

# DC-Micromotors

Precious Metal Commutation

5,9 mNm

8 W

## Series 2233 ... S

Values at 22°C and nominal voltage	2233 T	4,5 S	006 S	012 S	018 S	024 S	030 S	
1 Nominal voltage	$U_N$	4,5	6	12	18	24	30	V
2 Terminal resistance	$R$	1,2	2,7	9,6	25	52	97	$\Omega$
3 Output power	$P_{2nom.}$	4,48	3,23	3,69	3,19	2,75	2,26	W
4 Efficiency, max.	$\eta_{max.}$	86	85	85	83	83	81	%
5 No-load speed	$n_0$	8 500	7 700	8 200	9 000	8 400	8 700	min <sup>-1</sup>
6 No-load current, typ. (with shaft $\varnothing$ 1,5 mm)	$I_0$	0,02	0,014	0,007	0,005	0,004	0,003	A
7 Stall torque	$M_H$	20,2	16	17,3	13,4	12,4	9,9	mNm
8 Friction torque	$M_R$	0,1	0,1	0,1	0,1	0,1	0,1	mNm
9 Speed constant	$k_n$	1 895	1 296	684	508	354	293	min <sup>-1</sup> /V
10 Back-EMF constant	$k_E$	0,528	0,772	1,46	1,97	2,82	3,41	mV/min <sup>-1</sup>
11 Torque constant	$k_M$	5,04	7,37	14	18,8	27	32,6	mNm/A
12 Current constant	$k_I$	0,198	0,136	0,072	0,053	0,037	0,031	A/mNm
13 Slope of n-M curve	$\Delta n/\Delta M$	421	483	472	676	678	877	min <sup>-1</sup> /mNm
14 Rotor inductance	$L$	60	120	440	800	1 600	2 400	$\mu$ H
15 Mechanical time constant	$\tau_m$	11,5	10	11	17	11	12,9	ms
16 Rotor inertia	$J$	2,6	2	2,2	2,5	1,6	1,4	gcm <sup>2</sup>
17 Angular acceleration	$\alpha_{max.}$	77	80	78	54	78	71	$\cdot 10^3$ rad/s <sup>2</sup>
18 Thermal resistance	$R_{th1} / R_{th2}$	4 / 27						K/W
19 Thermal time constant	$\tau_{w1} / \tau_{w2}$	4 / 660						s
20 Operating temperature range:								
– motor		-30 ... +85 (optional version -55 ... +125)						°C
– winding, max. permissible		+125						°C
21 Shaft bearings		sintered bearings (standard)			ball bearings, preloaded (optional version)			
22 Shaft load max.:								
– with shaft diameter		1,5			2			mm
– radial at 3 000 min <sup>-1</sup> (3 mm from bearing)		1,2			8			N
– axial at 3 000 min <sup>-1</sup>		0,2			0,8			N
– axial at standstill		20			10			N
23 Shaft play:								
– radial	$\leq$	0,03			0,015			mm
– axial	$\leq$	0,2			0			mm
24 Housing material		steel, zinc galvanized and passivated						
25 Mass		61						g
26 Direction of rotation		clockwise, viewed from the front face						
27 Speed up to	$n_{max.}$	10 000						min <sup>-1</sup>
28 Number of pole pairs		1						
29 Magnet material		AlNiCo						
<b>Rated values for continuous operation</b>								
30 Rated torque	$M_N$	3,4	5	5,9	4,9	4,9	4,3	mNm
31 Rated current (thermal limit)	$I_N$	0,7	0,7	0,43	0,27	0,19	0,14	A
32 Rated speed	$n_N$	6 930	4 800	4 600	4 830	4 170	3 860	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.



