

# DC-Micromotors

## Precious Metal Commutation

6,8 mNm  
8,5 W

### Series 2224 ... SR

Values at 22°C and nominal voltage	2224 U	003 SR	006 SR	012 SR	018 SR	024 SR	036 SR		
1 Nominal voltage	$U_N$	3	6	12	18	24	36	V	
2 Terminal resistance	$R$	0,56	1,94	8,71	17,5	36,3	91,4	$\Omega$	
3 Output power	$P_{2nom.}$	3,92	4,55	4,05	4,54	3,88	3,46	W	
4 Efficiency, max.	$\eta_{max.}$	80	82	82	81	80	80	%	
5 No-load speed	$n_0$	8 100	8 200	7 800	8 100	7 800	7 800	min <sup>-1</sup>	
6 No-load current, typ. (with shaft $\varnothing$ 2 mm)	$I_0$	0,066	0,029	0,014	0,01	0,007	0,005	A	
7 Stall torque	$M_H$	18,5	21,2	19,8	21,4	19	16,9	mNm	
8 Friction torque	$M_R$	0,23	0,2	0,2	0,21	0,2	0,22	mNm	
9 Speed constant	$k_n$	2 730	1 380	657	454	328	219	min <sup>-1</sup> /V	
10 Back-EMF constant	$k_E$	0,366	0,725	1,52	2,2	3,04	4,56	mV/min <sup>-1</sup>	
11 Torque constant	$k_M$	3,49	6,92	14,5	21	29,1	43,5	mNm/A	
12 Current constant	$k_I$	0,286	0,144	0,069	0,048	0,034	0,023	A/mNm	
13 Slope of n-M curve	$\Delta n/\Delta M$	438	387	394	379	411	462	min <sup>-1</sup> /mNm	
14 Rotor inductance	$L$	11	45	200	450	800	1 800	$\mu$ H	
15 Mechanical time constant	$\tau_m$	11	11	11	11	11	11	ms	
16 Rotor inertia	$J$	2,4	2,7	2,7	2,8	2,6	2,3	gcm <sup>2</sup>	
17 Angular acceleration	$\alpha_{max.}$	77	78	74	77	74	74	$\cdot 10^3$ rad/s <sup>2</sup>	
18 Thermal resistance	$R_{th1} / R_{th2}$	5 / 20						K/W	
19 Thermal time constant	$\tau_{w1} / \tau_{w2}$	6,8 / 440						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		2			2				mm
– radial at 3 000 min <sup>-1</sup> (3 mm from bearing)		1,5			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, black coated							
25 Mass		46						g	
26 Direction of rotation		clockwise, viewed from the front face							
27 Speed up to	$n_{max.}$	9 000						min <sup>-1</sup>	
28 Number of pole pairs		1							
29 Magnet material		NdFeB							
<b>Rated values for continuous operation</b>									
30 Rated torque	$M_N$	2,2	4,5	6,7	6,8	6,6	6,1	mNm	
31 Rated current (thermal limit)	$I_N$	0,7	0,7	0,52	0,37	0,25	0,16	A	
32 Rated speed	$n_N$	7 170	6 390	4 390	4 800	4 300	4 060	min <sup>-1</sup>	

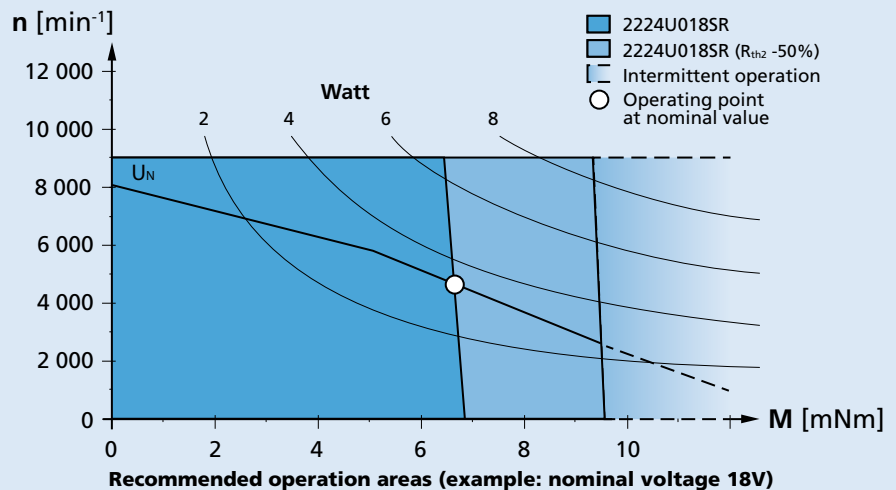
**Note:** Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The  $R_{th2}$  value has been reduced by 0%.

**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.

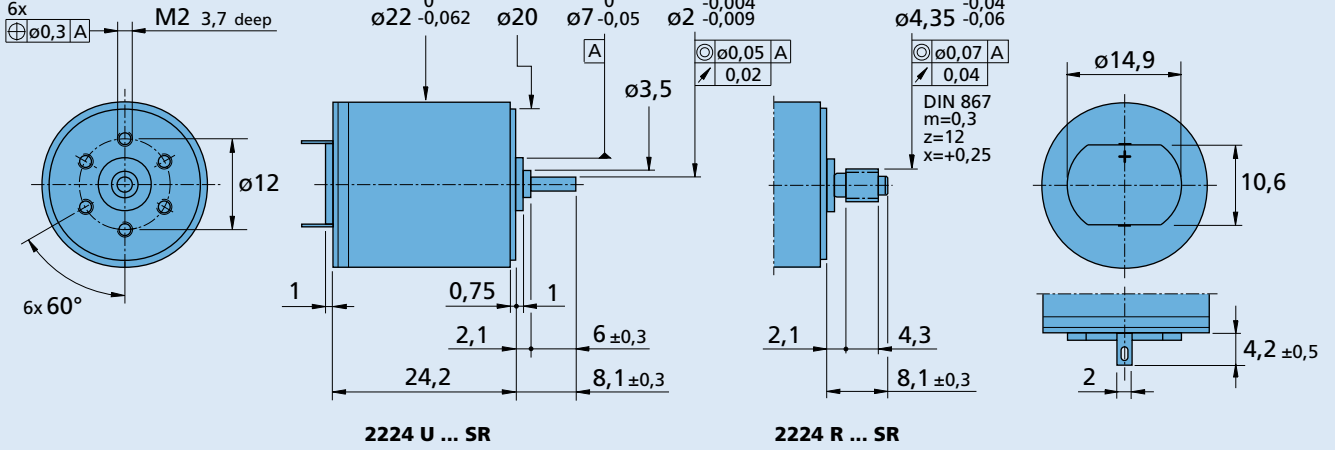
The diagram shows the motor in a completely insulated as well as thermally coupled condition ( $R_{th2}$  50% reduced).

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.



### Dimensional drawing

Orientation with respect to motor terminals not defined



### Options

Example product designation: **2224U012SR-277**

Option	Type	Description
L	Twin Leads	For motors with twin leads (PVC), length 150 mm, red (+) / black (-)
4924	Twin Leads	For motors with twin leads (PVC), length 300 mm, red (+) / black (-)
X4924	Twin Leads	For motors with twin leads (PVC), length 600 mm, red (+) / black (-)
4925	Twin Leads	For motors with twin leads (PVC), length 150 mm, red (+) / black (-), with connector AMP 179228-2
X4925	Twin Leads	For motors with twin leads (PVC), length 300 mm, red (+) / black (-), with connector AMP 179228-2
Y4925	Twin Leads	For motors with twin leads (PVC), length 600 mm, red (+) / black (-), with connector AMP 179228-2
F	Single Leads	For motors with single leads (PTFE), length 150 mm, red (+) / black (-)
277	Bearings	2 preloaded ball bearings

### Product Combination

Precision Gearheads / Lead Screws	Encoders	Drive Electronics	Cables / Accessories
20/1	IE2-16	SC 1801	
20/1R	IE2-1024	SC 2402	
22E	IEH2-4096	SC 2804	
22EKV	IEH3-4096	MCDC 3002	
22F		MCDC 3003	
22/7		MCDC 3006	
23/1			
22/2			
22/5			