Flat DC-Micromotors

Precious Metal Commutation
with integrated Encoder

2,9 mNm
3 W

Series 2607 ... SR IE2-16

Values at 22°C and nominal voltage		2607 T		006 SR	012 SR	024 SR	IE2-16
1	Nominal voltage	U_N		6	12	24	V
2	Terminal resistance	R		8	31,2	118,6	Ω
3	Efficiency, max.	$\eta_{max.}$		80	80	80	%
4	No-load speed	n_0		6 700	6 900	7 200	min⁻¹
5	No-load current, typ. (with shaft ø 1,5 mm)	I_0		0,01	0,005	0,0025	A
6	Stall torque	M_H		6,33	6,31	6,48	mNm
7	Friction torque	M_R		0,08	0,08	0,08	mNm
8	Speed constant	k_n		1 130	582	304	min⁻¹/V
9	Back-EMF constant	k_E		0,884	1,72	3,29	mV/min⁻¹
10	Torque constant	k_M		8,44	16,4	31,4	mNm/A
11	Current constant	k_I		0,118	0,061	0,032	A/mNm
12	Slope of n-M curve	$\Delta n/\Delta M$		1 060	1 090	1 110	min⁻¹/mNm
13	Rotor inductance	L		420	1 600	5 800	µH
14	Mechanical time constant	τ_m		7,5	7,8	7,9	ms
15	Rotor inertia	J		0,68	0,68	0,68	gcm²
16	Angular acceleration	$\alpha_{max.}$		94	93	95	·10³rad/s²
17	Thermal resistance	R_{th1} / R_{th2}	10 / 32				K/W
18	Thermal time constant	τ_{w1} / τ_{w2}	6 / 250				s
19	Operating temperature range:						
	– motor		+0 ... +70				°C
	– winding, max. permissible		+70				°C
20	Shaft bearings		sintered bearings	ball bearings, preloaded			
21	Shaft load max.:		(standard)	(optional version)			
	– with shaft diameter		1,5	1,5			mm
	– radial at 3 000 min⁻¹ (3 mm from bearing)		1,2	5			N
	– axial at 3 000 min⁻¹		0,2	0,5			N
	– axial at standstill		20	10			N
22	Shaft play:						
	– radial	≤	0,03	0,015			mm
	– axial	≤	0,2	0			mm
23	Housing material		plastic				
24	Mass		18,6				g
25	Direction of rotation		clockwise, viewed from the front face				
26	Speed up to	$n_{max.}$	8 000				min⁻¹
27	Number of pole pairs		2				
28	Magnet material		NdFeB				
Rated values for continuous operation							
29	Rated torque	M_N		3	2,9	2,9	mNm
30	Rated current (thermal limit)	I_N		0,39	0,2	0,1	A
31	Rated speed	n_N		2 620	2 760	3 010	min⁻¹

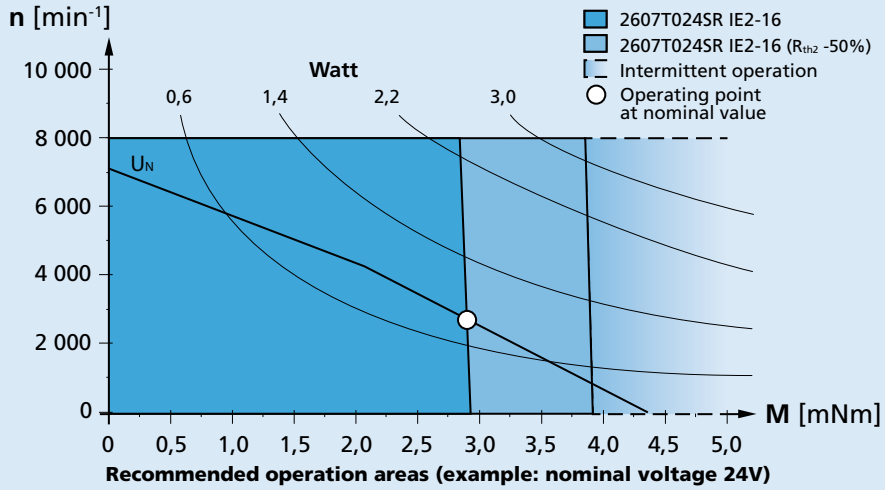
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 0%.

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).

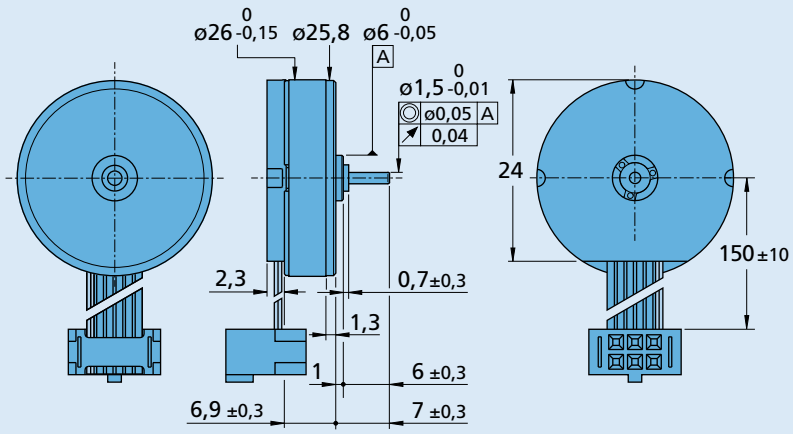
The nominal voltage (U_N) curve shows the operating point at nominal voltage in the insulated and thermally coupled condition. Any points of operation above the curve at nominal voltage will require a higher operating voltage. Any points below the nominal voltage curve will require less voltage.



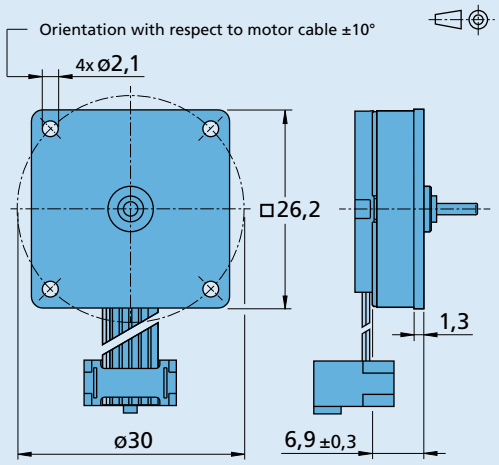
Recommended operation areas (example: nominal voltage 24V)

For notes on technical data and lifetime performance refer to "Technical Information".

Dimensional drawing



2607 T ... SR IE2-16



2607 T ... SR IE2-16 3697

Integrated optical Encoder

Lines per revolution	*N*	16	
Signal output, square wave		2	Channel
Supply voltage	U_{DD}	3,2 ... 5,5	V DC
Current consumption, typical (U_{DD} = 5 V DC)	I_{DD}	typ. 8, max. 15	mA
Output current, max. allowable (at U_{out} < 1,5V)	I_{OUT}	5	mA
Pulse width [1]	*P*	180 ± 45	°e
Phase shift, channal A to B [1]	*Φ*	90 ± 45	°e
Signal rise/fall time, max. (C_{LOAD} = 50 pF)	*tr/tf*	2,5 / 0,3	µs
Frequency range [2], up to	*f*	4,5	kHz

[1] Ambient temperature 22°C (tested at 1kHz)
[2] Velocity (min^{-1}) = f (Hz) x 60/N

Features

In this version, the DC-Micromotors have an optical encoder with two output channels. A code wheel on the shaft is optically captured and further processed. At the encoder outputs, two 90° phase-shifted rectangular signals are available with 16 impulses per motor revolution.

The encoder is suitable for the monitoring and regulation of the speed and direction of rotation and for positioning the drive shaft.

The supply voltage for the encoder and the DC-Micromotor as well as the two channel output signals are interfaced through a ribbon cable with connector.

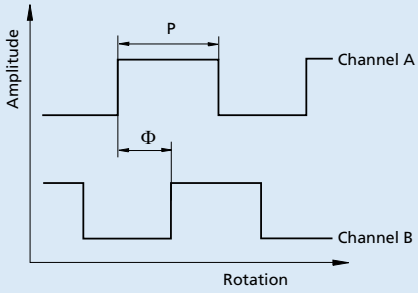
Full product description
Examples:

2607T006SR IE2-16

2607T024SR IE2-16

Output signals / Circuit diagram / Connector information

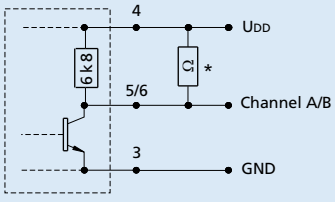
Output signals
with clockwise rotation as seen from the shaft end



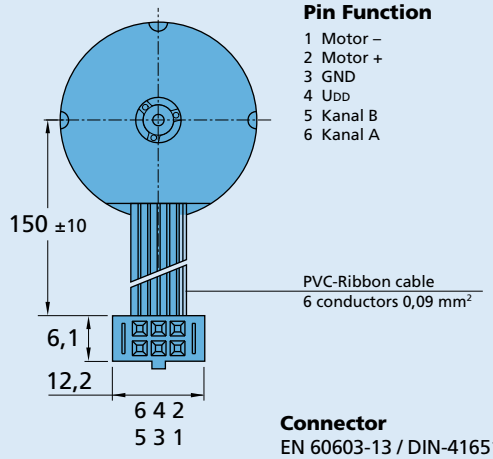
Admissible deviation of phase shift:

$$\Delta\Phi = \left| 90° - \frac{\Phi}{P} * 180° \right| \leq 45°$$

Output circuit



* An additional external pull-up resistor can be added to improve the rise time. Caution: I_{OUT} max. 5 mA must not be exceeded!



Pin Function
1 Motor –
2 Motor +
3 GND
4 UDD
5 Kanal B
6 Kanal A

Connector
EN 60603-13 / DIN-41651.
grid 2,54 mm