

# DC-Micromotors

## 3 mNm

### Precious Metal Commutation

For combination with (overview on page 14-15)

Gearheads:  
20/1, 22E, 22/2, 22/5, 22/6, 23/1, 38/3

Encoders:  
5500, 5540

DC-Motor-Tacho Combinations:  
2251 ... S

### Series 2233 ... S

	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	Volt
2 Terminal resistance	R	1,3	2,9	9,7	25,0	57,0	105	$\Omega$
3 Output power	$P_{2 \max}$	3,85	3,06	3,66	3,18	2,47	2,08	W
4 Efficiency	$\eta_{\max}$	86	85	84	82	80	79	%
5 No-load speed	$n_0$	8 000	8 000	8 500	8 700	8 800	9 300	rpm
6 No-load current (with shaft $\varnothing$ 1,5 mm)	$I_0$	0,020	0,013	0,009	0,007	0,005	0,004	A
7 Stall torque	$M_H$	18,40	14,60	16,40	13,90	10,70	8,56	mNm
8 Friction torque	$M_{fr}$	0,11	0,09	0,12	0,14	0,13	0,12	mNm
9 Speed constant	$k_n$	1 790	1 340	714	488	371	314	rpm/V
10 Back-EMF constant	$k_E$	0,559	0,745	1,400	2,050	2,690	3,180	mV/rpm
11 Torque constant	$k_M$	5,34	7,12	13,40	19,60	25,70	30,40	mNm/A
12 Current constant	$k_i$	0,187	0,141	0,075	0,051	0,039	0,033	A/mNm
13 Slope of n-M curve	$\Delta n / \Delta M$	435	548	518	626	822	1 090	rpm/mNm
14 Rotor inductance	L	70	130	400	600	1 600	2 200	$\mu$ H
15 Mechanical time constant	$\tau_m$	12	11	12	14	11	12	ms
16 Rotor inertia	J	2,60	1,90	2,20	2,10	1,30	1,10	gcm <sup>2</sup>
17 Angular acceleration	$\alpha_{\max}$	70	76	74	65	84	81	$\cdot 10^3$ 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 - 55 ... + 125)						$^{\circ}$ C
- rotor, max. permissible		+ 125						$^{\circ}$ C
21 Shaft bearings		sintered bronze sleeves	ball bearings	ball bearings, preloaded				
22 Shaft load max.:		(standard)	(optional)	(optional)				
- with shaft diameter		1,5	2,0	2,0				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	$\leq$	0,03	0,015	0,015				mm
- axial	$\leq$	0,2	0,2	0				mm
24 Housing material		steel, zinc galvanized and passivated						
25 Weight		61						g
26 Direction of rotation		clockwise, viewed from the front face						

### Recommended values - mathematically independent of each other

27 Speed up to	$n_{e \max}$	8 000	8 000	8 000	8 000	8 000	8 000	rpm
28 Torque up to	$M_{e \max}$	3	3	3	3	3	3	mNm
29 Current up to (thermal limits)	$I_{e \max}$	1,340	0,900	0,490	0,300	0,200	0,140	A

