

DC Servo Motors ServoDisc™

U ... Series



- Compact axial lengths, flat shape
- High torque / weight ratio
- Low inertia for fast acceleration
- Mechanical time constant of 10 ... 20 ms
- Wide speed range, zero cogging
- Flat, iron less disc armature, no inductance
- No commutation limit, constant torque from 0 to full speed
- Very long brushes life time

Characteristics

U ... Series

Specifications			U9M4	U9M4T	U12M4	U12M4T	U16M4	U16M4T
1. Rated Values (1)								
1.1	Nominal torque	M_N Ncm	33	30	82	75	207	198
1.2	Nominal speed (2)	n_N min ⁻¹	3000	3000	3000	3000	3000	3000
1.3	Power output (2)	P_N W	104	93	258	235	645	620
1.4	Terminal voltage	U_N V	24	24	44	44	82	82
1.5	Nominal current	I_N A	8,0	8,0	8,0	8,0	9,8	9,8
2. Motor Performance								
2.1	Peak torque (3)	M_{max} Ncm	310	287	870	790	2100	1940
2.2	Max. peak current (3)	I_{max} A	67	67	79	79	95	95
2.3	Acceleration at peak torque	a_{max} 10 ³ rad/s ²	78	49	65	46	35	25
2.4	Stall torque (4)	M_G Ncm	27	24	80	73	195	180
2.5	Current at stall torque (4)	I_G A	6,0	5,6	7,3	7,9	8,7	9,0
2.6	Max. load speed	n_{max} min ⁻¹	4000	4000	4000	4000	4000	4000
2.7	Max. no load speed	n_0 min ⁻¹	6000	6000	6000	6000	6000	6000
3. Intrinsic Motor Constants								
3.1	Torque constant	k_T Ncm/A	4,63	4,30	11,0	10,1	22,3	20,5
3.2	Back E.M.F. constant	k_E V/10 ³ min ⁻¹	4,85	4,50	11,6	10,6	23,3	21,5
3.3	Viscous damping constant	k_D Ncm/10 ³ min ⁻¹	0,54	0,59	1,28	1,4	4,3	4,6
3.4	Speed regulation at const. voltage	k_n min ⁻¹ /Ncm	28,9	33,9	4,76	5,64	0,71	0,82
3.5	Average friction torque	M_F Ncm	2,8	3,2	3,9	4,3	7,9	8,1
3.6	Terminal resistance (25° C)	R_A Ohm	0,85	0,85	0,75	0,75	0,88	0,88
3.7	Armature (Cu) resistance (25° C)	R_{Cu} Ohm	0,66	0,66	0,61	0,61	0,74	0,74
3.8	Armature inductance	L_A mH	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1	< 0,1
3.9	Mechanical time constant	T_{m1} ms	12,0	20,5	6,7	10,84	8,81	13,77
3.10	Electrical time constant	T_e ms	0,15	0,15	0,16	0,16	0,14	0,16
3.11	Rotor inertia	J kg cm ²	0,39	0,58	1,34	1,84	5,9	7,9
4. Thermal Characteristics								
4.1	Time const. armature-housing	T_{th1} min	0,5	0,5	0,8	0,8	1,4	1,4
4.2	Time const. housing-ambient (5)	T_{th2} min	18	18	27	27	32	32
4.3	Resistance armature-housing	R_{th1} K/W	1,2	1,2	0,95	0,95	0,7	0,7
4.4	Resistance housing-ambient (5)	R_{th2} K/W	0,9	0,9	0,68	0,68	0,7	0,7
4.5	Temperatur coeff. of back E.M.F.	c_m %/K	- 0,02	- 0,02	- 0,02	- 0,02	- 0,02	- 0,02
4.6	Max. cont. armature temperatur	th °C	155	155	155	155	155	155
5. Physical Data								
5.1	Number of magnet poles	2p pcs	8	8	8	8	8	8
5.2	Number of commutator bars	z pcs	117	117	141	141	165	165
5.3	Admitted shaft load,) radial	F_R N	200	200	220	220	440	440
5.4	Admitted shaft load,) axial	F_A N	190	190	190	190	330	330
5.5	Weight (mass), without extensions	m kg	2,1	-	3,7	-	8,4	-
5.6	Weight (mass), with tachogenerator	m kg	2,6	2,2	4,2	3,9	8,9	8,7
<p>1) for D.C. current with formfactor 1,05, uncooled execution, protection IP 54, ambient temperatur +40 degr. C</p> <p>2) Continuous operation S1, VDE 530, part 1.4. Motor can be run at all points of the torque speed curve S1, continuous speed beyond 4000 rpm is not recommended, please check the torque speed curve.</p> <p>3) Incremental motion cycle S3, VDE 530, part 1.4, pulse duration 50 ms, 1% of duty cycle.</p> <p>4) Point of intersection torque speed curve S1 with torque coordinate at speed zero. Permitted at very low speed < 1 rpm. Works the motor with blocked shaft longer than 20 s, the stall current must be reduced to appr. 70%</p> <p>5) Based upon mounted motors, heat transfer from motor to equipment.</p>								

Options U ... Series

Integral DC tachometer		U9M4T	U12M4T	U16M4T
EMF 1000 rpm ($\pm 5\%$)	V/10 ³ rpm	2,25	5,30	10,5
Bi-directional tolerance	%	$\pm 1,5$	$\pm 1,5$	$\pm 1,0$
Residual ripple peak to peak (1)	%	< 4,5	< 4,5	< 4,5
Linearity ref. to 3500 rpm	%	0,06	0,11	0,11
Temperature coefficient of EMF	%/K	- 0,02	- 0,02	- 0,02
Max. rated current (2)	mA	100	100	150
Max. speed (3)	rpm	5000	5000	5000
Output impedance	Ω	0,4	0,5	0,6
Inductance	mH	0,1	0,1	0,1

1) resistive load 10 kOhm 2) thermally allowable 3) mechanically allowable

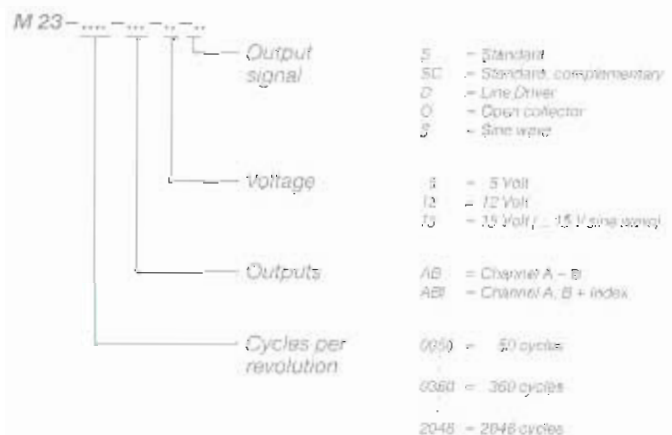
Incremental shaft encoder, M 23 ... series		standard	square wave		sine wave		
			open collector	line driver	bi-polar		
Number of outputs	pcs	channel A, B, Index (+ complementary)					
Cycles per revolution	pcs	50	250	500	1024	50	250
		60	254	512	1200	60	300
		100 ¹⁾	300	600	1500	100	360
		180	360 ¹⁾	800	2000 ¹⁾	180	400
		200	400	1000 ¹⁾	2048	200	500
Phasing	degrees el.	90°	90°	90°	90°	90°	90°
Phasing tolerance	degrees el.	$\pm 30^\circ$	$\pm 30^\circ$	$\pm 30^\circ$	$\pm 30^\circ$	$\pm 30^\circ$	$\pm 30^\circ$
Supply voltage ($\pm 5\%$)	V _{DC}	5, 12 or 15	5	5, 12 or 15	± 15	± 15	± 15
Max. rated current	mA	100	100	350	20	20	20
Frequency response	kHz	100	100	100	50	50	50
Inertia	kg cm ²	0,021	0,021	0,021	0,021	0,021	0,021
Operating temperature	°C	0 - 70	0 - 70	0 - 70	0 - 70	0 - 70	0 - 70
Weight (cover incl.)	kg	0,4	0,4	0,4	0,4	0,4	0,4

¹⁾ Standard, available on stock

How to order



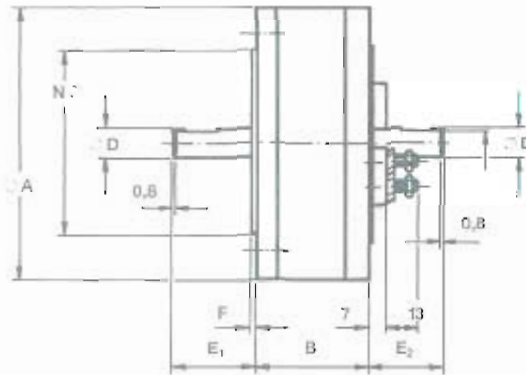
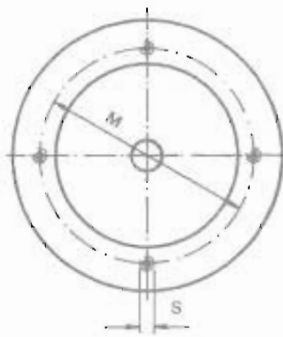
(1) Additional details about encoders



Motor order number (example)
 Motor U12M4
 Motor with tach U12M4T

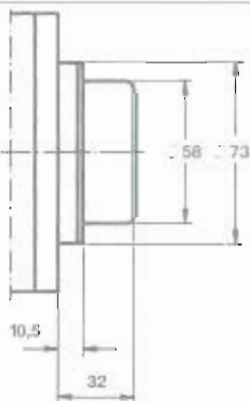
Motor with tach and encoder U16M4T/M23
 (M23-0360-AB1-15-SC)

Outline drawings U ... Series

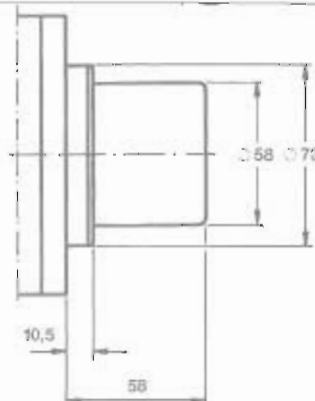


Dimensions in mm

	U9M4	U9M4T	U12M4	U12M4T	U16M4	U16M4T
A	110	110	140	140	188	188
B	47	48	53	54	65	66
D	12 ^{±0.05}	12 ^{±0.05}	12 ^{±0.05}	12 ^{±0.05}	18 ^{±0.05}	18 ^{±0.05}
E ₁	32	32	32	32	40	40
E ₂	30	30	30	30	30	30
F	1,6	1,6	1,6	1,6	3,5	3,5
M	88	88	88	88	165	165
N	75 ^{±0.1}	75 ^{±0.1}	75 ^{±0.1}	75 ^{±0.1}	130 ^{±0.1}	130 ^{±0.1}
S	M5 × 5	M5 × 5	M5 × 5	M5 × 5	M5 × 5	M5 × 5



Outline drawing
Standard encoder M 23 ...



Outline drawing
Encoder M 23... with line driver

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