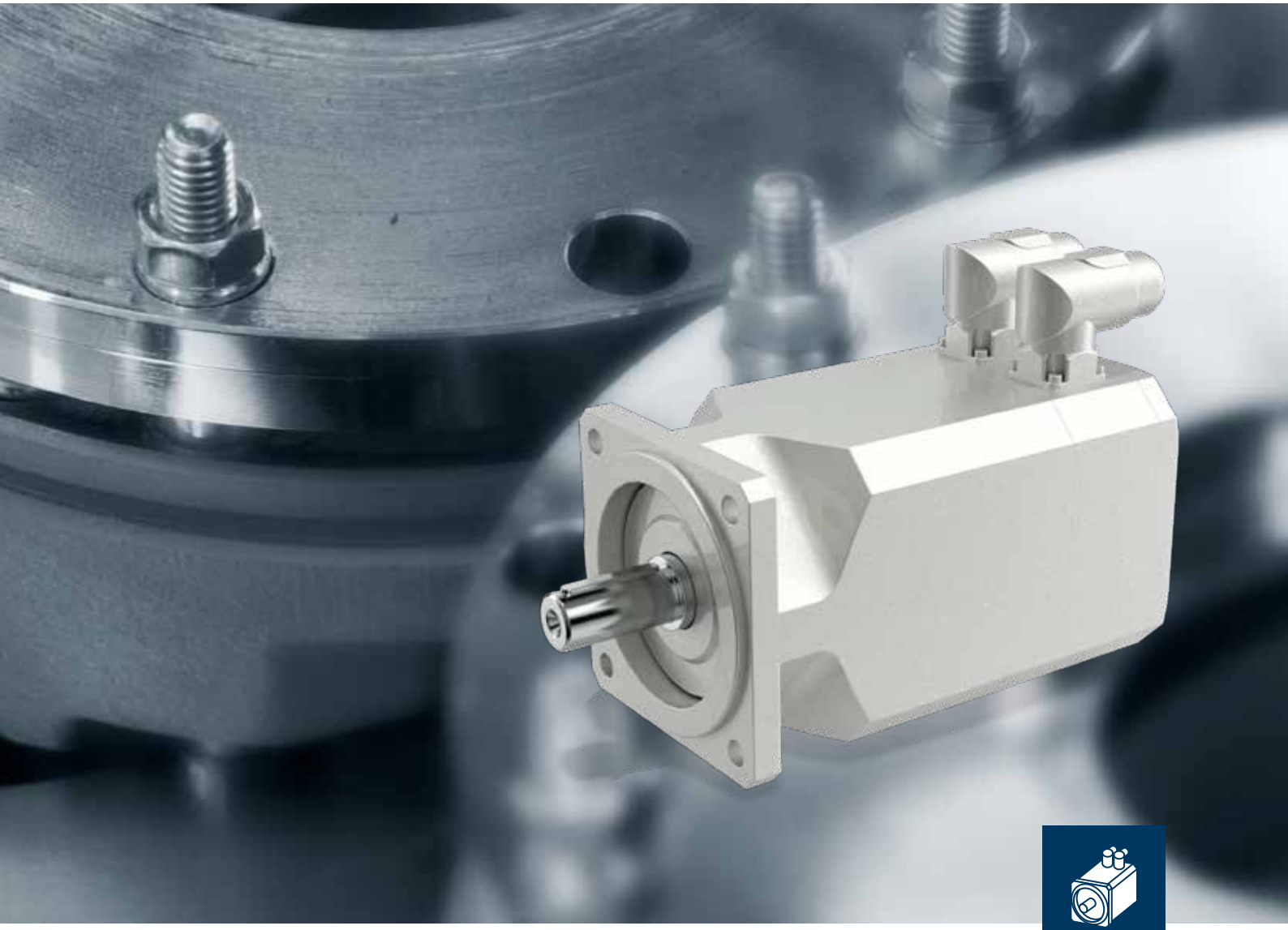
Bonfiglioli
Riduttori

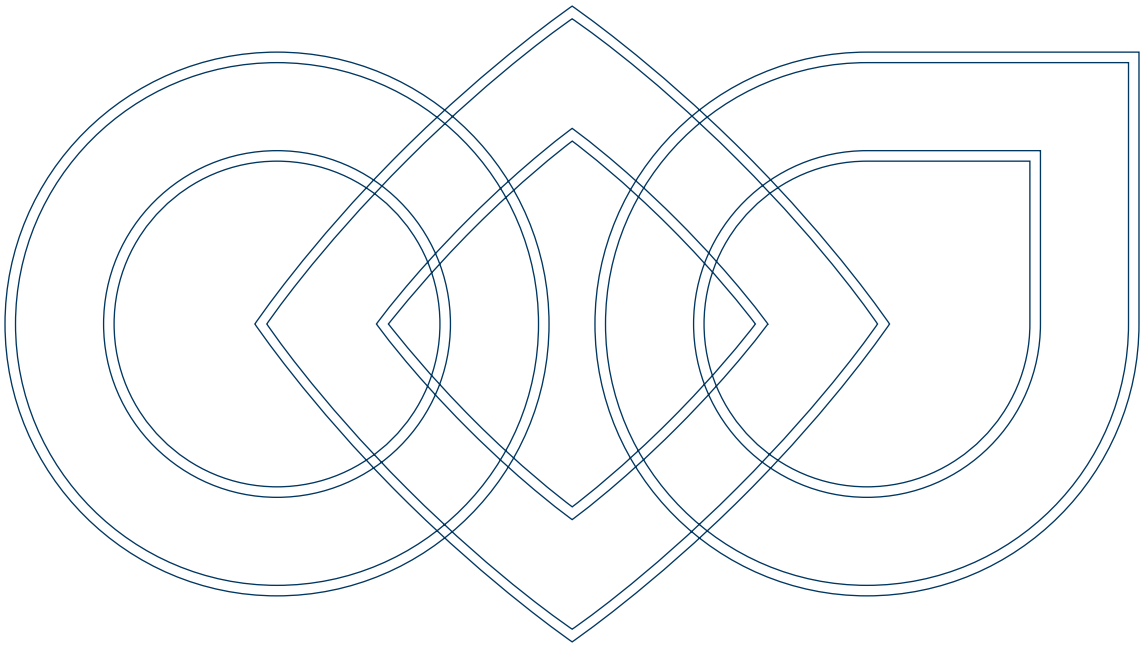
BMD

Permanent Magnet AC
Synchronous Motors



PRODUCT

Bonfiglioli
Forever Forward



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Focus on our synchronous servomotors

These permanent magnet AC synchronous servomotors are ideal for any type of automatic machinery in particular applications with high dynamic requirements. They are particularly suited to typical applications in plastic and metal machining, packaging, food and beverage processing, winding and textile industries.

The dimensions of the motor are drastically reduced, with considerable advantages in terms of torque density, overall dimensions and dynamic performance.
Thanks to the high quality of the neodymium iron boron rare-earth magnets, performance are maximized in terms of very high accelerations and withstand high overloads without risk of demagnetization of the magnets.

The motors are available in six frames covering a stall torque range between 0.85 ÷ 45 Nm with natural cooling and up to 60 Nm with forced ventilation.

These brushless sinusoidal motors are designed as standard for a three phase power supply, 230Vac and 400Vac.

BMD motor series are manufactured using class F insulation materials. The standard cooling method is free ventilation IC410. As option, the forced ventilation IC416 is available only for the size BMD 145 and BMD 170.

Since each servomotor has a protective temperature sensor (PTC, KTY or PT100) embedded in the motor windings, operating temperature is constantly acquired and monitored by the drive to prevent all risks of damage to the motor irrespective of operating conditions.
An optional electromechanical holding brake is available for all models. Brake operation is controlled entirely by the frequency inverter.

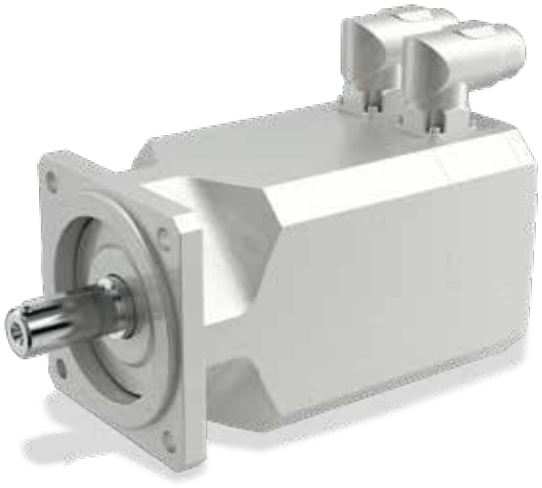
BMD motors are optionally available with an external additional flywheel mass to face the machine inertia.

BMD series are available with degree of protection IP65 (standard) and IP67 (optional).

The following feedback devices are available:
- Resolver with excitation frequency 8 and 10 kHz
- Single turn absolute SinCos interface
- Single turn and Multi-turn: Hiperface and EnDAT protocols supported
- No feedback versions (specific control algorithms with sensorless servo drive are required).

BMD Series servomotors are controlled in speed and/or torque by a suitable electronic servo drive. The servo drive therefore constitutes a fundamental part of the actuator and requires perfect synchronization with it in order to achieve optimum performance.

The combination of BMD servomotors with frequency inverters from Bonfiglioli inverters ensures the perfect control of the motor in order to optimse the performance according to the machine requirements.



BMD Brushless motor photos used inside this catalogue do not represent the real product colour.
The actual colour is black (RAL 9005). Silver dressing has to be intended for marketing and promotional purposes only.

Standards and directives

BMD motors are manufactured in accordance with applicable standards and Directive listed in the following.

STANDARD

IEC 60034-1, EN 60034-1
Rotating electrical machines
Part 1: Rating and performance

IEC 60034-2-3
Rotating electrical machines
Part 2-3: Specific test methods for determining losses and efficiency of converter-fed AC motor

IEC 60034-5, EN 60034-5
Rotating electrical machines
Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) - Classification

IEC 60034-6, EN 60034-6
Rotating electrical machines
Part 6: Methods of cooling (IC Code)

IEC 60034-8, EN 60034-8
Rotating electrical machines
Part 8: Terminal markings and direction of rotation

IEC 60034-14, IEC 60034-14
Rotating electrical machines
Part 14: Mechanical vibration - Measurement, evaluation and limits of vibration severity

IEC TS 60034-25
Rotating electrical machines
Part 25: Guidance for the design and performance of a.c. motors specifically designed for converter supply

IEC 60072-1
Dimensions and output series for rotating electrical machines - Part 1

DIRECTIVES

Low Voltage Directive: 2014/35/EU

The BMD servomotors series comply with UL/CSA standards for the North American market (UL file number E358266).

UL 1004-1
Rotating Electrical Machines
General Requirements

UL 1004-6
Servo and Stepper Motors

CSA C22.2 No. 100
Motors and Generators

Symbols and units of measure

SYMBOL	U.M.	DESCRIPTION
2p	[-]	Number of poles
dT	[K]	Winding temperature rise
f_H	[-]	Altitude adjustment factor
f_n	[Hz]	Rated frequency
f_T	[-]	Temperature adjustment factor
I_0	[A]	Stall RMS current
I_b	[A]	Brake DC current
I_{max}	[A]	Max RMS current
I_n	[A]	Rated RMS current
J_b	[$Kgm^2 \cdot 10^{-4}$]	Brake moment of inertia
J_M	[$Kgm^2 \cdot 10^{-4}$]	Motor moment of inertia
K_e	[$mV\ min^{-1}$]	Back EMF constant phase-phase
K_T	[Nm/A]	Torque constant
L_{pp}	[mH]	Stator phase-phase inductance
M_0	[Nm]	Stall torque
M_b	[Nm]	Brake torque
m_b	[kg]	Brake mass
M_{EQU}	[Nm]	Equivalent torque
M_{max}	[Nm]	Max torque
m_M	[kg]	Motor mass without bake/ flywheel
M_n	[Nm]	Rated torque
n_n	[min^{-1}]	Rated speed
P_b	[W]	Brake electrical power at 20°C
P_n	[kW]	Rated power
R_{pp}	[Ω]	Stator phase-phase resistance at 20°C
t_1	[ms]	Brake engaging time
t_2	[ms]	Brake relase time
V_b	[V]	Brake DC voltage
V_n	[V]	Rated voltage
ΔJ	[$Kgm^2 \cdot 10^{-4}$]	Inertia increase with brake/flywheel
Δm_M	[kg]	Mass increase with brake/flywheel
τ_{el}	[ms]	Electric time constant
τ_{therm}	[min]	Thermal time constant

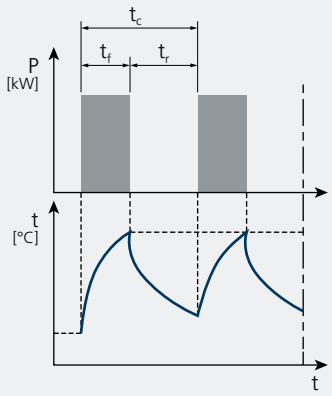
Unless otherwise specified, all dimensions are expressed in millimeters.

Terms and definitions

Back EMF constant [K_e]: is the relationship between the phase-to-phase RMS motor back EMF terminal voltage (V_{AC}) and the corresponding shaft rotational speed. It is typically computed as the RMS value of line voltage at speed of 1 min^{-1} with a winding temperature of 20°C.

Duty type S1: Operation at constant load maintained for sufficient time to allow the machine to reach thermal equilibrium

Duty type S3: sequence of identical duty cycles, each including a time of operation at constant load and a time de-energized and at rest. If not specified the cycle time is fixed equal to 10 minutes.



Intermittence:

$$I = \frac{t_f}{t_f + t_r} \cdot 100$$

t_f Work time under constant load
t_r Rest time

Electric time constant [τ_{el}]: is the time taken for the current to reach 63.2% of its steady state value when a step input voltage is applied while the rotor is stationary. Calculated by dividing the winding phase-to-phase inductance (L_{pp}) by the winding phase-to-phase resistance (R_{pp}) at 20°C.

$$\tau_{el} = L_{pp} / R_{pp}$$

Max current [I_{max}]: is the current used to produce the max torque (M_{max}). It is the current limit of the machine, and if exceeded, even for a short period, it may happen an irreversible damage of the machine.

Max torque [M_{max}]: is the absolute maximum torque that can be produced by a servomotor for a short time.

Rated current [I_n]: is the RMS current to produce the rated torque (M_n).

Rated frequency [f_n]: is the frequency of the fundamental component of the output voltage corresponding at the rated speed (n_n) according to the following equation where p is the pole pairs.

$$f_n = p \cdot n_n / 60$$

Terms and definitions

Rated power [P_n]: is the mechanical power available at shaft at rated speed n_n.

$$P_n = 2\pi \cdot M_n \cdot n_n / 60$$

Rated speed [n_n]: is the speed at which the motor has been designed to operate with a reasonable level of control, in terms of overload and overspeed.

Rated torque [M_n]: is the thermally permissible continuous torque for S1 duty at the rated motor speed (n_n). It is normally less than the standstill torque (M_0) due to rotational losses (iron losses, friction losses…).

Standstill current [I_0]: is the RMS current to produce the standstill torque (M_0).

Standstill torque [M_0]: is the thermal limit torque for S1 duty produced when the motor runs at zero speed.

Thermal equilibrium: is the state reached when the temperature rise of the several parts of the machine do not vary by more than a gradient of 2 K per hour.

Thermal time constant [τ_{therm}]: is the time for the temperature to reach 63.2% of this final value between the motor housing and the ambient after a step-wise current change.

Torque constant [K_T]: is the phase RMS current to torque transfer ratio at standstill condition. It is quoted at rated motor winding temperature in steady state condition (thermal equilibrium – S1 duty cycle).

Winding temperature rise [dT]: is the temperature rise, in specified service conditions, of the motor windings above the maximum ambient reference temperature.

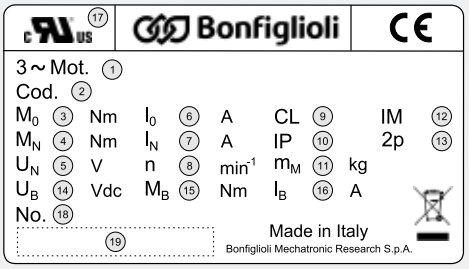
Rating plates

In accordance with IEC 60034-1, the motor rating plate summarizes the motor rating including the approximate total weight. Example of rating plate and fields description are reported hereafter.

Fields:
1) Product designation
2) Product code
3) Stall torque
4) Nominal torque
5) Nominal voltage
6) Stall current
7) Nominal current
8) Nominal speed
9) Insulation class
10) Degree of protection
11) Total weight
12) Motor mounting
13) Number of poles
14) Nominal brake voltage [1]
15) Nominal brake torque [1]
16) Nominal brake current [1]
17) UL certification logo [2]
18) Serial number
19) Serial number as barcode

[1] *Only for brake motors (F24 option)*
[2] *Only for motors with CUS option*

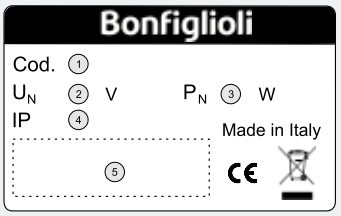
Example of BMD rating plate:



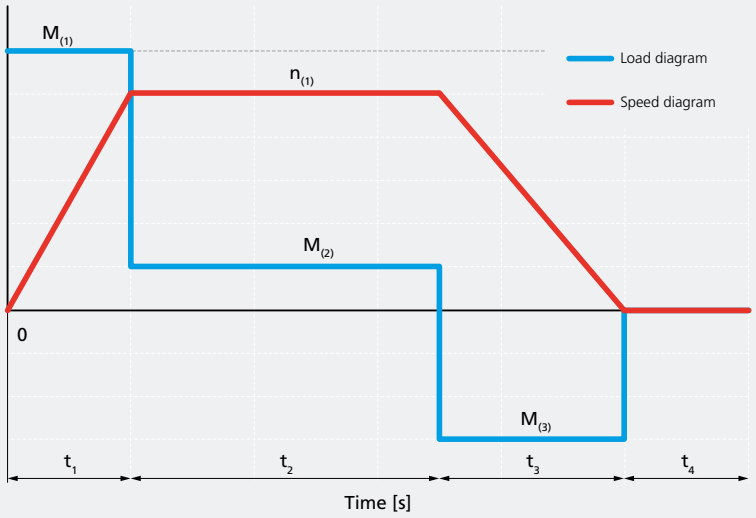
The fan unit data are summarized in a dedicated rating plate. Example of rating plate and fields description are reported hereafter.

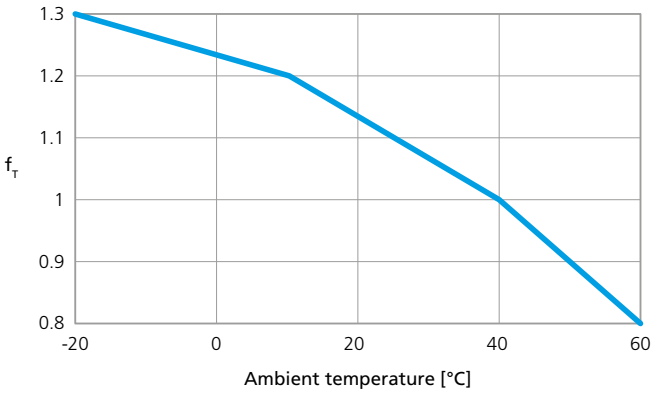
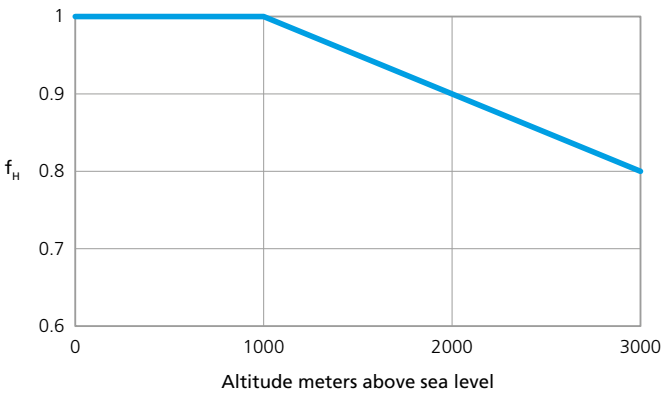
Fields:
1) Product code
2) Nominal voltage
3) Nominal power
4) Degree of protection
5) Product code as barcode

Example of fan unit rating plate:

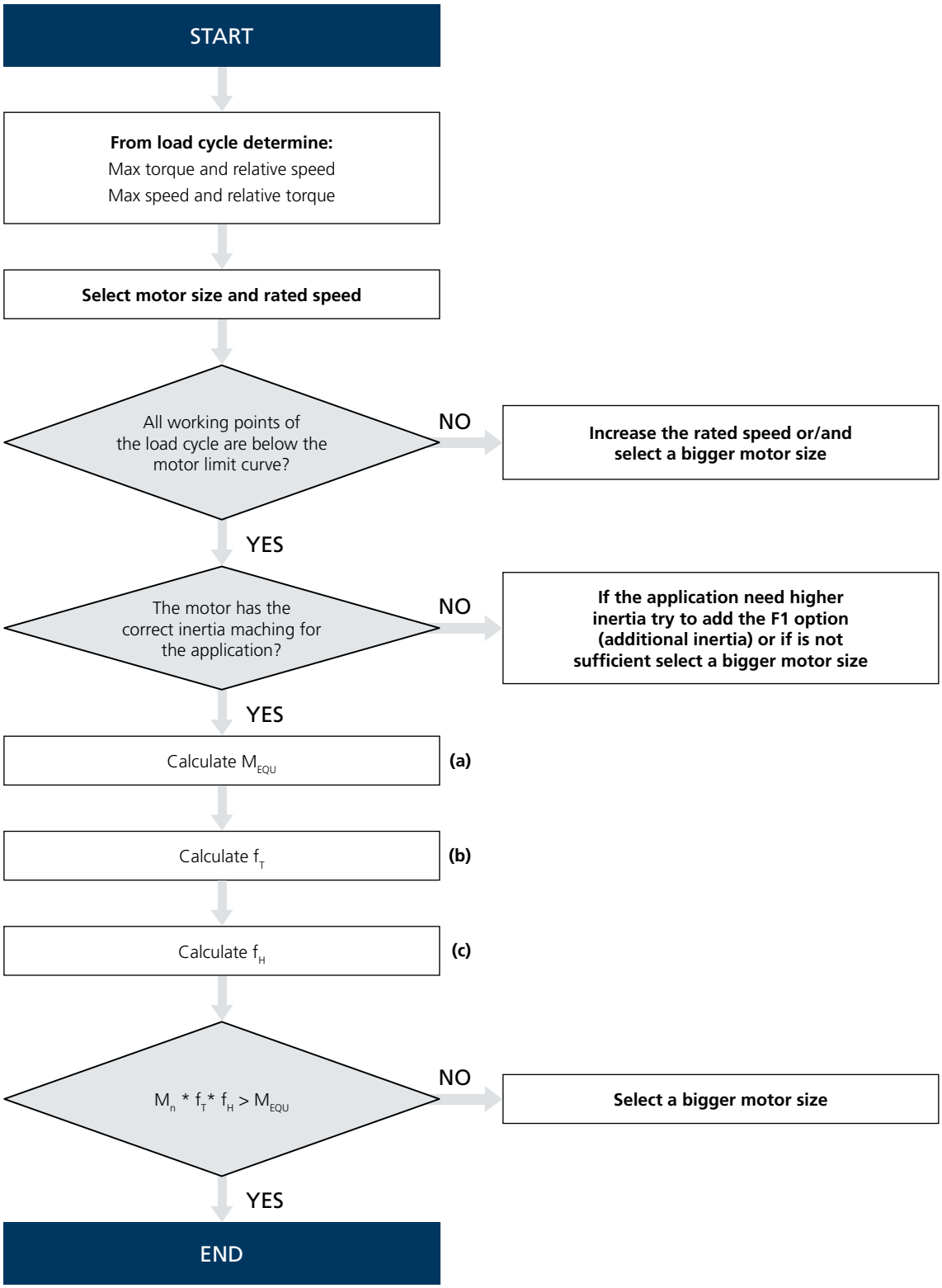


Selecting the servomotor

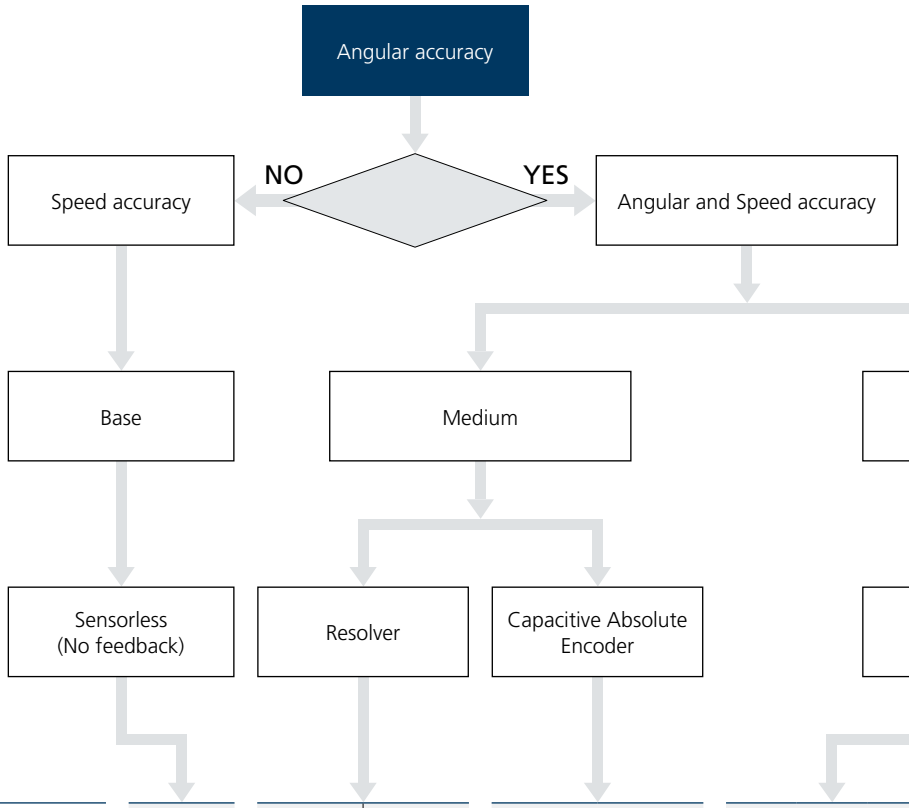


(a)	Equivalent torque	M_{EQU}	[Nm]	$M_{EQU} = \sqrt{\frac{M_{(1)}^2 \cdot t_1 + M_{(2)}^2 \cdot t_2 + \ldots + M_{(n)}^2 \cdot t_n}{t_1 + t_2 + \ldots + t_n}}$
(b)	Temperature adjusting factor	f_T	-	
(c)	Altitude adjustment factor	f_H	-	

Selecting the servomotor



Feedback selection



Interface	-	-	-	Hiperface		EnDat			Hiperface		SinCos
Feedback option	**SEN**	**RES1**(2)	**RES2**	**ENB5**	**ENB6**	**ENB1**	**ENB2**	**ENB8**	**ENB3**	**ENB4**	**ENB7**
Periods per revolution	-	1	1	16	16	512(1) 2048(2)	512(1) 2048(2)	-	1024(1) 2048(2)	1024(1) 2048(2)	2048(2)
Resolution available to position loop	-	12 bits(4)	12 bits(4)	9 bits(3)	9 bits(3)	13 bits(3)	13 bits(3)	19 bits(3)	12 bits(1) (3) 15 bits(2) (3)	12 bits(1) (3) 15 bits(2) (3)	16 bits(5)
Multi turn resolution	-	-	-	-	12 bits(3)	-	12 bits(3)	12 bits(3)	-	12 bits(3)	-

1) Only for size BMD 65

2) For the sizes from BMD 82 to BMD 170

3) The information is supplied by the feedback device manufacturer. The values may change when mounted into motor and connected to a drive.

4) The output from the resolver is analog output. The resolution of the system is also determined by the analog to digital converter used. This resolution is obtained when used with the EM-RES-01/02 acquisition module.

5) The output is analog and the resolution of the system is also determined by the analog to digital converter used. This resolution is obtained when used with the EM-ABS-01 acquisition module.

Please check the compatibility with our Motion Control with our Technical team or by consulting the Motion Control catalogue.

Degree of protection

BMD motors are manufactured in protection class IP65 or IP67 by selecting the basic variant "degree of protection" in the designation.

In accordance with IEC 60034-5:

FIRST DIGIT (protection about solid objects)	
0	Non-protected machine
1	Machine protected against solid objects greater than 50 mm
2	Machine protected against solid objects greater than 12 mm
3	Machine protected against solid objects greater than 2.5 mm
4	Machine protected against solid objects greater than 1 mm
5	Dust-protected machine
6	Dust-tight machines

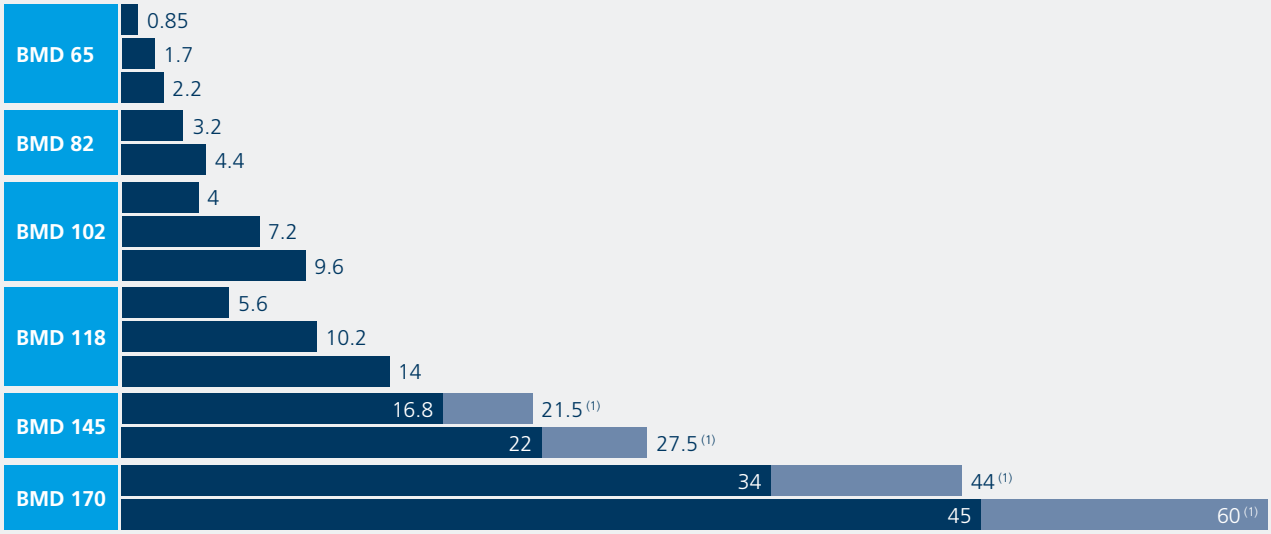
SECOND DIGIT (protection about liquids)	
0	Non-protected machine
1	Machine protected against dripping water
2	Machine protected against dripping water when tilted up to 15°
3	Machine protected against spraying water
4	Machine protected against splashing water
5	Machine protected against water jets
6	Machine protected against heavy seas
7	Machine protected against the effects of immersion
8	Machine protected against the effects of continuous submersion

Bonfiglioli permanent magnet synchronous servomotors range

The Bonfiglioli permanent magnet synchronous motors are available in six sizes with stall torque comprises between 0.85 ÷ 60 Nm.

Product Line Up
- Competitive technology
- Low inertia
- Highest dynamics
- High torque density
- Precision
- Compact design

BMD series
Stall Torque distribution



A brief overview of the available combinations of the basic variants such as motor size, motor stall torque, nominal voltage and nominal speed is reported in the following table.

		BMD 65			BMD 82		BMD 102			BMD 118			BMD 145				BMD 170			
		0.85	1.7	2.2	3.2	4.4	4	7.2	9.6	5.6	10.2	14	16.8	21.5(1)	22	27.5(1)	34	44(1)	45	60(1)
400 V	1600 rpm		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	3000 rpm	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4500 rpm	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
	5500 rpm	X	X	X	X	X	X	X	X	X	X	X	X	X	X					
	6000 rpm	X	X	X	X	X	X	X	X	X	X	X	X							
230 V	1600 rpm	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
	3000 rpm	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		
	4500 rpm	X	X	X	X	X	X	X	X	X	X									
	5500 rpm	X	X	X	X	X	X	X	X	X	X									
	6000 rpm	X	X	X	X	X	X	X	X	X										

(1) Motor with forced ventilation option

Product designation of Bonfiglioli servomotors

BASIC VARIANTS

BMD	145	22	3000	400	165	24	K	65

Degree of protection

65	IP65
67	IP67

Shaft keway

K	with key
NK	without key

Shaft diameter

9	size 65
11	size 65, 82
14	size 82
19	size 82, 102, 118, 145
24	size 102, 118, 145, 170
28	size 118, 145, 170
32	size 170

Flange (1)

63	size 65
75	size 65
100	size 82, 102
115	size 82, 102
130	size 118
130S	size 118
165	size 118, 145, 170

Motor AC voltage (2)

230
400

Motor rated speed (2)

1600	(min^{-1})
3000	(min^{-1})
4500	(min^{-1})
5500	(min^{-1})
6000	(min^{-1})

Motor stall torque

0.85	(Nm) size 65	**5.6**	(Nm) size 118
1.7	(Nm) size 65	**10.2**	(Nm) size 118
2.2	(Nm) size 65	**14**	(Nm) size 118
3.2	(Nm) size 82	**16.8**	(Nm) size 145
4.4	(Nm) size 82	**22**	(Nm) size 145
4	(Nm) size 102	**34**	(Nm) size 170
7.2	(Nm) size 102	**45**	(Nm) size 170
9.6	(Nm) size 102		

Motor size

65, 82, 102, 118, 145, 170

Series

BMD

OPTIONAL VARIANTS

PTC | RES1 | P1 | S1 | F24 | CUS | V1R

Forced ventilation [4]
- **(blank)** no forced ventilation (default)
- **V1R** 24V DC IP 54 angled rotatable receptacle
- **V1S** 24V DC IP 54 straight receptacle
- **V2R** 230V AC IP 54 angled rotatable receptacle
- **V2S** 230V AC IP 54 straight receptacle

Certified execution
- **(blank)** CE
- **CUS** UL

Brake/Flywheel
- **(blank)** no brake nor flywheel (default)
- **F24** brake 24 Vdc
- **F1** additional flywheel / inertia

Signal connector
- **(blank)** Sensorless version, no feedback device
- **S1** Angled rotatable receptacle, with plug
- **S1N** Angled rotatable receptacle, without plug
- **S2** [3][5] Cable with flying leads, without connector
- **S2C** [3][5] Cable with SubD connector
- **S3** Straight receptacle, with plug
- **S3N** Straight receptacle, without plug

Power connector
- **P1** Angled rotatable receptacle, with plug
- **P1N** Angled rotatable receptacle, without plug
- **P2** [3][5] Cable with flying leads, without connector
- **P3** Straight receptacle, with plug
- **P3N** [3] Straight receptacle, without plug

Feedback device
- **RES1** [3] 2 poles resolver 8 kHz
- **RES2** 2 poles resolver 10 kHz
- **ENB1** Optical absolute encoder EnDat interface Single Turn
- **ENB2** Optical absolute encoder EnDat interface Multi Turn
- **ENB3** Optical absolute encoder Hiperface interface Single Turn
- **ENB4** Optical absolute encoder Hiperface interface Multi Turn
- **ENB5** Capacitive absolute encoder Hiperface interface Single Turn
- **ENB6** Capacitive absolute encoder Hiperface interface Multi Turn
- **ENB7** [3] Optical SinCos absolute encoder Single Turn
- **ENB8** Inductive absolute encoder EnDat interface Multi Turn
- **SEN** Sensorless

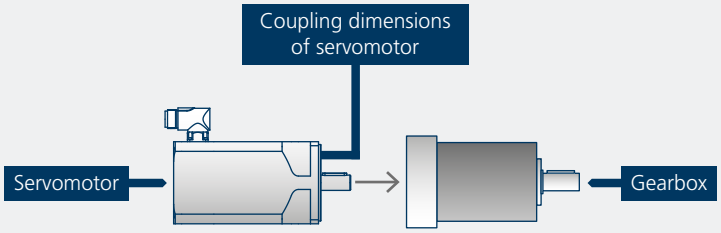
Thermal protection
- **PTC** Thermistor PTC 150
- **KTY** Silicon sensor type KTY84-130
- **TC1** Platinium sensor PT1000

Notes:
(1) M flange dimension, see page 16
(2) For available motor AC voltage and speed combinations refer to general overview of page 13
(3) Not available for motor size BMD 65
(4) For available motor AC voltage and speed combinations refer to pages 30 and 34. Not compatible with UL certification (CUS option).
(5) Standard length 1 meter, for different lengths please contact us

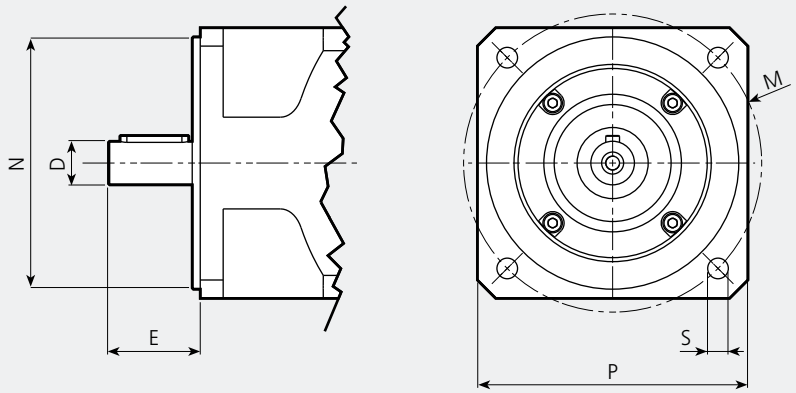
Please check the compatibility with our Motion Control with our Technical team or by consulting the Motion Control catalogue.

Coupling dimensions

The coupling dimensions include both, flange and shaft that are univocally defined by catalogue variants. The flanges and the shafts of BMD are described by fixed geometrics according to standard IEC 60072-1.



According to IEC 60072-1, the interface geometry is defined by quantities D, E, P, M, N, S showed in the following drawing whose numerical values (mm) depend on motor size.



		SERVOMOTORS										
		BMD65		BMD82		BMD102		BMD118			BMD145	BMD170
Shaft diameter x shaft length	DxE	9x20 11x23		11x23 14x30 19x40		19x40 24x50		19x40 24x50 28x60			19x40 24x50 28x60	24x50 28x60 32x60
Flange square	P	65	65	82	100	102	102	118	118	145	145	170
Flange pitch holes diameter	M	63	75	100	115	100	115	130 (1)	130	165	165	165
Diameter of the spigot	N	40	60	80	95	80	95	95	110	130	130	130
Fixing holes diameters	S	5.8	5.8	6.5	9	7	9	9	9	12	12	12

Notes:
(1) Flange variant 130S

Mechanical tolerances

Dimensions and tolerances of shaft extension, key and flange are in accordance with IEC 60072-1.
Shaft extension features an axial threaded hole in accordance with UNI 3221, DIN 332.
Tolerances of the different parts are reported in the table.

COMPONENT		DIMENSIONS	TOLERANCE
Shaft end	D	Ø 9 - 28	j6
		Ø 32	k6
Key	F		h9
Flange	N	Ø < 250	j6

Bearings

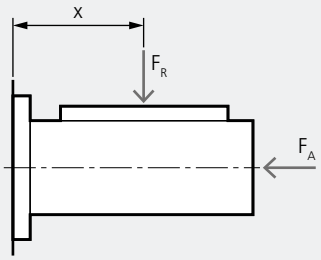
BMD motors use radial ball bearings, lubricated for life with grease and axially pre-loaded. The types of bearings in use are listed in the following table.

SIZE	DRIVE END	NON DRIVE END
BMD 65	6201 2RS	6001 2RS
BMD 82	6205 2RS	6203 2RS
BMD 102	6205 2RS	6204 2RS
BMD 118	6206 2RS	6205 2RS
BMD 145	6206 2RS	6305 2RS
BMD 170	6208 2RS	6305 2RS

Shaft loads

The maxium radial load (F_R) and maximum axial load (F_A) are computed using ISO 281 calculation L_{10h} assuming a bearing life of 20.000h. The load and the speed are assumed to be constant throughout the bearing life.

The maximum radial load is reported as a function of the distance (X) between flange plane and the point of force applicaton. The fatigue limit for the radial load is computed for each size assuming the smallest shaft diameter catalogue (e.g. 11mm for BMD 82). The maximum radial loads F_R are valid only for the horizontal installation of the motor without additional axial load.



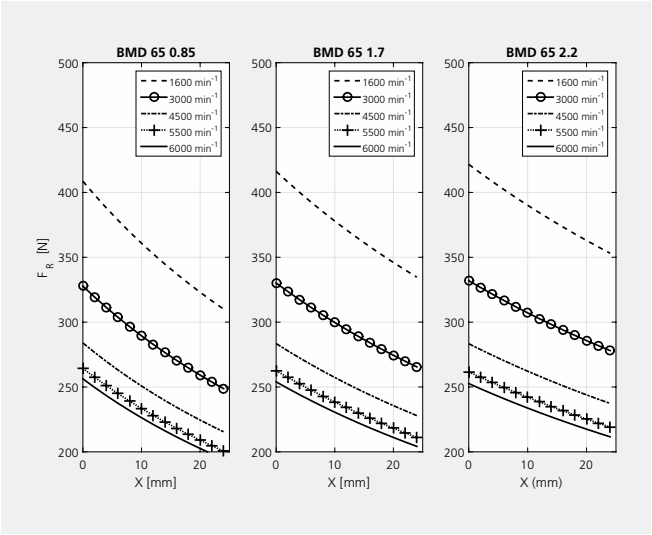
Maximum axial load (F_R=0)

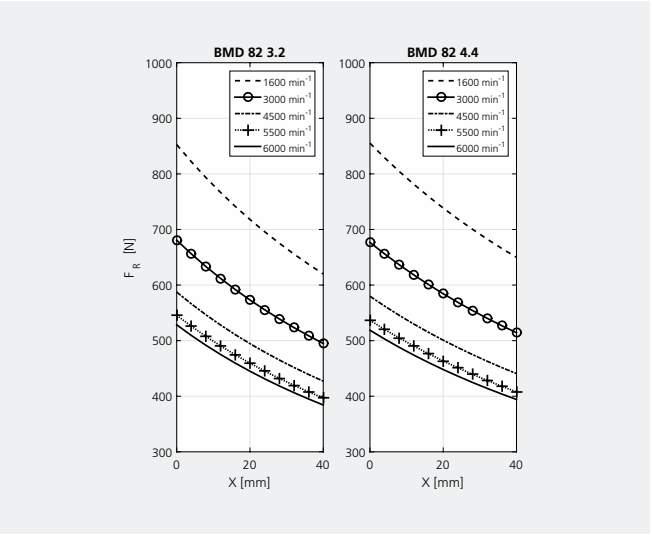
SIZE	SPEED [min^{-1}]					
	[Nm]	1600	3000	4500	5500	6000
BMD 65	0.85	59	48	42	39	38
	1.7	65	53	46	43	42
	2.2	69	56	49	46	44
BMD 82	3.2	115	94	82	77	75
	4.4	120	100	85	81	79
BMD 102	4	140	110	100	95	90
	7.2	150	120	105	100	95
	9.6	160	130	110	105	100
BMD 118	5.6	150	132	114	109	104
	10.2	170	139	121	115	110
	14	180	145	130	120	115
BMD 145	16.8	280	230	200	185	180
	22	295	240	210	195	
BMD 170	34	300	270			
	45	320	290			

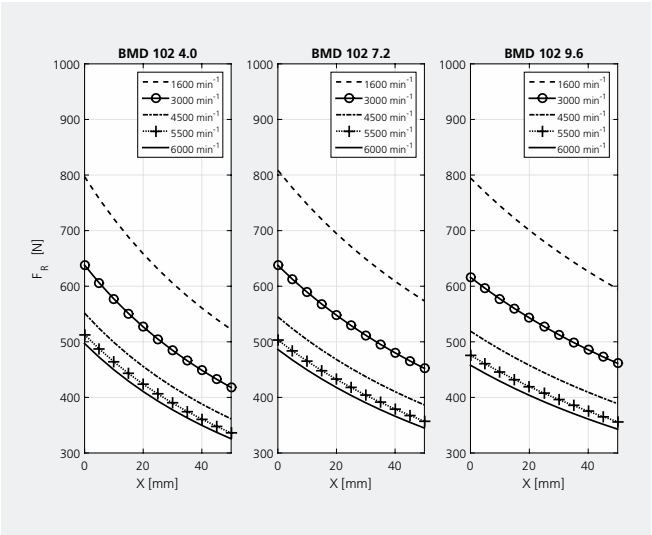
Shaft loads

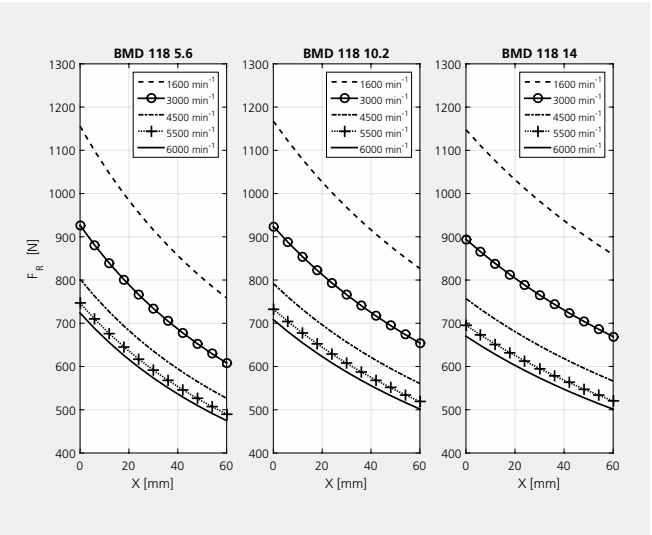
Maximum radial load (F_A=0)

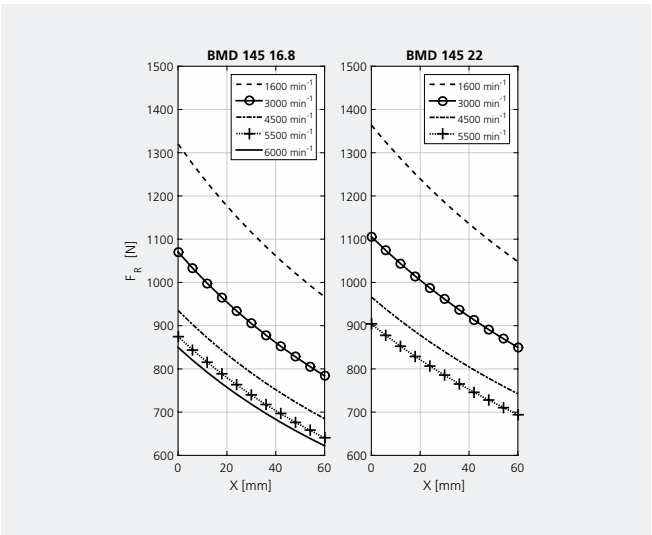
Curves paramtrized according to motor nominal speed.

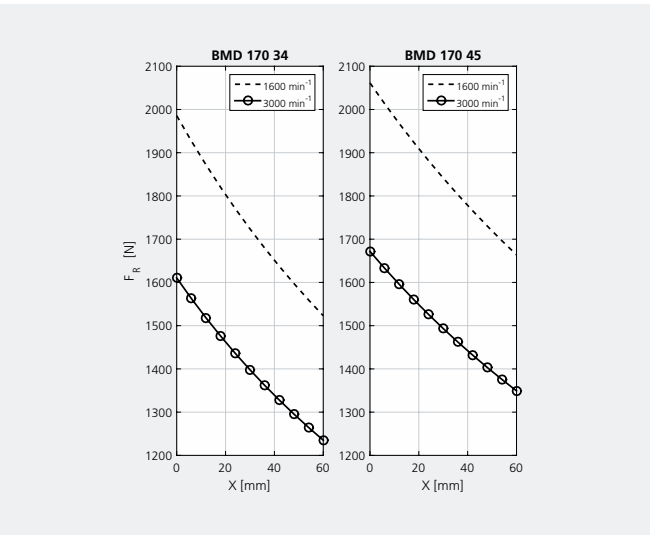










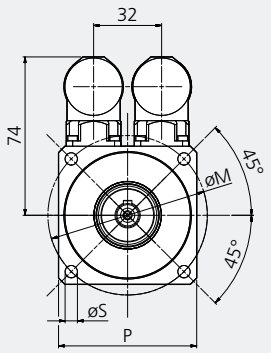


BMD 65 • Ratings

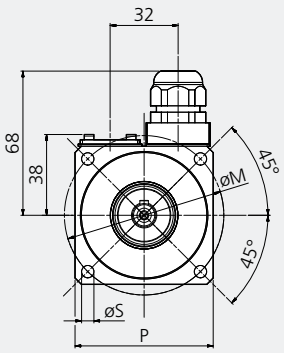
			BMD 65 0.85 Nm					BMD 65 1.7 Nm					BMD 65 2.2 Nm				
	M_0	[Nm]	0.85					1.70					2.20				
	M_n	[Nm]	0.83	0.80	0.76	0.74	0.73	1.65	1.60	1.52	1.48	1.45	2.12	2.05	1.95	1.85	1.80
	n	[min^{-1}]	1600	3000	4500	5500	6000	1600	3000	4500	5500	6000	1600	3000	4500	5500	6000
	f_n	[Hz]	107	200	300	367	400	107	200	300	367	400	107	200	300	367	400
	P_n	[kW]	0.14	0.25	0.36	0.43	0.46	0.28	0.50	0.72	0.85	0.91	0.36	0.64	0.92	1.07	1.13
	M_{max}	[Nm]	2.55					4.90					6.20				
	2p	[-]	8					8					8				
	J	[$Kgm^2 \cdot 10^{-4}$]	0.2					0.4					0.6				
	τ_{el}	[ms]	3					3					3				
	τ_{therm}	[min]	14					20					26				
	m_M	[kg]	1.3					1.9					2.6				
230 Vac	V_n	[V_{AC}]	168	181	172	179	177	193	180	180	174	171	179	180	191	192	190
	I_0	[A]	0.77	1.23	1.93	2.18	2.39	1.26	2.34	3.40	4.20	4.70	1.70	2.96	4.10	4.90	5.40
	I_n	[A]	0.74	1.16	1.74	1.92	2.09	1.25	2.30	3.20	3.90	4.20	1.65	2.78	3.60	4.10	4.40
	I_{max}	[A]	2.50	3.90	6.20	7.00	7.70	4.30	8.00	11.5	14.5	15.9	5.40	9.40	12.9	15.6	17.1
	K_e	[mV/min^{-1}]	75	47	30	27	24	89	48	33	26	24	90	52	38	31	28
	K_T	[Nm/A]	1.10	0.69	0.44	0.39	0.36	1.35	0.73	0.50	0.40	0.36	1.29	0.74	0.54	0.45	0.41
	R_{pp}	[Ω]	48.4	19.2	7.75	6.10	5.04	30.4	8.79	4.19	2.66	2.20	18.8	6.21	3.27	2.26	1.86
	L_{pp}	[mH]	145	57.5	23.2	18.3	15.1	91.9	26.6	12.6	8.00	6.60	56.9	18.8	9.90	6.80	5.60
400 Vac	V_n	[V_{AC}]	-	295	331	318	306	336	311	308	316	300	285	314	314	328	313
	I_0	[A]	-	0.76	0.98	1.23	1.38	0.72	1.35	1.98	2.34	2.68	1.07	1.70	2.48	2.88	3.27
	I_n	[A]	-	0.72	0.88	1.08	1.21	0.72	1.33	1.85	2.14	2.43	1.04	1.60	2.20	2.41	2.68
	I_{max}	[A]	-	2.43	3.10	3.90	4.40	2.46	4.60	6.70	8.00	9.10	3.40	5.40	7.90	9.10	10.4
	K_e	[mV/min^{-1}]	-	76	59	47	42	155	83	57	48	42	143	90	62	53	47
	K_T	[Nm/A]	-	1.12	0.87	0.69	0.62	2.36	1.26	0.86	0.73	0.63	2.06	1.29	0.89	0.76	0.67
	R_{pp}	[Ω]	-	50.0	30.3	19.2	15.1	92.3	26.3	12.2	8.79	6.65	47.6	18.8	8.82	6.56	5.08
	L_{pp}	[mH]	-	150	90.7	57.5	45.2	279	79.5	37.0	26.6	20.1	144	56.9	26.7	19.8	15.4
F24	Mb	[Nm]	2					2					2				
	Δm_M	[kg]	0.2					0.2					0.2				
	ΔJ	[$Kgm^2 \cdot 10^{-4}$]	0.1					0.1					0.1				
F1	Δm_M	[kg]	0.4					0.4					0.4				
	ΔJ	[$Kgm^2 \cdot 10^{-4}$]	0.5					0.5					0.5				

BMD 65 • Dimensions

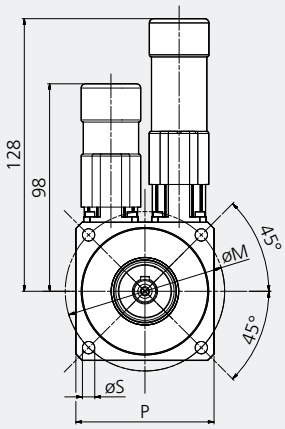
P1-S1 VARIANT

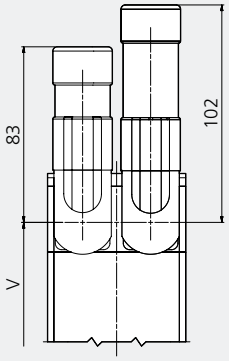


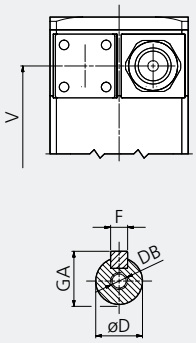
P2 VARIANT



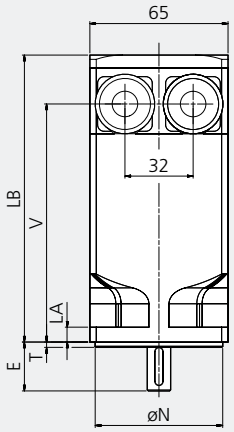
P3-S3 VARIANT



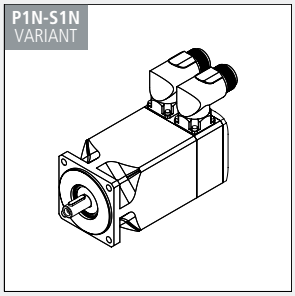




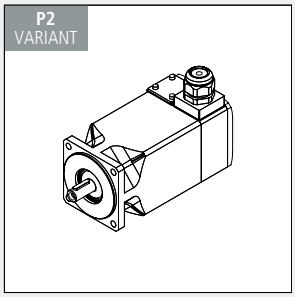
SHAFT END SECTION



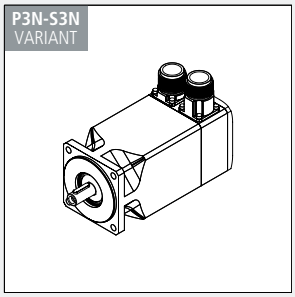
P1N-S1N VARIANT



P2 VARIANT



P3N-S3N VARIANT



B5 FLANGE VARIANT						
Flange variant	P	M	N	S	T	LA
63	65	63	40	5.8	2.5	7
75	65	75	60	5.8	2.5	7

SHAFT DIAMETER VARIANT					
Shaft diameter	D	E	DB	GA (1)	F (1)
9	9	20	M3	10.2	3
11	11	23	M4	12.5	4

MOTOR LENGTH DEPENDING ON THE OPTION

DIMENSION V

Torque	Without Brake or Flyweel			With Brake or Flyweel **F24/F1** options		
	Feedback Variants			Feedback Variants		
M_0	**RES2/SEN**	**ENB1/ENB2**	**ENB3...ENB6/ENB8**	**RES2/SEN**	**ENB1/ENB2**	**ENB3...ENB6/ENB8**
0,85	89	89	89	89	138	138
1,7	112	112	112	112	161	161
2,2	138	138	138	138	187	187

DIMENSION LB

Torque	Without Brake or Flyweel			With Brake or Flyweel **F24/F1** options		
	Feedback Variants			Feedback Variants		
M_0	**RES2/SEN**	**ENB1/ENB2**	**ENB3...ENB6/ENB8**	**RES2/SEN**	**ENB1...ENB6**	**ENB8**
0,85	112	130	130	143	179	161
1,7	135	153	153	166	202	184
2,2	161	179	179	192	228	210

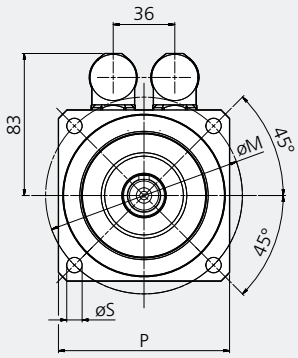
Notes:
(1) Motor shaft extension without key available.

BMD 82 • Ratings

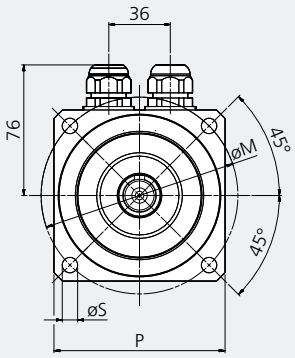
			BMD 82 3.2 Nm					BMD 82 4.4 Nm				
	M_0	[Nm]	3.20					4.40				
	M_n	[Nm]	3.15	3.00	2.80	2.60	2.50	4.20	3.80	3.55	3.30	3.15
	n	[min^{-1}]	1600	3000	4500	5500	6000	1600	3000	4500	5500	6000
	f_n	[Hz]	107	200	300	367	400	107	200	300	367	400
	P_n	[kW]	0.53	0.94	1.32	1.50	1.57	0.70	1.19	1.67	1.90	2.00
	M_{max}	[Nm]	8.50					11.5				
	2p	[-]	8					8				
	J	[$Kgm^2 \cdot 10^{-4}$]	1.4					1.7				
	τ_{el}	[ms]	5.7					5.7				
	τ_{therm}	[min]	26					33				
	m_M	[kg]	3.5					4.6				
230 Vac	V_n	[V_{AC}]	191	181	200	176	176	181	184	188	196	197
	I_0	[A]	2.51	4.50	6.00	8.30	9.00	3.30	5.80	8.40	9.70	10.6
	I_n	[A]	2.37	4.30	5.30	7.00	7.60	3.10	5.10	6.80	7.30	7.60
	I_{max}	[A]	8.30	15.5	20.6	15.5	8.30	9.80	17.4	25.1	29.2	32.0
	K_e	[mV/min^{-1}]	92	49	37	27	24	93	52	36	31	29
	K_T	[Nm/A]	1.33	0.71	0.53	0.39	0.35	1.35	0.76	0.53	0.45	0.42
	R_{pp}	[Ω]	11.3	3.23	1.81	0.96	0.81	6.89	2.19	1.05	0.78	0.66
	L_{pp}	[mH]	64.2	18.3	10.3	5.40	4.60	39.0	12.4	6.00	4.40	3.70
400 Vac	V_n	[V_{AC}]	332	315	312	323	308	315	323	328	335	335
	I_0	[A]	1.39	2.60	3.90	4.50	5.20	1.88	3.30	4.80	5.70	6.20
	I_n	[A]	1.36	2.50	3.40	3.80	4.30	1.76	2.90	3.90	4.30	4.50
	I_{max}	[A]	4.70	8.90	13.2	15.5	17.7	5.60	9.90	14.4	17.1	18.6
	K_e	[mV/min^{-1}]	159	85	57	49	43	161	92	63	53	49
	K_T	[Nm/A]	2.31	1.23	0.83	0.71	0.62	2.34	1.33	0.92	0.77	0.71
	R_{pp}	[Ω]	34.3	9.75	4.42	3.23	2.47	20.8	6.77	3.21	2.26	1.92
	L_{pp}	[mH]	194	55.2	25.0	18.3	14.0	118	38.3	18.1	12.8	10.8
F24	Mb	[Nm]	4.5					4.5				
	Δm_M	[kg]	0.6					0.6				
	ΔJ	[$Kgm^2 \cdot 10^{-4}$]	0.2					0.2				
F1	Δm_M	[kg]	1					1				
	ΔJ	[$Kgm^2 \cdot 10^{-4}$]	3					3				

BMD 82 • Dimensions

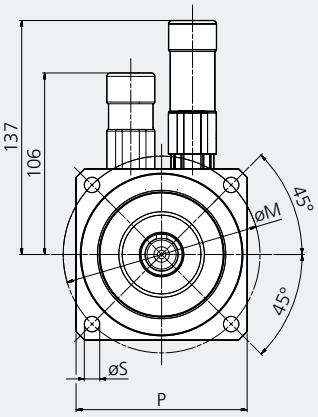
P1-S1 VARIANT



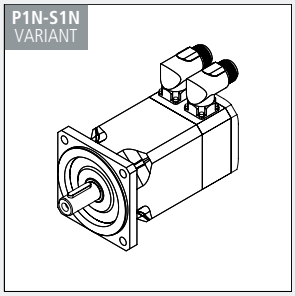
P2 S2 VARIANT



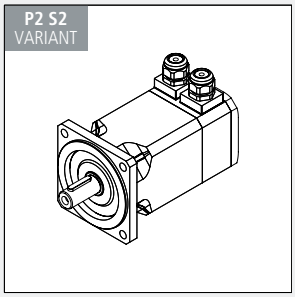
P3-S3 VARIANT



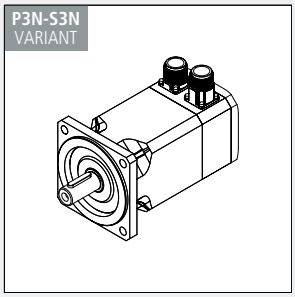
P1N-S1N VARIANT

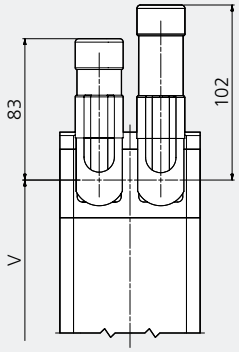


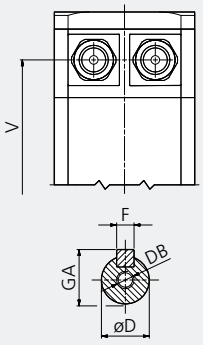
P2 S2 VARIANT



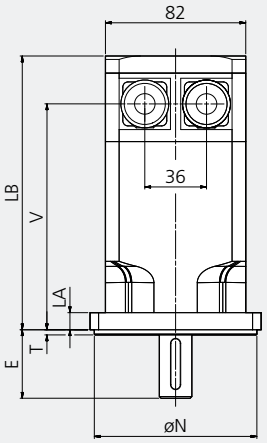
P3N-S3N VARIANT







SHAFT END SECTION



B5 FLANGE VARIANT						
Flange variant	P	M	N	S	T	LA
100	82	100	80	6.5	3	10
115	100	115	95	9	3	10

SHAFT DIAMETER VARIANT					
Shaft diameter	D	E	DB	GA (1)	F (1)
11	11	23	M4	12.5	4
14	14	30	M5	16	5
19	19	40	M6	21.5	6

MOTOR LENGTH DEPENDING ON THE OPTION

DIMENSION V

Torque	Without Brake or Flyweel			With Brake or Flyweel **F24/F1** options		
	Feedback Variants			Feedback Variants		
M_0	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7/ENB8**	**ENB3...ENB6**
3.2	132	132	132	132	195	218
4.4	152	152	152	152	215	238

DIMENSION LB

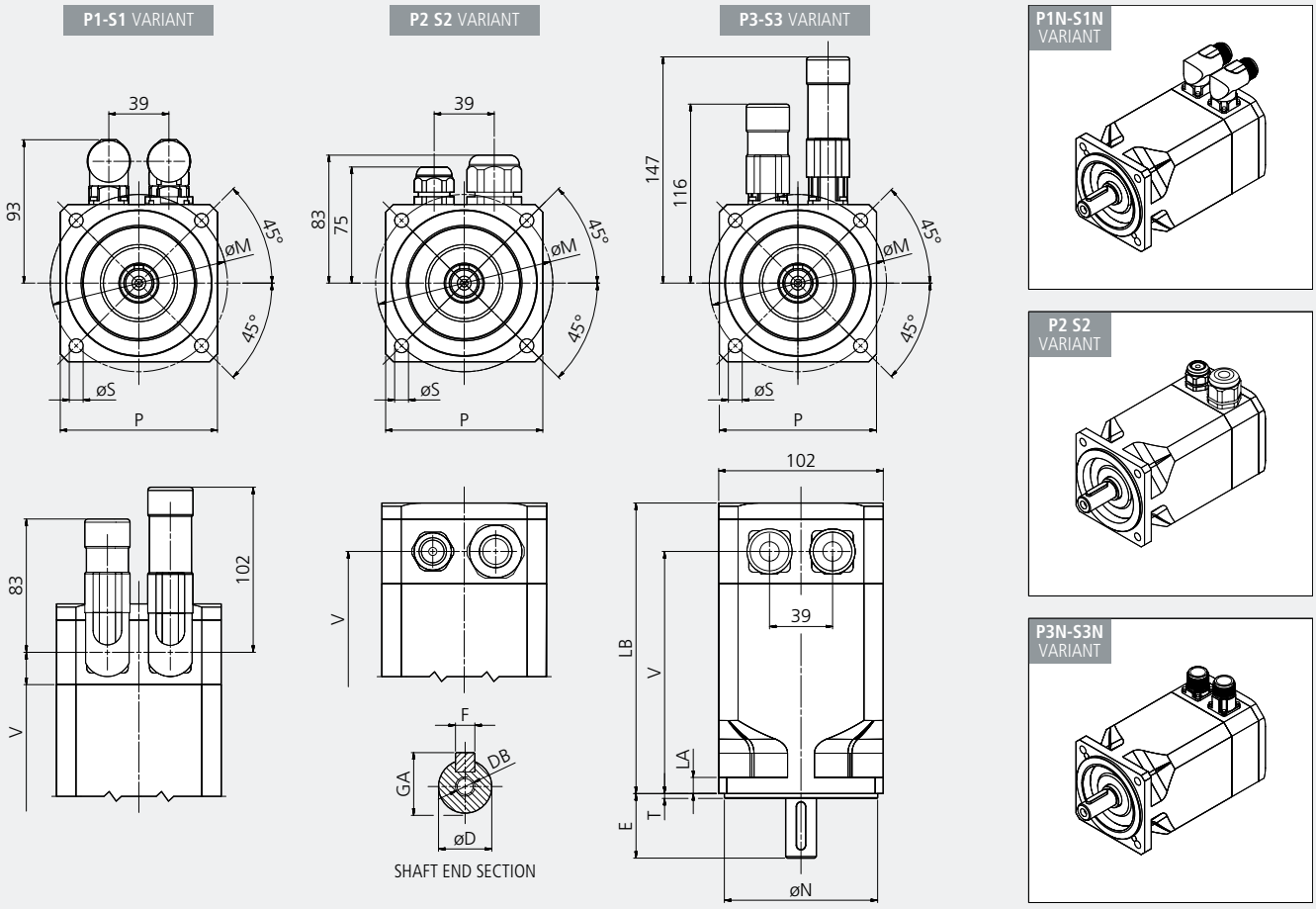
Torque	Without Brake or Flyweel			With Brake or Flyweel **F24/F1** options		
	Feedback Variants			Feedback Variants		
M_0	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**	**RES1/RES2/SEN**	**ENB1...ENB7**	**ENB8**
3.2	160	183	160	200	223	200
4.4	180	203	180	220	243	220

Notes:
(1) Motor shaft extension without key available.

BMD 102 • Ratings

			BMD 102 4 Nm					BMD 102 7.2 Nm					BMD 102 9.6 Nm				
	M_0	[Nm]	4.00					7.20					9.60				
	M_n	[Nm]	3.70	3.40	3.10	2.90	2.80	7.00	6.70	6.00	5.80	5.60	9.20	8.50	7.70	6.90	6.50
	n	[min^{-1}]	1600	3000	4500	5500	6000	1600	3000	4500	5500	6000	1600	3000	4500	5500	6000
	f_n	[Hz]	107	200	300	367	400	107	200	300	367	400	107	200	300	367	400
	P_n	[kW]	0.62	1.01	1.46	1.67	1.76	1.17	2.10	2.83	3.30	3.50	1.54	2.70	3.60	4.00	4.10
	M_{max}	[Nm]	11.0					21.0					28.0				
	2p	[-]	8					8					8				
	J	[$Kgm^2 \cdot 10^{-4}$]	1.9					3.4					4.7				
	τ_{el}	[ms]	8.4					8.4					8.4				
	τ_{therm}	[min]	25					31					38				
	m_M	[kg]	4.2					5.8					7.4				
230 Vac	V_n	[V_{AC}]	184	177	177	181	174	187	177	182	183	185	183	184	187	192	190
	I_0	[A]	3.03	5.73	8.82	10.0	11.4	5.00	9.70	13.9	16.9	18.2	6.30	11.5	16.8	19.8	21.8
	I_n	[A]	2.60	4.86	6.88	7.40	8.29	4.90	9.50	12.6	14.4	15.4	6.00	10.2	13.5	14.3	14.8
	I_{max}	[A]	9.30	17.6	27.3	30.7	35.1	18.3	35.0	51.0	61.0	66.0	20.4	37.0	54.0	64.0	70.0
	K_e	[mV/min^{-1}]	94	50	32	28	25	94	49	34	28	26	102	56	38	33	30
	K_T	[Nm/A]	1.32	0.70	0.45	0.40	0.35	1.43	0.75	0.52	0.43	0.40	1.52	0.84	0.57	0.48	0.44
	R_{pp}	[Ω]	8.38	2.39	1.02	0.76	0.59	3.02	0.82	0.40	0.27	0.23	2.24	0.68	0.32	0.23	0.19
	L_{pp}	[mH]	70.5	20.1	8.58	6.40	4.96	25.4	6.90	3.30	2.30	1.90	18.8	5.70	2.70	1.90	1.60
400 Vac	V_n	[V_{AC}]	314	305	303	319	314	320	311	305	320	305	318	324	323	332	333
	I_0	[A]	1.77	3.30	4.90	5.68	6.30	2.94	5.50	8.30	9.70	11.0	3.60	6.50	9.70	11.5	12.4
	I_n	[A]	1.52	2.83	3.80	4.20	4.60	2.92	5.40	7.50	8.20	9.30	3.40	5.80	7.80	8.30	8.40
	I_{max}	[A]	5.48	10.2	15.0	17.6	19.0	10.7	20.0	30.0	35.0	40.0	11.7	21.0	31.0	37.0	40.0
	K_e	[mV/min^{-1}]	160	86	57	49	43	161	86	57	49	43	177	99	66	56	52
	K_T	[Nm/A]	2.26	1.21	0.82	0.70	0.63	2.45	1.31	0.87	0.75	0.65	2.65	1.48	0.99	0.84	0.77
	R_{pp}	[Ω]	24.0	7.05	3.27	2.39	2.00	8.87	2.53	1.11	0.82	0.63	6.77	2.11	0.95	0.68	0.58
	L_{pp}	[mH]	202	59.3	27.5	20.1	16.8	74.7	21.3	9.40	6.90	5.30	56.8	17.7	8.00	5.70	4.80
F24	Mb	[Nm]	9					9					9				
	Δm_M	[kg]	1.1					1.1					1.1				
	ΔJ	[$Kgm^2 \cdot 10^{-4}$]	0.5					0.5					0.5				
F1	Δm_M	[kg]	1.7					1.7					1.7				
	ΔJ	[$Kgm^2 \cdot 10^{-4}$]	7.5					7.5					7.5				

BMD 102 • Dimensions



B5 FLANGE VARIANT						
Flange variant	P	M	N	S	T	LA
100	102	100	80	7	3	10
115	102	115	95	9	3	10

SHAFT DIAMETER VARIANT					
Shaft diameter	D	E	DB	GA (1)	F (1)
19	19	40	M6	21.5	6
24	24	50	M8	27	8

MOTOR LENGTH DEPENDING ON THE OPTION

DIMENSION V

Torque	Without Brake or Flyweel			With Brake or Flyweel **F24/F1** options		
	Feedback Variants			Feedback Variants		
M_0	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**
4	123	123	123	123	163	163
16	150	150	150	150	190	190
9.6	177	177	177	177	217	217

DIMENSION LB

Torque	Without Brake or Flyweel			With Brake or Flyweel **F24/F1** options		
	Feedback Variants			Feedback Variants		
M_0	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**
4	153	176	153	193	216	193
7.2	180	203	180	220	243	220
9.6	207	230	207	247	297	247

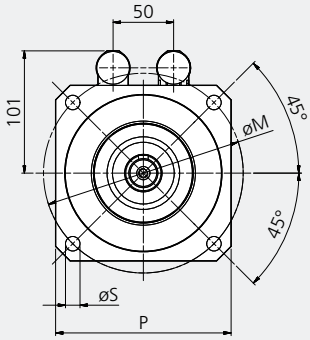
Notes:
(1) Motor shaft extension without key available.

BMD 118 • Ratings

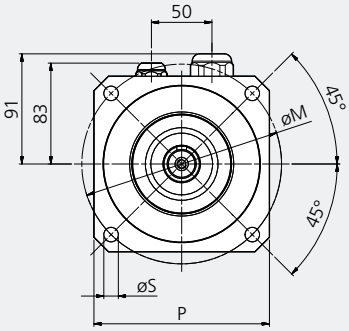
			BMD 118 5.6 Nm					BMD 118 10.2 Nm					BMD 118 14 Nm				
	M_0	[Nm]	5.60					10.2					14.0				
	M_n	[Nm]	5.50	5.10	4.60	4.10	3.90	10.0	9.50	8.50	8.00	7.50	13.3	12.2	10.9	9.70	9.00
	n	[min^{-1}]	1600	3000	4500	5500	6000	1600	3000	4500	5500	6000	1600	3000	4500	5500	6000
	f_n	[Hz]	107	200	300	367	400	107	200	300	367	400	107	200	300	367	400
	P_n	[kW]	0.92	1.60	2.18	2.36	2.45	1.68	3.00	4.00	4.60	4.70	2.20	3.80	5.00	5.30	5.30
	M_{max}	[Nm]	15.0					30.0					39.0				
	2p	[-]	8					8					8				
	J	[$Kgm^2 \cdot 10^{-4}$]	4.5					7.8					9.9				
	τ_{el}	[ms]	13					13					13				
	τ_{therm}	[min]	28					34					42				
	m_M	[kg]	7.7					9.7					11.7				
230 Vac	V_n	[V_{AC}]	179	185	180	186	171	184	178	174	196	-	184	192	-	-	-
	I_0	[A]	4.20	7.30	11.2	13.2	15.6	7.20	13.7	20.8	22.6	-	9.20	16.3	-	-	-
	I_n	[A]	38.0	6.60	9.00	9.30	10.3	7.20	13.5	18.3	17.4	-	8.60	14.0	-	-	-
	I_{max}	[A]	13.8	23.9	36.5	43.0	50.8	25.3	48.0	73.0	79.0	-	30.0	53.0	-	-	-
	K_e	[mV/min^{-1}]	92	52	34	28	24	95	50	33.1	30.4	-	104	59	-	-	-
	K_T	[Nm/A]	1.33	0.76	0.50	0.42	0.36	1.41	0.75	0.49	0.45	-	1.51	0.86	-	-	-
	R_{pp}	[Ω]	3.94	1.29	0.56	0.39	0.28	1.56	0.43	0.19	0.16	-	1.17	0.37	-	-	-
	L_{pp}	[mH]	52.3	17.1	7.40	5.18	3.72	20.5	5.70	2.50	2.10	-	15.4	4.90	-	-	-
400 Vac	V_n	[V_{AC}]	322	315	316	335	324	312	305	314	323	306	323	320	325	335	329
	I_0	[A]	2.30	4.30	6.40	7.30	8.20	4.30	8.00	11.6	13.7	15.8	5.30	9.80	14.4	16.9	18.9
	I_n	[A]	2.1	3.90	5.20	5.20	5.50	4.20	7.90	10.2	10.5	11.4	4.90	8.40	10.9	11.4	11.8
	I_{max}	[A]	7.49	14.0	21.0	24.0	27.0	14.9	28.0	40.0	48.0	55.0	17.2	32.0	47.0	55.0	62.0
	K_e	[mV/min^{-1}]	165	88	59	52	46	161	86	60	50	44	182	98	67	57	51
	K_T	[Nm/A]	2.43	1.30	0.88	0.77	0.68	2.39	1.28	0.88	0.75	0.65	2.66	1.43	0.97	0.83	0.74
	R_{pp}	[Ω]	13.1	3.76	1.76	1.29	1.04	4.47	1.27	0.61	0.43	0.33	3.60	1.04	0.48	0.35	0.28
	L_{pp}	[mH]	174	50.5	23.4	17.1	13.8	58.8	16.7	8.00	5.70	4.30	47.4	13.7	6.30	4.60	3.70
F24	Mb	[Nm]	18					18					18				
	Δm_M	[kg]	2.2					2.2					2.2				
	ΔJ	[$Kgm^2 \cdot 10^{-4}$]	1.7					1.7					1.7				
F1	Δm_M	[kg]	3.5					3.5					3.5				
	ΔJ	[$Kgm^2 \cdot 10^{-4}$]	16					16					16				

BMD 118 • Dimensions

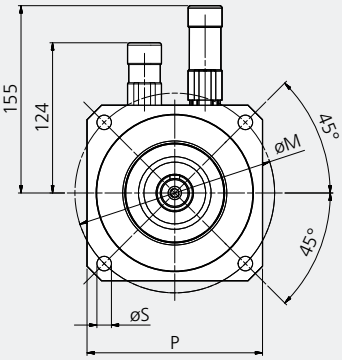
P1-S1 VARIANT



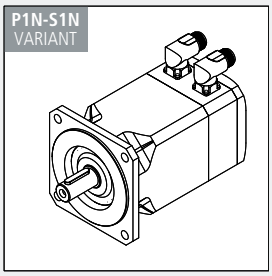
P2 S2 VARIANT



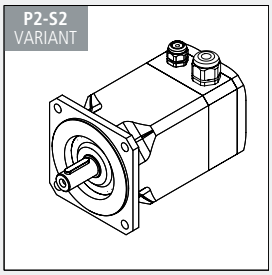
P3-S3 VARIANT



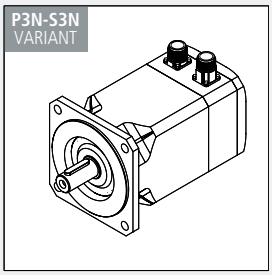
P1N-S1N VARIANT

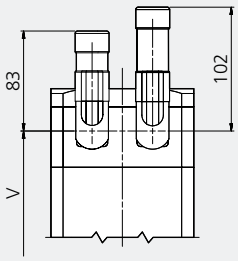


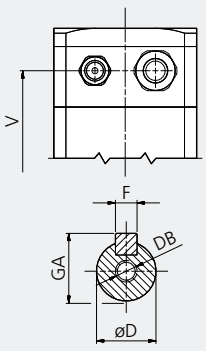
P2-S2 VARIANT



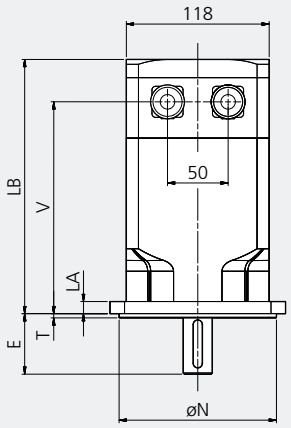
P3N-S3N VARIANT







SHAFT END SECTION



B5 FLANGE VARIANT						
Flange variant	P	M	N	S	T	LA
130S	118	130	95	9	3.5	10
130	118	130	110	9	3.5	10
165	145	165	130	11.5	3.5	10

SHAFT DIAMETER VARIANT					
Shaft diameter	D	E	DB	GA (1)	F (1)
19	19	40	M6	21.5	6
24	24	50	M8	27	8
28	28	60	M10	31	8

MOTOR LENGTH DEPENDING ON THE OPTION

DIMENSION V

Torque	Without Brake or Flyweel			With Brake or Flyweel **F24/F1** options		
	Feedback Variants			Feedback Variants		
M_0	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**
5.6	144	144	144	194	194	194
10.2	175	175	175	225	225	225
14	208	208	208	258	258	258

DIMENSION LB

Torque	Without Brake or Flyweel			With Brake or Flyweel **F24/F1** options		
	Feedback Variants			Feedback Variants		
M_0	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**
5.6	179	204	179	229	254	229
10.2	210	235	210	260	258	260
14	243	268	243	293	318	293

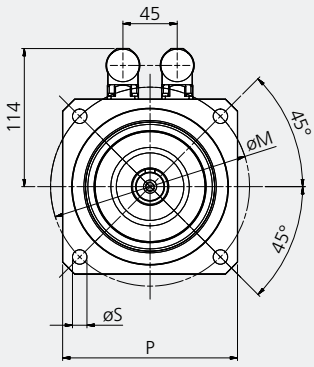
Notes:
(1) Motor shaft extension without key available.

BMD 145 • Ratings

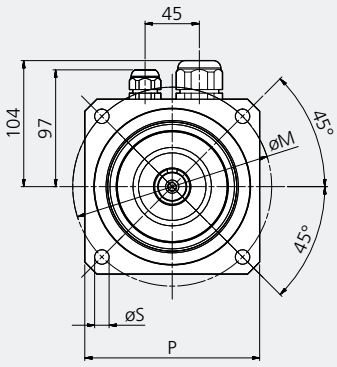
			BMD 145 16.8 Nm					BMD145 22 Nm				
	M_0	[Nm]	16.8					22.0				
	M_n	[Nm]	16.5	16.0	14.0	13.0	12.5	20.7	19.2	17.0	15.0	-
	n	[min^{-1}]	1600	3000	4500	5500	6000	1600	3000	4500	5500	-
	f_n	[Hz]	107	200	300	367	400	107	200	300	367	-
	P_n	[kW]	2.76	5.00	6.60	7.50	7.90	3.50	6.00	8.00	8.60	-
	M_{max}	[Nm]	46.0					59.0				
	2p	[-]	8					8				
	J	[$Kgm^2 \cdot 10^{-4}$]	12.8					17.6				
	τ_{el}	[ms]	16					16				
	τ_{therm}	[min]	36					47				
	m_M	[kg]	15.2					18.2				
230 Vac	V_n	[V_{AC}]	180	176	-	-	-	185	202	-	-	-
	I_0	[A]	12.1	22.8	-	-	-	15.4	26.5	-	-	-
	I_n	[A]	11.9	21.9	-	-	-	14.5	22.9	-	-	-
	I_{max}	[A]	46.0	88.0	-	-	-	51.0	87.0	-	-	-
	K_e	[mV/min^{-1}]	89	47	-	-	-	102	60	-	-	-
	K_T	[Nm/A]	1.39	0.74	-	-	-	1.42	0.83	-	-	-
	R_{pp}	[Ω]	0.84	0.24	-	-	-	0.67	0.23	-	-	-
	L_{pp}	[mH]	13.3	3.80	-	-	-	10.6	3.60	-	-	-
400 Vac	V_n	[V_{AC}]	314	308	314	319	305	319	321	323	357	-
	I_0	[A]	6.90	13.0	19.0	22.8	26.0	9.00	16.4	24.3	26.5	-
	I_n	[A]	6.80	12.5	16.4	17.5	19.0	8.40	14.2	18.3	17.6	-
	I_{max}	[A]	26.7	50.0	73.0	88.0	100	29.5	54.0	80.0	87.0	-
	K_e	[mV/min^{-1}]	156	83	57	47	42	176	96	65	59	-
	K_T	[Nm/A]	2.42	1.29	0.88	0.74	0.65	2.45	1.34	0.90	0.83	-
	R_{pp}	[Ω]	2.53	0.72	0.34	0.24	0.18	1.97	0.59	0.27	0.23	-
	L_{pp}	[mH]	40.4	11.5	5.40	3.80	2.90	31.5	9.40	4.30	3.60	-
F24	Mb	[Nm]	18					18				
	Δm_M	[kg]	2.6					2.6				
	ΔJ	[$Kgm^2 \cdot 10^{-4}$]	1.7					1.7				
F1	Δm_M	[kg]	5.0					5.0				
	ΔJ	[$Kgm^2 \cdot 10^{-4}$]	36					36				

BMD 145 • Dimensions

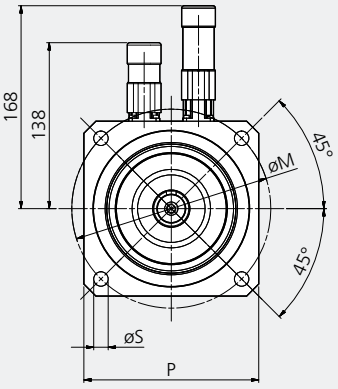
P1-S1 VARIANT



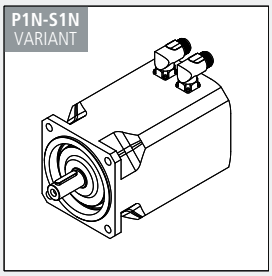
P2 S2 VARIANT



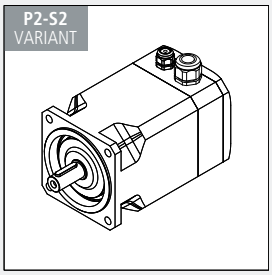
P3-S3 VARIANT



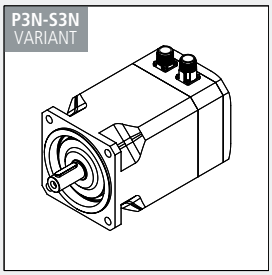
P1N-S1N VARIANT

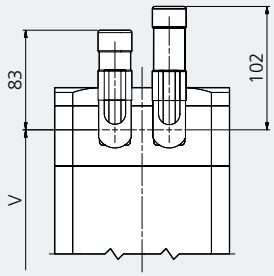


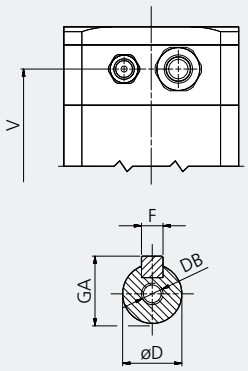
P2-S2 VARIANT



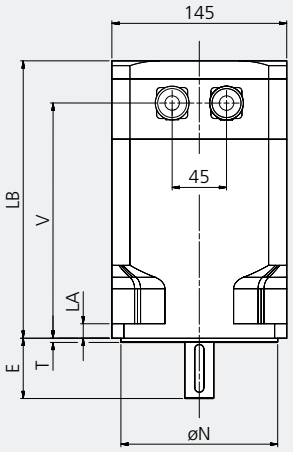
P3N-S3N VARIANT







SHAFT END SECTION



B5 FLANGE VARIANT						
Flange variant	P	M	N	S	T	LA
165	145	165	130	12	3.5	12

SHAFT DIAMETER VARIANT					
Shaft diameter	D	E	DB	GA (1)	F (1)
19	19	40	M6	21.5	6
24	24	50	M8	27	8
28	28	60	M10	31	8

MOTOR LENGTH DEPENDING ON THE OPTION

DIMENSION V

Torque	Without Brake or Flyweel			With Brake or Flyweel **F24/F1** options		
	Feedback Variants			Feedback Variants		
M_0	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**
16.8	195	195	195	245	245	245
22	230	230	230	280	280	280

DIMENSION LB

Torque	Without Brake or Flyweel			With Brake or Flyweel **F24/F1** options		
	Feedback Variants			Feedback Variants		
M_0	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**
16.8	230	255	230	280	305	280
22	265	290	265	315	375	315

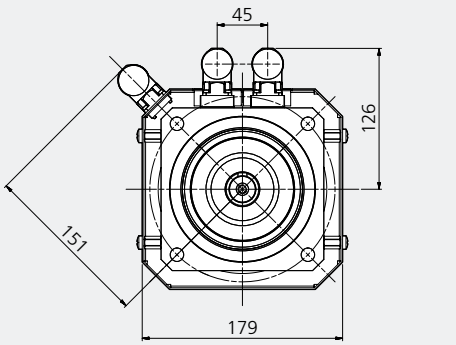
Notes:
(1) Motor shaft extension without key available.

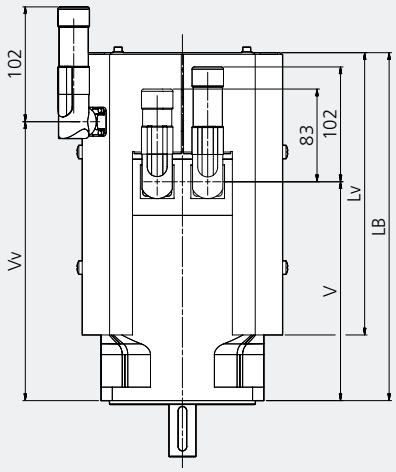
BMD 145 with Forced Ventilation option • Ratings

			BMD 145 16.8 Nm with Forced Ventilation					BMD145 22 Nm with Forced Ventilation				
	M_0	[Nm]	21.5					27.5				
	M_n	[Nm]	20.5	19.2	17.2	15.7	-	27.4	26.1	24.3	-	-
	n	[min^{-1}]	1600	3000	4500	5500	-	1600	3000	4500	-	-
	f_n	[Hz]	107	200	300	367	-	107	200	300	-	-
	P_n	[kW]	3.43	6.00	8.10	9.00	-	4.60	8.20	11.5	-	-
	M_{max}	[Nm]	46.0					59.0				
	2p	[-]	8					8				
	J	[$Kgm^2 \cdot 10^{-4}$]	12.8					17.6				
	τ_{el}	[ms]	16					16				
	τ_{therm}	[min]	17					22				
	m_M	[kg]	18.7					21.7				
230 Vac	V_n	[V_{AC}]	203	195	-	-	-	214	-	-	-	-
	I_0	[A]	16.3	30.0	-	-	-	19.8	-	-	-	-
	I_n	[A]	15.5	26.6	-	-	-	19.6	-	-	-	-
	I_{max}	[A]	46.0	88.0	-	-	-	51.0	-	-	-	-
	K_e	[mV/min^{-1}]	89	47	-	-	-	102	-	-	-	-
	K_T	[Nm/A]	1.32	0.72	-	-	-	1.39	-	-	-	-
	R_{pp}	[Ω]	0.84	0.24	-	-	-	0.67	-	-	-	-
	L_{pp}	[mH]	13.3	3.80	-	-	-	10.6	-	-	-	-
400 Vac	V_n	[V_{AC}]	345	331	322	323	-	363	352	348	-	-
	I_0	[A]	9.45	17.6	25.8	30.0	-	11.5	21.1	30.0	-	-
	I_n	[A]	8.90	15.2	20.0	21.6	-	11.4	19.8	27.1	-	-
	I_{max}	[A]	26.7	50.0	73.0	88.0	-	29.5	54.0	80.0	-	-
	K_e	[mV/min^{-1}]	156	83	57	47	-	176	96	65	-	-
	K_T	[Nm/A]	2.28	1.23	0.83	0.72	-	2.39	1.31	0.92	-	-
	R_{pp}	[Ω]	2.53	0.72	0.34	0.24	-	1.97	0.59	0.27	-	-
	L_{pp}	[mH]	40.4	11.5	5.40	3.80	-	31.5	9.40	4.30	-	-
F24	Mb	[Nm]	18					18				
	Δm_M	[kg]	2.6					2.6				
	ΔJ	[$Kgm^2 \cdot 10^{-4}$]	1.7					1.7				
F1	Δm_M	[kg]	5.0					5.0				
	ΔJ	[$Kgm^2 \cdot 10^{-4}$]	36					36				

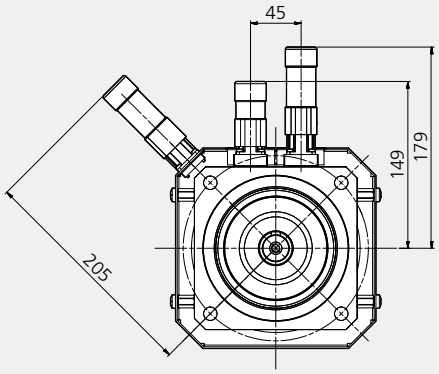
BMD 145 with Forced Ventilation option • Dimensions

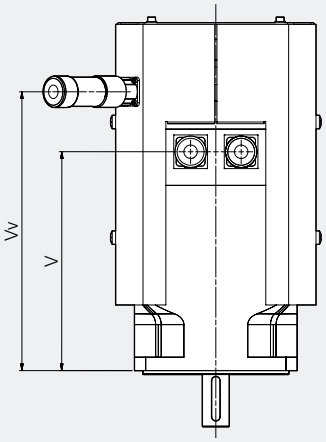
P1-S1-V1R/V2R VARIANT



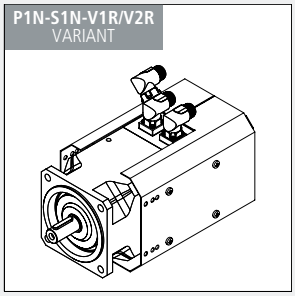


P3-S3-V1S/V2S VARIANT

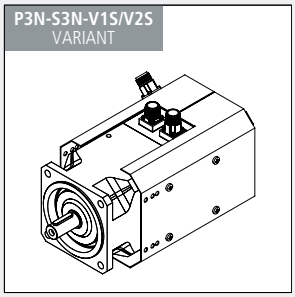


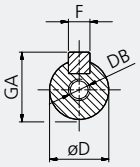


P1N-S1N-V1R/V2R VARIANT



P3N-S3N-V1S/V2S VARIANT





SHAFT END SECTION

B5 FLANGE VARIANT						
Flange variant	P	M	N	S	T	LA
165	145	165	130	12	3.5	12

SHAFT DIAMETER VARIANT					
Shaft diameter	D	E	DB	GA (1)	F (1)
19	19	40	M6	21.5	6
24	24	50	M8	27	8
28	28	60	M10	31	8

MOTOR LENGTH DEPENDING ON THE OPTION

DIMENSION V - (Vv)

Torque	Without Brake or Flyweel			With Brake or Flyweel **F24/F1** options		
	Feedback Variants			Feedback Variants		
M_0	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**
16.8	195 - (249)	195 - (274)	195 - (249)	245 - (299)	245 - (324)	245 - (299)
22	230 - (284)	230 - (309)	230 - (284)	280 - (334)	280 - (394)	280 - (334)

DIMENSION LB - (Lv)

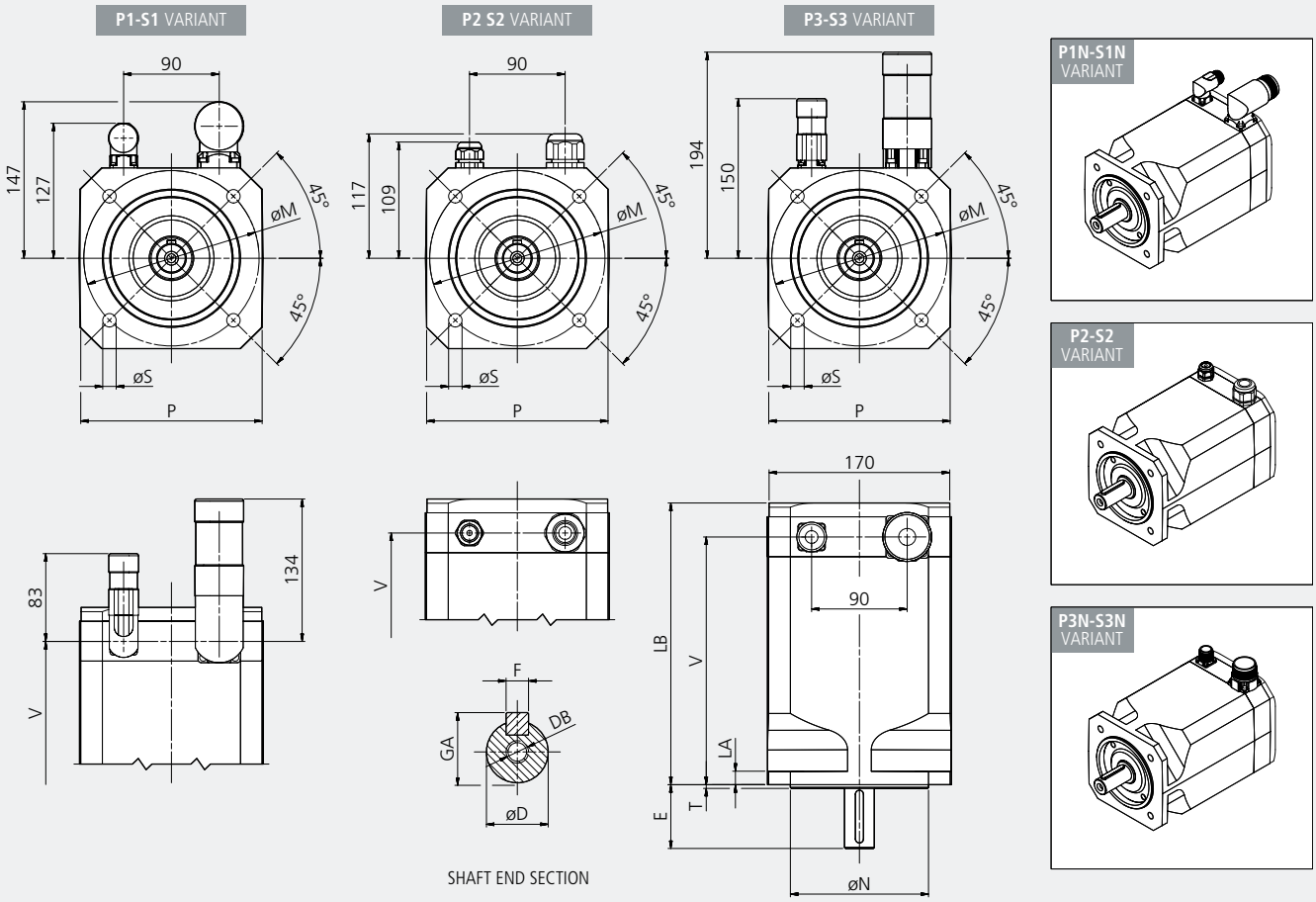
Torque	Without Brake or Flyweel			With Brake or Flyweel **F24/F1** options		
	Feedback Variants			Feedback Variants		
M_0	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**
16.8	310- (252)	335 - (252)	310 - (252)	360 - (252)	385 - (312)	360 - (252)
22	345 - (252)	370 - (312)	345 - (252)	395 - (312)	455 - (312)	395 - (312)

Notes:
(1) Motor shaft extension without key available.

BMD 170 • Ratings

			BMD 170 34 Nm					BMD170 45 Nm				
	M_0	[Nm]	34.0					45.0				
	M_n	[Nm]	31.0	27.5	-	-	-	42.0	36.0	-	-	-
	n	[min^{-1}]	1600	3000	-	-	-	1600	3000	-	-	-
	f_n	[Hz]	107	200	-	-	-	107	200	-	-	-
	P_n	[kW]	5.20	8.60	-	-	-	7.00	11.3	-	-	-
	M_{max}	[Nm]	90.0					125				
	2p	[-]	8					8				
	J	[$Kgm^2 \cdot 10^{-4}$]	33.8					47.5				
	τ_{el}	[ms]	20					19				
	τ_{therm}	[min]	50					65				
	m_M	[kg]	25					30				
230 Vac	V_n	[V_{AC}]	181	182	-	-	-	-	-	-	-	-
	I_0	[A]	21.8	40.4	-	-	-	-	-	-	-	-
	I_n	[A]	19.7	32.2	-	-	-	-	-	-	-	-
	I_{max}	[A]	66.0	121	-	-	-	-	-	-	-	-
	K_e	[mV/min^{-1}]	99	54	-	-	-	-	-	-	-	-
	K_T	[Nm/A]	1.56	0.84	-	-	-	-	-	-	-	-
	R_{pp}	[Ω]	0.30	0.09	-	-	-	-	-	-	-	-
	L_{pp}	[mH]	5.80	1.70	-	-	-	-	-	-	-	-
400 Vac	V_n	[V_{AC}]	319	315	-	-	-	310	314	-	-	-
	I_0	[A]	12.4	23.3	-	-	-	17.1	31.0	-	-	-
	I_n	[A]	11.2	18.6	-	-	-	15.9	24.9	-	-	-
	I_{max}	[A]	37.0	70.0	-	-	-	52.0	96.0	-	-	-
	K_e	[mV/min^{-1}]	174	93	-	-	-	185	101	-	-	-
	K_T	[Nm/A]	2.74	1.46	-	-	-	2.64	1.50	-	-	-
	R_{pp}	[Ω]	0.91	0.26	-	-	-	0.57	0.17	-	-	-
	L_{pp}	[mH]	17.9	5.10	-	-	-	11.1	3.30	-	-	-
F24	Mb	[Nm]	36					36				
	Δm_M	[kg]	4.5					4.5				
	ΔJ	[$Kgm^2 \cdot 10^{-4}$]	5.6					5.6				
F1	Δm_M	[kg]	8.2					8.2				
	ΔJ	[$Kgm^2 \cdot 10^{-4}$]	70					70				

BMD 170 • Dimensions



B5 FLANGE VARIANT						
Flange variant	P	M	N	S	T	LA
165	170	165	130	12	3.5	12

SHAFT DIAMETER VARIANT					
Shaft diameter	D	E	DB	GA (1)	F (1)
24	24	50	M8	27	8
28	28	60	M10	31	8
32	32	60	M12	35	10

MOTOR LENGTH DEPENDING ON THE OPTION

DIMENSION V						
Torque	Without Brake or Flyweel			With Brake or Flyweel **F24/F1** options		
	Feedback Variants			Feedback Variants		
M_0	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**
34	233	233	233	308	308	308
45	287	287	287	362	362	362

DIMENSION LB						
Torque	Without Brake or Flyweel			With Brake or Flyweel **F24/F1** options		
	Feedback Variants			Feedback Variants		
M_0	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**
34	265	303	265	340	378	340
45	319	357	319	394	432	394

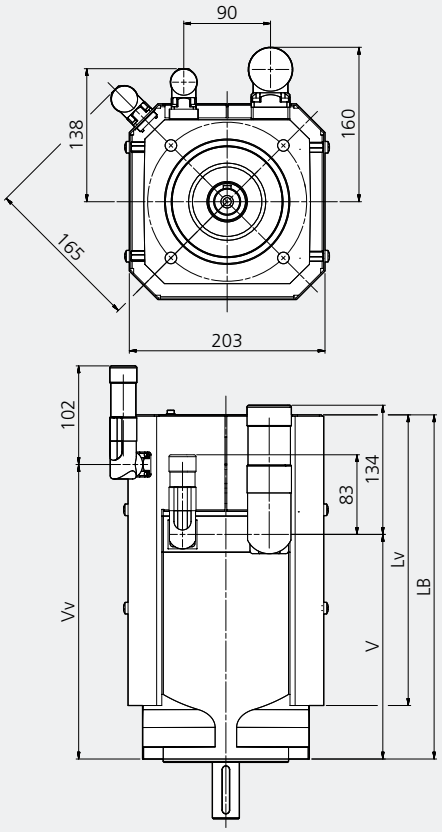
Notes:
(1) Motor shaft extension without key available.

BMD 170 with Forced Ventilation option • Ratings

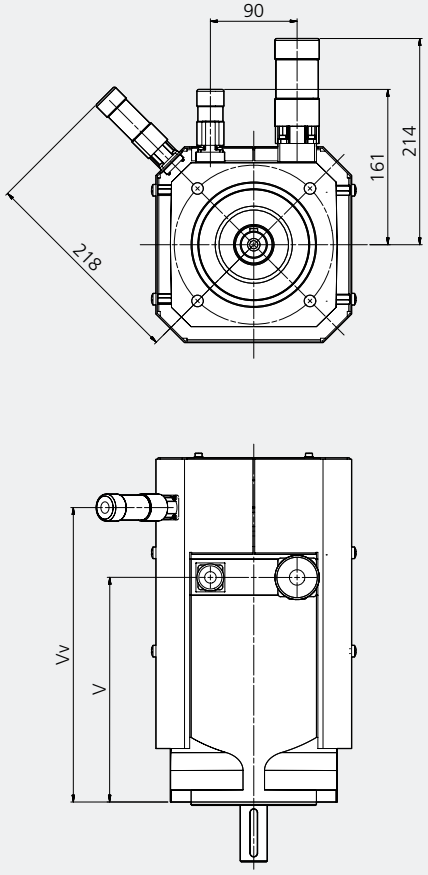
			BMD 170 34 Nm with Forced Ventilation					BMD170 45 Nm with Forced Ventilation				
	M_0	[Nm]	44.0					60.0				
	M_n	[Nm]	42.0	39.0	-	-	-	57.0	53.0	-	-	-
	n	[min^{-1}]	1600	3000	-	-	-	1600	3000	-	-	-
	f_n	[Hz]	107	200	-	-	-	107	200	-	-	-
	P_n	[kW]	7.00	12.2	-	-	-	9.50	16.6	-	-	-
	M_{max}	[Nm]	90.0					125				
	2p	[-]	8					8				
	J	[$Kgm^2 \cdot 10^{-4}$]	33.8					47.5				
	τ_{el}	[ms]	20					19				
	τ_{therm}	[min]	23					29				
	m_M	[kg]	29					34				
230 Vac	V_n	[V_{AC}]	207	205	-	-	-	-	-	-	-	-
	I_0	[A]	29.8	55.1	-	-	-	-	-	-	-	-
	I_n	[A]	28.7	48.9	-	-	-	-	-	-	-	-
	I_{max}	[A]	66.0	121	-	-	-	-	-	-	-	-
	K_e	[mV/min^{-1}]	99	54	-	-	-	-	-	-	-	-
	K_T	[Nm/A]	1.48	0.80	-	-	-	-	-	-	-	-
	R_{pp}	[Ω]	0.3	0.09	-	-	-	-	-	-	-	-
	L_{pp}	[mH]	5.8	1.7	-	-	-	-	-	-	-	-
400 Vac	V_n	[V_{AC}]	350	342	-	-	-	361	351	-	-	-
	I_0	[A]	17.0	31.8	-	-	-	23.0	42.0	-	-	-
	I_n	[A]	16.3	28.2	-	-	-	21.5	36.3	-	-	-
	I_{max}	[A]	37.0	70.0	-	-	-	52.0	96.0	-	-	-
	K_e	[mV/min^{-1}]	174	93	-	-	-	185	101	-	-	-
	K_T	[Nm/A]	2.59	1.39	-	-	-	2.62	1.43	-	-	-
	R_{pp}	[Ω]	0.91	0.26	-	-	-	0.57	0.17	-	-	-
	L_{pp}	[mH]	17.9	5.10	-	-	-	11.1	3.30	-	-	-
F24	Mb	[Nm]	36					36				
	Δm_M	[kg]	4.5					4.5				
	ΔJ	[$Kgm^2 \cdot 10^{-4}$]	5.6					5.6				
F1	Δm_M	[kg]	8.2					8.2				
	ΔJ	[$Kgm^2 \cdot 10^{-4}$]	70					70				

BMD 170 with Forced Ventilation option • Dimensions

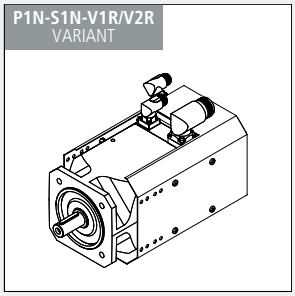
P1-S1-V1R/V2R VARIANT



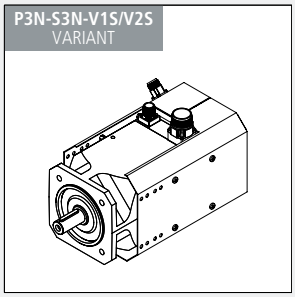
P3-S3-V1S/V2S VARIANT

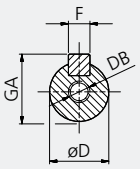


P1N-S1N-V1R/V2R VARIANT



P3N-S3N-V1S/V2S VARIANT





SHAFT END SECTION

B5 FLANGE VARIANT						
Flange variant	P	M	N	S	T	LA
165	170	165	130	12	3.5	12

SHAFT DIAMETER VARIANT					
Shaft diameter	D	E	DB	GA (1)	F (1)
24	24	50	M8	27	8
28	28	60	M10	31	8
32	32	60	M12	35	10

MOTOR LENGTH DEPENDING ON THE OPTION

DIMENSION V - (Vv)

Torque	Without Brake or Flyweel			With Brake or Flyweel **F24/F1** options		
	Feedback Variants			Feedback Variants		
M_0	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**
34	233 - (306)	233 - (344)	233 - (306)	308 - (381)	308 - (427)	308 - (381)
45	287 - (360)	287 - (398)	287 - (360)	362 - (435)	362 - (473)	362 - (435)

DIMENSION LB - (Lv)

Torque	Without Brake or Flyweel			With Brake or Flyweel **F24/F1** options		
	Feedback Variants			Feedback Variants		
M_0	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**	**RES1/RES2/SEN**	**ENB1/ENB2/ENB7**	**ENB3...ENB6/ENB8**
34	357 - (302)	395 - (302)	357 - (302)	432 - (302)	478 - (377)	432 - (302)
45	411 - (302)	449 - (302)	411 - (302)	486 - (377)	524 - (377)	486 - (377)

Notes:
(1) Motor shaft extension without key available.

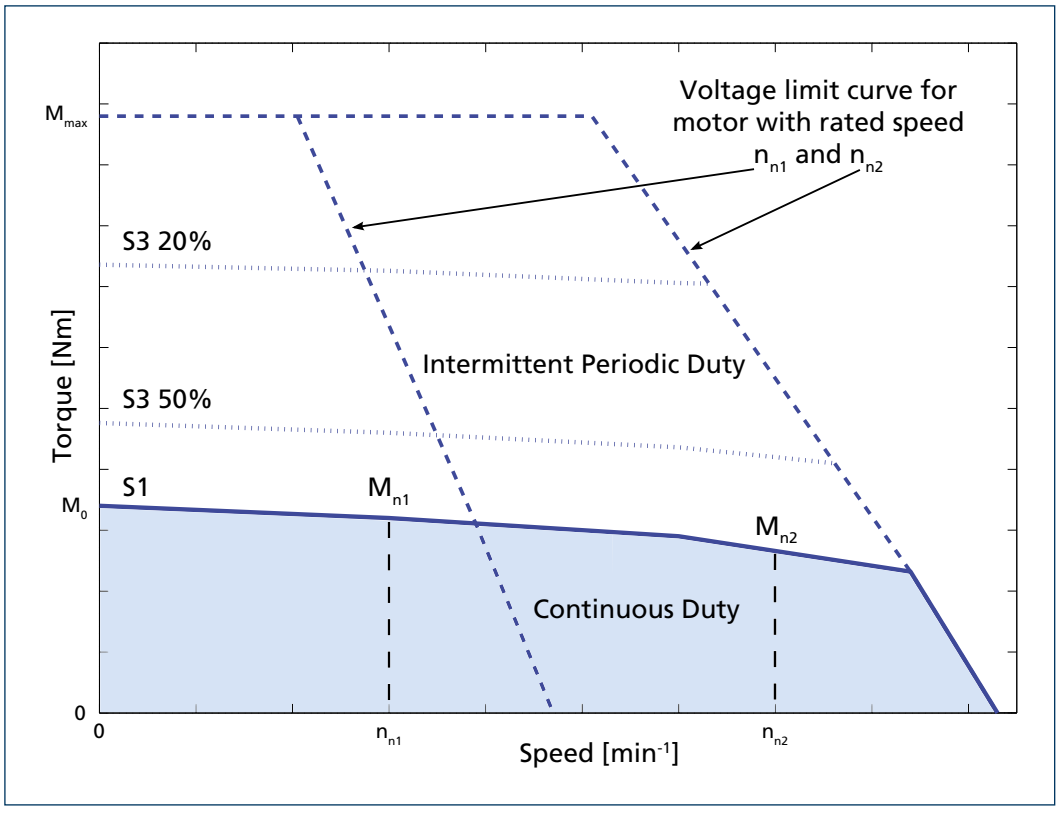
Torque-speed characteristic

The permissible operating range of a brushless servomotor is limited by thermal, mechanical, and electromagnetic limits.

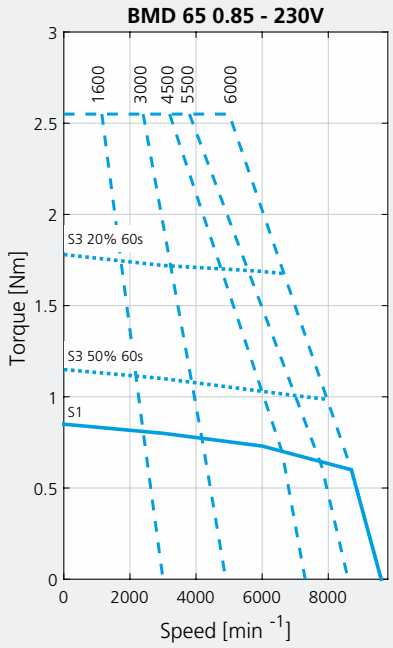
The thermal limit is dependent on the thermal class of the insulation system (F). To adhere to the temperature limits, the torque must be reduced as the speed increases, starting from stall torque M_0. The maximum permissible torque is then dependent on the operation mode. The characteristic curves are assigned for continuous duty S1 and intermittent periodic duty S3 with a cycle time of 10 minutes, except for small motors, for which a cycle time of 1 minute is specified and noted in the characteristic curves. A transient, high overload capacity up to M_{max} is provided.

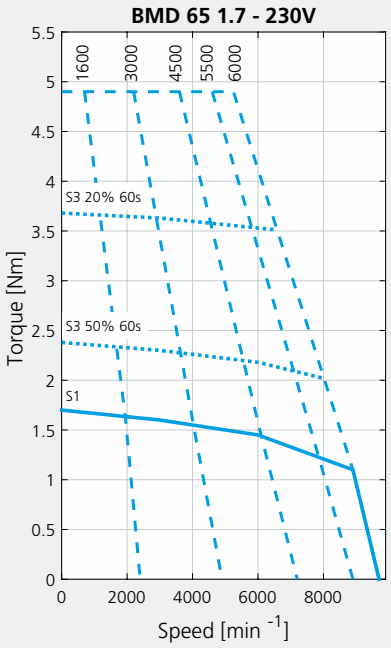
The speed range is limited by the maximum mechanical speed and the voltage limit. The voltage limit is usually lower than the mechanical limit. The voltage limiting characteristic curve is determined by the motor nominal speed. The characteristic curves for each nominal speed are reported in the same diagram. For drive sizing convenience, it is preferable to select the motor whose voltage limit curve does not lie too far above the maximum speed required for the application.

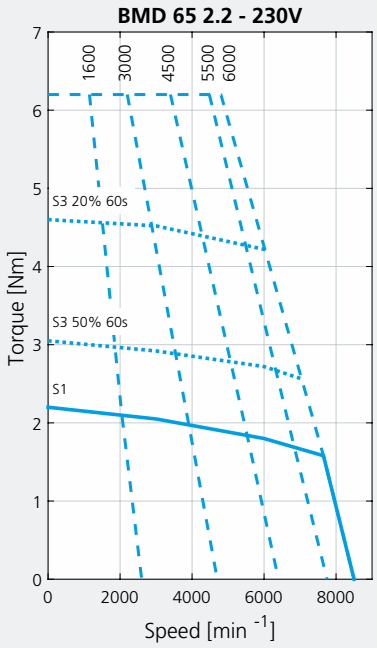
Therefore, the performance characteristics of a brushless motor are described by a torque and speed operating area. The continuous duty zone is bordered by the maximum continuous torque curve up to the intersection with the voltage limit curve. Continuous duty in the area above the S1 characteristic curve is not thermally permitted for the motor. The intermittent periodic duty zone is bordered by the peak torque line and the voltage limit curve.

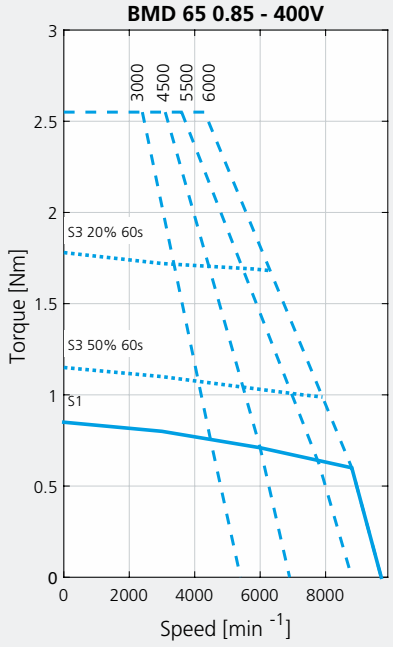


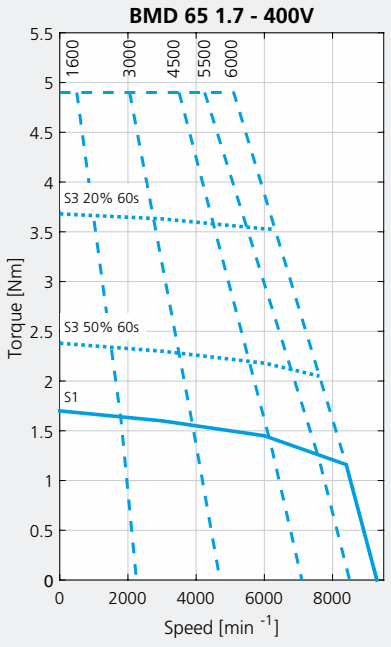
BMD 65 • Torque-speed curves

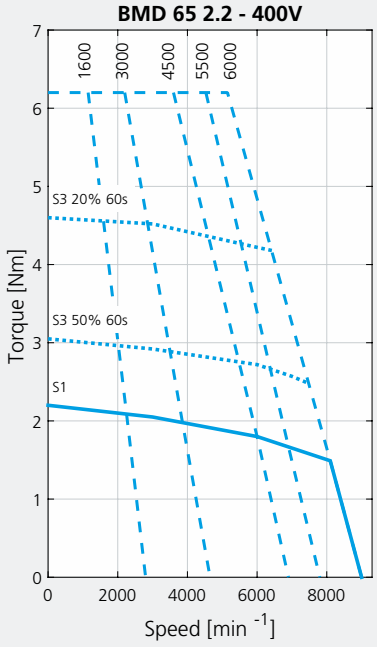




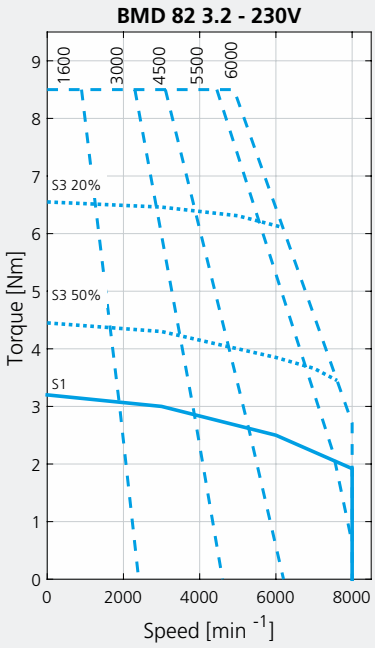


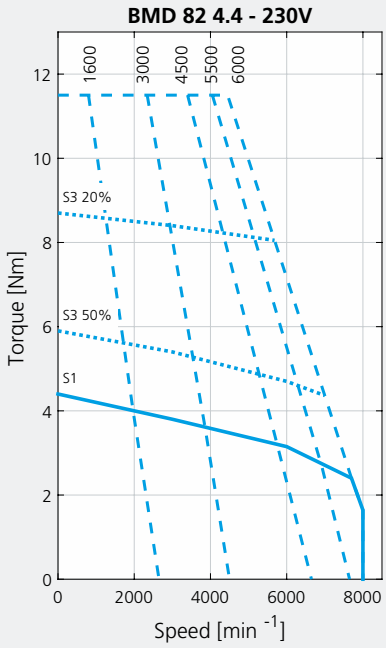


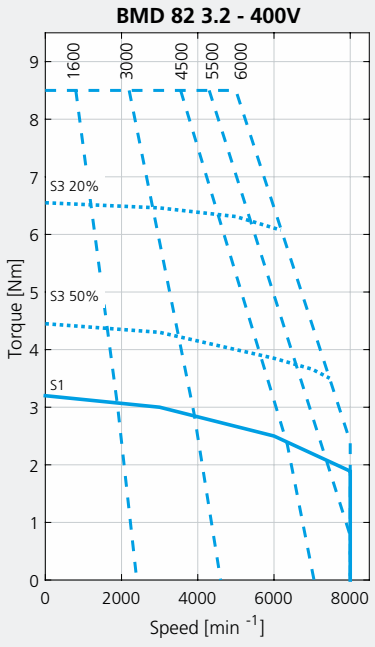


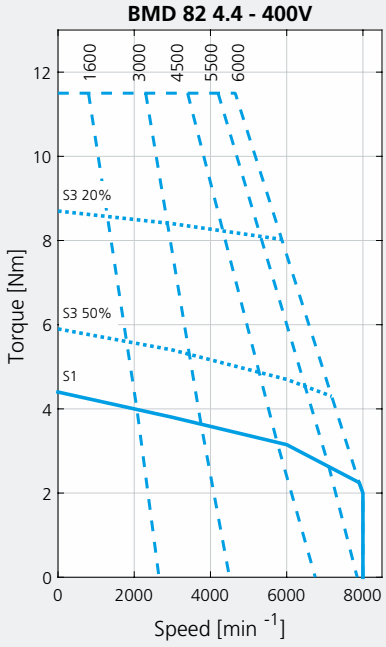


BMD 82 • Torque-speed curves

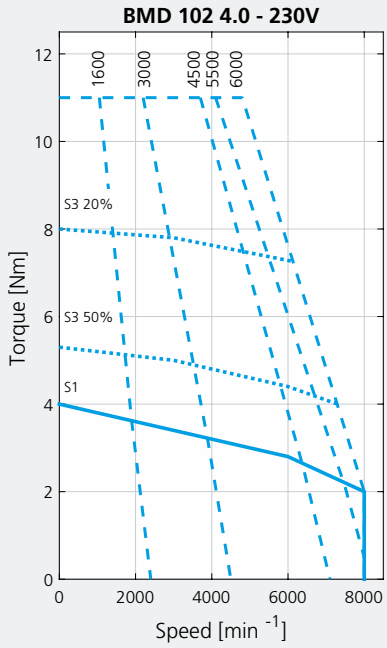


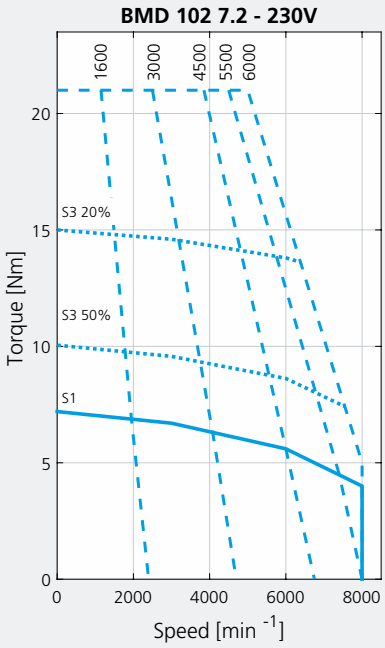


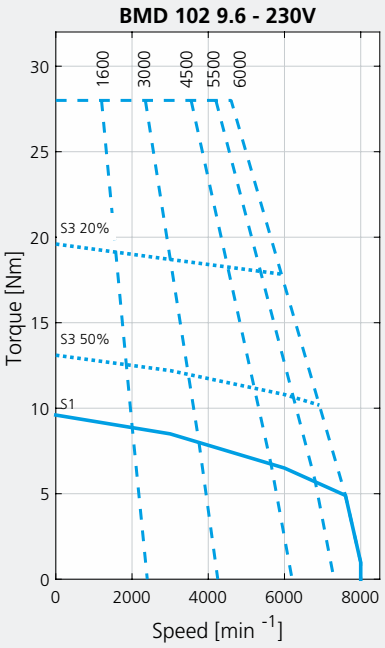


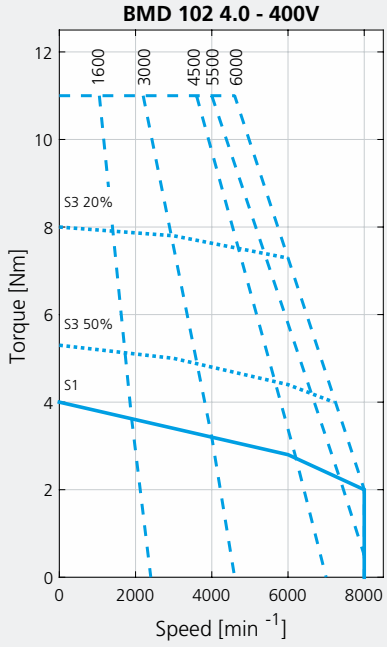


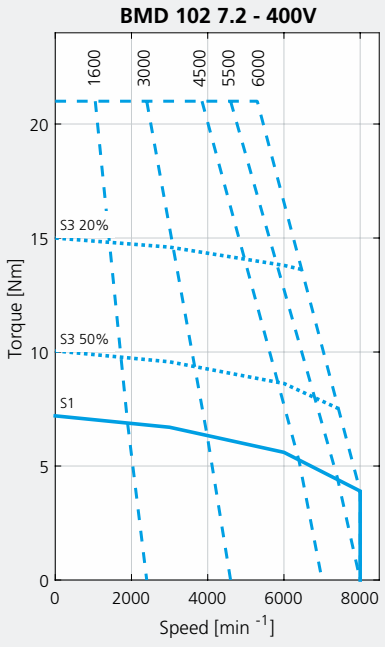
BMD 102 • Torque-speed curves

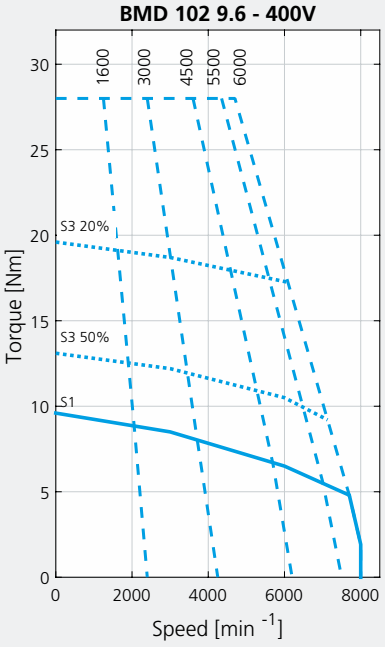




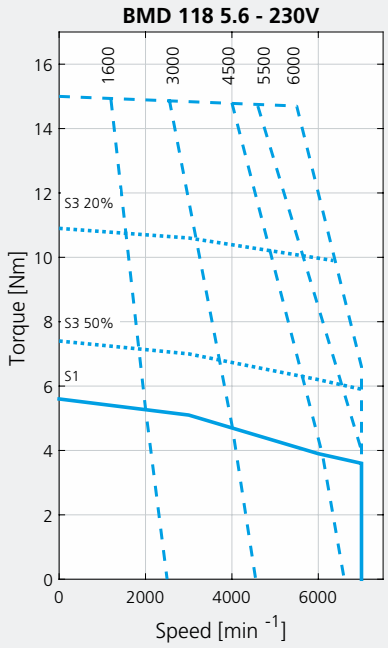


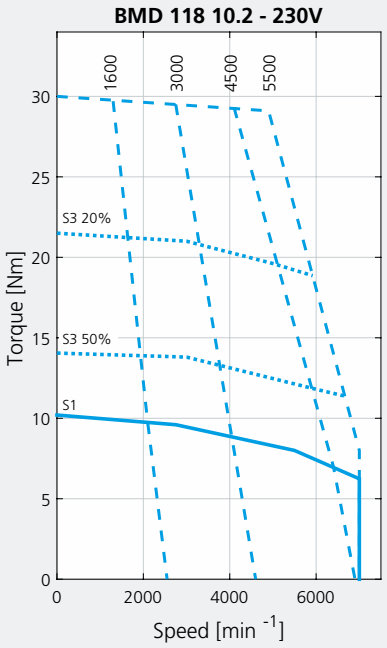


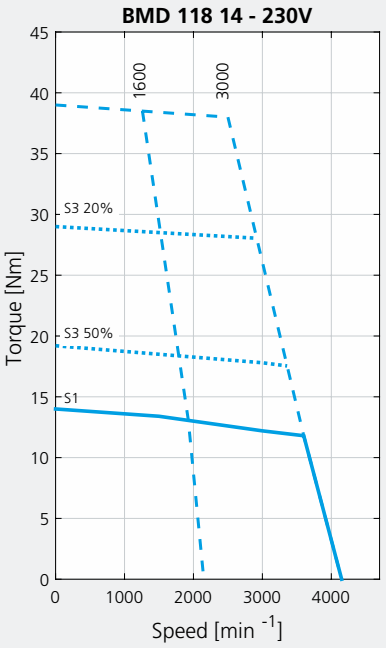


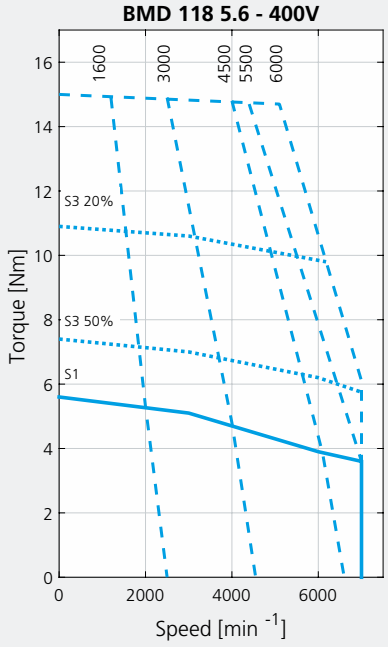


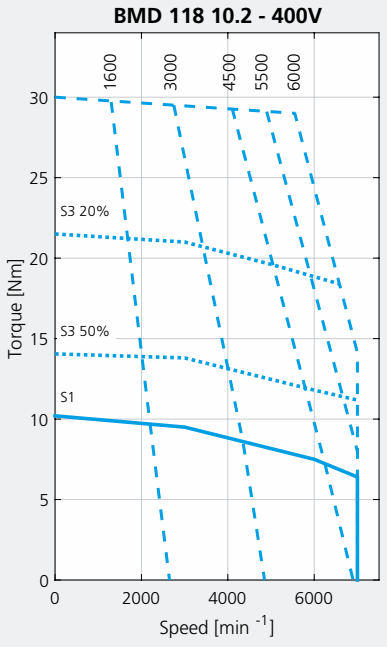
BMD 118 • Torque-speed curves

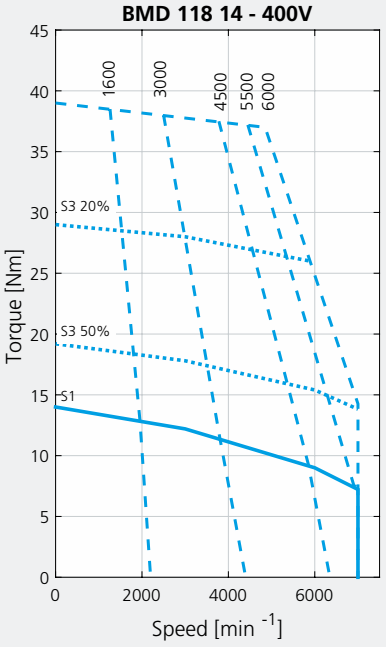




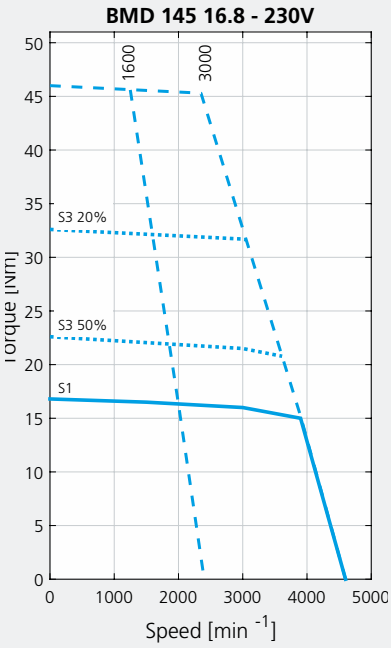


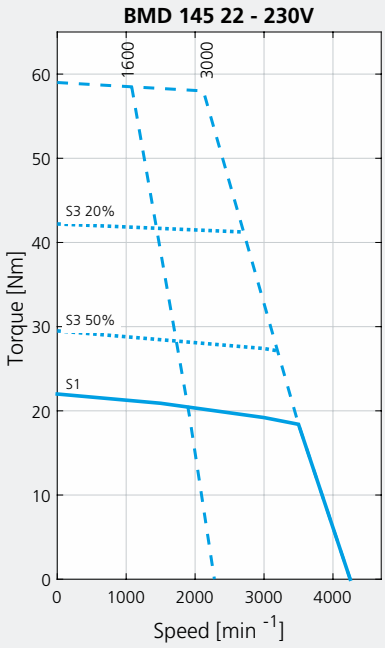


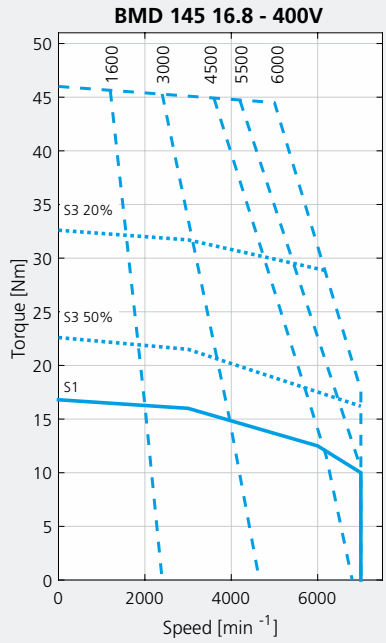


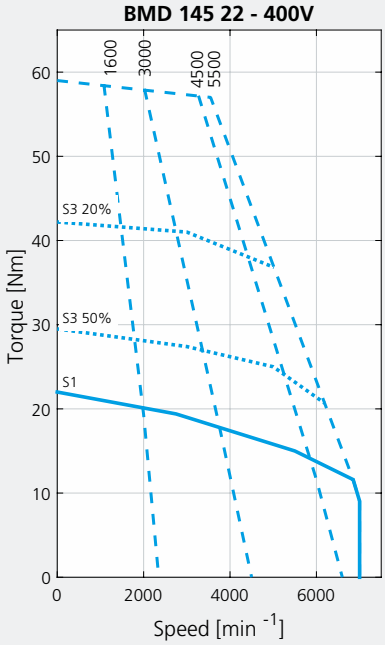


BMD 145 • Torque-speed curves





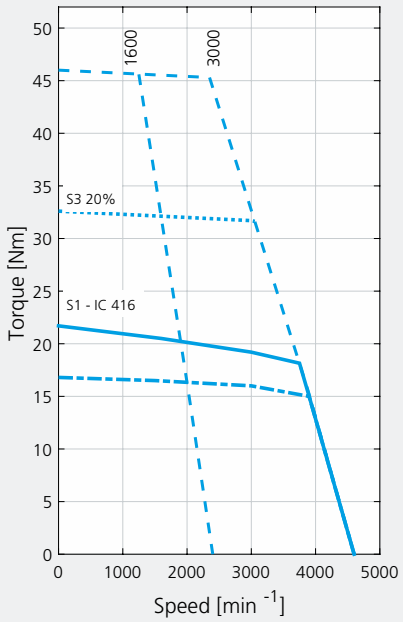




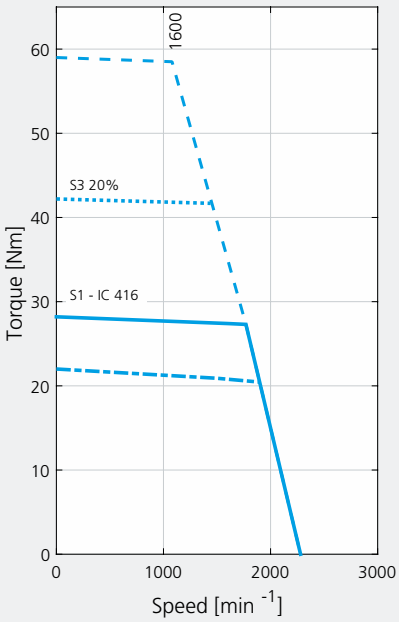
BMD 145 with Forced Ventilation option

Torque-speed curves

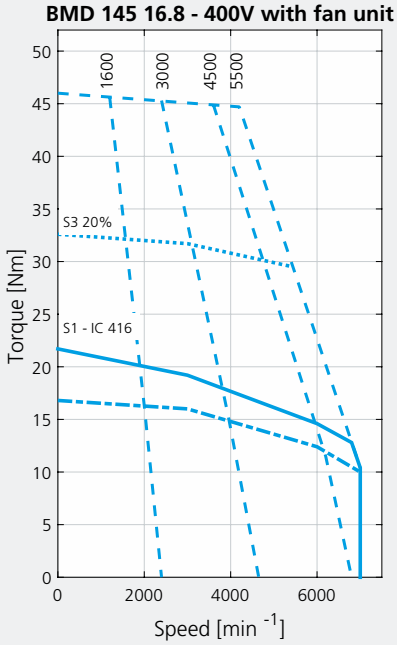
BMD 145 16.8 - 230V with fan unit



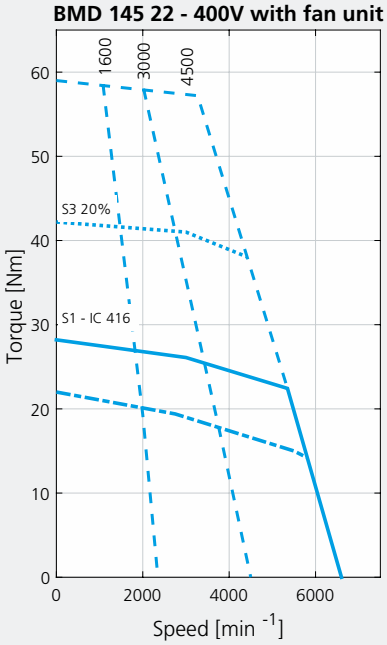
BMD 145 22 - 230V with fan unit



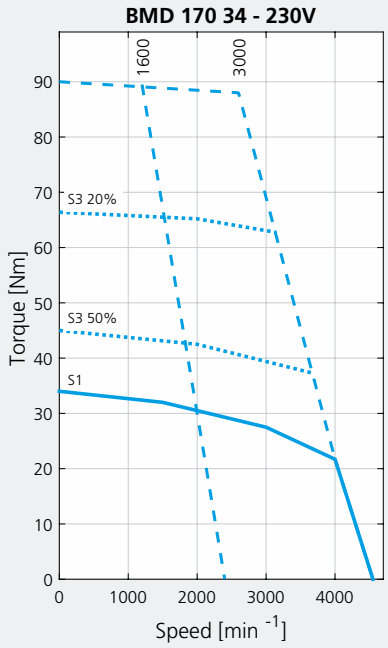
BMD 145 16.8 - 400V with fan unit

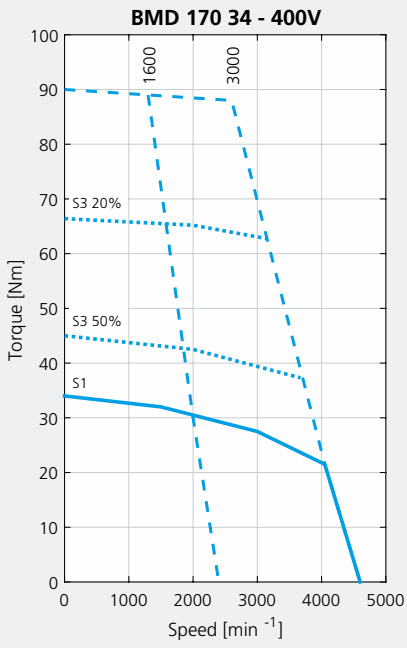


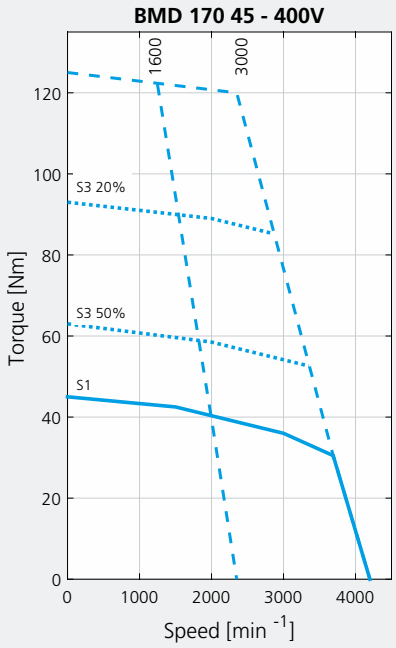
BMD 145 22 - 400V with fan unit



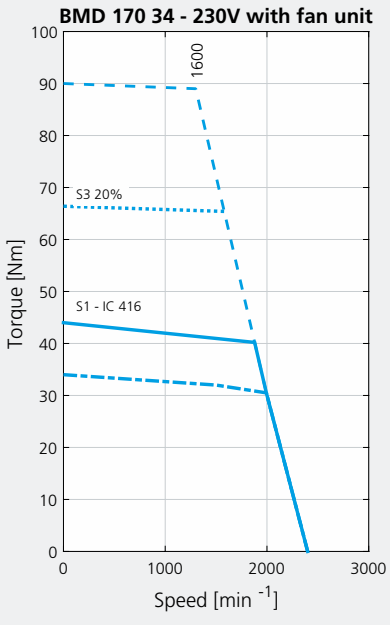
BMD 170 • Torque-speed curves

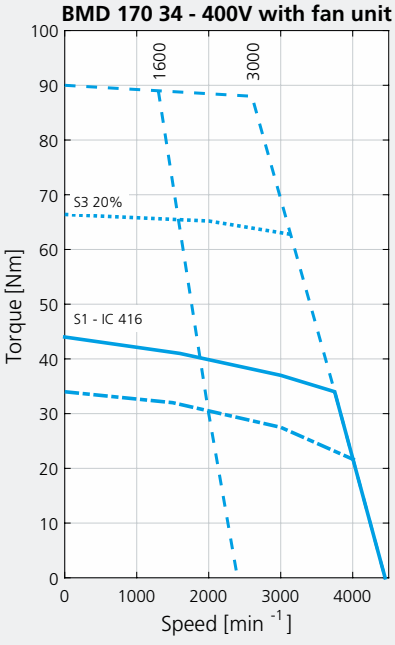


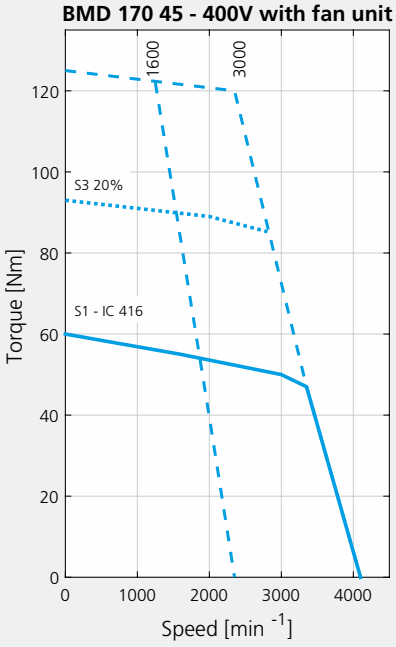




BMD 170 with Forced Ventilation option
Torque-speed curves

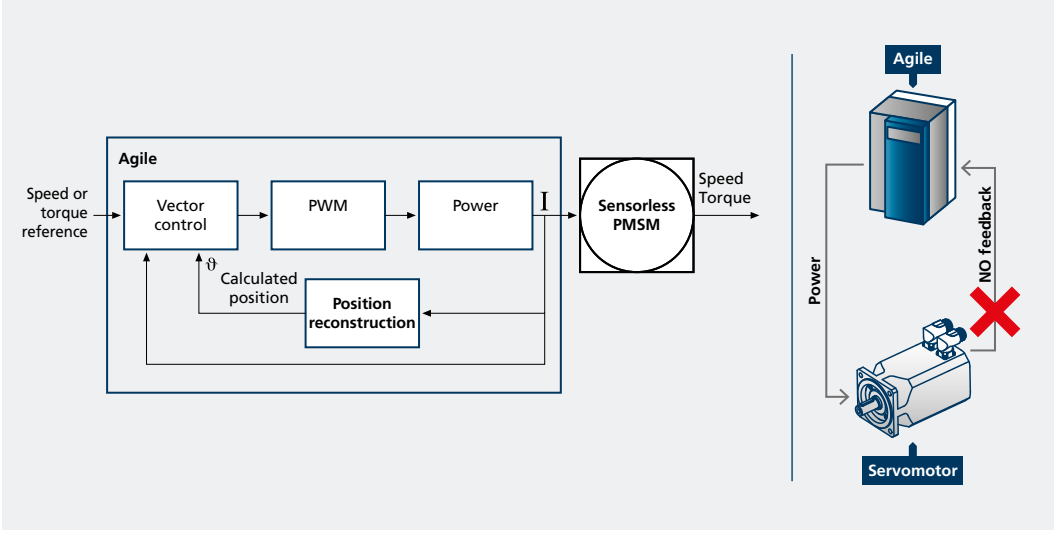




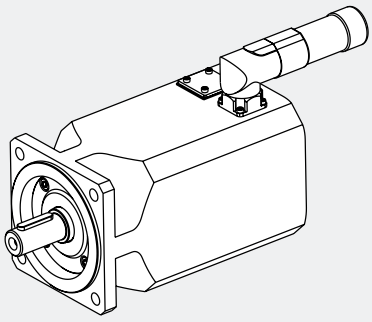


Feedback devices

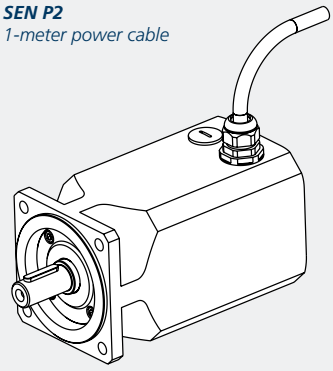
SENSORLESS: [SEN]
Thanks to an efficient algorithms Bonfiglioli Agile drives can control brushless servo motors without the need of any feedback sensors. With this option the BMD servo motor have no feedback device and the angular position of the motor shaft is estimated from measuraments of the current absorbed by the motor.



SEN P1/P1N
8-pin power connector

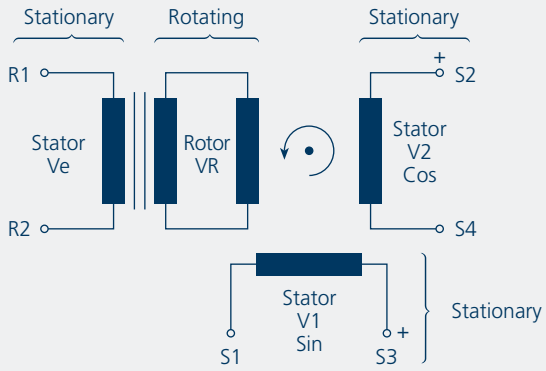


SEN P2
1-meter power cable



Feedback devices

RESOLVER: [RES1,RES2]
The resolver is a passive wound device consisting of a stator and a rotor elements excited from an external source. It produces two output signals that correspond to the sine and cosine angle of the motor shaft. This is a robust device of good accuracy, capable of withstanding high temperature and high levels of vibration. Position information is absolute within one turn.



ITEM	BMD 65	BMD82 - BMD170	
	RES2	RES1	RES2
Poles number	2	2	2
Transformation ratio	0.5 ±5%	0.5 $^{+15\%}_{-5\%}$	0.5 ±5%
Input voltage [Vac_{rms}]	7	11	5.5
Input current [mA]	65	57	61
Input frequency [kHz]	10	8	10
Phase shift	0°	-11°	-12°
Input impedance Zro	70 + j100	75 + j185	43 + j79
Output impedance Zss (Ω)	175 +j275	135 + j265	62 + j112
Electrical error	±10′	±10′	±10′
Accuracy ripple	1′ max	1′ max	1′ max
Operating temperature	-55°C ... + 155°C	-55°C ... + 155°C	-55°C ... + 155°C
Max Speed [min^{-1}]	10000	20000	10000
Mass [kg]	0.065	0.28	0.28
Rotor Inertia [$kgm^2 \times 10^{-6}$]	3.0	5.0	5.0

Please check the compatibility with our Motion Control with our Technical team or by consulting the Motion Control catalogue.

Optical encoders

The optical absolute encoder use a high precision optical disc to measure the angular position. Single turn absolute encoder has an absolute positional information only within one turn. Multi turn absolute encoder is provided of extra gear wheels that account of several shaft revolution. Therefore the output is unique for each shaft position and revolution up to available revolutions.

HEIDENHAIN ENCODERS

ITEM	BMD65		BMD82 - BMD170		
	ENB1	ENB2	ENB1	ENB2	ENB7
Manufacturer	Dr. JOHANNES HEIDENHAIN GmbH				
Data interface	EnDat		EnDat		SinCos
Model	ECN1113	EQN1125	ECN1313	EQN1325	ERN 1387
Type	Single turn	Multi turn	Single turn	Multi turn	Single turn
Measuring principle	Optical		Optical		Optical
Power supply	3.6VDC ... 14VDC		3.6VDC ... 14VDC		5 VDC ±0.5V
Current consumption	85mA (5V)	105mA (5V)	85mA (5V)	105mA (5V)	<120 mA
Periods per revolution	512	512	2048	2048	2048
Position per revolution	8192 (13 bits)	8192 (13 bits)	8192 (13 bits)	8192 (13 bits)	65536 (16 bits) (1)
Revolutions	-	4096 (12 bits)	-	4096 (12 bits)	-
Operating temperature	-40°C ... +115°C		-40°C ... +115°C		-40°...+120°C
Max Speed [min^{-1}]	12000		12000		15000
Resistance to shocks	1000 m/s^2 - 6ms		2000 m/s^2 - 6ms		2000 m/s^2 - 6ms
Resistance to vibrations	200m/s^2 - 55 … 2000Hz		300m/s^2 - 55 … 2000Hz		300m/s^2 - 55 … 2000Hz
Mass [kg]	0.10		0.25		0.25
Rotor Inertia [$kgm^2 \times 10^{-6}$]	0.40		2.60		2.6

(1) This resolution is obtained when used with the EM-ABS-01 acquisition module.

SICK ENCODERS

ITEM	BMD65		BMD82 - BMD170	
	ENB3	ENB4	ENB3	ENB4
Manufacturer	SICK AG			
Data interface	Hiperface		Hiperface	
Model	SKS36	SKM36	SRS50	SRM50
Type	Single turn	Multi turn	Single turn	Multi turn
Measuring principle	Optical		Optical	
Power supply	7VDC ... 12VDC		7VDC ... 12VDC	
Current consumption	60mA	60mA	80mA	80mA
Periods per revolution	128	128	1024	1024
Position per revolution	4096 (12 bits)	4096 (12 bits)	32768 (15 bit)	32768 (15 bit)
Revolutions	-	4096 (12 bits)	-	4096 (12 bits)
Operating temperature	-20°C ... +110°C		-30°C ... +115°C	
Max Speed [min^{-1}]	10000		12000	
Resistance to shocks	100 g / 6 ms		100 g / 6 ms	
Resistance to vibrations	50 g / 10 … 2000 Hz		20 g / 10 … 2000 Hz	
Mass [kg]	0.07		0.20	
Rotor Inertia [$kgm^2 \times 10^{-6}$]	0.45		1.00	

Please check the compatibility with our Motion Control with our Technical team or by consulting the Motion Control catalogue.

Inductive and Capacitive encoders

The absolute inductive and capacitive encoders available in the BMD series have no integral bearing. The angular position is achieved measuring high-frequency signals for encoder exploiting the inductive measuring principle or with a holistic scanning system for encoder exploiting the capacitive principle of measurement.

HEIDENHAIN ENCODER

ITEM	BMD65 - BMD170
	ENB8
Manufacturer	Dr. JOHANNES HEIDENHAIN GmbH
Data interface	EnDat
Model	EQI1131
Type	Multi turn
Measuring principle	Inductive
Power supply	3.6VDC ... 14VDC
Current consumption	115mA (5V)
Periods per revolution	-
Position per revolution	524288 (19 bits)
Revolutions	4096 (12 bits)
Operating temperature	-40°C ... +115°C
Max Speed [min^{-1}]	12000
Resistance to shocks	2000 m/s^2 - 6ms
Resistance to vibrations	400m/s^2 - 55 … 2000Hz
Mass [kg]	0.04
Rotor Inertia [$kgm^2 \times 10^{-6}$]	0.30

SICK ENCODERS

ITEM	BMD65 - BMD170	
	ENB5	ENB6
Manufacturer	SICK AG	
Data interface	Hiperface	
Model	SEK37	SEL37
Type	Single turn	Multi turn
Measuring principle	Capacitive	
Power supply	7VDC ... 12VDC	
Current consumption	50mA	50mA
Periods per revolution	16	16
Position per revolution	512 (9 bits)	512 (9 bits)
Revolutions	-	4096 (12 bits)
Operating temperature	-40°C ... +115°C	-20°C ... +115°C
Max Speed [min^{-1}]	120000	
Resistance to shocks	100 g / 10 ms	
Resistance to vibrations	50 g / 10 … 2000 Hz	
Mass [kg]	0.04	
Rotor Inertia [$kgm^2 \times 10^{-6}$]	0.10	

Please check the compatibility with our Motion Control with our Technical team or by consulting the Motion Control catalogue.

Thermal protection

As standard, the BMD motors are equipped with an integrated PTC thermistor to protect the windings against overtemperatures exceeding the limit of the motor class F insulation. Optionally a KTY or a PT1000 sensors are available, to fit any needs for temperature feedback.

OPTIONS	THERMAL PROTECTOR	NOTE
PTC	1x PTC BMD 65-102 3x PTC BMD 118-170	The PTC thermistors is placed in contact with the motor winding. The thermistor switch temperature is in accordance with the insulation class F of the motor.
KTY	Type KTY 84-130	A KTY silicon semi-conductor resistance sensor is placed in contact with the motor winding. The working temperature range is from 0°C to 170°C.
TC1	PT1000	A platinum resistance temperature sensor is place in contact with the motor winding. The PT1000 characteristic is in accordance with IEC 60751 : 2008, tolerance class B. The working temperature is from -40°C to 250°C.

Electromechanical holding brake - F24 option

An electromagnetic holding brake is available. The brake variant can be ordered by selecting the F24 value in the brake option field.

The electromechanical brake is for use as an holding brake with motor shaft stationary. Do not use it as a dynamic brake, except for emergencies such as main supply faliure.

Data of the available brake for each motor size are summarized in the following table.
When the motor is delivered without brake, the brake fitting is not possible.

The brake coil voltage supply must be 24V DC-voltage.
The brake option is responsible of an increment of the motor length.
Brake leads are wired in the power connector togheter with motor leads.

Please note that the brake option is not available when the "additional inertia" option is selected.

Motor	Rated brake torque 20°C M_b	Rated brake torque 100°C M_b	Brake voltage V_b	Brake current I_b	Brake power 20°C P_b	Inertia increase ΔJ	Mass increase Δm_M	Engaging time t_1	Release time t_2
	Nm	Nm	Vdc	A	W	$Kgm^2 \cdot 10^{-4}$	kg	ms	ms
65	2	1.8	24	0.46	11	0.068	0.2	6	25
82	4.5	4		0.5	12	0.18	0.6	7	35
102	9	8		0.75	18	0.54	1.1	7	40
118	18	15		1.0	24	1.66	2.2	10	50
145	18	15		1.0	24	1.66	2.6	10	50
170	36	32		1.1	26	5.56	4.5	22	90

Notes
t_1 Time from disconnecting the current until the rated torque is attained
t_2 Time from connecting the current until the torque decreases

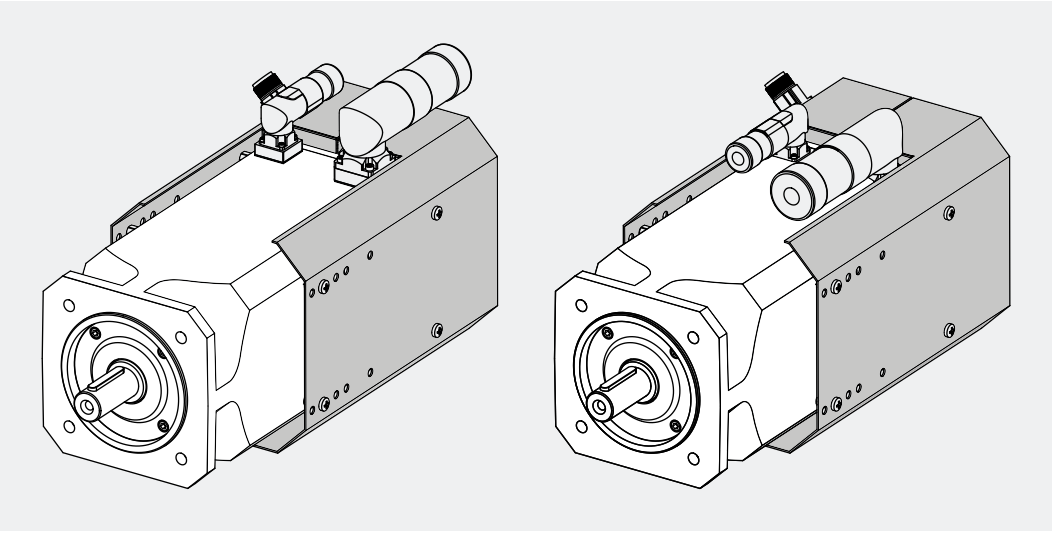
Additional inertia feature - F1 option

BMD Permanent Magnet AC Synchronous Motor series is provided optionally with additional inertia.
The BMD motors with additional inertia have higher rotor moment of inertia in comparison with basic version.
Additional inertia is designed to be used in application with high load inertia. The increased rotor moment of inertia provides a comfortable control response due to "higher" inertial matching of the machine.

MOTOR	INERTIA INCREASE ΔJ	MASS INCREASE Δm_M
	$Kgm^2 \cdot 10^{-4}$	kg
65	0.5	0.4
82	3	1
102	7.5	1.7
118	16	3.5
145	36	5
170	70	8.2

Forced ventilation

BMD motors size 145 and 170 can be ordered completed with additional fan unit (forced ventilation IC 416) selecting the proper designation variants (V1R, V1S, V2R, V2S). Motors originally provided with a fan unit have the power and signal connectors rotatable as per standard BMD motors (180° x 90°).
Alternatively, the fan units are available as kit suitable for the retrofit of standard motors. In this case the customer has to modify the existing motor to assembly the fan unit.
The fan cowl is black painted RAL 9005. Fans have metal housing and IP54 degree of protection.



Forced ventilation

KIT ORDER CODES FOR RETROFIT
To install the forced ventilation as a retrofit kit the standard BMD motor housing must be modify adding 8 threaded holes. In this configuration the motor connectors must be oriented to the drive end side and they can not rotate. Instructions for housing modifications are reported in the fan unit operation manual supplied with the kit.
For selecting the right ventilation kit refer to the following tables.

MOTOR VARIANT		
	Fan cowl type S	Fan cowl type L
BMD 145 16.8	SEN / RES1 / RES2 / ENB1...ENB8	-
BMD 145 16.8…F24/F1	SEN / RES1 / RES2 / ENB3...ENB6 / ENB8	ENB1 / ENB2 / ENB7
BMD 145 22	SEN / RES1 / RES2 / ENB3...ENB6 / ENB8	ENB1 / ENB2 / ENB7
BMD 145 22…F24/F1	-	SEN / RES1 / RES2 / ENB1...ENB8
BMD 170 34	SEN / RES1 / RES2 / ENB1...ENB8	-
BMD 170 34…F24/F1	SEN / RES1 / RES2 / ENB3...ENB6 / ENB8	ENB1 / ENB2 / ENB7
BMD 170 45	SEN / RES1 / RES2 / ENB1...ENB8	-
BMD 170 45…F24/F1	-	SEN / RES1 / RES2 / ENB1...ENB8

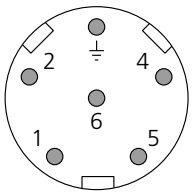
FAN UNIT VARIANTS AND KIT ORDER CODES				
KIT code	BMD size	Fan voltage	Fan cowl size	Connector type
19MOT0001	BMD 170	24V DC	S	Straight
19MOT0002	BMD 170	24V DC	L	Straight
19MOT0003	BMD 170	230V AC	S	Straight
19MOT0004	BMD 170	230V AC	L	Straight
19MOT0005	BMD 170	24V DC	S	Rotatable
19MOT0006	BMD 170	24V DC	L	Rotatable
19MOT0007	BMD 170	230V AC	S	Rotatable
19MOT0008	BMD 170	230V AC	L	Rotatable
19MOT0009	BMD 145	24V DC	S	Straight
19MOT0010	BMD 145	24V DC	L	Straight
19MOT0011	BMD 145	230V AC	S	Straight
19MOT0012	BMD 145	230V AC	L	Straight
19MOT0013	BMD 145	24V DC	S	Rotatable
19MOT0014	BMD 145	24V DC	L	Rotatable
19MOT0015	BMD 145	230V AC	S	Rotatable
19MOT0016	BMD 145	230V AC	L	Rotatable

Note
In case of retrofit, check the power cable section. It must be in accordance with the power servocables matching table present in this catalog.

Forced ventilation

FANS ELECTRICAL DATA AND CONNECTION

FANS ELECTRICAL DATA				
BMD size	Fan voltage	Voltage range	Power	Frequency
BMD 170	24V DC	12…30V DC	12 W	-
	230V AC	-	45 / 39 W	50/ 60 Hz
BMD 145	24V DC	12…30V DC	12 W	-
	230V AC	-	30 / 28 W	50/ 60 Hz

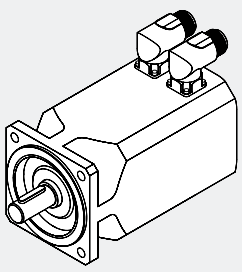
LAYOUT OF SUPPLY CONNECTORS VXS / VXR AND PRE-ASSEMBLED CABLES			
PIN	DESCRIPTION		CABLE LABEL
1	Not connected		-
2	Not connected		-
⏚	Earth		Yellow-Green
4	+VDC / Phase		1
5	- VDC / Neutral		2
6	Not connected		-

CONNECTION ACCESSORIES

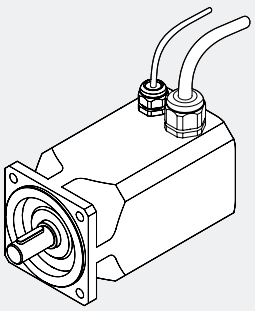
ORDER CODE	DESCRIPTION
712692054	Plug connector with pin – Clamping range: 7.5…12mm
712692108	Plug connector with pin – Clamping range: 4.2…6.6mm
612580269	Assembled cable with connector MFC 03 C1 – Length: 3m
612580271	Assembled cable with connector MFC 05 C1 – Length: 5m
612580272	Assembled cable with connector MFC 10 C1 – Length: 10m

Connections

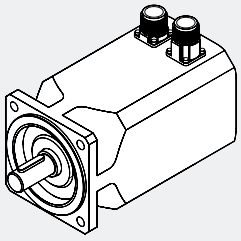
The power and feedback device connections can made by angled rotatable receptacles connector (P1N S1N or P1 S1) or by straight turning receptacles connector (P3N S3N or P3 S3) or by 1 metre flying cable (P2, S2 or S2C).



P1N S1N
Angled rotatable receptacles



P2 S2-S2C
1m Flying cables

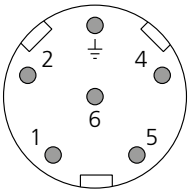


P3N S3N
Straight receptacles

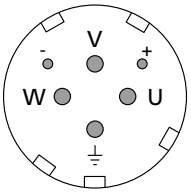
Power connections

The 6-pin power connector of the motor with feedback includes the pins of the motor supply and the ones for the brake supply (if provided). The sensorless motor has 8-pin power connector and iclude also the pins for the thermal protection. Same layouts are used for motor with flying cable connection.

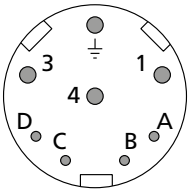
MOTOR WITH FEEDBACK DEVICE / BMD65 - BMD145

Power connector layout (P1N/P1/P3N/P3 options)			Power cable (P2 option)
Connector PIN number	Description		Cable label or color
1	Phase U		L1 / 1 / U
2	Phase V		L2 / 2 / V
⏚	Earth - SL		Yellow - Green
4	Brake +		White
5	Brake -		Black
6	Phase W		L3 / 3 / W

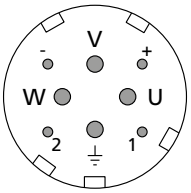
MOTOR WITH FEEDBACK DEVICE / BMD170

Power connector layout (P1N/P1/P3N/P3 options)			Power cable (P2 option)
Connector PIN number	Description		Cable label or color
U	Phase U		L1 / 1 / U
V	Phase V		L2 / 2 / V
W	Phase W		L3 / 3 / W
⏚	Earth - SL		Yellow - Green
+	Brake +		White
-	Brake -		Black

SENSORLESS MOTOR / BMD65 - BMD145

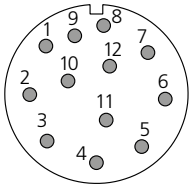
Power connector layout (P1N/P1/P3N/P3 options)			Power cable (P2 option)
Connector PIN number	Description		Cable label or color
1	Phase U		L1 / 1 / U
⏚	Earth - SL		Yellow - Green
3	Phase W		L3 / 3 / W
4	Phase V		L2 / 2 / V
A	Thermal protector +		White / 5
B	Thermal protector -		Black / 6
C	Brake +		7
D	Brake -		8

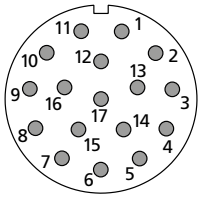
SENSORLESS MOTOR / BMD170

Power connector layout (P1N/P1/P3N/P3 options)			Power cable (P2 option)
Connector PIN number	Description		Cable label or color
U	Phase U		L1 / 1 / U
V	Phase V		L2 / 2 / V
W	Phase W		L3 / 3 / W
⏚	Earth - SL		Yellow - Green
1	Thermal protector +		White / 5
2	Thermal protector -		Black / 6
+	Brake +		7
-	Brake -		8

Signal connections

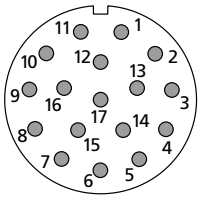
The signal connector gathers the feedback device signals and the thermal protection terminal. Each feedback device has proper signal connector layout. Variants with flying cable have different termination on the inverter feedback module side. S2 variant has lead wires with ferrules for connection to scree terminals. S2C variant has SUB-D male standard connector with layout in accordance with the Bonfiglioli interface module.

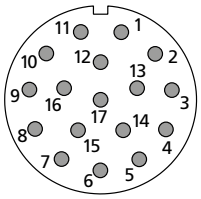
MOTOR WITH RESOLVER (RES1/RES2) / BMD65 - BMD170			
Signal connector layout (S1N/S1/S3N/S3 options)			Signal cable (S2 option)
Connector PIN number	Description		Cable color
1	Sin -		Brown
2	Sin +		Green
3	n.c.		not connected
4	Shield cable		-
5	n.c.		not connected
6	n.c.		not connected
7	Exct -		Black
8	Thermal protector -		White (0.50 mm²)
9	Thermal protector +		Brown (0.50 mm²)
10	Exct +		Red
11	Cos +		Gray
12	Cos -		Rose

MOTOR WITH ENDAT ENCODER (ENB1/ENB2/ENB8) / BMD65 - BMD170			
Signal connector layout (S1N/S1/S3N/S3 options)			Signal cable (S2 option)
Connector PIN number	Description		Cable color
1	UP SENSOR		Violet
2	n.c.		not connected
3	n.c.		not connected
4	0V SENSOR		Yellow
5	Thermal protector -		Blue (0.50 mm2)
6	Thermal protector +		White (0.50 mm2)
7	UP		White Green
8	Clock +		Blue
9	Clock -		Black
10	0V		Brown Green
11	Shield cable		-
12	B + (1)		Red Black (2)
13	B - (1)		Green Black (2)
14	DATA +		Gray
15	A + (1)		Blue Black (2)
16	A - (1)		Yellow Black (2)
17	DATA -		Rose

Note
(1) Signals not available for encoder ENB8
(2) Wires to be cut for cable MSC - EN1 FW in case of encoder ENB8

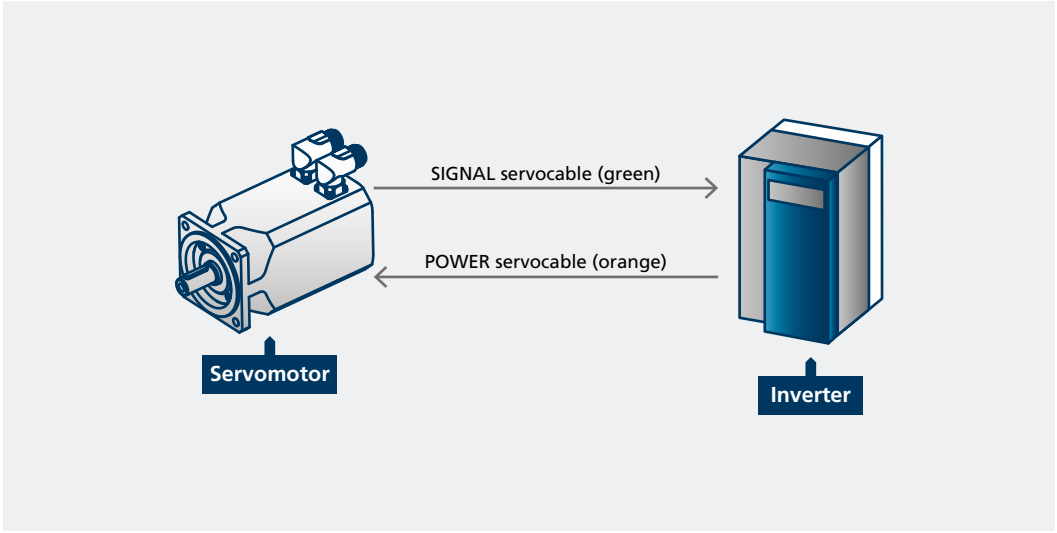
Signal connections

MOTOR WITH HYPERFACE ENCODER (ENB3/ENB4/ENB5/ENB6) / BMD65 - BMD170			
Signal connector layout (S1N/S1/S3N/S3 options)			Signal cable (S2 option)
Connector PIN number	Description		Cable color
1	Sin +		Green
2	Sin -		Brown
3	RS485 +		Blue
4	n.c.		not connected
5	Shield cable		-
6	n.c.		not connected
7	GND (0V)		Black
8	Thermal protector -		White (0.50 mm2)
9	Thermal protector +		Brown (0.50 mm2)
10	+ Vdc		Red
11	Cos +		Gray
12	Cos -		Rose
13	RS485 -		Violet
14	n.c.		not connected
15	n.c.		not connected
16	n.c.		not connected
17	n.c.		not connected

MOTOR WITH SINCOS ENCODER (ENB7) / BMD82 - BMD170			
Signal connector layout (S1N/S1/S3N/S3 options)			Signal cable (S2 option)
Connector PIN number	Description		Cable color
1	Sin +		Blue Black
2	Sin -		Yellow Black
3	R+		Blue
4	D-		Brown
5	C+		Gray
6	C-		Rose
7	0VL SENSOR		Yellow
8	Thermal protector +		White (0.50 mm2)
9	Thermal protector -		Blue (0.50 mm2)
10	Vencs		White Green
11	Cos +		Red Black
12	Cos -		Green Black
13	R -		Black
14	D +		Green
15	0VL		Brown Green
16	Venc		Violet
17	Shield cable		-

Servocables

The word servocable is referred to electrical cable connecting Bonfiglioli servomotor to respective inverter.
A servocables selection is available for power supply and sensor feed-back, justifying the distinction between power cables and signal cables.
The power cable provides energy to motor, but also feeds the brake when present.
The signal cables instead are in charge of transmission of electrical signals generated by feed-back equipment installed on the motor. The same cable is also used to convey the thermal protection.
All servocables are available in three different and fixed lengths (3 meters, 5 m, 10 m) offering to user an exhaustive proposal to numerous needs of configuration.
Other lengths available on request.



Servocables

Power servocables

Power cables are recognized by the orange color according to Desina standard. The conductors cross-section depends on the motor nominal current. In order to face different current level absorbed by different motor sizes, the power cables are executed with four conductors cross sections (1.5 mm², 2.5 mm², 4.0 mm², 10.0 mm²). On inverter side, every cable terminates with flying leads covered by ferrules for plug-in into screw terminals. On motor side the cable is equipped with metal circular plug with Speed-Tech technology for easy and sure plug-in with corresponding motor rotatable receptacle. According to page 52, power connectors have 6 pins for motor with feedback and 8 pins for sensorless motor variants.

Inverter side *Motor side*

The power cables fulfil the following technical requirements:

TECHNICAL DATA	
Properties	Oil resistant shielded cable for dynamic laying
Conductor	Tinned Stranded Cu wire complying with IEC 60228 Cl 5 / 6
Outer Sheath	PUR or equivalent thermoplastic material - Color: orange RAL 2003
Inner Sheath	PP or TPE
Tinned Cu braid Shield	Coverage overall screen > 80%

ELECTRICAL DATA	
Nom. Volt. Power cores	U_0/U 600/1000V
Nom. Volt. Control cores	U_0/U 300/500V
AC Test Volt. Power cores	4 kV
AC Test Volt. Control cores	1 kV
Insulation Resistance	> 5 MOhm/km

MECHANICAL DATA	
Service Temperature	-15 / +80 °C
Minimum Bending Radius	10 x D
N° bending cycles	≥ 10^6
Max Speed	≥ 180 m/min
Max Acceleration	≥ 15 m/s²

STANDARD AND CERTIFICATIONS
UL/CSA, RoHS, DESINA

The cable ordering code is structured in the following mode with five fields:

MPC | **3** | **15** | **NB** | **C1**

Connector size and type
C1 6-pin connector, motor with feedback, sizes 65 ... 145
C2 6-pin connector, motor with feedback, size 170
C3 8-pin connector, sensorless motor, sizes 65 ... 145
C4 8-pin connector, sensorless motor, size 170

Brake wires
NB Without brake wires
B With brake wires

Phase wire section
015 1.5 mm²
025 2.5 mm²
040 4 mm²
100 10 mm²

Cable length
03 3 m
05 5 m
10 10 m

Power servocables

For helping the user during servomotor-cable selection, the following matching tables are proposed. Field XX refers to the cable length (03, 05, 10), while field YY refers to the brake variant (NB, B): see previous page for fields description.

<table>
<tr><th>SIZE</th><th>STALL TORQUE</th><th colspan="5">NOMINAL SPEED</th></tr>
<tr><th></th><th>Nm</th><th>1600 min^{-1}</th><th>3000 min^{-1}</th><th>4500 min^{-1}</th><th>5500 min^{-1}</th><th>6000 min^{-1}</th></tr>
<tr><th colspan="7">400V NOMINAL VOLTAGE – MOTOR WITH FEEDBACK</th></tr>
<tr><td>65</td><td>-</td><td rowspan="10" colspan="5">MPC XX 015 YY C1
MPC XX 025 YY C1
MPC XX 040 YY C1
MPC XX 040 YY C2
MPC XX 100 YY C2
Not available</td></tr>
<tr><td>82</td><td>-</td></tr>
<tr><td>102</td><td>-</td></tr>
<tr><td rowspan="3">118</td><td>5,6</td></tr>
<tr><td>10,2</td></tr>
<tr><td>14</td></tr>
<tr><td rowspan="2">145</td><td>16,8</td></tr>
<tr><td>22</td></tr>
<tr><td rowspan="2">170</td><td>34</td></tr>
<tr><td>45</td></tr>
<tr><th colspan="7">400V NOMINAL VOLTAGE – SENSORLESS MOTOR WITH CONNECTOR</th></tr>
<tr><td>65</td><td>-</td><td rowspan="10" colspan="5">MPC XX 015 YY C3
MPC XX 025 YY C3
MPC XX 040 YY C3
MPC XX 040 YY C4
MPC XX 100 YY C4
Not available</td></tr>
<tr><td>82</td><td>-</td></tr>
<tr><td>102</td><td>-</td></tr>
<tr><td rowspan="3">118</td><td>5,6</td></tr>
<tr><td>10,2</td></tr>
<tr><td>14</td></tr>
<tr><td rowspan="2">145</td><td>16,8</td></tr>
<tr><td>22</td></tr>
<tr><td rowspan="2">170</td><td>34</td></tr>
<tr><td>45</td></tr>
<tr><th colspan="7">230V NOMINAL VOLTAGE – MOTOR WITH FEEDBACK</th></tr>
<tr><td>65</td><td>-</td><td rowspan="11" colspan="5">MPC XX 015 YY C1
MPC XX 025 YY C1
MPC XX 040 YY C1
MPC XX 025 YY C1
MPC XX 040 YY C1
MPC XX 025 YY C1
MPC XX 040 YY C2
MPC XX 100 YY C2
Not available</td></tr>
<tr><td>82</td><td>-</td></tr>
<tr><td rowspan="3">102</td><td>4</td></tr>
<tr><td>7,2</td></tr>
<tr><td>9,6</td></tr>
<tr><td rowspan="3">118</td><td>5,6</td></tr>
<tr><td>10,2</td></tr>
<tr><td>14</td></tr>
<tr><td rowspan="2">145</td><td>16,8</td></tr>
<tr><td>22</td></tr>
<tr><td>170</td><td>34</td></tr>
<tr><th colspan="7">230V NOMINAL VOLTAGE – SENSORLESS MOTOR WITH CONNECTOR</th></tr>
<tr><td>65</td><td>-</td><td rowspan="11" colspan="5">MPC XX 015 YY C3
MPC XX 025 YY C3
MPC XX 040 YY C3
MPC XX 025 YY C3
MPC XX 040 YY C3
MPC XX 025 YY C3
MPC XX 040 YY C4
MPC XX 100 YY C4
Not available</td></tr>
<tr><td>82</td><td>-</td></tr>
<tr><td rowspan="3">102</td><td>4</td></tr>
<tr><td>7,2</td></tr>
<tr><td>9,6</td></tr>
<tr><td rowspan="3">118</td><td>5,6</td></tr>
<tr><td>10,2</td></tr>
<tr><td>14</td></tr>
<tr><td rowspan="2">145</td><td>16,8</td></tr>
<tr><td>22</td></tr>
<tr><td>170</td><td>34</td></tr>
<tr><th colspan="7">400V NOMINAL VOLTAGE – MOTOR WITH FEEDBACK AND FORCED VENTILATION</th></tr>
<tr><td rowspan="2">145</td><td>21,5</td><td rowspan="2">MPC XX 015 YY C1</td><td>MPC XX 025 YY C1</td><td rowspan="2">MPC XX 040 YY C1</td><td rowspan="4" colspan="2">Not available</td></tr>
<tr><td>27,5</td><td></td></tr>
<tr><td rowspan="2">170</td><td>44</td><td rowspan="2">MPC XX 040 YY C2</td><td rowspan="2">MPC XX 100 YY C2</td></tr>
<tr><td>60</td></tr>
<tr><th colspan="7">400V NOMINAL VOLTAGE – SENSORLESS MOTOR WITH CONNECTOR AND FORCED VENTILATION</th></tr>
<tr><td rowspan="2">145</td><td>21,5</td><td rowspan="2">MPC XX 015 YY C3</td><td>MPC XX 025 YY C3</td><td rowspan="2">MPC XX 040 YY C3</td><td rowspan="4" colspan="2">Not available</td></tr>
<tr><td>27,5</td><td></td></tr>
<tr><td rowspan="2">170</td><td>44</td><td rowspan="2">MPC XX 040 YY C4</td><td rowspan="2">MPC XX 100 YY C4</td></tr>
<tr><td>60</td></tr>
<tr><th colspan="7">230V NOMINAL VOLTAGE – MOTOR WITH FEEDBACK AND FORCED VENTILATION</th></tr>
<tr><td rowspan="3">145</td><td>21,5</td><td rowspan="3">MPC XX 025 YY C1
MPC XX 040 YY C1</td><td rowspan="3">MPC XX 040 YY C1</td><td rowspan="5" colspan="2">Not available</td></tr>
<tr><td>27,5</td></tr>
<tr><td>170</td><td>44</td><td colspan="2">MPC XX 100 YY C2</td></tr>
<tr><th colspan="7">230V NOMINAL VOLTAGE – MOTOR WITH FEEDBACK AND FORCED VENTILATION</th></tr>
<tr><td rowspan="3">145</td><td>21,5</td><td rowspan="3">MPC XX 025 YY C3
MPC XX 040 YY C3</td><td rowspan="3">MPC XX 040 YY C3</td><td rowspan="5" colspan="2">Not available</td></tr>
<tr><td>27,5</td></tr>
<tr><td>170</td><td>44</td><td colspan="2">MPC XX 100 YY C4</td></tr>
</table>

Signal servocables

Signal cables are recognized by the green color according to Desina standard. The conductors number, their cross-section and their terminal type depend by the transducer typology supported by the cable.
Cables are available for connection of every feedback option, either resolver and absolute encoders. On motor side, the cable is equipped with metal circular plug with Speed-Tech technology for an easy and sure plug-in with respective rotatable receptacle present on motor.
On inverter side the cable end can be executed with two different terminations:
• with SUB-D male standard connector for easy and sure plug-in with corresponding SUB-D female of the module interface.
• with ferrules for connection to screw terminals of the module interface.
Connections layouts are dedicated to Bonfiglioli Vectron Active Cube interface modules.

Inverter side *Motor side*

The signal cables fulfil the following technical requirements:

TECHNICAL DATA	
Properties	Oil resistant shielded cable for dynamic laying
Conductor	Tinned Stranded Cu wire complying with IEC 60228 Cl 5 / 6
Outer Sheath	PUR or equivalent thermoplastic material - Color: green RAL 6018
Inner Sheath	PP or TPE
Tinned Cu braid Shield	Coverage overall screen > 80%

ELECTRICAL DATA	
Nominal Voltage	30 V
AC Test Voltage	1500 V
Insulation Resistance	> 10 MOhm/km
Capacitance strand/strand	< 150 pF/m

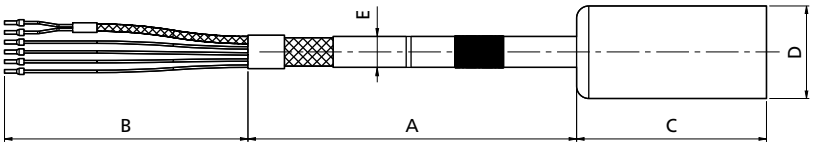
MECHANICAL DATA	
Service Temperature	-20 / +80 °C
Minimum Bending Radius	10 x D
N° bending cycles	≥ 10^6
Max Speed	≥ 180 m/min
Max Acceleration	≥ 15 m/s^2

STANDARD AND CERTICIATIONS
UL/CSA, RoHS, DESINA

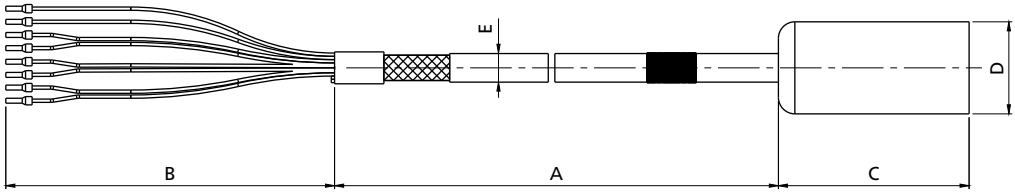
The ordering codes of the signal cables are described in the following table:

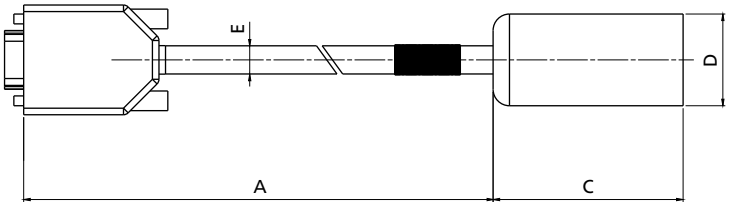
FEEDBACK DEVICE	INVERTER SIDE TERMINATION	INVERTER FEEDBACK MODULE	CABLE LENGTH		
			3 m	5m	10 m
RES1 / RES2	Flying leads	EM-RES-01/02 - EM-AUT-XX	MSC 03 RES FW	MSC 05 RES FW	MSC 10 RES FW
	SUB-D9	EM-RES-03	MSC 03 RES SC	MSC 05 RES SC	MSC 10 RES SC
ENB1 / ENB2 / ENB8	HD SUB-D15	EM-ABS-01 - EM-AUT-XX	MSC 03 EN1 SC	MSC 05 EN1 SC	MSC 10 EN1 SC
	Flying leads	-	MSC 03 EN1 FW	MSC 05 EN1 FW	MSC 10 EN1 FW
ENB3 ... ENB6	SUB-D15	EM-ABS-01 - EM-AUT-XX	MSC 03 EN3 SC	MSC 05 EN3 SC	MSC 10 EN3 SC
	Flying leads	-	MSC 03 EN3 FW	MSC 05 EN3 FW	MSC 10 EN3 FW
ENB7	SUB-D15	EM-ABS-01	MSC 03 EN7 SC	MSC 05 EN7 SC	MSC 10 EN7 SC
	Flying leads	-	MSC 03 EN7 FW	MSC 05 EN7 FW	MSC 10 EN7 FW

Power cable layout



Signal cable layout





CONNECTOR SIZE		A	B	C	D
		[m]	[mm]	[mm]	[mm]
Power Cable	C1 / C3	3 - 5 - 10 according to designation	150	76	28
	C2 / C4			93	46
Signal Cable	-	3 - 5 - 10 according to designation	150	76	28

	WIRE SECTION	BRAKE OPTION	E_{max}
	[mm²]		[mm]
Power Cable	1.5	NB	11.6
		B	12.8
	2.5	NB	13
		B	14.2
	4	NB	14.7
		B	16.3
	10	NB	19.7
		B	21.8

	FEEDBACK DESIGNATION	E
		[mm]
Signal Cable	RES	8.6
	EN1 / EN7	8.7
	EN3	8.6

Power and signal cable marking follows the label and wire colors reported in the pages 52, 53 and 54.

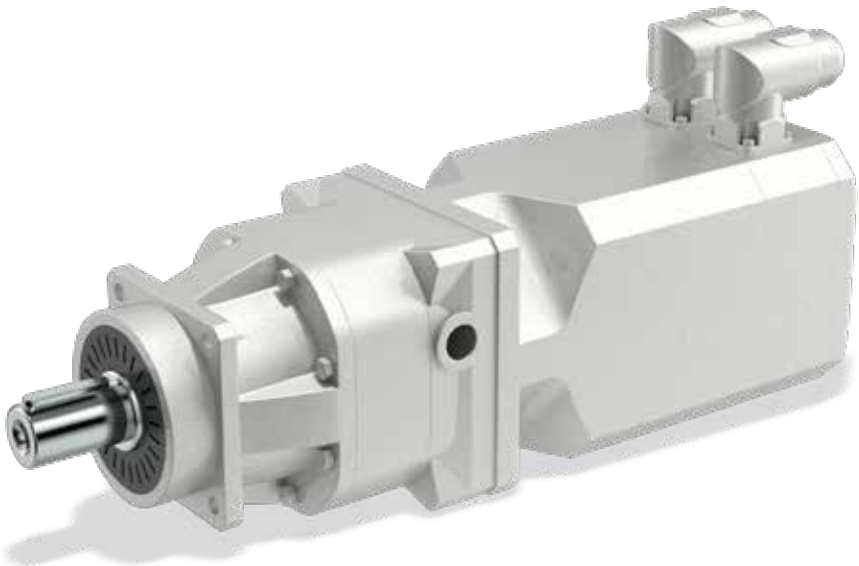
Servo gearheads

Motion application requires the use of precision planetary gearboxes to adapt speeds and torques, while ensuring the precision demanded by the application.
Bonfiglioli Riduttori has chosen to use planetary gearboxes with the BMD range of servo motors.
Bonfiglioli precision planetary gearboxes (PPG) match with BMD Permanent Magnet synchronous motors and provide industrial motion control equipment with torque multiplication and proper inertial matching.
These gearheads combined with powerful drive electronics are designed for servo applications requiring highest standards in terms of dynamics, precision, robustness, durability, and long trouble-free operation.

Low backlash at a competitive price.
The LC and SL Series of planetary gearboxes are characterized by low backlash, silent running and easy motor coupling.

High precision for excellent results.
The MP Series of low backlash planetary gearboxes is characterized by a wide range of mounting configurations, silent running, and superbly easy motor coupling.

Maximum precision for highly dynamic applications.
The TQ and TQF Series of precision planetary gearboxes are designed to deliver the highest level of transmission precision. Low backlash combined with a high torsional stiffness guarantees a very performing product, for in high dynamic and reversing applications. The technical design of this gearbox also allows high axial and radial loads on the output shaft.



BMD Servomotor / LC series Precision Planetary Gearbox combination

RATIOS FROM 3:1 TO 70:1

TYPE	MOTOR STALL TORQUE	RATIOS											MOTOR INERTIA
	[Nm]	3:1	4:1	5:1	7:1	10:1	16:1	20:1	25:1	40:1	50:1	70:1	$kgm^2 \times 10^{-3}$
BMD 65	0.85		LC 050	LC 050	LC 050	LC 050 LC 070	LC 090	LC 090	LC 090	LC 090 LC 120	LC 090 LC 120	LC 120	0,02
	1.7	LC 050 LC 070	LC 050 LC 070	LC 050 LC 070	LC 070 LC 090	LC 070 LC 090	LC 090	LC 090 LC 120	LC 090 LC 120	LC 120	LC 120		0,04
	2.2	LC 050 LC 070	LC 050 LC 070	LC 050 LC 070	LC 070 LC 090	LC 090	LC 090	LC 090 LC 120	LC 120	LC 120	LC 120		0,06
BMD 82	3.2	LC 050 LC 070	LC 070 LC 090	LC 070 LC 090	LC 070 LC 090	LC 090 LC 120	LC 120	LC 120	LC 120 LC 155	LC 155	LC 155	LC 155	0,14
	4.4	LC 070 LC 090	LC 070 LC 090	LC 070 LC 090	LC 070 LC 090	LC 120	LC 120	LC 120	LC 120 LC 155	LC 155	LC 155	LC 155	0,17
BMD 102	4.0	LC 070 LC 090	LC 070 LC 090	LC 070 LC 090	LC 070 LC 090	LC 120	LC 120	LC 120	LC 120 LC 155	LC 155	LC 155	LC 155	0,19
	7.2	LC 090	LC 090	LC 090 LC 120	LC 120	LC 120 LC 155	LC 155	LC 155	LC 155	LC 155			0,34
	9.6	LC 090	LC 090	LC 090 LC 120	LC 120	LC 155	LC 155	LC 155	LC 155				0,47
BMD 118	5.6	LC 070 LC 090	LC 070 LC 090	LC 090	LC 090 LC 120	LC 120	LC 120 LC 155	LC 120 LC 155	LC 155	LC 155	LC 155		0,45
	10.2	LC 090 LC 120	LC 120	LC 120	LC 120	LC 155	LC 155	LC 155	LC 155				0,78
	14.0	LC 120	LC 120	LC 120	LC 120	LC 155	LC 155	LC 155					0,99
BMD 145	16.8	LC 120	LC 120	LC 120 LC 155	LC 155	LC 155	LC 155						1,28
	22.0	LC 120	LC 120	LC 120 LC 155	LC 155	LC 155							1,76
BMD 170	34.0	LC 155	LC 155	LC 155	LC 155								3,38
	45.0	LC 155	LC 155	LC 155									4,75

DISTRIBUTION OF GEARBOX OUTPUT TORQUE [Nm]											
	3	4	5	7	10	16	20	25	40	50	70
LC 050	10	12	12	12	-	12	12	12	-	-	-
LC 070	18	25	25	25	18	25	25	25	25	25	25
LC 090	37	43	43	43	37	43	43	43	43	43	43
LC 120	95	110	110	110	95	110	110	110	110	110	110
LC 155	250	300	300	300	250	300	300	300	300	300	300

Notes:
Input speed lower than 3000 min^{-1}.
*Safety factor **1 < S ≤ 4**.*
For any additional technical information about gearboxes selection see relevant catalogues.

BMD Servomotor / SL series Precision Planetary Flanged Gearbox combination

RATIOS FROM 3:1 TO 70:1

TYPE	MOTOR STALL TORQUE	RATIOS											MOTOR INERTIA
	[Nm]	3:1	4:1	5:1	7:1	10:1	16:1	20:1	25:1	40:1	50:1	70:1	$kgm^2 \times 10^{-3}$
BMD 65	0.85					SL 070	SL 090	SL 090	SL 090	SL 090 SL 120	SL 090 SL 120	SL 120	0,02
	1.7	SL 070	SL 070	SL 070	SL 070 SL 090	SL 070 SL 090	SL 090	SL 090 SL 120	SL 090 SL 120	SL 120	SL 120		0,04
	2.2	SL 070	SL 070	SL 070	SL 070 SL 090	SL 090	SL 090	SL 090 SL 120	SL 120	SL 120	SL 120		0,06
BMD 82	3.2	SL 070	SL 070 SL 090	SL 070 SL 090	SL 070 SL 090	SL 090 SL 120	SL 120	SL 120	SL 120				0,14
	4.4	SL 070 SL 090	SL 070 SL 090	SL 070 SL 090	SL 070 SL 090	SL 120	SL 120	SL 120	SL 120				0,17
BMD 102	4.0	SL 070 SL 090	SL 070 SL 090	SL 070 SL 090	SL 070 SL 090	SL 120	SL 120	SL 120	SL 120				0,19
	7.2	SL 090	SL 090	SL 090 SL 120	SL 120	SL 120							0,34
	9.6	SL 090	SL 090	SL 090 SL 120	SL 120								0,47
BMD 118	5.6	SL 070 SL 090	SL 070 SL 090	SL 090	SL 090 SL 120	SL 120	SL 120	SL 120					0,45
	10.2	SL 090 SL 120	SL 120	SL 120	SL 120								0,78
	14.0	SL 120	SL 120	SL 120	SL 120								0,99
BMD 145	16.8	SL 120	SL 120	SL 120									1,28
	22.0	SL 120	SL 120	SL 120									1,76

DISTRIBUTION OF GEARBOX OUTPUT TORQUE [Nm]											
	3	4	5	7	10	16	20	25	40	50	70
SL 070	18	25	25	25	18	25	25	25	25	25	25
SL 090	37	43	43	43	37	43	43	43	43	43	43
SL 120	95	110	110	110	95	110	110	110	110	110	110

Notes:
Input speed lower than 3000 min^{-1}.
*Safety factor **1 < S ≤ 4**.*
For any additional technical information about gearboxes selection see relevant catalogues.

BMD Servomotor / MP-TR series Precision Planetary Gearbox combination

RATIOS FROM 3:1 TO 70:1

TYPE	MOTOR STALL TORQUE	RATIOS												MOTOR INERTIA
	[Nm]	3:1	4:1	5:1	6:1	7:1	10:1	16:1	20:1	25:1	40:1	50:1	70:1	kgm² x 10⁻³
BMD 65	0.85			MP-TR 053	MP-TR 053	MP-TR 053	MP-TR 060	MP-TR 053 MP-TR 060	MP-TR 053 MP-TR 060	MP-TR 060 MP-TR 080	MP-TR 080	MP-TR 080	MP-TR 080	0.02
	1.7	MP-TR 053 MP-TR 060	MP-TR 053 MP-TR 060	MP-TR 053 MP-TR 060	MP-TR 053 MP-TR 060	MP-TR 053 MP-TR 060	MP-TR 060 MP-TR 080	MP-TR 060 MP-TR 080	MP-TR 080 MP-TR 080	MP-TR 080 MP-TR 080	MP-TR 080 MP-TR 105	MP-TR 105 MP-TR 105	MP-TR 105 MP-TR 105	0.04
	2.2	MP-TR 053 MP-TR 060	MP-TR 053 MP-TR 060	MP-TR 053 MP-TR 060	MP-TR 053 MP-TR 060	MP-TR 053 MP-TR 060	MP-TR 060 MP-TR 080	MP-TR 080	MP-TR 080 MP-TR 080	MP-TR 080 MP-TR 080	MP-TR 080 MP-TR 105	MP-TR 105 MP-TR 105	MP-TR 105 MP-TR 105	0.06
BMD 82	3.2	MP-TR 053 MP-TR 060	MP-TR 053 MP-TR 060	MP-TR 060 MP-TR 080	MP-TR 060 MP-TR 080	MP-TR 060 MP-TR 080	MP-TR 080 MP-TR 105	MP-TR 080 MP-TR 105	MP-TR 080 MP-TR 105	MP-TR 105	MP-TR 105 MP-TR 130	MP-TR 105 MP-TR 130	MP-TR 130 MP-TR 160	0.14
	4.4	MP-TR 060 MP-TR 080	MP-TR 060 MP-TR 080	MP-TR 060 MP-TR 080	MP-TR 060 MP-TR 080	MP-TR 060 MP-TR 080	MP-TR 080 MP-TR 105	MP-TR 080 MP-TR 105	MP-TR 080 MP-TR 105	MP-TR 105	MP-TR 105 MP-TR 130	MP-TR 105 MP-TR 130	MP-TR 130 MP-TR 160	0.17
BMD 102	4.0	MP-TR 060 MP-TR 080	MP-TR 060 MP-TR 080	MP-TR 060 MP-TR 080	MP-TR 060 MP-TR 080	MP-TR 060 MP-TR 080	MP-TR 080 MP-TR 105	MP-TR 080 MP-TR 105	MP-TR 080 MP-TR 105	MP-TR 105	MP-TR 105 MP-TR 130	MP-TR 105 MP-TR 130	MP-TR 130 MP-TR 160	0.19
	7.2	MP-TR 080	MP-TR 080	MP-TR 080	MP-TR 080 MP-TR 105	MP-TR 080 MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 105 MP-TR 130	MP-TR 130	MP-TR 130 MP-TR 160	MP-TR 130 MP-TR 160	MP-TR 160	0.34
	9.6	MP-TR 080	MP-TR 080	MP-TR 080	MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 105 MP-TR 130	MP-TR 130	MP-TR 130 MP-TR 160	MP-TR 130 MP-TR 160	MP-TR 160	0.47
BMD 118	5.6	MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 105 MP-TR 130	MP-TR 130 MP-TR 160	MP-TR 130 MP-TR 160	MP-TR 130 MP-TR 160 MP-TR 190	0.45
	10.2	MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 130 MP-TR 160	MP-TR 130	MP-TR 130 MP-TR 160	MP-TR 130 MP-TR 160	MP-TR 130 MP-TR 160	MP-TR 160	MP-TR 190	0.78
	14.0	MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 130 MP-TR 160	MP-TR 130	MP-TR 130 MP-TR 160	MP-TR 130 MP-TR 160	MP-TR 130 MP-TR 160	MP-TR 160	MP-TR 190	0.99
BMD 145	16.8	MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 105 MP-TR 130	MP-TR 105 MP-TR 130	MP-TR 130 MP-TR 160	MP-TR 130 MP-TR 160 MP-TR 190	MP-TR 130 MP-TR 160 MP-TR 190	MP-TR 160 MP-TR 190	MP-TR 160 MP-TR 190	MP-TR 190		1.28
	22.0	MP-TR 105	MP-TR 105	MP-TR 105	MP-TR 105 MP-TR 130	MP-TR 130	MP-TR 160	MP-TR 130 MP-TR 160 MP-TR 190	MP-TR 130 MP-TR 160 MP-TR 190	MP-TR 160 MP-TR 190	MP-TR 160 MP-TR 190	MP-TR 190		1.76
BMD 170	34.0	MP-TR 105	MP-TR 105 MP-TR 130	MP-TR 130	MP-TR 130	MP-TR 130	MP-TR 160	MP-TR 160 MP-TR 190	MP-TR 160 MP-TR 190	MP-TR 190				3.38
	45.0	MP-TR 130	MP-TR 130	MP-TR 130	MP-TR 130 MP-TR 160	MP-TR 130 MP-TR 160	MP-TR 190	MP-TR 160 MP-TR 190	MP-TR 160 MP-TR 190	MP-TR 190				4.75

DISTRIBUTION OF GEARBOX OUTPUT TORQUE [Nm]												
	3	4	5	6	7	10	16	20	25	40	50	70
MP-TR 053	12	15	15	15	15	-	20	20	20	-	-	-
MP-TR 060	18	25	25	25	25	18	30	30	30	30	30	30
MP-TR 080	40	50	50	50	50	40	70	70	70	70	70	70
MP-TR 105	100	140	140	140	140	100	170	170	170	170	170	170
MP-TR 130	215	380	380	380	380	215	450	450	450	450	450	450
MP-TR 160	350	500	500	500	500	350	700	700	700	700	700	700
MP-TR 190	500	700	700	700	700	500	1000	1000	1000	1000	1000	1000

Notes:
Input speed lower than 3000 min^{-1}.
*Safety factor **1 < S ≤ 4**.*
For any additional technical information about gearboxes selection see relevant catalogues.

BMD Servomotor / TQ series Precision Planetary Gearbox combination

RATIOS FROM 3:1 TO 70:1

TYPE	MOTOR STALL TORQUE	RATIOS											MOTOR INERTIA
	[Nm]	3:1	4:1	5:1	7:1	10:1	16:1	20:1	25:1	40:1	50:1	70:1	$kgm^2 \times 10^{-3}$
BMD 65	0,85					TQ 060	TQ 060	TQ 060	TQ 060 TQ 070	TQ 070	TQ 070	TQ 070	0,02
	1,7	TQ 060 TQ 070	TQ 060 TQ 070	TQ 060 TQ 070	TQ 060 TQ 070	TQ 060 TQ 070	TQ 060 TQ 070	TQ 070	TQ 070	TQ 070			0,04
	2,2	TQ 060 TQ 070	TQ 060 TQ 070	TQ 060 TQ 070	TQ 060 TQ 070	TQ 070	TQ 070	TQ 070	TQ 070				0,06
BMD 82	3,2	TQ 070	TQ 070	TQ 070	TQ 070	TQ 090	TQ 070	TQ 070	TQ 090	TQ 090	TQ 090		0,14
	4,4	TQ 070	TQ 070	TQ 070	TQ 070	TQ 090	TQ 090	TQ 090	TQ 090	TQ 090			0,17
BMD 102	4,0	TQ 070	TQ 070	TQ 070	TQ 070	TQ 070 TQ 090	TQ 070 TQ 090	TQ 070 TQ 090	TQ 090	TQ 090	TQ 090	TQ 130	0,19
	7,2	TQ 070	TQ 070	TQ 070 TQ 090	TQ 070 TQ 090	TQ 090	TQ 090	TQ 090	TQ 090	TQ 130	TQ 130		0,34
	9,6	TQ 070	TQ 090	TQ 090 TQ 090	TQ 070 TQ 090	TQ 090	TQ 090	TQ 130	TQ 130	TQ 130			0,47
BMD 118	5,6	TQ 070	TQ 070	TQ 070	TQ 070	TQ 090	TQ 090	TQ 090 TQ 130	TQ 090 TQ 130	TQ 130 TQ 160	TQ 130 TQ 160	TQ 130 TQ 160	0,45
	10,2	TQ 070 TQ 090	TQ 070 TQ 090	TQ 070 TQ 090	TQ090	TQ090	TQ 130	TQ 130	TQ 130 TQ 160	TQ 130 TQ 160	TQ 160	TQ 160	0,78
	14,0	TQ 070 TQ 090	TQ 070 TQ 090	TQ 090	TQ 090 TQ 130	TQ130	TQ 130	TQ 130 TQ 160	TQ 130 TQ 160	TQ 160	TQ 160		0,99
BMD 145	16,8	TQ 090	TQ 090	TQ 090	TQ 090 TQ130	TQ130	TQ 160	TQ 160	TQ 160	TQ 160			1,28
	22,0	TQ 090	TQ 090	TQ 090	TQ 090 TQ 130	TQ130	TQ 160	TQ 160	TQ 160				1,76
BMD 170	34,0	TQ 090 TQ 130	TQ 090 TQ 130	TQ 090 TQ 130	TQ130	TQ 160	TQ 160	TQ 160					3,38
	45,0	TQ 130	TQ 130	TQ 130	TQ130	TQ 160	TQ 160						4,75

DISTRIBUTION OF GEARBOX OUTPUT TORQUE [Nm]											
	3	4	5	7	10	16	20	25	40	50	70
TQ 060	21	30	30	25	20	30	30	30	30	30	25
TQ 070	45	70	70	60	40	70	70	70	70	70	60
TQ 090	130	200	180	160	110	200	180	180	200	180	160
TQ 130	260	400	400	360	280	400	400	400	400	400	360
TQ 160	530	800	800	750	550	800	800	800	800	800	750

Notes:
Input speed lower than 3000 min^{-1}.
*Safety factor **1 < S ≤ 4**.*
For any additional technical information about gearboxes selection see relevant catalogues.

BMD Servomotor / TQF series Precision Planetary Flanged Gearbox combination

RATIOS FROM 4:1 TO 70:1

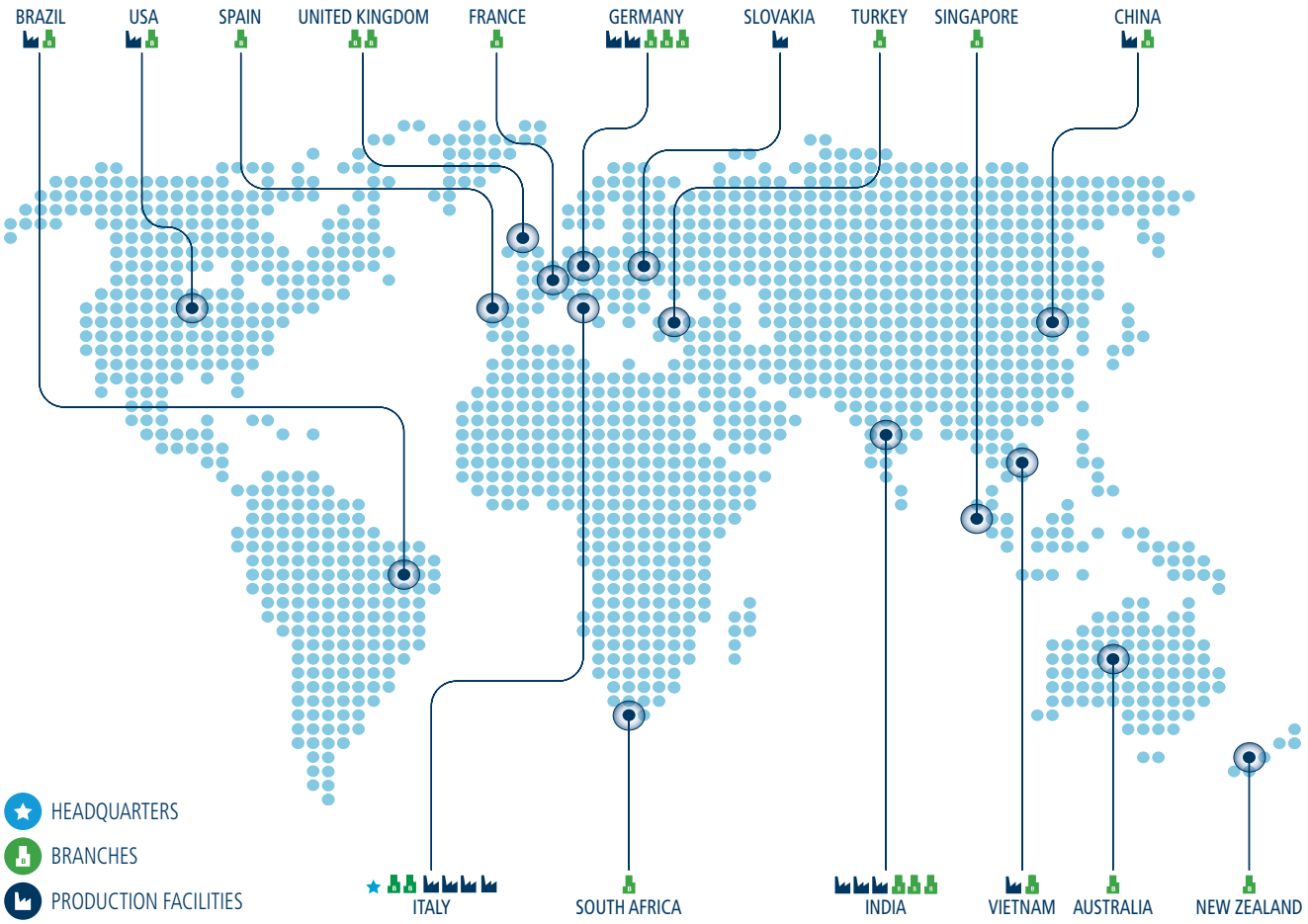
TYPE	MOTOR STALL TORQUE											MOTOR INERTIA
	[Nm]	4:1	5:1	7:1	10:1	16:1	20:1	25:1	40:1	50:1	70:1	kgm² x 10⁻³
BMD 65	0,85				TQF 060	TQF 060	TQF 060	TQF 060 TQF 070	TQF 070	TQF 070	TQF 070	0,02
	1,7	TQF 060 TQF 070	TQF 060 TQF 070	TQF 060 TQF 070	TQF 060 TQF 070	TQF 060 TQF 070	TQF 070	TQF 070	TQF 070			0,04
	2,2	TQF 060 TQF 070	TQF 060 TQF 070	TQF 060 TQF 070	TQF 070	TQF 070	TQF 070	TQF 070				0,06
BMD 82	3,2	TQF 070	TQF 070	TQF 070	TQF 090	TQF 070	TQF 070	TQF 090	TQF 090	TQF 090		0,14
	4,4	TQF 070	TQF 070	TQF 070	TQF 090	TQF 090	TQF 090	TQF 090	TQF 090			0,17
BMD 102	4,0	TQF 070	TQF 070	TQF 070	TQF 070 TQF 090	TQF 070 TQF 090	TQF 070 TQF 090	TQF 090	TQF 090	TQF 090	TQF 130	0,19
	7,2	TQF 070	TQF 070 TQF 090	TQF 070 TQF 090	TQF 090	TQF 090	TQF 090	TQF 090	TQF 130	TQF 130		0,34
	9,6	TQF 090	TQF 090 TQF 090	TQF 070 TQF 090	TQF 090	TQF 090	TQF 130	TQF 130	TQF 130			0,47
BMD 118	5,6	TQF 070	TQF 070	TQF 070	TQF 090	TQF 090	TQF 090 TQF 130	TQF 090 TQF 130	TQF 130 TQF 160	TQF 130 TQF 160	TQF 130 TQF 160	0,45
	10,2	TQF 070 TQF 090	TQF 070 TQF 090	TQF090	TQF090	TQF 130	TQF 130	TQF 130 TQF 160	TQF 130 TQF 160	TQF 160	TQF 160	0,78
	14,0	TQF 070 TQF 090	TQF 090	TQF 090 TQF 130	TQF130	TQF 130	TQF 130 TQF 160	TQF 130 TQF 160	TQF 160	TQF 160		0,99
BMD 145	16,8	TQF 090	TQF 090	TQF 090 TQF130	TQF130	TQF 160	TQF 160	TQF 160	TQF 160			1,28
	22,0	TQF 090	TQF 090	TQF 090 TQF 130	TQF130	TQF 160	TQF 160	TQF 160				1,76
BMD 170	34,0	TQF 090 TQF 130	TQF 090 TQF 130	TQF130	TQF 160	TQF 160	TQF 160					3,38
	45,0	TQF 130	TQF 130	TQF130	TQF 160	TQF 160						4,75

DISTRIBUTION OF GEARBOX OUTPUT TORQUE [Nm]										
	4	5	7	10	16	20	25	40	50	70
TQF 060	30	30	25	20	30	30	30	30	30	25
TQF 070	70	70	60	40	70	70	70	70	70	60
TQF 090	200	180	160	110	200	180	180	200	180	160
TQF 130	400	400	360	280	400	400	400	400	400	360
TQF 160	800	800	750	550	800	800	800	800	800	750

Notes:
Input speed lower than 3000 min^{-1}.
*Safety factor **1 < S ≤ 4**.*
For any additional technical information about gearboxes selection see relevant catalogues.

Bonfiglioli worldwide presence

Bonfiglioli is located in regions and countries around the world that enable us to provide faster sales and service to customers.
We are around the world, and around the corner.



LOCAL SUPPORT
Sales, Customer Service, Warranty, Tech support, Spare parts

21 BRANCH OFFICES IN 15 COUNTRIES

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We have a relentless commitment to excellence, innovation and sustainability. Our team creates, distributes and services world-class power transmission and drive solutions to keep the world in motion.

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