

# DC-Micromotors

## Graphite Commutation

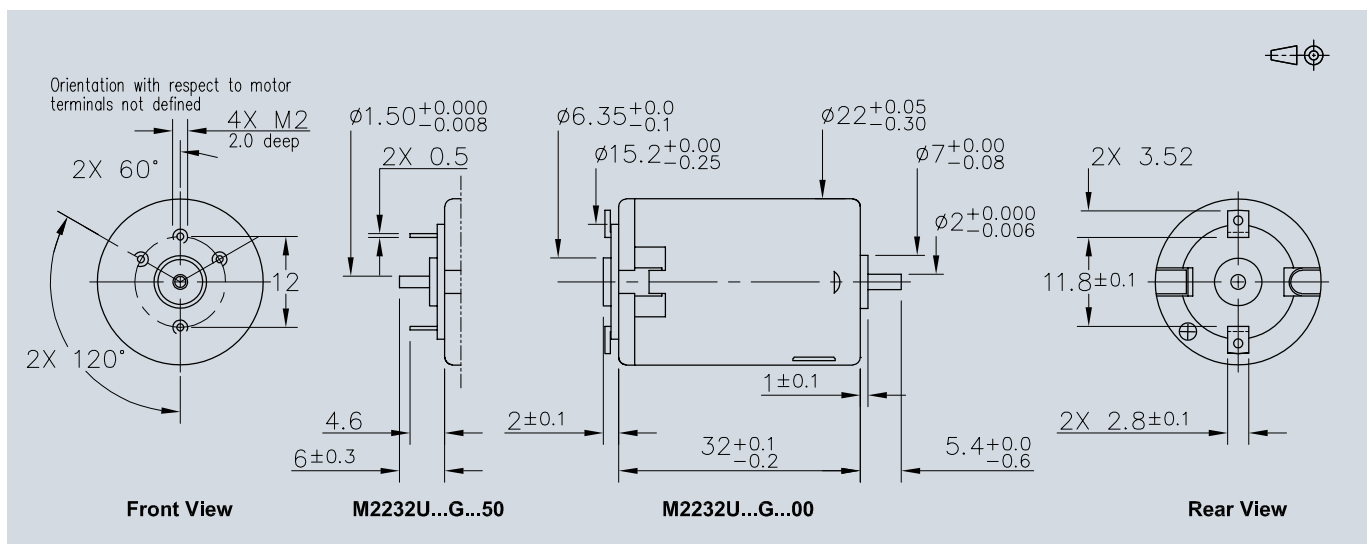
### Cantilever Brushes

5.4 mNm

For combination with:  
 Gearheads:  
 MD22P, M22P  
 Encoder:  
 AMT 102, AMT 103, E4P-300, HEDS 55,  
 HEDL 50, ME2-16, PD3-1250

### Series M2232U..GS

	M2232U		06GS	12GS	24GS	
1 Nominal voltage	$U_N$		6	12	24	Volt
2 Winding resistance	R	$\pm 12\%$	2.10	7.20	31.00	$\Omega$
3 Output power	$P_{2 \text{ max.}}$		3.97	4.65	4.29	W
4 Efficiency	$\eta_{\text{ max.}}$		65	66	65	%
5 No-load speed	$n_o$	$\pm 12\%$	8,700	8,400	8,700	rpm
6 No-load current max. (shaft $\varnothing$ 2 mm)	$I_o$	$\pm 50\%$	0.107	0.060	0.030	A
7 Stall torque	$M_H$		18.11	21.92	19.60	mNm
8 Friction torque	$M_R$		0.68	0.79	0.76	mNm
9 Speed constant	$k_n$		1,506	726	377	rpm/V
10 Back-EMF constant	$k_E$		0.66	1.38	2.65	mV/rpm
11 Torque constant	$k_M$		6.34	13.15	25.32	mNm/A
12 Current constant	$k_I$		0.158	0.076	0.039	A/mNm
13 Slope of n-M curve	$\Delta n / \Delta M$		480	383	444	rpm/mNm
14 Rotor inductance	L		750	3,400	13,000	$\mu\text{H}$
15 Mechanical time constant	$\tau_m$		24	19	22	ms
16 Rotor inertia	J		4.5	4.5	4.5	$\text{gcm}^2$
17 Angular acceleration	$\alpha_{\text{ max.}}$		40	49	44	$\cdot 10^3 \text{ rad/s}^2$
18 Thermal resistance	$R_{\text{th} 1} / R_{\text{th} 2}$		13 / 20	17 / 22	13 / 20	k/W
19 Thermal time constant	$\tau_{w1}$		522	450	450	s
20 Operating temperature range:						
- motor		- 10 to + 50				$^{\circ}\text{C}$
- rotor, max. permissible		+ 120				$^{\circ}\text{C}$
21 Shaft bearing		sintered bronze sleeves				
22 Shaft load max.:						
- with shaft diameter		2				mm
- radial at 3,000 rpm (3mm from bearing)		2				N
- axial at 3,000 rpm		1				N
- axial at standstill (shaft supported)		294				N
23 Shaft play						
- radial	$\leq$	0.025				mm
- axial	$\leq$	0.05 to 0.45				mm
24 Housing material		steel, zinc-plating (chrome free)				
25 Weight		40				g
26 Direction of rotation		clockwise, viewed from the front face				
<b>Recommended values</b>						
27 Speed up to	$n_{e \text{ max.}}$		10,000	10,000	10,000	rpm
28 Torque up to	$M_{e \text{ max.}}$		5.150	5.307	5.354	mNm
29 Current up to (thermal limits)	$I_{e \text{ max.}}$		1.010	0.502	0.263	A



## How to Order a M2232U..GS

Part number	Voltage	Description
M2232U06GS000	06	Standard motor
M2232U06GS050	06	Standard motor with rear shaft
M2232U12GS000	12	Standard motor
M2232U12GS050	12	Standard motor with rear shaft
M2232U24GS000	24	Standard motor
M2232U24GS050	24	Standard motor with rear shaft