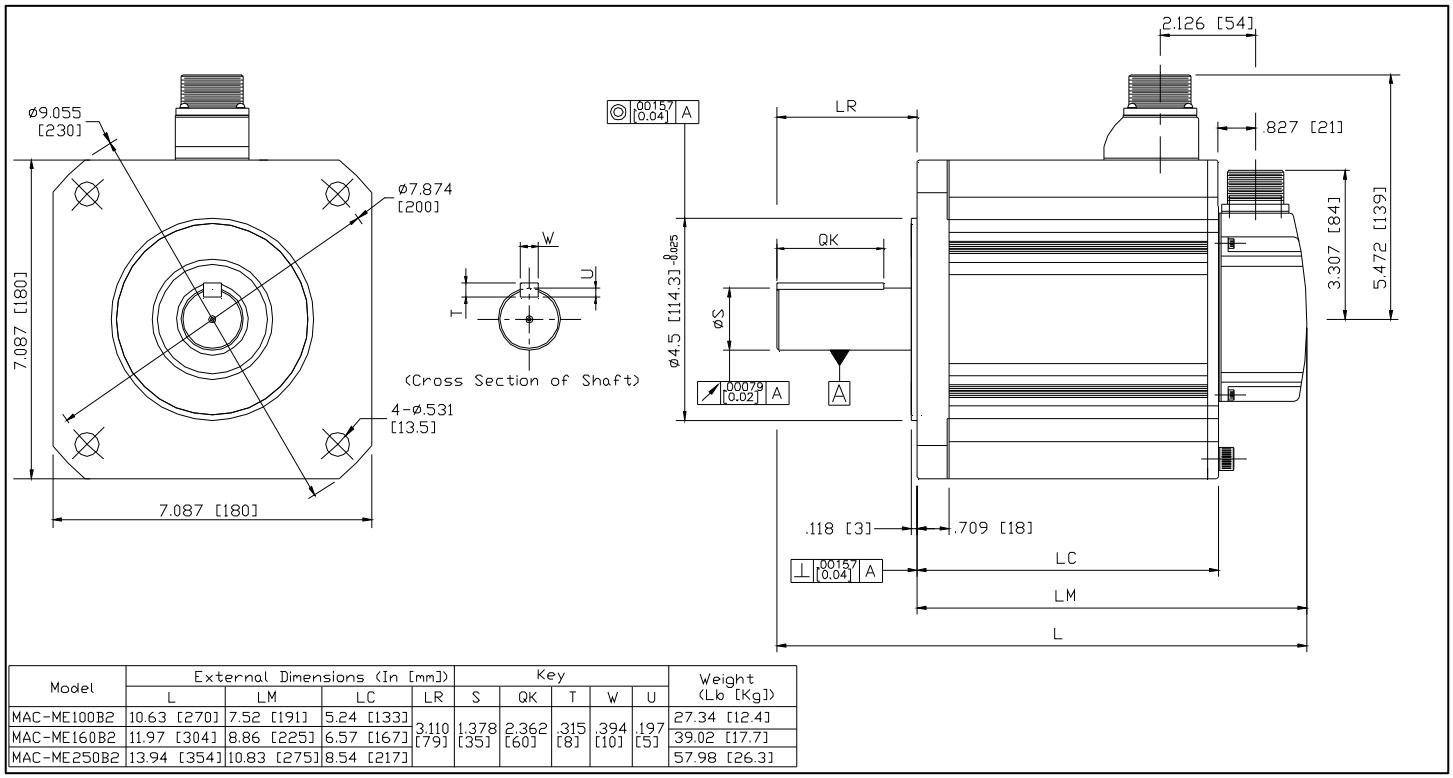
MD025_, MD050_, MD070_, & MD095_ Outline Drawings



Model	External Dimensions (In [mm])				Key			Weight (Lb [Kg])
	L	LM	LC	S	T	W	U	
MAC-MD025B2 MAC-MD025D2	7.95 [202]	5.67 [144]	3.70 [94]	.748 [19]	.197 [5]	.197 [5]	.118 [3]	12.35 [5.6]
MAC-MD050B2 MAC-MD050D2	8.90 [226]	6.61 [168]	4.65 [118]					15.87 [7.2]
MAC-MD070B2 MAC-MD070D2	9.84 [250]	7.56 [192]	5.59 [142]	.866 [22]	.236 [6]	.236 [6]	.138 [3.5]	19.18 [8.7]
MAC-MD095B2 MAC-MD095D2	10.79 [274]	8.50 [216]	6.54 [166]					22.49 [10.2]

For length of models with brake option selected, see page 10. Call for design details.

ME100B2, ME160B2, & ME250B2 Outline Drawings



Model	External Dimensions (In [mm])				Key					Weight (Lb [Kg])
	L	LM	LC	LR	S	QK	T	W	U	
MAC-ME100B2	10.63 [270]	7.52 [191]	5.24 [133]	3.110 [79]	1.378 [35]	2.362 [60]	.315 [8]	.394 [10]	.197 [5]	27.34 [12.4]
MAC-ME160B2	11.97 [304]	8.86 [225]	6.57 [167]							39.02 [17.7]
MAC-ME250B2	13.94 [354]	10.83 [275]	8.54 [217]							57.98 [26.3]

For length of models with brake option selected, see page 10. Call for design details.

Servo Motor Connectors & Cables

MOTOR / POWER RECEPTACLES

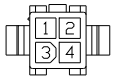


FIG. A

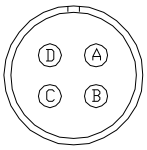


FIG. B

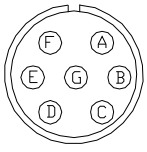


FIG. C

1	A	PHASE U
2	B	PHASE V
3	C	PHASE W
4	D	GROUND

A	PHASE U
B	PHASE V
C	PHASE W
D	GROUND
E	BRAKE +
F	BRAKE -

BRAKE CONNECTOR

FIG. D

1	BRAKE +
2	BRAKE -

Connector Type	Manufactured by
172...	Amp
MS...	Amphenol

ENCODER FEEDBACK RECEPTACLES

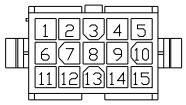


FIG. E

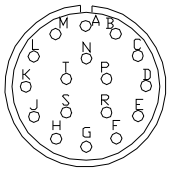


FIG. F

1	A	A	9	M	V
2	B	$\overline{A}$	10	N	$\overline{V}$
3	C	B	11	P	W
4	D	$\overline{B}$	12	R	$\overline{W}$
5	E	Z	13	H	+5V
6	F	$\overline{Z}$	14	G	0V
7	K	U	15	J	SHIELD
8	L	$\overline{U}$			

MOTOR / FEEDBACK / OPTION – MATING CONNECTOR CHART

MOTOR TYPE	FIG	MOTOR/POWER	MATING	FIG	FEEDBACK	MATING
115 & 230 VAC Incremental Encoder Motors						
All MAC-MA; -MB; -MC Motors	A	172167-1	172159-1	E	172171-1	172163-1
All MAC-MD Motors	B	MS3102A20-4P	MS3108B20-4S	F	MS3102A20-29P	MS3108B20-29S
All MAC-ME Motors	B	MS3102A22-22P	MS3108B22-22S	F	MS3102A20-29P	MS3108B20-29S
115 & 230 VAC Motors with Fail-Safe Brake						
All MAC-MA; -MB; -MC Motors	A	172167-1[1]	172159-1[1]	E	172171-1	172163-1
Fail-Safe Brake Interface	D	172165-1[1]	172157-1[1]			
All MAC-MD Motors	C	MS3102A20-15P	MS3108B20-15S	F	MS3102A20-29P	MS3108B20-29S
All MAC-ME Motors	C	MS3102A24-10P	MS3108B24-10S	F	MS3102A20-29P	MS3108B20-29S

[1] Brake option requires separate motor and brake cables.

M-Series Encoder and Motor Cables for use with G-Series Servo Drives

Standard	*Flex Option*[2]	*IP-67 Sealing*	*Brake Option*	*Flex Brake Option*[2]	*Brake IP-67 Sealing*	*Description [all cables 1-150 ft.]*
CBL-ME1G/X	CBL-ME1GF/X	N/A				Encoder cable for MAC-MA; MB; MC motors
CBL-ME2G/X	CBL-ME2GF/X	CBL-ME2GV/X				Encoder cable for MAC-MD & ME motors
CBL-MMG1/X	CBL-MMGF1/X	N/A	**Note: CBL-MBG1/X is in addition to motor cable**			Motor cable for MAC-MA; MB; MC Motors
CBL-MMG2/X	CBL-MMGF2/X	CBL-MMGV2/X	CBL-MMBG2/X	CBL-MMBGF2/X	CBL-MMBGV2/X	Motor cable for MAC-MD Motors
CBL-MMG3/X	CBL-MMGF3/X	CBL-MMGV3/X	CBL-MMBG3/X	CBL-MMBGF3/X	CBL-MMBGV3/X	Motor cable for MAC-ME Motors
			CBL-MBG1/X	CBL-MBGF1/X		Brake cable for MAC-MA; MB; MC Motors

M-Series Encoder and Motor Cables for use with ServoWire Servo Drives

Standard	*Flex Option*[2]	*IP-67 Sealing*	*Brake Option*	*Flex Brake Option*[2]	*Brake IP-67 Sealing*	*Description [all cables 1-150 ft.]*
CBL-ME1SW/X	CBL-ME1SWF/X	N/A				Encoder cable for MAC-MA; MB; MC
CBL-ME2SW/X	CBL-ME2SWF/X	CBL-ME2SWV/X				Encoder cable for MAC-MD & ME
CBL-MMSW1/X	CBL-MMSWF1/X	N/A	**Note: CBL-MBSW1/X is in addition to motor cable**			Motor cable for MAC-MA; MB; MC
CBL-MMSW2/X	CBL-MMSWF2/X	CBL-MMSWV2/X	CBL-MMBSW2/X	CBL-MMBSWF2/X	CBL-MMBSWV2/X	Motor cable for MAC-MD Motors
CBL-MMSW3/X	CBL-MMSWF3/X	CBL-MMSWV3/X	CBL-MMBSW3X	CBL-MMBSWF3/X	CBL-MMBSWV3X	Motor cable for MAC-ME Motors
			CBL-MBSW1/X	CBL-MBSWF1/X		Brake cable for MAC-MA; MB; MC

[2] Consult Factory for flex cables beyond 100 feet.

Note: For all cables above, specify length of the cable by adding the numerical length in the "X" place holder in the Model Number.

Lineshaft Pacer Encoders

The ability to interface a position encoder to a ServoWire Drive can provide vital position information to the motion control system.

This approach is simple, yet effective, because information for the "encoder axis" is available to be used in the same way that information is used from any "servo axis".

Uses of Remote Encoders

1) ***Pacer Encoders*** measure real-time shaft position data of a machine axis to be sent to other servo axes in the system when ***electronic gearing*** and/or ***cam profiling*** are used in an application.
2) ***Programmable limit switches*** on each ServoWire drive can be configured to turn on or off based on pacer encoder position.
3) ***Position and velocity information*** is accessible from the application program for every encoder used with an SMLC system.
4) ***Remote Feedback Encoders*** can be used to provide position feedback directly from the load under control, usually used in conjunction with velocity feedback from the servo motor shaft to provide an additional level of precision for the control system.

ServoWire Drive Interface

The encoder interface is a partial servo axis interface, consisting only of differentially received quadrature A and B channels and a reference Z-channel. Selecting the "encoder input" axis control mode disables servo drive alarm detection but still provides open wire detection to insure encoder position information integrity.

Optical Position Encoders

ORMEC's Model EDR-25 optical, incremental position encoders are ideal for a wide variety of rugged industrial applications where reliability is a prime concern.

LED light sources rated for 100K hours MTBF, 40 pound axial/40 pound radial shaft loading capability, 200 KHz frequency response allow these encoders to be effective in harsh, industrial applications.

The EDR-25 provides a 1/4 cycle wide gated zero reference output. Models with cycle interpolation have maximum resolutions up to 200,000 counts per shaft revolution.

Electrical Specifications

Excitation voltages: 5 VDC @ 100 mA maximum.

Output format: Two outputs (A and B) in phase quadrature with a zero reference (Z) output

Output Specifications: Output stage is an MC3487 (or performance equivalent) differential line driver with 20 ma sink and -20 ma source current.

Mechanical Specifications

Maximum Shaft loading: 80 Ib. max, 40 Ib. rated, axially and radially

Shaft radial runout: 0.001" T.I.R.

Maximum Starting torque at 25C: 3.0oz-in typical

Shaft angular acceleration: 10^5 radians/sec^2 (maximum)

Moment of inertia: 5.2 x 10^{-4}oz-in-sec^2

Bearing type: Precision ABEC ball bearing

Minimum Bearing Life: 1.5 x 10^9 revolutions at rated shaft loading.

Shaft: 303 stainless steel

Maximum shaft speed: 8000 RPM or 200 KHz count channel output frequency, whichever occurs first (before cycle interpolation).

Weight: 11 oz. typical (25S)
14 oz. typical (25C)

Environmental Specifications

Operating temperature range: 0 to +70C

Storage temperature range: -25 to +85C

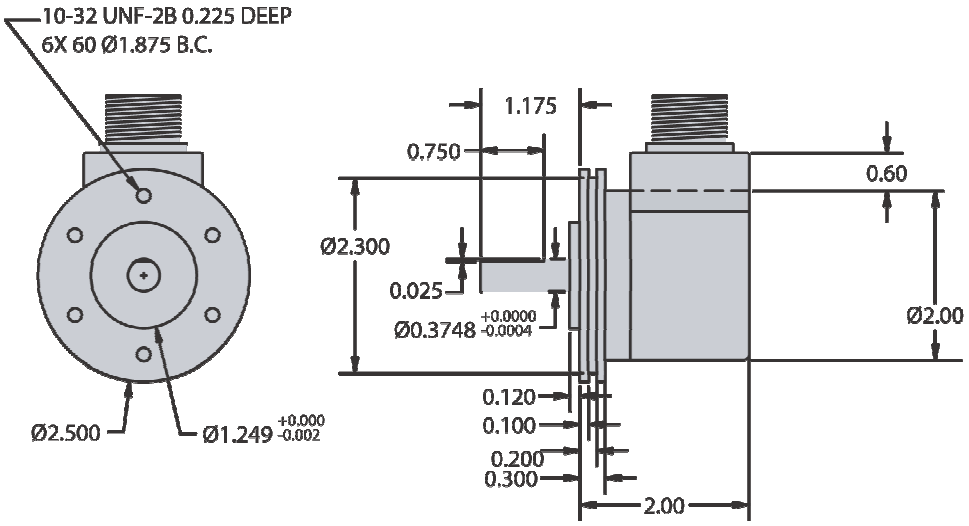
Maximum Shock: 75G's for 11 milliseconds duration

Vibration: 58Hz to 500Hz at 20G's

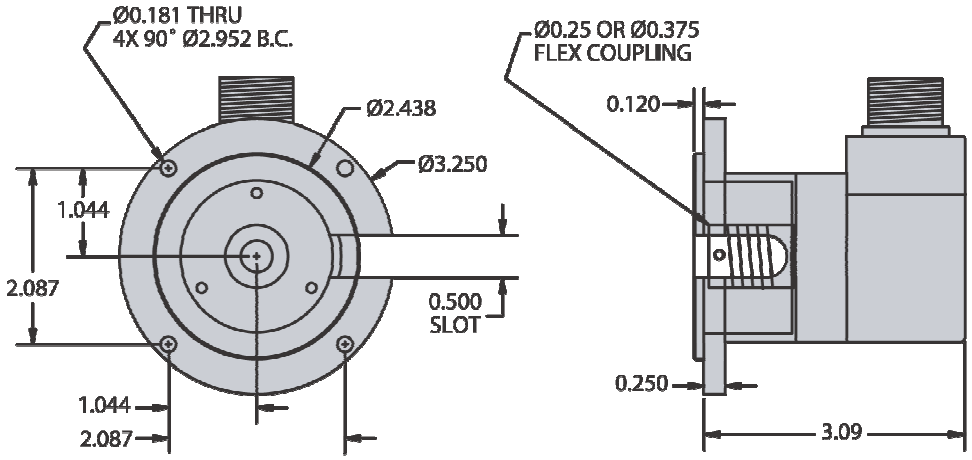
Maximum Humidity: 98% R.H. (non-condensing)

ORDERING GUIDE	Lineshaft Pacer Encoders
EDR-25S/A1000	Position Encoder: 1000 linecount, provides 4,000 counts/rev
EDR-25S/A1250	Position Encoder: 1250 linecount, provides 5,000 counts/rev
EDR-25S/A2500	Position Encoder: 2500 linecount, provides 10,000 counts/rev
EDR-25S/A5000	Position Encoder: 5000 linecount, provides 20,000 counts/rev
EDR-25S/B5000	Position Encoder: 10,000 linecount, provides 40,000 counts/rev
EDR-25S/E2500	Position Encoder: 12,500 linecount, provides 50,000 counts/rev
EDR-25S/D5000	Position Encoder: 20,000 linecount, provides 80,000 counts/rev
EDR-25S/E5000	Position Encoder: 25,000 linecount, provides 100,000 counts/rev
EDR-25S/F5000	Position Encoder: 25,000 linecount, provides 100,000 counts/rev, high freq.
EDR-25S/G5000	Position Encoder: 50,000 linecount, provides 200,000 counts/rev, high freq.
Note: To specify encoder with flange mount and integral coupling, replace "25S" in model numbers above with "25C".	
CBL-QE25SW/X	Encoder Cable, EDR-25 to ServoWire Drive, 5-150 ft
CBL-QE25SWV/X	Encoder Cable, EDR-25 to ServoWire Drive, IP-67, water-resistant, 5-150 ft
CON-E25	Encoder Connector, for EDR-25 Encoders

EDR-25S Outline Drawing



EDR-25C Outline Drawing



ORMEC

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