

# Flat DC-Micromotors

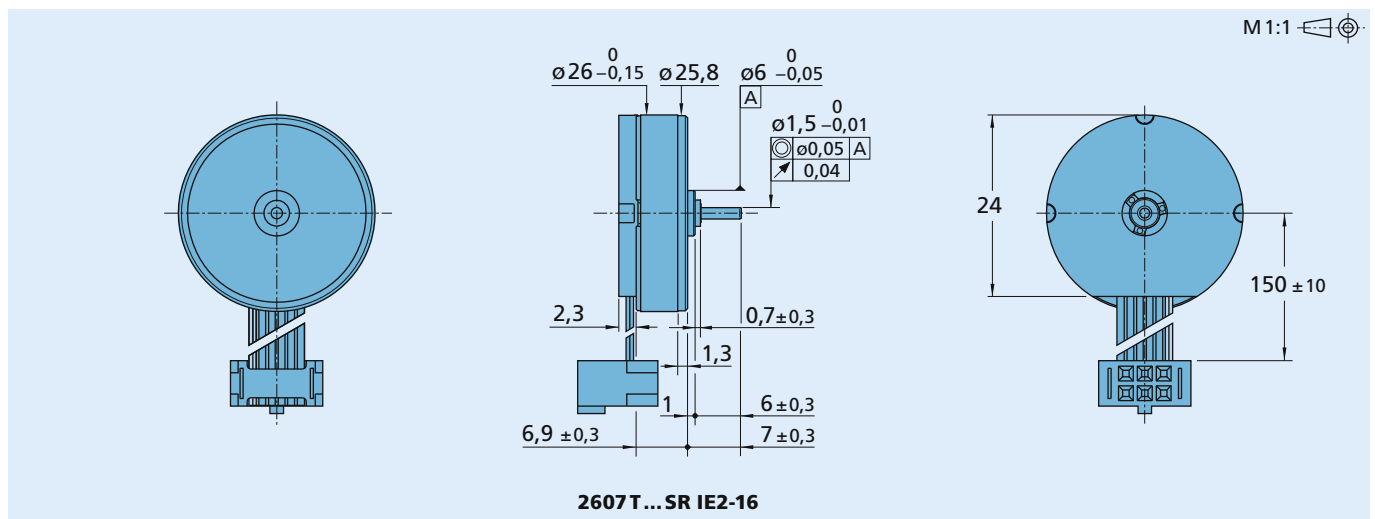
Precious Metal Commutation  
with integrated Encoder

## 2 mNm

For combination with  
Drive Electronics:  
SC 1801

### Series 2607 ... SR IE2-16

	2607 T	006 SR	012 SR	024 SR	IE2-16	
Nominal voltage	U <sub>N</sub>	6	12	24	Volt	
Terminal resistance	R	7,9	30,8	115	Ω	
Output power	P <sub>2 max.</sub>	1,11	1,14	1,22	W	
Efficiency	η <sub>max.</sub>	80	80	80	%	
No-load speed	n <sub>0</sub>	6 700	6 900	7 200	rpm	
No-load current (with shaft ø 1,5 mm)	I <sub>0</sub>	0,010	0,005	0,0025	A	
Stall torque	M <sub>H</sub>	6,33	6,31	6,48	mNm	
Friction torque	M <sub>R</sub>	0,08	0,08	0,08	mNm	
Speed constant	k <sub>n</sub>	1 130	582	304	rpm/V	
Back-EMF constant	k <sub>E</sub>	0,884	1,72	3,29	mV/rpm	
Torque constant	k <sub>M</sub>	8,44	16,4	31,4	mNm/A	
Current constant	k <sub>I</sub>	0,118	0,061	0,032	A/mNm	
Slope of n-M curve	Δn/ΔM	1 060	1 090	1 110	rpm/mNm	
Rotor inductance	L	420	1 600	5 800	μH	
Mechanical time constant	τ <sub>m</sub>	7,5	7,8	7,9	ms	
Rotor inertia	J	0,68	0,68	0,68	gcm <sup>2</sup>	
Angular acceleration	α <sub>max.</sub>	94	93	95	·10 <sup>3</sup> rad/s <sup>2</sup>	
Thermal resistance	R <sub>th 1</sub> / R <sub>th 2</sub>	10 / 32			K/W	
Thermal time constant	τ <sub>w1</sub> / τ <sub>w2</sub>	6 / 250			s	
Operating temperature range:						
– motor		– 30 ... + 70			°C	
– rotor, max. permissible		+100			°C	
Shaft bearings		sintered sleeves bearings (standard)	ball bearings (optional)			
Shaft load max.:						
– with shaft diameter		1,5	1,5		mm	
– radial at 3000 rpm (3 mm from bearing)		1,2	5		N	
– axial at 3000 rpm		0,2	0,5		N	
– axial at standstill		20	10		N	
Shaft play:						
– radial	≤	0,03	0,015		mm	
– axial	≤	0,2	0,2		mm	
Housing material		plastic				
Weight		18,6				g
Direction of rotation		clockwise, viewed from the front face				
<b>Recommended values - mathematically independent of each other</b>						
Speed up to	n <sub>e max.</sub>	5 500	5 500	5 500	rpm	
Torque up to	M <sub>e max.</sub>	2	2	2	mNm	
Current up to (thermal limits)	I <sub>e max.</sub>	0,371	0,187	0,097	A	



Integrated optical Encoder		IE2-16	
Lines per revolution	N	16	
Signal output, square wave		2	channels
Supply voltage	U <sub>DD</sub>	3,2 ... 5,5	V DC
Current consumption, typical (U <sub>DD</sub> = 5V DC)	I <sub>DD</sub>	typ. 8, max. 15	mA
Output current, max. allowable (at U <sub>out</sub> < 1,5V)	I <sub>OUT</sub>	5	mA
Pulse width <sup>1)</sup>	P	180 ± 45	°e
Phase shift, channel A to B <sup>1)</sup>	Φ	90 ± 45	°e
Signal rise/fall time, max. (C <sub>LOAD</sub> = 50 pF)	tr/tf	2,5/0,3	µs
Frequency range <sup>2)</sup> , up to	f	4,5	kHz
Operating temperature range		0 ... +70	°C

<sup>1)</sup> Ambient temperature 22°C (tested at 1kHz)

<sup>2)</sup> Velocity (rpm) = 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:

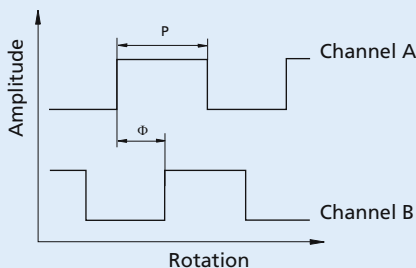
2607T0065R IE2-16

2607T0245R IE2-16

### Output signals / Circuit diagram / Connector information

#### Output signals

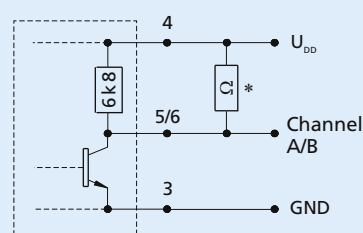
with clockwise rotation as seen from the shaft end



Admissible deviation of phase shift:

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

#### Output circuit



\* An additional external pull-up resistor can be added to improve the rise time. Caution: I<sub>OUT</sub> max. 5 mA must not be exceeded!

