Linear-Mech®

Brushless Servomotors

Catalogue 01 / 14

Summary

1. Brushless Servomotors BM Series

LINEARMECH Brushless Servomotors BM Series are produced according to the latest state-of-the-art technology to improve the specific torque and its linear erogation.

The high efficiency servomotors BM Series by Linearmech are made using "**Segmented Lamination Stator Technology**". This technology can pack higher torque and power density into the same-sized motor. It also allows the highest slot fill of the stator winding and the motor to run cooler, potentially extending its operational life.

Brushless servomotors BM Series have been designed for continuous working with natural convection cooling, without external cooling devices. The heat is mainly generated in the stator winding and it is dissipated through the motor external body thanks to the excellent mechanical and thermal coupling between these two parts.

1.1 General data

Motor type:	brushless with sinusoidal back-EMF (synchronous, permanent magnets)
Cooling:	natural convection
Mounting:	IM B5
Magnets material:	NeFeB
Insulation class:	F (overheating on windings 100 K with ambient temperature 40°C and safety margin 15°C)
Protection:	motore body IP 54 motore shaft IP 44 standard, IP 54 with lubricant seal
Operating temperature:	(0 ... + 40)°C
Ambient storage temperature:	(- 10 ... + 60)°C
Humidity:	max. 85 % without condensation
Operating altitude:	< 1000 m ASL (for higher altitude a degrading factor must be applied)
Thermal protection:	optional: PTC, PTO or KTY
Motor feedback:	optical encoder, LINE-DRIVER, 2000 ppr (standard) resolver, 1 pole pairs 7 V rms, 10 kHz (optional) BISS absolute multiturn encoder (optional)
Holding brake:	optional, 24 V dc power supply
Balance quality grade:	G 2.5 (standard) according to IEC 1940-1
Reference standards:	IEC 60034-1, IEC 60034-5, IEC 60034-6, IEC 60034-7, IEC 60034-11, ISO 1940-1
Marked:	CE

1.2 Construction technology

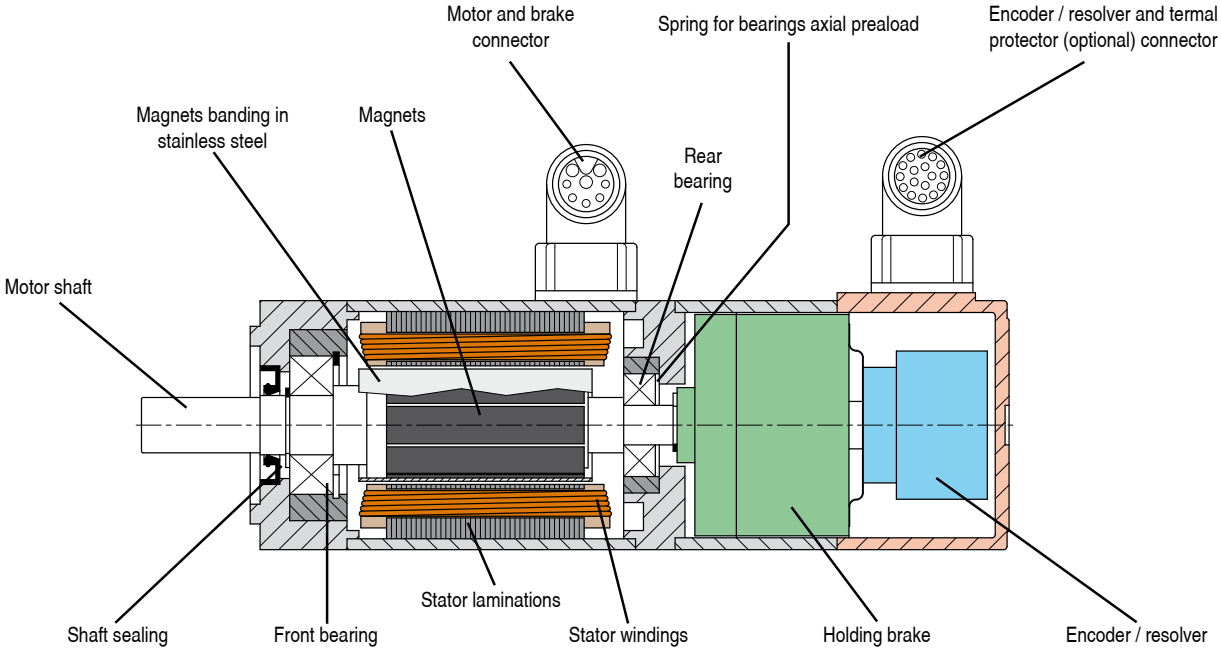
The STATOR of Linearmech brushless servomotors is made according to the **"Segmented Lamination Stator Technology"** to optimize the use of copper. In details, the advantages and benefits of this construction technology are:

- **Greater fill factor**: by winding every tooth individually, segmented lamination stator technology allow higher slot fill compared to more traditional brushless dc motor stators of equal size. With traditional windings, the slot fill is about 30% of the total space. Using the segmented lamination stator technology it's possible to reach 40% and more.
- **Reduced length of end windings**: the end windings do not provide additional power or torque. They only connect "active" electrical conductors from one slot to another. By carrying current, the end windings are naturally affected by losses of electrical power. By reducing their length, the motor efficiency increases.

The segmented lamination stator technology lead to a considerable increase of performances in servomotors, both in torque and efficiency, than motors produced with traditional technology.

Peculiar magnets geometry together with a specific magnets protection create a robust ROTOR structure, minimizing the cogging effect.

- **Magnets geometry**: through FEM software we defined the optimal magnets shape to minimize the cogging effect and the harmonic distortion of the BEMF generated by the motor. The result is a motor with very low cogging torque and a very low torque ripple.
- **Stainless steel magnets protection**: permanent magnets used in brushless servomotors are rare-earth magnets (NdFeB) with great magnetic properties in terms of "energy density". Unfortunately they can be subject to corrosive attack if exposed to particularly aggressive environments, as they are obtained by sintering process. Magnets are also fixed on the motor shaft and they are subject to centrifugal forces and mutual attraction forces while rotating. To ensure the mechanical fixing of magnets and their insulation from the outside, a retaing system based on stainless steel bushes placed in each rotor of the BM series is applied.

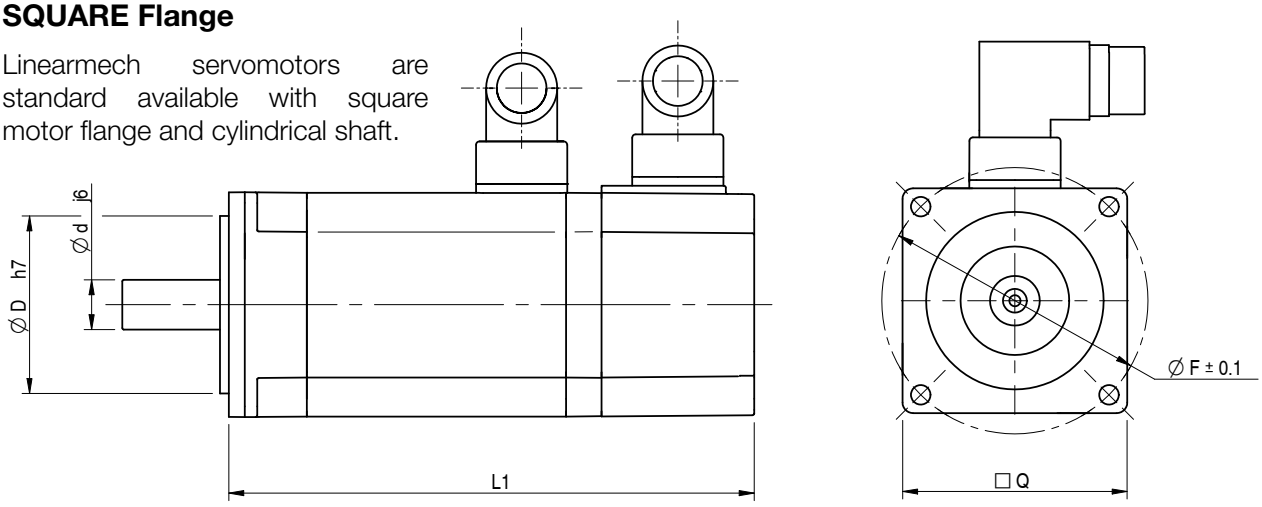


1. Brushless Servomotors BM Series

1.3 Sizes overview

SQUARE Flange

Linearmech servomotors are standard available with square motor flange and cylindrical shaft.



Servomotor	Continuous rated torque [Nm]	Stall torque [Nm]	Peak torque [Nm]	Ø d [mm]	Ø D [mm]	Ø F [mm]	□ Q [mm]	L1 [mm]
BM 45 L	0.32	0.35	1.05	9	40	50	45	122
BM 63 S	0.6	0.7	2.1	14	50	75	63	123
BM 63 L	1.3	1.35	4.2	14	50	75	63	148
BM 82 S	1.3	1.5	4.5	19	70	100	82	134
BM 82 L	2.5	2.9	9	19	70	100	82	159
BM 102 S	4.1	5.2	15	24	90	115	102	176
BM 102 L6	6.4	7.3	22	24	90	115	102	226
BM 102 L8	6.7	9	30	24	90	115	102	226

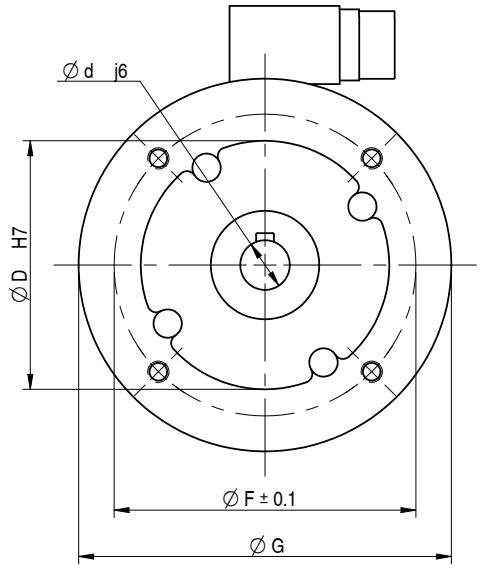
NOTE: for overall dimensions see Section 1.5 “Dimensions and performances”.

BM 45 L **BM 63 S** **BM 63 L** **BM 82 S**

1.3 Sizes overview

IEC Flange

Linearmech servomotors are also available with metric flange dimensions according to IEC 34-7, UNEL 05513 regulations (IEC B14 motor flange and input shaft with key).



Servomotor	IEC Flange	Ø d [mm]	Ø D [mm]	Ø F [mm]	Ø G [mm]
BM 45 L IEC	56 B14	9	50	65	80
BM 63 S IEC	63 B14	11	60	75	90
BM 63 L IEC	71 B14	14	70	85	105
BM 82 S IEC	80 B14	19	80	100	120
BM 82 L IEC	80 B14	19	80	100	120
BM 102 S IEC	90 B14	24	95	115	140
BM 102 L6 IEC	90 B14	24	95	115	140
BM 102 L8 IEC	90 B14	24	95	115	140

NOTE: for overall dimensions see Section 1.5 “Dimensions and performances”.

BM 82 L **BM 102 S** **BM 102 L6** **BM 102 L8**

1. Brushless Servomotors BM Series

1.4 Technical Data

Servomotor size			BM 45 L - 30		
Drive rated voltage	U_{nom}	[V]	24 V dc	48 V dc	230 V dc
Stall torque	$T_{0,\ 100K}$	[Nm]	0.35		
Continuous rated torque	$T_{nom,\ 100K}$	[Nm]	0.32		
Peak torque	T_p	[Nm]	1.05		
Rated speed	n_{nom}	[rpm]	3000		
Max. speed	n_{max}	[rpm]	4000		
Number of poles			8		
Stall current	$I_{0,\ 100K}$	[A]	7.4 (1)	3.8 (1)	1.25
Peak current	I_p	[A]	24.4 (1)	12.5 (1)	3.95
Voltage constant	k_E	[V/1000 rpm]	5 (1)	8.9 (1)	17.2
Torque constant	k_T	[Nm/A]	0.047 (1)	0.09 (1)	0.28
Thermal time constant	t_{th}	[min]	12		
Winding resistance	R_{ph}	[Ω]	0.38	1.4	9.7
Winding inductance	L_D	[mH]	0.69	2.4	16.7
Electric time constant	t_{el}	[ms]	1.8	1.7	1.7
Moment of inertia (without brake)	J_{motore}	[kg × m²]	0.091×10^{-4}		
Moment of inertia (with brake)	$J_{motore\ BR}$	[kg × m²]	0.092×10^{-4}		
Rated braking torque	T_{BR}	[Nm]	0.8		
Brake supply voltage	U_{BR}	[V]	24 V dc $^{+\ 5\ \%}_{-\ 10\ \%}$		
Brake power	P_{BR}	[W]	12.8		
Brake engagement delay time	t_{BR}	[ms]	40		
Brake disengagement delay time	t_{-BR}	[ms]	7		
Permissible radial load on motor shaft	F_R	[N]	150		
Permissible axial load on motor shaft	F_N	[N]	50		
Mass without brake / mass with brake	m	[kg]	0.9 / 1.2		

(1) - DC values refer to trapezoidal commutation

NOTE: Available, upon request, special windings for higher nominal rated speed up to 6000 rpm.
Contact our Technical Dpt. for more information.

1.4 Technical data

BM 63 S - 30			BM 63 L - 30			Servomotor size		
24 V dc	48 V dc	230 V ac	24 V dc (2)	48 V dc	230 V ac	[V]	U_{nom}	Drive rated voltage
0.7			1.35			[Nm]	$T_{0, 100K}$	Stall torque
0.6			1.3			[Nm]	$T_{nom, 100K}$	Continuous rated torque
2.1			4.2			[Nm]	T_p	Peak torque
3000			3000			[rpm]	n_{nom}	Rated speed
4000			4000			[rpm]	n_{max}	Max. speed
8			8					Number of poles
15.9 (1)	7.7 (1)	0.98	35 (1)	15.7 (1)	2.1	[A]	$I_{0, 100K}$	Stall current
50.8 (1)	25.8 (1)	3.7	115 (1)	53 (1)	7.1	[A]	I_p	Peak current
4.7 (1)	9.7 (1)	41	4.3 (1)	9.4 (1)	43	[V/1000 rpm]	k_E	Voltage constant
0.044 (1)	0.09 (1)	0.67	0.04 (1)	0.089 (1)	0.71	[Nm/A]	k_T	Torque constant
15			15			[min]	t_{th}	Thermal time constant
0.13	0.5	17.4	0.09	0.2	7.1	[Ω]	R_{ph}	Winding resistance
0.39	1.5	53	0.17	0.8	30	[mH]	L_D	Winding inductance
3	3	3	1.9	4.2	4.2	[ms]	t_{el}	Electric time constant
0.156×10^{-4}			0.272×10^{-4}			[kg × m²]	J_{motore}	Moment of inertia (without brake)
0.174×10^{-4}			0.290×10^{-4}			[kg × m²]	$J_{motore\ BR}$	Moment of inertia (with brake)
2.5			2.5			[Nm]	T_{BR}	Rated braking torque
24 V dc $^{+\ 5\ \%}_{-\ 10\ \%}$			24 V dc $^{+\ 5\ \%}_{-\ 10\ \%}$			[V]	U_{BR}	Brake supply voltage
13.3			13.3			[W]	P_{BR}	Brake power
40			40			[ms]	t_{BR}	Brake engagement delay time
7			7			[ms]	t_{-BR}	Brake disengagement delay time
230			230			[N]	F_R	Permissible radial load on motor shaft
70			70			[N]	F_N	Permissible axial load on motor shaft
1.25 / 1.90			1.85 / 2.50			[kg]	m	Mass without brake / mass with brake

(1) - DC values refer to trapezoidal commutation

(2) - only intermittent service S3 25 % over 10 min

1. Brushless Servomotors BM Series

1.4 Technical Data

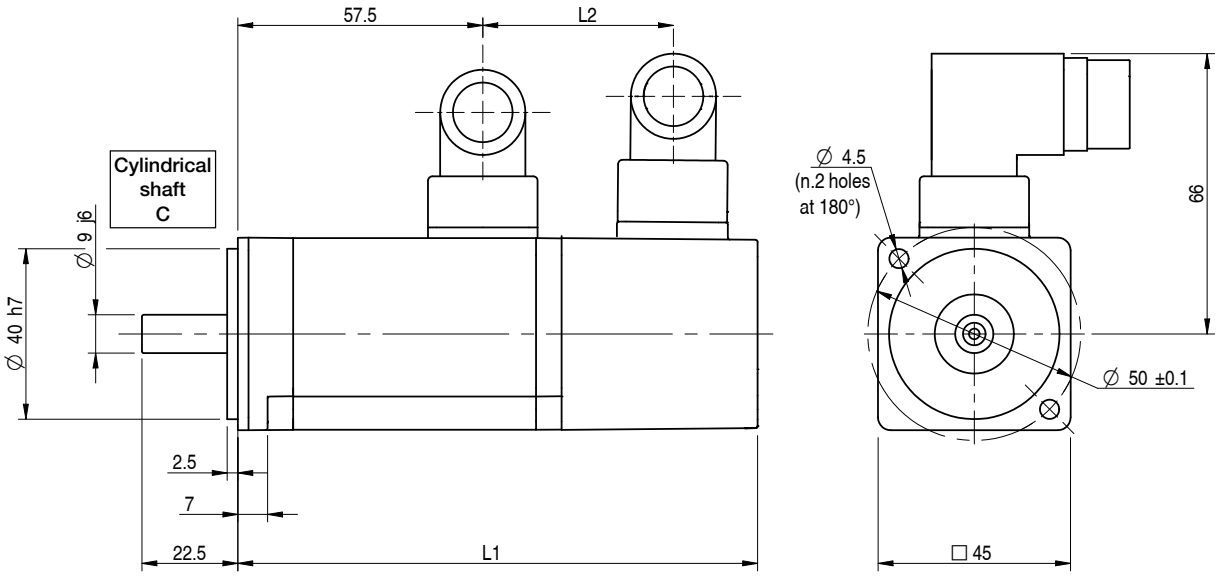
Servomotor size			BM 82 S - 30		BM 82 L - 30	
Drive rated voltage	U_{nom}	[V]	230 V ac	400 V ac	230 V ac	400 V ac
Stall torque	$T_{0,\ 100K}$	[Nm]	1.5		2.9	
Continuous rated torque	$T_{nom,\ 100K}$	[Nm]	1.3		2.5	
Peak torque	T_p	[Nm]	4.5		9.0	
Rated speed	n_{nom}	[rpm]	3000		3000	
Max. speed	n_{max}	[rpm]	4000		4000	
Number of poles			8		8	
Stall current	$I_{0,\ 100K}$	[A]	2.6	1.2	4.6	2.3
Peak current	I_p	[A]	7.2	3.7	14.7	7.4
Voltage constant	k_E	[V/1000 rpm]	39.0	76.5	39.5	78.0
Torque constant	k_T	[Nm/A]	0.64	1.26	0.64	1.28
Thermal time constant	t_{th}	[min]	16		16	
Winding resistance	R_{ph}	[Ω]	3.9	14.8	1.5	6.2
Winding inductance	L_D	[mH]	28	105	13.8	56
Electric time constant	t_{el}	[ms]	7.1	7.1	8.9	9
Moment of inertia (without brake)	J_{motore}	[kg × m²]	0.638×10^{-4}		1.030×10^{-4}	
Moment of inertia (with brake)	$J_{motore\ BR}$	[kg × m²]	0.768×10^{-4}		1.160×10^{-4}	
Rated braking torque	T_{BR}	[Nm]	6.5		6.5	
Brake supply voltage	U_{BR}	[V]	24 V dc $^{+\ 5\ \%}_{-\ 10\ \%}$		24 V dc $^{+\ 5\ \%}_{-\ 10\ \%}$	
Brake power	P_{BR}	[W]	23.8		23.8	
Brake engagement delay time	t_{BR}	[ms]	45		45	
Brake disengagement delay time	t_{-BR}	[ms]	10		10	
Permissible radial load on motor shaft	F_R	[N]	400		400	
Permissible axial load on motor shaft	F_N	[N]	130		130	
Mass without brake / mass with brake	m	[kg]	2.0 (3.7)		3.3 / 5.0	

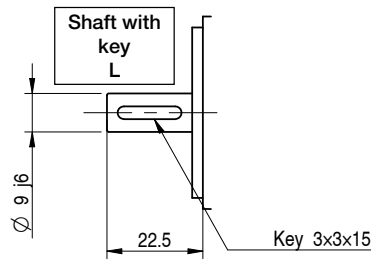
1.4 Technical Data

BM 102 S - 30		BM 102 L6 - 30		BM 102 L8 - 30				Servomotor size
230 V ac	400 V ac	230 V ac	400 V ac	230 V ac	400 V ac	[V]	U_{nom}	Drive rated voltage
5.2		7.3		9.0		[Nm]	$T_{0,\ 100K}$	Stall torque
4.1		6.4		6.7		[Nm]	$T_{nom,\ 100K}$	Continuous rated torque
15.0		22.0		30.0		[Nm]	T_p	Peak torque
3000		3000		3000		[rpm]	n_{nom}	Rated speed
4000		4000		4000		[rpm]	n_{max}	Max. speed
8		6		8				Number of poles
6.5	3.5	9.8	6.1	11.5	5.8	[A]	$I_{0,\ 100K}$	Stall current
26.0	14.0	35.5	22.0	47.0	25.5	[A]	I_p	Peak current
48.6	90.0	47.7	77.0	47.7	94.0	[V/1000 rpm]	k_E	Voltage constant
0.8	1.48	0.8	1.2	0.8	1.55	[Nm/A]	k_T	Torque constant
35		45		45		[min]	t_{th}	Thermal time constant
0.9	3.5	0.56	1.6	0.4	1.6	[Ω]	R_{ph}	Winding resistance
14.0	54.0	8.2	23.0	6.0	27.6	[mH]	L_D	Winding inductance
15.5	15.4	14.6	14.3	15.0	17.2	[ms]	t_{el}	Electric time constant
2.88×10^{-4}		4.950×10^{-4}		4.950×10^{-4}		[kg × m²]	J_{motore}	Moment of inertia (without brake)
3.34×10^{-4}		5.410×10^{-4}		5.410×10^{-4}		[kg × m²]	$J_{motore\ BR}$	Moment of inertia (with brake)
14		14		14		[Nm]	T_{BR}	Rated braking torque
24 V dc $^{+\ 5\ \%}_{-\ 10\ \%}$		24 V dc $^{+\ 5\ \%}_{-\ 10\ \%}$		24 V dc $^{+\ 5\ \%}_{-\ 10\ \%}$		[V]	U_{BR}	Brake supply voltage
35.2		35.2		35.2		[W]	P_{BR}	Brake power
50		50		50		[ms]	t_{BR}	Brake engagement delay time
15		15		15		[ms]	t_{-BR}	Brake disengagement delay time
500		500		500		[N]	F_R	Permissible radial load on motor shaft
150		150		150		[N]	F_N	Permissible axial load on motor shaft
5.2 / 7.4		7.8 / 10.0		7.8 / 10.0		[kg]	m	Mass without brake / mass with brake

1.5 Dimensions and performances - SQUARE Flange Series

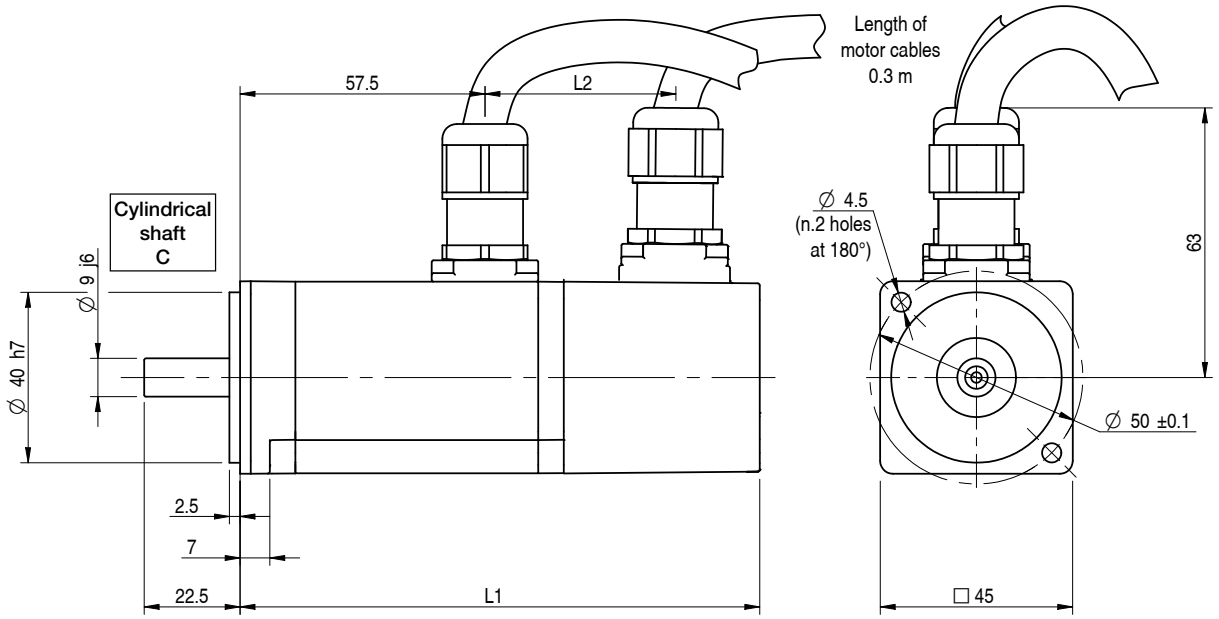
1.5.1 BM 45 L

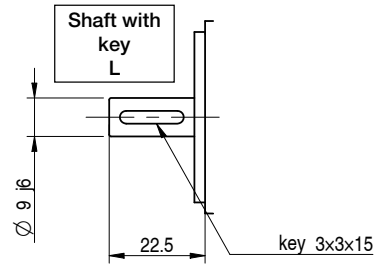




BM 45 L CN - Servomotor with connectors

Size	BM 45 L CN	BM 45 L B CN (with brake)
L1	122	156
L2	45	78





BM 45 L CV - Servomotor with cables

Size	BM 45 L CV	BM 45 L B CV (with brake)
L1	122	156
L2	45	78

1.5 Dimensions and performances - SQUARE Flange Series

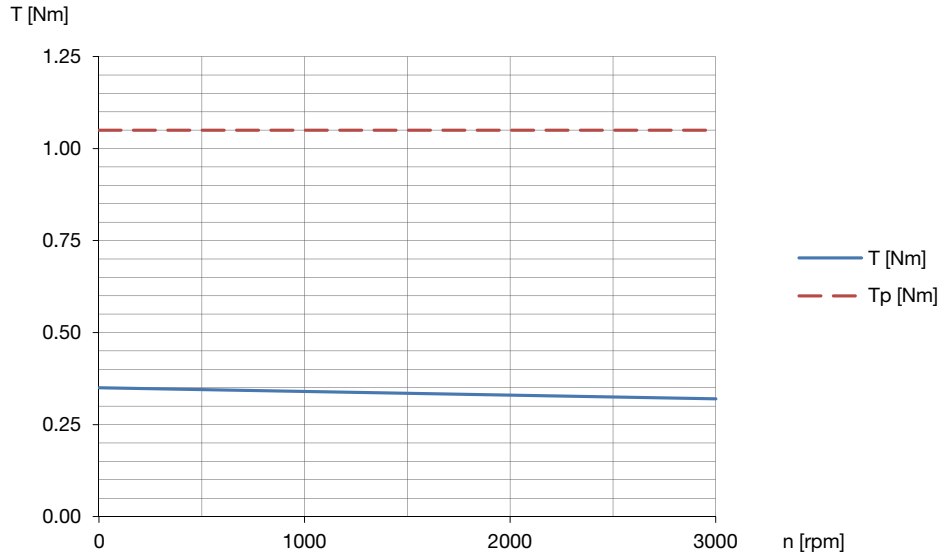
1.5.1 BM 45 L

Following diagram shows operating curve of servomotor, where:

- T_{nom} [Nm] = continuous rated torque
- T_p [Nm] = peak torque

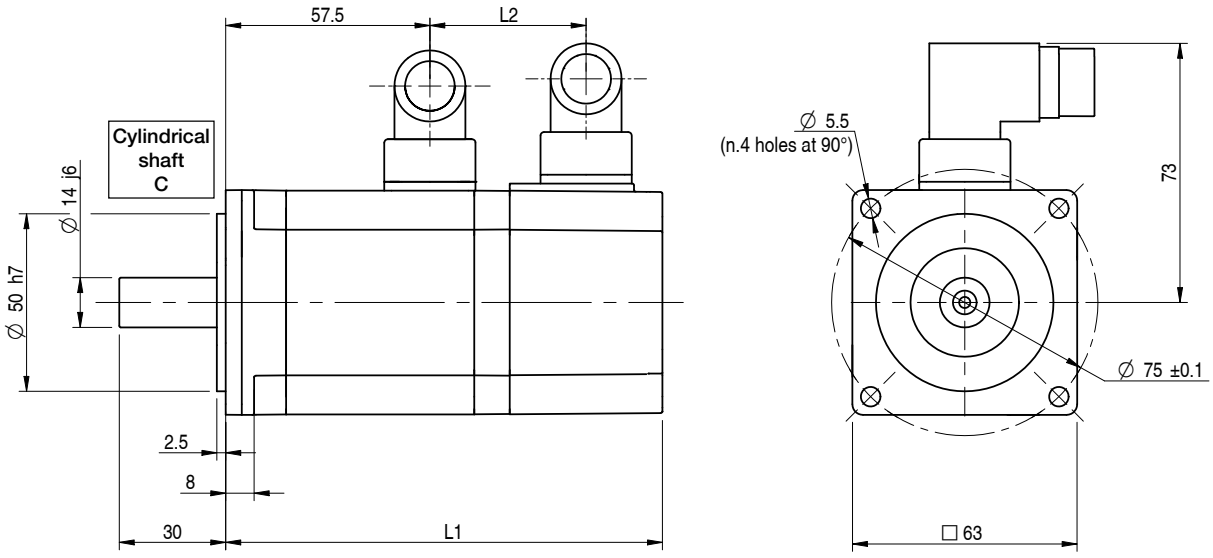
More information about the definitions above are available at Appendix A “Terms and Definitions”, page 43.

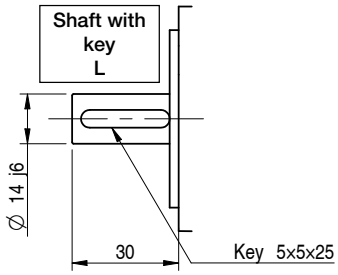
More information about the test conditions to define the operating curve of servomotor are available at Appendix B “Test conditions”, page 44.



1.5 Dimensions and performances - SQUARE Flange Series

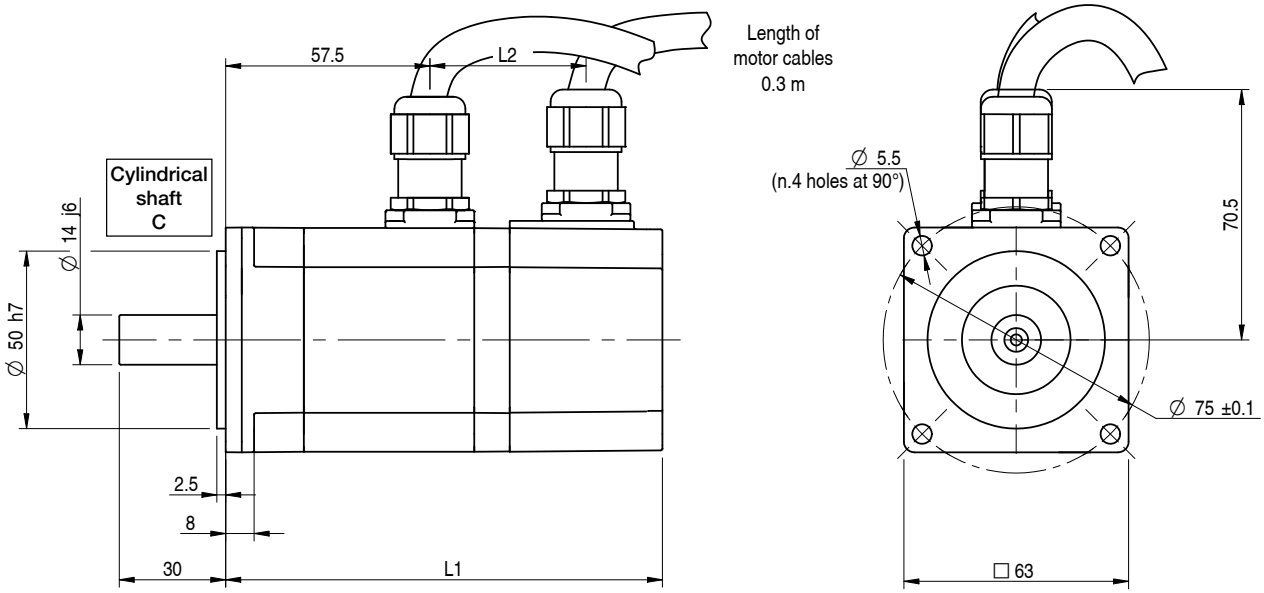
1.5.2 BM 63 S

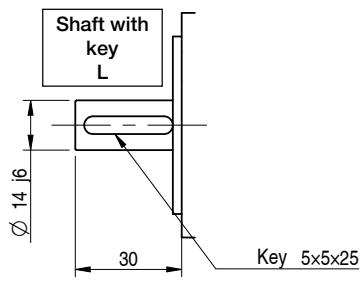




BM 63 S CN - Servomotor with connectors

Size	BM 63 S CN	BM 63 S B CN (with brake)
L1	123	164
L2	44	85





BM 63 S CV - Servomotor with cables

Size	BM 63 S CV	BM 63 S B CV (with brake)
L1	123	164
L2	44	85

1.5 Dimensions and performances - SQUARE Flange Series

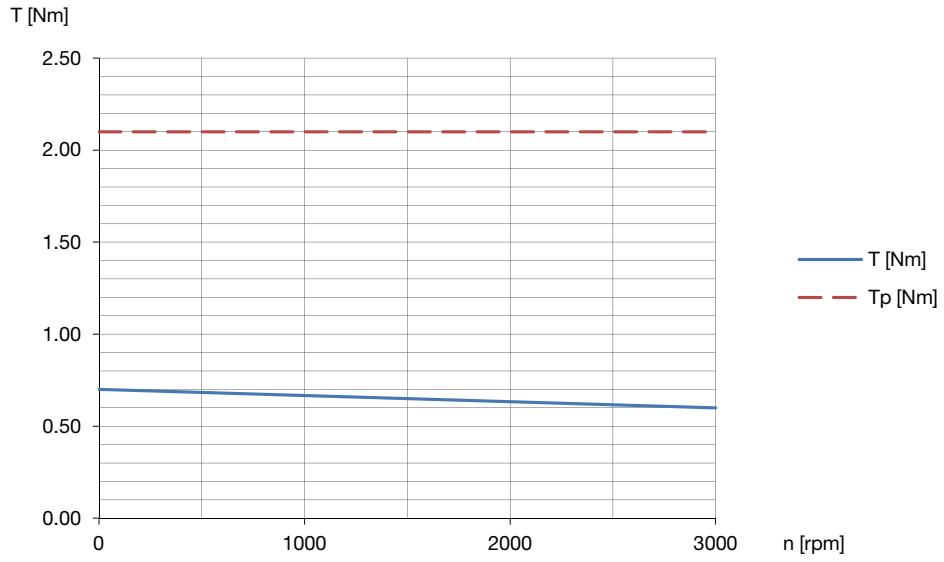
1.5.2 BM 63 S

Following diagram shows operating curve of servomotor, where:

- T_{nom} [Nm] = continuous rated torque
- T_p [Nm] = peak torque

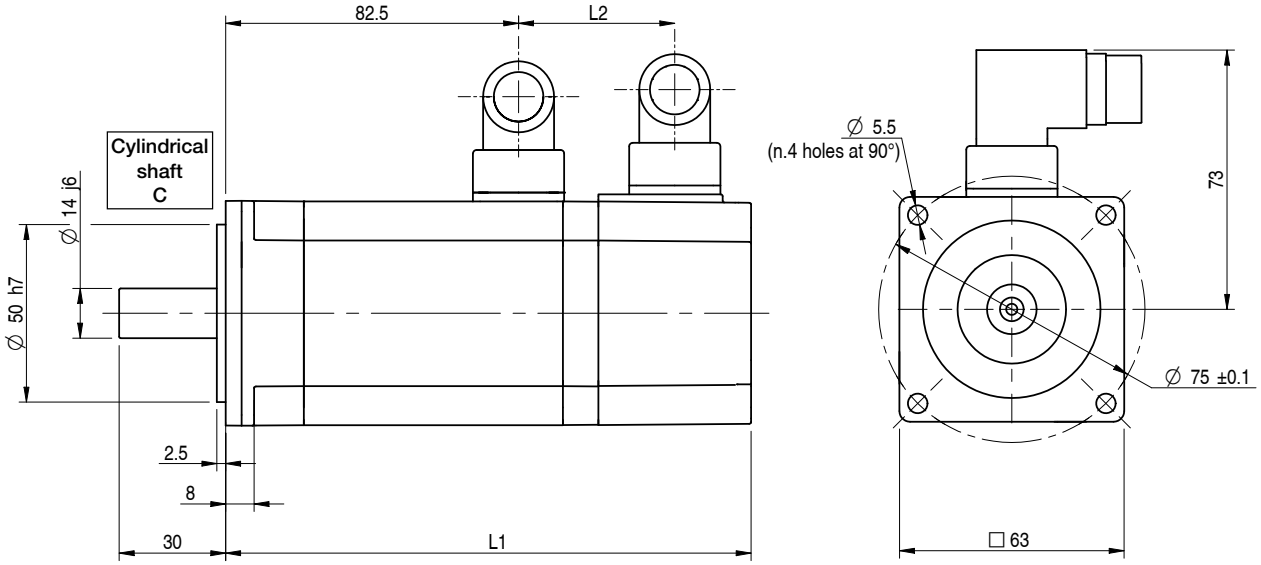
More information about the definitions above are available at Appendix A “Terms and Definitions”, page 43.

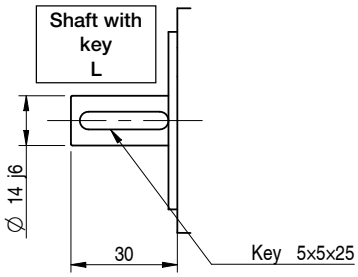
More information about the test conditions to define the operating curve of servomotor are available at Appendix B “Test conditions”, page 44.



1.5 Dimensions and performances - SQUARE Flange Series

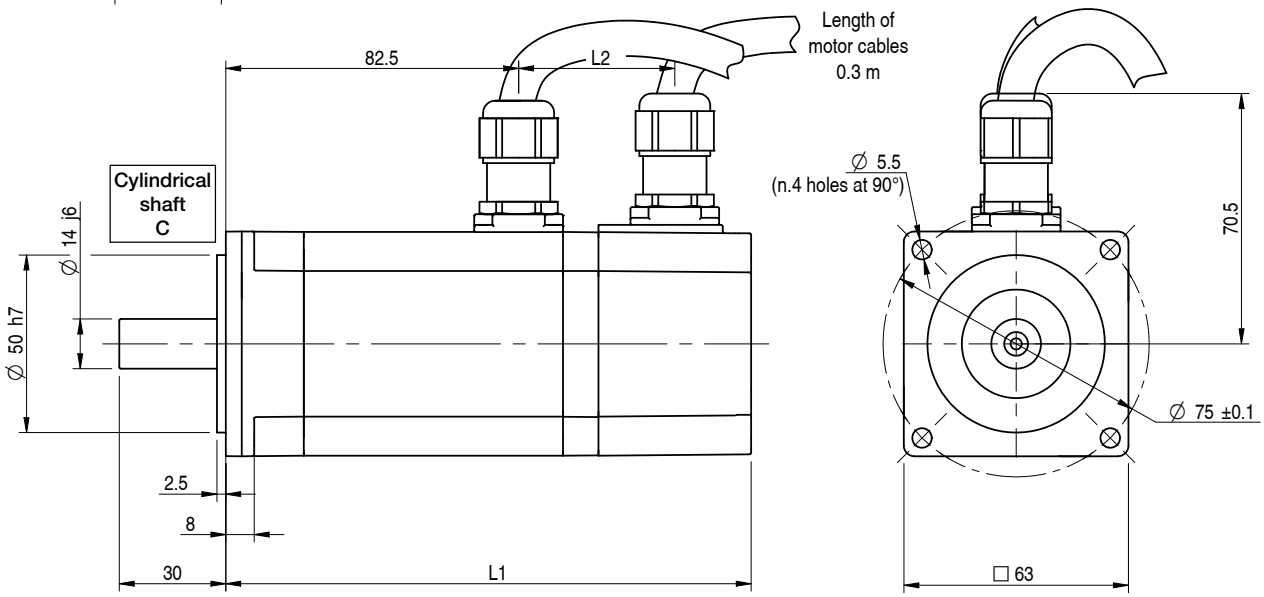
1.5.3 BM 63 L

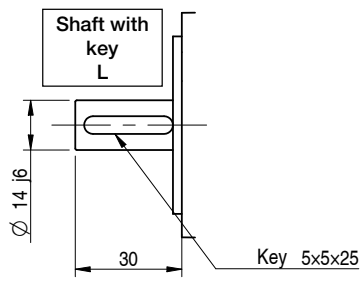




BM 63 L CN - Servomotor with connectors

Size	BM 63 L CN	BM 63 L B CN (with brake)
L1	148	189
L2	44	85





BM 63 L CV - Servomotor with cables

Size	BM 63 L CV	BM 63 L B CV (with brake)
L1	148	189
L2	44	85

1.5 Dimensions and performances - SQUARE Flange Series

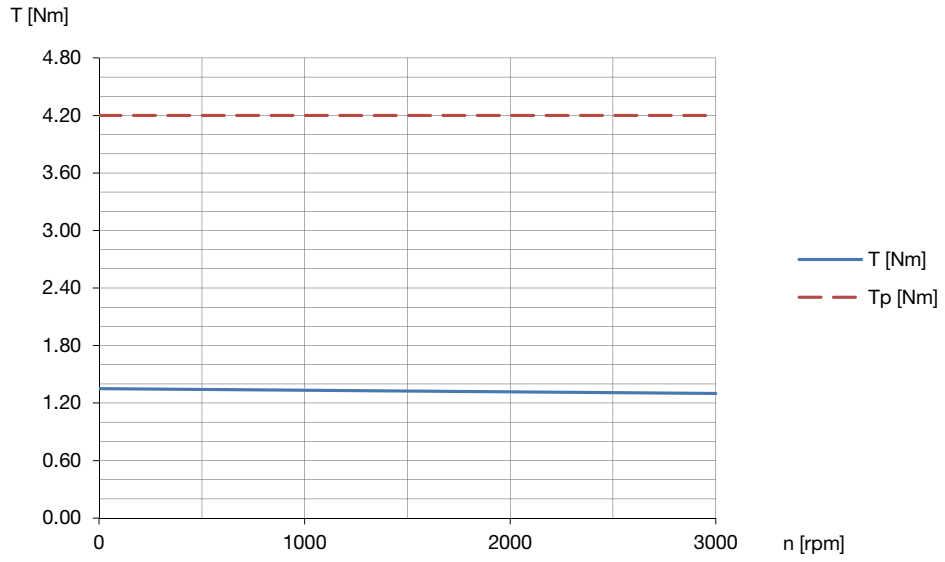
1.5.3 BM 63 L

Following diagram shows operating curve of servomotor, where:

- T_{nom} [Nm] = continuous rated torque
- T_p [Nm] = peak torque

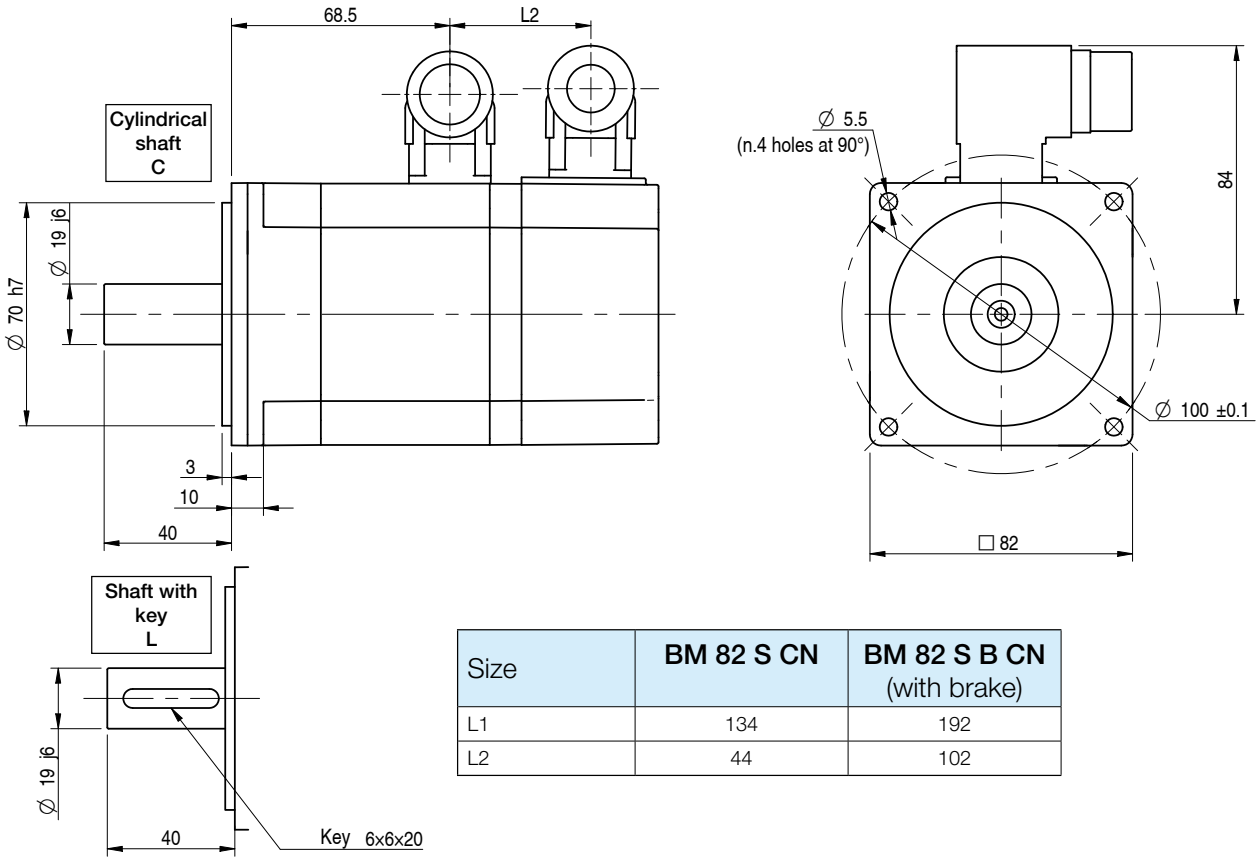
More information about the definitions above are available at Appendix A “Terms and Definitions”, page 43.

More information about the test conditions to define the operating curve of servomotor are available at Appendix B “Test conditions”, page 44.



1.5 Dimensions and performances - SQUARE Flange Series

1.5.4 **BM 82 S CN** - Servomotor with connectors



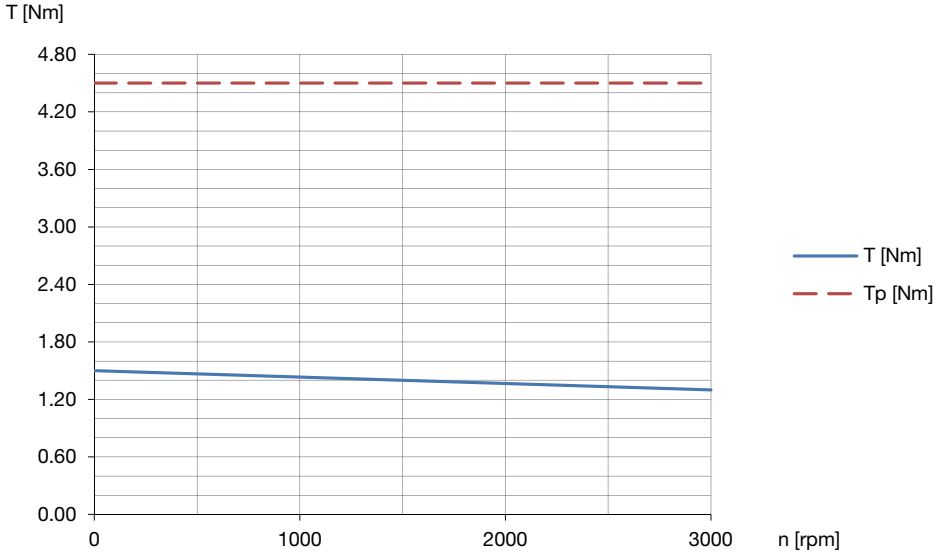
Size	BM 82 S CN	BM 82 S B CN (with brake)
L1	134	192
L2	44	102

Following diagram shows operating curve of servomotor, where:

- T_{nom} [Nm] = continuous rated torque
- T_p [Nm] = peak torque

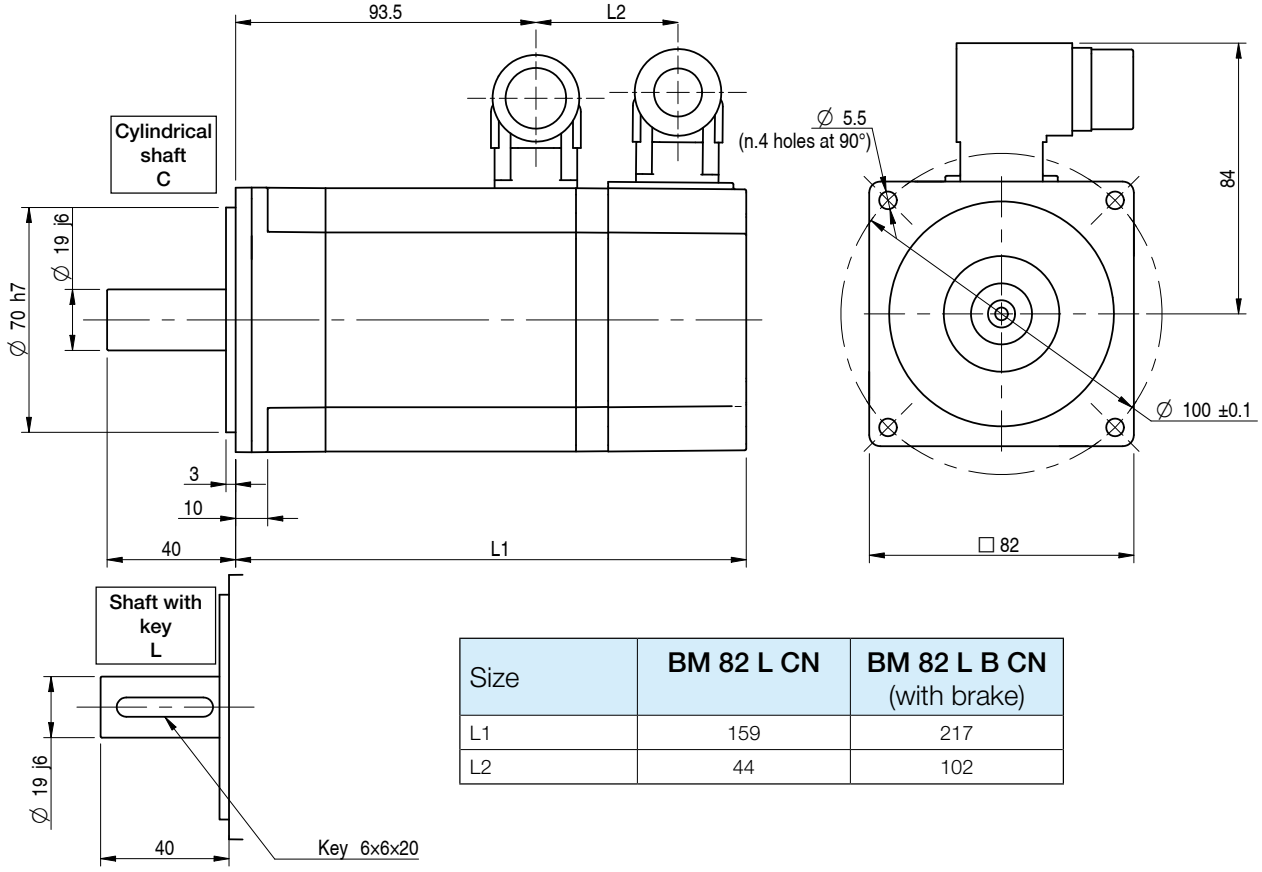
More information about the definitions above are available at Appendix A “Terms and Definitions”, page 43.

More information about the test conditions to define the operating curve of servomotor are available at Appendix B “Test conditions”, page 44.



1.5 Dimensions and performances - SQUARE Flange Series

1.5.5 **BM 82 L CN** - Servomotor with connectors



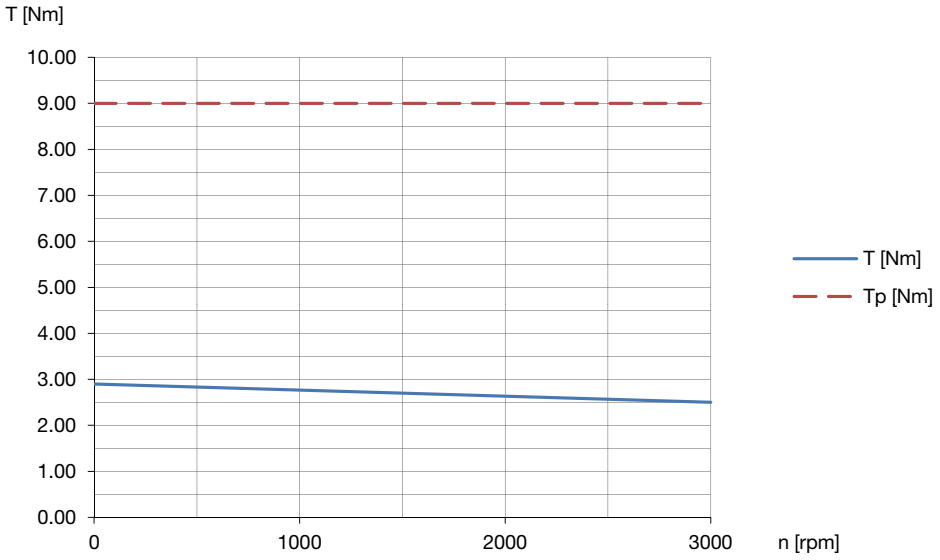
Size	BM 82 L CN	BM 82 L B CN (with brake)
L1	159	217
L2	44	102

Following diagram shows operating curve of servomotor, where:

- T_{nom} [Nm] = continuous rated torque
- T_p [Nm] = peak torque

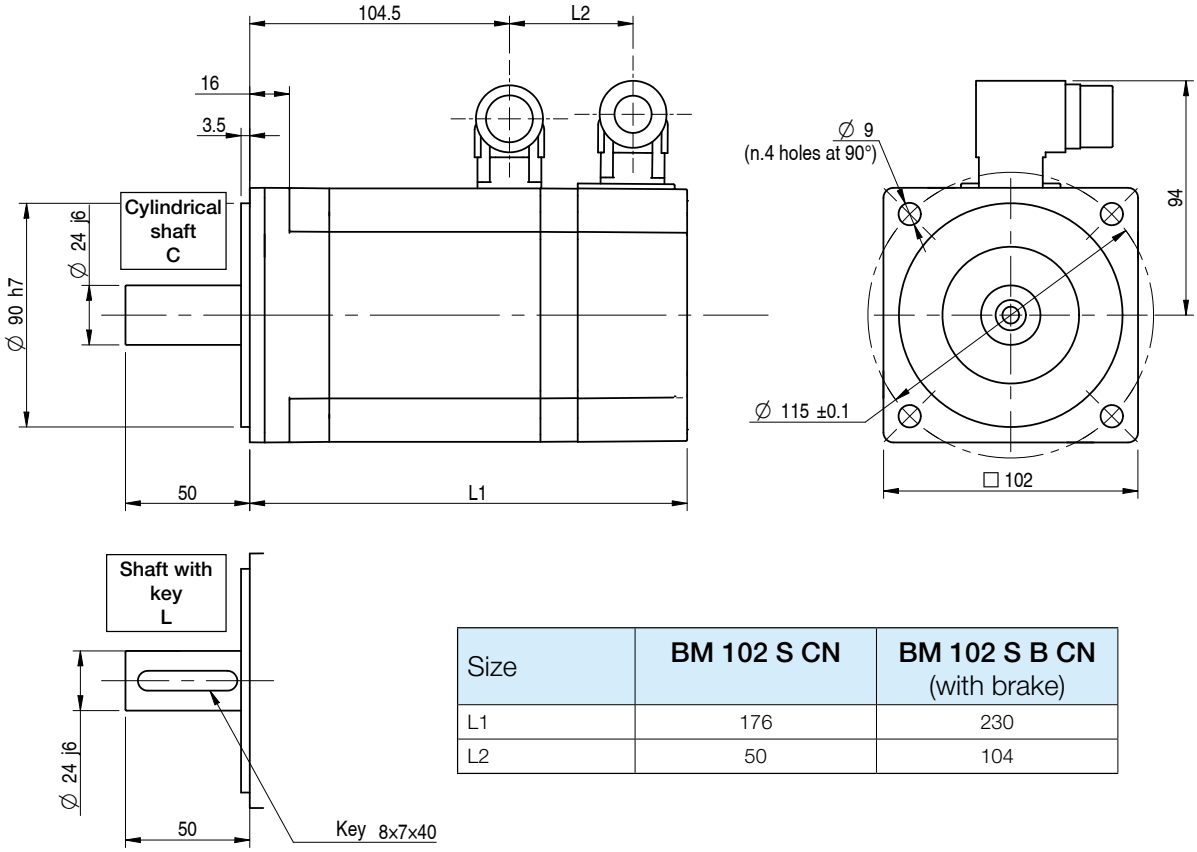
More information about the definitions above are available at Appendix A “Terms and Definitions”, page 43.

More information about the test conditions to define the operating curve of servomotor are available at Appendix B “Test conditions”, page 44.



1.5 Dimensions and performances - SQUARE Flange Series

1.5.6 **BM 102 S CN** - Servomotor with connectors



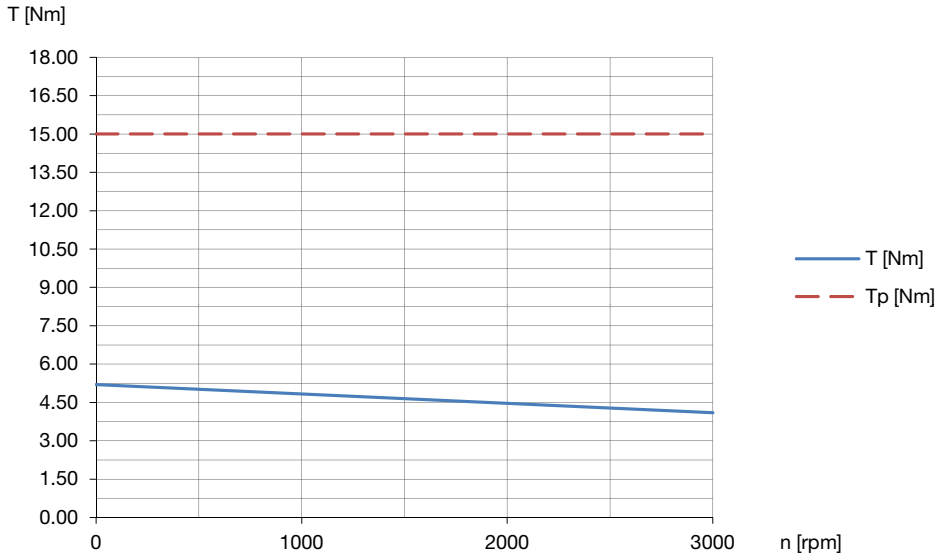
Size	BM 102 S CN	BM 102 S B CN (with brake)
L1	176	230
L2	50	104

Following diagram shows operating curve of servomotor, where:

- T_{nom} [Nm] = continuous rated torque
- T_p [Nm] = peak torque

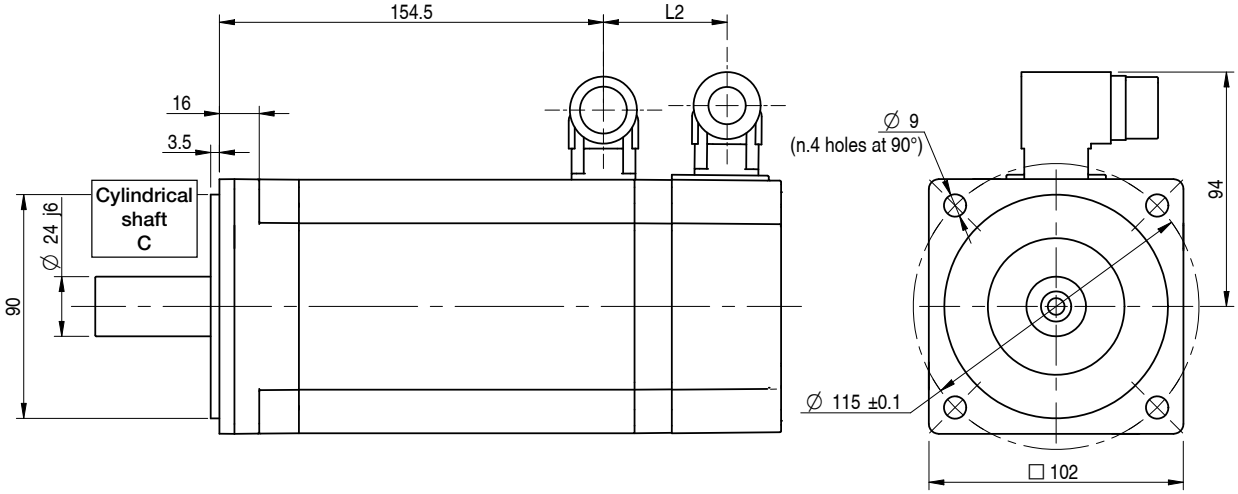
More information about the definitions above are available at Appendix A “Terms and Definitions”, page 43.

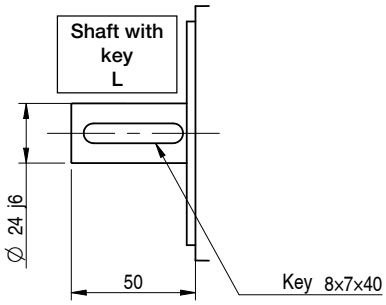
More information about the test conditions to define the operating curve of servomotor are available at Appendix B “Test conditions”, page 44.



1.5 Dimensions and performances - SQUARE Flange Series

1.5.7 **BM 102 L6 CN** - Servomotor with connectors





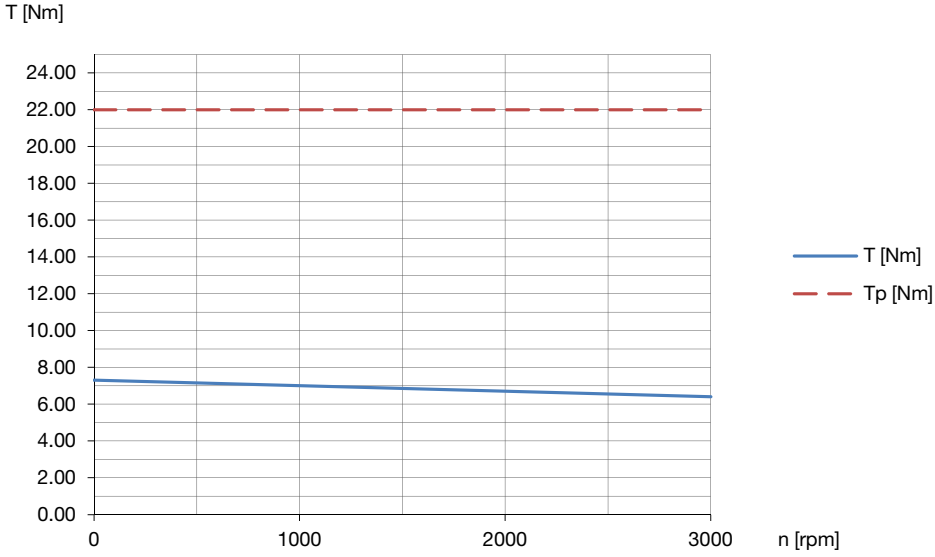
Size	BM 102 L6 CN	BM 102 L6 B CN (with brake)
L1	226	280
L2	50	104

Following diagram shows operating curve of servomotor, where:

- T_{nom} [Nm] = continuous rated torque
- T_p [Nm] = peak torque

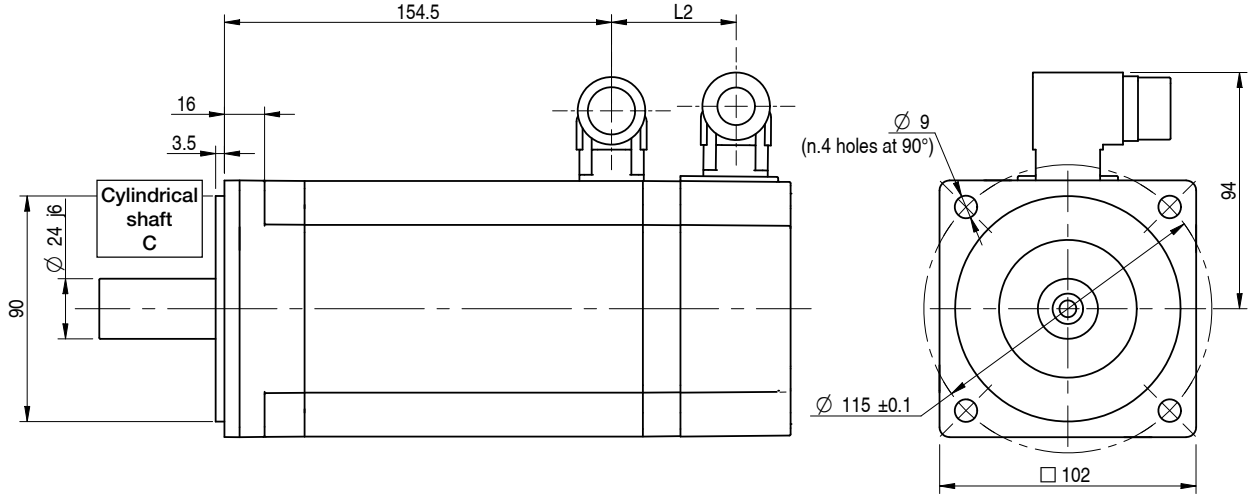
More information about the definitions above are available at Appendix A “Terms and Definitions”, page 43.

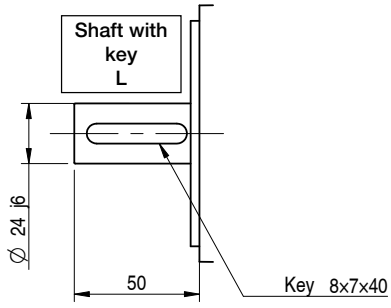
More information about the test conditions to define the operating curve of servomotor are available at Appendix B “Test conditions”, page 44.



1.5 Dimensions and performances - SQUARE Flange Series

1.5.8 **BM 102 L8 CN** - Servomotor with connectors





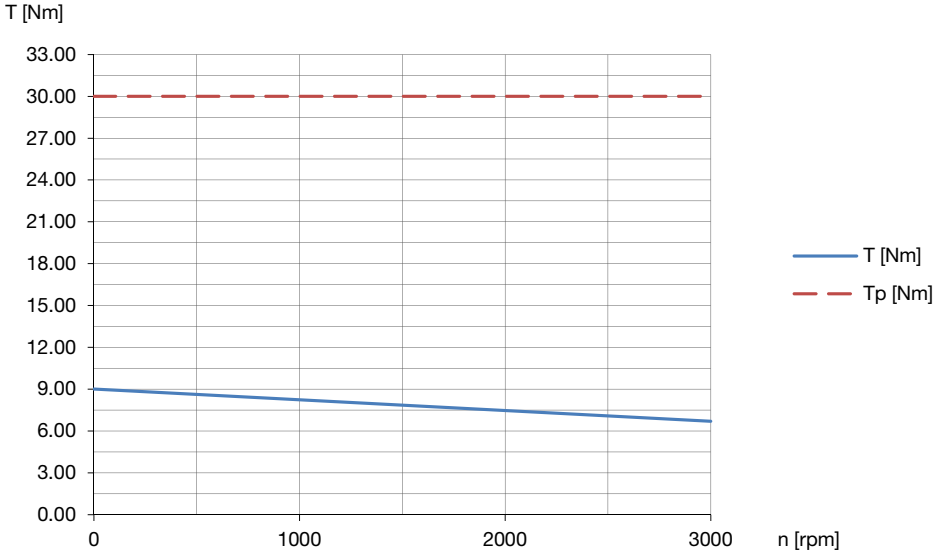
Size	BM 102 L8 CN	BM 102 L8 B CN (with brake)
L1	226	280
L2	50	104

Following diagram shows operating curve of servomotor, where:

- T_{nom} [Nm] = continuous rated torque
- T_p [Nm] = peak torque

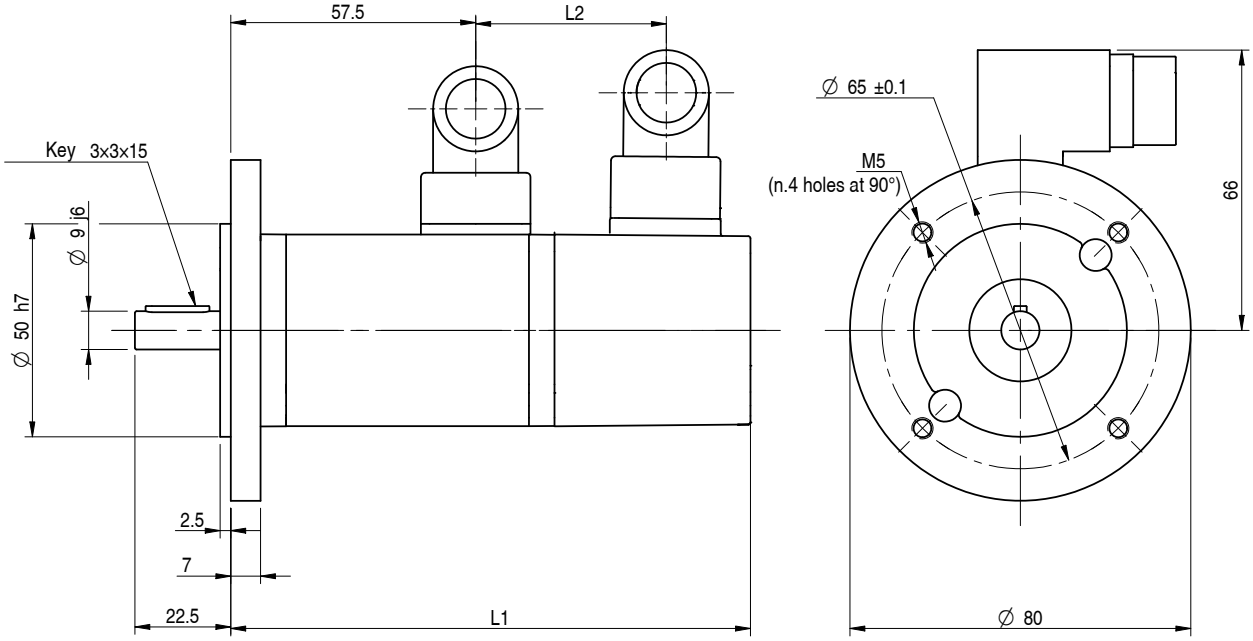
More information about the definitions above are available at Appendix A “Terms and Definitions”, page 43.

More information about the test conditions to define the operating curve of servomotor are available at Appendix B “Test conditions”, page 44.



1.5 Dimensions and performances - IEC Flange Series

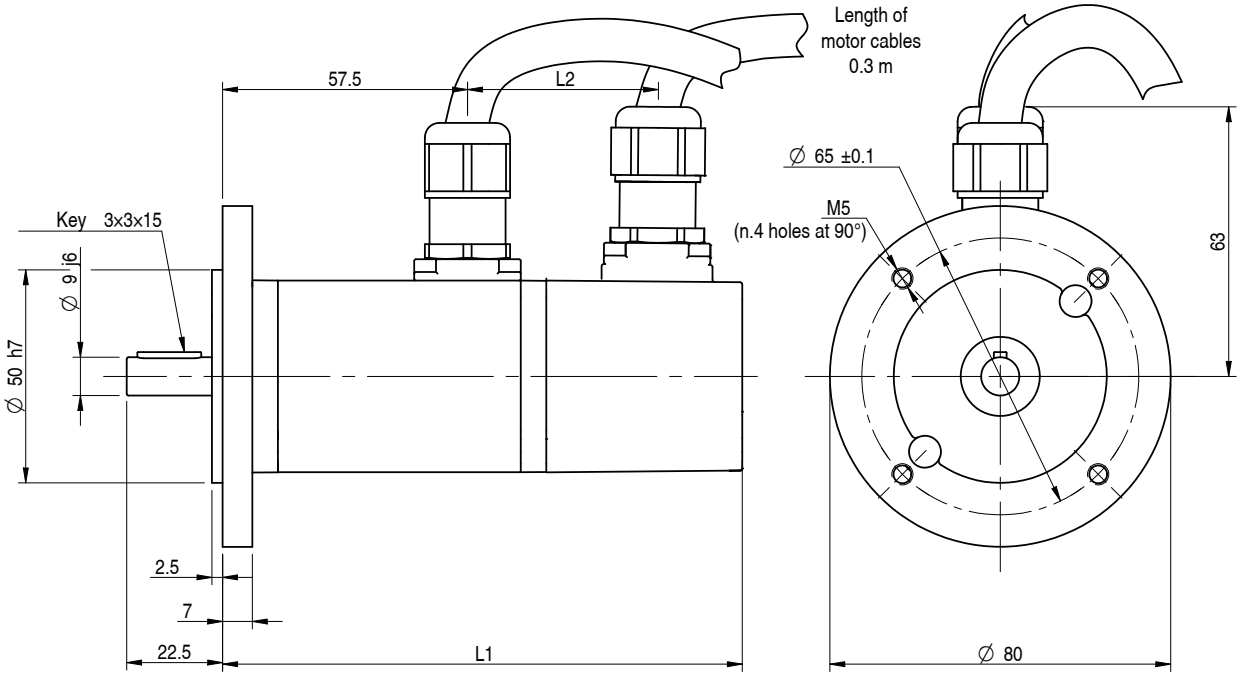
1.5.9 BM 45 L IEC



BM 45 L IEC CN - Servomotor with connectors

Size	BM 45 L IEC CN	BM 45 L IEC B CN (with brake)
L1	122	156
L2	45	78

NOTE: operating curve of servomotor at Section 1.5.1 page 11



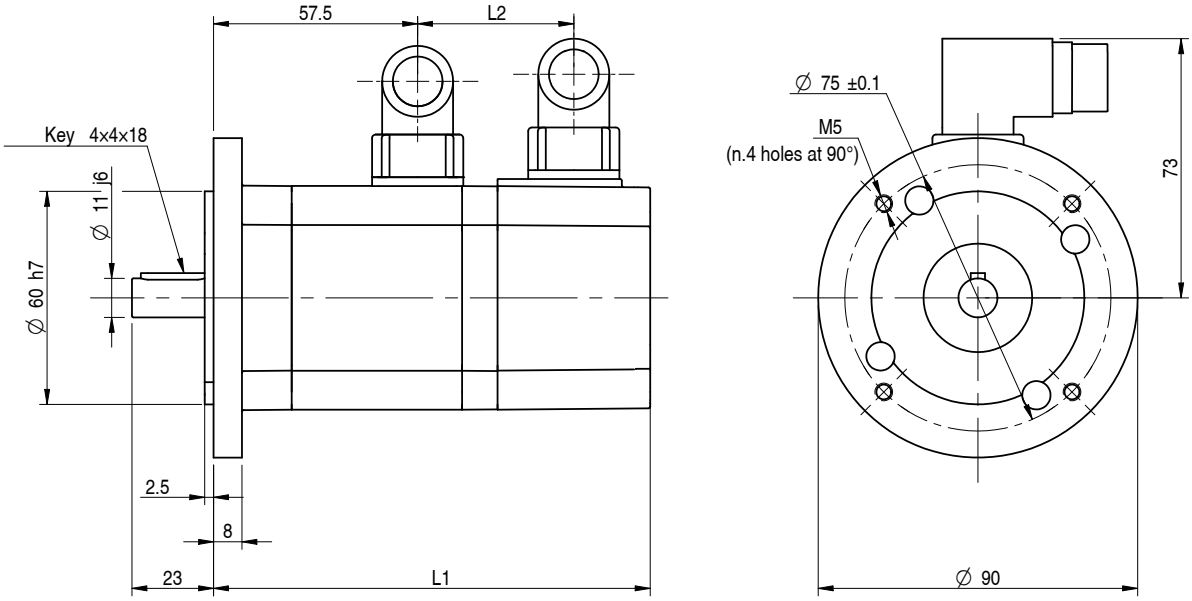
BM 45 L IEC CV - Servomotor with cables

Size	BM 45 L IEC CV	BM 45 L IEC B CV (with brake)
L1	122	156
L2	45	78

NOTE: operating curve of servomotor at Section 1.5.1 page 11

1.5 Dimensions and performances - IEC Flange Series

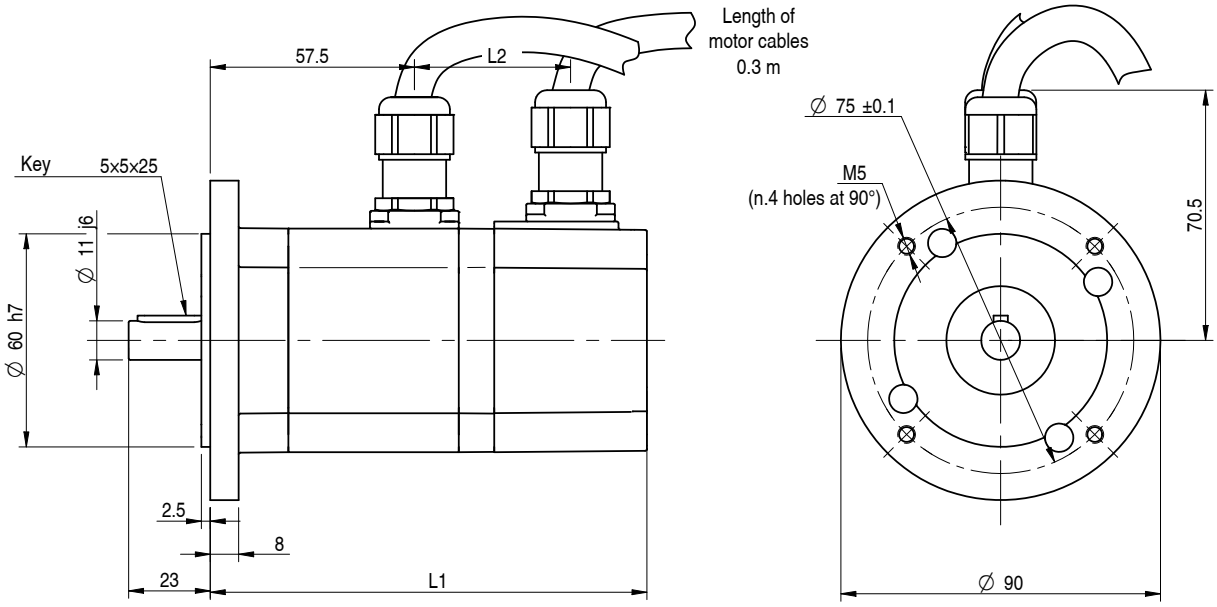
1.5.10 BM 63 S IEC



BM 63 S IEC CN - Servomotor with connectors

NOTE: operating curve of servomotor at Section 1.5.2 page 13

Size	BM 63 S IEC CN	BM 63 S IEC B CN (with brake)
L1	123	164
L2	44	85



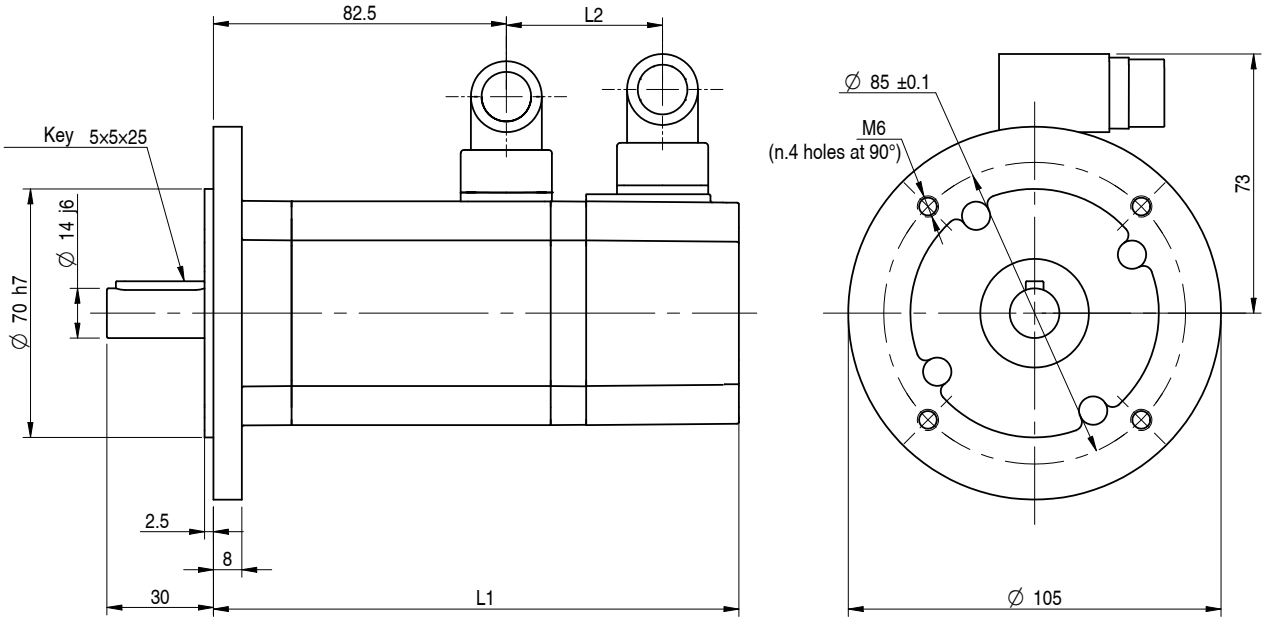
BM 63 S IEC CV - Servomotor with cables

NOTE: operating curve of servomotor at Section 1.5.2 page 13

Size	BM 63 S IEC CV	BM 63 S IEC B CV (with brake)
L1	123	164
L2	44	85

1.5 Dimensions and performances - IEC Flange Series

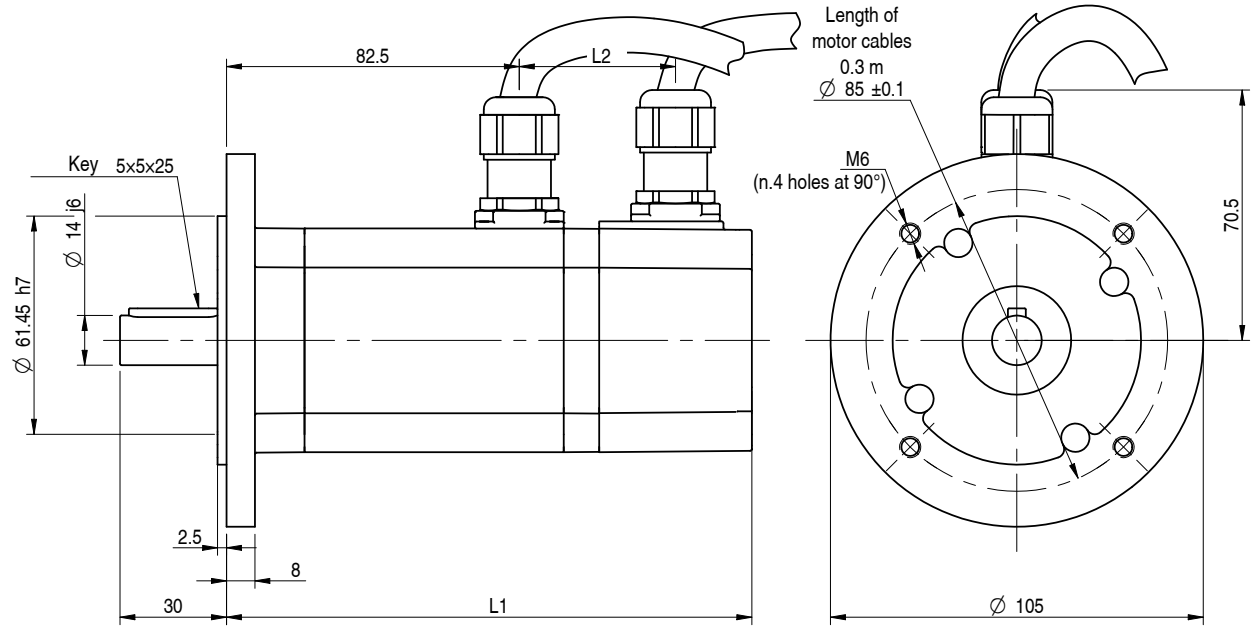
1.5.11 BM 63 L IEC



BM 63 L IEC CN - Servomotor with connectors

NOTE: operating curve of servomotor at Section 1.5.3 page 15

Size	BM 63 L IEC CN	BM 63 L IEC B CN (with brake)
L1	148	189
L2	44	85



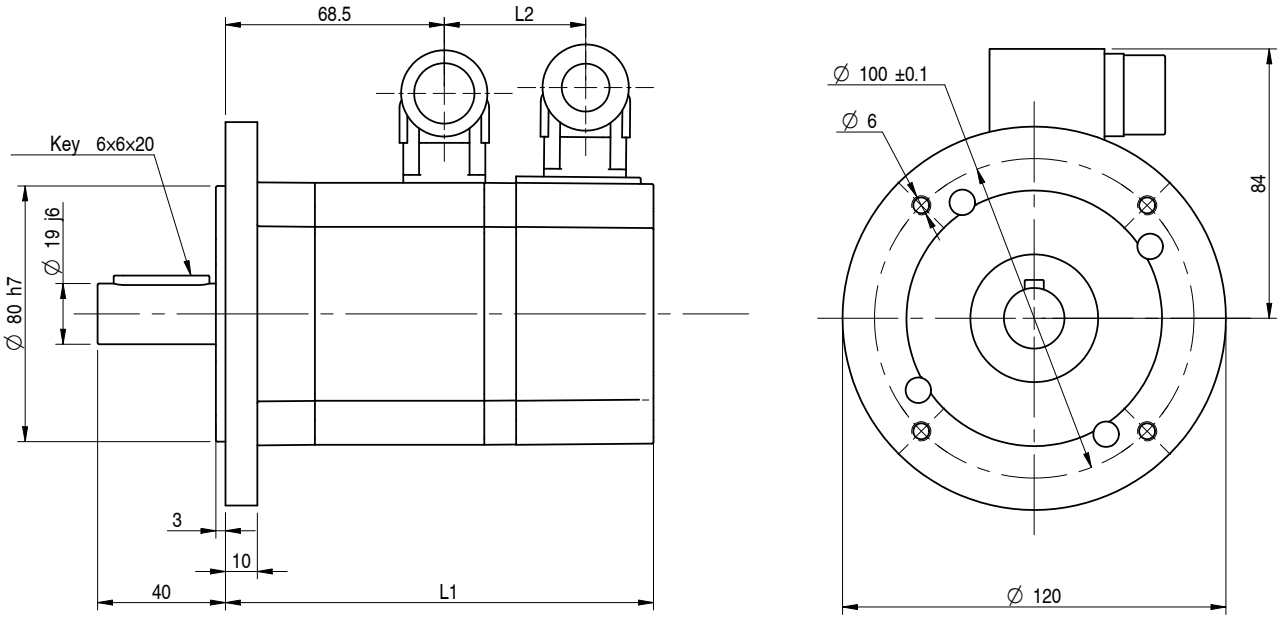
BM 63 L IEC CV - Servomotor with cables

NOTE: operating curve of servomotor at Section 1.5.3 page 15

Size	BM 63 L IEC CV	BM 63 L IEC B CV (with brake)
L1	148	189
L2	44	85

1.5 Dimensions and performances - IEC Flange Series

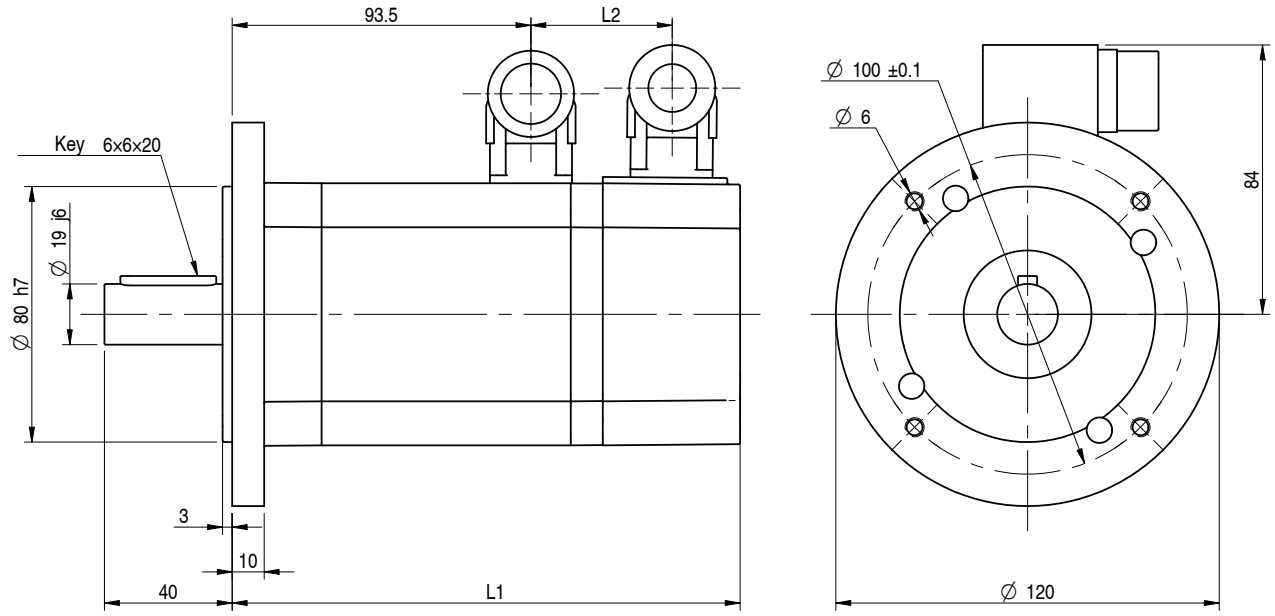
1.5.12 BM 82 S IEC CN



NOTE: operating curve of servomotor at Section 1.5.4 page 16

Size	BM 82 S IEC CN	BM 82 S IEC B CN (with brake)
L1	134	192
L2	44	102

1.5.13 BM 82 L IEC CN

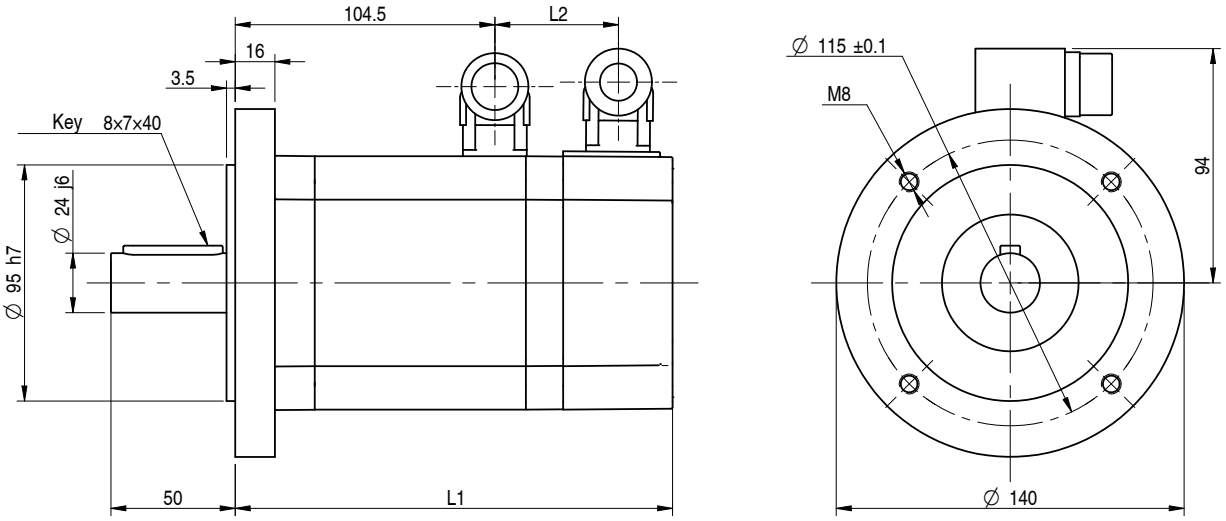


NOTE: operating curve of servomotor at Section 1.5.5 page 17

Size	BM 82 L IEC CN	BM 82 L IEC B CN (with brake)
L1	159	217
L2	44	102

1.5 Dimensions and performances - IEC Flange Series

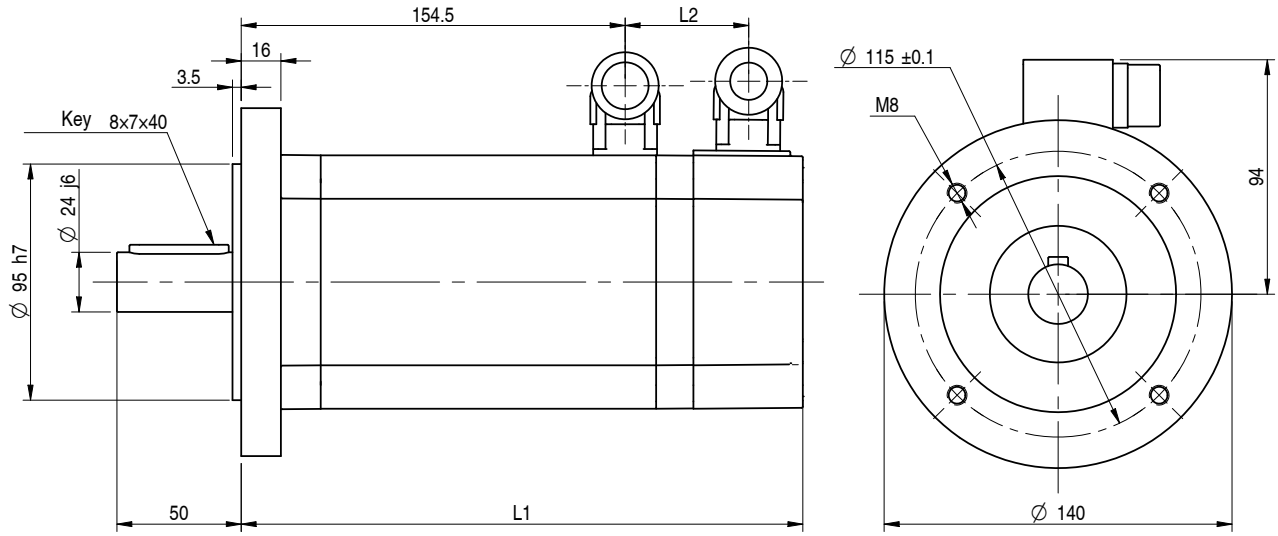
1.5.14 BM 102 S IEC CN



NOTE: operating curve of servomotor at Section 1.5.6 page 18

Size	BM 102 S IEC CN	BM 102 S IEC B CN (with brake)
L1	176	230
L2	50	104

1.5.15 BM 102 L6 IEC CN
BM 102 L8 IEC CN



NOTE: operating curves of servomotors at Section 1.5.7 page 19 and 1.5.8 page 20

Size	BM 102 L6 IEC CN BM 102 L8 IEC CN	BM 102 L6 IEC B CN BM 102 L8 IEC B CN (with brake)
L1	226	280
L2	50	104

1.6 Motor feedback

E01: Optical incremental encoder		
Supply voltage	[V dc]	5V ± 5%
Max. supply current	[mA]	200
Standard resolution	[pulses / turn]	2000
Electronics type	[-]	Line Driver
Max. frequency	[kHz]	200
Incremental signals (Line Driver)	[-]	A,A/ - B,B/ - Z,Z/
Switching signals (Line Driver)	[-]	HU,HU/ - HV,HV/ - HW,HW/
Operating temperature	[°C]	-20 ... +85
Max. speed	[rpm]	6000

R01: Resolver		
Supply voltage	[V rms]	7 @ 10KHz
Transformation ratio	[-]	0.5 ± 5%
Number of pole-pairs	[-]	1
Electrical error	[-]	± 10' max
Operating temperature	[°C]	-55 ... +155
Max. speed	[rpm]	10000

A01: BISS absolute multiturn encoder		
Supply voltage	[V dc]	5V $^{+\ 10\ \%}_{-\ 5\ \%}$
Current consumption	[mA]	150
Single turn resolution	[-]	12-19 bit
Multiturn resolution	[-]	12 bit
Serial interface	[-]	BISS
Connection	[-]	Clock and Data RS422
Incremental signals	[-]	Sin Cos 1Vpp
Resolution	[pulses / turn]	2048
Operating temperature	[°C]	-40 ... +120
Max. speed	[rpm]	10000

1.7 Thermal protectors

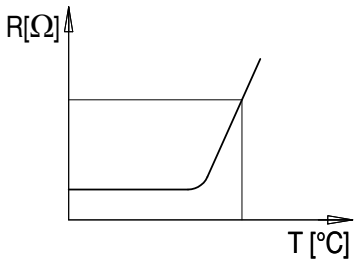
01: Thermistore PTC Suitable for fast overloads, no temperature monitoring		
Signal type	[-]	Non linear resistance
Rated voltage	[V dc]	7,5
Max. voltage	[V dc]	30
Insulation voltage	[kV]	2,5
Switching temperature (standard)	[°C]	140
Resistance @ 135°C	[Ω]	≤ 550
Resistance @ 145°C	[Ω]	≥1330
Resistance @ 155°C	[Ω]	≥4000

02: Bimetallic thermal protectors PTO Suitable for long time overloads, no temperature monitoring		
Signal type	[-]	NC - normally closed
Switching temperature	[°C]	140
Reactivation temperature	[°C]	110 ± 15
Supply voltage	[V]	250
Rated current	[A]	2,5
Insulation current	[kV]	2

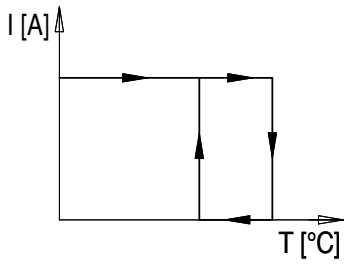
03: KTY84-130 Temperature monitoring		
Temperature monitoring		YES
Signal type	[-]	Linear resistance
Continuous current	[mA]	2
Operating temperature	[°C]	-40 ... +300
Resistance @100°C, 2mA	[Ω]	min 970 max 1030
Resistance rate R100°C/R25°C	[-]	min 0.595 max 0.611
Resistance rate R250°C/R100°C		min 2.111 max 2.221

NOTE: ECO Series drives supplied with Linearmech servomotors support 02 (PTO) protection only.

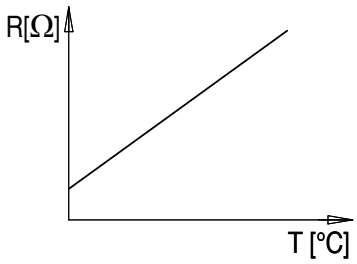
PTC



PTO



KTY

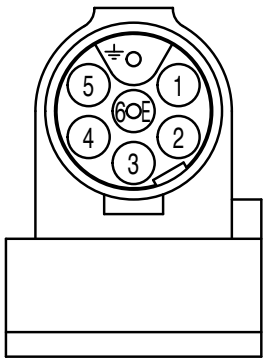


1.8 Motor connections

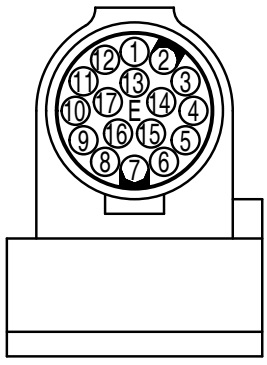
1.8.1 BM 45 / 63 CN - M17 Connectors

POWER M17 7-POLE	
Pin	Function
1	Phase U
2	Phase V
3	-
⏚	PE
4	Brake +
5	Brake -
6	Phase W

SIGNAL M17 17-POLE			
Pin	E01: Incremental encoder	R01: Resolver	A01: BISS absolute encoder
1	CHB	Sin+	DATA
2	CHB/	Sin-	DATA/
3	Z	-	A+
4	HU	-	B+
5	HW	-	DC 5V
6	-	-	-
7	OV enc	R2	0V sensor
8	PT (optional)	PT (optional)	PT (optional)
9	PT (optional)	PT (optional)	PT (optional)
10	5 V enc	R1	5V sensor
11	CHA/	Cos-	CLOCK/
12	CHA	Cos+	CLOCK
13	Z/	-	A-
14	HU/	-	B-
15	HV/	-	-
16	HV	-	-
17	HW/	-	0V Un



POWER

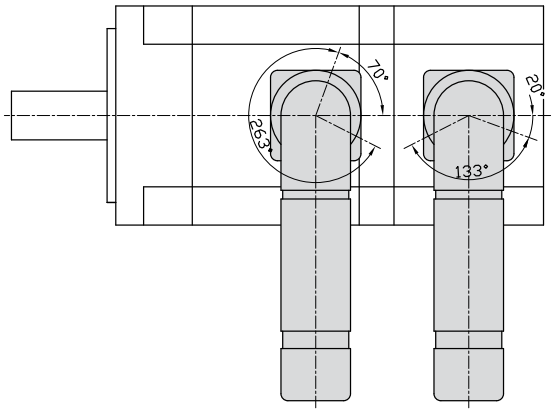


SIGNAL

Connectors orientation

Connectors may rotate to be properly oriented.

The drawing shows the angular range of orientation.



1.8 Motor connections

1.8.2 BM 45 / 63 CV - Cables, no connectors

POWER	
Wire color	Function
White	Phase U
Black	Phase V
Yellow - Green	⏚
Red 0,5 mm²	Brake +
Black 0,5 mm²	Brake -
Red	Phase W

SIGNAL			
E01: Incremental encoder		R01: Resolver	
Wire color	Function	Wire color	Function
Green	CHB	Yellow	Sin+
Green / Black	CHB/	Blue	Sin-
Yellow	Z	-	-
Brown	HU	-	-
White	HW	-	-
-	-	-	-
Black	0V ENC	Yellow/White or Black/White	R2
-	-	-	-
-	-	-	-
Red	+5V ENC	White/Red	R1
Blue	CHA/	Black	Cos-
Blue / Black	CHA	Red	Cos+
Yellow / Black	Z/	-	-
Brown / Black	HU/	-	-
Grey / Black	HV/	-	-
Grey	HV	-	-
White / Black	HW/	-	-

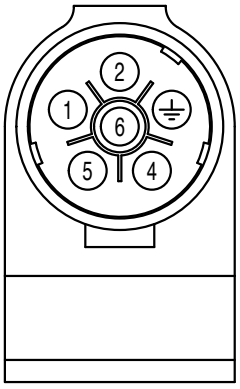
NOTE: Connections with cables (no connectors) are only available with 24/48 V dc supply.

1.8 Motor connections

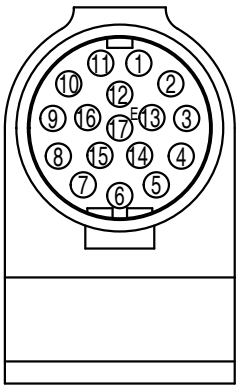
1.8.3 BM 82 / 102 CN - M23 Connectors

POWER M23 6-POLE	
Pin	Function
1	Phase U
2	Phase V
⏚	PE
4	Brake +
5	Brake -
6	Phase W
6	Phase W

SIGNAL M23 17-POLE			
Pin	E01: Incremental encoder	R01: Resolver	A01: BISS absolute encoder
1	CHB	Sin+	DATA
2	CHB/	Sin-	DATA/
3	Z	-	A+
4	HU	-	B+
5	HW	-	DC5V / 7-30V
6	-	-	-
7	OV enc	R2	0V sensor
8	PT (optional)	PT (optional)	PT (optional)
9	PT (optional)	PT (optional)	PT (optional)
10	5 V enc	R1	5V sensor
11	CHA/	Cos-	CLOCK/
12	CHA	Cos+	CLOCK
13	Z/	-	A-
14	HU/	-	B-
15	HV/	-	-
16	HV	-	-
17	HW/	-	0V Un



POWER

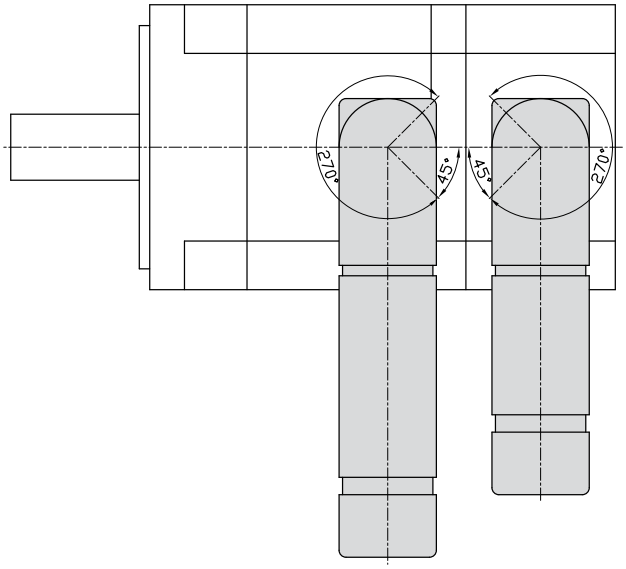


SIGNAL

Connectors orientation

Connectors may rotate to be properly oriented.

The drawing shows the angular range of orientation.



2. Drives

LINEARMECH product range also includes a complete Series of drives, specifically engineered and developed for Linearmech brushless servomotors BM Series and linear servoactuators SA Series. Linearmech can provide you a **full package solution** with the advantage of having a sole responsible partner from the initial phase of product selection up to the start-up operations of your applications.

2.1 General features

Drives ECO Series by LINEARMECH are full digital products, optimized to control sinusoidal motors.

The implemented control (**Field Oriented Control**) allows high accuracy in motion control, together with Torque, Speed and Positioning control.

The **integrated mechatronic functions** also allows to manage even complex movements with simple digital / serial inputs.

Drives ECO Series operating modes:

TORQUE CONTROL

- analogic reference (0 ... 10) V
- access to the internal drive registers (field networks)

SPEED CONTROL

- analogic reference ± 10V
- access to the internal drive registers (field networks)

POSITIONING CONTROL

- SAP (Stand Alone Positioning)
- MSQ (Multi Sequencer)
- Electrical Axis
- Field networks
  - Ethercat (Coe)
  - CANopen (DS402)
  - RS 422/485 (SNET @ 19200 Baud)
  - Modbus RTU (@ 19200 Baud)

The RS 422 serial port is available as standard. It enables the connection of all drives to a PC through a **serial line**.

The **"DRIVEWATCHER" application software** allows you to manage settings and debug functions. The software allows you to analyze all the data both coming from the drive unit and from the complete dynamic system, load and actuators parameters included.

Using the program utility, it is possible to save and control (graphics and diagrams allow you to have an immediate visual response) all the relevant measurements during the operations, such as speed, power, voltage. This to get the real evaluation of the required torque and finally to reach the better optimization of the system as a whole.

Following sections refer to the general information of each single operating mode; for more information, please refer to the specific manuals.

2.2 SAP (Stand Alone Positioning)

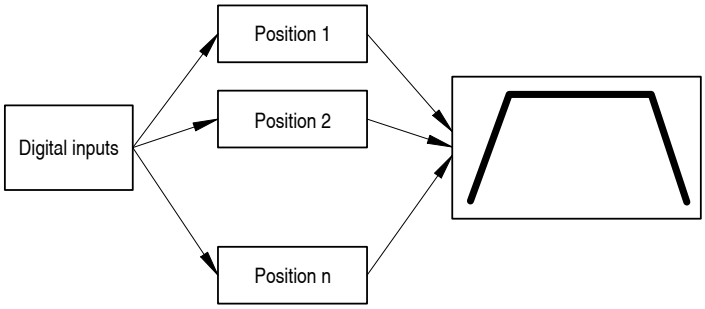
The SAP integrated mechatronic function allows to obtain a completely independent positioning, without any PLCs or PCs.

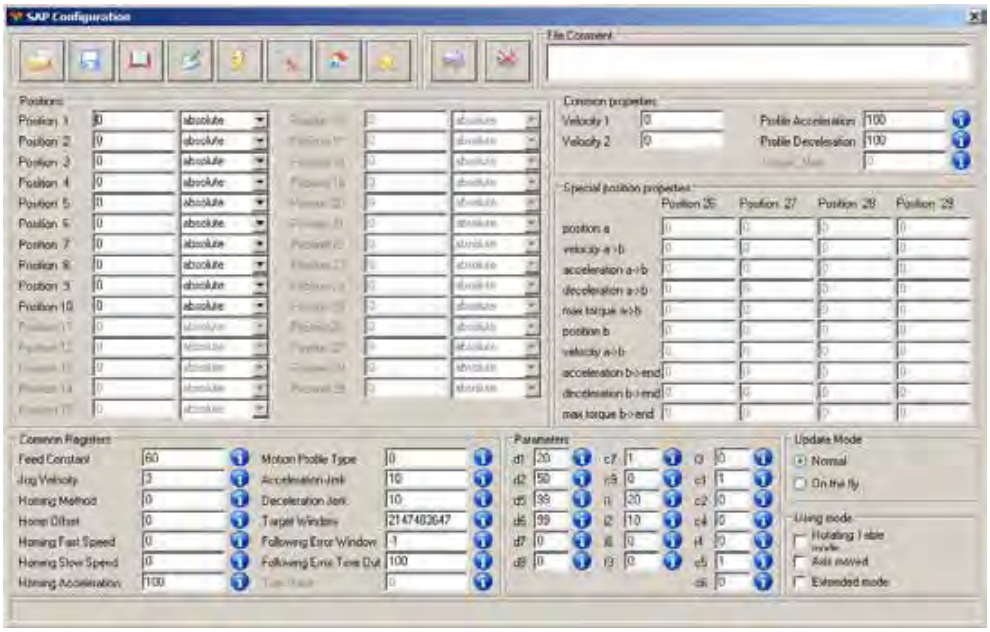
Through the selection of digital inputs, it is possible to recall TARGET positions, previously set inside the drive with DRIVE WATCHER software tool.

The system allows the following movements:

- ZERO SETTING, positioning adjustment related to the input of a sensor
- Movement with an ABSOLUTE positioning related to a reference position
- Movement with a RELATIVE positioning related to the current position

SAP operating mode





SAP Control panel

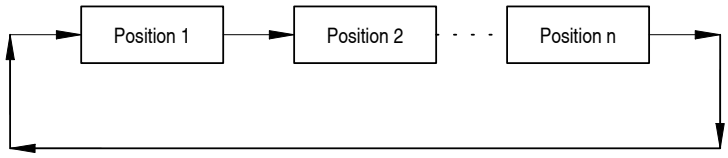
2.3 MSQ (Motion Sequencer)

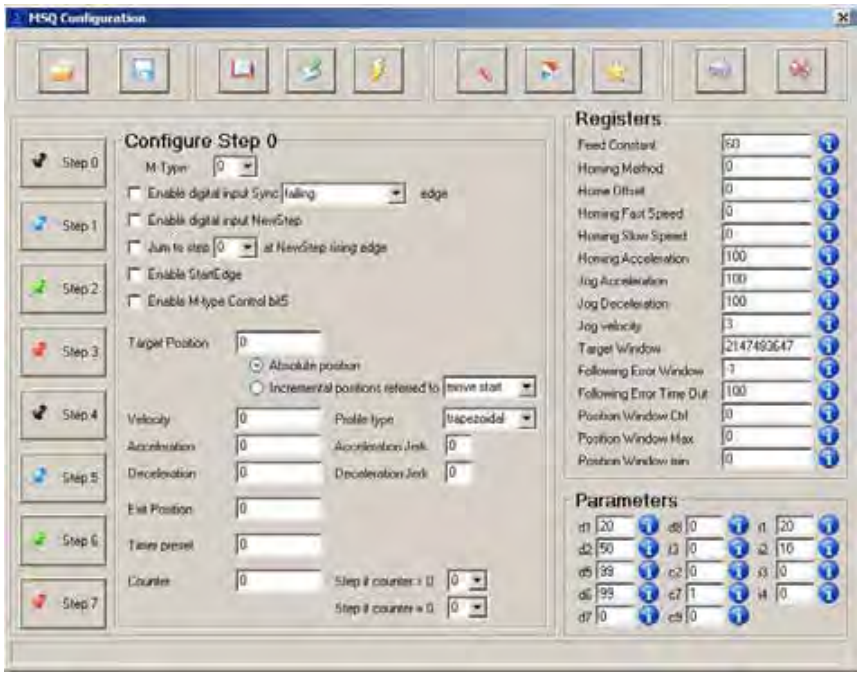
The MSQ integrated mechatronic function allows connecting a sequence of independent movements to manage even sophisticated applications, without any PLCs or PCs.

The system allows the following movements:

- ZERO SETTING, positioning adjustment related to the input of a sensor
- Movement with an ABSOLUTE positioning related to a reference position
- Movement with a RELATIVE positioning related to the current position
- Movement index
- Movement positioning after counting
- Movement positioning by external signal

MSQ operating mode



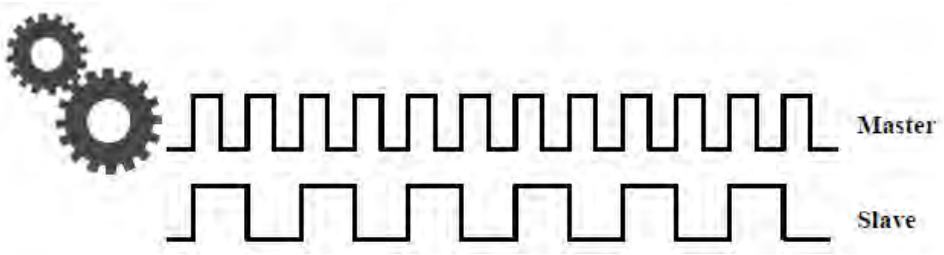


MSQ Control panel

2.4 Electrical axis

The Electrical Axis integrated mechatronic function allows relating the movement of a servomotor (SLAVE) to the action of another motor (MASTER encoder). Possibility to set a given transmission ratio trough a parameter (electric cam).

ELECTRICAL AXIS operating mode



2.5 Field Networks

Thanks to the fieldbus networks, it is possible to manage the drive by exchanging the information with a MASTER system in serial mode.

They offer great flexibility thanks to the possibility of modifying parameters, sending a speed or position setpoint or adding specific mechatronic functions.

A reduced need for wiring is possible by connecting several drives to the same serial line. Field networks differ from each other in communication speed, numbers of functions that can be managed and reference standards.

ETHERCAT

According to the new standards of industrial applications, the Ethercat fieldbus is now taking the lead.

High-speed communication bus, able to get real-time performances of drives. Specifically useful in case of application when many axes are involved with high dynamic and performance needs.

Ethercat is an industrial communication protocol with high performances, which extend the IEEE 802.3 Ethernet standard, allowing data transfer with predictable timing and an extremely precise synchronization. All datas are transferred in the standard Ethernet frame without modifying the basic structure.

For this reason the connection of the drive to an Ethercat network in made by a RJ45 connector, whose wiring respects Ethernet / IEEE 802.3 10Base-T, 100Base-TX and1000Base standards.

The Ethercat protocol applied on the Linearmech ECO Series Drives is Ethercat (CoE), this means a CANopen over EtherCAT.

CANopen

CANopen is a standard application for automation systems based on CAN (Controller Area Network) offering the following performance features:

- Transmission of critical data process according to the producer / consumer principle
- Standard description of the device (data, parameters, functions, programs) in the form of the so-called “object dictionary”
- Standard services for device monitoring, error signal (emergency messages) and network coordination (“network management”)

The implemented protocol refers to the CiA CANopen - Device Profile Drives and Motion Control - DSP 402 v1.1.

RS 422/485 - MODBUS RTU

These networks are very flexible but not really fast. Mostly used for changing parameters, positioning registers and running integrated mechatronic functions.

2.6 Models and functions

Model	ELECTRICAL CHARACTERISTICS			MECHATRONIC FUNCTIONS			
	Supply voltage [V]	Rated current [A] (RMS value)	Peak current [A] (RMS value)	Analogic	SAP MSQ	Electrical axis	Field networks
MICROECO 10-20	24 ... 48 V dc	10	20	•	•	-	• (NO Ethercat)
MINIECO 3-6	230 V ac	3	6	•	-	-	• (NO Ethercat)
MINIECO PLUS 4-8		4	8				
ECO 2D 4-10	230 V ac	4	10	•	•	•	• (Ethercat optional)
ECO 2D 6-15		6	15				
ECO 4D 4-10	400 V ac	4	10	•	•	•	• (Ethercat optional)
ECO 4D 5-13		5	13				
ECO 4D 10-20		10	20				

NOTE: Ethercat fieldbus network only available for ECO2D and ECO4D Drives Series.

2.7 Available trasducers

Model	ELECTRICAL CHARACTERISTICS			SUPPORTED FEEDBACKS		
	Supply voltage [V]	Rated current [A] (RMS value)	Peak current [A] (RMS value)	Incremental encoder 5 V LD with switching sensors E01	Resolver R01	Absolute multiturn encoder with BISS protocol A01
MICROECO 10-20	24 ... 48 V dc	10	20	•	-	-
MINIECO 3-6	230 V ac	3	6	•	-	-
MINIECO PLUS 4-8		4	8			optional
ECO 2D 4-10	230 V ac	4	10	•	optional	optional
ECO 2D 6-15		6	15			
ECO 4D 4-10	400 V ac	4	10	•	optional	optional
ECO 4D 5-13		5	13			
ECO 4D 10-20		10	20			

NOTE: in case of use of a RESOLVER or an ABSOLUTE ENCODER, please contact our Technical Dpt. for assistance in Linearmech ECO Series Drive product selection and configuration.

2.8 Recommended Servomotors - Drives matching

The table below shows the recommended matching between **Linearmech Servomotors BM Series** and **Drives ECO Series** with the related performances (standard motor wiring rated speed 3000 rpm).

WARNING: the performance diagrams shows in Chapter 1.5 refers to the maximum motor performances. Possible degrading in performances must be considered depending on the selected drive, as specified in the table below.

			BM 45 L	BM 63 S	BM 63 L	BM 82 S
MINIECO 10-20	24 V dc	$T_{0,\ 100K}$ [Nm]	0.35	0.44	0.38	
		$T_{nom,\ 100K}$ [Nm]	0.32	0.34	0.35	
		T_p [Nm]	0.86	0.82	0.76	
	48 V dc	$T_{0,\ 100K}$ [Nm]	0.35	0.70	0.89	
		$T_{nom,\ 100K}$ [Nm]	0.32	0.60	0.84	
		T_p [Nm]	1.05	1.65	1.67	
MINIECO 3-6	230 V ac	$T_{0,\ 100K}$ [Nm]	0.35	0.70	1.35	1.50
		$T_{nom,\ 100K}$ [Nm]	0.32	0.60	1.30	1.30
		T_p [Nm]	1.05	2.10	3.80	3.10
MINIECO PLUS 4-8		$T_{0,\ 100K}$ [Nm]	0.35	0.70	1.35	1.50
		$T_{nom,\ 100K}$ [Nm]	0.32	0.60	1.30	1.30
		T_p [Nm]	1.05	2.10	4.20	4.10
ECO 2D 4-10	230 V ac	$T_{0,\ 100K}$ [Nm]	0.35	0.70	1.35	1.50
		$T_{nom,\ 100K}$ [Nm]	0.32	0.60	1.30	1.30
		T_p [Nm]	1.05	2.10	4.20	4.50
ECO 2D 6-15		$T_{0,\ 100K}$ [Nm]				
		$T_{nom,\ 100K}$ [Nm]				
		T_p [Nm]				
ECO 4D 4-10	400 V ac	$T_{0,\ 100K}$ [Nm]				1.50
		$T_{nom,\ 100K}$ [Nm]				1.30
		T_p [Nm]				4.50
ECO 4D 5-13		$T_{0,\ 100K}$ [Nm]				
		$T_{nom,\ 100K}$ [Nm]				
		T_p [Nm]				
ECO 4D 10-20		$T_{0,\ 100K}$ [Nm]				
		$T_{nom,\ 100K}$ [Nm]				
		T_p [Nm]				

2.8 Recommended Servomotors - Drives matching

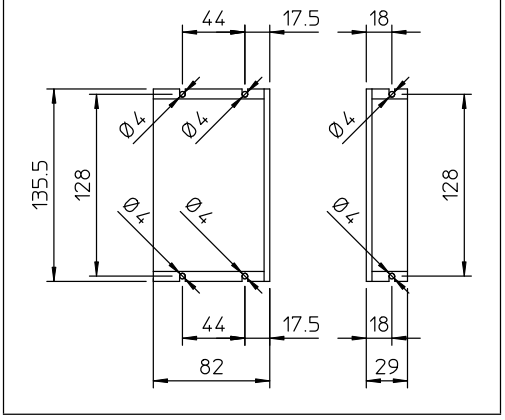
The table below shows the recommended matching between **Linearmech Servomotors BM Series** and **Drives ECO Series** with the related performances (standard motor wiring rated speed 3000 rpm).

WARNING: the performance diagrams shows in Chapter 1.5 refers to the maximum motor performances. Possible degrading in performances must be considered depending on the selected drive, as specified in the table below.

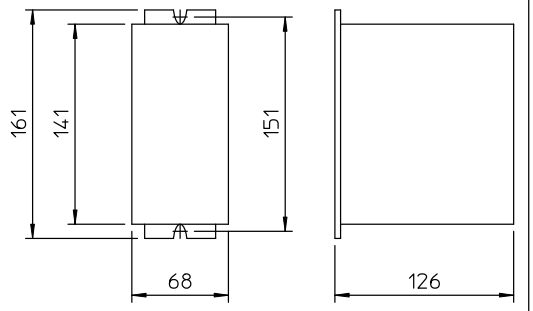
BM 82 L	BM 102 S	BM 102 L6	BM 102 L8			
				[Nm] $T_{0,\ 100K}$	24 V dc	MINIECO 10-20
				[Nm] $T_{nom,\ 100K}$		
				[Nm] T_p		
				[Nm] $T_{0,\ 100K}$	48 V dc	
				[Nm] $T_{nom,\ 100K}$		
				[Nm] T_p		
1.90				[Nm] $T_{0,\ 100K}$	230 V ac	MINIECO 3-6
1.52				[Nm] $T_{nom,\ 100K}$		
3.65				[Nm] T_p		
2.50				[Nm] $T_{0,\ 100K}$		MINIECO PLUS 4-8
2.16				[Nm] $T_{nom,\ 100K}$		
4.80				[Nm] T_p		
2.50	3.22			[Nm] $T_{0,\ 100K}$	230 V ac	ECO 2D 4-10
2.16	2.10			[Nm] $T_{nom,\ 100K}$		
6.10	6.72			[Nm] T_p		
2.90	4.82	4.50	4.70	[Nm] $T_{0,\ 100K}$		ECO 2D 6-15
2.50	3.70	3.90	2.50	[Nm] $T_{nom,\ 100K}$		
9.00	10.10	9.30	11.80	[Nm] T_p		
2.90	5.20	4.80	6.20	[Nm] $T_{0,\ 100K}$	400 V ac	ECO 4D 4-10
2.50	4.10	3.90	3.90	[Nm] $T_{nom,\ 100K}$		
9.00	10.70	10.00	13.80	[Nm] T_p		
	5.20	6.00	7.70	[Nm] $T_{0,\ 100K}$		ECO 4D 5-13
	4.10	5.10	5.45	[Nm] $T_{nom,\ 100K}$		
	13.90	13.00	17.50	[Nm] T_p		
	5.20	7.30	9.00	[Nm] $T_{0,\ 100K}$		ECO 4D 10-20
	4.10	6.40	6.70	[Nm] $T_{nom,\ 100K}$		
	15.00	20.00	24.30	[Nm] T_p		

2.9 Dimensions

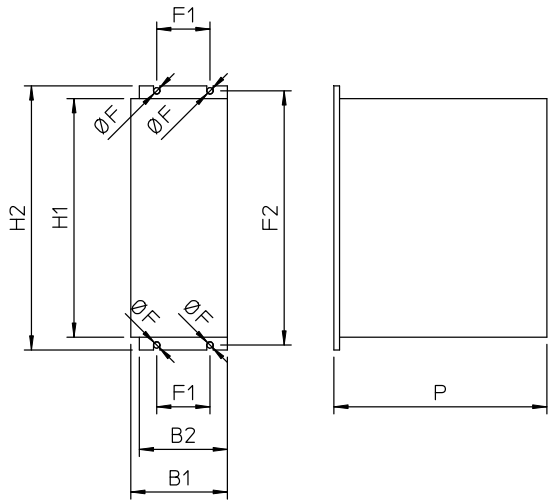
MICROECO



MINIECO, MINIECO Plus

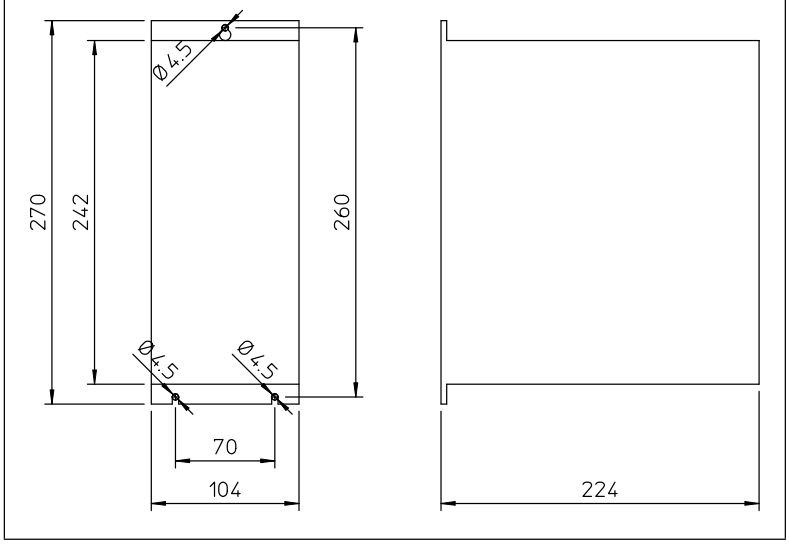


ECO2D 4-10 A 230 V, ECO2D 6-15 A 230 V, ECO4D 4-10 A 400 V, ECO4D 5-13 A 400 V



DRIVE	B1	B2	∅ F	F1	F2	H1	H2	P
ECO2D 4-10 A 230 V	68	62	4.5	37.5	179	168	186	150
ECO2D 6-15 A 230 V	82							
ECO4D 4-10 A 400 V	73	67	4.5	42.5	220	210	227	190
ECO4D 5-13 A 400 V	87							

ECO4D 10-20 A 400 V



3. Connecting cables

On request, wirings can be supplied with power and signal connectors from the servomotor to the drive. The standard cable length is 5 m.

3.1 Power supply cable

Outer jacket material:	PVC - Class 43 for UL 1581 and CSA 22.2 n°210 Colour: orange
Operating temperature:	for fixed wiring, without external mechanical stress: (- 40 ... + 80)°C for mobile laying cables: (- 10 ... + 80)°C
Minimum bending radius:	for fixed wiring: 4 × cable diameter for mobile laying cables: 7.5 × cable diameter
Max. shifting speed for trailing cables:	3 m/s
Max. acceleration/deceleration:	10 m/s^2
Fatigue life for trailing cables:	(3 ... 6) million movements
Operating voltage:	STYLE 2464: 300 V (UL) - U_0/U 450/750 V STYLE 2570: 1000 V (UL)
Reference standards:	CSA 22.2 n°210, UL 1581
Approvals:	UL recognized / CSA (or) AWM STYLE 2464 80°C 300 V - CSA AWM STYLE 2570 80°C 1000 V - CSA
Fire performance:	self-extinguishing VW-1 (UL); FT1 (CSA); IEC 60332-1, CEI 20-35 (EU)
Industrial oils resistance:	ASTM n°2, IRM 902, IEC 60811-2-1

3.2 Signal cable

Outer jacket material:	PVC - Class 43 for UL 1581 and CSA 22.2 n°210 Colour: green
Operating temperature:	for fixed wiring, without external mechanical stress: (- 40 ... + 80)°C for mobile laying cables: (- 10 ... + 80)°C
Minimum bending radius:	for fixed wiring: 4 × cable diameter for mobile laying cables: 7.5 × cable diameter
Max. shifting speed for trailing cables:	3 m/s
Max. acceleration/deceleration:	10 m/s^2
Fatigue life for trailing cables:	(3 ... 6) million movements
Operating voltage:	30 V - 300 V (UL)
Reference standards:	CSA 22.2 n°210, UL 1581
Approvals:	UL recognized / CSA (or) AWM STYLE 2464 80°C 300 V - CSA AWM STYLE 2570 80°C 1000 V - CSA
Fire performance:	self-extinguishing VW-1 (UL); FT1 (CSA); IEC 60332-1, CEI 20-35 (EU)
Industrial oils resistance:	ASTM n°2, IRM 902, IEC 60811-2-1

4. Ordering code

4.1 Servomotor ordering code

BM 45 L	-	30	24	E01	CV	01	L
1	2	3	4	5	6	7	8

1	Servomotor size	page 6-9
2	Brake	page 6-9
	- = without brake	
	B = with holding brake 24V dc	
3	Rated speed	
	30 = 3000 rpm (standard)	
	40 = 4000 rpm (1)	
	50 = 5000 rpm (1)	
	60 = 6000 rpm (2)	
4	Drive supply voltage	page 35
	24 = 24 V dc	
	48 = 48 V dc	
	230 = 230 V ac - 1-phase	
	400 = 400 V ac - 3-phase	
5	Motor feedback	page 26
	E01: optical encoder, LINE-DRIVER, 2000 ppr (standard)	
	R01: resolver, 1 pole pairs 7 V rms, 10 kHz (optional)	
	A01: BISS absolute multiturn encoder (option available starting from size BM 63)	
	- = without device	
6	Electrical connections	page 28-30
	CV = power and signal cable, 0.5 m long, no connectors	
	CN = double 90° connector	
7	Thermal protection	page 27
	01 = PTC (3)	
	02 = PTO	
	03 = KTY 84-130 (3)	
8	Output shaft version	page 10-25
	C = cylindrical shaft	
	L = shaft with key	

(1) - available only for BM 45 and BM 63 sizes - Contact our Technical Dpt. for more information
(2) - available only for BM 45 size - Contact our Technical Dpt. for more information
(3) - not supported by ECO series drives supplied by Linearmech

4. Ordering code

4.2 Drive ordering code

ECO 2D 4-10	230 V	SAP + MSQ	E01	-
1	2	3	4	5

Linearmech ECO Series Drives complete options and coding:

Model	Supply voltage	Positioner	Feedback	Ethercat
MICROECO 10-20	24 ... 48 V dc	SAP + MSQ	E01	-
MINIECO 3-6	230 V ac	SAP + MSQ	E01	-
MINIECO PLUS 4-8	230 V ac	-	E01	-
			A01	-
ECO 2D 4-10	230 V ac	SAP + MSQ	E01	- Ethercat
			R01	- Ethercat
			A01	- Ethercat
ECO 2D 6-15	230 V ac	SAP + MSQ	E01	- Ethercat
			R01	- Ethercat
			A01	- Ethercat
ECO 4D 4-10	400 V ac	SAP + MSQ	E01	- Ethercat
			R01	- Ethercat
			A01	- Ethercat
ECO 4D 5-13	400 V ac	SAP + MSQ	E01	- Ethercat
			R01	- Ethercat
			A01	- Ethercat
ECO 4D 10-20	400 V ac	SAP + MSQ	E01	- Ethercat
			R01	- Ethercat
			A01	- Ethercat

4. Ordering code

4.3 Connecting cables ordering code

4.3.1 Signal cables

CS	R01	M17	05	1
1	2	3	4	5

1 Cable type — page 39

CS = signal cable

CP = power supply cable

2 Trasducer — page 26

E01: optical encoder, LINE-DRIVER, 2000 ppr

R01: resolver, 1 polar pair, 7 V rms, 10 kHz

A01: BISS absolute multiturn encoder

3 Motor side connectors — page 28-30

M17 = M17 17-pole connector

M23 = M23 17-pole connector

4 Length

05 = 5 meters

10 = 10 meters

15 = 15 meters

5 Drive side connectors

1 = 26-pole HD type connector (for MINIECO-ECO2D-ECO4D drives)

2 = No connectors (for MICROECO drives)

4.3.2 Power supply cables

CP	M17	10
1	2	3

1 Cable type — page 39

CS = signal cable

CP = power supply cable

2 Motor side connectors — page 28-30

M17 = M17 7-pole connector

M23 = M23 6-pole connector

3 Length

05 = 5 meters

10 = 10 meters

15 = 15 meters

A. Terms and Definitions

Term	Symbol	Unit of measure	Definition
MOTOR			
Continuous rated torque	$T_{nom, 100K}$	Nm	Torque supplied by the motor for an unlimited period of time, at nominal speed (in thermal balance condition), without exceeding the thermal limits of the relevant insulation class. This condition is defined during test run at conditions described in appendix B.
Stall torque	$T_{0, 100K}$	Nm	Torque supplied by the motor for an unlimited period of time, with blocked rotor (in thermal balance condition), without exceeding the thermal limits of the relevant insulation class. This condition is defined during test run at a rotation speed closed to 0 rpm, at conditions described in appendix B.
Peak torque	T_p	Nm	Torque generated at max. current (peak). The max. torque is possible for short periods of time to have a dynamic system behaviour (abrupt variations of the operating condition). Exceeding this value causes the irreversible demagnetization of the rotor magnetic group.
Rated speed	n_{nom}	rpm	Speed performed by the motor for an unlimited period of time, without exceeding the thermal limits of the relevant insulation class, with torque as defined in the TORQUE - SPEED curve shown in the motor specific diagram.
Max. speed	n_{max}	rpm	Max. permissible rotating speed. It depends on centrifugal force of rotating masses, rotor balance grade and bearings.
Stall current	$I_{0, 100K}$	A	Current (RMS value) phase - phase supplied to the motor in order to generate the torque in conditions of blocked rotor (stall).
Peak current	I_p	A	Current (RMS value) phase - phase supplied to the motor in order to generate the max. torque (peak). This current is limited by the motor magnetic circuit: exceeding this value even for a short time causes the irreversible demagnetization of the magnets.
Voltage constant	k_E	V/1000 rpm	Voltage (RMS value) phase - phase produced by operating motor at 1 000 rpm, at 20°C ambient temperature, with average windings temperature increment of 20 K.
Torque constant	k_T	Nm/A	Ratio between torque with blocked rotor and current with blocked rotor ($T_{0, 100K}$ / $I_{0, 100K}$), with windings temperature increment of 100 K (insulation class F).
Thermal time constant	t_{th}	min	Time necessary to heat the cold motor up to a temperature increase of 0.63 × 100 K, with load $I_{0, 100K}$.
Winding resistance	R_{ph}	Ω	Electric resistance of phase - phase windings connected in Y circuit, at 20°C ambient temperature.
Winding inductance	L_D	mH	Inductance of phase - phase windings connected in Y circuit.
Electric time constant	t_{el}	ms	Ratio between winding inductance and winding resistance (L_D / R_{ph}).
Moment of inertia (without brake)	J_{motore}	kg × m^2	Moment of inertia of motor rotating elements.
Moment of inertia (with brake)	$J_{motore\ BR}$	kg × m^2	Moment of inertia of motor and brake rotating elements.
Permissible radial load on motor shaft	F_R	N	Constant load radially applied on the centre of the motor shaft, at 3 000 rpm for nominal bearing service life of 10 000 h.
Permissible axial load on motor shaft	F_N	N	Constant load axially applied on the motor shaft, at 3 000 rpm for nominal bearing service life of 10 000 h.
BRAKE			
Supply voltage	U_{BR}	V	Voltage supplied to the brake excitation coil to release the brake.
Brake power	P_{BR}	W	Power consumption of the brake excitation coil.
Rated braking torque	T_{BR}	Nm	Holding braking torque (it cannot be used to stop the motor).
Brake disengagement delay time	t_{-BR}	ms	Reacting time from the moment the rated power supply voltage is applied until the brake is completely disengaged.
Brake engagement delay time	t_{BR}	ms	Reacting time from the moment the brake power supply is interrupted until the rated braking torque T_{BR} is reached.

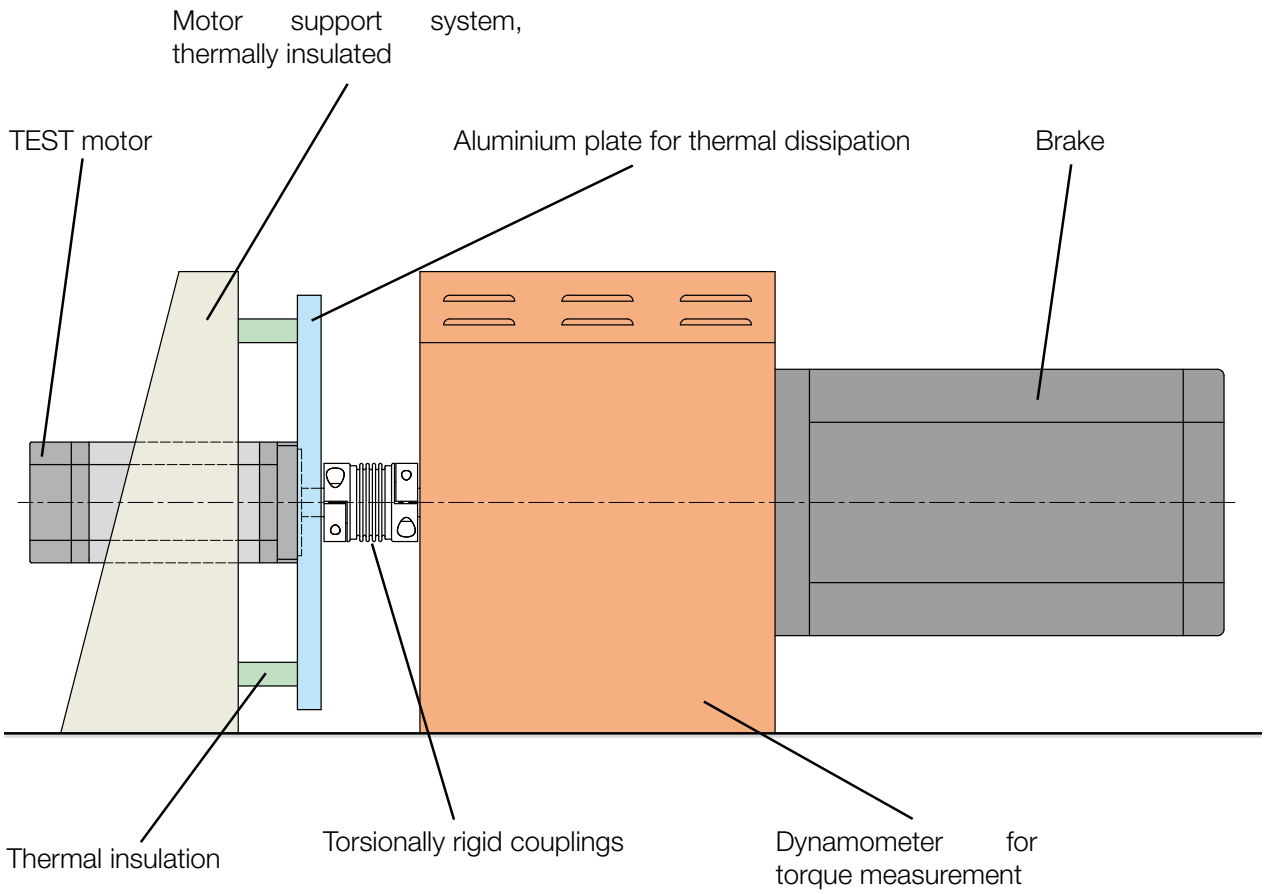
B. Test conditions

All electrical and mechanical performances of **Linearmech BM Series servomotors** are obtained during test run, where the servomotor has been fixed horizontally, supported by an aluminiun plate thermally insulated from the base of the test bench, and coupled by dynamometer to the brake.

The dimensions of aluminium plates used is related to the servomotor size:

- BM 45, BM 63, BM 82: 250×250×6 mm
- BM 102: 350×350×20 mm

During thermal test for the definition of stall torque ($T_{0,\ 100K}$) and continuous rated torque ($T_{nom,\ 100K}$) the motor, in thermal balance conditions, run to a windings temperature increment of 100 K, without exceeding temperature limits related to the F insulation class.



Notes

Notes

Notes

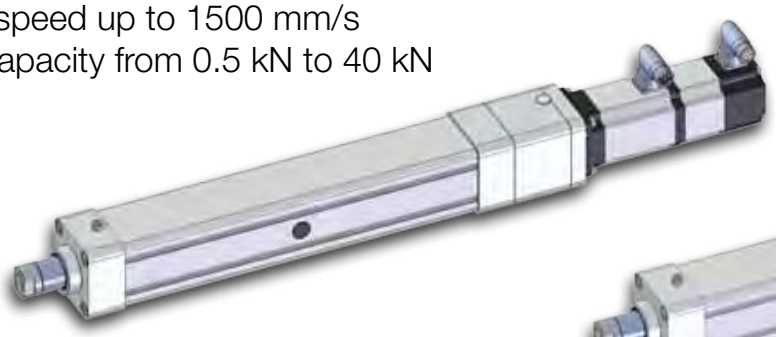
Servomech and Linearmech products

with Linearmech Brushless Servomotors BM Series

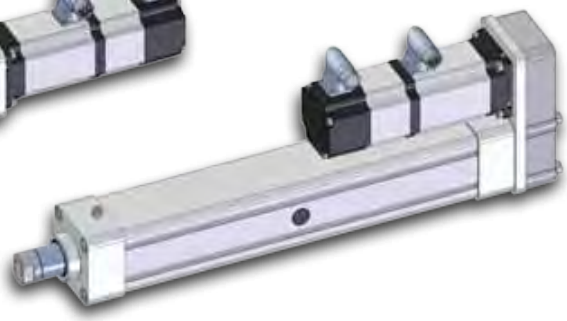
Linear Servoactuators

Ball screw linear drive
7 sizes available
Attachments according to ISO 15552
Linear speed up to 1500 mm/s
Load capacity from 0.5 kN to 40 kN

SA IL Series
In Line Design



SA PD Series
Parallel Design



Ball screw jacks
MA BS Series

Worm gearbox
Load capacity from 5 kN to 350 kN
8 sizes available
Ball screw diameter from 16 mm to 100 mm
Linear speed up to 285 mm/s

Travelling nut

Travelling screw

Ball screw jacks
HS Series

Gleason bevel gear
Load capacity from 10 kN to 200 kN
6 sizes available
Bull screw diameter from 25 mm to 80 mm
Linear speed up to 2000 mm/s

Servomech and Linearmech products

with Linearmech Brushless Servomotors BM Series

Linear Actuators

ATL Series

Acme screw linear drive

7 sizes available

Load capacity from 4 kN to 80 kN

Linear speed up to 150 mm/s

BSA Series

Ball screw linear drive

7 sizes available

Load capacity from 4 kN to 60 kN

Linear speed up to 120 mm/s

Serie UAL

Acme screw linear drive

5 sizes available

Load capacity from 2 kN to 15 kN

Linear speed up to 500 mm/s

UBA Series

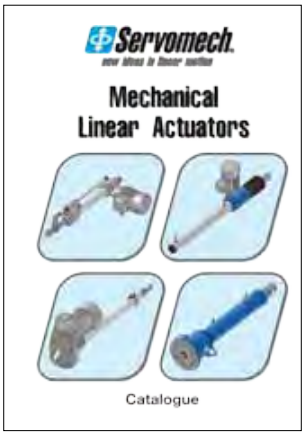
Ball screw linear drive

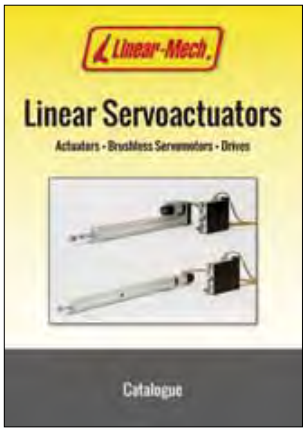
5 sizes available

Load capacity from 2 kN to 15 kN

Linear speed up to 500 mm/s

For further information check out our catalogues:





In this catalogue:

Brushless Servomotors BM Series

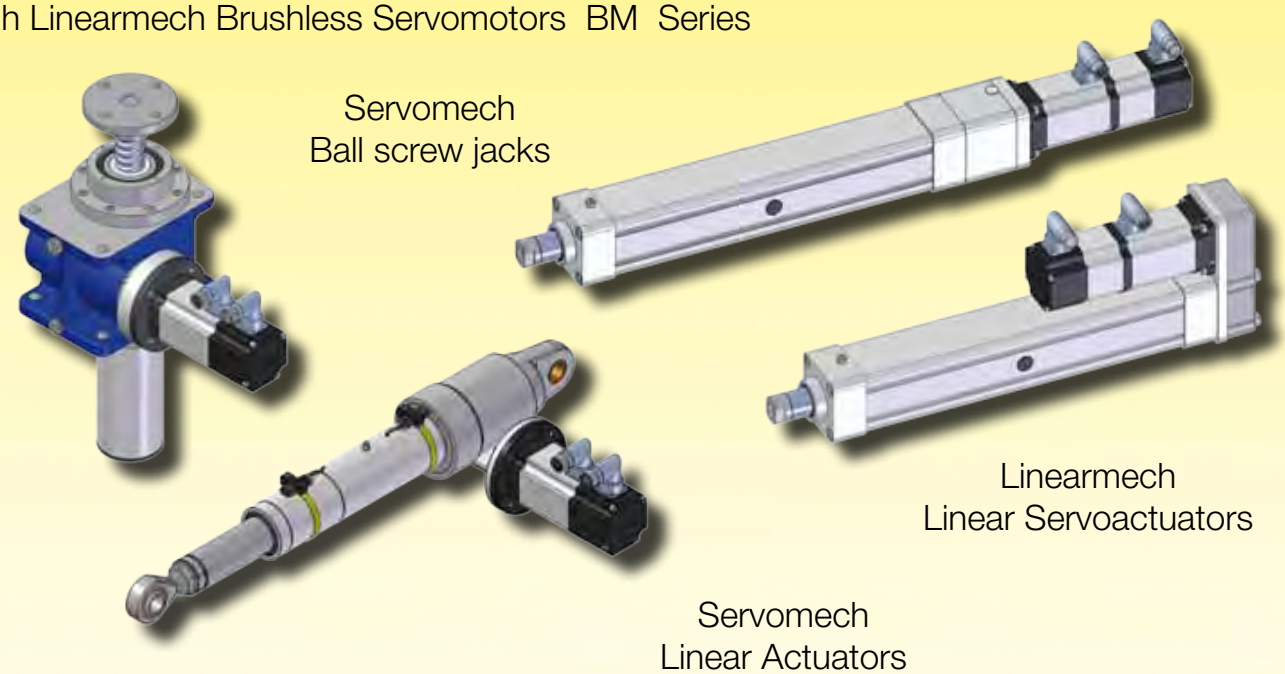
High efficiency and performances
Segmented lamination stator technology
7 sizes available
Nominal torque up to 10 Nm
Available with brake
Standard optical encoder, optional resolver or multi-turn absolute encoder

Drives Eco Series

Engineered focusing on linear performances for Automation Industry and Linear Motion
Positioning Control
(SAP - Stand Alone Positioning, MSQ - Motion Sequencing, Electrical axis),
Torque control, Speed control
Ethercat, CANopen, RS422/485, MODBUS RTU

Servomech and Linearmech products

with Linearmech Brushless Servomotors BM Series



Servomech
Ball screw jacks

Linearmech
Linear Servoactuators

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Linear Actuators

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