

# Brushless DC-Servomotors

## 2 Pole Technology

20 mNm  
68 W

### Series 2057 ... B

Values at 22°C and nominal voltage		2057 S	012 B	024 B	
1	Nominal voltage	$U_N$	12	24	V
2	Terminal resistance, phase-phase	$R$	0,5	1,32	$\Omega$
3	Efficiency, max.	$\eta_{max}$	83	84	%
4	No-load speed	$n_0$	22 800	26 800	min <sup>-1</sup>
5	No-load current, typ. (with shaft $\varnothing$ 3 mm)	$I_0$	0,2	0,136	A
6	Stall torque	$M_H$	120	155	mNm
7	Friction torque, static	$C_0$	0,12	0,12	mNm
8	Friction torque, dynamic	$C_V$	$3,84 \cdot 10^{-5}$	$3,84 \cdot 10^{-5}$	mNm/min <sup>-1</sup>
9	Speed constant	$k_n$	1 910	1 118	min <sup>-1</sup> /V
10	Back-EMF constant	$k_E$	0,524	0,894	mV/min <sup>-1</sup>
11	Torque constant	$k_M$	5	8,54	mNm/A
12	Current constant	$k_I$	0,2	0,117	A/mNm
13	Slope of n-M curve	$\Delta n / \Delta M$	191	173	min <sup>-1</sup> /mNm
14	Terminal inductance, phase-phase	$L$	41	120	$\mu$ H
15	Mechanical time constant	$\tau_m$	7,9	7,1	ms
16	Rotor inertia	$J$	4	4	gcm <sup>2</sup>
17	Angular acceleration	$\alpha_{max}$	304	393	$\cdot 10^3$ rad/s <sup>2</sup>
18	Thermal resistance	$R_{th1} / R_{th2}$	1,5 / 11,6		K/W
19	Thermal time constant	$\tau_{w1} / \tau_{w2}$	6,1 / 455		s
20	Operating temperature range:				
	– motor		-30 ... +125		°C
	– winding, max. permissible		+125		°C
21	Shaft bearings		ball bearings, preloaded		
22	Shaft load max.:				
	– with shaft diameter		3		mm
	– radial at 3 000 min <sup>-1</sup> (5 mm from mounting flange)		28		N
	– axial at 3 000 min <sup>-1</sup> (push only)		17		N
	– axial at standstill (push only)		75		N
23	Shaft play:				
	– radial	$\leq$	0,015		mm
	– axial	$=$	0		mm
24	Housing material		aluminium, black anodized		
25	Mass		95		g
26	Direction of rotation		electronically reversible		
27	Speed up to	$n_{max}$	55 000		min <sup>-1</sup>
28	Number of pole pairs		1		
29	Hall sensors		digital		
30	Magnet material		SmCo		
<b>Rated values for continuous operation</b>					
31	Rated torque	$M_N$	17	17	mNm
32	Rated current (thermal limit)	$I_N$	3,52	2,07	A
33	Rated speed	$n_N$	18 990	23 510	min <sup>-1</sup>

**Note:** Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The  $R_{th2}$  value has been reduced by 25%.

**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.



