Spur Gears

Helical Gears

Internal Gears

Racks

CP Racks & Pinions

Miter Gears

Bevel Gears

Screw Gears

Worm Gear Pair

Bevel Gearboxes

Other Products

Gear Boxes

PBX Miniature Bevel Gearboxes	**KBX** Bevel Gearboxes	**CBX** Bevel Gearboxes
Model L / T Page 396	Model L / T Page 400	Model L / T Page 404
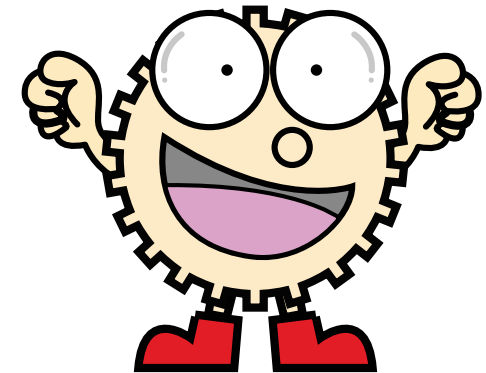
Catalog Number of KHK Stock Gears

The Catalog Number for KHK stock gears is based on the simple formula listed below. Please order KHK gears by specifying the Catalog Numbers.

(Example) Gearboxes

P BX - 04 1 L

Model (L Model)
Gear Ratio (1)
Shaft Diameter (4 mm)
Type (Bevel Gearbox)
Housing Material (Plastic)
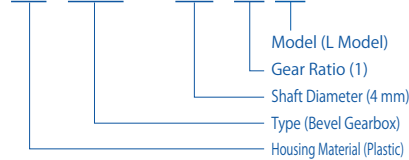
Housing Material
P   Plastic
K   Light Metal Alloy
C   FC250 Cast Iron

Main body
BX   Bevel Gearbox

■ Feature Icons

RoHS Compliant Product	Finished Product	Ground Gear
Re-machinable Product	Heat Treated Product	Stainless Product

Resin Product	Injection Molded Product
Copper Alloy Product	Black Oxide coated Product

Bevel Gearboxes

Side tabs (left and right): Spur Gears, Helical Gears, Internal Gears, Racks, CP Racks & Pinions, Miter Gears, Bevel Gears, Screw Gears, Worm Gear Pair, **Bevel Gearboxes**, Other Products

■ Selection Guide

PBX-L Type   PBX-T Type

KBX-L Type   KBX-T Type

Essential data for selection

Load torque, type of prime mover, input speed, speed ratio, running time, coupling method, and frequency of start and stop.

Selection Procedure

The performance table in the catalog is based on the design conditions that the prime mover is a motor, the load is uniform, and the unit runs 10 hours per day.

a) When using the units under any other condition, it is necessary to correct the value of load to torque by applying the service factors shown in Table 1.

Corrected Load Torque = Load torque applied to gearbox x Service factor <See Table 1>.

Service factors (Sf) 〈Table 1〉

Loading condition	Service factors （Sf）		
	Less than 3 hrs/day operation	3–10 hrs/day operation	More than 10 hrs/day operation
Uniform load	1 (1)	1 (1.25)	1.25 (1.50)
Light impact load	1 (1.25)	1.25 (1.50)	1.50 (1.75)
Heavy impact load	1.25 (1.50)	1.50 (1.75)	1.75 (2.00)

（NOTE） 1. Use the factors in parentheses when frequency of starts and stops exceed 10 times per hour.
2. Also, use the factors in parentheses when a prime mover other than a motor is used (for example, an internal combustion engine).

Keep the corrected load torque at the speed at less than the allowed X & Y axis torque (Speed ratio 1:1), or the allowable Y axis torque (Speed ratio 1:2) shown in the performance table.

b) Select an appropriate shaft layout from the shaft layout drawing for each model.

c) Check for overhang load space (O.H.L.)
Overhang load is a load applied beyond the bearing support. Examining the overhang load is indispensable whenever chains, belts, or gears are used to couple the unit with the mating machinery.

$$O.H.L. = \frac{T_{LE} \times K_1 \times K_2}{R} \text{ (N) \{kgf\}}$$

T_{LE} : Corrected load torque applied to the gearbox shaft （N・m）{kgf・m}
R : Pitch radius of sprocket, pulley, gear, etc., mounted on the gearbox shaft （m）
K_1 : Factor depending on the method of coupling <See Table 2>
K_2 : Factor depending on the position of load <See Table 3>
＊ The value of O.H.L. from the equation above must be smaller than the value of allowable O.H.L. on the X-and the Y-axis shown on the performance table.
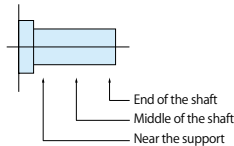
Factor K_1 〈Table 2〉

Coupling method	K_1
Chain, timing belt	1.00
Gear	1.25
V belt	1.50

Factor K_2 〈Table 3〉

Position of load	K_2
Near the support	0.75
Middle of shaft	1.00
End of the shaft	1.50

● Position of load

End of the shaft
Middle of the shaft
Near the support

d) Select a model capable to satisfy all of a), b) and c) obtained above.
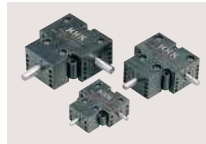
■ Selection Examples

CBX-L Type   CBX-T Type

Example 1

Application	／ Conveyor (uniform load)
Load torque	／ 78.4N・m {8kgf・m}
X-axis rotational speed	／ 300rpm
Speed Ratio	／ 1 : 2
Shaft layout	／ As illustrated at right
Running time	／ 12 hours/day
Coupling method	／ X-axis — Coupling
	Y-axis — Chain (positioned at the middle of the shaft)
Installation	／ Horizontal
Location	／ Indoors

CBX-LB Type

Motor

Chain

PCDφ100
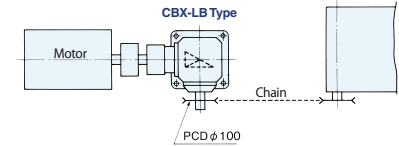
① **Torque Analysis**
Service factor under load is Sf = 1.25 (Table 1).
Accordingly, corrected load torque applied to Y-axis.
T_{LE} = 78.4 × 1.25 = 98N・m {T_{LE} = 8 × 1.25 = 10kgf・m}

② **O.H.L. Analysis**
O.H.L.on the Y-axis

$$O.H.L. = \frac{T_{LE} \times K_1 \times K_2}{R} = \frac{98 \times 1 \times 1}{\frac{100}{2 \times 1000}} = 1960N \quad \left\{ O.H.L. = \frac{T_{LE} \times K_1 \times K_2}{R} = \frac{10 \times 1 \times 1}{\frac{100}{2 \times 1000}} = 200kgf \right\}$$

③ **Model Selection**
A model capable of satisfying all of the design conditions, torque and O.H.L. is **CBX-322LB.**

Example 2

Application	／ Line shaft drive
Load torque	／ 58.8N・m {6kgf・m} (uniform load) for each A,B and C
Rotational speed	／ 600rpm
Speed Ratio	／ 1 : 1
Shaft layout	／ As illustrated at right
Running time	／ 8 hours/day
Coupling method	／ All couplings
Installation	／ Horizontal
Location	／ Indoors

Load A   Load B   Load C

Motor

No.1 CBX-TB Type   No.2 CBX-TB Type   No.3 CBX-LB Type
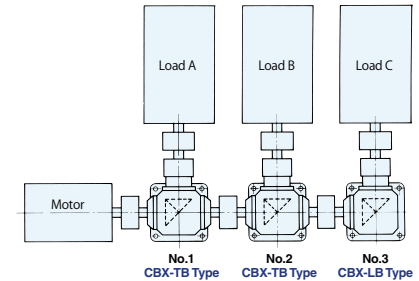
In case of an inline shaft drive, load applied to the Y-axis varies with the location of the gearbox. Therefore, an adequate model must be selected individually for each position. Service factor (Table 1) under the design condition is Sf=1.0 for all gearboxes.

① **Gearbox No.1**
Corrected load torque applied to the X-axis that drives only load A is:
58.8 × 1.0 = 58.8N・m {6 × 1.0 = 6kgf・m}
Corrected load torque applied to the Y-axis that drives load A, B and C is:
(58.8 + 58.8 + 58.8) × 1.0 = 176.4N・m
{(6 + 6 + 6) × 1.0 = 18kgf・m}
CBX-401TB is selected from the performance table.

② **Gearbox No.2**
Corrected load torque applied to the X-axis that drives only load B is:
58.8 × 1.0 = 58.8N・m {6 × 1.0 = 6kgf・m}
Corrected load torque applied to the Y-axis that drives load B and C is:
(58.8 + 58.8) × 1.0 = 117.6N・m
{(6 + 6) × 1.0 = 12kgf・m}
CBX-321TB is selected from the performance table.

③ **Gearbox No.3**
Corrected load torque applied to the X-axis that drives only load C is:
58.8 × 1.0 = 58.8N・m {6 × 1.0 = 6kgf・m}
Corrected load torque applied to the Y-axis that drives only load C is:
58.8 × 1.0 = 58.8N・m {6 × 1.0 = 6kgf・m}
CBX-251LB is selected from the performance table.

④ **Model selection**
No.1 gearbox is **CBX-401TB**
No.2 gearbox is **CBX-321TB**
No.3 gearbox is **CBX-251LB**

⬚ Bevel Gearbox's - Moment of Inertia

■ Moment of Inertia of KBX Bevel Gearbox's

Unit：kg・m^2

Type	Catalog No.	Pinion Shaft (X-axis)	Gear Shaft (Y-axis)
L	KBX-101L	4.45×10^{-6}	4.45×10^{-6}
	KBX-102L	2.16×10^{-6}	8.65×10^{-6}
	KBX-151L	5.30×10^{-5}	5.30×10^{-5}
	KBX-152L	3.65×10^{-5}	1.47×10^{-4}
	KBX-201L	1.79×10^{-4}	1.79×10^{-4}
	KBX-202L	7.85×10^{-5}	3.15×10^{-4}
T	KBX-101T	4.75×10^{-6}	4.75×10^{-6}
	KBX-102T	2.23×10^{-6}	8.93×10^{-6}
	KBX-151T	5.60×10^{-5}	5.60×10^{-5}
	KBX-152T	3.37×10^{-5}	1.50×10^{-4}
	KBX-201T	1.94×10^{-4}	1.94×10^{-4}
	KBX-202T	8.20×10^{-5}	3.28×10^{-4}

〔**CAUTION**〕 The moments of inertia shown in this table are reference values.
Please use data only for reference.

■ Moment of Inertia of CBX Bevel Gearbox's

Unit：kg・m^2

Type	Catalog No.	Pinion Shaft (X-axis)	Gear Shaft (Y-axis)
L	CBX-191L	4.00×10^{-4}	4.00×10^{-4}
	CBX-192L	1.86×10^{-4}	7.43×10^{-4}
	CBX-251L	2.48×10^{-3}	2.48×10^{-3}
	CBX-252L	1.03×10^{-3}	4.13×10^{-3}
	CBX-321L	4.00×10^{-3}	4.00×10^{-3}
	CBX-322L	1.29×10^{-3}	5.18×10^{-3}
	CBX-401L	8.95×10^{-3}	8.95×10^{-3}
	CBX-402L	3.83×10^{-3}	1.53×10^{-2}
T	CBX-191T	4.05×10^{-4}	4.05×10^{-4}
	CBX-192T	1.87×10^{-4}	7.48×10^{-4}
	CBX-251T	2.50×10^{-3}	2.50×10^{-3}
	CBX-252T	1.04×10^{-3}	4.15×10^{-3}
	CBX-321T	4.08×10^{-3}	4.08×10^{-3}
	CBX-322T	1.31×10^{-3}	5.25×10^{-3}
	CBX-401T	9.20×10^{-3}	9.20×10^{-3}
	CBX-402T	3.88×10^{-3}	1.55×10^{-2}

〔**CAUTION**〕 The moments of inertia shown in this table are reference values.
Please use data only for reference.

Spur Gears

Helical Gears

Internal Gears

Racks

CP Racks & Pinions

Miter Gears

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