DC-Micromotors

Precious Metal Commutation

4,7 mNm

For combination with
Gearheads:
20/1, 22/2, 22/5, 22/7, 22E, 22EKV, 23/1
Encoders:
HEDL 5540, HEDM 5500, HEDS 5500, HEDS 5540

Series 2230 ... S

Values at 22°C and nominal voltage		2230 T	003 S	006 S	012 S	015 S	024 S	040 S	
1	Nominal voltage	U_N	3	6	12	15	24	40	V
2	Terminal resistance	R	0,6	3	10,8	21	50	193	Ω
3	Output power	$P_{2nom.}$	3,69	2,94	3,27	2,63	2,82	2,01	W
4	Efficiency, max.	$\eta_{max.}$	83	82	83	82	81	78	%
5	No-load speed	n_0	9 600	9 300	9 500	8 400	9 000	8 200	rpm
6	No-load current, typ. (with shaft ø 1,5 mm)	I_0	0,04	0,019	0,01	0,007	0,005	0,003	A
7	Stall torque	M_H	14,7	12,1	13,2	11,9	12	9,37	mNm
8	Friction torque	M_R	0,12	0,12	0,12	0,12	0,13	0,14	mNm
9	Speed constant	k_n	3 230	1 560	799	566	379	208	rpm/V
10	Back-EMF constant	k_E	0,31	0,639	1,25	1,77	2,64	4,81	mV/rpm
11	Torque constant	k_M	2,96	6,1	12	16,9	25,2	45,9	mNm/A
12	Current constant	k_I	0,338	0,164	0,084	0,059	0,04	0,022	A/mNm
13	Slope of n-M curve	Δn/ΔM	653	769	720	706	750	875	rpm/mNm
14	Rotor inductance	L	35	150	420	900	2 200	8 000	µH
15	Mechanical time constant	τ_m	25	20	20	20	19	22	ms
16	Rotor inertia	J	3,7	2,5	2,7	2,7	2,4	2,4	gcm²
17	Angular acceleration	$\alpha_{max.}$	40	49	50	44	50	39	$\cdot 10^3$rad/s²
18	Thermal resistance	R_{th1} / R_{th2}	4 / 28						K/W
19	Thermal time constant	τ_{w1} / τ_{w2}	4,5 / 602						s
20	Operating temperature range:								
	– motor		-30 ... +85 (optional version -55 ... +125)						°C
	– winding, max. permissible		+125						°C
21	Shaft bearings		sintered bearings		ball bearings		ball bearings, preloaded		
22	Shaft load max.:		(standard)		(optional version)		(optional version)		
	– with shaft diameter		1,5		2		2		mm
	– radial at 3 000 rpm (3 mm from bearing)		1,2		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	≤	0,03		0,015		0,015		mm
	– axial	≤	0,2		0,2		0		mm
24	Housing material		steel, zinc galvanized and passivated						
25	Mass		50						g
26	Direction of rotation		clockwise, viewed from the front face						
27	Speed up to	$n_{max.}$	11 000						rpm
28	Number of pole pairs		1						
29	Magnet material		AlNiCo						
Rated values for continuous operation									
30	Rated torque	M_N	2	4,1	4,6	4,7	4,5	4,2	mNm
31	Rated current (thermal limit)	I_N	0,7	0,7	0,4	0,29	0,18	0,094	A
32	Rated speed	n_N	8 260	5 370	5 210	4 160	4 650	3 490	rpm

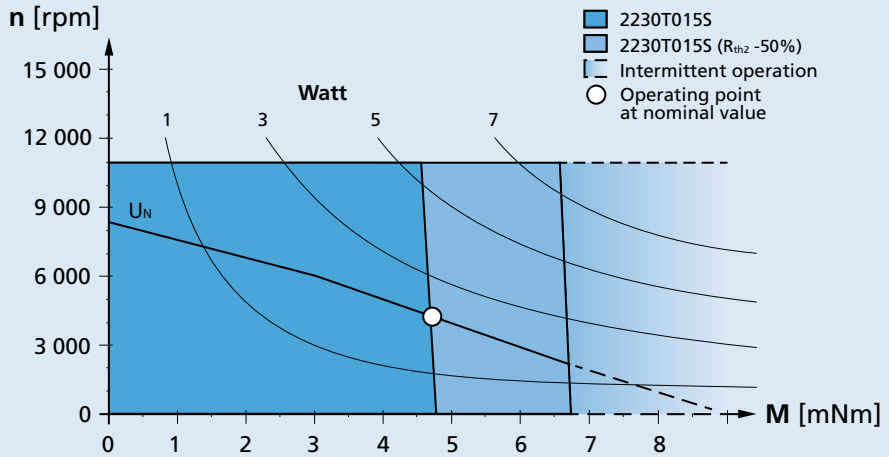
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 0%.

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.

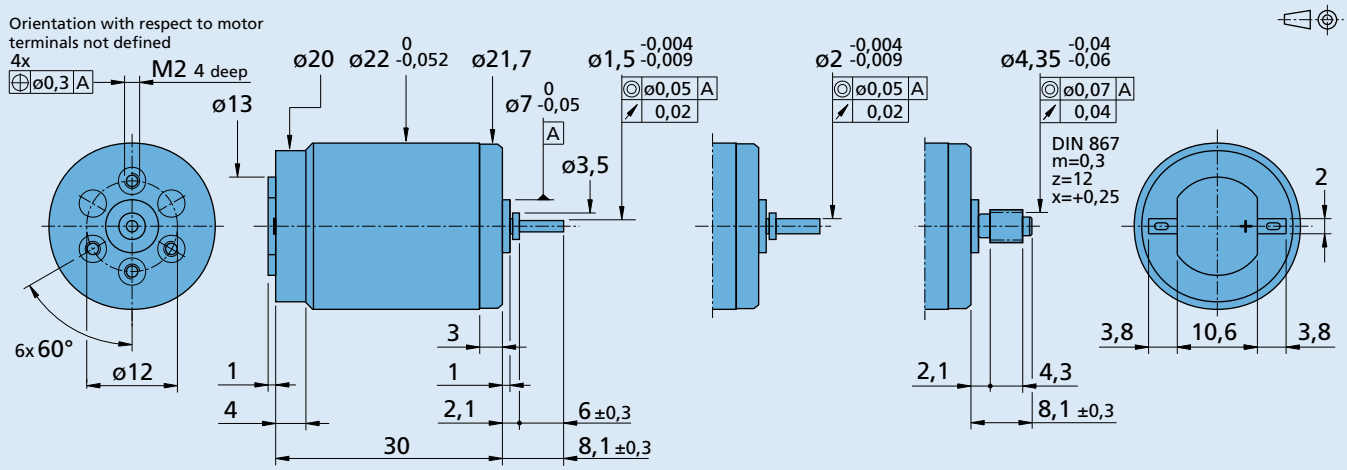
The diagram shows the motor in a completely insulated as well as thermally coupled condition (R_{th2} 50% reduced).

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.



Recommended operation areas (example: nominal voltage 15V)

Dimensional drawing



2230 T ... S **2230 U ... S** **2230 F/R ... S**