

DC-Micromotors with graphite commutation

The CXR series combines power, robustness and control in a compact form. This is ensured by graphite commutation, high-quality neodymium magnets and the tried-and-tested winding of the FAULHABER rotor.

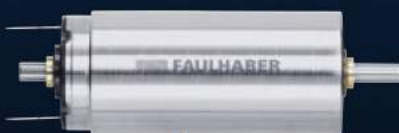
The powerful neodymium magnet gives the motors a high power density with a continuous torque ranging from 3.6 to 40 mNm. The impressive performance data and the compact size open up a wide spectrum of possible applications at an optimised price/performance ratio. The standard drive can be combined with high-resolution optical or magnetic encoders for applications with precise speed control or positioning tasks. A broad and optimally matched selection of gearheads is available to extend the range of requirements that this series is able to fulfil.

Series

| | |
|--------------|--------------|
| 1336 ... CXR | 1727 ... CXR |
| 1741 ... CXR | 2237 ... CXR |
| 2642 ... CXR | 2657 ... CXR |

Key Features

| | |
|-------------------|--------------------------------|
| Motor diameter | 13 ... 26 mm |
| Motor length | 27 ... 57 mm |
| Nominal voltage | 6 ... 48 V |
| Speed | up to 10.000 min ⁻¹ |
| Torque | up to 40 mNm |
| Continuous output | up to 34 W |



26 57 W 024 CXR

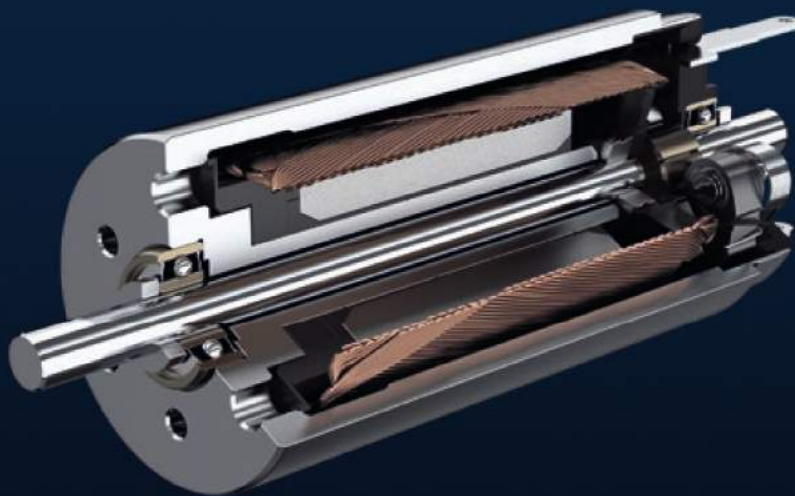
Product Code

| | |
|-----|---------------------|
| 26 | Motor diameter [mm] |
| 57 | Motor length [mm] |
| W | Shaft type |
| 024 | Nominal voltage [V] |
| CXR | Product family |

FAULHABER CXR

Advantages of this series at a glance

- Highly dynamic performance due to a low rotor inertia
- Shockproof all-steel housing with corrosion-resistant coating
- Powerful rare-earth magnet
- Wide operating temperature range: -30°C to +100°C (optional -55°C)
- Durable graphite commutation
- No cogging
- Very high power density



DC-Micromotors

Graphite Commutation

3,6 mNm
4 W

Series 1336 ... CXR

| Values at 22°C and nominal voltage | 1336 U | 006 CXR | 012 CXR | 018 CXR | 024 CXR | | |
|---|-------------------------|---------------------------------------|---------|--------------------|---------|-------|---------------------------------|
| 1 Nominal voltage | U_N | | 6 | 12 | 18 | 24 | V |
| 2 Terminal resistance | R | | 3,98 | 15,6 | 36,6 | 63,7 | Ω |
| 3 Efficiency, max. | η_{max} | | 58 | 62 | 64 | 64 | % |
| 4 No-load speed | n_0 | | 8 300 | 8 700 | 8 800 | 8 900 | min ⁻¹ |
| 5 No-load current, typ. (with shaft \varnothing 2 mm) | I_0 | | 0,058 | 0,029 | 0,019 | 0,014 | A |
| 6 Stall torque | M_H | | 8,1 | 8,6 | 8,6 | 8,6 | mNm |
| 7 Friction torque | M_R | | 0,35 | 0,35 | 0,35 | 0,35 | mNm |
| 8 Speed constant | k_n | | 1 568 | 783 | 525 | 392 | min ⁻¹ /V |
| 9 Back-EMF constant | k_E | | 0,638 | 1,277 | 1,904 | 2,552 | mV/min ⁻¹ |
| 10 Torque constant | k_M | | 6,09 | 12,19 | 18,18 | 24,37 | mNm/A |
| 11 Current constant | k_i | | 0,164 | 0,082 | 0,055 | 0,041 | A/mNm |
| 12 Slope of n-M curve | $\Delta n/\Delta M$ | | 1 025 | 1 003 | 1 057 | 1 024 | min ⁻¹ /mNm |
| 13 Rotor inductance | L | | 70 | 280 | 656 | 1 100 | μ H |
| 14 Mechanical time constant | τ_m | | 5,9 | 6 | 6,1 | 6 | ms |
| 15 Rotor inertia | J | | 0,55 | 0,57 | 0,55 | 0,56 | gcm ² |
| 16 Angular acceleration | α_{max} | | 147 | 152 | 156 | 154 | $\cdot 10^3$ rad/s ² |
| 17 Thermal resistance | R_{th1} / R_{th2} | 13 / 28 | | | | | K/W |
| 18 Thermal time constant | τ_{w1} / τ_{w2} | 11 / 245 | | | | | s |
| 19 Operating temperature range: | | | | | | | |
| – motor | | -30 ... +100 | | | | | °C |
| – winding, max. permissible | | +125 | | | | | °C |
| 20 Shaft bearings | | ball bearings, preloaded | | sintered bearings | | | |
| 21 Shaft load max.: | | (standard) | | (optional version) | | | |
| – with shaft diameter | | 2 | | 2 | | | mm |
| – radial at 3 000 min ⁻¹ (3 mm from bearing) | | 8 | | 1,5 | | | N |
| – axial at 3 000 min ⁻¹ | | 0,8 | | 0,2 | | | N |
| – axial at standstill | | 10 | | 20 | | | N |
| 22 Shaft play: | | | | | | | |
| – radial | \perp | 0,015 | | 0,03 | | | mm |
| – axial | \parallel | 0 | | 0,2 | | | mm |
| 23 Housing material | | steel, nickel plated | | | | | |
| 24 Mass | | 21 | | | | | g |
| 25 Direction of rotation | | clockwise, viewed from the front face | | | | | |
| 26 Speed up to | n_{max} | 10 000 | | | | | min ⁻¹ |
| 27 Number of pole pairs | | 1 | | | | | |
| 28 Magnet material | | NdFeB | | | | | |
| Rated values for continuous operation | | | | | | | |
| 29 Rated torque | M_N | 3,5 | 3,6 | 3,5 | 3,6 | | mNm |
| 30 Rated current (thermal limit) | I_N | 0,7 | 0,36 | 0,24 | 0,18 | | A |
| 31 Rated speed | n_N | 2 780 | 3 170 | 3 160 | 3 250 | | min ⁻¹ |

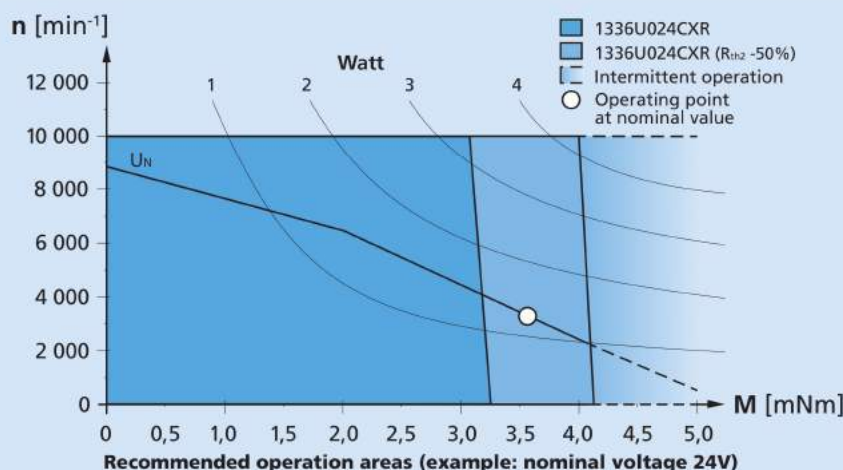
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

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).

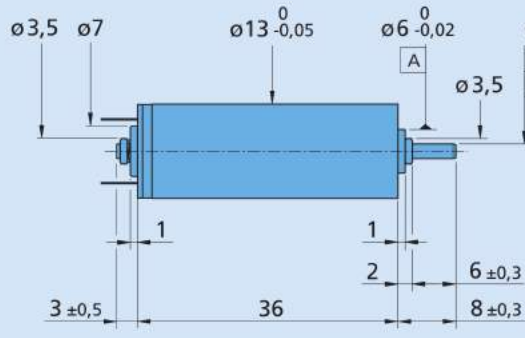
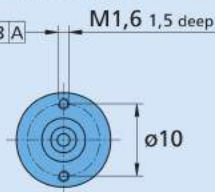
The nominal voltage (U_N) curve shows the operating point at nominal voltage in the insulated and thermally coupled condition. Any points of operation above the curve at nominal voltage will require a higher operating voltage. Any points below the nominal voltage curve will require less voltage.



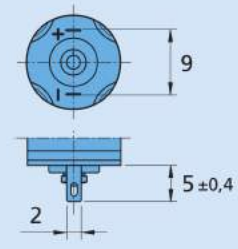
Dimensional drawing

Orientation with respect to motor terminals not defined

2x
 $\oplus \ominus \varnothing 0,3 \text{ A}$



$\varnothing 2 \begin{matrix} -0,004 \\ -0,009 \end{matrix}$
 $\oplus \ominus \varnothing 0,05 \text{ A}$
 A
 A
 $0,02$



1336 U ... CXR

Options

Example product designation: **1336U012CXR-217**

| 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 (-) |
| 123 | Encoder combination | Motor with rear end shaft for combination with Encoder IE2, IEH2 and IEH3 |
| 217 | Bearings | Motor with sintered bearings |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Product combination

| Precision Gearheads / Lead Screws | Encoders | Drive Electronics | Cables / Accessories |
|-----------------------------------|--|---|--|
| 13A 14/1 | IE2-16 IE2-1024 IEH2-4096 IEH3-4096 IEH3-4096L | SC 1801 P SC 1801 S MCDC 3002 P MCDC 3002 S MC 5004 P | To view our large range of accessory parts, please refer to the "Accessories" chapter. |

DC-Micromotors

Graphite Commutation

4,9 mNm
5,3 W

Series 1727 ... CXR

| Values at 22°C and nominal voltage | 1727 U | 006 CXR | 012 CXR | 024 CXR | |
|---|-------------------------|---------------------------------------|--------------------|---------|---------------------------------|
| 1 Nominal voltage | U_N | 6 | 12 | 24 | V |
| 2 Terminal resistance | R | 3,06 | 13,78 | 57,6 | Ω |
| 3 Efficiency, max. | η_{max} | 63 | 65 | 66 | % |
| 4 No-load speed | n_0 | 7 300 | 7 600 | 7 600 | min ⁻¹ |
| 5 No-load current, typ. (with shaft \varnothing 2 mm) | I_0 | 0,052 | 0,026 | 0,013 | A |
| 6 Stall torque | M_H | 12,2 | 11,4 | 11,4 | mNm |
| 7 Friction torque | M_R | 0,36 | 0,36 | 0,36 | mNm |
| 8 Speed constant | k_n | 1 362 | 681 | 332 | min ⁻¹ /V |
| 9 Back-EMF constant | k_E | 0,734 | 1,47 | 3,01 | mV/min ⁻¹ |
| 10 Torque constant | k_M | 7,01 | 14,03 | 28,73 | mNm/A |
| 11 Current constant | k_i | 0,143 | 0,071 | 0,035 | A/mNm |
| 12 Slope of n-M curve | $\Delta n/\Delta M$ | 595 | 668 | 666 | min ⁻¹ /mNm |
| 13 Rotor inductance | L | 80 | 320 | 1 440 | μ H |
| 14 Mechanical time constant | τ_m | 8,1 | 8,4 | 8,4 | ms |
| 15 Rotor inertia | J | 1,3 | 1,2 | 1,2 | gcm ² |
| 16 Angular acceleration | α_{max} | 94 | 95 | 95 | $\cdot 10^3$ rad/s ² |
| 17 Thermal resistance | R_{th1} / R_{th2} | 9,1 / 28,3 | | | K/W |
| 18 Thermal time constant | τ_{w1} / τ_{w2} | 7 / 340 | | | s |
| 19 Operating temperature range: | | | | | |
| – motor | | -30 ... +100 | | | °C |
| – winding, max. permissible | | +125 | | | °C |
| 20 Shaft bearings | | ball bearings, preloaded | sintered bearings | | |
| 21 Shaft load max.: | | (standard) | (optional version) | | |
| – with shaft diameter | | 2 | 2 | | mm |
| – radial at 3 000 min ⁻¹ (3 mm from bearing) | | 8 | 1,5 | | N |
| – axial at 3 000 min ⁻¹ | | 0,8 | 0,2 | | N |
| – axial at standstill | | 10 | 20 | | N |
| 22 Shaft play: | | | | | |
| – radial | \perp | 0,015 | 0,03 | | mm |
| – axial | \parallel | 0 | 0,2 | | mm |
| 23 Housing material | | steel, nickel plated | | | |
| 24 Mass | | 28 | | | g |
| 25 Direction of rotation | | clockwise, viewed from the front face | | | |
| 26 Speed up to | n_{max} | 9 000 | | | min ⁻¹ |
| 27 Number of pole pairs | | 1 | | | |
| 28 Magnet material | | NdFeB | | | |
| Rated values for continuous operation | | | | | |
| 29 Rated torque | M_N | 4,9 | 4,7 | 4,7 | mNm |
| 30 Rated current (thermal limit) | I_N | 0,84 | 0,41 | 0,2 | A |
| 31 Rated speed | n_N | 2 910 | 2 810 | 2 730 | min ⁻¹ |

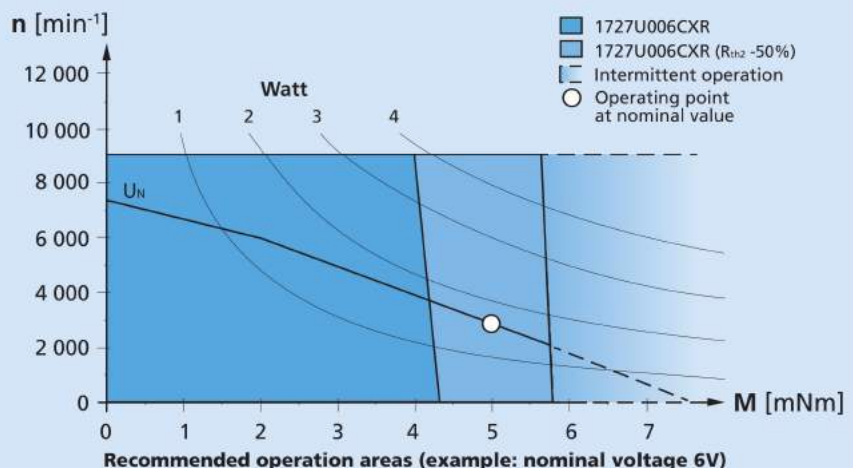
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

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.



DC-Micromotors

Graphite Commutation

8,8 mNm

9 W

Series 1741 ... CXR

| Values at 22°C and nominal voltage | 1741 U | 006 CXR | 012 CXR | 018 CXR | 024 CXR | | |
|---|-------------------------|---------------------------------------|--------------------|---------|---------|---------------------------------|-------------------|
| 1 Nominal voltage | U_N | 6 | 12 | 18 | 24 | V | |
| 2 Terminal resistance | R | 1,3 | 5,8 | 15 | 26,9 | Ω | |
| 3 Efficiency, max. | η_{max} | 72 | 74 | 75 | 75 | % | |
| 4 No-load speed | n_0 | 7 100 | 7 600 | 7 300 | 7 300 | min ⁻¹ | |
| 5 No-load current, typ. (with shaft \varnothing 2 mm) | I_0 | 0,055 | 0,028 | 0,017 | 0,013 | A | |
| 6 Stall torque | M_H | 30,6 | 27,9 | 26,1 | 26,2 | mNm | |
| 7 Friction torque | M_R | 0,4 | 0,4 | 0,4 | 0,4 | mNm | |
| 8 Speed constant | k_n | 1 303 | 668 | 420 | 314 | min ⁻¹ /V | |
| 9 Back-EMF constant | k_E | 0,768 | 1,496 | 2,378 | 3,185 | mV/min ⁻¹ | |
| 10 Torque constant | k_M | 7,33 | 14,29 | 22,71 | 30,41 | mNm/A | |
| 11 Current constant | k_i | 0,136 | 0,07 | 0,044 | 0,033 | A/mNm | |
| 12 Slope of n-M curve | $\Delta n/\Delta M$ | 231 | 271 | 278 | 278 | min ⁻¹ /mNm | |
| 13 Rotor inductance | L | 35 | 135 | 340 | 600 | μ H | |
| 14 Mechanical time constant | τ_m | 4,3 | 4,5 | 4,4 | 4,4 | ms | |
| 15 Rotor inertia | J | 1,8 | 1,6 | 1,5 | 1,5 | gcm ² | |
| 16 Angular acceleration | α_{max} | 170 | 175 | 174 | 174 | $\cdot 10^3$ rad/s ² | |
| 17 Thermal resistance | R_{th1} / R_{th2} | 7 / 23 | | | | K/W | |
| 18 Thermal time constant | τ_{w1} / τ_{w2} | 8 / 440 | | | | s | |
| 19 Operating temperature range: | | | | | | | |
| - motor | | -30 ... +100 | | | | °C | |
| - winding, max. permissible | | +125 | | | | °C | |
| 20 Shaft bearings | | ball bearings, preloaded | sintered bearings | | | | |
| 21 Shaft load max.: | | (standard) | (optional version) | | | | |
| - with shaft diameter | | 2 | 2 | | mm | | |
| - radial at 3 000 min ⁻¹ (3 mm from bearing) | | 8 | 1,5 | | N | | |
| - axial at 3 000 min ⁻¹ | | 0,8 | 0,2 | | N | | |
| - axial at standstill | | 10 | 20 | | N | | |
| 22 Shaft play: | | | | | | | |
| - radial | \leq | 0,015 | 0,03 | | mm | | |
| - axial | \parallel | 0 | 0,2 | | mm | | |
| 23 Housing material | | steel, zinc galvanized and passivated | | | | | |
| 24 Mass | | 45 | | | | | g |
| 25 Direction of rotation | | clockwise, viewed from the front face | | | | | |
| 26 Speed up to | n_{max} | 9 000 | | | | | min ⁻¹ |
| 27 Number of pole pairs | | 1 | | | | | |
| 28 Magnet material | | NdFeB | | | | | |
| Rated values for continuous operation | | | | | | | |
| 29 Rated torque | M_N | 8,8 | 8,4 | 8,4 | 8,4 | mNm | |
| 30 Rated current (thermal limit) | I_N | 1,4 | 0,69 | 0,43 | 0,33 | A | |
| 31 Rated speed | n_N | 4 280 | 4 410 | 3 940 | 3 940 | min ⁻¹ | |

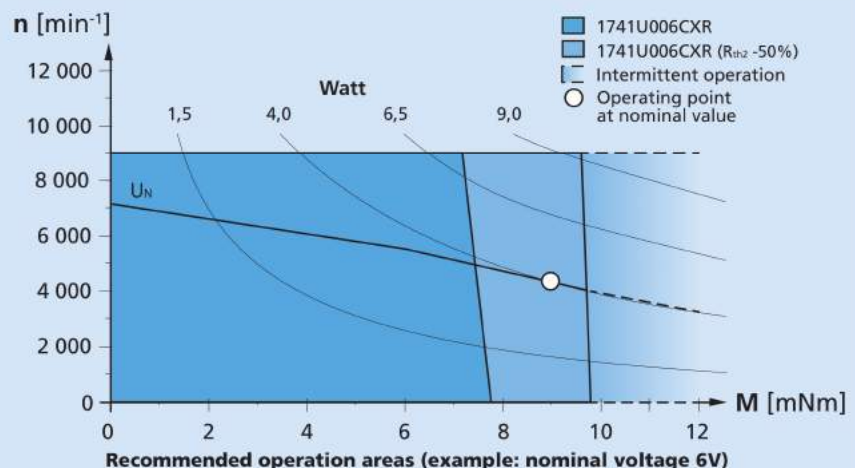
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

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.

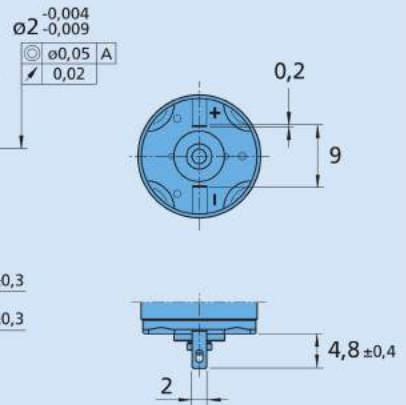
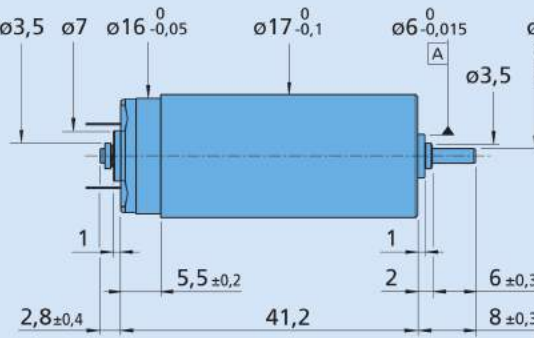
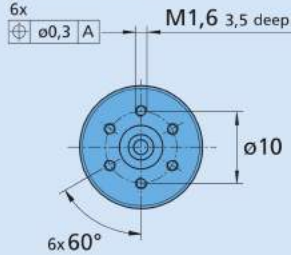
The diagram shows the motor in a completely insulated as well as thermally coupled condition (R_{th2} 50% reduced).

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

Orientation with respect to motor terminals not defined


1741 U ... CXR
Options

 Example product designation: **1741U012CXR-217**

| 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 (-) |
| 123 | Encoder combination | Motor with rear end shaft for combination with Encoder IE2, IEH2 and IEH3 |
| 217 | Bearings | Motor with sintered bearings |
| | | |
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| | | |

Product combination

| Precision Gearheads / Lead Screws | Encoders | Drive Electronics | Cables / Accessories |
|-----------------------------------|--|---|--|
| 15/10 16/7 17/1 20/1R | IE2-16 IE2-1024 IEH2-4096 IEH3-4096 IEH3-4096L | SC 1801 P SC 1801 S SC 2402 P SC 2804 S MCDC 3002 P MCDC 3002 S MCDC 3003 P MCDC 3006 S MC 5004 P | To view our large range of accessory parts, please refer to the "Accessories" chapter. |

DC-Micromotors

Graphite Commutation

12 mNm
11 W

Series 2237 ... CXR

| Values at 22°C and nominal voltage | 2237 S | 006 CXR | 012 CXR | 018 CXR | 024 CXR | 036 CXR | 048 CXR | | |
|---|-------------------------|---------------------------------------|---------|---------|--------------------------|---------|---------|---------------------------------|----|
| 1 Nominal voltage | U_N | 6 | 12 | 18 | 24 | 36 | 48 | V | |
| 2 Terminal resistance | R | 0,85 | 3,92 | 8,5 | 15,7 | 33 | 62,8 | Ω | |
| 3 Efficiency, max. | η_{max} | 68,1 | 70,8 | 72,2 | 72,6 | 73,6 | 73,5 | % | |
| 4 No-load speed | n_0 | 6 900 | 6 800 | 7 000 | 6 900 | 7 200 | 7 000 | min ⁻¹ | |
| 5 No-load current, typ. (with shaft \varnothing 3 mm) | I_0 | 0,124 | 0,058 | 0,039 | 0,029 | 0,02 | 0,015 | A | |
| 6 Stall torque | M_H | 47,2 | 45,7 | 47,1 | 46,6 | 48,7 | 47,1 | mNm | |
| 7 Friction torque | M_R | 0,92 | 0,92 | 0,92 | 0,92 | 0,92 | 0,92 | mNm | |
| 8 Speed constant | k_n | 1 283 | 601 | 409 | 301 | 207 | 150 | min ⁻¹ /V | |
| 9 Back-EMF constant | k_E | 0,78 | 1,66 | 2,44 | 3,33 | 4,83 | 6,65 | mV/min ⁻¹ | |
| 10 Torque constant | k_M | 7,44 | 15,9 | 23,3 | 31,8 | 46,2 | 63,5 | mNm/A | |
| 11 Current constant | k_i | 0,134 | 0,063 | 0,043 | 0,032 | 0,022 | 0,016 | A/mNm | |
| 12 Slope of n-M curve | $\Delta n / \Delta M$ | 146 | 148 | 149 | 149 | 148 | 149 | min ⁻¹ /mNm | |
| 13 Rotor inductance | L | 35 | 150 | 320 | 590 | 1 240 | 2 340 | μ H | |
| 14 Mechanical time constant | τ_m | 5 | 5 | 5 | 5 | 5 | 5 | ms | |
| 15 Rotor inertia | J | 3,1 | 3,1 | 3,1 | 3,1 | 3,1 | 3,1 | gcm ² | |
| 16 Angular acceleration | α_{max} | 152 | 147 | 152 | 150 | 157 | 152 | $\cdot 10^3$ rad/s ² | |
| 17 Thermal resistance | R_{th1} / R_{th2} | 8 / 17 | | | | | | K/W | |
| 18 Thermal time constant | τ_{w1} / τ_{w2} | 13 / 500 | | | | | | s | |
| 19 Operating temperature range: | | | | | | | | | |
| - motor | | -30 ... +100 | | | | | | °C | |
| - winding, max. permissible | | +125 | | | | | | °C | |
| 20 Shaft bearings | | sintered bearings | | | ball bearings, preloaded | | | | |
| 21 Shaft load max.: | | (standard) | | | (optional version) | | | | |
| - with shaft diameter | | 3 | | | 3 | | | | mm |
| - radial at 3 000 min ⁻¹ (3 mm from bearing) | | 2,5 | | | 15 | | | | N |
| - axial at 3 000 min ⁻¹ | | 0,3 | | | 2 | | | | N |
| - axial at standstill | | 20 | | | 20 | | | | N |
| 22 Shaft play: | | | | | | | | | |
| - radial | Δr | 0,03 | | | 0,015 | | | | mm |
| - axial | Δa | 0,15 | | | 0 | | | | mm |
| 23 Housing material | | steel, zinc galvanized and passivated | | | | | | | |
| 24 Mass | | 68 | | | | | | g | |
| 25 Direction of rotation | | clockwise, viewed from the front face | | | | | | | |
| 26 Speed up to | n_{max} | 8 000 | | | | | | min ⁻¹ | |
| 27 Number of pole pairs | | 1 | | | | | | | |
| 28 Magnet material | | NdFeB | | | | | | | |
| Rated values for continuous operation | | | | | | | | | |
| 29 Rated torque | M_N | 11 | 12 | 12 | 12 | 12 | 12 | mNm | |
| 30 Rated current (thermal limit) | I_N | 1,9 | 0,9 | 0,61 | 0,46 | 0,31 | 0,23 | A | |
| 31 Rated speed | n_N | 4 750 | 4 450 | 4 700 | 4 560 | 4 880 | 4 630 | min ⁻¹ | |

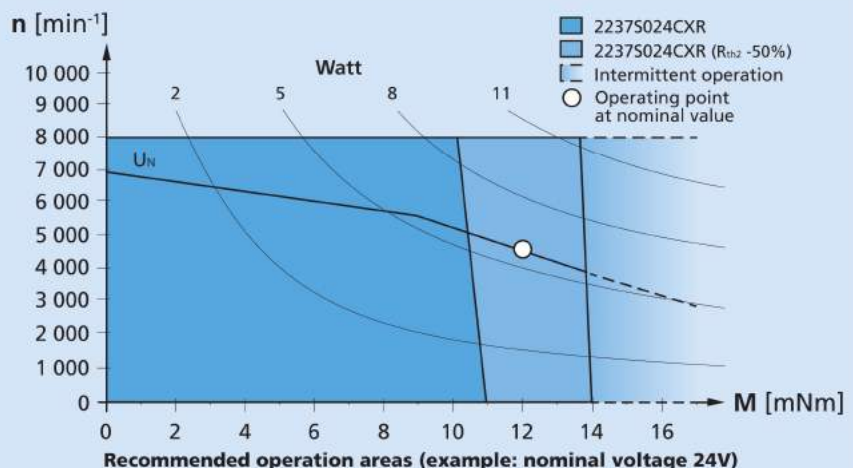
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

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.



DC-Micromotors

Graphite Commutation

26 mNm
21 W

Series 2642 ... CXR

| Values at 22°C and nominal voltage | 2642 W | 012 CXR | 015 CXR | 018 CXR | 024 CXR | 036 CXR | 048 CXR | | |
|---|-------------------------|---------------------------------------|---------|---------|---|---------|---------|---------------------------------|----|
| 1 Nominal voltage | U_N | 12 | 15 | 18 | 24 | 36 | 48 | V | |
| 2 Terminal resistance | R | 1,46 | 2,17 | 3,29 | 5,84 | 13,78 | 24,06 | Ω | |
| 3 Efficiency, max. | η_{max} | 76 | 81 | 80 | 78 | 80 | 79 | % | |
| 4 No-load speed | n_0 | 5 800 | 5 600 | 5 800 | 5 900 | 5 800 | 5 900 | min ⁻¹ | |
| 5 No-load current, typ. (with shaft \varnothing 4 mm) | I_0 | 0,092 | 0,07 | 0,06 | 0,045 | 0,03 | 0,022 | A | |
| 6 Stall torque | M_H | 144,6 | 165,3 | 153,2 | 150,5 | 148 | 149 | mNm | |
| 7 Friction torque | M_R | 1,7 | 1,7 | 1,7 | 1,7 | 1,7 | 1,7 | mNm | |
| 8 Speed constant | k_n | 514 | 395 | 337 | 252 | 167 | 125 | min ⁻¹ /V | |
| 9 Back-EMF constant | k_E | 1,945 | 2,53 | 2,965 | 3,962 | 6,001 | 7,994 | mV/min ⁻¹ | |
| 10 Torque constant | k_M | 18,57 | 24,16 | 28,31 | 37,83 | 57,31 | 76,34 | mNm/A | |
| 11 Current constant | k_i | 0,054 | 0,041 | 0,035 | 0,026 | 0,017 | 0,013 | A/mNm | |
| 12 Slope of n-M curve | $\Delta n / \Delta M$ | 40,4 | 35,5 | 39,2 | 39 | 40,1 | 39,4 | min ⁻¹ /mNm | |
| 13 Rotor inductance | L | 135 | 232 | 313 | 560 | 1 283 | 2 280 | μ H | |
| 14 Mechanical time constant | τ_m | 5,1 | 4,5 | 4,9 | 4,9 | 5 | 5 | ms | |
| 15 Rotor inertia | J | 12 | 12 | 12 | 12 | 12 | 12 | gcm ² | |
| 16 Angular acceleration | α_{max} | 121 | 138 | 128 | 125 | 123 | 124 | $\cdot 10^3$ rad/s ² | |
| 17 Thermal resistance | R_{th1} / R_{th2} | 4,7 / 15,2 | | | | | | K/W | |
| 18 Thermal time constant | τ_{w1} / τ_{w2} | 20 / 720 | | | | | | s | |
| 19 Operating temperature range: | | | | | | | | | |
| - motor | | -30 ... +100 | | | | | | °C | |
| - winding, max. permissible | | +125 | | | | | | °C | |
| 20 Shaft bearings | | sintered bearings (standard) | | | ball bearings, preloaded (optional version) | | | | |
| 21 Shaft load max.: | | | | | | | | | |
| - with shaft diameter | | 4 | | | 4 | | | | mm |
| - radial at 3 000 min ⁻¹ (3 mm from bearing) | | 10 | | | 20 | | | | N |
| - axial at 3 000 min ⁻¹ | | 2 | | | 2 | | | | N |
| - axial at standstill | | 50 | | | 20 | | | | N |
| 22 Shaft play: | | | | | | | | | |
| - radial | Δr | 0,03 | | | 0,015 | | | | mm |
| - axial | Δa | 0,15 | | | 0 | | | | mm |
| 23 Housing material | | steel, zinc galvanized and passivated | | | | | | | |
| 24 Mass | | 114 | | | | | | g | |
| 25 Direction of rotation | | clockwise, viewed from the front face | | | | | | | |
| 26 Speed up to | n_{max} | 7 000 | | | | | | min ⁻¹ | |
| 27 Number of pole pairs | | 1 | | | | | | | |
| 28 Magnet material | | NdFeB | | | | | | | |
| Rated values for continuous operation | | | | | | | | | |
| 29 Rated torque | M_N | 25 | 26 | 26 | 26 | 26 | 26 | mNm | |
| 30 Rated current (thermal limit) | I_N | 1,6 | 1,32 | 1,08 | 0,82 | 0,54 | 0,41 | A | |
| 31 Rated speed | n_N | 4 770 | 4 660 | 4 750 | 4 770 | 4 710 | 4 750 | min ⁻¹ | |

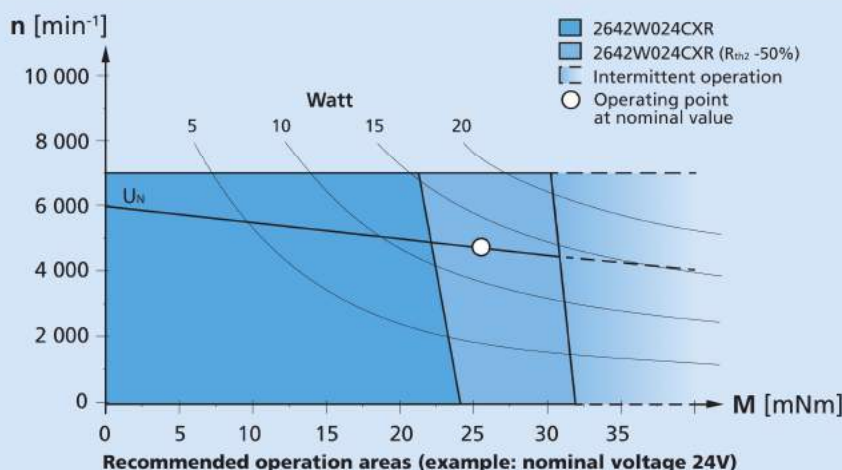
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

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.



DC-Micromotors

Graphite Commutation

40 mNm
34 W

Series 2657 ... CXR

| Values at 22°C and nominal voltage | 2657 W | 012 CXR | 018 CXR | 024 CXR | 030 CXR | 036 CXR | 048 CXR | | |
|---|-------------------------|---------------------------------------|---------|---------|---|---------|---------|---------------------------------|----|
| 1 Nominal voltage | U_N | 12 | 18 | 24 | 30 | 36 | 48 | V | |
| 2 Terminal resistance | R | 0,72 | 1,53 | 2,98 | 4,84 | 6,76 | 12,61 | Ω | |
| 3 Efficiency, max. | η_{max} | 81 | 85 | 83 | 84 | 85 | 83 | % | |
| 4 No-load speed | n_0 | 5 600 | 5 500 | 5 800 | 5 700 | 5 800 | 5 800 | min ⁻¹ | |
| 5 No-load current, typ. (with shaft \varnothing 4 mm) | I_0 | 0,104 | 0,067 | 0,052 | 0,041 | 0,035 | 0,026 | A | |
| 6 Stall torque | M_H | 306,7 | 347,3 | 302,9 | 300,7 | 306,9 | 283,1 | mNm | |
| 7 Friction torque | M_R | 2 | 2 | 2 | 2 | 2 | 2 | mNm | |
| 8 Speed constant | k_n | 494 | 321 | 247 | 196 | 165 | 122 | min ⁻¹ /V | |
| 9 Back-EMF constant | k_E | 2,024 | 3,113 | 4,05 | 5,11 | 6,07 | 8,205 | mV/min ⁻¹ | |
| 10 Torque constant | k_M | 19,33 | 29,73 | 38,67 | 48,84 | 58 | 78,35 | mNm/A | |
| 11 Current constant | k_i | 0,052 | 0,034 | 0,026 | 0,02 | 0,017 | 0,013 | A/mNm | |
| 12 Slope of n-M curve | $\Delta n / \Delta M$ | 18,4 | 16,5 | 19 | 19,4 | 19,2 | 19,6 | min ⁻¹ /mNm | |
| 13 Rotor inductance | L | 90 | 214 | 365 | 579 | 816 | 1 500 | μ H | |
| 14 Mechanical time constant | τ_m | 3,3 | 2,9 | 3,4 | 3,4 | 3,4 | 3,5 | ms | |
| 15 Rotor inertia | J | 17 | 17 | 17 | 17 | 17 | 17 | gcm ² | |
| 16 Angular acceleration | α_{max} | 180 | 204 | 178 | 177 | 180 | 172 | $\cdot 10^3$ rad/s ² | |
| 17 Thermal resistance | R_{th1} / R_{th2} | 4,4 / 12,6 | | | | | | K/W | |
| 18 Thermal time constant | τ_{w1} / τ_{w2} | 28 / 810 | | | | | | s | |
| 19 Operating temperature range: | | | | | | | | | |
| – motor | | -30 ... +100 | | | | | | °C | |
| – winding, max. permissible | | +125 | | | | | | °C | |
| 20 Shaft bearings | | sintered bearings (standard) | | | ball bearings, preloaded (optional version) | | | | |
| 21 Shaft load max.: | | | | | | | | | |
| – with shaft diameter | | 4 | | | 4 | | | | mm |
| – radial at 3 000 min ⁻¹ (3 mm from bearing) | | 10 | | | 20 | | | | N |
| – axial at 3 000 min ⁻¹ | | 2 | | | 2 | | | | N |
| – axial at standstill | | 50 | | | 20 | | | | N |
| 22 Shaft play: | | | | | | | | | |
| – radial | Δr | 0,03 | | | 0,015 | | | | mm |
| – axial | Δa | 0,15 | | | 0 | | | | mm |
| 23 Housing material | | steel, zinc galvanized and passivated | | | | | | | |
| 24 Mass | | 156 | | | | | | g | |
| 25 Direction of rotation | | clockwise, viewed from the front face | | | | | | | |
| 26 Speed up to | n_{max} | 7 000 | | | | | | min ⁻¹ | |
| 27 Number of pole pairs | | 1 | | | | | | | |
| 28 Magnet material | | NdFeB | | | | | | | |
| Rated values for continuous operation | | | | | | | | | |
| 29 Rated torque | M_N | 39 | 43 | 40 | 40 | 40 | 40 | mNm | |
| 30 Rated current (thermal limit) | I_N | 2,4 | 1,7 | 1,2 | 0,97 | 0,82 | 0,61 | A | |
| 31 Rated speed | n_N | 5 040 | 5 020 | 5 110 | 5 050 | 5 140 | 5 050 | min ⁻¹ | |

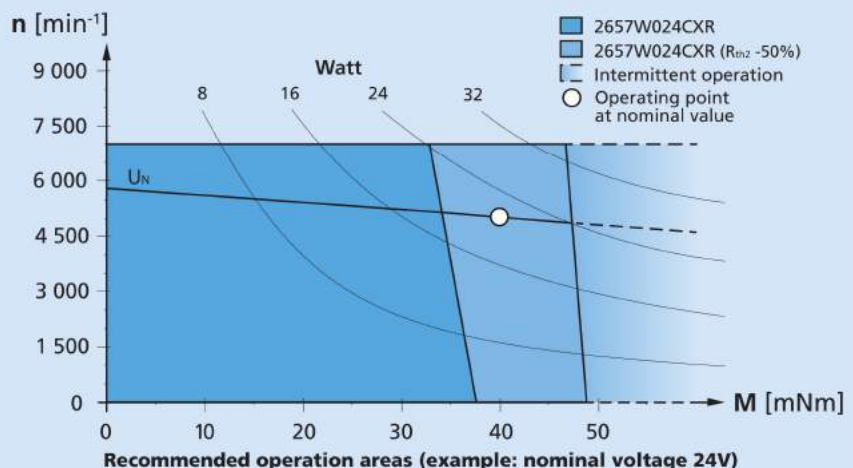
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

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.



DC-Micromotors with graphite commutation

Highly stable and low-wear graphite commutation, extremely powerful neodymium magnets and a particularly high copper content in the winding of the FAULHABER rotor give the CR series its enormous power. The impressive power range of 19 to 224 mNm is ideal for high-performance applications with fast start/stop operation or periodic overload conditions. Thanks to the extremely high power density as well as the outstanding dynamics with minimal rotor inertia, the CR family is the most powerful product family of the entire FAULHABER DC range. The standard drive can be combined with high-resolution optical or magnetic encoders for applications with precise speed control or positioning tasks. A broad and optimally matched selection of gearheads is available to extend the range of requirements that this series is able to fulfil.

Series

| | |
|-------------|-------------|
| 2342 ... CR | 2642 ... CR |
| 2657 ... CR | 2668 ... CR |
| 3242 ... CR | 3257 ... CR |
| 3272 ... CR | 3863 ... CR |
| 3890 ... CR | |

Key Features

| | |
|-------------------|--------------------------------|
| Motor diameter | 23 ... 38 mm |
| Motor length | 42 ... 90 mm |
| Nominal voltage | 6 ... 48 V |
| Speed | up to 11.000 min ⁻¹ |
| Torque | up to 224 mNm |
| Continuous output | up to 160 W |



Product Code

| | |
|-----|---------------------|
| 32 | Motor diameter [mm] |
| 72 | Motor length [mm] |
| G | Shaft type |
| 024 | Nominal voltage [V] |
| CR | Product family |

FAULHABER CR

Advantages of this series at a glance

- Best dynamic performance due to a low rotor inertia
- Shockproof all-steel housing with corrosion-resistant coating
- Powerful rare-earth magnet
- Extremely wide operating temperature range -30 °C to 125 °C (optionally -55 °C, winding up to 155 °C)
- Durable graphite commutation
- No cogging
- Highest power density



DC-Micromotors

Graphite Commutation

19 mNm
24 W

Series 2342 ... CR

| Values at 22°C and nominal voltage | 2342 S | 006 CR | 012 CR | 018 CR | 024 CR | 036 CR | 048 CR | |
|---|-------------------------|---------------------------------------|--------|--------|--------|--------|--------|---------------------------------|
| 1 Nominal voltage | U_N | 6 | 12 | 18 | 24 | 36 | 48 | V |
| 2 Terminal resistance | R | 0,4 | 1,9 | 4,1 | 7,1 | 15,9 | 31,2 | Ω |
| 3 Efficiency, max. | η_{max} | 81 | 80 | 81 | 81 | 81 | 81 | % |
| 4 No-load speed | n_0 | 9 000 | 8 100 | 8 000 | 8 500 | 8 100 | 8 000 | min ⁻¹ |
| 5 No-load current, typ. (with shaft \varnothing 3 mm) | I_0 | 0,17 | 0,075 | 0,048 | 0,038 | 0,024 | 0,017 | A |
| 6 Stall torque | M_H | 87,2 | 80 | 86,5 | 85,4 | 91,4 | 84,4 | mNm |
| 7 Friction torque | M_R | 0,98 | 1 | 0,99 | 0,99 | 0,99 | 0,95 | mNm |
| 8 Speed constant | k_n | 1 650 | 713 | 462 | 366 | 231 | 170 | min ⁻¹ /V |
| 9 Back-EMF constant | k_E | 0,604 | 1,4 | 2,16 | 2,73 | 4,34 | 5,87 | mV/min ⁻¹ |
| 10 Torque constant | k_M | 5,77 | 13,4 | 20,7 | 26,1 | 41,4 | 56,1 | mNm/A |
| 11 Current constant | k_i | 0,173 | 0,075 | 0,048 | 0,038 | 0,024 | 0,018 | A/mNm |
| 12 Slope of n-M curve | $\Delta n / \Delta M$ | 103 | 101 | 92,5 | 99,5 | 88,6 | 94,8 | min ⁻¹ /mNm |
| 13 Rotor inductance | L | 13,5 | 65 | 150 | 265 | 590 | 1 050 | μ H |
| 14 Mechanical time constant | τ_m | 6 | 6 | 6 | 6 | 6 | 6 | ms |
| 15 Rotor inertia | J | 5,6 | 5,7 | 6,2 | 5,8 | 6,5 | 6 | gcm ² |
| 16 Angular acceleration | α_{max} | 160 | 140 | 140 | 150 | 140 | 140 | $\cdot 10^3$ rad/s ² |
| 17 Thermal resistance | R_{th1} / R_{th2} | 3 / 15 | | | | | | K/W |
| 18 Thermal time constant | τ_{w1} / τ_{w2} | 6,5 / 490 | | | | | | s |
| 19 Operating temperature range: | | | | | | | | |
| – motor | | -30 ... +100 | | | | | | °C |
| – winding, max. permissible | | +125 | | | | | | °C |
| 20 Shaft bearings | | ball bearings, preloaded | | | | | | |
| 21 Shaft load max.: | | | | | | | | |
| – with shaft diameter | | 3 | | | | | | mm |
| – radial at 3 000 min ⁻¹ (3 mm from bearing) | | 20 | | | | | | N |
| – axial at 3 000 min ⁻¹ | | 2 | | | | | | N |
| – axial at standstill | | 20 | | | | | | N |
| 22 Shaft play: | | | | | | | | |
| – radial | \perp | 0,015 | | | | | | mm |
| – axial | \parallel | 0 | | | | | | mm |
| 23 Housing material | | steel, black coated | | | | | | |
| 24 Mass | | 88 | | | | | | g |
| 25 Direction of rotation | | clockwise, viewed from the front face | | | | | | |
| 26 Speed up to | n_{max} | 11 000 | | | | | | min ⁻¹ |
| 27 Number of pole pairs | | 1 | | | | | | |
| 28 Magnet material | | NdFeB | | | | | | |
| Rated values for continuous operation | | | | | | | | |
| 29 Rated torque | M_N | 14 | 17 | 18 | 17 | 19 | 18 | mNm |
| 30 Rated current (thermal limit) | I_N | 2,9 | 1,5 | 1 | 0,78 | 0,53 | 0,38 | A |
| 31 Rated speed | n_N | 7 140 | 6 090 | 6 040 | 6 470 | 6 160 | 5 910 | min ⁻¹ |

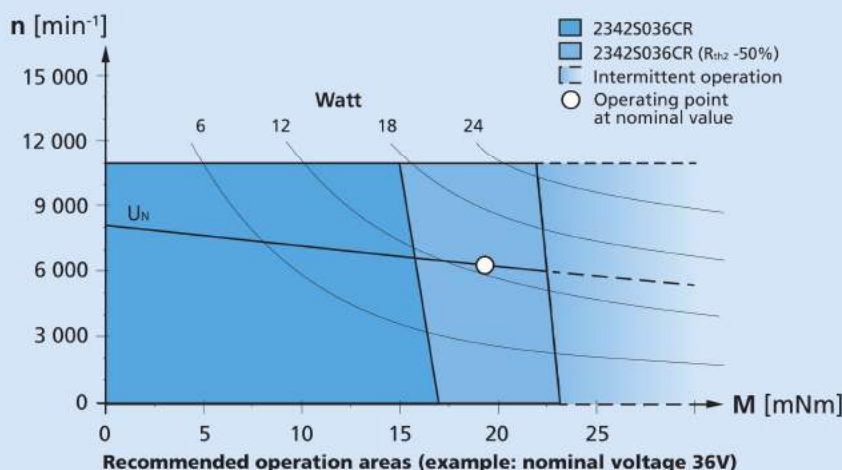
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

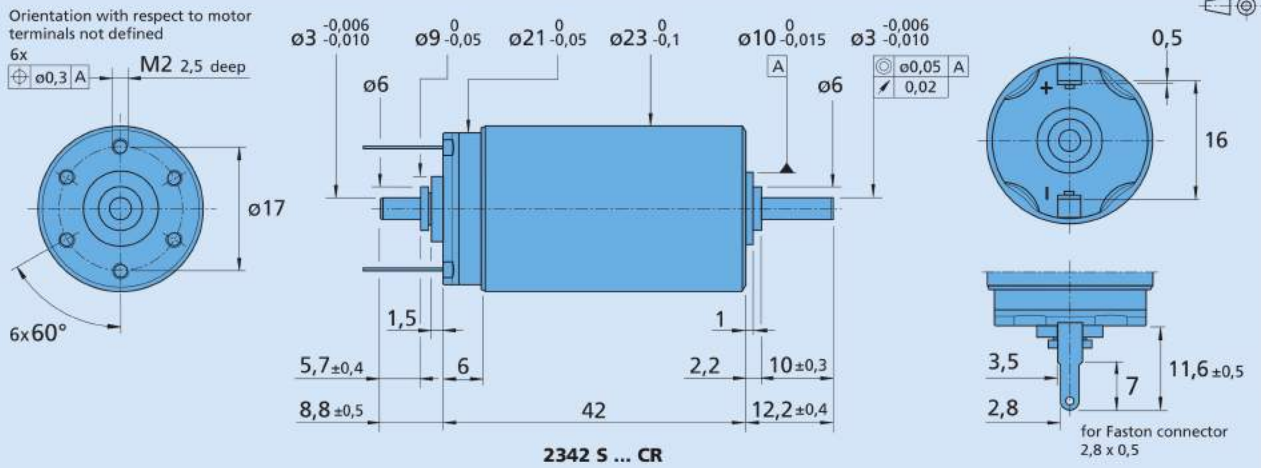
Note:

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

Options

 Example product designation: **2342S012CR-158**

| Option | Type | Description |
|--------|--------------------|---|
| U | Single Leads | For motors with single leads (PTFE), length 160 mm, red (+) / black (-) |
| 158 | Shaft end | No second shaft end |
| X188 | Brakes combination | For combination with Brakes MBZ |
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Product combination

| Precision Gearheads / Lead Screws | Encoders | Drive Electronics | Cables / Accessories |
|-----------------------------------|--------------|-------------------|--|
| 22F | IE3-1024 | SC 2402 P | MBZ |
| 22GPT | IE3-1024 L | SC 2804 S | To view our large range of accessory parts, please refer to the "Accessories" chapter. |
| 22/7 | IERS3-500 | SC 5004 P | |
| 23/1 | IERS3-500 L | SC 5008 S | |
| 26A | IER3-10000 | MCDC 3002 P | |
| 26/1 | IER3-10000 L | MCDC 3002 S | |
| 26/1R | | MCDC 3003 P | |
| 30/1 | | MCDC 3006 S | |
| 30/1 S | | MC 5004 P | |
| | | MC 5005 S | |
| | | | |
| | | | |

DC-Micromotors

Graphite Commutation

32 mNm
28 W

Series 2642 ... CR

| Values at 22°C and nominal voltage | 2642 W | 012 CR | 018 CR | 024 CR | 036 CR | 048 CR | | |
|---|-------------------------|--------|---------------------------------------|--------|--------|--------|-------|---------------------------------|
| 1 Nominal voltage | U_N | | 12 | 18 | 24 | 36 | 48 | V |
| 2 Terminal resistance | R | | 1,45 | 3,1 | 5,78 | 13,6 | 23,8 | Ω |
| 3 Efficiency, max. | η_{max} | | 78 | 76 | 79 | 76 | 79 | % |
| 4 No-load speed | n_0 | | 6 400 | 6 400 | 6 400 | 6 500 | 6 400 | min ⁻¹ |
| 5 No-load current, typ. (with shaft \varnothing 4 mm) | I_0 | | 0,118 | 0,079 | 0,058 | 0,039 | 0,029 | A |
| 6 Stall torque | M_H | | 132 | 144 | 139 | 134 | 137 | mNm |
| 7 Friction torque | M_R | | 2 | 2 | 2 | 2 | 2 | mNm |
| 8 Speed constant | k_n | | 565 | 370 | 276 | 183 | 137 | min ⁻¹ /V |
| 9 Back-EMF constant | k_E | | 1,77 | 2,7 | 3,62 | 5,47 | 7,31 | mV/min ⁻¹ |
| 10 Torque constant | k_M | | 16,9 | 25,8 | 34,6 | 52,2 | 69,8 | mNm/A |
| 11 Current constant | k_i | | 0,059 | 0,039 | 0,029 | 0,019 | 0,014 | A/mNm |
| 12 Slope of n-M curve | $\Delta n/\Delta M$ | | 48,5 | 44,5 | 46 | 47,7 | 46,7 | min ⁻¹ /mNm |
| 13 Rotor inductance | L | | 130 | 300 | 550 | 1 200 | 2 200 | μ H |
| 14 Mechanical time constant | τ_m | | 5,4 | 5,4 | 5,4 | 5,4 | 5,4 | ms |
| 15 Rotor inertia | J | | 11 | 12 | 11 | 11 | 11 | gcm ² |
| 16 Angular acceleration | α_{max} | | 120 | 120 | 120 | 120 | 120 | $\cdot 10^3$ rad/s ² |
| 17 Thermal resistance | R_{th1} / R_{th2} | | 2,1 / 11 | | | | | K/W |
| 18 Thermal time constant | τ_{w1} / τ_{w2} | | 10 / 510 | | | | | s |
| 19 Operating temperature range: | | | | | | | | |
| - motor | | | -30 ... +125 | | | | | °C |
| - winding, max. permissible | | | +155 | | | | | °C |
| 20 Shaft bearings | | | ball bearings, preloaded | | | | | |
| 21 Shaft load max.: | | | | | | | | |
| - with shaft diameter | | | 4 | | | | | mm |
| - radial at 3 000 min ⁻¹ (3 mm from bearing) | | | 20 | | | | | N |
| - axial at 3 000 min ⁻¹ | | | 2 | | | | | N |
| - axial at standstill | | | 20 | | | | | N |
| 22 Shaft play: | | | | | | | | |
| - radial | \leq | | 0,015 | | | | | mm |
| - axial | \parallel | | 0 | | | | | mm |
| 23 Housing material | | | steel, black coated | | | | | |
| 24 Mass | | | 114 | | | | | g |
| 25 Direction of rotation | | | clockwise, viewed from the front face | | | | | |
| 26 Speed up to | n_{max} | | 7 000 | | | | | min ⁻¹ |
| 27 Number of pole pairs | | | 1 | | | | | |
| 28 Magnet material | | | NdFeB | | | | | |
| Rated values for continuous operation | | | | | | | | |
| 29 Rated torque | M_N | | 30 | 32 | 32 | 31 | 32 | mNm |
| 30 Rated current (thermal limit) | I_N | | 2,2 | 1,5 | 1,1 | 0,74 | 0,56 | A |
| 31 Rated speed | n_N | | 4 390 | 4 490 | 4 370 | 4 340 | 4 330 | min ⁻¹ |

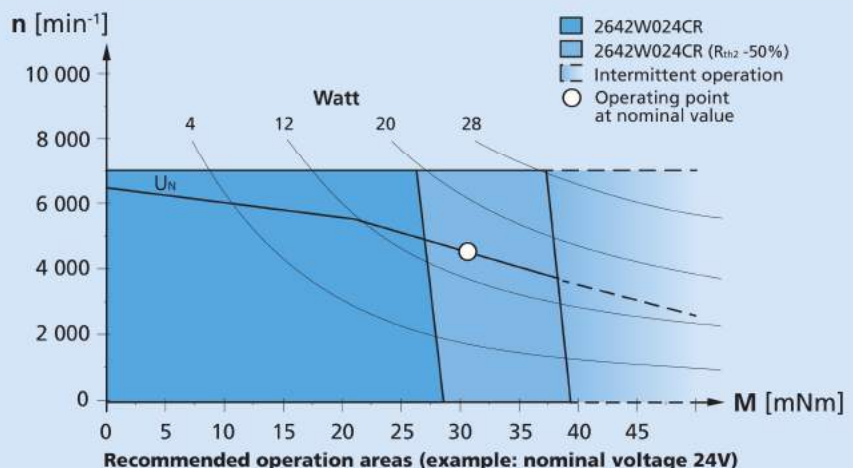
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

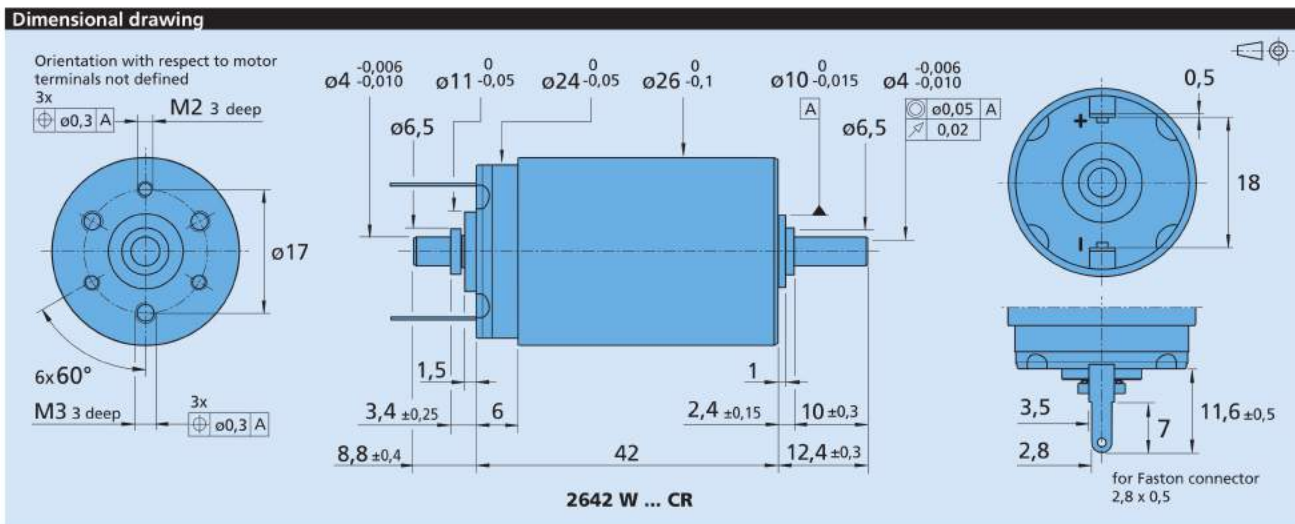
Note:

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.





Options

Example product designation: **2642W012CR-158**

| Option | Type | Description |
|--------|--------------|---|
| U | Single Leads | For motors with single leads (PTFE), length 160 mm, red (+) / black (-) |
| 158 | Shaft end | No second shaft end |
| | | |
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Product combination

| Precision Gearheads / Lead Screws | Encoders | Drive Electronics | Cables / Accessories |
|--|--|--|---|
| 22GPT 26A 26/1 26/1R 30/1 30/1 S 32A 32ALN 32GPT | IE3-1024 IE3-1024 L IERS3-500 IERS3-500 L IER3-10000 IER3-10000 L | SC 2402 P SC 2804 S SC 5004 P SC 5008 S MCDC 3003 P MCDC 3006 S MC 5004 P MC 5005 S | MBZ To view our large range of accessory parts, please refer to the "Accessories" chapter. |

DC-Micromotors

Graphite Commutation

51 mNm
45 W

Series 2657 ... CR

| Values at 22°C and nominal voltage | 2657 W | 012 CR | 018 CR | 024 CR | 036 CR | 048 CR | |
|---|-------------------------|---------------------------------------|--------|--------|--------|--------|---------------------------------|
| 1 Nominal voltage | U_N | 12 | 18 | 24 | 36 | 48 | V |
| 2 Terminal resistance | R | 0,71 | 1,7 | 2,84 | 6,78 | 12,5 | Ω |
| 3 Efficiency, max. | η_{max} | 84 | 81 | 85 | 82 | 84 | % |
| 4 No-load speed | n_0 | 6 300 | 6 300 | 6 400 | 6 480 | 6 400 | min ⁻¹ |
| 5 No-load current, typ. (with shaft \varnothing 4 mm) | I_0 | 0,115 | 0,077 | 0,058 | 0,039 | 0,028 | A |
| 6 Stall torque | M_H | 278 | 269 | 286 | 273 | 265 | mNm |
| 7 Friction torque | M_R | 2 | 2 | 2 | 2 | 2 | mNm |
| 8 Speed constant | k_n | 552 | 363 | 274 | 182 | 136 | min ⁻¹ /V |
| 9 Back-EMF constant | k_E | 1,81 | 2,75 | 3,65 | 5,51 | 7,37 | mV/min ⁻¹ |
| 10 Torque constant | k_M | 17,3 | 26,3 | 34,8 | 52,6 | 70,4 | mNm/A |
| 11 Current constant | k_i | 0,058 | 0,038 | 0,029 | 0,019 | 0,014 | A/mNm |
| 12 Slope of n-M curve | $\Delta n / \Delta M$ | 22,7 | 23,5 | 22,4 | 23,4 | 24,2 | min ⁻¹ /mNm |
| 13 Rotor inductance | L | 95 | 210 | 380 | 850 | 1 550 | μ H |
| 14 Mechanical time constant | τ_m | 3,9 | 3,9 | 3,9 | 3,9 | 3,9 | ms |
| 15 Rotor inertia | J | 16 | 16 | 17 | 16 | 15 | gcm ² |
| 16 Angular acceleration | α_{max} | 170 | 170 | 170 | 170 | 170 | $\cdot 10^3$ rad/s ² |
| 17 Thermal resistance | R_{th1} / R_{th2} | 1,9 / 9 | | | | | K/W |
| 18 Thermal time constant | τ_{w1} / τ_{w2} | 10 / 580 | | | | | s |
| 19 Operating temperature range: | | | | | | | |
| - motor | | -30 ... +125 | | | | | °C |
| - winding, max. permissible | | +155 | | | | | °C |
| 20 Shaft bearings | | ball bearings, preloaded | | | | | |
| 21 Shaft load max.: | | | | | | | |
| - with shaft diameter | | 4 | | | | | mm |
| - radial at 3 000 min ⁻¹ (3 mm from bearing) | | 20 | | | | | N |
| - axial at 3 000 min ⁻¹ | | 2 | | | | | N |
| - axial at standstill | | 20 | | | | | N |
| 22 Shaft play: | | | | | | | |
| - radial | \perp | 0,015 | | | | | mm |
| - axial | \parallel | 0 | | | | | mm |
| 23 Housing material | | steel, black coated | | | | | |
| 24 Mass | | 156 | | | | | g |
| 25 Direction of rotation | | clockwise, viewed from the front face | | | | | |
| 26 Speed up to | n_{max} | 7 000 | | | | | min ⁻¹ |
| 27 Number of pole pairs | | 1 | | | | | |
| 28 Magnet material | | NdFeB | | | | | |
| Rated values for continuous operation | | | | | | | |
| 29 Rated torque | M_N | 45 | 49 | 51 | 50 | 50 | mNm |
| 30 Rated current (thermal limit) | I_N | 3 | 2,3 | 1,8 | 1,2 | 0,86 | A |
| 31 Rated speed | n_N | 5 250 | 4 960 | 5 060 | 5 020 | 4 920 | min ⁻¹ |

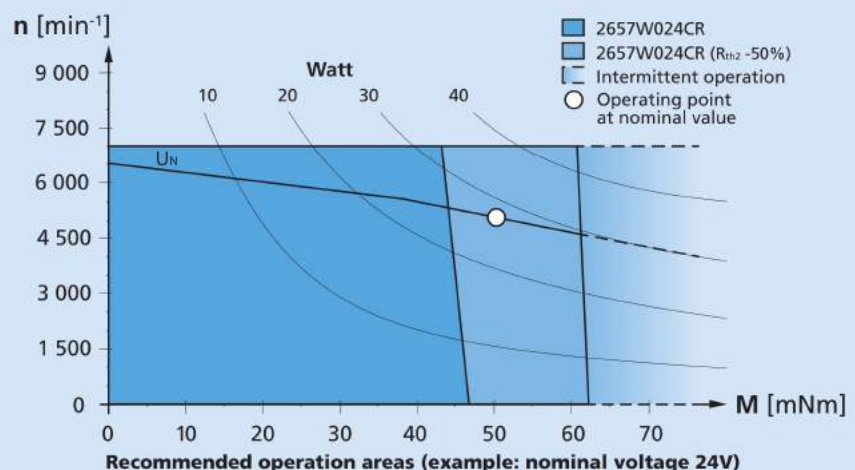
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

Note:

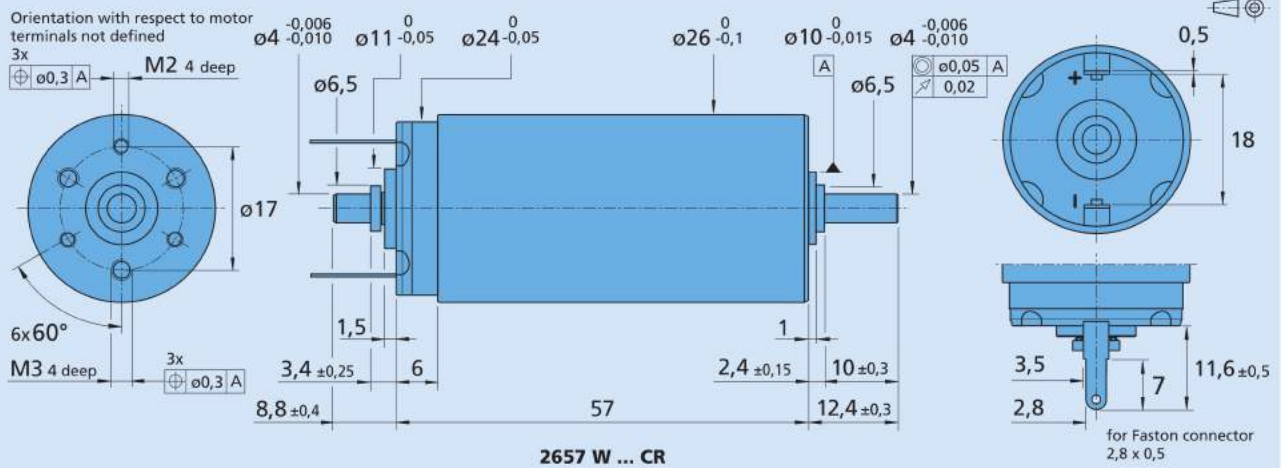
The diagram indicates the recommended speed in relation to the available torque at the output shaft for a given ambient temperature of 22°C.

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



Options

Example product designation: **2657W012CR-158**

| Option | Type | Description |
|--------|--------------|---|
| U | Single Leads | For motors with single leads (PTFE), length 160 mm, red (+) / black (-) |
| 158 | Shaft end | No second shaft end |
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Product combination

| Precision Gearheads / Lead Screws | Encoders | Drive Electronics | Cables / Accessories |
|--|--|--|---|
| 22GPT 26A 26/1 26/1R 30/1 30/1 S 32A 32ALN 32GPT | IE3-1024 IE3-1024 L IERS3-500 IERS3-500 L IER3-10000 IER3-10000 L | SC 2402 P SC 2804 S SC 5004 P SC 5008 S MCDC 3003 P MCDC 3006 S MC 5004 P MC 5005 S | MBZ To view our large range of accessory parts, please refer to the "Accessories" chapter. |

DC-Micromotors

Graphite Commutation

70 mNm
84 W

Series 2668 ... CR

| Values at 22°C and nominal voltage | 2668 W | 018 CR | 024 CR | 036 CR | 048 CR | |
|---|-------------------------|---------------------------------------|--------|--------|--------|---------------------------------|
| 1 Nominal voltage | U_N | 18 | 24 | 36 | 48 | V |
| 2 Terminal resistance | R | 0,57 | 1,03 | 2,53 | 4,23 | Ω |
| 3 Efficiency, max. | η_{max} | 86 | 87 | 87 | 88 | % |
| 4 No-load speed | n_0 | 7 900 | 7 800 | 7 500 | 7 700 | min ⁻¹ |
| 5 No-load current, typ. (with shaft \varnothing 4 mm) | I_0 | 0,105 | 0,078 | 0,05 | 0,038 | A |
| 6 Stall torque | M_H | 653 | 656 | 632 | 660 | mNm |
| 7 Friction torque | M_R | 2,2 | 2,2 | 2,2 | 2,2 | mNm |
| 8 Speed constant | k_n | 448 | 331 | 211 | 162 | min ⁻¹ /V |
| 9 Back-EMF constant | k_E | 2,24 | 3,02 | 4,73 | 6,18 | mV/min ⁻¹ |
| 10 Torque constant | k_M | 21,3 | 28,9 | 45,2 | 59 | mNm/A |
| 11 Current constant | k_i | 0,047 | 0,035 | 0,022 | 0,017 | A/mNm |
| 12 Slope of n-M curve | $\Delta n / \Delta M$ | 12 | 11,8 | 11,8 | 11,6 | min ⁻¹ /mNm |
| 13 Rotor inductance | L | 87 | 158 | 390 | 660 | μ H |
| 14 Mechanical time constant | τ_m | 3,4 | 3,1 | 3,1 | 3,2 | ms |
| 15 Rotor inertia | J | 27 | 25 | 25 | 26 | gcm ² |
| 16 Angular acceleration | α_{max} | 242 | 263 | 253 | 254 | $\cdot 10^3$ rad/s ² |
| 17 Thermal resistance | R_{th1} / R_{th2} | 3 / 8 | | | | K/W |
| 18 Thermal time constant | τ_{w1} / τ_{w2} | 33 / 600 | | | | s |
| 19 Operating temperature range: | | | | | | |
| – motor | | -30 ... +125 | | | | °C |
| – winding, max. permissible | | +155 | | | | °C |
| 20 Shaft bearings | | ball bearings, preloaded | | | | |
| 21 Shaft load max.: | | | | | | |
| – with shaft diameter | | 4 | | | | mm |
| – radial at 3 000 min ⁻¹ (3 mm from bearing) | | 20 | | | | N |
| – axial at 3 000 min ⁻¹ | | 2 | | | | N |
| – axial at standstill | | 20 | | | | N |
| 22 Shaft play: | | | | | | |
| – radial | \perp | 0,015 | | | | mm |
| – axial | \parallel | 0 | | | | mm |
| 23 Housing material | | steel, black coated | | | | |
| 24 Mass | | 189 | | | | g |
| 25 Direction of rotation | | clockwise, viewed from the front face | | | | |
| 26 Speed up to | n_{max} | 10 000 | | | | min ⁻¹ |
| 27 Number of pole pairs | | 1 | | | | |
| 28 Magnet material | | NdFeB | | | | |
| Rated values for continuous operation | | | | | | |
| 29 Rated torque | M_N | 56 | 68 | 69 | 70 | mNm |
| 30 Rated current (thermal limit) | I_N | 3 | 2,8 | 1,8 | 1,4 | A |
| 31 Rated speed | n_N | 7 480 | 7 370 | 7 030 | 7 260 | min ⁻¹ |

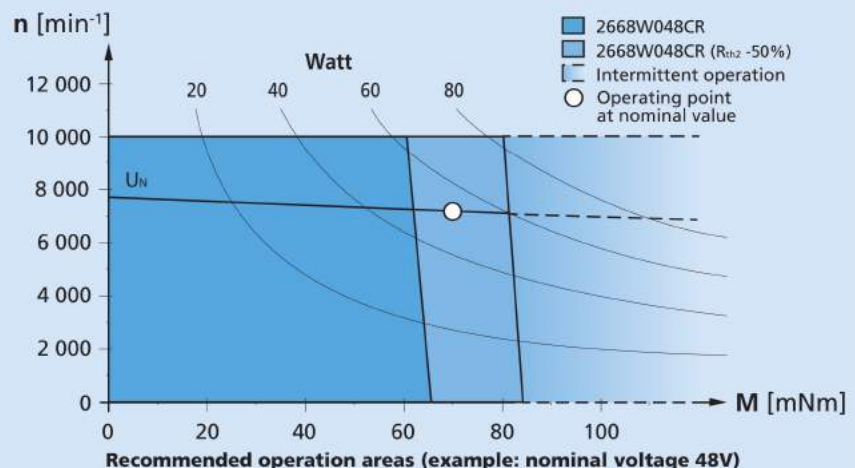
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

Note:

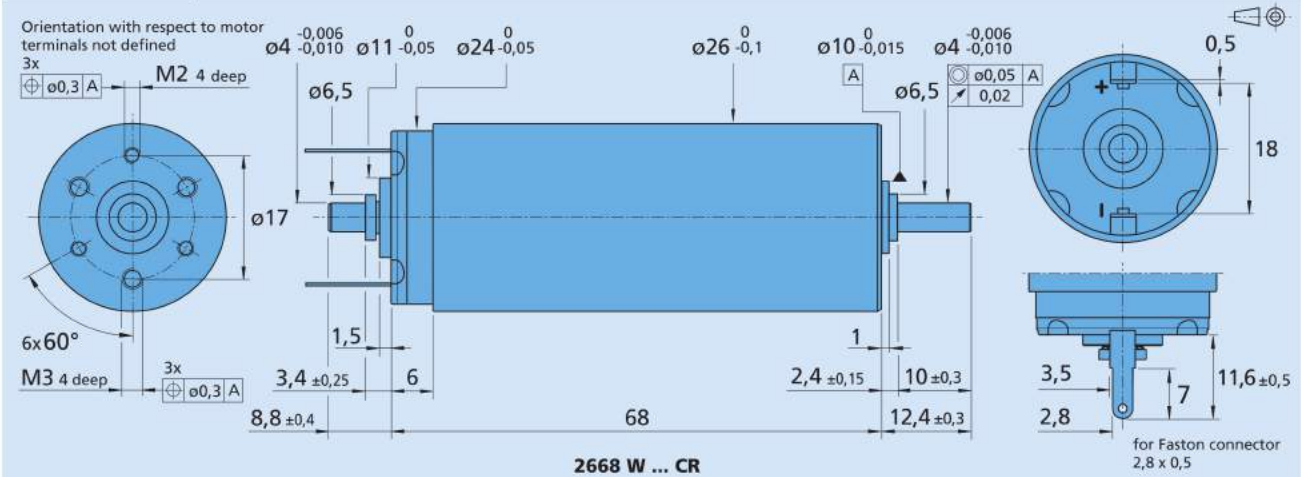
The diagram indicates the recommended speed in relation to the available torque at the output shaft for a given ambient temperature of 22°C.

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



Options

Example product designation: **2668W048CR-158**

| Option | Type | Description |
|--------|--------------|---|
| U | Single Leads | For motors with single leads (PTFE), length 160 mm, red (+) / black (-) |
| 158 | Shaft end | No second shaft end |
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Product combination

| Precision Gearheads / Lead Screws | Encoders | Drive Electronics | Cables / Accessories |
|---|--|---|---|
| 22GPT 26A 26/1 26/1R 30/1 30/1 S 32A 32ALN 32GPT 32/3 32/3R | IE3-1024 IE3-1024 L IERS3-500 IERS3-500 L IER3-10000 IER3-10000 L | SC 2804 S SC 5004 P SC 5008 S MCDC 3003 P MCDC 3006 S MC 5004 P MC 5005 S | MBZ To view our large range of accessory parts, please refer to the "Accessories" chapter. |

DC-Micromotors

Graphite Commutation

41 mNm

30 W

Series 3242 ... CR

| Values at 22°C and nominal voltage | 3242 G | 012 CR | 018 CR | 024 CR | 036 CR | 048 CR | | |
|---|-------------------------|--------|---------------------------------------|--------|--------|--------|-------|---------------------------------|
| 1 Nominal voltage | U_N | | 12 | 18 | 24 | 36 | 48 | V |
| 2 Terminal resistance | R | | 1,27 | 2,73 | 5 | 10,5 | 19,7 | Ω |
| 3 Efficiency, max. | η_{max} | | 72 | 70 | 73 | 71 | 73 | % |
| 4 No-load speed | n_0 | | 5 200 | 5 300 | 5 300 | 5 500 | 5 400 | min ⁻¹ |
| 5 No-load current, typ. (with shaft \varnothing 5 mm) | I_0 | | 0,234 | 0,157 | 0,117 | 0,081 | 0,058 | A |
| 6 Stall torque | M_H | | 181 | 196 | 189 | 202 | 193 | mNm |
| 7 Friction torque | M_R | | 4,8 | 4,8 | 4,8 | 4,8 | 4,8 | mNm |
| 8 Speed constant | k_n | | 464 | 304 | 231 | 156 | 116 | min ⁻¹ /V |
| 9 Back-EMF constant | k_E | | 2,15 | 3,29 | 4,33 | 6,42 | 8,58 | mV/min ⁻¹ |
| 10 Torque constant | k_M | | 20,6 | 31,4 | 41,3 | 61,3 | 82 | mNm/A |
| 11 Current constant | k_i | | 0,049 | 0,032 | 0,024 | 0,016 | 0,012 | A/mNm |
| 12 Slope of n-M curve | $\Delta n / \Delta M$ | | 28,7 | 26,4 | 28 | 26,7 | 28 | min ⁻¹ /mNm |
| 13 Rotor inductance | L | | 135 | 310 | 540 | 1 220 | 2 200 | μ H |
| 14 Mechanical time constant | τ_m | | 7,5 | 7,5 | 7,5 | 7,5 | 7,5 | ms |
| 15 Rotor inertia | J | | 25 | 27 | 26 | 27 | 26 | gcm ² |
| 16 Angular acceleration | α_{max} | | 73 | 73 | 74 | 75 | 75 | $\cdot 10^3$ rad/s ² |
| 17 Thermal resistance | R_{th1} / R_{th2} | | 2,5 / 9 | | | | | K/W |
| 18 Thermal time constant | τ_{w1} / τ_{w2} | | 17 / 660 | | | | | s |
| 19 Operating temperature range: | | | | | | | | |
| – motor | | | -30 ... +125 | | | | | °C |
| – winding, max. permissible | | | +155 | | | | | °C |
| 20 Shaft bearings | | | ball bearings, preloaded | | | | | |
| 21 Shaft load max.: | | | | | | | | |
| – with shaft diameter | | | 5 | | | | | mm |
| – radial at 3 000 min ⁻¹ (3 mm from bearing) | | | 50 | | | | | N |
| – axial at 3 000 min ⁻¹ | | | 5 | | | | | N |
| – axial at standstill | | | 50 | | | | | N |
| 22 Shaft play: | | | | | | | | |
| – radial | \perp | | 0,015 | | | | | mm |
| – axial | \parallel | | 0 | | | | | mm |
| 23 Housing material | | | steel, black coated | | | | | |
| 24 Mass | | | 175 | | | | | g |
| 25 Direction of rotation | | | clockwise, viewed from the front face | | | | | |
| 26 Speed up to | n_{max} | | 6 000 | | | | | min ⁻¹ |
| 27 Number of pole pairs | | | 1 | | | | | |
| 28 Magnet material | | | NdFeB | | | | | |
| Rated values for continuous operation | | | | | | | | |
| 29 Rated torque | M_N | | 40 | 41 | 41 | 41,7 | 41 | mNm |
| 30 Rated current (thermal limit) | I_N | | 2,5 | 1,7 | 1,3 | 0,89 | 0,65 | A |
| 31 Rated speed | n_N | | 3 580 | 3 690 | 3 690 | 3 900 | 3 780 | min ⁻¹ |

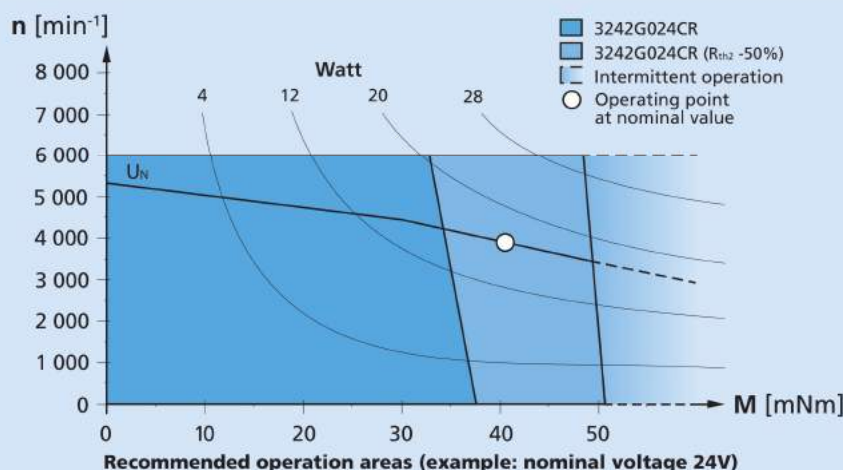
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

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).

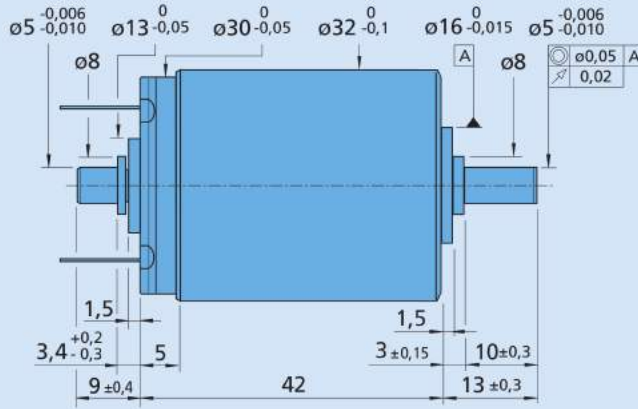
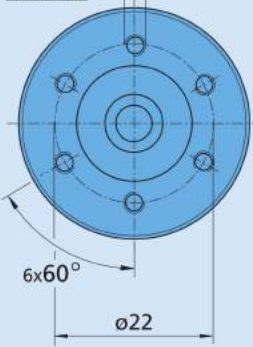
The nominal voltage (U_N) curve shows the operating point at nominal voltage in the insulated and thermally coupled condition. Any points of operation above the curve at nominal voltage will require a higher operating voltage. Any points below the nominal voltage curve will require less voltage.



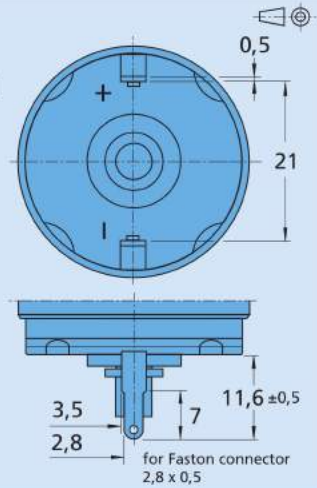
Dimensional drawing

Orientation with respect to motor terminals not defined

6x $\begin{matrix} \oplus \\ \ominus \end{matrix} \text{ } \phi 0,3 \text{ A}$ M3 3 deep



3242 G ... CR



Options

Example product designation: **3242G012CR-158**

| Option | Type | Description |
|--------|--------------|---|
| U | Single Leads | For motors with single leads (PTFE), length 160 mm, red (+) / black (-) |
| 158 | Shaft end | No second shaft end |
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Product combination

| Precision Gearheads / Lead Screws | Encoders | Drive Electronics | Cables / Accessories |
|--|--|---|---|
| 32A 32ALN 32GPT 32/3 32/3R 38A 38/1 38/1 S 38/2 38/2 S 42GPT | IE3-1024 IE3-1024 L IERS3-500 IERS3-500 L IER3-10000 IER3-10000 L | SC 2402 P SC 2804 S SC 5004 P SC 5008 S MCDC 3003 P MCDC 3006 S MC 5004 P MC 5005 S MC 5010 S | MBZ To view our large range of accessory parts, please refer to the "Accessories" chapter. |

DC-Micromotors

Graphite Commutation

73 mNm
60 W

Series 3257 ... CR

| Values at 22°C and nominal voltage | 3257 G | 012 CR | 018 CR | 024 CR | 036 CR | 048 CR | | |
|---|-------------------------|--------|---------------------------------------|--------|--------|--------|-------|---------------------------------|
| 1 Nominal voltage | U_N | | 12 | 18 | 24 | 36 | 48 | V |
| 2 Terminal resistance | R | | 0,41 | 0,84 | 1,63 | 4,15 | 6,56 | Ω |
| 3 Efficiency, max. | η_{max} | | 83 | 83 | 83 | 80 | 83 | % |
| 4 No-load speed | n_0 | | 5 700 | 6 100 | 5 900 | 5 600 | 5 900 | min ⁻¹ |
| 5 No-load current, typ. (with shaft \varnothing 5 mm) | I_0 | | 0,258 | 0,18 | 0,129 | 0,082 | 0,064 | A |
| 6 Stall torque | M_H | | 531 | 561 | 539 | 518 | 547 | mNm |
| 7 Friction torque | M_R | | 4,9 | 4,9 | 4,9 | 4,9 | 4,9 | mNm |
| 8 Speed constant | k_n | | 500 | 352 | 253 | 156 | 125 | min ⁻¹ /V |
| 9 Back-EMF constant | k_E | | 2 | 2,84 | 3,95 | 6,4 | 7,98 | mV/min ⁻¹ |
| 10 Torque constant | k_M | | 19,1 | 27,2 | 37,7 | 61,1 | 76,2 | mNm/A |
| 11 Current constant | k_i | | 0,052 | 0,037 | 0,027 | 0,016 | 0,013 | A/mNm |
| 12 Slope of n-M curve | $\Delta n / \Delta M$ | | 10,7 | 10,9 | 10,9 | 10,6 | 10,8 | min ⁻¹ /mNm |
| 13 Rotor inductance | L | | 70 | 140 | 270 | 700 | 1 100 | μ H |
| 14 Mechanical time constant | τ_m | | 4,7 | 4,7 | 4,7 | 4,7 | 4,7 | ms |
| 15 Rotor inertia | J | | 42 | 41 | 41 | 42 | 42 | gcm ² |
| 16 Angular acceleration | α_{max} | | 130 | 140 | 130 | 120 | 130 | $\cdot 10^3$ rad/s ² |
| 17 Thermal resistance | R_{th1} / R_{th2} | | 2 / 8 | | | | | K/W |
| 18 Thermal time constant | τ_{w1} / τ_{w2} | | 17 / 810 | | | | | s |
| 19 Operating temperature range: | | | | | | | | |
| – motor | | | -30 ... +125 | | | | | °C |
| – winding, max. permissible | | | +155 | | | | | °C |
| 20 Shaft bearings | | | ball bearings, preloaded | | | | | |
| 21 Shaft load max.: | | | | | | | | |
| – with shaft diameter | | | 5 | | | | | mm |
| – radial at 3 000 min ⁻¹ (3 mm from bearing) | | | 50 | | | | | N |
| – axial at 3 000 min ⁻¹ | | | 5 | | | | | N |
| – axial at standstill | | | 50 | | | | | N |
| 22 Shaft play: | | | | | | | | |
| – radial | \perp | | 0,015 | | | | | mm |
| – axial | \parallel | | 0 | | | | | mm |
| 23 Housing material | | | steel, black coated | | | | | |
| 24 Mass | | | 242 | | | | | g |
| 25 Direction of rotation | | | clockwise, viewed from the front face | | | | | |
| 26 Speed up to | n_{max} | | 7 000 | | | | | min ⁻¹ |
| 27 Number of pole pairs | | | 1 | | | | | |
| 28 Magnet material | | | NdFeB | | | | | |
| Rated values for continuous operation | | | | | | | | |
| 29 Rated torque | M_N | | 63 | 70 | 71 | 73,1 | 73 | mNm |
| 30 Rated current (thermal limit) | I_N | | 4 | 3,2 | 2,3 | 1,49 | 1,2 | A |
| 31 Rated speed | n_N | | 5 150 | 5 470 | 5 210 | 4 770 | 5 190 | min ⁻¹ |

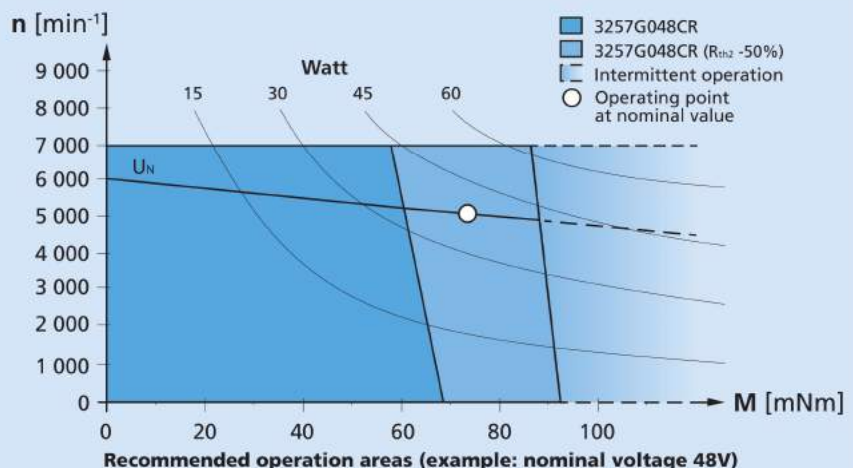
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

Note:

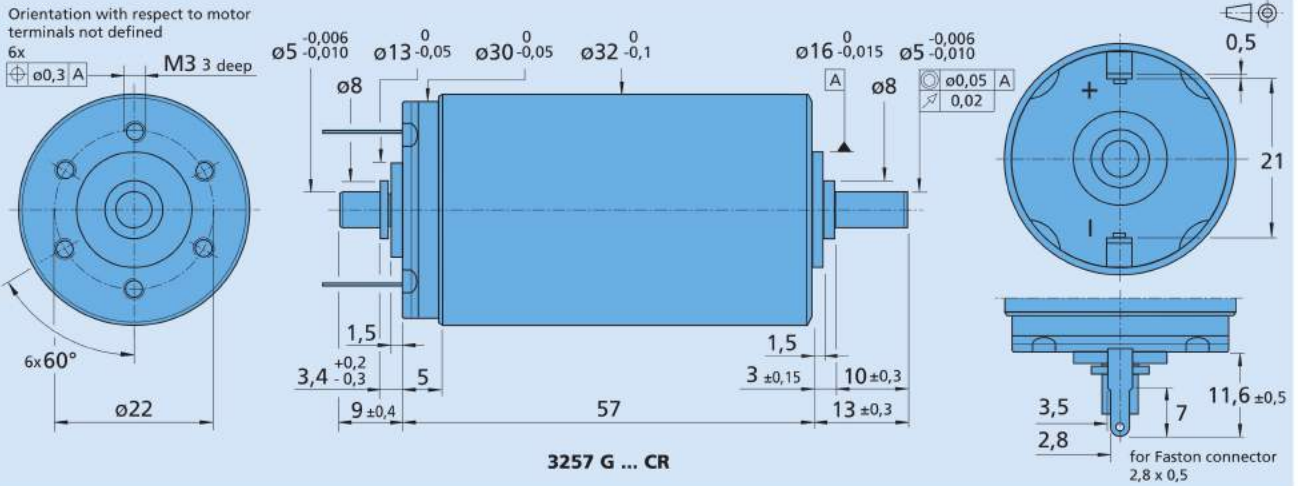
The diagram indicates the recommended speed in relation to the available torque at the output shaft for a given ambient temperature of 22°C.

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



Options

Example product designation: **3257G012CR-158**

| Option | Type | Description |
|--------|--------------|---|
| U | Single Leads | For motors with single leads (PTFE), length 160 mm, red (+) / black (-) |
| 158 | Shaft end | No second shaft end |
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Product combination

| Precision Gearheads / Lead Screws | Encoders | Drive Electronics | Cables / Accessories |
|--|--|---|---|
| 32A 32ALN 32GPT 32/3 32/3R 38A 38/1 38/1 S 38/2 38/2 S 42GPT | IE3-1024 IE3-1024 L IERS3-500 IERS3-500 L IER3-10000 IER3-10000 L | SC 2402 P SC 2804 S SC 5004 P SC 5008 S MCDC 3003 P MCDC 3006 S MC 5004 P MC 5005 S MC 5010 S | MBZ To view our large range of accessory parts, please refer to the "Accessories" chapter. |

DC-Micromotors

Graphite Commutation

120 mNm
85 W

Series 3272 ... CR

| Values at 22°C and nominal voltage | 3272 G | 012 CR | 018 CR | 024 CR | 036 CR | 048 CR | | |
|---|-------------------------|---------------------------------------|--------|--------|--------|--------|---------------------------------|-------------------|
| 1 Nominal voltage | U_N | 12 | 18 | 24 | 36 | 48 | V | |
| 2 Terminal resistance | R | 0,2 | 0,42 | 0,82 | 1,67 | 3,35 | Ω | |
| 3 Efficiency, max. | η_{max} | 85 | 87 | 87 | 88 | 88 | % | |
| 4 No-load speed | n_0 | 5 400 | 5 700 | 5 500 | 5 800 | 5 500 | min ⁻¹ | |
| 5 No-load current, typ. (with shaft \varnothing 5 mm) | I_0 | 0,191 | 0,135 | 0,095 | 0,069 | 0,048 | A | |
| 6 Stall torque | M_H | 1 192 | 1 225 | 1 188 | 1 250 | 1 177 | mNm | |
| 7 Friction torque | M_R | 3,9 | 3,9 | 3,9 | 4 | 3,9 | mNm | |
| 8 Speed constant | k_n | 459 | 324 | 230 | 162 | 115 | min ⁻¹ /V | |
| 9 Back-EMF constant | k_E | 2,18 | 3,09 | 4,35 | 6,18 | 8,7 | mV/min ⁻¹ | |
| 10 Torque constant | k_M | 20,8 | 29,5 | 41,6 | 59 | 83,3 | mNm/A | |
| 11 Current constant | k_i | 0,048 | 0,034 | 0,024 | 0,017 | 0,012 | A/mNm | |
| 12 Slope of n-M curve | $\Delta n / \Delta M$ | 4,4 | 4,6 | 4,5 | 4,6 | 4,6 | min ⁻¹ /mNm | |
| 13 Rotor inductance | L | 45 | 95 | 185 | 370 | 740 | μ H | |
| 14 Mechanical time constant | τ_m | 3,1 | 3 | 3 | 3 | 2,9 | ms | |
| 15 Rotor inertia | J | 67 | 60 | 63 | 62 | 60 | gcm ² | |
| 16 Angular acceleration | α_{max} | 178 | 204 | 189 | 202 | 196 | $\cdot 10^3$ rad/s ² | |
| 17 Thermal resistance | R_{th1} / R_{th2} | 2,3 / 7 | | | | | | K/W |
| 18 Thermal time constant | τ_{w1} / τ_{w2} | 40 / 850 | | | | | | s |
| 19 Operating temperature range: | | | | | | | | |
| - motor | | -30 ... +125 | | | | | | °C |
| - winding, max. permissible | | +155 | | | | | | °C |
| 20 Shaft bearings | | ball bearings, preloaded | | | | | | |
| 21 Shaft load max.: | | | | | | | | |
| - with shaft diameter | | 5 | | | | | | mm |
| - radial at 3 000 min ⁻¹ (3 mm from bearing) | | 50 | | | | | | N |
| - axial at 3 000 min ⁻¹ | | 5 | | | | | | N |
| - axial at standstill | | 50 | | | | | | N |
| 22 Shaft play: | | | | | | | | |
| - radial | \perp | 0,015 | | | | | | mm |
| - axial | \parallel | 0 | | | | | | mm |
| 23 Housing material | | steel, black coated | | | | | | |
| 24 Mass | | 312 | | | | | | g |
| 25 Direction of rotation | | clockwise, viewed from the front face | | | | | | |
| 26 Speed up to | n_{max} | 6 000 | | | | | | min ⁻¹ |
| 27 Number of pole pairs | | 1 | | | | | | |
| 28 Magnet material | | NdFeB | | | | | | |
| Rated values for continuous operation | | | | | | | | |
| 29 Rated torque | M_N | 75 | 102 | 119 | 119 | 120 | mNm | |
| 30 Rated current (thermal limit) | I_N | 4 | 4 | 3,5 | 2,4 | 1,7 | A | |
| 31 Rated speed | n_N | 5 110 | 5 470 | 5 150 | 5 560 | 5 180 | min ⁻¹ | |

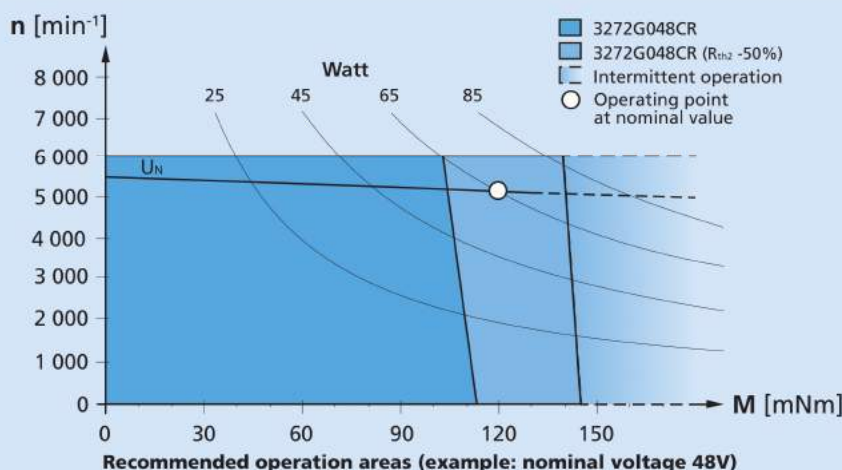
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

Note:

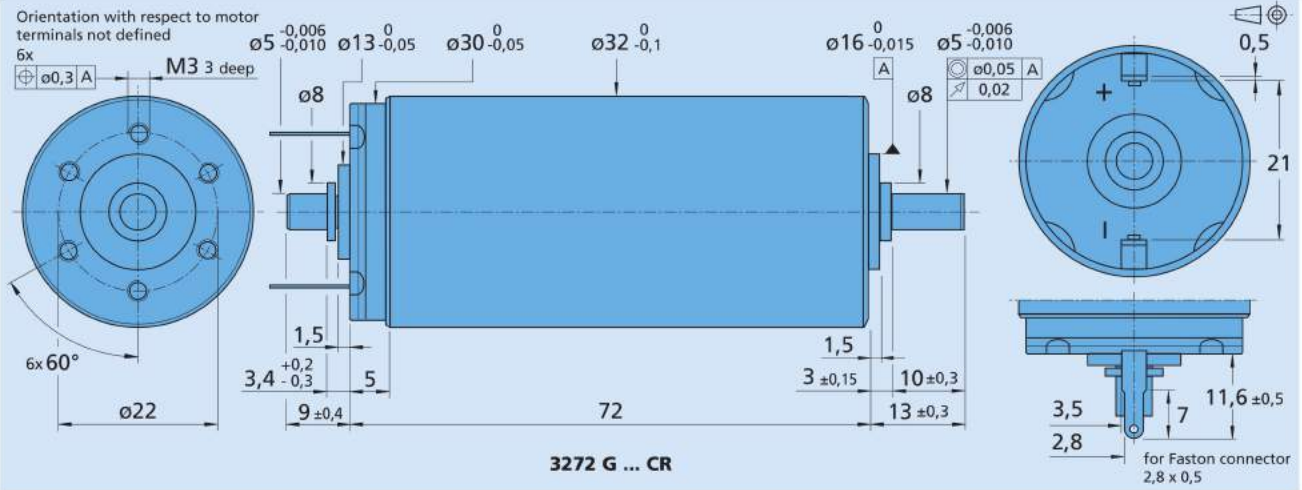
The diagram indicates the recommended speed in relation to the available torque at the output shaft for a given ambient temperature of 22°C.

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



Options

Example product designation: **3272G012CR-158**

| Option | Type | Description |
|--------|--------------|---|
| U | Single Leads | For motors with single leads (PTFE), length 160 mm, red (+) / black (-) |
| 158 | Shaft end | No second shaft end |
| | | |
| | | |
| | | |
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Product combination

| Precision Gearheads / Lead Screws | Encoders | Drive Electronics | Cables / Accessories |
|--|--|---|---|
| 32A 32ALN 32GPT 32/3 32/3R 38A 38/1 38/1 S 38/2 38/2 S 42GPT | IE3-1024 IE3-1024 L IERS3-500 IERS3-500 L IER3-10000 IER3-10000 L | SC 2402 P SC 2804 S SC 5004 P SC 5008 S MCDC 3003 P MCDC 3006 S MC 5004 P MC 5005 S MC 5010 S | MBZ To view our large range of accessory parts, please refer to the "Accessories" chapter. |

DC-Micromotors

Graphite Commutation

131 mNm

110 W

Series 3863 ... CR

| Values at 22°C and nominal voltage | 3863 H | 012 CR | 018 CR | 024 CR | 036 CR | 048 CR | |
|---|-------------------------|---------------------------------------|--------|--------|--------|--------|---------------------------------|
| 1 Nominal voltage | U_N | 12 | 18 | 24 | 36 | 48 | V |
| 2 Terminal resistance | R | 0,16 | 0,36 | 0,64 | 1,55 | 2,58 | Ω |
| 3 Efficiency, max. | η_{max} | 83 | 84 | 85 | 86 | 86 | % |
| 4 No-load speed | n_0 | 5 600 | 5 900 | 5 800 | 5 800 | 5 800 | min ⁻¹ |
| 5 No-load current, typ. (with shaft \varnothing 6 mm) | I_0 | 0,335 | 0,232 | 0,168 | 0,112 | 0,084 | A |
| 6 Stall torque | M_H | 1 424 | 1 394 | 1 455 | 1 363 | 1 461 | mNm |
| 7 Friction torque | M_R | 6,5 | 6,5 | 6,5 | 6,5 | 6,5 | mNm |
| 8 Speed constant | k_n | 480 | 332 | 240 | 160 | 120 | min ⁻¹ /V |
| 9 Back-EMF constant | k_E | 2,08 | 3,01 | 4,17 | 6,25 | 8,33 | mV/min ⁻¹ |
| 10 Torque constant | k_M | 19,9 | 28,8 | 39,8 | 59,8 | 79,7 | mNm/A |
| 11 Current constant | k_i | 0,05 | 0,035 | 0,025 | 0,017 | 0,013 | A/mNm |
| 12 Slope of n-M curve | $\Delta n / \Delta M$ | 3,9 | 4,1 | 3,9 | 4,1 | 3,9 | min ⁻¹ /mNm |
| 13 Rotor inductance | L | 45 | 90 | 180 | 400 | 700 | μ H |
| 14 Mechanical time constant | τ_m | 4,8 | 4,8 | 4,8 | 4,8 | 4,7 | ms |
| 15 Rotor inertia | J | 120 | 110 | 120 | 110 | 115 | gcm ² |
| 16 Angular acceleration | α_{max} | 119 | 127 | 121 | 124 | 127 | $\cdot 10^3$ rad/s ² |
| 17 Thermal resistance | R_{th1} / R_{th2} | 2,5 / 6 | | | | | K/W |
| 18 Thermal time constant | τ_{w1} / τ_{w2} | 50 / 900 | | | | | s |
| 19 Operating temperature range: | | | | | | | |
| – motor | | -30 ... +125 | | | | | °C |
| – winding, max. permissible | | +155 | | | | | °C |
| 20 Shaft bearings | | ball bearings, preloaded | | | | | |
| 21 Shaft load max.: | | | | | | | |
| – with shaft diameter | | 6 | | | | | mm |
| – radial at 3 000 min ⁻¹ (3 mm from bearing) | | 60 | | | | | N |
| – axial at 3 000 min ⁻¹ | | 6 | | | | | N |
| – axial at standstill | | 50 | | | | | N |
| 22 Shaft play: | | | | | | | |
| – radial | \perp | 0,015 | | | | | mm |
| – axial | \parallel | 0 | | | | | mm |
| 23 Housing material | | steel, black coated | | | | | |
| 24 Mass | | 390 | | | | | g |
| 25 Direction of rotation | | clockwise, viewed from the front face | | | | | |
| 26 Speed up to | n_{max} | 7 000 | | | | | min ⁻¹ |
| 27 Number of pole pairs | | 1 | | | | | |
| 28 Magnet material | | NdFeB | | | | | |
| Rated values for continuous operation | | | | | | | |
| 29 Rated torque | M_N | 69 | 99 | 129 | 126 | 131 | mNm |
| 30 Rated current (thermal limit) | I_N | 4 | 4 | 4 | 2,6 | 2 | A |
| 31 Rated speed | n_N | 5 430 | 5 660 | 5 510 | 5 500 | 5 550 | min ⁻¹ |

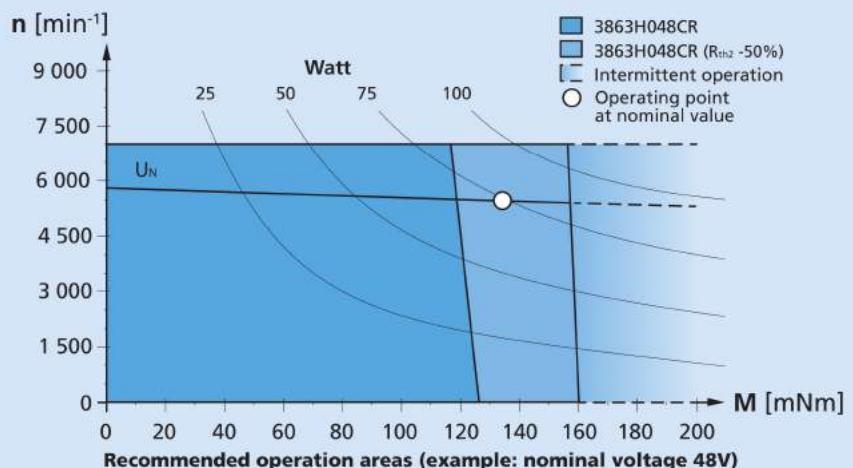
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

Note:

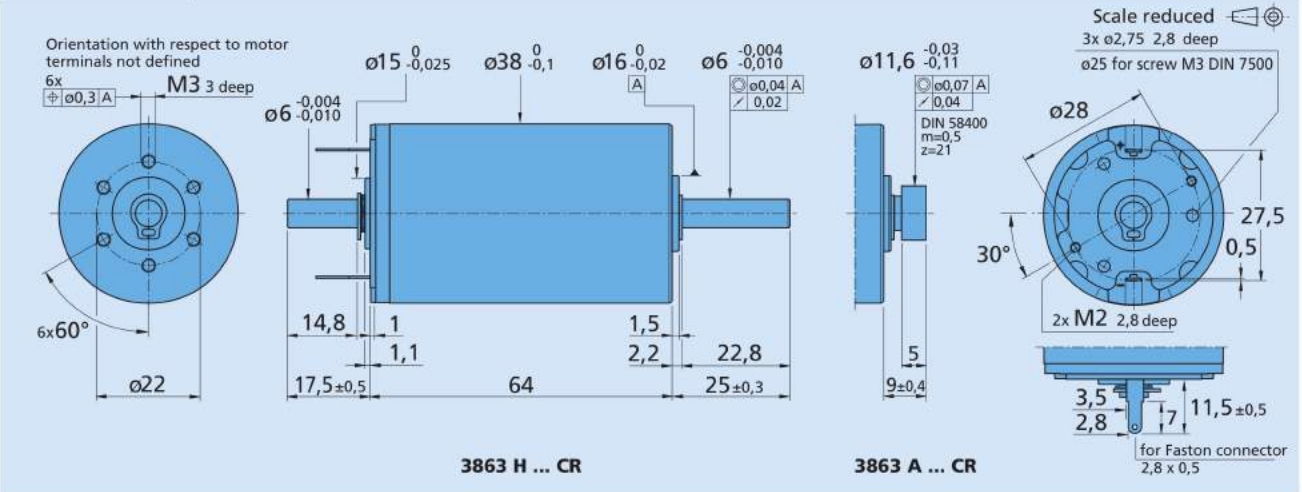
The diagram indicates the recommended speed in relation to the available torque at the output shaft for a given ambient temperature of 22°C.

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



Options

Example product designation: **3863H012CR-158**

| Option | Type | Description |
|--------|---------------------|--|
| U | Single Leads | For motors with single leads (PTFE), length 160 mm, red (+) / black (-) |
| 158 | Shaft end | No second shaft end |
| 2016 | Encoder combination | Motor with rear end shaft for combination with Encoder IE3, IERS3 and IER3 |
| 1387 | Brakes combination | For combination with Brakes MBZ |
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Product combination

| Precision Gearheads / Lead Screws | Encoders | Drive Electronics | Cables / Accessories |
|--|--|---|---|
| 38A 38/1 38/1 S 38/2 38/2 S 42GPT 44/1 | IE3-1024 IE3-1024 L IERS3-500 IERS3-500 L IER3-10000 IER3-10000 L | SC 2804 S SC 5004 P SC 5008 S MCDC 3006 S MC 5010 S | MBZ To view our large range of accessory parts, please refer to the "Accessories" chapter. |

DC-Micromotors

Graphite Commutation

224 mNm
160 W

Series 3890 ... CR

| Values at 22°C and nominal voltage | 3890 H | 018 CR | 024 CR | 036 CR | 048 CR | |
|---|-------------------------|---------------------------------------|--------|--------|--------|---------------------------------|
| 1 Nominal voltage | U_N | 18 | 24 | 36 | 48 | V |
| 2 Terminal resistance | R | 0,21 | 0,36 | 0,78 | 1,38 | Ω |
| 3 Efficiency, max. | η_{max} | 86 | 87 | 87 | 88 | % |
| 4 No-load speed | n_0 | 5 400 | 5 400 | 5 400 | 5 500 | min ⁻¹ |
| 5 No-load current, typ. (with shaft \varnothing 6 mm) | I_0 | 0,323 | 0,242 | 0,161 | 0,121 | A |
| 6 Stall torque | M_H | 2 642 | 2 760 | 2 887 | 2 911 | mNm |
| 7 Friction torque | M_R | 10 | 10 | 10 | 10 | mNm |
| 8 Speed constant | k_n | 300 | 225 | 150 | 112 | min ⁻¹ /V |
| 9 Back-EMF constant | k_E | 3,332 | 4,443 | 6,665 | 8,887 | mV/min ⁻¹ |
| 10 Torque constant | k_M | 31,82 | 42,43 | 63,65 | 84,86 | mNm/A |
| 11 Current constant | k_I | 0,031 | 0,024 | 0,016 | 0,012 | A/mNm |
| 12 Slope of n-M curve | $\Delta n / \Delta M$ | 2 | 1,9 | 1,8 | 1,8 | min ⁻¹ /mNm |
| 13 Rotor inductance | L | 60 | 110 | 240 | 430 | μ H |
| 14 Mechanical time constant | τ_m | 3,4 | 3,3 | 3,3 | 3,3 | ms |
| 15 Rotor inertia | J | 164 | 164 | 171 | 171 | gcm ² |
| 16 Angular acceleration | α_{max} | 161 | 168 | 169 | 170 | $\cdot 10^3$ rad/s ² |
| 17 Thermal resistance | R_{th1} / R_{th2} | 1,9 / 4,2 | | | | K/W |
| 18 Thermal time constant | τ_{w1} / τ_{w2} | 58 / 910 | | | | s |
| 19 Operating temperature range: | | | | | | |
| – motor | | -30 ... +125 | | | | °C |
| – winding, max. permissible | | +155 | | | | °C |
| 20 Shaft bearings | | ball bearings, preloaded | | | | |
| 21 Shaft load max.: | | | | | | |
| – with shaft diameter | | 6 | | | | mm |
| – radial at 3 000 min ⁻¹ (3 mm from bearing) | | 60 | | | | N |
| – axial at 3 000 min ⁻¹ | | 6 | | | | N |
| – axial at standstill | | 50 | | | | N |
| 22 Shaft play: | | | | | | |
| – radial | \perp | 0,015 | | | | mm |
| – axial | \parallel | 0 | | | | mm |
| 23 Housing material | | steel, black coated | | | | |
| 24 Mass | | 550 | | | | g |
| 25 Direction of rotation | | clockwise, viewed from the front face | | | | |
| 26 Speed up to | n_{max} | 6 000 | | | | min ⁻¹ |
| 27 Number of pole pairs | | 1 | | | | |
| 28 Magnet material | | NdFeB | | | | |
| Rated values for continuous operation | | | | | | |
| 29 Rated torque | M_N | 139 | 182 | 222 | 224 | mNm |
| 30 Rated current (thermal limit) | I_N | 5 | 5 | 4,3 | 3,2 | A |
| 31 Rated speed | n_N | 5 190 | 5 240 | 5 350 | 5 360 | min ⁻¹ |

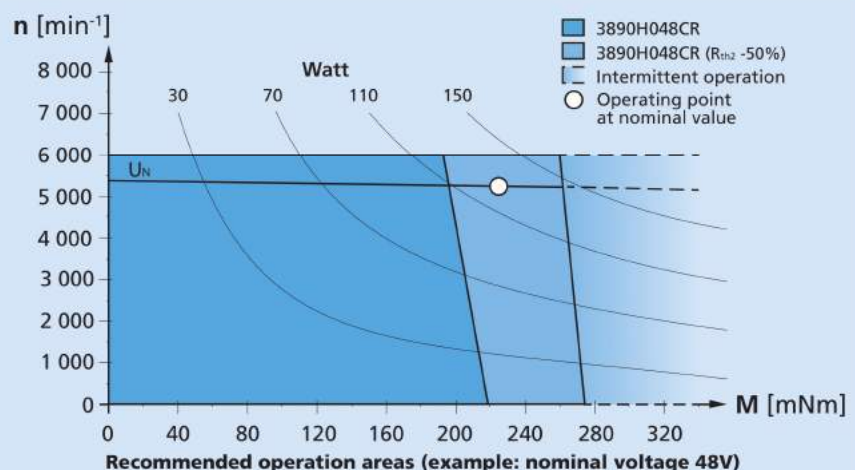
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

Note:

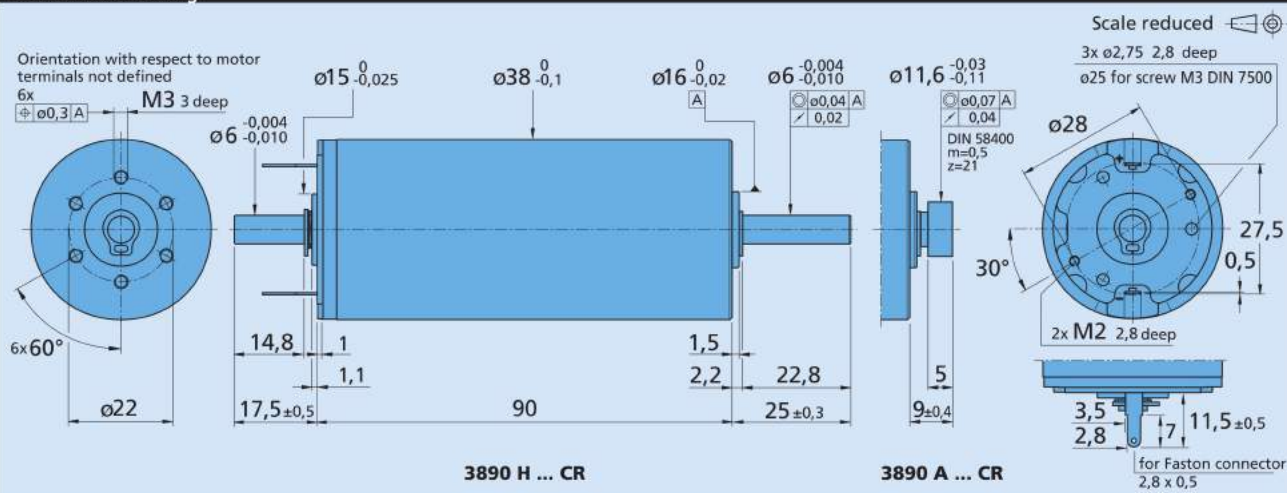
The diagram indicates the recommended speed in relation to the available torque at the output shaft for a given ambient temperature of 22°C.

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.



Recommended operation areas (example: nominal voltage 48V)

Dimensional drawing

Options

 Example product designation: **3890H024CR-158**

| Option | Type | Description |
|--------|---------------------|--|
| U | Single Leads | For motors with single leads (PTFE), length 160 mm, red (+) / black (-) |
| 158 | Shaft end | No second shaft end |
| 2016 | Encoder combination | Motor with rear end shaft for combination with Encoder IE3, IERS3 and IER3 |
| 1387 | Brakes combination | For combination with Brakes MBZ |
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Product combination

| Precision Gearheads / Lead Screws | Encoders | Drive Electronics | Cables / Accessories |
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| 38A 38/1 38/1 S 38/2 38/2 S 42GPT 44/1 | IE3-1024 IE3-1024 L IERS3-500 IERS3-500 L IER3-10000 IER3-10000 L | SC 2804 S SC 5004 P SC 5008 S MCDC 3006 S MC 5010 S | MBZ To view our large range of accessory parts, please refer to the "Accessories" chapter. |