

**NEW**

# Brushless DC-Servomotors

18,7 mNm

2 Pole Technology

81 W

## Series 1660 ... BHT

| Values at 22°C and nominal voltage           |  | 1660 S                  | 024 BHT                   | 036 BHT              | 048 BHT              |                                 |
|--|--|-------------------------|---------------------------|----------------------|----------------------|---------------------------------|
| 1  | Nominal voltage  | $U_N$                   | 24                        | 36                   | 48                   | V                               |
| 2  | Terminal resistance, phase-phase                                 | $R$                     | 0,49                      | 1,1                  | 1,93                 | $\Omega$                        |
| 3  | Efficiency, max.   | $\eta_{max}$            | 90                        | 90                   | 90                   | %                               |
| 4  | No-load speed  | $n_0$                   | 34 900                    | 35 200               | 35 500               | min <sup>-1</sup>               |
| 5  | No-load current, typ. (with shaft $\varnothing$ 3 mm)            | $I_0$                   | 0,133                     | 0,09                 | 0,069                | A                               |
| 6  | Stall torque   | $M_H$                   | 344                       | 341                  | 343                  | mNm                             |
| 7  | Friction torque, static  | $C_0$                   | 0,43                      | 0,43                 | 0,43                 | mNm                             |
| 8  | Friction torque, dynamic   | $C_V$                   | $1,28 \cdot 10^{-5}$      | $1,28 \cdot 10^{-5}$ | $1,28 \cdot 10^{-5}$ | mNm/min <sup>-1</sup>           |
| 9  | Speed constant   | $k_n$                   | 1 368                     | 918                  | 694                  | min <sup>-1</sup> /V            |
| 10   | Back-EMF constant  | $k_E$                   | 0,731                     | 1,09                 | 1,441                | mV/min <sup>-1</sup>            |
| 11   | Torque constant  | $k_M$                   | 6,98                      | 10,4                 | 13,7                 | mNm/A                           |
| 12   | Current constant   | $k_I$                   | 0,143                     | 0,096                | 0,073                | A/mNm                           |
| 13   | Slope of n-M curve   | $\Delta n / \Delta M$   | 95                        | 97                   | 97                   | min <sup>-1</sup> /mNm          |
| 14   | Terminal inductance, phase-phase                                 | $L$                     | 52                        | 114                  | 203                  | $\mu$ H                         |
| 15   | Mechanical time constant   | $\tau_m$                | 1,2                       | 1,2                  | 1,3                  | ms                              |
| 16   | Rotor inertia  | $J$                     | 1,2                       | 1,2                  | 1,2                  | gcm <sup>2</sup>                |
| 17   | Angular acceleration   | $\alpha_{max}$          | 2 796                     | 2 772                | 2 787                | $\cdot 10^3$ rad/s <sup>2</sup> |
| 18   | Thermal resistance   | $R_{th1} / R_{th2}$     | 2,1 / 18,2                |                      |                      | K/W                             |
| 19   | Thermal time constant  | $\tau_{w1} / \tau_{w2}$ | 6,8 / 631                 |                      |                      | s                               |
| 20   | Operating temperature range:                                     |                         |                           |                      |                      |                                 |
|  | - motor  |                         | -30 ... +125              |                      |                      | °C                              |
|  | - winding, max. permissible                                      |                         | +125                      |                      |                      | °C                              |
| 21   | Shaft bearings   |                         | ball bearings, preloaded  |                      |                      |                                 |
| 22   | Shaft load max.:   |                         |                           |                      |                      |                                 |
|  | - with shaft diameter  |                         | 3                         |                      |                      | mm                              |
|  | - radial at 40 000 min <sup>-1</sup> (5 mm from mounting flange) |                         | 19                        |                      |                      | N                               |
|  | - axial at 40 000 min <sup>-1</sup> (push only)                  |                         | 9                         |                      |                      | N                               |
|  | - axial at standstill (push only)                                |                         | 44                        |                      |                      | N                               |
| 23   | Shaft play:  |                         |                           |                      |                      |                                 |
|  | - radial   | $\leq$                  | 0,01                      |                      |                      | mm                              |
|  | - axial  | $=$                     | 0                         |                      |                      | mm                              |
| 24   | Housing material   |                         | stainless steel           |                      |                      |                                 |
| 25   | Mass   |                         | 78                        |                      |                      | g                               |
| 26   | Direction of rotation  |                         | electronically reversible |                      |                      |                                 |
| 27   | Speed up to  | $n_{max}$               | 76 000                    |                      |                      | min <sup>-1</sup>               |
| 28   | Number of pole pairs   |                         | 1                         |                      |                      |                                 |
| 29   | Hall sensors   |                         | digital                   |                      |                      |                                 |
| 30   | Magnet material  |                         | NdFeB                     |                      |                      |                                 |
| <b>Rated values for continuous operation</b> |  |                         |                           |                      |                      |                                 |
| 31   | Rated torque   | $M_N$                   | 13,9                      | 13,7                 | 13,6                 | mNm                             |
| 32   | Rated current (thermal limit)                                    | $I_N$                   | 2,38                      | 1,58                 | 1,18                 | A                               |
| 33   | Rated speed  | $n_N$                   | 34 490                    | 34 740               | 35 070               | min <sup>-1</sup>               |

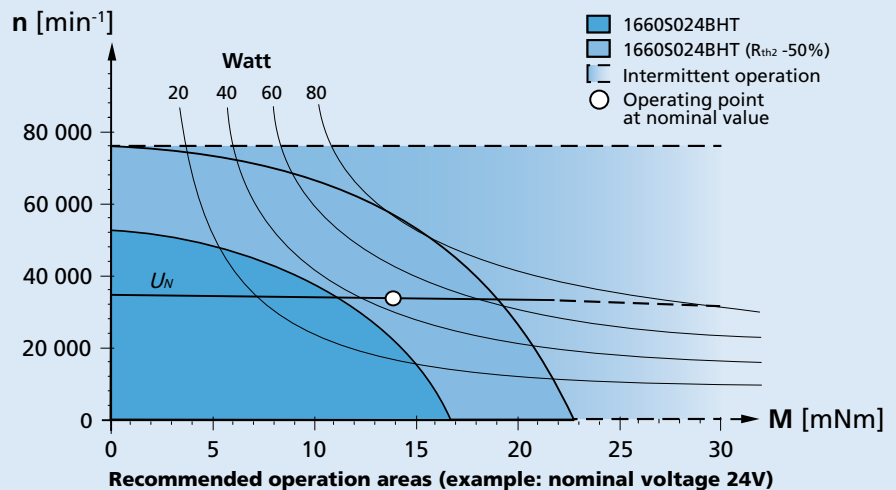
**Note:** Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The  $R_{th2}$  value has been reduced by 25%.

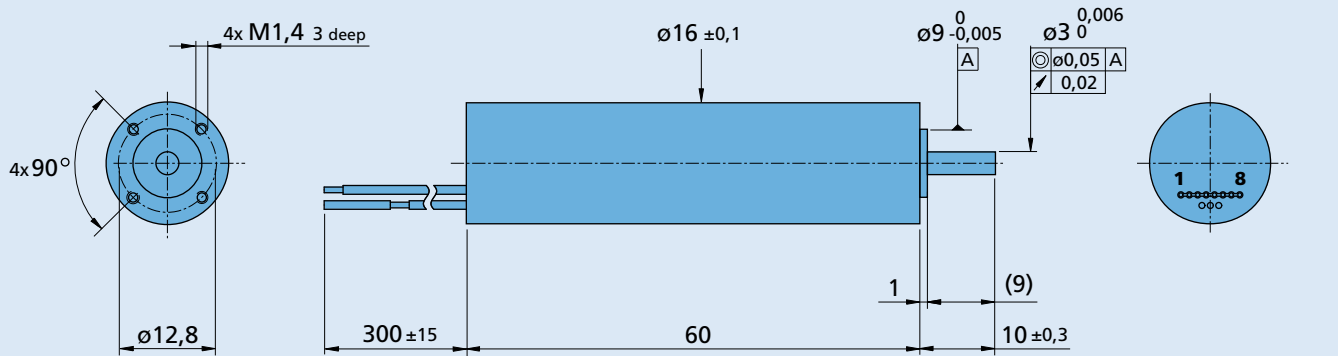
**Note:**

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**

**1660 S ... BHT**
**Option, cable and connection information**

 Example product designation: **1660S024BHT**

| Option | Type | Description | Connection |                                |        |
|--------|------|-------------|------------|--------------------------------|--------|
|        |      |             | No.        | Function                       | Colour |
|        |      |             | -          | Phase C                        | yellow |
|        |      |             | -          | Phase B                        | orange |
|        |      |             | -          | Phase A                        | brown  |
|        |      |             | 1          | GND                            | red    |
|        |      |             | 2          | U <sub>DD</sub> (4,5 ... 5,5V) | grey   |
|        |      |             | 3          | Hall sensor C                  | grey   |
|        |      |             | 4          | Hall sensor B                  | grey   |
|        |      |             | 5          | Hall sensor A                  | grey   |
|        |      |             | 6          | Reserved                       | grey   |
|        |      |             | 7          | Reserved                       | grey   |
|        |      |             | 8          | Reserved                       | grey   |

**Standard cable**  
 Single wires, material PTFE  
 AWG24, Phase A/B/C  
 Flat cable, material PVC  
 AWG28, Pitch 1,27 mm  
 Hall A,B,C, U<sub>DD</sub>, GND

**Product combination**

| Precision Gearheads / Lead Screws | Encoders  | Drive Electronics                                | Cables / Accessories   |
|-----------------------------------|-----------|--|--|
| 15/10<br>17/1<br>20/1R            | IEM3-1024 | SC 5004 P<br>SC 5008 S<br>MC 5004 P<br>MC 5005 S | To view our large range of accessory parts, please refer to the "Accessories" chapter. |