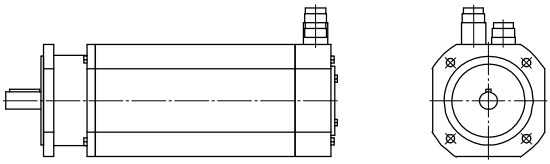
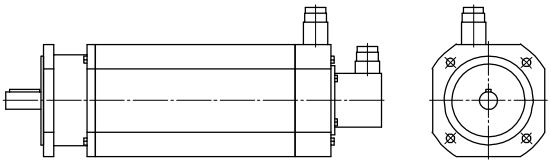
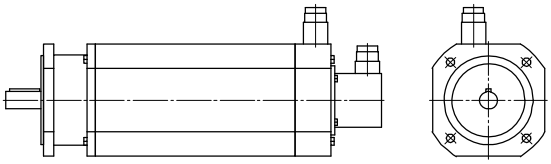
Servo motors TA



Encoder system ER
Resolver
Example: TA21 VD0 ER TW



Encoder system EAS
Absolute encoder singleturn
Example: TA52 V30 EAS TW



Encoder system EAM
Absolute encoder multiturn
Example: TA41 V40 EAM TW

Servo motors TA

Technical characteristics

AC servo-motor, suitable for frequency inverter F5-Multi
Standard version:

- Protection standard IP64
- Insulation class F
- PTC thermistor sensor
- Nominal voltage Un=400V
  optional for motors TA2, TA3 and TA4: Nominal voltage Un=230V
- Number of poles: TA2 2-pole, TA3..TA6 6-pole

The motors correspond to the following standards:

DIN EN 60034	Rotating electrical machines, rating and performance.
DIN 42948	Mounting flanges for electrical machines

Nominal torque Mn

The values given in the tables are valid for the following conditions:

- Duty cycle S1
- Maximum ambient temperature +40°C

  reduced motor torque at ambient temperature 40°C < θ ≤ 80°C: $Mth = Mn \cdot \left(\frac{145°C - \theta}{105°C} \right)$

- Installation altitude up to 1000m above mean sea level

selection conditions at periodical load

$$Ma = \sqrt{\frac{1}{t} \cdot \sum_i M_{ai}^2 \cdot ti} \le Mn$$

$$Mamax = \max(M_{ai}) \le Mmax$$

Mn	[Nm]	Nominal torque Servo motor
Mmax	[Nm]	Maximum torque Servo motor
Ma	[Nm]	Actual average load torque
Mamax	[Nm]	Maximum load torque
Mai	[Nm]	Load torque of cycle i
ti	[s]	Duration of cycle i
t	[s]	Total time $t = \sum_i ti$

Permissible Radial Forces for the Output Shaft

			F_{R1} [N]				
Motor	**Output shaft dxl [mm]**	**K1 [mm]**	**1500 1/min**	**2000 1/min**	**3000 1/min**	**4500 1/min**	**6000 1/min**
TA2	11x23	166	370	340	300	260	240
TA3	14x30	196	410	380	330	290	260
TA4	19x40	261.5	690	630	550	480	440
TA5	24x50	296.5	1040	950	830	720	660
TA6	32x58	401	1390	1260	1100	960	870

For selection condition formulas, see page 6/7

Servo motors TA

Selection table 400V

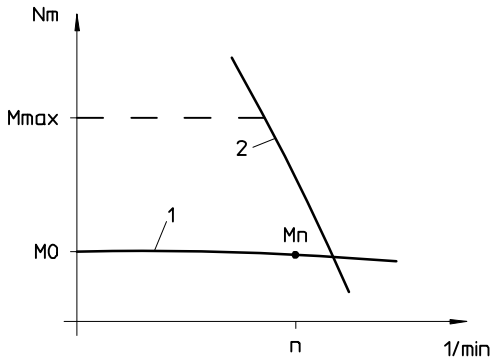
Motor	M0 [Nm]	Mn [Nm]	Mmax [Nm]	~kg	Jm [kgcm²]	I0 [A]	R_u-v [Ω]	L_u-v [mH]	kEpk [mV/min]	F5 MULTI - Mmax/M0				
1500 1/min														
TA61 V10	**34.5**	31.5	103.5	38.7	77.71	11.1	2.323	19.302	278.64	13-1.6	14-2.2	15-3.0		
TA62 V10	**50**	44	150	50.4	113.71	16.4	1.200	12.356	273.51	14-1.5	15-2.2	16-3.0	17-3.0	
TA63 V10	**64**	55	192	63.4	149.7	21.5	0.783	8.867	267.65	15-1.7	16-2.3	17-2.9	18-3.0	
TA63 V10 F	**100**	82	192	63.4	149.7	33.5	0.783	8.867	267.65	16-1.5	17-1.9	18-1.9		
2000 1/min														
TA41 V20	**6.9**	6.6	20.7	10.3	5.65	3.15	13.812	32.931	198.16	09-2.0	10-2.8	12-3.0		
TA42 V20	**9.2**	8.6	27.6	12.9	8.15	4.0	8.388	23.631	205.81	09-1.5	10-2.2	12-3.0		
TA43 V20	**11.7**	10.8	35.1	15.2	10.65	5.00	5.554	18.360	209.53	10-1.7	12-2.9	13-3.0		
TA51 V20	**11.5**	10.8	34.5	16.8	14.9	5.00	7.336	27.341	205.42	10-1.7	12-2.9	13-3.0		
TA52 V20	**16.1**	14.7	48.3	21	21.53	6.9	4.114	19.124	210.74	12-2.1	13-2.6	14-3.0		
TA53 V20	**20**	17.7	60	25	28.15	8.7	2.553	13.752	206.64	12-1.6	13-2.1	14-2.8	15-3.0	
TA61 V20	**34.5**	30	103.5	38.7	77.71	15.1	1.259	10.558	206.20	14-1.6	15-2.4	16-3.0		
TA62 V20	**50**	41	150	50.4	113.71	22.5	0.649	6.638	200.37	15-1.6	16-2.2	17-2.8	18-3.0	
TA63 V20	**64**	50	192	63.4	149.7	29.5	0.413	4.687	194.54	16-1.7	17-2.1	18-2.5	19-3.0	20-3.0
TA63 V20 F	**100**	75	192	63.4	149.7	46.5	0.413	4.687	194.54	18-1.6	19-1.9	20-1.9		
3000 1/min														
TA31 V30	**1.5**	1.45	4.5	4	0.82	1.10	83.179	43.928	122.73	07-3.0				
TA32 V30	**2.75**	2.55	8.25	5.5	1.51	1.85	31.805	26.072	133.55	07-2.1	09-3.0			
TA33 V30	**3.9**	3.55	11.7	6.8	2.19	2.60	17.874	17.906	135.88	07-1.5	09-2.4	10-3.0		
TA41 V30	**6.9**	6.3	20.7	10.3	5.65	4.45	6.995	16.493	139.96	10-2.0	12-3.0			
TA42 V30	**9.2**	8.1	27.6	12.9	8.15	5.9	3.727	11.042	140.55	10-1.5	12-2.4	13-3.0		
TA43 V30	**11.7**	10.1	35.1	15.2	10.65	7.3	2.611	8.735	144.54	12-2.0	13-2.5	14-3.0		
TA51 V30	**11.5**	10.2	34.5	16.8	14.9	7.4	3.441	12.710	140.06	12-1.9	13-2.4	14-3.0		
TA52 V30	**16.1**	13.5	48.3	21	21.53	10.3	1.815	8.498	140.47	13-1.7	14-2.4	15-3.0		
TA53 V30	**20**	16.1	60	25	28.15	12.8	1.279	6.390	140.83	14-1.9	15-2.8	16-3.0		
TA61 V30	**34.5**	26	103.5	38.7	77.71	21.5	0.635	5.256	145.43	15-1.7	16-2.3	17-2.9	18-3.0	
TA62 V30	**50**	33	150	50.4	113.71	31.0	0.345	3.515	145.89	16-1.6	17-2.0	18-2.4	19-2.9	20-3.0
TA63 V30	**64**	37	192	63.4	149.7	39.5	0.232	2.637	145.90	17-1.6	18-1.9	19-2.3	20-2.8	21-3.0
TA63 V30 F	**100**	55	192	66	149.7	62	0.232	2.637	145.90	19-1.5	20-1.8	21-1.9		
4500 1/min														
TA21 V40	**0.85**	0.82	2.55	2.5	0.37	0.90	81.799	52.994	85.00	07-3.0				
TA22 V40	**1.55**	1.45	4.65	3.4	0.7	1.52	29.433	30.423	91.72	07-2.6	09-3.0			
TA31 V40	**1.5**	1.41	4.5	4	0.82	1.57	41.481	21.871	86.17	07-2.5	09-3.0			
TA32 V40	**2.75**	2.4	8.25	5.5	1.51	2.70	14.624	12.177	91.28	09-2.3	10-3.0			
TA33 V40	**3.9**	3.25	11.7	6.8	2.19	3.80	8.226	8.252	92.23	09-1.6	10-2.3	12-3.0		
TA41 V40	**6.9**	5.7	20.7	10.3	5.65	6.5	3.165	7.611	95.05	12-2.2	13-2.8	14-3.0		
TA42 V40	**9.2**	7.1	27.6	12.9	8.15	8.5	1.766	5.295	97.35	12-1.7	13-2.1	14-2.9	15-3.0	
TA43 V40	**11.7**	8.6	35.1	15.2	10.65	11.2	1.120	3.690	93.94	13-1.6	14-2.2	15-3.0		
TA51 V40	**11.5**	9	34.5	16.8	14.9	11.0	1.521	5.679	93.88	13-1.6	14-2.3	15-3.0		
TA52 V40	**16.1**	11.3	48.3	21	21.53	15.8	0.828	3.594	91.40	14-1.6	15-2.3	16-3.0		
TA53 V40	**20**	10.4	60	25	28.15	19.2	0.513	2.839	93.84	15-1.9	16-2.6	17-3.0		
6000 1/min														
TA21 V60	**0.85**	0.81	2.55	2.5	0.37	1.14	50.88	32.935	67.30	07-3.0				
TA22 V60	**1.55**	1.39	4.65	3.4	0.7	1.98	17.821	17.866	70.32	07-2.0	09-3.0			
TA31 V60	**1.5**	1.35	4.5	4	0.82	1.98	25.718	13.751	68.16	07-2.0	09-3.0			
TA32 V60	**2.75**	2.15	8.25	5.5	1.51	3.60	8.126	6.976	69.16	09-1.7	10-2.4	12-3.0		
TA33 V60	**3.9**	2.75	11.7	6.8	2.19	5.00	4.701	4.813	70.44	10-1.7	12-2.9	13-3.0		

Servo motors TA

Selection table 230V

Motor	M0 [Nm]	Mn [Nm]	Mmax [Nm]	~kg	Jm [kgcm²]	I0 [A]	R_u-v [Ω]	L_u-v [mH]	kEpk [mV/min]	F5 MULTI - Mmax/M0			
2000 1/min													
TA41 VB0	**6.9**	6.6	20.7	10.3	5.65	6.2	3.601	8.499	100.46	09-1.7	10-2.4	12-3.0	
TA42 VB0	**9.2**	8.6	27.6	12.9	8.15	8.0	2.096	5.905	102.86	10-1.9	12-3.0		
TA43 VB0	**11.7**	10.8	35.1	15.2	10.65	10.4	1.309	4.278	101.12	12-2.4	13-3.0		
3000 1/min													
TA31 VC0	**1.5**	1.45	4.5	4	0.82	2.20	20.355	10.899	60.90	05-1.6	07-2.7	09-3.0	
TA32 VC0	**2.75**	2.55	8.25	5.5	1.51	3.70	7.961	6.521	66.80	07-1.6	09-2.8	10-3.0	
TA33 VC0	**3.9**	3.55	11.7	6.8	2.19	5.2	4.416	4.372	67.18	09-2.0	10-2.9	12-3.0	
TA41 VC0	**6.9**	6.3	20.7	10.3	5.65	9.1	1.674	3.919	68.26	10-1.6	12-2.7	13-3.0	
TA42 VC0	**9.2**	8.1	27.6	12.9	8.15	11.8	0.955	2.761	70.28	12-2.1	13-3.0		
TA43 VC0	**11.7**	10.1	35.1	15.2	10.65	14.6	0.654	2.183	72.25	12-1.7	13-2.5	14-3.0	
4500 1/min													
TA21 VD0	**0.85**	0.82	2.55	2.5	0.37	1.82	18.721	12.832	41.96	05-1.9	07-3.0		
TA22 VD0	**1.55**	1.45	4.65	3.4	0.7	3.05	6.723	7.491	45.49	07-2.0	09-3.0		
TA31 VD0	**1.5**	1.41	4.5	4	0.82	3.15	10.245	5.341	42.63	07-1.9	09-3.0		
TA32 VD0	**2.75**	2.4	8.25	5.5	1.51	5.4	3.753	3.044	45.64	09-1.9	10-2.8	12-3.0	
TA33 VD0	**3.9**	3.25	11.7	6.8	2.19	7.5	2.131	2.139	46.96	10-2.0	12-3.0		
TA41 VD0	**6.9**	5.7	20.7	10.3	5.65	13.3	0.760	1.835	46.73	12-1.9	13-2.7	14-3.0	
TA42 VD0	**9.2**	7.1	27.6	12.9	8.15	17.0	0.446	1.324	48.68	12-1.5	13-2.1	14-2.9	15-3.0
TA43 VD0	**11.7**	8.6	35.1	15.2	10.65	24.5	0.233	0.786	43.36	13-1.5	14-2.0	15-3.0	16-3.0
6000 1/min													
TA21 VF0	**0.85**	0.81	2.55	2.5	0.37	2.30	12.614	8.107	33.46	05-1.5	07-2.6	09-3.0	
TA22 VF0	**1.55**	1.39	4.65	3.4	0.7	4.05	4.373	4.304	34.52	07-1.5	09-2.6	10-3.0	
TA31 VF0	**1.5**	1.35	4.5	4	0.82	3.95	6.354	3.437	34.08	07-1.5	09-2.7	10-3.0	
TA32 VF0	**2.75**	2.15	8.25	5.5	1.51	6.9	2.097	1.859	35.70	09-1.5	10-2.2	12-3.0	
TA33 VF0	**3.9**	2.75	11.7	6.8	2.19	10.0	1.175	1.203	35.22	10-1.5	12-2.5	13-3.0	

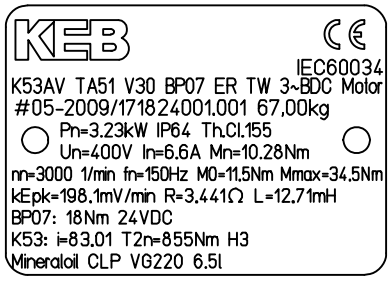
n	Nominal speed
M0	Stall torque
Mn	Nominal torque S1
Mmax	Maximum torque
~kg	Weight
Jm	Inertia
I0	Current at stall torque
R_u-v	Winding resistance
L_u-v	Winding inductance
kEpk	Voltage constant, Peak value mV/min = V/(1000 1/min) Effektive value $kE = kEpk/\sqrt{2}$
nmax	Maximum speed n≤2000 1/min → nmax=3000 1/min n=3000 1/min → nmax=4500 1/min n≤6000 1/min → nmax=6000 1/min
F5 MULTI - Mmax/M0	Available maximum torque of the servo-motor for operation with frequency inverter COMBIVERT F5-MULTI Current at maximum torque Imax=1.5*In_F5



1 - Characteristic curve for S1-duty cycle
2 - Voltage limit curve 400V or 230V

Servo motors TA

Rating plate (Example)



Brake COMBIPERM

- Permanent magnet holding brake with emergency-stop-function
- Standard voltages: 24VDC
- Insulation class: F

Connection with power connector

Technical Data

Brake	Mbr [Nm]	JB [kgcm²]	P20 [W]	t2 [ms]	t1= [ms]	t11= [ms]	WR0.1 [J*10^6]	WRmax [J*10^3]	~kg
BP03	2	0.068	11	25	8	2	0.41	5.3	0.2
BP05	4.5	0.18	12	35	15	2.5	0.58	8.0	0.4
BP06	9	0.54	18	40	20	2	0.89	11	0.6
BP07	18	1.66	24	60	30	5	1.29	14	1.0
BP08	36	5.56	26	100	25	5	2.90	30	2.0

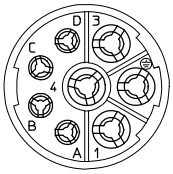
Mbr	Static braking torque after completed run-in phase (20°C)
JB	Inertia
P20	Excitation rating at 20°C
t2	Release time, time from connecting the current to the beginning of torque decrease
t1=	Engaging time: Time from disconnecting of current until the rated torque is attained
t11=	Engaging delay time: Time from disconnecting of current until the torque rises
WR0.1	friction work until 0.1mm abrasion
WRmax	permissible friction work for emergency stop from 3000 1/min

The specified switching times apply to nominal clearance and nominal torque. It relates to average values and depends on the type of rectification and coil temperature.

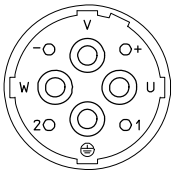
Servo motors TA

Electrical Connection

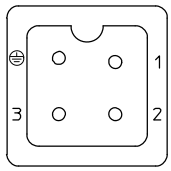
Motor TA2..TA5

Power connector Size 1, 8pole 1)	Pin	Signal
	1	U
	⏚	PE
	3	W
	4	V
	A	Brake +
	B	Brake -
	C	TW
	D	TW

Motor TA6

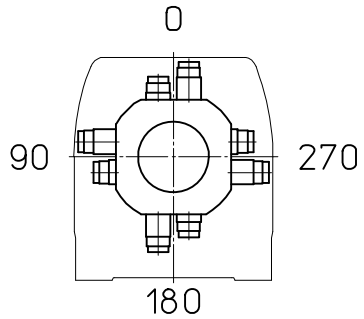
Power connector Size 1.5, 8pole 1)	Pin	Signal
	U	U
	V	V
	W	W
	⏚	PE
	+	Brake +
	-	Brake -
	1	TW
	2	TW

F – Forced ventilation

Power connector 4pole 2)	Pin	Signal
	1	U
	2	V
	3	W
	⏚	PE

Voltage/Frequency: 3 ~ 400V 50Hz
Rated current of forced ventilation: 0.14A
Counterplug included

Position of motor connection for geared motors



Example: Motor connection 90, Plug connector radial

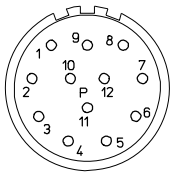
Servo motors TA

Encoder system

ER – Resolver

Type	BRX 2-pole
Voltage	7Vrms
Frequency	10kHz
Transformation factor	0.5
Encoder system position	
KEB F5-Multi	ec02 = 57344

Signal connector 12pole



Counterplug optional

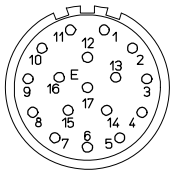
Pin	Signal
1	/sin
2	/cos
5	/sin-ref
7	sin-ref
10	sin
11	cos

EAS – Absolute encoder singleturn
EAM - Absolute encoder multiturn

Standard version

Resolution singleturn	13bit
Resolution multiturn	12bit (4096 rev)
Code type	SSI-Gray-Code
Sin/Cos-periods	2048ppr 1Vpp
Supply voltage	5VDC ± 5%
Current consumption	max. 70mA
Permissible load / channel	± 20 mA
Protection standard	IP65
Encoder system position	
KEB F5-Multi	ec02 = 0

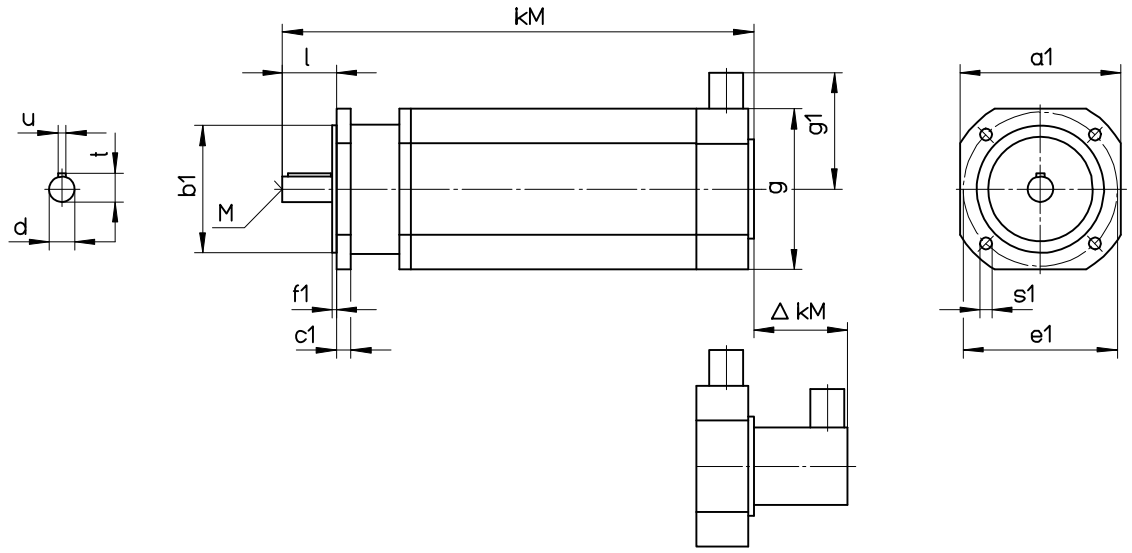
Signal connector 17pole



Counterplug optional

Pin	Signal
10	0V
7	+5V
8	clock
9	/clock
14	data
17	/data
1	set
2	dir
15	A
16	/A
12	B
13	/B

Servo motors TA
Dimensions

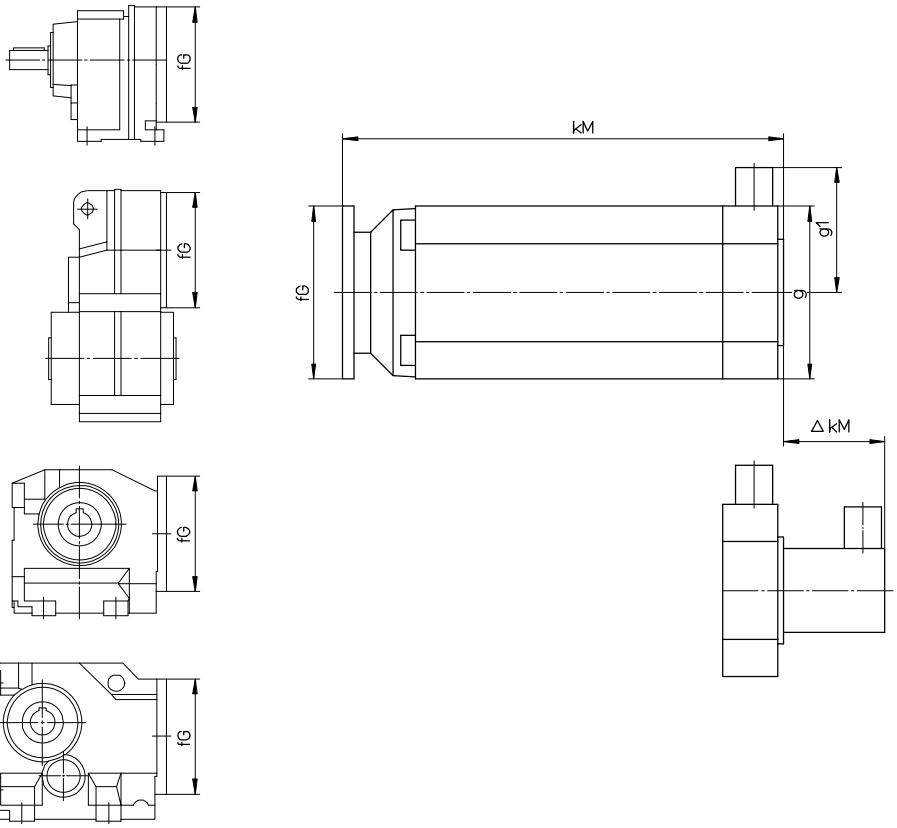


Motor	TA21	TA22	TA31	TA32	TA33	TA41	TA42	TA43	TA51	TA52	TA53	TA61	TA62	TA63
a1	73		88			115.5			145			190		
e1	Ø75		Ø100			Ø115			Ø165			Ø215		
b1	Ø60		Ø80			Ø95			Ø130			Ø180		
c1	8		10			11			12			14		
f1	2.5		3			3			3.5			4		
s1	5.8		7			9			11			14		
d	Ø11k6		Ø14k6			Ø19k6			Ø24k6			Ø32k6		
l	23		30			40			50			58		
t	12.5		16			21.5			27			35		
u	4		5			6			8			10		
M	M4		M5			M6			M8			M12		
g	75		90			120			150			182 1)		
g1	77		84.5			99.5			114.5			144		
kM	186	221	211.5	246.5	281.5	281	316	351	323	358	393	425	495	565
ΔkM1	25		35			35			35			40		
ΔkM2	65		64			64			64			68		
ΔkM3	90		99			99			99			108		
ΔkM4												183		

kM	ER
kM + ΔkM1	BP ER
kM + ΔkM2	EAS or EAM
kM + ΔkM3	BP EAS or BP EAM
kM + ΔkM4	F ER or BP F ER

ER	Resolver
BP	Permanent magnet brake
EAS	Absolute encoder singleturn
EAM	Absolute encoder multiturn
F	Forced ventilation
1)	Motor TA6 with forced ventilation: g=200

Servo motors TA
Dimensions



Motor	TA31	TA32	TA33	TA41	TA42	TA43	TA51	TA52	TA53	TA61	TA62	TA63		
g	90			120			150			182 1)				
g1	84.5			99.5			114.5			144			**fG**	**Gear unit**
kM	172	207	242										105	**G0, S0**
	171	206	241	235.5	270.5	305.5							120	**G1, S1, F2, K2**
	168	203	238	231.5	266.5	301.5	257	292	327				140	**G2, S2, F3, K3**
	167.5	202.5	237.5	231	266	301	257.5	292.5	327.5	356	426	496	160	**G3, S3, F4, K4**
				227.5	262.5	297.5	255	290	325	351.5	421.5	491.5	200	**G4, S4, F5, K5**
							250	285	320	346.5	416.5	486.5	250	**G5, F6, K6**
							243	278	313	339.5	409.5	479.5	300	**G6, F7, K7**
										334.5	404.5	474.5	350	**G7, K8**
ΔkM1	35			35			35			40				
ΔkM2	64			64			64			68				
ΔkM3	99			99			99			108				
ΔkM4										183				

kM	ER
kM + ΔkM1	BP ER
kM + ΔkM2	EAS or EAM
kM + ΔkM3	BP EAS or BP EAM
kM + ΔkM4	F ER or BP F ER

ER	Resolver
BP	Permanent magnet brake
EAS	Absolute encoder singleturn
EAM	Absolute encoder multiturn
F	Forced ventilation
1)	Motor TA6 with forced ventilation: g=200