

# DC-Micromotors

## 10 mNm

### Precious Metal Commutation

For combination with

Gearheads:  
20/1, 22/2, 22/5, 22/7, 22E, 22EKV, 22F, 23/1, 26A, 38/3

Encoders:  
IE2-1024, IE2-16

### Series 2232 ... SR

	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 Output power	$P_{2 \max.}$	11	9,35	8,7	8,41	8,86	8,68	W
4 Efficiency, max.	$\eta_{\max.}$	87	86	86	85	86	86	%
5 No-load speed	$n_0$	7 100	7 400	7 100	7 100	7 100	7 100	rpm
6 No-load current (with shaft $\varnothing$ 2 mm)	$I_0$	0,035	0,0241	0,0175	0,0139	0,0116	0,0087	A
7 Stall torque	$M_H$	59,2	48,3	46,8	45,2	47,6	46,7	mNm
8 Friction torque	$M_R$	0,28	0,28	0,28	0,28	0,28	0,28	mNm
9 Speed constant	$k_n$	1 190	827	595	476	397	298	rpm/V
10 Back-EMF constant	$k_E$	0,84	1,21	1,68	2,1	2,52	3,36	mV/rpm
11 Torque constant	$k_M$	8,03	11,5	16	20,1	24,1	32,1	mNm/A
12 Current constant	$k_i$	0,125	0,087	0,062	0,05	0,042	0,031	A/mNm
13 Slope of n-M curve	$\Delta n / \Delta M$	120	153	152	157	149	152	rpm/mNm
14 Rotor inductance	L	45	90	180	280	400	710	$\mu$ H
15 Mechanical time constant	$\tau_m$	6	6	6	6	6	6	ms
16 Rotor inertia	J	4,8	3,8	3,8	3,8	3,8	3,8	gcm <sup>2</sup>
17 Angular acceleration	$\alpha_{\max.}$	120	120	120	120	120	120	$\cdot 10^3 \text{rad/s}^2$
18 Thermal resistance	$R_{th 1} / R_{th 2}$	4 / 13						K/W
19 Thermal time constant	$\tau_{w1} / \tau_{w2}$	7 / 340						s
20 Operating temperature range:								
- motor		-30 ... +85 (optional version -55 ... +125)						$^{\circ}\text{C}$
- rotor, max. permissible		+125						$^{\circ}\text{C}$
21 Shaft bearings		sintered bearings		ball bearings		ball bearings, preloaded		
22 Shaft load max.:		(standard)		(optional version)		(optional version)		
- with shaft diameter		2		2		2		mm
- radial at 3 000 rpm (3 mm from bearing)		1,5		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, black coated						
25 Weight		62						g
26 Direction of rotation		clockwise, viewed from the front face						
<b>Recommended values - mathematically independent of each other</b>								
27 Speed up to	$n_{e \max.}$	8 000	8 000	8 000	8 000	8 000	8 000	rpm
28 Torque up to	$M_{e \max.}$	10	10	10	10	10	10	mNm
29 Current up to (thermal limits)	$I_{e \max.}$	1,87	1,3	0,94	0,74	0,63	0,46	A

