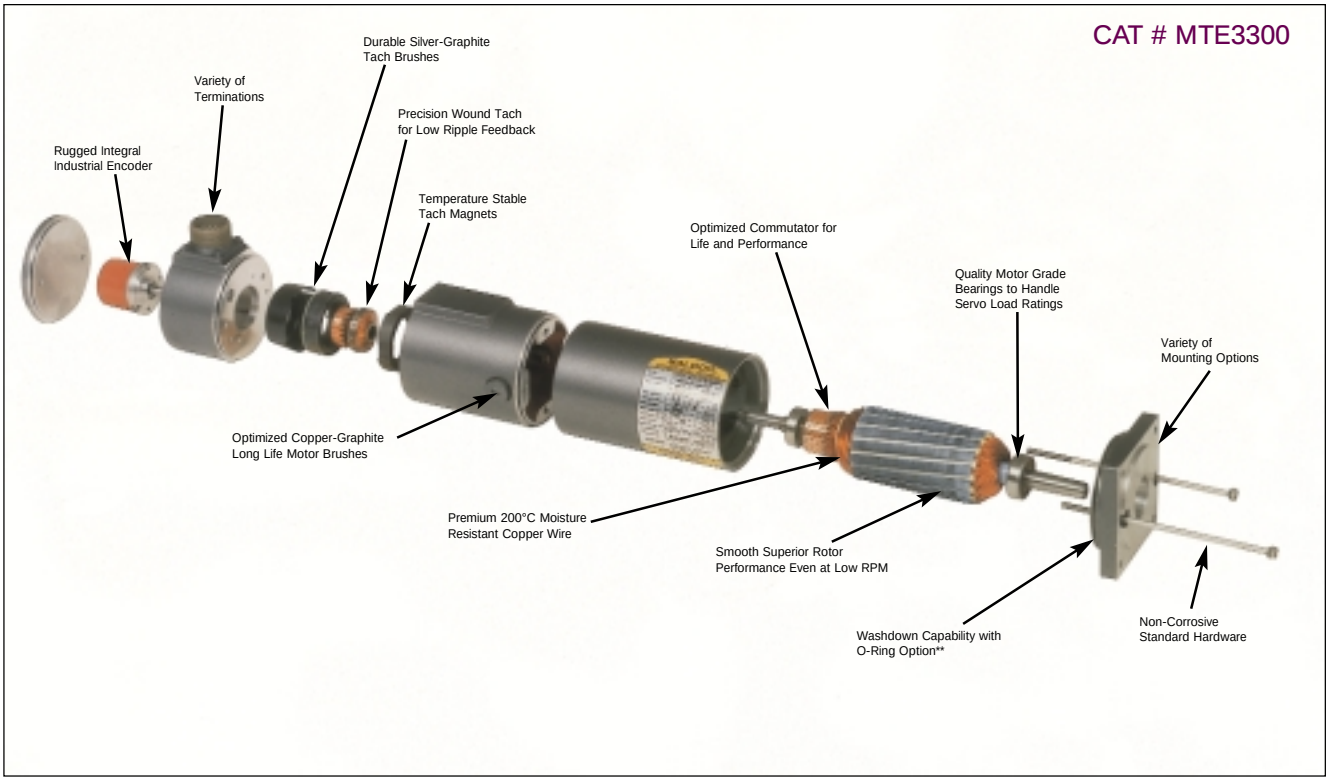
DC Servo Motors

CE

The Baldor family of DC servo motors provide continuous torques from 1.9 lb.-in. to 58 lb.-in. These high performance motors were designed to meet the demanding requirements of industrial motion control. They have a rugged industrial housing and can be supplied with many electrical and mechanical options. These DC motors are ideal for applications such as machine tool, robotics, factory automation, packaging, laboratory, and medical equipment.



Electrical Design Characteristics

Specification	Description
Rating	Continuous duty 155°C rotor temperature -- high temperature design for dependability.
Wire	Premium 200°C moisture resistant, multi-coated copper wire for reliability.
Insulation	Non-hygroscopic polyester high temperature Class H varnish -- designed for product dependability.
Windings	Variety of electrical windings -- performance and versatility for your application needs.
Feedback	Precision integral tachometer (optional) with low ripple -- precise speed regulation; Integral encoder (optional) enclosed and self-contained -- for rugged industrial applications.

Mechanical Design Characteristics

Specification	Description
Enclosure	Totally enclosed, non-ventilated housing, with optional environmental sealed (washdown) to IP65 – provides protection in light industrial or demanding environments.
Terminations	Strain relieved cable exits; optional MS connectors, NPT hole, junction box – provides for variety of installation options.
Armature	Proven skewed armature design provides superior performance even at very low speeds.
Bearings	Quality motor grade ball bearings -- designed to handle servo radial and axial load ratings.
Brushes	Copper-graphite composition -- selected for minimizing wear and motor maintenance intervals.
Mounting	Standard mounting directly interchangeable with many machine tool manufacturers, PMDC motor and stepper manufacturers; optional NEMA and metric mounting -- designed for worldwide acceptance.

Available Modifications and Options

Electrical
- Special motor windings (voltage constant)
- Terminal box / Junction box
- MS connectors
- Cable and / or connector assemblies length
- Strain relief cable exits
- NPT hole lead exit for conduit connections

Feedback
- Special encoder line counts
- Mounting and hardware provisions for custom encoders and resolver provisions
- Special tachometer winding (voltage constant) strain reliefs
- Cable / connector assemblies

Mechanical
- Holding brakes
- NEMA mounting faces
- Special mounting: face / flange
- Special shaft dimensions: diameter /

Environmental
- Shaft seals
- IP54 (E-Option)
- IP65 (not available on M2200 Series)
- Environmental MS connectors and
- Purge holes / drains

DC Servo Motor Performance Selection Guide

TORQUE				Winding	MOTOR INERTIA		CURRENT CONT. AT STALL	Catalog
CONT. STALL		PEAK STALL						
lb-in	Nm	lb-in.	N-m	rpm	lb-in-sec^2	kg-cm^2	AMP	Number
1.8	0.21	13	1.4	4000	0.0003	0.35	2.1	MT-2240-ACYAN
1.8	0.21	13	1.4	5000	0.0003	0.35	3.4	MT-2240-BCYAN
3.1	0.35	19	2.1	4000	0.0005	0.54	3.4	MT-2250-ACYAN
3.1	0.35	19	2.1	5000	0.0005	0.54	5.5	MT-2250-BCYAN
6.2	0.71	44	4.9	3200	0.0016	1.84	2.8	MT-3353-BLYAN
6.2	0.71	44	4.9	5000	0.0016	1.84	5.1	MT-3353-DLYAN
8.8	0.99	59	6.7	3200	0.0024	2.75	3.8	MT-3358-BLYAN
8.8	0.99	59	6.7	5000	0.0024	2.75	6	MT-3358-CLYAN
11.2	1.27	75	8.5	3200	0.0033	3.67	4.9	MT-3363-BLYAN
11.2	1.27	75	8.5	4200	0.0033	3.67	6.3	MT-3363-CLYAN
12.5	1.41	45	5.0	3000	0.007	7.91	5.5	MT-4050-ALYBE
12.5	1.41	45	5.0	4500	0.007	7.91	7.9	MT-4050-BLYBE
21.5	2.43	72	8.1	1500	0.011	12.43	5	MT-4060-ALYBE
21.5	2.43	72	8.1	2300	0.011	12.43	7	MT-4060-BLYBE
28	3.16	125	14.1	1500	0.014	15.82	6.2	MT-4070-ALYBE
28	3.16	125	14.1	2300	0.014	15.82	9.2	MT-4070-BLYBE
40	4.52	185	20.9	1500	0.024	27.12	9	MT-4090-ALYBE
40	4.52	185	20.9	2300	0.024	27.12	13	MT-4090-BLYBE
30	3.39	130	14.7	2200	0.014	15.82	6.1	MT-4525-BTYCN
30	3.39	130	14.7	3200	0.014	15.82	9.2	MT-4525-CTYCN
30	3.39	130	14.7	4200	0.014	15.82	12	MT-4525-DTYCN
40	4.52	190	21.5	1500	0.021	23.73	5.7	MT4535-ATYCN
40	4.52	190	21.5	2200	0.021	23.73	8.3	MT-4535-BTYCN
40	4.52	190	21.5	3000	0.021	23.73	11.2	MT-4535-CTYCN
40	4.52	190	21.5	4200	0.021	23.73	16.4	MT-4535-DTYCN
50	5.65	250	28.2	1700	0.028	31.64	8	MT-4545-ATYCN
50	5.65	250	28.2	2200	0.028	31.64	10.6	MT-4545-BTYCN
50	5.65	250	28.2	3200	0.028	31.64	15.7	MT-4545-CTYCN
58	6.55	283	31.8	1500	0.035	39.55	8.5	MT-4555-ATYCN
58	6.55	283	31.8	2400	0.035	39.55	12.1	MT-4555-BTYCN
58	6.55	283	31.8	3000	0.035	39.55	15.3	MT-4555-CTYCN

How to Read Motor Speed-Torque Curves

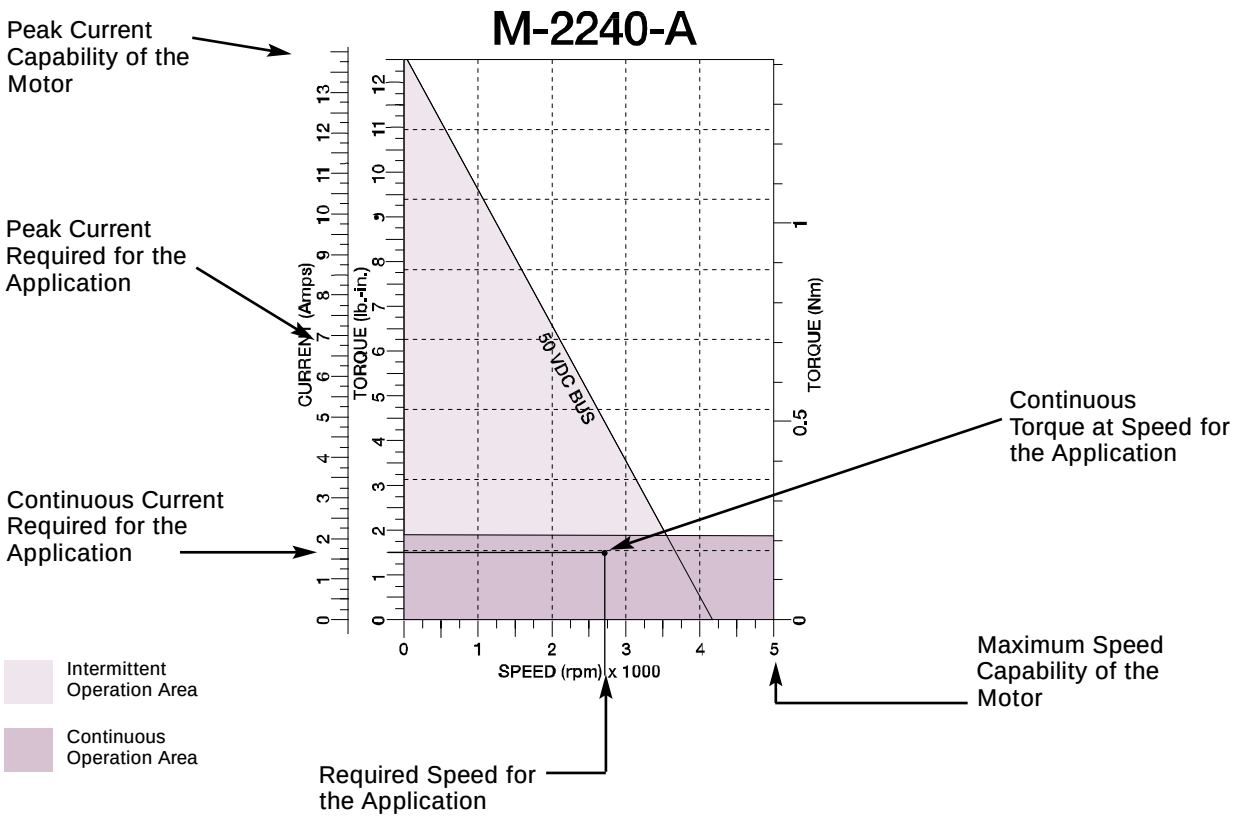
Baldor has provided the following curves in order to simplify the process of selecting both a motor and control for a specific application. The following paragraphs explain how the information in these curves should be interpreted.

In constant speed applications, motors are defined in terms of horsepower (which is torque at a base speed). Servo motors normally operate over a wide speed range. The curves show continuous torque (defined as torque which will not overheat the motor), and peak torque (defined as intermittent acceleration torque).

It is also necessary to know the current and voltage required for the motor to operate. The curves have a scale that shows current required for any torque, and voltage required for any speed.

As an example, an application requires a continuous torque of 1.5 lb-in at a speed of 2700 RPM. The peak torque required for acceleration is 6 lb-in.

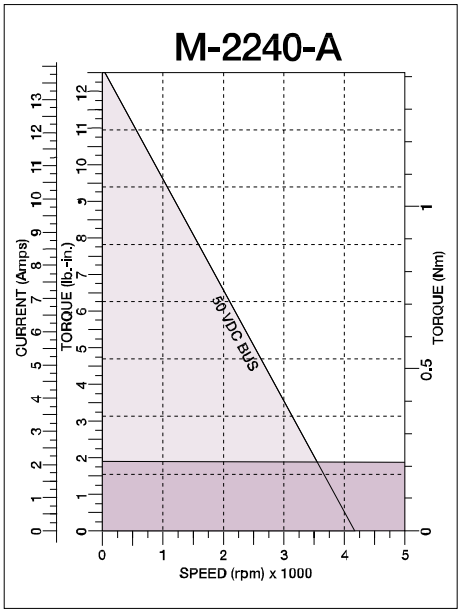
This curve shows that the M-2240-A will work in this application. The bus voltage required is 50VDC. The continuous and peak currents required is 1.7 and 6.7 amps. From this information, we select a TSD control (5 amps continuous, 10 amps peak) with a 115VAC input (50VDC Bus).

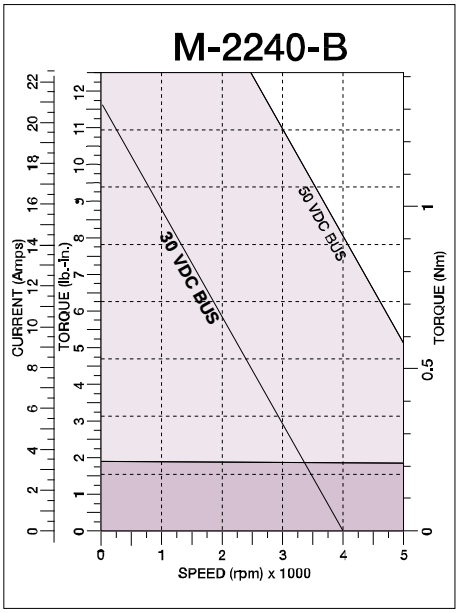


Data in the tables have the following values: The motor's voltage constant (back-emf) and torque constant are "cold" values (25°C); the continuous stall torque and current are "hot" values (155°C). The temperature coefficient factor between "cold" and "hot" is 0.85 for DC motors.

Contact Baldor for special windings, custom shafts/mountings, and custom specs.

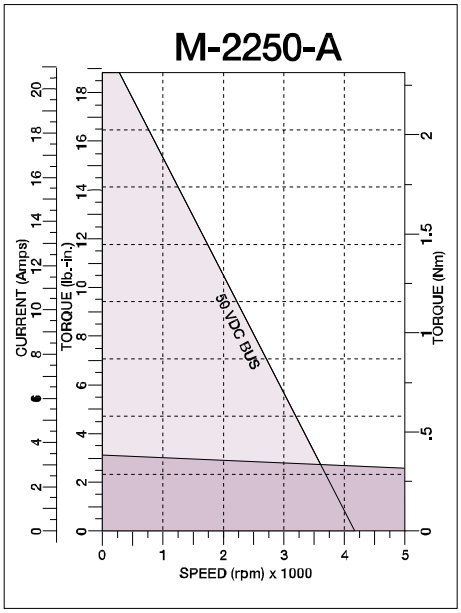
M-Series S-T Curves

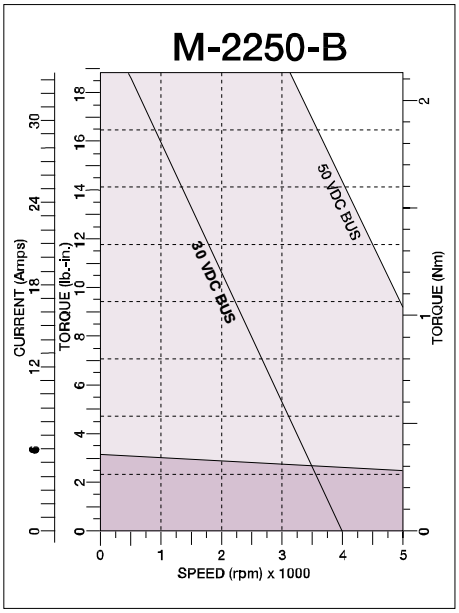




Catalog No.		MT-2240-ACYAN	MT-2240-BCYAN
General			
Continuous Stall	lb-in	1.88	1.88
Torque	N-m	0.21	0.21
Cont. Current	amps	2.05	3.33
Peak Torque	lb-in	13	13
	N-m	1.4	1.4
Peak Current	amps	12.3	20
Viscous Damping	lb-in/krpm	0.01	0.01
	N-m/krpm	7.1 E-04	7.1 E-04
Thermal Resistance	°C/watt	5	5
Mechanical Time Constant	msec	2.0	2.0
Electrical Time Constant	msec	7.8	9
Rated Speed	rpm	3500	3000
Rated Voltage	volts	50	30
Electrical			
Torque	lb-in/amp	1.012	0.625
Constant	N-m/amp	0.115	0.071
Voltage	V_{pk}/krpm	12	7.4
Constant	v/r/s	0.115	0.071
Resistance	ohms	4.0	1.6
Inductance	mH	7.7	3.3
Mechanical			
Inertia	Lb-In-s^2	0.00031	0.00031
	Kg-cm^2	0.35	0.35
Max Speed	rpm	5000	5000
Weight (Motor Tach)	lbs	3.2	3.2
	Kg	1.5	1.5

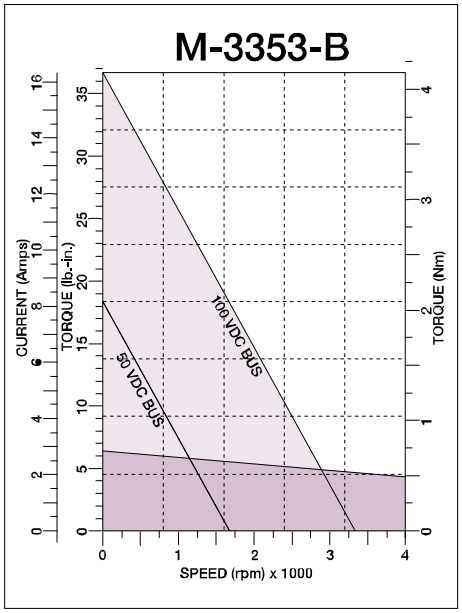
M-Series S-T Curves

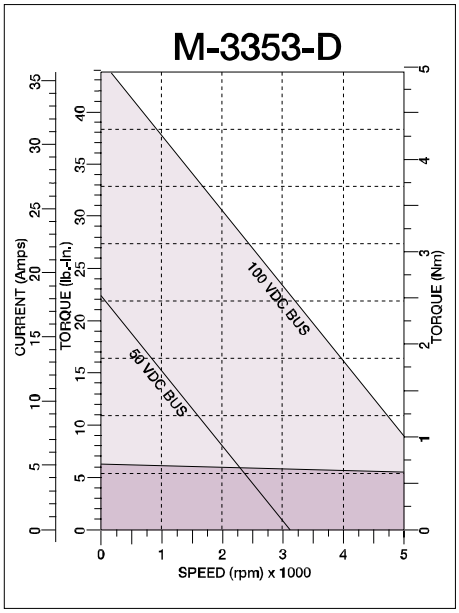




Catalog No.		MT-2250-ACYAN	MT-2260-BCYAN
General			
Continuous Stall Torque	lb-in	3.13	3.13
	N-m	0.35	0.35
Cont. Current	amps	3.42	5.5
Peak Torque	lb-in	19	19
	N-m	2.1	2.1
Peak Current	amps	18.5	30
Viscous Damping	lb-in/krpm	0.01	0.01
	N-m/krpm	1.4 E-03	1.4 E-03
Thermal Resistance	°C/watt	4.2	4.2
Mechanical Time Constant	msec	9.5	9.8
Electrical Time Constant	msec	2.52	2.78
Rated Speed	rpm	3500	3000
Rated Voltage	volts	50	30
Electrical			
Torque Constant	lb-in/amp	1.0125	0.625
	N-m/amp	0.115	0.071
Voltage Constant	V_{pk}/krpm	12	7.4
	v/r/s	0.115	0.071
Resistance	ohms	2.3	0.9
Inductance	mH	5.8	2.5
Mechanical			
Inertia	Lb-In-s^2	0.00048	0.00048
	Kg-cm^2	0.54	0.54
Max Speed	rpm	5000	5000
Weight (Motor Tach)	lbs	3.5	3.5
	Kg	1.6	1.6

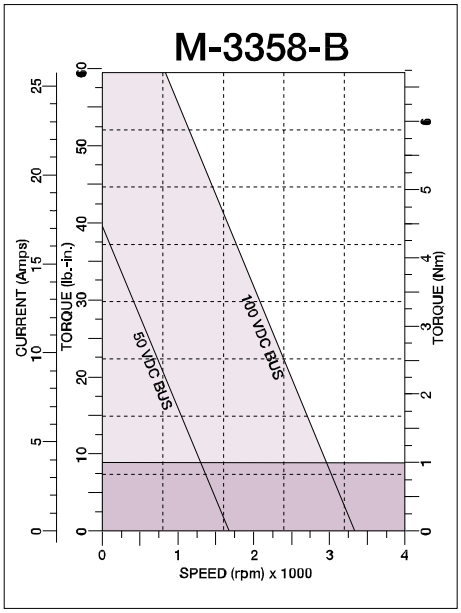
M-Series S-T Curves

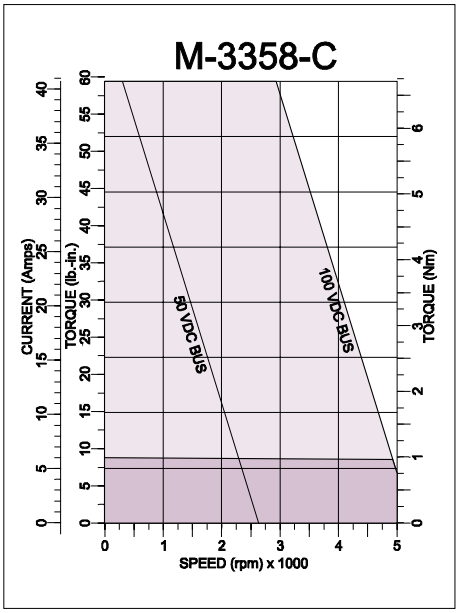




Catalog No.		MT-3353-BLYAN	MT-3353-DLYAN
General			
Continuous Stall	lb-in	6.25	6.25
Torque	N-m	0.71	0.71
Cont. Current	amps	2.68	4.9
Peak Torque	lb-in	44	44
	N-m	4.94	4.94
Peak Current	amps	16.9	34.4
Viscous Damping	lb-in/krpm	0.04	0.04
	N-m/krpm	4.2E-03	4.2 E-02
Thermal Resistance	°C/watt	2.8	2.8
Mechanical Time Constant	msec	11.96	12.99
Electrical Time Constant	msec	2.77	2.22
Rated Speed	rpm	2800	2000
Rated Voltage	volts	100	50
Electrical			
Torque	lb-in/amp	2.59	1.41
Constant	N-m/amp	0.293	0.159
Voltage	V_{pk}/krpm	30.7	16.7
Constant	v/r/s	0.293	0.159
Resistance	ohms	5.6	1.8
Inductance	mH	15.5	4.0
Mechanical			
Inertia	Lb-In-s^2	0.00163	0.00163
	Kg-cm^2	1.84	1.84
Max Speed	rpm	4000	5000
Weight (Motor Tach)	lbs	8	8
	Kg	3.6	3.6

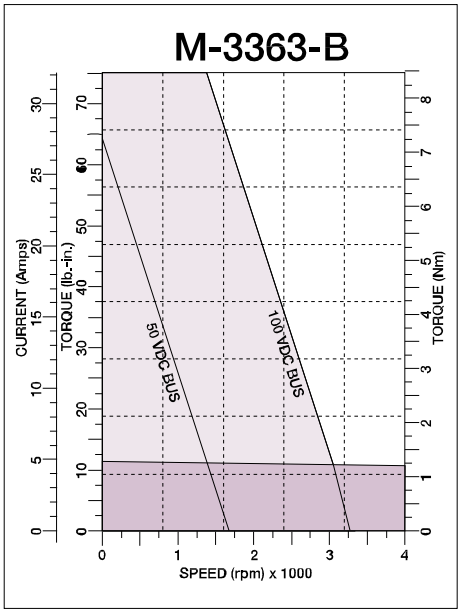
M-Series S-T Curves

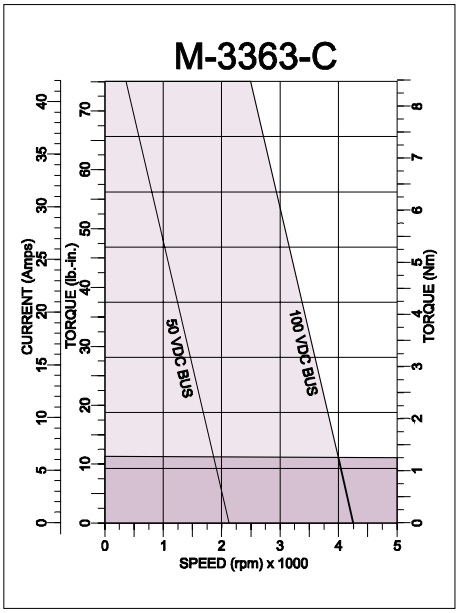




Catalog No.		MT-3358-BLYAN	MT-3358-CLYAN
General			
Continuous Stall	lb-in	8.75	8.75
Torque	N-m	0.99	0.99
Cont. Current	amps	3.6	5.99
Peak Torque	lb-in	59	59
	N-m	6.7	6.7
Peak Current	amps	24.7	36.6
Viscous Damping	lb-in/krpm	0.05	0.05
	N-m/krpm	5.6 E-03	5.6 E-03
Thermal Resistance	°C/watt	2.4	2.4
Mechanical Time Constant	msec	8.77	11.47
Electrical Time Constant	msec	2.76	2.21
Rated Speed	rpm	2800	2000
Rated Voltage	volts	100	50
Electrical			
Torque	lb-in/amp	2.67	1.62
Constant	N-m/amp	0.302	0.183
Voltage	V_{pk}/krpm	31.6	19.2
Constant	v/r/s	0.302	0.183
Resistance	ohms	2.9	1.4
Inductance	mH	8.0	3.1
Mechanical			
Inertia	Lb-In-s^2	0.00244	0.00244
	Kg-cm^2	0.275	0.275
Max Speed	rpm	4000	5000
Weight (Motor Tach)	lbs	10	10
	Kg	4.5	4.5

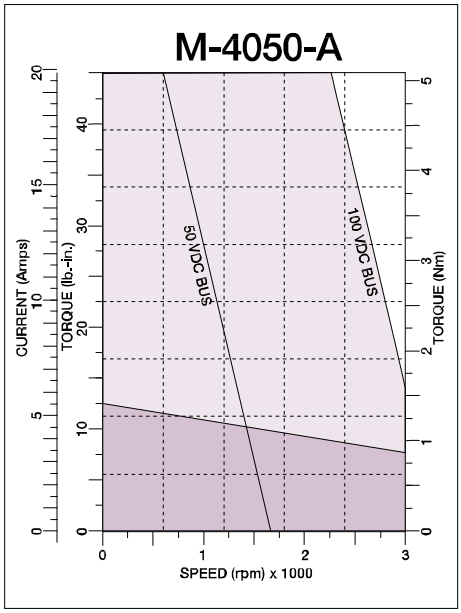
M-Series S-T Curves

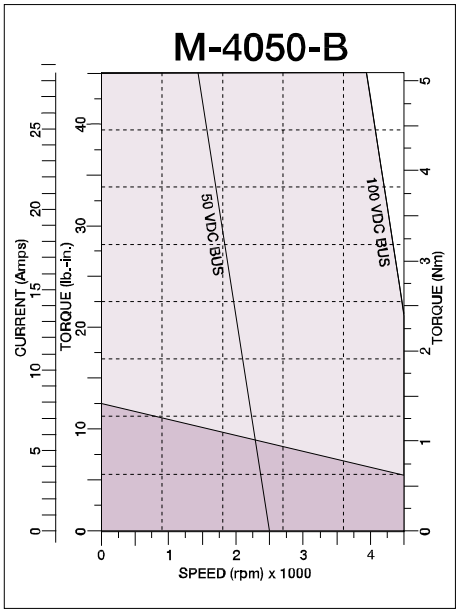




Catalog No.		MT-3363-BLYAN	MT-3363-CLYAN
General			
Continuous Stall Torque	lb-in	11.25	11.25
	N-m	1.27	1.27
Cont. Current	amps	4.76	5.99
Peak Torque	lb-in	75	75
	N-m	8.5	8.5
Peak Current	amps	28.5	35.9
Viscous Damping	lb-in/krpm	0.07	0.07
	N-m/krpm	7.8 E-03	7.8 E-03
Thermal Resistance	°C/watt	2.1	2.1
Mechanical Time Constant	msec	9.99	11.88
Electrical Time Constant	msec	2.54	2.06
Rated Speed	rpm	2800	1800
Rated Voltage	volts	100	50
Electrical			
Torque Constant	lb-in/amp	2.63	2.09
	N-m/amp	0.297	0.297
Voltage Constant	V_{pk}/krpm	31.1	24.7
	v/r/s	0.297	0.297
Resistance	ohms	2.4	1.8
Inductance	mH	6.1	3.7
Mechanical			
Inertia	Lb-In-s^2	0.00325	0.00325
	Kg-cm^2	3.67	3.67
Max Speed	rpm	4000	5000
Weight (Motor Tach)	lbs	11	11
	Kg	5	5

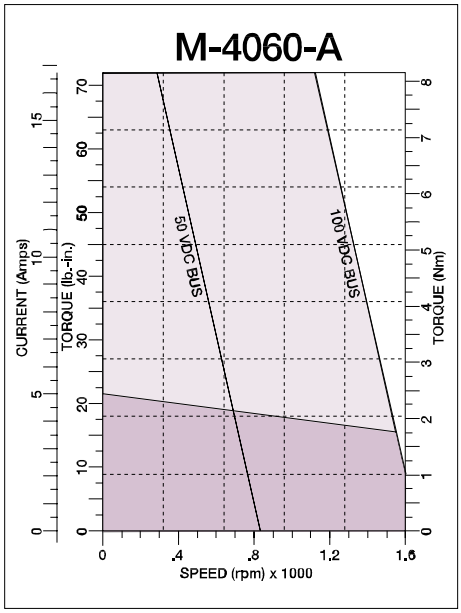
M-Series S-T Curves

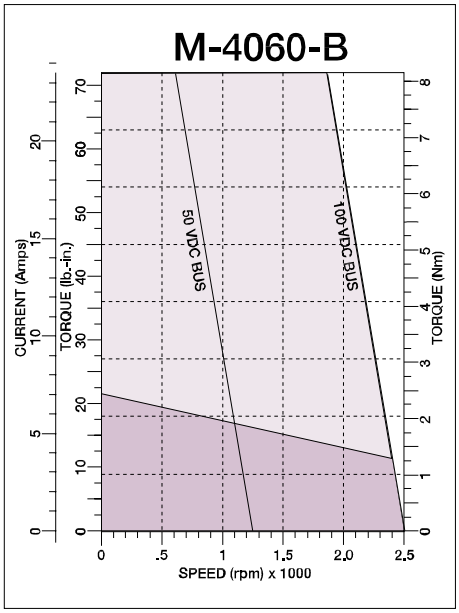




Catalog No.		MT-4050-ALYBE	MT-4050-BLYBE
General			
Continuous Stall	lb-in	12.5	12.5
Torque	N-m	1.41	1.41
Cont. Current	amps	5.48	8.22
Peak Torque	lb-in	45	45
	N-m	5.08	5.08
Peak Current	amps	17.75	26.62
Viscous Damping	lb-in/krpm	0.31	0.31
	N-m/krpm	0.035	0.035
Thermal Resistance	°C/watt	2.2	2.2
Mechanical Time Constant	msec	17.35	17.35
Electrical Time Constant	msec	4.17	3.75
Rated Speed	rpm	1200	2200
Rated Voltage	volts	50	50
Electrical			
Torque	lb-in/amp	2.54	1.69
Constant	N-m/amp	0.086	0.191
Voltage	V_{pk}/krpm	30.0	20.0
Constant	v/r/s	0.286	0.191
Resistance	ohms	1.8	0.80
Inductance	mH	7.5	3.0
Mechanical			
Inertia	Lb-In-s^2	0.0071	0.0071
	Kg-cm^2	7.91	7.91
Max Speed	rpm	3000	4500
Weight (Motor Tach)	lbs	8	8
	Kg	3.63	3.63

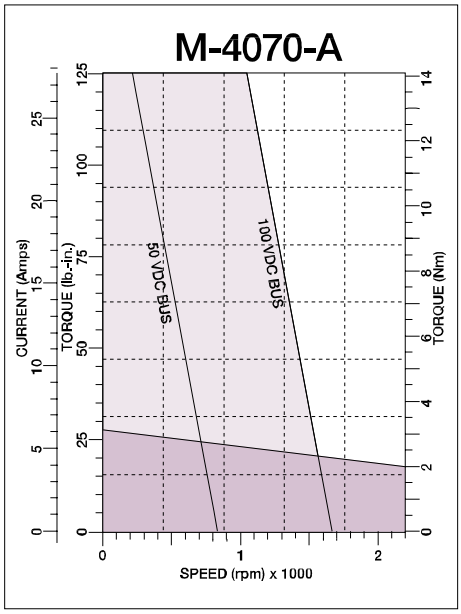
M-Series S-T Curves

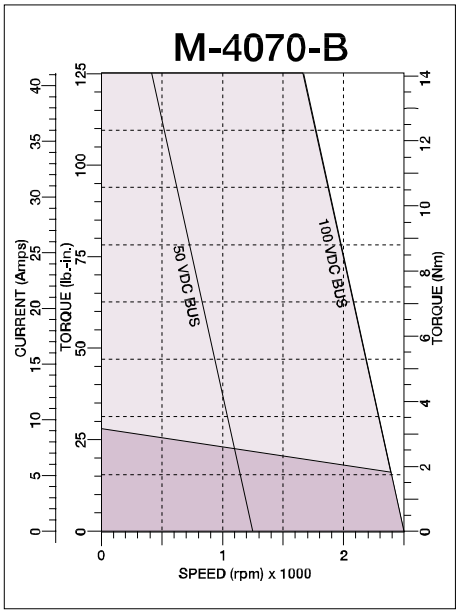




Catalog No.		MT-4060-ALYBE	MT-4060-BLYBE
General			
Continuous Stall	lb-in	21.5	21.8
Torque	N-m	2.43	2.43
Cont. Current	amps	4.71	7
Peak Torque	lb-in	72	72
	N-m	8.1	8.1
Peak Current	amps	15.8	25
Viscous Damping	lb-in/krpm	1	1
	N-m/krpm	0.113	0.113
Thermal Resistance	°C/watt	1.5	1.5
Mechanical Time Constant	msec	8.71	10.22
Electrical Time Constant	msec	4.71	3.83
Rated Speed	rpm	1500	2300
Rated Voltage	volts	100	100
Electrical			
Torque	lb-in/amp	5.07	3.38
Constant	N-m/amp	0.573	0.382
Voltage	V_{pk}/krpm	60.0	40.0
Constant	v/r/s	0.573	0.382
Resistance	ohms	2.3	1.2
Inductance	mH	9.6	4.6
Mechanical			
Inertia	Lb-In-s^2	0.011	0.011
	Kg-cm^2	12.43	12.43
Max Speed	rpm	1600	2500
Weight (Motor Tach)	lbs	11	11
	Kg	4.99	4.99

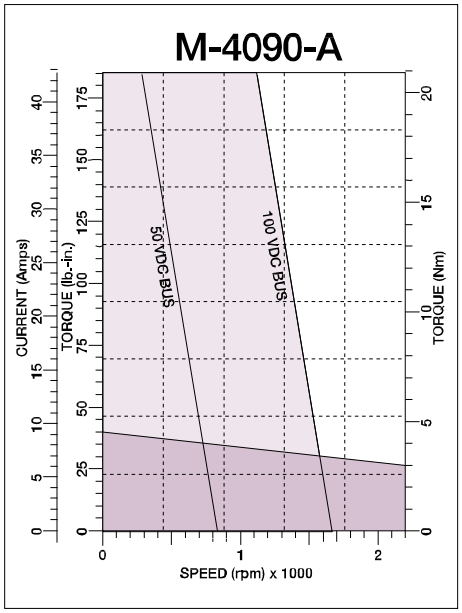
M-Series S-T Curves

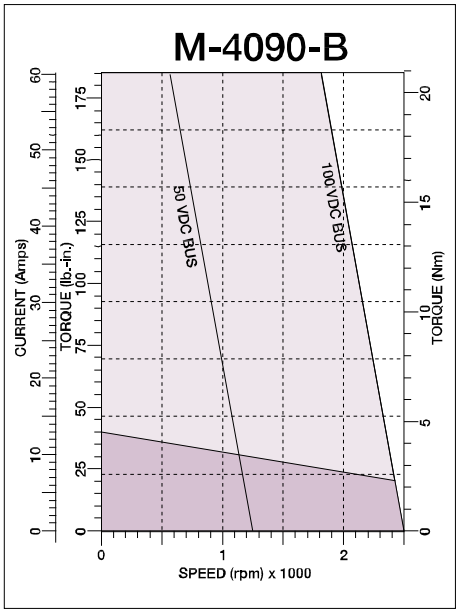




Catalog No.		MT-4070-ALYBE	MT-4070-BLYBE
General			
Continuous Stall	lb-in	28.0	28.0
Torque	N-m	3.16	3.16
Cont. Current	amps	6.13	9.2
Peak Torque	lb-in	125	125
	N-m	14.1	14.1
Peak Current	amps	24.65	36.97
Viscous Damping	lb-in/krpm	1.6	1.6
	N-m/krpm	0.181	0.181
Thermal Resistance	°C/watt	1.3	1.3
Mechanical Time Constant	msec	7.23	9.76
Electrical Time Constant	msec	4.53	3.33
Rated Speed	rpm	1500	2300
Rated Voltage	volts	100	100
Electrical			
Torque	lb-in/amp	5.07	3.38
Constant	N-m/amp	0.573	0.382
Voltage	V_{pk}/krpm	60.0	40.0
Constant	v/r/s	0.573	0.382
Resistance	ohms	1.5	0.90
Inductance	mH	6.8	3.0
Mechanical			
Inertia	Lb-In-s^2	0.014	0.014
	Kg-cm^2	15.82	15.82
Max Speed	rpm	2200	2500
Weight (Motor Tach)	lbs	13	13
	Kg	5.9	5.9

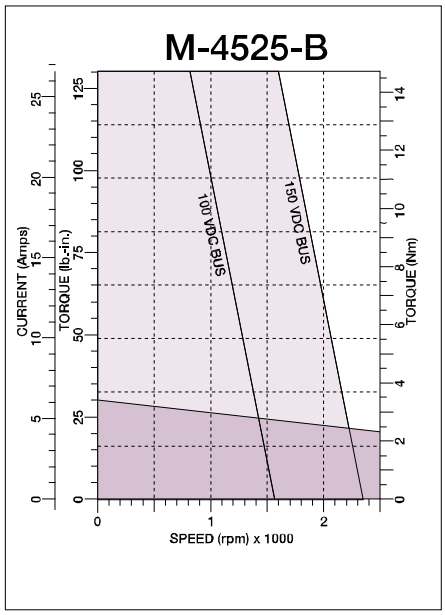
M-Series S-T Curves

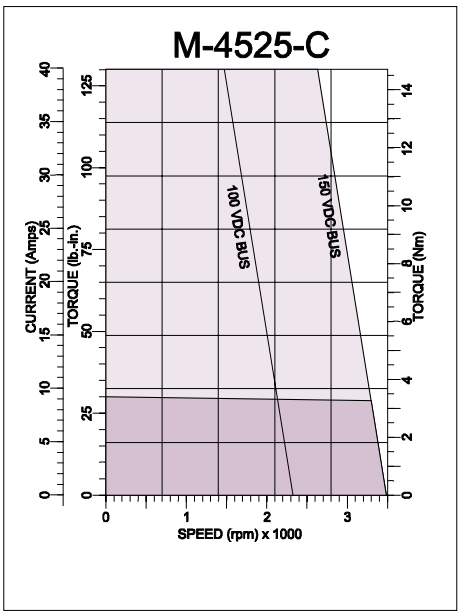


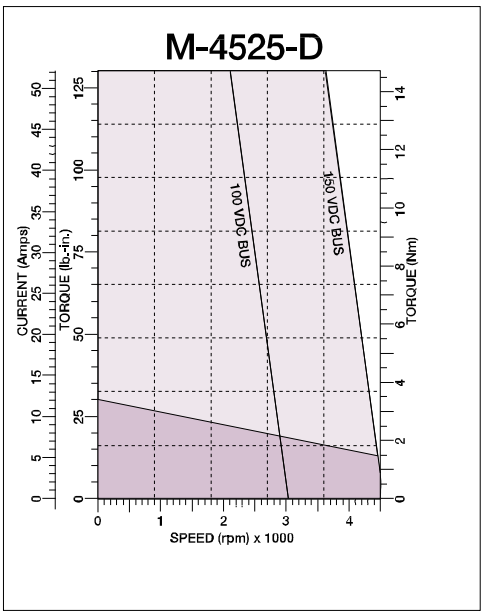


Catalog No.		MT-4090-ALYBE	MT-4090-BLYBE
General			
Continuous Stall	lb-in	40.0	40.0
Torque	N-m	4.52	4.52
Cont. Current	amps	8.7	13.15
Peak Torque	lb-in	185	185
	N-m	20.9	20.9
Peak Current	amps	36.5	60.8
Viscous Damping	lb-in/krpm	2.2	2.2
	N-m/krpm	0.249	0.249
Thermal Resistance	°C/watt	1.1	1.1
Mechanical Time Constant	msec	7.43	9.29
Electrical Time Constant	msec	4.78	5.0
Rated Speed	rpm	1500	2300
Rated Voltage	volts	100	100
Electrical			
Torque	lb-in/amp	5.07	3.38
Constant	N-m/amp	0.573	0.382
Voltage	V_{pk}/krpm	60.0	40.0
Constant	v/r/s	0.573	0.382
Resistance	ohms	0.9	0.5
Inductance	mH	4.3	2.5
Mechanical			
Inertia	Lb-In-s^2	0.024	0.024
	Kg-cm^2	27.14	27.14
Max Speed	rpm	2200	2500
Weight (Motor Tach)	lbs	18	18
	Kg	8.16	8.16

M-Series S-T Curves

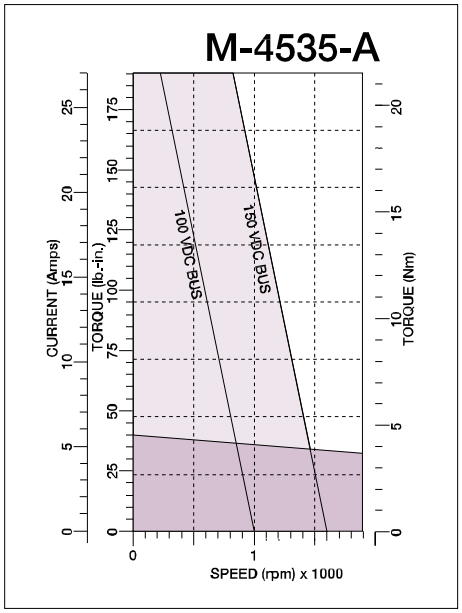


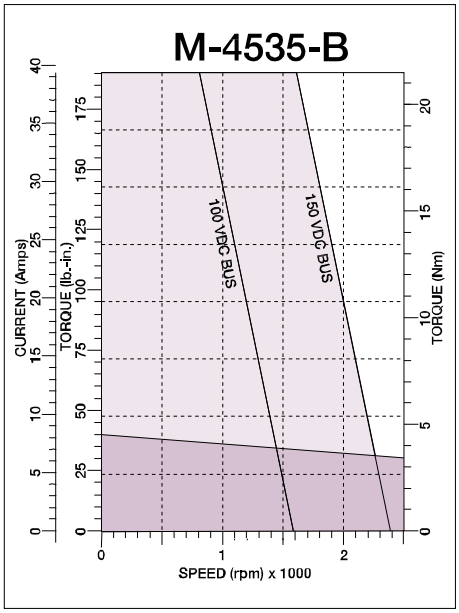




Catalog No.		MT-4525-BTYCN	MT-4525-CTYCN	MT-4525-DTYCN
General				
Continuous Stall	lb-in	30.0	3.0	3.0
Torque	N-m	3.39	3.39	3.39
Cont. Current	amps	6.16	9.17	12.0
Peak Torque	lb-in	130	130	130
	N-m	14.7	14.7	14.7
Peak Current	amps	24	35.8	46.6
Viscous Damping	lb-in/krpm	1.76	1.76	1.76
	N-m/krpm	0.199	0.199	0.199
Thermal Resistance	°C/watt	1.3	1.3	1.3
Mechanical Time Constant	msec	8.43	9.57	10.35
Electrical Time Constant	msec	4.52	4.12	3.54
Rated Speed	rpm	2200	3200	4400
Rated Voltage	volts	150	150	150
Electrical				
Torque	lb-in/amp	5.41	3.63	2.79
Constant	N-m/amp	0.611	0.411	0.315
Voltage	V_{pk}/krpm	64	43	33
Constant	v/r/s	0.611	0.411	0.315
Resistance	ohms	1.99	1.02	0.65
Inductance	mH	9.0	4.2	2.3
Mechanical				
Inertia	Lb-In-s^2	0.014	0.014	0.014
	Kg-cm^2	15.82	15.82	15.82
Max Speed	rpm	2500	3500	4500
Weight (Motor Tach)	lbs	16	16	16
	Kg	7.3	7.3	7.3

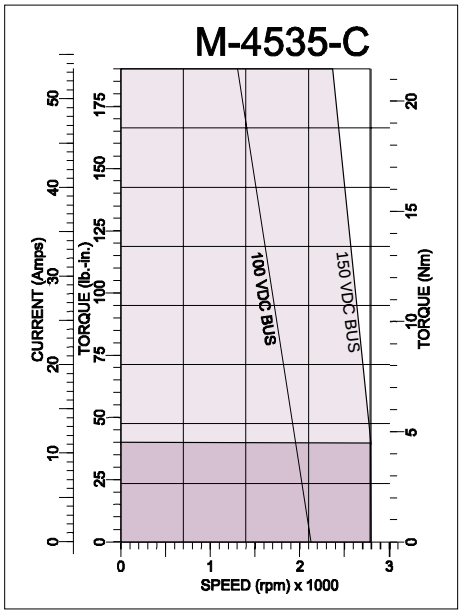
M-Series S-T Curves

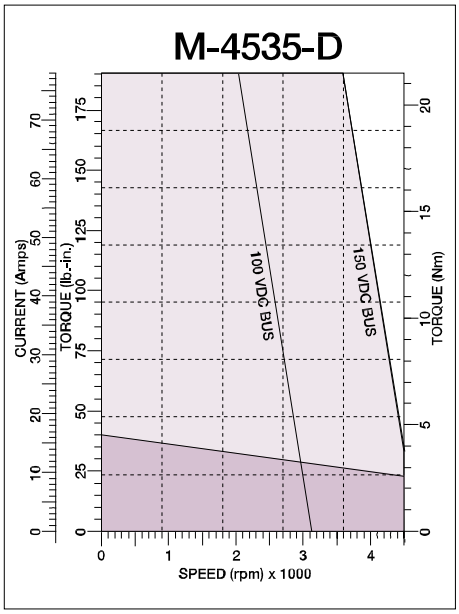




Catalog No.		MT-4535-ATYCN	MT-4535-BTYCN
General			
Continuous Stall	lb-in	40	40
Torque	N-m	4.52	4.52
Cont. Current	amps	5.7	8.35
Peak Torque	lb-in	190	190
	N-m	21.5	21.5
Peak Current	amps	24.4	35.7
Viscous Damping	lb-in/krpm	2.6	2.6
	N-m/krpm	0.294	0.294
Thermal Resistance	°C/watt	1.2	1.2
Mechanical Time Constant	msec	7.51	8.07
Electrical Time Constant	msec	5.15	4.19
Rated Speed	rpm	1400	2200
Rated Voltage	volts	150	150
Electrical			
Torque	lb-in/amp	7.78	5.32
Constant	N-m/amp	0.879	0.602
Voltage	V_{pk}/krpm	92	63
Constant	v/r/s	0.879	0.602
Resistance	ohms	2.7	1.36
Inductance	mH	13.9	5.7
Mechanical			
Inertia	Lb-In-s^2	0.019	0.019
	Kg-cm^2	21.47	21.47
Max Speed	rpm	1900	2500
Weight (Motor Tach)	lbs	20	20
	Kg	9.1	9.1

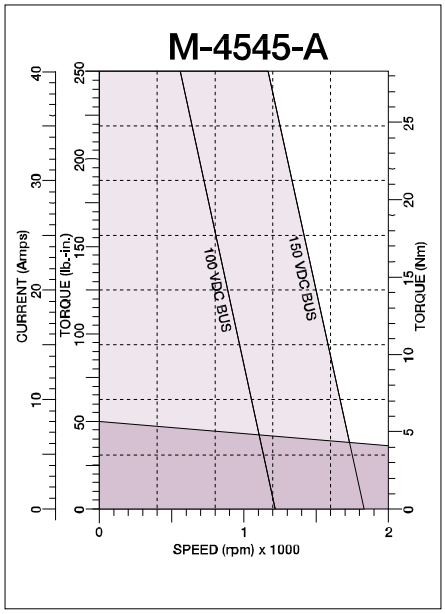
M-Series S-T Curves

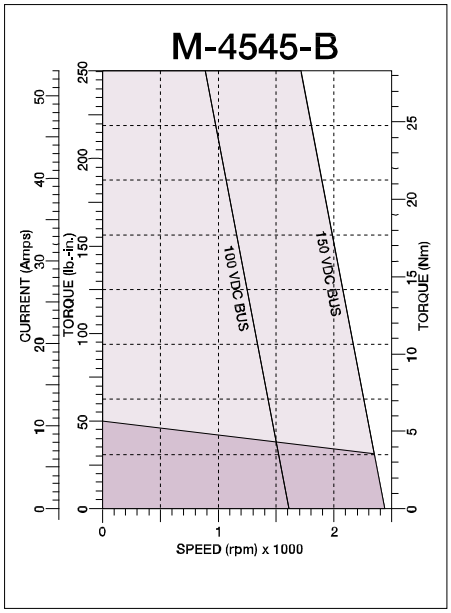


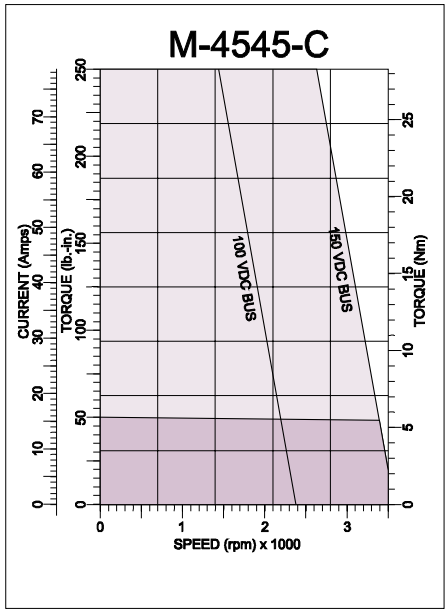


Catalog No.		MT-4535-CTYCN	MT-4535-DTYCN
General			
Continuous Stall	lb-in	40	40
Torque	N-m	4.5	4.5
Cont. Current	amps	11.2	16.4
Peak Torque	lb-in	190	190
	N-m	21.5	21.5
Peak Current	amps	46.8	70.2
Viscous Damping	lb-in/krpm	2.6	2.6
	N-m/krpm	0.294	0.294
Thermal Resistance	°C/watt	1.2	1.2
Mechanical Time Constant	msec	8.63	11.49
Electrical Time Constant	msec	4.2	3.6
Rated Speed	rpm	1800	2900
Rated Voltage	volts	100	100
Electrical			
Torque	lb-in/amp	3.97	2.7
Constant	N-m/amp	0.449	0.306
Voltage	V_{pk}/krpm	47	32
Constant	v/r/s	0.449	0.306
Resistance	ohms	0.81	0.50
Inductance	mH	3.4	1.8
Mechanical			
Inertia	Lb-In-s^2	0.019	0.019
	Kg-cm^2	21.47	21.47
Max Speed	rpm	3000	4500
Weight (Motor Tach)	lbs	20	20
	Kg	9.1	9.1

M-Series S-T Curves

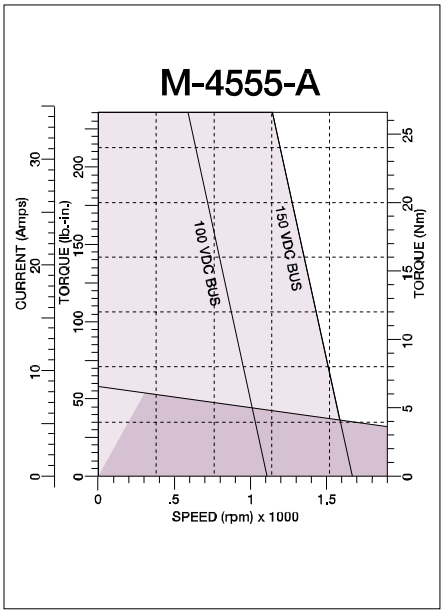


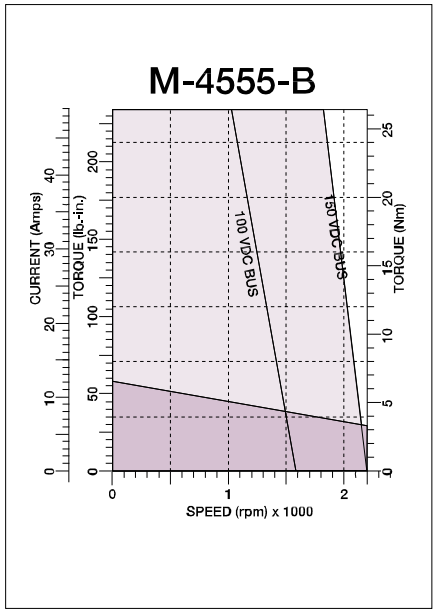


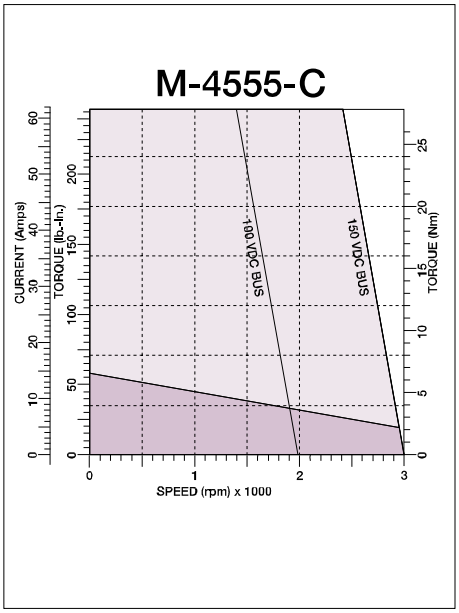


Catalog No.		MT-4545-ATYCN	MT-4545-BTYCN	MT-4545-CTYCN
General				
Continuous Stall	lb-in	50	50	50
Torque	N-m	5.65	5.65	5.65
Cont. Current	amps	8.02	10.6	15.
Peak Torque	lb-in	250	250	250
	N-m	28.2	28.2	28.2
Peak Current	amps	36.1	47.7	37
Viscous Damping	lb-in/krpm	3.62	3.62	3.62
	N-m/krpm	0.409	0.409	0.409
Thermal Resistance	°C/watt	1.0	1.0	1.0
Mechanical Time Constant	msec	6.63	7.27	9.44
Electrical Time Constant	msec	4.8	4.26	3.21
Rated Speed	rpm	1700	2300	3300
Rated Voltage	volts	150	150	150
Electrical				
Torque	lb-in/amp	6.93	5.24	3.55
Constant	N-m/amp	0.783	0.592	0.401
Voltage	V_{pk}/krpm	82	62	42
Constant	v/r/s	0.783	0.592	0.401
Resistance	ohms	1.5	0.94	0.56
Inductance	mH	7.2	4.0	1.8
Mechanical				
Inertia	Lb-In-s^2	0.024	0.024	0.024
	Kg-cm^2	27.12	27.12	27.12
Max Speed	rpm	2000	2500	3500
Weight (Motor Tach)	lbs	23	23	23
	Kg	10.4	10.4	10.4

M-Series S-T Curves





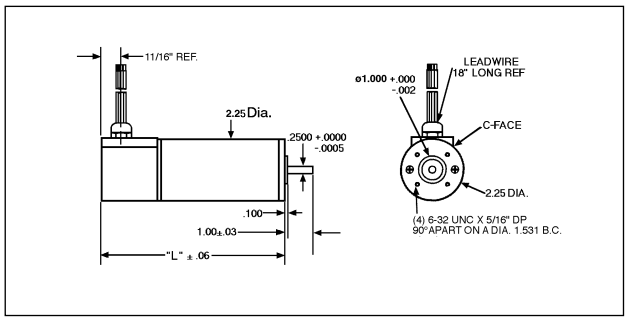


Catalog No.		MT-4555-ATYCN	MT-4555-BTYCN	MT-4555-CTYCN
General				
Continuous Stall	lb-in	56.0	56.0	56.0
Torque	N-m	6.33	6.33	6.33
Cont. Current	amps	8.47	10.9	13.7
Peak Torque	lb-in	282	282	282
	N-m	31.9	31.9	31.9
Peak Current	amps	38.1	48.8	61.6
Viscous Damping	lb-in/krpm	3.71	3.71	3.71
	N-m/krpm	0.419	0.419	0.419
Thermal Resistance	°C/watt	0.9	0.9	0.9
Mechanical Time Constant	msec	7.9	8.7	11.6
Electrical Time Constant	msec	5.9	6.5	5.2
Rated Speed	rpm	1500	1400	1800
Rated Voltage	volts	150	100	100
Electrical				
Torque	lb-in/amp	7.61	5.32	4.23
Constant	N-m/amp	0.859	0.602	0.47
Voltage	V_{pk}/krpm	90	63	50
Constant	v/r/s	0.859	0.602	0.477
Resistance	ohms	1.52	0.6229	0.3938
Inductance	mH	7.9	3.8	2.6
Mechanical				
Inertia	Lb-In-s^2	0.035	0.035	0.035
	Kg-cm^2	35.03	35.03	35.03
Max Speed	rpm	1900	2200	3500
Weight (Motor Tach)	lbs	27	27	27
	Kg	12.2	12.2	12.2

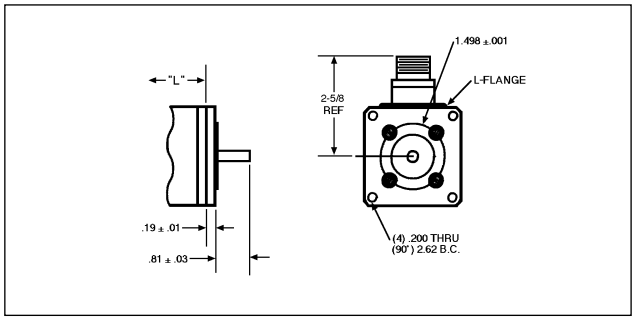
DC Servo Motors

M2200 Series Dimensions

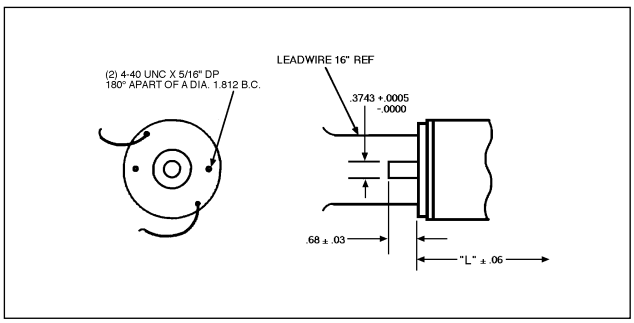
MOTOR - TACHOMETER
STANDARD "C" FACE MOUNTING
(Termination Option "A")



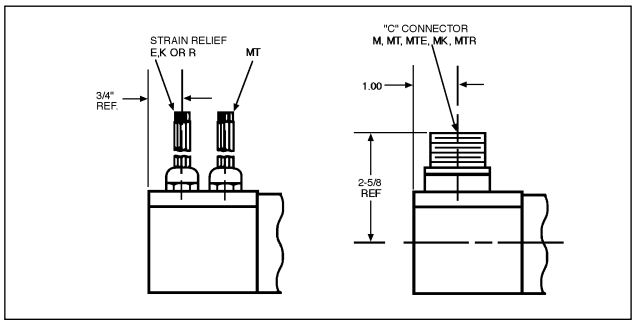
FLANGE MOUNTING
OPTIONAL "L" MOUNTING



MOTOR ONLY (REAR VIEW)



OPTIONAL TERMINATIONS



Model	M "L"	MT "L"	MTE "L"	MTR "L"	ME "L"	MR "L"	MK "L"	MTK "L"
M2240	3.81/96.8	5.59/141.9	8.53/216.6	8.69/220.7	7.39/187.7	7.54/191.5	5.59/141.9	7.22/183.3
M2250	4.81/122.2	6.59/167.3	9.53/242.1	9.69/246.1	8.39/213.1	8.54/216.9	6.59/167.3	8.22/208.7

Dimensions are in Inches/mm.

How to Order

M [ ] [ ] — **2 2** [ ] [ ] — [ ] [ ] [ ] [ ] **N**

CONFIGURATION
- M ... Motor
- E ... Encoder
- T ... Tachometer
- B ... Brake

MOTOR SIZE
- 40 (1.9 lb-in)(.21Nm)
- 50 (3.1 lb-in)(.35Nm)

WINDING
- A
- B

MOUNTING
- L ... D-Flange
- C ... C-Face
- D ... B5 Flange(Metric)
- M ... B14 Face(Metric)

FEEDBACK SIGNAL
- A ... Encoder, 500 Line (MTE, ME, MK)
- B ... Encoder, 1000 Line (MTE, ME, MK)
- D ... Encoder, 2000 Line (MTE, ME)
- E ... Encoder, 2500 Line (MTE, ME)
- Y ... No Feedback Device

TERMINATIONS
- A ... Cable Exit
- C ... MS Connector, Side Exit
- R ... Rear Exit MS Conn.

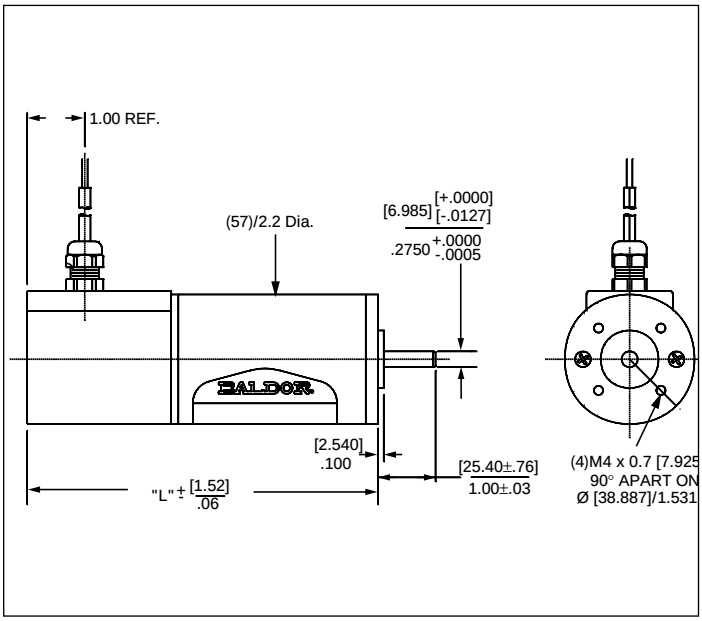
SPECIAL OPTION
- N ... None

Example:
MTE – 2250 - BCBCN
Motor - Tach - Encoder with B-Winding, round face, 1000 line encoder, MS side mounted connector.

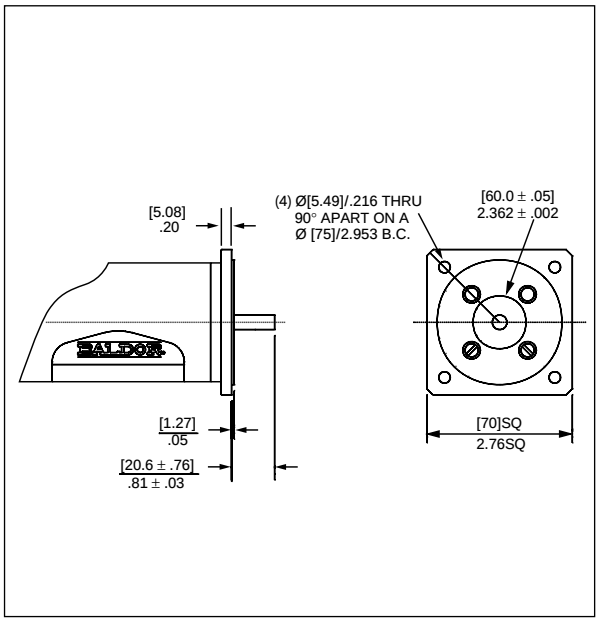
DC Servo Motors

M2200 Series

**MOTOR - TACHOMETER
METRIC "M" MOUNTING**

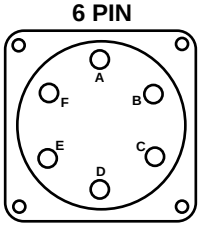


OPTIONAL "D" MOUNTING



Connection Diagrams

6 PIN



MOTOR CONNECTOR
MS3102E-14S-06P

M2200, M, MT, MB, MTB, VERSIONS

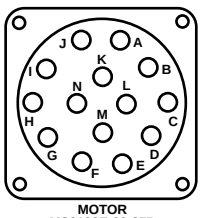
PIN	FUNCTION (OPTIONAL)
A	MOTOR C.C.W. (+)
B	MOTOR C.C.W. (-)
C	TACH C.C.W. (-)
D	TACH C.C.W. (+)
E	TACH SHIELD (OR BRAKE)
F	(BRAKE)

LEADS OUT

Series	M2200
Rotation	C.C.W.
Motor	Red (+), Black (-)
Tach	Red (-), Black (+)

NOTE: All motor rotation is facing output shaft.

14 PIN



MOTOR
MS3102E-20-27P

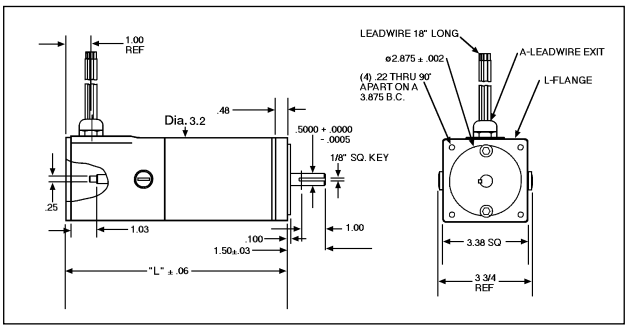
M2200 ME,
MTE, MTEB, VERSIONS

PIN	FUNCTION (OPTIONAL)
A	ENCODER SHIELD (OR BRAKE)
B	TACH C.C.W. (+)
C	MOTOR C.C.W. (-)
D	CHANNEL Z
E	CHANNEL B
F	COMMON
G	CHANNEL A
H	MOTOR C.C.W. (+)
I	TACH SHIELD (OR BRAKE)
J	CHANNEL $\overline{B}$
K	TACH C.C.W. (-)
L	CHANNEL $\overline{Z}$
M	+5VDC
N	CHANNEL $\overline{A}$

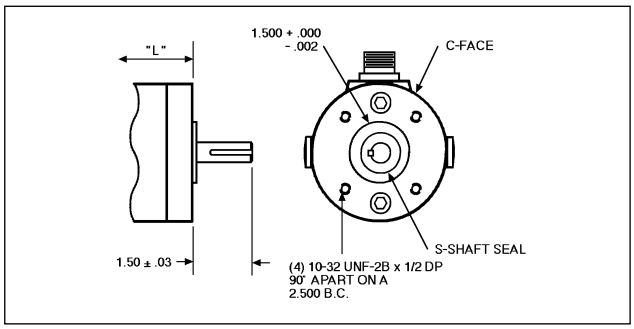
DC Servo Motors

M3300 Series Dimensions

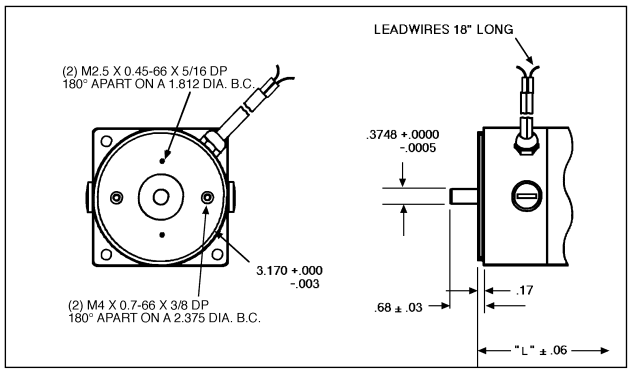
MOTOR - TACHOMETER
STANDARD "L" FLANGE MOUNTING
(Termination Option "A")



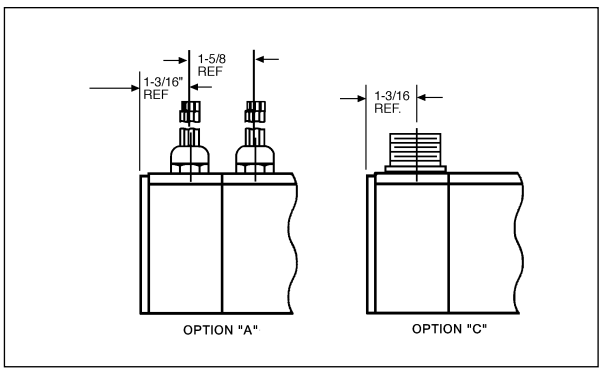
FACE MOUNTING
OPTIONAL "C" MOUNTING



MOTOR ONLY (REAR VIEW)



OPTIONAL TERMINATIONS
MOTOR - TACH - ENCODER



MODEL	M "L"	MT "L"	MTE "L"	ME "L"	BRAKE LENGTH IN ADDITION TO "L"
M3353	5.63/143.0	7.86/199.6	9.69/246.1	8.98/228	1.8/45.7
M3358	6.63/168.4	8.86/225	10.69/271.5	9.98/253.4	1.8/45.7
M3363	7.63/193.8	9.86/250.4	11.69/296.9	10.98/278.8	1.8/45.7

Dimensions are in Inches/mm.

How to Order

M | | | | – **3** **3** | | | – | | | | | |

CONFIGURATION
- M ... Motor
- T ... Tachometer
- E ... Encoder
- B ... Brake

MOTOR SIZE
- 53 (6.3 lb-in)(.71Nm)
- 58 (8.8 lb-in)(.99Nm)
- 63 (11.3lb-in)(1.28Nm)

WINDING
- B
- C
- D

MOUNTING
- L ... D-Flange
- C ... C-Face
- D ... B5 Flange(Metric)
- M ... B14 Face(Metric)

FEEDBACK SIGNAL
- A ... Encoder, 500 Line (MTE, ME)
- B ... Encoder, 1000 Line (MTE, ME)
- D ... Encoder, 2000 Line (MTE, ME)
- E ... Encoder, 2500 Line (MTE, ME)
- Y ... No Feedback Device

TERMINATIONS
- A ... Cable Exit
- C ... MS Connector, Side exit

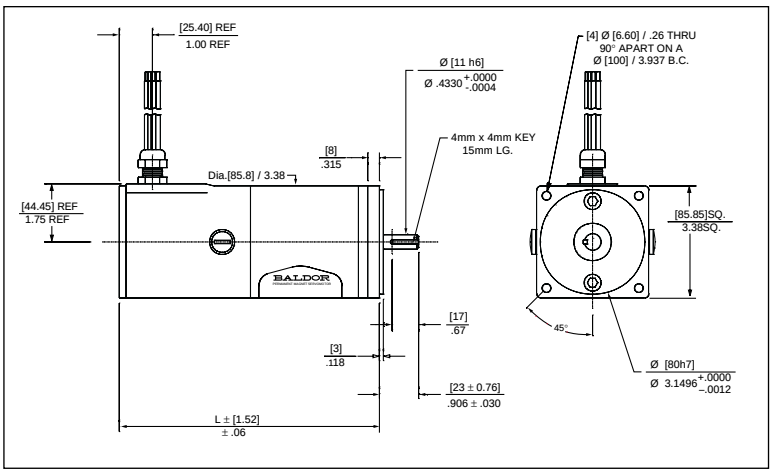
SPECIAL OPTION
- E ... Environmentally Sealed
- S ... Shaft Seal
- N ... None

Example:
MTE – 3363 – BLBCN
Motor - Tach - Encoder with B-Winding, square flange, 1000 line encoder, MS side mounted connector.

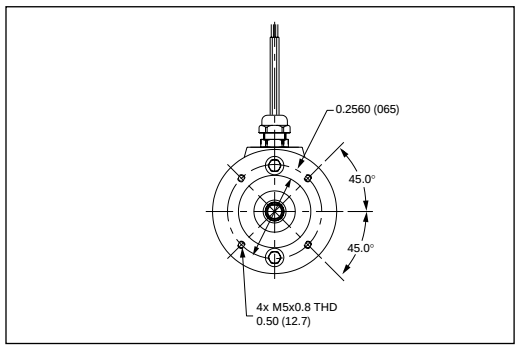
DC Servo Motors

M3300 Series

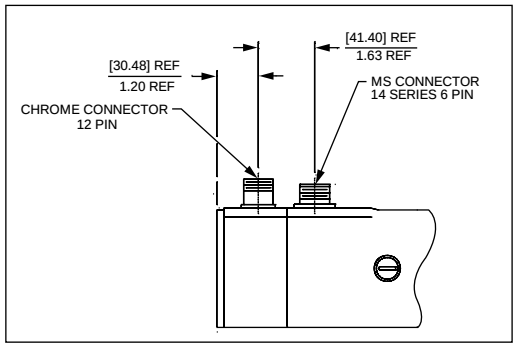
MOTOR - TACHOMETER METRIC "D" MOUNTING



OPTIONAL 'M' MOUNTING

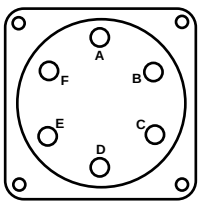


ENCODER OPTION (REAR VIEW) (Standard with Metric Mounting)



Connection Diagrams

6 PIN



MOTOR CONNECTOR
MS3102E-14S-06P

M3300, M, MT, MB, MTB, VERSIONS

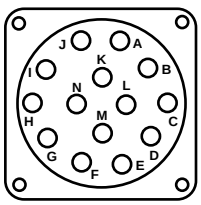
PIN	FUNCTION (OPTIONAL)
A	MOTOR C.C.W. (+)
B	MOTOR C.C.W. (-)
C	TACH C.C.W. (-)
D	TACH C.C.W. (+)
E	TACH SHIELD (OR BRAKE)
F	(BRAKE)

LEADS OUT

Series	M3300
Rotation	C.C.W.
Motor	Red (+), Black (-)
Tach	Red (-), Black (+)

NOTE: All motor rotation is facing output shaft.

14 PIN



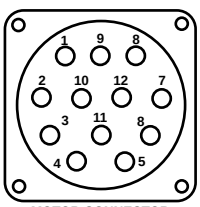
MOTOR
MS3102E-20-27P

M3300 ME, MTE, MTEB, VERSIONS

PIN	FUNCTION (OPTIONAL)
A	ENCODER SHIELD (OR BRAKE)
B	TACH C.C.W. (+)
C	MOTOR C.C.W. (-)
D	CHANNEL Z
E	CHANNEL B
F	COMMON
G	CHANNEL A
H	MOTOR C.C.W. (+)
I	TACH SHIELD (OR BRAKE)
J	CHANNEL $\overline{B}$
K	TACH C.C.W. (-)
L	CHANNEL $\overline{Z}$
M	+5VDC
N	CHANNEL $\overline{A}$

Encoder Connection (on motors ordered with "D" and "M" mounting options)

12 PIN



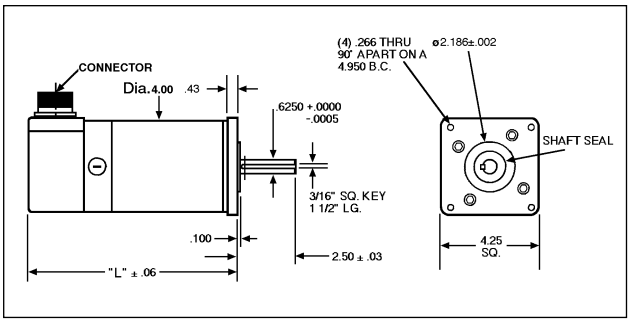
MOTOR CONNECTOR
GMBH CHROME 12 PIN

PIN	FUNCTION
1	CHANNEL $\overline{B}$
3	CHANNEL Z
4	CHANNEL $\overline{Z}$
5	CHANNEL A
6	CHANNEL $\overline{A}$
8	CHANNEL B
9	SHIELD
l0	COMMON
12	+5VDC

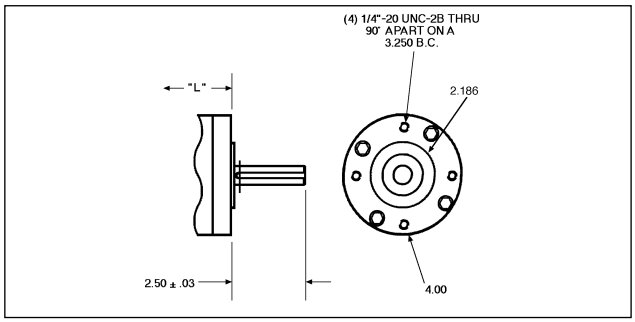
DC Servo Motors

M4000 Series Dimensions

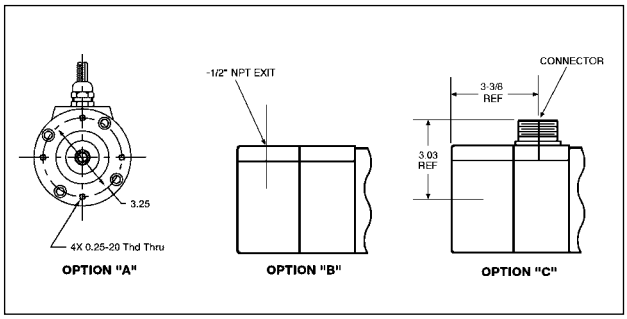
MOTOR TACHOMETER STANDARD "L" FLANGE MOUNTING



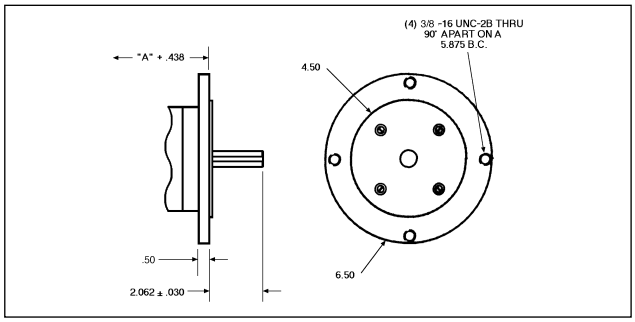
OPTIONAL "C" FACE MOUNTING



OPTIONAL TERMINATIONS



OPTIONAL "N" NEMA FLANGE MOUNTING



MODEL	M "L"	MT "L"	MTE "L"	ME "L"	BRAKE LENGTH IN ADDITION TO "L"
M4050	7.04/178.8	7.04/178.8	9.2/233.6	8.08/205.2	2.46/62.4
M4060	8.04/204.2	8.04/204.2	10.2/259	9.08/230.6	2.46/62.4
M4070	9.04/229.6	9.04/229.6	11.2/284.4	10.08/256	2.46/62.4
M4090	11.04/280.4	11.04/280.4	13.2/335.2	12.08/306.8	2.46/62.4

Dimensions are in Inches/mm.

How to Order

M [ ] [ ] [ ] - **4** **0** [ ] [ ] - [ ] [ ] [ ] [ ] [ ] **E**

CONFIGURATION
- M ... Motor
- T ... Tachometer
- E ... Encoder
- B ... Brake

MOTOR SIZE
- 50 (12 lb-in)(1.36Nm)
- 60 (21 lb-in)(2.37Nm)
- 70 (28 lb-in)(3.16Nm)
- 90 (40 lb-in)(4.52Nm)

WINDING
- A
- B

MOUNTING
- L ... D-Flange
- C ... C-Face
- N ... NEMA Flange
- D…B5 Flange (Metric)
- M…B14 Face (Metric)

FEEDBACK SIGNAL
- A ... Encoder, 500 Line (MTE)(ME)
- B ... Encoder, 1000 Line (MTE)(ME)
- D ... Encoder, 2000 Line (MTE)(ME)
- E ... Encoder, 2500 Line(MTE)(ME)
- Y ... No Feedback Device

TERMINATIONS
- A ... Leadwire Exit
- B ... 1/2 NPT Hole
- C ... MS Connector, Side Exit

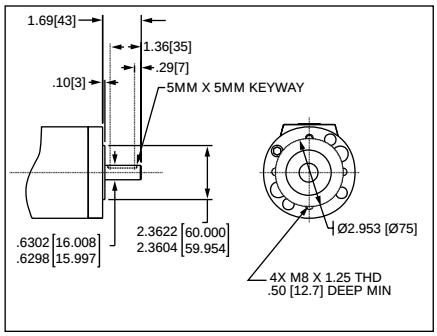
SPECIAL OPTION
- E ... Environmentally Sealed

Example:
MTE – 4070 – BLBCE
Motor - Tach - Encoder with B-Winding, square flange, 1000 line encoder, MS side mounted connector.

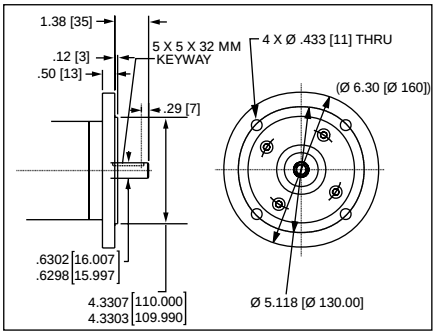
DC Servo Motors

M4000 Series

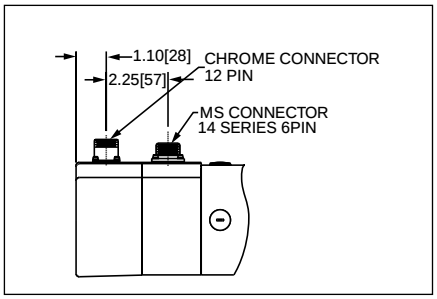
OPTIONAL "M" MOUNTING



OPTION "D" MOUNTING

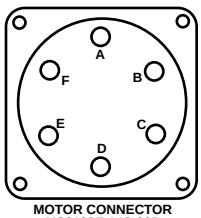


OPTIONAL MTE CONFIGURATION



Connection Diagrams

6 PIN



MOTOR CONNECTOR
MS3102E-14S-06P

M4000, (4050, 4060)
M, MT, MB, MTB, VERSIONS

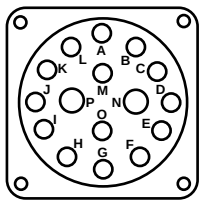
PIN	FUNCTION (OPTIONAL)
A	MOTOR C.C.W. (+)
B	MOTOR C.C.W. (-)
C	TACH C.C.W. (-)
D	TACH C.C.W. (+)
E	TACH SHIELD (OR BRAKE)
F	(BRAKE)

LEADS OUT

Series	M4000
Rotation	C.C.W.
Motor	Red (+), Black (-)
Tach	Red (-), Black (+)

NOTE: All motor rotation is facing output shaft.

16 PIN

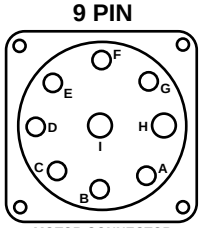


MOTOR CONNECTOR
MS3102E-24-07P

M4000, ME, MEB, MTE, MTEB, VERSIONS

PIN	FUNCTION (OPTIONAL)
A	CHANNEL A
B	CHANNEL $\overline{A}$
C	CHANNEL $\overline{B}$
D	CHANNEL B
E	CHANNEL Z
F	CHANNEL $\overline{Z}$
G	(BRAKE)
H	+5VDC
I	COMMON
J	(BRAKE)
K	ENCODER SHIELD
L	TACH SHIELD
M	TACH C.C.W. (+)
N	MOTOR C.C.W. (-)
O	TACH C.C.W. (-)
P	MOTOR C.C.W. (+)

9 PIN



MOTOR CONNECTOR
MS3102E-20-16P

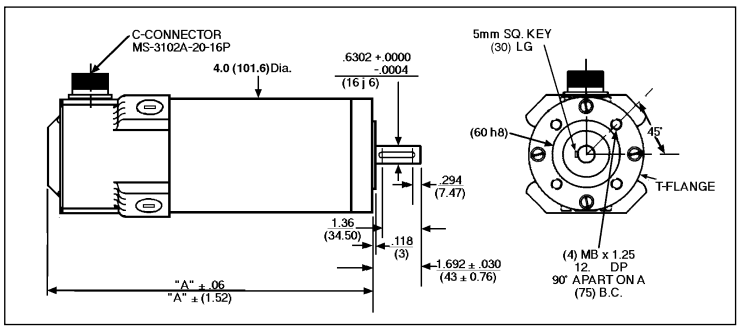
M4000, (4070, 4090)
M, MT, MB, MTB, VERSIONS

PIN	FUNCTION (OPTIONAL)
A	TACH C.C.W. (-)
B	TACH C.C.W. (+)
E	(BRAKE)
F	(BRAKE)
G	TACH SHIELD
H	MOTOR C.C.W. (-)
I	MOTOR C.C.W. (+)

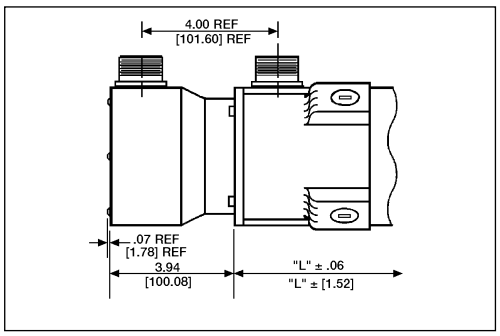
DC Servo Motors

M4500 Series Dimensions

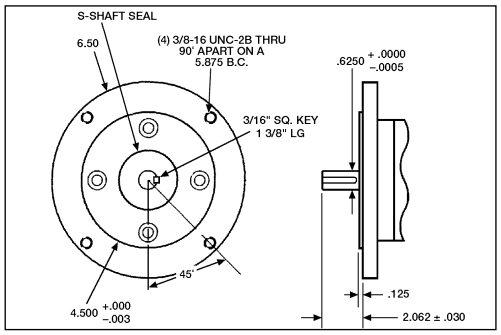
MOTOR - TACHOMETER
STANDARD "T" METRIC FACE MOUNTING (B14)



ENCODER OPTION (REAR VIEW)



OPTIONAL "N" NEMA FLANGE MOUNTING



MODEL	M / MT "L"	MTE "L"	BRAKE LENGTH ADDITION "L"
M4525	9.8/248.9	13.26/336.8	1.82/46.22
M4535	11.3/287	14.76/374.9	1.82/46.22
M4545	12.8/325	16.26/413	1.82/46.22
M4555	14.3/363.2	17.76/451	1.82/46.22

Dimensions are in Inches/mm.

How to Order

M	T			-	4	5			-					C	

CONFIGURATION
- M ... Motor
- T ... Tachometer
- E ... Encoder
- B ... Brake

MOTOR SIZE
- 25 (30 lb-in) (3.39Nm)
- 35 (40 lb-in) (4.52Nm)
- 45 (50 lb-in) (5.65Nm)
- 55 (58 lb-in) (6.55Nm)

WINDING
- A
- B
- C
- D

MOUNTING
- T ... Face
- H ... Flange
- N ... NEMA Flange
- D ... B5 Flange
- M ,,, B14 Face

FEEDBACK SIGNAL
- A ... Encoder, 500 Line (MTE)
- B ... Encoder, 1000 Line (MTE)
- D ... Encoder, 2000 Line (MTE)
- E ... Encoder, 2500 Line (MTE)
- Y ... No Position Feedback Device Installed

TERMINATIONS
- C ... MS Connector (see note)

SPECIAL OPTION
- E ... Environmentally Sealed
- S ... Shaft Seal
- N ... None

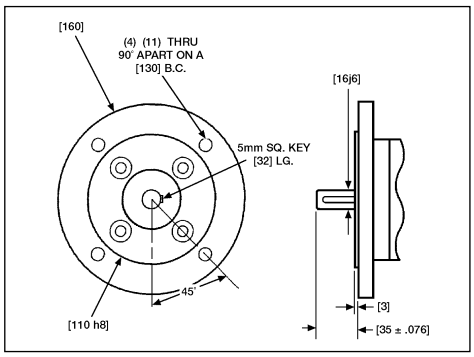
Example:
MTE – 4535 – CTBCN
Motor - Tach - Encoder with C-Winding, round face, 1000 line encoder, MS connector.

Note: The MTE4500 series have two connectors. One connector for power and tachometer, and connector for encoder. The mating connectors must be ordered separately

DC Servo Motors

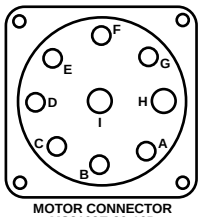
M4500 Series

OPTIONAL "H" METRIC FLANGE MOUNTING (B5)



Connection Diagrams

9 PIN



MOTOR CONNECTOR
MS3102E-20-16P

M4500,
M, MT, MB, MTB, VERSIONS

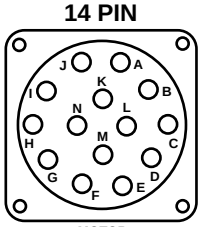
PIN	FUNCTION (OPTIONAL)
A	TACH C.W. (+)
B	TACH C.W. (-)
C	THERMAL SWITCH
D	THERMAL SWITCH
E	(BRAKE)
F	(BRAKE)
G	TACH SHIELD
H	MOTOR C.W. (+)
I	MOTOR C.W. (-)

LEADS OUT

Series	M4500, SD
Rotation	C.W.
Motor	Red (+), Black (-)
Tach	Red (-), Black(+)

NOTE: All motor rotation is facing output shaft.

14 PIN



MOTOR
MS3102E-20-27P

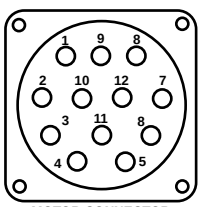
STANDARD
CONNECTOR

M4500
ENCODER CONNECTIONS

PIN	FUNCTION
A	ENCODER SHIELD
D	CHANNEL Z
E	CHANNEL B
F	COMMON
G	CHANNEL A
J	CHANNEL $\overline{B}$
L	CHANNEL $\overline{Z}$
M	+5VDC
N	CHANNEL $\overline{A}$

ENCODER CONNECTION
(on motors ordered with "D" and "M" mounting options)

12 PIN



MOTOR CONNECTOR
GMBH CHROME 12 PIN

INTERNATIONAL
CONNECTOR
SUPPLIED WITH
METRIC MOUNTED
MOTORS

M4500

PIN	FUNCTION
1	CHANNEL $\overline{B}$
3	CHANNEL Z
4	CHANNEL $\overline{Z}$
5	CHANNEL A
6	CHANNEL $\overline{A}$
8	CHANNEL B
9	SHIELD
l0	COMMON
12	+5VDC

DC Servo Motor Option Specifications

Tachometer Data

Motor Family	Tach K_E V/K_{rpm}	Tach Ripple	Inertia		Temperature Coefficient %/°C
			Oz - in - S^2	Kg - cm^2	
M2200	7	> 1%	0.01	0.71	0.016
M3300	7	> 1%	0.01	0.71	0.016
M4000	7	> 1%	0.01	0.71	0.016
M4500	9.5	> 1%	0.01	0.71	0.016

Encoder Data

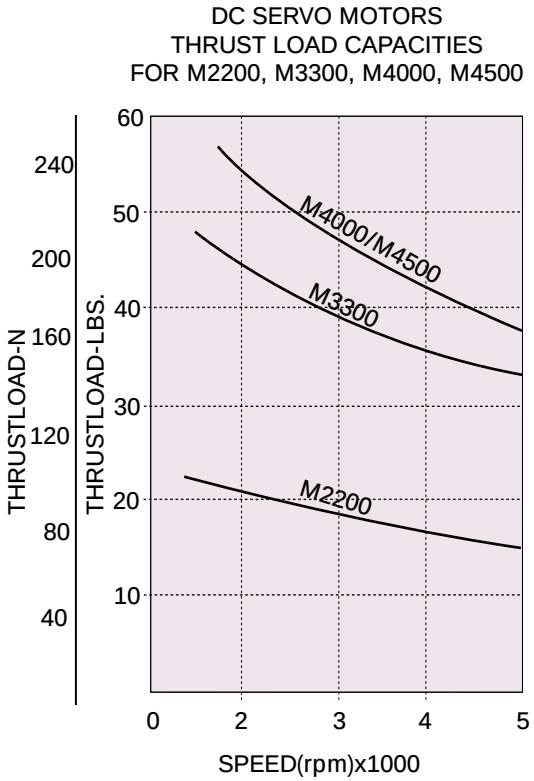
	Specification
Resolution (ppr)	100 / 500 / 1000 / 1024 / 2000 / 2500 / Custom
Output	Differential Line Driver Logic “1” V_{cc} = 2V (min) 4ma Max Source Current Logic “0” V_{cc} = 0.4V (max) 8ma Max Sink Current
Voltage	5 VDC ± 5% @ 80ma
Inertia	0.0001 oz - in - S^2
Frequency Response	200 KHz
Index	Non-gated There is no specific alignment between index and channels.
Vibration	50 to 2000 Hz @ 10 G’s
Shock	30 G’s for 11 ms

Brake Data

Motor Family	Brake Holding Torque		Watts	Brake Voltage	Brake Current	Brake Inertia	
	lb-in	N-m				lb- in-S^2	Kg-cm^2
M3300	25	2.8	12	24	0.5	0.000141	0.16
M4000	45	5.08	12	24	0.5	0.000142	0.16
M4500	70	7.91	12	24	0.5	0.00024	0.27

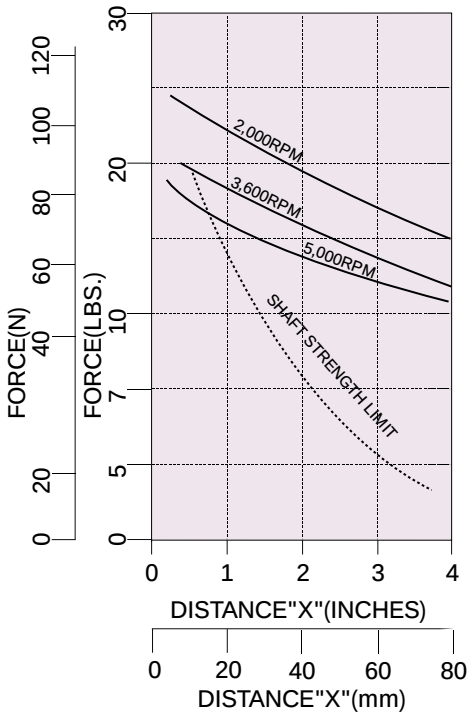
DC Servo Motors

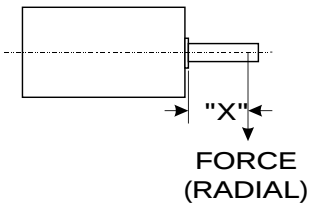
Thrust Load Capacity



Radial Load Capacity

M2200





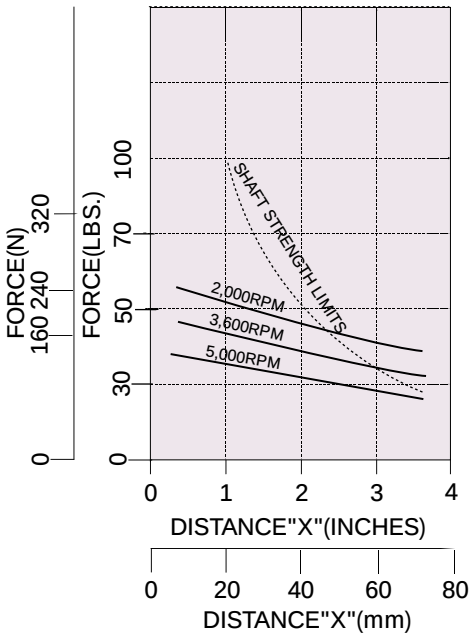
Notes:

1) Solid lines are based on L_{10} = 100,000 hours.
2) Dashed line is based on 10^4 load peaks @ 110% of rated torque.

DC Servo Motors

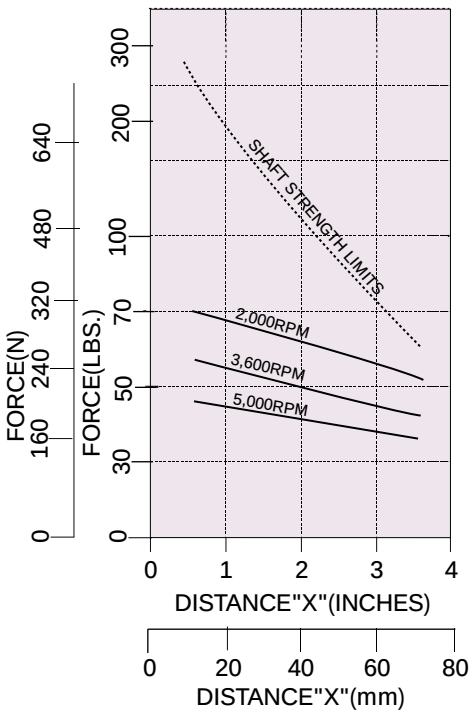
Radial Load Capacity

M3300



Radial Load Capacity

M4000/M4500



DC Servo Motors

Cable Assemblies

Any of These Motor Types… …can use this cable assembly.

	Cable Assembly Catalog No.	No. of Connector Pins	Length	
			Meters	Feet
M, MT - 2200	CBL030SP-AF	6	3.0	10
M, MT, MTB, MB - 3300	CBL061SP-AF	6	6.1	20
	CBL091SP-AF	6	9.1	30
MTE, ME, - 2200	CBL030SC-GN	14	3.0	10
MTE, ME, - 3300	CBL061SC-GN	14	6.1	20
MTEB, - 3300	CBL091SC-GN	14	9.1	30
MEB, - 3300				
	CBL030SP-AF	6	3.0	10
M, MT, MB, MTB - 4050/4060	CBL061SP-AF	6	6.1	20
	CBL091SP-AF	6	9.1	30
M, MT, MTB, MB - 4070/4090	CBL030SP-BI	9	3.0	10
M, MT, MTB, MB - 4500①	CBL061SP-BI	9	6.1	20
	CBL091SP-BI	9	9.1	30
MTE, ME, MTEB, MEB - 4050	CBL061SC-GP	16	6.1	20
- 4060	CBL091SC-GP	16	9.1	30
- 4070				
- 4090				
Encoder Feeback for				
MTE, ME MEB, MTEB - 4500①	CBL030SF-BN	14	3.0	10
	CBL061SF-BN	14	6.1	20
	CBL091SF-BN	14	9.1	30

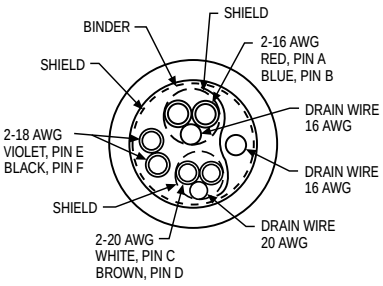
Note: ① The MTE-4500 Series with encoder feedback requires two cables; one for power, and one for feedback.

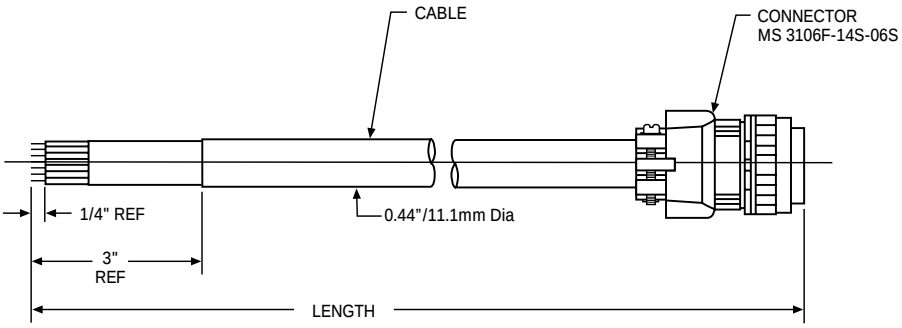
Cable Assembly

M2200/3300 Motor Series

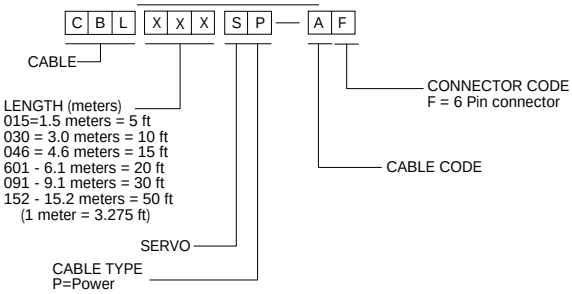
Use this Cable for Following Configurations		MOTOR FAMILY 2200	3300
Motor	M–	Yes	Yes
Motor - Tach	MT–	Yes	Yes
Motor - Brake	MB–	No	Yes
Motor - Tach - Brake	MTB–	No	Yes

CABLE END VIEW



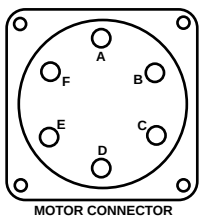


CATALOG NO. DEFINITION



COLOR	FUNCTION	PIN
RED	MOTOR CCW+	A
BLUE	MOTOR CCW-	B
WHITE	TACH CCW-	C
BROWN	TACH CCW+	D
VIOLET	TACH SHIELD (or BRAKE)	E
BLACK	(BRAKE)	F

6 PIN



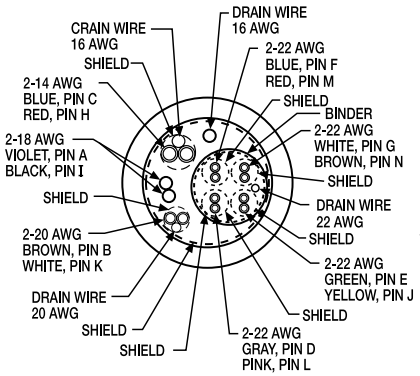
MOTOR CONNECTOR
MS3102E-14S-06P

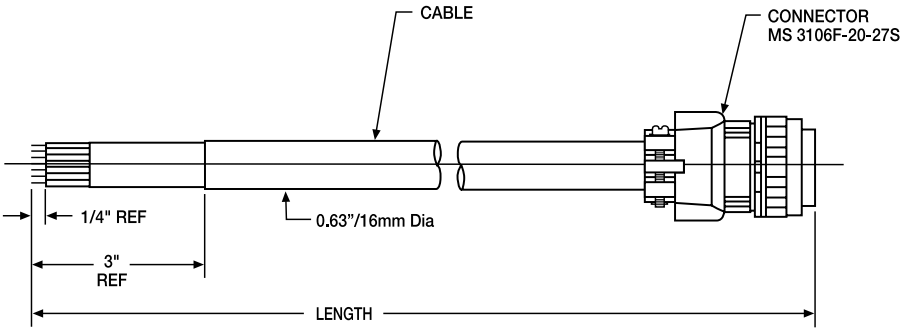
Cable Assembly

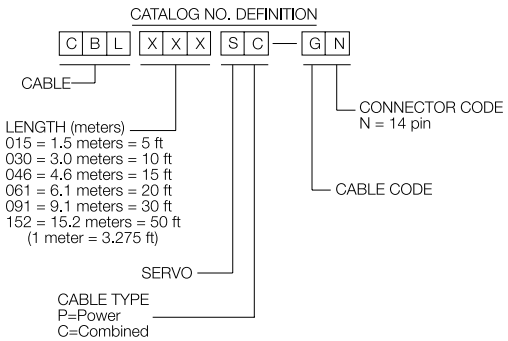
M2200/3300 Motor Series

Use this Cable for Following Configurations		MOTOR FAMILY 2200	3300
Motor - Tach - Encoder	MTE–	Yes	Yes
Motor - Encoder	ME–	Yes	Yes
Motor - Tach - Encoder - Brake	MTEB–	No	Yes
Motor - Encoder - Brake	MEB–	No	Yes

CABLE END VIEW

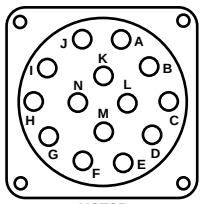






COLOR	FUNCTION	PIN
VIOLET	ENCODER SHIELD (or brake)	A
BROWN	TACH CCW+	B
BLUE	MOTOR CCW-	C
GRAY	CHANNEL Z	D
GREEN	CHANNEL B	E
BLUE	COMMON	F
WHITE	CHANNEL A	G
RED	MOTOR CCW+	H
BLACK	TACH SHIELD (or brake)	I
YELLOW	CHANNEL B	J
WHITE	TACH CCW-	K
PINK	CHANNEL Z	L
RED	+5VDC	M
BROWN	CHANNEL A	N

14 PIN



MOTOR MS3102E-20-27P

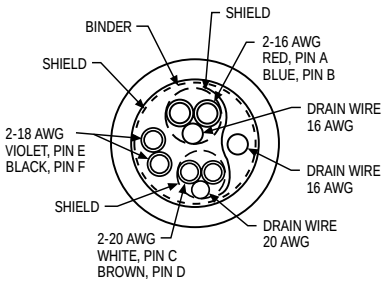
Note: 22 AWG are encoder signals, larger AWG are for motor/tach.

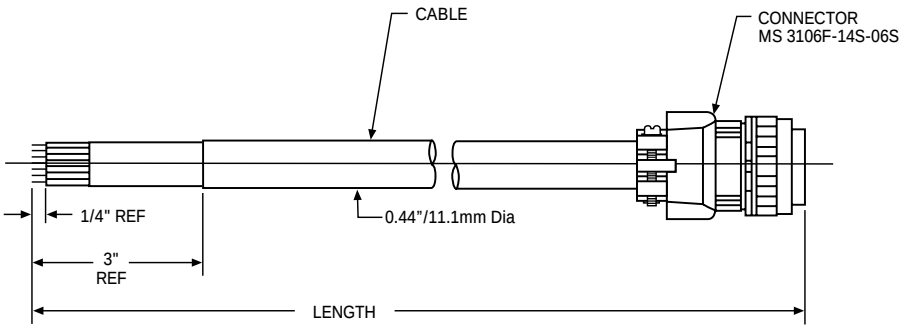
Cable Assembly

M4050/4060 Motor Series

Use this Cable for Following Configurations		MOTOR FAMILY 4050	4060
Motor	M–	Yes	Yes
Motor - Tach	MT–	Yes	Yes
Motor - Brake	MB–	Yes	Yes
Motor - Tach - Brake	MTB–	Yes	Yes

CABLE END VIEW





CATALOG NO. DEFINITION

C	B	L	X	X	X	S	P	—	A	F

CABLE

LENGTH (meters)
015=1.5 meters = 5 ft
030 = 3.0 meters = 10 ft
046 = 4.6 meters = 15 ft
601 - 6.1 meters = 20 ft
091 - 9.1 meters = 30 ft
152 - 15.2 meters = 50 ft
(1 meter = 3.275 ft)

SERVO

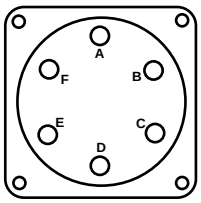
CABLE TYPE
P=Power

CONNECTOR CODE
F = 6 Pin connector

CABLE CODE

COLOR	FUNCTION	PIN
RED	MOTOR CCW+	A
BLUE	MOTOR CCW-	B
WHITE	TACH CCW-	C
BROWN	TACH CCW+	D
VIOLET	TACH SHIELD (or BRAKE)	E
BLACK	(BRAKE)	F

6 PIN



MOTOR CONNECTOR
MS3102E-14S-06P

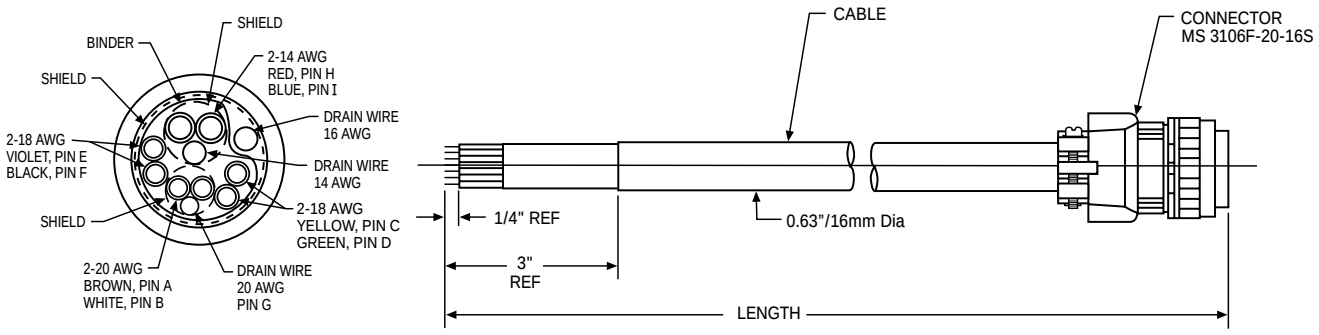
Cable Assembly

M4070/4090/4500 Motor Series

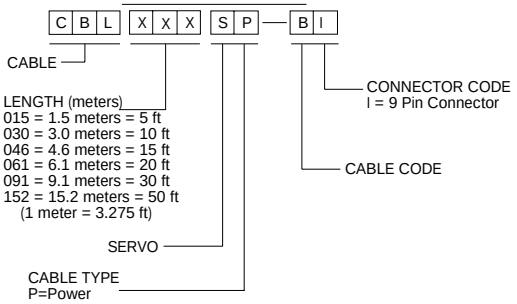
Use this Cable for Following Configurations		MOTOR FAMILY		
		4070	4090	4500①
Motor	M–	Yes	Yes	Yes
Motor - Tach	MT–	Yes	Yes	Yes
Motor - Brake	MB–	Yes	Yes	Yes
Motor - Tach - Brake	MTB–	Yes	Yes	Yes

Note: ① 4500 Series motors with encoders also require a second cable (feedback).

CABLE END VIEW

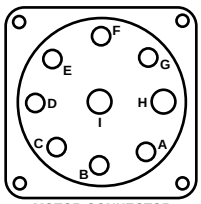


CATALOG NO. DEFINITION



COLOR	FUNCTION	PIN
BROWN	TACH CCW-	A
WHITE	TACH CCW+	B
VIOLET	(BRAKE)	E
BLACK	(BRAKE)	F
20 AWG	TACH SHIELD	G
RED	MOTOR CCW-	H
BLUE	MOTOR CCW+	I

9 PIN



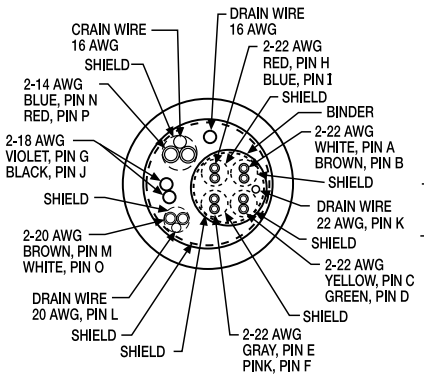
MOTOR CONNECTOR
MS3102E-20-16P

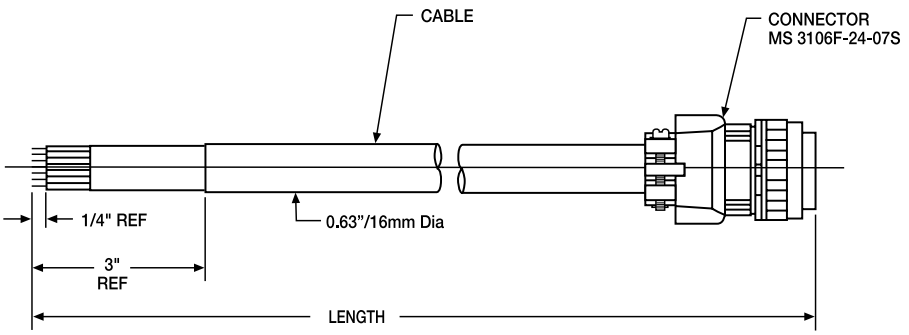
Cable Assembly

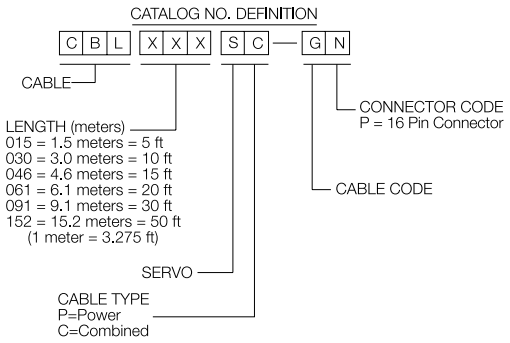
M4050/4060/4070/4090 Motor Series

Use this Cable for Following Configurations		MOTOR FAMILY			
		4050	4060	4070	4090
Motor - Tach - Encoder	MTE–	Yes	Yes	Yes	Yes
Motor - Encoder	ME–	Yes	Yes	Yes	Yes
Motor - Tach - Brake	MTEB–	Yes	Yes	Yes	Yes
Motor - Encoder - Brake	MEB–	Yes	Yes	Yes	Yes

CABLE END VIEW

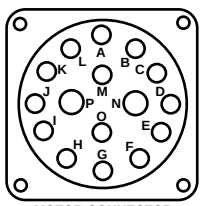






COLOR	FUNCTION	PIN
WHITE	CHANNEL A	A
BROWN	CHANNEL $\overline{A}$	B
YELLOW	CHANNEL B	C
GREEN	CHANNEL $\overline{B}$	D
GREY	CHANNEL Z	E
PINK	CHANNEL $\overline{Z}$	F
VIOLET	(BRAKE)	G
RED	+5VDC	H
BLUE	COMMON	I
BLACK	(BRAKE)	J
22 AWG	ENCODER SHIELD	K
20 AWG	TACH SHIELD	L
BROWN	TACH CCW+	M
BLUE	MOTOR CCW-	N
WHITE	TACH CCW-	O
RED	MOTOR CCW+	P

16 PIN



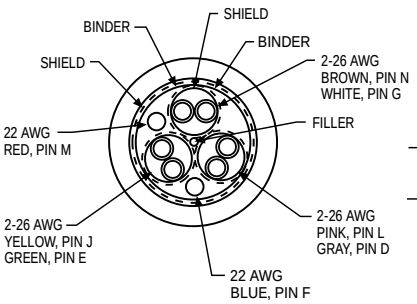
MOTOR CONNECTOR
MS3102E-24-07P

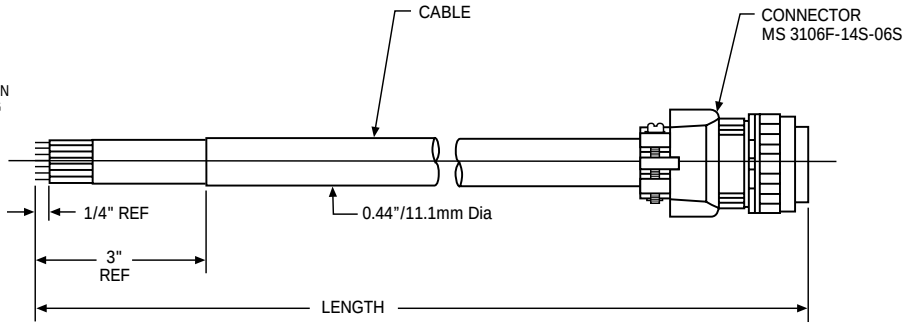
Note: 22 AWG are encoder signals, larger AWG are for motor/tach/brake.

Cable Assembly

M4500 Encoder Feedback

CABLE END VIEW





CATALOG NO. DEFINITION

C	B	L	X	X	X	S	F	—	B	N

CABLE

LENGTH (meters)
015=1.5 meters = 5 ft
030 = 3.0 meters = 10 ft
046 = 4.6 meters = 15 ft
601 - 6.1 meters = 20 ft
091 - 9.1 meters = 30 ft
152 - 15.2 meters = 50 ft
(1 meter = 3.275 ft)

SERVO

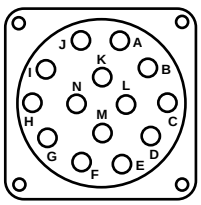
CABLE TYPE

CONNECTOR CODE
N = 14 Pin Connector

CABLE CODE

COLOR	FUNCTION	PIN
GREY	CHANNEL Z	D
GREEN	CHANNEL B	E
BLUE	COMMON	F
WHITE	CHANNEL $\overline{A}$	G
YELLOW	CHANNEL $\overline{B}$	J
PINK	CHANNEL $\overline{Z}$	L
RED	+5VDC M	
BROWN	CHANNEL $\overline{A}$	N

14 PIN



MOTOR
MS3102E-20-27P

Motor/Tach Replacement Parts

Motor Type	Tach Complete	Tach Brush Ring W/Brushes	Motor Brush Caps	Motor Brushes
M2200	TG200-7-3/8	BA00105B-02	-	BP5047AP01
M3300	TG200-7-3/8	BA00105B-02	External Thread KM00035A-00	BP5048AP01 (2 each)
			Old Style Internal Thread BP4522	BP5052P01 (2 each)
M4050 & M4060	TG200-7-3/8	BA00105B-02	External Thread KM00036A-00	BP5044AP01 (4 each)
M4070 & M4090	TG200-7-3/8	BA00105B-02	External Thread KM00036A-00	BP5046AP01 (4 each)
M4500	TG200-10-1/2	BA00105B-02	BP4520	BP5049AP01 (4 each)

Conversion Tables

Rotary inertia (To convert from A to B, multiply by entry in table)

A \ B	$gm\text{-}cm^2$	$oz\text{-}in^2$	$gm\text{-}cm\text{-}s^2$	$kg\text{-}cm^2$	$lb\text{-}in^2$	$oz\text{-}in\text{-}s^2$	$lb\text{-}ft^2$	$Kg\text{-}cm\text{-}s^2$	$lb\text{-}in\text{-}s^2$	$lb\text{-}ft\text{-}s^2$ or $slug\text{-}ft^2$
$gm\text{-}cm^2$	1	$5.46x10^{-3}$	$1.01x10^{-3}$	10^{-3}	$3.417x10^{-4}$	$1.41x10^{-5}$	$2.37x10^{-6}$	$1.01x10^{-6}$	$8.85x10^{-7}$	$7.37x10^{-8}$
$oz\text{-}in^2$	182.9	1	0.186	0.182	0.0625	$2.59x10^{-3}$	$4.34x10^{-4}$	$1.86x10^{-4}$	$1.61x10^{-4}$	$1.34x10^{-5}$
$gm\text{-}cm\text{-}s^2$	980.6	5.36	1	0.9806	0.335	$1.38x10^{-2}$	$2.32x10^{-3}$	10^{-3}	$8.67x10^{-4}$	$7.23x10^{-5}$
$Kg\text{-}cm^2$	1000	5.46	1.019	1	0.3417	$1.41x10^{-2}$	$2.37x10^{-3}$	$1.019x10^{-3}$	$8.85x10^{-4}$	$7.37x10^{-5}$
$lb\text{-}in^2$	$2.92x10^{3}$	16	2.984	2.926	1	$4.14x10^{-2}$	$6.94x10^{-3}$	$2.98x10^{-3}$	$2.59x10^{-3}$	$2.15x10^{-4}$
$oz\text{-}in\text{-}s^2$	$7.06x10^{4}$	386.08	72	70.615	24.13	1	0.1675	$7.20x10^{-2}$	$6.25x10^{-2}$	$5.20x10^{-3}$
$lb\text{-}ft^2$	$4.21x10^{5}$	2304	429.71	421.40	144	5.967	1	0.4297	0.3729	$3.10x10^{-2}$
$Kg\text{-}cm\text{-}s^2$	$9.8x10^{5}$	$5.36x10^{3}$	1000	980.66	335.1	13.887	2.327	1	0.8679	$7.23x10^{-2}$
$lb\text{-}in\text{-}s^2$	$1.129x10^{6}$	$6.177x10^{3}$	$1.152x10^{3}$	$1.129x10^{3}$	386.08	16	2.681	1.152	1	$8.33x10^{-2}$
$lb\text{-}ft\text{-}s^2$ or $slug\text{-}ft^2$	$1.355x10^{7}$	$7.41x10^{4}$	$1.38x10^{4}$	$1.35x10^{4}$	$4.63x10^{3}$	192	32.17	13.825	12	1

Conversion Tables

Torque (To convert from A to B, multiply by entry in table)

A \ B	dyne-cm	gm-cm	oz-in	kg-cm	lb-in	Newton-m	lb-ft	Kg-cm
dyne-cm	1	$1.019x10^{-3}$	$1.416x10^{-5}$	$1.0197x10^{-6}$	$8.850x10^{-7}$	10^{-7}	$7.375x10^{-8}$	$1.019x10^{-8}$
gm-cm	980.65	1	$1.388x10^{-2}$	10^{-3}	$8.679x10^{-4}$	$9.806x10^{-5}$	$7.233x10^{-5}$	10^{-5}
oz-in	$7.061x10^{4}$	72.007	1	$7.200x10^{-2}$	$6.25x10^{-2}$	$7.061x10^{-3}$	$5.208x10^{-3}$	$7.200x10^{-4}$
Kg-cm	$9.806X10^{5}$	1000	13.877	1	0.8679	$9.806X10^{-2}$	$7.233X10^{-2}$	10^{-2}
lb-in	$1.129x10^{6}$	$1.152x10^{3}$	16	1.152	1	0.112	$8.333x10^{-2}$	$1.152x10^{-2}$
Newton-m	10^{7}	$1.019x10^{4}$	141.612	10.197	8.850	1	0.737	0.101
lb-ft	$1.355x10^{7}$	$1.382x10^{4}$	192	13.825	12	1.355	1	0.138
Kg-m	$9.806x10^{7}$	10^{5}	$1.388x10^{3}$	100	86.796	9.806	7.233	1

Conversion Tables

(To convert A to B multiply by value in table)

Length

A \ B	Inch	Feet	Micro Inch	Micron	Millimeter	Centimeter	Meter
Inch	1	8.33×10^{-2}	1.0×10^{6}	2.54×10^{4}	25.4	2.54	2.54×10^{-2}
Feet	12	1	1.2×10^{7}	3.05×10^{5}	305	30.5	0.305
Micro-Inch	1.0×10^{-6}	1.2×10^{4}	1	2.54×10^{-2}	2.54×10^{-5}	2.54×10^{-6}	2.54×10^{-8}
Micron	3.937×10^{-5}	3.28×10^{-6}	39.37	1	0.001	1.0×10^{-4}	1.0×10^{-6}
Millimeter	3.937×10^{-2}	3.28×10^{-3}	3.937×10^{4}	1000	1	0.1	0.001
Centimeter	0.3937	3.28×10^{-2}	3.937×10^{5}	1×10^{4}	10	1	0.01
Meter	39.37	3.28	3.937×10^{7}	1×10^{6}	1000	100	1

Power

A \ B	Watts	Kilowatts	ft.lb/sec	in-lb/sec	Hp (Imperial)	Hp (SI)
Watts	1	1×10^{-3}	0.74	8.85	1.34×10^{-3}	1.33×10^{-3}
Kilowatts	1000	1	738	8850	1.34	1.33
ft-lb/sec	1.35	1.36×10^{-3}	1	12	1.82×10^{-3}	1.81×10^{-3}
in-lb/sec	0.113	1.13×10^{-4}	8.3×10^{-2}	1	1.52×10^{-4}	1.53×10^{-4}
Hp(Imperial)	746	0.746	550	6600	1	0.995
Hp (SI)	750	0.750	553	6636	1.005	1

Mass

A \ B	ozm	lbm	slug	gm	kg
oz-m	1	6.25×10^{-2}	1.94×10^{-3}	28.35	2.835×10^{-2}
Lb-m	16	1	3.11×10^{-2}	453.6	0.453
slug	514.72	32.2	1	14590	14.59
gm	3.53×10^{-2}	2.205×10^{-3}	6.85×10^{-5}	1	0.001
kg	35.274	2.205	6.85×10^{-2}	1000	1

Force

A \ B	ozf	lbf	Newtons	dyne	gmf	Kgf
oz-f	1	6.25×10^{-2}	0.278	2.78×10^{4}	28.35	2.835×10^{-2}
lb-f	16	1	4.448	4.448×10^{5}	453.6	0.4535
Newtons	3.596	0.225	1	1×10^{5}	101.9	0.1019
dyne	3.59×10^{-5}	2.248×10^{-6}	1.0×10^{-5}	1	1.02×10^{-3}	1.02×10^{-6}
gm-f	3.53×10^{-2}	2.205×10^{-3}	9.81×10^{-3}	981	1	0.001
kg-f	35.3	2.205	9.81	9.81×10^{5}	1000	1