FLUID COUPLING

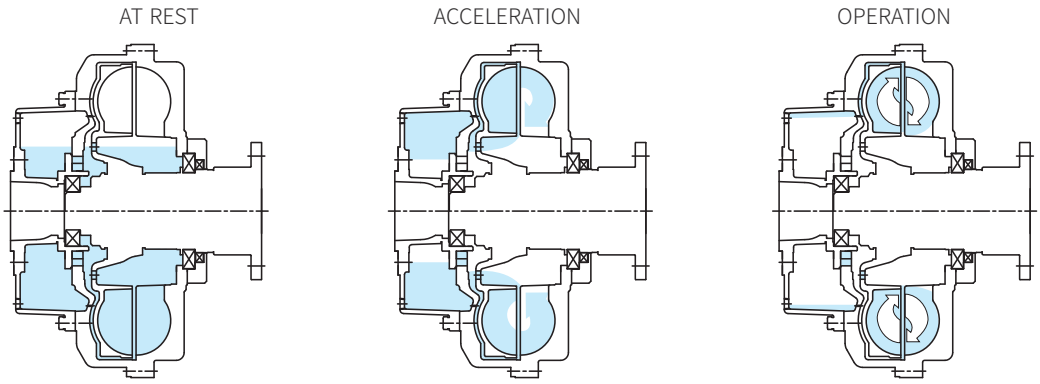
Features

Standard Type

• Since there is no mechanical connection, the motor and the driven equipment can be protected against any impulsive load.
• When driving components with two or more motors, each motor can distribute the load by adjusting the quantity of oil.

Chamber Type

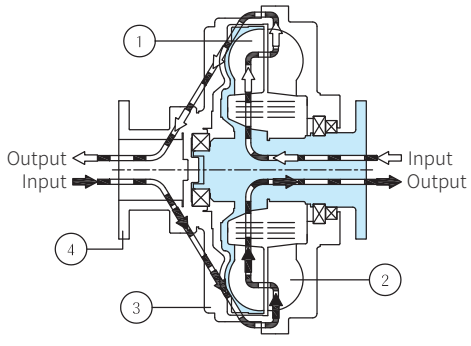
Oil in the chamber flows into the circuit through the nozzle when it is at rest and flows into the circuit when operating, therefore the start-up time is extended and smooth operation is possible during start-up. During normal operation after start-up, oil in the chamber is in the working circuit, resulting little slip. It is particularly effective when used for the purpose of controlling the starting torque of the belt conveyor.



Operating principle

Fluid coupling consists of three main components.
• Driving impeller assembled to the input side
• Driven impeller assembled to the output side
• Cover(external impeller) and other parts
Fluid coupling is based on the hydrodynamic principle. As shown in Fig 1, the input side blade and the output side blade are assembled face to face, and a certain amount of oil moves across the blades towards outside and hit the output side blade in order to transmit power.
At this time, a speed difference (slip) between the input side blade and the output side blade occurs. In normal operating conditions, the slip ratio is app. 1.5% to 6%.

$$\text{Slip}(\%) = \frac{\text{Input speed} - \text{Output speed}}{\text{Input speed}} \times 100$$

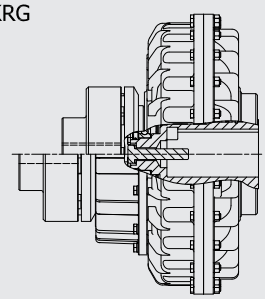


[Fig.1]

1. Driving impeller
2. Driven impeller
3. Cover
4. Flexible coupling

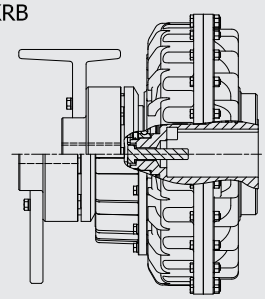
Line-up

KRG



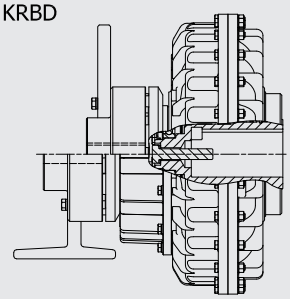
CKRG, CCKRG

KRB



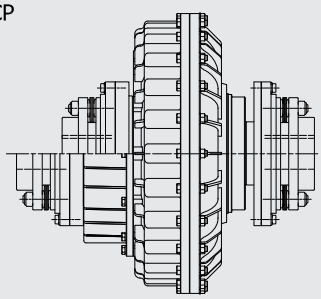
CKRBD, CCKRBD

KRBD



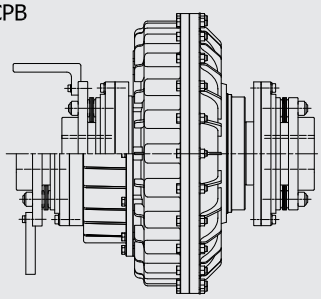
CKRB, CCKRB

KCP



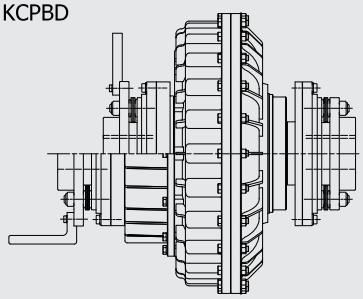
CKCP, CCKCP

KCPB



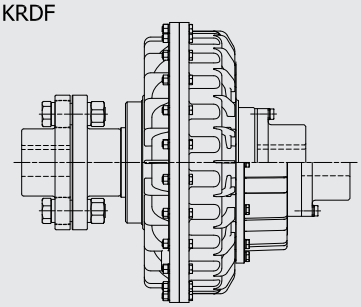
CKCPBD, CCKCPBD

KCPBD



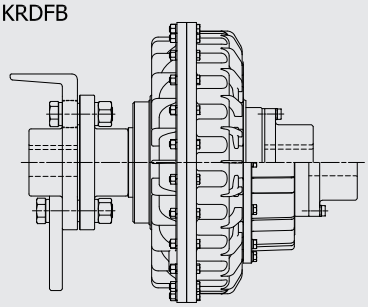
CKCPB, CCKCPB

KRDF



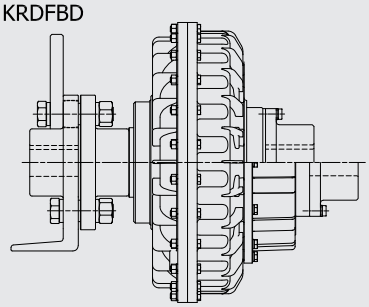
CKRDF, CCKRDF

KRDFB



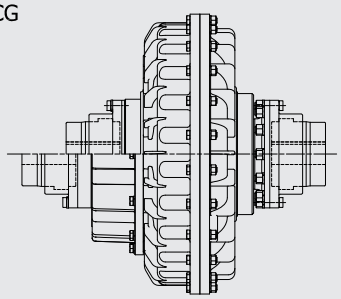
CKRDFBD, CCKRDFBD

KRDFBD



CKRDFB, CCKRDFB

KCG

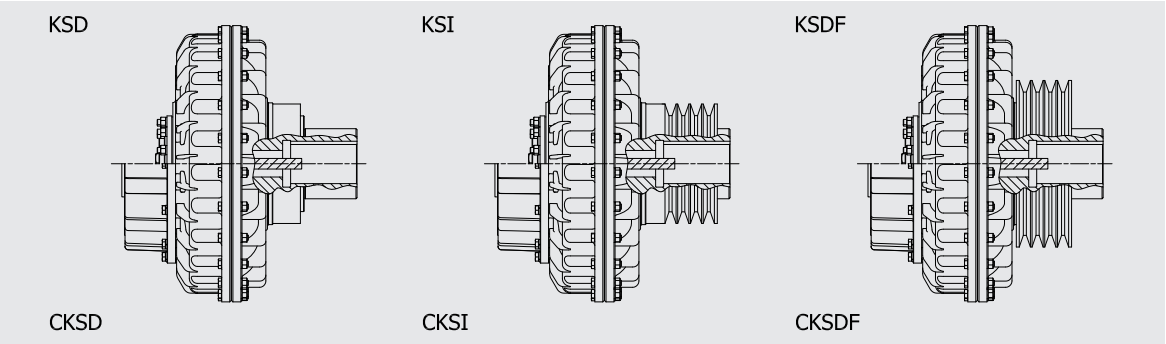


CKCG, CCKCG

1. In-line type

- KRG-CKRG-CCKRG : With SF coupling
- KRB(D)-CKRB(D)-CCKRB(D) : KRG series with brake drum (..KRB) or disc (..KRBD)
- KCP-CKCP-CCKCP : With Fanflex coupling
- KCPB(D)-CKCPB(D)-CCKCPB(D) : KCP series with brake drum (..KCPB) or disc (..KCPBD)
- KRDF-CKRDF-CCKRDF : With Flexible Flanged Coupling(KSB1552)
- KRDFB(D)-CKRDFB(D)-CCKRDFB(D) : KRDF series with brake drum (..KRDFB) or disc (..KRDFBD)
- KCG-CKCG-CCKCG : With gear coupling

Line-up



2. Pulley type

- KSD-CKSD : Basic coupling flanged-pulley mounted
- KSI-CKSI : Integrated pulley type fitted at inside
- KSDF-CKSDF : KSD series with flanged-pulley mounted at outside, easy disassembly

3. Special type

- ATEX : To select the suitable coupling under ATEX, the additional service factor 1.2 times of absorbed power should be considered. (e.g., in case of moter power 110 kW and absorbed power 100 kW, the coupling should be selected with 120 kW power, 100 kW x 1.2)

  – Please select suitable coupling according to the ATEX categories as shown on below table

Coupling series	category 3 Atex zone 2 or 22 Ex II 3 D or G T4	category 2 Atex zone 1 or 21 Ex II 2 D or G T4	category 1 M2 Industrial Atex Ex I M2
..KRG	■	■	■
..KCP	■	■	■
..KCG	■	■	
..KRDF	■	■	■
..KSD	■	■ (water)	
Filled fluid	Oil or Treated water	Fire-resistant fluid or Treated water	only Treated water

- Water-filled coupling : Eco-friendly, and suitable for hazadous zone and mines.
  The filled fluid is a mixture of water and glycol.
  Please contact us for detailed specification.

- Coupling at low temperature : The special bearings and seals are applied for −20℃ condition.
  contact NARA on detailed specification.

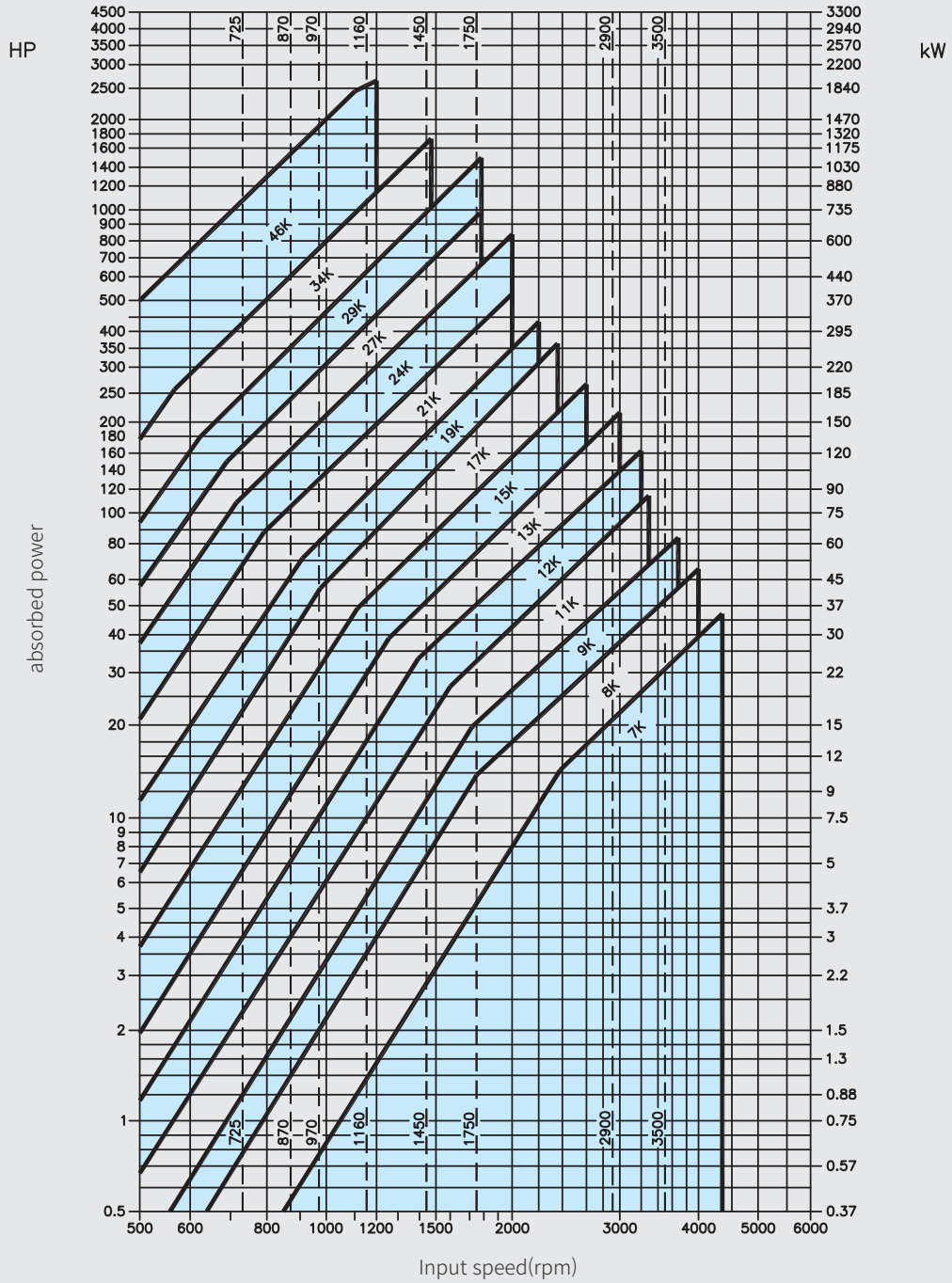
Selection

NR - 15 KRG

- KRG: Type
- 15: Size
- NR: NARA

Use the below graph to select the appropriate size according to the absorbed power and input speed.
1. It is recommended to select larger size in case the required specifications are on the limit line.
2. If accurate selection required, contact Nara.

Standard selection graph according to absorbed power and input speed

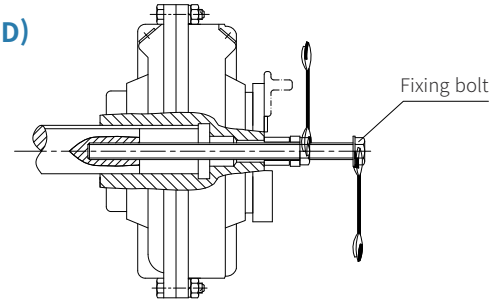


Installation

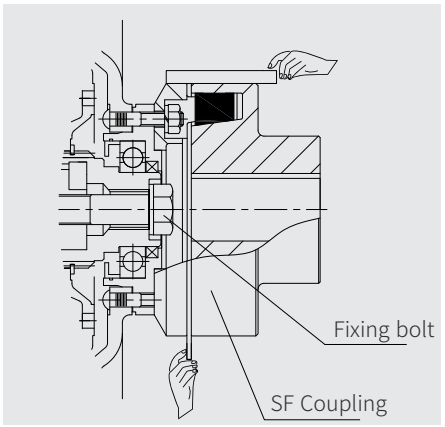
KRG, CKRG, CCKRG, KRB(D), CKRB(D), CCKRB(D)

- Assemble fluid coupling body to the motor shaft using fixing bolts as shown in Fig 2.
- Fit SF coupling to the driven shaft.
- Lock the fluid coupling body with a fixing bolt, ss shown in Fig 3.
- Align shafts with a straightedge and a clearance gauge as shown in Fig 3.

- Align parallel misalignment (ε), angular misalignment (α), and clearance (K) within the values in Table 1 to maintain long service life of SF coupling.



[Fig.2]



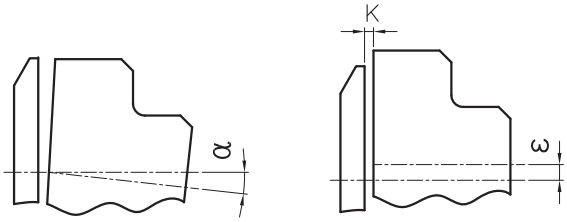
[Fig.3]

Table 1

Size	SF coupling	(ε) (mm)	(α) (°)	Clearance(K)
9,11,12	20	≤0.15	≤0.4	2
13	30	≤0.2	≤0.3	3
15	40	≤0.2	≤0.3	3
17,19	50	≤0.25	≤0.3	3
21,24	60	≤0.3	≤0.2	3
27,29	80	≤0.3	≤0.15	4
34	90	≤0.3	≤0.15	5
46	100	≤0.3	≤0.15	8

※ In case the speed exceeds 1,500 rpm, apply only a half of the above (ε, α) values.

SF Coupling



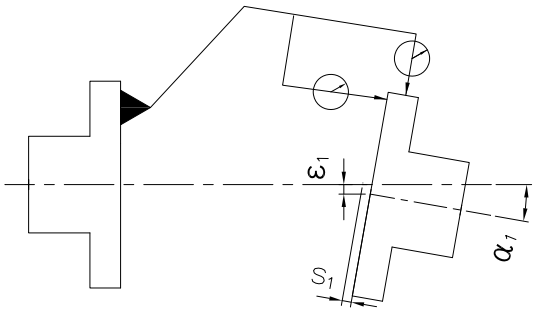
KSI, KSDF, CKSI, CKSDF

- Fit fluid coupling body to the motor shaft as shown in Figure 2.
- Lock fluid coupling body and the motor with fixing screws, as shown in Figure 3.

Installation

KCP,CKCP,CCKCP / KCG,CKCG,CCKCG / KRDF, CKRDF, CCKRDF

• Fit the flange or hub to both shafts.
- For shrink fit, the heating temperature should be 90℃ ~ 150℃.
• Align shafts with a dial gauge as shown in Fig. 4 and 5.
- To maintain long service life, parallel misalignment (ε_1, ε_2), angular misalignment (α_1, α_2), and axial displacement (S_1, S_2) must be within the values shown in Table 2.
• Align the pulley and belt in straight line.

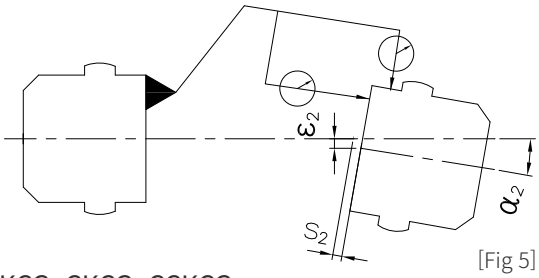


KCP, CKCP, CCKCP
KRDF, CKRDF, CCKRDF

[Fig 4]

KRDF, CKRDF, CCKRDF

• In case severe vibration occurs, minimize the values of shaft alignment.
• For larger sizes than 27K, in case rotation speed exceeds 1,500rpm, contact Nara .
• Axial alignment values are shown in Table 2.



[Fig 5]

KCG, CKCG, CCKCG

Table 2

Size	KCP, CKCP, CCKCP			KCG, CKCG, CCKCG		
	ε_1	α_1	S_1	ε_1	α_1	S_2
	(mm)	(°)	(mm)	(mm)	(°)	(mm)
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
46	≤0.2	≤0.1	±0.25	≤0.30	≤0.05	-0.5~5.5

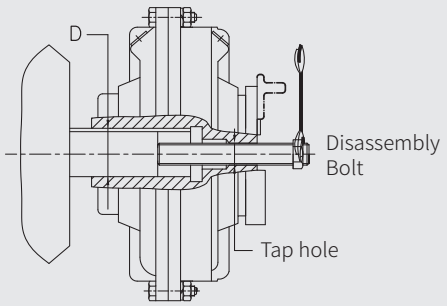
Disassembly

KRG, CKRG, CCKRG / KSI, CKSI, CCKSI KSDF, CKSDF, CCKSDF

• Disassemble the fluid coupling body with a disassembly bolt as shown in Figure 6.
• Do not hit with a hammer when disassembling.
• Refer to Table 3 for tap hole size of threaded bolts.

Table 3

Size	Inner bore(D)	Tap hole	Size	Inner bore(D)	Tap hole
9,11,12	28,38	M16	21,24	80,90,100	M36
	42,48	M20	27,29	100,120,135	M45
13,15	48,55,60,65	M27	34	150	M45
17,19	60,65,75,80	M27	46	180	M45



[Fig 6]

Oil filling instruction

Fill oil into fluid coupling as follows.

• In case of horizontal installation of fluid coupling, rotate the coupling so oil filling mark engraved on the casing (X, 1, 2, 3, 4, 5) is faced up (Fig. 7).

• Select an appropriate filling point.

• It is important to choose an appropriate filling point, as a result of more slip and less efficiency, oil can be overheated.

• First, fix the coupling smoothly, open the plug on the opposite side so that the air inside can vent out. Fill until the oil overflows out of the inlet.

• Refer to Table 4 for the guantity of oil to be filled.

⑥ It is recommended to apply an airtight agent to the plug to prevent leakage during operation. (Caution = Do not use screw glue.)

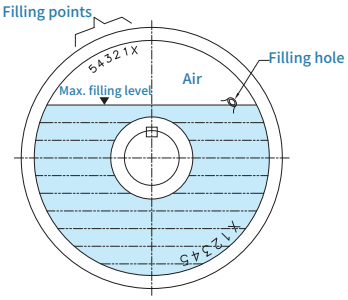
⑦ If the injection point is unknown, fill at “X” for standard type (without oil chamber) and “2” for chamber type (with oil chamber).

⑧ Chamber type fluid coupling maximum filling point is "2".

⑨ Refer to Table 5 for the oil recommended.

Table 5

Recommended oil	ISO32HM
GS	RANDO32
Castrol	HYSPIN AWS32
BP	ENERGOL HLP32
EXXON MOBIL	DTE24, NUTO H32
SHELL	TELLUS S2 MX32



[Fig 7]

Table 4

Size	Quantity of oil (ℓ)											
	K TYPE					CK TYPE				CCK TYPE		
	Filling mark					Filling mark				Filling mark		
	X	1	2	3	4	2	3	4	5	3	4	5
9	1.7	1.6	1.5	1.4	1.2	-	-	-	-	-	-	-
11	2.6	2.4	2.2	2	1.8	-	-	-	-	-	-	-
12	3.8	3.6	3.3	3	2.7	4.5	3.9	3.3	-	-	-	-
13	4.3	4	3.7	3.3	2.9	5	4.5	4.1	-	-	-	-
15	7.2	6.8	6.3	5.7	5.1	7.9	7.1	5.9	-	-	-	-
17	10.5	9.8	9	8.2	7.3	13	12.2	11.2	10.4	15.7	14.5	13.3
19	13.7	12.8	11.8	10.7	9.6	15.6	14.5	13.4	12.6	18.3	16.8	15.4
21	18	16.8	15.4	14	12.6	22.1	20.5	18.6	17.7	27.2	25	23
24	28	26.2	24.2	22	19.6	31.2	28.6	26	24.2	35	31.9	29.3
27	39	36.5	33.6	30.7	27.6	47	43.7	40.4	38.2	56.5	52.2	48.2
29	51	47.6	44.2	40.6	36.8	61	57.1	52.3	48.5	67.8	62.4	57.5
34	82.5	76.6	70.7	65.8	61.9	88	84.2	79.4	74.6	102.3	94	86.4
46	135	125	115	107	100	142	134	127	120	148	137	126

Warning) Be careful not to exceed the maximum quantity of oil fill (standard type: X, chamber type: 2). (The fluid coupling can be damaged.)

Operation & maintenance

• Even in case of frequent operation, maximum heating temperature should not exceed 90°C. In case of operation in high temperature conditions, special seals must be used. Severe oil operating temperature can be caused by:

- Insufficient oil filling
- When the required driven power is higher than the motor rated power
- High ambient temperature and long start-up time
- Too frequent starts
- Insufficient cooling of the coupling due to poor air ventilation

• After the first 20 days of operation, check the oil quantity, as well as the locked condition of the fixing bolts.

• Check the shaft alignment of the fluid coupling periodically.

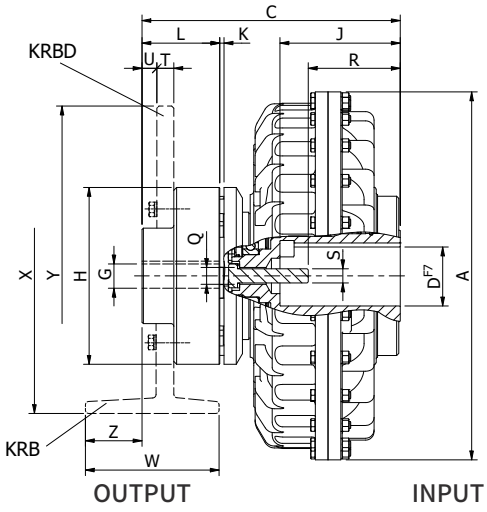
• Standard temperature for fusible plugs is 145°C. In case 120°C or 175°C required, contact Nara.

• Change oil every 4,000 hours of operation.

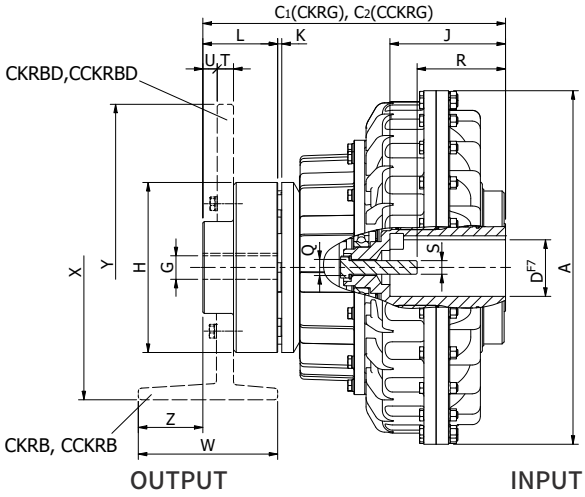
Warning) Reverse rotation of the driven machine can cause people injury and damage to the equipment. And make sure to install a braking device that can get over full power of driven machine.

Dimensions

KRG



CKRG, CCKRG

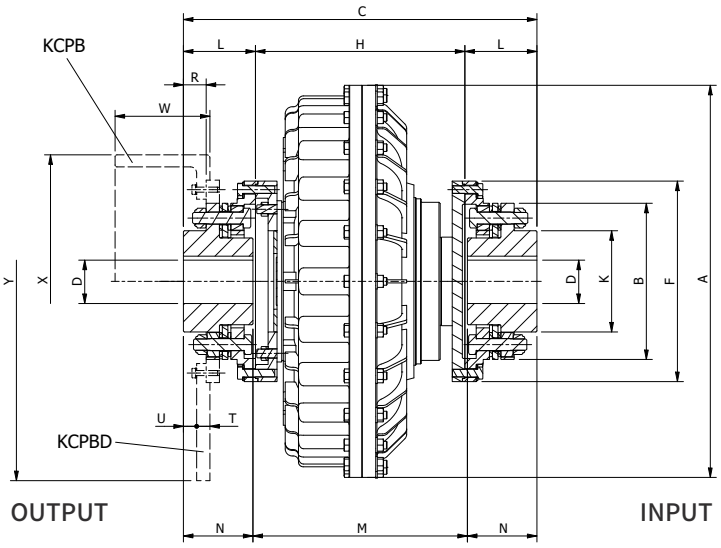


Size	Dimensions(mm)													flexible coupling	Mass(kg) - (without oil)		
	D	J	A	G_{MAX}	C	C_1	C_2	H	K	L	Q	R	S		KRG	CKRG	CCKRG
9	28 38 60 80		295	55	249	-	-	132	2	80	M16	43 54	M10 M12	SF20	16	-	-
	42 ●48	110									M20	74	M16				
11	28 38 60 80		325		258	-	-				M16	42 63	M10 M12		18	-	-
	42 ●48	110									M20	83	M16				
12	38	80	370		258	322	-	132		80	M16	63	M12	SF20	21.5	24.5	-
	42 ●48	110									M20	83	M16				
13	42 48	110	398	70	285	345	-	170			M27	84	M16	SF30	34	37	-
	55 ●60	110 140										84 104	M20				
15	48 55	110	460	80	343	411	-	170		110		81	M16 M20	SF40	50.3	54.3	-
	60 65	140										111	M20				
17	60 65	140	520	90	362	442	542	250	3			104	M20	SF50	77	83	93
	75 80	140 170										104 134					
19	60 65	140	565									104			84	90	100
	75 80	140 170										104 134					
21	75	140	620	110	433	533	633	290		140	M36	100	M20	SF60	129	139	149
	80 90	170										130	M20 M24				
24	80 95	170	710		433	533	633					130	M20 M24		147	157	167
27	max.120	max.210	780	120	504	622	722	350	4	150	M45	*167	*M24	SF80	228	246	256
29	max.135	max.240	860		533	651	751					*167			281	299	309
34	max.150	max.265	1,000	155	615	746	846	425	5	180		*200	*M36	SF100	449	464	474
46	max.180	max.320	1,330	180	-	-	1,092	490	7	195		190		SF120	-	-	1,102

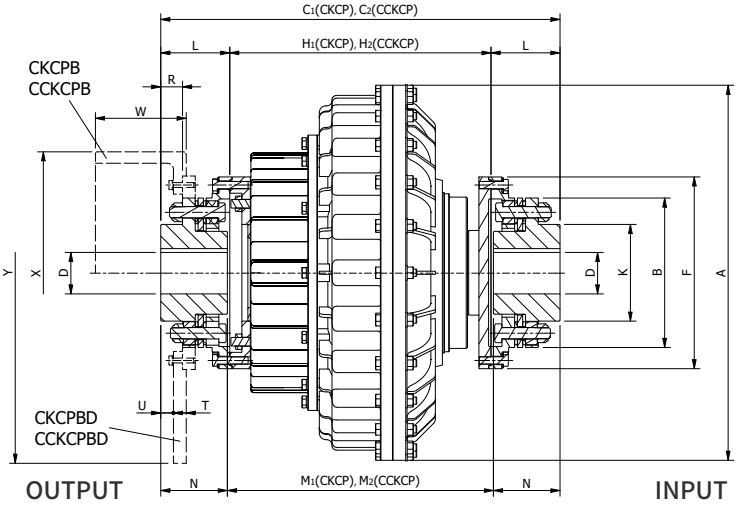
1. " ● " : Low-sized key should be applied. (DIN 6885/2)
2. Dimensions "X", "W", "Z", "Y", "U", "T" are determined by the size of the brake drum and brake disc. Contact NARA when ordering.
3. Refer to page 79 (Table 4) for oil quantity.

Dimensions

KCP



CKCP, CCKCP



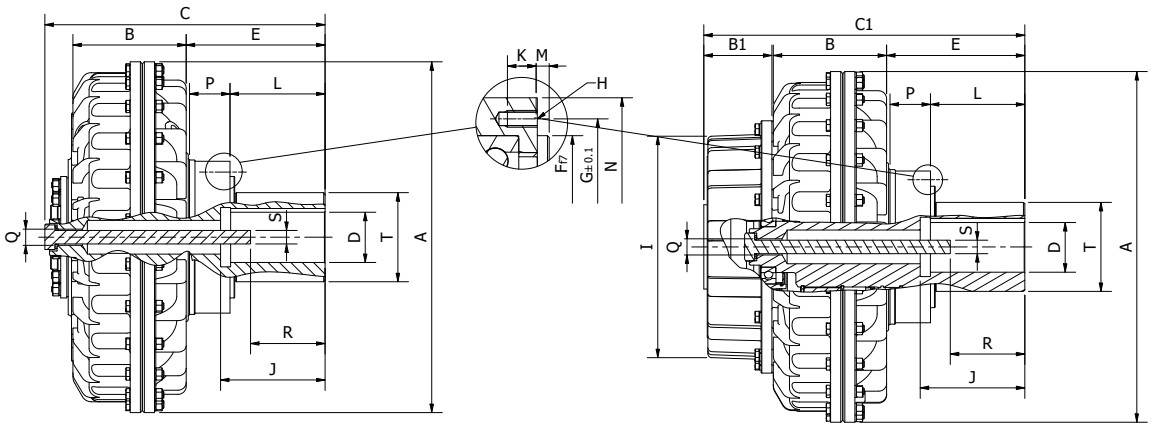
Size	Dimensions(mm)																	Mass(kg) - (without oil)		
	A	B	C	C_1	C_2	D_{max}	K	H	H_1	H_2	L	M	M_1	M_2	N	R	F	KCP	CKCP	CCKCP
9	295	145	299.5	-	-	55	103	188.5	-	-	55.5	199.5	-	-	50	10.5	195	22.5	-	-
11	325	145	309	-	-	55	103	198	-	-	55.5	209	-	-	50	10.5	195	24.3	-	-
12	370	145	309	376	-	55	103	198	265	-	55.5	209	276	-	50	10.5	195	28.1	31.3	-
13	398	175	364	424	-	70	128	232	292	-	66	244	304	-	60	13	237	43	47	-
15	460	175	392	460.7	510.7	70	128	260	328.7	378.7	66	272	340.7	390.7	60	13	237	70	74	82
17	520	197	457	537	617	85	144	278	358	438	89.5	287	367	447	85	27.5	260	94	101	110
19	565	197	457	537	617	85	144	278	358	438	89.5	287	367	447	85	27.5	260	102	108	118
21	620	247	560	660	750	100	181	331	431	521	114.5	340	440	530	110	39.5	317	167	167	186
24	710	247	560	660	750	100	181	331	431	521	114.5	340	440	530	110	39.5	317	186	196	205
27	780	296	690	808	908	135	196	400	518	618	145	410	528	628	140	63.5	375	303	322	342
29	860	296	719	837	937	135	196	429	547	647	145	439	557	657	140	63.5	375	359	378	389
34	1,000	337	769	941	1,041	160	229	437	609	709	166	449	621	721	160	75.3	426	584	590	601
46	1,330	486	1,063	1,259	1,359	210	336	647	843	943	208	663	859	959	200	88.5	590	1,126	1,179	1,158

1. Refer to page 79 (Table 4) for oil quantity.
2. Dimensions "X", "W", "Y", "U", "T" are determined by the size of the brake drum and brake disc. Contact NARA when ordering.

Dimensions

KSD

CKSD

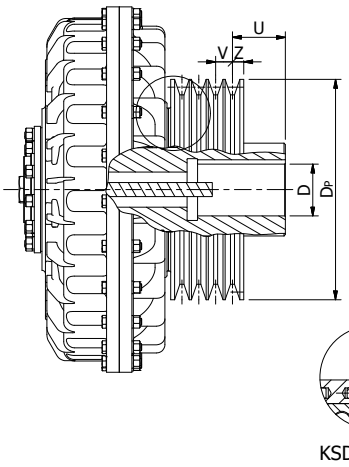


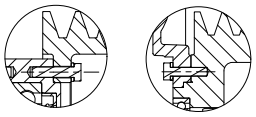
Size	Dimensions(mm)																							Mass(kg)-(without oil)	
	D		J		A	B	B_1	C_{MAX}	C_{1MAX}	E	F	G	H	I	K	L	M	N	P	Q	R		S		T_{max}	KSD	CKSD
9	28	38	60	80	295	96	-	250	-	116	96	114	8 × M8	-	13	85	5	128	20	M16	39	45	M10	M12	69	13	-
	42	48	110																	M20	78		M16				
11	28	38	60	80	325	107	-	259	-	113										M16	38	63	M10	M12		15	-
	42	●48	80	110																M20	78		M16				
12	38		80		370	122	83	274	330	125	112	130		220		98	7	145	22	M16	54		M12		80	19	22
	42	48	110																	M20	83		M16				
13	42	48	110		398	137	-	359	410	190	135	155	12 × M8			158	6	179	29	M27	76		M16		88	31	34
	55	60	110	140																	76	106	M20				
15	55	60	110	140	460	151	92	384	438	195	150	178		255		159		206	28		71	101	M20		100	46	50
	65	●75	140																		101						
17	60	65	140		520	170	101	455	516	245	180	200	12 × M10	330	17	180	7	225	60		102				132	74	80
	75	80	140	170																	102	142					
19	60	65	140		565	190	-			225									45		102					82	88
	75	80	140	170																	102	142					
21	80	90	170		620	205	115	505	580	260	200	228	8 × M14	400	20	190		250	57	M36	135	125	M20	M24	145	110	120
	100		210					545	620	300						230					165		M24				
24	80	90	170		710	229	-	505	580	236						190			46		135	125	M20	M24		125	137
	100		Max 210					545	620	276						230					165		M24				

1. Refer to page 79 (Table 4) for oil quantity.
"●" : Low-sized key should be applied. (DIN 6885/2)

Dimensions

KSI, KSDF

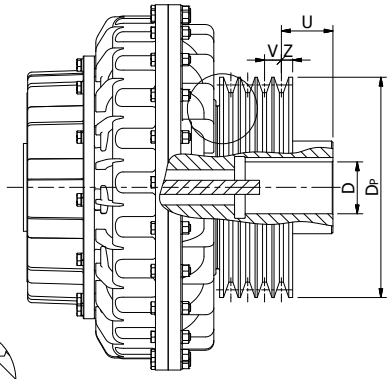




KSDF-CKSDF

KSI-CKSI

CKSI, CKSDF



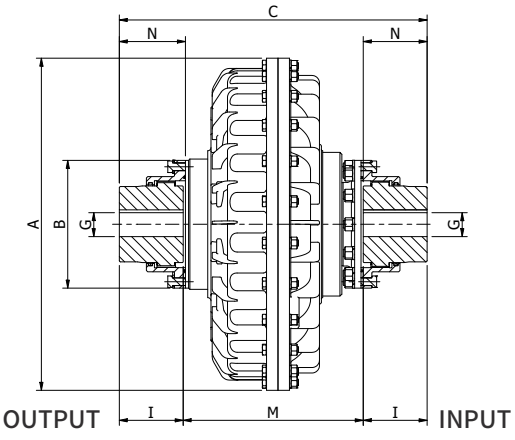
V-belt Type	V	Z
M	10	9.5
A	15	10
B	19	12.5
C	25.5	17
D	37	24
3V	10.3	8.7
5V	17.5	12.7
8V	28.6	19

Size	Dimensions(mm)				Type
	D	U	Pulley groove		
			Dp	#-Type	
12	38 42 48	12	140	5-B	KSI, CKSI
		50	180	4-B	
		51	200	3-C	
		26	200	4-C	
13	48 55 60	50	180	6-B	
			250		KSDF, CKSDF, KSI, CKSI
		49	250	5-C	
15	60 65	50	200	6-B	KSDF, CKSDF
		17	250	5-C	
			280		
17	65 75	12	265	7-B	
		72	315	6-B	
		35	355	6-C	
19	75	72	315	6-B	
	80	35	355	6-C	
21	80	20	355	8-C	
	90		400		
21	100	60	355	8-C	
			400		
24	80	20	355	8-C	
	90		400		
24	100	60	355	8-C	
			400		

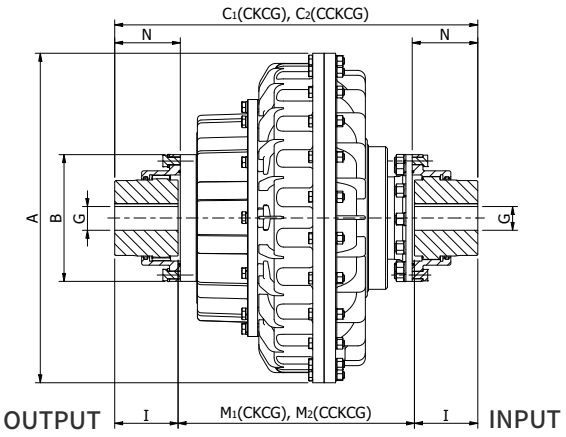
1. Dimensions are the same as KSD and CKSD types, except for the V-belt pulley.
2. Refer to page 79 (Table 4) for oil quantity.

Dimensions

KCG



CKCG, CCKCG

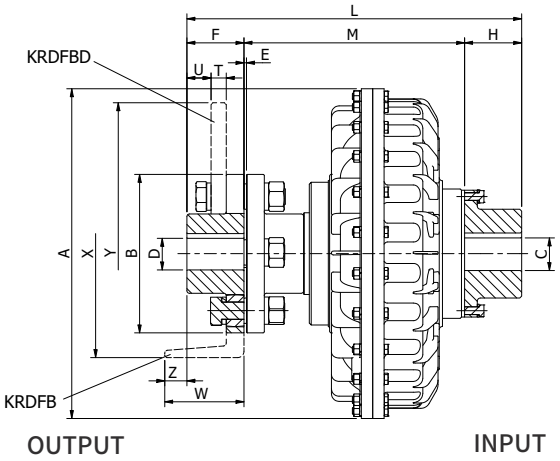


Size	Dimensions(mm)										Mass(kg)- (without oil)			gear coupling set			
	A	C	C_1	C_2	G_{max}	I	M	M_1	M_2	N	KCG	CKCG	CCKCG	SIZE		Mass (kg)	Amount of grease (ℓ)
9	295	287	-	-	65	50	187	-	-	51.5	14	-	-	NGG15	153	8	0.1
11	325	296	-	-			196	-	-		16	-	-				
12	370	308	375	-			208	275	-		21	24	-				
13	398	318	393.5	-			218	293.5	-		28	31	-				
15	460	412	491	-	98	77	258	337	-	79.5	47.2	51	-	NGG25	213	25	0.2
17	520	439	521	621			285	367	467		66.2	72	81				
19	565										75	81	90				
21	620	511	613	713	111	92	327	429	529	94.5	109	119	128	NGG30	240	40	0.4
24	710										129	139	148				
27	780	615	774	874	134	107	401	560	660	110	206	229	238	NGG35	280	62	0.5
29	860	644	803	874			430	589			255	278	286				
34	1,000	747	910	1,010	160	121	505	668	768	124	436	444	452	NGG40	318	90	0.9
46	1,330	-	-	1,313	244	189	-	-	933.4	193	-	-	1,333	NGG60	458	240	3.2

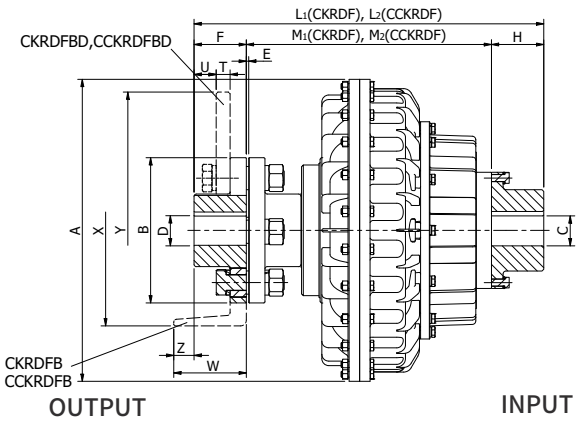
1. Refer to page 79 (Table 4) for oil quantity.
23. Fill grease in the gear coupling.

Dimensions

KRDF



CKRDF, CCKRDF



Size	Dimensions(mm)													Mass(kg) - (without oil)		
	A	B	C_{max}	D_{max}	E	F	H	M	M_1	M_2	L	L_1	L_2	KRDF	CKRDF	CCKRDF
12	370	180	68	50	3	63	63	259	326	426	385	452	552	32.6	35.6	44.6
13	398	200	68	56	4	71	80	269	345.5	445.5	420	496.5	596.5	46	49	58
15	460	224	70	70	4	80	80	330	409	509	490	569	669	73.2	80	89
17	520	250	90	71	4	90	90	350	432	532	530	612	712	112.8	118.8	127.8
19	565	250	90	80	4	90	90	350	432	532	530	612	712	112.8	118.8	127.8
21	620	280	107	80	4	100	100	400	502	602	600	702	802	157.6	167.6	176.6
24	710	315	107	90	4	112	100	400	502	602	612	714	814	191.3	201.3	210.3
27	780	355	125	120	5	125	125	483	642	742	733	892	992	259.2	277.2	286
29	860	355	125	120	5	125	125	529	688	788	779	938	1,038	365.2	383.2	392
34	1,000	400	155	130	5	125	125	602	756	856	852	1,006	1,106	558	678	687

1. Refer to page 79 (Table 4) for oil quantity.
2. For standard models 27, 29, and 34K, contact NARA in case the rotation speed exceeds 1,500 rpm.
3. The dimensions of " X "," W "," Z "," Y ", " U "," T " depend on the brake drum and brake disc. Contact Nara when ordering.