

# Brushless DC-Servomotors

## 4 Pole Technology

53 mNm  
45 W

### Series 3242 ... BX4

| Values at 22°C and nominal voltage                              | 3242 G                  | 012 BX4                   | 018 BX4             | 024 BX4             | 036 BX4             | 042 BX4             | 048 BX4             |                                 |
|---|-------------------------|---------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------------------|
| 1 Nominal voltage   | $U_N$                   | 12                        | 18                  | 24                  | 36                  | 42                  | 48                  | V                               |
| 2 Terminal resistance, phase-phase                              | $R$                     | 0,92                      | 2,01                | 3,67                | 8,96                | 11,7                | 15,1                | $\Omega$                        |
| 3 Efficiency, max.  | $\eta_{max}$            | 78                        | 78                  | 78                  | 77                  | 78                  | 78                  | %                               |
| 4 No-load speed   | $n_0$                   | 5 600                     | 5 500               | 5 600               | 5 500               | 5 500               | 5 500               | min <sup>-1</sup>               |
| 5 No-load current, typ. (with shaft $\varnothing$ 5 mm)         | $I_0$                   | 0,179                     | 0,117               | 0,089               | 0,059               | 0,05                | 0,044               | A                               |
| 6 Stall torque  | $M_H$                   | 268,7                     | 280                 | 269,4               | 251                 | 262                 | 265                 | mNm                             |
| 7 Friction torque, static                                       | $C_0$                   | 1,3                       | 1,3                 | 1,3                 | 1,3                 | 1,3                 | 1,3                 | mNm                             |
| 8 Friction torque, dynamic                                      | $C_V$                   | $4,1 \cdot 10^{-4}$       | $4,1 \cdot 10^{-4}$ | $4,1 \cdot 10^{-4}$ | $4,1 \cdot 10^{-4}$ | $4,1 \cdot 10^{-4}$ | $4,1 \cdot 10^{-4}$ | mNm/min <sup>-1</sup>           |
| 9 Speed constant  | $k_n$                   | 461                       | 304                 | 231                 | 152                 | 130                 | 114                 | min <sup>-1</sup> /V            |
| 10 Back-EMF constant  | $k_E$                   | 2,168                     | 3,285               | 4,335               | 6,571               | 7,666               | 8,762               | mV/min <sup>-1</sup>            |
| 11 Torque constant  | $k_M$                   | 20,7                      | 31,4                | 41,4                | 62,8                | 73,1                | 83,7                | mNm/A                           |
| 12 Current constant   | $k_I$                   | 0,048                     | 0,032               | 0,024               | 0,016               | 0,014               | 0,012               | A/mNm                           |
| 13 Slope of n-M curve   | $\Delta n / \Delta M$   | 20,5                      | 19,5                | 20,4                | 21,7                | 20,8                | 20,6                | min <sup>-1</sup> /mNm          |
| 14 Terminal inductance, phase-phase                             | $L$                     | 60                        | 132                 | 240                 | 529                 | 719                 | 940                 | $\mu$ H                         |
| 15 Mechanical time constant                                     | $\tau_m$                | 6,4                       | 6,1                 | 6,4                 | 6,8                 | 6,5                 | 6,5                 | ms                              |
| 16 Rotor inertia  | $J$                     | 30                        | 30                  | 30                  | 30                  | 30                  | 30                  | gcm <sup>2</sup>                |
| 17 Angular acceleration   | $\alpha_{max}$          | 90                        | 93,2                | 90                  | 83,6                | 87,2                | 88,3                | $\cdot 10^3$ rad/s <sup>2</sup> |
| 18 Thermal resistance   | $R_{th1} / R_{th2}$     | 2,3 / 11,6                |                     |                     |                     |                     |                     | K/W                             |
| 19 Thermal time constant  | $\tau_{w1} / \tau_{w2}$ | 13 / 880                  |                     |                     |                     |                     |                     | s                               |
| 20 Operating temperature range:                                 |                         |                           |                     |                     |                     |                     |                     |                                 |
| – motor   |                         | -40 ... +100              |                     |                     |                     |                     |                     | °C                              |
| – winding, max. permissible                                     |                         | +125                      |                     |                     |                     |                     |                     | °C                              |
| 21 Shaft bearings   |                         | ball bearings, preloaded  |                     |                     |                     |                     |                     |                                 |
| 22 Shaft load max.:   |                         |                           |                     |                     |                     |                     |                     |                                 |
| – with shaft diameter   |                         | 5                         |                     |                     |                     |                     |                     | mm                              |
| – radial at 3 000 min <sup>-1</sup> (5 mm from mounting flange) |                         | 50                        |                     |                     |                     |                     |                     | N                               |
| – axial at 3 000 min <sup>-1</sup> (push / pull)                |                         | 5                         |                     |                     |                     |                     |                     | N                               |
| – axial at standstill (push / pull)                             |                         | 50                        |                     |                     |                     |                     |                     | N                               |
| 23 Shaft play:  |                         |                           |                     |                     |                     |                     |                     |                                 |
| – radial  | $\leq$                  | 0,015                     |                     |                     |                     |                     |                     | mm                              |
| – axial   | $=$                     | 0                         |                     |                     |                     |                     |                     | mm                              |
| 24 Housing material   |                         | stainless steel           |                     |                     |                     |                     |                     |                                 |
| 25 Mass   |                         | 179                       |                     |                     |                     |                     |                     | g                               |
| 26 Direction of rotation  |                         | electronically reversible |                     |                     |                     |                     |                     |                                 |
| 27 Speed up to  | $n_{max}$               | 17 000                    |                     |                     |                     |                     |                     | min <sup>-1</sup>               |
| 28 Number of pole pairs   |                         | 2                         |                     |                     |                     |                     |                     |                                 |
| 29 Hall sensors   |                         | digital                   |                     |                     |                     |                     |                     |                                 |
| 30 Magnet material  |                         | NdFeB                     |                     |                     |                     |                     |                     |                                 |
| <b>Rated values for continuous operation</b>                    |                         |                           |                     |                     |                     |                     |                     |                                 |
| 31 Rated torque   | $M_N$                   | 41,8                      | 43                  | 41,8                | 40,7                | 41,6                | 41,8                | mNm                             |
| 32 Rated current (thermal limit)                                | $I_N$                   | 2,43                      | 1,64                | 1,21                | 0,78                | 0,68                | 0,6                 | A                               |
| 33 Rated speed  | $n_N$                   | 4 600                     | 4 580               | 4 600               | 4 480               | 4 520               | 4 530               | min <sup>-1</sup>               |

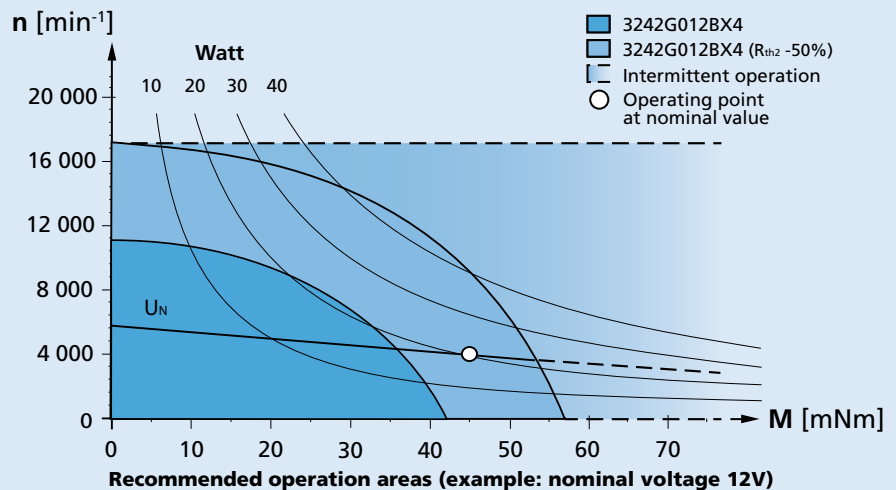
**Note:** Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The  $R_{th2}$  value has been reduced by 25%.

**Note:**

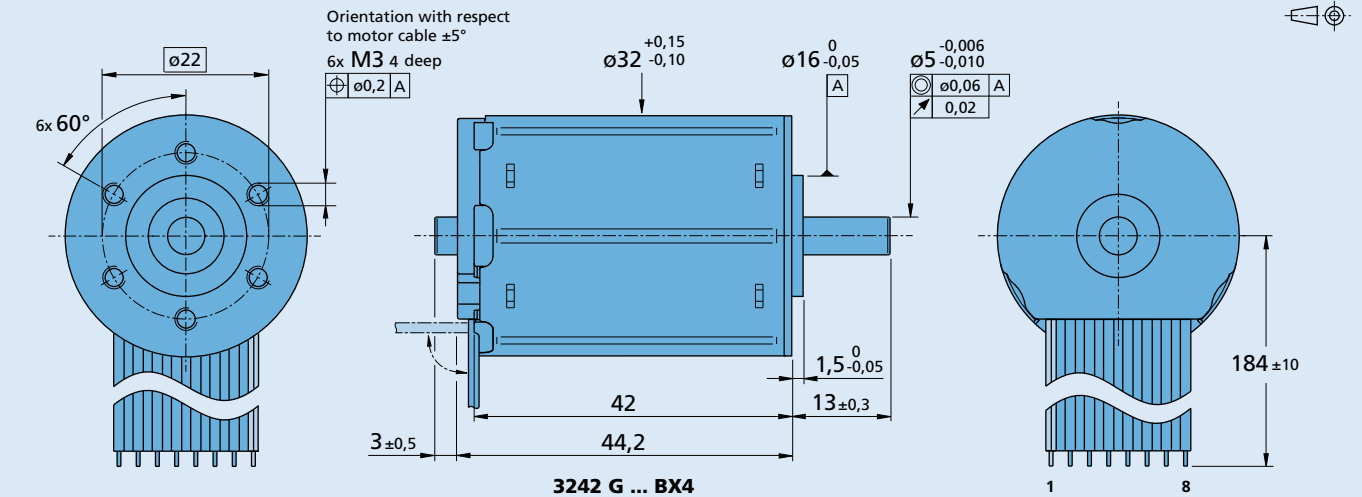
The diagram indicates the recommended speed in relation to the available torque at the output shaft for a given ambient temperature of 22°C.

The diagram shows the motor in a completely insulated as well as thermally coupled condition ( $R_{th2}$  50% reduced).

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



### Option, cable and connection information

Example product designation: **3242G012BX4-3692**

| Option | Type                   | Description  | Connection standard |                       |
|--------|------------------------|--|---------------------|-----------------------|
|        |                        |  | No.                 | Function              |
| 3830   | Connector<br>          | AWG 26 / PVC ribbon cable with connector<br>MOLEX Microfit 3.0, 43025-0800,<br>recommended mating connector 43020-0800 |                     |                       |
| 4935   | Single wires           | Motor with single wires (PTFE), length 184 mm, AWG22   | 1                   | Phase C               |
| X4935  | Single wires           | Motor with single wires (PTFE), length 300 mm, AWG22   | 2                   | Phase B               |
| Y4935  | Single wires           | Motor with single wires (PTFE), length 600 mm, AWG22   | 3                   | Phase A               |
| 4747   | Temperature range      | Up to 150°C, winding max. 150°C, with single wires (PTFE), length 184 mm, AWG22  | 4                   | GND                   |
| X4747  | Temperature range      | Up to 150°C, winding max. 150°C, with single wires (PTFE), length 300 mm, AWG22  | 5                   | U <sub>DD</sub> (+5V) |
| Y4747  | Temperature range      | Up to 150°C, winding max. 150°C, with single wires (PTFE), length 600 mm, AWG22  | 6                   | Hall sensor C         |
| Y158   | Shaft end              | Motor without second shaft end   | 7                   | Hall sensor B         |
| 3692   | Controller combination | Analog Hall sensors for combination with Speed Controller SC or Motion Controller MC                                   | 8                   | Hall sensor A         |

**Option: 4935/4747**

| Function              | Function              | Colour |
|-----------------------|-----------------------|--------|
| Phase C               | Phase C               | yellow |
| Phase B               | Phase B               | orange |
| Phase A               | Phase A               | brown  |
| GND                   | GND                   | black  |
| U <sub>DD</sub> (+5V) | U <sub>DD</sub> (+5V) | red    |
| Hall sensor C         | Hall sensor C         | grey   |
| Hall sensor B         | Hall sensor B         | blue   |
| Hall sensor A         | Hall sensor A         | green  |

**Standard cable**  
 Insulation: PVC  
 8 conductors, AWG 24  
 pitch 2,54 mm, wires tinned

### Product combination

| Precision Gearheads / Lead Screws   | Encoders   | Drive Electronics  | Cables / Accessories  |
|---|--|--|---|
| 32GPT<br>32/3R<br>38/1<br>38/1 S<br>38/2<br>38/2 S<br>42GPT<br>32L ... TL<br>32L ... ML<br>32L ... SB<br>32L ... PB | IE3-1024<br>IE3-1024 L<br>IER3-10000<br>IER3-10000 L<br>AEMT-12/16 L<br>AES-4096 L | SC 2402 P<br>SC 2804 S<br>SC 5004 P<br>SC 5008 S<br>MC 3603 S<br>MC 5004 P<br>MC 5005 S<br>MC 5010 S | MBZ<br>Brake MBZ is available in combination with analog Hall sensors only.<br><br>To view our large range of accessory parts, please refer to the "Accessories" chapter. |