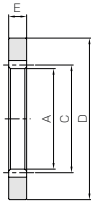




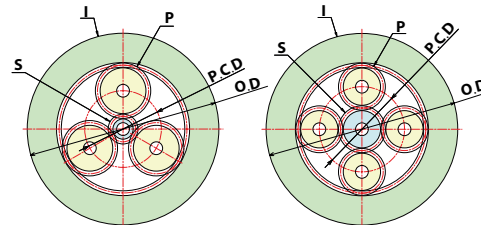
Specifications	
Precision grade	JIS grade NB (JIS B1702-1:1998) * JIS grade 4 (JIS B1702:1976)
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	less than 194HB

* The precision grade of products with a module of less than 0.8 is equivalent to the value shown in the table.



T1

Planetary Gear Systems created by using KHK Stock Gears



3 planetary gears are used

4 planetary gears are used

KHK's stock internal and spur gears working together will allow you to create planetary gear devices. In the table below, we introduce examples of planetary gear systems, where gears are assembled without meshing interference. The velocity ratio (Note 1) in the table are for planetary gear systems created with a stationary internal gear.

Used as speed deceleration devices from input by the sun gear and output by the carrier. Selection of the number of teeth also enables you to create various planetary gear devices with different transmission ratios.

Catalog No. <small>New items indicated in blue letters.</small>	Module	No. of teeth	Shape	Internal dia. A	Pitch dia. C	Outside dia. D	Face width E	Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)
								Bending strength	Surface durability	Bending strength	Surface durability		
S10.5-60	m0.5	60	T1	29	30	50	5	3.75	0.67	0.38	0.07	0.04~0.15	0.049
S10.5-80		80	T1	39	40	60	5	4.85	0.75	0.49	0.08	0.04~0.15	0.062
S10.5-100		100	T1	49	50	70	5	5.97	0.87	0.61	0.09	0.04~0.15	0.074
S10.8-60	m0.8	60	T1	46.4	48	75	8	15.4	2.87	1.57	0.29	0.05~0.16	0.16
S10.8-80		80	T1	62.4	64	90	8	19.9	3.24	2.03	0.33	0.05~0.16	0.20
S10.8-100		100	T1	78.4	80	105	8	24.5	3.75	2.50	0.38	0.05~0.16	0.23
S11-60	m1	60	T1	58	60	90	10	30.0	5.95	3.06	0.61	0.10~0.22	0.28
S11-80		80	T1	78	80	110	10	38.8	6.59	3.96	0.67	0.10~0.22	0.35
S11-100		100	T1	98	100	130	10	47.8	7.64	4.87	0.78	0.12~0.25	0.43
S11.5-50	m1.5	50	T1	72	75	115	15	87.1	20.9	8.88	2.13	0.13~0.29	0.70
S11.5-60		60	T1	87	90	130	15	101	20.6	10.3	2.10	0.13~0.29	0.81
S11.5-80		80	T1	117	120	160	15	131	23.3	13.4	2.38	0.13~0.29	1.04
S11.5-100		100	T1	147	150	190	15	161	27.0	16.5	2.75	0.15~0.32	1.26
S12-50	m2	50	T1	96	100	150	20	206	50.3	21.0	5.13	0.16~0.33	1.54
S12-60		60	T1	116	120	170	20	240	50.5	24.5	5.15	0.16~0.33	1.79
S12-80		80	T1	156	160	210	20	311	57.0	31.7	5.81	0.16~0.33	2.28
S12-100		100	T1	196	200	250	20	382	65.7	39.0	6.70	0.17~0.37	2.77
S12.5-50	m2.5	50	T1	120	125	185	25	403	101	41.1	10.3	0.17~0.37	2.87
S12.5-60		60	T1	145	150	210	25	469	101	47.8	10.3	0.17~0.37	3.33
S12.5-80		80	T1	195	200	260	25	607	114	61.9	11.6	0.17~0.37	4.25
S13-50	m3	50	T1	144	150	220	30	697	178	71.0	18.1	0.19~0.41	4.79
S13-60		60	T1	174	180	250	30	811	178	82.7	18.2	0.19~0.41	5.57

- [Caution on Product Characteristics] ① The backlash values shown in the table are the theoretical values for the normal direction for the internal ring in mesh with a 30 tooth SS spur gear.
 ② The allowable torque shown in the table are the calculated values according to the assumed usage conditions. Please see page 182 for more details
 ③ Please check for the involute interference, trochoid interference and trimming interference prior to using internal gears.

- [Caution on Secondary Operations] ① Please read "Caution on Performing Secondary Operations" (Page 32) 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 Avoid performing secondary operations that narrow the tooth width as it affects precision and strength.

Velocity ratio Note 1	Stock gears used in the system										Allowable transmission torque (kgf·m)				Total weight (kg)
	Internal gears (I)		Planetary gears (P)				Sun gear (S)		Sun gear T1		Planetary carrier T2				
	OD(mm)	Catalog No.	No. of teeth	Catalog No.	No. of teeth	Quantity	P.C.D(mm)	Equal angles	Catalog No.	No. of teeth	Bending strength	Surface durability		Bending strength	
6	50	S10.5-60	60	SSO.5-24A	24	3	18	120°	12	SSSO.5-12	0.072	0.0003	0.43	0.013	0.10
	75	S10.8-60	80	SSO.8-24A	24	3	28.8	120°	12	SSSO.8-12	0.30	0.0011	1.78	0.057	0.30
	90	S11-60	100	SSA1-24	24	3	36	120°	12	SSS1-12	0.58	0.0023	3.47	0.11	0.48
	130	S11.5-60	150	SSA1.5-24	24	3	54	120°	12	SSS1.5-12	1.77	0.0081	10.7	0.40	1.20
	170	S12-60	200	SSA2-24	24	3	72	120°	12	SSS2-12	4.21	0.020	25.2	0.99	2.66
	210	S12.5-60	250	SSA2.5-24	24	3	90	120°	12	SSS2.5-12	8.21	0.040	49.3	1.98	5.03
	250	S13-60	300	SSA3-24	24	3	108	120°	12	SSS3-12	14.2	0.070	85.2	3.49	8.57
	60	S10.5-80	80	SSO.5-32A	32	3	24	90°	16	SSO.5-16A	0.12	0.0005	0.75	0.027	0.11
	90	S10.8-80	100	SSO.8-32A	32	3	38.4	90°	16	SSO.8-16A	0.51	0.0024	3.05	0.12	0.38
	110	S11-80	120	SSA1-32	32	3	48	90°	16	SSS1-16	0.99	0.0047	5.96	0.24	0.57
	160	S11.5-80	180	SSA1.5-32	32	3	72	90°	16	SSS1.5-16	3.35	0.026	20.1	1.32	1.72
	210	S12-80	240	SSA2-32	32	3	96	90°	16	SSS2-16	7.95	0.064	47.7	3.22	3.85
	260	S12.5-80	300	SSA2.5-32	32	3	120	90°	16	SSS2.5-16	15.5	0.13	93.2	6.45	7.33
	70	S10.5-100	100	SSO.5-40A	40	4	30	90°	20	SSO.5-20A	0.23	0.0019	1.39	0.10	0.18
	105	S10.8-100	120	SSO.8-40A	40	4	48	90°	20	SSO.8-20A	0.95	0.0082	5.68	0.41	0.59
	130	S11-100	150	SSA1-40	40	4	60	90°	20	SSS1-20	1.85	0.016	11.1	0.82	0.84
	190	S11.5-100	200	SSA1.5-40	40	4	90	90°	20	SSS1.5-20	6.24	0.058	37.5	2.90	2.62
	250	S12-100	250	SSA2-40	40	4	120	90°	20	SSS2-20	14.8	0.14	88.8	7.09	6.01
5	60	S10.5-80	80	SSO.5-30A	30	4	25	90°	20	SSO.5-20A	0.23	0.0012	1.13	0.070	0.12
	90	S10.8-80	100	SSO.8-30A	30	4	40	90°	20	SSO.8-20A	0.93	0.0050	4.65	0.30	0.40
	110	S11-80	120	SSA1-30	30	4	50	90°	20	SSS1-20	1.82	0.010	9.08	0.60	0.59
	160	S11.5-80	180	SSA1.5-30	30	4	75	90°	20	SSS1.5-20	6.13	0.035	30.63	2.13	1.86
	210	S12-80	240	SSA2-30	30	4	100	90°	20	SSS2-20	14.5	0.087	72.6	5.21	4.18
	260	S12.5-80	300	SSA2.5-30	30	4	125	90°	20	SSS2.5-20	28.4	0.17	142	10.4	7.97
3	60	S10.5-80	80	SSO.5-20A	20	4	30	90°	40	SSO.5-40A	0.46	0.0016	1.39	0.10	0.13
	90	S10.8-80	100	SSO.8-20A	20	4	48	90°	40	SSO.8-40A	1.89	0.0068	5.68	0.41	0.35
	110	S11-80	120	SSA1-20	20	4	60	90°	40	SSS1-40	3.70	0.014	11.1	0.82	0.60
	160	S11.5-80	180	SSA1.5-20	20	4	90	90°	40	SSS1.5-40	12.5	0.048	37.5	2.91	1.77
	210	S12-80	240	SSA2-20	20	4	120	90°	40	SSS2-40	29.6	0.12	88.8	7.12	3.93
	260	S12.5-80	300	SSA2.5-20	20	4	150	90°	40	SSS2.5-40	57.8	0.24	173	14.3	7.47
	70	S10.5-100	100	SSO.5-25A	25	3	37.5	120°	50	SSO.5-50A	0.47	0.0020	1.42	0.12	0.16
	105	S10.8-100	120	SSO.8-25A	25	3	60	120°	50	SSO.8-50A	1.94	0.0084	5.83	0.51	0.43
	130	S11-100	150	SSA1-25	25	3	75	120°	50	SSS1-50	3.79	0.017	11.4	1.01	0.75
	190	S11.5-100	200	SSA1.5-25	25	3	112.5	120°	50	SSS1.5-50	12.8	0.060	38.4	3.58	2.24
	250	S12-100	250	SSA2-25	25	3	150	120°	50	SSS2-50	30.4	0.15	91.1	8.79	5.02

Calculation of Allowable Transmission Torque

One advantage of a planetary gear system is that they share load burdens by grouping multiple planetary gears, enabling high torque capacity transmission. The following formula is the calculation method for T1 (Allowable transmission torque of Sun Gear) and T2 (Allowable transmission torque of Planetary Carrier), shown in the table.

$$T_1 = T_s \cdot Z_p \cdot \eta \quad (\text{kgf} \cdot \text{m}) \quad \dots \dots \dots (1)$$

$$T_2 = T_s \cdot Z_p \cdot u \cdot \eta \quad (\text{kgf} \cdot \text{m}) \quad \dots \dots \dots (2)$$

Where:

Ts : Allowable transmission torque for a Sun gear (kgf · m) on a meshed pair of sun gear and planetary gear.
 For a sun gear meshed with a planetary gear, the number of revolutions is set to 100rpm.

Zp : Number of planetary gears used in the system

u : Velocity ratio

η : Contact efficiency for torque transmission
 In consideration of machining accuracy, variation in tooth thickness or other factors on the planetary carrier, the contact efficiency is set to 75%.

* For products not categorized in our KHK Stock Gear series, custom gear production services with short lead times is available. For details see page 8.