

NEW

Brushless DC-Servomotors
with magnetic Encoders and Line Driver
Electronic Commutation

6 / 10 mNm

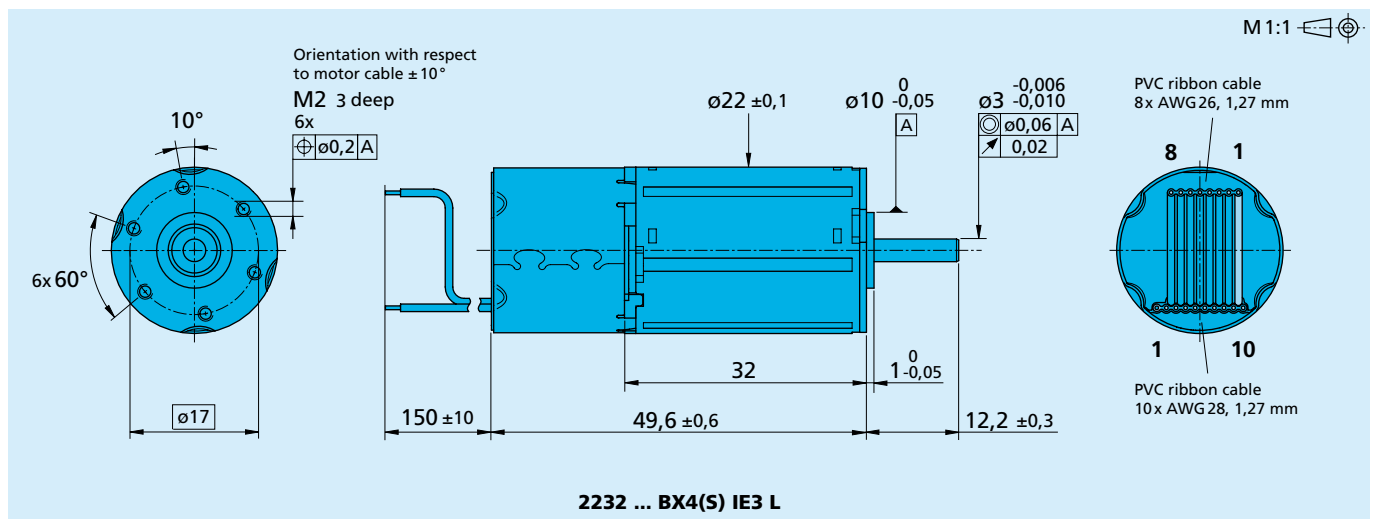
For combination with
Gearheads:
22F

Series 2232 ... BX4 IE3 L

	2232 S	012 BX4 S	024 BX4 S	012 BX4	024 BX4	IE3 L
1 Nominal voltage	U _N	12	24	12	24	Volt
2 Terminal resistance, phase-phase	R	3,5	12,4	3,5	12,4	Ω
3 Output power ^{1) 2)}	P _{2 max.}	3,1	3,1	5,7	5,8	W
4 Efficiency	η _{max.}	60,9	61,7	66,1	66,8	%
5 No-load speed	n ₀	13 180	13 980	6 840	7 250	rpm
6 No-load current (with shaft ø 3,0 mm)	I ₀	0,163	0,088	0,118	0,064	A
7 Stall torque	M _H	27,3	29,4	53,6	57,7	mNm
8 Friction torque, static	C ₀	0,6	0,6	0,85	0,85	mNm
9 Friction torque, dynamic	C _v	5,5 · 10 ⁻⁵	5,5 · 10 ⁻⁵	1,5 · 10 ⁻⁴	1,5 · 10 ⁻⁴	mNm/rpm
10 Speed constant	k _n	1 174	616	601	315	rpm/V
11 Back-EMF constant	k _E	0,852	1,623	1,664	3,170	mV/rpm
12 Torque constant	k _M	8,14	15,50	15,89	30,27	mNm/A
13 Current constant	k _I	0,123	0,065	0,063	0,033	A/mNm
14 Slope of n-M curve	Δn/ΔM	505	493	132	129	rpm/mNm
15 Terminal inductance, phase-phase	L	130	470	120	440	μH
16 Mechanical time constant	τ _m	22	22	7	7	ms
17 Rotor inertia	J	4,2	4,2	5,2	5,2	gcm ²
18 Angular acceleration	α _{max.}	65	70	103	111	· 10 ³ rad/s ²
19 Thermal resistance	R _{th 1} / R _{th 2}	2 / 17		2 / 17		K/W
20 Thermal time constant	τ _{w1} / τ _{w2}	4 / 510		4 / 527		s
21 Operating temperature range		- 40 ... + 85		- 40 ... + 85		°C
22 Shaft bearings		ball bearings, preloaded				
23 Shaft load max.:						
– radial at 3 000 rpm (4 mm from mounting flange)		20				N
– axial at 3 000 rpm		2				N
– axial at standstill		20				N
24 Shaft play:						
– radial	≤	0,015				mm
– axial	=	0				mm
25 Housing material		stainless steel				
26 Weight		76				g
27 Direction of rotation		electronically reversible				
28 Number of pole pairs		2				
Recommended values - mathematically independent of each other						
29 Speed up to ²⁾	n _{e max.}	14 100	14 100	8 900	8 900	rpm
30 Torque up to ^{1) 2)}	M _{e max.}	6	6	10	10	mNm
31 Current up to ^{1) 2)}	I _{e max.}	0,85	0,45	0,80	0,43	A

¹⁾ at 5 000 rpm

²⁾ thermal resistance R_{th 2} not reduced



Magnetic Encoder		IE3-32 L	IE3-64 L	IE3-128 L	IE3-256 L	
Lines per revolution	N	32	64	128	256	
Frequency range ¹⁾ , up to	f	15	30	60	120	kHz
Signal output, square wave		2 + 1 index and complementary outputs				channels
Supply voltage	U _{DD Enc}	4,5 ... 5,5				V DC
Current consumption, typical ²⁾	I _{DD Enc}	typ. 17, max. 25				mA
Pulse width ³⁾	P	180 ± 45				°e
Index Pulse width ³⁾	P ₀	90 ± 45				°e
Phase shift, channel A to B ³⁾	Φ	90 ± 45				°e
Inertia of encoder magnet	J	0,08				gcm ²

¹⁾ velocity (rpm) = f (Hz) x 60/N

²⁾ U_{DD Enc} = 5V: with unloaded outputs

³⁾ at 5 000 rpm

Notes: The output signals are TIA-422 compatible.

Examples of Line driver Receivers: ST26C32ABD (STM), ST26C32IP16 (EXAR), DS26C32AT (NSC).

Features

In this version, the brushless DC servomotors have an encoder with 3 output channels. A permanent magnet on the shaft creates a moving magnetic field which is captured using a single-chip angular sensor and further processed. At the encoder outputs, two 90° phase-shifted rectangular signals are available with up to 256 impulses and an index impulse per motor revolution.

The Line Driver version has differential signal outputs according to TIA-422. With this symmetrical interface, synchronism faults can be suppressed and longer leads are possible. On the connection side, these differential signals must be brought together again with a receiver module.

The encoder is available with various impulse figures and is suitable for the monitoring and regulation of the speed and direction of rotation and for positioning the drive shaft. The motor and encoder are connected via separate ribbon cables.

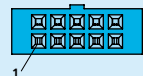
A detailed instruction manual for installation and operation is enclosed.

Options

- connector variants

Encoder:

AWG 28 / PVC ribbon cable (10-conductors), with connector DIN-41651 (pitch 2,54 mm)



Motor:

AWG 26 / PVC ribbon cable (8-conductors), with connector MicroFit



Order information

- Ordering examples:

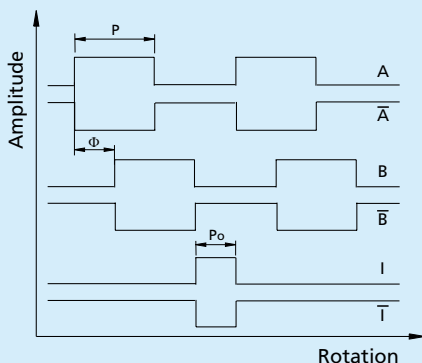
2232S024BX4 IE3-256 L

2232S012BX4S IE3-32 L

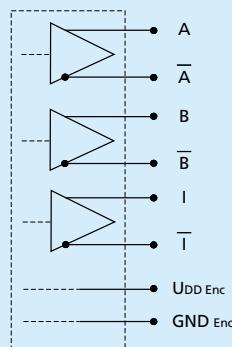
Output signals / Circuit diagram / Connector information

Output signals

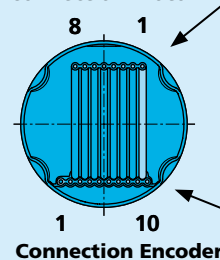
with clockwise rotation as seen from the shaft end



Output circuit



Connection Motor



No.	Function
1	Phase C
2	Phase B
3	Phase A
4	GND
5	U _{DD} (2,2 ... 18V DC)
6	Hall sensor C
7	Hall sensor B
8	Hall sensor A

No.	Function
1	n.c.
2	U _{DD Enc}
3	GND Enc
4	n.c.
5	Channel A-bar
6	Channel A
7	Channel B-bar
8	Channel B
9	Channel I-bar (Index)
10	Channel I (Index)

Caution:
Incorrect lead connection will damage the motor electronics!