



Motors

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Since its establishment in 1973, Mavilor Motors S.A. has been associated with creativity, innovation and tenacity.

Only in this way it has been possible to offer our clients the most complete range of servomotors during all these years. Servomotors, which range from plane geometry to extended geometry and brush technology to brushless technology, executed with ac or dc technology. Each one of these offers distinctive elements, which gives them their unique and exclusive characteristics.

Moreover if we associate this with a culture based on flexibility in all aspects, listening to the client, the highest level of professionalism, offering intelligent solutions, all of which allow Mavilor Motors S.A. to respond appropriately to everything that we have been entrusted with, and to satisfy our clients in their need to optimise their industrial automation applications in all types of machines and installations.

Thousands of clients every day using our servomotors confirms their confidence in us.



DC Servo Motors MSS Series

- Ratings to 6,000 RPM.
- Compact Length.
- Zero Cogging.
- Acceleration Torques to 10 x Rated.

MAVILOR's axial air gap dish armature is specially suited for high response servo drives. High torque to inertia ratio and smooth, non cogging torque low speed velocity control makes MAVILOR the motor of choice for the most exacting applications.

The MAVILOR MSS Series servomotors provide a 20% increase in power to weight and volume ratios and a 20% increase in power rate and acceleration capability over previous designs.

Incorporating an ironless rotor design, these industrial strength motors have an extremely long brush life and high efficiency.

MAVILOR MSS Series motors incorporate options of tachometers and fail-safe holding brakes within the motor structure, and in many cases are half the length of equivalently rated conventional motors.



Dimensions

	MSS-2	MSS-4	MSS-6	MSS-8	MSS-12	MSS-22	MSS-35	MSS-45
A	131.5	129.5		140	139.5	167.5	193	
B	23	30			50		60	
C	122.5	120.5		131	127.5	155.5	181	
D		9				12		
E	4	3.5				4.5		
F (DIN 933)	M3x10	M4x16			M8x16		M10x22	
G (DIN 6885)	A4x4x14	A5x5x20				A8x7x32		
H	3	2				3.5		
I	235	233		243.5	237.5	265.5	291	
J (j6)	ø80	ø95			ø130		ø180	
K (j6)	ø110	ø130			ø180	ø230	ø250	
L	ø118	ø140	ø168	ø192	ø212	ø275	ø305	
M	4xM6 ø100	4xM6 ø115			4xM8 ø165	4xM10 ø165	4xM12 ø215	
N (h11)	ø149	ø200	ø210	ø205	ø250	ø300	ø350	
O	□119	□154	□170	□176	□206	□258	□284	
P	4xø9 ø130	4xø11 ø165	4xø11 ø180		4xø14 ø215	4xø14 ø265	4xø18 ø300	
Q (h9)	4	5				8		
R (g6)	11	14			24		28	
S ($\begin{smallmatrix} 0 \\ -0.1 \end{smallmatrix}$)	12.7	16			27		31	
T					ø101			
V	8		10			11	14	
W	10.5	13	13.5	14	12.5		14	
X		35.5				33		
Z					77			



Available CSA-US certified

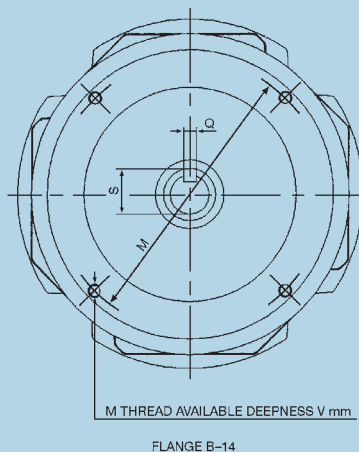
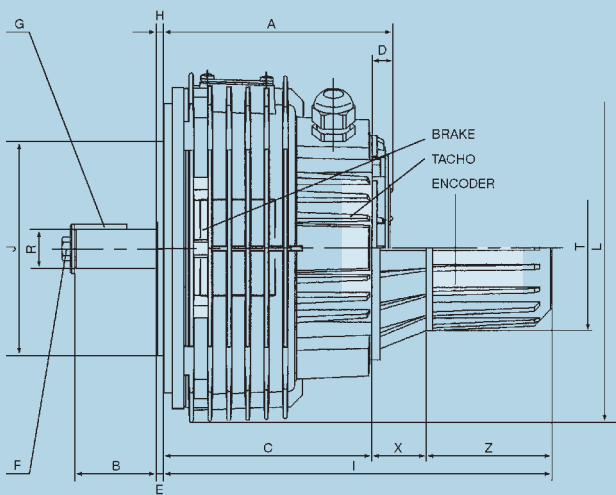
Technical Specifications

ALL CHARACTERISTICS MEASURED AT 40°C AMBIENT TEMPERATURE EXCEPT TERMINAL RESISTANCE (25°C)	SYMBOLS	UNITS	MSS-2	MSS-4	MSS-6	MSS-8	MSS-12	MSS-22	MSS-35	MSS-45
RATED SPEED	n	rpm	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
RATED VOLTAGE ±5%	U	V	39.4	67	67.8	89.7	106.7	181	200	224
RATED CURRENT	I	A	6.5	7.8	10.7	10.7	14	16	19.5	21
RATED OUTPUT POWER ⁽¹⁾	P	W	190.3	397	575	805	1,240	2,573	3,525	4,274
EFFICIENCY	η	%	74	76	80	84	83	89	90	91
RATED TORQUE	T	Nm	0.6	1.26	1.83	2.56	3.95	8.19	11.23	13.6
MAXIMUM TORQUE ⁽²⁾	Tmax	Nm	3.6	7.58	11	15.38	23.7	49.14	67.38	81.6
MAXIMUM SPEED ⁽³⁾	n max	rpm	7,000	6,000	6,000	5,000	4,500	4,000	4,000	4,000
EMF CONSTANT ±5%	K _E	V/1000 rpm	10.4	18	19	26.3	30.85	55.6	62.53	70
TORQUE CONSTANT ±5%	K _T	Nm/A	0.099	0.172	0.181	0.251	0.295	0.53	0.597	0.668
FRICTION TORQUE	T _F	Nm	0.03	0.05	0.05	0.06	0.09	0.09	0.11	0.11
DAMPING CONSTANT	K _D	Nm/1000 rpm	0.003	0.009	0.018	0.021	0.02	0.05	0.1	0.11
TERMINAL RESISTANCE (25°C)	R	Ω	1	1.25	0.75	0.82	0.75	0.67	0.51	0.51
ARMATURE INDUCTANCE	L	μH	<102	<130	<120	<150	<200	<250	<300	<300
INERTIA	J	kg m ² 10 ⁻³	0.15	0.37	0.40	0.82	1.7	5.1	8.5	8.5
MECHANICAL TIME CONSTANT	T _M	ms	14.38	15	9	10.17	14	11.6	11.6	9.3
TRANSITORY POWER	P _S	kW/s	89	155	300	288	330	473	534	783
THERMAL TIME CONSTANT ROTOR TO HOUSING	T _{AC}	s	170	180	190	200	300	360	650	650
THERMAL TIME CONSTANT ⁽¹⁾ HOUSING TO AMBIENT	T _{CA}	s	1,700	1,750	1,800	2,000	2,700	3,000	4,000	4,000
THERMAL RESISTANCE ROTOR TO HOUSING	R _{AC}	°C/W	0.8	0.5	0.5	0.5	0.3	0.2	0.13	0.15
THERMAL RESISTANCE ⁽¹⁾ HOUSING TO AMBIENT	R _{CA}	°C/W	0.5	0.3	0.4	0.4	0.3	0.2	0.14	0.15
RADIAL LOAD (at mid-length of shaft)	F _R	N	200	200	300	300	500	600	700	700
AXIAL LOAD	F _A	N	150	200	200	200	250	400	400	400
MASS (Only motor. No options)	M	kg	3.3	4.5	5.8	8	10	16	22	24
(1) With an aluminium heat sink plate			300x300x10	400x400x10					500x500x10	
(2) For an S3 cycle			3	3.5	4	7	10			
(3) Maximum speed in continuous service. During a very short time (r.p.m.)			9,000	6,000				4,500		

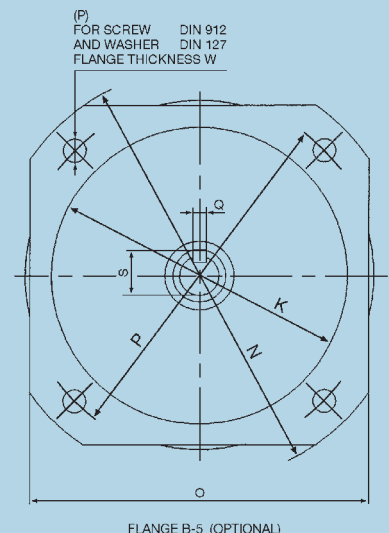
(1) With an aluminium heat sink plate

(2) For an S3 cycle

(3) Maximum speed in continuous service. During a very short time (r.p.m.)



FLANGE B-14



FLANGE B-5 (OPTIONAL)

Options

MODEL	Tachometer Type	Brake Type
MSS-2	D40	04
MSS-4	D40	06
MSS-6	D40	06
MSS-8	D40	06
MSS-12	D40	07
MSS-22	D26	09
MSS-35	D26	11
MSS-45	D26	11

Tachometer Specifications

	UNITS	TYPE	
		D40	D26
Voltage Constant	V/krpm	10 ± 5%*	10 ± 5%*
Ripple @ 1000 rpm (pp)	%	<1.5	<1.2
Linearity @ 6000 rpm	%	≤0.1	≤0.1
Reversing Error	%	≤0.12	≤0.12
Temperature Coefficient	%/°C	0.03	0.02
Rotor Inertia	kg m ² 10 ⁻³	0.004	0.024
Resistance	Ω	86	90
Inductance	mH	13	25
Current	mA	2	4
Maximum Current	mA	8	17
Maximum Speed	rpm	9,000	8,000
Mass	kg	0.105	0.295

*other voltages available

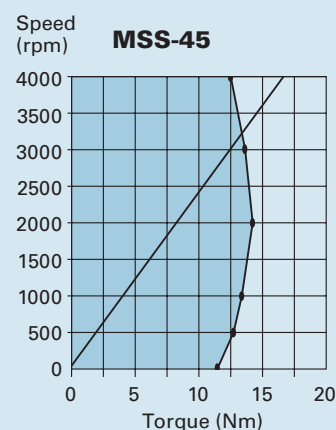
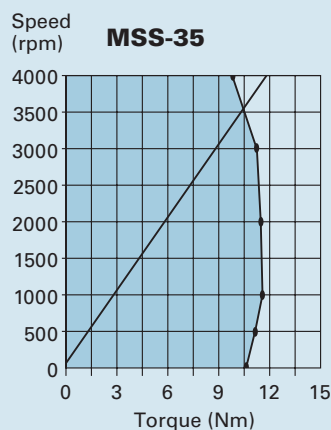
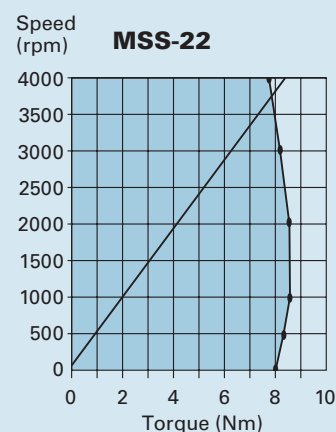
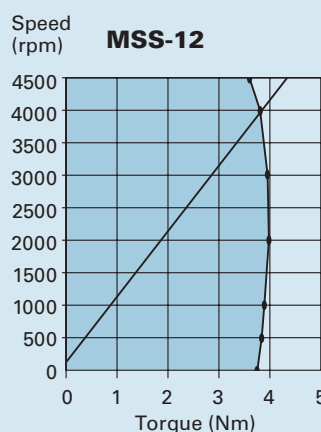
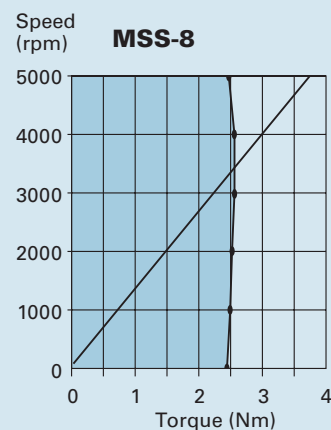
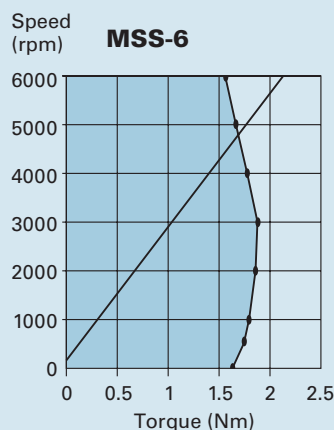
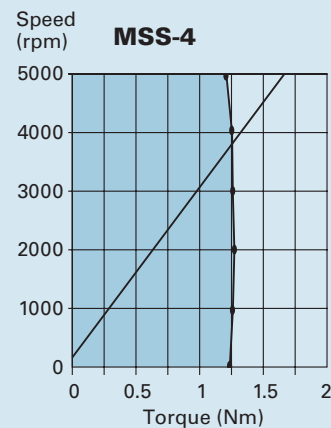
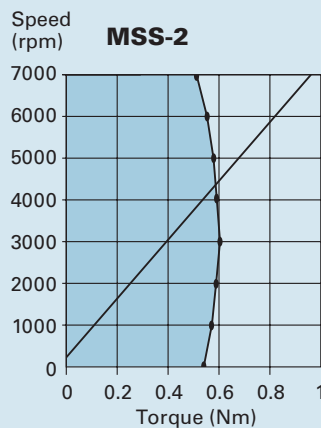
Brake Specifications

	UNITS	TYPE				
		04	06	07	09	11
Holding Torque	Nm	1.2	2.5	5	12	20
DC Voltage	V	24	24	24	24	24
Input Power	W	8	12	16	18	22
Inertia	kg cm ²	0.05	0.23	0.65	2.14	5.7
Response Time						
Disengagement	ms	4	7	15	30	55
Engagement	ms	3	5	7	13	18
Mass	kg	0.19	0.3	0.6	1.1	1.9

Performance curves shown right indicate the continuous operating zone or torque-speed envelope for 40°C ambient conditions. For MAVILOR motors, the torque that the motor can produce continuously at rated speed (3000 rpm for most MSS Series motors) exceeds the stall torque rating of the motor. The continuous torque rating (T) is the value used for sizing motors once the RMS torque requirement has been determined.

Acceleration torques to 10X rated torque can be obtained. The S3 curves for each motor should be consulted to ascertain time duration vs duty cycle for peak torques.

Performance Curves



DC Servo Motors MSS Series



MSK

Available as "kit" motor (shaftless version) for direct mounting on the shaft of a machine.
Characteristics and curves correspond to Kit Option.

Technical Specifications

	SYMBOLS	UNITS	MSK-8
RATED SPEED	n	rpm	6,000
RATED VOLTAGE $\pm 5\%$	U	V	40
RATED CURRENT	I	A	5.2
RATED OUTPUT POWER ⁽¹⁾	P	W	149
EFFICIENCY	η	%	71.6
RATED TORQUE	T	Nm	0.24
MAXIMUM TORQUE ⁽²⁾	T _{max}	Nm	1.2
MAXIMUM SPEED ⁽³⁾	n max	rpm	10,000
EMF CONSTANT $\pm 5\%$	K _E	V/1000 rpm	5.5
TORQUE CONSTANT $\pm 5\%$	K _T	Nm/A	0.053
FRICTION TORQUE	T _F	Nm	0.01
DAMPING CONSTANT	K _D	Nm/1000 rpm	0.004
TERMINAL RESISTANCE (25°C)	R	Ω	1.04
ARMATURE INDUCTANCE	L	μH	>60
INERTIA	J	kg m ² 10 ⁻³	0.031
MECHANICAL TIME CONSTANT	T _M	ms	11.2
TRANSITORY POWER	P _S	kW/s	46
THERMAL TIME CONSTANT ROTOR TO HOUSING	T _{AC}	s	110
THERMAL TIME CONSTANT ⁽¹⁾ HOUSING TO AMBIENT	T _{CA}	s	1,000
THERMAL RESISTANCE ROTOR TO HOUSING	R _{AC}	°C/W	0.66
THERMAL RESISTANCE ⁽¹⁾ HOUSING TO AMBIENT	R _{CA}	°C/W	1
RADIAL LOAD (at mid-length of shaft)	F _R	N	220
AXIAL LOAD	F _A	N	150
MASS (Only motor. No options)	M	kg	1.178

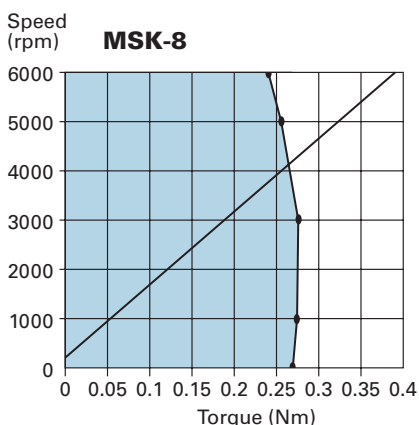
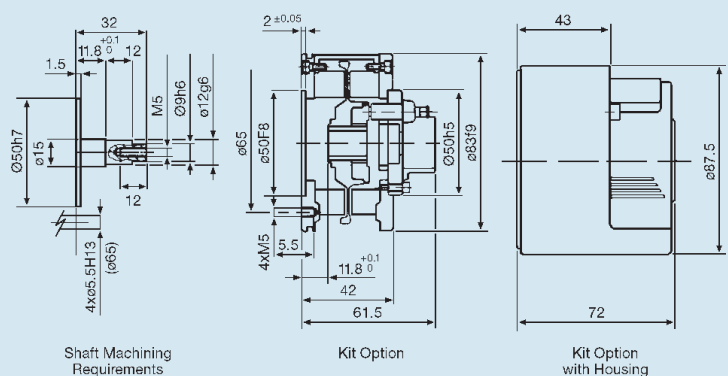
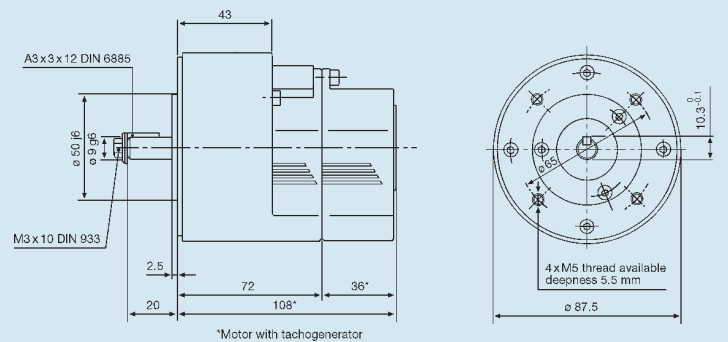
(1) With a 300x300x10 aluminium heat sink plate

(2) For an S3 cycle

(3) Maximum speed in continuous service. During a very short time 12,000 rpm

REMARK: Characteristics could be altered by any additional assembling

Dimensions



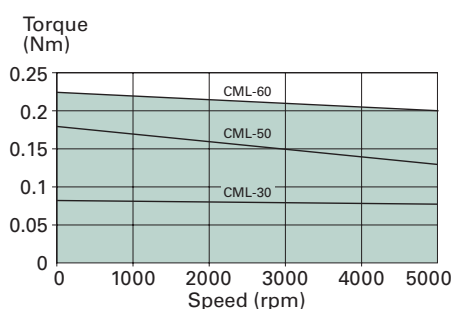
Available Kit Option with housing + Tachogenerator

DC Servo Motors CML Series

- Small dimensions.
- Radial magnetic flux.
- High performances.
- Square format.



Performance Curves



Encoder Specifications

Waveform	Square Wave
Line Counts	1000 ppr
Channels	A, B, Z, $\bar{A}$, $\bar{B}$, $\bar{Z}$ / U, V, W, $\bar{U}$, $\bar{V}$, $\bar{W}$ Line drives (RS422)
Supply Voltage	5VDC $\pm$ 10%
Frequency Response	200 kHz
Operating Temperature	-40 °C ~ +120 °C

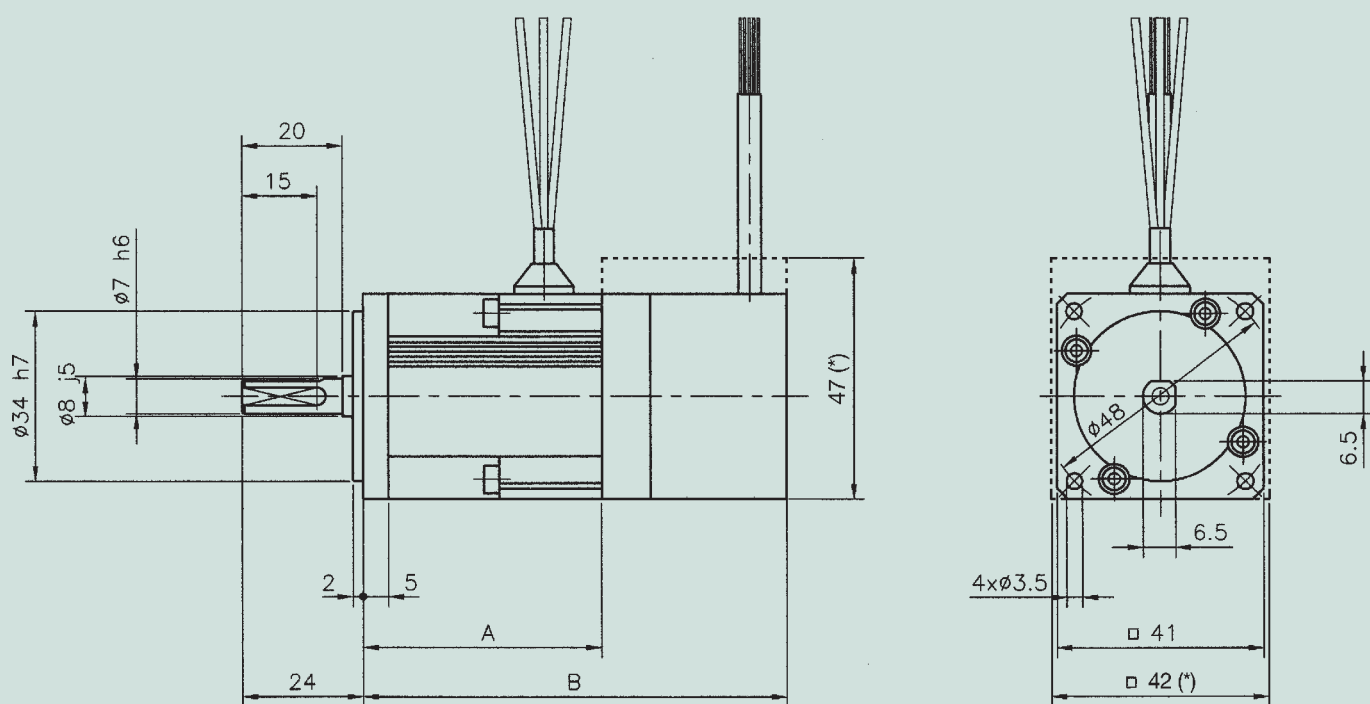
Tachometer Specifications

	UNITS	TYPE
		D40
Voltage Constant	V/krpm	10 $\pm$ 5%*
Ripple @ 1000 rpm (pp)	%	<1.5
Linearity @ 6000 rpm	%	$\leq$ 0.1
Reversing Error	%	$\leq$ 0.12
Temperature Coefficient	%/°C	0.03
Rotor Inertia	kg m ² 10 ⁻³	0.004
Resistance	Ω	86
Inductance	mH	13
Current	mA	2
Maximum Current	mA	8
Maximum Speed	rpm	9,000
Mass	kg	0.105

*other voltages available

Technical Specifications

ALL CHARACTERISTICS MEASURED AT 25°C AMBIENT TEMPERATURE				CML-30	CML-50	CML-60
	SYMBOLS	UNITS				
RATED SPEED	n	rpm		3000	3000	3000
RATED VOLTAGE ±5%	U	V		24	24	34
RATED CURRENT	I	A		2.1	3.9	2.7
RATED OUTPUT POWER ⁽¹⁾	P	W		25	47	63
RATED TORQUE	T	Nm		0.08	0.15	0.2
MAX TORQUE	T _{max}	Nm		0.32	0.6	0.8
MAX SPEED WITHOUT LOAD	n _{max}	rpm		4750	5000	3550
EMF CONSTANT ±5%	K _E	V/1000 rpm		4.80	4.71	9.00
TORQUE CONSTANT ±5%	K _T	Nm/A		0.0458	0.0450	0.0859
FRICTION TORQUE	T _F	Nm		0.01	0.011	0.02
DAMPING CONSTANT	K _D	Nm/1000 rpm		0.002	0.005	0.004
TERMINAL RESISTANCE	R	Ω		3.1	1.45	2.45
ARMATURE INDUCTANCE	L	mH		1.1	0.4	0.95
ROTOR INERTIA	J	kg m ² 10 ⁻³		0.0039	0.0065	0.0094
MECHANICAL TIME CONSTANT	T _M	ms		5.75	4.66	3.12
ELECTRICAL TIME CONSTANT	T _E	ms		0.35	0.28	0.39
THERMAL TIME CONSTANT	T _{TH}	s		900	1260	1380
THERMAL RESISTANCE	R _{TH}	°C/W		3.8	2.0	1.5
MASS (Only motor. No system)	M	kg		0.38	0.50	0.62
RADIAL LOAD (at mid-length of shaft)	F _R	N		150	150	150
AXIAL LOAD	F _A	N		80	80	80
(1) With an aluminium heat sink plate				150x150x10	150x150x10	150x150x10



WITH ENCODER OPTION

	CML-30	CML-50	CML-60
A	47.5	62.5	77.5
B	84	99	114

WITH TACHO OPTION (*)

	CML-30	CML-50	CML-60
A	29	44	59
B	86	101	116

DC Servo Motors EExdIIC Series

EExdIIC Series are axial air-gap servomotors housed in an enclosure into which gas can gain access: the gas can be ignited within the enclosure without the explosion damaging the enclosure or being transmitted to any flammable atmosphere external to the enclosure. These motors comply with the requirements for Apparatus Group IIC specified in EN 50 018 (1977) + A1 to 3 and EN 50 014 (1977) + A1 to 5.

The temperature classification referred to an ambient temperature of 70°C is:

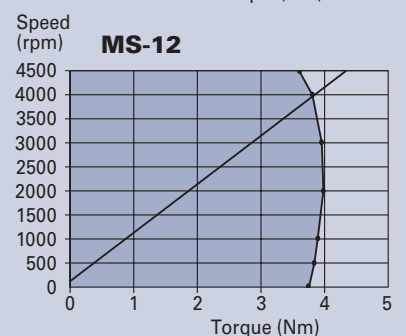
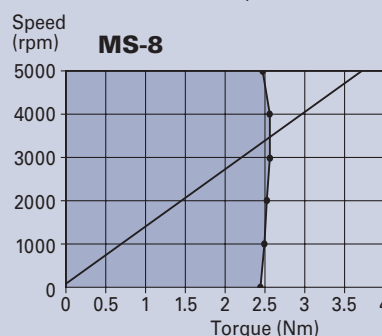
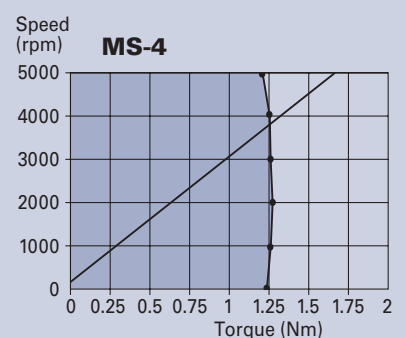
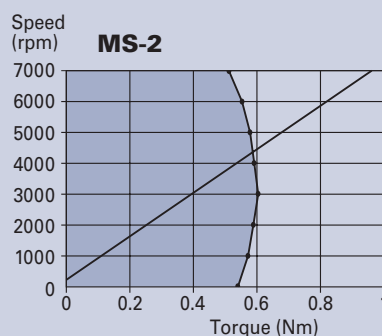
T5 for $\left\{ \begin{array}{l} \text{MS-2 / MS-12 / MS-22} \\ \text{MA-3 / MA-20 / MA-30} \end{array} \right.$

T3 for $\left\{ \begin{array}{l} \text{MS-4 / MS-6 / MS-8} \\ \text{MA-6 / MA-10} \end{array} \right.$

D.C. and A.C. "brushless" motors are included in EExdIIC Series, incorporating options of tachometer, resolver and parking brake fitted internally.



Performance Curves



Technical Specifications

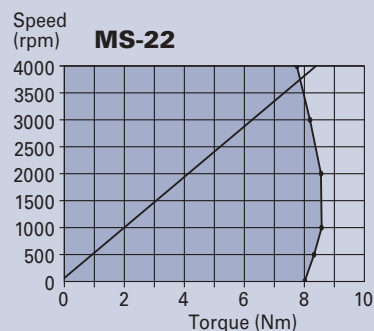
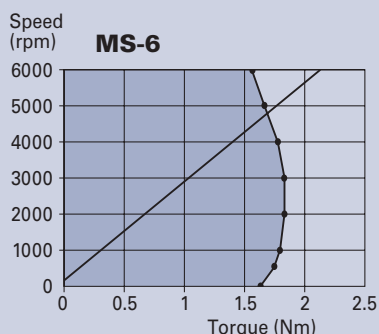
ALL CHARACTERISTICS MEASURED AT 40°C AMBIENT TEMPERATURE EXCEPT TERMINAL RESISTANCE (25°C)			SYMBOLS	UNITS	MS-2	MS-4	MS-6	MS-8	MS-12	MS-22
RATED SPEED	n	rpm			3,000	3,000	3,000	3,000	3,000	3,000
RATED VOLTAGE ±5%	U	V			39.4	67	67.8	89.7	106.7	181
RATED CURRENT	I	A			6.5	7.8	10.7	10.7	14	16
RATED OUTPUT POWER ⁽¹⁾	P	W			190.3	397	575	805	1,240	2,573
EFFICIENCY	η	%			74	76	80	84	83	89
RATED TORQUE	T	Nm			0.6	1.26	1.83	2.56	3.95	8.19
MAXIMUM TORQUE ⁽²⁾	T _{max}	Nm			3.6	7.58	11	15.38	23.7	49.14
MAXIMUM SPEED ⁽³⁾	n _{max}	rpm			7,000	6,000	6,000	5,000	4,500	4,000
EMF CONSTANT ±5%	K _E	V/1000 rpm			10.4	18	19	26.3	30.85	55.6
TORQUE CONSTANT ±5%	K _T	Nm/A			0.099	0.172	0.181	0.251	0.295	0.53
FRICTION TORQUE	T _F	Nm			0.03	0.05	0.05	0.06	0.09	0.09
DAMPING CONSTANT	K _D	Nm/1000 rpm			0.003	0.009	0.018	0.021	0.02	0.05
TERMINAL RESISTANCE (25°C)	R	Ω			1	1.25	0.75	0.82	0.75	0.67
ARMATURE INDUCTANCE	L	μH			<102	<130	<120	<150	<200	<250
INERTIA	J	kg m ² 10 ⁻³			0.15	0.37	0.40	0.82	1.7	5.1
MECHANICAL TIME CONSTANT	T _M	ms			14.38	15	9	10.17	14	11.6
TRANSITORY POWER	P _S	kW/s			89	155	300	288	330	473
THERMAL TIME CONSTANT ROTOR TO HOUSING	T _{AC}	s			170	180	190	200	300	360
THERMAL TIME CONSTANT ⁽¹⁾ HOUSING TO AMBIENT	T _{CA}	s			1,700	1,750	1,800	2,000	2,700	3,000
THERMAL RESISTANCE ROTOR TO HOUSING	R _{AC}	°C/W			0.8	0.5	0.5	0.5	0.3	0.2
THERMAL RESISTANCE ⁽¹⁾ HOUSING TO AMBIENT	R _{CA}	°C/W			0.5	0.3	0.4	0.4	0.3	0.2
RADIAL LOAD (at mid-length of shaft)	F _R	N			200	200	300	300	500	600
AXIAL LOAD	F _A	N			150	200	200	200	250	400
MASS (Only motors. No options)	M	kg								28
					300x300x10	400x400x10				
					3	3.5	4	7	10	
					9,000		6,000		4,500	

(1) With an aluminium heat sink plate

(2) For an S3 cycle

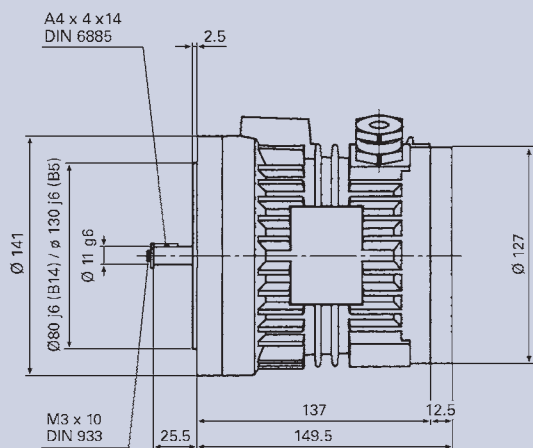
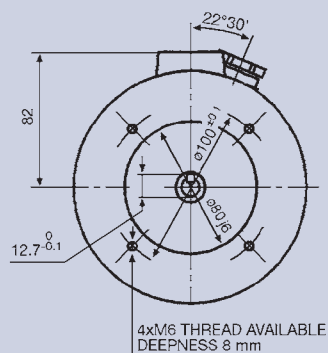
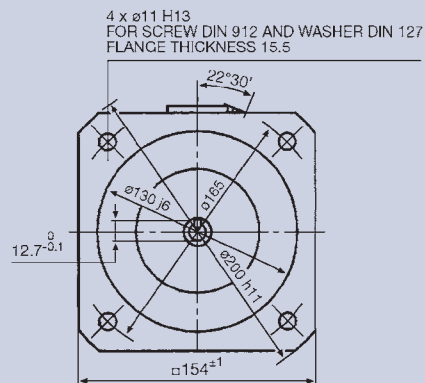
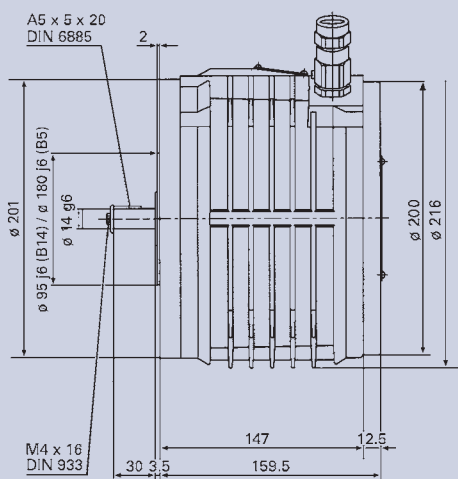
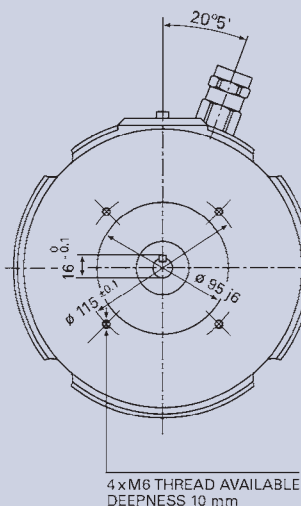
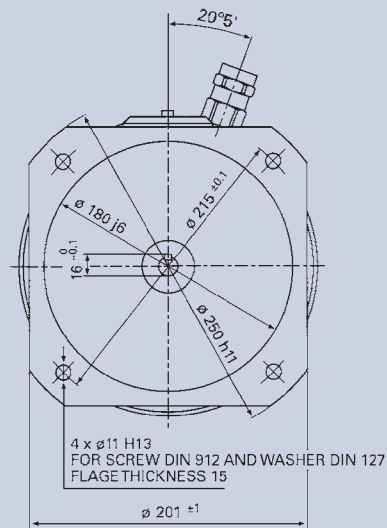
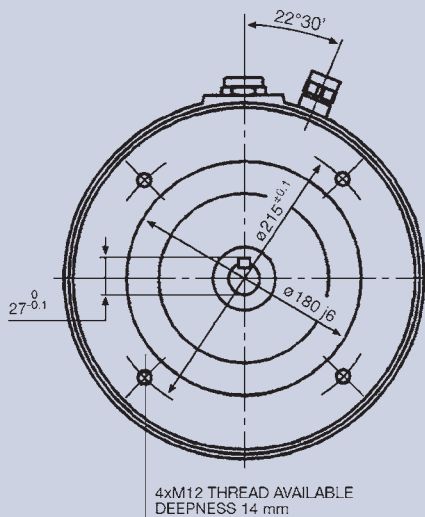
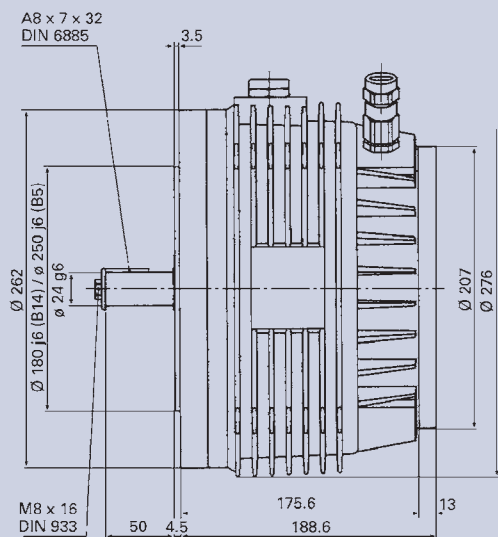
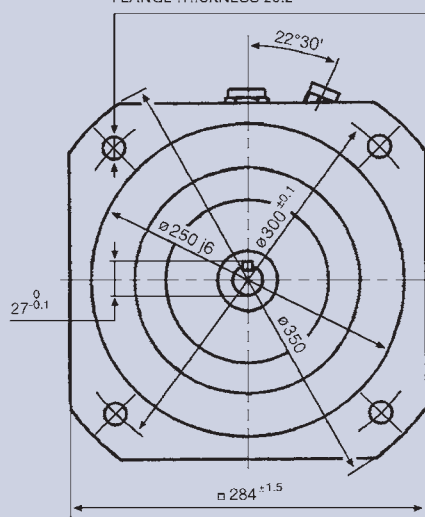
(3) Maximum speed in continuous service. During a very short time (r.p.m.)

Tachometer Specifications



	UNITS	MS-2	MS-4	MS-6	MS-8	MS-12	MS-22
	SIZE	D40	D40	D40	D40	D40	D26
Voltage Constant	V/krpm	10 ± 5%*	10 ± 5%*	10 ± 5%*	10 ± 5%*	10 ± 5%*	10 ± 5%*
Ripple @ 1000 rpm (pp)	%	<1.5	<1.5	<1.5	<1.5	<1.5	<1.2
Linearity @ 6000 rpm	%	≤0.1	≤0.1	≤0.1	≤0.1	≤0.1	≤0.1
Reversing Error	%	≤0.12	≤0.12	≤0.12	≤0.12	≤0.12	≤0.12
Temperature Coefficient	%/°C	0.03	0.03	0.03	0.03	0.03	0.02
Rotor Inertia	kg m ² 10 ⁻³	0.004	0.004	0.004	0.004	0.004	0.024
Resistance	Ω	86	86	86	86	86	90
Inductance	mH	13	13	13	13	13	25
Current	mA	2	2	2	2	2	4
Maximum Current	mA	8	8	8	8	8	17
Maximum Speed	rpm	9,000	9,000	9,000	9,000	9,000	8,000
Mass	kg	0.105	0.105	0.105	0.105	0.105	0.295

*other voltages available

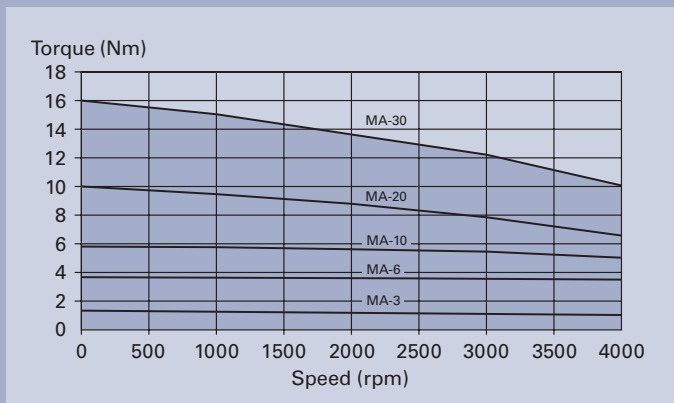
MS-2 EExdIIC
MA-3 EExdIIC

FLANGE B-14

FLANGE B-5 (OPTIONAL)

**MS-4 EExdIIC
MS-6 EExdIIC
MS-8 EExdIIC**
**MA-6 EExdIIC
MA-10 EExdIIC**

FLANGE B-14

FLANGE B-5 (OPTIONAL)

**MS-12 EExdIIC
MS-22 EExdIIC**
**MA-20 EExdIIC
MA-30 EExdIIC**

**4 x Ø18 H13
FOR SCREW DIN 912 AND WASHER DIN 127
FLANGE THICKNESS 20.2**

FLANGE B-14
FLANGE B-5 (OPTIONAL)

AC Servo Motors EExdIIC Series

Technical Specifications

ALL CHARACTERISTICS MEASURED AT 40° C AMBIENT TEMPERATURE EXCEPT TERMINAL RESISTANCE (25° C)			SYMBOLS	UNITS	MA-3	MA-6	MA-10	MA-20	MA-30
MAX MECHANICAL SPEED	n	rpm			9,000	6,000	6,000	6,000	6,000
STALL TORQUE ⁽¹⁾ ±10%	M _S	Nm			1.3	3.6	5.8	10.0	16.0
STALL CURRENT	I _S	A			2.2	4.2	6.8	10.3	16.5
PEAK TORQUE ±10%	M _J	Nm			5.2	28.5	40.7	69.8	96.0
TORQUE-WEIGHT RATIO ±10%	T _W	Nm/kg			0.7	0.8	1.1	1.2	1.6
EMF CONSTANT ±5%	K _E	Vs/rad			0.3	0.5	0.5	0.6	0.6
TORQUE CONSTANT ±5%	K _T	Nm/A			0.6	0.9	0.9	1.0	1.0
RELUCTANCETORQUE ±10%	T _R	Nm			<0.02	<0.1	<0.1	<0.2	<0.3
WINDING RESISTANCE ±5%	R	Ω			10.2	5.3	2.2	1.4	0.5
WINDING INDUCTANCE ±5%	L	mH			25.0	11.6	0.4	7.0	4.0
ROTOR INERTIA	J	kg m ² 10 ⁻³			0.04	0.30	2.10	0.80	1.60
MECHANICAL TIME CONSTANT	T _M	ms			2.0	3.8	3.6	2.1	1.6
ELECTRICAL TIME CONSTANT	T _E	ms			2.5	2.2	7.5	5.0	7.5
THERMAL TIME CONSTANT	T _{TH}	s			1,500	1,500	1,800	1,500	1,500
THERMAL RESISTANCE	R _{TH}	°C/W			1.1	0.6	0.5	0.4	0.4
MASS (motor with resolver)	M	kg						34	36
RADIAL LOAD (at mid-length of shaft)	F _R	N			218	410	410	600	600
AXIAL LOAD	F _A	N			218	225	225	390	390
INSULATION					CLASS-F				
PROTECTION					IP-65				
(1) With an aluminium heat sink plate					300x300x10	400x400x10	830x830x10		

Performance Curves



Resolver Specifications

	UNITS	2T8 (Transmitter Speed 1)
Input Voltage/Frequency	V/kHz	10/4.5
Primary Element		Rotor
Number of Speed		1X
Transformation Ratio		0.5 ± 5%
Electrical Error	minutes	±10 max.
Dielectric Strength	VAC/1 minute	500
Mass	kg	0.230
Rotor Moment of Inertia	kg m ² 10 ⁻³	0.0123
Operating Temperature Range	°C	-55 ~ +155

Brake Specifications

	UNITS	MS-2	MS-4	MS-6	MS-8	MS-12	MS-22	MA-3	MA-6	MA-10	MA-20	MA-30
	SIZE	04	06	06	06	07	09	07 (*)	10	10	10	10
Holding Torque	Nm	1.2	2.5	2.5	2.5	5	12	1	4	4	8	8
DC Voltage	V	24	24	24	24	24	24	4.8	24	24	24	24
Input Power	W	8	12	12	12	16	18	5	22	22	22	22
Inertia	kg cm ²	0.05	0.23	0.23	0.23	0.65	2.14	0.08	0.3	0.3	0.3	0.3
Response Time												
Disengagement	ms	4	7	7	7	15	30	7	30	30	30	30
Engagement	ms	3	5	5	5	7	13	5	7	7	7	7
Mass	kg	0.19	0.3	0.3	0.3	0.6	1.1	0.3	0.8	0.8	0.8	0.8

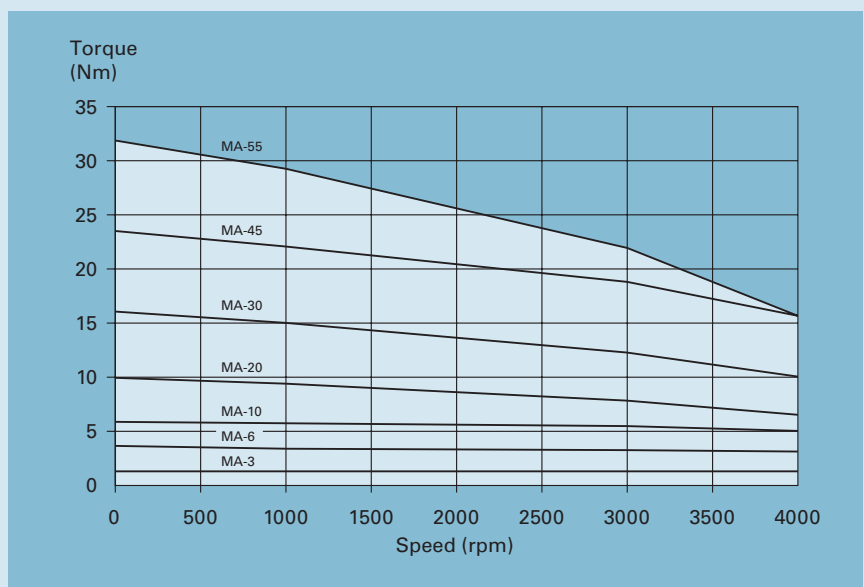
(*) with chopper

AC Servo Motors MA Series

- The short mechanical time constant makes it ideal for control operations.
- An extremely short electrical constant provides high peak torque at high speed.
- A high "theoretical" acceleration gives an extremely fast response time.
- High stall torque due to the absence of commutators bars.
- Low thermal resistance provides low working temperatures.
- High power to weight ratio, ideal for manipulator mounted motors.
- Air gap design, small diameter and short length.
- For many applications a separate position sensor is not required, the resolver can be used for deriving a position feed back signal as well as speed/current information.



Performance Curves



Technical Specifications

ALL CHARACTERISTICS MEASURED AT 25°C AMBIENT TEMPERATURE			SYMBOLS	UNITS	MA-3	MA-6	MA-10	MA-20	MA-30	MA-45	MA-55
MAX MECHANICAL SPEED			n	rpm	9000	6000	6000	6000	6000	6000	6000
STALL TORQUE ⁽¹⁾ ±10%			M _S	Nm	1.3	3.6	5.8	10.0	16.0	23.4	31.8
STALL CURRENT			I _S	A	2.2	4.2	6.8	10.3	16.5	24.1	32.7
PEAK TORQUE ±10%			M _J	Nm	5.2	28.5	40.7	69.8	96.0	140.5	190.8
TORQUE-WEIGHT RATIO ±10%			T _W	Nm/kg	0.7	0.8	1.1	1.2	1.6	1.7	1.9
EMF CONSTANT ±5%			K _E	Vs/rad	0.3	0.5	0.5	0.6	0.6	0.6	0.6
TORQUE CONSTANT ±5%			K _T	Nm/A	0.6	0.9	0.9	1.0	1.0	1.0	1.0
RELUCTANCE TORQUE ±10%			T _R	Nm	<0.02	<0.1	<0.1	<0.2	<0.3	<0.4	<0.6
WINDING RESISTANCE ±5%			R	Ω	10.2	5.3	2.2	1.4	0.5	0.4	0.2
WINDING INDUCTANCE ±5%			L	mH	25.0	11.6	8.0	7.0	4.0	2.7	1.9
ROTOR INERTIA			J	kg m ² 10 ⁻³	0.04	0.30	0.40	0.80	1.60	2.20	3.60
MECHANICAL TIME CONSTANT			T _M	ms	2.0	3.8	2.1	2.1	1.6	1.6	1.6
ELECTRICAL TIME CONSTANT			T _E	ms	2.5	2.2	3.6	5.0	7.5	6.6	7.6
THERMAL TIME CONSTANT			T _{TH}	s	1,500	1,500	1,800	1,500	1,500	1,500	1,500
THERMAL RESISTANCE			R _{TH}	°C/W	1.1	0.6	0.5	0.4	0.4	0.2	0.2
MASS (motor with resolver)			M	kg	1.9	4.4	5.3	8.2	10.0	14.0	16.8
RADIAL LOAD (at mid-length of shaft)			F _R	N	218	410	410	600	600	830	830
AXIAL LOAD			F _A	N	218	225	225	390	390	410	410
INSULATION			CLASS-F								
PROTECTION			IP-54								
(1) With an aluminium heat sink plate			300x300x10			400x400x10			830x830x10		

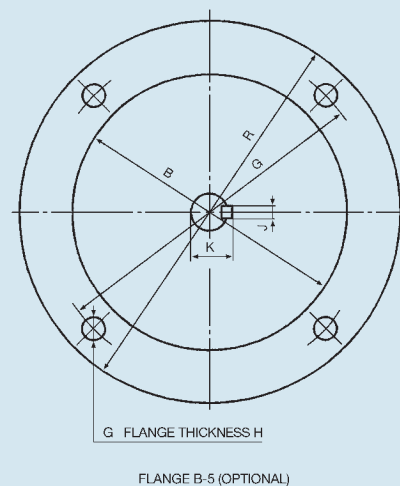
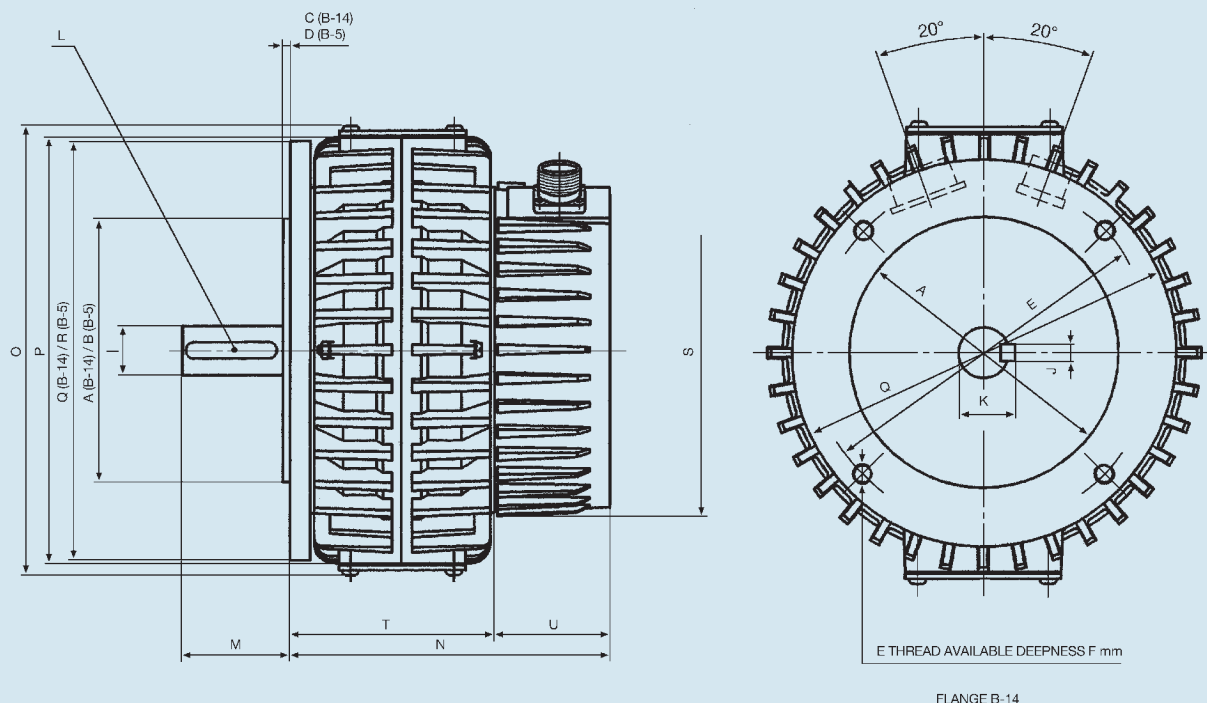
Resolver Specifications

	UNITS	2T8 (Transmitter Speed 1)
Input Voltage/Frecuency	V/kHz	10/4.5
Primary Element		Rotor
Number of Speed		1X
Transformation Ratio		0.5 ± 5%
Electrical Error	minutes	±10 max.
Dielectric Strength	VAC/1 minute	500
Mass	kg	0.230
Rotor Moment of Inertia	kg m ² 10 ⁻³	0.0123
Operating Temperature Range	°C	-55 ~ +155

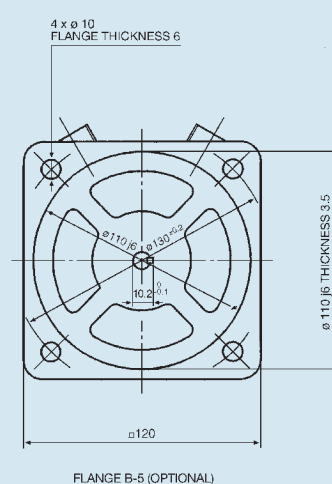
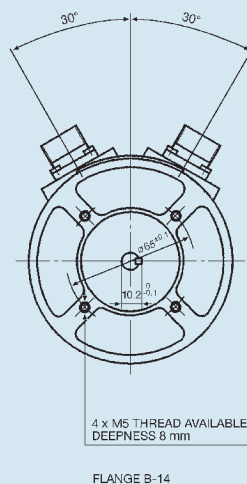
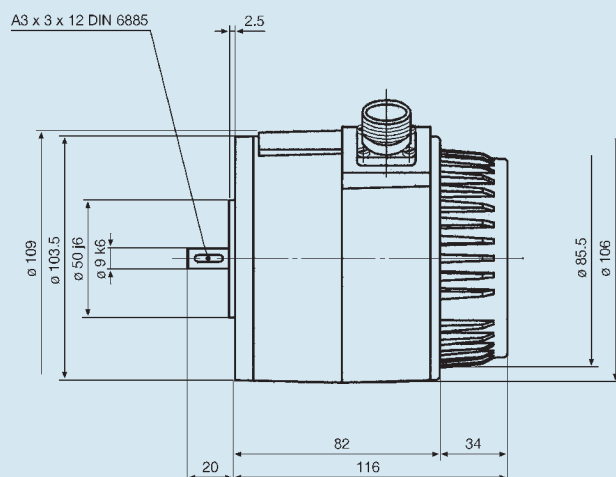
Brake Specifications

	SIZE	TORQUE Nm	INERTIA kg cm ²	MASS kg
MA-3	07 (*)	1	0.08	0.3
MA-6 / 10	10	4	0.30	0.8
MA-20 / 30	10	8	0.30	0.8
MA-45 / 55	10	12	0.30	0.8
(*) With chopper				

The MA Series incorporates the option of a fail-safe holding brake within the structure of the motor which holds the shaft without backlash on loss of electric current.



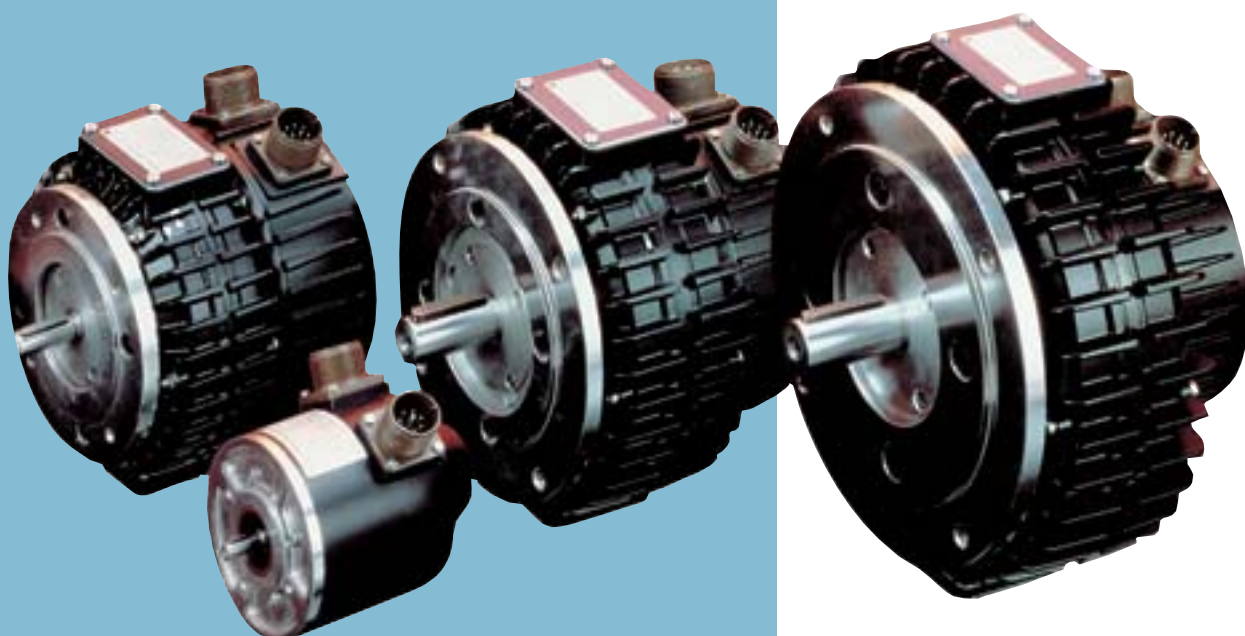
MA-3



AC Servo Motors MA Series

Dimensions

		MA-6	MA-10	MA-20	MA-30	MA-45	MA-55
A	(j6)	ø95		ø130		ø180	
B	(j6)	ø180				ø250	
C		3		3.5		4	
D		4				5	
E		ø115 4xM8		ø165 4xM10		ø215 4xM12	
F		10				12	
G		ø215 4xø15				ø300 4xø19	
H		10				17	
I	(k6)	ø14		ø24		ø28	
J	(N9)	5		8			
K	($\frac{0}{0.1}$)	16		27		31	
L	(DIN 6885)	A5x5x28		A8x7x45		A8x7x50	
M		34		50		60	
N		137.5		152.5	161.5	174	
O		ø178		ø218		ø278	
P		ø170		ø210		ø270	
Q		ø140		ø186		ø242	
R		ø250				□265	
S		ø165					
T		80		95	104	116.5	
U		57.5					



AC Servo Motors MSA Series

- Very compact.
- Reduced diameter and length.
- Axial magnetic flux.
- Low cogging torque.
- Excellent torque/weight/volume ratio.



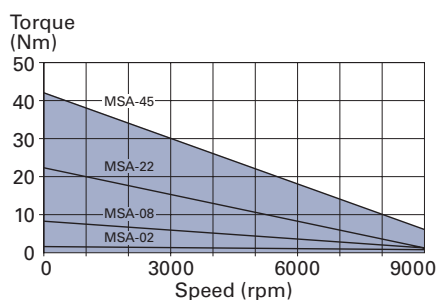
Brake Specifications

	SIZE	TORQUE Nm	INERTIA kg cm ²	MASS kg
MSA-2	03	2	0.068	0.18
MSA-8	06	9	0.54	0.50
MSA-22	08	36	5.56	1.75
MSA-45	08	36	5.56	1.75

Resolver Specifications

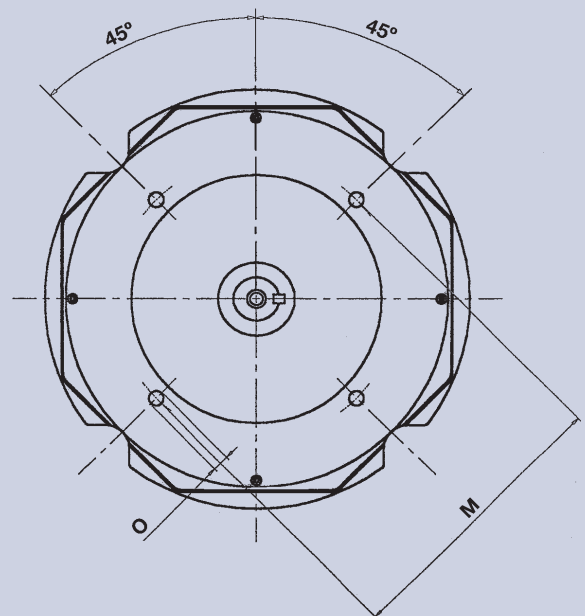
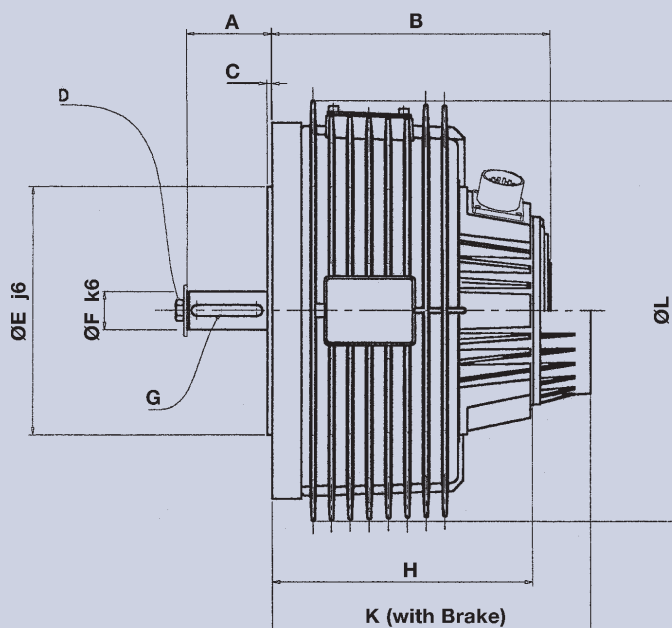
	UNITS	2T8 (Transmitter Speed 1)
Input Voltage/Frequency	V/kHz	10/4.5
Primary Element		Rotor
Number of Speed		1X
Transformation Ratio		0.5 ± 5%
Electrical Error	minutes	±10 max.
Dielectric Strength	VAC/1 minute	500
Mass	kg	0.230
Rotor Moment of Inertia	kg m ² 10 ⁻³	0.0123
Operating Temperature Range	°C	-55 ~ +155

Performance Curves



Technical Specifications

ALL CHARACTERISTICS MEASURED AT 25°C AMBIENT TEMPERATURE			SYMBOLS	UNITS	MSA-2	MSA-2	MSA-8	MSA-8	MSA-22	MSA-22	MSA-45
					220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	400 VAC
MAX MECHANICAL SPEED	n	rpm			10000	10000	6500	6500	6000	6000	4500
STALL TORQUE ⁽¹⁾ ±10%	M _S	Nm			1.9	1.9	9	9	26	26	44
STALL CURRENT	A	A			5.48	3.54	9.12	9.12	27.85	15.97	26.19
PEAK TORQUE ±10%	M _J	Nm			7.6	7.6	36	36	104	104	176
TORQUE-WEIGHT RATIO	T _W	Nm/kg			0.70	0.70	1.125	1.125	1.48	1.48	1.63
EMF CONSTANT ±5%	K _E	Vs/rad			0.20	0.31	0.57	0.57	0.54	0.94	0.97
TORQUE CONSTANT ±5%	K _T	Nm/A			0.35	0.54	0.99	0.99	0.93	1.63	1.68
RELUCTANCE TORQUE (Respect to the Stall Torque)	T _R	Nm			<1.5%	<1.5%	<1.5%	<1.5%	<1.5%	<1.5%	<1.5%
WINDING RESISTANCE ±5%	R	Ω			2.90	7.07	1.50	1.50	0.26	0.78	0.41
WINDING INDUCTANCE ±5%	L	mH			11.50	28.00	15.00	15.00	5.56	14.00	10.90
ROTOR INERTIA	J	kg m ² 10 ⁻³			0.05	0.05	0.45	0.45	2.3	2.3	4
MECHANICAL TIME CONSTANT	T _M	ms			2.09	2.12	1.20	1.20	1.19	1.17	1.01
ELECTRICAL TIME CONSTANT	T _E	ms			3.97	3.96	10.00	10.00	21.38	17.95	26.59
MASS (Motor with resolver)	M	kg			2.7	2.7	8	8	17.6	17.6	27
RADIAL LOAD	F _R	N			218	218	410	410	600	600	700
AXIAL LOAD	F _A	N			218	218	225	225	400	400	400
INSULATION					CLASS-F	CLASS-F	CLASS-F	CLASS-F	CLASS-F	CLASS-F	CLASS-F
PROTECTION					IP-65	IP-65	IP-65	IP-65	IP-65	IP-65	IP-65
(1) With an aluminium heat sink plate					300x300x10		400x400x10		700x700x20		



MODELS	A	B	C	D	E	F	G	H	K	L	M	O
				DIN933	j6	k6	DIN6885					
MSA-2	23	94.5	2.5	M4x8	Ø50	Ø11	A4x4x14	85.5	151	Ø118	Ø65	4xM5
MSA-8	40	145	3	M6x16	Ø95	Ø16	A5x5x30	136	170	Ø192	Ø115	4xM8
MSA-22	50	178	3.5	M8x16	Ø130	Ø24	A8x7x32	166	202	Ø275	Ø165	4xM10
MSA-45	60	200	3.5	M10x22	Ø180	Ø28	A8x7x50	188	224	Ø305	Ø215	4xM12

AC Servo Motors BL 40/50/70 Series

The BL Series are synchronous electrical servomotors, with 3 winding phases, supplied with Sinusoidal or Trapezoidal current wave forms. The Feed-Back devices that produce the synchronization signal and speed (position, also in the Sinusoidal case), are a Resolver (BLS Series) or a Hall Effect devices (BLT Series). This "BRUSHLESS" technology provides:

- High dynamic response.
- Full speed condition, not limited by the "Brush Sparking effect".
- High thermal and dynamic characteristics, because of the motor's windings which are located in the stators.
- Very low maintenance.



BLS ~ Technical Specifications

ALL CHARACTERISTICS MEASURED
AT 25°C AMBIENT TEMPERATURE

SYMBOLS

UNITS

MAX MECHANICAL SPEED	n	rpm
STALL TORQUE ⁽¹⁾ ±10%	M _S	Nm
STALL CURRENT	I _S	A
PEAK TORQUE ±10%	M _J	Nm
TORQUE-WEIGHT RATIO	T _W	Nm/kg
EMF CONSTANT ±5%	K _E	Vs/rad
TORQUE CONSTANT ±5%	K _T	Nm/A
RELUCTANCE TORQUE ^(*)	T _R	Nm
WINDING RESISTANCE ±5%	R	Ω
WINDING INDUCTANCE ±5%	L	mH
ROTOR INERTIA	J	kg m ² 10 ⁻³
MECHANICAL TIME CONSTANT	T _M	ms
ELECTRICAL TIME CONSTANT	T _E	ms
THERMAL TIME CONSTANT	T _{TH}	s
THERMAL RESISTANCE	R _{TH}	°C/W
MASS	M	kg
RADIAL LOAD (at mid-length of shaft)	F _R	N
AXIAL LOAD	F _A	N
INSULATION		
PROTECTION		

(1) With an aluminium heat sink plate

(*) Respect to the Stall Torque

BLT ~ Technical Specifications

ALL CHARACTERISTICS MEASURED
AT 25°C AMBIENT TEMPERATURE

SYMBOLS

UNITS

MAX MECHANICAL SPEED	n	rpm
STALL TORQUE ⁽¹⁾ ±10%	M _S	Nm
STALL CURRENT	I _S	A
PEAK TORQUE ±10%	M _J	Nm
TORQUE-WEIGHT RATIO	T _W	Nm/kg
EMF CONSTANT ±5%	K _E	Vs/rad
TORQUE CONSTANT ±5%	K _T	Nm/A
RELUCTANCE TORQUE ^(*)	T _R	Nm
WINDING RESISTANCE ±5%	R	Ω
WINDING INDUCTANCE ±5%	L	mH
ROTOR INERTIA	J	kg m ² 10 ⁻³
MECHANICAL TIME CONSTANT	T _M	ms
ELECTRICAL TIME CONSTANT	T _E	ms
THERMAL TIME CONSTANT	T _{TH}	s
THERMAL RESISTANCE	R _{TH}	°C/W
MASS	M	kg
RADIAL LOAD (at mid-length of shaft)	F _R	N
AXIAL LOAD	F _A	N
INSULATION		
PROTECTION		

(1) With an aluminium heat sink plate

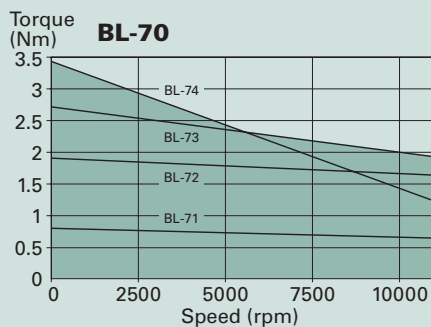
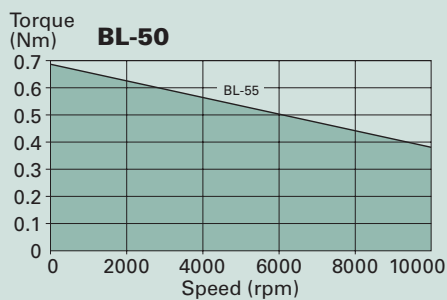
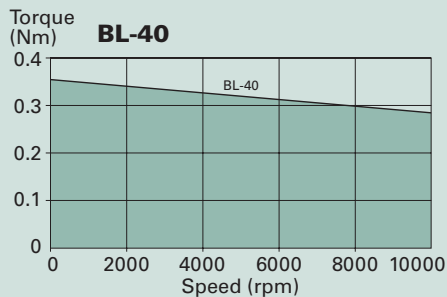
(*) Respect to the Stall Torque

BLS-40		BLS-55		BLS-71		BLS-72		BLS-73		BLS-74	
110 VAC	220 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC
10,000		10,000		11,000		11,000		11,000		11,000	
0.36	0.36	0.7	0.7	0.8	0.8	1.9	1.9	2.7	2.7	3.4	3.4
2.57	1.24	1.4	0.77	2.11	1.13	3.96	2.37	3.91	2.2	4.2	2.25
1.44	1.44	2.8	2.8	3.2	3.2	7.6	7.6	10.8	10.8	13.6	13.6
0.6	0.6	0.5	0.5	0.53	0.53	1	1	1.17	1.17	1.21	1.21
0.08	0.17	0.29	0.53	0.22	0.41	0.28	0.46	0.4	0.71	0.47	0.87
0.14	0.29	0.5	0.91	0.38	0.71	0.48	0.8	0.69	1.23	0.81	1.51
<6%		<4%		<3.5%		<3.5%		<3.5%		<3.5%	
6	24.4	14.7	47	10.7	33.8	5.3	15.5	6.4	18.9	5.7	18.6
3.23	12	18.6	61	7.4	24	5.4	13.2	6.4	20	6.7	22
0.0024	0.0024	0.017	0.017	0.027	0.027	0.051	0.051	0.074	0.074	0.097	0.097
1.19	1.19	1.72	1.66	3.46	3.14	2.01	2.15	1.72	1.6	1.45	1.37
0.54	0.49	1.27	1.3	0.69	0.71	1.02	0.85	1	1.06	1.18	1.18
1,190	1,190	1,120	1,120	1,100	1,100	1,280	1,280	1,560	1,560	1,990	1,990
1.53	1.53	1.99	2.06	1.21	1.34	0.69	0.69	0.59	0.63	0.57	0.61
0.6	0.6	1.4	1.4	1.5	1.5	1.9	1.9	2.3	2.3	2.8	2.8
150		250		216		245		274		314	
80		100		98		98		98		98	
CLASS-F		CLASS-F		CLASS-F		CLASS-F		CLASS-F		CLASS-F	
IP-65		IP-65		IP-65		IP-65		IP-65		IP-65	
300x300x10		300x300x10		300x300x10		300x300x10		300x300x10		300x300x10	

BLT-40		BLT-55		BLT-71		BLT-72		BLT-73		BLT-74	
110 VAC	220 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC
10,000		10,000		11,000		11,000		11,000		11,000	
0.36	0.36	0.7	0.7	0.8	0.8	1.9	1.8	2.7	2.7	3.4	3.4
3	1.50	1.71	0.95	2.58	1.4	4.87	2.77	4.82	2.7	5.15	2.76
1.44	1.44	2.8	2.8	3.2	3.2	7.6	7.20	10.8	10.8	13.6	13.6
0.6	0.63	0.51	0.51	0.54	0.54	1.02	0.96	1.19	1.19	1.23	1.23
0.12	0.24	0.41	0.74	0.31	0.57	0.39	0.65	0.56	1	0.66	1.23
0.12	0.24	0.41	0.74	0.31	0.57	0.39	0.65	0.56	1	0.66	1.23
<6%		<4%		<3.5%		<3.5%		<3.5%		<3.5%	
6	24.4	14.7	47	10.7	33.8	5.3	15.5	6.4	18.9	5.7	18.6
3.23	12	18.6	61	7.4	24	5.4	13.2	6.4	20	6.7	22
0.0024	0.0024	0.017	0.017	0.027	0.027	0.051	0.051	0.074	0.074	0.097	0.097
1.02	1.02	1.49	1.46	3.01	2.81	1,78	1.87	1.51	1.4	1.27	1.19
0.54	0.49	1.27	1.3	0.69	0.71	1.02	0.85	1	1.06	1.18	1.18
1,190	1,190	1,120	1,120	1,100	1,100	1,280	1,280	1,560	1,560	1,990	1,990
1.53	1.57	2.01	2.05	1.21	1.29	0.68	0.72	0.58	0.62	0.57	0.61
0.6	0.57	1.37	1.37	1.47	1.47	1.87	1.87	2.27	2.27	2.77	2.77
150		250		216		245		274		314	
80		100		98		98		98		98	
CLASS-F		CLASS-F		CLASS-F		CLASS-F		CLASS-F		CLASS-F	
IP-65		IP-65		IP-65		IP-65		IP-65		IP-65	
300x300x10		300x300x10		300x300x10		300x300x10		300x300x10		300x300x10	

AC Servo Motors BL 40/50/70 Series

Performance Curves



Resolver Specifications

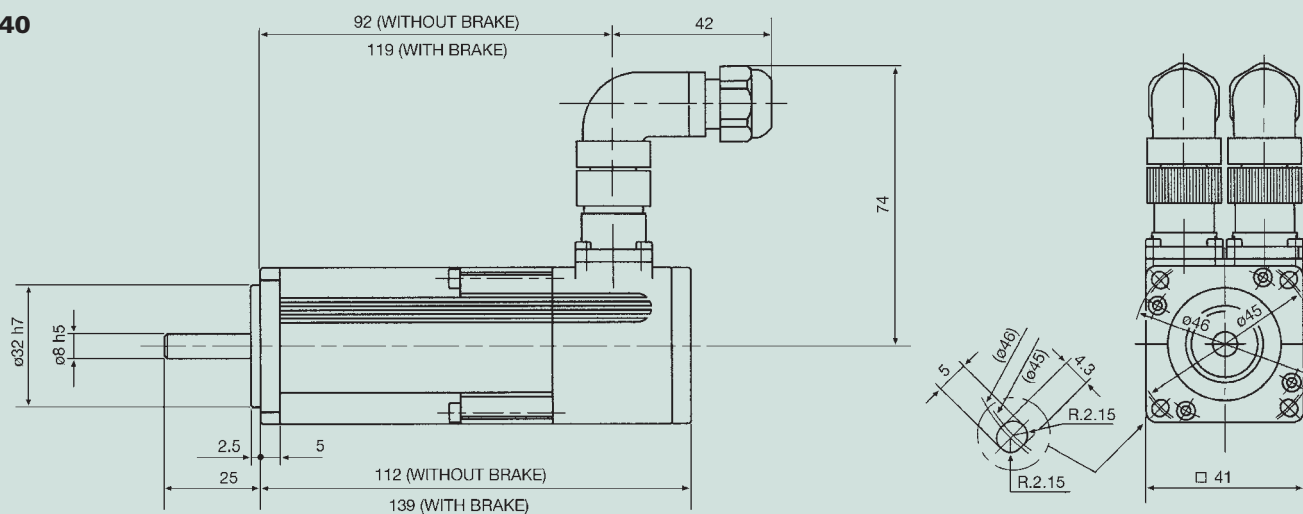
	UNITS	BL-40	BL-50	BL-70
2T8 (Transmitter Speed 1)				
Input Voltage/Frequency	V/kHz	7/10	10/4.5	
Primary Element		Rotor	Rotor	
Number of Speed		1X	1X	
Transformation Ratio		0.5 ± 5%	0.5 ± 5%	
Electrical Error	minutes	±10 max	±10 max	
Dielectric Strength	VAC/1 minute	500	500	
Mass	kg	0.04	0.13	
Rotor Moment of Inertia	kg m ² 10 ⁻³	0.0006	0.0032	
Operating Temperature Range	°C	-55 ~ + 155	-55 ~ +155	

Brake Specifications

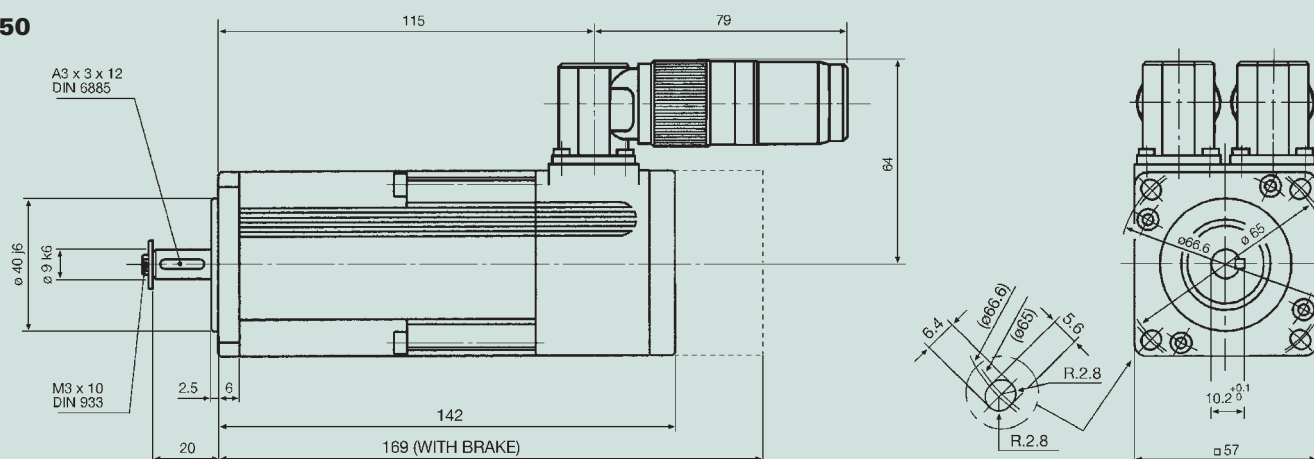
	SIZE	TORQUE Nm	INERTIA kg cm ²	MASS kg
BL-40	01	0.4	0.016	0.10
BL-55	02	0.75	0.021	0.15
BL-71 / 72	03	1.5	0.068	0.18
BL-73 / 74	06	3	0.38	0.30

The BL Series incorporates the option of a fail-safe holding brake within the structure of the motor. Brake option is not available for short length version.

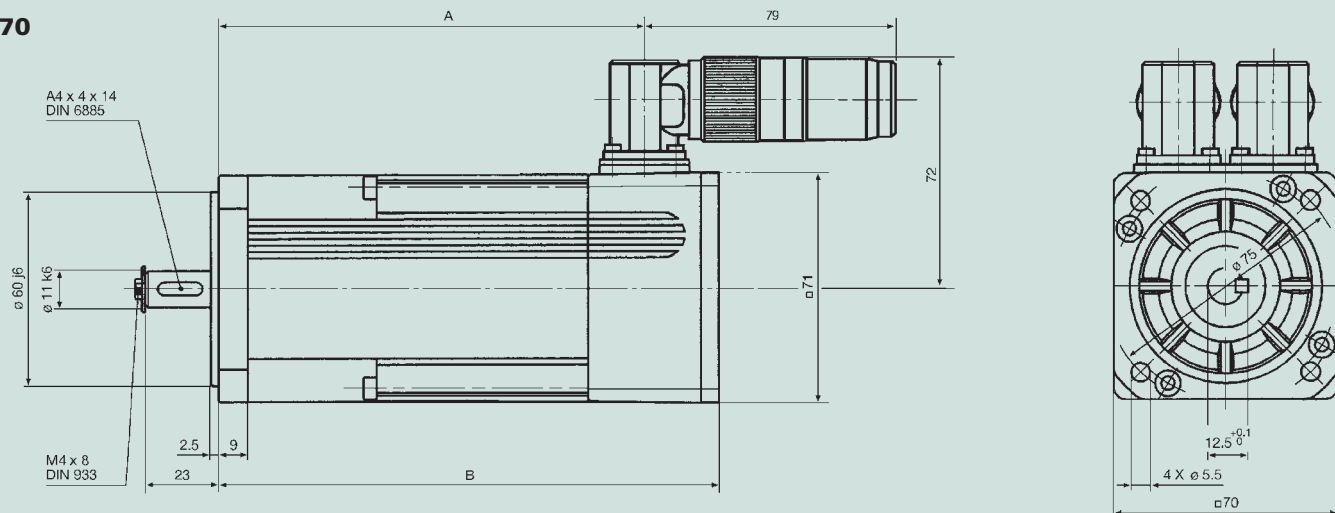
BL-40



BL-50



BL-70



SHORT LENGTH VERSION (Not available with brake option)

	BL-71	BL-72	BL-73	BL-74
A	76.5	96.5	114.5	132.5
B	100.5	120.5	138.5	156.5

STANDARD VERSION (With or without brake option)

	BL-71	BL-72	BL-73	BL-74
A	81	101	119	137
B	128.5	148.5	166.5	184.5

The short length version must be specifically indicated in the order, as the product code applies to the standard version only.

AC Servo Motors

BL 110/140/190 Series

The BL Series are synchronous electrical servomotors, with 3 winding phases, supplied with Sinusoidal or Trapezoidal current wave forms. The Feed-Back devices that produce the synchronization signal and speed (position, also in the Sinusoidal case), are a Resolver (BLS Series) or a Hall effect devices (BLT Series). This "BRUSHLESS" technology provides:

- High dynamic response.
- Full speed condition, not limited by the "Brush Sparking effect".
- High thermal and dynamic characteristics, because of the motor's windings which are located in the stators.
- Very low maintenance.
- Connection box with four available positions from the standard construction.



BLS ~ Technical Specifications

ALL CHARACTERISTICS MEASURED
AT 25° C AMBIENT TEMPERATURE

SYMBOLS

UNITS

MAX MECHANICAL SPEED	n	rpm
STALL TORQUE ⁽¹⁾ ±10%	M _S	Nm
STALL CURRENT	I _S	A
PEAK TORQUE ±10%	M _J	Nm
TORQUE-WEIGHT RATIO	T _W	Nm/kg
EMF CONSTANT ±5%	K _E	Vs/rad
TORQUE CONSTANT ±5%	K _T	Nm/A
RELUCTANCE TORQUE ^(*)	T _R	Nm
WINDING RESISTANCE ±5%	R	Ω
WINDING INDUCTANCE ±5%	L	mH
ROTOR INERTIA	J	kg m ² 10 ⁻³
MECHANICAL TIME CONSTANT	T _M	ms
ELECTRICAL TIME CONSTANT	T _E	ms
THERMAL TIME CONSTANT	T _{TH}	s
THERMAL RESISTANCE	R _{TH}	°C/W
MASS	M	kg
RADIAL LOAD (at mid-length of shaft)	F _R	N
AXIAL LOAD	F _A	N
INSULATION		
PROTECTION		

(1) With an aluminium heat sink plate

(*) Respect to the Stall Torque

BLT ~ Technical Specifications

ALL CHARACTERISTICS MEASURED
AT 25° C AMBIENT TEMPERATURE

SYMBOLS

UNITS

MAX MECHANICAL SPEED	n	rpm
STALL TORQUE ⁽¹⁾ ±10%	M _S	Nm
STALL CURRENT	I _S	A
PEAK TORQUE ±10%	M _J	Nm
TORQUE-WEIGHT RATIO	T _W	Nm/kg
EMF CONSTANT ±5%	K _E	Vs/rad
TORQUE CONSTANT ±5%	K _T	Nm/A
RELUCTANCE TORQUE ^(*)	T _R	Nm
WINDING RESISTANCE ±5%	R	Ω
WINDING INDUCTANCE ±5%	L	mH
ROTOR INERTIA	J	kg m ² 10 ⁻³
MECHANICAL TIME CONSTANT	T _M	ms
ELECTRICAL TIME CONSTANT	T _E	ms
THERMAL TIME CONSTANT	T _{TH}	s
THERMAL RESISTANCE	R _{TH}	°C/W
MASS	M	kg
RADIAL LOAD (at mid-length of shaft)	F _R	N
AXIAL LOAD	F _A	N
INSULATION		
PROTECTION		

(1) With an aluminium heat sink plate

(*) Respect to the Stall Torque

BLS-111		BLS-112		BLS-113		BLS-114		BLS-115	
220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC
8,500		8,500		8,500		8,500		8,500	
2.9	2.9	5.0	5.0	8.4	8.4	10.6	10.6	13.9	13.9
3.49	2.04	6.02	3.29	9.88	5.71	12.77	7.31	17.16	9.79
11.6	11.6	20.0	20.0	33.6	33.6	42.4	42.4	55.6	55.6
0.73	0.73	1.0	1.0	1.33	1.33	1.43	1.43	1.64	1.64
0.48	0.82	0.48	0.88	0.49	0.85	0.48	0.84	0.47	0.82
0.83	1.42	0.83	1.52	0.85	1.47	0.83	1.45	0.81	1.42
<3%		<3%		<3%		<3%		<3%	
7.2	20.6	2.4	7.1	1.3	3.79	0.8	2.58	0.6	1.84
10	31	4.8	13.2	2.7	8.5	1.9	5.8	1.5	5.1
0.2	0.2	0.38	0.38	0.56	0.56	0.74	0.74	0.93	0.93
3.61	3.54	2.29	2.02	1.75	1.70	1.49	1.57	1.47	1.47
1.39	1.5	2.0	1.86	2.08	2.24	2.38	2.25	2.5	2.77
2,520	2,520	1,910	1,910	2,260	2,260	2,510	2,510	3,700	3,700
0.65	0.67	0.66	0.75	0.45	0.46	0.44	0.42	0.32	0.33
4	4	5	5	6.3	6.3	7.4	7.4	8.5	8.5
515		515		515		515		515	
255		255		255		255		255	
CLASS-F		CLASS-F		CLASS-F		CLASS-F		CLASS-F	
IP-65		IP-65		IP-65		IP-65		IP-65	
400x400x10									

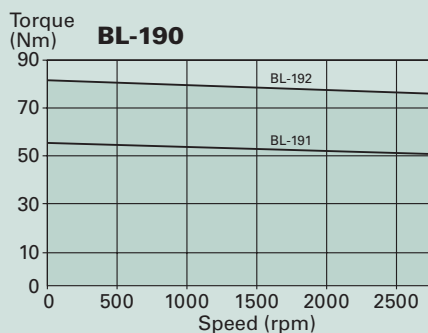
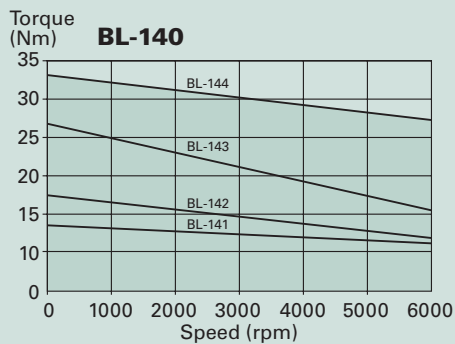
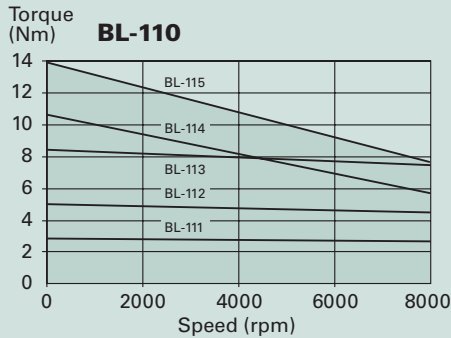
								BLS-191	BLS-192
BLS-141		BLS-142		BLS-143		BLS-144			
220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	400 VAC	400 VAC
6,500		6,500		6,500		6,500		2,800	
13.6	13.6	17.4	17.4	26.8	26.8	33	33	56	82
13.6	7.01	15.4	8.02	19.14	10.19	17.55	9.38	25.11	34.60
54.4	54.4	69.6	69.6	107.2	107.2	132.0	132.0	224.0	328.0
1.3	1.3	1.41	1.41	1.63	1.63	1.64	1.64	1.9	2.1
0.58	1.12	0.65	1.25	0.81	1.52	1.09	2.03	1.29	1.37
1	1.94	1.13	2.17	1.4	2.63	1.88	3.52	2.23	2.37
<2.5%		<2.5%		<2.5%		<2.5%		<2%	
0.86	2.9	0.73	2.46	0.63	2.04	0.74	2.5	0.39	0.26
2.8	11.5	2.6	9	2.7	9.6	3.2	11	1.9	1.5
1.71	1.71	2.34	2.34	3.34	3.34	4.59	4.59	14.7	22
2.54	2.28	2.33	2.12	1.86	1.70	1.66	1.61	1.99	1.76
3.26	3.97	3.56	3.66	4.29	4.71	4.32	4.4	4.87	5.77
3,740	3,740	4,500	4,500	4,626	4,626	4,800	4,800	4,400	4,090
0.36	0.40	0.33	0.36	0.25	0.27	0.25	0.26	0.23	0.18
10.5	10.5	12.3	12.3	16.4	16.4	20.1	20.1	29.5	39
784		784		784		784		1,400	
343		343		343		343		690	
CLASS-F		CLASS-F		CLASS-F		CLASS-F		CLASS-F	
IP-65		IP-65		IP-65		IP-65		IP-65	
700x700x20								700x700x20	

BLT-111		BLT-112		BLT-113		BLT-114		BLT-115	
220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC
8,500		8,500		8,500		8,500		8,500	
2.9	2.9	5.0	5.0	8.4	8.4	10.6	10.6	13.9	13.9
4.33	2.5	7.46	4.03	12.17	7.0	15.82	8.98	21.06	11.98
11.6	11.6	20.0	20.0	33.6	33.6	42.4	42.4	55.6	55.6
0.73	0.73	1.01	1.01	1.34	1.34	1.44	1.44	1.64	1.64
0.67	1.16	0.67	1.24	0.69	1.2	0.67	1.18	0.66	1.16
0.67	1.16	0.67	1.24	0.69	1.2	0.67	1.18	0.66	1.16
<3%		<3%		<3%		<3%		<3%	
7.2	20.6	2.4	7.1	1.3	3.79	0.8	2.58	0.6	1.84
10	31	4.8	13.2	2.7	8.5	1.9	5.8	1.5	5.1
0.2	0.2	0.38	0.38	0.56	0.56	0.74	0.74	0.93	0.93
3.21	3.06	2.03	1.75	1.53	1.47	1.32	1.37	1.28	1.27
1.39	1.5	2.0	1.86	2.08	2.24	2.38	2.25	2.5	2.77
2,520	2,520	1,910	1,910	2,260	2,260	2,510	2,510	3,700	3,700
0.64	0.67	0.64	0.75	0.45	0.46	0.43	0.41	0.32	0.33
3.97	3.97	4.97	4.97	6.27	6.27	7.37	7.37	8.47	8.47
515		515		515		515		515	
255		255		255		255		255	
CLASS-F		CLASS-F		CLASS-F		CLASS-F		CLASS-F	
IP-65		IP-65		IP-65		IP-65		IP-65	
400x400x10									

BLT-141		BLT-142		BLT-143		BLT-144		BLT-191	BLT-192
220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	400 VAC	400 VAC
6,500		6,500		6,500		6,500		2,800	
13.6	13.6	17.4	17.4	26.8	26.8	33	33	56	82
16.59	8.61	18.91	9.89	23.51	12.47	21.43	11.5	30.43	42.49
54.4	54.4	69.6	69.6	107.2	107.2	132.0	132.0	224.0	328.0
1.3	1.3	1.42	1.42	1.64	1.64	1.64	1.64	1.9	2.1
0.82	1.58	0.92	1.76	1.14	2.15	1.54	2.87	1.84	1.93
0.82	1.58	0.92	1.76	1.14	2.15	1.54	2.87	1.84	1.93
<2.5%		<2.5%		<2.5%		<2.5%		<2%	
0.86	2.9	0.73	2.46	0.63	2.04	0.74	2.5	0.39	0.26
2.8	11.5	2.6	9	2.7	9.6	3.2	11	1.9	1.5
1.71	1.71	2.34	2.34	3.34	3.34	4.59	4.59	14.7	22
2.19	1.99	2.02	1.86	1.62	1.47	1.43	1.39	1.69	1.54
3.26	3.97	3.56	3.66	4.29	4.71	4.32	4.4	4.87	5.77
3,740	3,740	4,500	4,500	4,626	4,626	4,800	4,800	4,400	4,090
0.36	0.4	0.33	0.36	0.25	0.27	0.25	0.26	0.24	0.18
10.47	10.47	12.27	12.27	16.37	16.37	20.7	20.7	29.47	38.97
784		784		784		784		1,400	
343		343		343		343		690	
CLASS-F		CLASS-F		CLASS-F		CLASS-F		CLASS-F	
IP-65		IP-65		IP-65		IP-65		IP-65	
700x700x20								700x700x20	

AC Servo Motors BL 110/140/190 Series

Performance Curves



Resolver Specifications

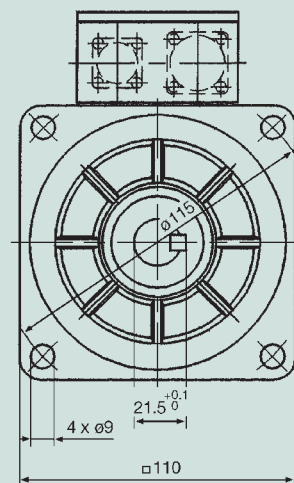
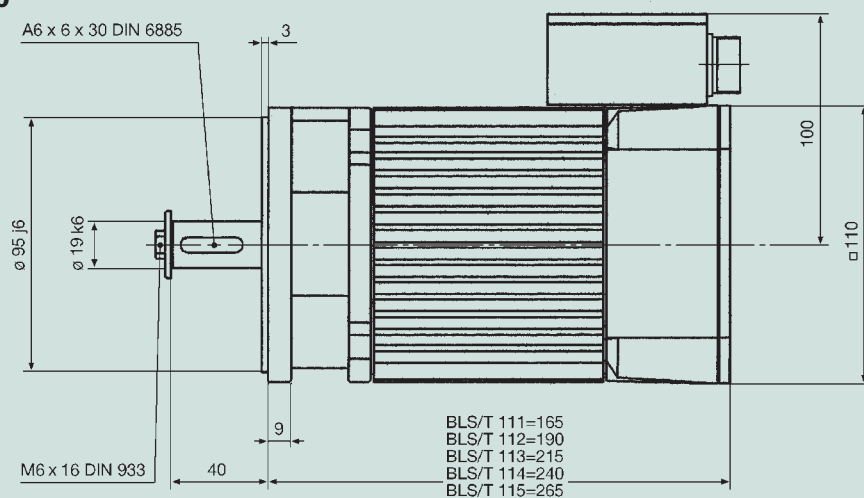
	UNITS	2T8 (Transmitter Speed 1)
Input Voltage/Frequency	V/kHz	10/4.5
Primary Element		Rotor
Number of Speed		1X
Transformation Ratio		0.5 ± 5%
Electrical Error	minutes	±10 max.
Dielectric Strength	VAC/1 minute	500
Mass	kg	0.230
Rotor Moment of Inertia	kg m ² 10 ⁻³	0.0123
Operating Temperature Range	°C	-55 ~ +155

Brake Specifications

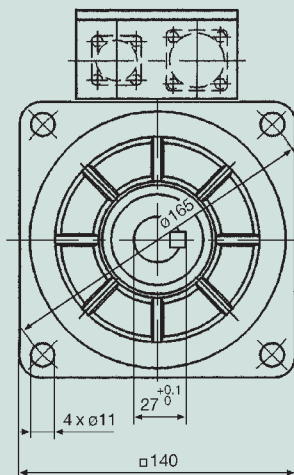
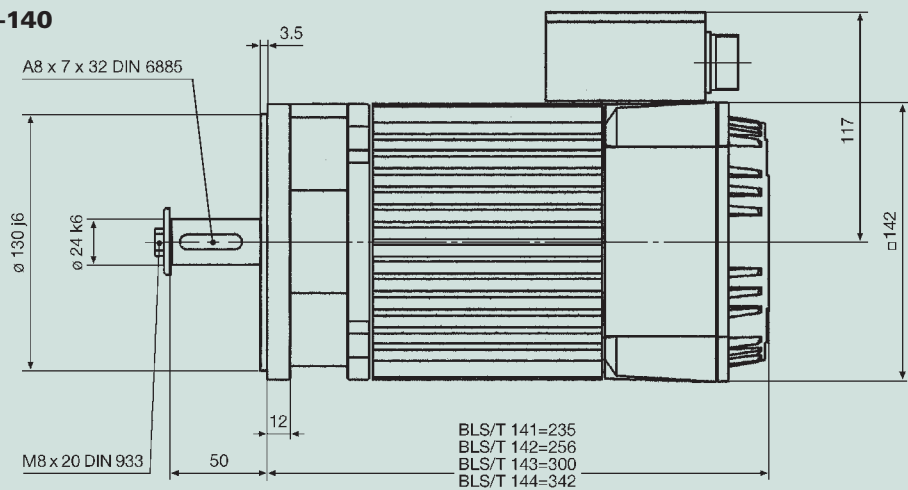
	SIZE	TORQUE Nm	INERTIA kg cm ²	MASS kg
BL-111 / 112	10	8	0.30	0.8
BL-113 / 114 / 115	10	12	0.30	0.8
BL-141 / 142 / 143 / 144	11	20	9.5	1.9
BL-191 / 192	09	72	16	2.85

The BL Series incorporates the option of a fail-safe holding brake within the structure of the motor.

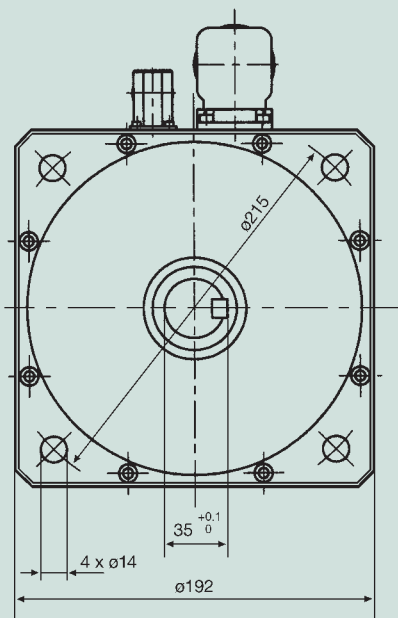
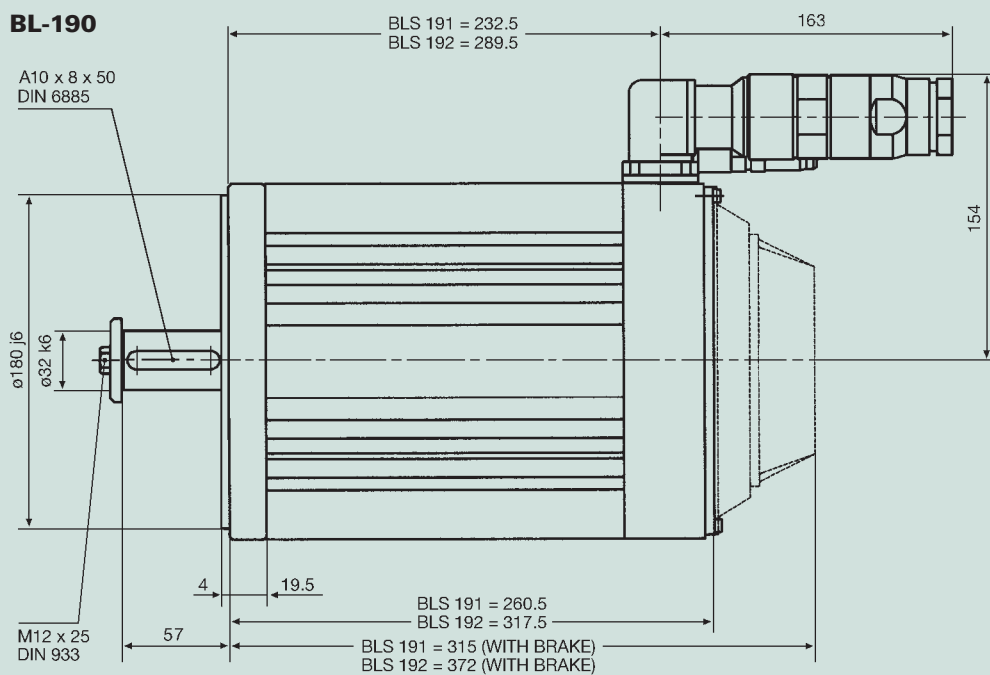
BL-110



BL-140



BL-190



ROLIVAM Tachogenerators

ROLIVAM TACHOGENERATORS are designed and produced by a leading manufacturer of precision A.C. and D.C. servomotors. They have been designed to stop, position, accelerate or change direction without cogging and with fluctuations of less than 1.5 % (pp).

Electro-mechanic configuration with winding on 2 parallel branches, four brushes (2 on each line), a copper-silver alloy commutator with a great number of segments, good surface finish, rare-earth permanent magnets, very low inertia and high manufacturing quality.

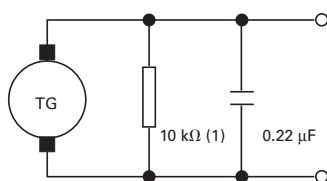
The above means that the ROLIVAM TACHOGENERATORS insure reliable transmission of the output signal and contributes to the ultrafast response in situations where rapid reversals are an essential element in the servo-drive system, without cyclic variation.



Technical Specifications

		D-23 A D-25 A D-26			D-40 D-41 A D-41 B		
UNITS		7 v	10 v	20 v	7 v	10 v	20 v
Voltage Constant $\pm 5\%$	V/1000 rpm	7	10	20	7	10	20
Ripple at 1000 rpm (*) (pp)	%	<1.2	<1.2	<1.2	<1.5	<1.5	<1.5
Linearity at 6000 rpm	%	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1
Reversing Error	%	≤ 0.12	≤ 0.12	≤ 0.12	≤ 0.12	≤ 0.12	≤ 0.12
Temperature Coefficient	$^{\circ}\text{C}/\%$	0.02	0.02	0.02	0.03	0.03	0.03
Rotor Inertia	$\text{kg m}^2 10^{-3}$	0.024	0.024	0.024	0.004	0.004	0.004
Resistance	Ω	72	90	380	60	86	275
Inductance	mH	16	25	190	6.3	13	42
Current	mA	5	4	3	2	2	1.5
Maximum Current	mA	20	17	10	8	8	6
Maximum Speed	rpm	8,000	8,000	8,000	9,000	9,000	6,000
Brushes Life Expectancy	revolutions	1.1×10^9	1.1×10^9	1.1×10^9	3.24×10^9	3.24×10^9	3.24×10^9
Number of Poles		4	4	4	4	4	4

(*) Ripple Test Circuit

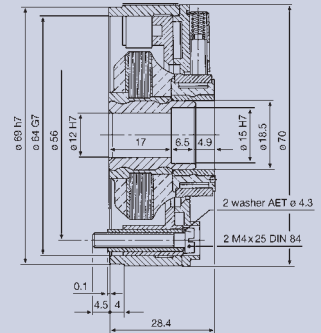
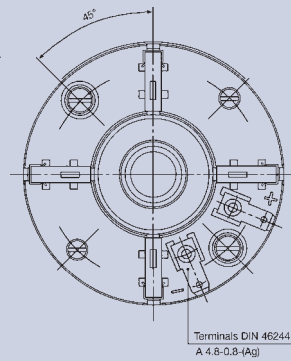


(1) 20 v = 20 kΩ

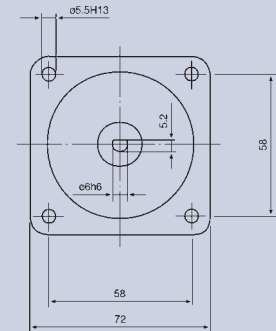
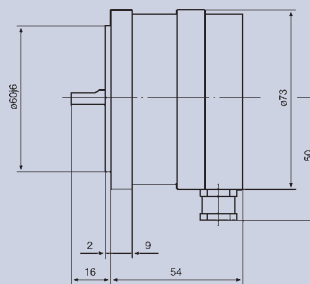
MODELS	D-23 A	D-25 A	D-26	D-40	D-41 A	D-41 B
MASS (kg)	0.28	0.64	0.29	0.11	0.32	0.32



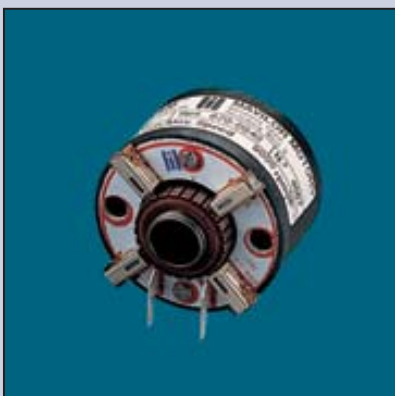
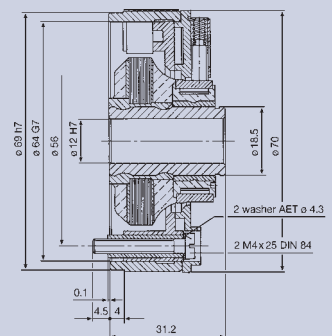
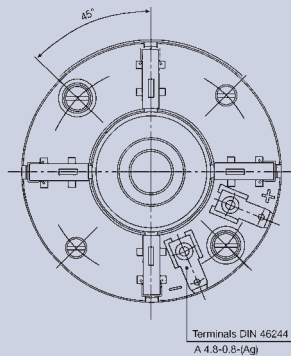
D-23 A



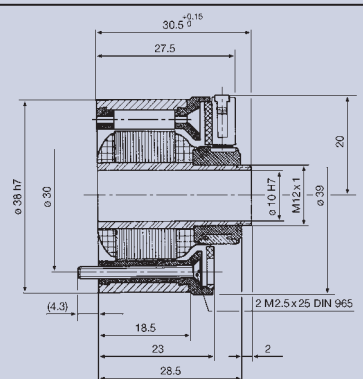
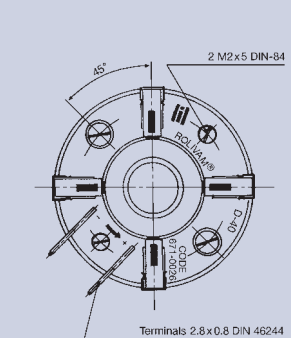
D-25 A



D-26



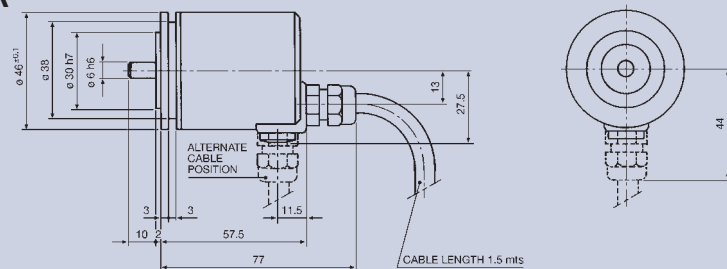
D-40



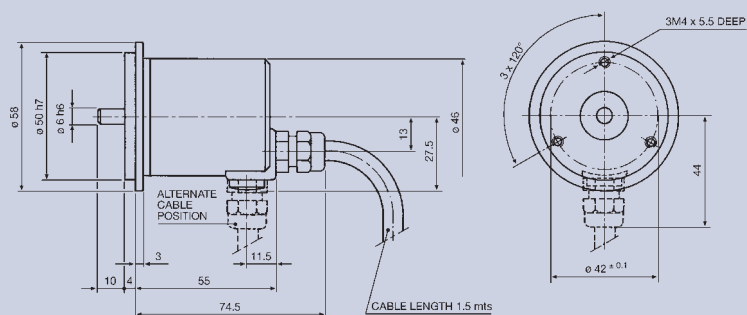
ROLIVAM Tachogenerators



D-41 A



D-41 B



Brakes

These Electro-Magnetic Brakes are Single Disc units which operate on the Fail Safe principle. Functionally the brake is released by energisation of the operating coil with D.C. supply, and is applied by interruption of the coil current or power failure.



Technical Specifications

	STATIC TORQUE (Nm)	VOLTAGE (V)	CURRENT (A)	INERTIA OF FRICTION DISC (kg cm ²)	MASS (kg)
FB-00	4	24	1.2	0.3	0.8
	8				
	12				
* without chopper					

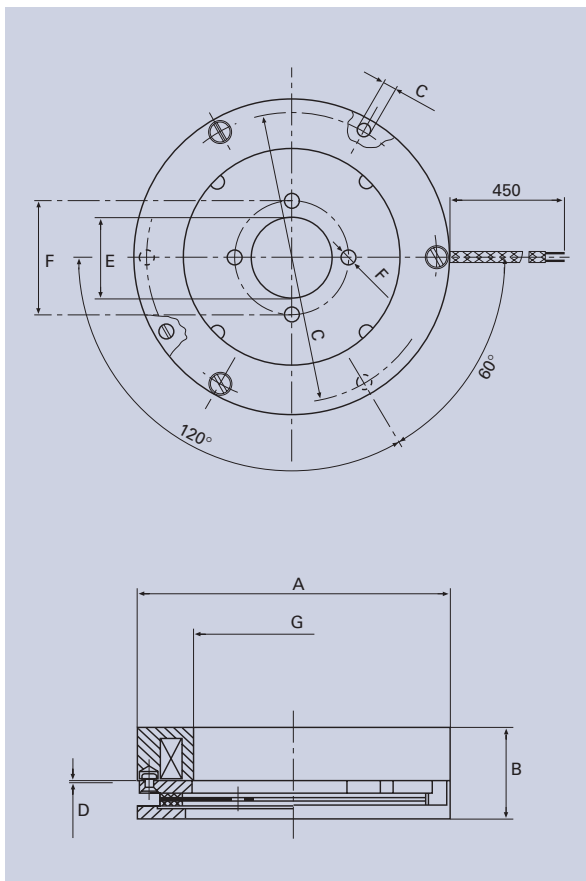
	STATIC TORQUE (Nm)	START POWER (W)	CONSTANT POWER (W)	INERTIA OF FRICTION DISC (kg cm ²)	MASS (kg)
FB-07	0.35	142	5	0.08	0.3
	0.7				
	1				
FB-10	1	210	9.5	0.3	0.8
	2				
	4				
	8				
	16				
FB-14	3.5	220	10	1.54	1.5
	7.5				
	15				
	30				
* with chopper					

Chopper Specifications

	SYMBOLS	UNITS	DATA
Supply Voltage (-30%+15%) ripple max. 4%	U ₁	V	24
Overexcitation Voltage	U	V	-2
Overexcitation Time	T	ms	150
Overexcitation Current	I	A	10 max
Retention Voltage (Chopper for FB-10/14)	U ₃	V	5.5
Retention Voltage (Chopper for FB-07)	U ₃	V	4.8
Retention Current	I ₃	A	2
Response Time	T	ms	50
Chopper Frequency	F	kHz	20
Operating Temperature	T	°C	0-70
Mass	M	kg	0.095

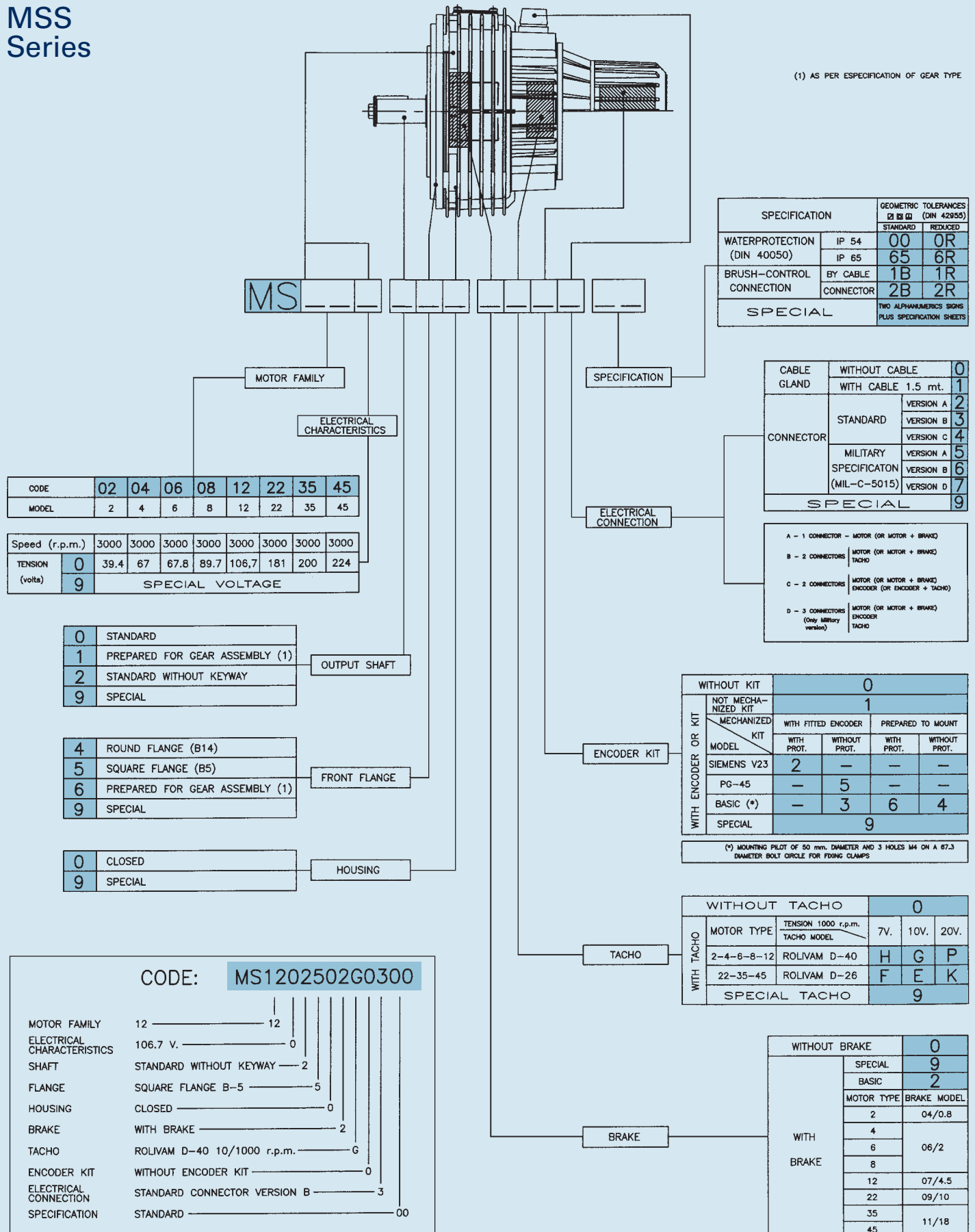
Dimensions

	FB-00	FB-07	FB-10	FB-14
A h8	101	75	101	142
B	34	23.7	29	33.7
C	93	69.5	93	134
H12	3 x ø4.3	3 x ø3.4	3 x ø4.3	3 x ø4.3
D ±0.05	0.3	0.2	0.3	0.4
E	26	20	26	26
F	36	28	36	36
H12	ø4.3	ø4.3	ø4.3	ø4.3
G H8	60	56	65	102



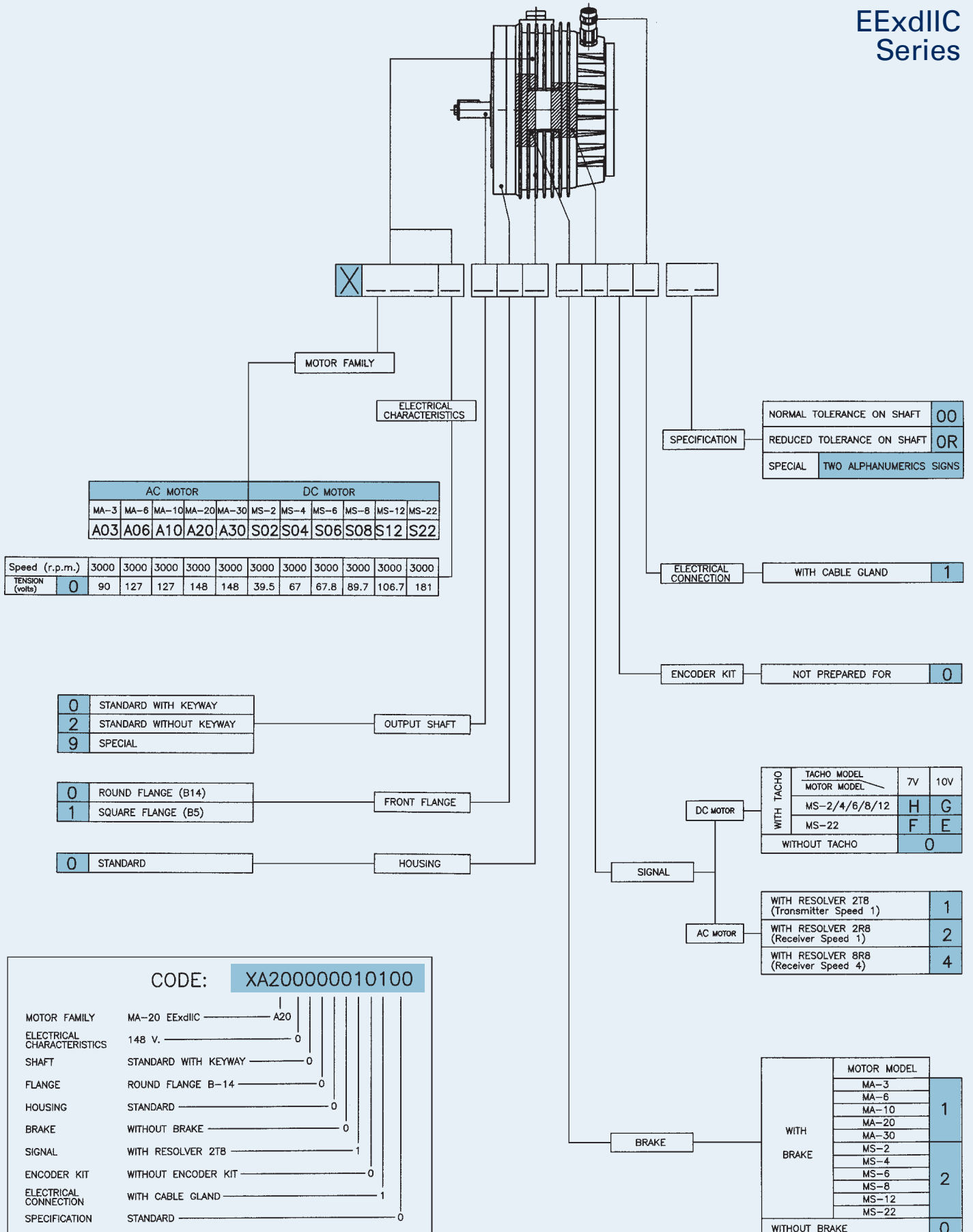
Motor-Codification Diagrams

MSS Series



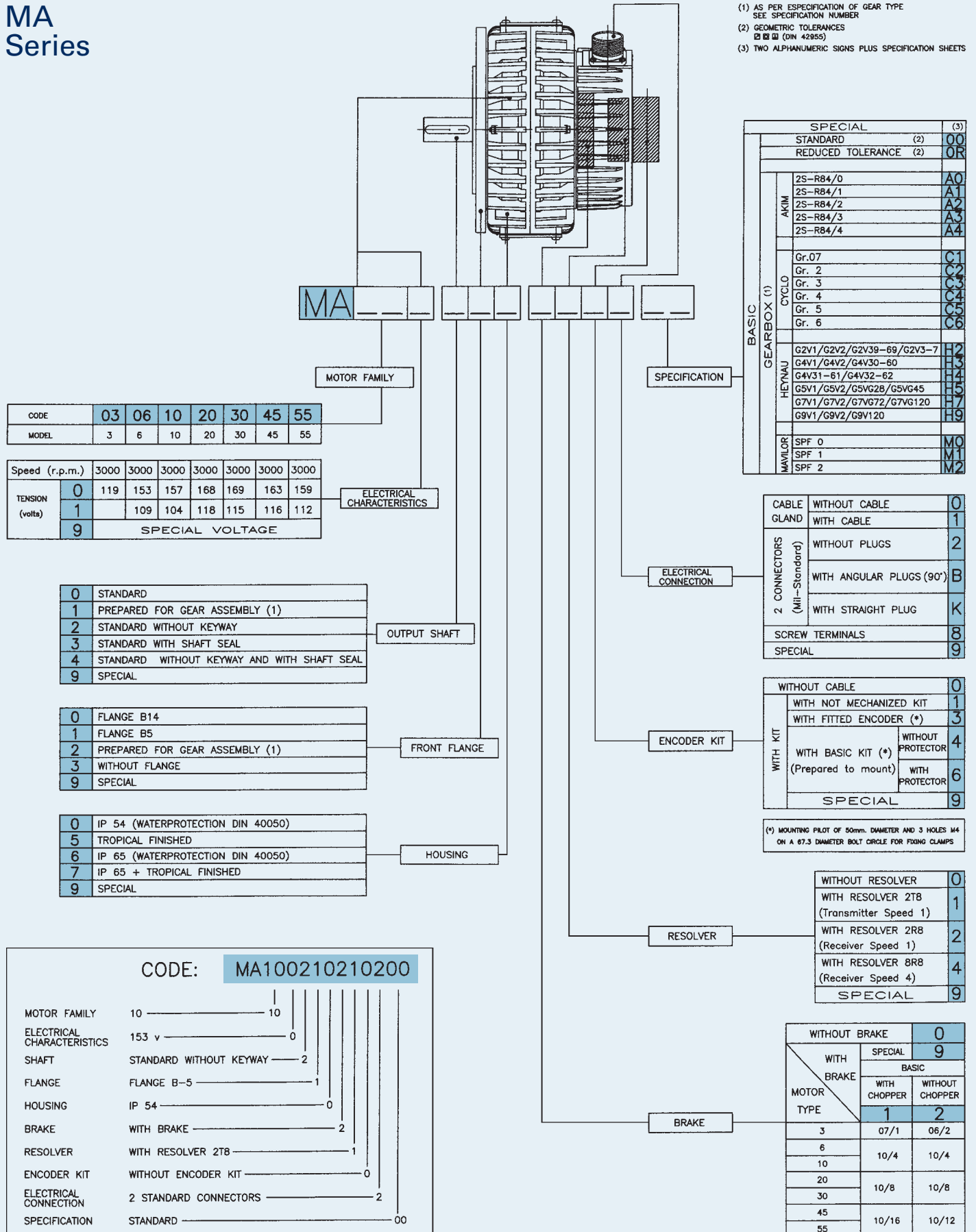
Motor-Codification Diagrams

EExdIIC
Series



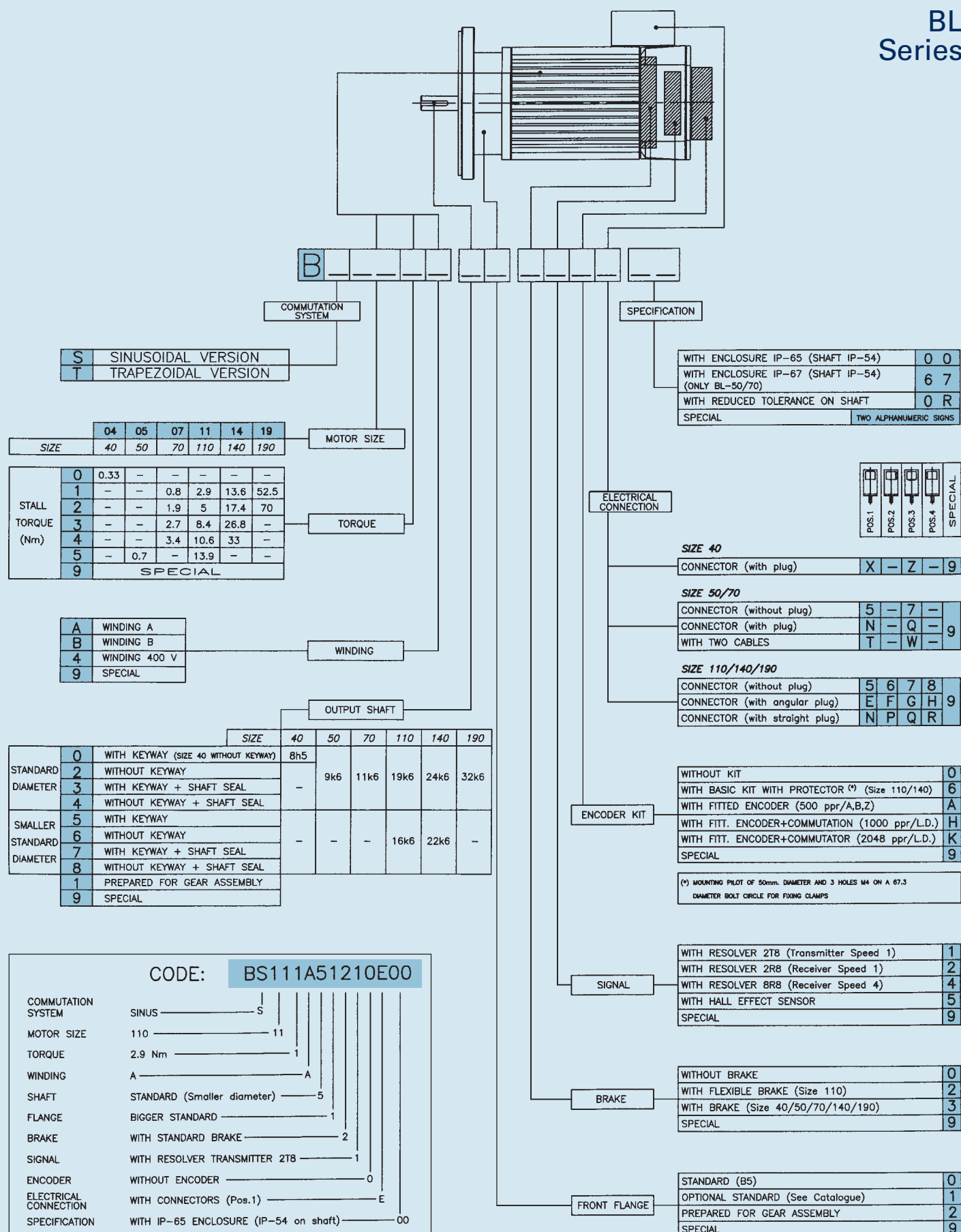
Motor-Codification Diagrams

MA Series



Motor-Codification Diagrams

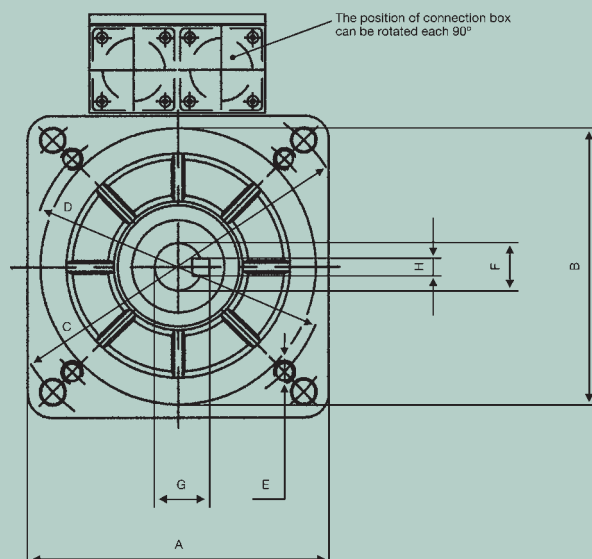
BL
Series



Code list

Model	Motor	Motor with IP-65	With Brake	With Encoder Kit	With Encoder (A)	With Encoder (H)	With Encoder (K)
BLT-55	BT055A00050N00	BT055A00050N00	BT055A00350N00	-----	BT055A0005AN00	BT055A0000HN00	BT055A0000KN00
BLT-71	BT071A00050N00	BT071A00050N00	BT071A00350N00	-----	BT071A0005AN00	BT071A0000HN00	BT071A0000KN00
BLT-72	BT072A00050N00	BT072A00050N00	BT072A00350N00	-----	BT072A0005AN00	BT072A0000HN00	BT072A0000KN00
BLT-73	BT073A00050N00	BT073A00050N00	BT073A00350N00	-----	BT073A0005AN00	BT073A0000HN00	BT073A0000KN00
BLT-74	BT074A00050N00	BT074A00050N00	BT074A00350N00	-----	BT074A0005AN00	BT074A0000HN00	BT074A0000KN00
BLT-111	BT111A00050E00	BT111A00050E00	BT111A00250E00	BT111A00056E00	BT111A0005AE00	BT111A0000HE00	BT111A0000KE00
BLT-112	BT112A00050E00	BT112A00050E00	BT112A00250E00	BT112A00056E00	BT112A0005AE00	BT112A0000HE00	BT112A0000KE00
BLT-113	BT113A00050E00	BT113A00050E00	BT113A00250E00	BT113A00056E00	BT113A0005AE00	BT113A0000HE00	BT113A0000KE00
BLT-114	BT114A00050E00	BT114A00050E00	BT114A00250E00	BT114A00056E00	BT114A0005AE00	BT114A0000HE00	BT114A0000KE00
BLT-115	BT115A00050E00	BT115A00050E00	BT115A00250E00	BT115A00056E00	BT115A0005AE00	BT115A0000HE00	BT115A0000KE00
BLT-141	BT141A00050E00	BT141A00050E00	BT141A00350E00	BS141A00056E00	BT141A0005AE00	BT141A0000HE00	BT141A0000KE00
BLT-142	BT142A00050E00	BT142A00050E00	BT142A00350E00	BS142A00056E00	BT142A0005AE00	BT142A0000HE00	BT142A0000KE00
BLT-143	BT143A00050E00	BT143A00050E00	BT143A00350E00	BS143A00056E00	BT143A0005AE00	BT143A0000HE00	BT143A0000KE00
BLT-144	BT144A00050E00	BT144A00050E00	BT144A00350E00	BS144A00056E00	BT144A0005AE00	BT144A0000HE00	BT144A0000KE00
BLS-40	BS040A00010X00	BS040A00010X00	BS040A00310X00	-----			
BLS-55	BS055A00010N00	BS055A00010N00	BS055A00310N00	-----			
BLS-71	BS071A00010N00	BS071A00010N00	BS071A00310N00	-----			
BLS-72	BS072A00010N00	BS072A00010N00	BS072A00310N00	-----			
BLS-73	BS073A00010N00	BS073A00010N00	BS073A00310N00	-----			
BLS-74	BS074A00010N00	BS074A00010N00	BS074A00310N00	-----			
BLS-111	BS111A00010E00	BS111A00010E00	BS111A00210E00	BS111A00016E00			
BLS-112	BS112A00010E00	BS112A00010E00	BS112A00210E00	BS112A00016E00			
BLS-113	BS113A00010E00	BS113A00010E00	BS113A00210E00	BS113A00016E00			
BLS-114	BS114A00010E00	BS114A00010E00	BS114A00210E00	BS114A00016E00			
BLS-115	BS115A00010E00	BS115A00010E00	BS115A00210E00	BS115A00016E00			
BLS-141	BS141A00010E00	BS141A00010E00	BS141A00310N00	BS141A00016E00			
BLS-142	BS142A00010E00	BS142A00010E00	BS142A00310N00	BS142A00016E00			
BLS-143	BS143A00010E00	BS143A00010E00	BS143A00310N00	BS143A00016E00			
BLS-144	BS144A00010E00	BS144A00010E00	BS144A00310N00	BS144A00016E00			
BLS-191	BS191A00010E00	BS191A00010E00	BS191A00310N00				
BLS-192	BS192A00010E00	BS192A00010E00	BS192A00310N00				
MA-3	MA030006010B00	MA030006010B00	MA030006210B00	MA030006016B00			
MA-6	MA060000010B00	MA060006010B00	MA060000210B00	MA060000016B00			
MA-10	MA100000010B00	MA100006010B00	MA100000210B00	MA100000016B00			
MA-20	MA200000010B00	MA200006010B00	MA200000210B00	MA200000016B00			
MA-30	MA300000010B00	MA300006010B00	MA300000210B00	MA300000016B00			
MA-45	MA450000010B00	MA450006010B00	MA450000210B00	MA450000016B00			
MA-55	MA550000010B00	MA550006010B00	MA550000210B00	MA550000016B00			
MA-3 EExdIIC	XA030000010100	-----	XA030000210100	-----			
MA-6 EExdIIC	XA060000010100	-----	XA060000210100	-----			
MA-10 EExdIIC	XA100000010100	-----	XA100000210100	-----			
MA-20 EExdIIC	XA200000010100	-----	XA200000210100	-----			
MA-30 EExdIIC	XA300000010100	-----	XA300000210100	-----			
MS-2 EExdIIC	XS020000000100	-----	XS020000200100	-----	XS0200000G0100	XS0200002G0100	
MS-4 EExdIIC	XS040000000100	-----	XS040000200100	-----	XS0400000G0100	XS0400002G0100	
MS-6 EExdIIC	XS060000000100	-----	XS060000200100	-----	XS0600000G0100	XS0600002G0100	
MS-8 EExdIIC	XS080000000100	-----	XS080000200100	-----	XS0800000G0100	XS0800002G0100	
MS-12 EExdIIC	XS120000000100	-----	XS120000200100	-----	XS1200000G0100	XS1200002G0100	
MS-22 EExdIIC	XS220000000100	-----	XS220000200100	-----	XS2200000E0100	XS2200002E0100	
MSK-08	MSK800000000000	MSK800000000000	-----	-----	MSK800000G0100	-----	
MSS-2	MS020040000000	MS020040000065	MS020040200100	MS020040006100	MS0200400G0100	MS0200402G0100	
MSS-4	MS040040000000	MS040040000065	MS040040200100	MS040040006100	MS0400400G0100	MS0400402G0100	
MSS-6	MS060040000000	MS060040000065	MS060040200100	MS060040006100	MS0600400G0100	MS0600402G0100	
MSS-8	MS080040000000	MS080040000065	MS080040200100	MS080040006100	MS0800400G0100	MS0800402G0100	
MSS-12	MS120040000000	MS120040000065	MS120040200100	MS120040006100	MS1200400G0100	MS1200402G0100	
MSS-22	MS220040000000	MS220040000065	MS220040200100	MS220040006100	MS2200400E0100	MS2200402E0100	
MSS-35	MS350040000000	MS350040000065	MS350040200100	MS350040006100	MS3500400E0100	MS3500402E0100	
MSS-45	MS450040000000	MS450040000065	MS450040200100	MS450040006100	MS4500400E0100	MS4500402E0100	

Optional Dimensions



Optional flange mounting

	BL-110	BL-140
A	□ 115	□ 140
B	ø110 j6	ø110 j6
C	ø130	ø165
D	—	ø130
E	—	4xM10

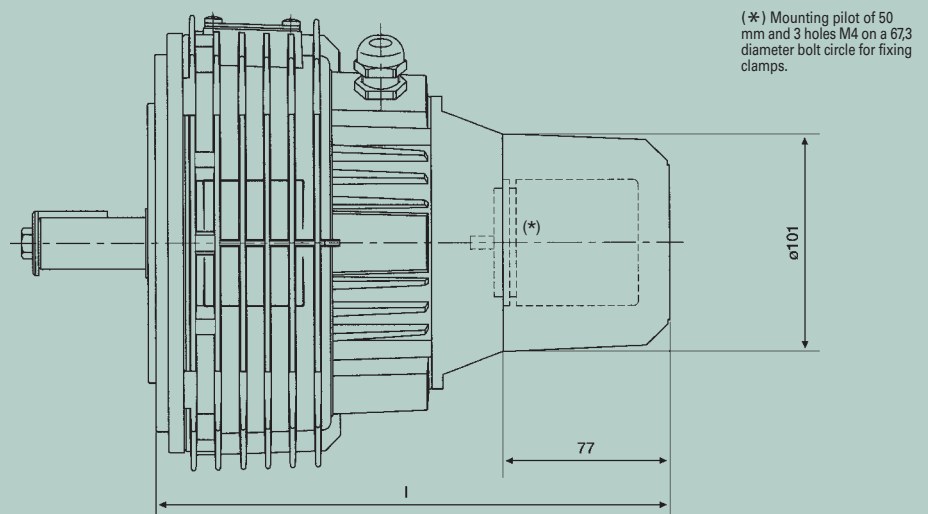
Smaller output Shaft

	BL-110	BL-140
F	ø16 k6	ø22 k6
G	18 $^{+0.1}_0$	24.5 $^{+0.1}_0$
H	5x5x30	6x6x32

Optional Accessories

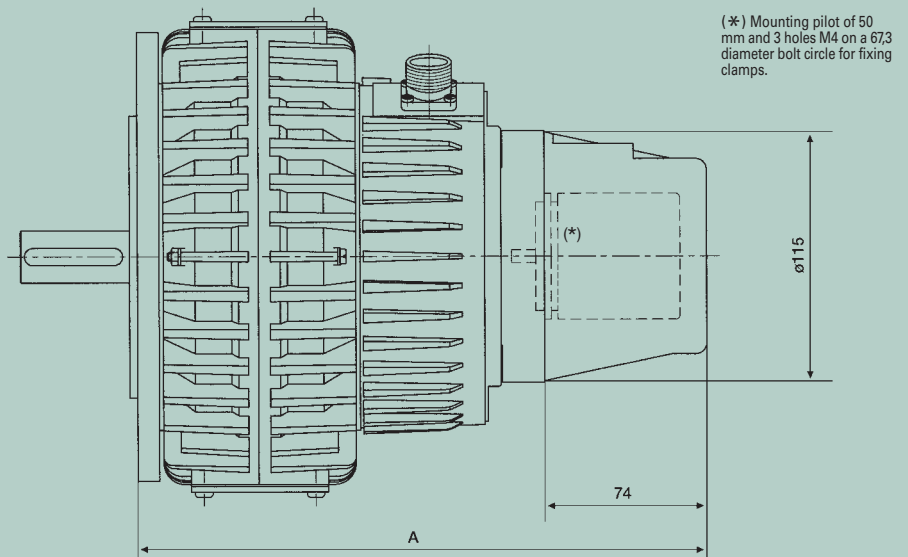
MSS Encoder Kit (no encoder)

	I
MSS-2	235
MSS-4	233
MSS-6	233
MSS-8	243.5
MSS-12	237.5
MSS-22	265.5
MSS-35	291
MSS-45	291



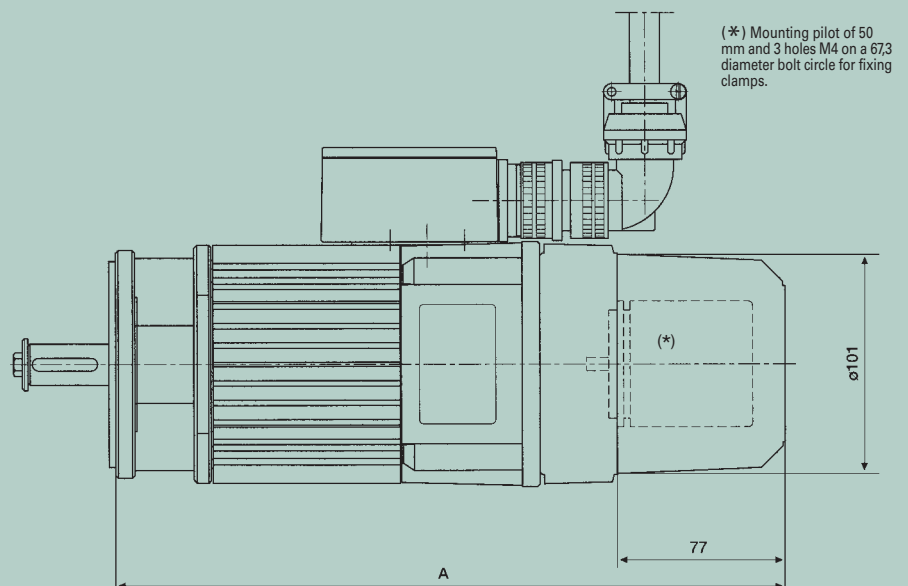
MA Encoder Kit (no encoder)

	A
MA-6	237.5
MA-10	237.5
MA-20	252.5
MA-30	261.5
MA-45	274
MA-55	274

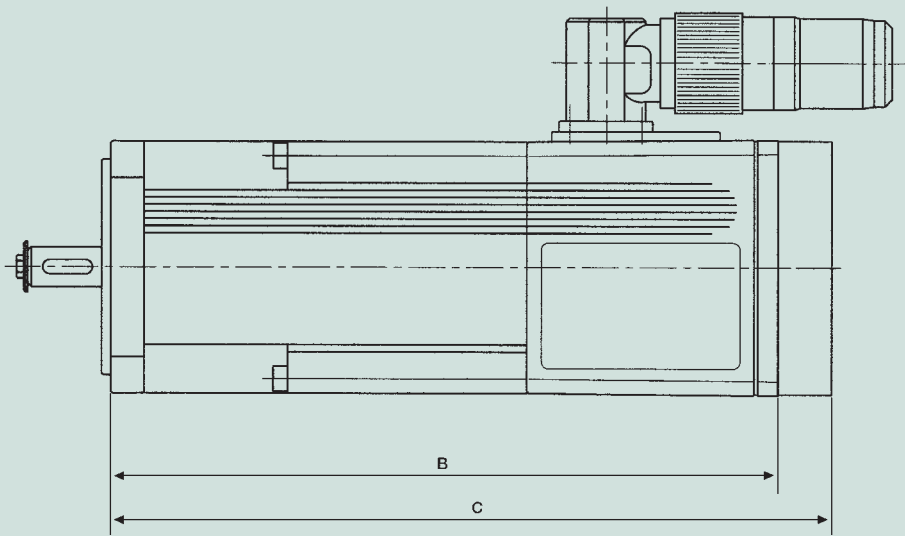


BL 110/140 Encoder Kit (no encoder)

	A
BL-111	282
BL-112	307
BL-113	332
BL-114	357
BL-115	382
BL-141	346
BL-142	367
BL-143	411
BL-144	453



Optional Accessories



**BL 50/70
With Fitted
Encoder**

Dimensions

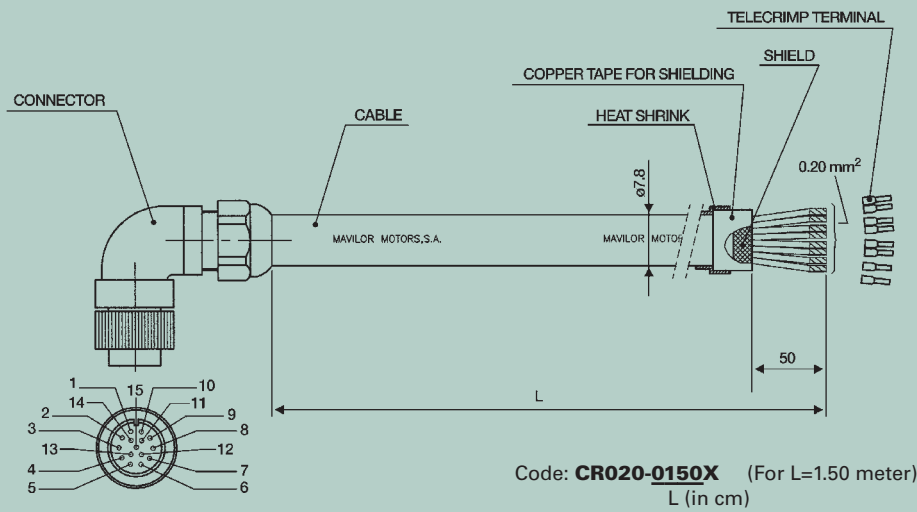
WITHOUT BRAKE		BL-55	BL-71	BL-72	BL-73	BL-74
B		142	128.5	148.5	166.5	184.5
C	Encoder Type "A"	142	147	167	185	203
	Encoder Type "H"	142	128,5	148,5	166.5	184.5
	Encoder Type "K"	—	128,5	148,5	166.5	184.5

WITH BRAKE		BL-55	BL-71	BL-72	BL-73	BL-74
B		180.5	128.5	148.5	166.5	184.5
C	Encoder Type "A"	180.5	147	167	185	203
	Encoder Type "H"	—	136	156	166.5	184.5
	Encoder Type "K"	—	136	156	166.5	184.5

Encoder Specifications

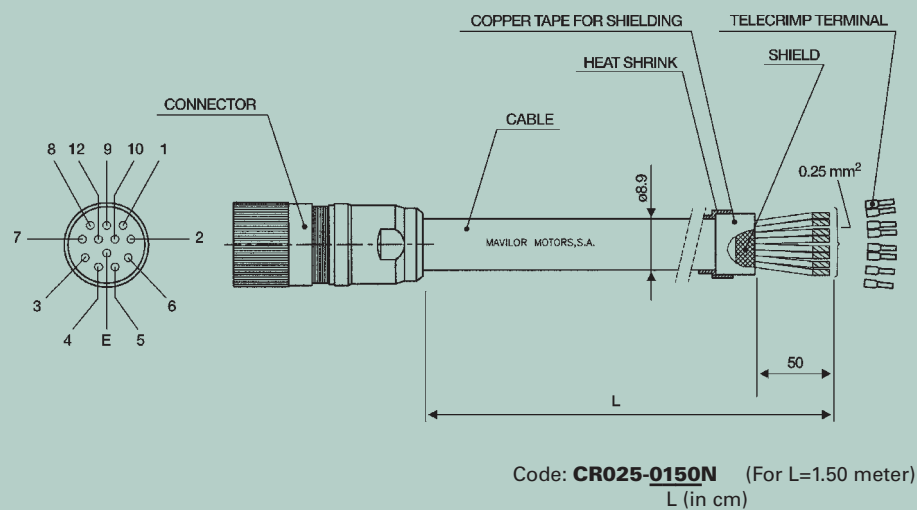
	TYPE "A"	TYPE "H"	TYPE "K"
Waveform	Square Wave	Square Wave	
Line Counts	500 ppr	1000 ppr	2048 ppr
Channels	A, B, Z Open-Collector	A, B, Z, $\bar{A}$, $\bar{B}$, $\bar{Z}$ / U, V, W, $\bar{U}$, $\bar{V}$, $\bar{W}$ Line drives (RS422)	
Supply Voltage	5VDC $\pm$ 10%	5VDC $\pm$ 10%	
Frequency Response	100 kHz	200 kHz	
Operating Temperature	-40 °C ~ +100 °C	-40 °C ~ +120 °C	

Resolver Cable Assembly Kit



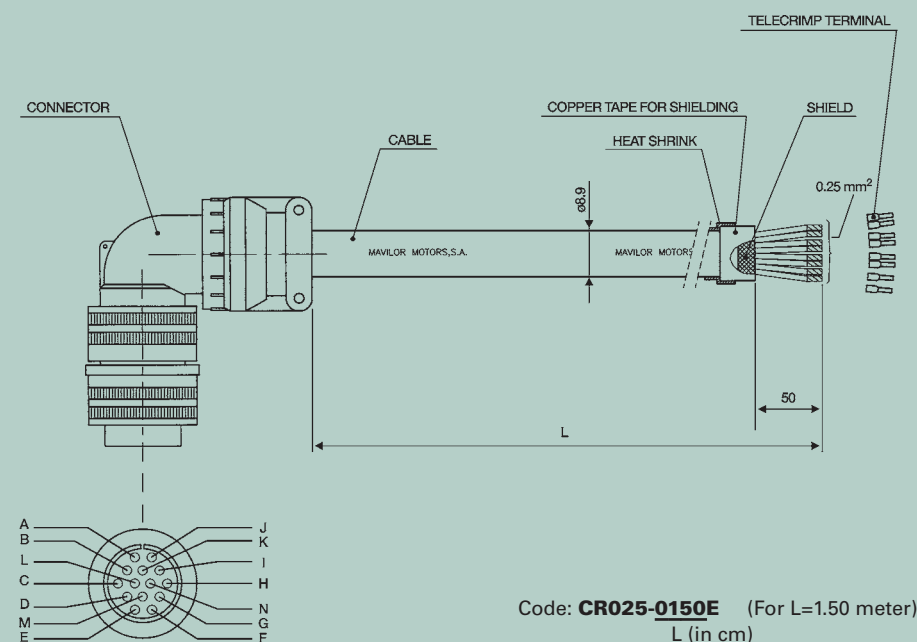
BL-40

CONTACT	COLOR	FUNCTION
1	Grey	S4 (SEN -)
2	Pink	S2 (SEN +)
3	Blue	S1 (COS -)
4	Red	S3 (COS +)
5	Yellow	R1 (REF +)
6	Green	R2 (REF -)
7	Brown	Temp. Contact
8	White	Temp. Contact



BL-50/70

CONTACT	COLOR	FUNCTION
2	Pink	S2 (SEN +)
1	Grey	S4 (SEN -)
3	Blue	S1 (COS -)
4	Red	S3 (COS +)
8	Yellow	R1 (REF +)
7	Green	R2 (REF -)
5	Brown	Temp. Contact
6	White	Temp. Contact

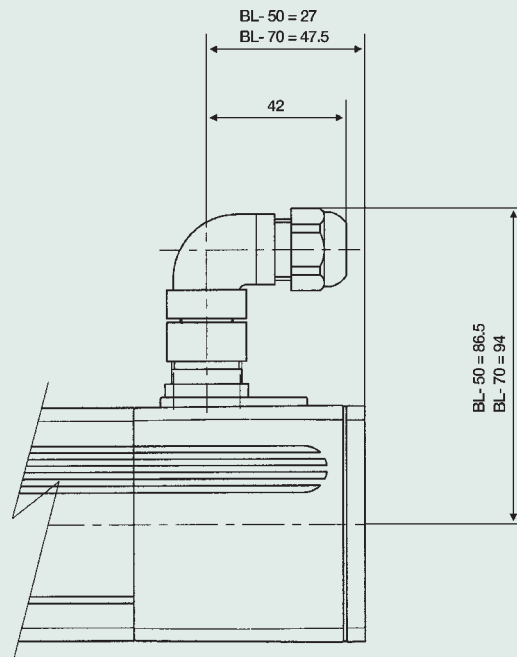


BL-110/140 MA-3 to MA-55

CONTACT	COLOR	FUNCTION
A	Pink	S2 (SEN +)
B	Grey	S4 (SEN -)
C	Blue	S1 (COS -)
D	Red	S3 (COS +)
E	Yellow	R1 (REF +)
F	Green	R2 (REF -)
H	Brown	Temp. Contact
I	White	Temp. Contact

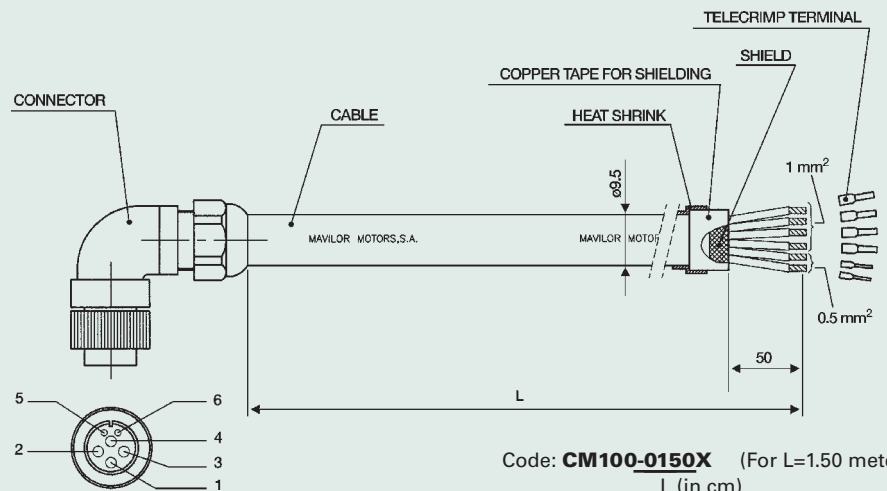
Optional Connectors

BL-50/70



BL-50/70 Power Cable Assembly Kit (optional)

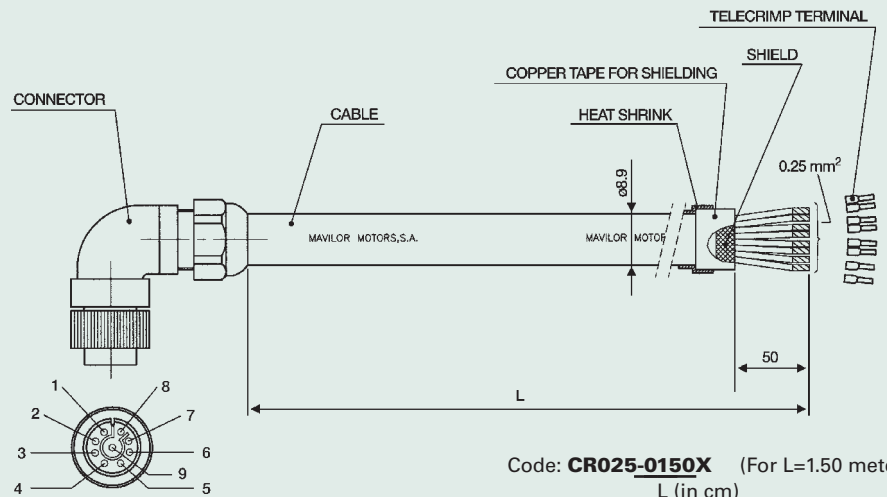
CONTACT	COLOR	FUNCTION
1	Brown	Phase 1 U
2	Black	Phase 2 V
3	Blue	Phase 3 W
4	Yellow/Green	Ground $\oplus$
5	Red	Brake +
6	White	Brake -



Code: **CM100-0150X** (For L=1.50 meter)
L (in cm)

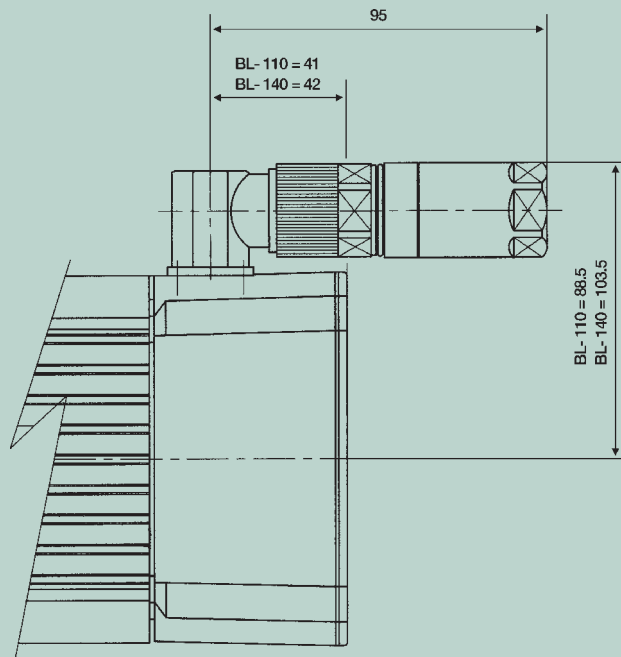
BL-50/70 Resolver Cable Assembly Kit (optional)

CONTACT	COLOR	FUNCTION
1	Grey	S4 (SEN -)
2	Pink	S2 (SEN +)
3	Blue	S1 (COS -)
4	Red	S3 (COS +)
5	Yellow	R1 (REF +)
6	Green	R2 (REF -)
7	Brown	Temp. Contact
8	White	Temp. Contact

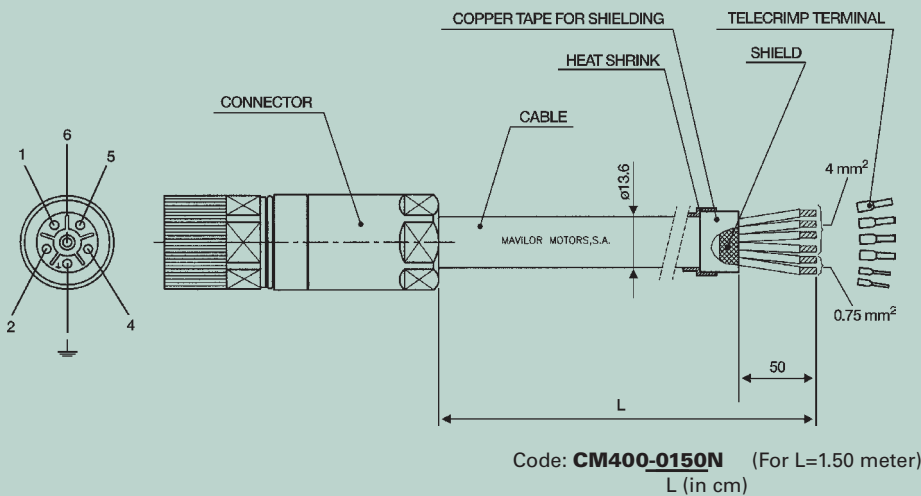


Code: **CR025-0150X** (For L=1.50 meter)
L (in cm)

Optional Connector

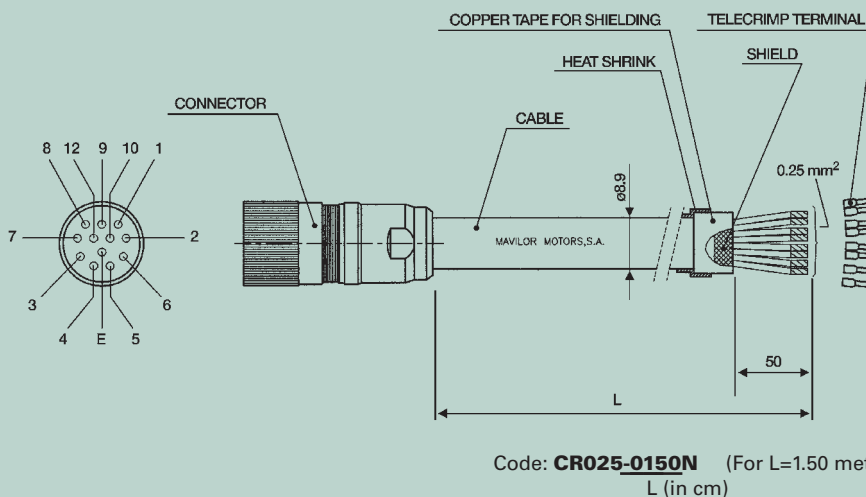


BL-110/140
(No terminal BOX)



BL-110/140
Power Cable
Assembly Kit
(optional)

CONTACT	COLOR	FUNCTION
1	Blue	Phase 3 W
2	Brown	Phase 1 U
⊕	Yellow/Green	Ground ⊕
4	Black	Phase 2 V
5	Red	Brake +
6	White	Brake -



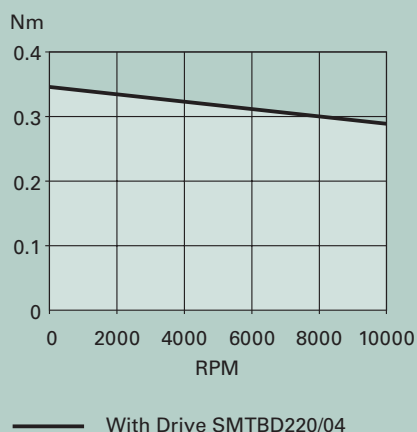
BL-110/140
Resolver Cable
Assembly Kit
(optional)

CONTACT	COLOR	FUNCTION
2	Pink	S2 (SEN +)
1	Grey	S4 (SEN -)
3	Blue	S1 (COS -)
4	Red	S3 (COS +)
8	Yellow	R1 (REF +)
7	Green	R2 (REF -)
5	Brown	Temp. Contact
6	White	Temp. Contact

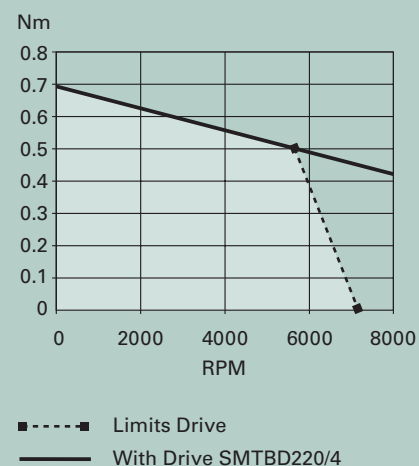
Performance curves with some Infranor's drives

- These curves have been obtained using the most adequate drive in terms of current and voltage to the motor to be controlled.
- The current loop adjustment of the drive has been adapted depending on the characteristics of the motor.
- The limits drive curves refer to the maximum speed with and without load at the nominal voltage of the drive.

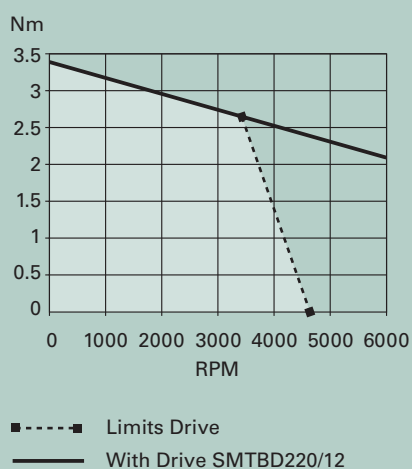
BLS-40 (220 VAC)



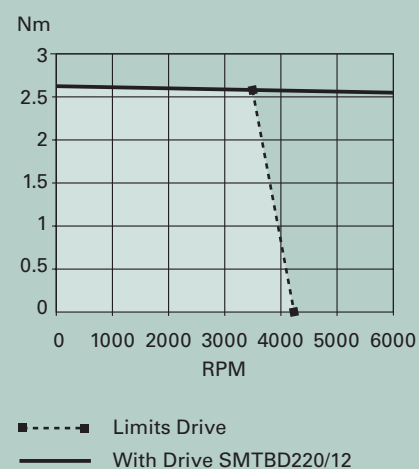
BLS-55 (220 VAC)



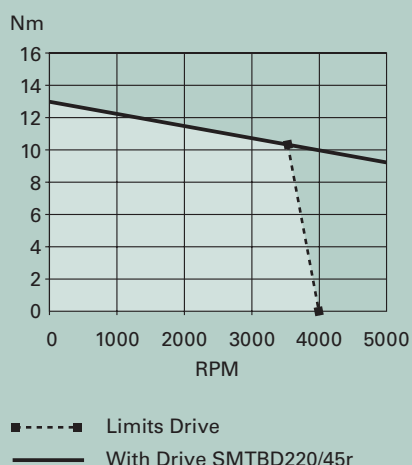
BLS-74 (220 VAC)



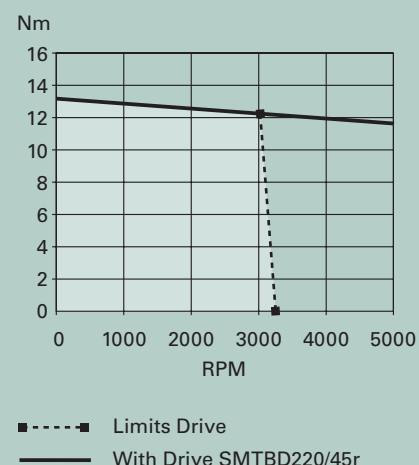
BLS-111 (220 VAC)

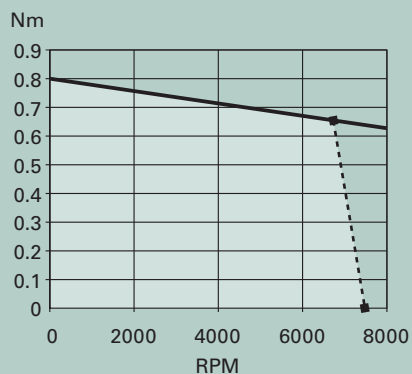


BLS-115 (220 VAC)

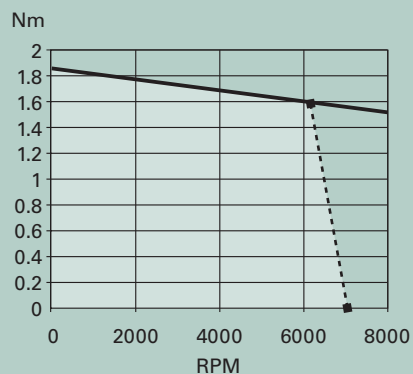


BLS-141 (220 VAC)

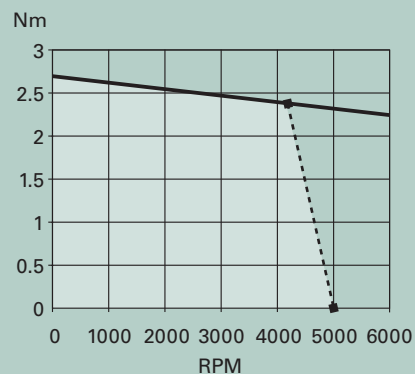


BLS-71 (220 VAC)

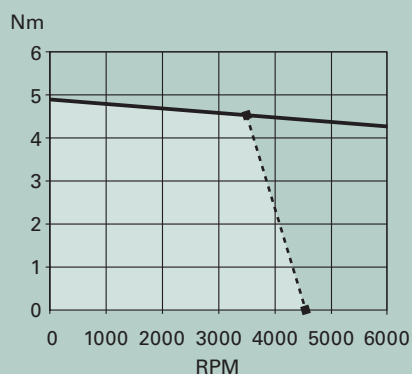
■ - - - Limits Drive
— With Drive SMTBD220/8

BLS-72 (220 VAC)

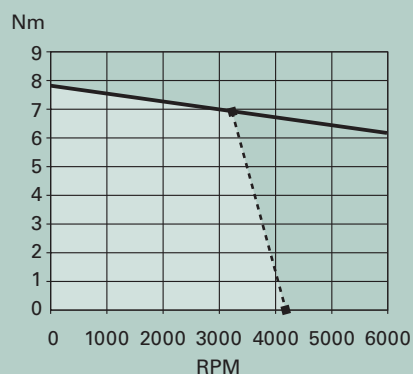
■ - - - Limits Drive
— With Drive SMTBD220/8

BLS-73 (220 VAC)

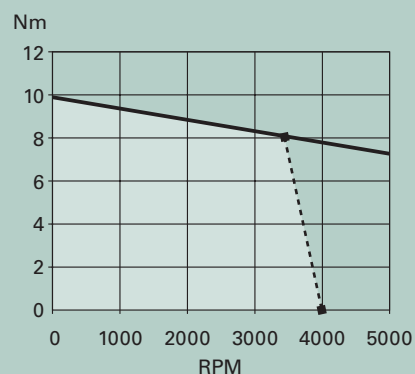
■ - - - Limits Drive
— With Drive SMTBD220/8

BLS-112 (220 VAC)

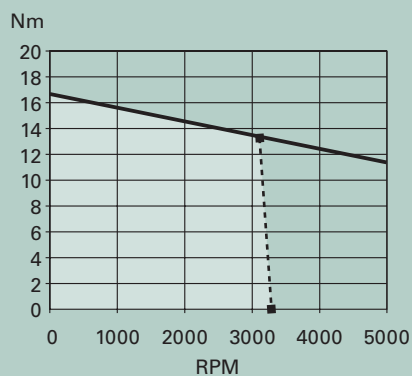
■ - - - Limits Drive
— With Drive SMTBD220/17

BLS-113 (220 VAC)

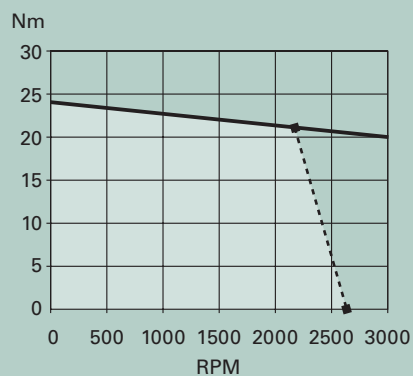
■ - - - Limits Drive
— With Drive SMTBD220/45r

BLS-114 (220 VAC)

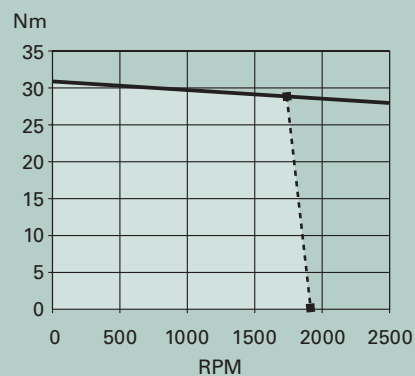
■ - - - Limits Drive
— With Drive SMTBD220/45r

BLS-142 (220 VAC)

■ - - - Limits Drive
— With Drive SMTBD220/45r

BLS-143 (220 VAC)

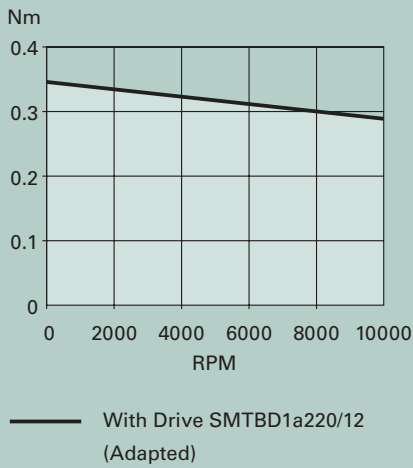
■ - - - Limits Drive
— With Drive SMTBD220/45r

BLS-144 (220 VAC)

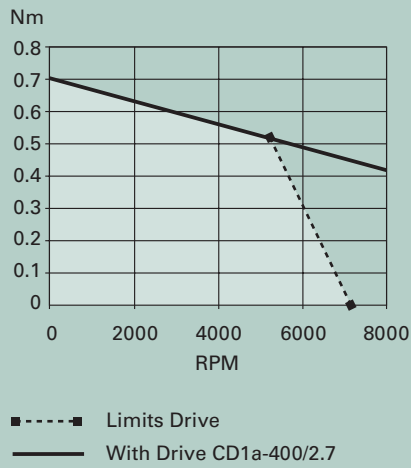
■ - - - Limits Drive
— With Drive SMTBD220/45r

Performance curves with some Infranor's drives

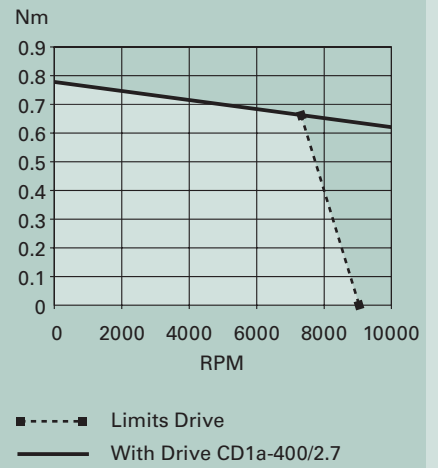
BLS-40 (110 VAC)



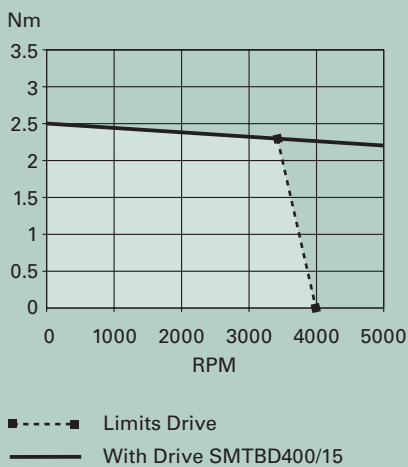
BLS-55 (400 VAC)



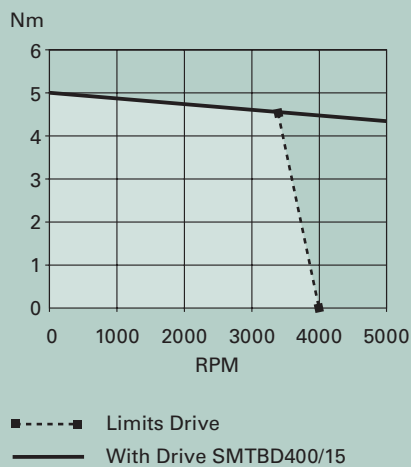
BLS-71 (400 VAC)



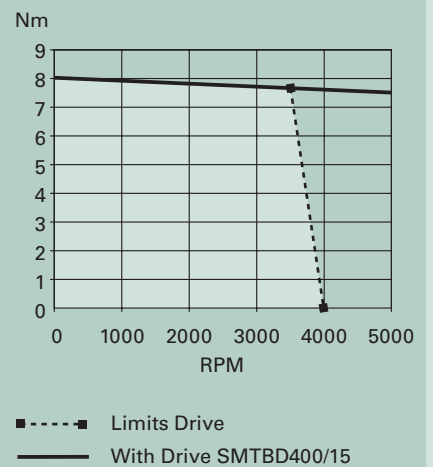
BLS-111 (400 VAC)



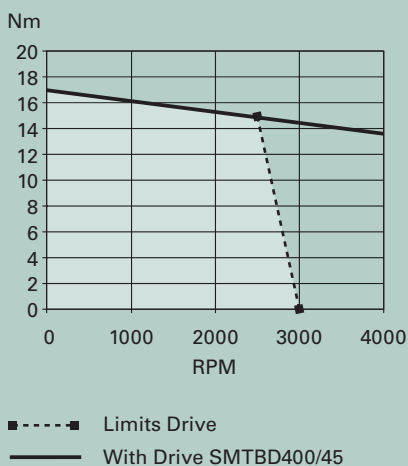
BLS-112 (400 VAC)



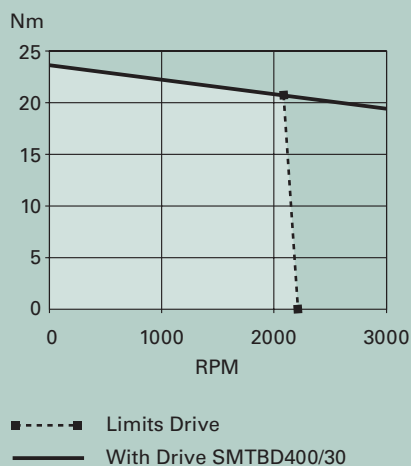
BLS-113 (400 VAC)



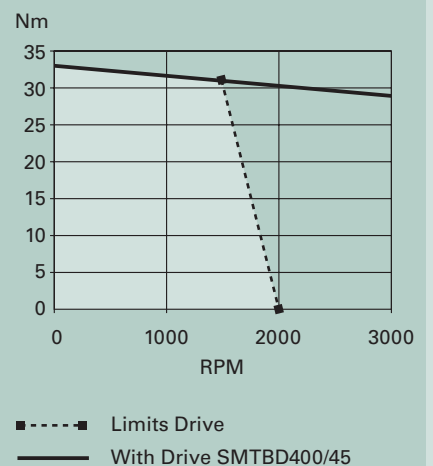
BLS-142 (400 VAC)



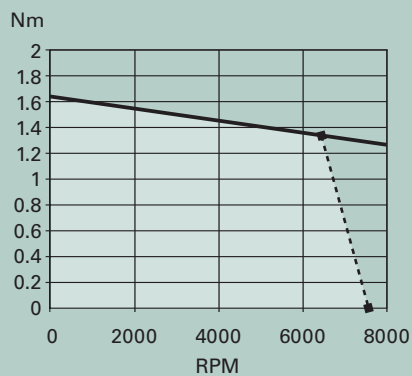
BLS-143 (400 VAC)



BLS-144 (400 VAC)

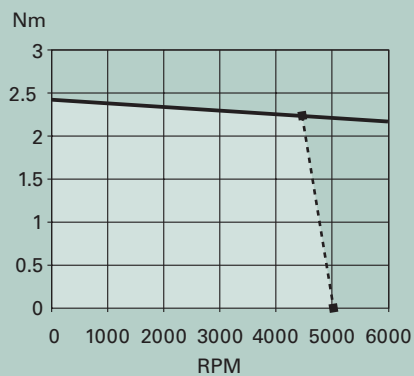


BLS-72 (400 VAC)



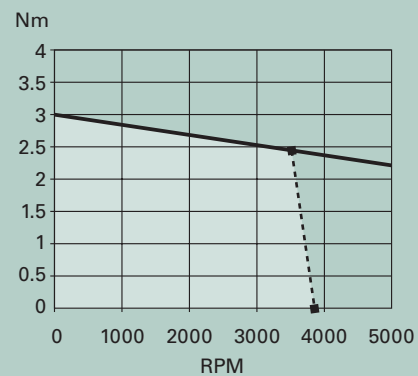
■ - - - ■ Limits Drive
— With Drive SMTBD400/15

BLS-73 (400 VAC)



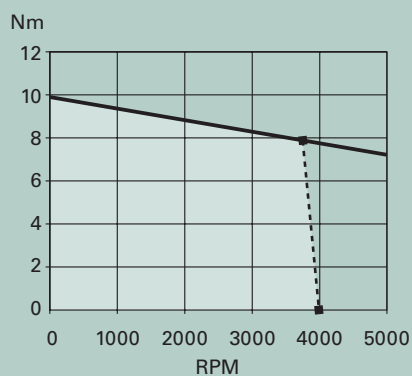
■ - - - ■ Limits Drive
— With Drive CD1a-400/72

BLS-74 (400 VAC)



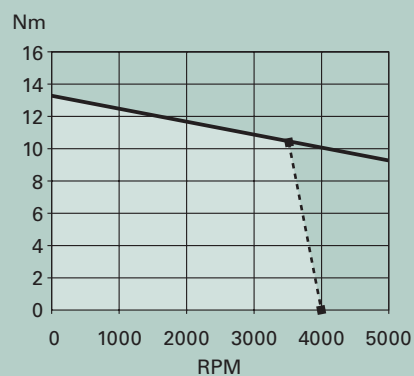
■ - - - ■ Limits Drive
— With Drive SMTBD400/15

BLS-114 (400 VAC)



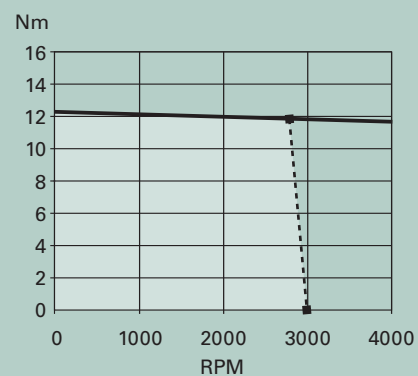
■ - - - ■ Limits Drive
— With Drive SMTBD400/15

BLS-115 (400 VAC)



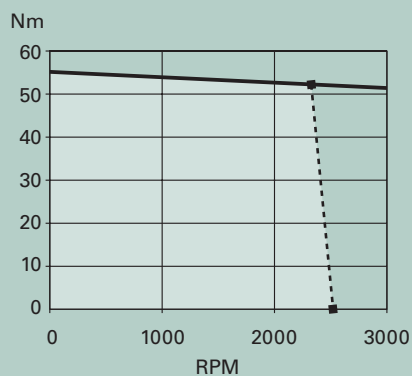
■ - - - ■ Limits Drive
— With Drive SMTBD400/45

BLS-141 (400 VAC)



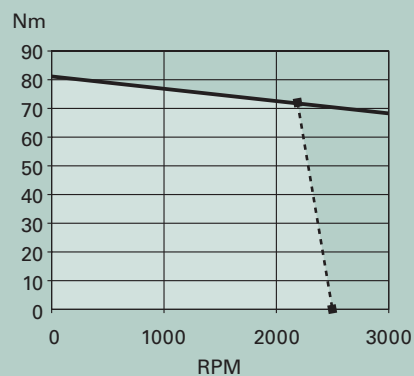
■ - - - ■ Limits Drive
— With Drive SMTBD400/30

BLS-191 (400 VAC)



■ - - - ■ Limits Drive
— With Drive SMTBD400/60

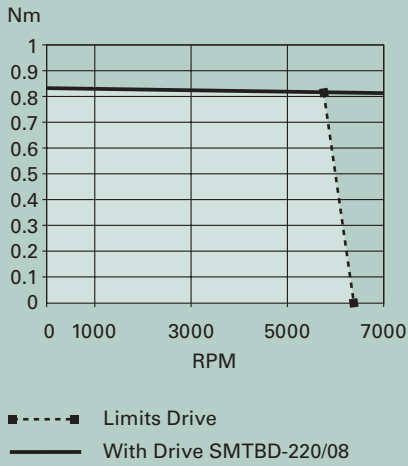
BLS-192 (400 VAC)



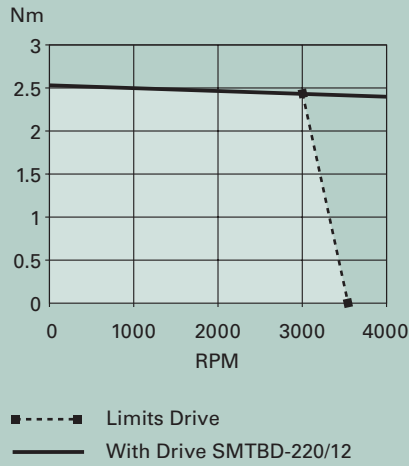
■ - - - ■ Limits Drive
— With Drive SMTBD400/60

Performance curves with some Infranor's drives

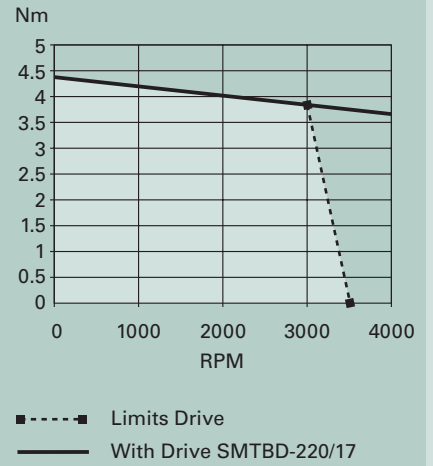
MA-03 (220 VAC)



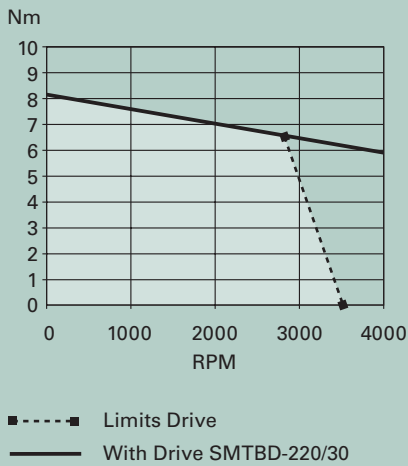
MA-06 (220 VAC)



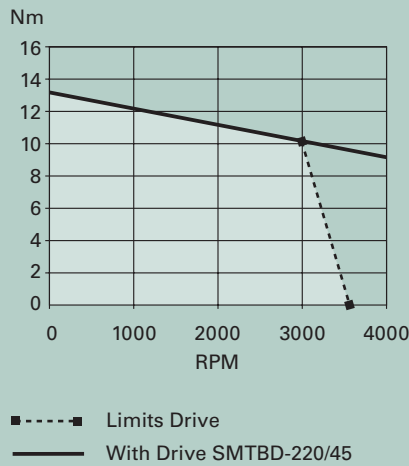
MA-10 (220 VAC)



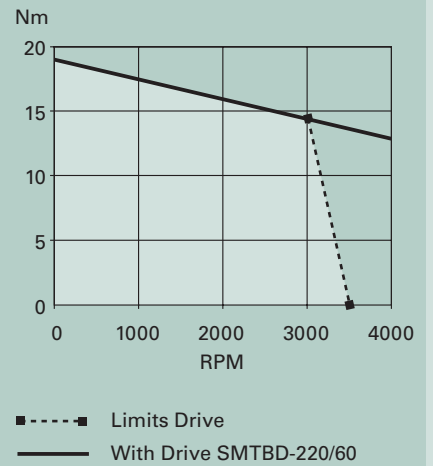
MA-20 (220 VAC)



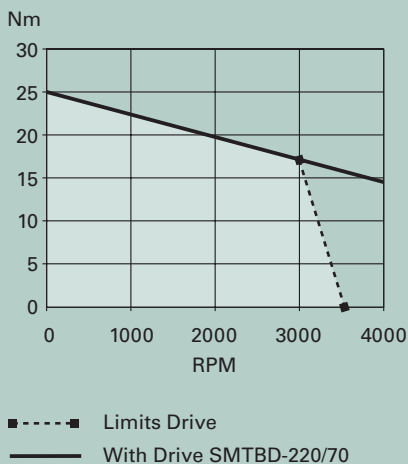
MA-30 (220 VAC)



MA-45 (220 VAC)



MA-55 (220 VAC)







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