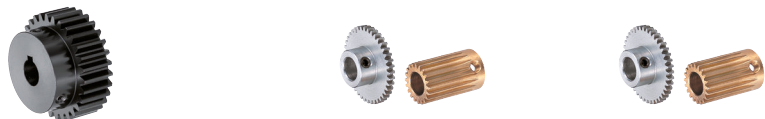


Gears

Gears



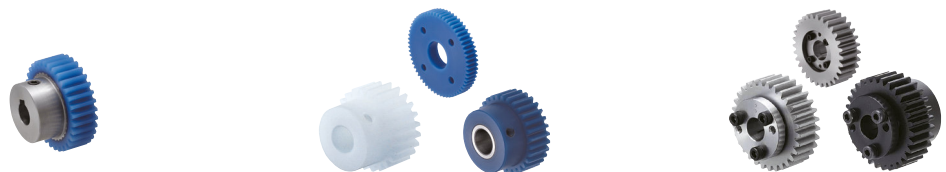
Product Name	Module 0.5, 0.8, 1.0, 1.5, 2.0, 2.5, 3.0, Shape B, Dimension Fixed	Spur Gears - Module 0.5	Module 0.8
Page	1499	1501	1502



Module 1.0	Module 1.5	Module 2.0
1503	1505	1507



Module 2.5	Module 3.0	Spur Gears - Tooth Width, Hub Dimensions Configurable	Induction Hardened Spur Gears - Ground, Module 1.0, 1.5, 2.0, 2.5, 3.0
1509	1511	1513	1515



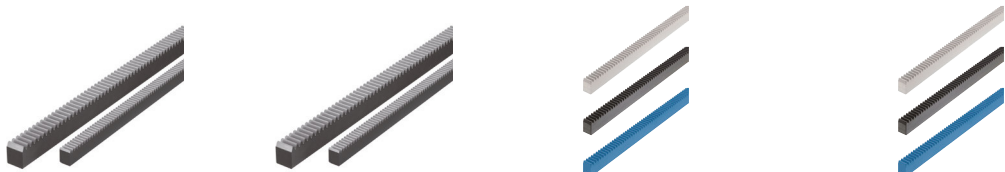
Bonded Plastic Spur Gears - Module 1.0, 1.5, 2.0, 2.5, 3.0	Plastic Spur Gears - Module 0.5, 0.8, 1.0, 1.5, 2.0, 2.5, 3.0	Keyless Hub Spur Gears - Module 1.0, 1.5, 2.0, 2.5, 3.0 (Steel)
1517	1519	1521



Bevel Gears - Module 1.0, 1.5, 2.0	Helical Gears - Module 1.0, 1.5, 2.0, 2.5, 3.0	Non-Contact Magnetic Transmission Drives Standard / Economy Type
1523	1524	1525~1526



Spur Gears - Bearing Built-In, Module 1.0, 1.5, 2.0	Round Rack Gears - L Fixed / Configurable	Worm	Worm Wheel
1527	1528	1528	1528



Induction Hardened Rack Gears - Ground	Ground, Hole Position Configurable Type	Rack Gears - L Fixed	Rack Gears - L Configurable (One End Machined)
1529	1530	1531	1532

Gears - Overview / Technical Data

The product lineup includes: high performance induction hardened gears and bonded plastic spur gears, keyless hub spur gears and bearing built-in gears. In addition to spur gears, various types of gears like bevel, helical and rack gears are also available.

Spur Gear

Module	Spur Gear				Keyless Hub Spur Gear	Spur Gears - Bearing Built-In
	EN 1.1191 Equiv., EN 1.4301 Equiv., Free-Cutting Brass Bar	EN 1.1191 Equiv. Induction Hardening Ground Tooth	Plastic Bonded	Plastic	EN 1.1191 Equiv.	EN 1.1191 Equiv., Plastic
	Standard spur gears most widely used.	Excels in strength and friction resistance.	Plastic Spur Gears that can be mounted solidly on shafts.	Plastic Type is relatively quiet when engaged.	Spur gears that don't require machining to shafts. Easy phase matching.	Bearing built-in spur gears suitable for rotation reversing idler gear.
0.5	P.1499~P.1514	-	-	P.1519	-	-
0.8		P.1515	P.1517		P.1521	P.1527
1.0						
1.5						
2.0						
2.5						
3.0						

Other Gears

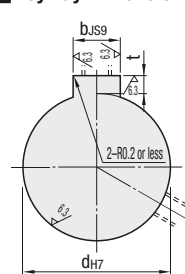
Module	Rack Gear	Rack Gears - Ground	Round Rack Gear	Bevel Gear	Helical Gear	Worm, Worm Wheel	Non-Contact Magnetic Transmission Drives
	EN 1.1191 Equiv., EN 1.4301 Equiv., Plastic, Free-Cutting Brass Bar	EN 1.1191 Equiv. Induction Hardened	EN 1.1191 Equiv., EN 1.4305 Equiv.	EN 1.1191 Equiv., EN 1.4301 Equiv.	EN 1.1191 Equiv., EN 1.4301 Equiv., Plastic	EN 1.1191 Equiv., EN CC480K Equiv.	Magnets, etc.
	Converts between rotating motion and linear motion. Length and mounting hole machining can be specified.	High precision rack gears excellent in strength and friction resistance.	Convenient for reciprocal motion of the rack side.	Used for perpendicular transmission.	Used for perpendicular transmission of unparallel shafts.	Perpendicular transmission of unparallel shafts makes these gears suitable for power transmission of large deceleration and high torque.	Non-contact transmission of motive force. Ultra-low particle generation and can be used semi-permanently with no required maintenance.
0.5	P.1531, 1532	-	P.1528	-	-	-	-
0.8		P.1529, 1530		P.1523	P.1524		
1.0							
1.5							
2.0							
2.5							
3.0							

Calculation Conditions of Spur Gears' Allowable Transmission Power (Bending Strength)

Formula	Material	EN 1.1191 Equiv.	EN 1.1191 Equiv. Tooth Surface Induction Hardened	EN 1.4301 Equiv.	Free-Cutting Brass Bar	MC Nylon	Polyacetal
			-	-	-	-	-
Mating Gear	Same Material, Same Number of Teeth					Lewis Formula	
Speed	100rpm	500rpm	100rpm	-	-	100rpm	Metal Material
Lubrication Type	-	-	-	-	-	Non-lubricated	
Ambient Temperature	-	-	-	-	-	40°C	20°C
Stress Cycles	More than 10 ⁷ times					-	10 ⁷
Impact from Motor	Equal Load					-	Equal Load
Impact from the Mating Gear	Equal Load					-	Equal Load
Load Direction	Bidirectional					-	-
Allowable Tooth Root Bending Stress (kgf/mm ²) *	18.4	23.0	10.5	4.0	-	-	-
Safety Factor	1.2						

* Allowable Tooth Root Bending Stress is 2/3 of a fatigue limit because of the load is bidirectional.

Keyway Dimensions



N: New JIS (B1301) Keyway Dimensions


Nominal	dh7	bjs9	t Tolerance	Nominal	dh7	bjs9	t Tolerance	Nominal	dh7	bjs9	t Tolerance
8N	8	+0.015	3	23N	23			39N	39		
10N	10	0	±0.0125	24N	24			40N	40		
10K	10			25N	25			41N	41		
11N	11		4	26N	26	+0.021	8	42N	42	12	3.3
12N	12			27N	27	0		43N	43		
13N	13			28N	28			44N	44	+0.025	
14N	14	+0.018		29N	29			45N	45	0	
15N	15	0	5	30N	30			46N	46		
16N	16		±0.0150	31N	31			47N	47		
17N	17			32N	32			48N	48		
18N	18			33N	33			49N	49		
19N	19			34N	34	+0.025	10	50N	50		
20N	20	+0.021	6	35N	35	0					
21N	21	0		36N	36						
22N	22			37N	37						
				38N	38						

Spur Gear

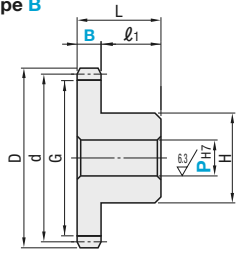
Pressure Angle 20°, Module 0.5, 0.8, 1.0, 1.5, 2.0, 2.5, 3.0, B Shape, Shaft Bore Fixed Type

■ **Features:** Compared with Straight Bore (GEAHBB), price is reduced and by making it in stock, next-day shipment can be realized.

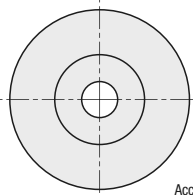
Type	Material	Surface Treatment
GEAHF	EN 1.1191 Equiv.	Black Oxide



Shape B



Shaft Bore Specifications



Accuracy Previous JIS B 1702 Class 4
(New JIS B 1702-1 Class 8 Equiv.)

RoHS

■ **Module 0.5 / 0.8 / 1.0** (For shaft bore free dimension parts, see P.1501 ~ P.1512; For configuration of the tooth width/hub dimensions, see P.1513.)

Part Number Type	Module	Number of Teeth	B	Gear Shape	Shaft Bore Dia. PH7	d Reference Dia.	D Tip Dia.	G Root Dia.	H	L	ℓ1	Unit Price										
GEAHF	0.5	28	3	B	3	14	15	12.75	10	8	5											
		30				15	13.75															
		32				16	14.75															
		35				17.5	16.25															
		36				18	16.75															
		40				20	18.75															
	0.8	2	42	3	B	3	21	22	19.75	10	7		5									
			45				22.5	23.5	21.25													
			48				24	22.75														
			50				25	23.75														
			52				26	24.75														
			60				30	28.75														
1.0	2	70	5	B	5	35	36	33.75	20	7	5											
		80				40	41	38.75														
		100				50	48.75															
		0.5				7	20	4					B		4	16	17.6	14	10	14	7	
							24									19.2	20.8	17.2				
							25									20	21.6	18				
							28							22.4		24	20.4					
							30							24		25.6	22					
							32							25.6		27.2	23.6					
							36							28.8		30.4	26.8					
40	32		33.6	30																		
45	36		37.6	34																		
48	38.4		40	36.4																		
50	40	41.6	38																			
0.8	5	20	6	B	6	20	22	17.5	16	20	8											
		21				21	23	18.5														
		22				22	24	19.5														
		23				23	25	20.5														
		24				24	26	21.5														
		25				25	27	22.5														
		26				26	28	23.5														
		27				27	29	24.5														
		28				28	30	25.5														
		29				29	31	26.5														
30	30	32	27.5																			
1.0	8	32	8	B	8	32	34	29.5	28	20	10											
		34				34	36	31.5														
		35				35	37	32.5														
		36				36	38	33.5														
		38				38	40	35.5														
		40				40	42	37.5														
		42				42	44	39.5														
		44				44	46	41.5														
		45				45	47	42.5														
		46				46	48	43.5														
48	48	50	45.5																			
0.5	10	50	8	B	8	50	52	47.5	44	20	10											
		52				52	54	49.5														
		54				54	56	51.5														
		55				55	57	52.5														
		56				56	58	53.5														
		58				58	60	55.5														
		60				60	62	57.5														
		62				62	64	59.5														
		64				64	66	61.5														
		65				65	67	62.5														
66	66	68	63.5																			
0.8	10	68	10	B	10	68	70	65.5	50	20	10											
		70				70	72	67.5														
		72				72	74	69.5														
		75				75	77	72.5														
		80				80	82	77.5														
		84				84	86	81.5														
		85				85	87	82.5														
		90				90	92	87.5														
		95				95	97	92.5														
		96				96	98	93.5														
1.0	10	100	16	B	16	100	102	97.5	70	20	10											
		110				110	112	107.5														
		120				120	122	117.5														

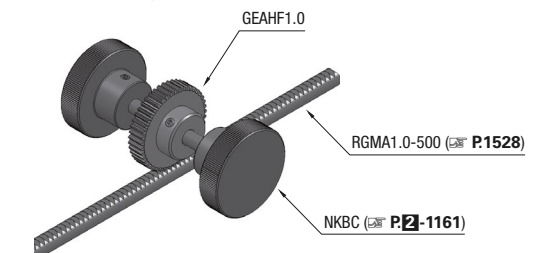
■ **Module 1.5 / 2.0 / 2.5 / 3.0** (For parts with selectable shaft bore dimension, see P.1501 ~ P.1512; For configuration of the tooth width/hub dimensions, see P.1513.)

Part Number Type	Module	Number of Teeth	B	Gear Shape	Shaft Bore Dia. PH7	d Reference Dia.	D Tip Dia.	G Root Dia.	H	L	ℓ1	Unit Price				
GEAHF	1.5	20	15	B	6	30	33	26.25	25	27	12					
		21				31.5	34.5	27.75								
		22				33	36	29.25								
		23				34.5	37.5	30.75								
		24				36	39	32.25								
		25				37.5	40.5	33.75								
		26				39	42	35.25								
		27				40.5	43.5	36.75								
		28				42	45	38.25								
		29				43.5	46.5	39.75								
		30				45	48	41.25								
		32				48	51	44.25								
34	51	54	47.25													
2.0	8	35	8	B	8	52.5	55.5	48.75	40	45	50					
		36				54	57	50.25								
		38				57	60	53.25								
		40				60	63	56.25								
		42				63	66	59.25								
		44				66	69	62.25								
		45				67.5	70.5	63.75								
		46				69	72	65.25								
		48				72	75	68.25								
		50				75	78	71.25								
		52				78	81	74.25								
		54				81	84	77.25								
55	82.5	85.5	78.75													
2.5	10	56	10	B	10	84	87	80.25	45	55	60					
		58				87	90	83.25								
		60				90	93	86.25								
		62				93	96	89.25								
		64				96	99	92.25								
		65				97.5	100.5	93.75								
		66				99	102	95.25								
		21				42	46	37					34	34	14	
		22				44	48	39					36			
		23				46	50	41					37			
		24				48	52	43					40			
		25				50	54	45					40			
26	52	56	47	42												
27	54	58	49	45												
28	56	60	51	45												
29	58	62	53	47												
30	60	64	55	48												
32	64	68	59	50												
34	68	72	63	50												
3.0	12	62	12	B	12	90	93	86.25	50	60	16					
		64				93	96	89.25								
		66				96	99	92.25								
		68				99	102	95.25								
		70				102	105	98.25								
		72				105	108	101.25								
		74				108	111	104.25								
		76				111	114	107.25								
		78				114	117	110.25								
		80				117	120	113.25								
		82				120	123	116.25								
		84				123	126	119.25								
86	126	129	122.25													
2.0	20	21	20	B	8	42	46	37	34	41	18					
		22				44	48	39	36							
		23				46	50	41	37							
		24				48	52	43	40							
		25				50	54	45	40							
		26				52	56	47	42							
		27				54	58	49	45							
		28				56	60	51	45							
		29				58	62	53	47							
		30				60	64	55	48							
		32				64	68	59	50							
		34				68	72	63	50							
2.5	25	26	25	B	8	70	74	65	52	48	18					
		27				72	76	67	55							
		28				74	78	69	55							
		29				76	80	71	55							
		30				78	82	73	55							
		32				82	86	77	55							
		34				86	90	81	55							
		36				90	94	85	55							
		38				94	98	89	55							
		40				98	102	93	55							
		42				102	106	97	55							
		44				106	110	101	55							
46	110	114	105	55												
3.0	30	20	30	B	8	60	66	52.5	50	48	18					
		21				63	69	55.5	52							
		22				66	72	58.5	54							
		23				69	75	61.5	56							
		24				72	78	64.5	58							
		25				75	81	67.5	60							
		26				78	84	70.5	65							
		27				81	87	73.5	65							
		28				84	90	76.5	70							
		29				87	93	79.5	70							
		30				90	96	82.5	75							



Ordering Example Part Number - Number of Teeth - B - Gear Shape - Shaft Bore Dia.
GEAHF1.0 - 40 - 10 - B - 8

Pinion mechanism by Round Gear Rack



Spur Gear

Pressure Angle 20°, Module 0.5 Shaft Bore Configurable Type

Spur Gear

Pressure Angle 20°, Module 0.8 Shaft Bore Configurable Type

Type	Material	Surface Treatment	Accessory	Shaft Bore Specifications (Selectable Gear Shapes)	
Straight Bore	Straight Bore + Tap			Straight Bore (Shape A, Shape B, Shape K)	Straight Bore + Tap (Shape B, Shape K)
-	GEABN	EN 1.1191 Equiv.	-		
-	GEABB	EN 1.1191 Equiv.	Black Oxide		
-	GEABG	EN 1.1191 Equiv.	Electroless Nickel Plating		
-	GEAHB	Free-Cutting Brass Bar	Set Screw (EN 1.7220 Equiv. Black Oxide)		
-	GEABS	EN 1.4301 Equiv.	Set Screw (EN 1.4301 Equiv.)		

⚠ Set Screw is not included in Un-tapped Type products.

Accuracy Previous JIS B 1702 Class 4 (New JIS B 1702-1 Class 8 Equiv.)

⚠ Tapped shaft bores are not available for Shape A.

Type	Material	Surface Treatment	Accessory	Shaft Bore Specifications (Selectable Gear Shapes)	
Straight Bore	Straight Bore + Tap			Straight Bore (Shape A, Shape B, Shape K)	Straight Bore + Tap (Shape B, Shape K)
-	GEABN	EN 1.1191 Equiv.	-		
-	GEABB	EN 1.1191 Equiv.	Black Oxide		
-	GEABG	EN 1.1191 Equiv.	Electroless Nickel Plating		
-	GEAHB	Free-Cutting Brass Bar	Set Screw (EN 1.7220 Equiv. Black Oxide)		
-	GEABS	EN 1.4301 Equiv.	Set Screw (EN 1.4301 Equiv.)		

⚠ Set Screw is not included in Un-tapped Type products.

Accuracy Previous JIS B 1702 Class 4 (New JIS B 1702-1 Class 8 Equiv.)

⚠ Tapped shaft bores are not available for Shape A.

Part Number	Number of Teeth	B	Gears Shape	Shaft Bore Dia. Per (1mm Increment)	d Reference Dia.	D Tip Dia.	G Root Dia.	H	L	l1	l2	M (Coarse)	*1. Allowable Transmission Force (N·m) Bending Strength			Unit Price				
													EN 1.1191 Equiv.	Free-Cutting Brass Bar	EN 1.4301 Equiv.	Straight Bore	GEABN (x1.0) GEABB (x1.1) GEABG (x1.2)	GEAB	GEABS	
Straight Bore (Shape A, Shape B, Shape K) GEAHB	15	8	K	3-5	7.5	8.5	6.25	9	18	10	3	M3	0.72	0.16	0.41					
	16				8	9	6.75						0.79	0.17	0.45					
	18				9	10	7.75						0.95	0.21	0.54					
	20				10	11	8.75						1.12	0.24	0.64					
	24				12	13	10.75						0.42	0.09	0.24					
	25				12.5	13.5	11.25						0.54	0.12	0.31					
	Straight Bore + Tap (Shape B, Shape K) GEABN, GEABB, GEABG, GEAB, GEABS	26	3	A	3-6, 6.35	12.5	13.5	11.25	10	8	5	2.5	M3	0.58	0.13	0.33				
		28				13	14	11.75						0.61	0.13	0.35				
		30				14	15	12.75						0.68	0.15	0.39				
		32				15	16	13.75						0.74	0.16	0.42				
		35				16	17	14.75						0.80	0.17	0.46				
		36				17.5	18.5	16.25						0.91	0.20	0.52				
Straight Bore + Tap (Shape B, Shape K) GEABN, GEABB, GEABG, GEAB, GEABS		40	2	B	5-12	18	19	16.75	20	7	5	2.5	M3	0.72	0.16	0.41				
		42				20	21	18.75						0.94	0.20	0.54				
		45				21	22	19.75						0.76	0.17	0.43				
		48				22.5	23.5	21.25						0.83	0.18	0.48				
		50				24	25	22.75						0.90	0.20	0.51				
		*52				25	26	23.75						0.95	0.21	0.54				
	*60	26	27	24.75	0.99	0.22														
	*70	30	31	28.75	1.18	0.26														
	*80	35	36	33.75	1.42	0.31														
	*100	40	41	38.75	1.65	0.36														
	*120	50	51	48.75	2.13	0.46														
		60	61	58.75	2.59	0.56														

Part Number	Number of Teeth	B	Gears Shape	Shaft Bore Dia. Per (1mm Increment)	d Reference Dia.	D Tip Dia.	G Root Dia.	H	L	l1	l2	M (Coarse)	*1. Allowable Transmission Force (N·m) Bending Strength			Unit Price				
													EN 1.1191 Equiv.	Free-Cutting Brass Bar	EN 1.4301 Equiv.	Straight Bore	GEABN (x1.0) GEABB (x1.1) GEABG (x1.2)	GEAB	GEABS	
Straight Bore (Shape A, Shape B, Shape K) GEAHB	12	7	K	4-5	9.6	11.2	7.6	11.2	20	13	3	M3	1.11	0.24	0.63					
	14				11.2	12.8	9.2	12.8					1.43	0.31	0.82					
	15				12	13.6	10	13.6					1.60	0.35	0.92					
	16				12.8	14.4	10.8						1.78	0.39	1.01					
	18				14.4	16	12.4	10					1.52	0.33	0.87					
	20				16	17.6	14						2.13	0.46	1.22					
	Straight Bore + Tap (Shape B, Shape K) GEABN, GEABB, GEABG, GEAB, GEABS	24	5	A	5-8	19.2	20.8	17.2	14	14	9	4	M4	2.32	0.50	1.32				
		28				24	24	20.4						12.5	1.78	0.39	1.02			
		30				25.6	22							2.50	0.54	1.42				
		32				25.6	27.2	23.6							2.32	0.50	1.32			
		36				28.8	30.4	26.8							3.25	0.71	1.85			
		40				32	33.6	30							2.46	0.53	1.40			
Straight Bore + Tap (Shape B, Shape K) GEABN, GEABB, GEABG, GEAB, GEABS		45	5	B	6-8	34.4	37.6	34	14	9	4	M4	3.44	0.75	1.98					
		48				36	37.6	34						2.89	0.63	1.65				
		50				38.4	40	36.4						4.04	0.88	2.30				
						36	37.6	34						3.16	0.69	1.80				
						40	41.6	38						4.42	0.96	2.52				
						40	41.6	38						3.42	0.74	1.95				

* marked number of teeth is not available for GEABS. ⚠ Shaft Bore Dia. 6.35 is available.

*1 Allowable Transmission Forces in the table are reference values calculated with prescribed conditions. For conditions, see P. 1498.

Ordering Example: Part Number - Number of Teeth - B - Gear Shape - P

GEAB0.5 - 20 - 3 - B - 3

GEAHB0.5 - 30 - 3 - A - 6

GEABS0.5 - 16 - 8 - K - 5

⚠ When gear shape is not specified, number of teeth 15 ~ 20 (B=8) will be Shape K, and number of teeth 20 ~ 120 (B=3, 2) will be Shape B.

*1 Allowable Transmission Forces in the table are reference values calculated with prescribed conditions. For conditions, see P. 1498. ⚠ Shaft Bore Dia. 6.35 is available.

Ordering Example: Part Number - Number of Teeth - B - Gear Shape - P

GEAB0.8 - 25 - 5 - B - 6

GEAHB0.8 - 30 - 7 - A - 8

GEABS0.8 - 15 - 7 - K - 5

⚠ When gear shape is not specified, number of teeth 12 ~ 15 will be Shape K, 16 ~ 50 will be Shape B.

Alterations: Part Number - Number of Teeth - B - Gear Shape - P - (KC90, TPC, DHL, WDH...etc.)

GEAB0.8 - 30 - 7 - B - 6 - KC120

GEAHB0.8 - 40 - 5 - A - 8 - QTC16 - M4

Alterations	Set Screw	Side Through Hole	Tapped Hole Dimension
Code	KC90, KC120	KFC, KTC	TPC
Spec.	<p>Adds another set screw at 90° position.</p> <p>⚠ Not applicable to Shape A. ⚠ Not applicable to Straight Bore Type.</p>	<p>Machines through holes on the side surface.</p> <p>(KFC, KTC: 1mm Increment, K: 0.5mm Increment)</p> <p>⚠ Applicable to Shape A only. ⚠ P+K+4<KFC(KTC)<G-K-4</p> <p>[K Selection] K3.0-K6.0 [Ordering Code] KFC15-K3.5</p>	<p>Changes the tapped hole dimension to M4.</p> <p>[Ordering Code] TPC4</p> <p>⚠ Not applicable to Shape A. ⚠ Not applicable to Straight Bore Type.</p>

Alterations	Stepped Hole	Both Ends Stepped Bore
Code	DHL, DHR	WDH
Spec.	<p>Changes shaft bores to stepped bores.</p> <p>(Z: 1mm Increment, J: 0.1mm Increment)</p> <p>[Ordering Code] DHL-Z20-J2.0 ⚠ Applicable to Straight Bore Type Only.</p>	<p>Changes shaft bores to both ends stepped hole.</p> <p>(Q, R, S, T: 1mm Increment) ⚠ S, T ≥ 3</p> <p>[Ordering Code] WDH-Q10-R10-S5-T5</p>

Alterations	Side Slotted Hole	Side Through Hole	Side Tapped Hole
Code	LFC, LTC	KFC, KTC	QFC, QTC
Spec.	<p>Machines slotted holes on the side surface (30°).</p> <p>(LFC, LTC: 1mm Increment)</p> <p>⚠ Applicable to Shape A only. ⚠ P+C+4<LFC(LTC)<G-C-4</p> <p>[M Selection] M3 M4 [Ordering Code] LFC20-M3</p>	<p>Machines through holes on the side surface.</p> <p>(KFC, KTC: 1mm Increment, K: 0.5mm Increment)</p> <p>⚠ Applicable to Shape A only. ⚠ P+K+4<KFC(KTC)<G-K-4</p> <p>[K Selection] K3.0-K6.0 [Ordering Code] KFC20-K3.5</p>	<p>Machines tapped holes on the side surface of the gear. (QFC, QTC: 1mm Increment)</p> <p>⚠ Applicable to Shape A only. ⚠ P+M+4<QFC(QTC)<G-M-4</p> <p>[M Selection] M3 M4 [Ordering Code] QFC25-M3 ⚠ The tapped holes go through.</p>

Spur Gear

Pressure Angle 20°, Module 2.5 Shaft Bore Configurable Type

Type			Material	Surface Treatment	Accessory
Straight Bore	Straight Bore + Tap	Keyway, Keyway + Tap			
GEAHB	GEAB	GEAKB	EN 1.1191 Equiv.	Black Oxide	Set Screw (EN 1.7220 Equiv., Black Oxide)
GEAHBB	GEABB	GEAKBB			

⚠ Set screw is not included in Un-tapped Type products.

Gear Shape

Shaft Bore Specifications (Selectable Gear Shapes)

Straight Bore (Shape A, Shape B)	Straight Bore + Tap (Shape B)
Keyway (Shape A)	Keyway + Tap (Shape B)

⚠ Keyway Dimension Details **P.1498**
 ⚠ Positioning of keyway and teeth is not fixed.

⚠ Tapped shaft bores are not available for Shape A.

Accuracy Previous JIS B 1702 Class 4 (New JIS B 1702-1 Class 8 Equiv.)

For alterations on tooth width and hub dimensions, see **P.1513**.

Part Number	Number of Teeth	B	Gear Shape	Shaft Bore Dia. PH7 (1mm Increment)		d Reference Dia.	D Tip Dia.	G Root Dia.	H	L	l1	l2	M (Coarse)	*1. Allowable Transmission Force (N·m) Bending Strength EN 1.1191 Equiv.
				Straight Bore	Keyway, Keyway + Tap									
Straight Bore (Shape A, Shape B) GEAHB GEAHBB	12	2.5	A B	8-13	8N	30	35	23.75	23	37	12	6	M5	38.58
	14			8-15	8N-12N	35	40	28.75	25					49.96
	15			8-20	8N-15N	37.5	42.5	31.25	30					55.96
	16			8-22	8N-17N	40	45	33.75	32					61.98
	17			8-24	8N-19N	42.5	47.5	36.25	35					68.13
	18			8-26	8N-21N	45	50	38.75	38					74.36
	19			8-27	8N-22N	47.5	52.5	41.25	39					80.60
	20			8-28	8N-23N	50	55	43.75	40					87.09
	21			8-29	8N-25N	52.5	57.5	46.25	42					93.50
	22			8-30	8N-27N	55	60	48.75	44					100.13
	23			8-32	8N-28N	57.5	62.5	51.25	46					106.58
	24			8-33	8N-30N	60	65	53.75	48					113.19
	25			8-35	8N-31N	62.5	67.5	56.25	50					119.98
	26			8-38	8N-35N	65	70	58.75	55					126.94
	27			8-42	8N-38N	67.5	72.5	61.25	60					133.57
	28			8-43	8N-39N	70	75	63.75	65					140.86
	29			8-45	8N-41N	72.5	77.5	66.25	70					147.18
	30			8-49	8N-45N	75	80	68.75	75					154.16
	32			10-49	10N-45N	80	85	73.75	80					167.17
	34			10-52	10N-48N	85	90	78.75	85					182.65
	35			10-56	10N-50N	87.5	92.5	81.25	90					189.48
	36			10-59	10N-50N	90	95	83.75	95					195.56
	38			12-59	12N-50N	95	100	88.75	100					210.35
	40			15-59	15N-50N	100	105	93.75	110					223.66
	42			17-59	17N-50N	105	110	98.75	115					238.12
	44			20-59	20N-50N	110	115	103.75	120					252.85
	45			25-59	25N-50N	112.5	117.5	106.25	125					260.32
46	30-59	30N-50N	115	120	108.75	130	267.86							
48	35-59	35N-50N	120	125	113.75	135	281.94							
50	40-59	40N-50N	125	130	118.75	140	296.17							
52	45-59	45N-50N	130	135	123.75	145	310.53							
54	50-59	50N-50N	135	140	128.75	150	325.04							
55	55-59	55N-50N	137.5	142.5	131.25	155	333.08							
56	60-59	60N-50N	140	145	133.75	160	341.19							
58	65-59	65N-50N	145	150	138.75	165	354.50							
60	70-59	70N-50N	150	155	143.75	170	369.44							
62	75-59	75N-50N	155	160	148.75	175	382.84							
64	80-59	80N-50N	160	165	153.75	180	398.01							
65	85-59	85N-50N	162.5	167.5	156.25	185	404.75							
68	90-59	90N-50N	170	175	163.75	190	428.78							
70	95-59	95N-50N	175	180	168.75	195	442.41							
72	100-59	100N-50N	180	185	173.75	200	456.04							
75	105-59	105N-50N	187.5	192.5	181.25	205	478.65							
80	110-59	110N-50N	200	205	193.75		396.36							

⚠ Shaft bore diameter 9N is not available for Keyway Bore + Tap.
 ⚠ Specify 10K as the P dimension if keyway width of 4.0mm (height 1.8mm) for Keyway + Tap with shaft bore diameter of 10 is desired. **P.1498**
 *1 Allowable Transmission Forces in the table are reference values calculated with prescribed conditions. For conditions, see **P.1498**.

Ordering Example

Part Number - Number of Teeth - B - Gear Shape - P

GEAB2.5 - 15 - 25 - B - 8

GEAKB2.5 - 30 - 25 - A - 10N

⚠ Gear shape will be "B" when not specified.

Number of Teeth	Unit Price			
	Straight Bore	Straight Bore + Tap	Keyway, Keyway + Tap	
	GEAHB	GEAHBB	GEAB	GEABB
12				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
32				
34				
35				
36				
38				
40				
42				
44				
45				
46				
48				
50				
52				
54				
55				
56				
58				
60				
62				
64				
65				
68				
70				
72				
75				
80				

Alterations Part Number - Number of Teeth - B - Gear Shape - P - (KC90, KC120, TPC, DHL, DHR, WDH, LFC, LTC, KFC, KTC, QFC, QTC)

GEAB2.5 - 15 - 25 - B - 8 - TPC4


GEAHBB2.5 - 30 - 25 - A - 15 - DHL - Z30 - J10

Alterations Code	Set Screw	Tapped Hole Dimension	Stepped Hole	Both Ends Stepped Bore
	KC90, KC120	TPC	DHL, DHR	WDH
Spec.	KC90: Adds another set screw at 90° position. KC120: Adds another set screw at 120° position. ⚠ Not applicable to Shape A. ⚠ Not applicable to Straight Bore Type.	Changes the tapped hole dimension. Ordering Code: TPC4 ⚠ Not applicable to Shape A. ⚠ Not applicable to Straight Bore Type.	Changes shaft bores to both ends stepped bores. (Z: 1mm Increment, J: 0.1mm Increment) Ordering Code: DHL-Z20-J4.0 ⚠ Applicable to Straight Bore Type Only.	Changes shaft bores to both ends stepped hole. (Q, R, S, T: 1mm Increment) Ordering Code: WDH-Q10-R10-S5-T5 ⚠ Applicable to Straight Bore Type Only.

Alterations Code	Side Slotted Hole	Side Through Hole	Side Tapped Hole
	LFC, LTC	KFC, KTC	QFC, QTC
Spec.	Machines slotted holes on the side surface (30°). (LFC, LTC: 1mm Increment) ⚠ Applicable to Shape A only. ⚠ P+C+4≤LFC(LTC)≤G-C-4 M Selection: M3, M4, M5, M6 Ordering Code: LFC20-M3	Machines through holes on the side surface. (KFC, KTC: 1mm Increment, K: 0.5mm Increment) ⚠ Applicable to Shape A only. ⚠ P+K+4≤KFC(KTC)≤G-K-4 K Selection: K3.0-K6.0 Ordering Code: KFC20-K3.5	Machines tapped holes on the side surface of the gear (QFC, QTC: 1mm Increment). ⚠ Applicable to Shape A only. ⚠ P+M+4≤QFC(QTC)≤G-M-4 M Selection: M3, M4 Ordering Code: QFC25-M3 ⚠ Tapped Hole Depth Max 1.5

Spur Gear

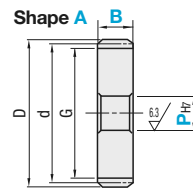
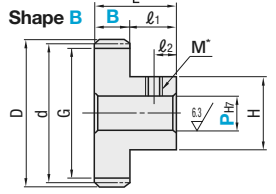
Pressure Angle 20°, Module 3.0 Shaft Bore Configurable Type



Type		Material	Surface Treatment	Accessory
Straight Bore	Keyway, Keyway + Tap	EN 1.1191 Equiv.	-	Set Screw (EN 1.7220 Equiv., Black Oxide)
GEAHB	GEAKB		-	
GEAHBB	GEAKBB		Black Oxide	
GEAHBG	GEAKBG	EN 1.4301 Equiv.	Electroless Nickel Plating	Set Screw (EN 1.4301 Equiv.)
GEAHS	GEAKS		-	

⚠ Set Screw is not included in Un-tapped Type products.

Gear Shape

Shape A  Shape B 

Shaft Bore Specifications (Selectable Gear Shapes)

Straight Bore (Shape A, Shape B)	Keyway (Shape A)	Keyway + Tap (Shape B)

⚠ Keyway Dimension Details **P.1498**
⚠ Positioning of keyway and teeth is not fixed.

Accuracy Previous JIS B 1702 Class 4 (New JIS B 1702-1 Class 8 Equiv.)

RoHS ⊗ Tapped shaft bores are not available for Shape A.

For alterations on tooth width and hub dimensions, see **P.1513**.

Part Number	Number of Teeth	B	Gear Shape	Shaft Bore Dia. PH7 (1mm Increment)		d Reference Dia.	D Tip Dia.	G Root Dia.	H	L	ℓ ₁	ℓ ₂	M (Coarse)	*1. Allowable Transmission Force (N·m) Bending Strength		
				Straight Bore	Keyway Keyway + Tap									EN 1.1191 Equiv.	EN 1.4301 Equiv.	
Straight Bore (Shape A, Shape B) GEAHB GEAHBB GEAHBG GEAHS	12	3.0	A	A	8~17	8N~12N	36	42	28.5	27	48	18	9	M5	66.66	38.04
	14				8~22	8N~16N	42	48	34.5	32					86.33	49.27
	15				8~24	8N~19N	45	51	37.5	35					96.70	55.18
	16				8~28	8N~23N	48	54	40.5	40					107.10	61.12
	17						51	57	43.5	40					117.74	67.19
	18				8~30	8N~25N	54	60	46.5	44					128.50	73.33
	19				8~31	8N~26N	57	63	49.5	45					139.28	79.48
	20				8~35	8N~31N	60	66	52.5	50					150.49	85.88
	21				8~36	8N~33N	63	69	55.5	52					161.57	92.20
	22				8~37	8N~34N	66	72	58.5	54					173.02	98.74
	23				8~39	8N~35N	69	75	61.5	56					184.17	105.09
	24				8~40	8N~37N	72	78	64.5	58					195.60	111.62
	25				8~42	8N~38N	75	81	67.5	60					207.33	118.31
	26				10~45	10N~42N	78	84	70.5	65					219.36	125.18
	27						81	87	73.5	65					230.80	131.71
	28				10~49	10N~45N	84	90	76.5	70					243.41	138.90
	29						87	93	79.5	70					254.32	145.13
	30				10~52	10N~48N	90	96	82.5	75					266.40	152.02
	32						96	102	88.5	75					288.88	164.85
	34				12~56	12N~50N	102	108	94.5	80					315.62	180.11
	35						105	111	97.5	80					327.41	186.84
	36						108	114	100.5	80					337.93	192.84
	38				12~59	12N~50N	114	120	106.5	80					363.48	207.42
	40						120	126	112.5	80					386.49	220.55
	42				20~59	20N~50N	126	132	118.5	85					411.47	234.81
	44						132	138	124.5	85					436.93	249.34
	45						135	141	127.5	85					449.84	256.70
	46						138	144	130.5	85					462.87	264.14
	48						144	150	136.5	85					487.20	278.02
	50						150	156	142.5	85					511.77	292.04
	52						156	162	148.5	85					536.60	306.21
	54						162	168	154.5	85					561.67	320.52
	55						165	171	157.5	85					575.63	328.44
	56						168	174	160.5	85					589.57	336.44
	58						174	180	166.5	85					612.58	349.57
60	180	186	172.5	85			638.40	364.31								
*62	25~59	25N~50N	186	192	178.5	90	661.55	-								
*64			192	198	184.5	90	684.00	-								
*65			195	201	187.5	90	699.95	-								
*68			204	210	196.5	90	738.00	-								
*70			210	216	202.5	90	768.00	-								

⊗ * marked number of teeth is not available for GEAKS, GEAKS.

⊗ Shaft bore diameter 9N is not available for Keyway Bore + Tap.

⊗ Specify 10K as the P dimension if keyway width of 4.0mm (height 1.8mm) for Keyway + Tap with shaft bore diameter of 10 is desired. **P.1498**

*1 Allowable Transmission Forces in the table are reference values calculated with prescribed conditions. For conditions, see **P.1498**.

Ordering Example

Part Number - Number of Teeth - B - Gear Shape - P

GEAHB3.0 - 15 - 30 - A - 8

GEAKBG3.0 - 30 - 30 - A - 10N

⊗ Gear shape will be "B" when not specified.

Number of Teeth	Unit Price							
	Straight Bore				Keyway, Keyway + Tap			
	GEAHB	GEAHBB	GEAHBG	GEAHS	GEAKB	GEAKBB	GEAKBG	GEAKS
12								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
32								
34								
35								
36								
38								
40								
42								
44								
45								
46								
48								
50								
52								
54								
55								
56								
58								
60								
62								
64								
65								
68								
70								

Alterations **Part Number** - **Number of Teeth** - **B** - **Gear Shape** - **P** - (KC90, KC120, TPC, DHL, DHR, WDH, LFC, LTC, KFC, KTC, QFC, QTC)

GEAHB3.0 - 30 - 30 - A - 20 - KFC40 - K6.0

Alterations Code	Set Screw KC90, KC120	Tapped Hole Dimension TPC	Stepped Hole DHL, DHR	Both Ends Stepped Bore WDH
Spec.	KC90: Adds another set screw at 90° position. KC120: Adds another set screw at 120° position. ⊗ Not applicable to Shape A. ⊗ Not applicable to Straight Bore Type.	Changes the tapped hole dimension. Ordering Code: TPC4 ⊗ Not applicable to Shape A. ⊗ Not applicable to Straight Bore Type.	Changes shaft bores to stepped bores. (Z: 1mm Increment, J: 0.1mm Increment) Ordering Code: DHL-Z20-J4.0 ⊗ Applicable to Straight Bore Type Only.	Changes shaft bores to both ends stepped hole. (Q, R, S, T: 1mm Increment) ⊗ S, T ≥ 3 Ordering Code: WDH-Q10-R10-S5-T5 ⊗ Applicable to Straight Bore Type Only.

Alterations Code	Side Slotted Hole LFC, LTC	Side Through Hole KFC, KTC	Side Tapped Hole QFC, QTC
Spec.	Machines slotted holes on the side surface (30°). (LFC, LTC: 1mm Increment) ⊗ Applicable to Shape A only. ⊗ P+K+4 ≤ LFC(LTC) ≤ G-C-4 M Selection: M3 M4 M5 M6 Ordering Code: LFC20-M3	Machines through holes on the side surface. (KFC, KTC: 1mm Increment, K: 0.5mm Increment) ⊗ Applicable to Shape A only. ⊗ P+K+4 ≤ KFC(KTC) ≤ G-K-4 K Selection: K3.0-K6.0 Ordering Code: KFC20-K3.5	Machines tapped holes on the side surface of the gear (QFC, QTC: 1mm Increment). ⊗ Applicable to Shape A only. ⊗ P+M+4 ≤ QFC(QTC) ≤ G-M-4 M Selection: M3, M4 Ordering Code: QFC25-M3 ⊗ Tapped Hole Depth Mx1.5

Bonded Plastic Spur Gears

Pressure Angle 20°, Module 1.0, 1.5, 2.0, 2.5, 3.0

■ **Features:** Plastic gears with metal cores and MC nylon teeth are fusion bonded. Best suited when strong mounting to shafts is desired.

Type			Material		Accessory
Straight Bore	Straight Bore + Tap	Keyway + Tap	Teeth	Core	
GEYH	GEYT	GEYK	MC Nylon	EN 1.1158 Equiv.	Set Screw (EN 1.7220 Equiv., Black Oxide)

Gear Shape: Shape B

Shaft Bore Specifications (Selectable Gear Shapes)

Straight Bore (Shape B)	Straight Bore + Tap (Shape B)	Keyway + Tap (Shape B)

⚠ Keyway Dimension Details **☒ P.1498**
⚠ Positioning of keyway and teeth is not fixed.

■ **Tapped Hole Dimension List**

Shaft Bore Dia. P _{H7}	M (Coarse)	Accessory Set Screw
8~12	M4	M4x3
13~17	M5	M5x4
18~30	M6	M6x5

Accuracy Previous JIS B 1702 Class 5
(New JIS B 1702-1 Class 9 Equiv.)

*Straight Bore Type has neither tapped holes nor set screws.
⚠ MC nylon may change dimensions due to its water-absorbing property.

Part Number	Type	Module	Number of Teeth	B	Gear Shape	Shaft Bore Dia. P _{H7} (1mm Increment)		d _{Reference Dia.}	D _{Tip Dia.}	G _{Root Dia.}	H	E	L	ℓ	*1. Allowable Transmission Force (N·m) Bending Strength	Unit Price 1 ~ 4 pc(s).			
						Straight Bore	Keyway + Tap									Straight Bore	Straight Bore + Tap	Keyway + Tap	
Straight Bore GEYH	1.0	10	30	B	10	8~12	8N~10N	30	32	27.5	18	20	20	10	10	1.03			
			32					34	29.5										
			34					36	31.5										
			35					37	32.5										
			36					38	33.5										
			38					40	35.5										
			40					42	37.5										
			42					44	39.5										
			45					47	42.5										
			48					50	45.5										
			50					52	47.5										
			52					54	49.5										
	Straight Bore + Tap GEYT	1.5	15	28	B	15	10~16	10N~13N	42	45	38.25	23	25	27	12	3.18			
				30					48	41.25									
				32					48	44.25									
				34					51	47.25									
				35					52.5	48.75									
				36					54	50.25									
				40					60	56.25									
				42					63	59.25									
				45					67.5	63.75									
				48					72	68.25									
				50					75	71.25									
				Keyway + Tap GEYK					2.0	20	20						B	20	10~15
22	48	39																	
24	48	43																	
25	50	45																	
28	56	51																	
30	60	55																	
32	64	59																	
34	68	63																	
35	70	65																	
36	72	67																	

⚠ Shaft bore diameter 9N is not available for Keyway Bore + Tap.
⚠ Specify 10K as P dimension if keyway width of 4.0mm (height 1.8mm) for Keyway + Tap with shaft bore diameter of 10 is desired. ☒ P.1498
*1 Allowable Transmission Forces in the table are reference values calculated with prescribed conditions. For conditions, see ☒ P.1498.
⚠ For orders larger than indicated quantity, please request a quotation.

Module 2.5, 3.0

Part Number	Type	Module	Number of Teeth	B	Gear Shape	Shaft Bore Dia. P _{H7} (1mm Increment)		d _{Reference Dia.}	D _{Tip Dia.}	G _{Root Dia.}	H	E	L	ℓ	*1. Allowable Transmission Force (N·m) Bending Strength	Unit Price 1 ~ 4 pc(s).		
						Straight Bore	Keyway + Tap									Straight Bore	Straight Bore + Tap	Keyway + Tap
Straight Bore GEYH	2.5	25	18	B	25	12~17	12N~15N	45	50	38.75	25	30	40	15	8.28			
			22			12~19	12N~17N	50	55	43.75	28	9.59						
			24			12~24	12N~21N	55	60	48.75	35	10.84						
			25					60	65	53.75	40	12.10						
			26					62.5	67.5	56.25	45	12.78						
			28					65	70	58.75	40	13.47						
Straight Bore + Tap GEYT	3.0	30	16	B	30	12~16	12N~14N	48	54	40.5	24	30	47	17	12.25			
			18			12~21	12N~18N	54	60	46.5	30	14.31						
			20			12~23	12N~20N	60	66	52.5	33	16.56						
			22			12~26	12N~23N	66	72	58.5	38	18.72						
			24			12~30	12N~26N	72	78	64.5	43	20.90						

*1 Allowable Transmission Forces in the table are reference values calculated with prescribed conditions. For conditions, see ☒ P.1498. ⚠ For orders larger than indicated quantity, please request a quotation.

Ordering Example Part Number - Number of Teeth - B - Gear Shape - P
GEYT1.5 - 40 - 15 - B - 18
GEYK2.0 - 30 - 20 - B - 15N

Alterations Part Number - Number of Teeth - B - Gear Shape - P - (KC90, KC120, BS)
GEYK3.0 - 20 - 30 - B - 20N - BS12.5

Alterations Code	Set Screw		Hub Cut
	KC90	KC120	BS
Spec.	Adds another set screw at 90° position. ⊗ Not applicable to Straight Bore Type.	Adds another set screw at 120° position. ⊗ Not applicable to Straight Bore Type.	Cuts the hub length in 0.5mm increments. ⊗ Straight Bore Type: 0 ≤ BS ≤ ℓ ⊗ Straight Bore + Tap Type: M+3 ≤ BS ≤ ℓ ⊗ Keyway + Tap Type: M+3 ≤ BS ≤ ℓ

Bonding Strength and Safety Factor

- The fusion bonding strength of MC nylon and cores varies depending on bonded areas. See Fig. 1 for the relations between bonded diameter and radial strength (torque), and Fig. 2 for bonded diameter and thrust strength.
- For the bonded strength obtained in ①, apply 4 ~ 5 as safety factor. If ambient temperature rises, multiply it by the modification coefficient in Fig. 3.
- Allowable strength is as follows:

$T_{al} = T_{max} \times 1 / \text{Safety Factor} \times T$

T_{al}: Allowable Fusion Bonded Strength
 T_{max}: Fusion Bonded Strength in Fig. 1 or 2

Fig. 1 Relation of Fusion Bonded Dia. (E Dimension) and Radial Strength

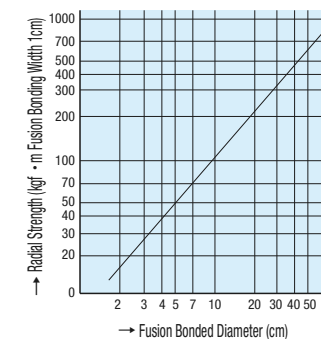


Fig. 2 Relation of Fusion Bonded Dia. (E Dimension) and Thrust Strength

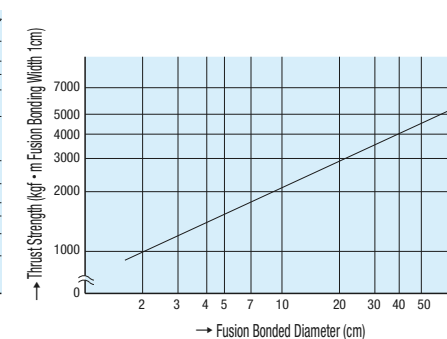
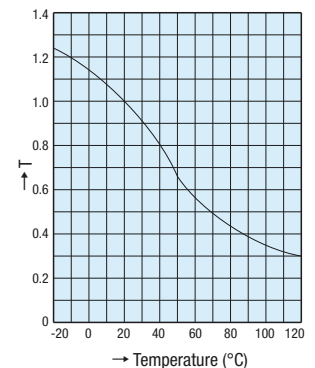


Fig. 3 Modification Coefficient T of Ambient Temperature



Plastic Spur Gears

Pressure Angle 20°, Module 0.5, 0.8, 1.0, 1.5, 2.0, 2.5, 3.0

RoHS

Type	Material	Accessory
GEABM	MC Nylon	Set Screw (EN 1.7220 Equiv., Black Oxide)
GEABMS	MC Nylon	Set Screw (EN 1.4301 Equiv., Black Oxide)
GEABMT	MC Nylon	Set Screw (EN 1.7220 Equiv., Black Oxide)
GEABPS	MC Nylon	Set Screw (EN 1.4301 Equiv., Black Oxide)
GEABPT	MC Nylon	Set Screw (EN 1.4301 Equiv., Black Oxide)

⚠ Set Screw is not included in products with Gear Shape A.

⚠ Adhesive is applied to metal hub insert and press-fit.

⚠ P dimension of GEABM (MC Nylon) may shrink due to its water-absorbing property.

Gear Shape

Shape K **Shape A** **Shape A (With Metal Hub Insert)** **Shape B** **Shape B (With Metal Hub Insert)**

Accuracy Previous JIS B 1702 Class 5 (New JIS B 1702-1 Class 9 Equiv.)

Part Number	Number of Teeth	B	Gear Shape	Shaft Bore Dia. Ph7 Selection		d Reference Dia.	D Tip Dia.	G Root Dia.	H	L	ℓ1	ℓ2	M (Coarse)	d1	*1. Allowable Transmission Force (N.m) Bending Strength		Unit Price				
				W/o Metal Hub Insert	With Metal Hub Insert										MC Nylon	Polycetal	GEABM	GEABMS	GEABPT		
GEABM (MC Nylon)	*15	8	K	3-5	-	7.5	8.5	6.25	9	18	10	3	M3	P+4	0.08	0.33					
	*16				8	9	6.75	0.09							0.36						
	*18				9	10	7.75	0.11							0.42						
	*20				10	11	8.75	0.12							0.49						
	GEABP (Polycetal)	*20	3	B	3-5	-	10	11	8.5	8.5	20	13	3	M3	P+4	0.05	0.18				
		*24				12	13	10.75	0.06							0.23					
		*25				12.5	13.5	11.25	0.06							0.24					
		*28				14	15	12.75	0.07							0.28					
		GEABMT (Stainless Steel with Metal Hub Insert, MC Nylon)	*30	10	A	3-7	-	20	21	18.75	20	10	13	3	M3	P+4	0.08	0.31			
			*32				20	21	18.75	0.08							0.33				
			*36				22	23	20.75	0.10							0.39				
			*40				24	25	22.75	0.11							0.44				

Module 2.0, 2.5, 3.0

Part Number	Number of Teeth	B	Gear Shape	Shaft Bore Dia. Ph7 Selection		d Reference Dia.	D Tip Dia.	G Root Dia.	H	L	ℓ1	ℓ2	M (Coarse)	d1	*1. Allowable Transmission Force (N.m) Bending Strength		Unit Price																												
				W/o Metal Hub Insert	With Metal Hub Insert										MC Nylon	Polycetal	GEABM	GEABMS	GEABPT																										
GEABM (MC Nylon)	*12	20	A	3-5	-	24	28	19.0	18	34	14	4	M4	P+4	2.25	2.45																													
	*14				28	32	23.0	2.96							3.23																														
	*15				30	34	25.0	3.28							3.59																														
	*16				32	36	27.0	3.63							3.97																														
	GEABMS (With Metal Hub Insert, MC Nylon)				*20	25	B	3-7							-	40				44	35.0	30	37	12	6	M5	P+6	4.91	5.36																
					*22										48	52				43.0	6.19							6.77																	
					*24										50	54				45.0	6.54							7.15																	
					*25										56	60				51.0	7.54							8.24																	
					GEABPT (Stainless Steel with Metal Hub Insert, Polycetal)										*30	30				B	3-9							-	60				64	55.0	48	45	15	7.5	M6	P+8	11.86	12.95			
															*32													64	68				59.0	13.81							14.97				
															*35													70	74				65.0	15.80							17.05				
															*36													72	76				67.0	16.02							17.34				

⚠ Number of Teeth with * is not With Metal Hub Insert Type. *1 Allowable Transmission Forces in the table are reference values calculated with prescribed conditions. For conditions, see P. 1498.

Ordering Example

Part Number - Number of Teeth - B - Gear Shape - P

GEABM1.0 - 20 - 10 - A - 8

GEABPS2.0 - 40 - 20 - B - 20

GEABM0.5 - 20 - 8 - K - 7

⚠ When gear shape is not specified, Module 1.0 with 18 or more teeth and Module 1.5, 2.0, 2.5, 3.0 will be Shape B.

Alterations

Part Number - Number of Teeth - B - Gear Shape - P - (KC90, KC120...etc.)

GEABM1.0 - 25 - 10 - B - 8 - KC120

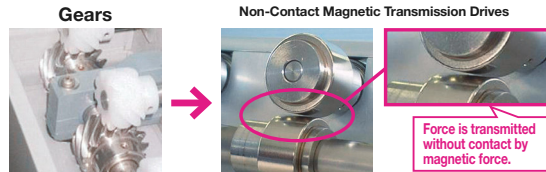
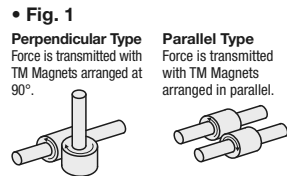
GEABPS2.0 - 40 - 20 - A - 15 - KTC20 - K4.0

Code	Set Screw	Tapped Hole Dimension	Stepped Hole										
	KC90, KC120	TPC	DHL, DHR										
Spec.	KC90: Adds another set screw at 90° position. KC120: Adds another set screw at 120° position. ⚠ Not applicable to Shape A.	Changes the tapped hole dimension. [Ordering Code] TPC4 ⚠ Not applicable to Shape A. <table border="1" style="width: 100%; border-collapse: collapse; font-size: 6px;"> <tr><td>M</td><td>TPC</td></tr> <tr><td>M3</td><td>M4</td></tr> <tr><td>M4</td><td>M3 M5</td></tr> <tr><td>M5</td><td>M4 M6</td></tr> <tr><td>M6</td><td>M5 M8</td></tr> </table>	M	TPC	M3	M4	M4	M3 M5	M5	M4 M6	M6	M5 M8	Changes shaft bores to stepped bores. ⚠ Not applicable to Shape K. (Z: 1mm Increment, J: 0.1mm Increment) ⚠ Not applicable to With Metal Hub Insert Type. ⚠ No tapped holes for Shape B. [Ordering Code] DHL-Z20-J4.0 <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> DHL ⚠ Shape A: P+2<Z<G-4, 2<J<B-3 ⚠ Shape B: P+2<Z<G-4, 2<J<L-3 </div> <div style="text-align: center;"> DHR ⚠ Shape B: P+2<Z<H-4, 2<J<L-B </div> </div>
M	TPC												
M3	M4												
M4	M3 M5												
M5	M4 M6												
M6	M5 M8												

Code	Both Ends Stepped Bore	Side Slotted Hole	Side Through Hole
	WDH	LFC, LTC	KFC, KTC
Spec.	Changes shaft bores to both ends stepped bore. ⚠ Not applicable to Shape K. (Q, R, S, T: 1mm Increment) ⚠ S.T.≥3 ⚠ Not applicable to With Metal Hub Insert Type. ⚠ No tapped holes for Shape B. [Ordering Code] WDH-Q10-R10-S3-T3 <div style="display: flex; justify-content: space-around; align-items: center;"> ⚠ Shape A ⚠ P+2<Q, R<G-4 ⚠ S+T<B-3 </div>	Machines slotted holes on the side surface (30°). (LFC, LTC: 1mm Increment) ⚠ S.T.≥3 ⚠ Applicable to Shape A only. ⚠ W/o Metal Hub Insert: P+C+4<LFC(LTC)≤G-C-4 ⚠ With Metal Hub Insert: d1+C+4<LFC(LTC)≤G-C-4 [M Selection] M3, M4, M5, M6 [Ordering Code] LFC20-M3 <div style="display: flex; justify-content: space-around; align-items: center;"> ⚠ P+2<Q, R<G-4 ⚠ S+T<B-3 </div>	Machines through holes on the side surface. (KFC, KTC: 1mm Increment, K: 0.5mm Increment) ⚠ Applicable to Shape A only. ⚠ W/o Metal Hub Insert: P+K+4<KFC(KTC)≤G-K-4 ⚠ With Metal Hub Insert: d1+K+4<KFC(KTC)≤G-K-4 [K Selection] K3.0-K6.0 [Ordering Code] KFC20-K3.5 <div style="display: flex; justify-content: space-around; align-items: center;"> ⚠ P+2<Q, R<G-4 ⚠ S+T<B-3 </div>

Non-Contact Magnetic Transmission Drives Overview

What are Non-Contact Magnetic Transmission Drives?
Non-Contact Magnetic Transmission Drives are Toothless Magnetic Gears.
 Motive force is transmitted by using magnetic pull / repulsion without any gear engagement or contact.



Main Merits of Non-Contact Magnetic Transmission Drive

The following merits are realized from non-contact rotation

- ① **Can be used in clean rooms**
 - Ultra low particle generation. Can be used even for Class 1.
- ② **Semi-permanently maintenance free**
 - No need for lubricating grease
 - No need for replacement due to wearing or damage

Ordering Code

Selection Procedure

- Selection of Transmission Direction (Perpendicular Type or Horizontal Type)
- Selection of Product Type (See Table 1)
- Calculate Qty from work size and conveyance distance
- Calculate the load torque (Refer to the selection example on the right)
- Select the external form size by the load torque required for 1 magnet
- Select inner diameter size from the size of the shaft

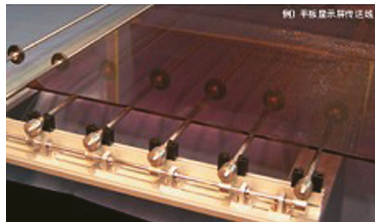


Table 1: Differences Between Precision Type and Standard Type

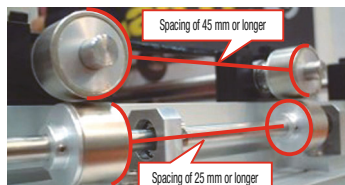
Type	Clean Room	Rotational deviation at low speeds	Price
Precision	Class 1	Small	High
Standard	Class 1	Large	Low

* When the Economy Type is operating at low speed, cogging (rotational deviation) may occur.

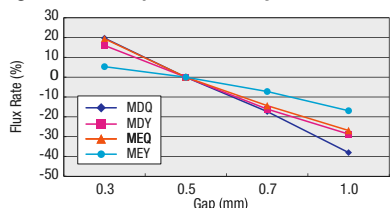
Cautions when Designing

- When designing shafts in a series, as attraction between two magnets and the displacement of the magnets' positions could occur, make a spacing interval between the transmission surface of the magnets of 45 mm or greater. Also ensure a space between the transverse surfaces of magnets of 25 mm or more. (Photo 1)
- By adjusting the distance between the magnets, the allowable torque changes. (Design Data 1) The recommended distance is 0.5 mm. Ensure the distance is at least 0.3 mm or more to prevent contact from occurring.
- The magnetic force of the magnet has a maximum attractive force of 7 kgf · cm. Use a bearing holder set, etc. to fix the magnets to prevent them contacting each other.

Photo 1: Spacing Intervals When Using Shafts in Series



Design Data 1: Torque Variation by Distance Change (Reference)



Selection Example

Preconditions

- Roller Dia: 50mm · Roller Total Weight: 0.3 kg · Work Weight: 5 kg · Shaft Size: 12φ · Shaft Weight: 0.5 kg · No. of Shafts: 7 · Seal Frictional Coefficient: 0.1
- Transmission Efficiency: 0.9 · Safety Ratio: 3 · Use of Induction Motor
- ① Orthogonal Type ② Select Precision Type from the size of the shaft
- ③ Required Qty: 14 ④ Load Torque Calculation (See the following) ⑤ External Dimension Size: D35
- ⑥ Internal Diameter Size: d12

- * Example of a safety ratio. Set it according to your specifications.
- * Calculate the transmission efficiency by referencing the magnet transmission efficiency.
- * Calculate the seal frictional coefficient from the bearing, etc. that will be used.

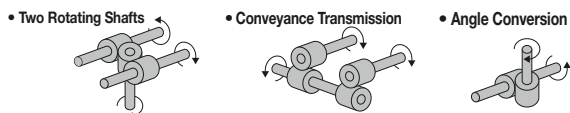
Formula Example

$$F = (\text{Work Weight (kg)} + \text{Shaft Weight (kg)} + \text{Roller Weight (kg)}) \times \text{Seal Frictional Coefficient}$$

$$T = (F (N) \times D (\text{Roller Dia. (m)}) / 2 \times \text{Transmission Efficiency}) \times \text{Safety Ratio}$$

Set the following as prerequisites:
 $F = (5 + 3.5 + 0.3) \times 0.1 = 0.88 \text{ kg} \Rightarrow 8.6 \text{ N}$
 $T = (8.6 \times 0.05 / 2) \times 3 = 0.58 (\text{N} \cdot \text{m})$
 0.58 / Minimum Interlocking Gears When Carrying Work 5 pc = 0.116 (N · m)

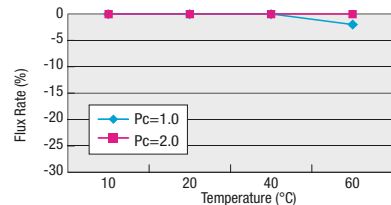
Main Transmission Methods



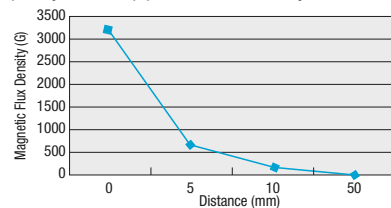
Cautions During Use

- Allowable torque changes depending on the temperature (Design Data 2).
- The following objects are negatively affected by strong magnetic field (Design Data 3).
 Electronic devices such as mobile phones, PCs, watches
 Electronic medical devices such as pacemakers
- No alteration is available for the magnetic parts.
- Strong impact may cause damage and lead to deterioration in magnetic force.
- Due to its non-contact nature, it is not suitable for extremely high-speed rotation (Max. Speed 1500 rpm)

Design Data 2: Magnetic Flux Variation Rate by Temperature (Reference)



Design Data 3: Space Magnetic Flux Density by Distance from Non-Contact Magnetic Transmission Drive (Reference)



Non-Contact Magnetic Transmission Drives / Non-Contact Magnetic Transmission Drives Economy Type

Q&A can be viewed regarding the TM Magnets from the URL on the right. <http://jp.misumi-ec.com/mech/product/ro/tm.html>
Features: Rotational displacement is unlikely to occur even at low-speed rotation.

Standard Type

Type	Combined Type	Material		Surface Treatment	
		① Magnet Section	② Holder Section	① Magnet Section	② Holder Section
Standard Type	MDQ	Perpendicular Type	Neodymium Sintered Magnet	EN AW-5056 Equiv.	Out-gassing Prevention Treatment
	MDY	Parallel Type			Corrosion Resistant Anodizing

Maximum Rotational Speed: 1500rpm
 Operating Temperature: 0 ~ 60°C

Perpendicular Type
 Motive force is transmitted by arranging TM magnets at 90°.

Parallel Type
 Motive force is transmitted by arranging TM magnets in parallel.

Part Number	Type	D	d Selection				D1	D2	H	W	ℓ	M	* Allowable Torque (N · m)		Unit Price
			MDQ	MDY	Standard Torque										
Perpendicular Type MDQ		16	6	8			13	12	19.5	8	5	M3	0.013	0.032	
		22	8	10	12	18	17	23.5	12	0.050			0.105		
		26	10	12	15	22	20	25.5	14	0.068			0.186		
Parallel Type MDY		35			12	15	20	32	29	34.0	22	M4	0.245	0.558	

- ⊗ Perpendicular Type and Parallel Type cannot be used in combination.
 - ⊗ Cannot be combined with other manufacturer's products. Please be sure to order in sets of the compatible product types.
 - ⊗ Drives with different diameters cannot be used in combination. Combine the drives of same diameter.
- * Allowable Torque values are for reference at 0.5mm gap.

Features: This type is made of plastic and more economical than the Standard Type. Suitable for use in normal atmosphere. Equiv. allowable torque to the Standard Type.

Economy Type

Type	Combined Type	Material		Surface Treatment	
		① Magnet Section	② Holder Section	① Magnet Section	② Holder Section
Economy Type	MEQ	Perpendicular Type	Neodymium Bonded Magnet	Polyacetal (D16: EN AW-5056 Equiv.)	Electrostatic Paint
	MEY	Parallel Type			-

Maximum Rotational Speed: 1500rpm
 Operating Temperature: 0 ~ 60°C

Perpendicular Type
 Motive force is transmitted by arranging TM magnets at 90°.

Parallel Type
 Motive force is transmitted by arranging TM magnets in parallel.

Part Number	Type	D	d Selection				H	W	ℓ	Locking Screw (D16: Set Screw)		F	E	* Allowable Torque (N · m)		Unit Price	
			M	Tightening Torque (N · m)	MEQ	MEY				MEQ	MEY						
Perpendicular Type MEQ		8	5				8	-	-	-	-	-	-	0.0058	0.0078		
		16	6	8		19.5	8		M3	1.5	-	-	-	0.015	0.021		
		26		12	15	25.5	14	5	M2.5	0.333	1.5	11.5	0.098	0.167			
Parallel Type MEY		35			15	20	33.5	22	M3	0.422		16	0.221	0.515			
		45			20	45	30	6.35	M5	0.784	2	20.5	0.804	-	-		

- ⊗ Perpendicular Type and Parallel Type cannot be used in combination.
 - ⊗ Cannot be combined with other manufacturer's products. Please be sure to order in sets of the compatible product types.
 - ⊗ Drives with different diameters cannot be used in combination. Combine the drives of same diameter.
 - ⊗ D diameter 45 is available for Perpendicular Type only.
 - ⊗ D8 does not have the ② holder section. Use adhesive to fix.
 - ⊗ The holder section of D16 is tightened with a set screw. (Set screw included)
- * Allowable Torque values are for reference at 0.5mm gap.

Ordering Example

Part Number	d
MDQ22	8
MEQ35	20

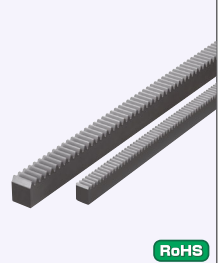
Induction Hardened Rack Gears - Ground

Pressure Angle 20°, Module 1.0, 1.5, 2.0, 2.5, 3.0

Induction Hardened Rack Gears - Ground, Hole Position Configurable

Pressure Angle 20°, Module 1.0, 1.5, 2.0, 2.5, 3.0

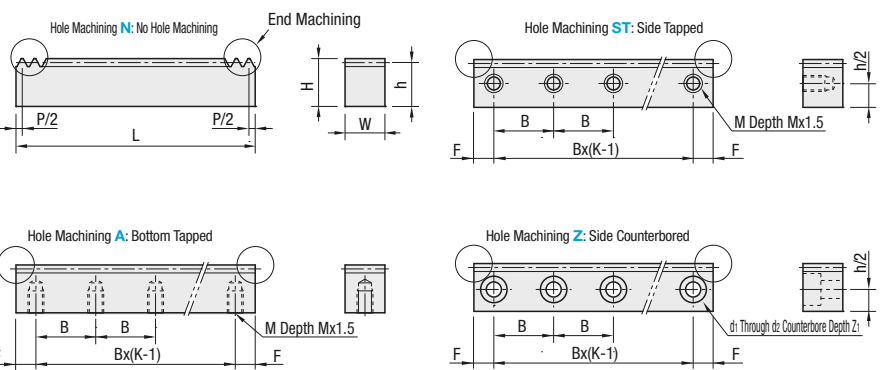
■ **Features:** Rack gears with hardened teeth which provide excellent strength, abrasion resistance and high precision.



Type	Material	Surface Treatment	Hardness
RGEAH	EN 1.1191 Equiv.	Black Oxide	Tooth Induction Hardened 45-55HRC

Teeth and Hole Machined surfaces have no surface treatment.

Module	Accuracy: Accumulated Pitch Error (µm)	
	Nominal	300
1.0-1.5	32	35
2.0-3.0	-	39



Enlarged View of End Face

Module	P Tolerance
1.0-2.0	-0.1 -0.3
2.5-3.0	-0.1 -0.4

$$F = \frac{L - Bx(K-1)}{2}$$

Part Number	Type	Module	Nominal	Hole Machining	Number of Effective Teeth	L	P (Pitch)	W	H	h	B (Hole Pitch)	M (Coarse)	d1	d2	Z1	K (Number of Holes)
	1.0	500	A (Bottom Tapped)	159	499.51	4.712	15	20	18.5	180	M4	4.5	8	4.5	3	
	1.5	300	ST (Side Tapped)	63	296.85	6.283	20	25	23	180	M5	5.5	9.5	5.5	3	
	1.5	500	Z (Side Counterbored)	106	499.51	7.854	25	30	27.5	180	M5	5.5	9.5	5.5	3	
	2.0	500		79	496.37	9.424	30	35	32	180	M5	5.5	9.5	5.5	3	
	2.5	500		63	494.8											
	3.0	500		53	499.51											

Ordering Example: Part Number - Nominal - Hole Machining
RGEAH1.0 - 500 - A

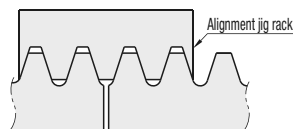
Part Number	Type	Module	Nominal	Unit Price 1 ~ 4 pc(s).			
				Hole Machining N	Hole Machining A	Hole Machining ST	Hole Machining Z
RGEAH	1.0	300	500				
	1.5	300	500				
	2.0	500	500				
2.5	500	500					
3.0	500	500					

For orders larger than indicated quantity, please request a quotation.

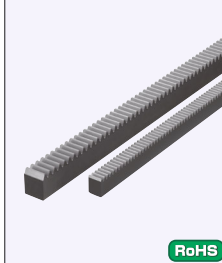
Alterations: Part Number - Nominal - Hole Machining - (MC, WMC)
RGEAH1.0 - 500 - A - MC4

Alterations Code	One End Tapped		Both Ends Tapped	
	MC	WMC	MC	WMC
Spec.	Ordering Code MC5		Ordering Code WMC5	
	Module	M Selection	Module	M Selection
	1.0	3 4	1.0	3 4
	1.5-3.0	4 5 6	1.5-3.0	4 5 6

■ **How to Connect Rack Gears**
MISUMI Induction Hardened Rack Gears are end machined with negative pitch tolerance in length. When connecting the racks, use a piece of rack gear in the same module) as a spacer jig as shown in the right side figure to properly adjust the pitch.



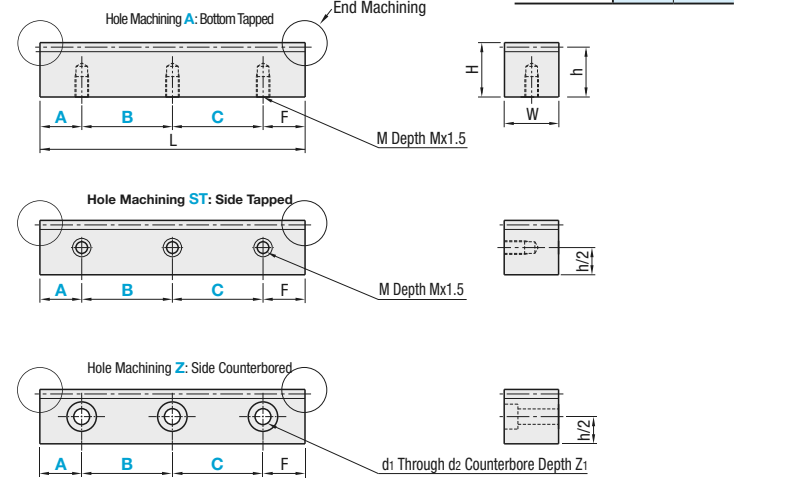
■ **Features:** Rack gears with hardened teeth which provide excellent strength, abrasion resistance and high precision.



Type	Material	Surface Treatment	Hardness
RGEAHL	EN 1.1191 Equiv.	Black Oxide	Tooth Induction Hardened 45-55HRC

Teeth and Hole Machined surfaces have no surface treatment.

Module	Accuracy: Accumulated Pitch Error (µm)	
	Nominal	300
1.0-1.5	32	35
2.0-3.0	-	39



Enlarged View of End Face

Module	P Tolerance
1.0-2.0	-0.1 -0.3
2.5, 3.0	-0.1 -0.4

$$F = L - A - B - C$$

Part Number	Type	Module	Nominal	Hole Machining	Hole Position ABC 1mm Increment	Number of Effective Teeth	Overall Length L	P (Pitch)	W	H	h	M (Coarse)	d1	d2	Z1
	1.0	500	ST (Side Tapped)	5-494	159	499.51	4.712	15	20	18.5	M4	4.5	8	4.5	
	1.5	300	Z (Side Counterbored)	5-291	63	296.88	6.283	20	25	23	M5	5.5	9.5	5.5	
	1.5	500		5-493	106	499.51	7.854	25	30	27.5	M5	5.5	9.5	5.5	
	2.0	500		6-490	79	496.37	9.424	30	35	32	M5	5.5	9.5	5.5	
	2.5	500		6-488	63	494.8									
	3.0	500		6-492	53	499.51									

Ordering Example: Part Number - Nominal - Hole Machining - Hole Position (First) - Hole Position (Second) - Hole Position (Third)
RGEAHL1.0 - 500 - ST - A50 - B100 - C200
RGEAHL2.0 - 500 - Z - A200

Part Number	Type	Module	Nominal	Body Price 1 ~ 4 pc(s).	Hole Machining Charge (+ Body Price)	
					Tapped Hole (A, ST)	Counterbored Hole (Z)
RGEAHL	1.0	300	500			
	1.5	300	500			
	2.0	500	500			
2.5	500	500				
3.0	500	500				

Unit Price = Body Price + Hole Machining Charge
(Calculation Example)
RGEAHL1.0-500-ST-A50-B100-C200

$$\text{Body Price} + \frac{\text{Hole Machining Charge}}{\text{Hole Machining Unit Price} \times \text{Number of Holes}} = \text{Unit Price}$$

For orders larger than indicated quantity, please request a quotation.

Alterations: Part Number - Nominal - Hole Machining - Hole Position (First) - Hole Position (Second) - Hole Position (Third) - (MC, WMC)
RGEAHL1.0 - 500 - ST - A50 - B100 - C200 - WMC3

Alterations Code	One End Tapped		Both Ends Tapped	
	MC	WMC	MC	WMC
Spec.	Ordering Code MC5		Ordering Code WMC5	
	Module	M Selection	Module	M Selection
	1.0	3 4	1.0	3 4
	1.5-3.0	4 5 6	1.5-3.0	4 5 6

