

**NEW**

# Brushless DC-Servomotors

## with integrated Speed Controller

### 4 Pole Technology

**54 mNm**

For combination with  
Gearheads:  
32A

### Series 3242 ... BX4 SC

	3242 G	012 BX4	024 BX4	SC
1 Nominal voltage	$U_N$	12	24	Volt
2 Terminal resistance, phase-phase	R	0,89	3,6	$\Omega$
3 Output power <sup>1)</sup>	$P_{2 \text{ max.}}$	21,2	21,1	W
4 Efficiency	$\eta_{\text{ max.}}$	77,4	77,3	%
5 No-load speed	$n_0$	5 500	5 500	rpm
6 No-load current	$I_0$	0,206	0,103	A
7 Stall torque	$M_H$	83	83	mNm
8 Friction torque, static	$C_0$	1,3	1,3	mNm
9 Friction torque, dynamic	$C_v$	$5,2 \cdot 10^{-4}$	$5,2 \cdot 10^{-4}$	mNm/rpm
10 Speed constant	$k_n$	455	227	rpm/V
11 Back-EMF constant	$k_E$	2,199	4,409	mV/rpm
12 Torque constant	$k_M$	21,0	42,1	mNm/A
13 Current constant	$k_I$	0,0476	0,0238	A/mNm
14 Slope of n-M curve	$\Delta n / \Delta M$	19,3	19,4	rpm/mNm
15 Terminal inductance, phase-phase	L	60	240	$\mu\text{H}$
16 Mechanical time constant	$\tau_m$	6,1	6,1	ms
17 Rotor inertia	J	30	30	gcm <sup>2</sup>
18 Angular acceleration	$\alpha_{\text{ max.}}$	28	28	$\cdot 10^3 \text{ rad/s}^2$
19 Thermal resistance	$R_{\text{th} 1} / R_{\text{th} 2}$	1,6 / 12,4		K/W
20 Thermal time constant	$\tau_{w1} / \tau_{w2}$	9 / 810		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		192		g
27 Direction of rotation		electronically reversible		
28 Number of pole pairs		2		

### Recommended values - mathematically independent of each other

29 Speed up to	$n_{e \text{ max.}}$	14 000	6 000	rpm
30 Torque up to <sup>1) 2)</sup>	$M_{e \text{ max.}}$	32 / 36	32 / 54	mNm
31 Current up to <sup>1) 2)</sup>	$I_{e \text{ max.}}$	1,90 / 2,00	0,95 / 1,55	A

<sup>1)</sup> at 5 000 rpm

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

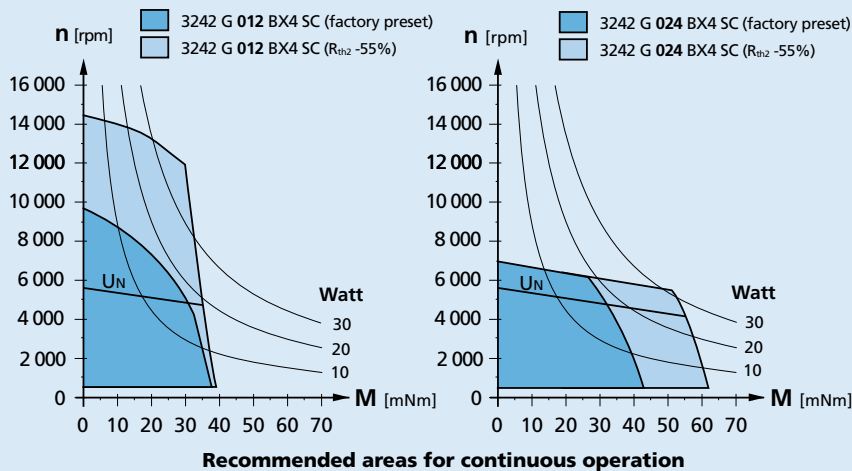
#### Note:

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

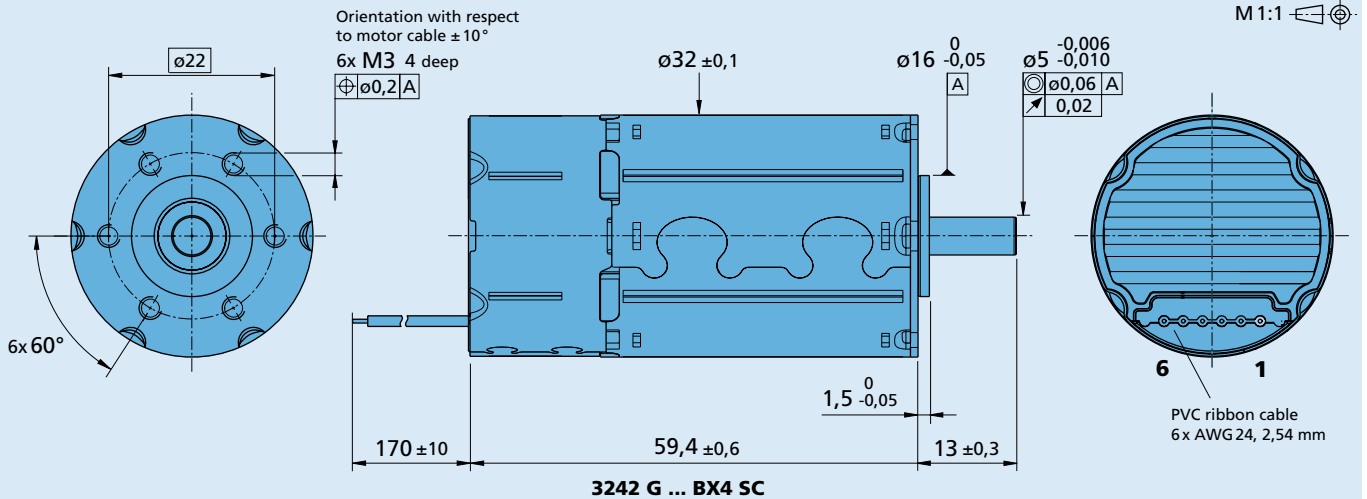
The diagram shows the motor in a completely insulated as well as thermally coupled condition ( $R_{\text{th} 2} \geq 55\%$  reduced).

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		012 BX4	024 BX4	SC
Power supply electronic	$U_p$	5 ... 30		V DC
Power supply motor	$U_{mot}$	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 $U_N$	$I_{el}$		17	10
				mA
Speed range, electronics		400 ... 50 000 <sup>2)</sup>		rpm
Scanning rate		500		$\mu$ s

<sup>1)</sup> at 22°C ambient temperature

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

### Features

In this version, the brushless DC servomotors have an integrated Speed Controller. The motor is commutated using the integrated digital hall sensors. 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: speed control, current limit and regulator parameters.

### Full product description

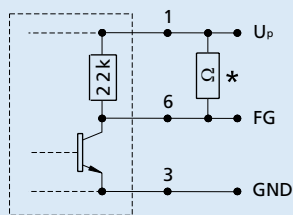
Examples:

3242G012BX4 SC

3242G024BX4 SC

**Circuit diagram / Connection information**

**Output circuit**



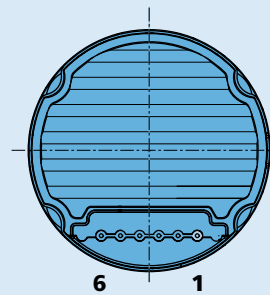
\* An additional external pull-up resistor can be added to improve the rise time.  
 Caution: I<sub>OUT</sub> max. 15 mA must not be exceeded!

**Options**

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



**Cable connection**



**Connection**

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

**Caution:**  
 Incorrect lead connection will damage the motor electronics!