DC-Micromotors

Precious Metal Commutation

5,9 mNm

For combination with
Gearheads:
20/1, 22/2, 22/5, 22/7, 22E, 22EKV, 23/1
Encoders:
HEDL 5540, HEDM 5500, HEDS 5500, HEDS 5540

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	Ω
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	rpm
6	No-load current, typ. (with shaft ø 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	rpm/V
10	Back-EMF constant	k_E	0,528	0,772	1,46	1,97	2,82	3,41	mV/rpm
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	rpm/mNm
14	Rotor inductance	L	60	120	440	800	1 600	2 400	µH
15	Mechanical time constant	τ_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	gcm²
17	Angular acceleration	$\alpha_{max.}$	77	80	78	54	78	71	$\cdot 10^3$rad/s²
18	Thermal resistance	R_{th1} / R_{th2}	4 / 27						K/W
19	Thermal time constant	τ_{w1} / τ_{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		ball bearings		ball bearings, preloaded		
22	Shaft load max.:		(standard)		(optional version)		(optional version)		
	– with shaft diameter		1,5		2		2		mm
	– radial at 3 000 rpm (3 mm from bearing)		1,2		8		8		N
	– axial at 3 000 rpm		0,2		0,8		0,8		N
	– axial at standstill		20		10		10		N
23	Shaft play								
	– radial	≤	0,03		0,015		0,015		mm
	– axial	≤	0,2		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						rpm
28	Number of pole pairs		1						
29	Magnet material		AlNiCo						
Rated values for continuous operation									
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	rpm

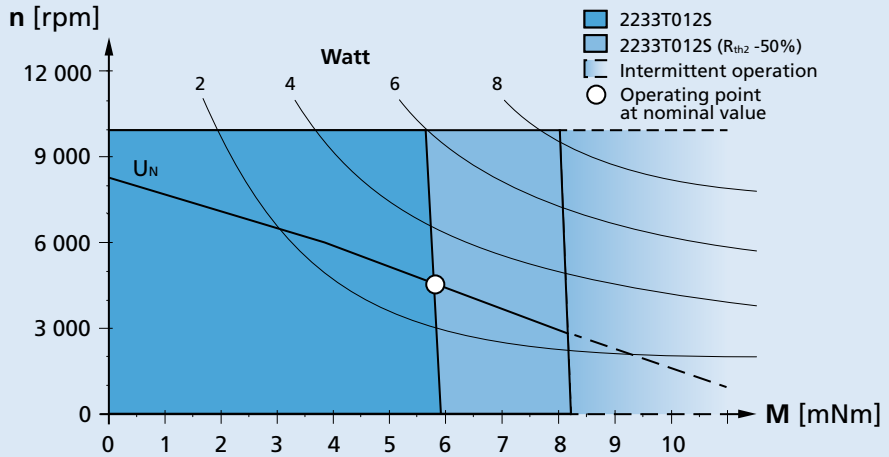
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 0%.

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.



Recommended operation areas (example: nominal voltage 12V)

Dimensional drawing