

# 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	$\Omega$
3 Efficiency, max.	$\eta_{max}$	86	87	87	88	%
4 No-load speed	$n_0$	5 400	5 400	5 400	5 500	min <sup>-1</sup>
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 <sup>-1</sup> /V
9 Back-EMF constant	$k_E$	3,332	4,443	6,665	8,887	mV/min <sup>-1</sup>
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 <sup>-1</sup> /mNm
13 Rotor inductance	$L$	60	110	240	430	$\mu$ H
14 Mechanical time constant	$\tau_m$	3,4	3,3	3,3	3,3	ms
15 Rotor inertia	$J$	164	164	171	171	gcm <sup>2</sup>
16 Angular acceleration	$\alpha_{max}$	161	168	169	170	$\cdot 10^3$ rad/s <sup>2</sup>
17 Thermal resistance	$R_{th1} / R_{th2}$	1,9 / 4,2				K/W
18 Thermal time constant	$\tau_{w1} / \tau_{w2}$	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 <sup>-1</sup> (3 mm from bearing)		60				N
– axial at 3 000 min <sup>-1</sup>		6				N
– axial at standstill		50				N
22 Shaft play:						
– radial	$\leq$	0,015				mm
– axial	$=$	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 <sup>-1</sup>
27 Number of pole pairs		1				
28 Magnet material		NdFeB				
<b>Rated values for continuous operation</b>						
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 <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.



