

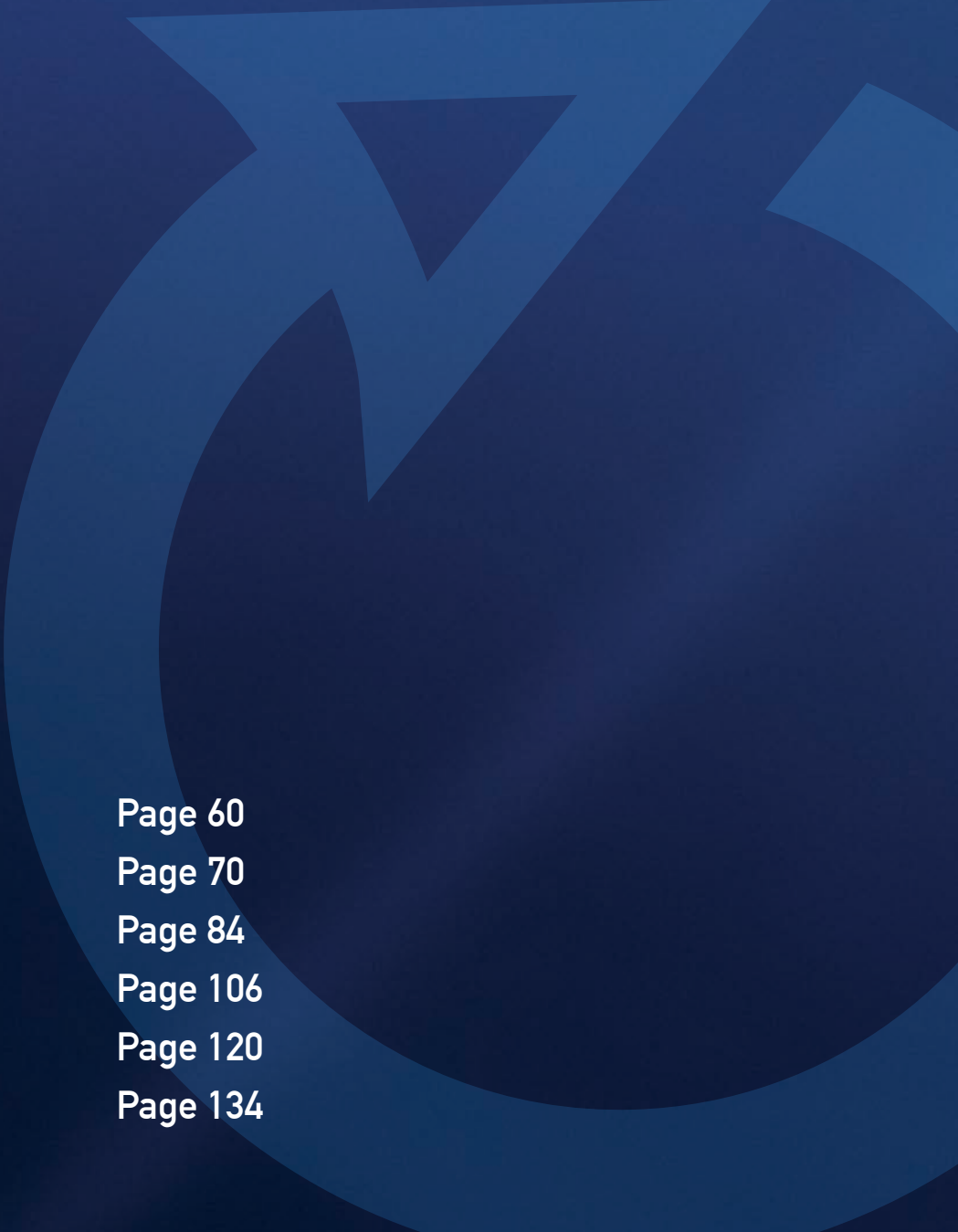
DC-Motors

Brush motors

Our standard programme of brush motors does currently extend over six series.

These series are the basis for versatile application solutions and drive combinations. An overview of the various adaptation possibilities can be found from page 192 onwards.





DC-Motors

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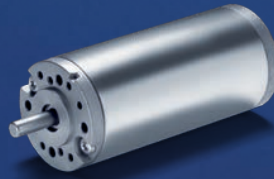
Overview DC-standard motors



M28

M36

	x 20/S	x 20/S	x 40/S	x 40/S	x13/I	x13/I	x20/I	x20/I	
Ident. no.	220518	220519	220520	220521	220218	220219	220220	220221	
Voltage	12	24	12	24	12	24	12	24	
Torque	1,6	1,6	3	3	1,5	1,5	3	3	
Speed	3150	3000	3100	3100	3000	3100	2900	2900	
Weight [kg]	0,07 – 0,17				0,2 – 0,3				
Length [mm]	50 – 70				51 – 70				
shaft diameter [mm]	3m3				4k5				
shaft length [mm]	12				20				
PKS30	28 - 250 Ncm		53 - 250 Ncm						
P32I	5 - 345 Ncm		10 - 450 Ncm		5 - 323 Ncm		10 - 450 Ncm		
P42I									
P52I									
P62I									
P72I									
P82I									
SN17									
SN22,6									
SN31									
SN40									
S1	8,8 - 100 Ncm		16,4 - 100 Ncm						
S5									
S90									
S92									
IGO RU	x				x				
IGO									
IGO SN									
IGM					x				
IGMi									
B37					x				
B47									
B56									



M42

[illegible]

Overview DC-standard motors



M48

	x25/l	x25/l	x50/l	x50/l	x60/l	x60/l	x25/l	
Ident. no.	210890	210891	210892	210893	220191	211333	210950	
Voltage	12	24	12	24	12	24	12	
Torque	5	5	10	10	15	15	14	
Speed	2800	2800	3050	3150	3000	3300	3300	
Weight [kg]	0,65 – 0,98							
Length [mm]	91 – 126							
shaft diameter [mm]	5k5 / 6k5							
shaft length [mm]	20							
PKS30								
P32I	16 - 450 Ncm		32 - 450 Ncm		48 - 450 Ncm			
P42I	16 - 1078 Ncm		32 - 1500 Ncm		48 - 1500 Ncm			
P52I	16 - 1078 Ncm		32 - 2156 Ncm		48 - 2500 Ncm		45 - 2500 Ncm	
P62I							45 - 3018 Ncm	
P72I								
P82I								
SN17								
SN22,6	12 - 68 Ncm		24 - 136 Ncm		36 - 204 Ncm			
SN31	42 - 87 Ncm		84 - 175 Ncm		126 - 262 Ncm		88 - 245 Ncm	
SN40							78 - 245 Ncm	
S1								
S5	37 - 500 Ncm		73 - 500 Ncm		110 - 500 Ncm			
S90								
S92							180 - 940 Ncm	
IGO RU								
IGO	x							
IGO SN	x							
IGM	x							
IGMi								
B37								
B47	x							
B56								



M63

x25/l	x40/l	x40/l	x60/l	x60/l
210961	210951	210962	220311	210963
24	12	24	12	24
14	18	18	22	30
3250	2550	3050	3150	3000
1,16 – 1,75				
95 – 130				
8g6				
25				

45 - 2500 Ncm	58 - 2500 Ncm	70 - 2500 Ncm
45 - 3018 Ncm	58 - 3881 Ncm	70 - 5000 Ncm

88 - 245 Ncm	113 - 315 Ncm	139 - 400 Ncm
78 - 245 Ncm	101 - 315 Ncm	123 - 525 Ncm

180 - 940 Ncm	230 - 1210 Ncm	280 - 1500 Ncm

x	
x	
x	
x	

x	



M80

x40/l	x40/l	x80/l	x80/l
222784	222334a	222779	222335a
12	24	12	24
38	38	70	70
2850	2900	1500	3200
2,6 – 3,7			
135 – 175			
12g5			
30			

122 - 5000 Ncm	224 - 5000 Ncm
120 - 8190 Ncm	220 - 8400 Ncm
120 - 8190 Ncm	220 - 12000 Ncm

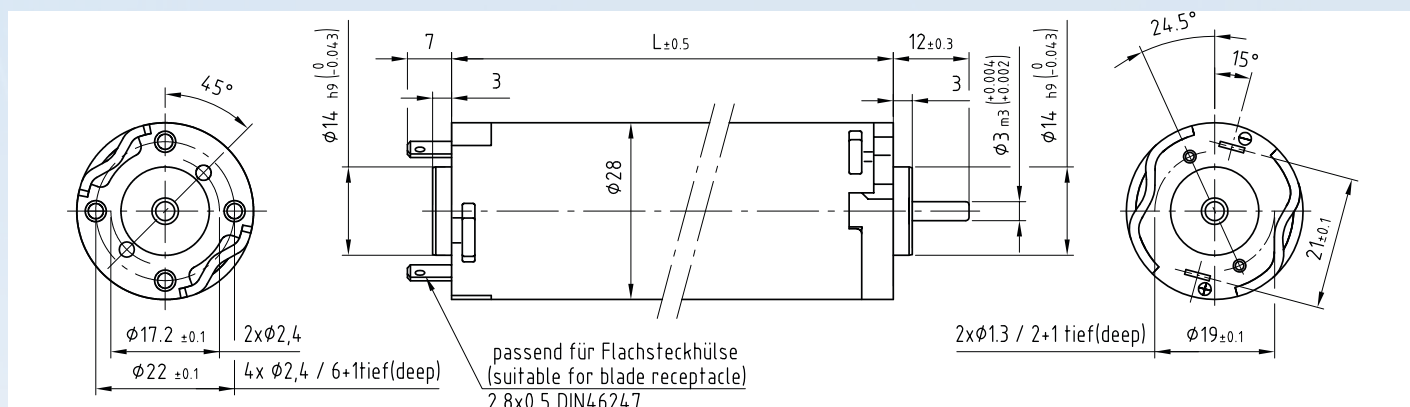
210 - 670 Ncm	390 - 1230 Ncm

x	
x	
x	
x	

x	

DC-Motors Type M28

- Permanent magnet DC-motor
- Sintered bearings, optional ball bearings
- Clip connection, optional lead wires
- Power range in continuous operation approx. 5 to 10 watt
- Voltages 12 and 24 volts
- Multiple combination possibilities with gears and encoders



Application on request

Versions	Unit	M28x20/S	M28x20/S	M28x40/S	M28x40/S
Part number	[ID]	220518	220519	220520	220521
Nominal voltage	[V]	12	24	12	24
Nominal torque	[Ncm]	1.6	1.6	3	3
Nominal speed	[1/min]	3150	3000	3100	3100
Nominal current	[A]	0.95	0.45	1.5	0.81
Output power ¹⁾	[W]	5.3	5	9.7	9.7
Rise of M-n-characteristic	[1/min / Ncm]	1281.3	1437.5	566.7	533.3
Torque constant	[Ncm / A]	2	4.2	2.2	4.2
Rotor moment of inertia	[gcm ²]	14	14	24	24
Weight	[kg]	0.1	0.1	0.17	0.17
Length	[mm]	50	50	70	70

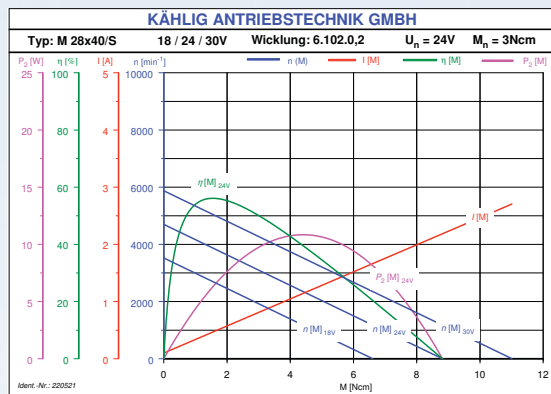
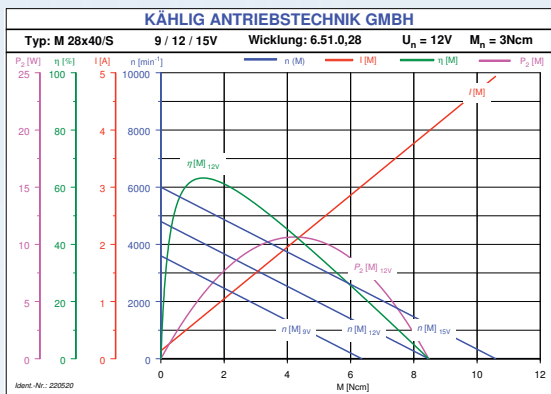
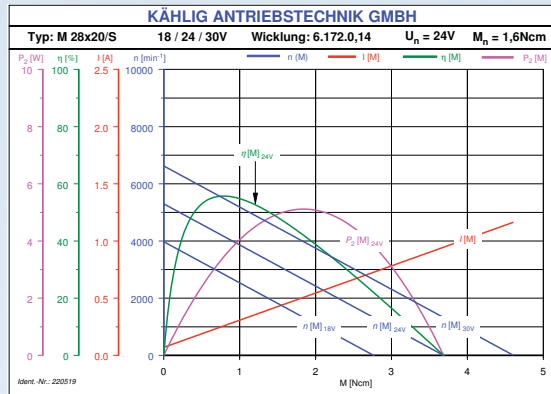
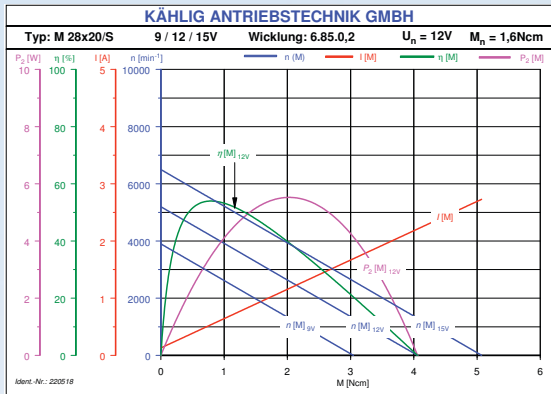
General data

Lifetime at rated torque ¹⁾	h	1500
Permissible axial shaft load ²⁾	N	5
Permissible radial shaft load ²⁾	N	20
Insulation class (DIN VDE 0530)		E
IP protection class (DIN VDE 0530)		IP30
RFI suppression		optional

¹⁾ Operation by nominal values: Date: 13.05.2008 Subject to change without notice
²⁾ At 3000 rpm and 3000 hrs nominal life, simultaneous axial and radial loads

Stand: 10. January 2014 – changes reserved

Performance characteristics

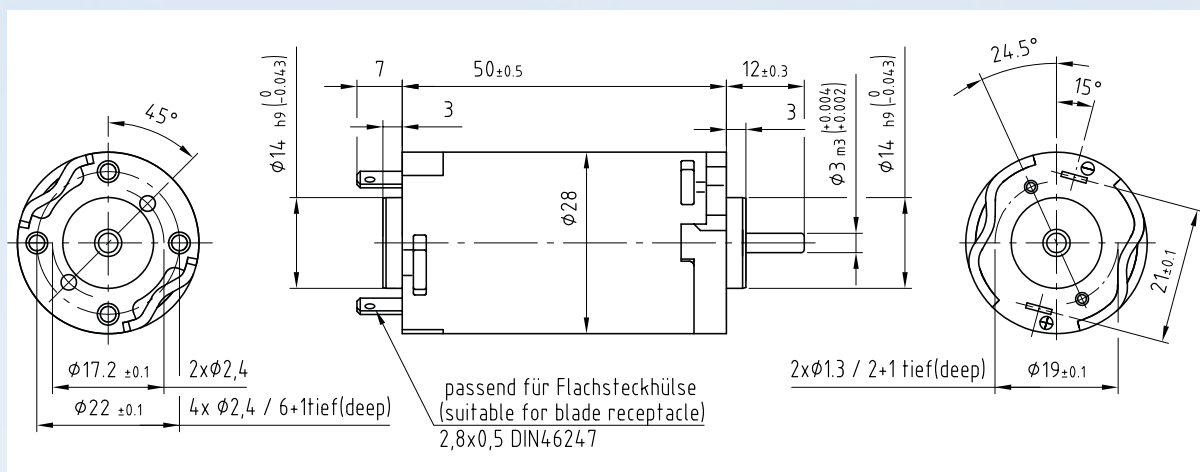


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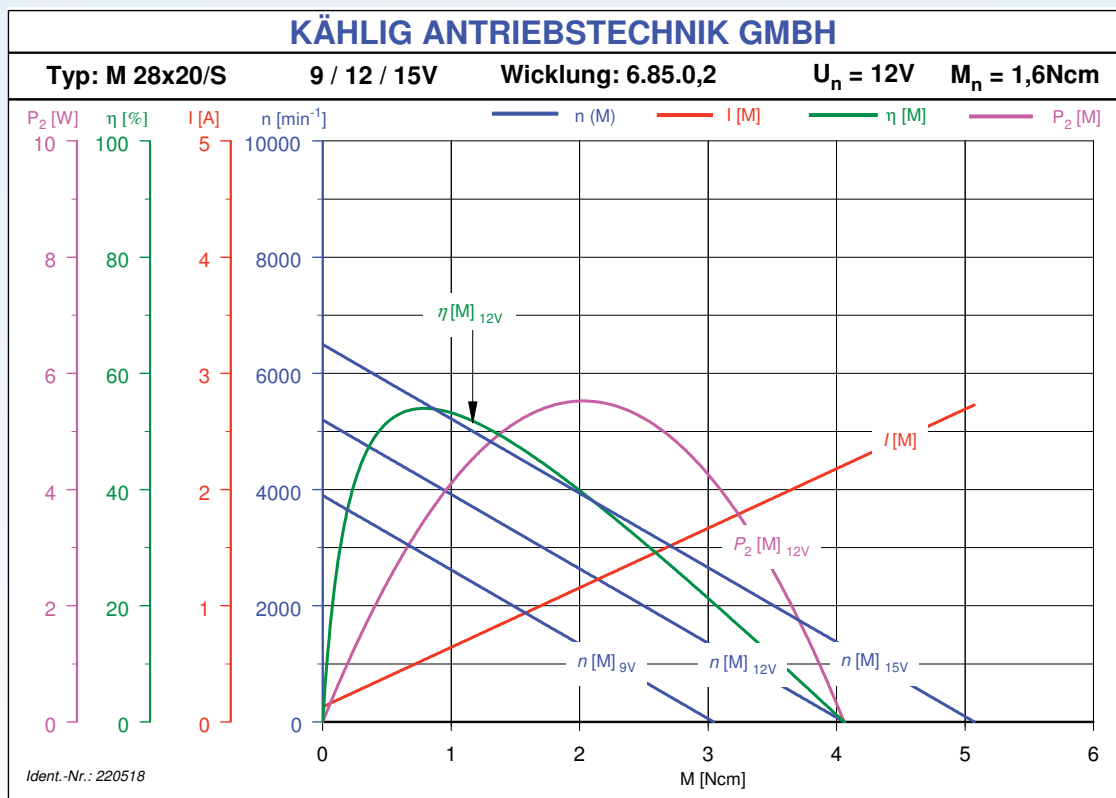
DC-Motor M28x20/S (12V)

Ident-Nr. 220518

- Brushed DC motor with permanent magnet
- Sintered bearings
- Clip connection, optional litz wire
- Multiple combination possibilities with gears and encoders
- Direction of rotation CW / CCW
- Power output in rated operation: 5.3 Watt
- Multiple combination possibilities with gears and encoders



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	1,6	
Rated speed ¹⁾	n_N	min ⁻¹	3150	±10%
Rated current ¹⁾	I_N	A	0,95	±20%
No load speed ¹⁾	n_0	min ⁻¹	5200	±15%
No load current ¹⁾	I_0	A	0,13	±50%
Rated power output ¹⁾	P_{2N}	W	5,3	
Rated power input ¹⁾	P_{1N}	W	11,4	
Rated efficiency ¹⁾	η_N	%	46,3	
Maximum power output ²⁾³⁾	P_{2max}	W	5,5	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	1,6	
Maximum Continuous current ²⁾³⁾	I_{max}	A	0,95	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	12000	
Stall torque ¹⁾	M_H	Ncm	4,1	
Stall current ¹⁾	I_H	A	2,2	
Demagnetization current	I_E	A	7,6	
Connecting resistance ¹⁾	R	Ω	5,43	
Armature resistance ¹⁾	R_A	Ω	5,3	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	3,31	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	1281,3	
Torque constant ¹⁾	k_M	Ncm/A	2	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	2,3	
Friction torque ¹⁾	M_R	Ncm	-0,3	
Mechanical time constant ¹⁾	T_M	ms	2,2	
Electrical time constant ¹⁾	T_e	ms	0,6	
Rotor inertia	J_R	gcm ²	14	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	5	
Permissible radial shaft loads ³⁾	F_{radial}	N	20	
Protection class DIN VDE 0530	IP30			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-15°C to +40°C			
Bearing	2 sintered bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature $\approx 20^\circ\text{C}$ 2) $\Delta\vartheta_w$ allowable = 100K

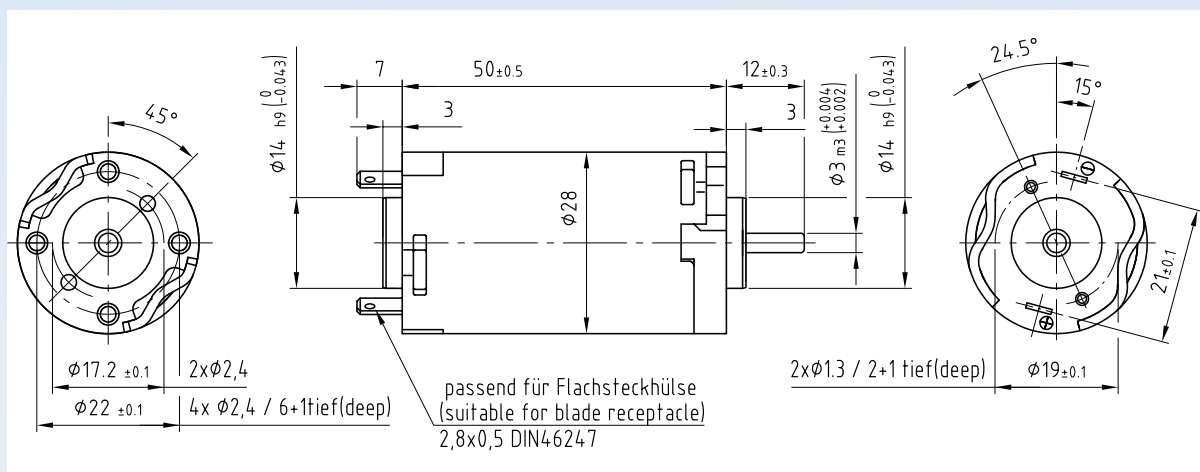
3) The operating at maximum levels reduces the lifespan

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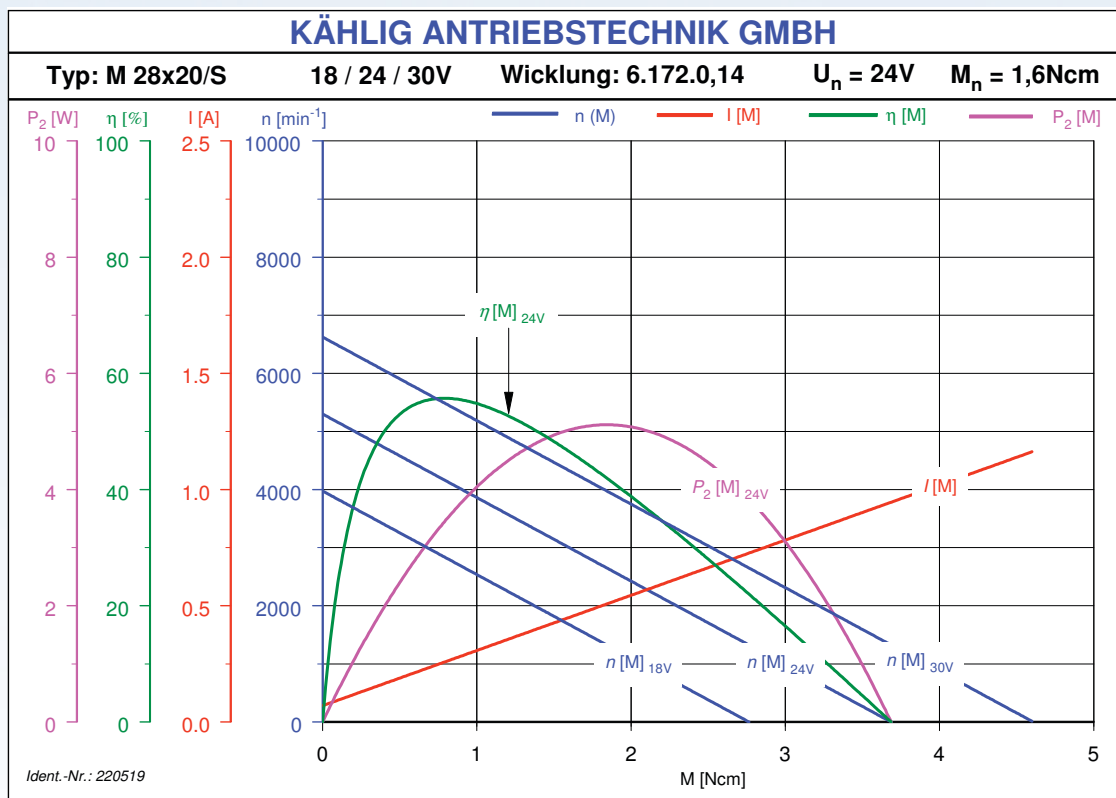
DC-Motor M28x20/S (24V)

Ident-Nr. 220519

- Brushed DC motor with permanent magnet
- Sintered bearings
- Clip connection, optional litz wire
- Multiple combination possibilities with gears and encoders
- Direction of rotation CW / CCW
- Power output in rated operation: 5 Watt
- Multiple combination possibilities with gears and encoders



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	1,6	
Rated speed ¹⁾	n_N	min ⁻¹	3000	±10%
Rated current ¹⁾	I_N	A	0,45	±20%
No load speed ¹⁾	n_0	min ⁻¹	5300	±15%
No load current ¹⁾	I_0	A	0,07	±50%
Rated power output ¹⁾	P_{2N}	W	5	
Rated power input ¹⁾	P_{1N}	W	10,8	
Rated efficiency ¹⁾	η_N	%	46,5	
Maximum power output ²⁾³⁾	P_{2max}	W	5,1	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	1,6	
Maximum Continuous current ²⁾³⁾	I_{max}	A	0,45	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	12000	
Stall torque ¹⁾	M_H	Ncm	3,7	
Stall current ¹⁾	I_H	A	0,9	
Demagnetization current	I_E	A	3,7	
Connecting resistance ¹⁾	R	Ω	25,38	
Armature resistance ¹⁾	R_A	Ω	23,9	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	23	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	1437,5	
Torque constant ¹⁾	k_M	Ncm/A	4,2	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	4,5	
Friction torque ¹⁾	M_R	Ncm	-0,3	
Mechanical time constant ¹⁾	T_M	ms	18,9	
Electrical time constant ¹⁾	T_e	ms	0,9	
Rotor inertia	J_R	gcm ²	14	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	5	
Permissible radial shaft loads ³⁾	F_{radial}	N	20	
Protection class DIN VDE 0530	IP30			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-15°C to +40°C			
Bearing	2 sintered bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature $\approx 20^\circ\text{C}$ 2) $\Delta\vartheta_w$ allowable = 100K

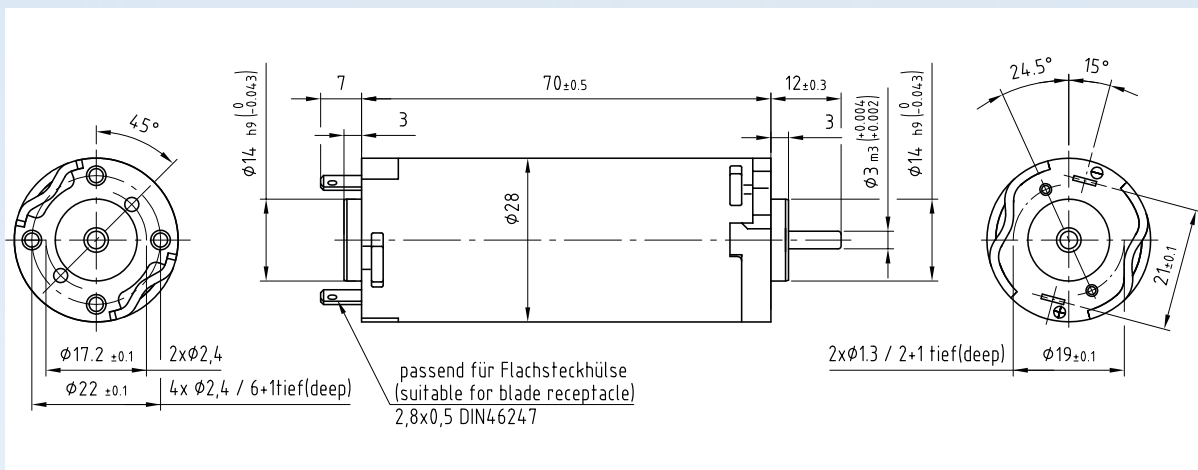
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

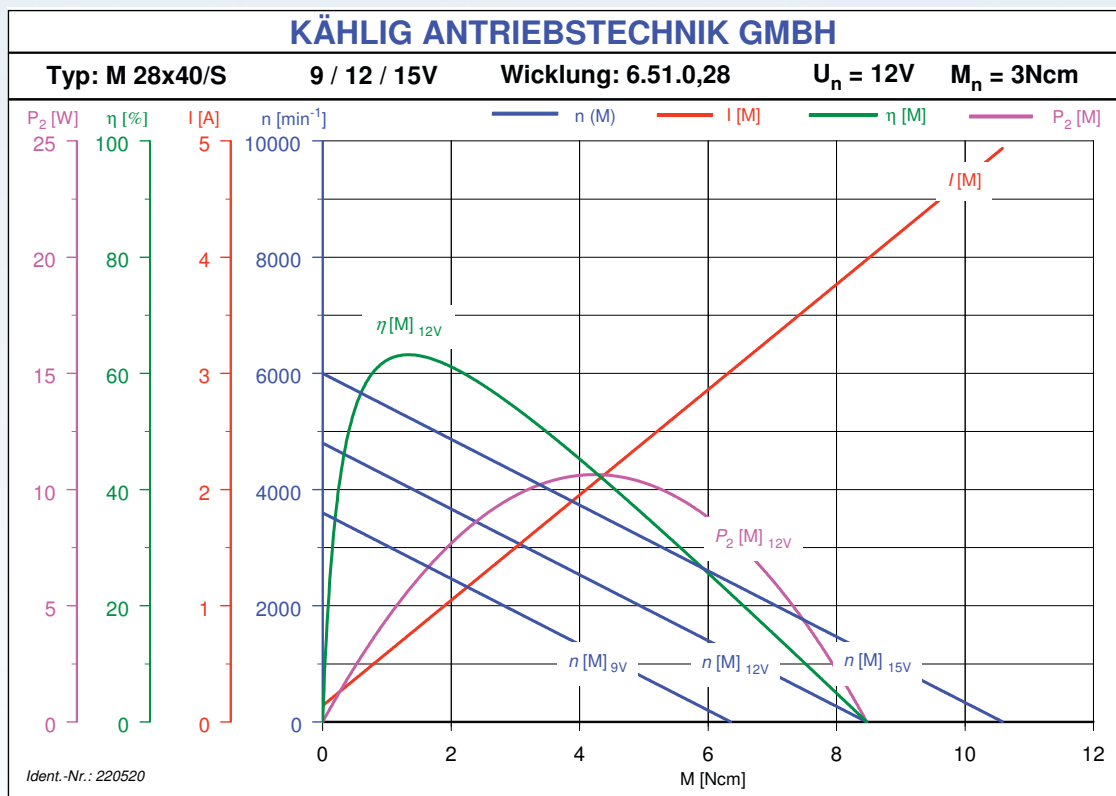
DC-Motor M28x40/S (12V)

Ident-Nr. 220520

- Brushed DC motor with permanent magnet
- Sintered bearings
- Clip connection, optional litz wire
- Multiple combination possibilities with gears and encoders
- Direction of rotation CW / CCW
- Power output in rated operation: 9,7 Watt
- Multiple combination possibilities with gears and encoders



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	3	
Rated speed ¹⁾	n_N	min ⁻¹	3100	±10%
Rated current ¹⁾	I_N	A	1,5	±20%
No load speed ¹⁾	n_0	min ⁻¹	4800	±15%
No load current ¹⁾	I_0	A	0,14	±50%
Rated power output ¹⁾	P_{2N}	W	9,7	
Rated power input ¹⁾	P_{1N}	W	18,0	
Rated efficiency ¹⁾	η_N	%	54,1	
Maximum power output ²⁾³⁾	P_{2max}	W	10,6	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	3,0	
Maximum Continuous current ²⁾³⁾	I_{max}	A	1,5	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	12000	
Stall torque ¹⁾	M_H	Ncm	8,5	
Stall current ¹⁾	I_H	A	4	
Demagnetization current	I_E	A	12,6	
Connecting resistance ¹⁾	R	Ω	3,02	
Armature resistance ¹⁾	R_A	Ω	2,55	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	2,01	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	566,7	
Torque constant ¹⁾	k_M	Ncm/A	2,2	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	2,5	
Friction torque ¹⁾	M_R	Ncm	-0,3	
Mechanical time constant ¹⁾	T_M	ms	12,6	
Electrical time constant ¹⁾	T_e	ms	0,7	
Rotor inertia	J_R	gcm ²	24	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	5	
Permissible radial shaft loads ³⁾	F_{radial}	N	20	
Protection class DIN VDE 0530	IP30			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-15°C to +40°C			
Bearing	2 sintered bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

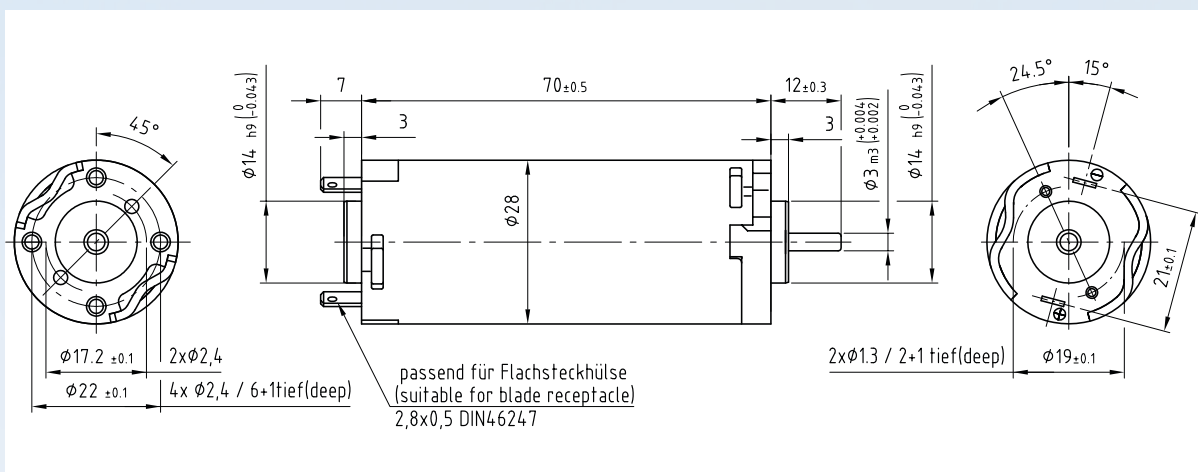
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

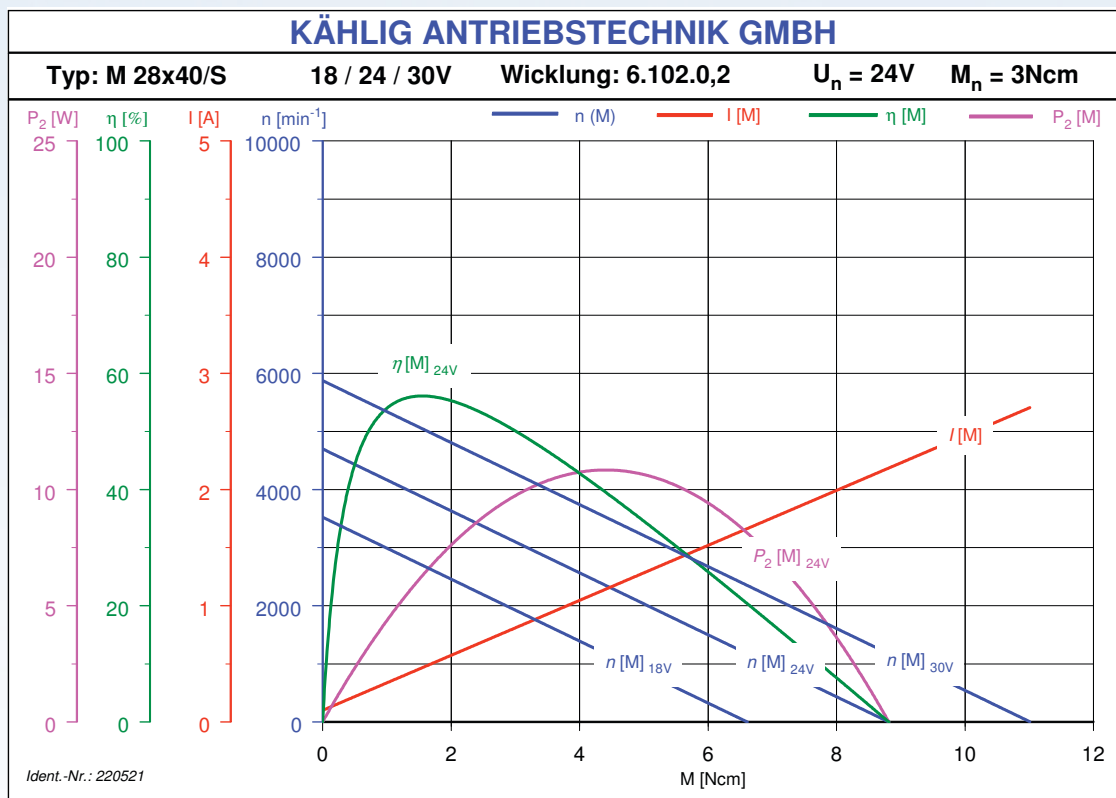
DC-Motor M28x40/S (24V)

Ident-Nr. 220521

- Brushed DC motor with permanent magnet
- Sintered bearings
- Clip connection, optional litz wire
- Multiple combination possibilities with gears and encoders
- Direction of rotation CW / CCW
- Power output in rated operation: 9.7 Watt
- Multiple combination possibilities with gears and encoders



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	3	
Rated speed ¹⁾	n_N	min ⁻¹	3100	±10%
Rated current ¹⁾	I_N	A	0,81	±20%
No load speed ¹⁾	n_0	min ⁻¹	4700	±15%
No load current ¹⁾	I_0	A	0,1	±50%
Rated power output ¹⁾	P_{2N}	W	9,7	
Rated power input ¹⁾	P_{1N}	W	19,4	
Rated efficiency ¹⁾	η_N	%	50,1	
Maximum power output ²⁾³⁾	P_{2max}	W	10,8	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	3,0	
Maximum Continuous current ²⁾³⁾	I_{max}	A	0,81	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	12000	
Stall torque ¹⁾	M_H	Ncm	8,8	
Stall current ¹⁾	I_H	A	2,2	
Demagnetization current	I_E	A	7,1	
Connecting resistance ¹⁾	R	Ω	10,98	
Armature resistance ¹⁾	R_A	Ω	10,05	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	8,23	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	533,3	
Torque constant ¹⁾	k_M	Ncm/A	4,2	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	5,1	
Friction torque ¹⁾	M_R	Ncm	-0,4	
Mechanical time constant ¹⁾	T_M	ms	13,5	
Electrical time constant ¹⁾	T_e	ms	0,7	
Rotor inertia	J_R	gcm ²	24	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	5	
Permissible radial shaft loads ³⁾	F_{radial}	N	20	
Protection class DIN VDE 0530	IP30			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-15°C to +40°C			
Bearing	2 sintered bearings			
Interference suppression	optional			

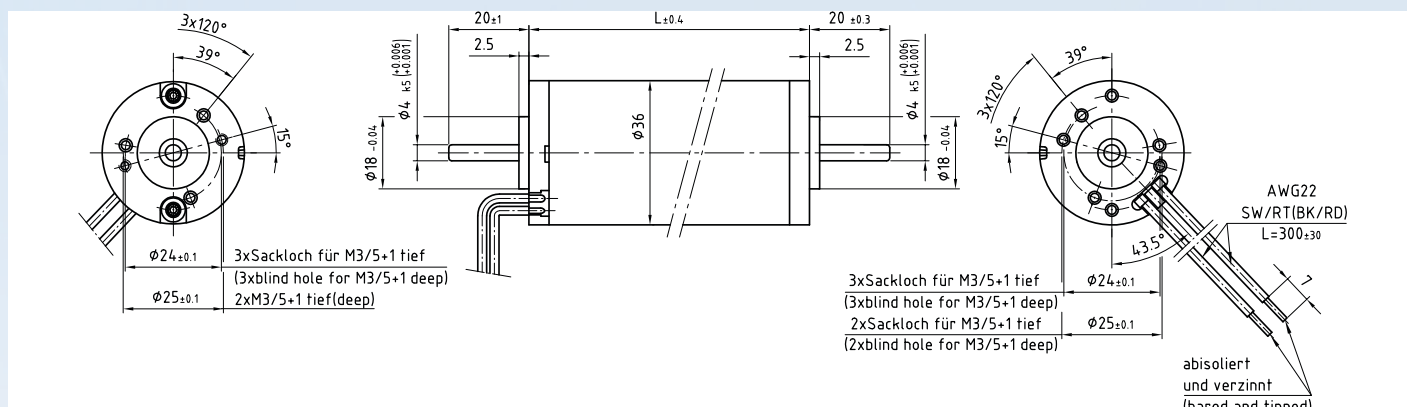
1) ϑ_w Winding temperature $\approx 20^\circ\text{C}$ 2) $\Delta\vartheta_w$ allowable = 100K

3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

DC-Motors Type M36

- Permanent magnet DC-motor
- Ball bearings
- Lead wires
- Power range in continuous operation approx. 5 to 15 watt
- Voltages 12 and 24 volts
- Multiple combination possibilities with gears, encoders and brakes



Application on request

Versions	Unit	M36x13/I	M36x13/I	M36x20/I	M36x20/I	M36x30/I	M36x30/I
Part number	[ID]	220218	220219	220220	220221	220222	220223
Nominal voltage	[V]	12	24	12	24	12	24
Nominal torque	[Ncm]	1.5	1.5	3	3	4	4
Nominal speed	[1/min]	3000	3100	2900	2900	3400	3200
Nominal current	[A]	0.73	0.37	1.4	0.62	1.84	0.86
Output power ¹⁾	[W]	4.7	4.9	9.1	9.1	14.2	13.4
Rise of M-n-characteristic	[1/min / Ncm]	633.3	566.7	350	333.3	262.5	212.5
Torque constant	[Ncm / A]	2.7	5.6	2.5	5.6	2.5	5.3
Rotor moment of inertia	[gcm ²]	25	25	38	38	53	53
Weight	[kg]	0.2	0.2	0.25	0.25	0.3	0.3
Length	[mm]	51	51	60	60	70	70

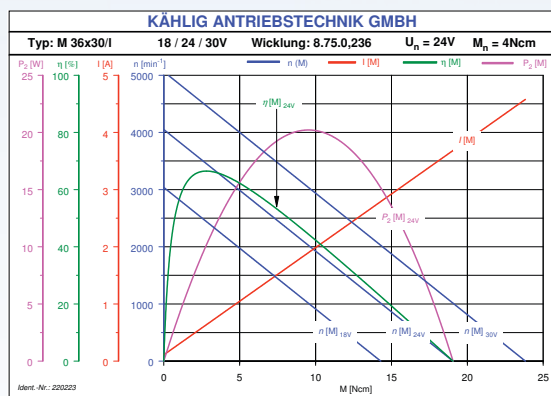
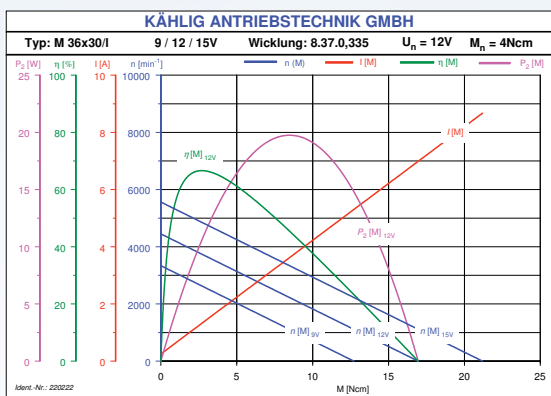
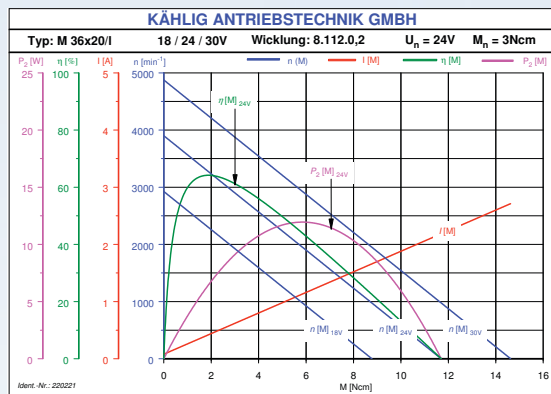
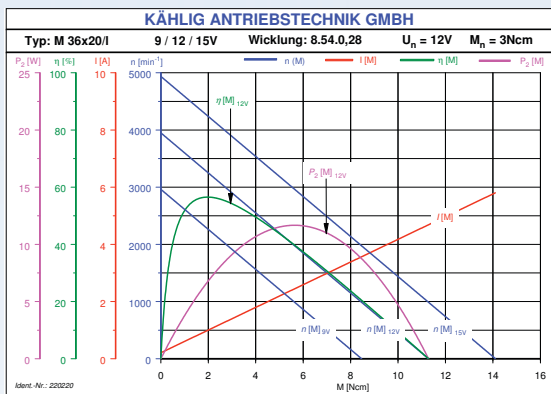
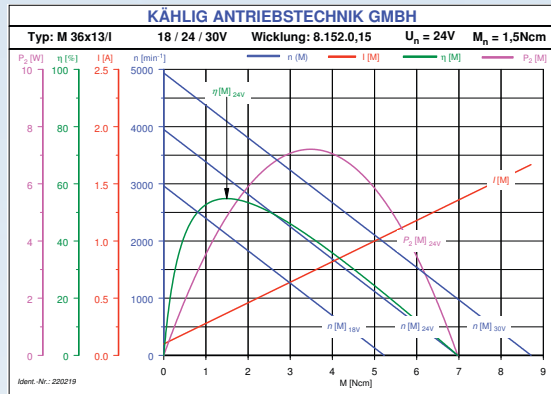
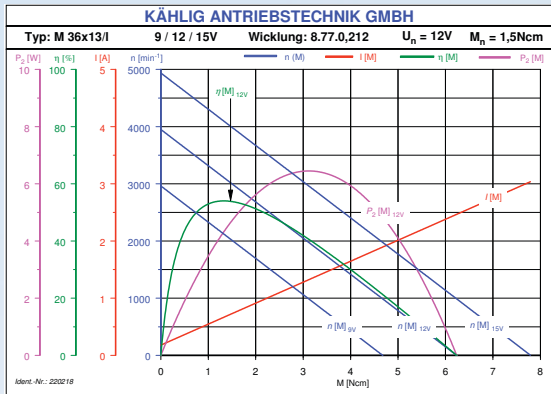
General data

Lifetime at rated torque ¹⁾	h	3000
Permissible axial shaft load ²⁾	N	30
Permissible radial shaft load ²⁾	N	80
Insulation class (DIN VDE 0530)		E
IP protection class (DIN VDE 0530)		IP 40
RFI suppression		2xL (3.9μH)

1) Operation by nominal values. Date: 13.05.2008 Subject to change without notice
2) At 3000 rpm and 3000 hrs nominal life, simultaneous axial and radial loads

Stand: 10. January 2014 – changes reserved

Performance characteristics

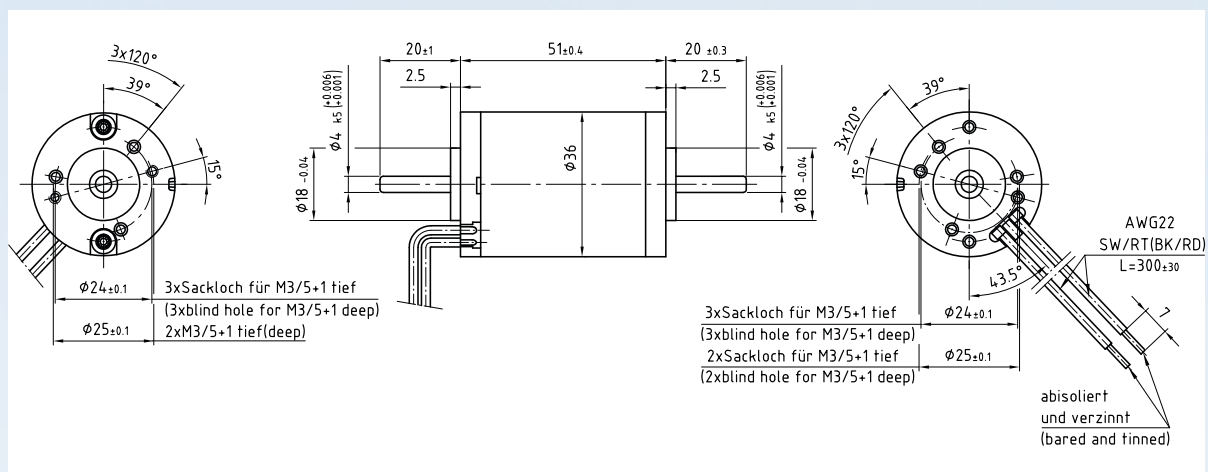


Stand: 10. January 2014 – changes reserved

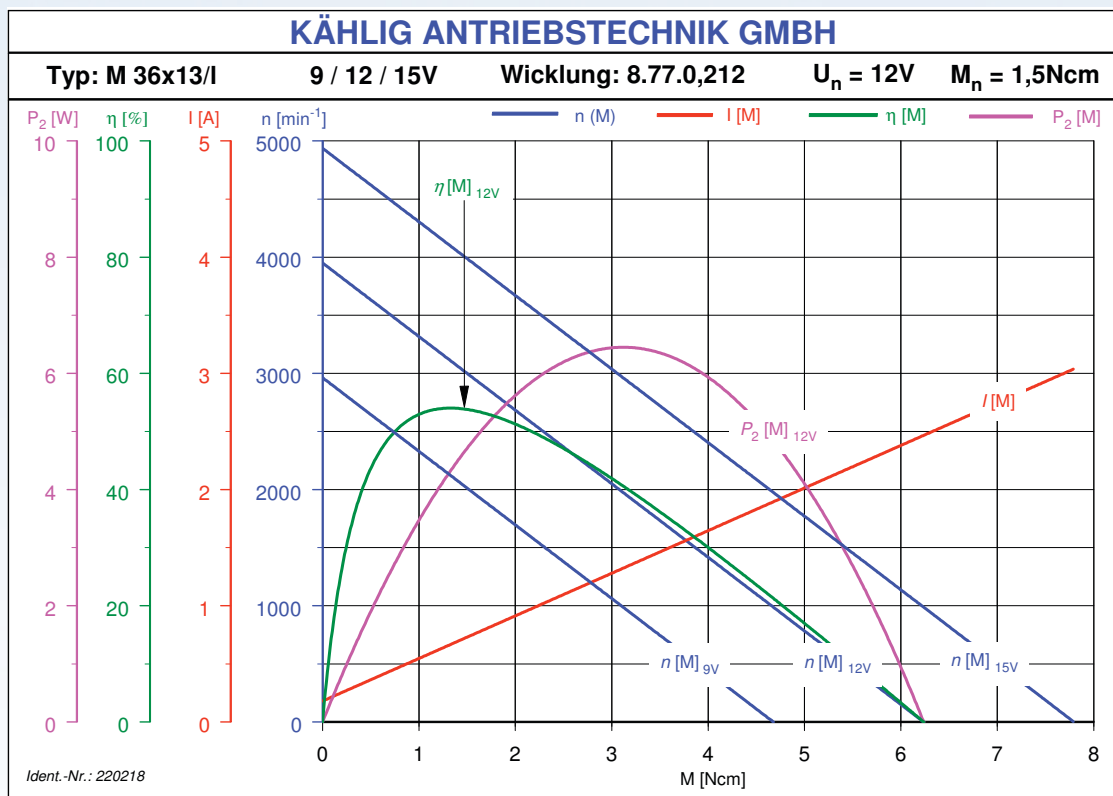
DC-Motor M36x13/I (12V)

Ident-Nr. 220218

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 4,7 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	1,5	
Rated speed ¹⁾	n_N	min ⁻¹	3000	±10%
Rated current ¹⁾	I_N	A	0,73	±20%
No load speed ¹⁾	n_0	min ⁻¹	3950	±15%
No load current ¹⁾	I_0	A	0,18	±50%
Rated power output ¹⁾	P_{2N}	W	4,7	
Rated power input ¹⁾	P_{1N}	W	8,8	
Rated efficiency ¹⁾	η_N	%	53,8	
Maximum power output ²⁾³⁾	P_{2max}	W	6,4	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	1,5	
Maximum Continuous current ²⁾³⁾	I_{max}	A	0,73	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	6,2	
Stall current ¹⁾	I_H	A	2,5	
Demagnetization current	I_E	A	8,4	
Connecting resistance ¹⁾	R	Ω	4,86	
Armature resistance ¹⁾	R_A	Ω	4,7	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	3,1	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	633,3	
Torque constant ¹⁾	k_M	Ncm/A	2,7	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	3,0	
Friction torque ¹⁾	M_R	Ncm	-0,5	
Mechanical time constant ¹⁾	T_M	ms	17,1	
Electrical time constant ¹⁾	T_e	ms	0,6	
Rotor inertia	J_R	gcm ²	25	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	30	
Permissible radial shaft loads ³⁾	F_{radial}	N	80	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	2xL (3,9uH)			

1) ϑ_w Winding temperature $\approx 20^\circ\text{C}$ 2) $\Delta\vartheta_w$ allowable = 100K

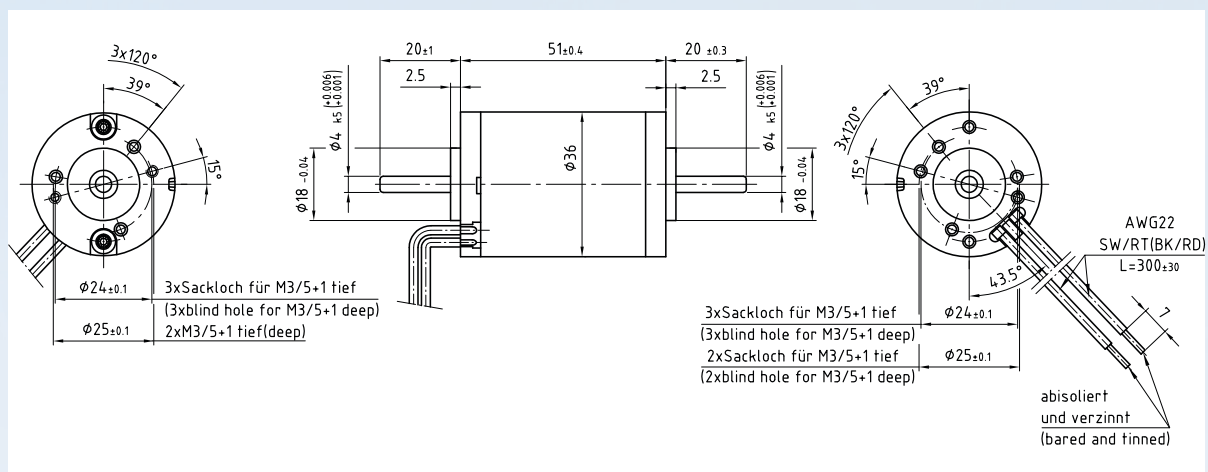
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

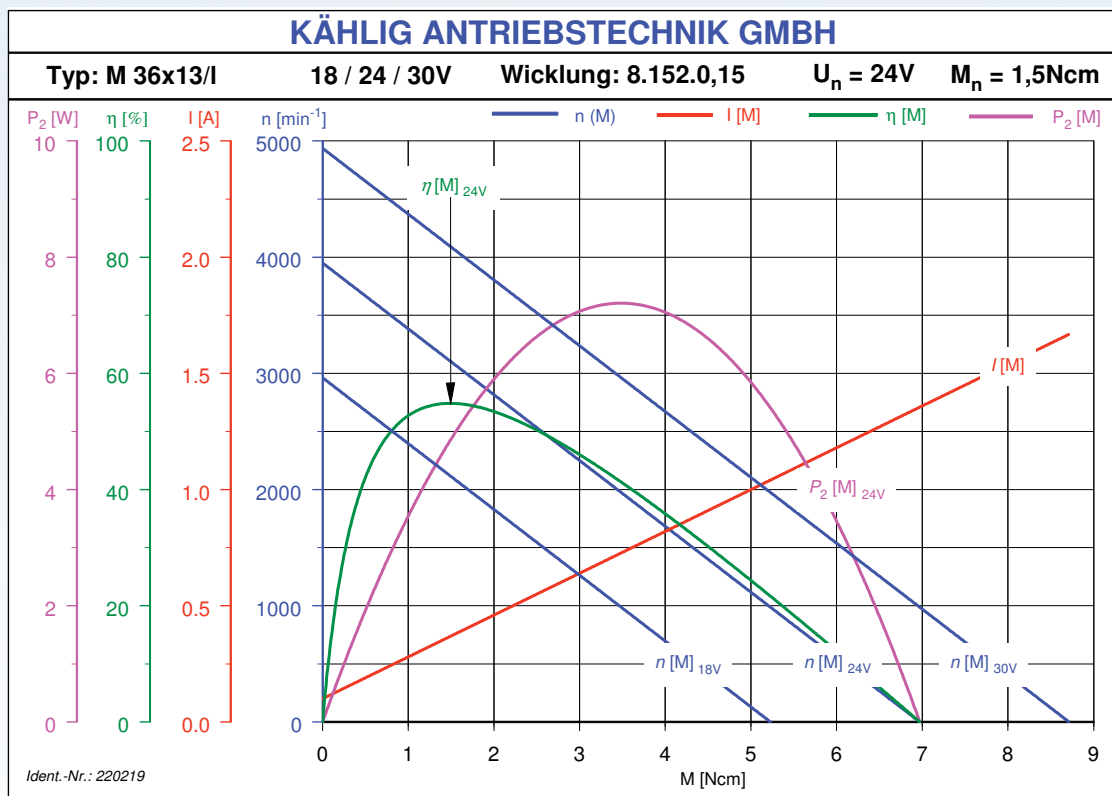
DC-Motor M36x13/I (24V)

Ident-Nr. 220219

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 4,9 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	1,5	
Rated speed ¹⁾	n_N	min ⁻¹	3100	±10%
Rated current ¹⁾	I_N	A	0,37	±20%
No load speed ¹⁾	n_0	min ⁻¹	3950	±15%
No load current ¹⁾	I_0	A	0,1	±50%
Rated power output ¹⁾	P_{2N}	W	4,9	
Rated power input ¹⁾	P_{1N}	W	8,9	
Rated efficiency ¹⁾	η_N	%	54,8	
Maximum power output ²⁾³⁾	P_{2max}	W	7,2	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	1,5	
Maximum Continuous current ²⁾³⁾	I_{max}	A	0,37	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	7,0	
Stall current ¹⁾	I_H	A	1,4	
Demagnetization current	I_E	A	4,8	
Connecting resistance ¹⁾	R	Ω	18,7	
Armature resistance ¹⁾	R_A	Ω	18,1	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	11,9	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	566,7	
Torque constant ¹⁾	k_M	Ncm/A	5,6	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	6,1	
Friction torque ¹⁾	M_R	Ncm	-0,6	
Mechanical time constant ¹⁾	T_M	ms	15,8	
Electrical time constant ¹⁾	T_e	ms	0,7	
Rotor inertia	J_R	gcm ²	25	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	30	
Permissible radial shaft loads ³⁾	F_{radial}	N	80	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	2xL (3,9uH)			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

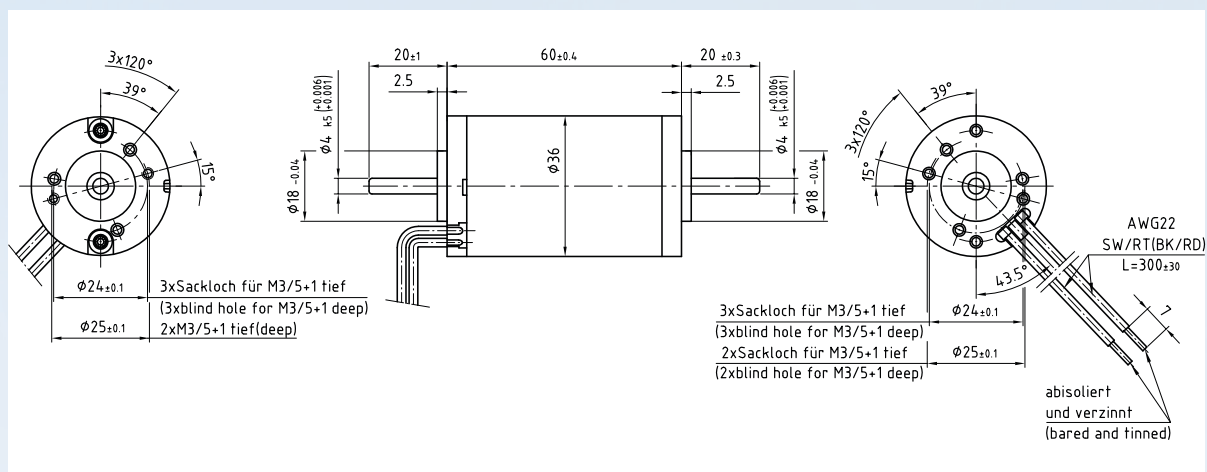
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

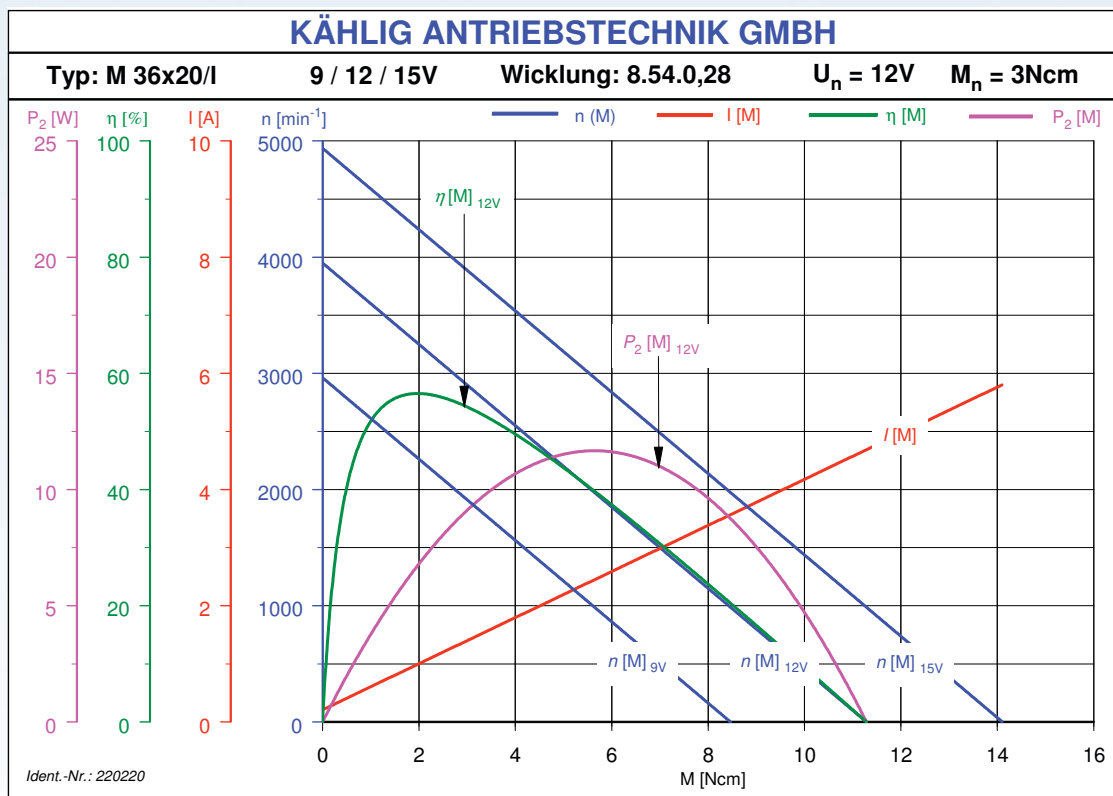
DC-Motor M36x20/I (12V)

Ident-Nr. 220220

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 9,1 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	3	
Rated speed ¹⁾	n_N	min ⁻¹	2900	±10%
Rated current ¹⁾	I_N	A	1,4	±20%
No load speed ¹⁾	n_0	min ⁻¹	3950	±15%
No load current ¹⁾	I_0	A	0,21	±50%
Rated power output ¹⁾	P_{2N}	W	9,1	
Rated power input ¹⁾	P_{1N}	W	16,8	
Rated efficiency ¹⁾	η_N	%	54,2	
Maximum power output ²⁾³⁾	P_{2max}	W	11,7	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	3,0	
Maximum Continuous current ²⁾³⁾	I_{max}	A	1,4	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	11,3	
Stall current ¹⁾	I_H	A	4,7	
Demagnetization current	I_E	A	12	
Connecting resistance ¹⁾	R	Ω	2,56	
Armature resistance ¹⁾	R_A	Ω	2,3	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	1,86	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	350	
Torque constant ¹⁾	k_M	Ncm/A	2,5	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	3,0	
Friction torque ¹⁾	M_R	Ncm	-0,5	
Mechanical time constant ¹⁾	T_M	ms	13,8	
Electrical time constant ¹⁾	T_e	ms	0,7	
Rotor inertia	J_R	gcm ²	38	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	30	
Permissible radial shaft loads ³⁾	F_{radial}	N	80	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	2xL (3,9uH)			

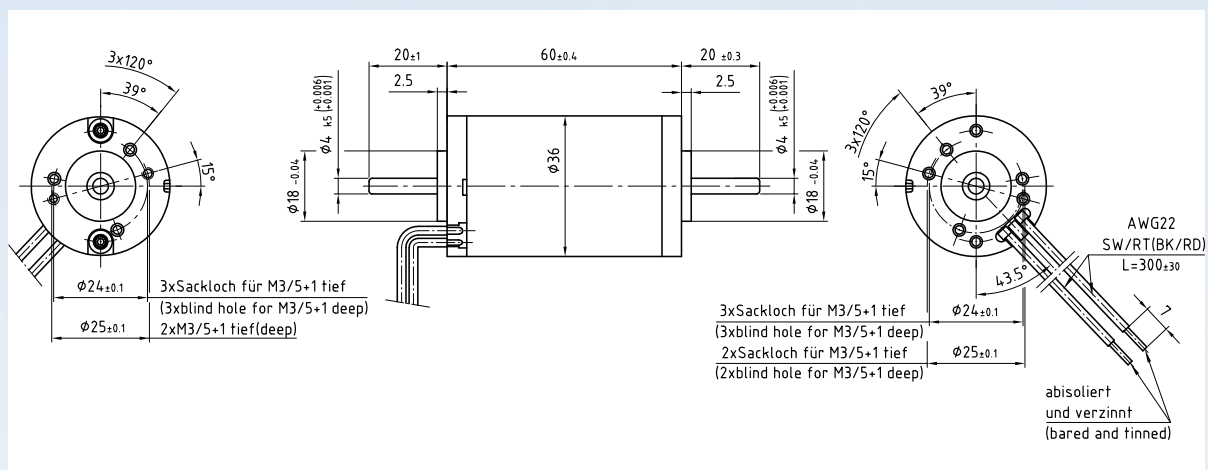
1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

3) The operating at maximum levels reduces the lifespan

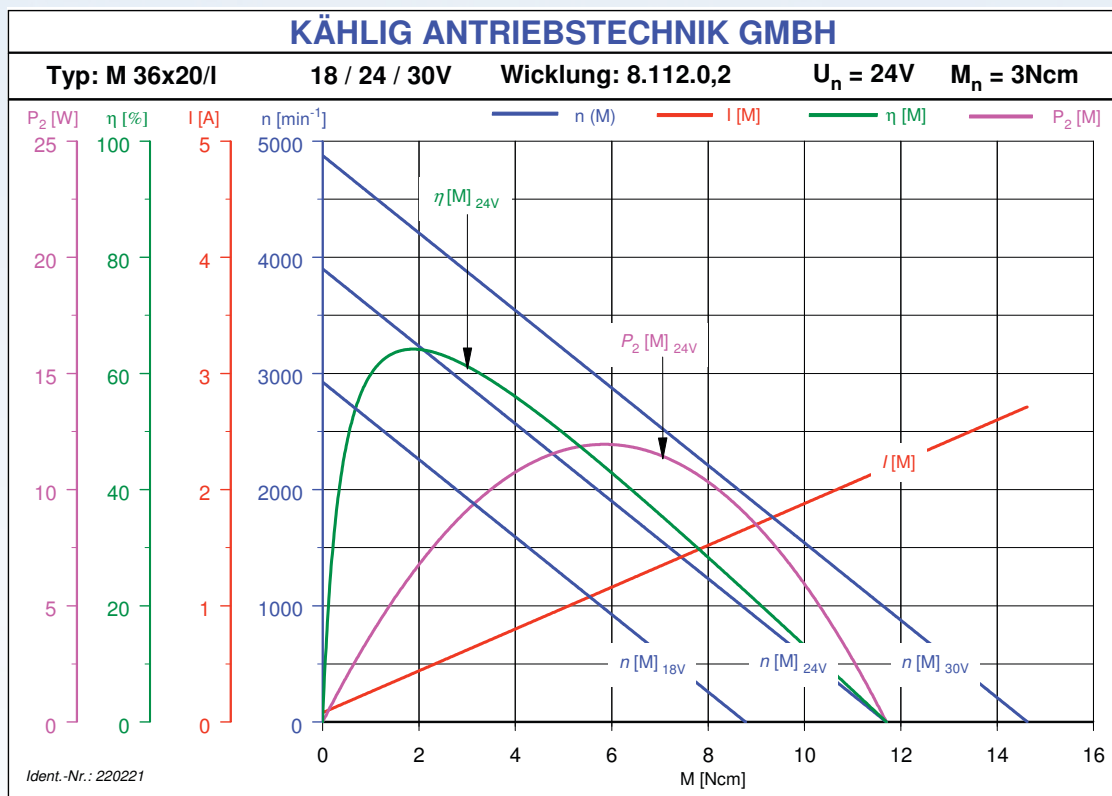
Stand: 22. Januar 2015 – changes reserved

DC-Motor M36x20/I (24V)
Ident-Nr. 220221

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 9,1 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	3	
Rated speed ¹⁾	n_N	min ⁻¹	2900	±10%
Rated current ¹⁾	I_N	A	0,62	±20%
No load speed ¹⁾	n_0	min ⁻¹	3900	±15%
No load current ¹⁾	I_0	A	0,08	±50%
Rated power output ¹⁾	P_{2N}	W	9,1	
Rated power input ¹⁾	P_{1N}	W	14,9	
Rated efficiency ¹⁾	η_N	%	61,2	
Maximum power output ²⁾³⁾	P_{2max}	W	11,9	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	3,0	
Maximum Continuous current ²⁾³⁾	I_{max}	A	0,62	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	11,7	
Stall current ¹⁾	I_H	A	2,2	
Demagnetization current	I_E	A	5,8	
Connecting resistance ¹⁾	R	Ω	10,98	
Armature resistance ¹⁾	R_A	Ω	9,85	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	8,0	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	333,3	
Torque constant ¹⁾	k_M	Ncm/A	5,6	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	6,2	
Friction torque ¹⁾	M_R	Ncm	-0,4	
Mechanical time constant ¹⁾	T_M	ms	12,1	
Electrical time constant ¹⁾	T_e	ms	0,7	
Rotor inertia	J_R	gcm ²	38	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	30	
Permissible radial shaft loads ³⁾	F_{radial}	N	80	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	2xL (3,9uH)			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

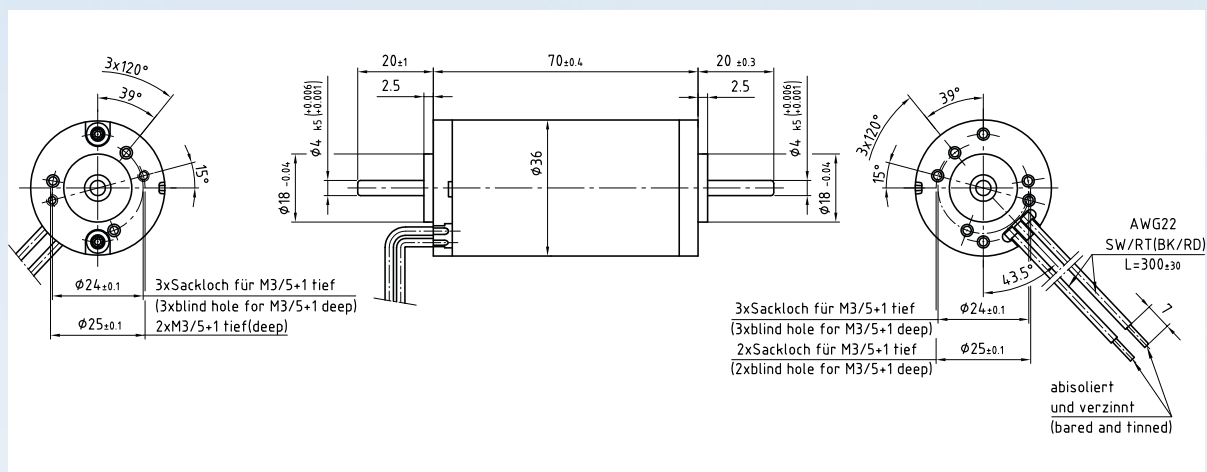
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

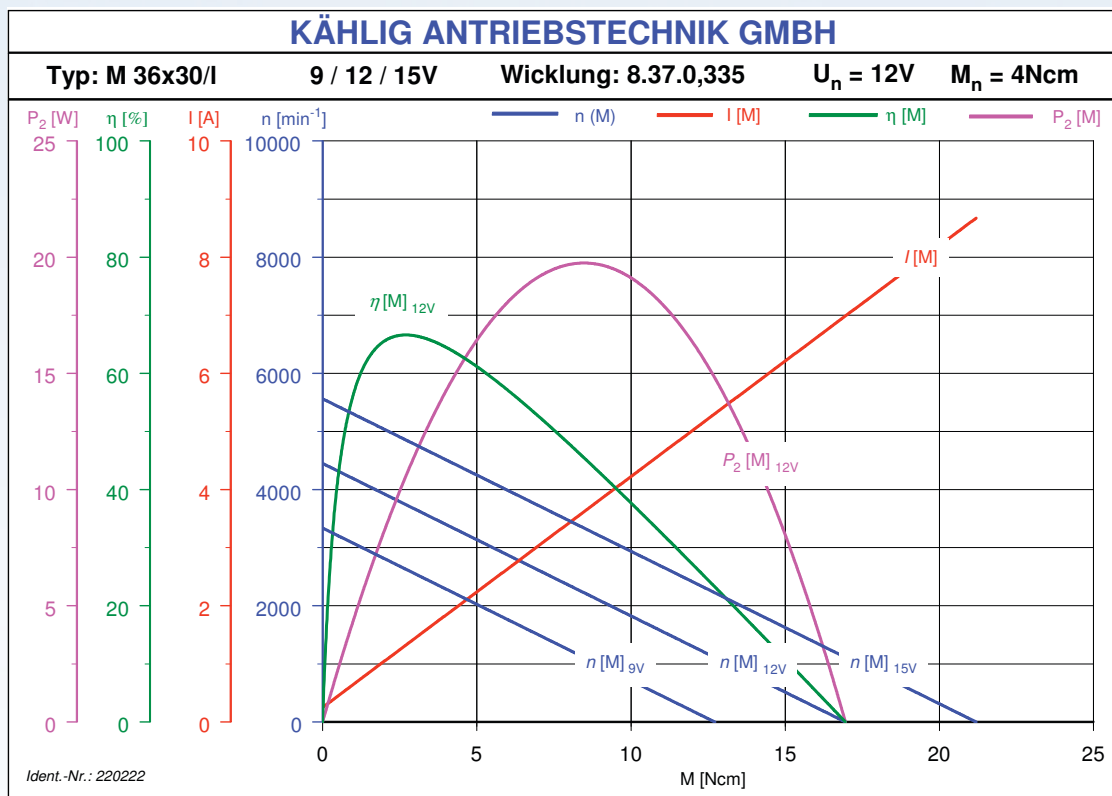
DC-Motor M36x30/I (12V)

Ident-Nr. 220222

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 14,2 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	4	
Rated speed ¹⁾	n_N	min ⁻¹	3400	±10%
Rated current ¹⁾	I_N	A	1.84	±20%
No load speed ¹⁾	n_0	min ⁻¹	4450	±15%
No load current ¹⁾	I_0	A	0.25	±50%
Rated power output ¹⁾	P_{2N}	W	14.2	
Rated power input ¹⁾	P_{1N}	W	22.1	
Rated efficiency ¹⁾	η_N	%	64.5	
Maximum power output ²⁾³⁾	P_{2max}	W	19.7	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	4.0	
Maximum Continuous current ²⁾³⁾	I_{max}	A	1.84	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	17.0	
Stall current ¹⁾	I_H	A	7.0	
Demagnetization current	I_E	A	19.8	
Connecting resistance ¹⁾	R	Ω	1.72	
Armature resistance ¹⁾	R_A	Ω	1.4	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	1.1	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	262.5	
Torque constant ¹⁾	k_M	Ncm/A	2.5	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	2.7	
Friction torque ¹⁾	M_R	Ncm	-0.6	
Mechanical time constant ¹⁾	T_M	ms	11.7	
Electrical time constant ¹⁾	T_e	ms	0.6	
Rotor inertia	J_R	gcm ²	53	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	30	
Permissible radial shaft loads ³⁾	F_{radial}	N	80	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	2xL (3.9uH)			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

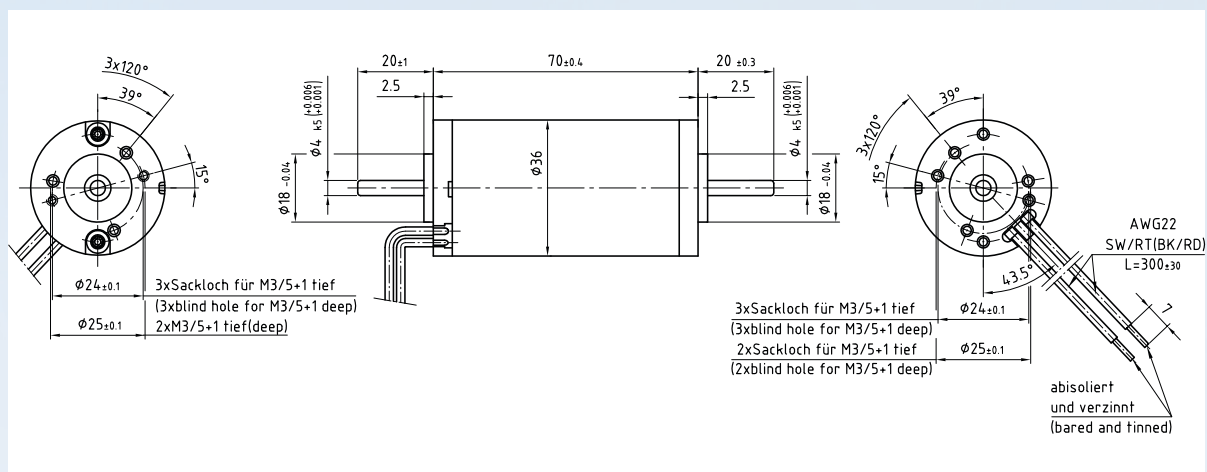
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

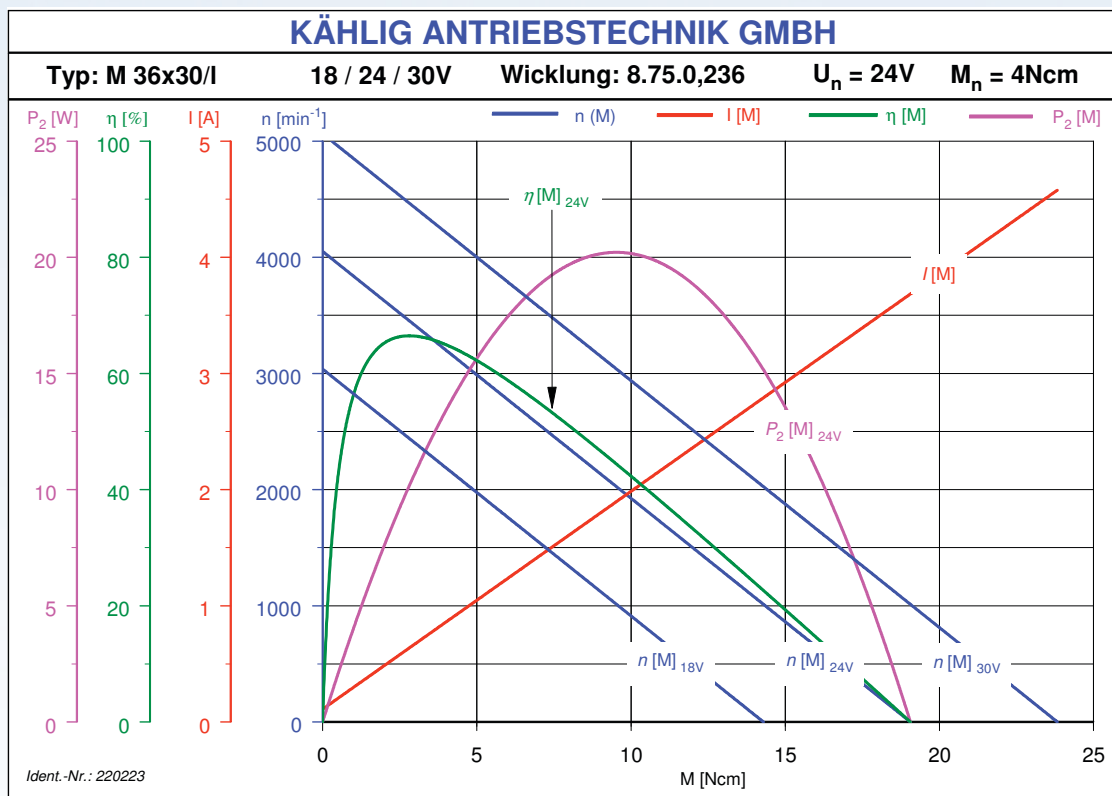
DC-Motor M36x30/I (24V)

Ident-Nr. 220223

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 13,4 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	4	
Rated speed ¹⁾	n_N	min ⁻¹	3200	±10%
Rated current ¹⁾	I_N	A	0.86	±20%
No load speed ¹⁾	n_0	min ⁻¹	4050	±15%
No load current ¹⁾	I_0	A	0.11	±50%
Rated power output ¹⁾	P_{2N}	W	13.4	
Rated power input ¹⁾	P_{1N}	W	20.6	
Rated efficiency ¹⁾	η_N	%	64.9	
Maximum power output ²⁾³⁾	P_{2max}	W	20.2	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	4.0	
Maximum Continuous current ²⁾³⁾	I_{max}	A	0.86	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	19.1	
Stall current ¹⁾	I_H	A	3.7	
Demagnetization current	I_E	A	9.8	
Connecting resistance ¹⁾	R	Ω	6.52	
Armature resistance ¹⁾	R_A	Ω	5.8	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	4.5	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	212.5	
Torque constant ¹⁾	k_M	Ncm/A	5.3	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	5.9	
Friction torque ¹⁾	M_R	Ncm	-0.6	
Mechanical time constant ¹⁾	T_M	ms	10.8	
Electrical time constant ¹⁾	T_e	ms	0.7	
Rotor inertia	J_R	gcm ²	53	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	30	
Permissible radial shaft loads ³⁾	F_{radial}	N	80	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	2xL (3.9uH)			

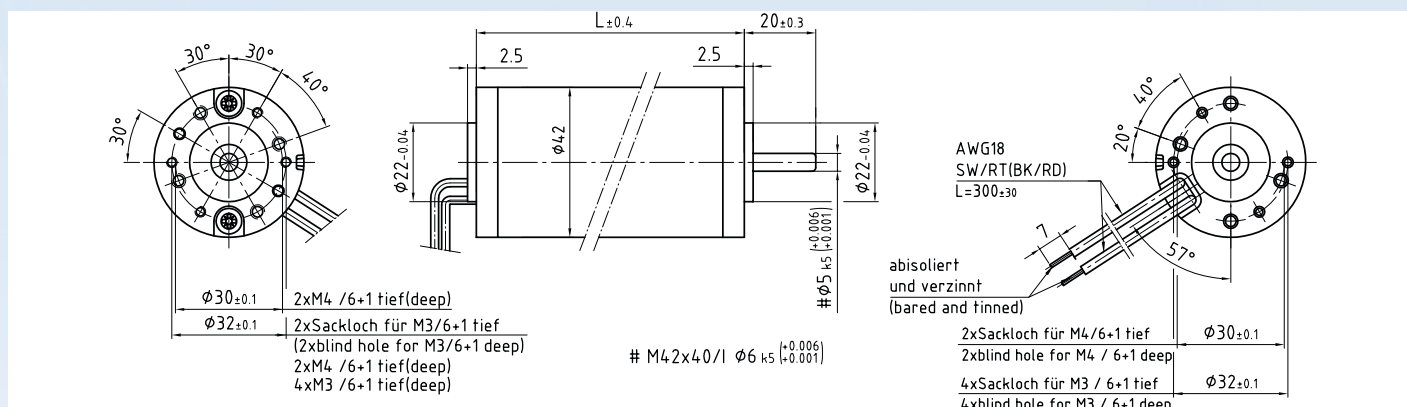
1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

DC-Motors Type M42 (12V)

- Permanent magnet DC-motor
- Ball bearings
- Lead wires
- Power range in continuous operation approx. 12 to 30 watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request

Versions	Unit	M42x15/I	M42x20/I	M42x30/I	M42x40/I
Part number	[ID]	211112b	211100a	211102	211220
Nominal voltage	[V]	12	12	12	12
Nominal torque	[Ncm]	4	5	6.5	8
Nominal speed	[1/min]	3000	3300	3300	3150
Nominal current	[A]	2	2.5	2.81	3.13
Output power ¹⁾	[W]	12.6	17.3	22.5	26.4
Rise of M-n-characteristic	[1/min / Ncm]	250	290	138.5	70
Torque constant	[Ncm / A]	2.4	2.3	2.6	2.9
Rotor moment of inertia	[gcm ²]	60	74	100	130
Weight	[kg]	0.4	0.42	0.5	0.58
Length	[mm]	70	75	85	95

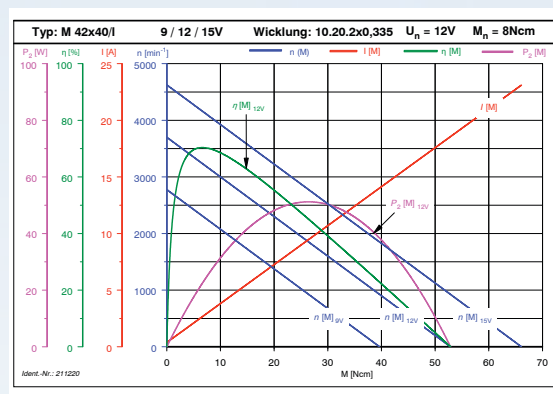
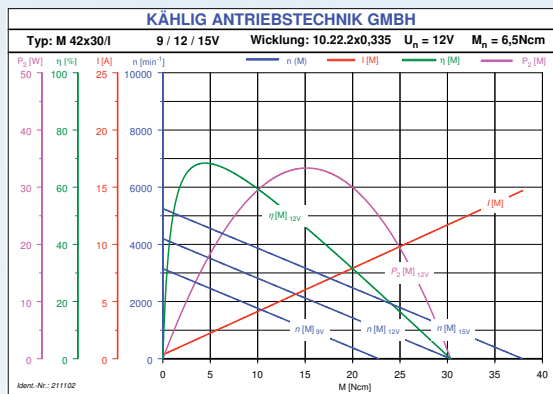
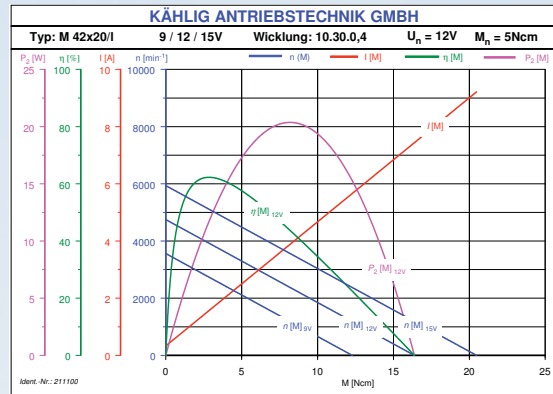
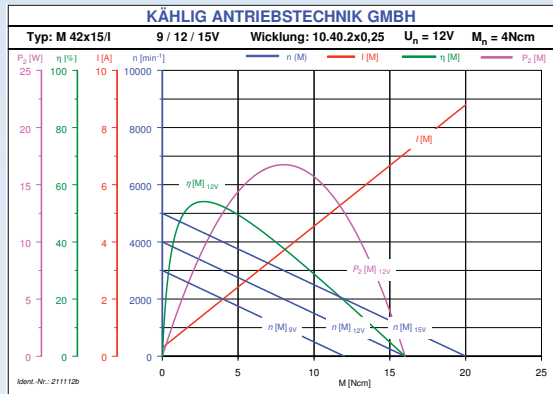
General data

Lifetime at rated torque ¹⁾	h	3000
Permissible axial shaft load ²⁾	N	40
Permissible radial shaft load ²⁾	N	100
Insulation class (DIN VDE 0530)		E
IP protection class (DIN VDE 0530)		IP 40
RFI suppression		optional

¹⁾ Operation by nominal values: Date: 13.05.2008 Subject to change without notice
²⁾ At 3000 rpm and 3000 hrs nominal life, simultaneous axial and radial loads

Stand: 10. January 2014 – changes reserved

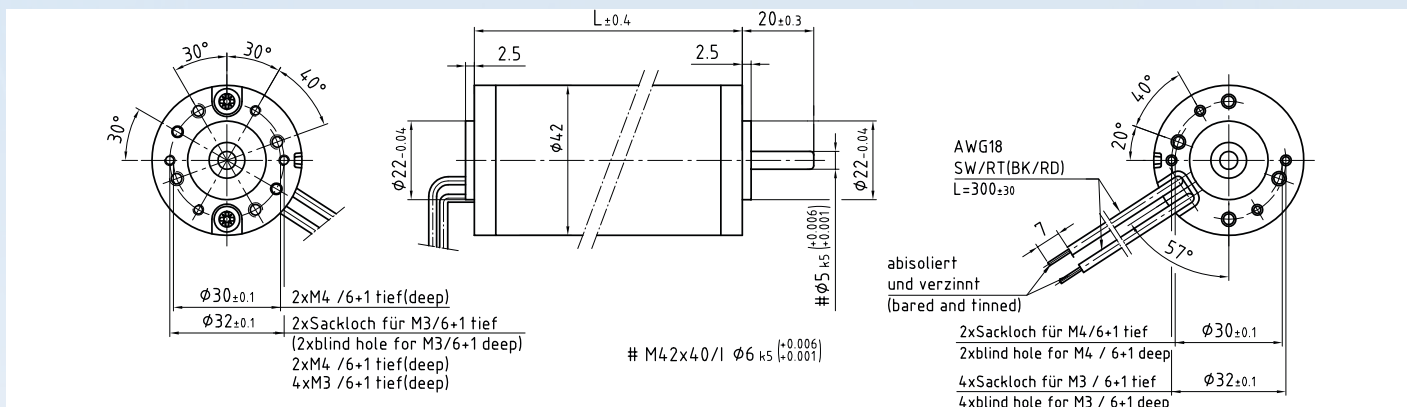
Performance characteristics



Stand: 10. January 2014 – changes reserved

DC-Motors Type M42 (24V)

- Permanent magnet DC-motor
- Ball bearings
- Lead wires
- Power range in continuous operation approx. 7 to 30 watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request

Versions	Unit	M42x10/I	M42x15/I	M42x20/I	M42x30/I	M42x40/I
Part number	[ID]	211192e	211113d	211101	211103	211221b
Nominal voltage	[V]	24	24	24	24	24
Nominal torque	[Ncm]	2,5	4	5	6,5	9
Nominal speed	[1/min]	2800	3250	3400	3100	3000
Nominal current	[A]	0,6	1	1,2	1,22	1,75
Output power ¹⁾	[W]	7,3	13,6	17,8	21,1	28,3
Rise of M-n-characteristic	[1/min / Ncm]	400	262,5	220	100	83,3
Torque constant	[Ncm / A]	5,2	5,0	4,9	6,2	5,8
Rotor moment of inertia	[gcm ²]	38	60	74	100	130
Weight	[kg]	0,34	0,4	0,42	0,5	0,58
Length	[mm]	65	70	75	85	95

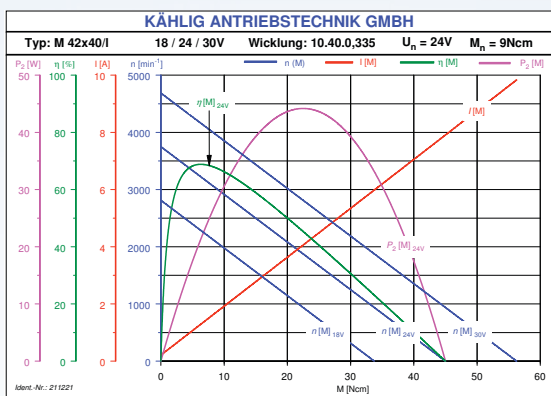
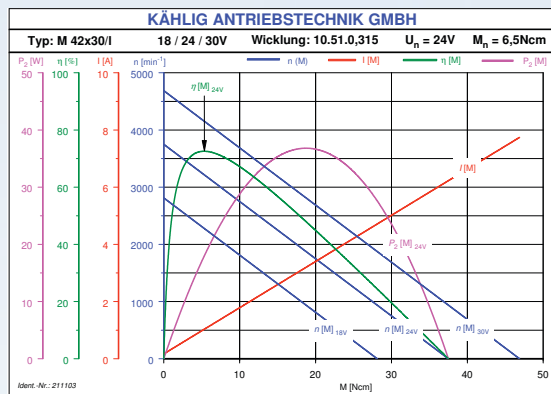
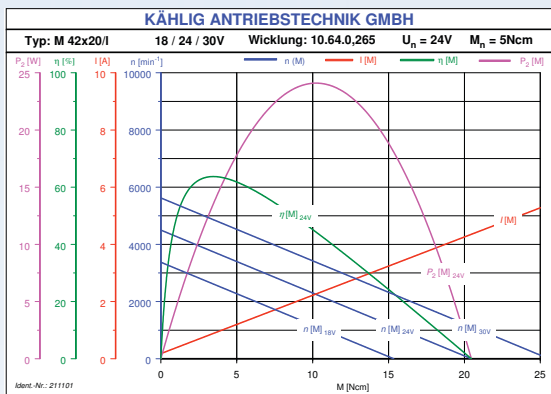
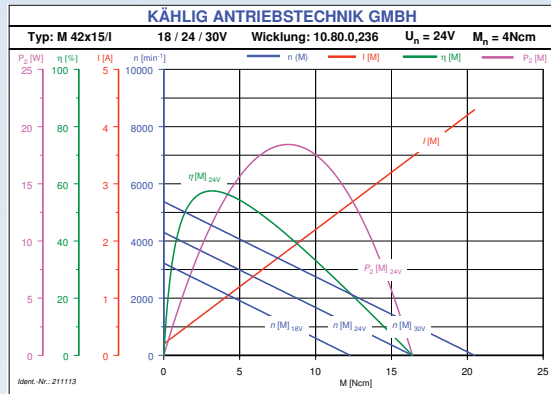
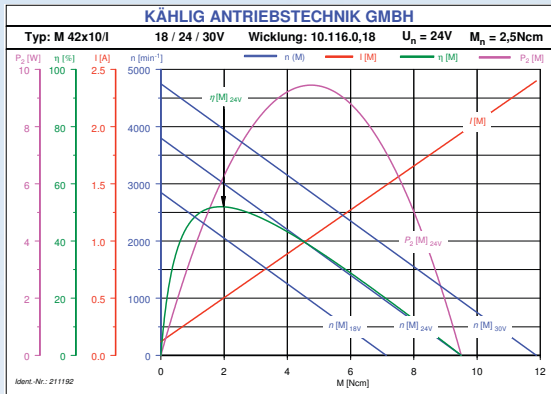
General data

Lifetime at rated torque ¹⁾	h	3000
Permissible axial shaft load ²⁾	N	40
Permissible radial shaft load ²⁾	N	100
Insulation class (DIN VDE 0530)		E
IP protection class (DIN VDE 0530)		IP 40
RFI suppression		optional

1) Operation by nominal values: Date: 13.05.2008 Subject to change without notice
2) At 3000 rpm and 3000 hrs nominal life, simultaneous axial and radial loads

Stand: 10. January 2014 – changes reserved

Performance characteristics

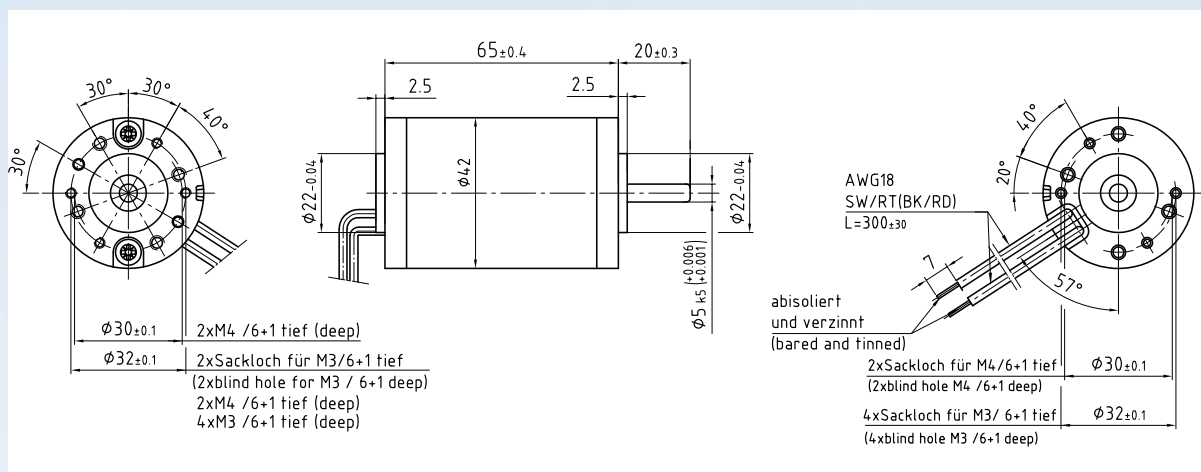


Stand: 10. January 2014 – changes reserved

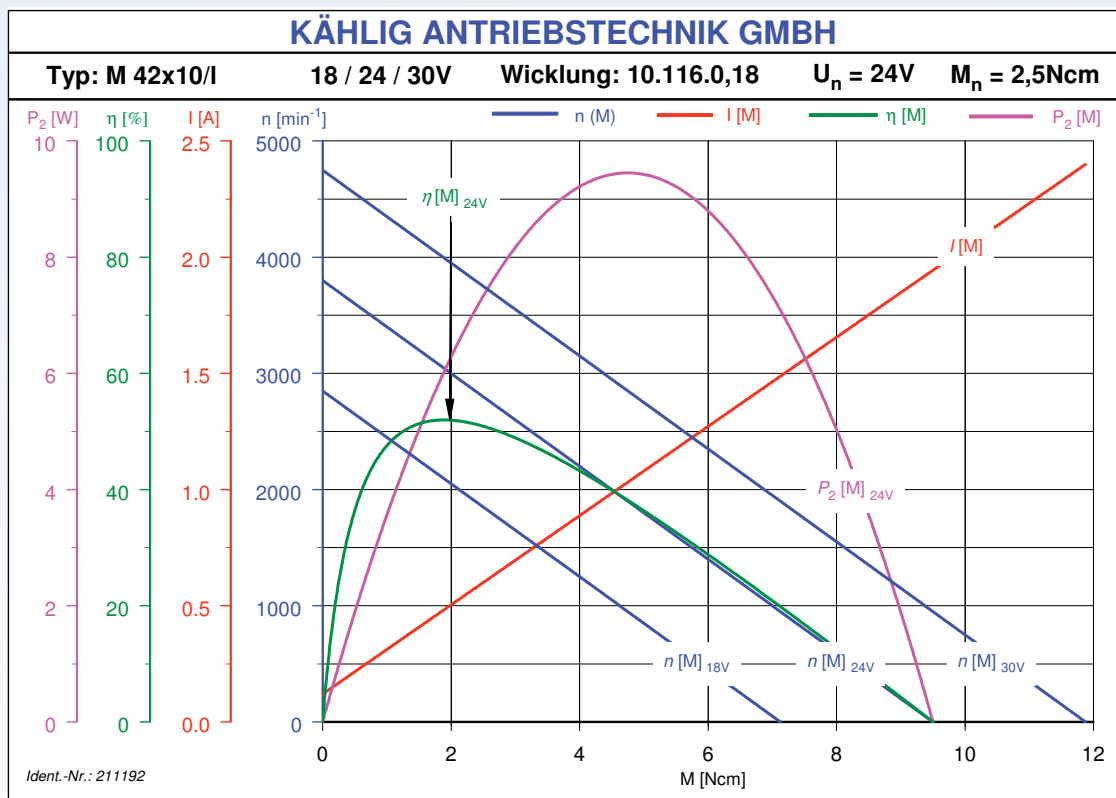
DC-Motor M42x10/I (24V)

Ident-Nr. 211192

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 7,3 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	2,5	
Rated speed ¹⁾	n_N	min ⁻¹	2800	±10%
Rated current ¹⁾	I_N	A	0,6	±20%
No load speed ¹⁾	n_0	min ⁻¹	3800	±15%
No load current ¹⁾	I_0	A	0,12	±50%
Rated power output ¹⁾	P_{2N}	W	7,3	
Rated power input ¹⁾	P_{1N}	W	14,4	
Rated efficiency ¹⁾	η_N	%	50,9	
Maximum power output ²⁾³⁾	P_{2max}	W	9,5	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	2,5	
Maximum Continuous current ²⁾³⁾	I_{max}	A	0,6	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	9,5	
Stall current ¹⁾	I_H	A	1,9	
Demagnetization current	I_E	A	5,3	
Connecting resistance ¹⁾	R	Ω	12,35	
Armature resistance ¹⁾	R_A	Ω	13,0	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	10,0	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	400	
Torque constant ¹⁾	k_M	Ncm/A	5,2	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	6,3	
Friction torque ¹⁾	M_R	Ncm	-0,6	
Mechanical time constant ¹⁾	T_M	ms	18,2	
Electrical time constant ¹⁾	T_e	ms	0,8	
Rotor inertia	J_R	gcm ²	38	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	40	
Permissible radial shaft loads ³⁾	F_{radial}	N	100	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

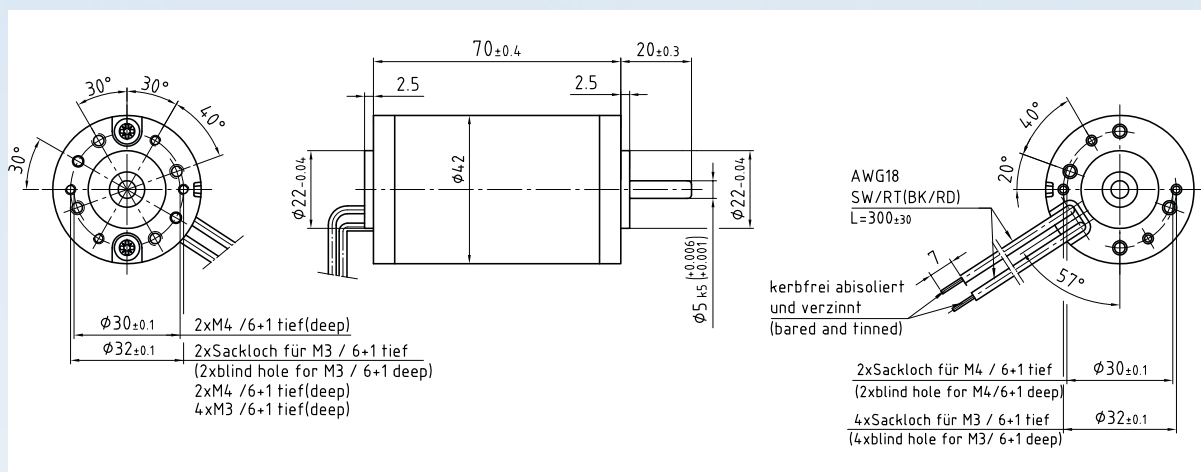
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

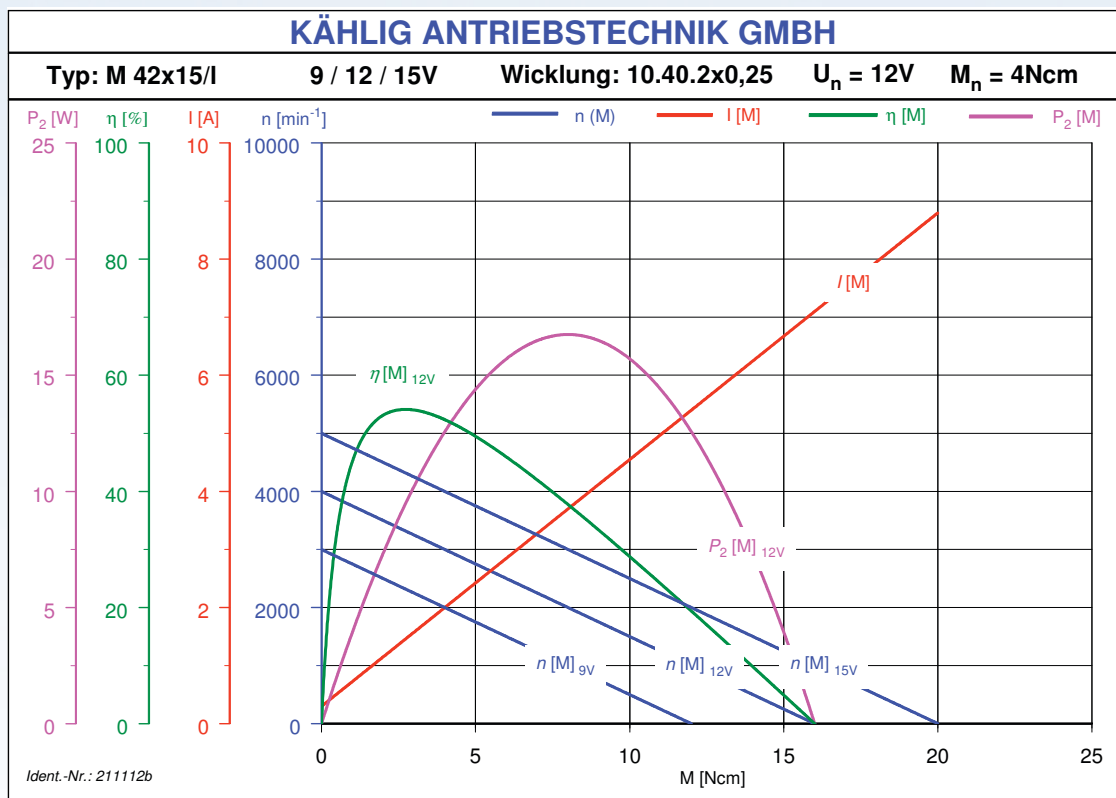
DC-Motor M42x15/I (12V)

Ident-Nr. 211112

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 12,6 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	4	
Rated speed ¹⁾	n_N	min ⁻¹	3000	±10%
Rated current ¹⁾	I_N	A	2	±20%
No load speed ¹⁾	n_0	min ⁻¹	4000	±15%
No load current ¹⁾	I_0	A	0.3	±50%
Rated power output ¹⁾	P_{2N}	W	12.6	
Rated power input ¹⁾	P_{1N}	W	24.0	
Rated efficiency ¹⁾	η_N	%	52.4	
Maximum power output ²⁾³⁾	P_{2max}	W	16.8	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	4.0	
Maximum Continuous current ²⁾³⁾	I_{max}	A	2.0	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	16	
Stall current ¹⁾	I_H	A	7.1	
Demagnetization current	I_E	A	15.9	
Connecting resistance ¹⁾	R	Ω	1.69	
Armature resistance ¹⁾	R_A	Ω	1.5	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	1.63	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	250	
Torque constant ¹⁾	k_M	Ncm/A	2.4	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	3.0	
Friction torque ¹⁾	M_R	Ncm	-0.7	
Mechanical time constant ¹⁾	T_M	ms	15.0	
Electrical time constant ¹⁾	T_e	ms	1.0	
Rotor inertia	J_R	gcm ²	60	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	40	
Permissible radial shaft loads ³⁾	F_{radial}	N	100	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

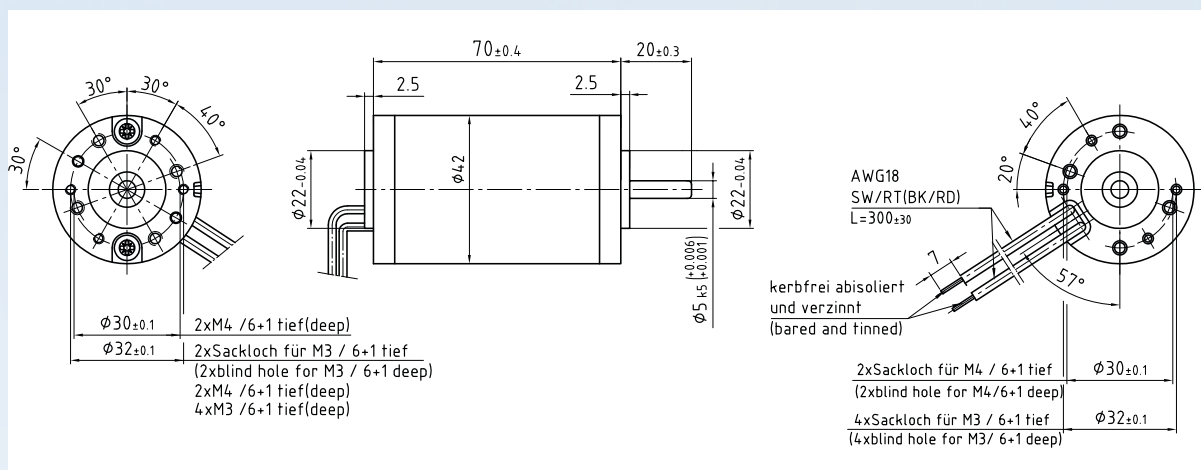
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

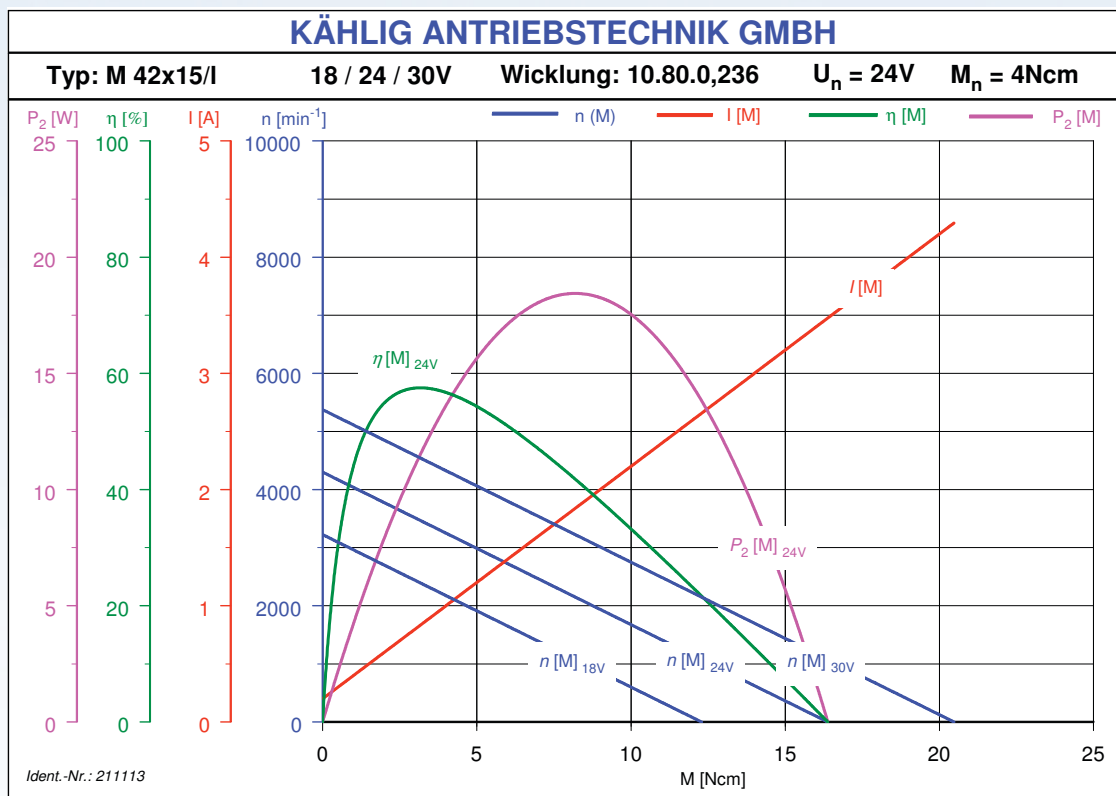
DC-Motor M42x15/I (24V)

Ident-Nr. 211113

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 13,6 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	4	
Rated speed ¹⁾	n_N	min ⁻¹	3250	±10%
Rated current ¹⁾	I_N	A	1	±20%
No load speed ¹⁾	n_0	min ⁻¹	4300	±15%
No load current ¹⁾	I_0	A	0,2	±50%
Rated power output ¹⁾	P_{2N}	W	13,6	
Rated power input ¹⁾	P_{1N}	W	24,0	
Rated efficiency ¹⁾	η_N	%	56,7	
Maximum power output ²⁾³⁾	P_{2max}	W	18,4	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	4,0	
Maximum Continuous current ²⁾³⁾	I_{max}	A	1,0	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	16,4	
Stall current ¹⁾	I_H	A	3,5	
Demagnetization current	I_E	A	7,7	
Connecting resistance ¹⁾	R	Ω	6,9	
Armature resistance ¹⁾	R_A	Ω	6,7	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	5,4	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	262,5	
Torque constant ¹⁾	k_M	Ncm/A	5,0	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	5,6	
Friction torque ¹⁾	M_R	Ncm	-1,0	
Mechanical time constant ¹⁾	T_M	ms	16,1	
Electrical time constant ¹⁾	T_e	ms	0,8	
Rotor inertia	J_R	gcm ²	60	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	40	
Permissible radial shaft loads ³⁾	F_{radial}	N	100	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

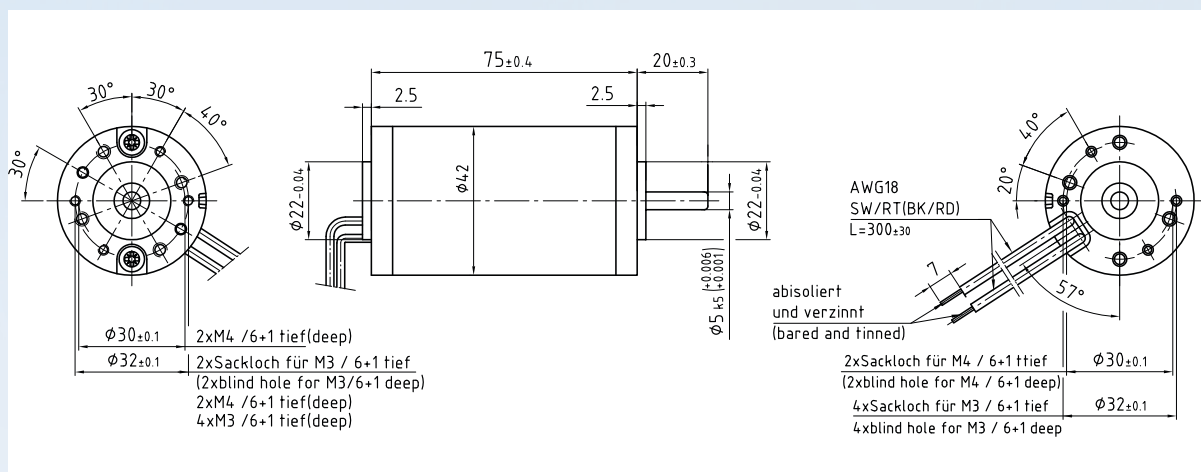
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

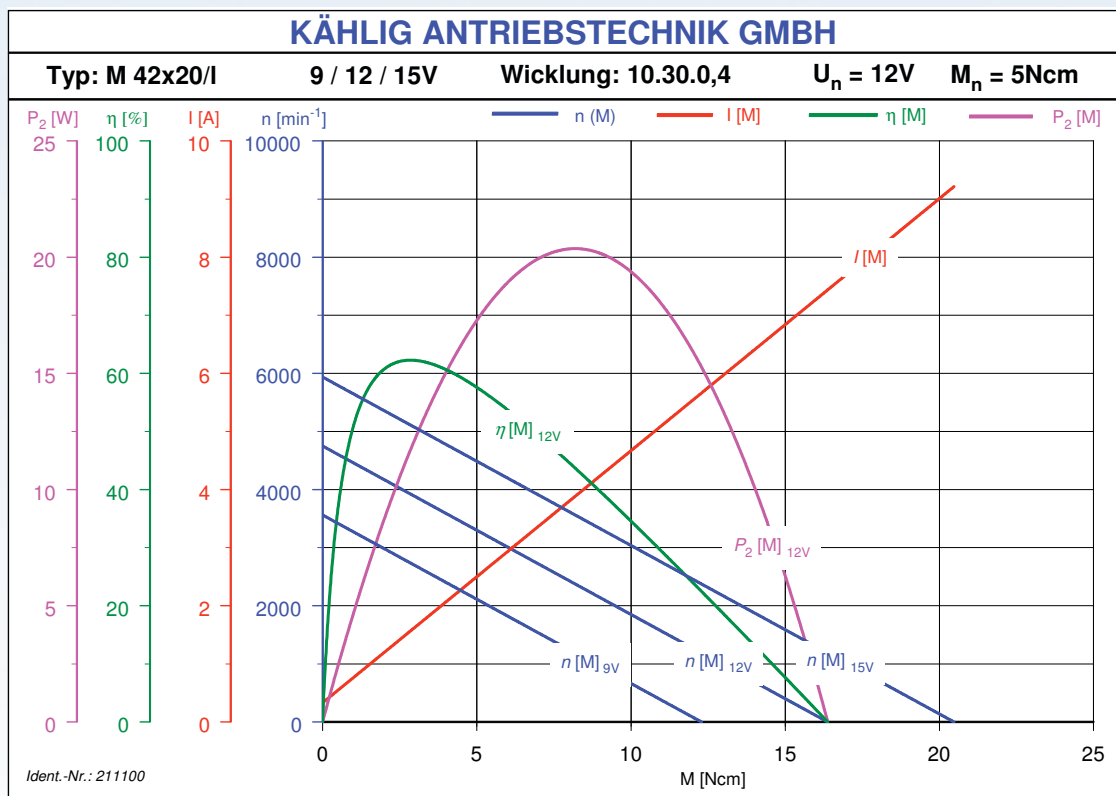
DC-Motor M42x20/I (12V)

Ident-Nr. 211100

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 17,3 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	5	
Rated speed ¹⁾	n_N	min ⁻¹	3300	±10%
Rated current ¹⁾	I_N	A	2,5	±20%
No load speed ¹⁾	n_0	min ⁻¹	4750	±15%
No load current ¹⁾	I_0	A	0,33	±50%
Rated power output ¹⁾	P_{2N}	W	17,3	
Rated power input ¹⁾	P_{1N}	W	30	
Rated efficiency ¹⁾	η_N	%	57,6	
Maximum power output ²⁾³⁾	P_{2max}	W	20,4	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	5,0	
Maximum Continuous current ²⁾³⁾	I_{max}	A	2,5	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	16,4	
Stall current ¹⁾	I_H	A	7,4	
Demagnetization current	I_E	A	20,6	
Connecting resistance ¹⁾	R	Ω	1,61	
Armature resistance ¹⁾	R_A	Ω	0,97	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	0,9	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	290	
Torque constant ¹⁾	k_M	Ncm/A	2,3	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	2,5	
Friction torque ¹⁾	M_R	Ncm	-0,8	
Mechanical time constant ¹⁾	T_M	ms	13,5	
Electrical time constant ¹⁾	T_e	ms	0,6	
Rotor inertia	J_R	gcm ²	74	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	40	
Permissible radial shaft loads ³⁾	F_{radial}	N	100	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

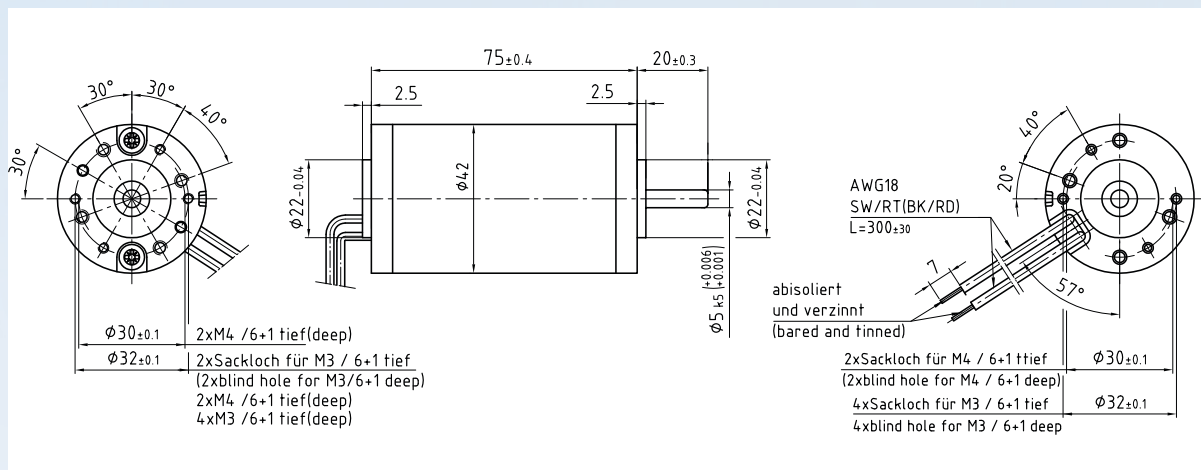
1) ϑ_w Winding temperature $\approx 20^\circ\text{C}$ 2) $\Delta\vartheta_w$ allowable = 100K

3) The operating at maximum levels reduces the lifespan

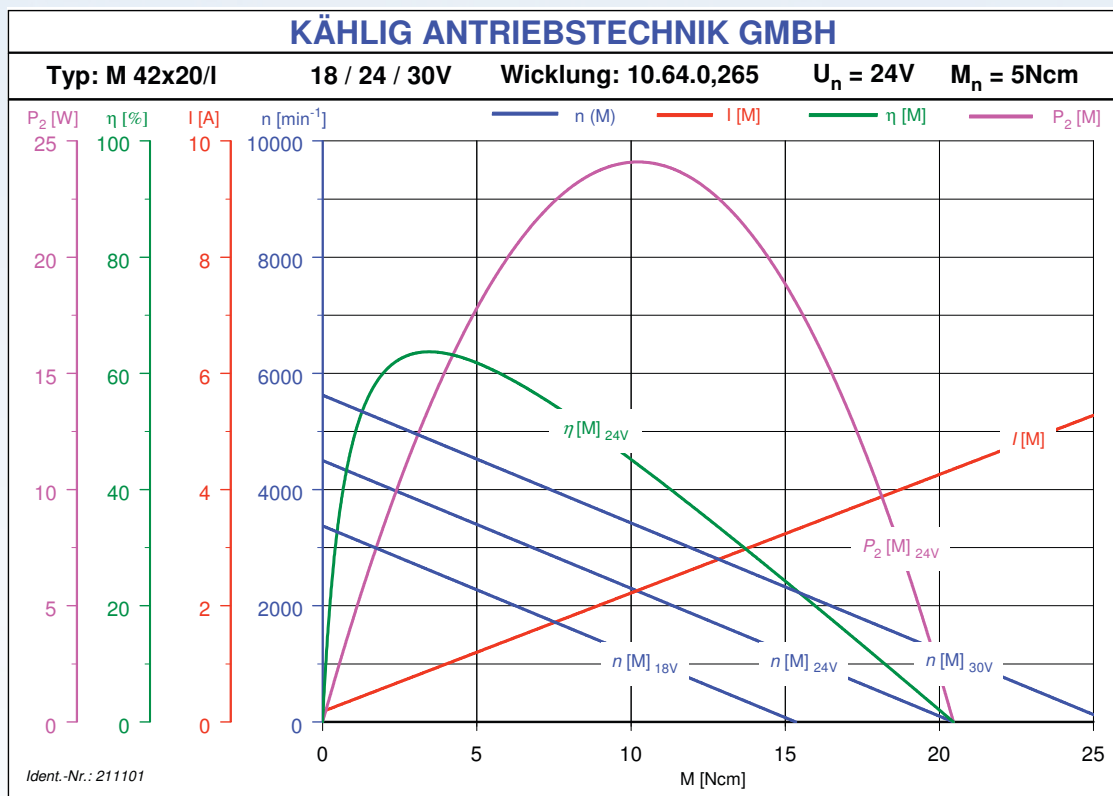
Stand: 22. Januar 2015 – changes reserved

DC-Motor M42x20/I (24V)
Ident-Nr. 211101

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 17,8 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	5	
Rated speed ¹⁾	n_N	min ⁻¹	3400	±10%
Rated current ¹⁾	I_N	A	1.2	±20%
No load speed ¹⁾	n_0	min ⁻¹	4500	±15%
No load current ¹⁾	I_0	A	0.18	±50%
Rated power output ¹⁾	P_{2N}	W	17.8	
Rated power input ¹⁾	P_{1N}	W	28.8	
Rated efficiency ¹⁾	η_N	%	61.8	
Maximum power output ²⁾³⁾	P_{2max}	W	24.1	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	5.0	
Maximum Continuous current ²⁾³⁾	I_{max}	A	1.2	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	20.5	
Stall current ¹⁾	I_H	A	4.4	
Demagnetization current	I_E	A	10.9	
Connecting resistance ¹⁾	R	Ω	5.51	
Armature resistance ¹⁾	R_A	Ω	4.75	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	4.08	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	220	
Torque constant ¹⁾	k_M	Ncm/A	4.9	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	5.3	
Friction torque ¹⁾	M_R	Ncm	-0.9	
Mechanical time constant ¹⁾	T_M	ms	14.6	
Electrical time constant ¹⁾	T_e	ms	0.7	
Rotor inertia	J_R	gcm ²	74	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	40	
Permissible radial shaft loads ³⁾	F_{radial}	N	100	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

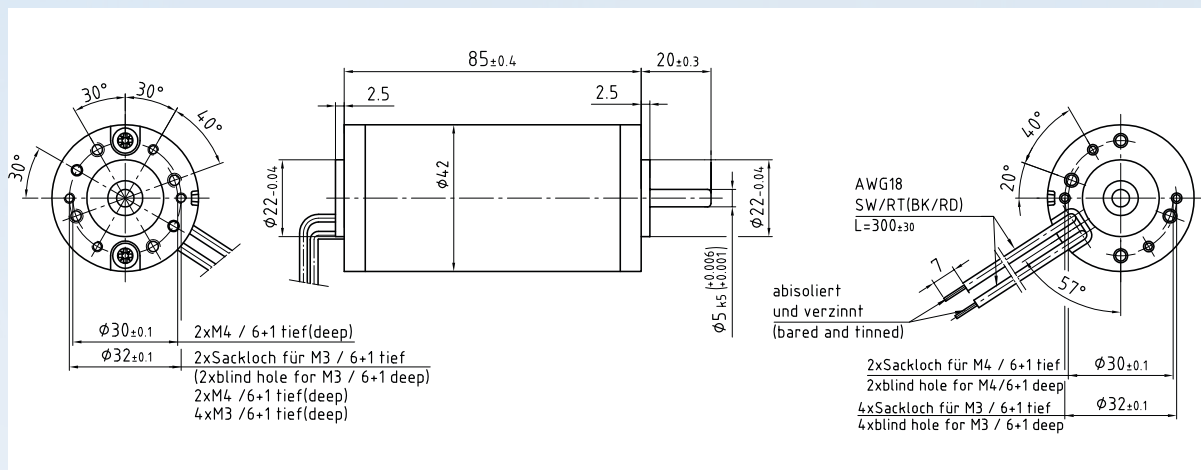
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

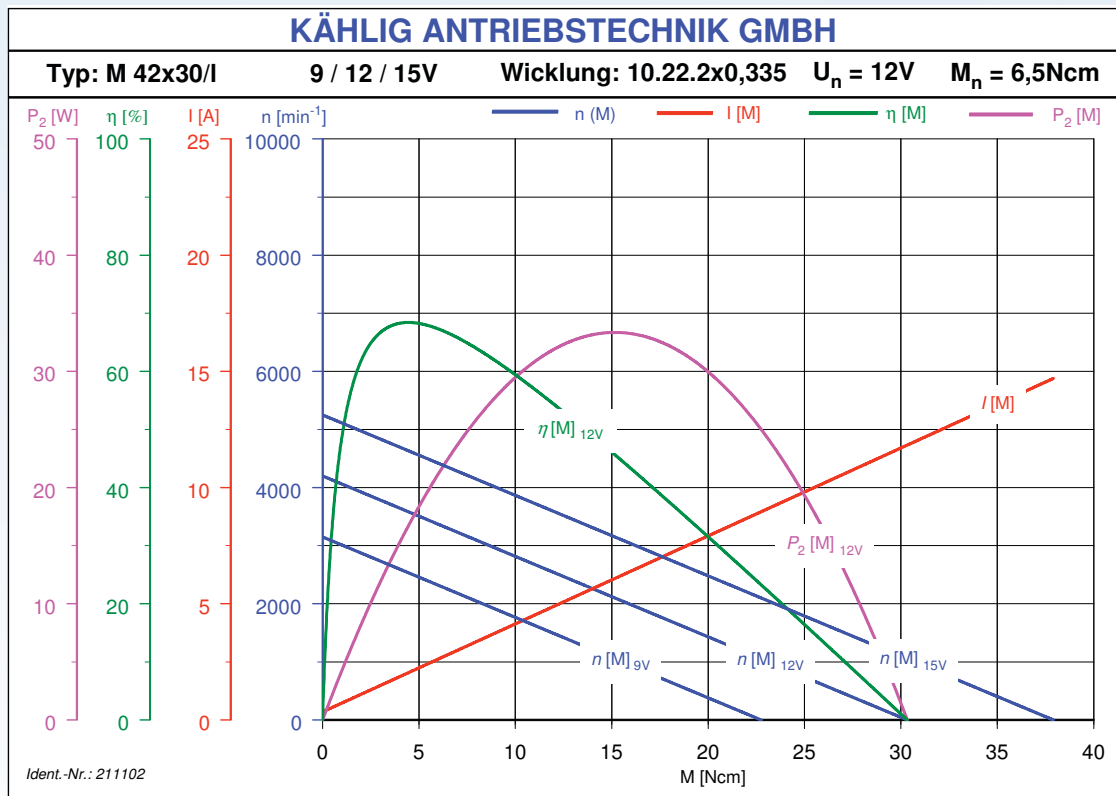
DC-Motor M42x30/I (12V)

Ident-Nr. 211102

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 22,5 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	6,5	
Rated speed ¹⁾	n_N	min ⁻¹	3300	±10%
Rated current ¹⁾	I_N	A	2,81	±20%
No load speed ¹⁾	n_0	min ⁻¹	4200	±15%
No load current ¹⁾	I_0	A	0,35	±50%
Rated power output ¹⁾	P_{2N}	W	22,5	
Rated power input ¹⁾	P_{1N}	W	33,7	
Rated efficiency ¹⁾	η_N	%	66,6	
Maximum power output ²⁾³⁾	P_{2max}	W	33,4	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	6,5	
Maximum Continuous current ²⁾³⁾	I_{max}	A	2,81	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	30,3	
Stall current ¹⁾	I_H	A	11,8	
Demagnetization current	I_E	A	31,7	
Connecting resistance ¹⁾	R	Ω	1,01	
Armature resistance ¹⁾	R_A	Ω	0,61	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	0,61	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	138,5	
Torque constant ¹⁾	k_M	Ncm/A	2,6	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	2,9	
Friction torque ¹⁾	M_R	Ncm	-0,9	
Mechanical time constant ¹⁾	T_M	ms	8,7	
Electrical time constant ¹⁾	T_e	ms	0,6	
Rotor inertia	J_R	gcm ²	100	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	40	
Permissible radial shaft loads ³⁾	F_{radial}	N	100	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature $\approx 20^\circ\text{C}$ 2) $\Delta\vartheta_w$ allowable = 100K

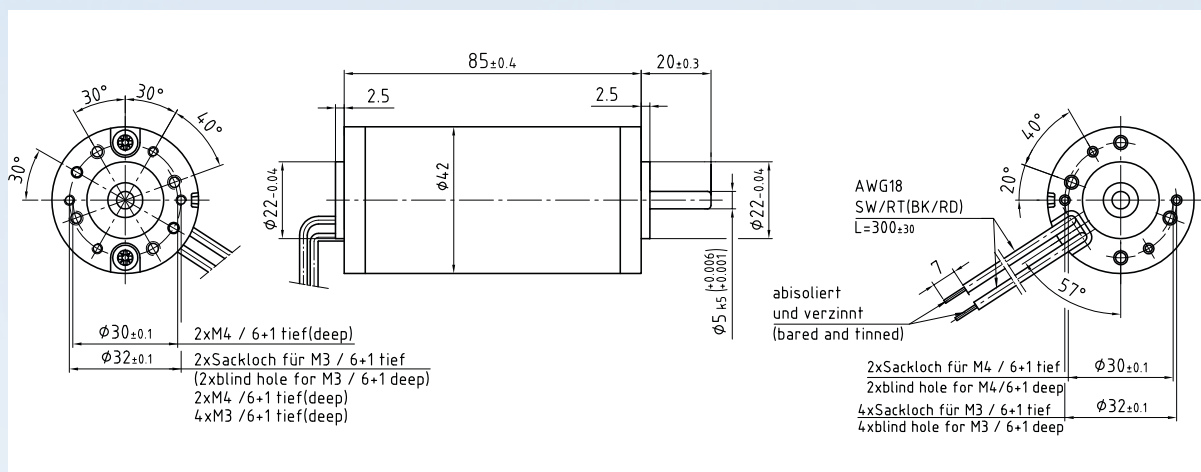
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

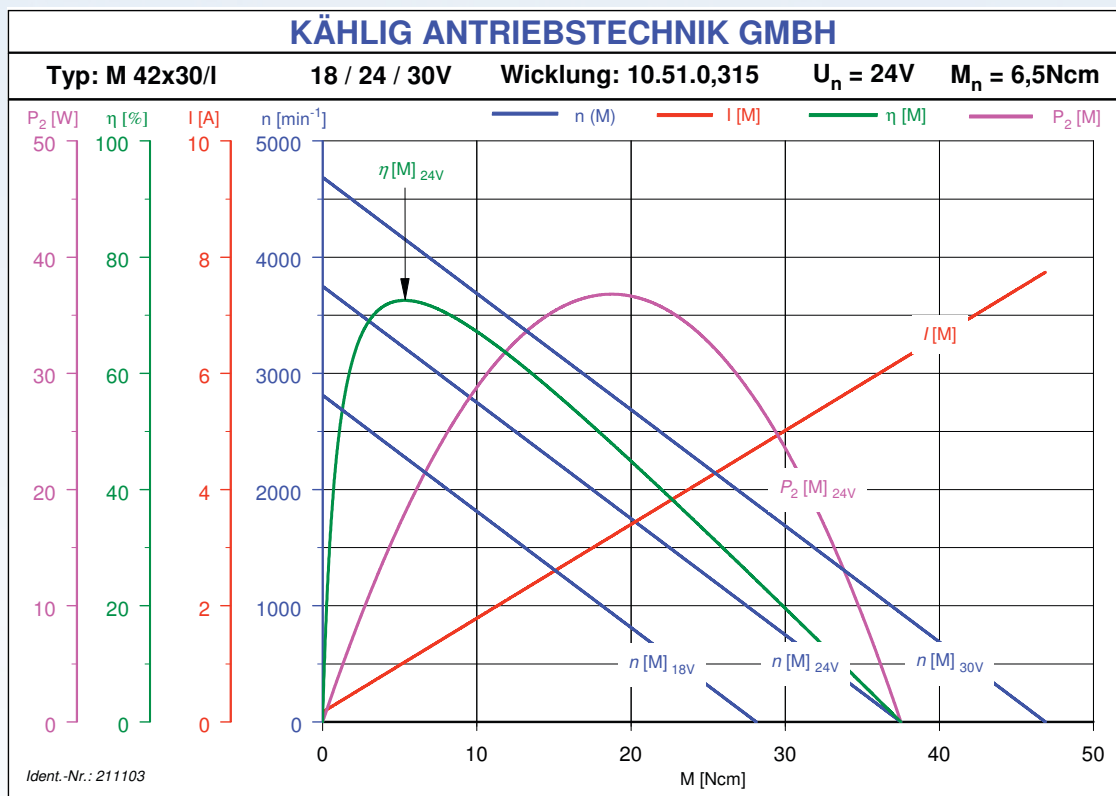
DC-Motor M42x30/I (24V)

Ident-Nr. 211103

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 22,1 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	6,5	
Rated speed ¹⁾	n_N	min ⁻¹	3100	±10%
Rated current ¹⁾	I_N	A	1,22	±20%
No load speed ¹⁾	n_0	min ⁻¹	3750	±15%
No load current ¹⁾	I_0	A	0,17	±50%
Rated power output ¹⁾	P_{2N}	W	21,1	
Rated power input ¹⁾	P_{1N}	W	29,3	
Rated efficiency ¹⁾	η_N	%	72,1	
Maximum power output ²⁾³⁾	P_{2max}	W	36,8	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	6,5	
Maximum Continuous current ²⁾³⁾	I_{max}	A	1,22	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	37,5	
Stall current ¹⁾	I_H	A	6,2	
Demagnetization current	I_E	A	13,7	
Connecting resistance ¹⁾	R	Ω	3,85	
Armature resistance ¹⁾	R_A	Ω	3,35	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	3,33	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	100	
Torque constant ¹⁾	k_M	Ncm/A	6,2	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	6,4	
Friction torque ¹⁾	M_R	Ncm	-1,1	
Mechanical time constant ¹⁾	T_M	ms	8,7	
Electrical time constant ¹⁾	T_e	ms	0,9	
Rotor inertia	J_R	gcm ²	100	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	40	
Permissible radial shaft loads ³⁾	F_{radial}	N	100	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature $\approx 20^\circ\text{C}$ 2) $\Delta\vartheta_w$ allowable = 100K

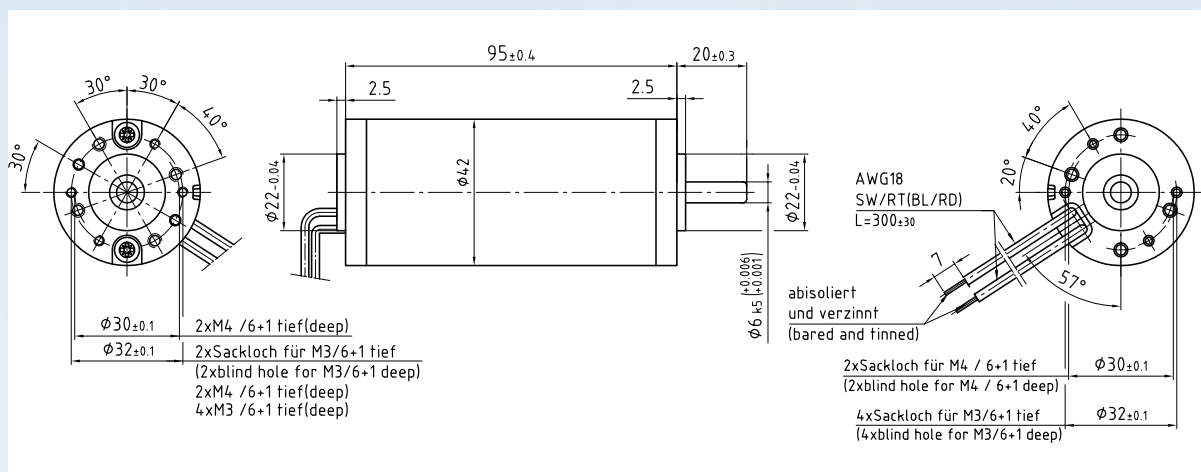
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

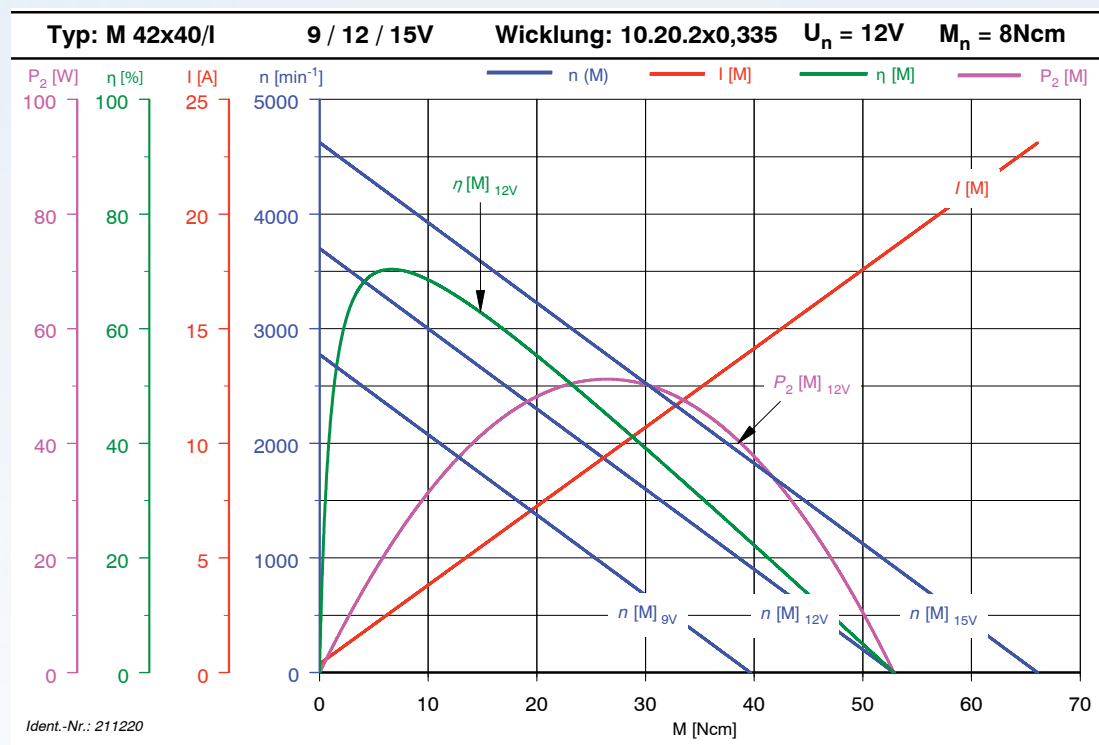
DC-Motor M42x40/I (12V)

Ident-Nr. 211220

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 26,4 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	8	
Rated speed ¹⁾	n_N	min ⁻¹	3150	±10%
Rated current ¹⁾	I_N	A	3,13	±20%
No load speed ¹⁾	n_0	min ⁻¹	3700	±15%
No load current ¹⁾	I_0	A	0,38	±50%
Rated power output ¹⁾	P_{2N}	W	26,4	
Rated power input ¹⁾	P_{1N}	W	37,6	
Rated efficiency ¹⁾	η_N	%	70,3	
Maximum power output ²⁾³⁾	P_{2max}	W	51,2	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	8	
Maximum Continuous current ²⁾³⁾	I_{max}	A	3,13	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	52,9	
Stall current ¹⁾	I_H	A	18,6	
Demagnetization current	I_E	A	34,9	
Connecting resistance ¹⁾	R	Ω	0,67	
Armature resistance ¹⁾	R_A	Ω	0,65	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	0,8	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	70	
Torque constant ¹⁾	k_M	Ncm/A	2,9	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	3,2	
Friction torque ¹⁾	M_R	Ncm	-1,1	
Mechanical time constant ¹⁾	T_M	ms	10,0	
Electrical time constant ¹⁾	T_e	ms	1,2	
Rotor inertia	J_R	gcm ²	130	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	40	
Permissible radial shaft loads ³⁾	F_{radial}	N	100	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature $\approx 20^\circ\text{C}$ 2) $\Delta\vartheta_w$ allowable = 100K

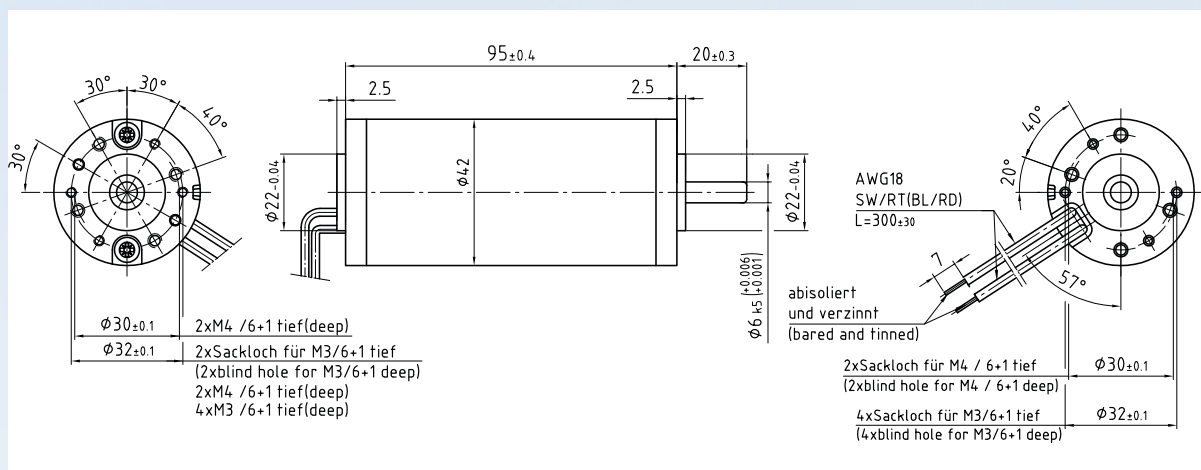
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

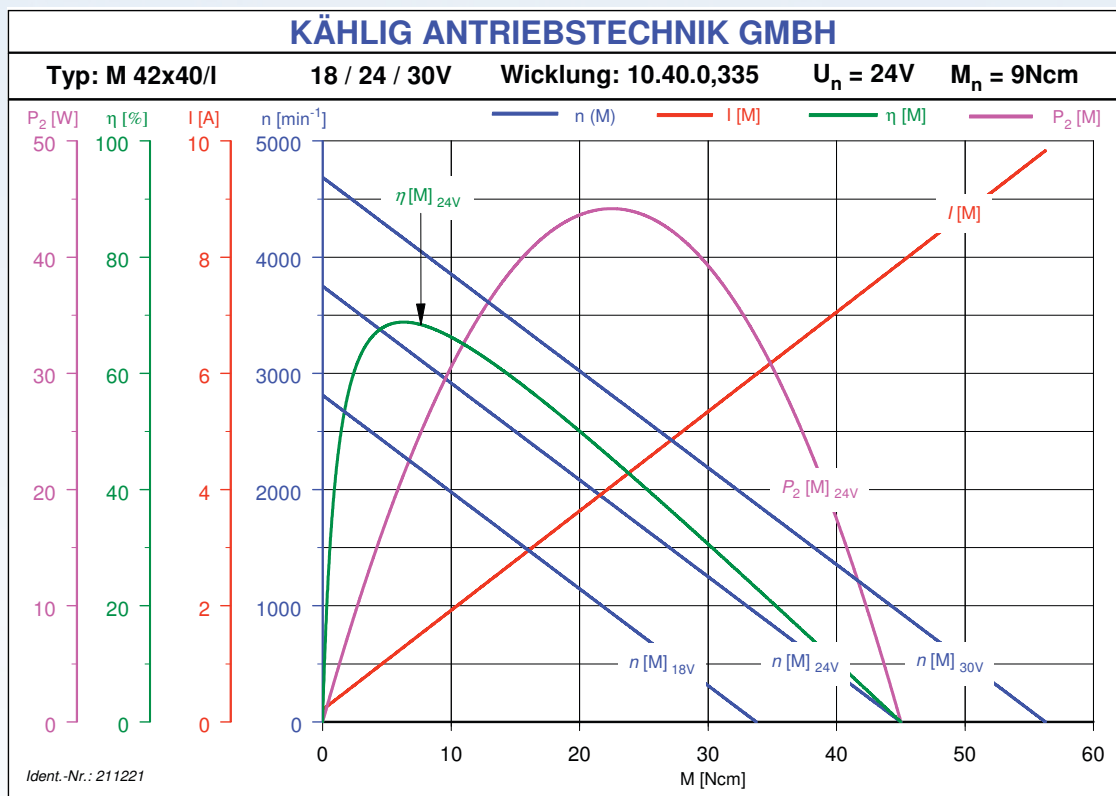
DC-Motor M42x40/I (24V)

Ident-Nr. 211221

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 28,3 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	9	
Rated speed ¹⁾	n_N	min ⁻¹	3000	±10%
Rated current ¹⁾	I_N	A	1,75	±20%
No load speed ¹⁾	n_0	min ⁻¹	3750	±15%
No load current ¹⁾	I_0	A	0,21	±50%
Rated power output ¹⁾	P_{2N}	W	28,3	
Rated power input ¹⁾	P_{1N}	W	42,0	
Rated efficiency ¹⁾	η_N	%	67,3	
Maximum power output ²⁾³⁾	P_{2max}	W	44,2	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	9,0	
Maximum Continuous current ²⁾³⁾	I_{max}	A	1,75	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	45	
Stall current ¹⁾	I_H	A	7,9	
Demagnetization current	I_E	A	15,4	
Connecting resistance ¹⁾	R	Ω	3,03	
Armature resistance ¹⁾	R_A	Ω	2,61	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	2,5	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	83,3	
Torque constant ¹⁾	k_M	Ncm/A	5,8	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	6,4	
Friction torque ¹⁾	M_R	Ncm	-1,2	
Mechanical time constant ¹⁾	T_M	ms	9,9	
Electrical time constant ¹⁾	T_e	ms	0,8	
Rotor inertia	J_R	gcm ²	130	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	40	
Permissible radial shaft loads ³⁾	F_{radial}	N	100	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

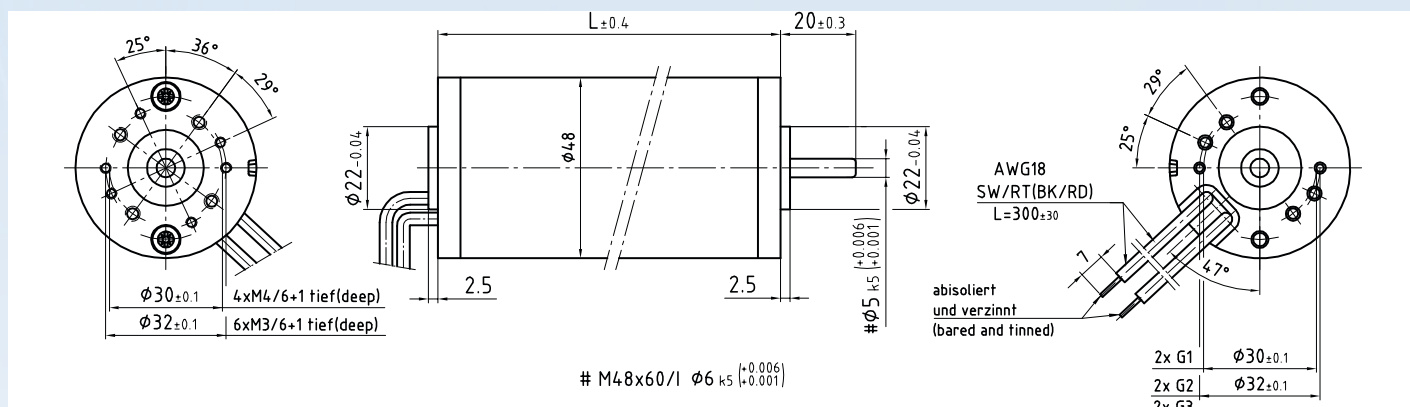
1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

DC-Motors Type M48

- Permanent magnet DC-motor
- Ball bearings
- Lead wires
- Power range in continuous operation approx. 15 to 55 watt
- Voltages 12 and 24 volts
- Multiple combination possibilities with gears, encoders and brakes



Application on request

Versions	Unit	M48x25/I	M48x25/I	M48x50/I	M48x50/I	M48x60/I	M48x60/I
Part number	[ID]	210890	210891	210892	210893	220191	211333
Nominal voltage	[V]	12	24	12	24	12	24
Nominal torque	[Ncm]	5	5	10	10	15	15
Nominal speed	[1/min]	2800	2800	3050	3150	3000	3300
Nominal current	[A]	1.8	0.8	3.4	1.8	5.15	2.75
Output power ¹⁾	[W]	14.7	14.7	31.9	33.0	47.1	51.8
Rise of M-n-characteristic	[1/min / Ncm]	100	80	45	35	40	33.3
Torque constant	[Ncm / A]	3.3	7.7	3.2	6.2	3.2	5.9
Rotor moment of inertia	[gcm ²]	165	165	323	323	383	383
Weight	[kg]	0.65	0.65	0.91	0.91	0.98	0.98
Length	[mm]	91	91	116	116	126	126

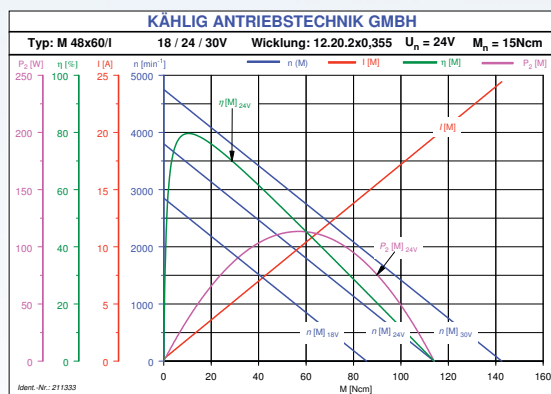
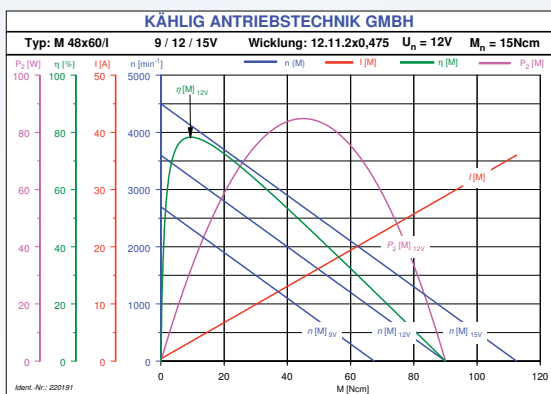
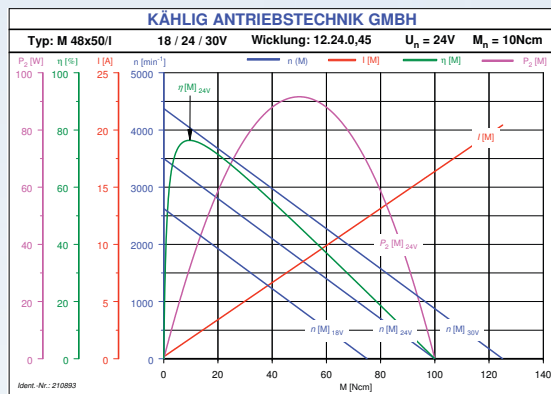
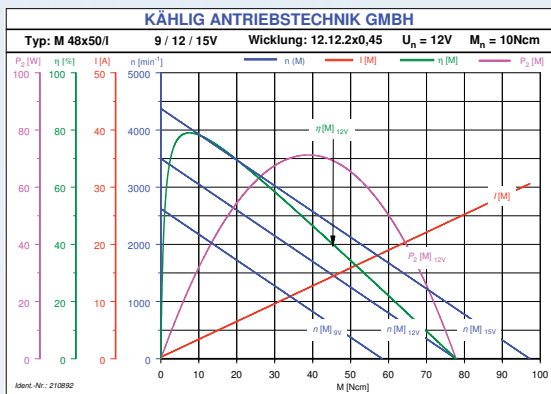
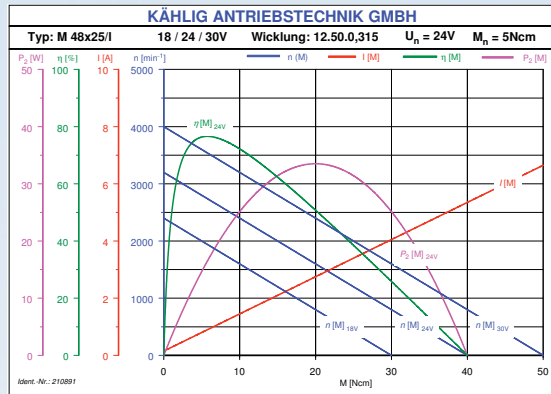
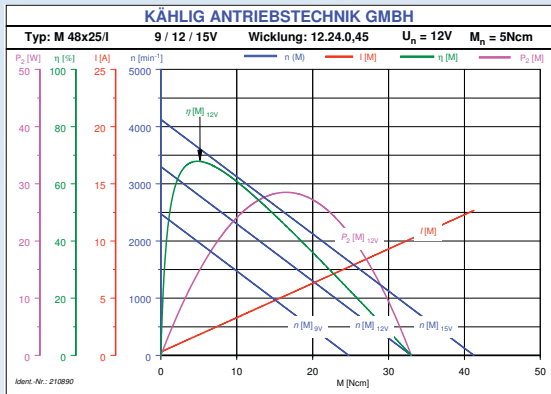
General data

Lifetime at rated torque ¹⁾	h	3000
Permissible axial shaft load ²⁾	N	40
Permissible radial shaft load ²⁾	N	100
Insulation class (DIN VDE 0530)		E
IP protection class (DIN VDE 0530)		IP 40
RFI suppression		optional

¹⁾ Operation by nominal values: Date: 13.05.2008 Subject to change without notice
²⁾ At 3000 rpm and 3000 hrs nominal life, simultaneous axial and radial loads

Stand: 10. January 2014 – changes reserved

Performance characteristics

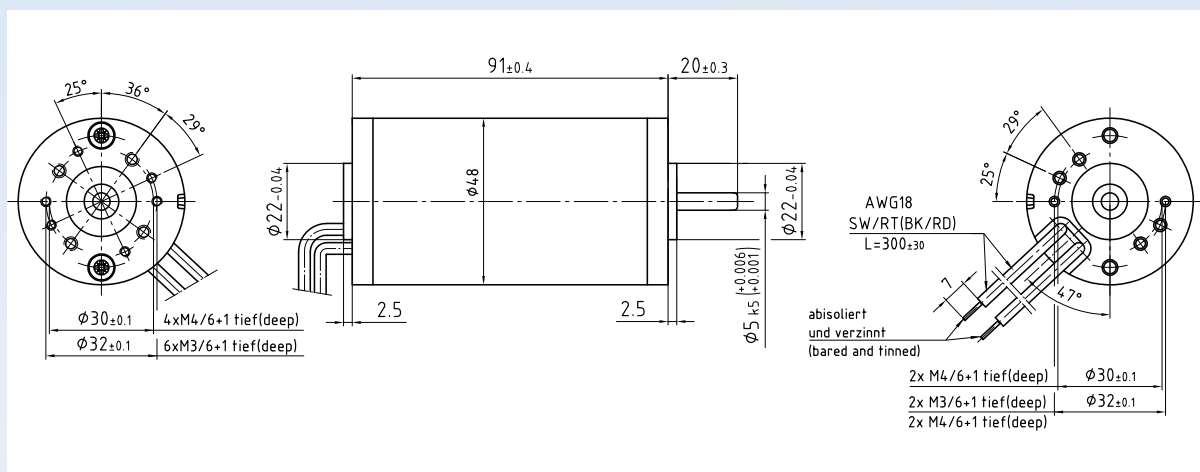


Stand: 10. January 2014 – changes reserved

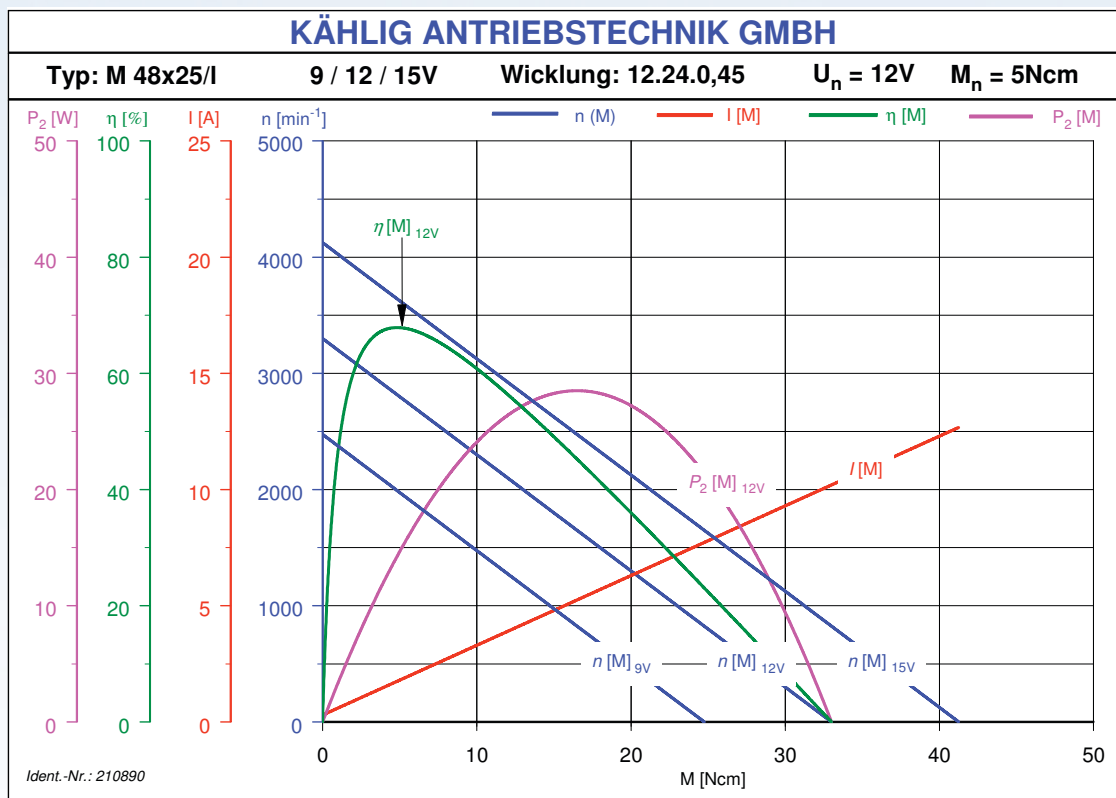
DC-Motor M48x25/I (12V)

Ident-Nr. 210890

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 14,7 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	5	
Rated speed ¹⁾	n_N	min ⁻¹	2800	±10%
Rated current ¹⁾	I_N	A	1.8	±20%
No load speed ¹⁾	n_0	min ⁻¹	3300	±15%
No load current ¹⁾	I_0	A	0.3	±50%
Rated power output ¹⁾	P_{2N}	W	14.7	
Rated power input ¹⁾	P_{1N}	W	21.6	
Rated efficiency ¹⁾	η_N	%	67.9	
Maximum power output ²⁾³⁾	P_{2max}	W	28.5	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	5	
Maximum Continuous current ²⁾³⁾	I_{max}	A	1.8	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	33	
Stall current ¹⁾	I_H	A	10.2	
Demagnetization current	I_E	A	21.3	
Connecting resistance ¹⁾	R	Ω	1.18	
Armature resistance ¹⁾	R_A	Ω	0.87	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	0.9	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	100	
Torque constant ¹⁾	k_M	Ncm/A	3.3	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	3.6	
Friction torque ¹⁾	M_R	Ncm	-1.0	
Mechanical time constant ¹⁾	T_M	ms	12.8	
Electrical time constant ¹⁾	T_e	ms	0.8	
Rotor inertia	J_R	gcm ²	165	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	40	
Permissible radial shaft loads ³⁾	F_{radial}	N	100	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

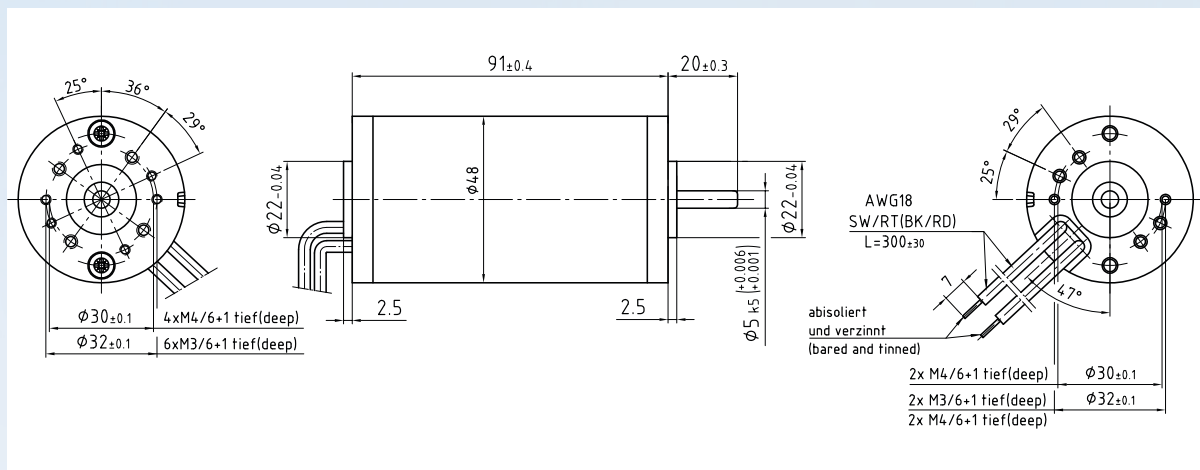
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

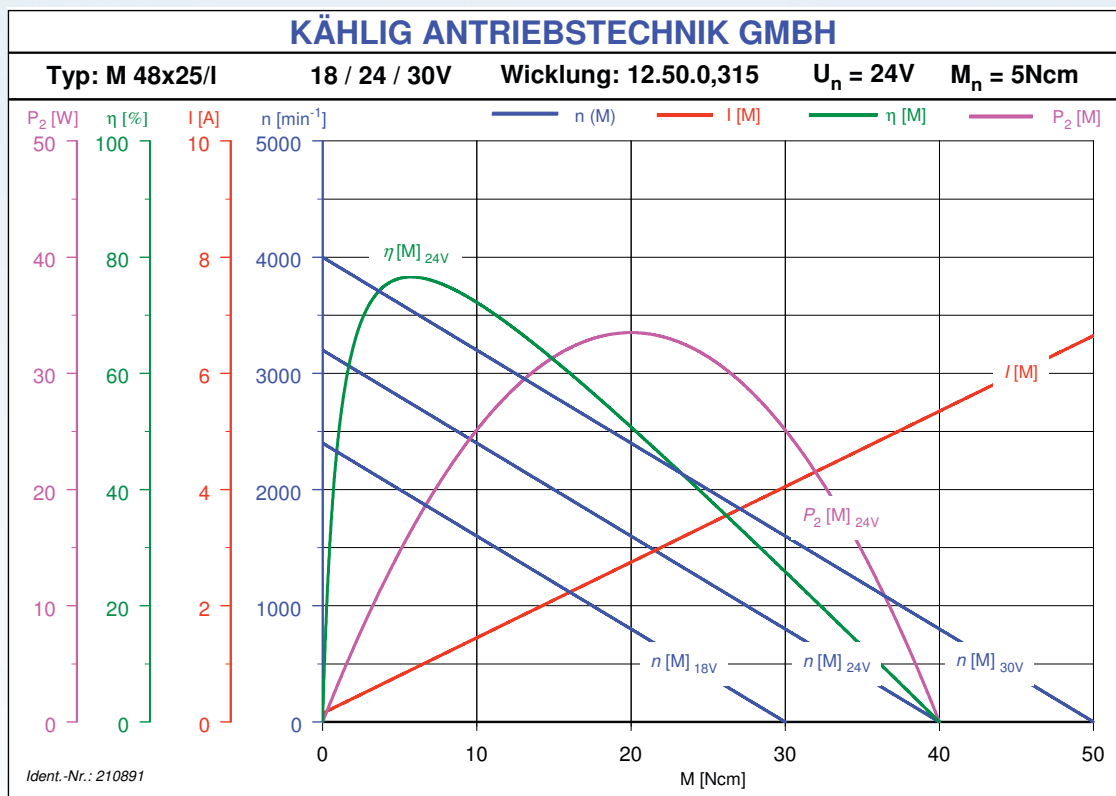
DC-Motor M48x25/I (24V)

Ident-Nr. 210891

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 14,7 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	5	
Rated speed ¹⁾	n_N	min ⁻¹	2800	±10%
Rated current ¹⁾	I_N	A	0.8	±20%
No load speed ¹⁾	n_0	min ⁻¹	3200	±15%
No load current ¹⁾	I_0	A	0.15	±50%
Rated power output ¹⁾	P_{2N}	W	14.7	
Rated power input ¹⁾	P_{1N}	W	19.2	
Rated efficiency ¹⁾	η_N	%	76.4	
Maximum power output ²⁾³⁾	P_{2max}	W	33.5	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	5	
Maximum Continuous current ²⁾³⁾	I_{max}	A	0.8	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	40	
Stall current ¹⁾	I_H	A	5.4	
Demagnetization current	I_E	A	12.3	
Connecting resistance ¹⁾	R	Ω	4.49	
Armature resistance ¹⁾	R_A	Ω	3.95	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	3.92	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	80	
Torque constant ¹⁾	k_M	Ncm/A	7.7	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	7.5	
Friction torque ¹⁾	M_R	Ncm	-1.2	
Mechanical time constant ¹⁾	T_M	ms	11.0	
Electrical time constant ¹⁾	T_e	ms	0.9	
Rotor inertia	J_R	gcm ²	165	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	40	
Permissible radial shaft loads ³⁾	F_{radial}	N	100	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature $\approx 20^\circ\text{C}$ 2) $\Delta\vartheta_w$ allowable = 100K

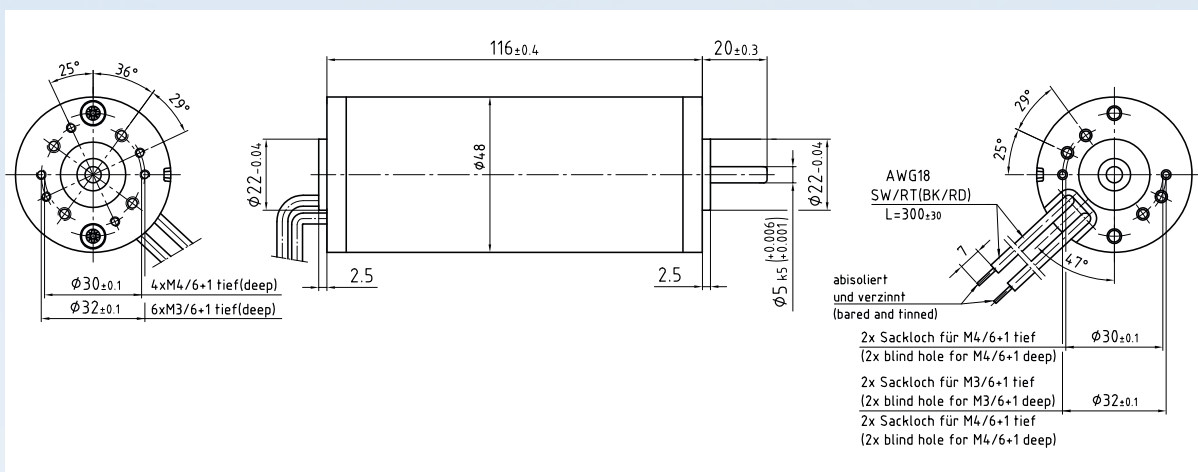
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

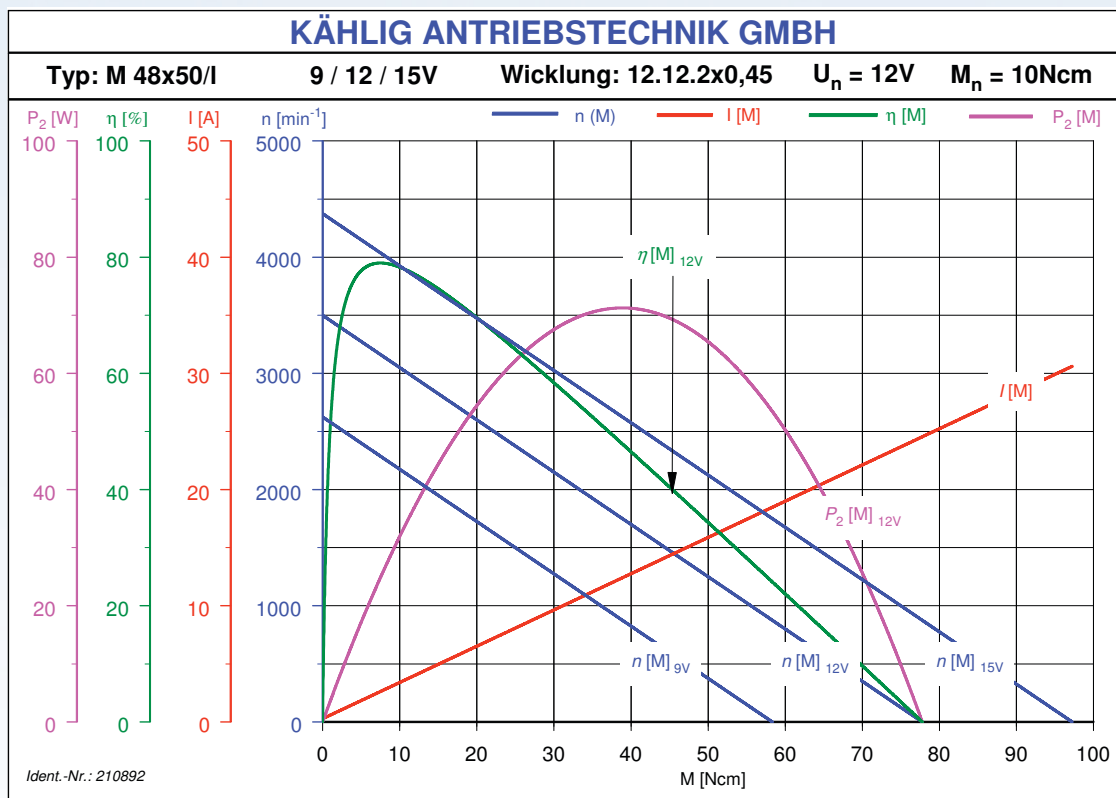
DC-Motor M48x50/I (12V)

Ident-Nr. 210892

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 31,9 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	10	
Rated speed ¹⁾	n_N	min ⁻¹	3050	±10%
Rated current ¹⁾	I_N	A	3,4	±20%
No load speed ¹⁾	n_0	min ⁻¹	3500	±15%
No load current ¹⁾	I_0	A	0,28	±50%
Rated power output ¹⁾	P_{2N}	W	31,9	
Rated power input ¹⁾	P_{1N}	W	40,8	
Rated efficiency ¹⁾	η_N	%	78,3	
Maximum power output ²⁾³⁾	P_{2max}	W	71,3	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	10	
Maximum Continuous current ²⁾³⁾	I_{max}	A	3,4	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	77,8	
Stall current ¹⁾	I_H	A	24,5	
Demagnetization current	I_E	A	48	
Connecting resistance ¹⁾	R	Ω	0,49	
Armature resistance ¹⁾	R_A	Ω	0,33	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	0,42	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	45	
Torque constant ¹⁾	k_M	Ncm/A	3,2	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	3,4	
Friction torque ¹⁾	M_R	Ncm	-0,9	
Mechanical time constant ¹⁾	T_M	ms	10,2	
Electrical time constant ¹⁾	T_e	ms	0,9	
Rotor inertia	J_R	gcm ²	323	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	40	
Permissible radial shaft loads ³⁾	F_{radial}	N	100	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

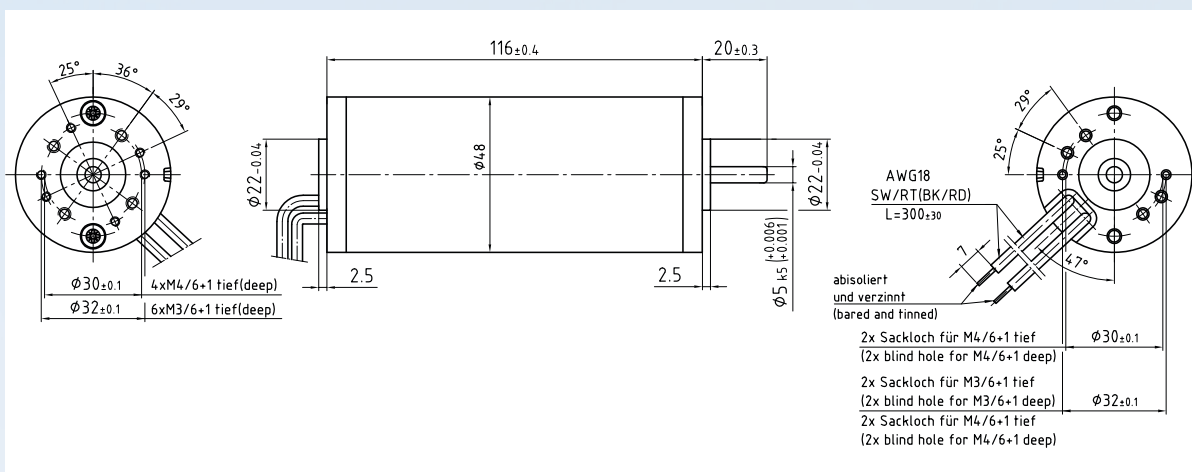
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

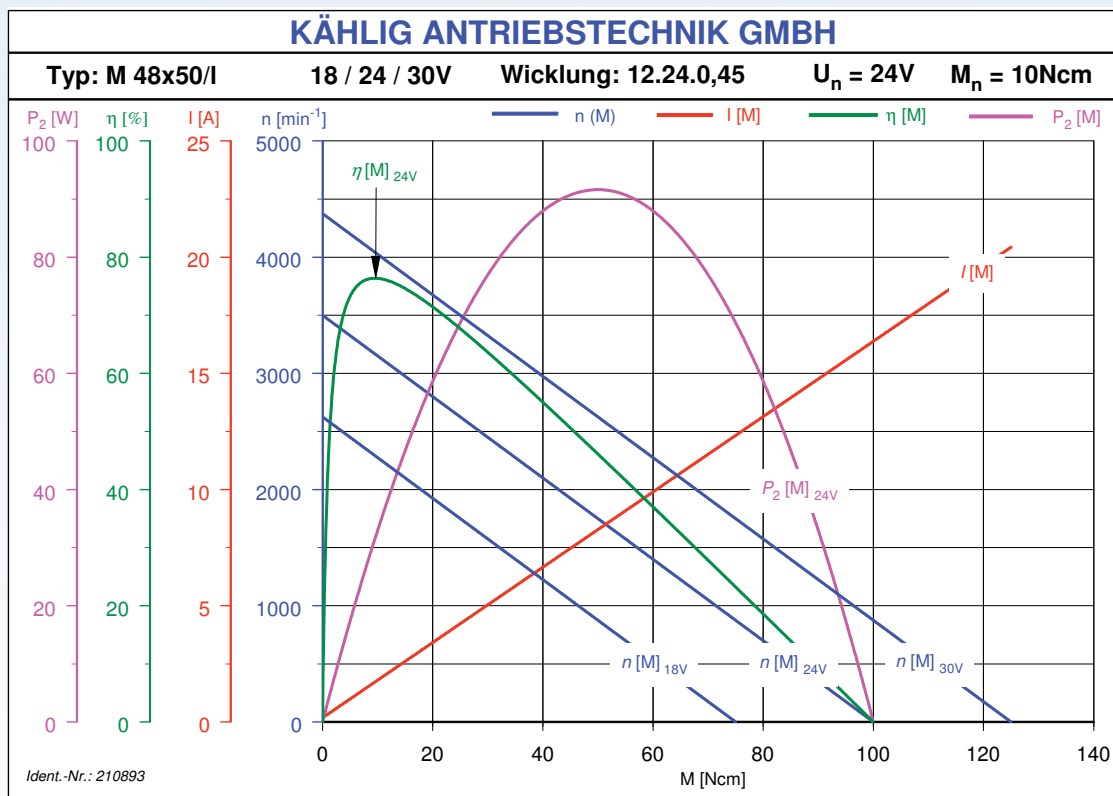
DC-Motor M48x50/I (24V)

Ident-Nr. 210893

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 33 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	10	
Rated speed ¹⁾	n_N	min ⁻¹	3150	±10%
Rated current ¹⁾	I_N	A	1.8	±20%
No load speed ¹⁾	n_0	min ⁻¹	3500	±15%
No load current ¹⁾	I_0	A	0.18	±50%
Rated power output ¹⁾	P_{2N}	W	33.0	
Rated power input ¹⁾	P_{1N}	W	43.2	
Rated efficiency ¹⁾	η_N	%	76.4	
Maximum power output ²⁾³⁾	P_{2max}	W	91.6	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	10	
Maximum Continuous current ²⁾³⁾	I_{max}	A	1.8	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	100	
Stall current ¹⁾	I_H	A	16.4	
Demagnetization current	I_E	A	21.3	
Connecting resistance ¹⁾	R	Ω	1.47	
Armature resistance ¹⁾	R_A	Ω	1.34	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	1.7	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	35	
Torque constant ¹⁾	k_M	Ncm/A	6.2	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	6.9	
Friction torque ¹⁾	M_R	Ncm	-1.1	
Mechanical time constant ¹⁾	T_M	ms	10.1	
Electrical time constant ¹⁾	T_e	ms	1.2	
Rotor inertia	J_R	gcm ²	323	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	40	
Permissible radial shaft loads ³⁾	F_{radial}	N	100	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

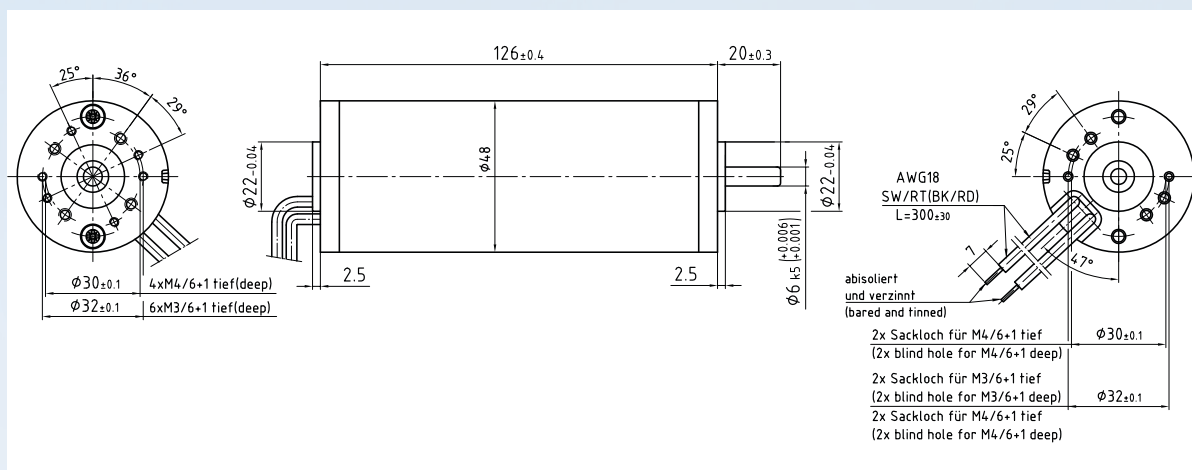
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

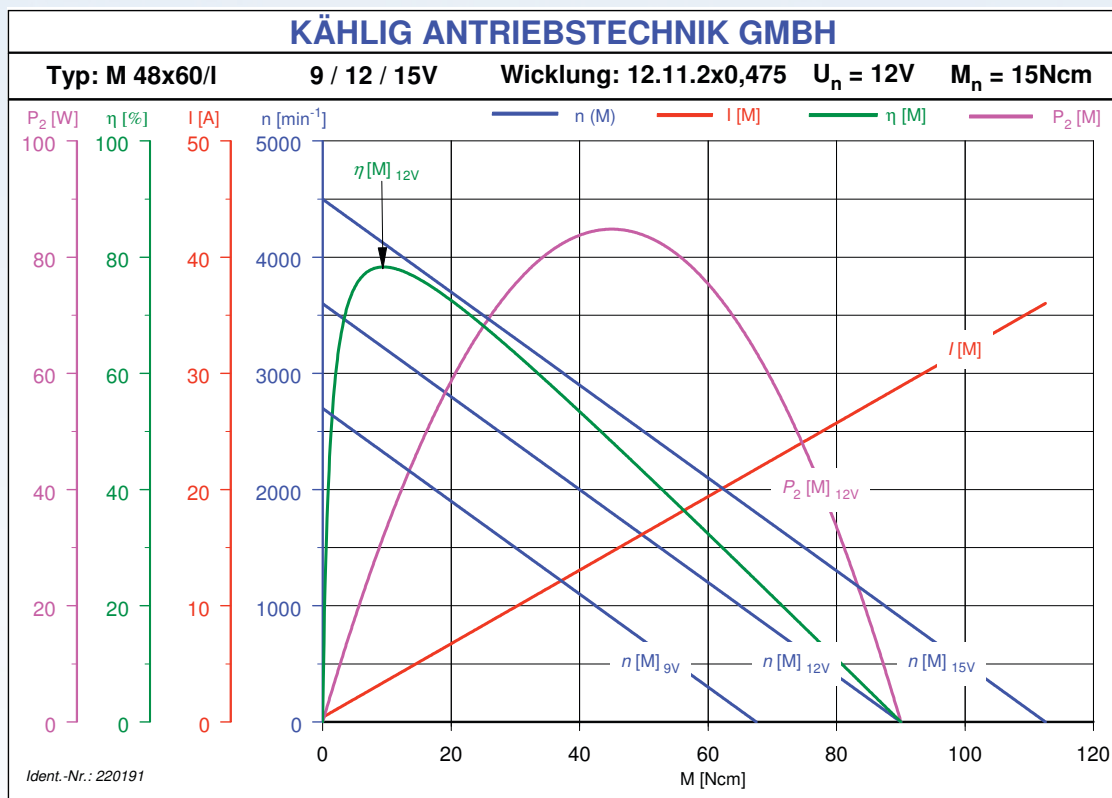
DC-Motor M48x60/I (12V)

Ident-Nr. 220191

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 47,1 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	15	
Rated speed ¹⁾	n_N	min ⁻¹	3000	±10%
Rated current ¹⁾	I_N	A	5,15	±20%
No load speed ¹⁾	n_0	min ⁻¹	3600	±15%
No load current ¹⁾	I_0	A	0,4	±50%
Rated power output ¹⁾	P_{2N}	W	47,1	
Rated power input ¹⁾	P_{1N}	W	61,8	
Rated efficiency ¹⁾	η_N	%	76,3	
Maximum power output ²⁾³⁾	P_{2max}	W	84,8	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	15	
Maximum Continuous current ²⁾³⁾	I_{max}	A	5,15	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	90	
Stall current ¹⁾	I_H	A	28,9	
Demagnetization current	I_E	A	52,4	
Connecting resistance ¹⁾	R	Ω	0,44	
Armature resistance ¹⁾	R_A	Ω	0,32	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	0,39	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	40	
Torque constant ¹⁾	k_M	Ncm/A	3,2	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	3,3	
Friction torque ¹⁾	M_R	Ncm	-1,3	
Mechanical time constant ¹⁾	T_M	ms	11,4	
Electrical time constant ¹⁾	T_e	ms	0,9	
Rotor inertia	J_R	gcm ²	383	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	40	
Permissible radial shaft loads ³⁾	F_{radial}	N	100	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

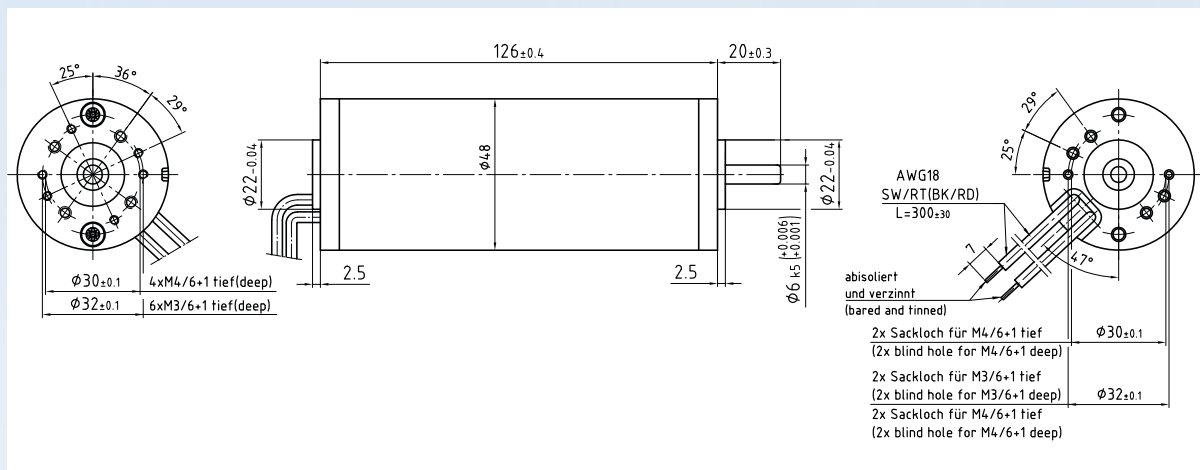
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

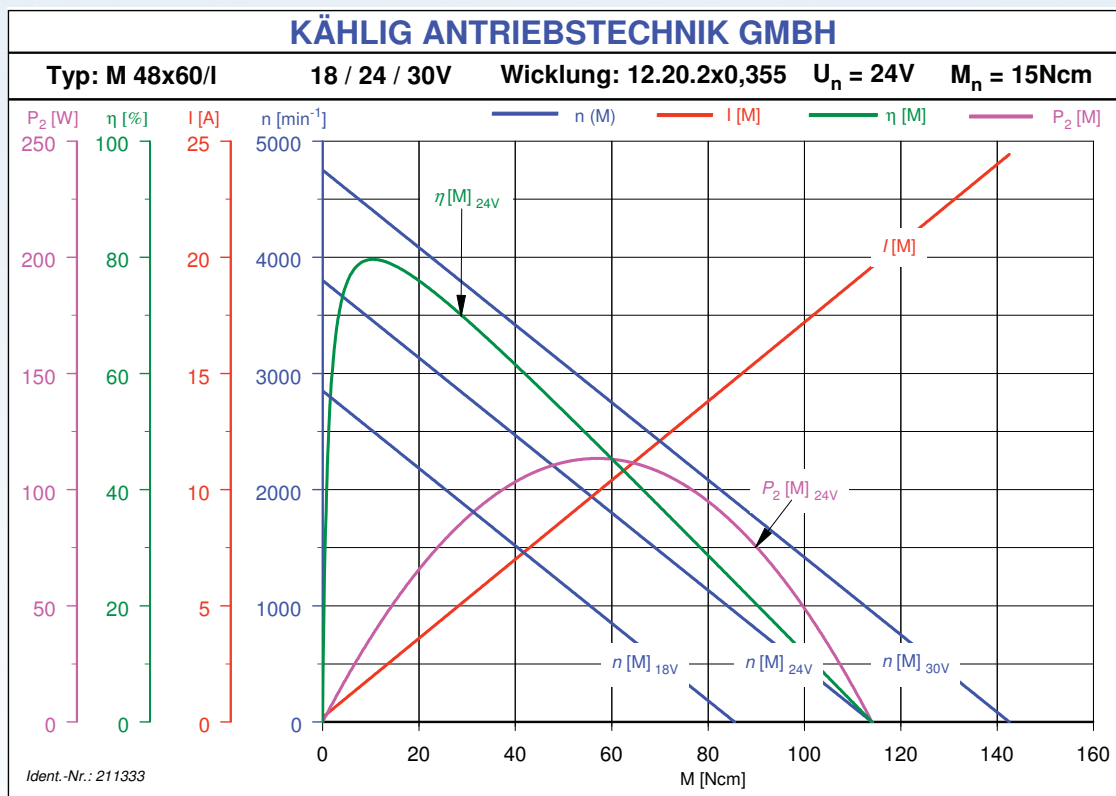
DC-Motor M48x60/I (24V)

Ident-Nr. 211333

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 51,8 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	15	
Rated speed ¹⁾	n_N	min ⁻¹	3300	±10%
Rated current ¹⁾	I_N	A	2,75	±20%
No load speed ¹⁾	n_0	min ⁻¹	3800	±15%
No load current ¹⁾	I_0	A	0,2	±50%
Rated power output ¹⁾	P_{2N}	W	51,8	
Rated power input ¹⁾	P_{1N}	W	66,0	
Rated efficiency ¹⁾	η_N	%	78,5	
Maximum power output ²⁾³⁾	P_{2max}	W	113,4	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	15	
Maximum Continuous current ²⁾³⁾	I_{max}	A	2,75	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	10000	
Stall torque ¹⁾	M_H	Ncm	114	
Stall current ¹⁾	I_H	A	19,6	
Demagnetization current	I_E	A	25,5	
Connecting resistance ¹⁾	R	Ω	1,23	
Armature resistance ¹⁾	R_A	Ω	1,03	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	1,42	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	33,3	
Torque constant ¹⁾	k_M	Ncm/A	5,9	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	6,3	
Friction torque ¹⁾	M_R	Ncm	1,2	
Mechanical time constant ¹⁾	T_M	ms	12,0	
Electrical time constant ¹⁾	T_e	ms	1,2	
Rotor inertia	J_R	gcm ²	383	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	40	
Permissible radial shaft loads ³⁾	F_{radial}	N	100	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

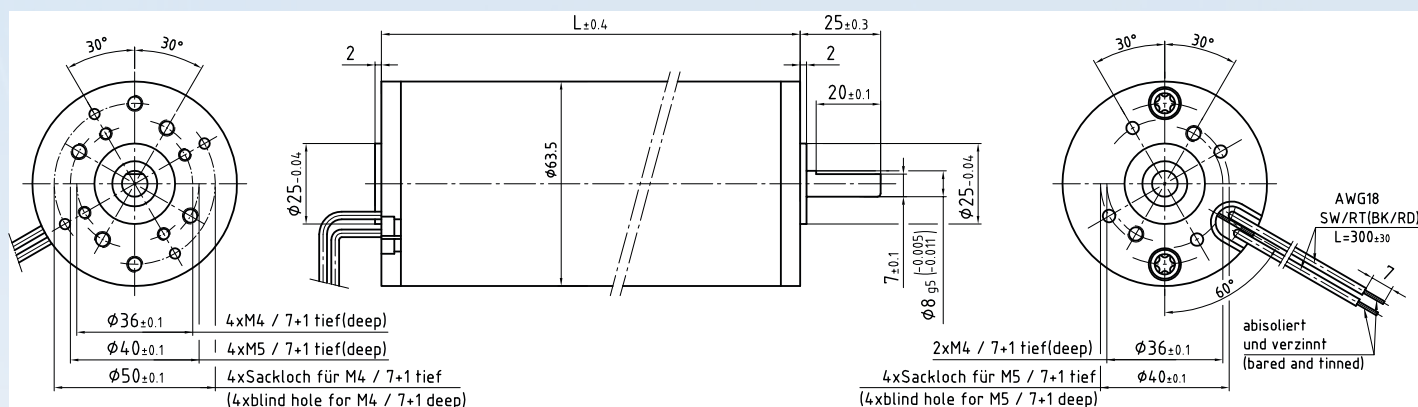
1) ϑ_w Winding temperature $\approx 20^\circ\text{C}$ 2) $\Delta\vartheta_w$ allowable = 100K

3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

DC-Motors Type M63

- Permanent magnet DC-motor
- Ball bearings
- Lead wires
- Power range in continuous operation approx. 50 to 100 watt
- Voltages 12 and 24 volts
- Multiple combination possibilities with gears, encoders and brakes



Application on request

Versions	Unit	M63x25/I	M63x25/I	M63x40/I	M63x40/I	M63x60/I	M63x60/I
Part number	[ID]	210950	210961	210951	210962	220311	210963
Nominal voltage	[V]	12	24	12	24	12	24
Nominal torque	[Ncm]	14	14	18	18	22	30
Nominal speed	[1/min]	3300	3250	2550	3050	3150	3000
Nominal current	[A]	5.95	2.84	5.35	3.2	7.9	5.1
Output power ¹⁾	[W]	48.4	48.0	48.1	57.5	72.6	94.2
Rise of M-n-characteristic	[1/min / Ncm]	39.3	30.9	19.4	19.4	15.9	13.3
Torque constant	[Ncm / A]	2.8	6.0	3.8	6.4	3.1	6.5
Rotor moment of inertia	[gcm ²]	596	596	792	792	1209	1209
Weight	[kg]	1.16	1.16	1.46	1.46	1.73	1.73
Length	[mm]	95	95	110	110	130	130

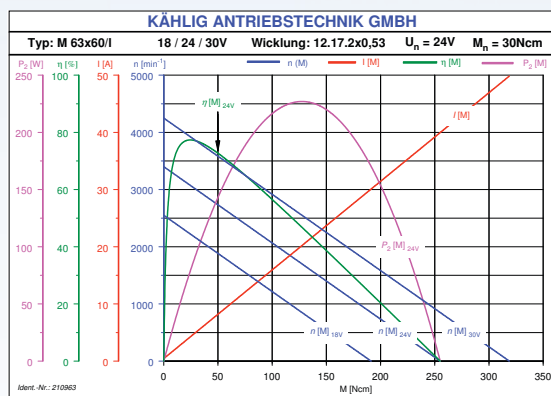
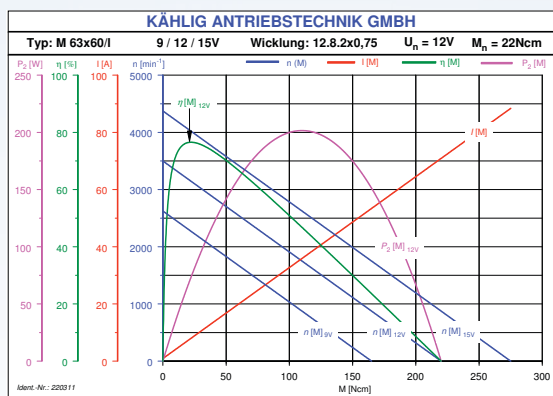
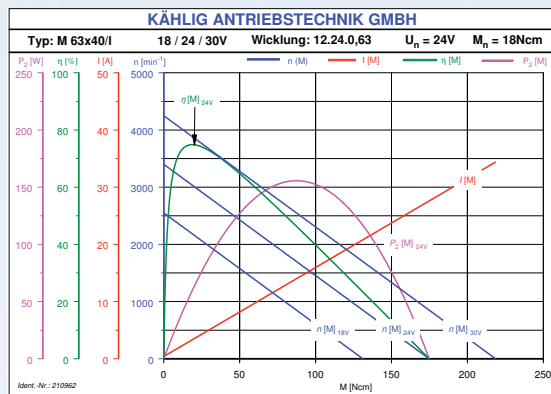
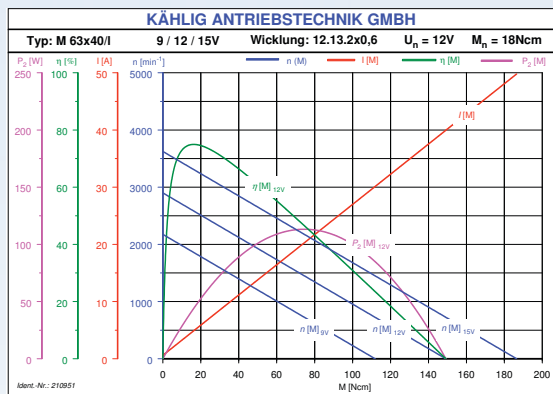
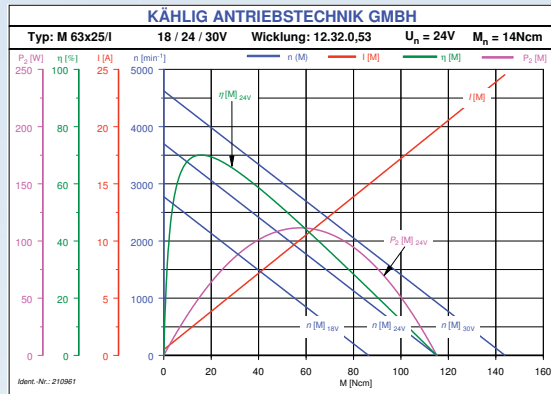
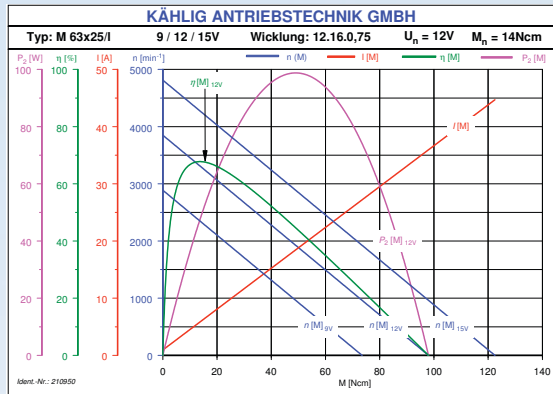
General data

Lifetime at rated torque ¹⁾	h	3000
Permissible axial shaft load ²⁾	N	110
Permissible radial shaft load ²⁾	N	300
Insulation class (DIN VDE 0530)		E
IP protection class (DIN VDE 0530)		IP40
RFI suppression		optional

¹⁾ Operation by nominal values: Date: 13.05.2008 Subject to change without notice
²⁾ At 3000 rpm and 3000 hrs nominal life, simultaneous axial and radial loads

Stand: 10. January 2014 – changes reserved

Performance characteristics

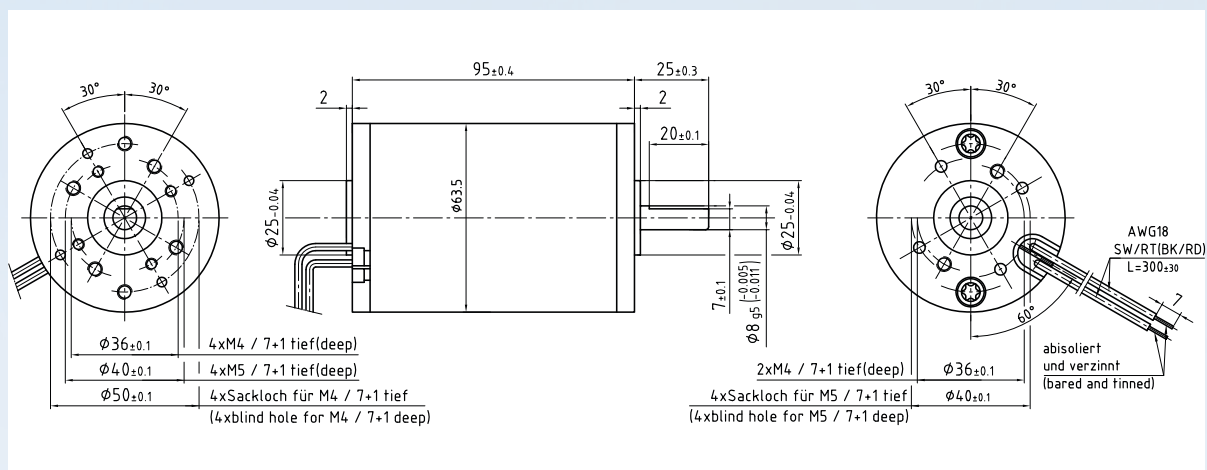


Stand: 10. January 2014 – changes reserved

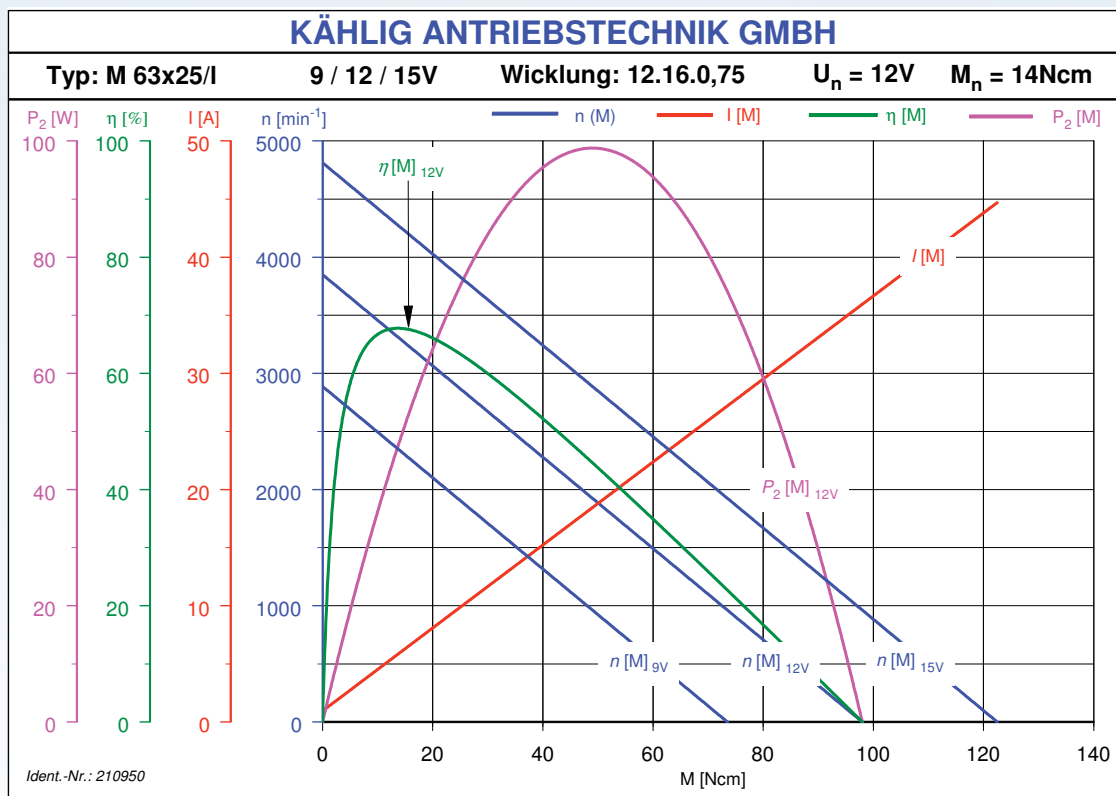
DC-Motor M63x25/I (12V)

Ident-Nr. 210950

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 48,4 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	14	
Rated speed ¹⁾	n_N	min ⁻¹	3300	±10%
Rated current ¹⁾	I_N	A	5,95	±20%
No load speed ¹⁾	n_0	min ⁻¹	3850	±15%
No load current ¹⁾	I_0	A	0,95	±50%
Rated power output ¹⁾	P_{2N}	W	48,4	
Rated power input ¹⁾	P_{1N}	W	71,4	
Rated efficiency ¹⁾	η_N	%	67,8	
Maximum power output ²⁾³⁾	P_{2max}	W	98,8	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	14	
Maximum Continuous current ²⁾³⁾	I_{max}	A	5,95	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	8000	
Stall torque ¹⁾	M_H	Ncm	98	
Stall current ¹⁾	I_H	A	36	
Demagnetization current	I_E	A	44,6	
Connecting resistance ¹⁾	R	Ω	0,33	
Armature resistance ¹⁾	R_A	Ω	0,25	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	0,47	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	39,3	
Torque constant ¹⁾	k_M	Ncm/A	2,8	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	3,1	
Friction torque ¹⁾	M_R	Ncm	-2,7	
Mechanical time constant ¹⁾	T_M	ms	18,6	
Electrical time constant ¹⁾	T_e	ms	1,4	
Rotor inertia	J_R	gcm ²	596	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	110	
Permissible radial shaft loads ³⁾	F_{radial}	N	300	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

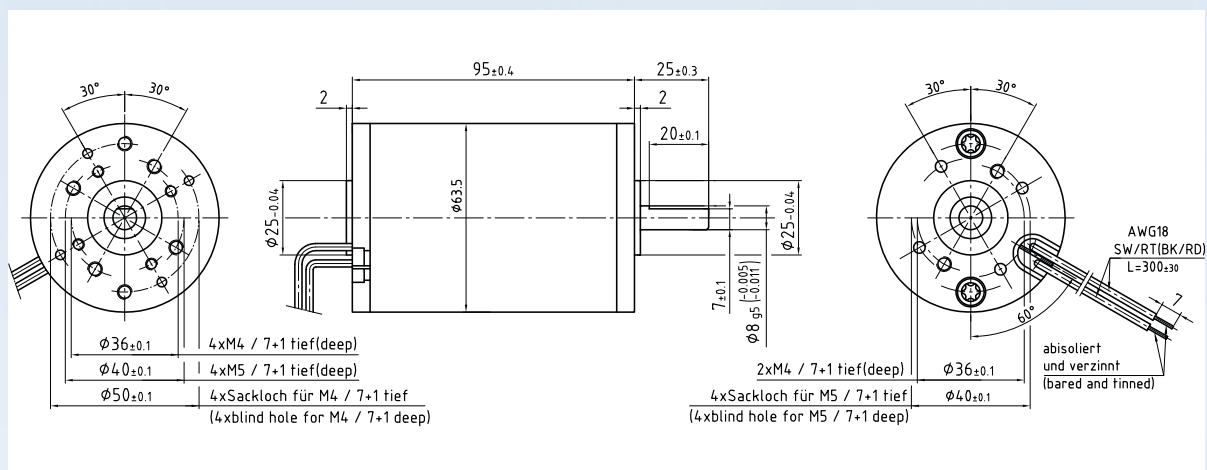
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

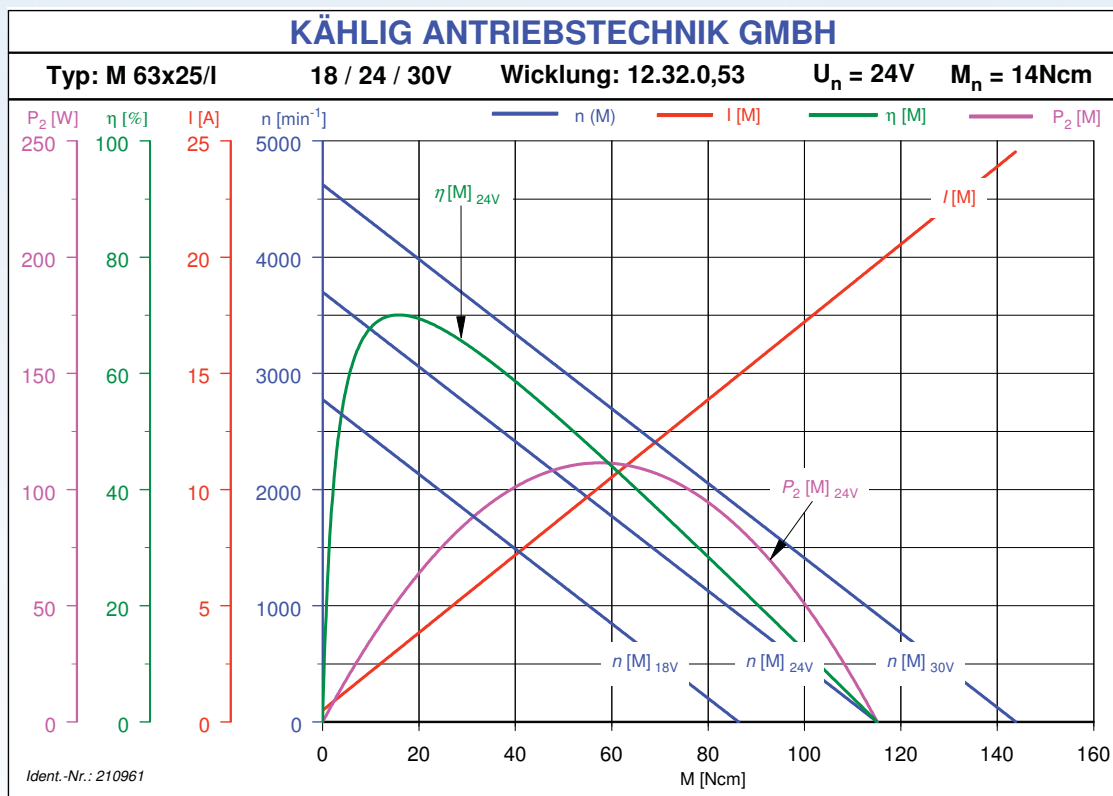
DC-Motor M63x25/I (24V)

Ident-Nr. 210961

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 48 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	14	
Rated speed ¹⁾	n_N	min ⁻¹	3250	±10%
Rated current ¹⁾	I_N	A	2,84	±20%
No load speed ¹⁾	n_0	min ⁻¹	3700	±15%
No load current ¹⁾	I_0	A	0,5	±50%
Rated power output ¹⁾	P_{2N}	W	48,0	
Rated power input ¹⁾	P_{1N}	W	68,1	
Rated efficiency ¹⁾	η_N	%	70,5	
Maximum power output ²⁾³⁾	P_{2max}	W	116,6	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	14	
Maximum Continuous current ²⁾³⁾	I_{max}	A	2,84	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	8000	
Stall torque ¹⁾	M_H	Ncm	120	
Stall current ¹⁾	I_H	A	20,5	
Demagnetization current	I_E	A	22,3	
Connecting resistance ¹⁾	R	Ω	1,17	
Armature resistance ¹⁾	R_A	Ω	1,03	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	1,97	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	30,9	
Torque constant ¹⁾	k_M	Ncm/A	6,0	
Voltage constant ¹⁾	k_E	V/10³min ⁻¹	6,5	
Friction torque ¹⁾	M_R	Ncm	-3,0	
Mechanical time constant ¹⁾	T_M	ms	17,1	
Electrical time constant ¹⁾	T_e	ms	1,7	
Rotor inertia	J_R	gcm²	596	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	110	
Permissible radial shaft loads ³⁾	F_{radial}	N	300	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

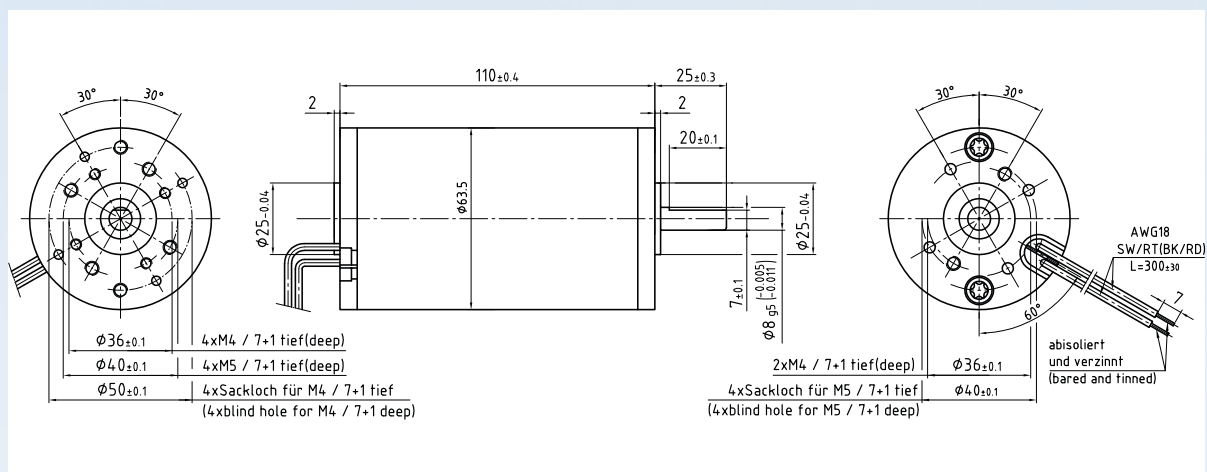
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

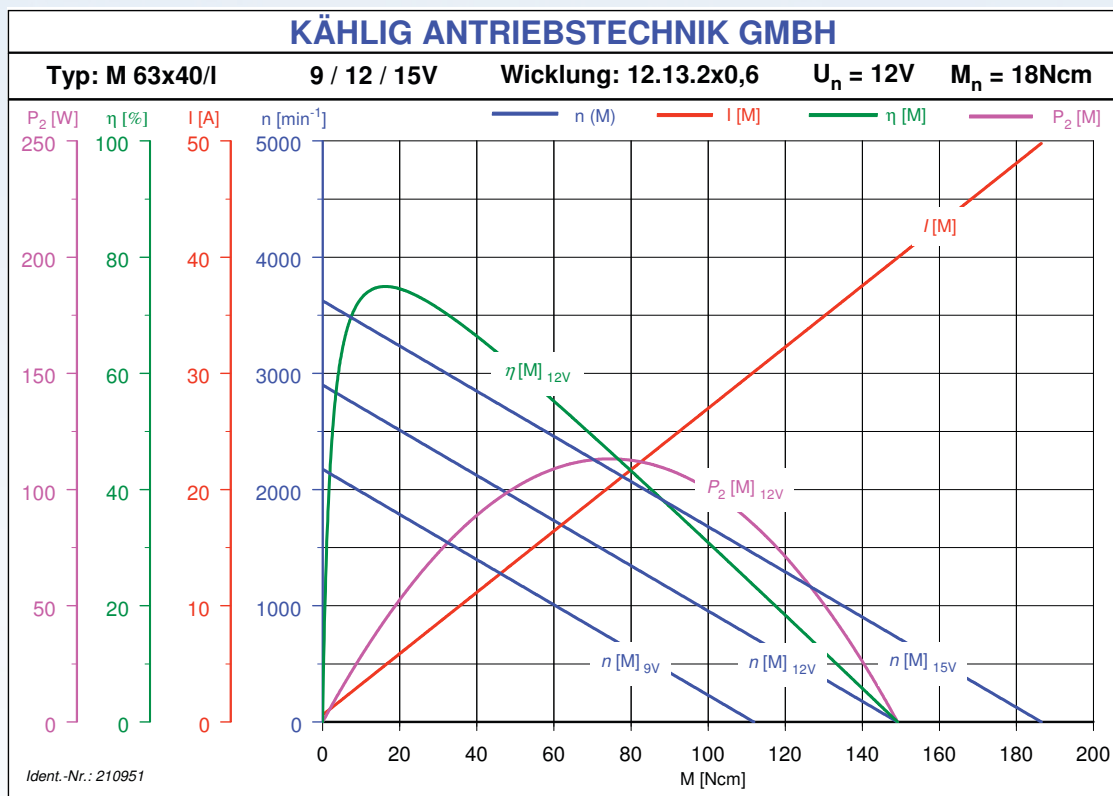
DC-Motor M63x40/I (12V)

Ident-Nr. 210951

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 48,1 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	18	
Rated speed ¹⁾	n_N	min ⁻¹	2550	±10%
Rated current ¹⁾	I_N	A	5,35	±20%
No load speed ¹⁾	n_0	min ⁻¹	2900	±15%
No load current ¹⁾	I_0	A	0,6	±50%
Rated power output ¹⁾	P_{2N}	W	48,1	
Rated power input ¹⁾	P_{1N}	W	64,2	
Rated efficiency ¹⁾	η_N	%	74,9	
Maximum power output ²⁾³⁾	P_{2max}	W	113,2	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	18	
Maximum Continuous current ²⁾³⁾	I_{max}	A	5,35	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	8000	
Stall torque ¹⁾	M_H	Ncm	149	
Stall current ¹⁾	I_H	A	40	
Demagnetization current	I_E	A	71,3	
Connecting resistance ¹⁾	R	Ω	0,3	
Armature resistance ¹⁾	R_A	Ω	0,2	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	0,41	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	19,4	
Torque constant ¹⁾	k_M	Ncm/A	3,8	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	4,1	
Friction torque ¹⁾	M_R	Ncm	-2,3	
Mechanical time constant ¹⁾	T_M	ms	11,0	
Electrical time constant ¹⁾	T_e	ms	1,4	
Rotor inertia	J_R	gcm ²	792	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	110	
Permissible radial shaft loads ³⁾	F_{radial}	N	300	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature $\approx 20^\circ\text{C}$ 2) $\Delta\vartheta_w$ allowable = 100K

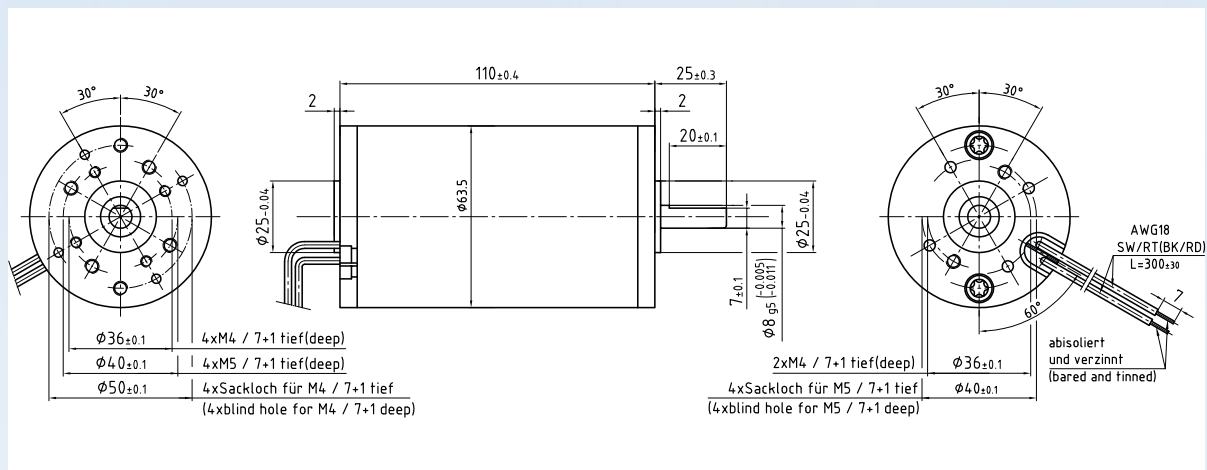
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

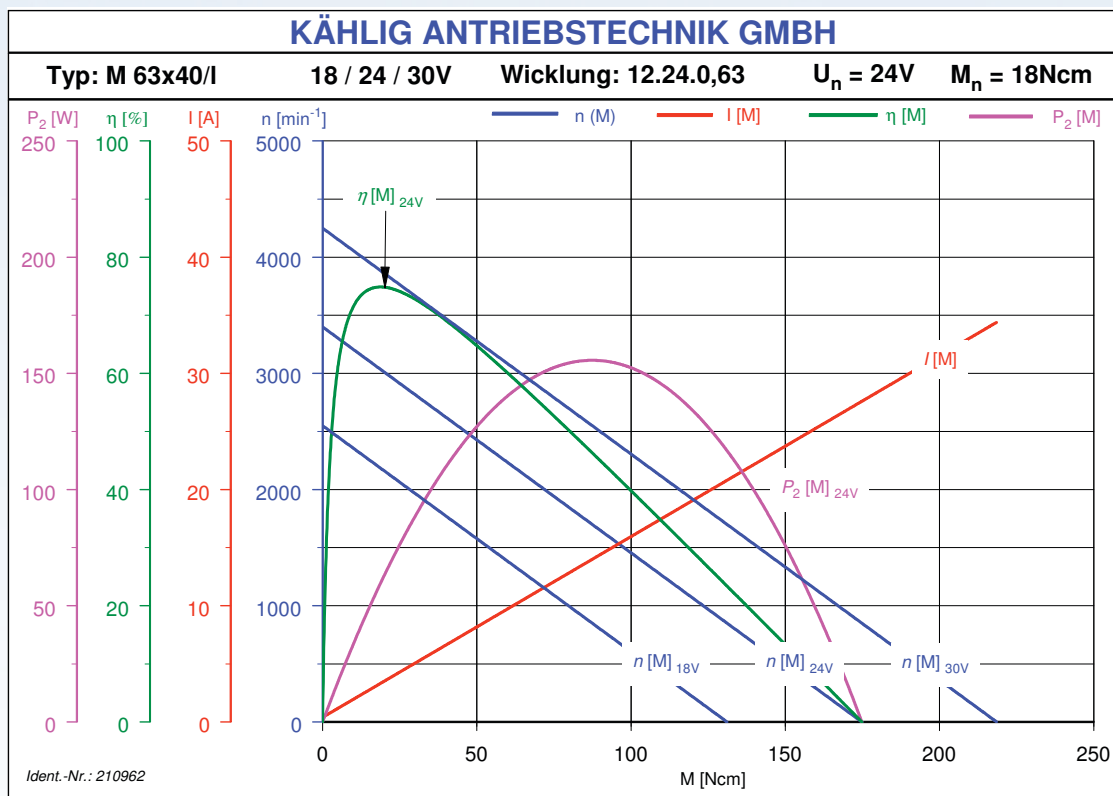
DC-Motor M63x40/I (24V)

Ident-Nr. 210962

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 56,5 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	18	
Rated speed ¹⁾	n_N	min ⁻¹	3050	±10%
Rated current ¹⁾	I_N	A	3,2	±20%
No load speed ¹⁾	n_0	min ⁻¹	3400	±15%
No load current ¹⁾	I_0	A	0,4	±50%
Rated power output ¹⁾	P_{2N}	W	56,5	
Rated power input ¹⁾	P_{1N}	W	82,8	
Rated efficiency ¹⁾	η_N	%	68,3	
Maximum power output ²⁾³⁾	P_{2max}	W	171,1	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	18	
Maximum Continuous current ²⁾³⁾	I_{max}	A	3,45	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	8000	
Stall torque ¹⁾	M_H	Ncm	198	
Stall current ¹⁾	I_H	A	31	
Demagnetization current	I_E	A	38,6	
Connecting resistance ¹⁾	R	Ω	0,78	
Armature resistance ¹⁾	R_A	Ω	0,67	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	1,0	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	16,7	
Torque constant ¹⁾	k_M	Ncm/A	6,5	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	7,3	
Friction torque ¹⁾	M_R	Ncm	-4,6	
Mechanical time constant ¹⁾	T_M	ms	12,4	
Electrical time constant ¹⁾	T_e	ms	1,3	
Rotor inertia	J_R	gcm ²	792	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	110	
Permissible radial shaft loads ³⁾	F_{radial}	N	300	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

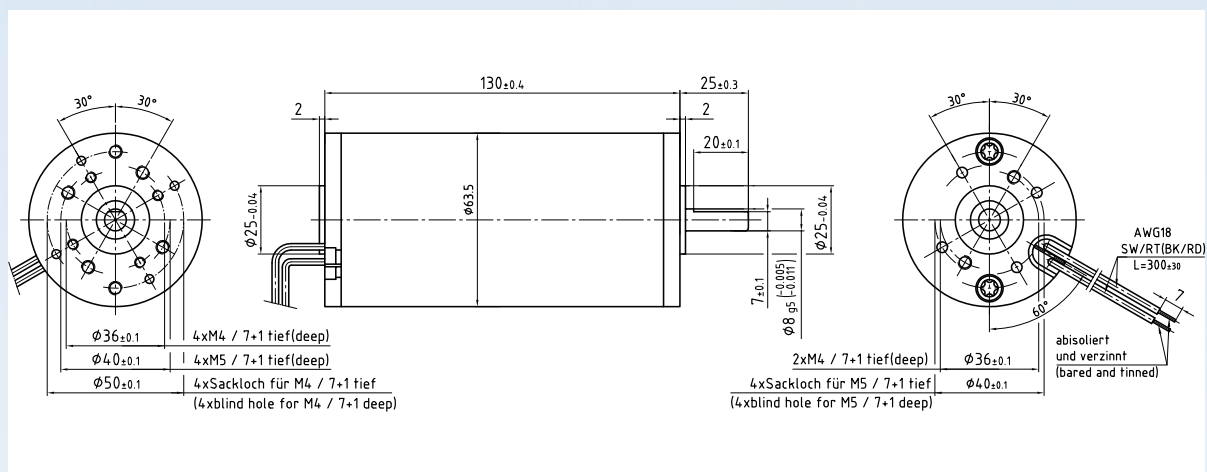
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

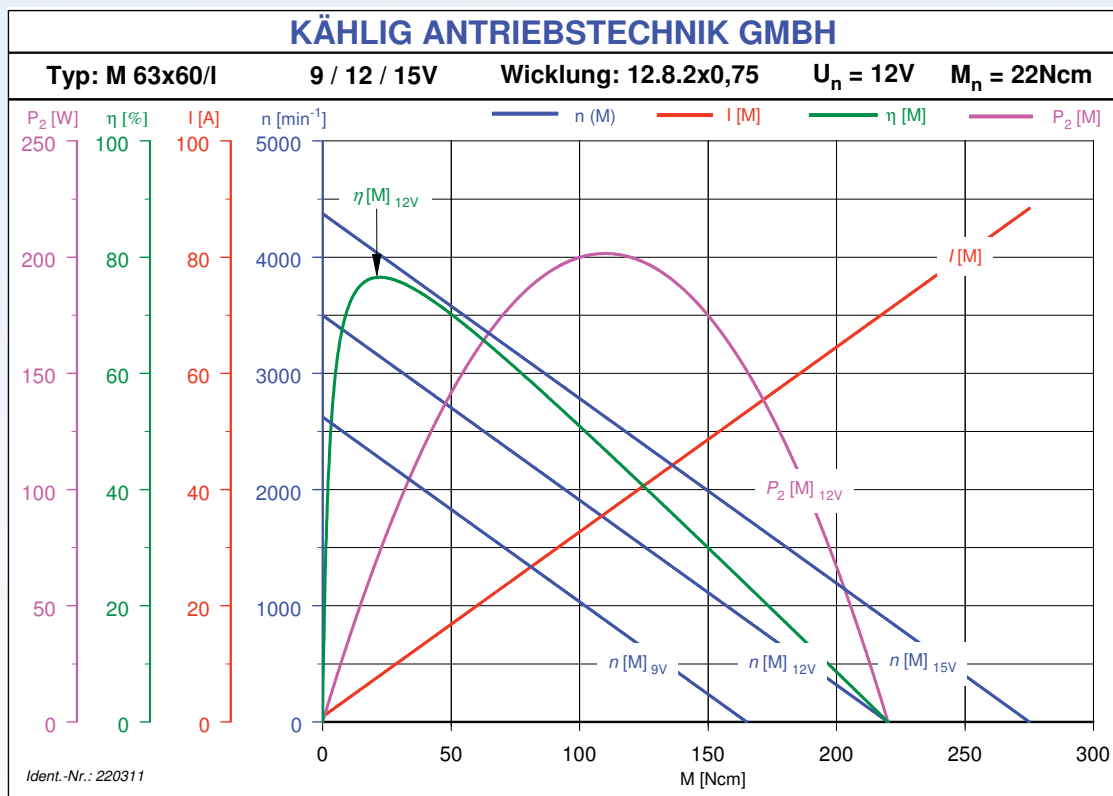
DC-Motor M63x60/I (12V)

Ident-Nr. 220311

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 72,6 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	22	
Rated speed ¹⁾	n_N	min ⁻¹	3150	±10%
Rated current ¹⁾	I_N	A	7,9	±20%
No load speed ¹⁾	n_0	min ⁻¹	3500	±15%
No load current ¹⁾	I_0	A	0,9	±50%
Rated power output ¹⁾	P_{2N}	W	72,6	
Rated power input ¹⁾	P_{1N}	W	95,0	
Rated efficiency ¹⁾	η_N	%	76,4	
Maximum power output ²⁾³⁾	P_{2max}	W	201,6	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	22	
Maximum Continuous current ²⁾³⁾	I_{max}	A	7,9	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	8000	
Stall torque ¹⁾	M_H	Ncm	220	
Stall current ¹⁾	I_H	A	71,5	
Demagnetization current	I_E	A	89,1	
Connecting resistance ¹⁾	R	Ω	0,17	
Armature resistance ¹⁾	R_A	Ω	0,10	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	0,20	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	15,9	
Torque constant ¹⁾	k_M	Ncm/A	3,1	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	3,4	
Friction torque ¹⁾	M_R	Ncm	-2,7	
Mechanical time constant ¹⁾	T_M	ms	12,1	
Electrical time constant ¹⁾	T_e	ms	1,2	
Rotor inertia	J_R	gcm ²	1209	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	110	
Permissible radial shaft loads ³⁾	F_{radial}	N	300	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

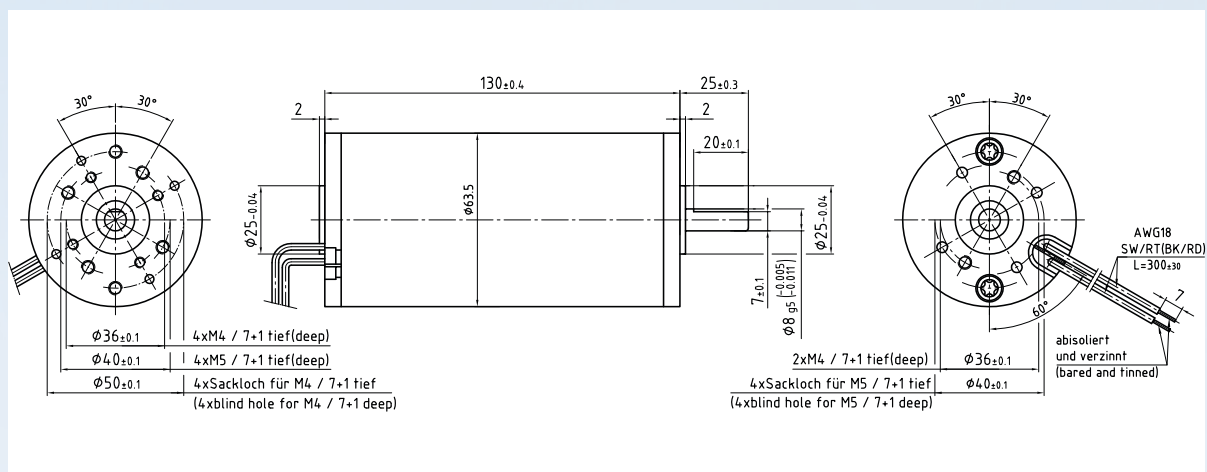
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

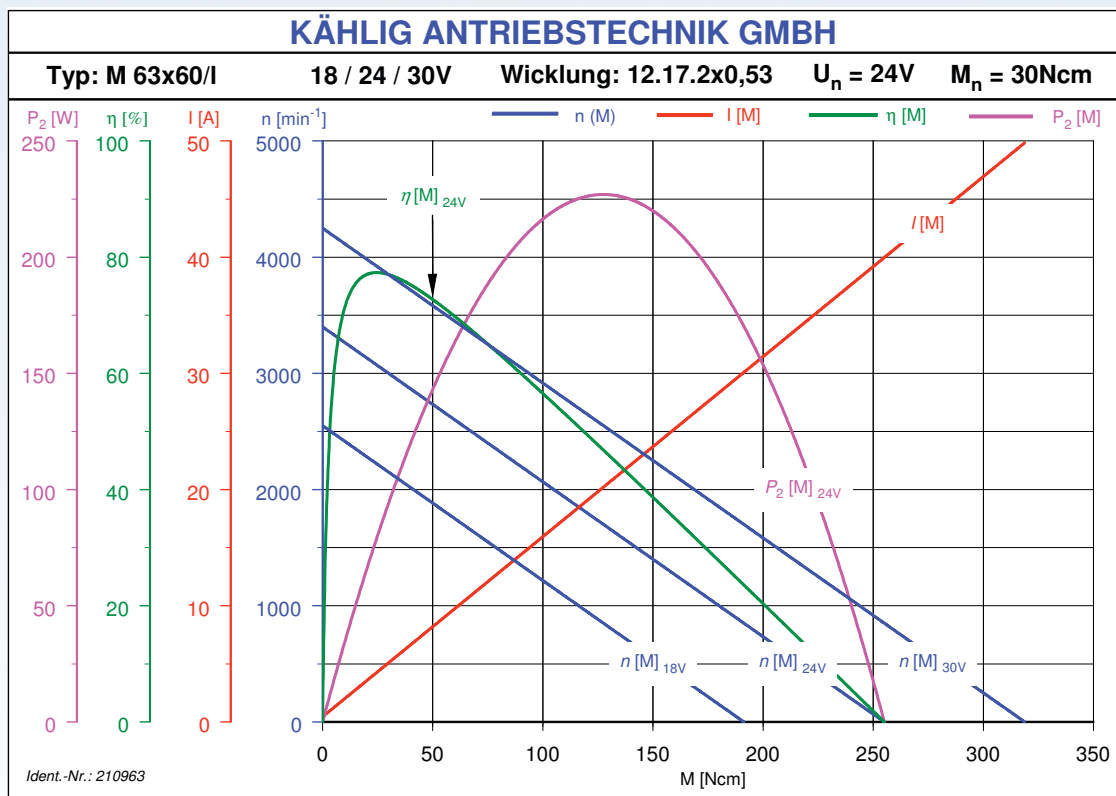
DC-Motor M63x60/I (24V)

Ident-Nr. 210963

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 94,2 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	30	
Rated speed ¹⁾	n_N	min ⁻¹	3000	±10%
Rated current ¹⁾	I_N	A	5,1	±20%
No load speed ¹⁾	n_0	min ⁻¹	3400	±15%
No load current ¹⁾	I_0	A	0,45	±50%
Rated power output ¹⁾	P_{2N}	W	94,2	
Rated power input ¹⁾	P_{1N}	W	122,4	
Rated efficiency ¹⁾	η_N	%	77,0	
Maximum power output ²⁾³⁾	P_{2max}	W	227	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	30	
Maximum Continuous current ²⁾³⁾	I_{max}	A	5,1	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	8000	
Stall torque ¹⁾	M_H	Ncm	255	
Stall current ¹⁾	I_H	A	40	
Demagnetization current	I_E	A	47,4	
Connecting resistance ¹⁾	R	Ω	0,6	
Armature resistance ¹⁾	R_A	Ω	0,42	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	0,96	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	13,3	
Torque constant ¹⁾	k_M	Ncm/A	6,5	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	7,1	
Friction torque ¹⁾	M_R	Ncm	-2,9	
Mechanical time constant ¹⁾	T_M	ms	12,3	
Electrical time constant ¹⁾	T_e	ms	1,6	
Rotor inertia	J_R	gcm ²	1209	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	110	
Permissible radial shaft loads ³⁾	F_{radial}	N	300	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	optional			

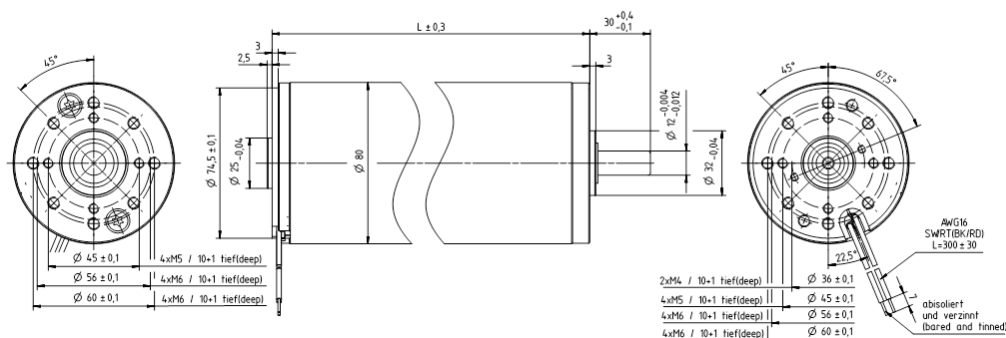
1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

DC-Motors Type M80

- Permanent magnet DC-motor
- Ball bearings
- Lead wires
- Power range in continuous operation approx. 110 to 240 watt
- Voltages 12 and 24 volts
- Multiple combination possibilities with gears, encoders and brakes



Application on request

Versions	Unit	M80x40/I	M80x40/I	M80x80/I	M80x80/I
Part number	[ID]	222784a	222334b	222779a	222335b
Nominal voltage	[V]	12	24	12	24
Nominal torque	[Ncm]	38	38	70	70
Nominal speed	[1/min]	2850	2900	1500	3200
Nominal current	[A]	12,5	6,2	11,3	11,4
Output power ¹⁾	[W]	113,4	115,4	110	233,1
Rise of M-n-characteristic	[1/min / Ncm]	10,5	-9,21	2,9	4,1
Torque constant	[Ncm / A]	3,3	6,97	6,6	6,5
Rotor moment of inertia	[gcm ²]	1900	1900	3300	3300
Weight	[kg]	2,6	2,6	3,7	3,7
Length	[mm]	132	132	172	172

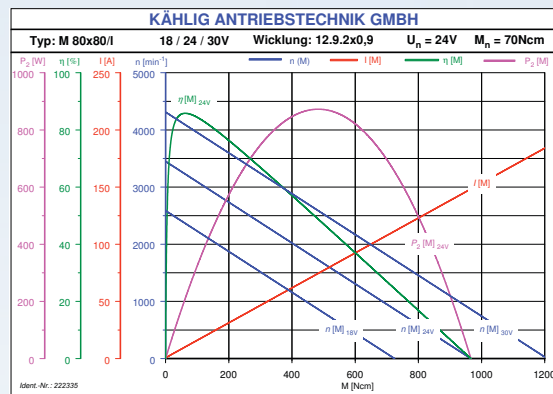
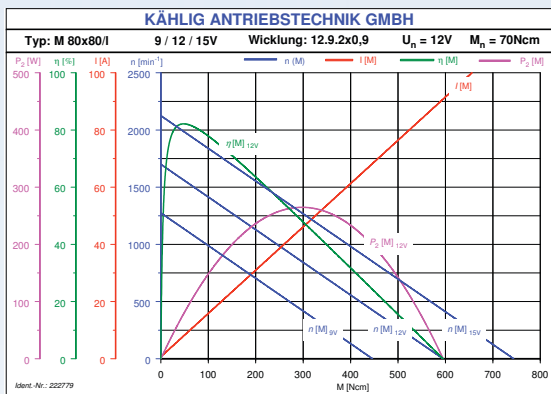
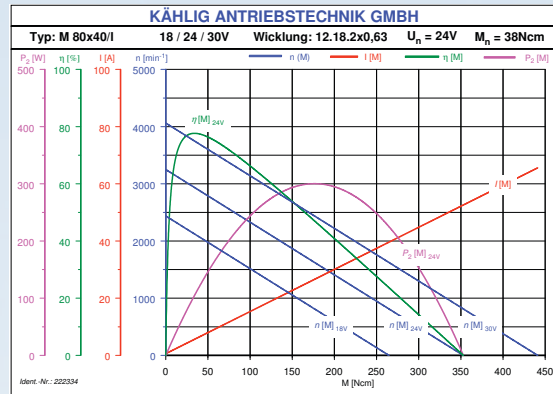
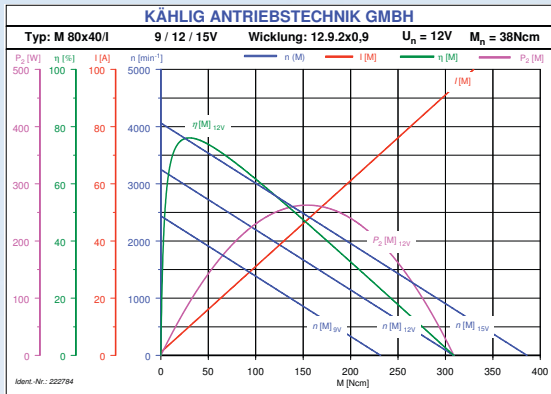
General data

Lifetime at rated torque ¹⁾	h	3000
Permissible axial shaft load ²⁾	N	180
Permissible radial shaft load ²⁾	N	350
Insulation class (DIN VDE 0530)		E
IP protection class (DIN VDE 0530)		IP 40
RFI suppression		optional

¹⁾ Operation by nominal values; Date: 13.05.2008 Subject to change without notice
²⁾ At 3000 rpm and 3000 hrs nominal life, simultaneous axial and radial loads

Stand: 10. January 2014 – changes reserved

Performance characteristics

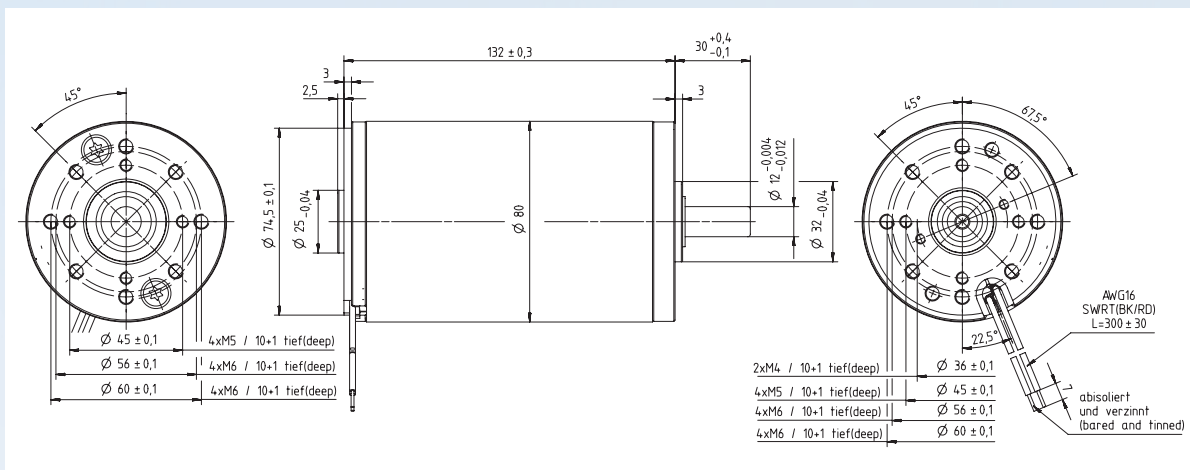


Stand: 10. January 2014 – changes reserved

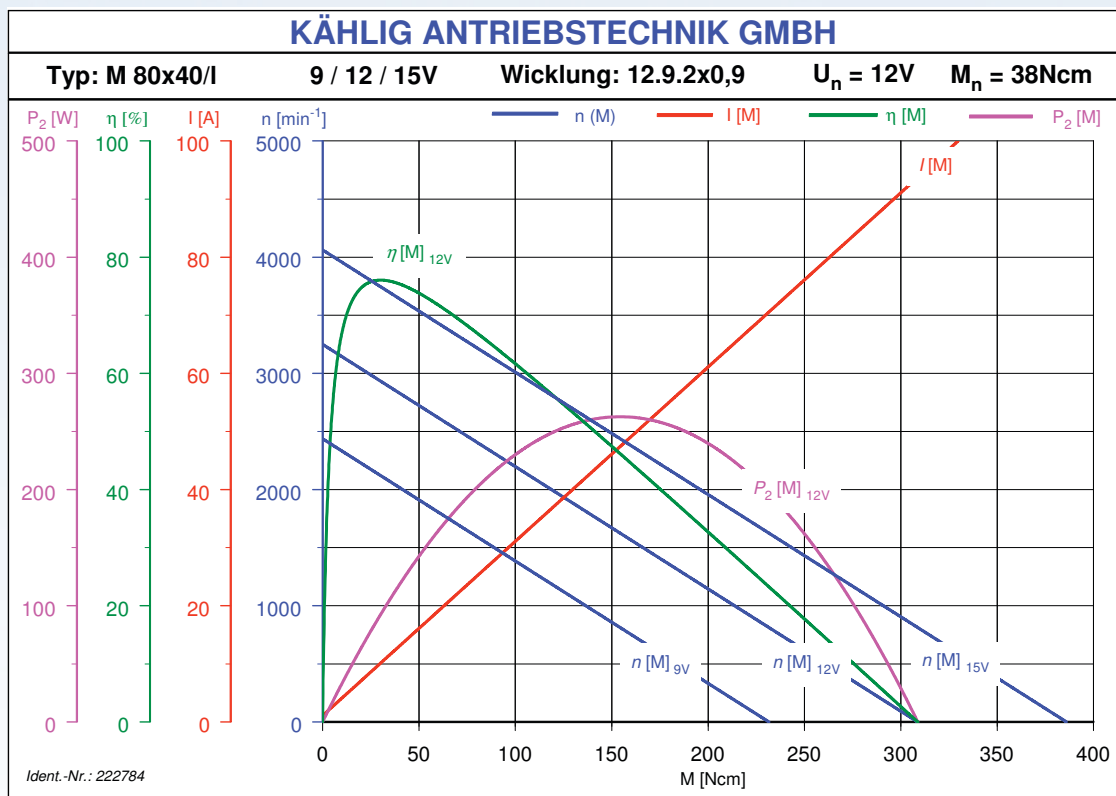
DC-Motor M80x40/I (12V)

Ident-Nr. 222784

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 113.4 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	38	
Rated speed ¹⁾	n_N	min ⁻¹	2850	±10%
Rated current ¹⁾	I_N	A	12,5	±20%
No load speed ¹⁾	n_0	min ⁻¹	3250	±15%
No load current ¹⁾	I_0	A	1,1	±50%
Rated power output ¹⁾	P_{2N}	W	113,4	
Rated power input ¹⁾	P_{1N}	W	150	
Rated efficiency ¹⁾	η_N	%	75,6	
Maximum power output ²⁾³⁾	P_{2max}	W	262,7	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	38	
Maximum Continuous current ²⁾³⁾	I_{max}	A	12,5	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	6000	
Stall torque ¹⁾	M_H	Ncm	309	
Stall current ¹⁾	I_H	A	93,7	
Demagnetization current	I_E	A	95	
Connecting resistance ¹⁾	R	Ω	0,13	
Armature resistance ¹⁾	R_A	Ω	0,07	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	0,21	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	10,5	
Torque constant ¹⁾	k_M	Ncm/A	3,3	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	3,7	
Friction torque ¹⁾	M_R	Ncm	-3,7	
Mechanical time constant ¹⁾	T_M	ms	12,0	
Electrical time constant ¹⁾	T_e	ms	1,6	
Rotor inertia	J_R	gcm ²	1900	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	180	
Permissible radial shaft loads ³⁾	F_{radial}	N	350	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	2xL (3μH)			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

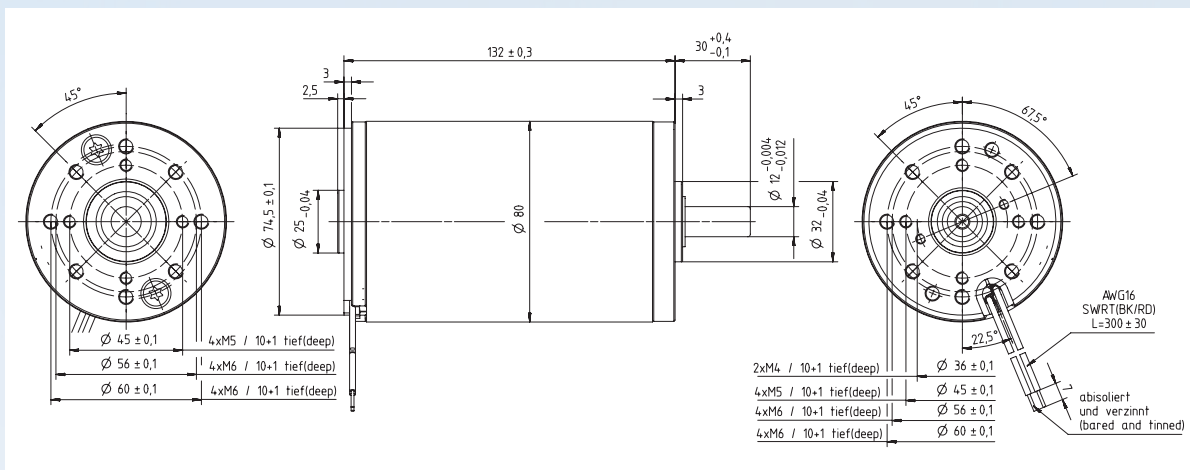
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

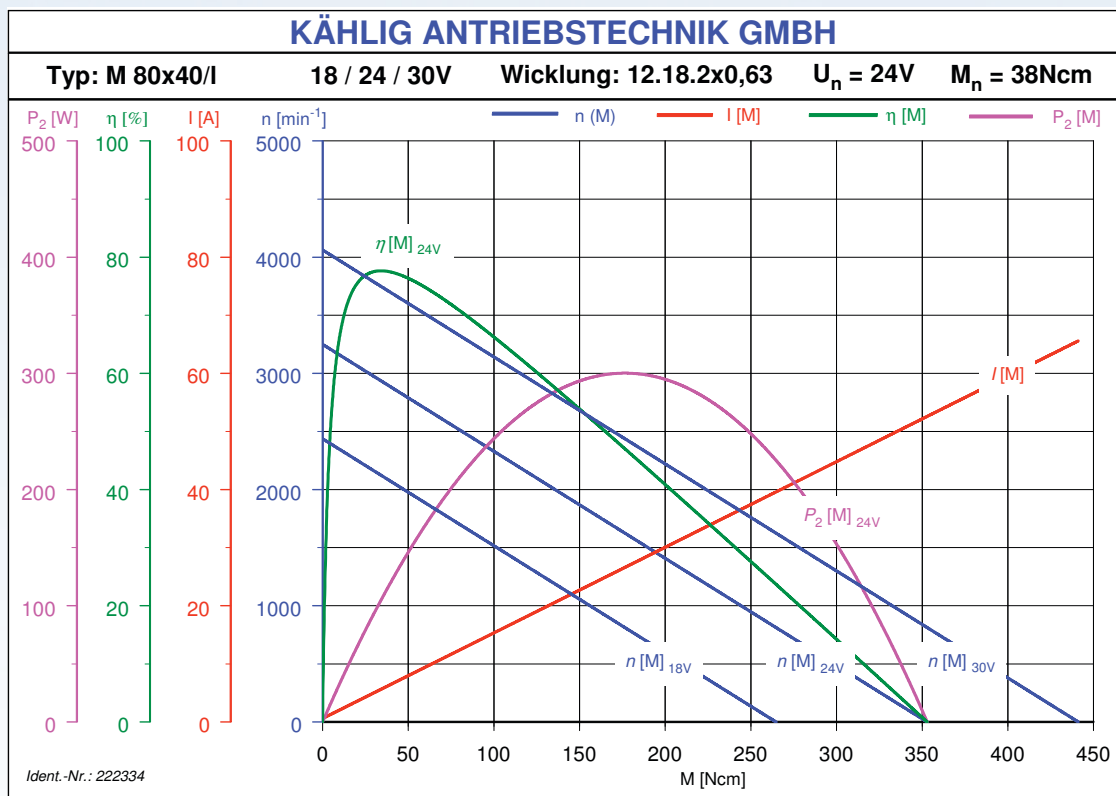
DC-Motor M80x40/I (24V)

Ident-Nr. 222334

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 115.4 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	38	
Rated speed ¹⁾	n_N	min ⁻¹	2900	±10%
Rated current ¹⁾	I_N	A	6,2	±20%
No load speed ¹⁾	n_0	min ⁻¹	3250	±15%
No load current ¹⁾	I_0	A	0,6	±50%
Rated power output ¹⁾	P_{2N}	W	115,4	
Rated power input ¹⁾	P_{1N}	W	148,8	
Rated efficiency ¹⁾	η_N	%	77,6	
Maximum power output ²⁾³⁾	P_{2max}	W	300	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	38	
Maximum Continuous current ²⁾³⁾	I_{max}	A	6,2	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	6000	
Stall torque ¹⁾	M_H	Ncm	353	
Stall current ¹⁾	I_H	A	52,5	
Demagnetization current	I_E	A	47,5	
Connecting resistance ¹⁾	R	Ω	0,456	
Armature resistance ¹⁾	R_A	Ω	0,268	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	0,9	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	-9,21	
Torque constant ¹⁾	k_M	Ncm/A	6,8	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	7,38	
Friction torque ¹⁾	M_R	Ncm	-4,07	
Mechanical time constant ¹⁾	T_M	ms	10,2	
Electrical time constant ¹⁾	T_e	ms	1,97	
Rotor inertia	J_R	gcm ²	1900	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	180	
Permissible radial shaft loads ³⁾	F_{radial}	N	350	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	2xL (3μH)			

1) ϑ_w Winding temperature $\approx 20^\circ\text{C}$ 2) $\Delta\vartheta_w$ allowable = 100K

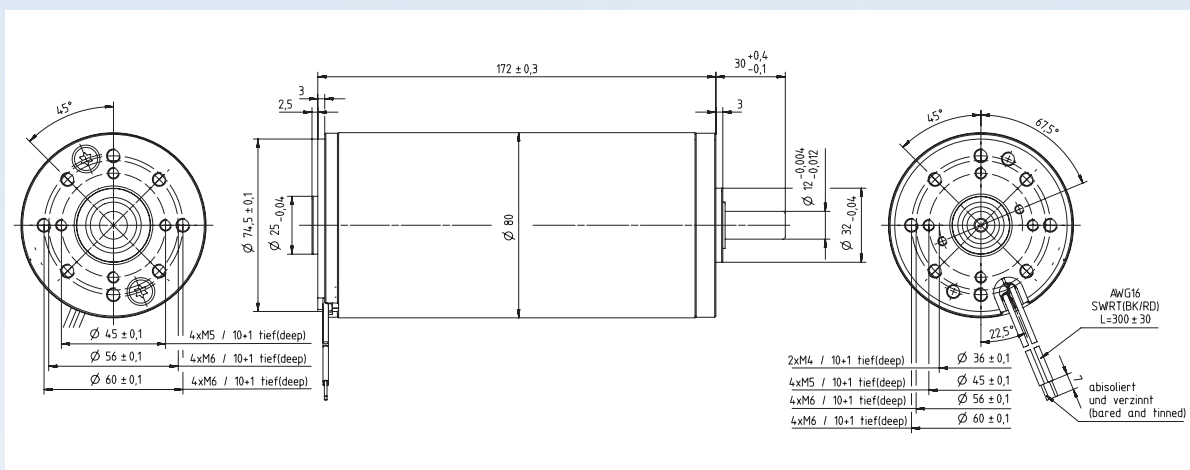
3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved

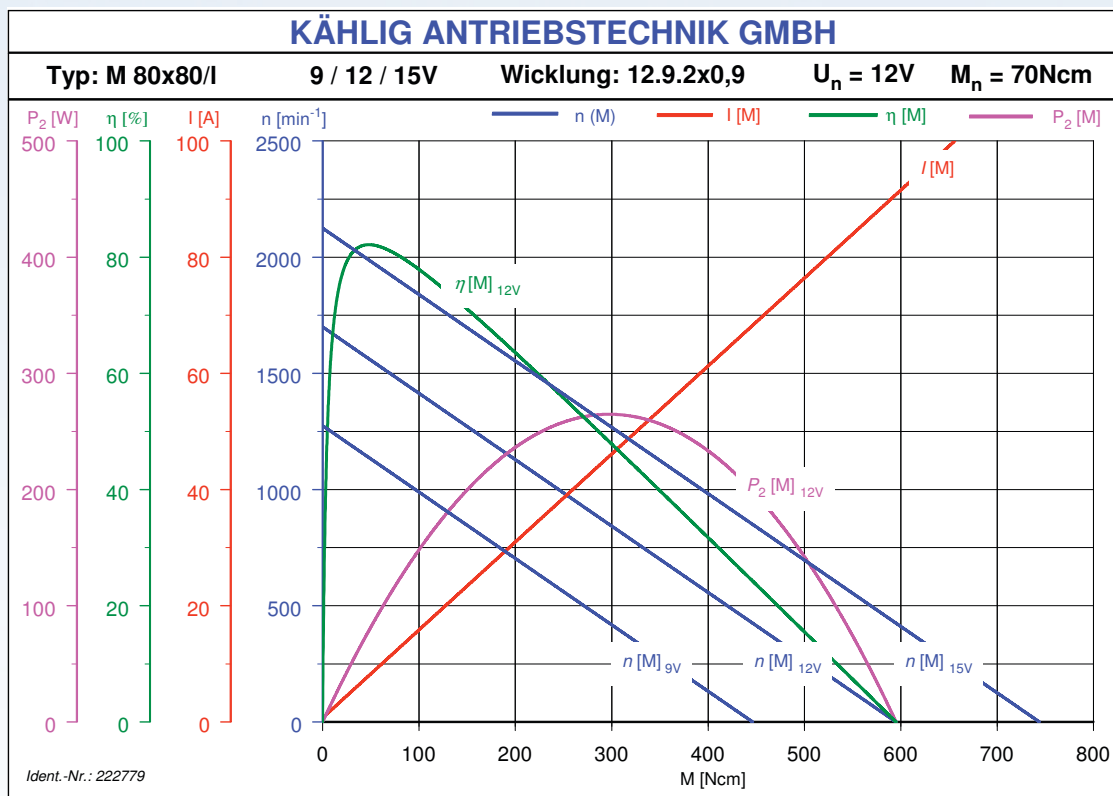
DC-Motor M80x80/I (12V)

Ident-Nr. 222779

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 110 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	12	
Rated torque ¹⁾	M_N	Ncm	70	
Rated speed ¹⁾	n_N	min ⁻¹	1500	±10%
Rated current ¹⁾	I_N	A	11.3	±20%
No load speed ¹⁾	n_0	min ⁻¹	1700	±15%
No load current ¹⁾	I_0	A	0.7	±50%
Rated power output ¹⁾	P_{2N}	W	110	
Rated power input ¹⁾	P_{1N}	W	135.6	
Rated efficiency ¹⁾	η_N	%	81.1	
Maximum power output ²⁾³⁾	P_{2max}	W	264.8	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	70	
Maximum Continuous current ²⁾³⁾	I_{max}	A	11.3	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	6000	
Stall torque ¹⁾	M_H	Ncm	595	
Stall current ¹⁾	I_H	A	90.8	
Demagnetization current	I_E	A	95	
Connecting resistance ¹⁾	R	Ω	0.13	
Armature resistance ¹⁾	R_A	Ω	0.1	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	0.33	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	2.9	
Torque constant ¹⁾	k_M	Ncm/A	6.6	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	7.1	
Friction torque ¹⁾	M_R	Ncm	-4.6	
Mechanical time constant ¹⁾	T_M	ms	7.6	
Electrical time constant ¹⁾	T_e	ms	2.5	
Rotor inertia	J_R	gcm ²	3300	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	180	
Permissible radial shaft loads ³⁾	F_{radial}	N	350	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	2xL (3μH)			

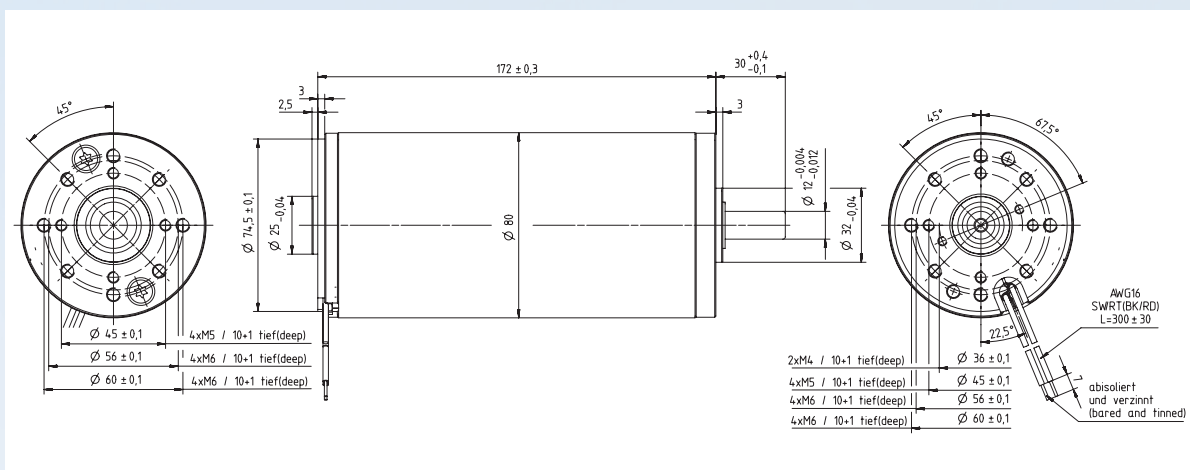
1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

3) The operating at maximum levels reduces the lifespan

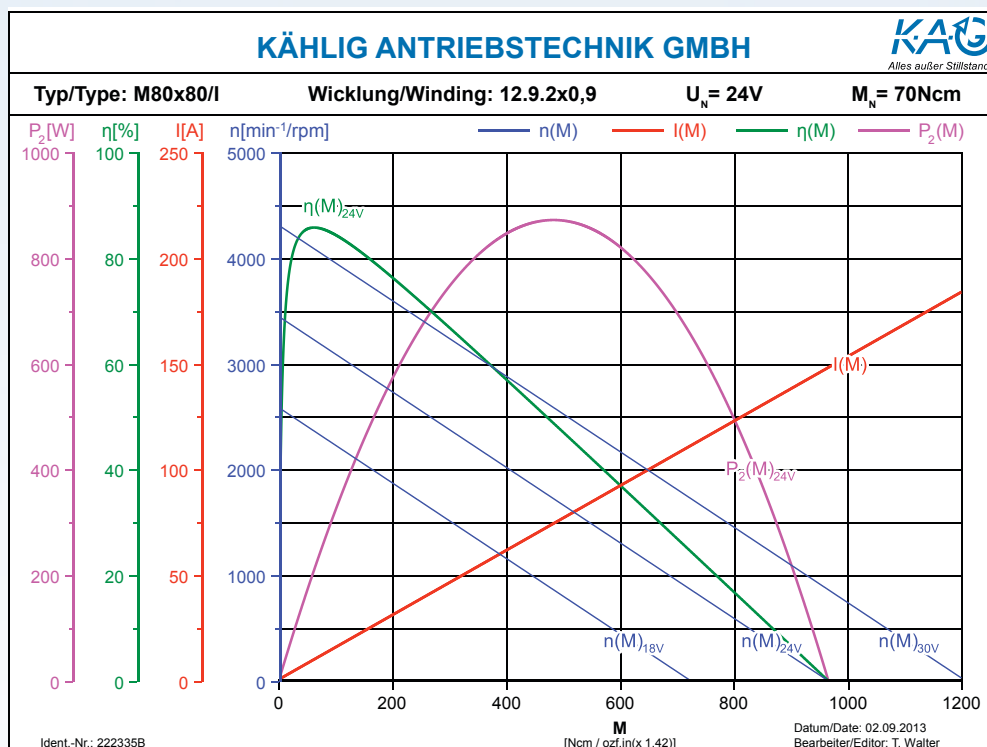
Stand: 22. Januar 2015 – changes reserved

DC-Motor M80x80/I (24V)
Ident-Nr. 222335

- Brushed DC motor with permanent magnet
- Ball bearings
- Lead wires
- Closed zinc-plated housing with zinc-die-cast bearing flanges
- Direction of rotation CW / CCW
- Power output in rated operation: 233,1 Watt
- Multiple combination possibilities with gears, encoders and brakes



Application on request



Stand: 22. Januar 2015 – changes reserved

Performance

	Sign	Unit	Value	Tolerances
Rated voltage	U_N	V	24	
Rated torque ¹⁾	M_N	Ncm	70	
Rated speed ¹⁾	n_N	min ⁻¹	3200	±10%
Rated current ¹⁾	I_N	A	11,4	±20%
No load speed ¹⁾	n_0	min ⁻¹	3450	±15%
No load current ¹⁾	I_0	A	0,7	±50%
Rated power output ¹⁾	P_{2N}	W	234,6	
Rated power input ¹⁾	P_{1N}	W	273,6	
Rated efficiency ¹⁾	η_N	%	85,7	
Maximum power output ²⁾³⁾	P_{2max}	W	872,5	
Maximum Continuous torque ²⁾³⁾	M_{max}	Ncm	70	
Maximum Continuous current ²⁾³⁾	I_{max}	A	11,4	
Maximum speed ¹⁾³⁾	n_{max}	min ⁻¹	6000	
Stall torque ¹⁾	M_H	Ncm	966	
Stall current ¹⁾	I_H	A	148,4	
Demagnetization current	I_E	A	95	
Connecting resistance ¹⁾	R	Ω	0,16	
Armature resistance ¹⁾	R_A	Ω	0,1	±5%
Armature inductance [1 kHz] ¹⁾	L_A	mH	0,33	
Rise of speed-characteristic ¹⁾	k_D	min ⁻¹ /Ncm	3,6	
Torque constant ¹⁾	k_M	Ncm/A	6,5	
Voltage constant ¹⁾	k_E	V/10 ³ min ⁻¹	7	
Friction torque ¹⁾	M_R	Ncm	-4,6	
Mechanical time constant ¹⁾	T_M	ms	7,5	
Electrical time constant ¹⁾	T_e	ms	2	
Rotor inertia	J_R	gcm ²	3300	
Maximum case temperature ²⁾	ϑ_G	°C	80	
Starting voltage ¹⁾	U_A	V	2	
Permissible axial shaft loads ³⁾	F_{axial}	N	180	
Permissible radial shaft loads ³⁾	F_{radial}	N	350	
Protection class DIN VDE 0530	IP 40			
Duty cycle DIN VDE 0530	S1			
Insulation class DIN VDE 0530	E			
Lifetime at rated torque [h] ¹⁾	3000			
Ambient temperature	-30°C to +40°C			
Bearing	2 ball bearings			
Interference suppression	2xL (3μH)			

1) ϑ_w Winding temperature ≈ 20°C 2) $\Delta\vartheta_w$ allowable = 100K

3) The operating at maximum levels reduces the lifespan

Stand: 22. Januar 2015 – changes reserved