Spur Gears

Helical Gears

Internal Gears

Racks

CP Racks & Pinions

Miter Gears

Bevel Gears

Screw Gears

Worm Gear Pair

Bevel Gearboxes

Other Products

## ■ Features of MHP High Ratio Hypoid Gears

A pair of MHP high-ratio hypoid gears are able to produce an amazing reduction of speed of 200:1 in one stage.

1. Total-cost reduction

   The MHP provides a compact gearing body replacing several stages of reduction gears. This reduces the cost sharply.

2. High efficiency

   Compared to worm gear drives, the MHP has less sliding contact. The resulting higher efficiency allows the use of smaller motors (See the graph on the right).

3. High rigidity

   The carburized hypoid gears lead to smaller size than comparable worms gears.

4. Compact gear assembly

   The size of the gear housing is nearly the same as outer diameter of the large gear. (See the diagrams below)


Comparison of the efficiency of MHP High Ratio Hypoid Gear and Worm Gear

### Comparison of MHP and Worm Gear
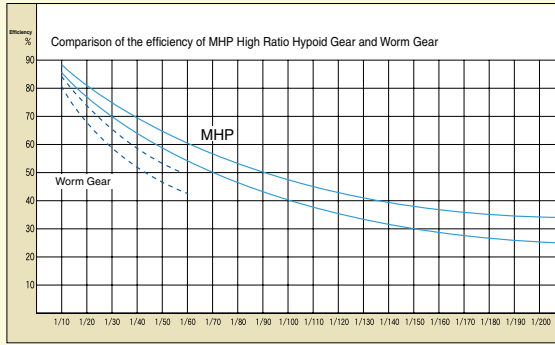


## ■ How to determine the radial and thrust loads

Before using the MHP high-ratio hypoid gears, be sure to confirm the direction of radial and thrust loads. Following equations are used to compute these loads. The radial and thrust load coefficients are given on the product pages.
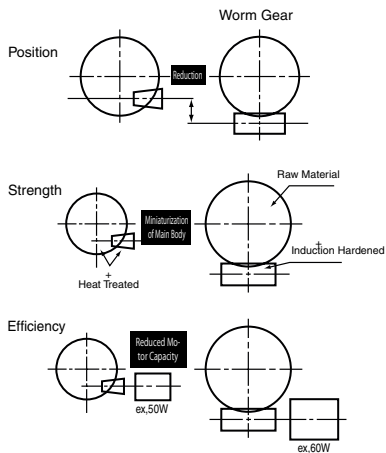
### Radial load calculation

$W_{RP}$ : Radial load on the pinion or L(N)

$$W_{RP} = W_{KP} \times T_G \times \frac{n}{z}$$

$W_{KP}$ : Radial load coefficient of pinion or L (given on the product pages)
$T_G$ : Torque of gear or R(N·m)
$n$ : Number of teeth of pinion or L
$z$ : Number of teeth of gear or R

$W_{RG}$ : Radial load on the gear or R(N)

$$W_{RG} = W_{KG} \times T_G$$

$W_{KG}$ : Radial load coefficient of gear or R (given on the product pages)
$T_G$ : Torque of gear or R(N·m)

### Thrust load calculation

$W_{XP}$ : Thrust load on the pinion or L(N)

$$W_{XP} = W_{NP} \times T_G \times \frac{n}{z}$$

$W_{NP}$ : Thrust load coefficient of pinion or L (given on the product page)
$T_G$ : Torque of gear or R(N·m)
$n$ : Number of teeth of pinion or L
$z$ : Number of teeth of gear or R

$W_{XG}$ : Thrust load of gear or R(N)

$$W_{XG} = W_{NG} \times T_G$$

$W_{NG}$ : Thrust load coefficient of gear or R (given on the product pages)
$T_G$ : Torque of gear or R(N·m)

## ■ Variations in tooth contact due to poor alignment of gears

If the gear engagement position is out of the normal position, variations in tooth contact, as illustrated below, may appear.


(1) Tooth contact in case of a shaft-angle error


(2) Tooth contact in case of a shaft-offset error


(3) Tooth contact in case of a pinion set position error


(4) Tooth contact in case of a gear set position error

# MHP
# High-Ratio Hypoid Gears

| Specifications | |
|---|---|
| Precision grade | JIS B 1704 : 1978 grade 3 |
| Gear teeth | Gleason |
| Pressure angle | 20° ＊ |
| Material | SCM415 |
| Heat treatment | Carburizing |
| Tooth hardness | 60 ～ 63HRC |

＊ 22° 30′ for MHP1.5-0453R/3045L and
MHP1.5-0451R/1045L

**B8**

| Catalog No. | Reduction ratio | Nominal module | Actual module | No. of teeth | Direction of spiral | Shape | Bore • Shaft Dia. A (Bore H7 • Shaft h7) | Hub dia. B | Pitch dia. C | Outside dia. D | Mounting distance E | Total length F | Hub width H | Length of bore and shaft I | Catalog No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHP1-0453R MHP1-3045L | 15 | m1 | 1.067 | 45 3 | R L | B9 B8 | 12 22.1 | 30 — | 48 10.3 | 48 10.3 | 19 127 | 16.3 113 | 7 — | 14 94 | MHP1-0453R MHP1-3045L |
| MHP1.5-0453R MHP1.5-3045L | 15 | m1.5 | 1.733 | 45 3 | R L | B9 B8 | 14 31.1 | 40 — | 78 17.6 | 78 17.6 | 28 170 | 23.7 148 | 10 — | 20 116 | MHP1.5-0453R MHP1.5-3045L |
| MHP1.5-0603R MHP1.5-3060L | 20 | m1.5 | 1.633 | 60 3 | R L | B9 B8 | 20 36.1 | 50 — | 98 15.7 | 98 15.7 | 33 199 | 28.7 168 | 13 — | 25 135 | MHP1.5-0603R MHP1.5-3060L |
| MHP1-0602R MHP1-2060L | 30 | m1 | 1.05 | 60 2 | R L | B9 B8 | 12 22.1 | 34 — | 63 12.8 | 63 12.8 | 21 134 | 17.8 120 | 8 — | 16 94 | MHP1-0602R MHP1-2060L |
| MHP1-0451R MHP1-1045L | 45 | m1 | 1.067 | 45 1 | R L | B9 B8 | 12 20.1 | 30 — | 48 10.1 | 48 10.1 | 19 115 | 16.5 104 | 7 — | 14 85 | MHP1-0451R MHP1-1045L |
| MHP1.5-0451R MHP1.5-1045L | 45 | m1.5 | 1.733 | 45 1 | R L | B9 B8 | 14 26.1 | 40 — | 78 18.3 | 78 18.3 | 28 152 | 23.9 138 | 10 — | 20 102 | MHP1.5-0451R MHP1.5-1045L |
| MHP1-0601R MHP1-1060L | 60 | m1 | 1.05 | 60 1 | R L | B9 B8 | 12 22.1 | 34 — | 63 12.9 | 63 12.9 | 21 134 | 17.9 122 | 8 — | 16 94 | MHP1-0601R MHP1-1060L |
| MHP1.5-0601R MHP1.5-1060L | 60 | m1.5 | 1.633 | 60 1 | R L | B9 B8 | 20 31.1 | 50 — | 98 17.7 | 98 17.7 | 33 175 | 28.2 151 | 13 — | 25 116 | MHP1.5-0601R MHP1.5-1060L |

[Caution on Product Characteristics]　① The allowable torques are obtained from the results of experimentation with the pinion at 600 rpm, lubricated with Kingstar SG-O (NIHON GREASE).
② Radial and thrust load coefficients are the factors used for calculation of those loads. As shown in the figure B8 Shape, CW and CCW stand for clockwise and counterclockwise rotation. A plus sign means that the two gears in a set move away each other when load is applied. A minus sign means that two gears in a set approach each other when load is applied. For more details, see the section "How to determine the radial and thrust loads" on Page 286.

## ■ Helix Hands and Offset Position

MHP High Ratio Hypoid Gears are designed to be right hand helix for gears, left hand helix for pinions. The opposite helix hand gears are not available for these products. Also, the offset position is already set, so please refer to the illustration bellow when designing or assembling.

**B9**

| Face width (J) | Holding surface dia. K | Offset L | Radial load coefficient CW | Radial load coefficient CCW | Thrust load coefficient CW | Thrust load coefficient CCW | Allowable transmission torque (N·m) | Allowable transmission torque (kgf·m) | Backlash (mm) | Weight (kg) | Catalog No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (6) | 35.1 — | 10 | 48.48 147.3 | −37.67 523.74 | 13 969.92 | 31.74 −831.16 | 10.3 | 1.05 | 0.05~0.15 | 0.15 0.29 | MHP1-0453R MHP1-3045L |
| (10) | 56.5 — | 18 | 26.78 100.09 | −18.67 338.45 | 8.98 566.72 | 21.19 −466.63 | 41.2 | 4.20 | 0.10~0.20 | 0.50 0.73 | MHP1.5-0453R MHP1.5-3045L |
| (10) | 76.8 — | 22 | 20.44 119.32 | −16.54 302.18 | 7.15 577.56 | 13.95 −511.77 | 82.4 | 8.40 | 0.10~0.20 | 0.94 1.15 | MHP1.5-0603R MHP1.5-3060L |
| (8) | 46.4 — | 18 | 33.59 186.59 | −24.15 784.31 | 8.21 1461.23 | 24.77 −1248.6 | 24.1 | 2.46 | 0.05~0.15 | 0.29 0.28 | MHP1-0602R MHP1-2060L |
| (6) | 34.9 — | 14 | 48.04 400.81 | −35.58 1579.79 | 11.13 3014.6 | 34.11 −2605.26 | 11.3 | 1.15 | 0.05~0.15 | 0.16 0.22 | MHP1-0451R MHP1-1045L |
| (10) | 56 — | 25 | 26.36 233.59 | −16.04 1034.08 | 6.88 1755.84 | 22.02 −1439.58 | 46.6 | 4.75 | 0.10~0.20 | 0.50 0.48 | MHP1.5-0451R MHP1.5-1045L |
| (8) | 46.3 — | 20 | 33.34 357.61 | −23.12 1564.81 | 7.41 2936.72 | 25.14 −2514.09 | 25.3 | 2.58 | 0.05~0.15 | 0.29 0.28 | MHP1-0601R MHP1-1060L |
| (10) | 76.8 — | 30 | 22.63 303.06 | −17.19 974.4 | 5.82 1912.11 | 15.81 −1675.65 | 94.0 | 9.58 | 0.10~0.20 | 0.94 0.77 | MHP1.5-0601R MHP1.5-1060L |

[Caution on Secondary Operations]　① Please read "Caution on Performing Secondary Operations" (Page 284) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK's system for quick modification of KHK stock gears is also available.
② In the illustration, the area surrounded with−−−− line is masked during the carburization process and can be modified. However, care should be exercised since the hardness is high (approx. HRC40, maximum).

Inquiries are now being accepted on our website.

Spur Gears
Helical Gears
Internal Gears
Racks
CP Racks & Pinions
Miter Gears
Bevel Gears
Screw Gears
Worm Gear Pair
Bevel Gearboxes
Other Products