

Brushless Flat DC-Micromotors

4 Pole Technology

0,5 mNm
1,5 W

Series 1509 ... B

| Values at 22°C and nominal voltage | | 1509 T | 006 B | 012 B | |
|--|---|-------------------------|---------------------------|----------------------|---------------------------------|
| 1 | Nominal voltage | U_N | 6 | 12 | V |
| 2 | Terminal resistance, phase-phase | R | 22 | 92,7 | Ω |
| 3 | Efficiency, max. | η_{max} | 54 | 53 | % |
| 4 | No-load speed | n_0 | 15 000 | 14 900 | min ⁻¹ |
| 5 | No-load current, typ. (with shaft \varnothing 1,5 mm) | I_0 | 0,019 | 0,009 | A |
| 6 | Stall torque | M_H | 0,953 | 0,904 | mNm |
| 7 | Friction torque, static | C_0 | 0,019 | 0,019 | mNm |
| 8 | Friction torque, dynamic | C_V | $3,42 \cdot 10^{-6}$ | $3,42 \cdot 10^{-6}$ | mNm/min ⁻¹ |
| 9 | Speed constant | k_n | 2 682 | 1 339 | min ⁻¹ /V |
| 10 | Back-EMF constant | k_E | 0,373 | 0,747 | mV/min ⁻¹ |
| 11 | Torque constant | k_M | 3,56 | 7,13 | mNm/A |
| 12 | Current constant | k_I | 0,281 | 0,14 | A/mNm |
| 13 | Slope of n-M curve | $\Delta n / \Delta M$ | 16 577 | 17 423 | min ⁻¹ /mNm |
| 14 | Terminal inductance, phase-phase | L | 570 | 2 282 | μ H |
| 15 | Mechanical time constant | τ_m | 120 | 126 | ms |
| 16 | Rotor inertia | J | 0,69 | 0,69 | gcm ² |
| 17 | Angular acceleration | α_{max} | 14 | 13 | $\cdot 10^3$ rad/s ² |
| 18 | Thermal resistance | R_{th1} / R_{th2} | 65 / 45 | | K/W |
| 19 | Thermal time constant | τ_{w1} / τ_{w2} | 12 / 133 | | s |
| 20 | Operating temperature range: | | | | |
| | – motor | | -25 ... +80 | | °C |
| | – winding, max. permissible | | +80 | | °C |
| 21 | Shaft bearings | | ball bearings, preloaded | | |
| 22 | Shaft load max.: | | | | |
| | – with shaft diameter | | 1,5 | | mm |
| | – radial at 3 000 min ⁻¹ (3 mm from mounting flange) | | 2 | | N |
| | – axial at 3 000 min ⁻¹ (push only) | | 2 | | N |
| | – axial at standstill (push only) | | 15 | | N |
| 23 | Shaft play: | | | | |
| | – radial | \leq | 0,015 | | mm |
| | – axial | $=$ | 0 | | mm |
| 24 | Housing material | | plastic | | |
| 25 | Mass | | 6,9 | | g |
| 26 | Direction of rotation | | electronically reversible | | |
| 27 | Speed up to | n_{max} | 40 000 | | min ⁻¹ |
| 28 | Number of pole pairs | | 2 | | |
| 29 | Hall sensors | | digital | | |
| 30 | Magnet material | | NdFeB | | |
| Rated values for continuous operation | | | | | |
| 31 | Rated torque | M_N | 0,45 | 0,44 | mNm |
| 32 | Rated current (thermal limit) | I_N | 0,147 | 0,071 | A |
| 33 | Rated speed | n_N | 5 860 | 5 550 | min ⁻¹ |

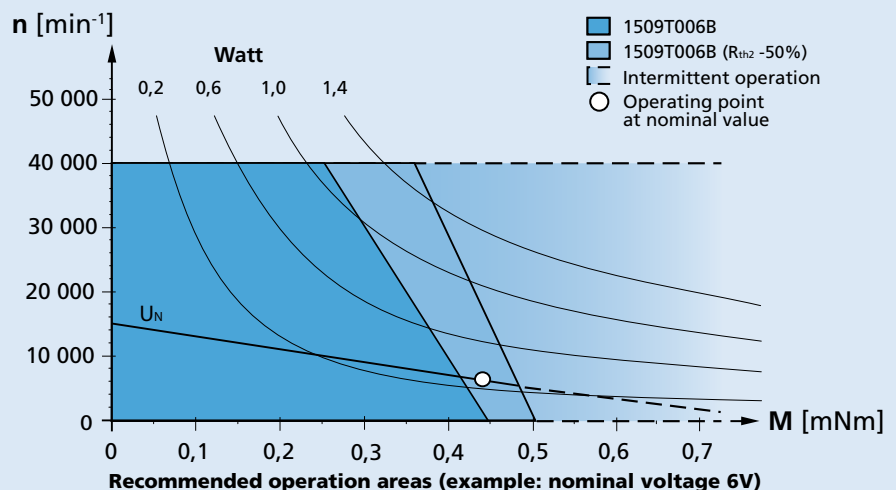
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

Note:

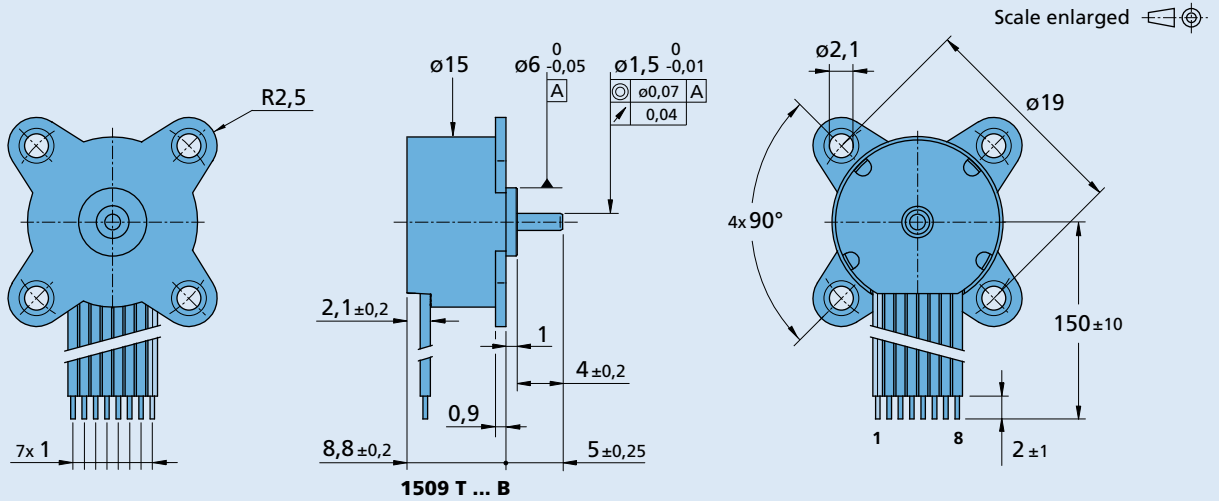
The diagram indicates the recommended speed in relation to the available torque at the output shaft for a given ambient temperature of 22°C.

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: **1509T006B-X4192**

| Option | Type | Description | Connection | |
|--------|---------------------|--|--------------------------|-----------------------|
| X4192 | Bearing lubrication | For vacuum of 10^{-5} Pa @ 22°C | No. | Function |
| 4082 | Temperature range | Extended temperature range (-40...+85°C) | 1 | Phase C |
| | | | 2 | Phase B |
| | | | 3 | Phase A |
| | | | 4 | GND |
| | | | 5 | U _{DD} (+5V) |
| | | | 6 | Hall sensor C |
| | | | 7 | Hall sensor B |
| | | | 8 | Hall sensor A |
| | | | Standard cable | |
| | | | Insulation: PVC | |
| | | | 8 conductors, AWG 28 | |
| | | | pitch 1 mm, wires tinned | |

| Precision Gearheads / Lead Screws | Encoders | Drive Electronics | Cables / Accessories |
|-----------------------------------|----------|------------------------|----------------------|
| | | SC 1801 P SC 1801 S | |