

# Brushless DC-Servomotors

## 2 Pole Technology

18 mNm  
51 W

### Series 2444 ... B

Values at 22°C and nominal voltage		2444 S	024 B	048 B	
1	Nominal voltage	$U_N$	24	48	V
2	Terminal resistance, phase-phase	$R$	2	8,54	$\Omega$
3	Efficiency, max.	$\eta_{max}$	79	78	%
4	No-load speed	$n_0$	22 200	21 600	$\text{min}^{-1}$
5	No-load current, typ. (with shaft $\varnothing$ 3 mm)	$I_0$	0,159	0,076	A
6	Stall torque	$M_H$	123	118,5	mNm
7	Friction torque, static	$C_0$	0,746	0,746	mNm
8	Friction torque, dynamic	$C_V$	$3,87 \cdot 10^{-5}$	$3,87 \cdot 10^{-5}$	$\text{mNm}/\text{min}^{-1}$
9	Speed constant	$k_n$	927	450	$\text{min}^{-1}/\text{V}$
10	Back-EMF constant	$k_E$	1,08	2,22	$\text{mV}/\text{min}^{-1}$
11	Torque constant	$k_M$	10,3	21,2	$\text{mNm}/\text{A}$
12	Current constant	$k_I$	0,097	0,047	$\text{A}/\text{mNm}$
13	Slope of n-M curve	$\Delta n/\Delta M$	180	181	$\text{min}^{-1}/\text{mNm}$
14	Terminal inductance, phase-phase	$L$	175	740	$\mu\text{H}$
15	Mechanical time constant	$\tau_m$	10,8	10,8	ms
16	Rotor inertia	$J$	5,7	5,7	$\text{gcm}^2$
17	Angular acceleration	$\alpha_{max}$	216	208	$\cdot 10^3 \text{rad}/\text{s}^2$
18	Thermal resistance	$R_{th1} / R_{th2}$	2,4 / 11,6		K/W
19	Thermal time constant	$\tau_{w1} / \tau_{w2}$	9,6 / 470		s
20	Operating temperature range:				
	– motor		-30 ... +125		$^{\circ}\text{C}$
	– winding, max. permissible		+125		$^{\circ}\text{C}$
21	Shaft bearings		ball bearings, preloaded		
22	Shaft load max.:				
	– with shaft diameter		3		mm
	– radial at 3 000 $\text{min}^{-1}$ (5 mm from mounting flange)		31		N
	– axial at 3 000 $\text{min}^{-1}$ (push only)		16		N
	– axial at standstill (push only)		57		N
23	Shaft play:				
	– radial	$\leq$	0,015		mm
	– axial	$=$	0		mm
24	Housing material		aluminium, black anodized		
25	Mass		98		g
26	Direction of rotation		electronically reversible		
27	Speed up to	$n_{max}$	45 000		$\text{min}^{-1}$
28	Number of pole pairs		1		
29	Hall sensors		digital		
30	Magnet material		SmCo		
<b>Rated values for continuous operation</b>					
31	Rated torque	$M_N$	14,2	14,3	mNm
32	Rated current (thermal limit)	$I_N$	1,58	0,772	A
33	Rated speed	$n_N$	18 800	18 100	$\text{min}^{-1}$

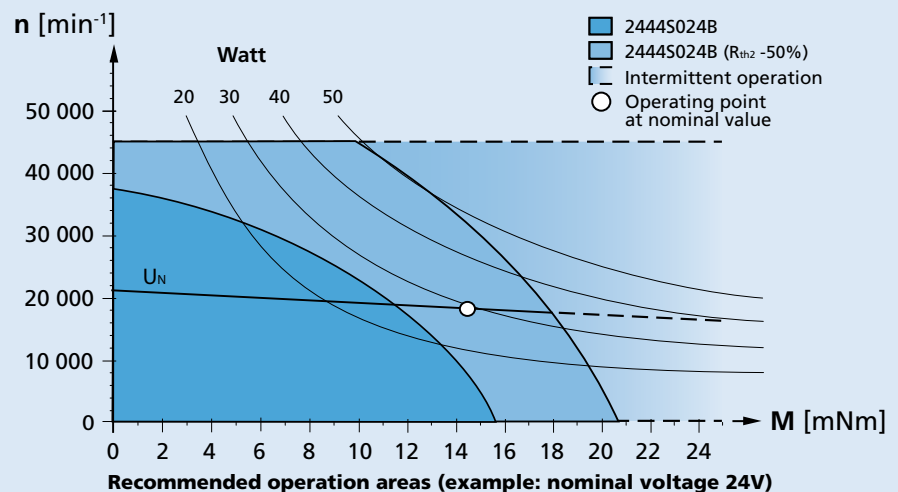
**Note:** Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The  $R_{th2}$  value has been reduced by 25%.

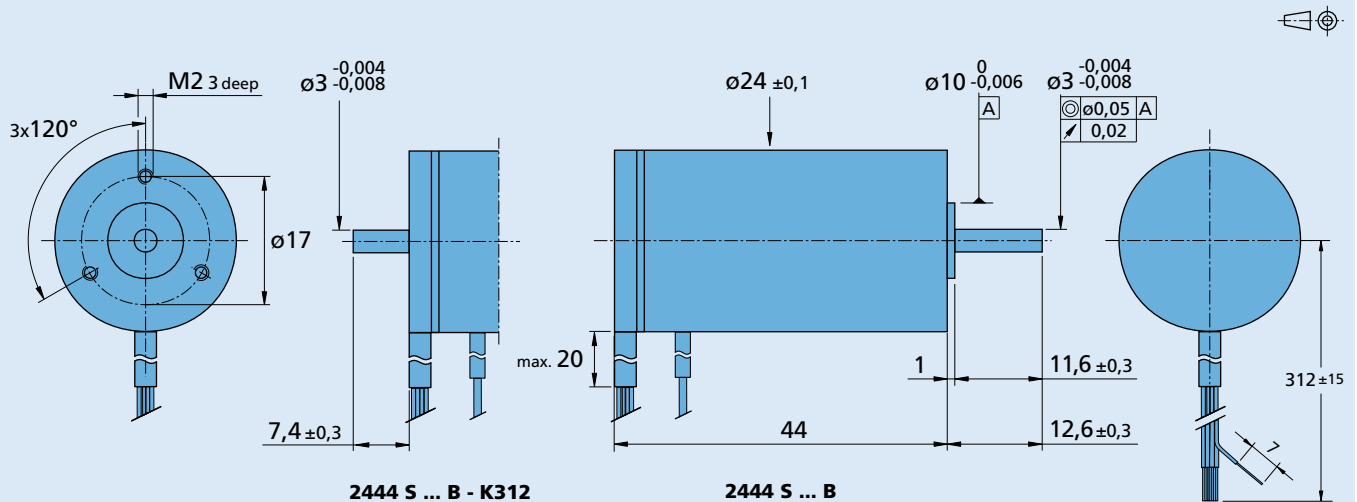
**Note:**

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.



**Dimensional drawing**

**Option, cable and connection information**

 Example product designation: **2444S024B-K1155**

Option	Type	Description	Connection	
			Function	Colour
K1155	Controller combination	Analog Hall sensors for combination with Motion Controller MCBL	Phase C	yellow
K1026	Sensorless	Motor without Hall sensors	Phase B	orange
K1555	Lead wires length	Single lead wires 750 mm long in PTFE	Phase A	brown
K903	Lead wires length	Single lead wires 1000 mm long in PTFE	GND	black
K1838	Encoder combination	Motor with rear end shaft for combination with Encoder IE3	U <sub>DD</sub> (+5V)	red
K313	Encoder combination	Motor with rear end shaft for combination with Encoder IE2	Hall sensor C	grey
K312	Encoder combination	Motor with rear end shaft for combination with Encoder HEDS/HEDL/HEDM	Hall sensor B	blue
K3051	Encoder combination	Motor with rear end shaft for combination with Encoder AES	Hall sensor A	green
K179	Bearing lubrication	For vacuum of 10 <sup>-5</sup> Pa @ 22°C		
			<b>Standard cable</b>	
			Single wires, material PTFE	
			AWG 24: Phase A/B/C	
			AWG 26: Hall A/B/C, U <sub>DD</sub> , GND	

**Product combination**

Precision Gearheads / Lead Screws	Encoders	Drive Electronics	Cables / Accessories
22/7	HEDS 5500	SC 2402 P	MBZ  To view our large range of accessory parts, please refer to the "Accessories" chapter.
23/1	IE3-1024	SC 2804 S	
26/1	IE3-1024 L	SC 5004 P	
26/1 R	HEDL 5540	SC 5008 S	
30/1	AES-4096	MCBL 3002 P	
30/1 S		MCBL 3002 S	
		MCBL 3003 P	
		MCBL 3006 S	
		MC 5004 P	
		MC 5004 P STO	
		MC 5005 S	