

Gear Ratio 2 ■ Modules 2~4

Catalog No.	Direction of Spiral	Module	No. of teeth	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length	Hub width	Length of bore	Face width
		<i>m</i>	<i>z</i>	A _{H7}	B	C	D	E	F	G	H	I	J
MBSG2 -4020R	R	2	40	15	45	80	81.1	45	31.78	26.1	18	29	14
MBSG2 -2040L	L		20	12	35	40	44.1	55	28.16	16.02	13.75	27	
MBSG2.5-4020R	R	2.5	40	16	55	100	101.29	50	33.35	26.29	16	30	17
MBSG2.5-2040L	L		20	12	43	50	55.12	65	31.01	16.28	13.25	29	
MBSG3 -4020R	R	3	40	20	65	120	121.57	60	39.81	31.57	20	35	20
MBSG3 -2040L	L		20	16	52	60	66.03	80	38.9	21.51	18	36.5	
MBSG4 -4020R	R	4	40	25	80	160	162.06	75	48.27	37.06	22	42	27
MBSG4 -2040L	L		20	20	70	80	88.46	100	45.38	22.12	17.5	43	

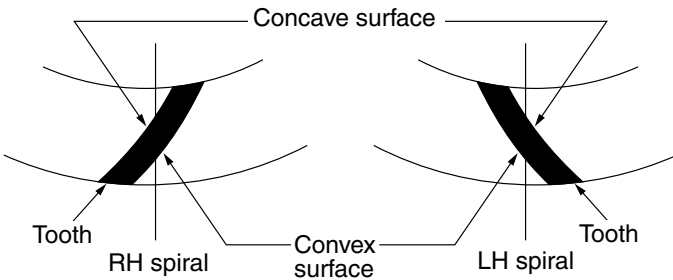
CAUTION: Dimensions of the outside diameter, the overall length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.

Bevel Gears

Gears

■ Contact Surface of Spiral Bevel Gears

Tooth surfaces of spiral gears have concave and convex sides. Changes in the rotational direction of the driving gear alters the contact surface accordingly. The illustrations show top views of RH and LH spiral gears, and the tables on the right explain the different contact surface depending on the situation.



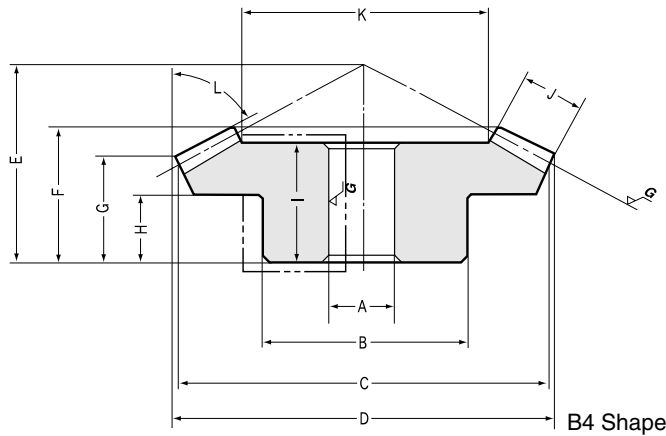
RH spiral as a driving gear

Rotating direction of driving gear <small>NOTE 1</small>	Contact surface	
	Driving gear (RH spiral)	Driven gear (LH spiral)
RH rotation (clockwise)	Convex surface	Concave surface
LH rotation (counterclockwise)	Concave surface	Convex surface

LH spiral as a driving gear

Rotating direction of driving gear <small>NOTE 1</small>	Contact surface	
	Driving gear (LH spiral)	Driven gear (RH spiral)
RH rotation (clockwise)	Concave surface	Convex surface
LH rotation (counterclockwise)	Convex surface	Concave surface

NOTE 1: Rotational directions given in the tables are for viewing the gears from the hub side.



Specifications

Precision grade	JIS B 1704 grade 2	Tooth hardness	55~60HRC
Gear teeth	Gleason	Surface treatment	—
Pressure angle	20°	Tooth surface finish	Cut
Helix angle	35°	Datum reference surface for gear grinding	Bore
Material	SCM415	Secondary Operations	Possible for portion not carburizing
Heat treatment	Carburizing <small>NOTE 1</small>		

NOTE 1: The areas marked with ---- on the diagram are masked during the carburizing and can be modified, even though the hardness is somewhat higher.

Holding surface dia. K	Tip angle L	Shape	Allowable torque (N·m) <small>NOTE 2</small>		Allowable torque (kgf·m)		Backlash (mm)	Weight (kgf)	Catalog No.
			Bending strength	Surface durability	Bending strength	Surface durability			
52.7 25.39	66°06' 30°04'	B4 B3	51.8 25.9	87.19 43.59	(5.28) (2.65)	(8.891) (4.445)	0.05 ~ 0.11	0.55 0.17	MBSG2 -4020R MBSG2 -2040L
66.99 29.97	65°28' 30°07'	B4 B3	99.3 49.7	170.2 85.1	(10.13) (5.07)	(17.36) (8.678)	0.06 ~ 0.12	0.96 0.27	MBSG2.5-4020R MBSG2.5-2040L
80.28 36.56	65°42' 29°44'	B4 B3	169.4 84.9	294.8 147.4	(17.28) (8.65)	(30.06) (15.03)	0.07 ~ 0.13	1.52 0.55	MBSG3 -4020R MBSG3 -2040L
106.63 51.25	65°29' 30°45'	B4 B3	405 203	722.4 361.2	(41.3) (20.7)	(73.66) (36.83)	0.1 ~ 0.16	3.3 1.1	MBSG4 -4020R MBSG4 -2040L

NOTE 2: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 229 for more details.

Pitch Angle Gear: 63°26' Pinion: 26°34'

Forces Acting on Spiral Bevel Gear Teeth

For a spiral bevel gear with shaft angle $\Sigma = 90^\circ$, pressure angle $\alpha_n = 20^\circ$ and spiral angle $\beta_m = 35^\circ$, the tables below show the axial thrust force F_a and the radial force F_r when a tangential force F_u of 100 units is applied at the center of face width.

The tables show the values of $\frac{\text{axial thrust force } F_a}{\text{radial force } F_r}$

(1) Forces acting upon pinion

Contact surface	Gear ratio z_2/z_1						
	1.0	1.5	2.0	2.5	3.0	4.0	5.0
Concave surface	80.9	82.9	82.5	81.5	80.5	78.7	77.4
	-18.1	-1.9	8.4	15.2	20.0	26.1	29.8
Convex surface	-18.1	-33.6	-42.8	-48.5	-52.4	-57.2	-59.9
	80.9	75.8	71.1	67.3	64.3	60.1	57.3

(2) Forces acting upon gear

Contact surface	Gear ratio z_2/z_1						
	1.0	1.5	2.0	2.5	3.0	4.0	5.0
Concave surface	80.9	75.8	71.1	67.3	64.3	60.1	57.3
	-18.1	-33.6	-42.8	-48.5	-52.4	-57.2	-59.9
Convex surface	-18.1	-1.9	8.4	15.2	20.0	26.1	29.8
	80.9	82.9	82.5	81.5	80.5	78.7	77.4