

# Brushless DC-Servomotors

## with integrated Speed Controller

### 4 Pole Technology

## 73 mNm

For combination with  
Gearheads:  
32A, 32ALN, 32/3, 32/3 S, 38/1, 38/1S, 38/2, 38/2 S

### Series 3268 ... BX4 SC

	3268 G		024 BX4	SC
1 Nominal voltage	$U_N$		24	Volt
2 Terminal resistance, phase-phase	R		1,45	$\Omega$
3 Output power <sup>1)</sup>	$P_{2 \max.}$		32,7	W
4 Efficiency	$\eta_{\max.}$		79,5	%
5 No-load speed	$n_0$		5 500	rpm
6 No-load current	$I_0$		0,215	A
7 Stall torque	$M_H$		137	mNm
8 Friction torque, static	$C_0$		1,7	mNm
9 Friction torque, dynamic	$C_v$		$1,3 \cdot 10^{-3}$	mNm/rpm
10 Speed constant	$k_n$		220	rpm/V
11 Back-EMF constant	$k_E$		4,555	mV/rpm
12 Torque constant	$k_M$		43,5	mNm/A
13 Current constant	$k_I$		0,0230	A/mNm
14 Slope of n-M curve	$\Delta n / \Delta M$		7,3	rpm/mNm
15 Terminal inductance, phase-phase	L		110	$\mu H$
16 Mechanical time constant	$\tau_m$		4,6	ms
17 Rotor inertia	J		60	gcm <sup>2</sup>
18 Angular acceleration	$\alpha_{\max.}$		23	$\cdot 10^3 \text{ rad/s}^2$
19 Thermal resistance	$R_{th 1} / R_{th 2}$	1,9 / 9,6		K/W
20 Thermal time constant	$\tau_{w1} / \tau_{w2}$	17 / 1 060		s
21 Operating temperature range		- 40 ... + 100		°C
22 Shaft bearings		ball bearings, preloaded		
23 Shaft load max.:				
– radial at 3 000 rpm (4,5 mm from mounting flange)		50		N
– axial at 3 000 rpm		5		N
– axial at standstill		50		N
24 Shaft play:				
– radial	$\leq$	0,015		mm
– axial	$=$	0		mm
25 Housing material		stainless steel		
26 Weight		305		g
27 Direction of rotation		electronically reversible		
28 Number of pole pairs		2		
<b>Recommended values - mathematically independent of each other</b>				
29 Speed up to	$n_{e \max.}$		7 000	rpm
30 Torque up to <sup>1) 2)</sup>	$M_{e \max.}$		47 / 73	mNm
31 Current up to <sup>1) 2)</sup>	$I_{e \max.}$		1,41 / 2,00	A

<sup>1)</sup> at  $U_{soll} = 10V$

<sup>2)</sup> thermal resistance  $R_{th 2}$  not reduced / thermal resistance  $R_{th 2}$  by 55% reduced

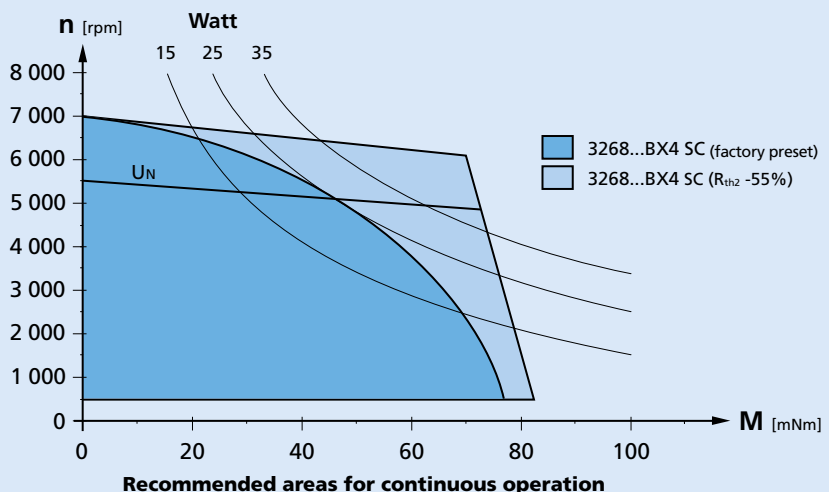
#### Note:

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

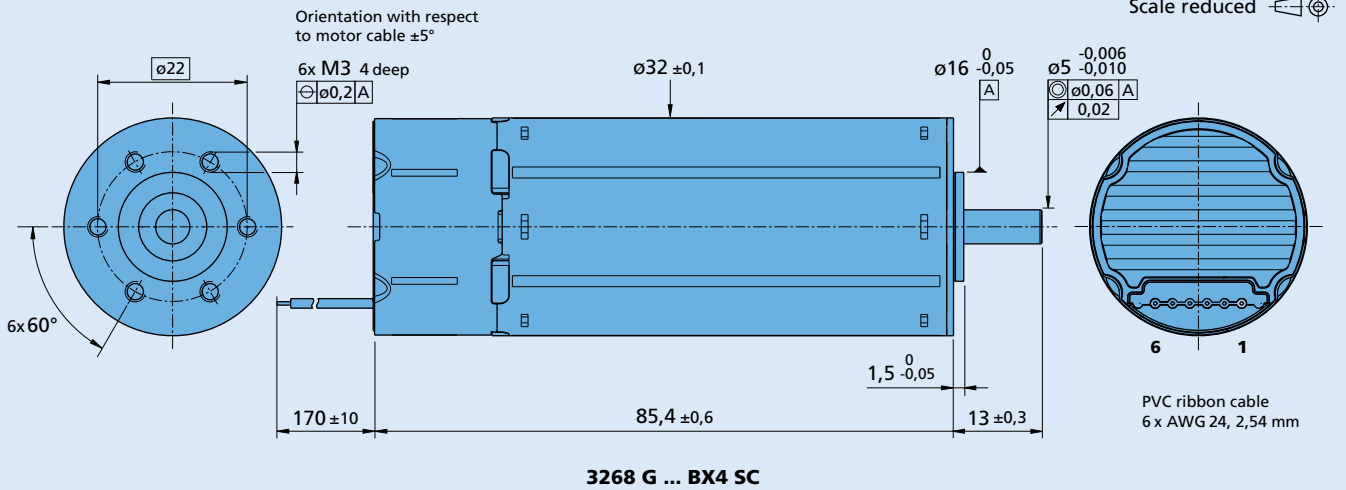
The diagram shows the motor in a completely insulated as well as thermally coupled condition ( $R_{th 2} \geq 55\%$  reduced).

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 at higher continuous current.

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



Speed Controller		024 BX4	SC
Power supply electronic	$U_p$	6,5 ... 30	V DC
Power supply motor	$U_{mot}$	6,5 ... 30	V DC
PWM switching frequency	$f_{PWM}$	96	kHz
Efficiency	$\eta$	95	%
Max. continuous output current <sup>1)</sup>	$I_{dauer}$	2	A
Max. peak output current	$I_{max}$	4	A
Total standby current at $U_N$	$I_{el}$	10	mA
Speed range:			
– standard » Hall sensors (digital)		400 ... 50 000 <sup>2)</sup>	rpm
– optional » Hall sensors (analog)		50 ... 50 00 <sup>2)</sup>	rpm
Scanning range		500	$\mu$ s

<sup>1)</sup> at 22°C ambient temperature and max. 60°C motor temperature at the nominal voltage of motor and electronics

<sup>2)</sup> speed is dependent on the motor operating voltage

### Connection information

<b>Connection 1 "U<sub>P</sub>":</b>	power supply electronic	$U_p$	
<b>Connection 2 "U<sub>mot</sub>":</b>	power supply electronic coil	$U_{mot}$	
<b>Connection 3 "GND":</b>	ground	ground	
<b>Connection 4 "U<sub>nsoll</sub>":</b>			
– analog input	input voltage	$U_{in} = 0 \dots 10 \text{ V} \mid > 10 \text{ V} \dots U_p$ » set speed value not defined	
	input resistance	$R_{in} \geq 8,9 \text{ k}\Omega$	
	set speed value	per 1 V, 1 000	rpm
		$U_{in} < 0,15 \text{ V}$ » motor stops	
		$U_{in} > 0,3 \text{ V}$ » motor starts	
<b>Connection 5 "DIR":</b>			
– digital input	direction of rotation	to ground or level $< 0,5 \text{ V}$ » counterclockwise	
		open or level $> 3 \text{ V}$ » clockwise	
	input resistance	$R_{in} \geq 10 \text{ k}\Omega$	
<b>Connection 6 "FG":</b>			
– digital output	frequency output	max. $U_p$ ; $I_{max} = 15 \text{ mA}$ ; open collector with 22 k $\Omega$ pull-up resistor	
		6 lines per revolution	

### Features

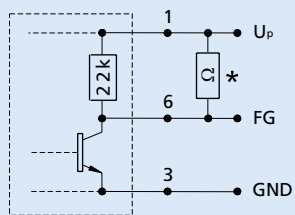
In this variant, the brushless DC servomotors have an integrated Speed Controller. The motor is commutated using Hall sensors integrated into the motor. Speed control is via a PI regulator.

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.

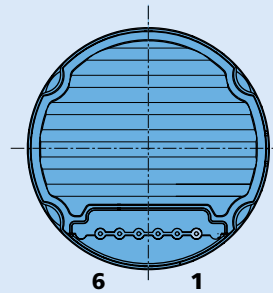
## Circuit diagram / Connection information

### Output circuit



\* An additional external pull-up resistor can be added to improve the rise time.  
**Caution:** I<sub>OUT</sub> max. 15 mA must not be exceeded!

### Cable connection



### Connection

No.	Function
1	U <sub>p</sub>
2	U <sub>mot</sub>
3	GND
4	U <sub>nsoll</sub>
5	DIR
6	FG

### Caution:

Incorrect lead connection will damage the motor electronics!

### Options

- Connector variant (Option no.: 3809)  
 AWG 24 / PVC ribbon cable with connector Micro-Fit



- Analog Hall sensors (Option no.: 3692)

### Accessories

- Programming board (Part No.: 6501.00088)

### Full product description

- Example:  
**3268G024BX4 SC**