

# DC-Micromotors

## Precious Metal Commutation

10 mNm  
8,5 W

### Series 2232 ... SR

Values at 22°C and nominal voltage	2232 U	006 SR	009 SR	012 SR	015 SR	018 SR	024 SR		
1 Nominal voltage	$U_N$	6	9	12	15	18	24	V	
2 Terminal resistance	$R$	0,81	2,14	4,09	6,61	9,04	16,4	$\Omega$	
3 Efficiency, max.	$\eta_{max}$	87	86	86	85	86	86	%	
4 No-load speed	$n_0$	7 100	7 400	7 100	7 100	7 100	7 100	min <sup>-1</sup>	
5 No-load current, typ. (with shaft $\varnothing$ 2 mm)	$I_0$	0,035	0,0241	0,0175	0,0139	0,0116	0,0087	A	
6 Stall torque	$M_H$	59,2	48,3	46,8	45,2	47,6	46,7	mNm	
7 Friction torque	$M_R$	0,28	0,28	0,28	0,28	0,28	0,28	mNm	
8 Speed constant	$k_n$	1 190	827	595	476	397	298	min <sup>-1</sup> /V	
9 Back-EMF constant	$k_E$	0,84	1,21	1,68	2,1	2,52	3,36	mV/min <sup>-1</sup>	
10 Torque constant	$k_M$	8,03	11,5	16	20,1	24,1	32,1	mNm/A	
11 Current constant	$k_I$	0,125	0,087	0,062	0,05	0,042	0,031	A/mNm	
12 Slope of n-M curve	$\Delta n / \Delta M$	120	153	152	157	149	152	min <sup>-1</sup> /mNm	
13 Rotor inductance	$L$	45	90	180	280	400	710	$\mu$ H	
14 Mechanical time constant	$\tau_m$	6	6	6	6	6	6	ms	
15 Rotor inertia	$J$	4,8	3,8	3,8	3,8	3,8	3,8	gcm <sup>2</sup>	
16 Angular acceleration	$\alpha_{max}$	120	120	120	120	120	120	$\cdot 10^3$ rad/s <sup>2</sup>	
17 Thermal resistance	$R_{th1} / R_{th2}$	4 / 13						K/W	
18 Thermal time constant	$\tau_{w1} / \tau_{w2}$	7 / 340						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 (optional version)				
21 Shaft load max.:		(standard)			(optional version)				
– with shaft diameter		2			2				mm
– radial at 3 000 min <sup>-1</sup> (3 mm from bearing)		1,5			8				N
– axial at 3 000 min <sup>-1</sup>		0,2			0,8				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		62							g
25 Direction of rotation		clockwise, viewed from the front face							
26 Speed up to	$n_{max}$	8 000							min <sup>-1</sup>
27 Number of pole pairs		1							
28 Magnet material		NdFeB							
<b>Rated values for continuous operation</b>									
29 Rated torque	$M_N$	10	10	10	10	10	10	mNm	
30 Rated current (thermal limit)	$I_N$	1,3	0,93	0,67	0,53	0,44	0,33	A	
31 Rated speed	$n_N$	5 900	5 810	5 510	5 420	5 530	5 490	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.



