Brushless DC-Servomotors

with integrated Speed Controller
4 Pole Technology

7 / 13 mNm

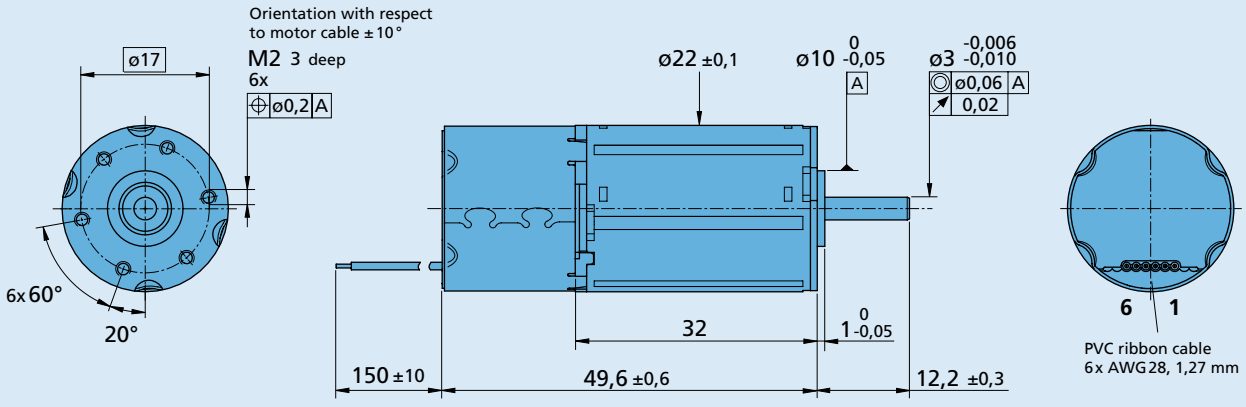
For combination with
Gearheads:
22F, 23/1, 26A

Series 2232 ... BX4 SC

		2232 S		012 BX4 S	024 BX4 S	012 BX4	024 BX4	SC
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]	$P_{2\ max.}$		4,4	4,5	8,8	8,9	W
4	Efficiency	$\eta_{max.}$		60,9	61,7	66,9	67,6	%
5	No-load speed	n_o		13 200	14 000	6 600	7 000	rpm
6	No-load current (with shaft ø 3,0 mm)	I_o		0,163	0,088	0,112	0,061	A
7	Stall torque	M_H		27,3	29,4	55,7	59,9	mNm
8	Friction torque, static	C_o		0,6	0,6	0,85	0,85	mNm
9	Friction torque, dynamic	C_v		$5,5 \cdot 10^{-5}$	$5,5 \cdot 10^{-5}$	$1,5 \cdot 10^{-4}$	$1,5 \cdot 10^{-4}$	mNm/rpm
10	Speed constant	k_n		1 173	616	579	304	rpm/V
11	Back-EMF constant	k_E		0,852	1,623	1,728	3,288	mV/rpm
12	Torque constant	k_M		8,14	15,50	16,50	31,40	mNm/A
13	Current constant	k_I		0,123	0,065	0,061	0,032	A/mNm
14	Slope of n-M curve	$\Delta n/\Delta M$		504	493	123	120	rpm/mNm
15	Terminal inductance, phase-phase	L		130	470	120	440	µH
16	Mechanical time constant	τ_m		22	22	6,7	6,5	ms
17	Rotor inertia	J		4,2	4,2	5,2	5,2	gcm^2
18	Angular acceleration	$\alpha_{max.}$		65	70	107	115	$\cdot 10^3 rad/s^2$
19	Thermal resistance	$R_{th\,1}$ / $R_{th\,2}$		2 / 13		2 / 13		K/W
20	Thermal time constant	τ_{w1} / τ_{w2}		4,1 / 274		4,1 / 283		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		77					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]	$n_{e\ max.}$		16 700	16 700	10 500	10 500	rpm
30	Torque up to [1] [2]	$M_{e\ max.}$		7	7	13	13	mNm
31	Current up to [1] [2]	$I_{e\ max.}$		0,99	0,52	0,95	0,50	A

[1] at 5 000 rpm
[2] thermal resistance $R_{th\,2}$ not reduced

M 1:1



2232 ... BX4(S) SC

Speed Controller			012 BX4 S	024 BX4 S	012 BX4	024 BX4	SC
PWM switching frequency	f_{PWM}		96	96	96	96	kHz
Efficiency	η		95	95	95	95	%
Max. continuous output current [1]	I_{max}		1	0,5	1	0,5	A
Max. peak output current	I_{el}		2	1	2	1	A
Total standby current		0,020					A
Speed range electronic	n_{el}	400 ... 50 000 [2]					rpm
Scanning range	T_A	500					µs

[1] at 22°C ambient temperature and max. 60°C motor temperature respectively
[2] speed depend on motor operating voltage

Connection information			012 BX4 S	024 BX4 S	012 BX4	024 BX4	SC
Connection 1 "U_P":	power supply electronic	U_P = 5 ... 28 V					
Connection 2 "U_{mot}":	power supply electronic coil	U_{mot} = 6 ... 28 V					
Connection 3 "GND":	ground	ground					
Connection 4 "U_{nsoll}":							
– analog input	input voltage	U_{in} = 0 ... 10 V					
	input resistance	R_{in} ≥ 5 kΩ					
	set speed value	per 1 V	2 000	2 000	1 000	1 000	rpm
		U_{in} < 0,15 V » motor stops					
		U_{in} > 0,3 V » motor starts					
Connection 5 "DIR":							
– analog input	direction of rotation	to ground or level < 0,5 V » counterclockwise					
		open or level > 3 V » clockwise					
	input resistance	R_{in} ≥ 10 kΩ					
Connection 6 "FG":		with max. U_P » I_{max} = 15 mA; open collector with 22 kΩ pull-up resistor					
– digital output	frequency output	6 lines per revolution					

Features

In this variant, the brushless DC servomotors have an integrated Speed Controller. The motor is commutated using Hall sensors integrated into the motor. Speed control is via a PI regulator. The Speed Controller has a current limiting device which limits the maximum motor current if the thermal load is too high. Twice the continuous current is possible over a short time.

Using the **"FAULHABER Motion Manager"** software, the customer can modify the Speed Controller to special conditions of use.

The following parameters can be changed: current limit and regulator parameters.

Full product description

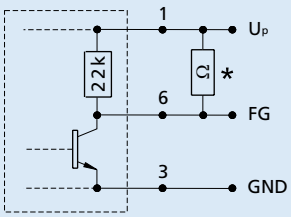
- Examples:

  2232S024BX4 SC

  2232S012BX4S SC

Circuit diagram / Connection information

Output circuit



* An additional external pull-up resistor can be added to improve the rise time.

Caution: I_{OUT} max. 15 mA must not be exceeded!

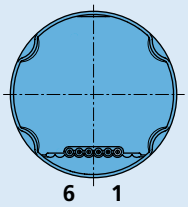
Options

- Connector variant

  AWG 26 / PVC ribbon cable with connector Molex Micro-Fit 3.0: 43025-0600

  connector pin assignment:

Cable connection



Connection

No.	Function
1	U_P
2	U_{mot}
3	GND
4	U_{nsoll}
5	DIR
6	FG

Caution:
Incorrect lead connection will damage the motor electronics!