

# Brushless DC-Servomotors

## 4 Pole Technology

18 mNm  
23 W

### Series 2232 ... BX4

Values at 22°C and nominal voltage	2232 S	006 BX4	012 BX4	015 BX4	018 BX4	024 BX4		
1 Nominal voltage	$U_N$		6	12	15	18	24	V
2 Terminal resistance, phase-phase	$R$		0,73	3,5	4,58	7,04	12,5	$\Omega$
3 Efficiency, max.	$\eta_{max}$		74	74	74	73	74	%
4 No-load speed	$n_0$		7 100	6 700	7 100	7 100	7 100	min <sup>-1</sup>
5 No-load current, typ. (with shaft $\varnothing$ 3 mm)	$I_0$		0,16	0,072	0,06	0,053	0,039	A
6 Stall torque	$M_H$		64,7	58,7	64	60,7	61,7	mNm
7 Friction torque, static	$C_0$		0,46	0,46	0,46	0,46	0,46	mNm
8 Friction torque, dynamic	$C_V$		$1,1 \cdot 10^{-4}$	$1,1 \cdot 10^{-4}$	$1,1 \cdot 10^{-4}$	$1,1 \cdot 10^{-4}$	$1,1 \cdot 10^{-4}$	mNm/min <sup>-1</sup>
9 Speed constant	$k_n$		1 198	562	480	399	295	min <sup>-1</sup> /V
10 Back-EMF constant	$k_E$		0,835	1,78	2,08	2,504	3,393	mV/min <sup>-1</sup>
11 Torque constant	$k_M$		7,97	17	19,9	23,9	32,4	mNm/A
12 Current constant	$k_I$		0,125	0,059	0,05	0,042	0,031	A/mNm
13 Slope of n-M curve	$\Delta n / \Delta M$		110	114	110	118	114	min <sup>-1</sup> /mNm
14 Terminal inductance, phase-phase	$L$		25	115	156	225	410	$\mu$ H
15 Mechanical time constant	$\tau_m$		5,9	6,1	5,9	6,3	6,1	ms
16 Rotor inertia	$J$		5,1	5,1	5,1	5,1	5,1	gcm <sup>2</sup>
17 Angular acceleration	$\alpha_{max}$		127	115	125	119	121	$\cdot 10^3$ rad/s <sup>2</sup>
18 Thermal resistance	$R_{th1} / R_{th2}$		3,9 / 18,8					K/W
19 Thermal time constant	$\tau_{w1} / \tau_{w2}$		7,9 / 520					s
20 Operating temperature range:								
– motor			-40 ... +100					°C
– winding, max. permissible			+125					°C
21 Shaft bearings			ball bearings, preloaded					
22 Shaft load max.:								
– with shaft diameter			3					mm
– radial at 3 000 min <sup>-1</sup> (5 mm from mounting flange)			20					N
– axial at 3 000 min <sup>-1</sup> (push / pull)			2					N
– axial at standstill (push / pull)			20					N
23 Shaft play:								
– radial	$\leq$		0,015					mm
– axial	$=$		0					mm
24 Housing material			stainless steel					
25 Mass			65					g
26 Direction of rotation			electronically reversible					
27 Speed up to	$n_{max}$		29 000					min <sup>-1</sup>
28 Number of pole pairs			2					
29 Hall sensors			digital					
30 Magnet material			NdFeB					
<b>Rated values for continuous operation</b>								
31 Rated torque	$M_N$		14,8	14,7	14,8	14,3	14,6	mNm
32 Rated current (thermal limit)	$I_N$		2,22	1	0,89	0,72	0,54	A
33 Rated speed	$n_N$		5 030	4 450	5 040	4 930	4 840	min <sup>-1</sup>

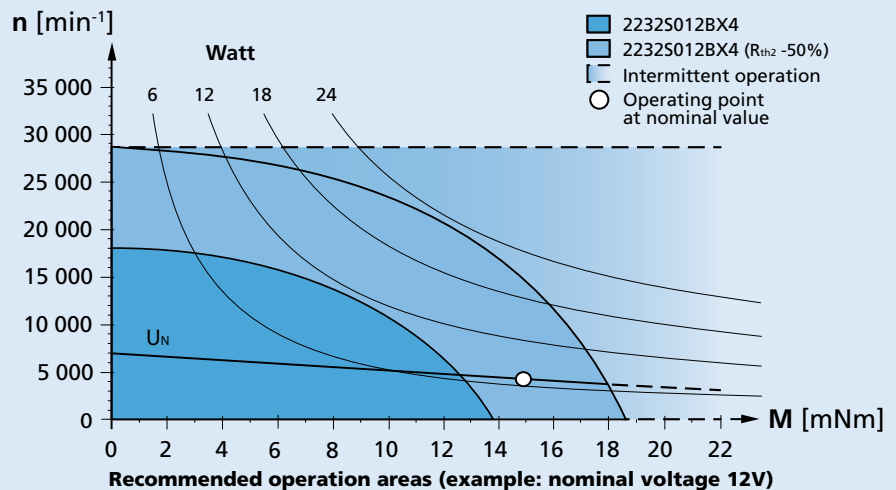
**Note:** Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The  $R_{th2}$  value has been reduced by 25%.

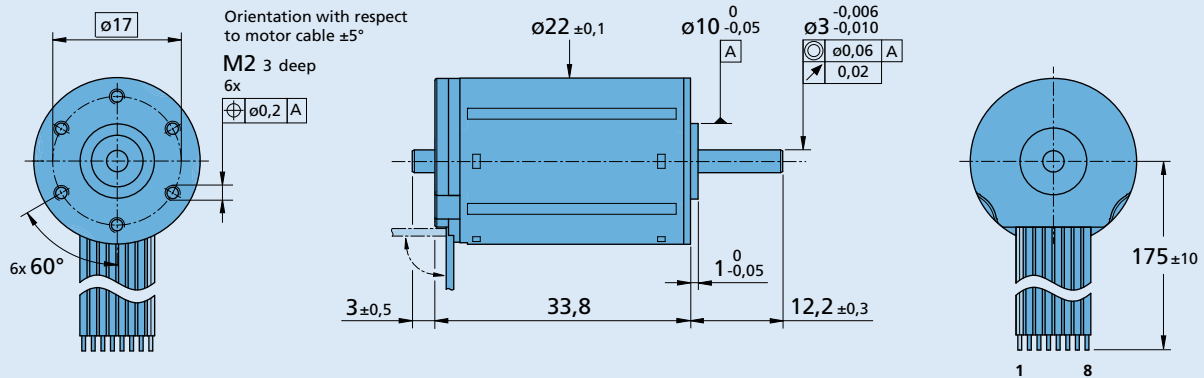
**Note:**

The diagram indicates the recommended speed in relation to the available torque at the output shaft for a given ambient temperature of 22°C.

The diagram shows the motor in a completely insulated as well as thermally coupled condition ( $R_{th2}$  50% reduced).

The nominal voltage ( $U_N$ ) curve shows the operating point at nominal voltage in the insulated and thermally coupled condition. Any points of operation above the curve at nominal voltage will require a higher operating voltage. Any points below the nominal voltage curve will require less voltage.



**Dimensional drawing**

**2232 S ... BX4**
**Option, cable and connection information**

 Example product designation: **2232S012BX4-3692**

Option	Type	Description	Connection standard		Option: 4935/4747	
			No.	Function	Function	Colour
3830	Connector 	AWG 26 / PVC ribbon cable with connector MOLEX Microfit 3.0, 43025-0800, recommended mating connector 43020-0800	1	Phase C	Phase C	yellow
4935	Single wires	Motor with single wires (PTFE), length 175 mm, AWG26	2	Phase B	Phase B	orange
X4935	Single wires	Motor with single wires (PTFE), length 300 mm, AWG26	3	Phase A	Phase A	brown
Y4935	Single wires	Motor with single wires (PTFE), length 600 mm, AWG26	4	GND	GND	black
4747	Temperature range	Up to 150°C, winding max. 150°C, with single wires (PTFE), length 175 mm, AWG26	5	U <sub>DD</sub> (+5V)	U <sub>DD</sub> (+5V)	red
X4747	Temperature range	Up to 150°C, winding max. 150°C, with single wires (PTFE), length 300 mm, AWG26	6	Hall sensor C	Hall sensor C	grey
Y4747	Temperature range	Up to 150°C, winding max. 150°C, with single wires (PTFE), length 600 mm, AWG26	7	Hall sensor B	Hall sensor B	blue
Y158	Shaft end	Motor without second shaft end	8	Hall sensor A	Hall sensor A	green
3692	Controller combination	Analog Hall sensors for combination with Motion Controller MCBL	<b>Standard cable</b>			
5327	Controller combination	For SIN-COS sensor model with integrated temperature sensor and combination with MC V3.0	Insulation: PVC		<b>Option: 5327</b>	
			8	conductors, AWG 26, pitch 1,27 mm , wires tinned.	No.	Function
					1	Phase C
					2	Phase B
					3	Phase A
					4	GND
					5	U <sub>DD</sub> (+5V)
					6	NTC
					7	SIN
					8	COS

**Product combination**

Precision Gearheads / Lead Screws	Encoders	Drive Electronics	Cables / Accessories
22GPT 22/7 26A 22L ... ML 22L ... SB 22L ... PB	IE3-1024 IE3-1024 L IER3-10000 IER3-10000 L AEMT-12/16 L AES-4096 L	SC 1801 P SC 1801 S SC 2402 P SC 2804 S SC 5004 P SC 5008 S MCBL 3002 P MCBL 3002 S MCBL 3003 P MCBL 3006 S MC 3001 B MC 3001 P MC 3603 S MC 5004 P MC 5005 S	To view our large range of accessory parts, please refer to the "Accessories" chapter.