

# DC-Micromotors

## Precious Metal Commutation

6,29 mNm  
7,83 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	
Nominal voltage	$U_N$	3	6	12	18	24	36	V
Terminal resistance	$R$	0,564	1,95	8,77	17,6	36,1	90,3	$\Omega$
Rotor inductance	$L$	11,5	46	203	421	791	1 810	$\mu\text{H}$
Efficiency, max.	$\eta_{max}$	79	82	81	81	81	79	%
No-load current, typ.	$I_o$	0,0665	0,0289	0,0138	0,01	0,007	0,0051	A
No-load speed	$n_o$	8 180	8 200	7 810	8 130	7 890	7 820	$\text{min}^{-1}$
Stall torque	$M_{H1}$	18,2	21,1	19,8	21,2	19	17,2	mNm
Rotor inertia	$J$	2,4	2,7	2,7	2,8	2,6	2,3	$\text{gcm}^2$
Friction torque	$M_R$	0,23	0,2	0,2	0,21	0,2	0,22	mNm
Torque constant	$k_M$	3,47	6,95	14,6	21	28,8	43,6	$\text{mNm/A}$
Speed constant	$k_n$	2 750	1 370	655	454	331	219	$\text{min}^{-1}/\text{V}$
Slope of n-M curve	$\Delta n/\Delta M$	447	386	393	381	415	454	$\text{min}^{-1}/\text{mNm}$
Thermal resistance:								
- winding to housing	$R_{th1}$	8,4						K/W
- housing to ambient (external plastic flange)	$R_{th2p}$	22						K/W
- housing to ambient (external metal flange)	$R_{th2m}$	1,5						K/W
Thermal time constant:								
- winding	$\tau_{w1}$	12						s
- housing (external plastic flange)	$\tau_{w2p}$	430						s
- housing (external metal flange)	$\tau_{w2m}$	30						s
Operating temperature range:								
- motor		-30 ... +85 (optional version -30 ... +125)						$^{\circ}\text{C}$
- winding, max. permissible		+125						$^{\circ}\text{C}$
Shaft bearings								
Shaft diameter		sintered bearings			ball bearings, preloaded			
Radial shaft load max.:		2			2			mm
- dynamic at 3 000 $\text{min}^{-1}$ (3 mm from bearing)		1,5			8			N
Axial shaft load max.:								
- dynamic at 3 000 $\text{min}^{-1}$		0,2			0,8			N
- static (shaft unsupported)		20			10			N
Shaft play, max.:								
- radial		0,03			0,015			mm
- axial		0,2			0			mm
Speed up to	$n_{max}$	9 000						$\text{min}^{-1}$
Number of pole pairs		1						
Mass		46						g
Housing material		steel, nickel plated						
Magnet material		NdFeB						

#### Rated values for continuous operation

Rated torque	$M_N$	2,17	4,47	6,21	6,29	6,04	5,78	mNm
Rated current (thermal limit)	$I_N$	0,7	0,7	0,485	0,341	0,239	0,152	A
Rated speed	$n_N$	7 210	6 350	4 560	4 990	4 550	4 270	$\text{min}^{-1}$

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

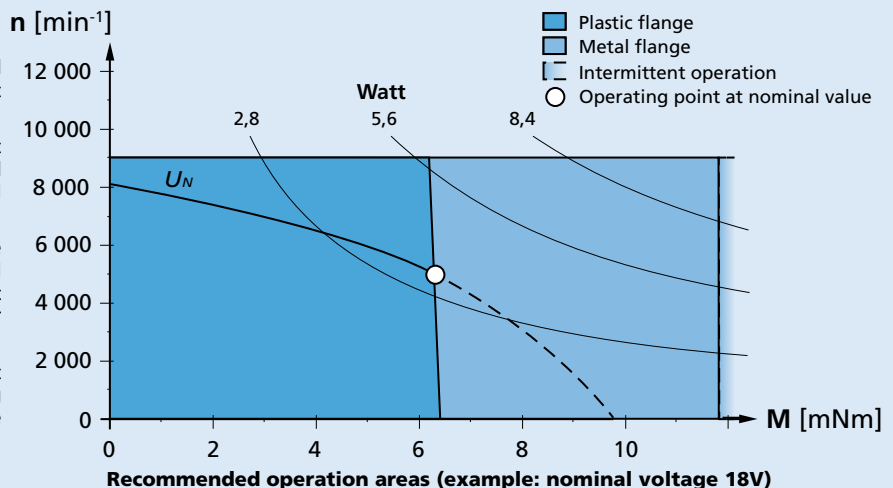
#### Note:

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 different conditions of thermal coupling, i.e. mounted respectively on a plastic flange and a metal flange.

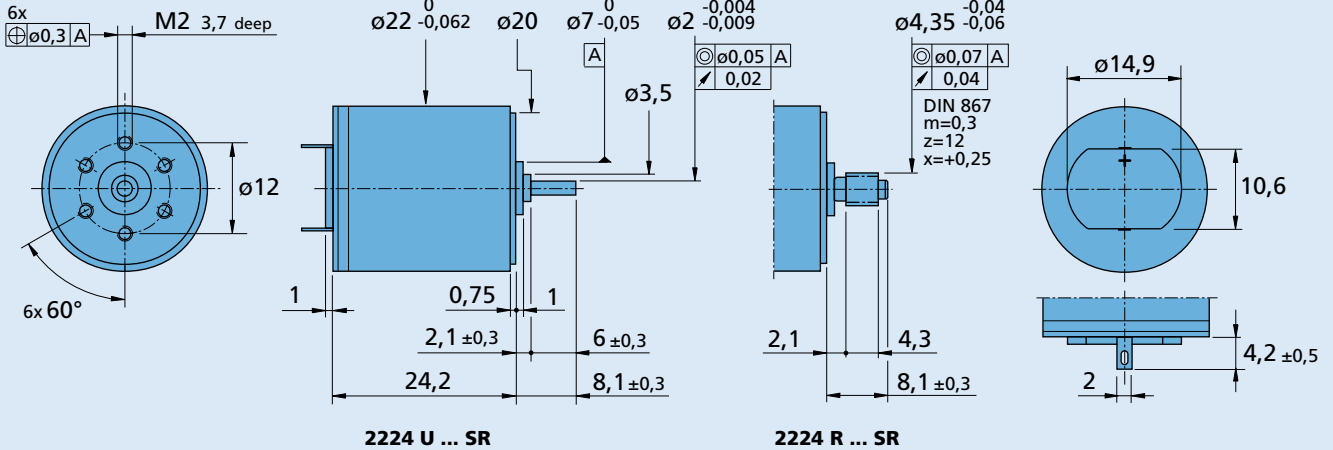
The nominal voltage ( $U_N$ ) curve shows, up to the thermal limit, the operating point at nominal voltage for the motor mounted on a plastic flange. Higher torque can be achieved by further reducing the thermal resistance.

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
20/1R 22E 22EKV 22GPT 22/2 22/5 22/7 23/1	IE2-1024 IEH2-4096 IEH3-4096 IEH3-4096L	SC 1801 P SC 1801 S SC 2402 P SC 2804 S MC 3001 B MC 3001 P MC 3603 S MC 5004 P	To view our large range of accessory parts, please refer to the "Accessories" chapter.