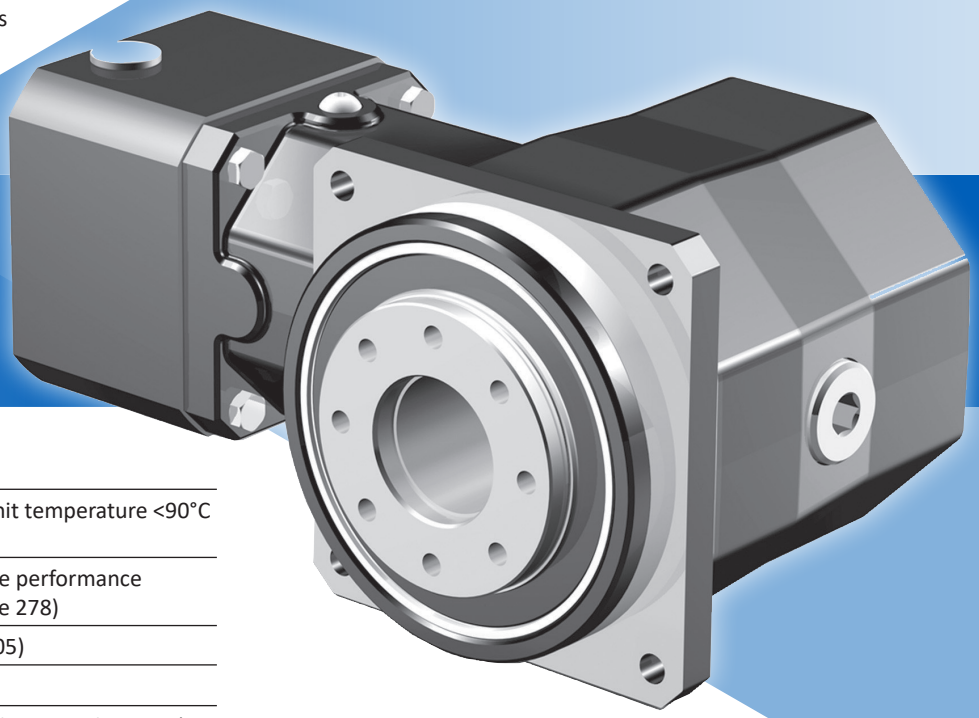
KS Series: RIGHT ANGLE – Versatile Outputs

KS Features

- 6:1 to 200:1 ratios (higher ratios available. Contact STOBER.)
- Quiet running (<62dB(A))
- Flexilibity for mounting
- Adaptability: shafts available in metric and imperial to meet your requirements
- Large motor input option to accept bigger diameter motor shafts so you don't use an oversized gearbox
- Error free motor mounting and quick changeover with toleranced pilot on motor plate
- Low no load running torque, giving you more torque for your application
- Magnetic oil filtration to remove contaminants to prevent breakdowns
- Build and ship in one day
- Assembled in the USA

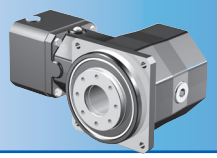
STOBER KS Series uses helical and bevel gearing to provide a low backlash unit, that is smooth running, with high efficiency, high power density, and high input speed capacity. The KS also offers flexibly with three output options: shaft, flange, and hollow. Every gearbox is made to order. STOBER will custom whatever you need to fit your application. Contact us today to learn more.

SHIPS in 1 DAY!
NO EXPEDITE FEE FOR 24 HOUR SERVICE



General Specifications

Ambient Temperature	0°C to +40°C (104°F) [Unit temperature <90°C Max]
Backlash	≤4 standard arcmins (see performance overview chart, see page 278)
Coating	Standard Black (RAL-9005)
Degree of Protection	IP65
Direction of Rotation	Input and output rotate the SAME direction (see page 278)
Efficiency	2 stage 95%; 3 stage 93%;
Input RPM	Up to 6,000 RPM
Installation	Requires 12.9 fasteners for tapped holes housing. See page 306, for more information
Lubrication	Lubricated for life – standard Mobil SHC629; option food grade Mobil SHC CIBUS 150
Mounting Position	Must be specified, see page 279
Warranty	5 Year Limited (2 Years on normal wear items: bearings, seals, etc.)



Overview

Selection Options *At-a-Glancee*

Using the **Selection Data** table later in this section, select the KS Series Gearhead with the appropriate performance and design options tailored to your motor choice and exact application requirements. Use the part number guide below as a reference to build a part number for the complete gearhead assembly.

Part Number Examples:

1	2	3	4	5	6	7	8	9		
KS	4	0	2	P	F	0060	ME	L	EL1	*

	Design Option	Part Number Code	Description
1	**Series**	KS	Concentric helical
2	**Size**	4 5 7	3 sizes of gearhead
3	**Generation**	0	Version of gearhead
4	**# of Stages**	2 3	Two stage for ratios ≤20:1 Three stage for ratios >20:1
5	**Output**	P G F S	Shaft with key Plain shaft (no key) Flanged hollow Shrink ring
6	**Housing**	F	Standard
7	**Ratio**	0060	Ratios range from 6:1 to 200:1 (0060=6:1; 0200=20:1; 2000=200:1)
8	**Motor Adapter**	ME	ME Motor adapter (See also motor mounting plate option, page 279)
0	**Options**	L	Large Input
*	**Mounting Position**	EL1 EL2 EL3 EL4 EL5 EL6	Required special instruction for all units, see page 279

Options

Coating Option

- Available with multi-layer, industrial 316 stainless steel epoxy coating. Contact factory for this option.

Large Input

- Accommodates a larger diameter motor shaft without going to a larger size gearbox.

ATEX

- ATmosphere EXplosible – rated for explosive environments. Contact factory for this option and allow additional time for delivery.

Oil Reservoir

- Use with 3 stage units (for vertical EL5 orientation, see page 278).

KS Performance Overview

KS Series performance is dependent on several factors including duty cycle, bearing design, gearhead size and stage configuration, among others. Use the chart below for preliminary evaluation, then use the following performance chart and selection information on the following pages for specific performance sizing and selection.

Size/Generation		KS40		KS50		KS70	
# of Stages		2	3	2	3	2	3
Acceleration Torque M_{2BMAX}	Nm	90		200		400	
Output Torque Nom. [1] M_{2N}	Nm	65		125		250	
Torsional Stiffness C_2	Nm/arcmin	≤8.5		≤17		≤42	
Torsional Backlash [2] $\Delta\phi$	arcmin	≤6		≤5		≤4	
Input Speed Max. n_{1MAX}	Continuous Cyclic	4000 6000	4500 6000	3500 6000	4200 6000	3200 6000	4000 6000
Efficiency (@nom torque)	%	95	93	95	93	95	93
Weight	kg lbs	8.4 18.5	8.2 18.1	13.6 30	14.4 31.8	26.8 59.1	28.1 62
Noise [3]	dB(A)	≤65		≤62		≤63	

Performance by Output Option (P = Shaft with Key; G = Shaft without Key; F = Flanged Hollow Output; S = Shrink Ring) [4]

Size/Generation			KS40	KS50	KS70
Axial Load Max. F_{2AMAX}	**P/G**	N	3400	6000	10,000
	F	N	4000	6000	10,000
	S	N	4000	6000	10,000
Radial Load Max. F_{2RMAX}	**P/G**	N	5000	8000	10,000
Tilting Moment Max. M_{2KMAX}	**F/S**	Nm	210	460	780

[1] *Ratings based on input speed (n_1) of 1500 RPM.*

For torque at higher input speeds (M_{2NX}) solve the formula:

$$M_{2NX} = \frac{M_{2N}}{\sqrt[3]{\frac{n_1}{1500}}}$$

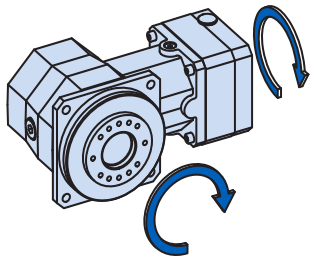
where n_1 = Actual Input Speed.

[2] *Tested at 1.5% of nominal torque and recorded on the output side of the gearhead. For lower backlash, contact STOBER technical support.*

[3] *Measurement at one (1) meter distance with input speed (n_1) of 2000 RPM.*

[4] *Rating based on output speed (n_2) of 100 RPM. For values at other speeds see page 280.*

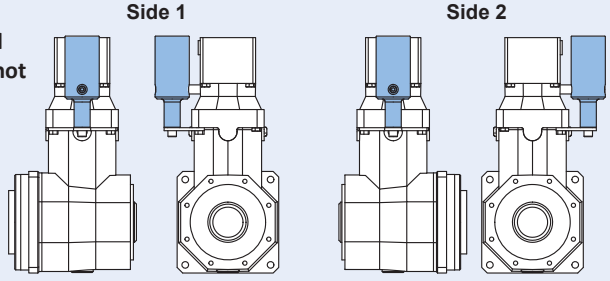
KS Direction of Rotation

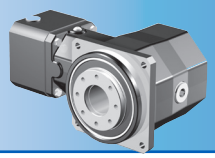


Oil Reservoir Orientation

For 3 stage units in vertical EL5 mounting position — not available with large input option

When ordering, Side 1 or Side 2 MUST BE SPECIFIED.





Overview

KS Series Motor Mounting Plate Option (Motor information required with Motor Adapter ME option)

STOBER Servo Gearheads fit the motor of your choice with the appropriate motor mounting plate assembled between the motor and the gearhead.

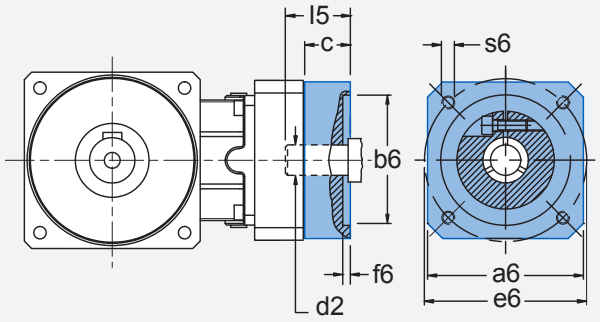
NOTE: When ordering a gearhead:

- Specify the motor manufacturer and part number
- Provide the motor drawing with dimensions, or specify the motor mounting dimensions (per the list shown at right)

For a precise dimension on a specific motor, or for general assistance, we recommend you contact STOBER Technical Support.

Customer Required Dimensions for Properly Sized Motor Mounting Plate

d2	Motor Shaft Diameter (If an adapter bushing is required it will be supplied with the motor plate.)
b6	Pilot Diameter
e6	Bolt Circle Diameter
s6	Bolt Diameter
l5	Motor Shaft Length
f6	Pilot Length
a6	Square Flange (Optional – motor plate will typically be made to match this dimension.)

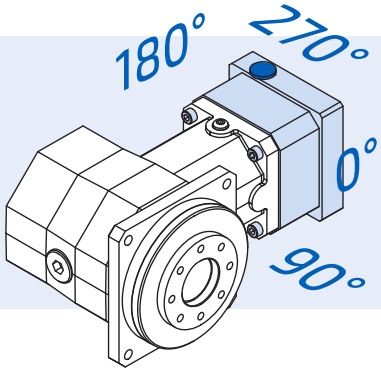


Motor Mounting Plate Dimensions — mm (Gearhead Part Number Specific)	KS403	KS402 KS403...L KS503	KS402...L KS502 KS503...L KS703	KS502...L KS702 KS703...L	KS702...L
Maximum Allowed Motor Shaft Dia. d2	14	19	24	32	38
Minimum Allowed Motor Plate Thickness c	15	18	21	24	25

** Note that the c motor plate thickness is determined by the motor shaft length. The minimum motor plate thickness is the value listed.*

KS Series Motor Mounting Plate Access Hole

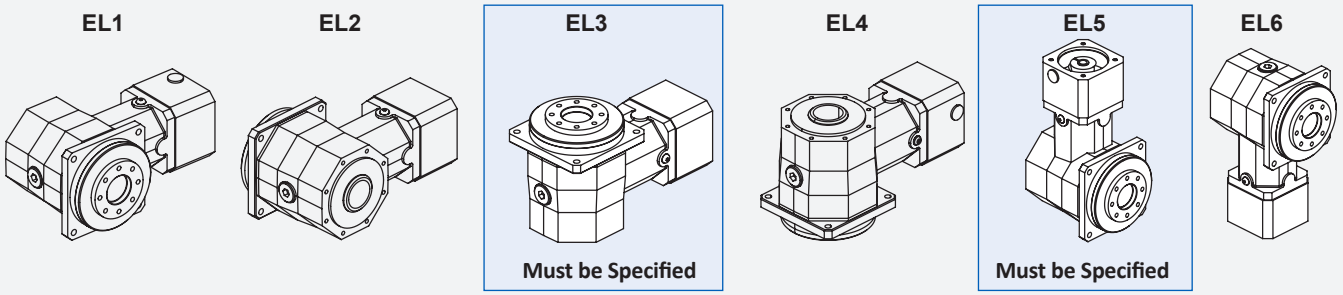
Access to the clamping screw for the motor coupling is located on the 270° side of the motor mounting plate at the location shown. If necessary, the motor mounting plate can be rotated in the field, if a 0°, 90° or 180° orientation for the access hole is desirable.



KS Mounting Position Options

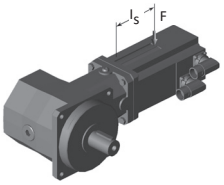
KS Units can be mounted in any of the positions illustrated below.

When ordering KS units mounted in a vertical position (EL3) or in a horizontal position (EL5), the mounting position MUST BE SPECIFIED. NOTE: EL5 3 stage units are only available with the oil reservoir option.



Permissible Motor Tilting Torque

The permissible tilting torque of the motor attached to the gear unit is a result of the static and dynamic load "F" from the motor weight, mass acceleration, and vibration multiplied by the distance from the center of gravity "l_S" of the motor.



$$M_{1k} = F \times l_S \leq M_{1K}$$

M_{1K}	KS403	KS402 KS503	KS502 KS703	KS702
Nm	10	20	40	80

Permissible Output Shaft Load and Tilting Moments*

Unit	Z_2 mm	F_{2A} N	F_{2R} N	F_{2RB} N	M_{2K} Nm	M_{2KB} Nm
P/G Solid Shaft (with/without key						
KS4	34	3400	5000	5000	260	260
KS5	40	6000	8000	8000	550	550
KS7	51	10,000	10,000	10,000	920	920
F Flange Hollow Output						
KS4	38	4000	6842	10,263	260	390
KS5	45	6000	12,222	18,333	550	825
KS7	55	10,000	16,727	25,091	920	1380
S Hollow Output with Shrink Ring						
KS4	36	4000	5000	5000	260	260
KS5	42	6000	8000	8000	550	550
KS7	52	10,000	10,000	10,000	920	920

** Refer to illustration and definitions below.*

During EMERGENCY OFF operation (maximum stops per gearhead = 1000) the permissible values in the table for F_{2A}, F_{2R}, and M_{2K} can be multiplied by a factor of 2.

KS Series Load/Life/Speed Calculations

All formulas shown are based on METRIC values

Upper case letters are permissible values. Lower case letters are for existing values.

The permissible load and tilting moment values are based on an output speed of 100 RPM. For higher speeds the following applies, where n_2 is the desired speed:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}}$$

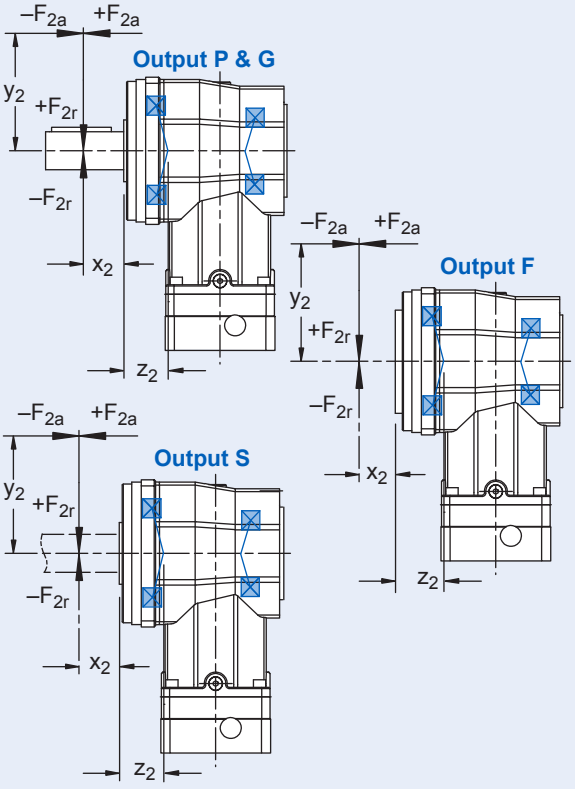
The application output tilting moment should be determined by the following formula:

Output P & G
$$M_{2k,acc*} = \frac{2 \bullet F_{2ax100*} \bullet y_2 + F_{2rad,acc*} \bullet (x_2 + Z_2)}{1000} \leq M_{2k,acc}$$

Output F & S
$$M_{2k,acc*} = \frac{F_{2ax100*} \bullet y_2 + F_{2rad,acc*} \bullet (x_2 + Z_2)}{1000} \leq M_{2k,acc}$$

$$M_{2k,eq*} = \sqrt[3]{\frac{n_{2m,1*} \bullet t_{1*} \bullet M_{2k,acc,1*}{}^3 + \ldots + n_{2m,n*} \bullet t_{n*} \bullet M_{2k,acc,n*}{}^3}{n_{2m,1*} \bullet t_{1*} + \ldots + n_{2m,n*} \bullet t_{n*}}} \leq M_{2kN}$$

$$F_{2ax,eq*} = \sqrt[3]{\frac{n_{2m,1*} \bullet t_{1*} \bullet F_{2rad,acc,1*}{}^3 + \ldots + n_{2m,n*} \bullet t_{n*} \bullet F_{2rad,acc,n*}{}^3}{n_{2m,1*} \bullet t_{1*} + \ldots + n_{2m,n*} \bullet t_{n*}}} \leq F_{2radN}$$



Where:

z_2	Distance of Shaft Shoulder to Center of Output Bearing	$F_{2rad100}$	Permitted Radial Force ≤100RPM
n_2	Actual Average Output Speed	$F_{2rad,acc}$	Radial Acceleration Force
x_2	Distance of the Shaft Shoulder to the Force Application Point	$F_{2rad,acc*}$	Radial Acceleration Force at Gear Unit Output
y_2	Distance of the Shaft Axis to the Axial Force Application Point	M_{2K100}	Permitted Tilting Torque ≤100RPM
F_{2ax*}	Actual Axial Force at Gear Unit Output	$M_{2K,acc}$	Permitted Acceleration Tilting Torque
F_{2ax100}	Permitted Axial Force	$M_{2k,acc*}$	Permitted Acceleration Tilting Torque at Gear Unit Output
		C_{2K}	Tilting Stiffness

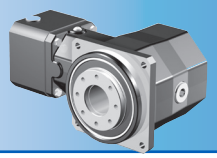
The hours of life (L_h) of the unit can be determined by the following formula:

bearing life for duty cycle ≤ 40%

L_h > 10,000 hours if $M_{2K100}/M_{2A*} < 1.25$ and > 1
L_h > 20,000 hours if $M_{2K100}/M_{2A*} > 1.25$ and > 1.5
L_h > 30,000 hours if $M_{2K100}/M_{2A*} < 1.5$

bearing life for duty cycle ≥ 40%

$$L_{hA} = L_h \left(\frac{40\%}{\text{Duty Cycle}} \right)$$



Selection Data

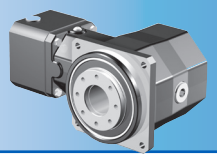
Exact Ratio (i)	Output Torque Nom. [1] M_{2N} Nm	Output Torque Accel. M_{2acc} Nm	Output Torque Peak [2] M_{2NOT} Nm	Part Number* (Gearhead + Input)	Max. Input Speed RPM (n1) Cont.	Max. Input Speed RPM (n1) Cyclic	Motor Shaft Max Ø d_{MW} mm	Input Inertia [3] J_1 kgcm²	Tors. Stiffness C_2 Nm/arcmin
KS4									
6.000	60	90	140	KS402_0060ME	3000	6000	19	1.1	8.1
				KS402_0060MEL			24	1.5	8.4
8.000	65	90	140	KS402_0080ME	3500	6000	19	0.7	8.4
				KS402_0080MEL			24	1.2	
10.00	65	90	140	KS402_0100ME	3800	6000	19	0.6	8.4
				KS402_0100MEL			24	1.1	
14.00	65	90	140	KS402_0140ME	4000	6000	19	.47	8.5
				KS402_0140MEL			24	1.0	
20.00	60	90	140	KS402_0200ME	4000	6000	19	0.1	8.5
				KS402_0200MEL			24	0.9	
24.00	60	90	140	KS403_0240ME	3500	6000	14	0.2	8.5
				KS403_0240MEL			19	0.5	
32.00	65	90	140	KS403_0320ME	3500	6000	14	0.2	8.5
				KS403_0320MEL			19	0.5	
40.00	65	90	140	KS403_0400ME	3500	6000	14	0.2	8.5
				KS403_0400MEL			19	0.5	
50.00	65	90	140	KS403_0500ME	4000	6000	14	0.1	8.5
				KS403_0500MEL			19	0.4	
70.00	65	90	140	KS403_0700ME	4500	6000	14	0.1	8.5
				KS403_0700MEL			19	0.4	
80.00	65	90	140	KS403_0800ME	4500	6000	14	0.1	8.5
				KS403_0800MEL			19	0.4	
100.0	65	90	140	KS403_1000MET	4500	6000	14	0.1	8.5
				KS403_1000MEL			19	0.4	
140.0	65	90	140	KS403_1400ME	4500	6000	14	0.1	8.5
				KS403_1400MEL			19	0.4	
200.0	60	90	140	KS403_2000ME	4500	6000	14	0.1	8.5
				KS403_2000MEL			19	0.4	

[1] *Based on input speed of 2000 RPM. See page 278 for details on torque calculations.*
[2] *Maximum momentary torque for emergency stops or heavy shock load. (Admissible stops per life of gearhead = 1,000 stops maximum.)*
[3] *Inertia based on maximum input. For lower inertia, using smaller diameter input, contact STOBER.*
* *MT = Motor Adapter L = Large Input Option*

Exact Ratio (i)	Output Torque: Nom. [1] M_{2N}	Output Torque: Accel. M_{2acc}	Output Torque: Peak [2] M_{2NOT}	Part Number* (Gearhead + Input)	Max. Input Speed RPM (n1): Cont.	Max. Input Speed RPM (n1): Cyclic	Motor Shaft Max Ø d_{MW}	Input Inertia [3] J_1	Tors. Stiffness C_2
	Nm	Nm	Nm				mm	kgcm²	Nm/arcmin
KS5									
6.000	100	200	300	KS502_0060ME	2500	5500	24	2.5	17.0
				KS502_0060MEL			32	4.1	
8.000	125	200	300	KS502_0080ME	2800	6000	24	1.9	17.0
				KS502_0080MEL			32	3.5	
10.00	125	200	300	KS502_0100ME	3000	6000	24	1.5	17.0
				KS502_0100MEL			32	3.1	
14.00	125	200	300	KS502_0140ME	3200	6000	24	1.1	17.0
				KS502_0140MEL			32	2.8	
20.00	120	200	300	KS502_0200ME	3500	6000	24	1.0	17.0
				KS502_0200MEL			32	2.6	
24.00	100	200	300	KS503_0240ME	3100	6000	19	0.6	17.0
				KS503_0240MEL			24	1.1	
32.00	125	200	300	KS503_0320ME	3100	6000	19	0.6	17.0
				KS503_0320MEL			24	1.1	
40.00	125	200	300	KS503_0400ME	3100	6000	19	0.6	17.0
				KS503_0400MEL			24	1.1	
50.00	125	200	300	KS503_0500ME	3500	6000	19	0.5	17.0
				KS503_0500MEL			24	1.0	
70.00	125	200	300	KS503_0700ME	4200	6000	19	0.4	17.0
				KS503_0700MEL			24	0.9	
80.00	125	200	300	KS503_0800ME	4200	6000	19	0.4	17.0
				KS503_0800MEL			24	0.9	
100.0	125	200	300	KS503_1000ME	4200	6000	19	0.4	17.0
				KS503_1000MEL			24	0.9	
140.0	125	200	300	KS503_1400ME	4200	6000	19	0.4	17.0
				KS503_1400MEL			24	0.9	
200.0	120	200	300	KS503_2000ME	4200	6000	19	0.4	17.0
				KS503_2000MEL			24	0.9	

[1] *Based on input speed of 2000 RPM. See page 278 for details on torque calculations.*
[2] *Maximum momentary torque for emergency stops or heavy shock load. (Admissible stops per life of gearhead = 1,000 stops maximum.)*
[3] *Inertia based on maximum input. For lower inertia, using smaller diameter input, contact STOBER.*
* *MT = Motor Adapter L = Large Input Option*

Selection Data



Exact Ratio (i)	Output Torque Nom. [1] M_{2N} Nm	Output Torque Accel. M_{2acc} Nm	Output Torque Peak [2] M_{2NOT} Nm	Part Number* (Gearhead + Input)	Max. Input Speed RPM (n1) Cont.	Max. Input Speed RPM (n1) Cyclic	Motor Shaft Max Ø d_{MW} mm	Input Inertia [3] J_1 kgcm²	Tors. Stiffness C_2 Nm/arcmin
KS7									
6.000	240	400	600	KS702_0060ME	2100	4500	32	8.3	41.0
				KS702_0060MEL			38	12.0	
8.000	250	400	600	KS702_0080ME	2500	5000	32	5.5	41.0
				KS702_0080MEL			38	9.2	
10.00	250	400	600	KS702_0100ME	2800	6000	32	4.4	42.0
				KS702_0100MEL			38	8.2	
14.00	250	400	600	KS702_0140ME	3000	6000	32	3.4	42.0
				KS702_0140MEL			38	7.1	
20.00	250	400	600	KS702_0200ME	3200	6000	32	2.9	42.0
				KS702_0200MEL			38	6.7	
24.00	240	400	600	KS703_0240ME	3000	6000	24	1.6	42.0
				KS703_0240MEL			32	3.2	
32.00	250	400	600	KS703_0320ME	3000	6000	24	1.5	42.0
				KS703_0320MEL			32	3.1	
40.00	250	400	600	KS703_0400ME	3000	6000	24	1.4	42.0
				KS703_0400MEL			32	3.0	
50.00	250	400	600	KS703_0500ME	3200	6000	24	1.2	42.0
				KS703_0500MEL			32	2.8	
70.00	250	400	600	KS703_0700ME	3500	6000	24	1.0	42.0
				KS703_0700MEL			32	2.6	
80.00	250	400	600	KS703_0800ME	4000	6000	24	0.9	42.0
				KS703_0800MEL			32	2.6	
100.0	250	400	600	KS703_1000ME	4000	6000	24	0.9	42.0
				KS703_1000MEL			32	2.6	
140.0	250	400	600	KS703_1400ME	4000	6000	24	0.9	42.0
				KS703_1400MEL			32	2.5	
200.0	250	400	600	KS703_2000ME	4000	6000	24	0.9	42.0
				KS703_2000MEL			32	2.5	

[1] *Based on input speed of 2000 RPM. See page 278 for details on torque calculations.*
[2] *Maximum momentary torque for emergency stops or heavy shock load. (Admissible stops per life of gearhead = 1,000 stops maximum.)*
[3] *Inertia based on maximum input. For lower inertia, using smaller diameter input, contact STOBER.*
* *MT = Motor Adapter L = Large Input Option*