Brushless DC-Servomotors

with integrated Speed Controller
4 Pole Technology

25 mNm

For combination with
Gearheads:
22F, 22/7, 26A

Series 2250 ... BX4 SC

		2250 S		024 BX4	SC
1	Nominal voltage	U_N		24	Volt
2	Terminal resistance, phase-phase	R		5,9	Ω
3	Output power [1]	$P_{2\ max.}$		17,3	W
4	Efficiency	$\eta_{max.}$		75,0	%
5	No-load speed	n_o		6 000	rpm
6	No-load current (with shaft ø 3,0 mm)	I_o		0,072	A
7	Stall torque	M_H		149,0	mNm
8	Friction torque, static	C_o		1,2	mNm
9	Friction torque, dynamic	C_v		$2,4 \cdot 10^{-4}$	mNm/rpm
10	Speed constant	k_n		259	rpm/V
11	Back-EMF constant	k_E		3,860	mV/rpm
12	Torque constant	k_M		36,9	mNm/A
13	Current constant	k_I		0,027	A/mNm
14	Slope of n-M curve	$\Delta n/\Delta M$		41,4	rpm/mNm
15	Terminal inductance, phase-phase	L		240	µH
16	Mechanical time constant	τ_m		4,30	ms
17	Rotor inertia	J		10	gcm^2
18	Angular acceleration	$\alpha_{max.}$		149	$\cdot 10^3 rad/s^2$
19	Thermal resistance	$R_{th\,1}$ / $R_{th\,2}$	1,2 / 10,5		K/W
20	Thermal time constant	τ_{w1} / τ_{w2}	4,2 / 424		s
21	Operating temperature range		– 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		117		g
27	Direction of rotation		electronically reversible		
28	Number of pole pairs		2		
Recommended values - mathematically independent of each other					
29	Speed up to	$n_{e\ max.}$		7 200	rpm
30	Torque up to [1] [2]	$M_{e\ max.}$		23 / 25	mNm
31	Current up to [1] [2]	$I_{e\ max.}$		0,8 / 1,2	A

[1] at 5 000 rpm
[2] thermal resistance $R_{th\,2}$ not reduced / thermal resistance $R_{th\,2}$ by 55% reduced

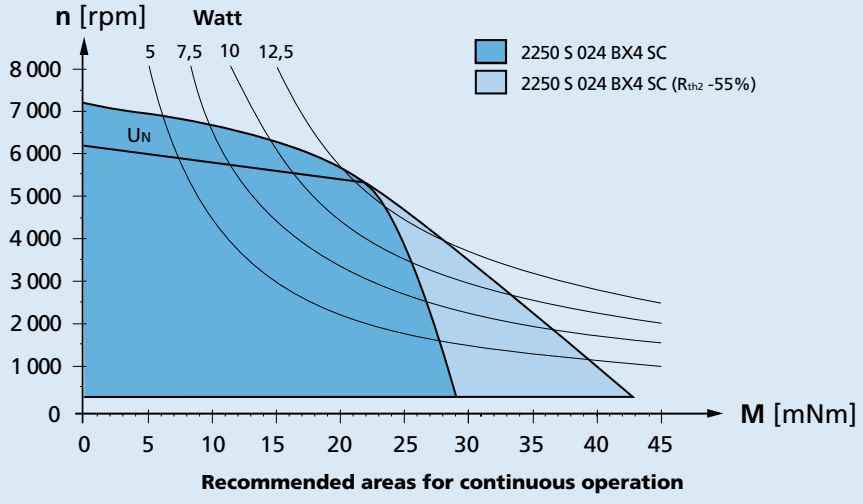
Note:

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

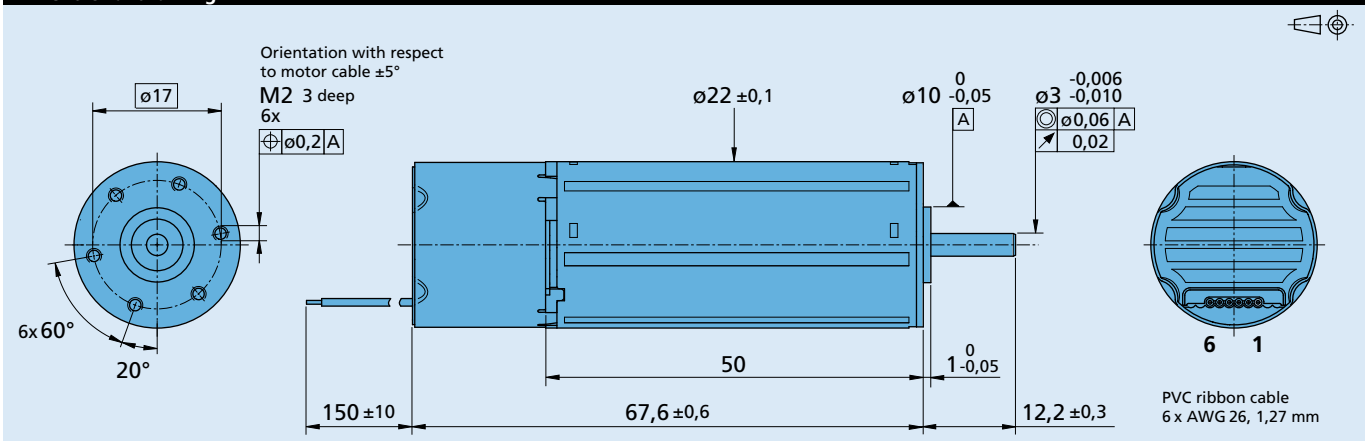
The diagram shows the motor in a completely insulated as well as thermally coupled condition ($R_{th\,2}$ 55% reduced).

The motor is factory pre-configured to a continuous current for the thermally insulated condition. The controller must be reconfigured with the easy to use Motion Manager Software for use with other parameter settings.

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



2250 S ... BX4 SC

Speed Controller		024 BX4	SC
Power supply electronic	U_P	5 ... 28	V DC
Power supply motor	U_{mot}	6 ... 28	V DC
PWM switching frequency	f_{PWM}	96	kHz
Efficiency	η	95	%
Max. continuous output current [1]	I_{dauer}	0,8	A
Max. peak output current [1]	I_{max}	1,6	A
Total standby current at U_N	I_{el}	0,020	A
Speed range:			
– standard » Hall sensors (digital)		400 ... 50 000 [2]	rpm
– optional » Hall sensors (analog)		50 ... 50 000 [2]	rpm
Scanning range		500	µs

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

Connection information

Connection 1 "U_P":	power supply electronic	U_P
Connection 2 "U_{mot}":	power supply electronic coil	U_{mot}
Connection 3 "GND":	ground	ground
Connection 4 "U_{nsoll}":		
– analog input	input voltage	U_{in} = 0 ... 10 V | > 10 V ... U_P » set speed value not defined
	input resistance	R_{in} ≥ 5 kΩ
	set speed value	per 1 V, 1 000 rpm
		U_{in} < 0,15 V » motor stops
		U_{in} > 0,3 V » motor starts
Connection 5 "DIR":		
– digital 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":		max. U_P; Imax = 15 mA; open collector with 22 kΩ pull-up resistor
– digital output	frequency output	6 lines per revolution

Features

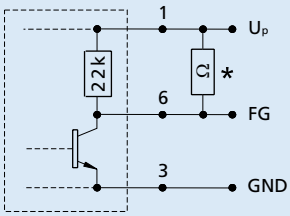
In this variant, the brushless DC servomotors have an integrated Speed Controller. The motor is commutated using Hall sensors integrated into the motor. Speed control is via a PI regulator.

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.

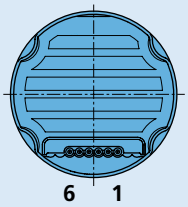
Circuit diagram / Connection information

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!

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!

Options

- Connector variant (Option no.: 3809)
  AWG 26 / PVC ribbon cable
  with connector Micro-Fit
- Analog Hall sensors (Option no.: 3692)

Accessories

- Programming board (Part No.: 6501.00088)

Full product description

- Example:
  2250S024BX4 SC