

# Brushless DC-Servomotors

2 Pole Technology

3,3 mNm

17 W

## Series 1628 ... B

| Values at 22°C and nominal voltage           |                                                                 | 1628 T                  | 012 B                     | 024 B                |                                 |
|----------------------------------------------|-----------------------------------------------------------------|-------------------------|---------------------------|----------------------|---------------------------------|
| 1                                            | Nominal voltage                                                 | $U_N$                   | 12                        | 24                   | V                               |
| 2                                            | Terminal resistance, phase-phase                                | $R$                     | 4,36                      | 15,2                 | $\Omega$                        |
| 3                                            | Efficiency, max.                                                | $\eta_{max}$            | 68                        | 69                   | %                               |
| 4                                            | No-load speed                                                   | $n_0$                   | 30 800                    | 31 600               | min <sup>-1</sup>               |
| 5                                            | No-load current, typ. (with shaft $\varnothing$ 1,5 mm)         | $I_0$                   | 0,087                     | 0,045                | A                               |
| 6                                            | Stall torque                                                    | $M_H$                   | 9,79                      | 11                   | mNm                             |
| 7                                            | Friction torque, static                                         | $C_0$                   | 0,148                     | 0,148                | mNm                             |
| 8                                            | Friction torque, dynamic                                        | $C_V$                   | $5,33 \cdot 10^{-6}$      | $5,33 \cdot 10^{-6}$ | mNm/min <sup>-1</sup>           |
| 9                                            | Speed constant                                                  | $k_n$                   | 2 645                     | 1 349                | min <sup>-1</sup> /V            |
| 10                                           | Back-EMF constant                                               | $k_E$                   | 0,378                     | 0,741                | mV/min <sup>-1</sup>            |
| 11                                           | Torque constant                                                 | $k_M$                   | 3,61                      | 7,08                 | mNm/A                           |
| 12                                           | Current constant                                                | $k_I$                   | 0,277                     | 0,141                | A/mNm                           |
| 13                                           | Slope of n-M curve                                              | $\Delta n / \Delta M$   | 3 195                     | 2 896                | min <sup>-1</sup> /mNm          |
| 14                                           | Terminal inductance, phase-phase                                | $L$                     | 134                       | 517                  | $\mu H$                         |
| 15                                           | Mechanical time constant                                        | $\tau_m$                | 18,1                      | 16,4                 | ms                              |
| 16                                           | Rotor inertia                                                   | $J$                     | 0,54                      | 0,54                 | gcm <sup>2</sup>                |
| 17                                           | Angular acceleration                                            | $\alpha_{max}$          | 181                       | 204                  | $\cdot 10^3$ rad/s <sup>2</sup> |
| 18                                           | Thermal resistance                                              | $R_{th1} / R_{th2}$     | 5,6 / 22,5                |                      | K/W                             |
| 19                                           | Thermal time constant                                           | $\tau_{w1} / \tau_{w2}$ | 5,7 / 283                 |                      | 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                                           |                         | 1,5                       |                      | mm                              |
|                                              | – radial at 3 000 min <sup>-1</sup> (4 mm from mounting flange) |                         | 17                        |                      | N                               |
|                                              | – axial at 3 000 min <sup>-1</sup> (push only)                  |                         | 10                        |                      | N                               |
|                                              | – axial at standstill (push only)                               |                         | 20                        |                      | N                               |
| 23                                           | Shaft play:                                                     |                         |                           |                      |                                 |
|                                              | – radial                                                        | $\leq$                  | 0,015                     |                      | mm                              |
|                                              | – axial                                                         | $=$                     | 0                         |                      | mm                              |
| 24                                           | Housing material                                                |                         | aluminium, black anodized |                      |                                 |
| 25                                           | Mass                                                            |                         | 30                        |                      | g                               |
| 26                                           | Direction of rotation                                           |                         | electronically reversible |                      |                                 |
| 27                                           | Speed up to                                                     | $n_{max}$               | 70 000                    |                      | min <sup>-1</sup>               |
| 28                                           | Number of pole pairs                                            |                         | 1                         |                      |                                 |
| 29                                           | Hall sensors                                                    |                         | digital                   |                      |                                 |
| 30                                           | Magnet material                                                 |                         | SmCo                      |                      |                                 |
| <b>Rated values for continuous operation</b> |                                                                 |                         |                           |                      |                                 |
| 31                                           | Rated torque                                                    | $M_N$                   | 2,62                      | 2,74                 | mNm                             |
| 32                                           | Rated current (thermal limit)                                   | $I_N$                   | 0,829                     | 0,442                | A                               |
| 33                                           | Rated speed                                                     | $n_N$                   | 19 130                    | 20 540               | min <sup>-1</sup>               |

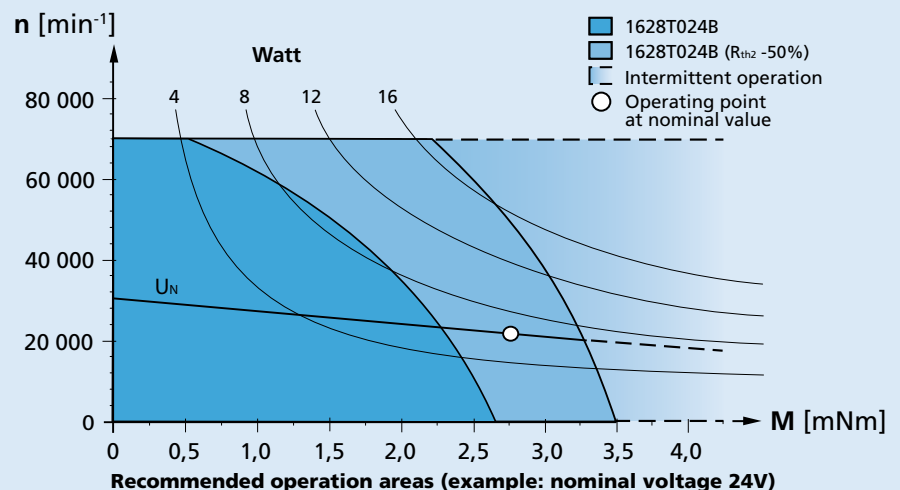
**Note:** Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The  $R_{th2}$  value has been reduced by 25%.

### Note:

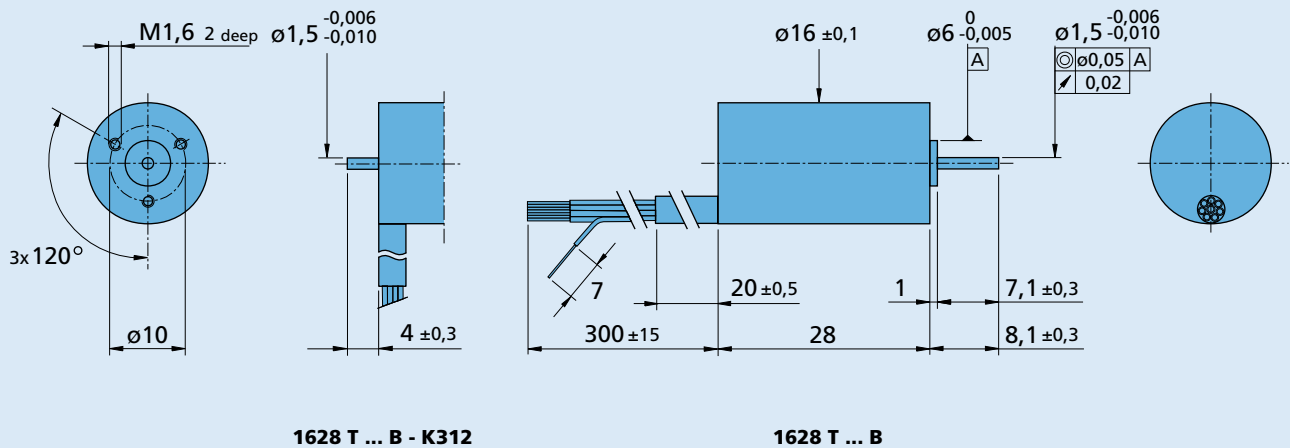
The diagram indicates the recommended speed in relation to the available torque at the output shaft for a given ambient temperature of 22°C.

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: **1628T012B-K1155**

| Option | Type                   | Description                                                                             | Connection                  |        |
|--------|------------------------|-----------------------------------------------------------------------------------------|-----------------------------|--------|
|        |                        |                                                                                         | Function                    | Colour |
| K1155  | Controller combination | Analog Hall sensors for combination with Speed Controller SC and Motion Controller MCBL | Phase C                     | yellow |
| K903   | Lead wires length      | Single lead wires 1000 mm long in PTFE                                                  | Phase B                     | orange |
| K313   | Encoder combination    | Motor with rear end shaft for combination with Encoder IE2                              | Phase A                     | brown  |
| K312   | Encoder combination    | Motor with rear end shaft                                                               | GND                         | black  |
| K179   | Bearing lubrication    | For vacuum of $10^{-5}$ Pa @ 22°C                                                       | U <sub>DD</sub> (+5V)       | red    |
|        |                        |                                                                                         | Hall sensor C               | grey   |
|        |                        |                                                                                         | Hall sensor B               | blue   |
|        |                        |                                                                                         | Hall sensor A               | green  |
|        |                        |                                                                                         | <b>Standard cable</b>       |        |
|        |                        |                                                                                         | Single wires, material PTFE |        |
|        |                        |                                                                                         | 8 conductors, AWG 26        |        |

## Product combination

| Precision Gearheads / Lead Screws | Encoders | Drive Electronics                                                                                                           | Cables / Accessories                                                                   |
|-----------------------------------|----------|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 15/10<br>16/7<br>17/1             | IE2-1024 | SC 1801 P<br>SC 1801 S<br>SC 2402 P<br>SC 2804 S<br>MCBL 3002 P<br>MCBL 3002 S<br>MCBL 3003 P<br>MC 5004 P<br>MC 5004 P STO | To view our large range of accessory parts, please refer to the "Accessories" chapter. |