

# DC-Micromotors

## Precious Metal Commutation

0,97 mNm  
2,4 W

### Series 1516 ... SR

| Values at 22°C and nominal voltage |   | 1516 T                  | 006 SR                                      | 009 SR                   | 012 SR |                                 |
|------------------------------------|---|-------------------------|---|--------------------------|--------|---------------------------------|
| 1                                  | Nominal voltage   | $U_N$                   | 6   | 9                        | 12     | V                               |
| 2                                  | Terminal resistance                                     | $R$                     | 15,2  | 32,5                     | 60     | $\Omega$                        |
| 3                                  | Efficiency, max.  | $\eta_{max}$            | 57  | 58                       | 58     | %                               |
| 4                                  | No-load speed   | $n_0$                   | 12 800                                      | 12 800                   | 12 900 | min <sup>-1</sup>               |
| 5                                  | No-load current, typ. (with shaft $\varnothing$ 1,5 mm) | $I_0$                   | 0,029                                       | 0,019                    | 0,014  | A                               |
| 6                                  | Stall torque  | $M_H$                   | 1,52  | 1,61                     | 1,53   | mNm                             |
| 7                                  | Friction torque   | $M_R$                   | 0,12  | 0,12                     | 0,12   | mNm                             |
| 8                                  | Speed constant  | $k_n$                   | 2 300                                       | 1 530                    | 1 160  | min <sup>-1</sup> /V            |
| 9                                  | Back-EMF constant                                       | $k_E$                   | 0,434                                       | 0,655                    | 0,865  | mV/min <sup>-1</sup>            |
| 10                                 | Torque constant   | $k_M$                   | 4,15  | 6,25                     | 8,26   | mNm/A                           |
| 11                                 | Current constant  | $k_I$                   | 0,241                                       | 0,16                     | 0,121  | A/mNm                           |
| 12                                 | Slope of n-M curve                                      | $\Delta n / \Delta M$   | 8 420                                       | 7 950                    | 8 430  | min <sup>-1</sup> /mNm          |
| 13                                 | Rotor inductance  | $L$                     | 100   | 230                      | 400    | $\mu$ H                         |
| 14                                 | Mechanical time constant                                | $\tau_m$                | 35  | 35                       | 35     | ms                              |
| 15                                 | Rotor inertia   | $J$                     | 0,4   | 0,42                     | 0,4    | gcm <sup>2</sup>                |
| 16                                 | Angular acceleration                                    | $\alpha_{max}$          | 38  | 38                       | 39     | $\cdot 10^3$ rad/s <sup>2</sup> |
|                                    |   |                         |   |                          |        |                                 |
| 17                                 | Thermal resistance                                      | $R_{th1} / R_{th2}$     | 10 / 33                                     |                          |        | K/W                             |
| 18                                 | Thermal time constant                                   | $\tau_{w1} / \tau_{w2}$ | 2,9 / 190                                   |                          |        | s                               |
| 19                                 | Operating temperature range:                            |                         |   |                          |        |                                 |
|                                    | – motor   |                         | -30 ... +85 (optional version -55 ... +125) |                          |        | °C                              |
|                                    | – winding, max. permissible                             |                         | +125  |                          |        | °C                              |
| 20                                 | Shaft bearings  |                         | sintered bearings                           | ball bearings, preloaded |        |                                 |
| 21                                 | Shaft load max.:  |                         | (standard)                                  | (optional version)       |        |                                 |
|                                    | – with shaft diameter                                   |                         | 1,5   | 1,5                      |        | mm                              |
|                                    | – radial at 3 000 min <sup>-1</sup> (3 mm from bearing) |                         | 1,2   | 5                        |        | N                               |
|                                    | – axial at 3 000 min <sup>-1</sup>                      |                         | 0,2   | 0,5                      |        | N                               |
|                                    | – axial at standstill                                   |                         | 20  | 10                       |        | N                               |
| 22                                 | Shaft play:   |                         |   |                          |        |                                 |
|                                    | – radial  | $\leq$                  | 0,03  | 0,015                    |        | mm                              |
|                                    | – axial   | $\leq$                  | 0,2   | 0                        |        | mm                              |
| 23                                 | Housing material  |                         | steel, black coated                         |                          |        |                                 |
| 24                                 | Mass  |                         | 13  |                          |        | g                               |
| 25                                 | Direction of rotation                                   |                         | clockwise, viewed from the front face       |                          |        |                                 |
| 26                                 | Speed up to   | $n_{max}$               | 15 000                                      |                          |        | min <sup>-1</sup>               |
| 27                                 | Number of pole pairs                                    |                         | 1   |                          |        |                                 |
| 28                                 | Magnet material   |                         | NdFeB                                       |                          |        |                                 |

#### Rated values for continuous operation

|    |                               |       |       |       |       |                   |
|----|-------------------------------|-------|-------|-------|-------|-------------------|
| 29 | Rated torque                  | $M_N$ | 0,92  | 0,97  | 0,93  | mNm               |
| 30 | Rated current (thermal limit) | $I_N$ | 0,27  | 0,19  | 0,14  | A                 |
| 31 | Rated speed                   | $n_N$ | 2 500 | 2 500 | 2 500 | min <sup>-1</sup> |

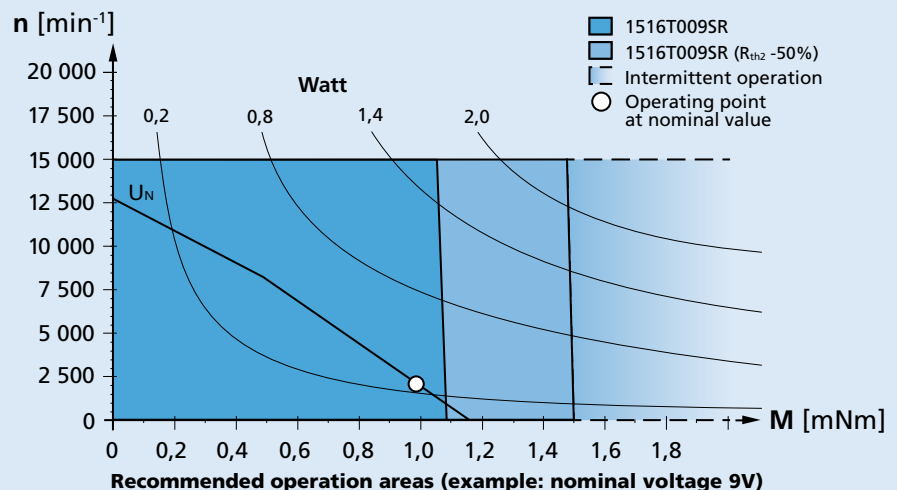
**Note:** Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The  $R_{th2}$  value has been reduced by 0%.

#### 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.

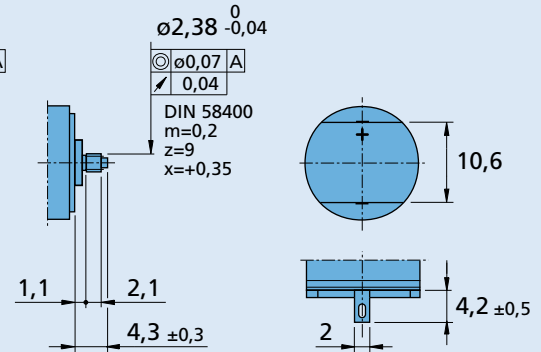
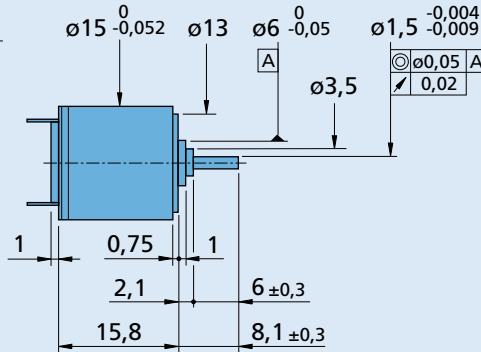
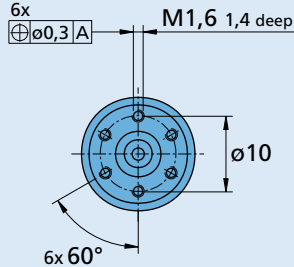
The diagram shows the motor in a completely insulated as well as thermally coupled condition ( $R_{th2}$  50% reduced).

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

Orientation with respect to motor terminals not defined



1516 T ... SR

1516 E ... SR

### Options

Example product designation: **1516T012SR-277**

| Option | Type         | Description   |
|--------|--------------|---|
| L      | Twin Leads   | For motors with twin leads (PVC), length 150 mm, red (+) / black (-)                              |
| 4924   | Twin Leads   | For motors with twin leads (PVC), length 300 mm, red (+) / black (-)                              |
| X4924  | Twin Leads   | For motors with twin leads (PVC), length 600 mm, red (+) / black (-)                              |
| 4925   | Twin Leads   | For motors with twin leads (PVC), length 150 mm, red (+) / black (-), with connector AMP 179228-2 |
| X4925  | Twin Leads   | For motors with twin leads (PVC), length 300 mm, red (+) / black (-), with connector AMP 179228-2 |
| Y4925  | Twin Leads   | For motors with twin leads (PVC), length 600 mm, red (+) / black (-), with connector AMP 179228-2 |
| F      | Single Leads | For motors with single leads (PTFE), length 150 mm, red (+) / black (-)                           |
| 277    | Bearings     | 2 preloaded ball bearings   |
|        |              |   |
|        |              |   |
|        |              |   |
|        |              |   |
|        |              |   |
|        |              |   |
|        |              |   |
|        |              |   |
|        |              |   |
|        |              |   |
|        |              |   |
|        |              |   |
|        |              |   |
|        |              |   |

### Product combination

| Precision Gearheads / Lead Screws                     | Encoders                                     | Drive Electronics               | Cables / Accessories   |
|---|--|---------------------------------|--|
| 15A<br>15/5<br>15/5 S<br>15/8<br>15/10<br>16A<br>16/7 | IE2-16<br>IE2-1024<br>IEH2-4096<br>IEH3-4096 | SC 1801<br>MC 5004<br>MCDC 3002 | To view our large range of accessory parts, please refer to the "Accessories" chapter. |