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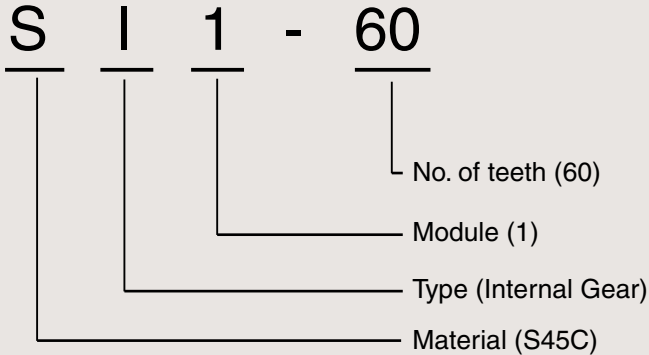
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Catalog Number of KHK Stock Gears

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)

Internal Gears



Material
S S45C

Type
I Internal Gears
IR Ring Gears

3

Internal Gears





Internal Gears

For Convenient Use in Various Purposes Such as Planetary Gear Drives and Segment Gears.



Characteristics

KHK stock internal gears are offered in modules 1 to 3 in 50 to 200 teeth. They can be used in many applications including planetary gear drives.

■ SI Internal Gears

SI internal gears can be combined with SS and SSA spur gears to make planetary gear drives.

■ SIR ring gears

SIR ring gears can be cut to make segment gears and corner racks.



Selection Hints

Please select the most suitable products by carefully considering the characteristics of items and contents of the product tables. It is also important to read all applicable notes before the final selection. Use of catalog numbers when ordering will simplify and expedite the processing of your order.

1. Caution in Selecting the Mating Gears

Most KHK stock spur gears may be used as the mating gears except CP spur gears and gears with large numbers of teeth. When the difference in the numbers of teeth between an internal gear and its mating gear is small, involute interference, trochoid interference or trimming interference may occur.

2. Caution in Selecting Gears Based on Gear Strength

The gear strength values shown in the product pages were computed by assuming a certain application environment. Therefore, they should be used as reference only. We recommend that each user computes his own values by applying the actual usage conditions. The table on the right contains the assumptions established for these products in order to compute gear strengths.



■ Calculation of Bending Strength of Gears

Item	Catalog No.	SI	SIR
Formula <small>NOTE 1</small>		Formula of spur and helical gears on bending strength(JGMA401-01)	
No. of teeth of mating gears		30	
Rotation		100min ⁻¹	
Durability		Over 10 ⁷ cycles	
Impact from motor		Uniform load	
Impact from load		Uniform load	
Direction of load		Bidirectional	
Allowable beam stress at root <small>σ_{Flim}</small> <small>NOTE 2</small>		12.67kgf/mm ²	
Safety factor <small>S_F</small>		1.2	

■ Calculation of Surface Durability (Except where it is common with bending strength)

Formula <small>NOTE 1</small>	Formula of spur and helical gears on surface durability (JGMA402-01)		
Kinematic viscosity of lubricant	100cSt(50°C)		
Gear support	Symmetric support by bearings		
Allowable Hertz stress <small>σ_{Hlim}</small>	49kgf/mm ²		
Safety factor <small>S_H</small>	1.15		

NOTE 1:The gear strength formula is based on JGMA (Japanese Gear Manufacturers' Association) The units for the rotational speed (min⁻¹) and the stress (kgf/mm²) are adjusted to the units needed in the formula.

NOTE 2:Since the load is bidirectional, the allowable bending stress at root σ_{Flim} calculated is set to 2/3 of the value.

3. Other Points to Consider in Selection Process

- ① There are various footnotes to the product pages under the headings of "NOTES". Please consider them carefully when selecting these products.
- ② There may be slight differences in color or shape of products shown in the photograph from the actual products.
- ③ KHK reserves the right to make changes in specifications and dimensions without notice.
- ④ KHK is ready to produce and supply custom order products. When you require specific gears different from KHK Stock Gears please contact our distributor for quotation. Also, please refer to page 16 "KHK Custom Order Products".



Application Hints

In order to use KHK stock internal gears safely, read the Application Hints carefully before proceeding. Also “1. Caution on Performing Secondary Operations”, “3. Notes on Starting Operations” and “4. Other Points to Consider in Applications” in the spur gear section should be consulted.

1. Point of Caution in Assembling

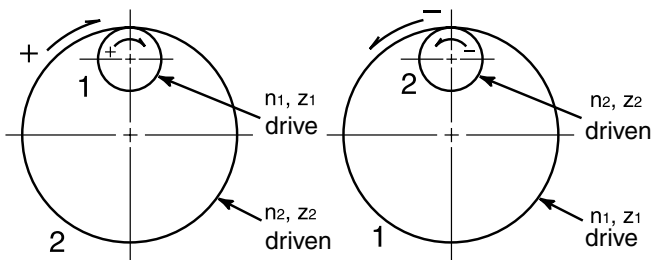
① KHK stock internal gears are designed to give the proper backlash when assembled using the center distance given by the formula below. The amount of backlash is given in the product table for each gear.

$$a = \frac{d_1 - d_2}{2}$$

where
 a = center distance
 d₁ = pitch diameter of pinion
 d₂ = pitch diameter of internal gear

② Note that the direction of rotation of the internal gear is different from that of two spur gears in mesh

Gear Ratio and Direction of Rotation



(a) Internal gear is driven (b) Internal gear drives

$$\text{Gear ratio } i = \frac{z_1}{z_2} = \frac{n_2}{n_1}$$

z = No. of teeth
 n = Rotational speed

③ Various types of interference and their symptoms and causes are tabulated below

TYPE	SYMPTOMS	CAUSES
Involute interference	The tip of the internal gear digs into the root of the pinion.	Too few teeth on the pinion.
Trochoid interference	The exiting pinion tooth contacts the internal gear tooth.	Too little difference in number of teeth of the two gears.
Trimming interference	Pinion can slide in or out axially but cannot move radially.	Too little difference in number of teeth of the two gears.

④ To use as a planetary gear drive, the following conditions must be satisfied.

Condition on number of teeth in planetary mechanism

Condition 1... $z_c = z_a + 2z_b$

Condition 2... $\frac{z_a + z_c}{N} = \text{Integer}$

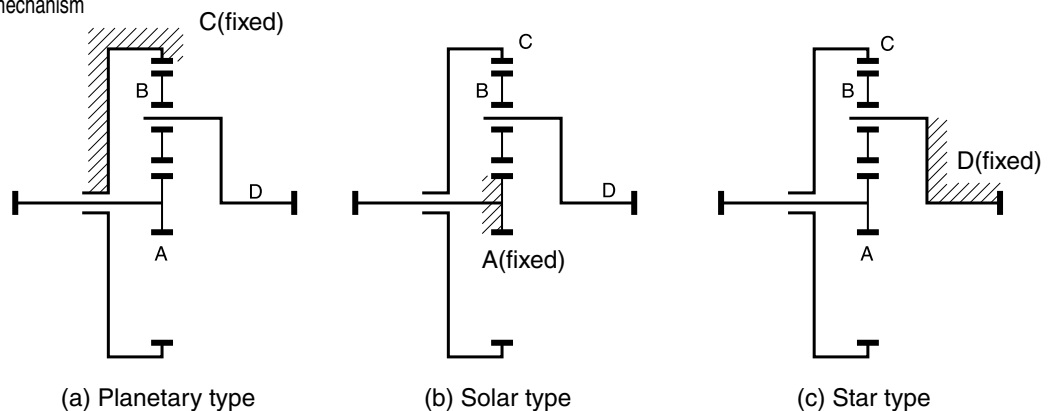
Condition 3... $z_b + 2 < (z_a + z_b) \sin \frac{180^\circ}{N}$

z_a : No. of teeth of sun gear
 z_b : No. of teeth of planet gears
 z_c : No. of teeth of internal gear
 N : No. of planet gears

Example of combinations

No. of teeth of internal gear	No. of planet gears	No. of teeth of sun gear	No. of teeth of planet gears	Reduction ratio of planetary type	Reduction ratio of solar type	Reduction ratio of star type
50	3	16	17	1/4.125	1/1.32	-1/3.125
80	3	16	32	1/6	1/1.2	-1/5
80	3	40	20	1/3	1/1.5	-1/2
100	3	20	40	1/6	1/1.2	-1/5
100	3	50	25	1/3	1/1.5	-1/2

Types of Planetary gear reduction mechanism



(a) Planetary type

(b) Solar type

(c) Star type