K Series

Bevel Helical Gear Units

RENOLD

Superior Gear Technology

ATEX
Compliance Assured

Total compliance with the ATEX Directive safeguarding the use of industrial equipment in potentially explosive atmospheres is assured for users of our geared products.

Certification is available for standard gearboxes and geared motors with badging displaying the CE Mark and the Ex mark, name and location of the manufacturer, designation of series or type, serial number, year of manufacture, Ex symbol and equipment group/category.

ATEX directive 94/9/EC (also known as ATEX 95 or ATEX 100A) and the CE Marking Directive are enforced in all EC member states. Compliance is compulsory for designers, manufacturers or suppliers of electrical and non-electrical equipment for use in potentially explosive atmospheres created by the presence of flammable gases, vapours, mists or dusts.

Ex compliant standard gearboxes can be supplied against Groups 2 or 3 for surface industries in designated hazardous location Zones 1 and 2 for gases, vapours and mists; and in Zones 21 and 22 for dusts.

GENERAL DESCRIPTION

K Series

K Series right angle drive helical bevel helical geared motors offer ratios from 8 : 1 to 160 : 1 in three stages or up to 10,000 : 1 in five stages. Motors are available up to 160kW and output torque capacity up to 50000. Nm. The K Series geared motor is designed with integral cast feet for base or end mounting and can be offered with single or double extended output shafts. Units are also available shaft mounted or with output flanges and are available for mounting horizontally or vertically. The units can also be offered with a bolt on torque reaction bracket and all variants are available either motorised or with an input shaft assembly.

Adding to the range of geared motors this product takes advantage of our many years of accumulated design expertise together with the use of high quality materials and components. The end result is a series of speed reducing geared motors offering high load carrying capacities, increased efficiency, quiet running and reliability.

The Range Includes:

12 Sizes of Units:
K03, K04, K05, K06, K07, K08, K09,
K10, K12, K15, K16, K18

Version B - standard unit with feet
Version F or H - standard unit with output flange
Version T or Q - standard unit with torque bracket

Unit Types:

Unit type M - Motorised with IEC standard motor
Unit type D - Motorised with Compact motor
Unit type N - Motorised with NEMA standard motor
Unit type H - Motorised with high efficiency motor (IE3)
Unit type E - Motorised with NEMA high efficiency motor (PREMIUM)
Unit type G - Unit to allow fitting of IEC motor
Unit type A - Unit to allow fitting of NEMA motor
Unit type R - Reducer unit
Unit type S - Reducer unit with fan kit
Unit type W - Reducer unit with backstop CCW rotation
Unit type X - Reducer unit with backstop CW rotation
Unit type Y - Reducer unit with fan and backstop CW rotation
Unit type Z - Reducer unit with fan and backstop CCW rotation

Design Features Include:

Patented standard motor connection (IEC or NEMA)

Ability to fit double oil seals, on output shaft or reducer input shaft as required.

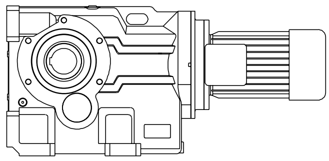
All units are dimensionally interchangeable with other major European manufacturers

Braked geared motors are available as standard

Units are manufactured and assembled from a family of modular kits for distributor friendliness minimising inventory and maximising availability

Motorised units can be fitted with a backstop module and reducer units can be fitted with a backstop and fan.

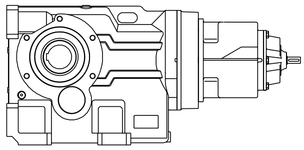
As improvements in design are being made continually this specification is not to be regarded as binding in detail and drawings and capacities are subject to alteration without notice. Certified drawings will be sent on request.



Motorised
Triple reduction
Standard unit with feet

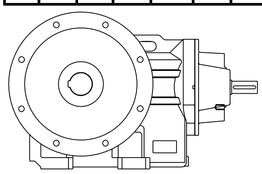
*

K	0	8	3	2	5	0	.	B	M	C	-	1	B	7	.	5	A	-	-



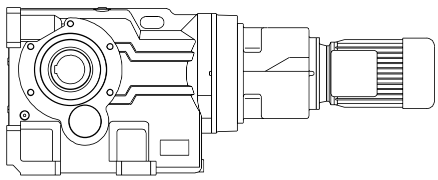
Reducer
Quintuple reduction
Standard unit with feet

K	0	8	5	2	1	2	C	B	R	C	-	1	-	-	-	-	-	-	-



Reducer
Triple reduction Standard unit with output flange on left

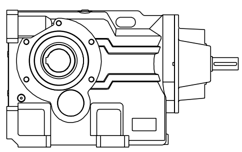
K	0	9	3	1	5	0	.	F	R	H	-	1	-	-	-	-	-	-	-



Motorised
Quintuple reduction
Standard unit with feet

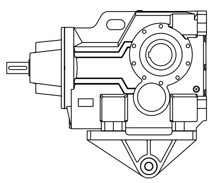
*

K	0	8	5	2	1	2	C	B	M	C	-	1	B	.	2	5	A	-	-



Reducer
Triple reduction
Standard unit with feet

K	0	8	3	2	5	0	.	B	R	C	-	1	-	-	-	-	-	-	-



Reducer
Triple reduction
Standard unit with torque bracket

K	0	8	3	2	5	0	.	T	R	H	-	1	-	-	-	-	-	-	-

* Typical unit designations

UNIT DESIGNATIONS

	Gearbox Codes														Motor Codes					
	Series	Size of Unit		No of Reductions	Revision Version	Nominal Overall Ratio			Unit Version	Type of Unit	Output Shaft	Motor Adaptor	Mounting Position		Geared Motor Power			No of Motor Poles	Additional Motor Features	Additional Gearbox Features
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
**	K																			
Example	K	0	8	3	2	5	0	.	B	M	C	G	1	D	4	.	0	A	-	-

** Looking on Inputshaft Mounting Position 1 (See unit handings page)

*** Non Standard and Handing - Consult Application Engineering

1 - K Series

Range K

2, 3 - Size of Unit

0 3 Through 1 8

4 - No of Reductions

3 Through 5

5 - Revision Version

2

6, 7, 8 - Nominal Overall Ratio

e.g. 5 0 .

9 - Unit Version

Standard Unit with Feet B

STD Unit with Output Flange F on Left ** H on Right**

STD Unit with Torque Bracket T on Left ** Q on Right**

10 - Type of Unit

- M - Motorized with IEC standard motor (IE2)
- D - Motorised with Compact Motor
- N - Motorized with NEMA standard motor
- H - Motorized with IEC high efficiency motor (IE3)
- E - Motorized with NEMA high efficiency motor (PREMIUM)
- G - Unit to allow fitting of IEC motor (customer own motor)
- A - Unit to allow fitting of NEMA motor (customer own motor)
- R - Reducer unit
- S - Reducer unit with fan kit
- W - Reducer unit with backstop CCW rotation
- X - Reducer unit with backstop CW rotation
- Y - Reducer unit with fan and backstop CW rotation
- Z - Reducer unit with fan and backstop CCW rotation

20 - Additional Gearbox Features

Double Oil Seal, Motorized Backstop etc

e.g. - F

19 - Additional Motor Features

e.g. - A

For Types Without Motor Enter -

18 - No of Motor Poles

- No motor

		60 Hz		50 Hz
4 Pole (Std)	1800 rpm	A	1500 rpm	B
4 Pole (High)	1800 rpm	K	1500 rpm	L
6 Pole (Std)	1200 rpm	C	1000 rpm	D
6 Pole (High)	1200 rpm	M	1000 rpm	N
2 Pole	3600 rpm	E	3000 rpm	F
8 Pole	900 rpm	G	750 rpm	H

S Dual speed or special motor

15, 16, 17 - Geared Motor Powers

Motor HP required (For 50 Hz enter kW)

e.g. . . 7 5

For reducer and non standard motor types enter - - -

13, 14 - Mounting Position

e.g. 2 B

12 - Motor Adaptor For Unit Types Column 10 Entries M, N, H, E, G or A

See Pages 9 and 10

For All Other Types Enter -

11 - OUTPUT SHAFT

Standard Single Extension C on Left * E on Right **

Standard Double Extension D

Standard Hollow Shaft H

Standard Shrink disc X on Left ** Y on Right ***

* This Page May Be Photocopied Allowing The Customer To Enter Their Order

EXPLANATION & USE OF RATINGS & SERVICE FACTORS

Gear unit selection is made by comparing actual loads with catalogue ratings. Catalogue ratings are based on a standard set of loading conditions, whereas actual load conditions vary according to type of application. Service Factors are therefore used to calculate an equivalent load to compare with catalogue ratings.
i.e. Equivalent Load = Actual Load x Service Factor

Mechanical Ratings and Service Factors Fm and Fs

Mechanical ratings measure capacity in terms of life and/or strength, assuming 10 hr/day continuous running under uniform load conditions.
Catalogue ratings allow 100% overload at starting, braking or momentarily during operation up to 10 hours per day.
The unit selected must therefore have a catalogue rating at least equal to half maximum overload.
Mechanical Service Factor Fm (Table 1) is used to modify the actual load according to daily operating time, and type of loading.
Load characteristics for a wide range of applications are detailed in Table 3 opposite, which are used in deciding the appropriate Service Factor Fm from Table 1.
If overloads can be calculated, or accurately assessed, actual loads should be used instead of Fm.
For units subjected to frequent stop/starts overloads in excess of 10 times/day multiply factor Fm x Factor Fs (table 2).
For applications where units are to operate in extremely dusty or moist/humid atmospheres unit selection should be referred to application engineering.

Table 1. Mechanical Service Factor (Fm)

Prime Mover	**Duration of Service Hours per day**	**Load Classification-Driven Machine**		
		Uniform mass acceleration factor ≤ 0.2	**Moderate** mass acceleration factor ≤ 3	**Heavy** mass acceleration factor ≤ 10
Electric Motor, Steam Turbine or Hydraulic Motor	< 3	0.80	1.00	1.50
	3 - 10	1.00	1.25	1.75
	> 10	1.25	1.50	2.00
Multi-cylinder Internal Combustion Engine	< 3	1.00	1.25	1.75
	3 - 10	1.25	1.50	2.00
	> 10	1.50	1.75	2.25
Single-cylinder Internal Combustion Engine	< 3	1.25	1.50	2.00
	3 - 10	1.50	1.75	2.25
	> 10	1.75	2.00	2.50

$$\text{Mass acceleration factor} = \frac{\text{all external moments of inertia *}}{\text{moment of inertia of driving motor}}$$

* calculated with reference to the motor speed

Table 2. Number of Starts Factor (Fs)

Start / Stops per hour (1)	Up to 1	5	10	40	60	≥ 200
Factor Fs	1.00	1.03	1.06	1.10	1.15	1.20

Note: Intermediate values are obtained by linear interpolation

LOAD CLASSIFICATION BY APPLICATIONS

Load Classifications - **U** =Uniform Load **M** =Moderate Shock Load **H** =Heavy Shock Load **†** =Consult our Engineers

Agitators	
Pure liquids	U
Liquids and solids	M
Liquids variable density	M
Blowers	
Centrifugal	U
Lobe	M
Vane	U
Brewing & distilling	
Bottling machinery	M
Brew Kettles	M
Cookers	M
Mash tubs	M
Scale hopper	M
Can filling machinery	M
Crane knife	M
Car dumper	M
Car puller	M
Clarifier	U
Classifier	M
Clay wokring machinery	
Brick press	H
Briquette machine	H
Clay working machinery	M
Plug mill	M
Compressors	
Centrifugal	U
Lobe	M
Reciprocating	
Multi cylinder	M
Single cylinder	H
Conveyors- Light duty uniform load	
Apron	U
Assembly	U
Belt	U
Bucket	U
Chain	U
Flight	U
Oven	U
Screw	U
Conveyors - Heavy duty uniform load	
Apron	M
Assembly	M
Belt	M
Bucket	M
Chain	M
Flight	M
Live roll	†
Oven	M
Reciprocating	M
Screw	M
Shaker	M
Cranes	†
Crusher	
Ore	H
Stone	H
Sugar	H
Dredger	M
Cable reals	M
Conveyors	M
Cutter head drive	H
Pumps	M
Screen drive	H
Stackers	M
Winches	M

Elevators	
Bucket - Uniform load	U
Bucket - Heavy load	M
Bucket - Continuous	U
Centrifugal discharge	U
Escalators	U
Freight	M
Gravity discharge	U
Passenger lifts	†
Fans	
Centrifugal	U
Cooling towers	
Induced draft	†
Forced draft	†
Fan - Large diameter induced draft	M
Fan - Light, small diameter	M
Feeders	
Apron	M
Belt	M
Disc	U
Reciprocating	H
Screw	M
Food industry	
Cereal cooker	U
Dough mixer	M
Meat grinder	M
Meat slicer	M
Generators - not welding	U
Hammer mills	H
Hoists	
Heavy duty	H
Medium duty	M
Skip hoist	M
Laundry	
Tumbler	M
Washer	M
Line shafts	
Heavy duty	M
Light duty	U
Lumber industry	
Barkers	M
Burner conveyor	H
Chain/ Drag saw	H
Chain transfer	H
Chain way transfer	H
De- barking drum	H
Edger feed	M
Gang feed	M
Green chain	M
Live roll	H
Log deck	H
Log haul	H
Log turning	H
Log converyor	H
Of bearing roll	M
Planer feed chaines	M
Planer hoist	M
Re-saw conveyor	M
Roll cases	H
Slab conveyor	H
Sorting table - triple hoist	M
Triple hoist - Drive /conveyor	M
Transfer converor	M
Transfer roll	M
Tray drive	M
Trimmer feed	M
Waster conveyor	M
Small waste conveyor (belt)	U
Small waste conveyor (chain)	U

Machine Tools	
Bending roll	M
Punch press	H
Notching press	H
Plate planer	H
Other machine tools	
Main drive	M
Aux drive	U
Metal mills	
Carriage/main drive	M
Draw bench	M
Dryer	M
Flattening machinery	M
Pinch drive	M
Reversing slitters	M
Scrubber rolls	M
Table conveyors	
Group drives	H
Individual drives	H
Table conveyors- reversing	H
Wire draw	M
Wire roll	M
Mills	
Cement kiln	H
Dryer, Cooler	H
Kiln (other)	H
Rod plain	H
Rod wedge bar	H
Rotary/ Ball	H
Tumbling barrel	H
Mixers	
Concrete	M
Cons density	U
Variable density	M
Oil industry	
Chiller’s	M
Oil well pump	M
Filter press	M
Rotary kiln	M
Paper industry	
Agitator (mixer)	M
Barker (hydraulic)	M
Barker (mechanical)	H
Barking drum	H
Beater & Pulper	M
Bleacher	U
Caledndners	M
Calenders- super	H
Converting machine	M
Conveyors	U
Couch	M
Cutters - plates	H
Cylinders	M
Dryers	M
Felt stretcher	M
Felt whipper	H
Jordans	M
Log haul	H
Machine real	M
Presses	M
Stock chest	M
Suction roll	M
Washers & thickeners	M
Winders	M
Printing presses	†
Pullers	
Barge haul	H

Pumps	
Centrifugal proportioning	U
Proportioning	M
Reciprocating	
Single acting 3+ cylinders	M
Double acting 2+ cylinders	M
Single acting 1 & 2 cylinders	†
Double acting 1 cylinder	†
Rotary- gear type	U
Rotary- lobe type/ vane	U
Sand muller	M
Sewage treatment	
Bar screen	U
Chemical feeder	U
Collector	U
Dewatering screw	M
Mixers	M
Scum breaker	M
Thickness	M
Vacuum filters	M
Screens	
Air washing	U
Rotary, stone or gravel	M
Traveling water intake	U
Slab pushers	M
Slewing	H
Steering gear	†
Stokers	U
Sugar industry	
Can knife	M
Crusher	M
Mills	M
Textile industry	
Batchers	M
Calenders	M
Cards	M
Dry cans	M
Dryers	M
Dyeing machinery	M
Knitting machinery	M
Looms	M
Mangles	M
Nappers	M
Pads	M
Range drive	M
Slashers	M
Soapers	M
Spinners	M
Tenter frame	M
Washers	M
Winders	M
Windlass	†

SELECTION PROCEDURE FOR MOTORISED UNITS

EXAMPLE APPLICATION DETAILS

Absorbed power of driven machine = 13kW
Output speed of gearbox or Input speed of machine = 45 rev/min
Application = Uniformly loaded belt conveyor
Duration of service (hours per day) = 24hrs
Mounting position = 1
Ambient temperature = 20°C
Running time (%) = 100%

1 DETERMINE MECHANICAL SERVICE FACTOR (Fm)

Refer to Load Classification by Application, table 3.

Application = Uniformly loaded belt conveyor

Conveyors-uniformly loaded or fed	
apron	U
assembly	U
belt	U
bucket	U
chain	U

U = Uniform load

Refer to mechanical service factor (Fm), table 1, page 3

Duration of service (hours per day) = 24hrs

Prime mover	Duration of service- hrs per day	Load classification-drive: Uniform	Moderate Shock
Electric motor, steam turbine or hydraulic motor	< 3	0.80	1.00
	3 - 10	1.00	1.25
	> 10	1.25	1.50

Therefore mechanical service factor (Fm) = 1.25

2 DETERMINE REQUIRED OUTPUT TORQUE AT GEARBOX OUTPUTSHAFT

$$\text{Absorbed output torque} = \frac{\text{Absorbed power x 9550}}{\text{Gearbox output speed}}$$

$$\frac{13 \times 9550}{45} = 2759 \text{ Nm}$$

3 SELECT GEARED MOTOR

Refer to selection table one motor size larger than absorbed power.
Absorbed power = 13kW, therefore refer to 15kW selection table.

Always select from 4 POLE selection table in the first instance as this offers a more economical solution.

Required output speed of gearbox = 45 rev/min

15.0kW

4 POLE

N2 R/MIN Output Speed	i Ratio	M2 Nm Output Torque	Fm Service Factor	N Overhung Load	Unit Designation Column Entry 1 Through 20 Spaces to be filled when entering order	kg Weight of base mount unit	Motor Size
73	20.03	1891	1.94	34547	K093220._M_-__15.A--	318	160L
58	25.02	2359	1.60	35382	K093225._M_-__15.A--	318	160L
53	27.78	2612	1.44	35382	K093228._M_-__15.A--	318	160L
46	31.67	2995	1.26	35345	K093232._M_-__15.A--	318	160L
41	35.62	3351	1.13	35024	K093236._M_-__15.A--	318	160L
36	40.33	3804	0.99	35372	K093240._M_-__15.A--	318	160L
33	44.89	4233	0.89	35372	K093245._M_-__15.A--	318	160L

Go to point 4

4 - <u>CHECK OUTPUT TORQUE</u>

Output torque (M2) of selected unit must be equal or more than required output torque at gearbox outputshaft.

Required output torque at gearbox outputshaft = 2759 Nm

15.0kW

4 POLE

N2 R/MIN	i	M2 Nm	Fm	N	Unit Designation	kg	
Output Speed	Ratio	Output Torque	Service Factor	Overhung Load	Column Entry 1 Through 20 Spaces to be filled when entering order	Weight of base mount unit	Motor Size
73	20.03	1891	1.94	34547	K093220._M_-__15.A--	318	160L
58	25.02	2359	1.60	35382	K093225._M_-__15.A--	318	160L
53	27.78	2612	1.44	35382	K093228._M_-__15.A--	318	160L
46	31.67	2995	1.26	35345	K093232._M_-__15.A--	318	160L
41	35.62	3351	1.13	35024	K093236._M_-__15.A--	318	160L
36	40.33	3804	0.99	35372	K093240._M_-__15.A--	318	160L
33	44.89	4233	0.89	35372	K093245._M_-__15.A--	318	160L

Selected unit's output torque (M2) = 2995 Nm, therefore unit is acceptable

5 - <u>CHECK SERVICE FACTOR</u>

Service factor (Fm) of selected unit must be equal or more than required service factor.

Required service factor of gearbox = 1.25

15.0kW

4 POLE

N2 R/MIN	i	M2 Nm	Fm	N	Unit Designation	kg	
Output Speed	Ratio	Output Torque	Service Factor	Overhung Load	Column Entry 1 Through 20 Spaces to be filled when entering order	Weight of base mount unit	Motor Size
73	20.03	1891	1.94	34547	K093220._M_-__15.A--	318	160L
58	25.02	2359	1.60	35382	K093225._M_-__15.A--	318	160L
53	27.78	2612	1.26	35382	K093232._M_-__15.A--	318	160L
46	31.67	2995	1.26	35345	K093232._M_-__15.A--	318	160L
41	35.62	3351	1.13	35024	K093236._M_-__15.A--	318	160L
36	40.33	3804	0.99	35372	K093240._M_-__15.A--	318	160L
33	44.89	4233	0.89	35372	K093245._M_-__15.A--	318	160L

Selected unit's service factor (Fm) = 1.26, therefore unit is acceptable.

6 - <u>CHECK OVERHUNG LOADS</u>

If sprocket, gear, etc is mounted on the outputshaft then refer to Overhung Loads Procedure and compare with allowable overhung load (N) of selected unit

Allowable overhung load (N) must be equal or more than calculated overhung load (P)

15.0kW

4 POLE

N2 R/MIN	i	M2 Nm	Fm	N	Unit Designation	kg	
Output Speed	Ratio	Output Torque	Service Factor	Overhung Load	Column Entry 1 Through 20 Spaces to be filled when entering order	Weight of base mount unit	Motor Size
73	20.03	1891	1.94	34547	K093220._M_-__15.A--	318	160L
58	25.02	2359	1.60	35382	K093225._M_-__15.A--	318	160L
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41	35.62	3351	1.13	35024	K093236._M_-__15.A--	318	160L
36	40.33	3804	0.99	35372	K093240._M_-__15.A--	318	160L
33	44.89	4233	0.89	35372	K093245._M_-__15.A--	318	160L

NOTE: If any of the following conditions occur then consult Application Engineering:-

a) $\frac{\text{Inertia of the Driven Machine (Referred to motor speed)}}{\text{Inertia of Gear Unit plus Motor}} > 10$

b) Ambient temperature is above 40°C