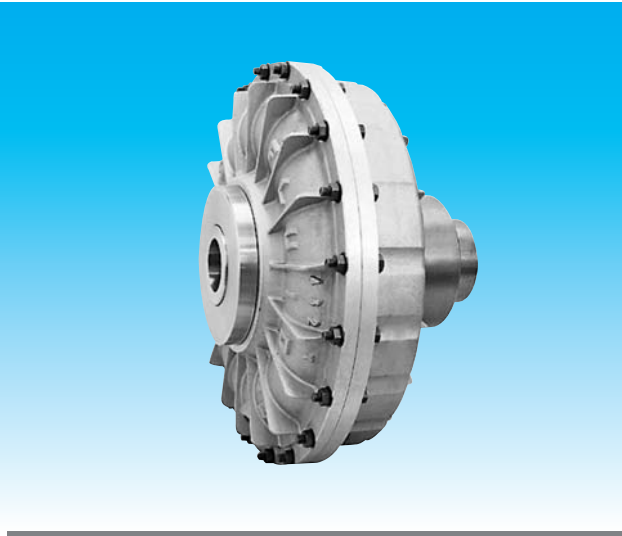


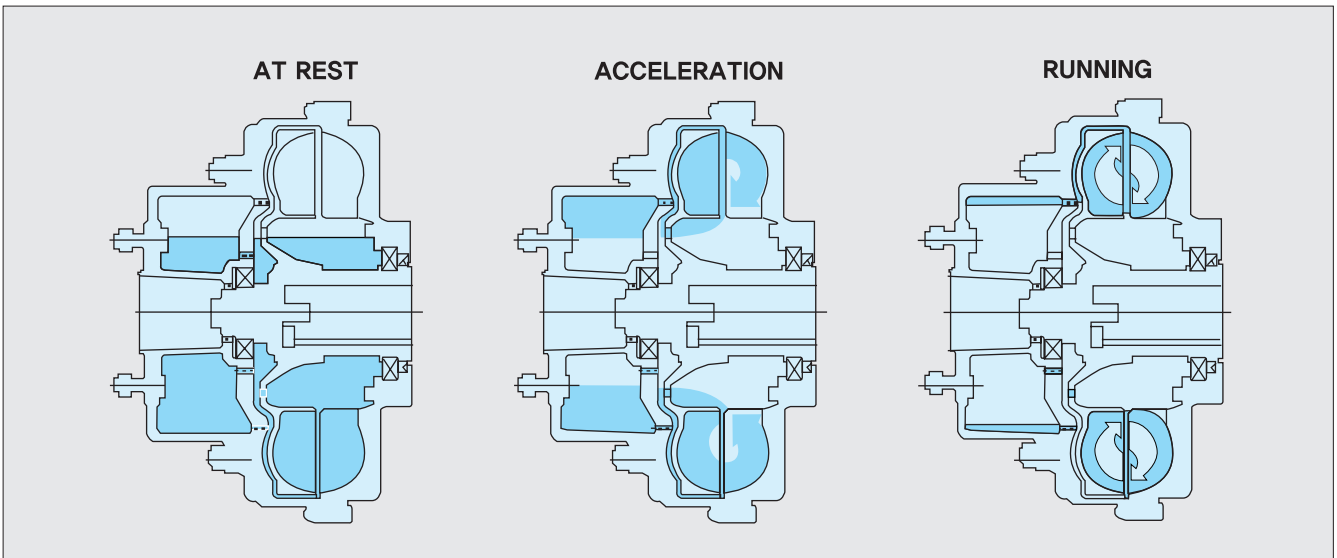
FLUID COUPLINGS

DESCRIPTION



Very smooth start-ups (Standard type)
 Reduction of current absorptions during the starting phase : the motor starts with very low load.
 Protection of the motor and the driven machine from jams and overloads.
 Utilization of asynchronous squirrel cage motors instead of special motors with soft starter devices.
 Possibility to achieve a high number of start-ups.
 Load balancing in case of a double motor drive : fluid couplings automatically adjust load speed to the motors speed.

With a delayed fill chamber (Chamber type)
 For very smooth start-ups with low torque absorptions, as typically required for machinery with large inertia values and for belt conveyors.
 The most convenient technical solutions to have fluid couplings with a delayed fill chamber connected to the main circuit by means of valves with calibrated bleed orifices.

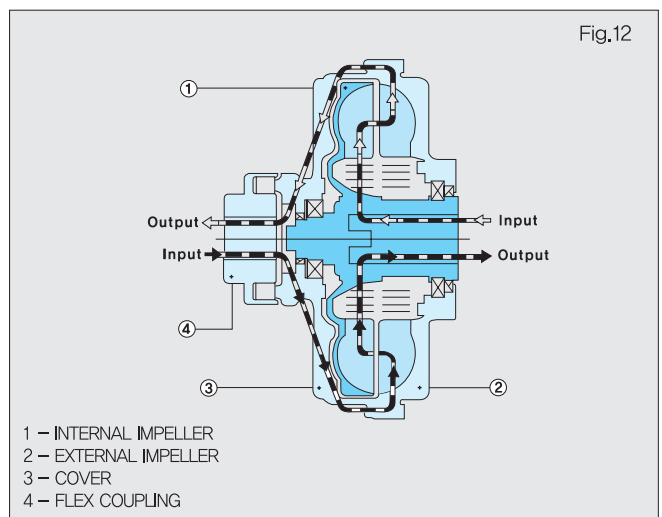


OPERATING PRINCIPLES

The FLUID coupling (K series) is a constant filling type comprising three main elements:

- 1-driving impeller (pump) mounted on the input shaft.
 - 2-driven impeller (turbine) mounted on the output shaft.
 - 3-cover. flanged to the External impeller, with an oil-tight seal.
- The FLUID coupling is a hydrokinetic transmission. The impellers performs like a centrifugal pump and a hydraulic turbine. With an input drive to the pump(e.g.electric motor or Diesel engine) kinetic energy is imparted to the oil in the coupling. The oil moves by centrifugal force across the blades of the turbine towards the outside of the coupling. The efficiency is influenced only by the speed difference (slip) between pump and turbine.
 In normal conditions (standard duty), slip can vary from 1.5% (large power) to 6% (small power).

$$\text{slip}(\%) = \frac{\text{input speed} - \text{output speed}}{\text{input speed}} \times 100$$



INSTALLATION

▣ KRG, CKRG

Fit fluid coupling on motor shaft, by using a threaded bar as shown on fig.13, and using two wrenches (hold wrench 'a' and turn wrench 'b' to draw the coupling on to the motor shaft.).

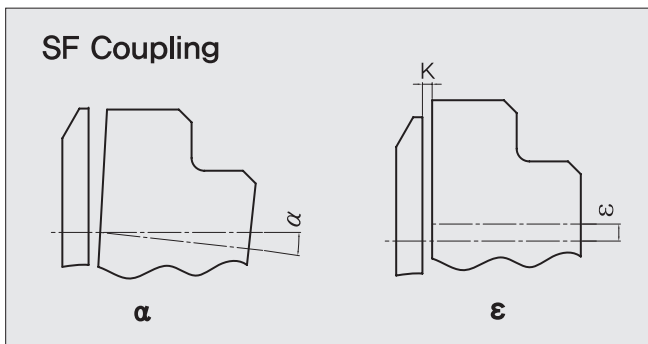
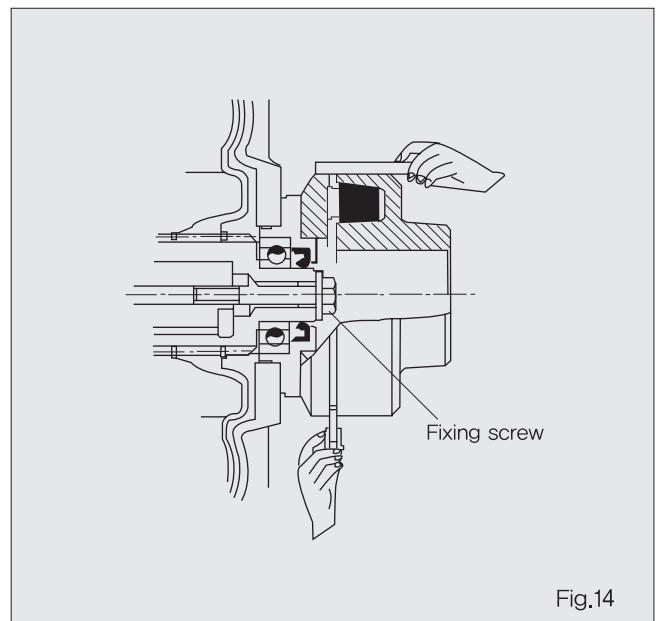
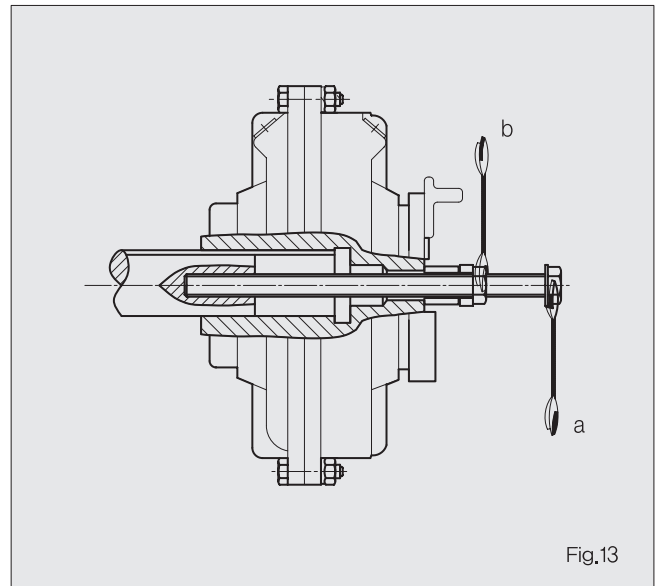
Position motor to driven machine until gap K(between half-couplings) Fig.14 reaches the indicated value on Tab.18

Check angular alignment by using filler in the gap at four point 90° apart. The errors should not exceed those indicated on Tab.18

Tab.18

Size	SF Coupling	ϵ (mm)	α (°)	Gap(k) ⁺¹ ₋₀₅
7-8	10	0,15	0,1	2
9-11-12	20	0,15	0,1	2
13	30	0,20	0,1	3
15	40	0,20	0,1	3
17-19	50	0,25	0,1	3
21-24	60	0,30	0,1	3
27-29	80	0,30	0,1	4
34	90	0,30	0,1	5

※ For speeds over 1500 RPM, reduce values ϵ & α by 50 percent.



INSTALLATION

■ KCP, CKCP, KCG, CKCG

When hub has been fabricated by interference fit, heat in a 90~120°C oil bath and fit it to the shaft. Never apply heat locally: it may cause distortion.

Fix dial gauges as shown on Fig.15, 16 and adjust the alignment of shafts.

The values on Tab.20 are recommended for long life time.

Tab.20

Size	KCP, CKCP			KCG, CKCG		
	ε_1 (mm)	α_1 (°)	S_1 (mm)	ε_2 (mm)	α_2 (°)	S_2 (mm)
7,8	0,1	0,1	±0.25	0,1	0.05	-0.5~2
9,11,12	0,12	0,1	±0.25	0,15	0.05	-0.5~3
13	0,15	0,1	±0.25	0,15	0.05	-0.5~3
15	0,15	0,1	±0.25	0,15	0.05	-0.5~3
17,19	0,15	0,1	±0.25	0,15	0.05	-0.5~3
21,24	0,2	0,1	±0.25	0,20	0.05	-0.5~4
27,29	0,2	0,1	±0.25	0,25	0,05	-0.5~4,5
34	0,2	0,1	±0.25	0,30	0.05	-0.5~5,5

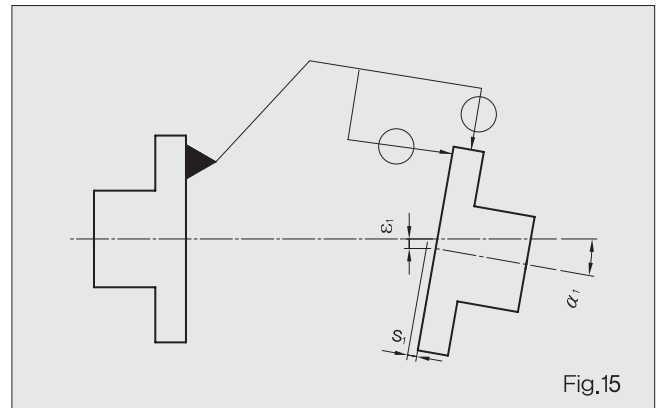


Fig.15

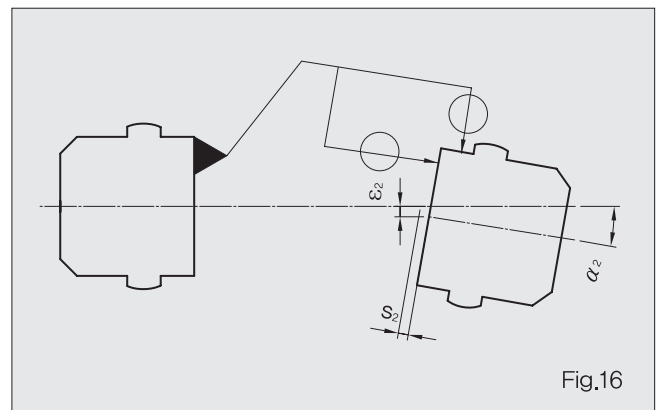


Fig.16

■ KSI, KSDF, CKSI, CKSDF

Fit fluid coupling on motor shaft, by using a threaded bar as shown on Fig.13, and using two wrenches (hold wrench 'a' and turn wrench 'b' to draw the coupling on to the motor shaft).

■ KRDF, CKRDF

- ① If the revolution is required over 1,500 rpm, consult to NARA. (27K, 29K model only)

Speed(rpm)	Over 2000		Under 2000	
	α_1	ε_1	α_1	ε_1
Allowable Error	0,05	0,05	0,1	0,1

DISASSEMBLY

■ KRG, CKRG, KSI, KSDF, CKSI, CKSDF

- Disassemble fixing screws,
- Screw threaded bar into tapped hole in end of fluid coupling and proceed as indicated in Fig.18 The threaded bar will push the coupling off the motor shaft. For Tap Hole dimension, see Tab.21

Tab.21

Size	Shaft (D)	Tap Hole		Size	Shaft (D)	Tap Hole	
		K..	CK..			K..	CK..
7	19,24	M12x190	-	13,15	48,55,60,65	M27x340	M27x410
	28,38	M14x190	-	17,19	60,65,75,80	M27x360	M27x440
8	24,28,38	M14x190	-	21,24	80,90,100	M36x460	M36x560
9,11,12	28,38	M16x250	M16x320	27,29	100,120,135	M45x530	M45x650
	42,48	M20x250	M20x320	34	150	M45x560	M45x690

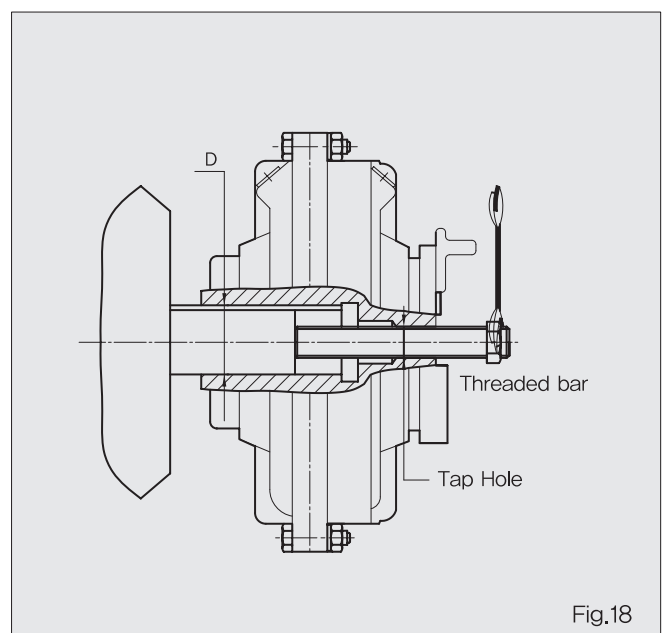


Fig.18

※ "K": Standard, "CK": Chamber

FILLING INSTRUCTION

It is necessary to follow the procedure reported here below to achieve the standard fill X for K series, fill 2 for CK series :

- ① Position the fluid coupling axis horizontally, turn it until the X mark (respectively 2 or 3 according to the fluid coupling type) casted into the housing gets at the top vertical (maximum oil fill), so that the oil plug is inclined as shown in Fig.19
- ② Fill with oil until it overflows out of the filler hole.
While filling, gently rock the coupling on its axis to make sure all air excess is vented out of the circuit.
The quantities to be filled are those described in Tab.22,23
- ③ Screw the cap and make sure no leakages occurred : otherwise use thread sealant on filler plug threads.
- ④ The fillings marked X-1-2-3-4 may be chosen by the operators to meet the best performance in terms of start-up and steady running condition.

- ⑤ For normal operating conditions, use only ISO HM 32(or equivalent SAE 10W). At low ambient temperatures(near 0°C), it is recommended to use ISO FD 10(or equivalent SAE 5W) oil. For temperatures below - 10°C, ask NARA.
- ⑥ For vertical mounted applications, the couplings recommended oil fills are described in Tab.22, 23.

Tab.24

RECOMMENDED OIL	ISO 32 HM
Agip	OSO 32
Castrol	HYPSPIN AWS 32
Esso	NUTO H 32
Mobil	DTE 24(OIL LIGHT)
Shell	TELLUS 32
Texaco	RANDO HD 32

Tab.22

K...	OIL QUANTITY(lt.)				
	X	1	2	3	4
7	0.92	0.86	0.8	0.73	0.65
8	1.28	1.19	1.1	1	0.9
9	1.95	1.82	1.69	1.55	1.4
11	2.75	2.55	2.35	2.1	1.85
12	4.1	3.875	3.575	3.25	2.9
13	5.2	4.85	4.45	4.05	3.6
15	7.65	7.15	6.6	6	5.4
17	11.7	10.9	10	9.1	8.2
19	14.2	13.3	12.3	11.2	10
21	19	17.8	16.4	15	13.5
24	28.4	26.5	24.6	22.6	20.5
27	42	39	36	33.5	31.5
29	55	51	47	44	41.5
34	82.5	76.6	70.6	66.2	62.5

Tab.23

CK...	OIL QUANTITY(lt.)		
	2	3	4
12	4.8	4.2	3.6
13	5.8	5.2	4.7
15	8.6	7.7	6.4
17	13.6	12.8	11.7
19	16.3	15.2	14
21	23	21.3	19.3
24	31.2	28.6	26
27	50	46.5	43
29	63	59	54
34	92.5	88.5	83.5

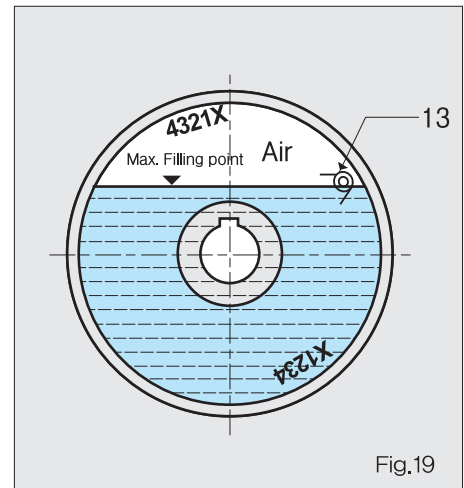


Fig.19

Warning) If the filling Quantities are over the maximum (X for K series, 2 for CK series), it may damage the facilities or injure. Be careful this.

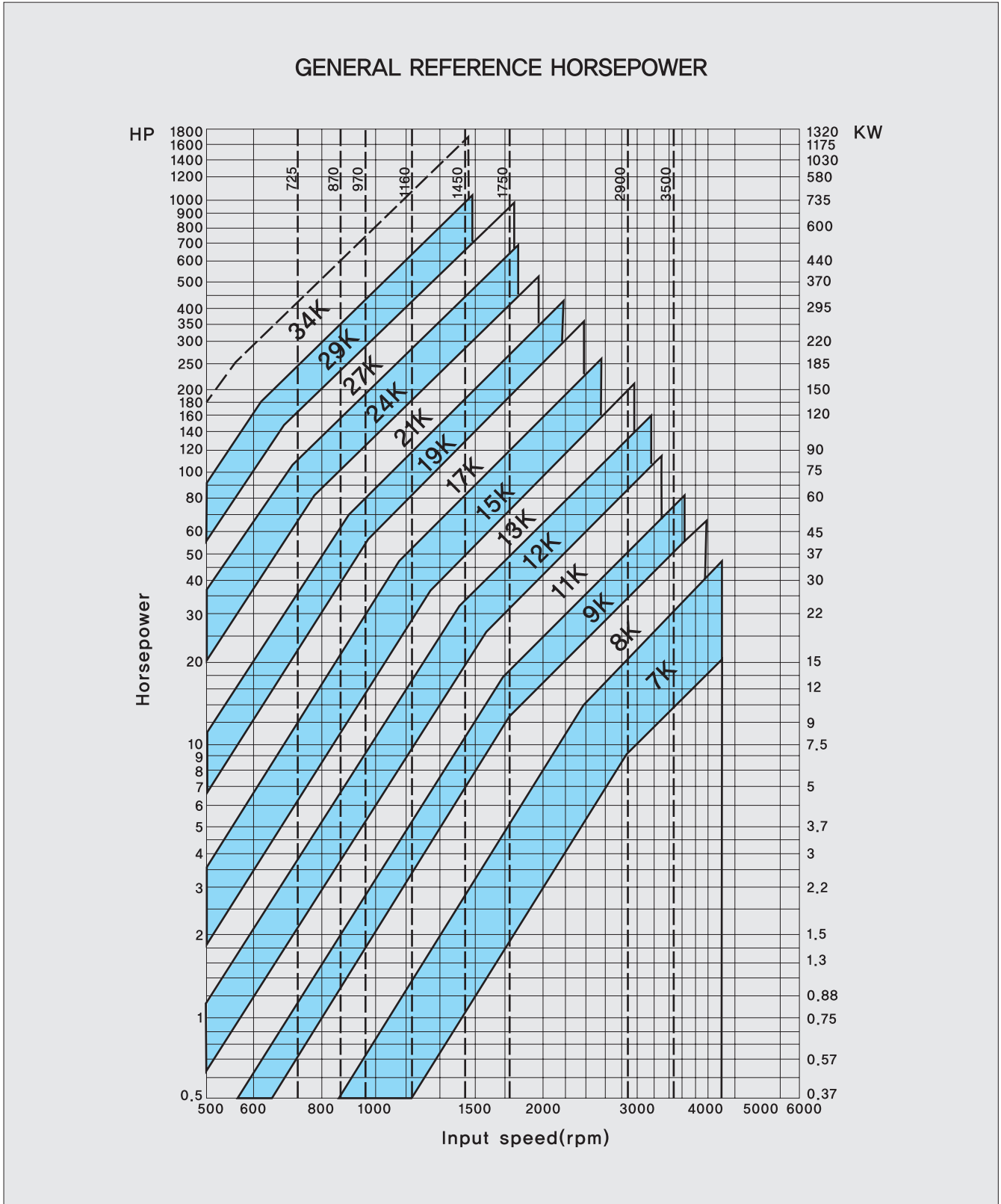
OPERATION AND MAINTENANCE

- ① Start motor several times to check the coupling performance. Maximum temperature should not exceed 90°C. For higher temperatures, use special seals : contact your NARA distributor. High oil operating temperatures can be caused by:
 - a) Insufficient oil filling.
 - b) Absorbed power is higher than the motor rated power.
 - c) High ambient temperature.
 - d) Too frequent starts.
 - e) Long starting time.
- ② Inadequate air ventilation to allow cooling of the coupling. if coupling is operating in a restricted space adequate ventilation aperture should be provided.
- ③ After the first 20 days operation, check the filling (this operation must be carried out with cold oil). Also check the motor and driven machine fixing screw.
- ④ Repeat these checks every 6 months.
- ⑤ Coupling is supplied with fusible plug at 145°C. 120°C or 175°C upon request.
It is suggested that these alternative fusible plugs should be considered for belt conveyors, crushers, mills, mixers, etc., where continual overload conditions can occur.
- ⑥ Oil should be replaced after 4,000 hours operation.

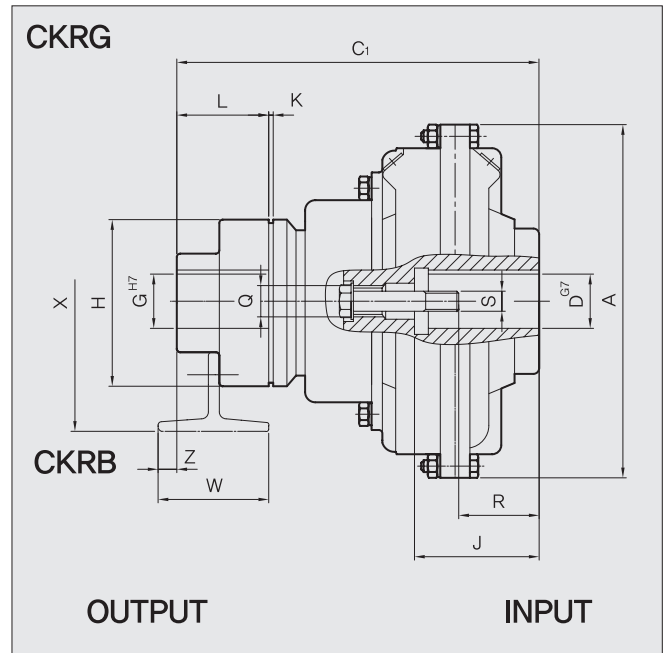
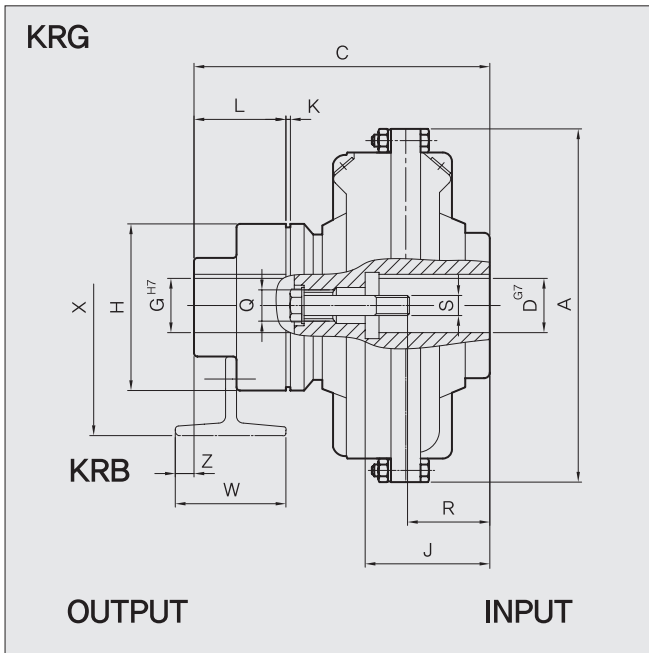
Warning) When risks to person or property may be involved by reversal operation of driven equipment, a holding device must be equipped and be an integral part of the driven equipment.

SELECTION

The chart below be used to select a unit size from the horse-power and input speed. If the selection point falls on a size limit line dividing one size from the other, it is advisable to select the larger size with a proportionally reduced oil fill.



DIMENSIONS



Size	Dimensions(mm)													Flex Coupling	Mass(kg) – without oil			
	D		J		A	G _{max}	C	C ₁	H	K	L	Q	R		S	KRG	CKRG	
7	19	24	40	50	228	42	189	-	110	60	M12	27	35	M6	M8	SF10	8.3	-
	28	38	60	80								M14	40	56	M10			
8	24	28	50	60	256	42	194	-	110	60	M14	40	45	M8	M10	SF10	8.7	-
	38	80	M12	61								M12						
9	28	38	60	80	295	55	246	-	132	80	M16	43	54	M10	M12	SF20	16	-
	42	48	110	M16								74	M16					
11	28	38	60	80	325	55	255	-	132	80	M16	42	63	M10	M12	SF20	18	-
	42	48	110	M16								83	M16					
12	38	80	370	55	255	322	132	2	80	M16	63	M12	SF20	21.5	24.5			
	42	48									110	M16				83	M16	
13	42	48	110	398	70	285	345	170	3	80	M16	63	M12	SF30	34	37		
	55	60	110									140	M16				84	104
15	48	55	110	460	80	343	411	170	3	110	M27	81	M16	M20	SF40	50.3	54.3	
	60	65	140									M20	111	M20				
17	60	65	140	520	90	362	442	250	3	110	M27	104	M20	SF50	77	83		
	75	80	140									170					104	134
19	60	65	140	565	90	362	442	250	3	110	M27	104	M20	SF50	84	90		
	75	80	140									170					104	134
21	75	140	620	110	433	533	290	4	140	M36	100	M20	SF60	129	139			
	80	90									170	M20				M24		
24	80	90	170	710	110	433	533	290	4	140	M36	130	M20	M24	SF60	147	157	
	100	210	468			568	165					M24						
27	120max	*210	780	120	504	622	350	4	150	M45	*167	*M24	SF80	228	246			
29	135max	*240	860		533	651					*167			281	299			
34	150max	*265	1000	155	615	746	425	5	180	M45	*200	*M36	SF90	449	464			

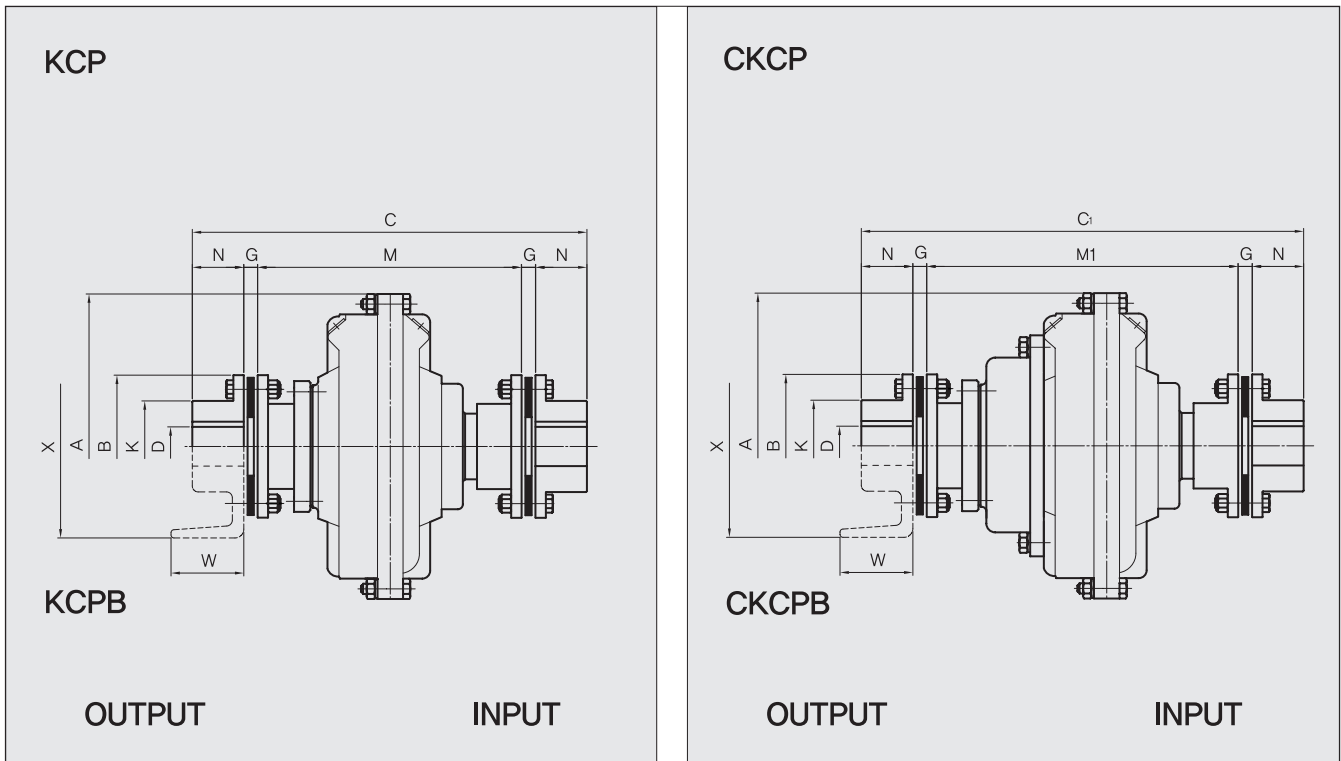
1. Refer to page33 for oil quantity.

2. "X, W & Z" Dimensions depend on brake drum size.

3. "·" Reduced depth keyway as per DIN6885/2

4. Markered "*" of dimenions J,R,S are applied to the Max. bore.

DIMENSIONS

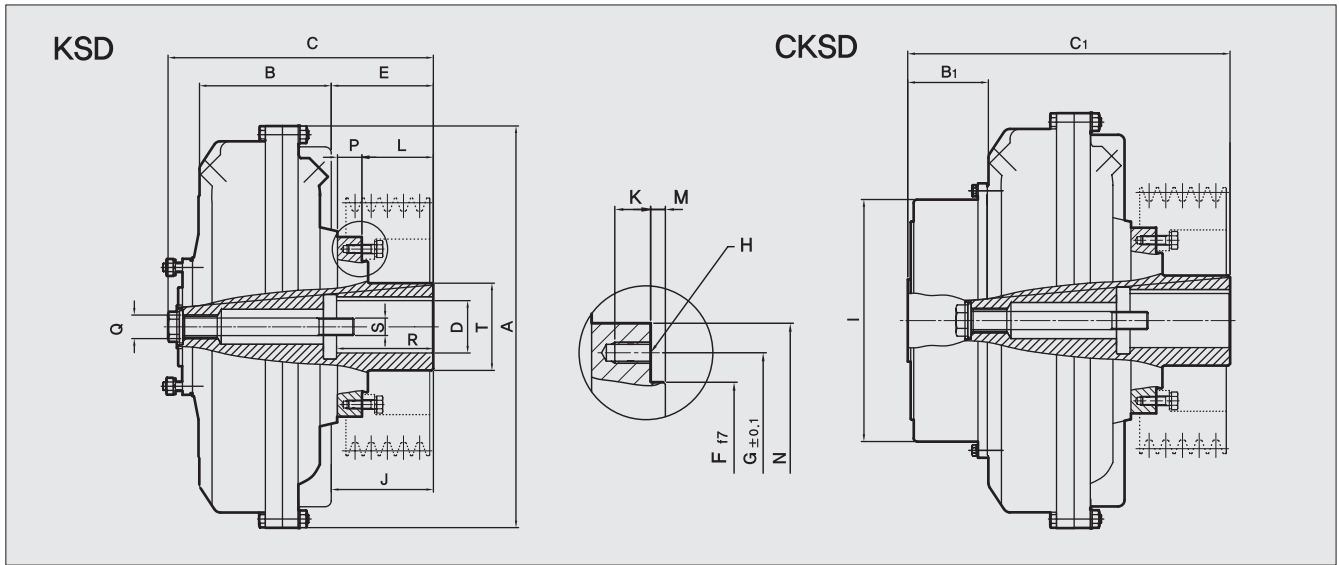


Size	Dimensions(mm)										Mass(kg) – without oil	
	A	B	C	C ₁	D _{max}	G	K	M	M ₁	N	KCP	CKCP
7	228	104	285,4	–	42	11,2	61	196	–	33,5	11	–
8	256	104	290,4	–	42	11,2	61	201	–	33,5	11,9	–
9	295	143	377,3	–	58	11,7	84	258,3	–	47,8	24,4	–
11	325	143	386,3	–	58	11,7	84	267,3	–	47,8	26,4	–
12	370	143	398,3	465,3	58	11,7	84	279,3	346,3	47,8	31,4	34,4
13	398	168	446,2	521,7	74	16,8	106	298,2	373,7	57,2	45	48
15	460	194	513	592	83	17,0	119	352	431	63,5	64,2	68
17	520	214	588,3	670,3	95	21,6	137	392,7	474,7	76,2	100	106
19	565	214	588,3	670,3	95	21,6	137	392,7	474,7	76,2	109	115
21	620	276	733,6	835,7	118	27,2	170	476,1	578,1	101,6	187	197
24	710	276	738,2	840,2	118	27,2	170	480,6	582,6	101,6	209	219
27	780	308	869	1,028	133	19	198	563	722	134	368	391
29	860	346	972,5	1,131,5	152	21,5	218	623,5	782,5	153	503	526
34	1,000	346	1,169,5	1,296,5	152	21,5	218	760,5	887,5	183	697	712

1. Refer to page33 for oil quantity.

2. "X" & "W" Dimensions depend on brake drum size.

DIMENSIONS

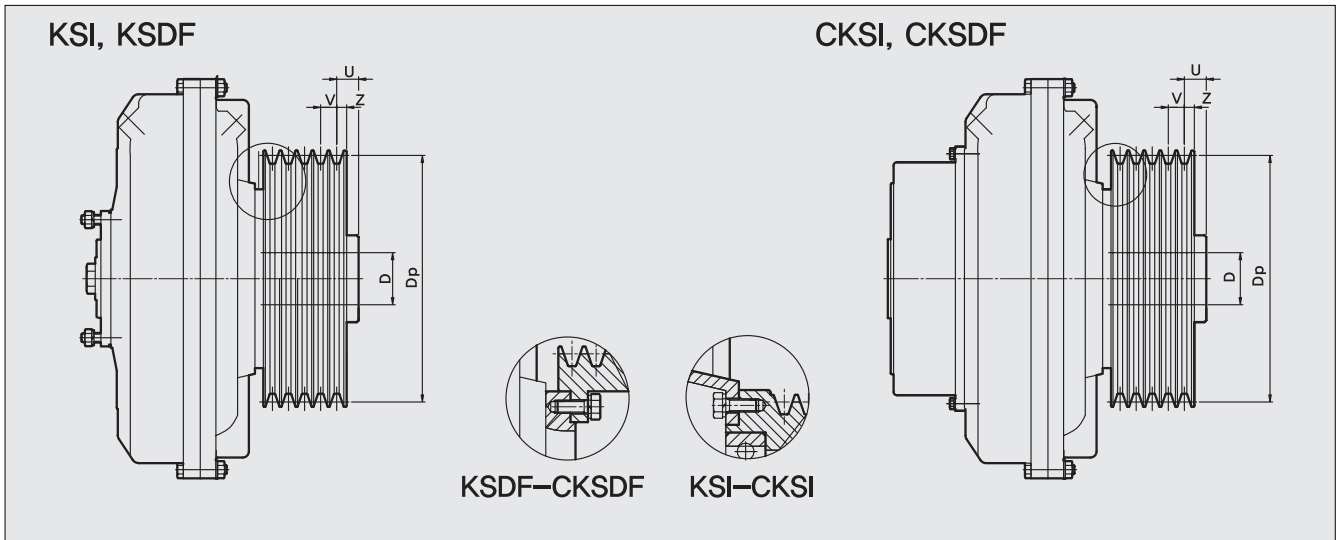


Size	Dimensions(mm)																				Mass(kg) - without oil						
	D	J	A	B	B ₁	C _{max}	C ₁	E	F	G	H	I	K	L	M	N	P	Q	R	S	T _{max}	KSD	CKSD				
7	19	24	40	50	228	77	-	159	-	55	75	90	4xM6	-	8	35	3	114	14	M12	29	38	M6	M8	42	5,9	-
	28	38	60	80			-	174	-	70										M14	43	54	M10	M12	50		
8	24	28	50	60	256	91	-	194	-	81	96	114	8xM8	-	13	65	3	114	14	M14	33	43	M8	M10	50	6,5	-
	38	80	-	-			81	M14	54	M12										50							
9	28	38	60	80	295	96	-	250	-	116	96	114	8xM8	-	13	85	5	128	20	M16	39	45	M10	M12	69	13	-
	42	48	110	-			116	M20	78	M16										69							
11	28	38	60	80	325	107	-	259	-	113	96	114	8xM8	-	13	85	5	128	20	M16	38	63	M10	M12	69	15	-
	42	48	110	-			113	M20	78	M16										15							
12	38	80	370	122	83	274	330	125	112	130	120	220	158	6	179	29	M16	54	M12	80	19	22	88	31	34		
	42	48																								110	398
13	42	48	110	398	137	359	410	190	135	155	12xM8	220	158	6	179	29	M16	76	M16	88	31	34	88	31	34		
	55	60	110																							140	398
15	55	60	110	140	460	151	92	384	438	195	150	178	255	159	206	28	M16	71	101	100	46	50	100	46	50		
	65	75	140	-																						101	455
17	60	65	140	520	170	101	455	516	245	180	200	330	180	225	45	57	M36	135	125	M20	M24	110	120	110	120		
	75	80	140																							170	520
19	60	65	140	565	190	455	516	225	200	228	8xM14	400	20	190	230	250	46	M36	135	125	M20	M24	125	137	125	137	
	75	80	140																								170
21	80	90	170	620	205	115	505	580	260	200	228	8xM14	400	20	190	230	250	46	M36	135	125	M20	M24	145	110	120	
	100	210	505				580	236	200																		228
24	80	90	170	710	229	505	580	236	200	228	8xM14	400	20	190	230	250	46	M36	135	125	M20	M24	145	125	137		
	100	210	545			620	276	200																		228	8xM14
27	120max	*210	780	278	138	consult NARA																					

1. Refer to page 33 for oil quantity.

2. * - "Reduced depth keyway as per DIN 6885/2.

DIMENSIONS



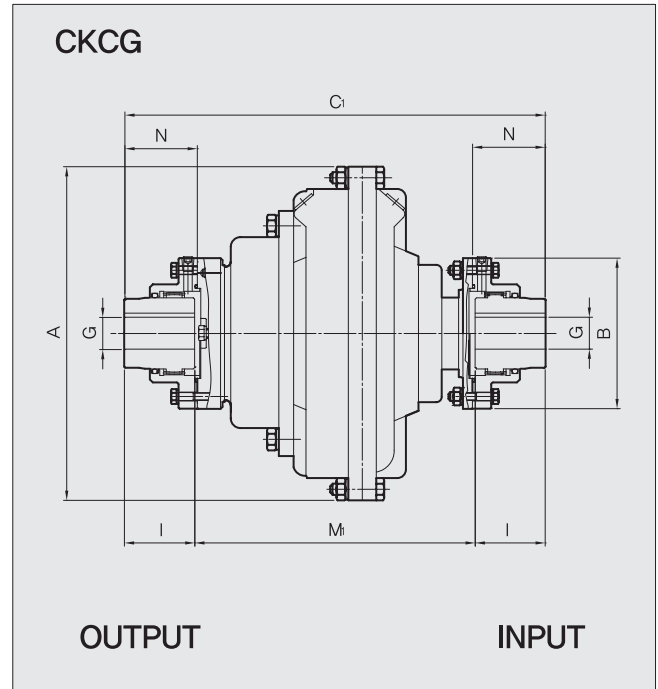
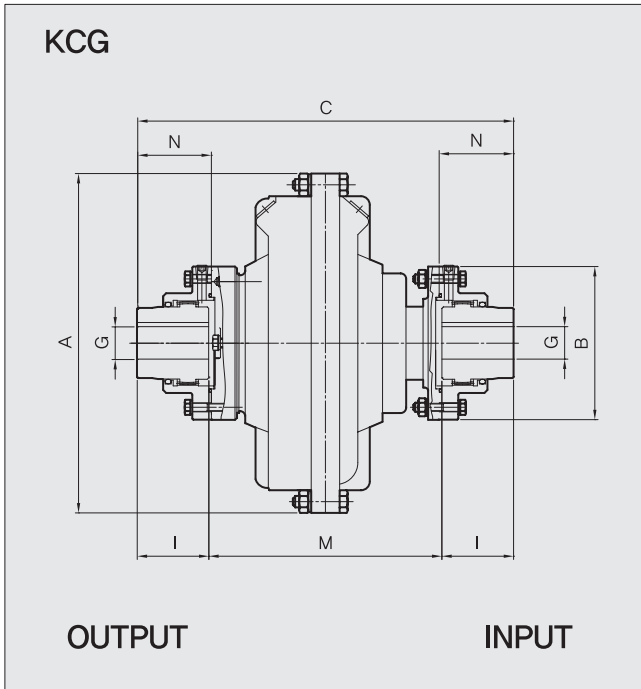
Groove	V	Z
M	-	9,5
A	15	10
B	19	12,5
C	25,5	17
D	37	24
3V	10,3	8,7
5V	17,5	12,7
8V	28,6	19

Size	Dimensions(mm)				Type
	D	U	Pulley Groove		
			Dp	#-Type	
6	14	14	63	2-A	KSI
			80		
			100		
6	19	24	63	2-A	
			80		
			100		
7	19	24	80	2-A	
			90		
			100		
7	28	26,5	80	2-A	
			90		
			100		
8	24	26,5	90	3-A	
			100		
			112		
9	28	10	125	5-A	
			112		
			125		
11	38	34	125	4-B	
			150		
			160		
11	42	15	160	4-B	
			175		
			200		
11	48	58	200	3-B	
			225		
			250		

Size	Dimensions(mm)				Type
	D	U	Pulley Groove		
			Dp	#-Type	
12	38	12	140	5-B	KSI CKSI
			180	4-B	
			200	3-C	
			200	4-C	
13	48	50	180	6-B	KSDf CKSDf KSI, CKSI
			250	5-C	
			250	5-C	
15	60	50	200	6-B	KSDf CKSDf
			250	5-C	
			280		
17	65	12	265	7-B	
			315	6-B	
			355	6-C	
19	75	72	315	6-B	
			355	6-C	
21	80	20	355	8-C	
			400		
21	100	60	355	8-C	
			400		
24	80	20	355	8-C	
			400		
24	100	60	355	8-C	
			400		

1. Refer to page 33 for oil quantity.
 2. Dimensions except V-belt pulley are same as type KSD, CKSD.

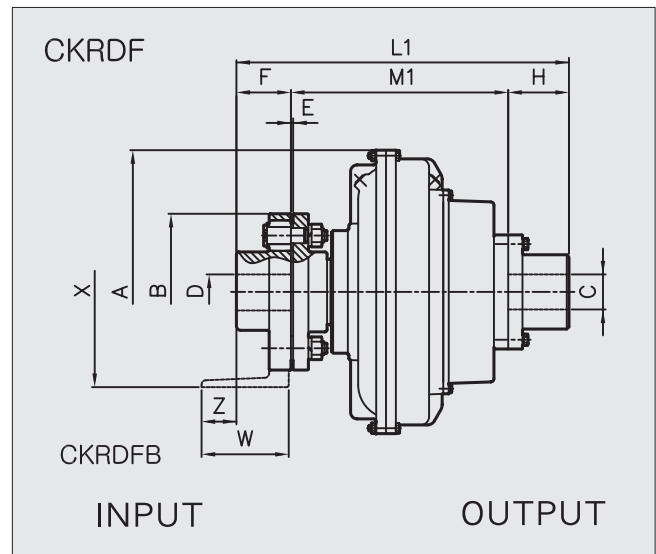
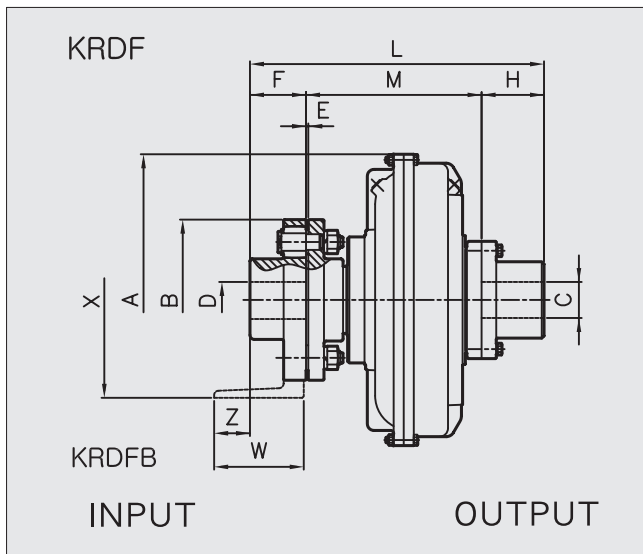
DIMENSIONS



Size	Dimensions(mm)								Mass(kg) – without oil		Gear Coupling Per Set		
	A	C	C ₁	G _{max}	I	M	M ₁	N	KCG	CKCG	Size (B)	Mass (kg)	Grease (g)
7	228	238	–	40	45	148	–	49	7,3	–	112	4,1	50
8	256	243	–			153	–						
9	295	347	–	65	80	187	–	85	14	–	160	14	130
11	325	356	–			196	–						
12	370	368	435			208	275						
13	398	378	453,5			218	293,5						
15	460	458	537	85	100	258	337	105	47,2	51	200	26	220
17	520	485	567			285	367						
19	565												
21	620	551	653	100	112	327	429	118	109	119	224	40	320
24	710								129	139			
27	780	681	840	135	140	401	560	147	206	229	280	79	620
29	860	710	869			430	589		255	278			
34	1000	825	988	160	160	505	668	167	436	444	315	122	1,000

1. Refer to page33 for oil quantity.
2. Lubricate grease to the gear couplings.

DIMENSIONS



Size	Dimensions(mm)											Mass(kg) - without oil	
	A	B	C (max)	D (max)	E	F	H	M	M ₁	L	L ₁	KRDF	CKRDF
12	370	180	68	50	3	63	63	259	326	385	452	32,6	35,6
13	398	200	68	56	4	71	80	269	345,5	420	496,5	46	49
15	460	250	90	71	4	90	90	330	409	510	589	81,7	88,5
17	520	250	90	71	4	90	90	350	432	530	612	100,7	106,5
19	565	280	90	80	4	100	90	350	432	540	622	123,6	129,6
21	620	280	107	80	4	100	100	400	502	600	702	157,6	167,6
24	710	315	107	90	4	112	100	400	502	612	714	191,3	201,3
27	780	400	125	110	5	125	125	504	642	754	892	280	298
29	860	450	125	125	5	140	140	529	688	809	968	418	436

1. Refer to p.33 of Tab 22, 23 for oil quantity.

2. If the revolution is required over 1,500 rpm, consult to NARA, (27K, 29K Model only)