

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	Ω	
3 Efficiency, max.	η_{max}	80	82	82	82	81	80	%	
4 No-load speed	n_0	8 100	8 200	7 800	8 100	7 800	7 800	min ⁻¹	
5 No-load current, typ. (with shaft \varnothing 2 mm)	I_0	0,066	0,029	0,014	0,01	0,007	0,005	A	
6 Stall torque	M_H	18,5	21,2	19,8	21,4	19	16,9	mNm	
7 Friction torque	M_R	0,23	0,2	0,2	0,21	0,2	0,22	mNm	
8 Speed constant	k_n	2 730	1 380	657	454	328	219	min ⁻¹ /V	
9 Back-EMF constant	k_E	0,366	0,725	1,52	2,2	3,04	4,56	mV/min ⁻¹	
10 Torque constant	k_M	3,49	6,92	14,5	21	29,1	43,5	mNm/A	
11 Current constant	k_I	0,286	0,144	0,069	0,048	0,034	0,023	A/mNm	
12 Slope of n-M curve	$\Delta n / \Delta M$	438	387	394	379	411	462	min ⁻¹ /mNm	
13 Rotor inductance	L	11	45	200	450	800	1 800	μ H	
14 Mechanical time constant	τ_m	11	11	11	11	11	11	ms	
15 Rotor inertia	J	2,4	2,7	2,7	2,8	2,6	2,3	gcm ²	
16 Angular acceleration	α_{max}	77	78	74	77	74	74	$\cdot 10^3$ rad/s ²	
17 Thermal resistance	R_{th1} / R_{th2}	5 / 20						K/W	
18 Thermal time constant	τ_{w1} / τ_{w2}	6,8 / 440						s	
19 Operating temperature range:									
– motor		-30 ... +85 (optional version -55 ... +125)							°C
– winding, max. permissible		+125							°C
20 Shaft bearings		sintered bearings			ball bearings, preloaded				
21 Shaft load max.:		(standard)			(optional version)				
– with shaft diameter		2			2				mm
– radial at 3 000 min ⁻¹ (3 mm from bearing)		1,5			8				N
– axial at 3 000 min ⁻¹		0,2			0,8				N
– axial at standstill		20			10				N
22 Shaft play:									
– radial	\leq	0,03			0,015				mm
– axial	\leq	0,2			0				mm
23 Housing material		steel, black coated							
24 Mass		46							g
25 Direction of rotation		clockwise, viewed from the front face							
26 Speed up to	n_{max}	9 000							min ⁻¹
27 Number of pole pairs		1							
28 Magnet material		NdFeB							
Rated values for continuous operation									
29 Rated torque	M_N	2,2	4,5	6,7	6,8	6,6	6,1	mNm	
30 Rated current (thermal limit)	I_N	0,7	0,7	0,52	0,37	0,25	0,16	A	
31 Rated speed	n_N	7 170	6 390	4 390	4 800	4 300	4 060	min ⁻¹	

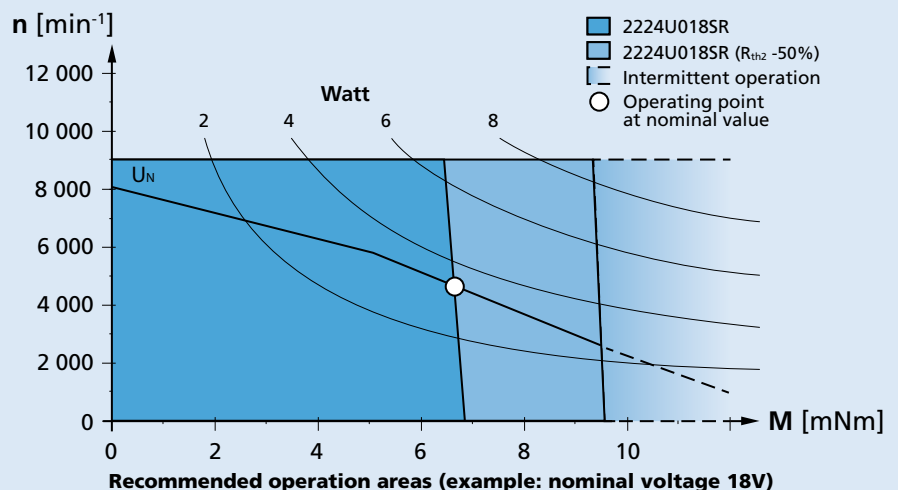
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 0%.

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.

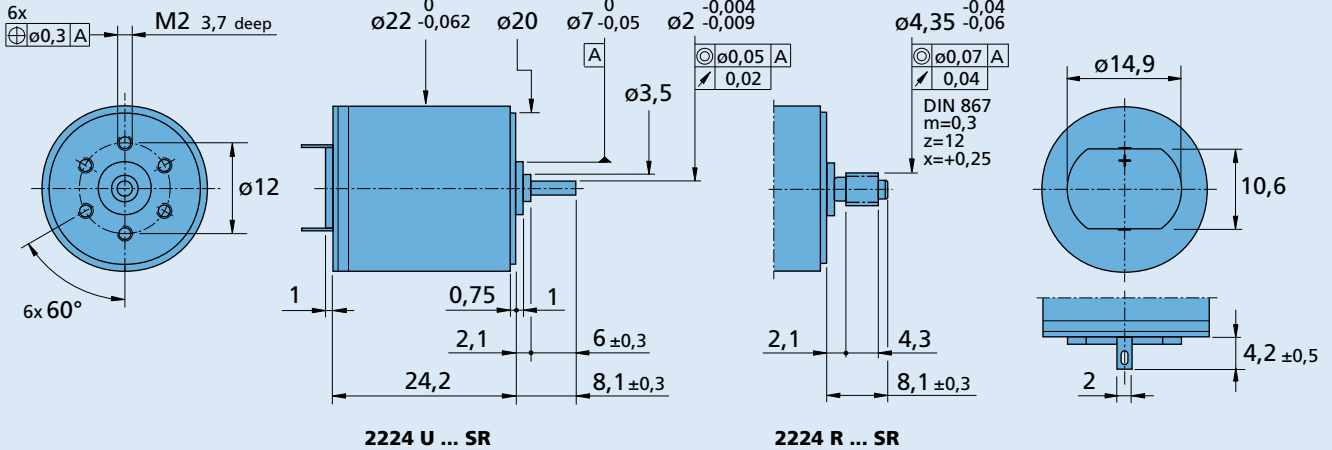
The diagram shows the motor in a completely insulated as well as thermally coupled condition (R_{th2} 50% reduced).

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
20/1R 22E 22EKV 22F 22/2 22/5 22/7 23/1	IE2-16 IE2-1024 IEH2-4096 IEH3-4096	SC 1801 P SC 1801 S SC 2402 P SC 2804 S MCDC 3002 P MCDC 3002 S MCDC 3003 P MCDC 3006 S MC 5004 P	To view our large range of accessory parts, please refer to the "Accessories" chapter.

Planetary Gearheads

0,7 Nm

For combination with
DC-Micromotors
Brushless DC-Motors
Stepper Motors

Series 23/1

	23/1
Housing material	metal
Geartrain material	steel
Recommended max. input speed for:	
– continuous operation	4 000 min ⁻¹
Backlash, at no-load	≤ 1 °
Bearings on output shaft	ball bearings, preloaded
Shaft load, max.:	
– radial (10 mm from mounting face)	≤ 170 N
– axial	≤ 150 N
Shaft press fit force, max.	≤ 150 N
Shaft play	
– radial (10 mm from mounting face)	≤ 0,03 mm
– axial	≤ 0,1 mm
Operating temperature range	- 30 ... + 100 °C

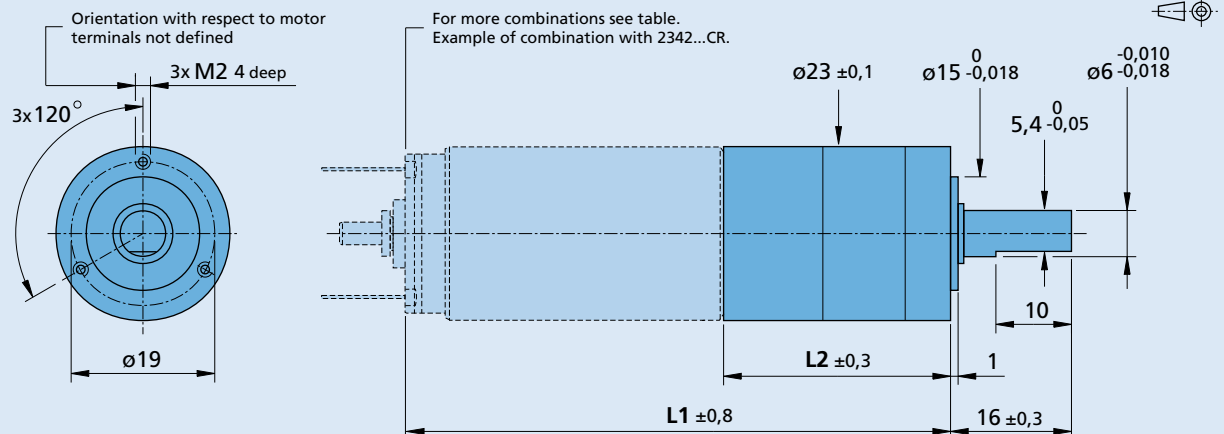
Specifications

	1	2	3	4	5
Number of gear stages					
Continuous torque	mNm 200	300	700	700	700
Intermittent torque	mNm 400	600	1 000	1 000	1 000
Mass without motor, ca.	g 60	70	90	100	110
Efficiency, max.	% 88	80	70	60	55
Direction of rotation, drive to output	=	=	=	=	=
Reduction ratio ¹⁾ (rounded)	3,71:1	9,7:1 14:1	43:1 66:1	94:1 112:1 134:1 159:1 190:1 246:1	415:1 592:1 989:1 1 526:1
L2 [mm] = length without motor ²⁾	27,9	34,1	40,3	46,4	52,6
L1 [mm] = length with motor	2224U...SR 48,2	2230U...S 54,4	2232U...SR 60,6	2233U...S 66,7	2237S...CXR 72,9
	2232U...SR 56,2	2233U...S 62,4	2342S...CR 68,6	2057S...B 74,7	2057S...BHS 80,9
	2444S...B 56,6	AM2224...-10 62,8	2057S...B 69,0	2444S...B 75,1	AM2224...-10 81,3
	2237S...CXR 64,9	2057S...B 71,1	2342S...CR 77,3	2057S...BHS 83,4	2444S...B 89,6
	2342S...CR 69,9	2057S...B 76,1	2444S...B 82,3	AM2224...-10 88,4	2237S...CXR 94,6
	2057S...B 84,9	2057S...BHS 91,1	2444S...B 97,3	AM2224...-10 103,4	2237S...CXR 109,6
	2057S...BHS 84,9	2444S...B 91,1	AM2224...-10 97,3	2237S...CXR 103,4	2444S...B 109,6
	2444S...B 71,9	AM2224...-10 78,1	2237S...CXR 84,3	2444S...B 90,4	AM2224...-10 96,6
	AM2224...-10 55,6	2237S...CXR 61,8	2444S...B 68,0	AM2224...-10 74,1	AM2224...-10 80,3

¹⁾ The reduction ratios are rounded, the exact values are available on request or at www.faulhaber.com.

²⁾ L2 - 3,9 mm, in combination with 2224U...SR, 2230U...S, 2232U...SR, 2233U...S and AM2224.

Note: Reduction ratio 3,71:1 with motor types 2224U...SR, 2230U...S, 2232U...SR, 2233U...S and AM2224 shall be ordered as 23/1 3,71:1 - K288.



23/1