NARA

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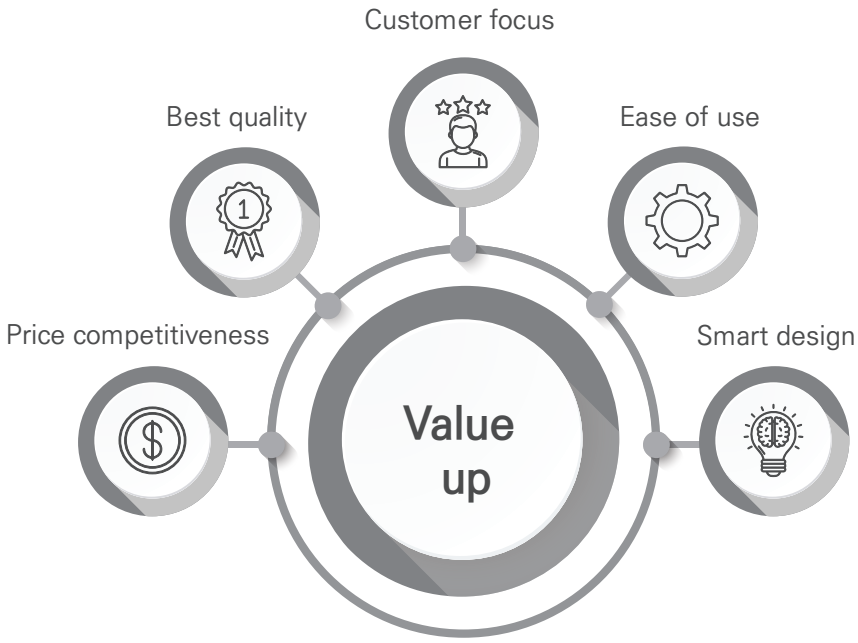
NARA as your global partner

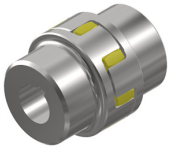
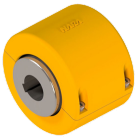
NARA has been doing best efforts to meet the customer's needs over the past 40 years and providing all of customized couplings for a variety of industrial field applications.

Customer satisfaction



Contents

Application guide

Coupling type		Application	
Smart coupling		• Gantry robot • Printing machine • Cutting and welding machine • Laser processing equipment • Medical Equipment	• Stepping Motor • Servo Motor • Detector (encoder)
Panflex coupling		• All kind of Pumps • Compressors • Steel making plant • Petro chemical plants	• Power plants equipment • Paper plant • Machine tools • Blower & Fans
Gear coupling		• Iron & Steel making plant • Plants Devices • Paper plant • All kind of pumps	• Compressors • Conveyors • Crane and hoist • Extruders • Subway Vehicles
Jaw coupling		• All kinds of pumps • Compressors • Injection moulding machines • Wind Power Generator	• Machine tool • Industrial machines • Automation machines
Drum coupling		• Container Cranes • Overhead Cranes • Radle Cranes • Ship unloader	
Chain coupling		• Industrial machines • Automation machines	
Flexible Flanged coupling		• Industrial Pumps	
Brake drum coupling		• Crane and hoist • Belt conveyors	
Fluid coupling		• Conveyor • Mills • Crusher • Agitator	• Stacker/ Reclaimer • Dust collector • Blower and Fan • Mixer • Ship unloader

SMART COUPLING

Type

SMD

SMJ

SMH

SMO

SMD
Torsionally rigid servo disc coupling

SMJ
Flexible Jaw type Coupling

SMH
Flexible Spiral Helical type Coupling

SMO
Flexible Oldham type Coupling

Selection Information

● Suitable ○ Applicable

Product Name		DISC	JAW	HELICAL	OLDHAM
Model Name		SMD	SMJ	SMH	SMO
Appearance					
Torque Range(Nm)		1~250	5~320	0.1~6	0.6~30
Bore Range(mm)		4~45	4~45	3~20	3~30
Performance	Low Backlash	●	○	●	
	Highly torsional rigidity	●	○	○	○
	Low Mass Inertia	●	●	●	○
	Flexibility	●	○	●	●
	Vibration Absorption		●		○
Application	General-Purpose Motor		●		●
	Stepping Motor	●	●	●	○
	Servo Motor	●	●	●	
	Detector(Encoder)		●	●	○

Selection

Step 1

• Calculation of transmitted torque (Tw)

$$Tw(Nm) = 9550 \times \frac{P(kW)}{N(rpm)}$$

P : Prime Motor Power(kW)
N : Coupling rotation speed(rpm)

However, when using a servo motor or stepping motor, apply the maximum torque (Ts).
Tw(Nm) = Ts(Nm)

Step 2

• Calculation of required torque (Tr)

$$Tr(Nm) = Tw(Nm) \times F_1 \times F_2 \times F_3 \times F_4$$

Service factor
F_1 : Load factor
F_2 : Usage hours coefficient
F_3 : Starting frequency coefficient
F_4 : Ambient temperature coefficient

Load factor (F_1)

Load type	Constant load	Light variable load	Medium variable load	Heavy variable load
F_1	1	1.3	1.8	2.3

Usage hours coefficient (F_2)

Hour/day	~8	~16	~24
F_2	1	1.2	1.3

Starting frequency coefficient (F_3)

Frequency/hour	~10	~50	~100	~200	~200 over
F_3	1	1.3	1.5	2	2.5

Ambient temperature coefficient(F_4)

※ Apply to Jaw and Oldham couplings only.

Temperature(°C)	-30~30	~40	~60	~80
F_4	1	1.2	1.4	2

Step 3

• Select a model in which the rated torque (Tn) of the coupling is larger than the required torque (Tr) according to the specifications and dimension table.

Tn > Tr

Step 4

• Check if the peak torque (Tp) of the prime motor and driven machine is less or equal to the maximum torque (Tmax.) in the specification table.

Tmax. > Tp

• If use clamp bolts for fitting to the shaft, check whether the allowable transmission torque (Tc) according to the inner bore diameter meets the required torque (Tr) and peak torque (Tp).

Tc > Tr, Tc > Tp

Step 5

• Check whether max. bore diameter of the coupling meets the shaft diameter of the prime motor and driven machine.
• Check whether max. rotation speed of the coupling meets the rotation speed of the prime motor.
※ In case of applying to the device severe vibration occurs, Contact NARA

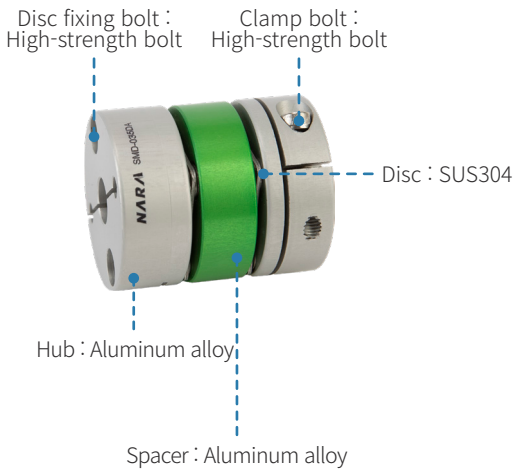
SMD Torsionally rigid servo disc coupling

Features

- Metal plate type flexible coupling.
- Stainless single disc allows angular misalignment and axial displacement, if two discs are applied, also parallel misalignment is allowed.
- Characteristics of forward and reverse rotation are iIdentical.
- Excellent torsional rigidity.
- The most suitable coupling for servo motors.

Structure

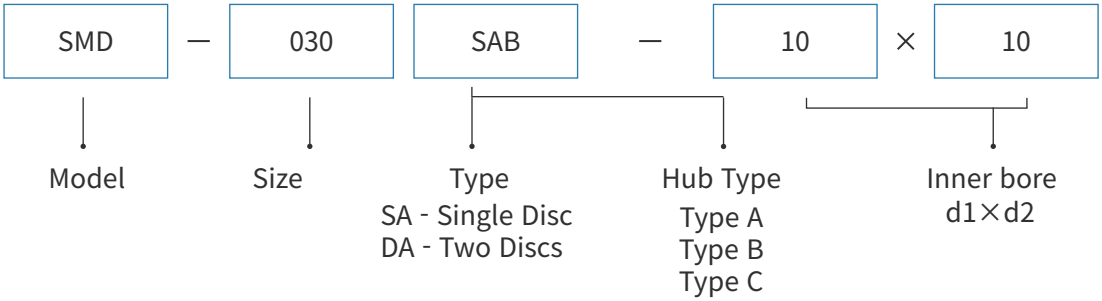
Single Disc Type



Two Discs Type

SMD Torsionally rigid servo disc coupling

How to order



Standard Bores Diameter

Model	Standard bores diameter d1-d2(mm)																									
	4	5	6	6.35	8	9	9.525	10	12	14	15	15.875	16	18	19	20	22	24	25	28	30	32	35	38	40	42	45
SMD-010SA/DA	●	●	●	●	●																						
SMD-020SA/DA		●	●	●	●	○	○	○																			
SMD-030SA/DA			○	●	●	●	●	●	●	●																	
SMD-035SA/DA					●	●	●	●	●	●	●	○	●														
SMD-040SA/DA						○	○	●	●	●	●	○	●	●	●												
SMD-050SA/DA									●	●	●	○	●	●	●	●	●	●	●								
SMD-060SA/DA										○	○	○	○	○	●	●	●	●	●	●	●						
SMD-080SA/DA																○	○	○	●	○	●	○	●				
SMD-090SA/DA																			○	○	○	○	○	○	○		
SMD-100SA/DA																							○	○	○	○	○

※ Standard type is always available in stock. ※ Contact us when ordering

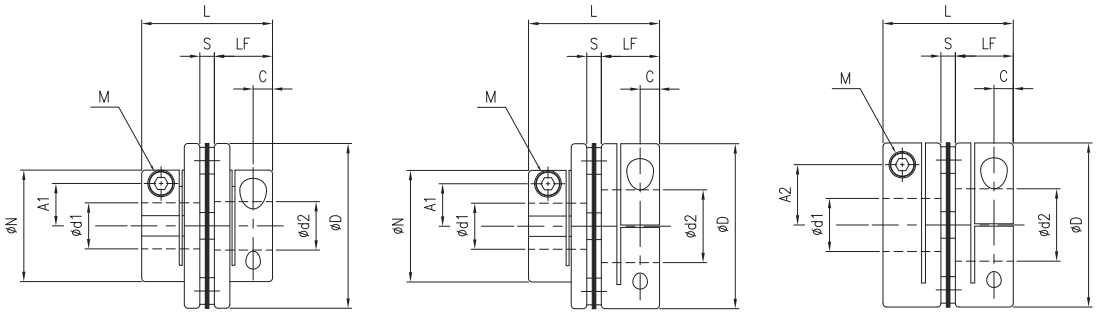
Allowable Transmission torque (Tc) for fixing with clamp bolt

Model	Standard bores diameter d1×d2(mm) and Allowable Transmission torque (Nm)																									
	4	5	6	6.35	8	9	9.525	10	12	14	15	15.875	16	18	19	20	22	24	25	28	30	32	35	38	40	42	45
SMD-010SA/DA	2	2	2	2	2																						
SMD-020SA/DA		3.2	3.6	3.6	4	4	4	4																			
SMD-030SA/DA			4.4	4.4	5	5.4	5.5	5.7	7.6	8.3																	
SMD-035SA/DA					11	12	12	13	14	15	15	16	16														
SMD-040SA/DA						11	11	12	13	14	14	17	18	19	19												
SMD-050SA/DA									25	27	28	28	28	30	31	38	40	42	43								
SMD-060SA/DA										51	53	54	54	57	58	59	75	78	79	83	86						
SMD-080SA/DA																123	128	134	136	143	148	151	157				
SMD-090SA/DA																			222	232	239	243	253	262	268		
SMD-100SA/DA																							275	285	291	297	306

Note)
1. Shaft tolerances are based on h7, transmitted torque may be decreased in case of small shaft size.
2. According to operating condition(Fixing type, Acc./Dec. Frequency, Temperature), Transmission Torque may be decreased, Therefore it is recommended to apply after testing with actual mounting to the devices.

SMD Torsionally rigid servo disc coupling

Specifications/ Dimensions



A Type B Type C Type

1. Contact NARA if a larger model than the below dimensions is required. 2. Recommended shaft tolerance is h7.
3. Specifications and Dimensions in the Catalog might be modified without any notice for performance improvement, Contact NARA before using the couplings.

Specifications(SMD-SA)

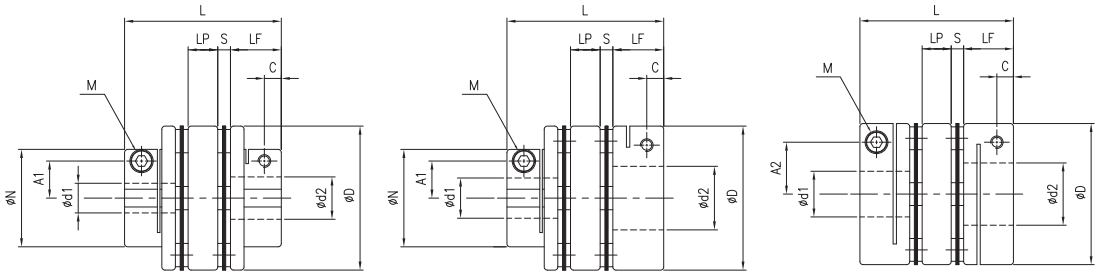
Model	Rated Torque (Nm)	Max Torque (Nm)	Max speed (rpm)	Torsional stiffness (Nm/rad)	Axial stiffness (N/mm)	Type	Moment of inertia (kgm^2)	Maximum allowable misalignment			Mass (g)
								Parallel misalignment (mm)	Angular misalignment (°)	Axial displacement (mm)	
SMD-010SA	1	2	10,000	220	140	C	0.75×10^{-6}	0.02	1	±0.1	14
SMD-020SA	1.5	3	10,000	1,600	64	C	2.45×10^{-6}	0.02	1	±0.15	25
SMD-030SA	4	8	10,000	3,200	64	A	3.80×10^{-6}	0.02	1	±0.2	31
						B	5.99×10^{-6}				40
						C	8.16×10^{-6}				50
SMD-035SA	7	14	10,000	7,000	90	C	18×10^{-6}	0.02	1	±0.25	80
SMD-040SA	10	20	10,000	8,800	80	A	15.5×10^{-6}	0.02	1	±0.3	70
						B	22.6×10^{-6}				90
						C	29.7×10^{-6}				110
SMD-050SA	25	50	10,000	18,000	48	A	50.6×10^{-6}	0.02	1	±0.4	150
						B	75.4×10^{-6}				180
						C	100×10^{-6}				220
SMD-060SA	60	120	10,000	36,000	76.4	A	131.6×10^{-6}	0.02	1	±0.45	260
						B	199.6×10^{-6}				330
						C	267.7×10^{-6}				400
SMD-080SA	100	200	10,000	52,800	54.8	C	736.5×10^{-6}	0.02	1	±0.55	750
SMD-090SA	180	360	10,000	170,000	122	C	1160×10^{-6}	0.02	1	±0.6	1130
SMD-100SA	250	500	10,000	250,000	160	C	1180×10^{-6}	0.02	1	±0.7	1330

Dimensions(SMD-SA)

Model	D	N	L	LF	LP	S	A1	A2	C	M	Bolt tightening torque (Nm)	Type	d1		d2	
													Min	Max	Min	Max
SMD-010SA	19	-	20.2	9	-	2.2	-	6.5	3.3	M2.5	1	C	4	8	4	8
SMD-020SA	26	-	22.5	10.5	-	1.5	-	9.5	3.5	M2.5	1	C	5	10	5	10
SMD-030SA	34	22	28	13	-	1.6	8	-	4	M3	1.5	A	6	10	6	10
							8	12.5				B	6	10	12	14
		-					-	12.5				C	12	14	12	14
SMD-035SA	39	-	32.3	15	-	2.3	-	13.5	4.5	M4	3.4	C	8	16	8	16
SMD-040SA	44	30	34	16	-	2.5	11	-	5	M4	3.4	A	9	15	9	15
							11	16				B	9	15	15	19
		-					-	16				C	15	19	15	19
SMD-050SA	56	38	43	20	-	2.8	14.5	-	7	M5	7	A	11	19	11	19
							14.5	21				B	11	19	20	25
							-	21				C	20	25	20	25
SMD-060SA	68	46	54	24	-	6	17.5	-	8	M6	14	A	14	20	14	20
							17.5	25				B	14	20	22	30
							-	25				C	22	30	22	30
SMD-080SA	83	-	67.5	30	-	7.5	-	28	9	M8	30	C	20	35	20	35
SMD-090SA	94	-	67.5	30	-	7.5	-	34	9	M8	30	C	25	40	25	40
SMD-100SA	104	-	68.3	30	-	8.3	-	39	9	M8	30	C	35	45	35	45

SMD Torsionally rigid servo disc coupling

Specifications/ Dimensions



A Type　　B Type　　C Type

1. Contact NARA if a larger model than the below dimensions is required.　　2. Recommended shaft tolerance is h7.
3. Specifications and Dimensions in the Catalog might be modified without any notice for performance improvement, Contact NARA before using the couplings.

Specifications(SMD-DA)

Model	Rated Torque (Nm)	Max Torque (Nm)	Max speed (rpm)	Torsional stiffness (Nm/rad)	Axial stiffness (N/mm)	Type	Moment of inertia (kg m²)	Maximum allowable misalignment			Mass (g)
								Parallel misalignment (mm)	Angular misalignment (°)	Axial displacement (mm)	
SMD-010DA	1	2	10,000	170	70	C	1.0×10^{-6}	0.12	2	±0.2	19
SMD-020DA	1.5	3	10,000	1,000	32	C	3.41×10^{-6}	0.15	2	±0.3	35
SMD-030DA	4	8	10,000	2,100	32	A	6.93×10^{-6}	0.17	2	±0.4	50
						B	9.1×10^{-6}				58
						C	11.3×10^{-6}				67
SMD-035DA	7	14	10,000	4,000	45	C	30.3×10^{-6}	0.23	2	±0.5	140
SMD-040DA	10	20	10,000	5,300	40	A	27.5×10^{-6}	0.23	2	±0.6	113
						B	34.6×10^{-6}				130
						C	41.7×10^{-6}				146
SMD-050DA	25	50	10,000	10,800	24	A	86.6×10^{-6}	0.28	2	±0.8	222
						B	111.3×10^{-6}				256
						C	136.1×10^{-6}				290
SMD-060DA	60	120	10,000	22,800	38.2	A	230.9×10^{-6}	0.35	2	±0.9	400
						B	298.9×10^{-6}				470
						C	366.9×10^{-6}				540
SMD-080DA	100	200	10,000	37,800	27.4	C	1070×10^{-6}	0.52	2	±1.1	1080
SMD-090DA	180	360	10,000	85,000	61	C	1640×10^{-6}	0.52	2	±1.2	1200
SMD-100DA	250	500	10,000	125,000	80	C	3770×10^{-6}	0.52	2	±1.4	1450

Dimensions(SMD-DA)

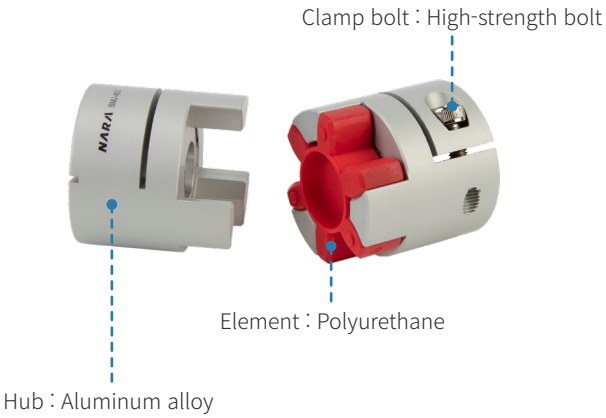
Model	D	N	L	LF	LP	S	A1	A2	C	M	bolt tightening torque (Nm)	Type	d1		d2	
													min	max	min	max
SMD-010DA	19	-	27.4	9	5	2.2	-	6.5	3.3	M2.5	1	C	4	8	4	8
SMD-020DA	26	-	30	10.5	6	1.5	-	9.5	3.5	M2.5	1	C	5	10	5	10
SMD-030DA	34	22	37.2	13	8	1.6	8	-	4	M3	1.5	A	6	10	6	10
							8	12.5				B	6	10	12	14
		-					-	12.5				C	12	14	12	14
SMD-035DA	39	-	46.6	15	12	2.3	-	13.5	4.5	M4	3.4	C	8	16	8	16
SMD-040DA	44	30	48	15.5	12	2.5	11	-	5	M4	3.4	A	9	15	9	15
							11	16				B	9	15	15	19
		-					-	16				C	15	19	15	19
SMD-050DA	56	38	58.6	20	13	2.8	14.5	-	7	M5	7	A	11	19	11	19
							14.5	21				B	11	19	20	25
		-					-	21				C	20	25	20	25
SMD-060DA	68	46	74	24	14	6	17.5	-	8	M6	14	A	14	20	14	20
							17.5	25				B	14	20	22	30
		-					-	25				C	22	30	22	30
SMD-080DA	83	-	97	30	22	7.5	-	28	9	M8	30	C	20	35	20	35
SMD-090DA	94	-	97	30	22	7.5	-	34	9	M8	30	C	25	40	25	40
SMD-100DA	104	-	98.6	30	22	8.3	-	39	9	M8	30	C	35	45	35	45

SMJ Flexible Jaw Type Coupling

Features

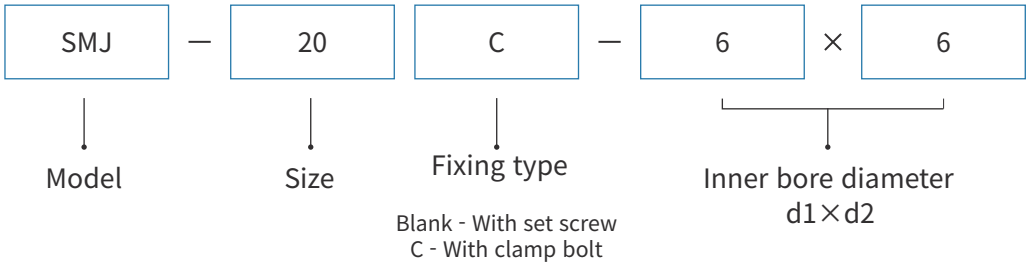
- A simple structure in which an element is fitted between two hubs.
- Zero backlash due to preliminary pressure applied to the element.
- Excellent flexibility and absorption of parallel misalignment, angular misalignment and torsional vibration.
- Characteristics of forward and reverse rotation are identical.
- It has electrical insulation characteristic.

Structure



SMJ Flexible Jaw Type Coupling

How to order



Standard bores diameter

Model	Standard bores diameter d1×d2(mm)																						
	4	5	6	6.35	7	8	9	10	11	12	14	15	16	18	19	20	24	25	28	30	32	35	40	45
SMJ-20/20C	●	●	●	●	●	●																		
SMJ-25/25C		●	●	●	●	●	○	●																
SMJ-30/30C			●	●	●	●	●	●	●	●	●													
SMJ-40/40C						○	○	●	○	●	●	●	●	●	●	●								
SMJ-55/55C								○	○	●	●	●	●	●	●	●	●	●	●					
SMJ-65/65C											●	●	●	●	●	●	●	●	●	●	○	○		
SMJ-80/80C																●	●	●	●	●	●	●	●	●

※ Standard type is always available in stock.

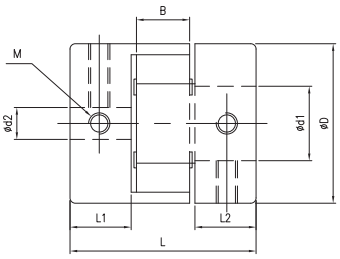
Allowable Transmission torque(Tc) for fixing with clamp bolt

Model	Standard bores diameter d1×d2(mm) and Allowable Transmission torque (Nm)																						
	4	5	6	6.35	7	8	9	10	11	12	14	15	16	18	19	20	24	25	28	30	32	35	40	45
SMJ-20C	1.8	2.3	2.8	2.8	3	3.4																		
SMJ-25C		3.5	4.1	4.1	4.4	4.9	5.3	5.7																
SMJ-30C			8.5	8.5	9.1	9.8	10	11	12	12	13													
SMJ-40C						18	19	21	22	23	25	26	27	28	29	30								
SMJ-55C								47	48	50	54	56	58	61	62	63	69	70	74					
SMJ-65C											92	95	98	103	105	107	117	119	126	130	134	140		
SMJ-80C															111	114	126	129	136	141	145	152	163	173

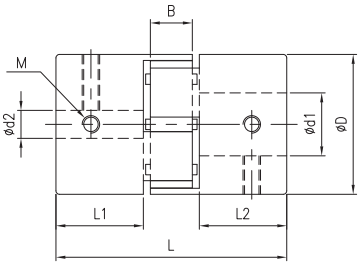
Note)
1. Shaft tolerances are based on h7, transmitted torque may be decreased in case of small shaft size.
2. According to operating condition(Fixing type, Acc./Dec. Frequency, Temperature), Transmission Torque may be decreased, Therefore it is recommended to apply after testing with actual mounting to the devices.

SMJ Flexible Jaw Type Coupling

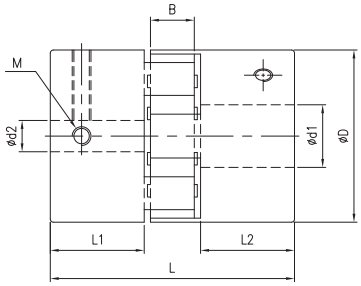
Specifications/ Dimensions



SMJ-20~30



SMJ-40



SMJ-55~80

※ Specifications and Dimensions in the Catalog might be modified without any notice for performance improvement, Contact NARA before using the couplings.

Specifications(SMJ)

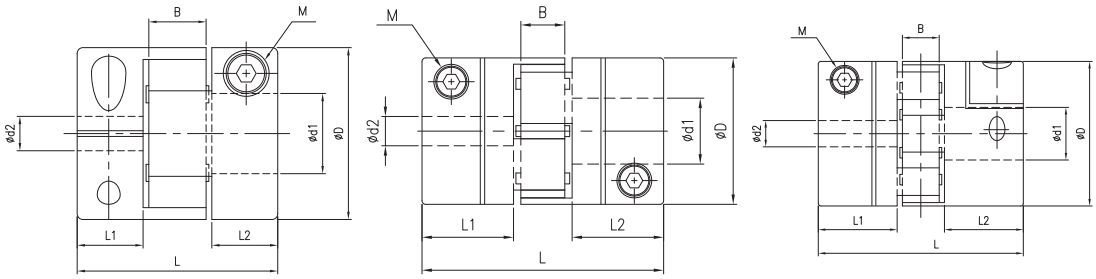
Model	Rated Torque (Nm)	Max Torque (Nm)	Max speed (rpm)	Torsional stiffness (Nm/rad)	Moment of inertia (kg m^2)	Maximum allowable misalignment			Mass (g)
						Parallel misalignment (mm)	Angular misalignment (°)	Axial displacement (mm)	
SMJ-20	5	10	10,000	29	1.0×10^{-6}	0.1	1	±0.8	18
SMJ-25	9	18	10,000	45	2.4×10^{-6}	0.1	1	±1.0	25
SMJ-30	10	20	10,000	73	5.9×10^{-6}	0.1	1	±1.0	46
SMJ-40	15	30	8,000	570	3.1×10^{-5}	0.1	1	±1.2	125
SMJ-55	60	120	7,000	1,600	1.7×10^{-4}	0.1	1	±1.4	350
SMJ-65	160	320	5,900	3,000	3.9×10^{-4}	0.1	1	±1.5	570
SMJ-80	320	640	4,500	6,500	1.1×10^{-3}	0.1	1	±1.8	1,150

Dimensions(SMJ)

Model	D	L	Inner bore		L1, L2	B	M	bolt tightening torque (Nm)
			d1	d2				
SMJ-20	20	30	4~8	4~8	10	8	M3	0.7
SMJ-25	25	32	5~10	5~10	10	9	M4	1.7
SMJ-30	30	35	6~14	6~14	11.5	10	M4	1.7
SMJ-40	40	66	8~20	8~20	25	12	M5	3.6
SMJ-55	55	78	10~28	10~28	30	14	M6	7
SMJ-65	65	90	14~35	14~35	35	15	M8	15
SMJ-80	80	114	19~45	19~45	45	18	M8	15

SMJ Flexible Jaw Type Coupling

Specifications/ Dimensions



SMJ-20C~30C | SMJ-40C | SMJ-55C~80C

※ Specifications and Dimensions in the Catalog might be modified without any notice for performance improvement, Contact NARA before using the couplings.

Specifications(SMJ-C)

Model	Rated Torque (Nm)	Max Torque (Nm)	Max speed (rpm)	Torsional stiffness (Nm/rad)	Moment of inertia (kg m^2)	Maximum allowable misalignment			Mass (g)
						Parallel misalignment (mm)	Angular misalignment (°)	Axial displacement (mm)	
SMJ-20C	5	10	10,000	29	1.1×10^{-6}	0.1	1	±0.8	19
SMJ-25C	9	18	10,000	45	2.4×10^{-6}	0.1	1	±1.0	25
SMJ-30C	10	20	10,000	73	6.2×10^{-6}	0.1	1	±1.0	50
SMJ-40C	15	30	8,000	570	3.1×10^{-5}	0.1	1	±1.2	135
SMJ-55C	60	120	7,000	1,600	1.6×10^{-4}	0.1	1	±1.4	330
SMJ-65C	160	320	5,900	3,000	3.8×10^{-4}	0.1	1	±1.5	560
SMJ-80C	320	640	4,500	6,500	1.0×10^{-3}	0.1	1	±1.8	1,050

Dimensions(SMJ-C)

Model	D	L	Inner bore		L1, L2	B	M	bolt tightening torque (Nm)
			d1	d2				
SMJ-20C	20	30	4~8	4~8	10	8	M2.5	1
SMJ-25C	25	32	5~10	5~10	10	9	M3	1.5
SMJ-30C	30	35	6~14	6~14	11.5	10	M4	3.4
SMJ-40C	40	66	8~20	8~20	25	12	M5	7
SMJ-55C	55	78	10~28	10~28	30	14	M6	14
SMJ-65C	65	90	14~35	14~35	35	15	M8	30
SMJ-80C	80	114	19~45	19~45	45	18	M8	30

SMH Flexible Spiral Helical Type Coupling

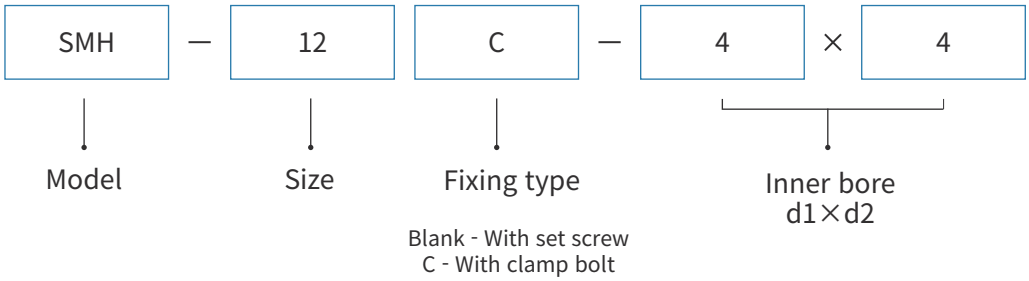
Features

- An integral structure with long spiral grooves in a cylindrical material, and has zero backlash.
- Long grooved coil springs allow parallel misalignment, angular misalignment and axial displacement.
- Characteristics of forward and reverse rotation are identical.
- Low moment of inertia and excellent flexibility.
- Suitable for servo motors.

Structure

SMH Flexible Spiral Helical Type Coupling

How to order



Standard bores diameter

Model	Standard bores diameter d1×d2(mm)																
	d1	3	4	4	5	6	6	8	8	10	10	12	12	15	16	18	20
	d2	3	4	6	5	6	8	8	10	10	12	12	14	15	16	18	20
SMH-12/12C		●	●														
SMH-16/16C		●	●		●												
SMH-19/19C			●		●	●											
SMH-22/22C			●	●	●	●											
SMH-25/25C						●	●	●		●							
SMH-29/29C						●	●	●		●	●	●					
SMH-32/32C						●	●	●		●	●	●					
SMH-34/34C								●	●	●	●	●	●		●		
SMH-39/39C												●		●		●	●

※ Standard type is always available in stock.

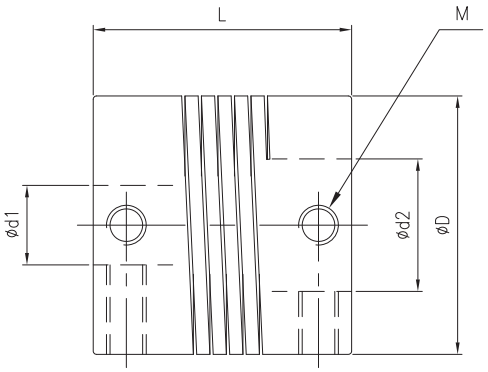
Allowable Transmission torque(Tc) for fixing with clamp bolt

Model	Standard bores diameter d1×d2(mm)											
	3	4	5	6	8	10	12	14	15	16	18	20
SMH-12C	0.6	0.6										
SMH-16C	0.8	0.8	0.8									
SMH-19C		1.2	1.2	1.2								
SMH-22C		2	2	2								
SMH-25C				3.2	3.2	3.2						
SMH-29C				4.3	4.6	4.6	4.6					
SMH-32C				5	5	5	5	5				
SMH-34C					6	6	6	6	6	6		
SMH-39C							12	12	12	12	12	12

Note)
1. Shaft tolerances are based on h7, transmitted torque may be decreased in case of small shaft size.
2. According to operating condition(Fixing type, Acc./Dec. Frequency, Temperature), Transmission Torque may be decreased, Therefore it is recommended to apply after testing with actual mounting to the devices.

SMH Flexible Spiral Helical Type Coupling

Specifications/ Dimensions



SMH

※ Specifications and Dimensions in the Catalog might be modified without any notice for performance improvement, Contact NARA before using the couplings.

Specifications(SMH)

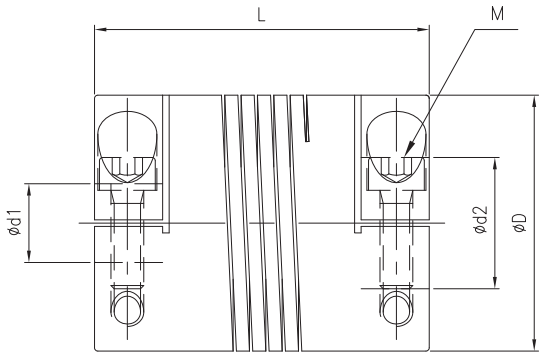
Model	Rated Torque (Nm)	Max Torque (Nm)	Max speed (rpm)	Torsional stiffness (Nm/rad)	Moment of inertia (kg m^2)	Maximum allowable misalignment			Mass (g)
						Parallel misalignment (mm)	Angular misalignment (°)	Axial displacement (mm)	
SMH-12	0.1	0.2	10,000	4	9.3×10^{-8}	0.25	5	±0.25	4
SMH-16	0.18	0.36	10,000	8	2.9×10^{-7}	0.25	5	±0.25	8
SMH-19	0.3	0.6	10,000	13.4	6.9×10^{-7}	0.25	5	±0.25	13
SMH-22	1	2	10,000	21.4	1.4×10^{-6}	0.25	5	±0.25	20
SMH-25	1.6	3.2	10,000	30.5	2.8×10^{-6}	0.25	5	±0.25	29
SMH-29	2.3	4.6	10,000	47.6	5.4×10^{-6}	0.25	5	±0.25	42
SMH-32	2.5	5	10,000	64	8.8×10^{-6}	0.25	5	±0.25	55
SMH-34	3	6	10,000	77	1.1×10^{-5}	0.25	5	±0.25	60
SMH-39	6	12	10,000	116	2.0×10^{-5}	0.25	5	±0.25	80

Dimensions(SMH)

Model	D	L	Inner bore		M	Bolt tightening torque (Nm)
			d1	d2		
SMH-12	12.7	12.7	3~4	3~4	M3	0.7
SMH-16	16	16	3~5	3~5	M3	0.7
SMH-19	19	19.4	4~6	4~6	M3	0.7
SMH-22	22.2	22.4	4~6	4~6	M4	1.7
SMH-25	25	25.4	6~10	6~10	M4	1.7
SMH-29	29	29	6~12	6~12	M5	3.6
SMH-32	32	32	6~12	6~12	M5	3.6
SMH-34	34	34	8~16	8~16	M5	3.6
SMH-39	39	39	12~20	12~20	M6	7

SMH Flexible Spiral Helical Type Coupling

Specifications/ Dimensions



SMH-C

※ Specifications and Dimensions in the Catalog might be modified without any notice for performance improvement, Contact NARA before using the couplings.

Specifications(SMH-C)

Model	Rated Torque (Nm)	Max Torque (Nm)	Max speed (rpm)	Torsional stiffness (Nm/rad)	Moment of inertia (kg m²)	Maximum allowable misalignment			Mass (g)
						Parallel misalignment (mm)	Angular misalignment (°)	Axial displacement (mm)	
SMH-12C	0.1	0.2	10,000	4	1.4×10^{-8}	0.25	5	±0.25	6
SMH-16C	0.18	0.36	10,000	8	3.6×10^{-7}	0.25	5	±0.25	11
SMH-19C	0.3	0.6	10,000	13.4	7.9×10^{-7}	0.25	5	±0.25	14
SMH-22C	1	2	10,000	21.4	1.7×10^{-6}	0.25	5	±0.25	24
SMH-25C	1.6	3.2	10,000	30.5	3.3×10^{-6}	0.25	5	±0.25	34
SMH-29C	2.3	4.6	10,000	47.6	6.7×10^{-6}	0.25	5	±0.25	52
SMH-32C	2.5	5	10,000	64	1.0×10^{-6}	0.25	5	±0.25	62
SMH-34C	3	6	10,000	77	1.3×10^{-5}	0.25	5	±0.25	68
SMH-39C	6	12	10,000	116	2.6×10^{-5}	0.25	5	±0.25	92

Dimensions(SMH-C)

Model	D	L	Inner bore		M	Bolt tightening torque (Nm)
			d1	d2		
SMH-12C	12.7	16.5	3~4	3~4	M2.5	1
SMH-16C	16	21.5	3~5	3~5	M2.5	1
SMH-19C	19	23.4	4~6	4~6	M2.5	1
SMH-22C	22.2	27	4~6	4~6	M3	1.5
SMH-25C	25	31.4	6~10	6~10	M3	1.5
SMH-29C	29	38.4	6~12	6~12	M3	1.5
SMH-32C	32	39	6~12	6~12	M4	3.4
SMH-34C	34	44	8~16	8~16	M4	3.4
SMH-39C	39	51	12~20	12~20	M5	7

SMO Flexible Oldham Type Coupling

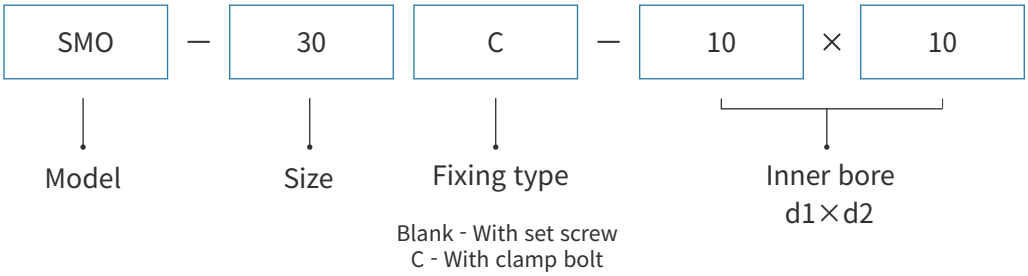
Features

- Shaft ends load is reduced due to small radial load caused by parallel misalignment.
- Allows large parallel and angular misalignment due to hub and element slip properties.
- It has electrical insulation.
- Simple structure and easy assembly.

Structure

SMO Flexible Oldham Type Coupling

How to order



Standard bores diameter

Model	Standard bores diameter d1×d2(mm)																		
	3	4	5	6	6.35	8	9.53	10	12	14	15	16	18	20	22	24	25	26	28	30
SMO-15/15C	●	●	●	●	●															
SMO-20/20C			●	●	●	●														
SMO-25/25C				●	●	●	●	●												
SMO-30/30C				○	○	●	●	●	●	●										
SMO-40/40C								●	●	●	●	●	○							
SMO-50/50C								○	○	●	●	●	●	●	●	●	●			
SMO-60/60C											○	●	●	●	●	●	●	●	●	●

※ Standard type is always available in stock.

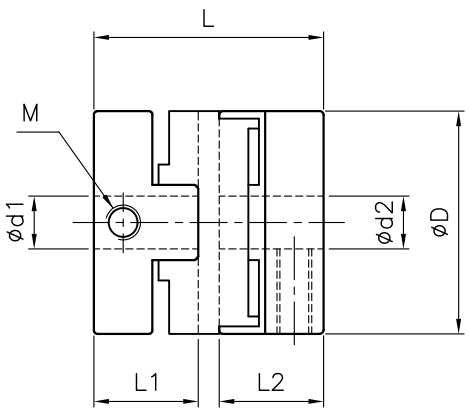
Allowable Transmission torque(Tc) for fixing with clamp bolt

Model	Standard bores diameter d1×d2(mm) and Allowable Transmission torque (Nm)																		
	3	4	5	6	6.35	8	9.53	10	12	14	15	16	18	20	22	24	25	26	28	30
SMO-15C	1.4	1.4	1.4	1.4	1.4															
SMO-20C			2.4	2.4	2.4	2.4														
SMO-25C				3.9	3.9	4	4	4												
SMO-30C				8	8	9	9	9	9	9	9									
SMO-40C								18	18	18	18	18	18							
SMO-50C								26	27	30	31	32	34	35	36	36	36	36		
SMO-60C											57	59	62	64	67	70	71	72	72	72

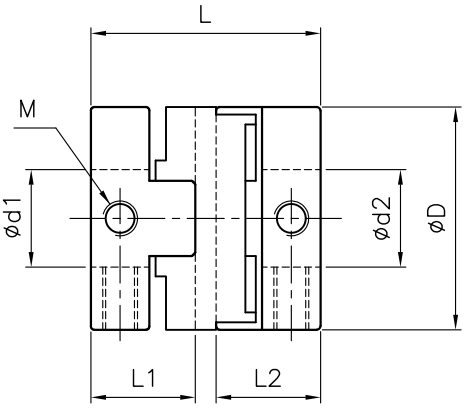
Note)
1. Shaft tolerances are based on h7, transmitted torque may be decreased in case of small shaft size.
2. According to operating condition(Fixing type, Acc./Dec. Frequency, Temperature), Transmission Torque may be decreased, Therefore it is recommended to apply after testing with actual mounting to the devices.

SMO Flexible Oldham Type Coupling

Specifications/ Dimensions



SMO-15



SMO-20~60

※ Specifications and Dimensions in the Catalog might be modified without any notice for performance improvement, Contact NARA before using the couplings.

Specifications(SMO)

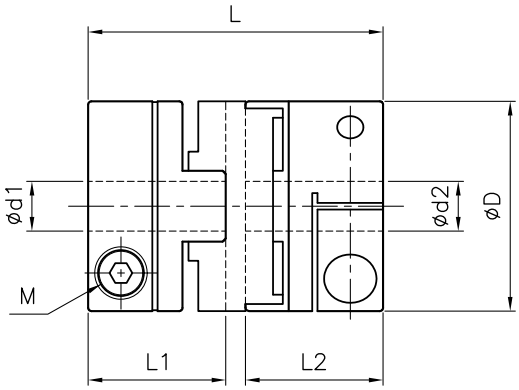
Model	Rated Torque (Nm)	Max Torque (Nm)	Max speed (rpm)	Torsional stiffness (Nm/rad)	Moment of inertia (kg m^2)	Maximum allowable misalignment			Mass (g)
						Parallel misalignment (mm)	Angular misalignment (°)	Axial displacement (mm)	
SMO-15	0.6	1.2	8,000	33	2.6×10^{-7}	1	3	±0.1	7.5
SMO-20	1.1	2.2	7,000	57	7.6×10^{-7}	1.5	3	±0.1	15
SMO-25	2	4	6,000	99	2.4×10^{-6}	2	3	±0.1	22
SMO-30	4	8	4,000	341	6.6×10^{-6}	2.5	3	±0.15	48
SMO-40	9	18	4,000	575	3.8×10^{-5}	3	3	±0.15	160
SMO-50	19	38	3,000	876	1.0×10^{-4}	3.5	3	±0.2	265
SMO-60	30	60	3,000	1,109	1.7×10^{-4}	4	3	±0.2	395

Dimensions(SMO)

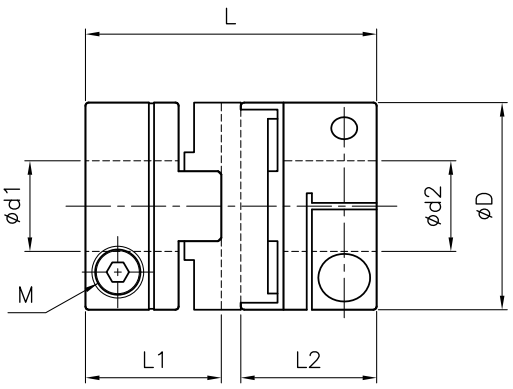
Model	D	L	Inner bore		L1, L2	M	bolt tightening torque (Nm)
			d1	d2			
SMO-15	16.5	18	3~6.35	3~6.35	8	M3	0.7
SMO-20	20.5	20	5~8	5~8	9	M4	1.7
SMO-25	26	26	6~10	6~10	12	M4	1.7
SMO-30	32	33	6~15	6~15	15	M5	3.6
SMO-40	43	52	10~19	10~19	24	M5	3.6
SMO-50	54	58	10~25	10~25	27	M6	7
SMO-60	57.5	77	15~30	15~30	37	M8	15

SMO Flexible Oldham Type Coupling

Specifications/ Dimensions



SMO-15C



SMO-20~60C

※ Specifications and Dimensions in the Catalog might be modified without any notice for performance improvement, Contact NARA before using the couplings.

Specifications(SMO-C)

Model	Rated Torque (Nm)	Max Torque (Nm)	Max speed (rpm)	Torsional stiffness (Nm/rad)	Moment of inertia (kg m^2)	Maximum allowable misalignment			Mass (g)
						Parallel misalignment (mm)	Angular misalignment (°)	Axial displacement (mm)	
SMO-15C	0.6	1.2	8,000	33	3.5×10^{-7}	1	3	±0.1	10
SMO-20C	1.1	2.2	7,0 00	57	9.8×10^{-7}	1.5	3	±0.1	18
SMO-25C	2	4	6,000	99	3.3×10^{-6}	2	3	±0.1	37
SMO-30C	4	8	4,000	341	9.9×10^{-6}	2.5	3	±0.15	81
SMO-40C	9	18	4,000	575	3.8×10^{-5}	3	3	±0.15	150
SMO-50C	19	38	3,000	876	1.0×10^{-4}	3.5	3	±0.2	260
SMO-60C	30	60	3,000	1,109	1.7×10^{-4}	4	3	±0.2	395

Dimensions(SMO-C)

Model	D	L	Inner bore		L1, L2	M	bolt tightening torque (Nm)
			d1	d2			
SMO-15C	16.5	24	3~6.35	3~6.35	11	M2.5	1
SMO-20C	20.5	26	5~8	5~8	12	M2.5	1
SMO-25C	26	32	6~10	6~10	15	M3	1.5
SMO-30C	32	45	6~15	6~15	21	M4	3.4
SMO-40C	43	52	10~19	10~19	24	M5	7
SMO-50C	54	58	10~25	10~25	27	M5	7
SMO-60C	57.5	77	15~30	15~30	37	M6	14

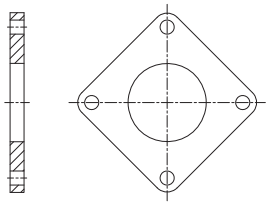
PANFLEX COUPLING

Features

• NARA Panflex coupling is designed with an optimized structure that is competitive in various industrial fields.
• Stable torque transmission even in case shaft misalignment is unavoidable.
• Possible to manufacture couplings that meet API 671 code.
• Simple installation and easy inspection.
• Possible to assemble and disassemble without moving related machines.
⑥ Zero backlash and high torsional rigidity.

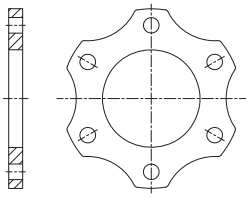
Structure

4 Bolts



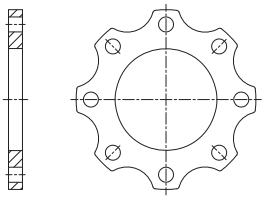
- Zero backlash
- Stainless Steel (SUS304)

6 Bolts

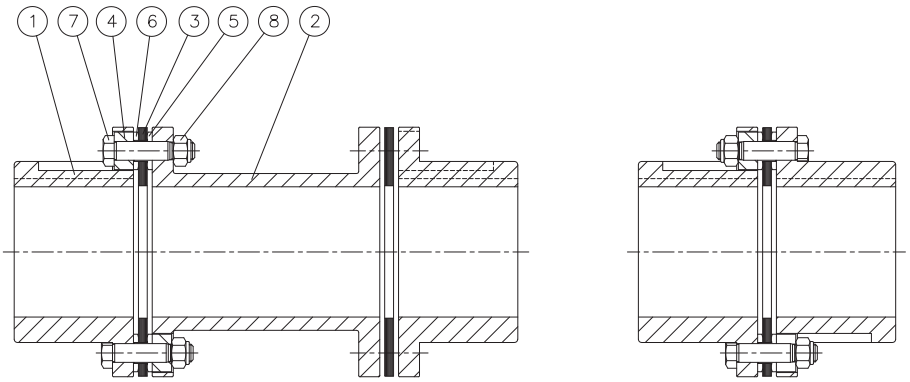


- Zero backlash
- Stainless Steel (SUS304)

8 Bolts



- Zero backlash
- Stainless steel (SUS304)



1. HUB
2. SPACER
3. ELELMENT PACK
4. OVERLOAD WASHER
5.BUSHING
6. WASHER
7. REAMER BOLT
8. NYLON NUT

Selection

NR - NPB × 610 200

- 200 : Distance Between Shaft Ends(DBSE)
- 610 : Size
- NPB : Type
  - NPA : No spacer type
  - NPB : Standard spacer type
  - NPS : Spacer as per Customer requirement
  - NPE : Adapter type
- NR : NARA

Step 1

• Calculation of required torque (Tw)

$$Tw\ (Nm) = 9550 \times \frac{P\ (kW)}{N\ (rpm)}$$

P : Prime motor power(kW)
N : Coupling rotation speed(rpm)

Step 2

• Calculation of required torque (Tw)

$Tr\ (Nm) = Tw(Nm) \times F_1$

Determine Service factor(F_1) on page 86

Step 3

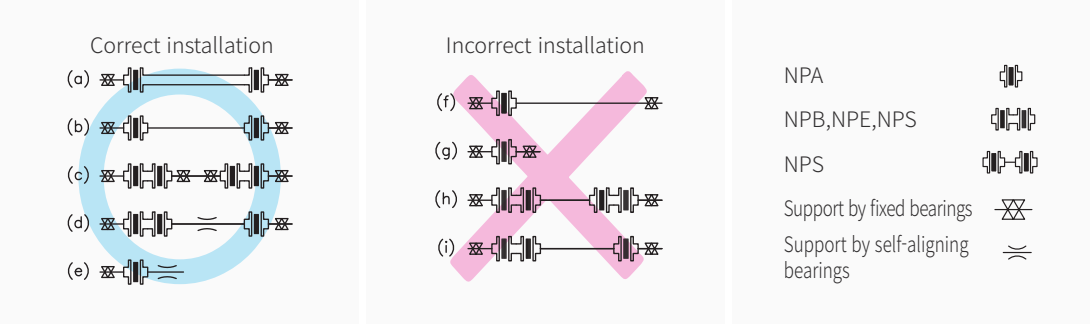
• Select size in which the rated torque (Tn) of the coupling size is larger than the required torque (Tr) in the dimension table.

$Tn > Tr$

Step 4

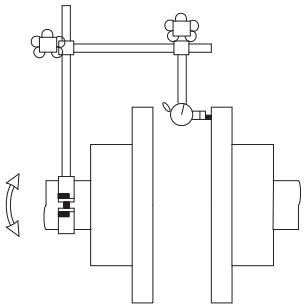
• Check whether max. bore diameter of the coupling meets the shaft diameter of the prime motor and driven machine.
• Check whether max. rotation speed of the coupling meets the rotation speed of the prime motor

Installation

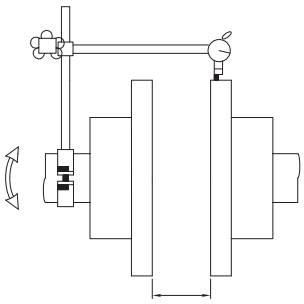


• Use NPA type coupling as shown in (b).
• When fitting the intermediate shaft to two pairs of NPB or NPS type, it has to be supported by fixed bearings as shown in (c).
• When using NPB / NPS type and NPA type together, it should be supported by self-aligning bearing to support inclined shaft as shown in (d).
• In case of mounting the couplings without supporting bearings on the intermediate shaft as shown in (h) or (i), it rotates in inclined condition that can cause vibration.
• For operation in high-speed rotation allowable maximum rotation speed of the coupling can be slightly increased thru the accuracy of the shaft alignment and coupling balancing work.

Installation

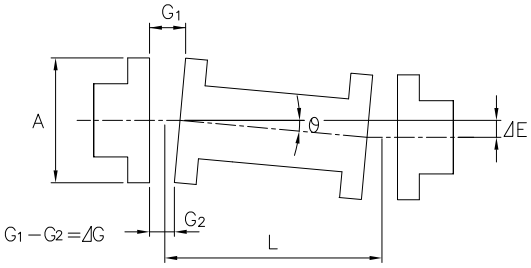


[Fig.1]



[Fig.2]

• Clean the shaft and the bore of flange and check if tolerance fits properly.
• When performing shrinkage fitting, heat the flange in oil bath at 120°C~150°C.
• For the distance between shaft ends refer to the dimensional table “G” or “DBSE” values.
• Check the lateral runout (ΔG) in Fig. 1 and align the shaft so that the lateral runout value is not more than the value as shown in Table 1.
• After checking the eccentricity in Fig. 2, find the lateral runout (ΔG) value due to the eccentricity (ΔE), and align the shaft so that the lateral runout value (ΔG) is within the value as shown in Table 1.
• After aligning the shaft, assemble the spacer and element to the flange with bolts.
Do not apply excessive force when inserting the bolts.
- Tighten the nut with the provided torque as per Table 2.
• To maintain a long service life, recheck the shaft alignment within 2 hours after installation and trial run.
When reassembling, tighten nuts securely with the provided tightening torque value.
It is recommended to disassemble and reassemble nuts within 10 times.
For long-term usage of the coupling and to show its maximum capability, shafts must be well aligned when assembling.



[Fig.3]

Shaft misalignment

• Shaft misalignment (θ and ΔE) causes lateral runout (ΔG) of the coupling.
• The related formula is as follows (refer to Fig 3)

$$\Delta E = L \tan\theta,\ \theta = \tan^{-1}(\Delta E / L)$$
$$\Delta G = A \tan\theta,\ \theta = \tan^{-1}(\Delta G / A)$$

• For angular misalignment and lateral runout, please align shafts not more than the values shown in Table 1.

Table 1

Type	Angular Misalign-ment	Content	Lateral runout(ΔG)TIR(mm)										
4Bolt	0.1°	Size	405	410	415	420	425	430	435	440	445	450	455
		tolerance	0.12	0.15	0.16	0.2	0.22	0.25	0.29	0.34	0.37	0.43	0.48
6Bolt	0.07°	Size	601	602	603	604	605	610	615	620	-	-	-
		tolerance	0.12	0.15	0.18	0.21	0.24	0.27	0.3	0.34	-	-	-
8bolt	0.05°	Size	815	820	825	830	840	850	860	870	-	-	-
		tolerance	0.26	0.3	0.34	0.38	0.42	0.47	0.5	0.6	-	-	-

※ TIR : Dial gauge value

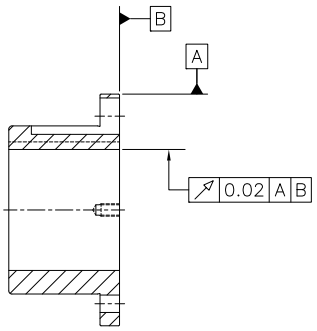
Installation

Nut tightening torque

Table 2

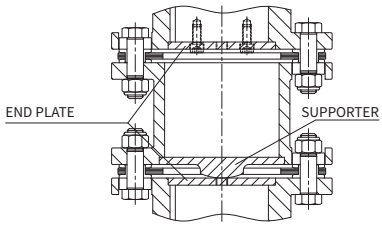
Size	405	410	415	420	425	430	435	440	445	450	455
Nut Nominal size	M6	M6	M8	M8	M10	M12	M12	M16	M16	M18	M24
Tightening torque(Nm)	9	9	22	22	41	72	72	160	160	220	570
Size	601	602	603	604	605	610	615	620	-	-	-
Nut Nominal size	M6	M8	M10	M12	M14	M16	M18	M20	-	-	-
Tightening torque(Nm)	9	22	41	72	86	160	220	320	-	-	-
Size	815	820	825	830	840	850	860	870	-	-	-
Nut Nominal size	M20	M22	M24	M30	M33	M36	M36	M42	-	-	-
Tightening torque(Nm)	320	440	570	1,100	1,500	1,700	1,700	3,000	-	-	-

General information



Assembly

• Make sure there is no lateral runout due to pack set deformation during assembly. In case lateral runout occurred, realign the shafts after disassemble the pack set.
• In case customer himself performs inner bore machining, perform it after aligning the concentricity and squareness.



Vertical Installation

• Couplings are designed for horizontal installation.
• For vertical mounting a spacer supporter and end plates shoud be added.

Machining of inner bore & keyway

• NARA Panflex couplings shall be supplied with an assembled condition after machining inner bore and keyway.
• If inner bore and keyway machining is not required, contact NARA.

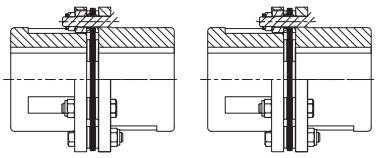
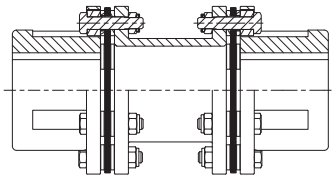
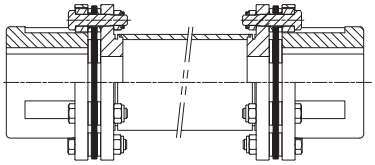
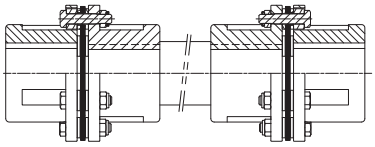
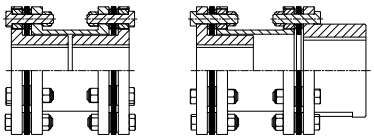
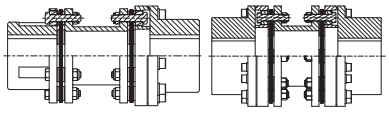
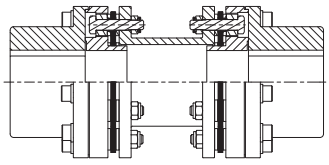
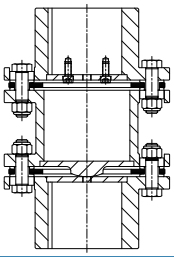
Balancing

• NARA Panflex coupling can be balancing-worked according to customer's requirements. Contact NARA if necessary.
• The standard couplings are not balancing-worked, In case of exceeding max. unbalanced speed, it should be balancing-worked.

Safety regulations

• Accidents may occur due to damage of coupling parts when being overloaded, etc. Make sure to install personal protection cover over ther couplings.

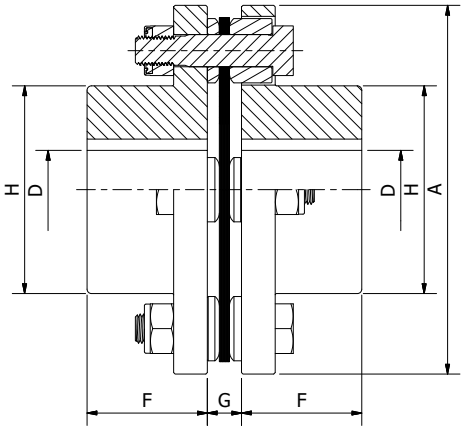
Application

Type	Features	Application
NPA Type 	• Single element • Only angular misalignment and axial displacement allowed • High torsional rigidity • Compact design	Refer to information for installation on page 25.
NPB Type 	• Two elements • Easy to absorb shafts misalignment • NPB standard type available in stock	• Mixer • Stirrer • Pump • Fan • Devices with large radial loads
NPS Type 	• Spacer length is decided by customer • Welded pipe • High torsional rigidity • Dynamic balancing	• Mixer • Stirrer • Pump • Fan • Devices with large radial loads
NPS Type 	• Spacer length is decided by customer • Assembly of NPA type 2 sets to the intermediate shaft	• Mixer • Stirrer • Pump • Fan • Devices with large radial loads
NPB-S/NPB-D Type 	• Size reduced Hub • Compact, two elements • Assembly thru lateral side of spacer is not possible • For Replacement of Gear Couplings	• Mixer • Stirrer • Pump • Fan • Devices with large radial loads
NPE-A/NPE-B Type 	• Compact, two elements • For Expansion of inner bore	• Mixer • Stirrer • Pump • Fan • Devices with large radial loads
NPE-B API Type 	• Two elements • Standard spacer applied	• Pump • Pump with API standard • Turbine
NPV Type 	• Vertical mounting • Available for long DBSE ※ Contact NARA	• Vertical Pumps • Agitator

Dimensions

NPA

Single element



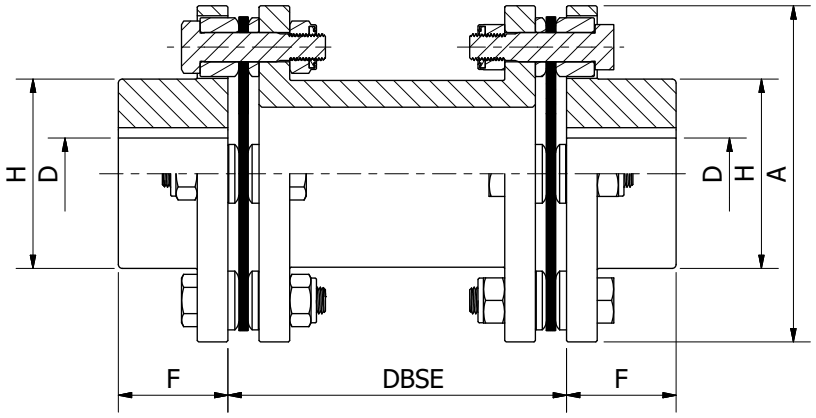
Size	Rated Torque (Nm)	Max speed (rpm)		Dimensions(mm)					Mass (kg)	Moment of inertia (kgm^2)
		Unbalanced	Balanced	Max. D	A	F	G	H		
405	33	5,000	15,000	23	67	25	6.1	33	0.6	0.00013
410	90	5,000	15,000	32	81	25	6.6	46	1.1	0.00033
415	177	5,000	15,000	35	93	29	8.4	51	1.7	0.00065
420	245	5,000	15,000	42	104	34	11.2	61	2.5	0.0012
425	422	4,400	12,000	50	126	41	11.7	71	4.3	0.003
430	775	4,000	10,000	58	143	48	11.7	84	6.8	0.0063
435	1,270	3,600	9,300	74	168	57	16.8	106	12	0.014
440	2,060	3,000	8,000	83	194	64	17	119	17	0.028
445	3,330	2,800	7,300	95	214	76	21.6	137	25	0.048
450	4,900	2,200	6,300	109	246	89	23.9	157	37	0.093
455	6,370	2,000	5,600	118	276	102	27.2	170	53	0.17

1. The standard couplings are not balancing-worked, In case of exceeding max. unbalanced speed, it should be balancing-worked.
2. For selection of NPA type, refer to installation guide on page 25. contact NARA if necessary
3. Mass and moment of inertia are values without bore's machining.

Dimensions

NPB

Standard spacer



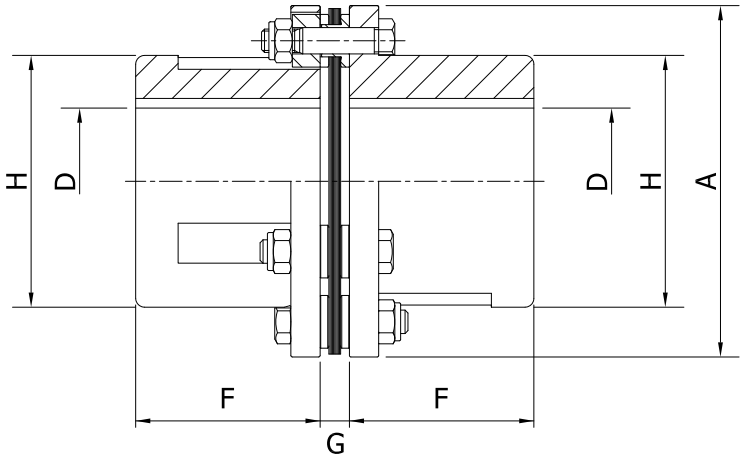
Size	Rated Torque (Nm)	Max speed (rpm)		Dimensions(mm)					Mass (kg)	Moment of inertia (kgm^2)
		Unbalanced	Balanced	max. D	A	F	DBSE	H		
405	33	5,000	15,000	23	67	25	90	33	0.6	0.0003
410	90	5,000	15,000	32	81	25	90	46	1.1	0.0008
415	177	5,000	15,000	35	93	29	100	51	1.7	0.0017
420	245	5,000	15,000	42	104	34	130	61	2.5	0.003
425	422	4,400	12,000	50	126	41	130	71	4.3	0.008
430	775	4,000	10,000	58	143	48	130	84	6.8	0.015
435	1,270	3,600	9,300	74	168	57	130	106	12	0.036
440	2,060	3,000	8,000	83	194	64	140	119	17	0.073
445	3,330	2,800	7,300	95	214	76	150	137	25	0.118
450	4,900	2,200	6,300	109	246	89	180	157	37	0.218
455	6,370	2,000	5,600	118	276	102	180	170	53	0.42

1. The standard couplings are not balancing-worked, In case of exceeding max. unbalanced speed, it should be balancing-worked.
2. "DBSE" can be manufactured according to customer's requirements.
3. Mass and moment of inertia are values without bore's machining.

Dimensions

NPA

Single Element Boss Extension Type



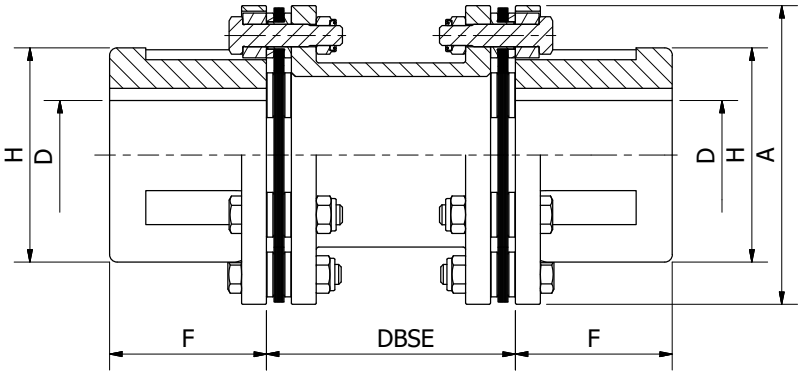
Size	Rated Torque (Nm)	Max speed (rpm)		Dimensions(mm)					Mass (kg)	Moment of inertia (kgm^2)
		Unbalanced	Balanced	max. D	A	F	G	H		
601	451	5,000	15,000	47	95	54	7.5	66	3.1	0.003
602	903	4,400	12,500	62	120	63	10	86	6.5	0.01
603	1,730	4,200	11,000	75	145	74	12	103	11	0.025
604	2,630	4,000	10,000	92	175	80	14	128	17	0.06
605	5,250	3,500	9,000	104	197	95	16	144	25.7	0.12
610	8,090	3,200	8,500	118	226	108	17	164	37.1	0.24
615	11,550	3,000	8,000	129	247	121	18	180	51.8	0.38
620	15,750	2,800	7,000	145	276	134	19	202	72.8	0.68
815	18,480	2,300	7,000	141	296	137	19	196	70	0.72
820	30,030	2,200	6,000	164	337	163	23.2	229	113.4	1.65
825	42,000	2,000	5,300	188	386	186	24.5	262	168.7	3
830	60,165	1,800	5,000	208	427	206	27	289	230.3	4
840	90,300	1,600	4,500	241	486	240	29.5	336	331	7
850	120,700	1,400	4,000	264	536	265	34	367	469	13

1. The standard couplings are not balancing-worked, In case of exceeding max. unbalanced speed, it should be balancing-worked.
2. For selection of NPA type, refer to installation guide on page 25. contact NARA if necessary
3. Mass and moment of inertia are values without bore's machining.

Dimensions

NPB

Standard Spacer



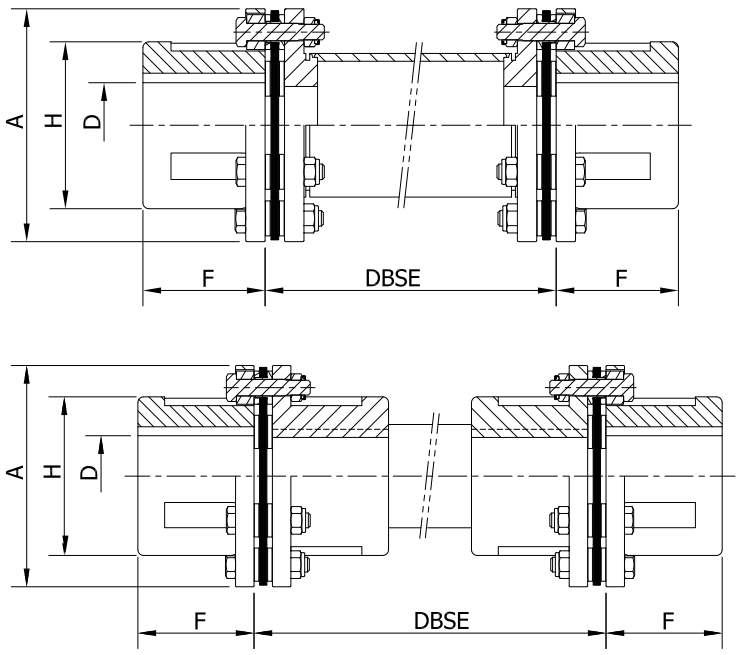
Size	Rated Torque (Nm)	Max speed (rpm)		Dimensions(mm)										Mass (kg)	Moment of inertia (kgm^2)
				max D	A	DBSE						F	H		
		Unbalanced	Balanced			minimum length	100	140	180	200	250				
601	451	5,000	15,000	47	95	100	○	○	○			54	66	According to customer spcification	
602	903	4,400	12,500	62	120	100	○	○	○			63	86		
603	1,730	4,200	11,000	75	145	100	○	○	○			74	103		
604	2,630	4,000	10,000	92	175	100	○	○	○			80	128		
605	5,250	3,500	9,000	104	197	140		○	○			95	144		
610	8,090	3,200	8,500	118	226	140		○	○			108	164		
615	11,550	3,000	8,000	129	247	140		○	○			121	180		
620	15,750	2,800	7,000	145	276	180			○	○		134	202		
815	18,480	2,300	7,000	141	296	180			○	○		137	196		
820	30,030	2,200	6,000	164	337	180					○	163	229		
825	42,000	2,000	5,300	188	386	180					○	186	262		
830	60,165	1,800	5,000	208	427	250			300			206	289		
840	90,300	1,600	4,500	241	486	250			300			240	336		
850	120,700	1,400	4,000	264	536	250			350			265	367		
860	143,000	1,200	3,500	288	571	250			350			290	403		
870	238,000	1,000	3,000	347	683	300			400			350	486		

1. The standard couplings are not balancing-worked, In case of exceeding max. unbalanced speed, it should be balancing-worked.
2. "DBSE" can be manufactured according to customer's requirements.

Dimensions

NPS

Long spacer & Intermediate shaft

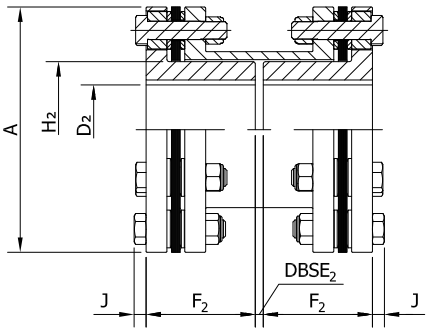


Size	Rated Torque (Nm)	Max speed (rpm)		Dimensions(mm)				
		Unbalanced	Balanced	max D	A	DBSE	F	H
601	451	According to customer spcification (DBSE)		47	95	According to customer spcification	54	66
602	903			62	120		63	86
603	1,730			75	145		74	103
604	2,630			92	175		80	128
605	5,250			104	197		95	144
610	8,090			118	226		108	164
615	11,550			129	247		121	180
620	15,750			145	276		134	202
815	18,480			141	296		137	196
820	30,030			164	337		163	229
825	42,000			188	386		186	262
830	60,165			208	427		206	289
840	90,300			241	486		240	336
850	120,700			264	536		265	367
860	143,000			288	571		290	403
870	238,000			347	683		350	486

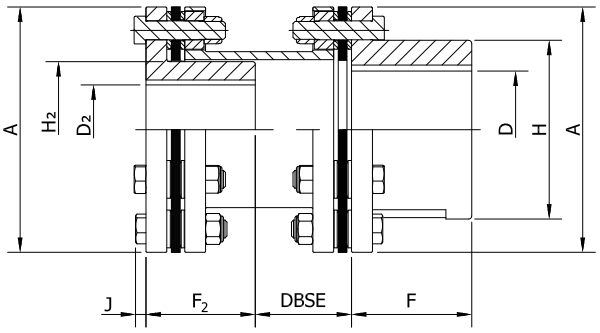
1. The standard couplings are not balancing-worked, In case of exceeding max. unbalanced speed, it should be balancing-worked.
2. "DBSE" can be manufactured according to customer's requirements. .

Dimensions

NPB-S



NPB-D



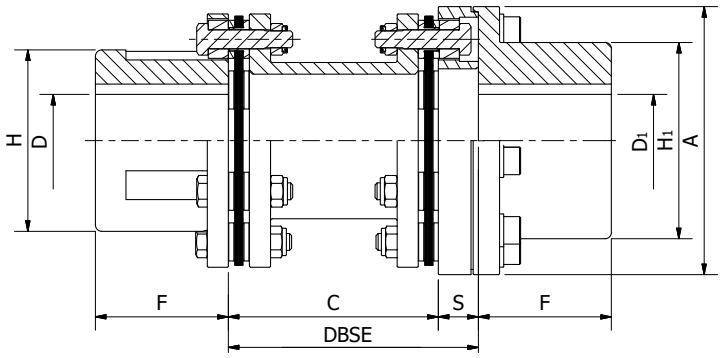
Size	Dimensions(mm)										NPB-S		NPB-D	
	D max	D_2 max	A	F	F_2	H	H_2	J	DBSE	$DBSE_2$	Mass (kg)	Moment of inertia (kgm^2)	Mass (kg)	Moment of inertia (kgm^2)
601	47	38	95	54	43	66	52.5	4	38	3	4.5	0.004	5	0.005
602	62	50	120	63	48	86	69	5.5	41	3	9.4	0.013	10.3	0.014
603	75	57	145	74	56	103	82	7	47.5	3	15.7	0.03	17.3	0.032
604	92	70	175	80	70	128	100	8	61	5	24.2	0.07	26.6	0.075
605	104	75	197	95	80	144	109	9	68	5	36.7	0.14	40	0.15
610	118	80	226	108	90	164	117	10	76	5	53	0.26	58	0.29
615	129	85	247	121	100	180	126	12	84	5	74	0.43	81	0.47
620	145	100	276	134	110	202	146	13	93	6	104	0.77	114	0.85
815	141	110	296	137	110	196	158	13	93	6	100	0.79	110	0.87
820	164	125	337	163	125	229	183	14	106	6	162	1.73	178	1.9
825	188	150	386	186	140	262	115	15	123	8	241	3.4	265	3.7
830	208	160	427	206	170	289	235	19	147	8	329	5.6	362	6.1
840	241	180	486	240	190	336	280	21	166	8	473	10.2	520	11
850	264	200	536	265	200	367	305	23	176	10	670	18	737	20

1. The standard couplings are not balancing-worked, In case of exceeding max. unbalanced speed, it should be balancing-worked.
2. "DBSE" can be manufactured according to customer's requirements.
3. Mass and moment of inertia are values without bore's machining.
4. Refer to NPB type on page 32 for rated torque & max. speed.

Dimensions

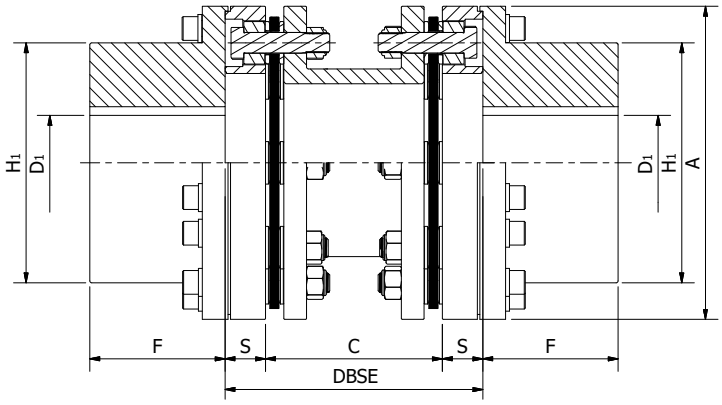
NPE-A

One side Adaptor



NPE-B

Both sides Adaptor

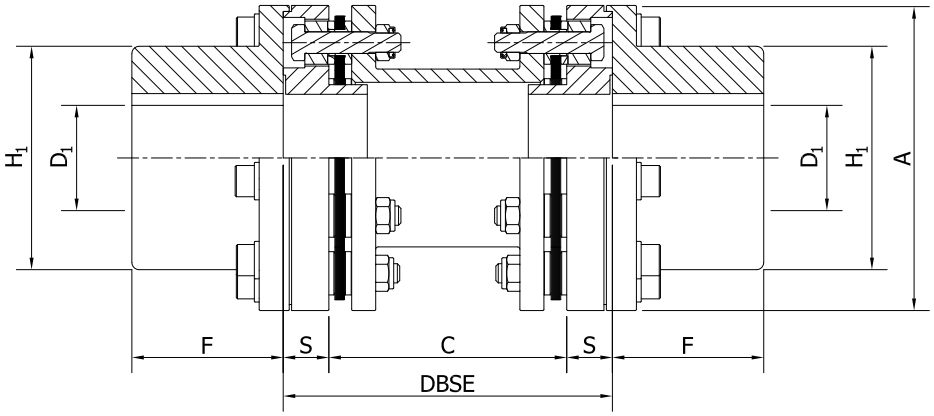


Size	Rated Torque (Nm)	Max speed (rpm)		Dimensions(mm)									Mass (kg)	Moment of inertia (kgm^2)
		Unbalanced	Balanced	max D	max D_1	A	C	F	S	H	H_1	DBSE Min length		
601	451	5,000	15,000	47	55	100	80	54	15	66	76	130	6.6	0.007
602	903	4,400	12,500	62	68	127	100	63	19	86	93	138	13.2	0.024
603	1,730	4,200	11,000	75	88	154	100	74	23	103	120	146	23.1	0.06
604	2,630	4,000	10,000	92	104	193	100	80	26	128	145	152	37.1	0.16
605	5,250	3,500	9,000	104	117	211	140	95	30	144	163	200	53.4	0.28
610	8,090	3,200	8,500	118	128	244	140	108	34	164	178	208	75.2	0.49
615	11,550	3,000	8,000	129	147	270	140	121	38	180	204	216	110	0.9
620	15,750	2,800	7,000	145	166	296	180	134	41	202	230	262	150	1.5
815	18,480	2,300	7,000	141	181	317	180	137	41	196	243	262	164	1.9
820	30,030	2,200	6,000	164	210	357	180	163	45	229	285	270	250	3.7
825	42,000	2,000	5,300	188	241	433	180	186	49	262	335	278	403	8.6
830	60,165	1,800	5,000	208	268	470	250	206	57	289	366	364	545	13.8
840	90,300	1,600	4,500	241	298	536	250	240	60	336	414	370	800	25.4
850	120,700	1,400	4,000	264	324	600	250	265	70	367	450	390	1,120	45

1. The standard couplings are not balancing-worked, In case of exceeding max. unbalanced speed, it should be balancing-worked.
2. "DBSE" can be manufactured according to customer's requirements.
3. Mass and moment of inertia are values without bore's machining.

Dimensions

NPE-B API



Size	Rated Torque (Nm)	Max speed (rpm)		Dimensions(mm)							Mass (kg)	Moment of inertia (kgm^2)
		Unbalanced	Balanced	max D_1	A	C	F	S	H	DBSE Min length		
601	451	5,000	15,000	55	100	100	54	15	76	130	6.6	0.007
602	903	4,400	12,500	68	127	100	63	19	93	138	13.2	0.024
603	1,730	4,200	11,000	88	154	100	74	23	120	146	23.1	0.06
604	2,630	4,000	10,000	104	193	100	80	26	145	152	37.1	0.16
605	5,250	3,500	9,000	117	211	140	95	30	163	200	53.4	0.28
610	8,090	3,200	8,500	128	244	140	108	34	178	208	75.2	0.49
615	11,550	3,000	8,000	147	270	140	121	38	204	216	110	0.9
620	15,750	2,800	7,000	166	296	180	134	41	230	262	150	1.5
815	18,480	2,300	7,000	181	317	180	137	41	243	262	164	1.9
820	30,030	2,200	6,000	210	357	180	163	45	285	270	250	3.7
825	42,000	2,000	5,300	241	433	180	186	49	335	278	403	8.6
830	60,165	1,800	5,000	268	470	250	206	57	366	364	545	13.8
840	90,300	1,600	4,500	298	536	250	240	60	414	370	800	25.4
850	120,700	1,400	4,000	324	600	250	265	70	450	390	1,120	45

1. The standard couplings are not balancing-worked, In case of exceeding max. unbalanced speed, it should be balancing-worked.
2. "DBSE" can be manufactured according to customer's requirements.
3. Mass and moment of inertia are values without bore's machining.
4. This type is compliant with the API 610 and API 671 codes.

GEAR COUPLING (NG type)

Features

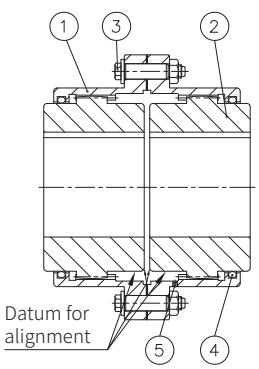
• Gear couplings are small and light compared to their transmitted power, and almost no noise or vibration occur even at high speed rotation.
• During installation and operation, even if some shaft misalignment occurs in the coupling, it is absorbed by self-regulation, so it can protect the mechanical part and produce powerful transmission. The wear resistance of the gear is increased by internal lubrication.
• It can be used at high speed and heavy load.
• Can be used even in case of rotation with sliding movement.
• Easy application when connecting to the intermediate shaft due to long distance between the shaft ends.
• Large and special types can be also manufactured.

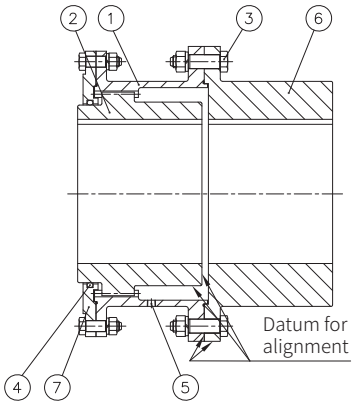
Structure

Gear coupling is composed of inner teeth of the sleeve and outer teeth of the hub, which are interlocked and assembled. Gear is designed as an involute tooth type, and even in case of a slight inclination between the sleeve and the hub, smooth power transmission is possible. NGG type has two pairs of hubs and sleeves, and performs smooth power transmission even with slight parallel, angular misalignment and axial displacement. The NGE type is composed of one pair of hubs and sleeves, and can only absorb angular misalignment and axial displacement.

Type	Description
NGG	Standard type, two pairs of sleeves and hub
NGE	One pair of sleeves and hubs, Flange type
NGGV	Vertical type
NGA	Spacer type
NGH, NGF	Intermediate shaft type
NGGD	Brake disc type
NGGB, NGEB	Brake drum type

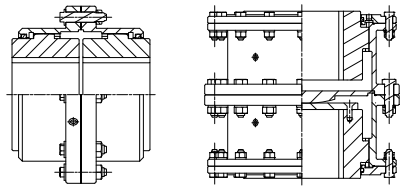
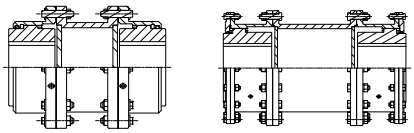
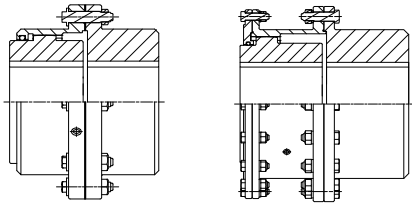
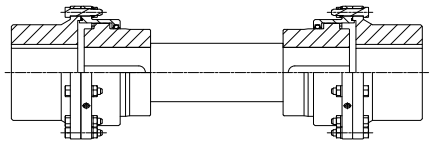
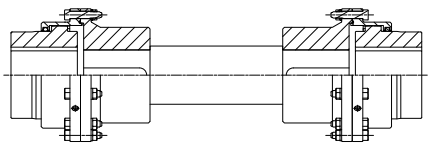
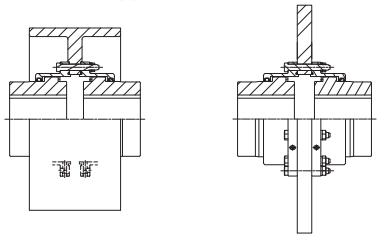
※ Special Gear coupling type is also available.



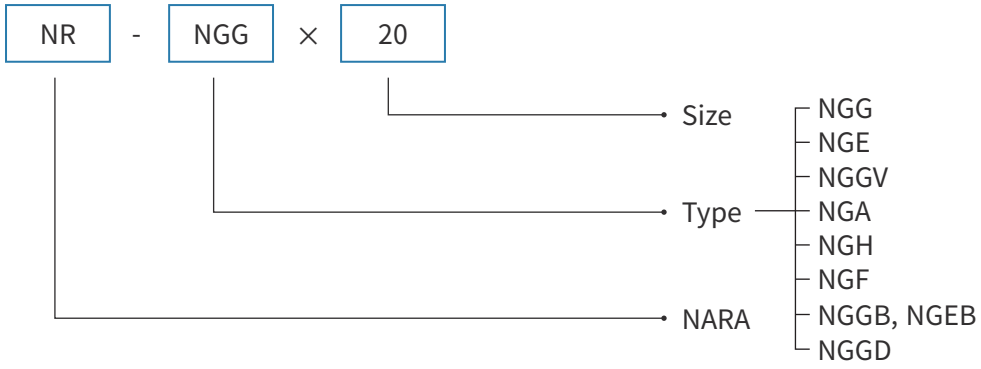


1. Sleeve 2. Hub 3. Reamer bolt 4. O-Ring
5. Oil Plug 6. Flange 7. Side cover

Application

Type	Features and applications
NGG/NGGV Type 	• NGG/NGGV type is combined with two pairs of hubs and sleeves to absorb shaft parallelism, angular misalignment, and axial displacement. • Application : cranes, conveyors, steel and iron making facilities, paper making facilities, chemical facilities, pens, agitators, elevators, industrial machines, pumps
NGA Type 	• NGA type is NGG type with spacer. When applied to a pump or compressor, gear coupling can be maintained and repaired without moving the related equipment.
NGE Type 	
NGH Type 	• NGE type is combination of one pair of hubs and sleeves, and only allows angular misalignment. • NGH/NGF type absorbs parallel misalignment and axial displacement by combining 2 sets of NGE type with an intermediate shaft, and can be applied to the equipment that requires a long distance between shafts. • Application : Crane drive, Traversing device, steel making equipment, rolling mill, blower
NGF Type 	
NGGB/NGGD Type 	• NGGB, NGGD and NGEB types are applied to the device's braking system by adding a brake drum or brake disc to NGG and NGE types. • Application : Industrial machinery that requires a braking system such as crane drive, traversing device, hoisting device, conveyor drive, etc.

Selection



Step 1

•Calculation of transmitted torque (Tw)

$$Tw\ (Nm) = 9550 \times \frac{P\ (kW)}{N\ (rpm)}$$

P : Prime motor Power(kW)
N : Coupling rotation speed(rpm)

Step 2

•Calculation of required torque (Tr)

$Tr\ (Nm) = Tw(Nm) \times F_1$

Determine Service factor(F_1) on page 86

•In case of using a brake, check the braking torque (Tb).
•Braking torque (Tb) is multiplied by the service factor (F1) and the peak torque (Tbp) when braking.

$Tb\ (Nm) = Tbp(Nm) \times F_1$

•Check the system peak torque (Tp).
•The required torque (Tr1)for forward and reverse rotation is multiplied by the peak torque (Tp)and the reverse rotation coefficient(F_2).

$Tr1\ (Nm) = Tp(Nm) \times F_2$

F_2 = apply 1.5 (for two way direction)
= apply 1.0 (for one way direction)

Step 3

•Select the coupling in which the rated torque (Tn) of the coupling is larger than the required torque (Tr), peak torque (Tp), braking torque (Tb), and the required torque for forward and reverse rotation (Tr1) in the dimension table.

$Tn > Tr,\quad Tn > Tb,\quad Tn > Tp,\quad Tn > Tr1$

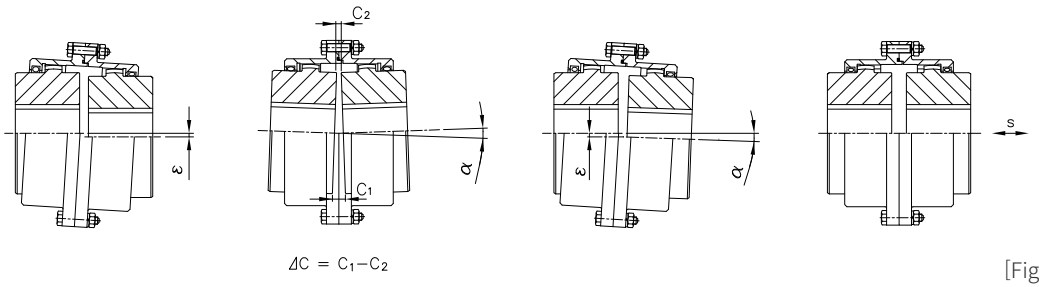
Step 4

•Check whether max. bore diameter of the coupling meets the shaft diameter of the prime motor and driven machine.
•Check whether max. rotation speed of the coupling meets the rotation speed of the prime motor.

Misalignment & Displacement

• Parallel misalignment (ε)
- Centerlines of the motor shaft and the driven shaft are deviated.
• Angular misalignment (α)
- The motor shaft and the driven shaft in a straight axis line are inclined.
• Complex misalignment
- Combination of Parallel misalignment (ε) and angular misalignment (α).
• Axial displacement (S)
- Both shafts move in the axial direction.

• Allowable displacement (ε, ΔC, S)
- In Tables 1, ε is the maximum parallel and angular misalignment due to structural characteristics, ε´ and ΔC are the parallel misalignment and the deviation of the distance between the planes of the hub to maintain a long life time value converted to distance deviation.



[Fig 1]

Amounts of Parallel misalignment(ε, ε '), deviation(ΔC)between hub plane spaces, axial displacement (S) - (NGG type)(NGGType)

(mm) Table 1

Size	ε	ε´	ΔC	S	Size	ε	ε´	ΔC	S	Size	ε	ε´	ΔC	S
10	1.2	0.04	0.12	-1~1	55	5.2	0.17	0.49	-2~7	140	9.2	0.46	1.1	-3~11
15	1.5	0.05	0.15	-1~3	60	5.8	0.19	0.53	-2~7.5	150	10	0.5	1.2	-4~12
20	1.9	0.06	0.19	-1~3	70	6.7	0.22	0.62	-2~7.5	160	11	0.53	1.3	-4~13
25	2.3	0.08	0.23	-1~4	80	5.5	0.28	0.62	-2.5~8	180	11	0.55	1.5	-4~14
30	2.6	0.09	0.27	-1~4	90	6.2	0.31	0.69	-2.5~8	200	13	0.65	1.6	-5~15
35	3.1	0.1	0.31	-1.5~4.5	100	6.9	0.34	0.77	-2.5~8.5	220	14	0.71	1.8	-5~15
40	3.7	0.12	0.36	-1.5~5.5	110	7.9	0.39	0.86	-3~9.5	240	15	0.76	2	-6~16
45	4.1	0.14	0.41	-1.5~5.5	120	8.4	0.42	1	-3~9.5	280	16	0.81	2.1	-7~18
50	4.7	0.16	0.44	-2~6.5	130	8.8	0.44	1	-3~10.5	300	17	0.84	2.3	-8~20

1. Apply a half of Table 1 for the axial displacement (S) of NGE type.
2. In case NGE type is used as 1 set, parallel misalignment cannot be absorbed, contact NARA for details.
3. For allowable displacement of other types, contact NARA

Calculation for parallel misalignment(ε) of long shaft.

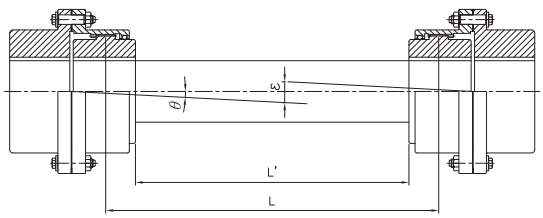
• NGE type is often used as shown in Fig 2. In this case, the amount of parallel misalignment can be obtained by the following formula.

$$\varepsilon = L \times \tan\theta$$

• In case the dimension L is unknown, calculate it as

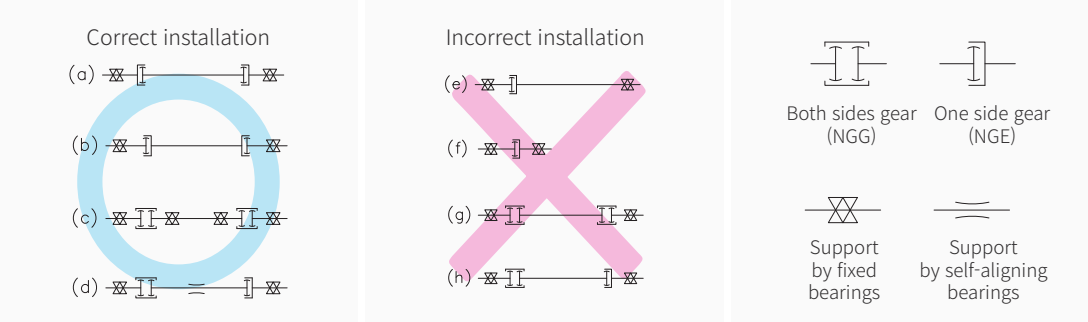
$$L \fallingdotseq L'$$

• Allowable angular misalignment(θ) = 0.1°



[Fig.2]

Installation



• NGE type couplings are used in an arrangement as shown in (a),(b). Case such as (e) must be avoided except when shafts are in special condition.
• When connecting the intermediate shaft to two pairs of NGG type couplings, it has to be supported by fixed bearings as shown in (C).
• When using NGE and NGG types together, the intermediate shaft must be supported by a self-aligning bearing to support inclined shaft as shown in (d),
• In case of mounting the couplings without supporting bearings on the intermediate shaft as shown in (g), (h), it will rotate in inclined condition and may cause vibration.
• When coupling is used for high-speed rotation, the allowable maximum rotation speed can be slightly increased thru the accuracy of shaft alignment and coupling sleeve balancing-work.
• For accurate shaft alignment, use gap gauge and dial gauge.

Lubrication

• Grease filling
When assembling, apply the grease to the sleeve and hub, then tighten the reamer bolt, inject grease with grease gun through the plug hole as shown in Fig 3. The plug of opposite side should be disassembled for grease injection.
Refer to Table 3 for the recommended grease.
• It is recommended to change grease after 3 months since first operation and every 6 months of operation thereafter.

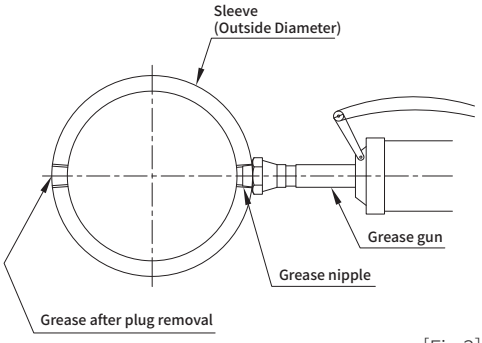
- After filling grease, remove the grease nibble, assemble the plug with air-tight sealant

※ Refer to the dimension table for the quantity of grease.
※ Contact NARA when using gear oil.

Recommended Grease

Table 3

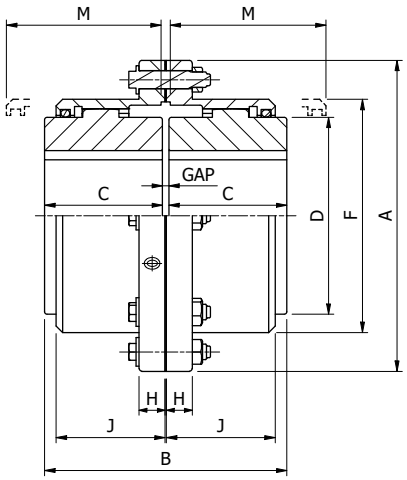
Company	Grease type
Exxon	Pen-o-led EP35
Shell	Gadus S2 V220 1
Caltex	Multifak Ep1
Mobile	Mobilux EP1



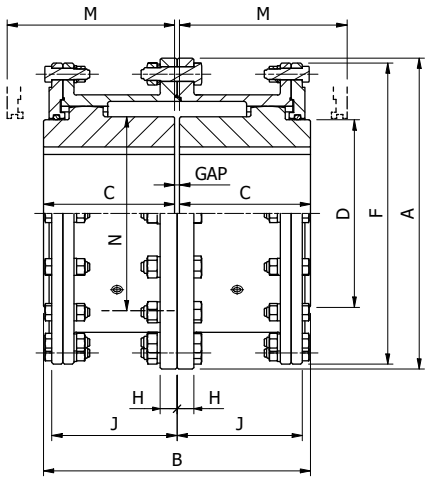
[Fig.3]

Dimensions

NGG Type



Size : 10~70



Size : 80~300

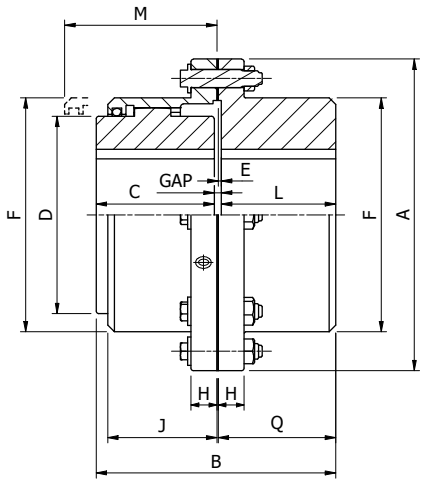
※ M : Dimensions for shaft's alignment.

Size	Rated Torque (Nm)	Max speed (rpm)	Max bore	Min Bore	Mass (kg)	Quantity of grease (kg)	Dimensions(mm)									
							A	B	C	D	F	J	M	N	H	GAP
10	1,000	7,800	50	13	4.5	0.05	116	89	43	69	84	39	51	-	14	3
15	2,100	6,600	65	20	8	0.08	152	101	49	86	105	48	61	-	19	3
20	4,000	5,400	78	26	14	0.1	178	127	62	105	126.5	59	77	-	19	3
25	7,200	4,700	98	32	25	0.2	213	159	77	131	155	72	92	-	22	5
30	12,000	4,200	111	39	40	0.4	240	187	91	152	180	84	107	-	22	5
35	17,000	3,700	134	51	62	0.5	279	218	106	178	211	98	130	-	28	6
40	30,000	3,400	160	64	90	0.9	318	248	121	210	245	111	145	-	28	6
45	40,000	3,000	183	77	128	1	346	278	135	235	274	123	166	-	28	8
50	54,000	2,700	200	89	178	1.7	389	314	153	254	306	141	183	-	38	8
55	72,000	2,500	220	102	240	2.2	425	344	168	279	334	158	204	-	38	8
60	89,000	2,350	244	115	300	3.2	457	384	188	305	366	169	229	-	25	8
70	120,000	2,100	289	127	480	4.4	527	452	221	356	425	196	267	-	28	10
80	170,000	1,700	266	102	710	9.5	591	508	249	356	571	243	300	368	32	10
90	220,000	1,500	290	115	988	12.2	660	565	276	394	641	265	328	419	38	13
100	305,000	1,400	320	127	1,310	15	711	623	305	445	698	294	356	470	44	13
110	400,000	1,300	373	140	1,680	17.7	775	679	333	495	749	322	384	521	51	13
120	550,000	1,200	400	153	2,120	20.9	838	719	353	546	825	341	404	572	54	13
130	715,000	1,000	440	165	2,600	32.7	911	761	371	584	886	362	435	610	54	19
140	908,000	900	460	177	3,120	33.1	965	805	393	635	939	378	458	660	54	19
150	1,100,000	750	490	190	3,780	40.8	1,029	857	419	685	1,003	408	483	711	54	19
160	1,300,000	620	525	254	4,750	43.1	1,111	907	441	737	1,085	419	502	762	57	25
180	1,600,000	450	600	285	6,300	49.9	1,219	939	457	838	1,193	435	521	864	57	25
200	2,100,000	350	660	317	8,600	68	1,359	1,099	537	927	1,308	514	635	965	64	25
220	2,700,000	270	725	349	11,700	107	1,511	1,193	584	1,016	1,473	565	686	1,067	64	25
240	3,400,000	250	810	381	14,600	109	1,632	1,283	629	1,130	1,581	607	724	1,168	76	25
260	4,400,000	230	880	412	18,000	122	1,746	1,371	673	1,232	1,695	648	775	1,270	76	25
280	5,800,000	210	950	444	22,000	136	1,867	1,411	693	1,334	1,803	667	794	1,372	83	25
300	6,700,000	200	1,025	476	25,000	150	1,975	1,447	711	1,435	1,911	686	800	1,473	83	25

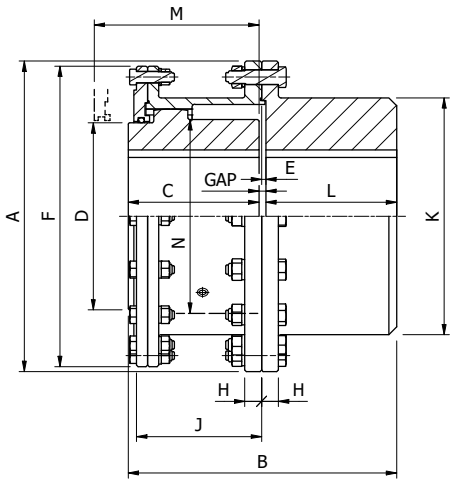
※ Mass and moment of inertia are values without bore's machining.

Dimensions

NGE Type



Size : 10~70



Size : 80~300

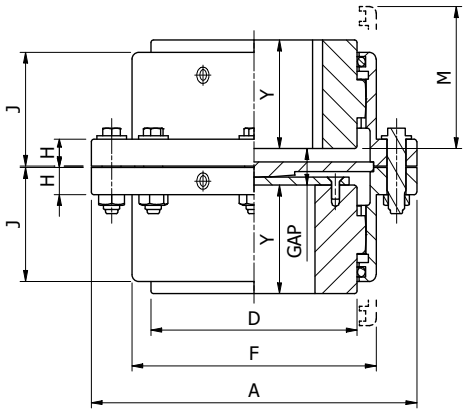
※ M : Dimensions for shaft's alignment.

Size	Rated Torque (Nm)	Max speed (rpm)	Max inner bore		Max bore	Mass (kg)	Quantity of grease (kg)	Dimensions(mm)													
			hub	flange				A	B	C	D	F	H	J	K	L	M	N	E	Q	GAP
10	1,000	7,800	50	65	13	4	0.04	116	87	43	69	84	14	39	-	40	51	-	2.5	42.5	4
15	2,100	6,600	65	80	20	9	0.05	152	99	49	86	105	19	48	-	46	61	-	2.5	48.5	4
20	4,000	5,400	78	98	26	15	0.07	178	124	62	105	126.5	19	59	-	58	77	-	2.5	60.5	4
25	7,200	4,700	98	118	32	27	0.1	213	156	77	131	155	22	72	-	74	92	-	2.5	76.5	5
30	12,000	4,200	111	140	39	43	0.2	240	184	91	152	180	22	84	-	88	107	-	2.5	90.5	5
35	17,000	3,700	134	163	51	68	0.3	279	214	106	178	211	28	98	-	102	130	-	2.5	104.5	6
40	30,000	3,400	160	196	64	100	0.5	318	243	121	210	245	28	111	-	115	145	-	4	119	7
45	40,000	3,000	183	216	77	130	0.6	346	274	135	235	274	28	123	-	131	166	-	4	135	8
50	54,000	2,700	200	235	89	190	0.9	389	309	153	254	306	38	141	-	147	183	-	5	152	9
55	72,000	2,500	220	266	102	260	1.1	425	350	168	279	334	38	158	-	173	204	-	5	178	9
60	89,000	2,350	244	290	115	320	1.7	457	384	188	305	366	25	169	-	186	229	-	7	193	10
70	120,000	2,100	289	340	127	500	2.3	527	454	221	356	425	28	196	-	220	267	-	8	228	13
80	170,000	1,700	266	340	102	690	5	591	511	249	356	571	32	243	451	249	300	368	8	257	13
90	220,000	1,500	290	380	115	980	6	660	566	276	394	641	38	265	508	276	328	419	8	284	14
100	305,000	1,400	320	400	127	1,250	8	711	626	305	445	698	44	294	530	305	356	470	10	315	16
110	400,000	1,300	373	440	140	1,630	9	775	682	333	495	749	51	322	584	333	384	521	10	343	16
120	550,000	1,200	400	483	153	2,070	11	838	721	353	546	825	54	341	648	352	404	572	10	362	16
130	715,000	1,000	440	500	165	2,570	17	911	761	371	584	886	54	362	708	371	435	610	10	381	19
140	908,000	900	460	535	177	3,060	17	965	806	393	635	939	54	378	749	394	458	660	10	404	19
150	1,100,000	750	490	580	190	3,750	21	1,029	857	419	685	1,003	54	408	813	419	483	711	10	429	19
160	1,300,000	620	525	630	254	4,630	22	1,111	908	441	737	1,085	57	419	886	442	502	762	13	455	25
180	1,600,000	450	600	710	285	6,060	25	1,219	939	457	838	1,193	57	435	994	457	521	864	13	470	25
200	2,100,000	350	660	780	317	8,480	34	1,359	1,098	537	927	1,308	64	514	1,095	536	635	965	13	549	25
220	2,700,000	270	725	890	349	11,680	54	1,511	1,196	584	1,016	1,473	64	565	1,245	584	686	1,067	16	600	28
240	3,400,000	250	810	940	381	14,380	57	1,632	1,286	629	1,130	1,581	76	607	1,315	629	724	1,168	16	645	28
260	4,400,000	230	880	1,015	412	17,720	61	1,746	1,374	673	1,232	1,695	76	648	1,422	673	775	1,270	16	689	28
280	5,800,000	210	950	1,090	444	21,100	70	1,867	1,413	693	1,334	1,803	83	667	1,531	692	794	1,372	16	708	28
300	6,700,000	200	1,025	1,170	476	24,700	77	1,975	1,450	711	1,435	1,911	83	686	1,638	711	800	1,473	16	727	28

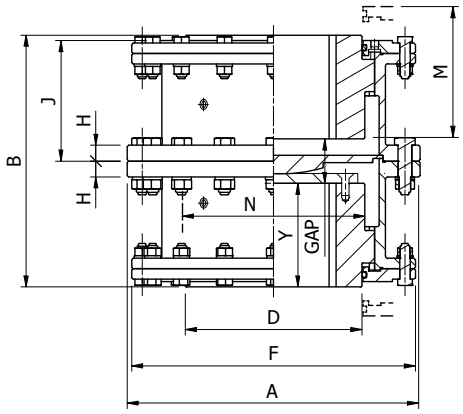
※ Mass and moment of inertia are values without bore's machining.

Dimensions

NGGV Type



Size : 10~70



Size : 80~300

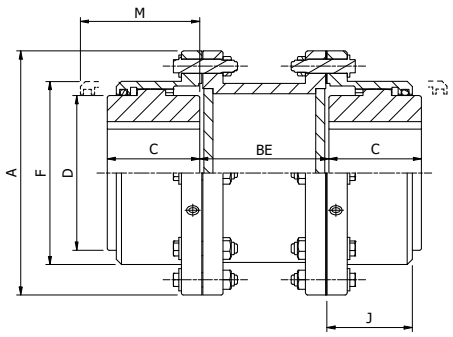
※ M : Dimensions for shaft's alignment.

Size	Rated Torque (Nm)	Max speed (rpm)	Max inner bore	Min Inner bore	Mass (kg)	Quantity of grease (kg)	Dimensions(mm)									
							A	B	D	F	H	J	M	N	Y	GAP
10	1,000	7,800	50	13	4	0.1	116	89	69	83	14	39	46	-	33	23
15	2,100	6,600	65	20	7.5	0.1	152	101	86	105	19	48	56	-	39	23
20	4,000	5,400	78	26	13.5	0.3	178	127	105	126	19	59	71	-	51	25
25	7,200	4,700	98	32	23.5	0.4	213	158	131	154	22	72	86	-	65	28
30	12,000	4,200	111	39	36	0.6	240	186	152	180	22	84	102	-	80	26
35	17,000	3,700	134	51	59	1	279	218	178	211	28	98	125	-	94	30
40	30,000	3,400	160	64	88	1.5	318	247	210	245	28	111	140	-	106	35
45	40,000	3,000	183	77	123	2	346	277	235	274	28	123	158	-	116	45
50	54,000	2,700	200	89	172	2.9	389	313	254	305	38	141	175	-	135	43
55	72,000	2,500	220	102	231	3.6	425	343	279	334	38	158	196	-	150	43
60	89,000	2,350	244	115	287	4.8	457	384	305	366	25	169	221	-	168	48
70	120,000	2,100	289	127	452	7.1	527	451	356	424	28	196	254	-	195	61
80	170,000	1,700	266	102	668	13	591	509	356	571	32	243	300	368	224	61
90	220,000	1,500	290	115	935	17	660	565	394	641	38	265	327	419	249	67
100	305,000	1,400	320	127	1,240	21	711	622	445	698	44	294	355	470	273	76
110	400,000	1,300	373	140	1,590	24	775	679	495	749	51	322	384	521	302	75
120	550,000	1,200	400	153	2,000	30	838	718	546	825	54	341	403	572	321	76
130	715,000	1,000	440	165	2,460	44	911	762	584	886	54	362	434	610	336	90
140	908,000	900	460	177	2,950	49	965	805	635	939	54	378	457	660	358	89
150	1,100,000	750	490	190	3,570	59	1,029	857	685	1,003	54	408	482	711	384	89
160	1,300,000	620	525	254	4,470	141	1,111	908	737	1,085	57	419	501	762	397	114
180	1,600,000	450	600	285	5,950	168	1,219	940	838	1,193	57	435	520	864	412	116
200	2,100,000	350	660	317	8,150	227	1,359	1,099	927	1,308	64	514	635	965	492	115
220	2,700,000	270	725	349	11,100	319	1,511	1,194	1,016	1,473	64	565	686	1,067	530	134
240	3,400,000	250	810	381	13,800	341	1,632	1,283	1,130	1,581	76	607	724	1,168	575	133
260	4,400,000	230	880	412	16,900	402	1,746	1,372	1,232	1,695	76	648	775	1,270	619	134
280	5,800,000	210	950	444	20,100	450	1,867	1,409	1,334	1,803	83	667	794	1,372	638	133
300	6,700,000	200	1,025	476	23,500	499	1,975	1,448	1,435	1,911	83	686	800	1,473	657	134

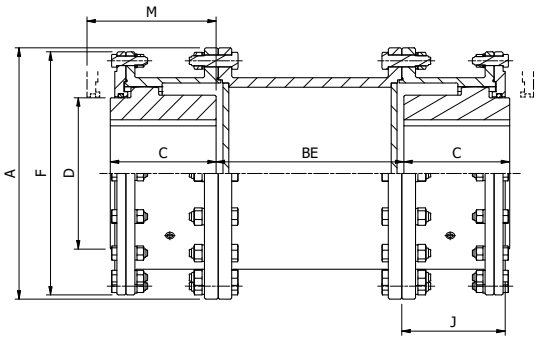
※ Mass and moment of inertia are values without bore's machining.

Dimensions

NGA Type



Size : 10~70



Size : 80~300

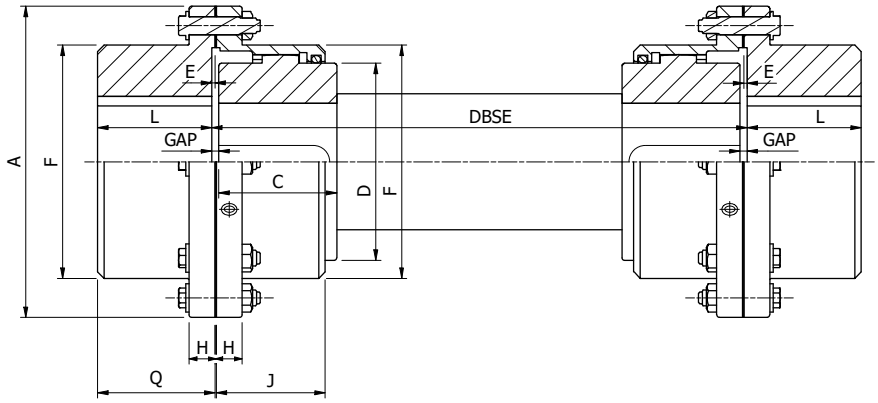
1. M : Dimensions for shaft's alignment.
2. Intermediate plate may not be included acc. to the dimension of DBSE, contact NARA.

Size	Rated Torque (Nm)	Max speed (rpm)	Max inner bore	Min inner bore	Mass (kg)	Quantity of grease (kg)	Dimensions(mm)						
							A	DBSE	C	D	F	J	M
10	1,000	50	13	According to spacer dimensions	0.1	116	According to customer specifications	43	69	84	39	51	51
15	2,100	65	20		0.1	152		49	86	105	48	61	61
20	4,000	78	26		0.1	178		62	105	126.5	59	77	77
25	7,200	98	32		0.2	213		77	131	155	72	92	92
30	12,000	111	39		0.4	240		91	152	180	84	107	107
35	17,000	134	51		0.6	279		106	178	211	98	130	130
40	30,000	160	64		1	318		121	210	245	111	145	145
45	40,000	183	77		1.2	346		135	235	274	123	166	166
50	54,000	200	89		1.8	389		153	254	306	141	183	183
55	72,000	220	102		2.2	425		168	279	334	158	204	204
60	89,000	244	115		3.4	457		188	305	366	169	229	229
70	120,000	289	127		4.6	527		221	356	425	196	267	267
80	170,000	266	102		10	591		249	356	571	243	300	300
90	220,000	290	115		12	660		276	394	641	265	328	328
100	305,000	320	127		16	711		305	445	698	294	356	356
110	400,000	373	140		18	775		333	495	749	322	384	384
120	550,000	400	153		22	838		353	546	825	341	404	404
130	715,000	440	165		34	911		371	584	886	362	435	435
140	908,000	460	177		34	965		393	635	939	378	458	458
150	1,100,000	490	190		42	1,029		419	685	1,003	408	483	483
160	1,300,000	525	254		44	1,111		441	737	1,085	419	502	502
180	1,600,000	600	285		50	1,219		457	838	1,193	435	521	521
200	2,100,000	660	317		68	1,359		537	927	1,308	514	635	635
220	2,700,000	725	349		108	1,511		584	1,016	1,473	565	686	686
240	3,400,000	810	381		114	1,632		629	1,130	1,581	607	724	724
260	4,400,000	880	412		122	1,746		673	1,232	1,695	648	775	775
280	5,800,000	950	444		140	1,867		693	1,334	1,803	667	794	794
300	6,700,000	1,025	476		154	1,975		711	1,435	1,911	686	800	800

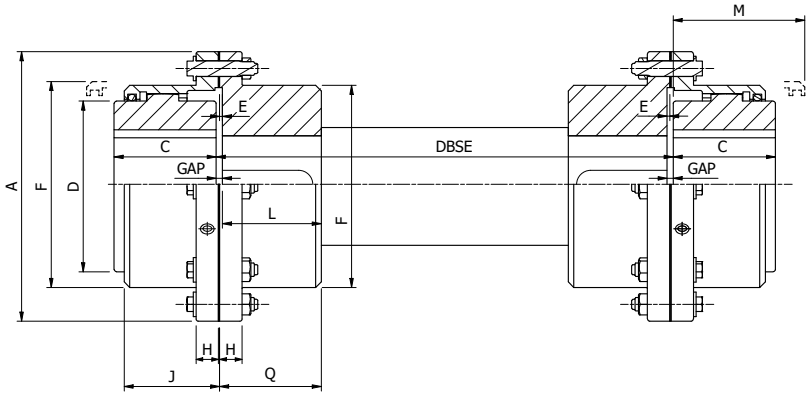
※ Max. speed depends on the dimension of DBSE.

Dimensions

NGH Type



NGF Type



※ M : Dimensions for shaft's alignment.

Size	Max Inner bore		Min Inner bore	Quantity of grease (kg)	Dimensions(mm)											
	Hub	Flange			A	DBSE	C	D	E	F	H	J	L	M	Q	GAP
10	50	65	13	0.1	116	According to customer specifications	43	69	2.5	84	14	39	40	51	42.5	4
15	65	80	20	0.1	152		49	86	2.5	105	19	48	46	61	48.5	4
20	78	98	26	0.1	178		62	105	2.5	126.5	19	59	58	77	60.5	4
25	98	118	32	0.2	213		77	131	2.5	155	22	72	74	92	76.5	5
30	111	140	39	0.4	240		91	152	2.5	180	22	84	88	107	90.5	5
35	134	163	51	0.6	279		106	178	2.5	211	28	98	102	130	104.5	6
40	160	196	64	1	318		121	210	4	245	28	111	115	145	119	7
45	183	216	77	1.2	346		135	235	4	274	28	123	131	166	135	8
50	200	235	89	1.8	389		153	254	5	306	38	141	147	183	152	9
55	220	266	102	2.2	425		168	279	5	334	38	158	173	204	178	9
60	244	290	115	3.4	457		188	305	7	366	25	169	186	229	193	10
70	289	340	127	4.6	527		221	356	8	425	28	196	220	267	228	13

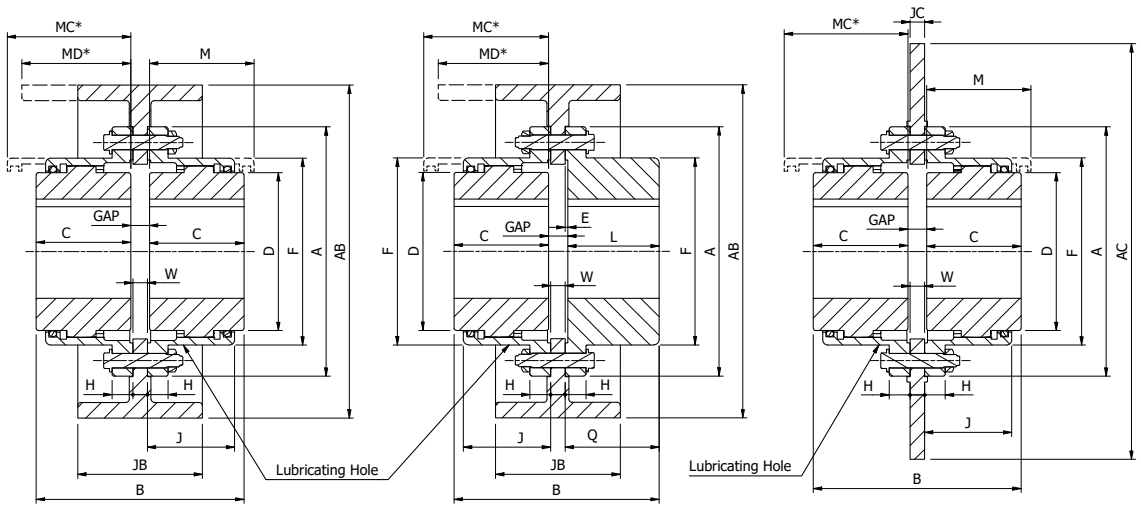
1. Refer to NGE type for rated-torque.
2. Max. speed, mass and inertia moment depand on the length of intermediate shaft, contact NARA.

Dimensions

NGGB Type

NGEB Type

NGGD Type



※ M, MC*, MD* : Dimensions for shaft's alignment.

Size	Max Inner bore		Min Inner bore	Quantity of grease (kg)		Dimensions(mm)														
	Hub	Flange		NGGB /NGGD	NGEB	A	B NGGB /NGGD	B NGEB	C	D	E	F	H	J	L	M	Q	W	GAP NGGB /NGGD	GAP NGEB
10	50	65	13	0.1	0.05	116	99	97	43	69	2.5	84	14	39	40	51	42.5	10	13	14
15	65	80	20	0.1	0.06	152	114	112	49	86	2.5	105	19	48	46	61	48.5	13	16	17
20	78	98	26	0.14	0.09	178	140	137	62	105	2.5	126.5	19	59	58	77	60.5	13	16	17
25	98	118	32	0.27	0.16	213	173	170	77	131	2.5	155	22	72	74	92	76.5	14	19	19
30	111	140	39	0.41	0.23	240	201	198	91	152	2.5	180	22	84	88	107	90.5	14	19	19
35	134	163	51	0.57	0.34	279	237	233	106	178	2.5	211	28	98	102	130	104.5	19	25	25
40	160	196	64	0.91	0.54	318	267	262	121	210	4	245	28	111	115	145	119	19	25	26
45	183	216	77	1.13	0.64	346	297	293	135	235	4	274	28	123	131	166	135	19	27	27
50	200	235	89	1.87	1.13	289	339	334	153	254	5	306	38	141	147	183	152	25.5	33	34
55	220	266	102	2.32	1.36	425	369	375	168	279	5	334	38	158	173	204	178	25.5	33	34
60	244	290	115	3.4	1.93	457	409	410	188	305	7	366	25	169	186	229	193	25.5	33	36
70	289	340	127	4.45	2.61	527	477	479	221	356	8	425	28	196	220	267	228	25.5	35	38

1. Max. speed, mass and inertia moment depand on the size of brake drum or brake disc.
2. Refer to NGG type for rated-torque.
3. AB, JB, AC, JC, MC*, MD* depend on the dimension of brake drum or brake disc, contact NARA when ordering.

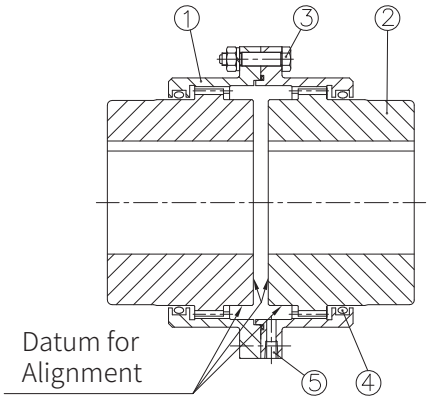
GEAR COUPLING (S type)

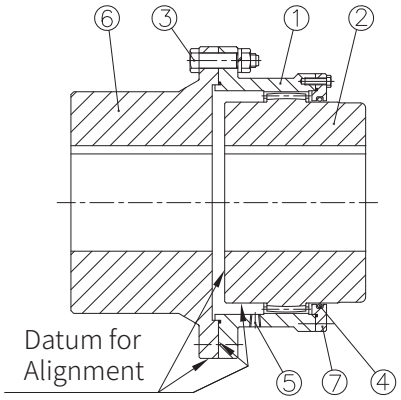
Features

• Gear couplings are small and light compared to their transmitted power, and almost no noise or vibration occur even at high speed rotation.
• During installation and operation, even if some shaft misalignment occurs in the coupling, it is absorbed by self-regulation, so it can protect the mechanical part and produce powerful transmission. The wear resistance of the gear is increased by internal lubrication.
• It can be used at high speed and heavy load.
• Can be used even in case of rotation with sliding movement.
• Easy application when connecting to the intermediate shaft due to long distance between the shaft ends.
• Large and special types can be also manufactured.

Structure

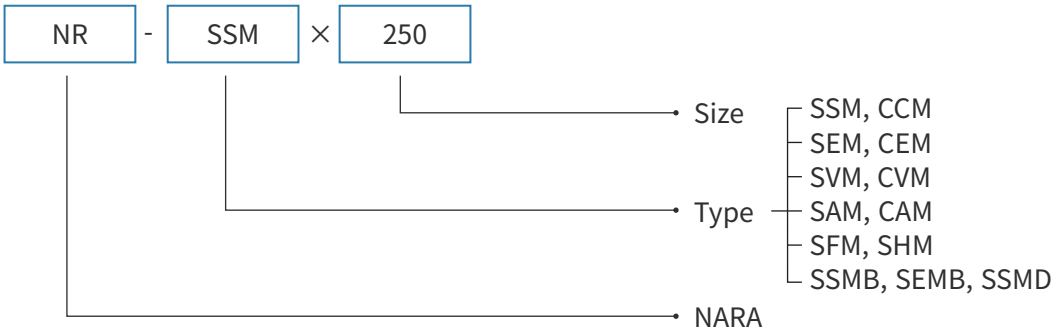
Gear coupling is composed of inner teeth of the sleeve and outer teeth of the hub, which are interlocked and assembled. Gear is designed as an involute tooth type, and even in case of a slight inclination between the sleeve and the hub, smooth power transmission is possible.
SSM and CCM types have two pairs of hubs and sleeves and performs a smooth power transmission even with slight parallel, angular misalignment and axial displacement.
SEM and CEM types consist of one pair of hubs and sleeves, and can only absorb angular misalignment and axial displacement. therefore, should be used with intermediate shaft as fig.5 on page 50.





1. Sleeve 2. Hub 3. Reamer bolt 4. O-Ring
5. Oil Plug 6. Flange 7. Side cover

Selection



Step 1

• Calculation of transmitted torque (Tw)

$$Tw\ (Nm) = 9550 \times \frac{P\ (kW)}{N\ (rpm)}$$

P : Prime motor Power(kW)
N : Coupling rotation speed(rpm)

Step 2

• Calculation of required torque (Tr)

$Tr\ (Nm) = Tw(Nm) \times F_1$

Determine Service factor(F_1) on page 86

• In case of using a brake, check the braking torque (Tb).
• Braking torque (Tb) is multiplied by the service factor (F1) and the peak torque (Tbp) when braking.

$Tb\ (Nm) = Tbp(Nm) \times F_1$

• Check the system peak torque (Tp).
• The required torque (Tr1)for forward and reverse rotation is multiplied by the peak torque (Tp)and the reverse rotation coefficient(F_2).

$Tr1\ (Nm) = Tp(Nm) \times F_2$

F_2 = apply 1.5 (for two way direction)
= apply 1.0 (for one way direction)

Step 3

• Select the coupling in which the rated torque (Tn) of the coupling is larger than the required torque (Tr), peak torque (Tp), braking torque (Tb), and the required torque for forward and reverse rotation (Tr1) in the dimension table.

$Tn > Tr,\quad Tn > Tb,\quad Tn > Tp,\quad Tn > Tr1$

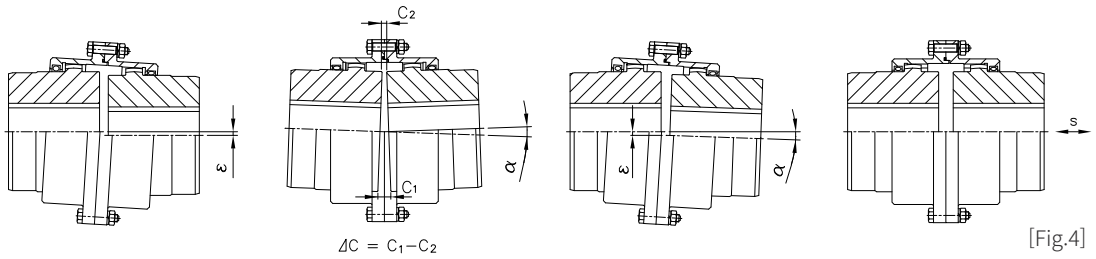
Step 4

• Check whether max. bore diameter of the coupling meets the shaft diameter of the prime motor and driven machine.
• Check whether max. rotation speed of the coupling meets the rotation speed of the prime motor.

Misalignment& Displacement

• Parallel misalignment (ε)
- Centerlines of the motor shaft and the driven shaft are offset.
• Angular misalignment (α)
- The motor shaft and the driven shaft is a straight axis line are inclined.
• Complex misalignment
- Combination of Parallel misalignment (ε) and angular misalignment (α).

• Axial displacement (S)
- Both shafts move in the axial direction.
• Allowable displacement (ε, ΔC, S)
- In Tables 4, ε is maximum parallel misalignment due to structural characteristics, ε´ and ΔC are the parallel misalignment and the deviation of the distance between the planes of the hub to maintain a long life time value converted to distance deviation.



[Fig.4]

Amounts of Parallel misalignment (ε, ε'), deviation (ΔC) between hub plane spaces, axial displacement (S) - (SSM, CCM type)

Table 4

Size	ε	ε´	ΔC	S	Size	ε	ε´	ΔC	S	Size	ε	ε´	ΔC	S
100	0.75	0.03	0.04	-05~1.0	280	2	0.08	0.17	-1.5~4.5	800	8.5	0.31	0.5	-3.0~9.5
112	1	0.03	0.05	-0.5~2.0	315	2.5	0.1	0.2	-1.5~5.5	900	6.5	0.33	0.58	-3.0~10.5
125	1	0.04	0.06	-0.5~2.5	355	3	0.11	0.22	-1.5~5.5	1000	7	0.35	0.63	-4.0~12.0
140	1.25	0.04	0.07	-0.5~2.5	400	3	0.11	0.25	-2.0~6.5	1120	8	0.41	0.73	-4.0~12.0
160	1.25	0.05	0.08	-1.0~3.0	450	3	0.17	0.25	-2.0~5.0	1250	9	0.47	0.84	-4.0~14.0
180	1.5	0.05	0.09	-1.0~3.0	500	3.5	0.19	0.29	-2.0~6.0					
200	1.5	0.05	0.1	-1.0~3.0	560	4	0.21	0.36	-2.0~6.5					
224	1.5	0.06	0.13	-1.0~4.0	630	4.5	0.24	0.4	-2.5~8.0					
250	2	0.07	0.14	-1.0~4.0	710	5	0.28	0.45	-2.5~8.5					

1. For SEM and CEM axial displacement (S), apply only a half of Table 4.
2. In case of using SEM and CEM models as one set, parallel misalignment cannot be absorbed, contact NARA for details.
3. For allowable displacement of other types, contact NARA.

Calculation for parallel misalignment(ε) of long shaft.

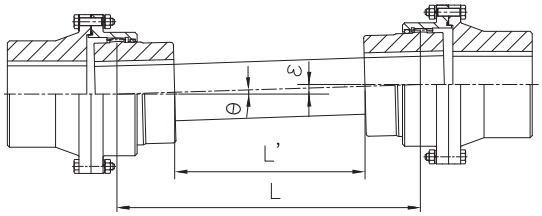
• SAM, CAM, SFM, SHM types are often used as shown in Figure 5. In this case, amount of parallel misalignment can be obtained from the following formula.

$$\varepsilon = L \times \tan\theta$$

• In case dimension L is unknown, calculate it as

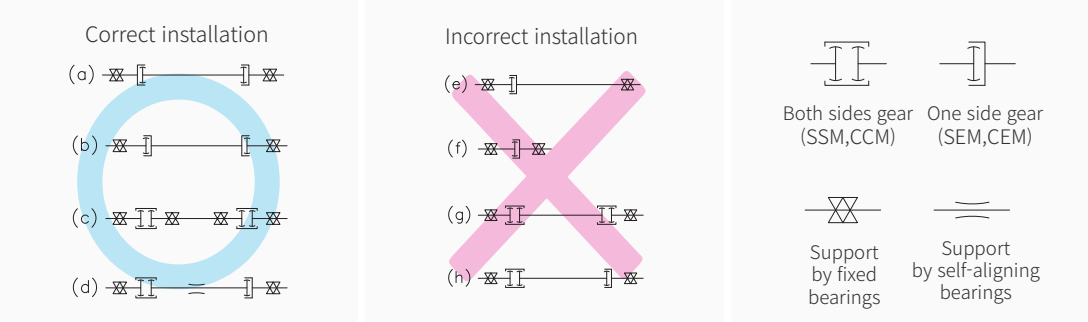
$$L \fallingdotseq L'$$

• Allowable angular misalignment(θ) = 0.1°



[Fig.5]

Installation



• SEM type couplings are used in an arrangement as shown in (a),(b). Case such as (e) must be avoided except when shafts are in special condition.
• When connecting the intermediate shaft to two pairs of SSM type couplings, it has to be supported by fixed bearings as shown in (C).
• When using SSM and SEM types together, the intermediate shaft must be supported by a self-aligning bearing to support inclined shaft as shown in (d),
• In case of mounting the couplings without supporting bearings on the intermediate shaft as shown in (g), (h), it will rotate in inclined condition and may cause vibration.
• When coupling is used for high-speed rotation, the allowable maximum rotation speed can be slightly increased thru the accuracy of shaft alignment and coupling sleeve balancing-work.
• For accurate shaft alignment, use gap gauge and dial gauge.

Lubrication

• Grease filling
When assembling, apply the grease to the sleeve and hub, then tighten the reamer bolt, inject grease with grease gun through the plug hole as shown in Fig 3. The plug of opposite side should be disassembled for grease injection. Refer to Table 6 for the recommended grease.
• It is recommended to change grease after 3 months since first operation and every 6 months of operation thereafter.

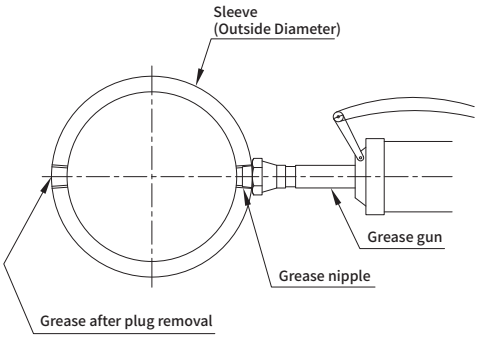
- After filling grease, remove the grease nibble, assemble the plug with air-tight sealant

※ Refer to the dimension table for the quantity of grease.
※ Contact NARA when using gear oil.

Recommended Grease

Table 6

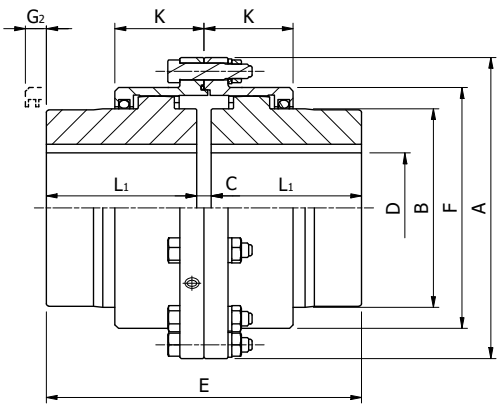
Company	Grease type
Exxon	Pen-o-led EP35
Shell	Gadus S2 V220 1
Caltex	Multifak Ep1
Mobile	Mobilux EP1



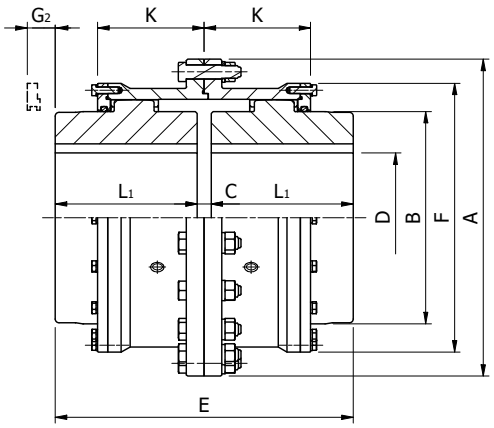
[Fig.3]

Dimensions

SSM Type



CCM Type



※ G_2 : Dimensions for shaft's alignment.

SSM Type

Size (OD A)	Rated Torque (Nm)	Max speed (rpm)	Dimensions(mm)										
			Inner bore D (max/min)	E	L_1	C	B	F	K	G_2	Mass (kg)	Moment of inertia (kgm^2)	Quantity of grease (Kg)
100	421	5,000	32/17	88	40	8	46	67	34	15	2.9	0.003	0.04
112	788	5,000	40/17	98	45	8	58	79	40	19	4.1	0.005	0.05
125	1,400	5,000	50/22	108	50	8	70	92	43	20	5.8	0.008	0.07
140	2,010	5,000	56/22	134	63	8	80	107	47	15	8.8	0.015	0.1
160	3,080	5,000	65/22	170	80	10	95	120	52	7	14	0.03	0.13
180	4,730	5,000	75/32	190	90	10	105	134	56	5	19	0.05	0.16
200	6,750	4,700	85/32	210	100	10	120	149	61	5	26	0.08	0.22
224	9,810	4,200	100/42	236	112	12	145	174	65	1	40	0.16	0.32
250	14,400	3,800	115/42	262	125	12	165	200	74	1	56	0.29	0.48
280	22,900	3,400	135/42	294	140	14	190	224	82	1	79	0.5	0.62
315	36,100	3,000	160/100	334	160	14	225	260	98	11	122	1.01	1.0
355	54,400	2,600	180/125	376	180	16	250	288	108	11	171	1.77	1.2
400	76,400	2,300	200/140	416	200	16	285	329	114	0	245	3.25	1.8

※ Mass and moment of inertia are values without bore's machining.

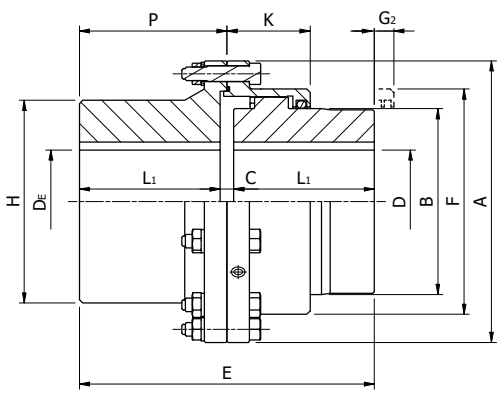
CCM Type

Size (OD A)	Rated Torque (kNm)	Max speed (rpm)	Dimensions(mm)										
			Inner bore D (max/min)	E	L_1	C	B	F	K	G_2	Mass (kg)	Moment of inertia (kgm^2)	Quantity of grease (Kg)
450	110	2,100	205/140	418	200	18	290	372	151	6	300	5.1	2.3
500	160	1,900	236/170	470	224	22	335	424	168	7	429	9.1	3.5
560	250	1,700	275/190	522	250	22	385	475	187	13	619	16.9	4.5
630	410	1,500	325/224	588	280	28	455	544	213	25	921	32.4	7
710	600	1,300	360/250	658	315	28	510	622	242	30	1,312	59.9	10.5
800	860	1,150	405/280	738	355	28	570	690	267	32	1,830	102	13.7
900	1,200	1,050	475/315	832	400	32	670	792	295	20	2,753	200	18
1,000	1,700	950	510/355	932	450	32	720	858	322	24	3,700	322	23
1,120	2,400	850	600/400	1,040	500	40	840	990	360	15	5,402	622	34
1,250	3,300	750	710/500	1,160	560	40	960	1,126	399	10	7,730	1,129	48

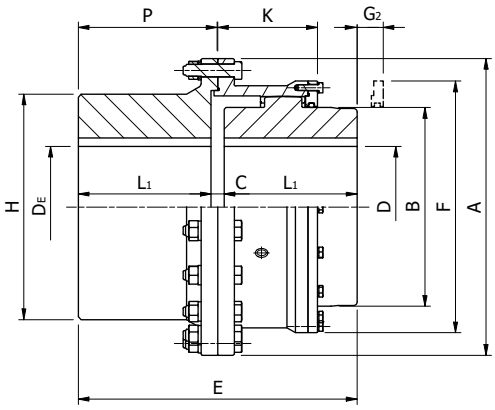
※ Mass and moment of inertia are values without bore's machining.

Dimensions

SEM Type



CEM Type



※ G_2 : Dimensions for shaft's alignment.

SEM Type

Size (O.D A)	Rated Torque (Nm)	Max speed (rpm)	Dimensions(mm)											
			Inner bore D (max/min)	Inner bore D_E (max/min)	E	L_1	C	K	P	H	G_2	Mass (kg)	Moment of inertia (kgm^2)	Quantity of grease (Kg)
100	421	5,000	32/17	40/17	88	40	8	34	44	55	15	3	0.003	0.03
112	788	5,000	40/17	50/17	98	45	8	40	49	70	19	4.3	0.005	0.04
125	1,400	5,000	50/22	56/22	108	50	8	43	54	80	20	6	0.008	0.06
140	2,010	5,000	56/22	63/22	134	63	8	47	67	90	15	9	0.015	0.08
160	3,080	5,000	65/22	75/22	170	80	10	52	85	105	7	14	0.03	0.11
180	4,730	5,000	75/32	80/32	190	90	10	56	95	115	5	19	0.05	0.13
200	6,750	4,700	85/32	95/32	210	100	10	61	105	135	5	27	0.08	0.17
224	9,810	4,200	100/42	105/42	236	112	12	65	118	150	1	40	0.16	0.27
250	14,400	3,800	115/42	125/42	262	125	12	74	131	180	1	58	0.29	0.37
280	22,900	3,400	135/42	150/42	294	140	14	82	147	210	1	84	0.54	0.51
315	36,100	3,000	160/100	180/100	334	160	14	98	167	250	11	130	1.1	0.81
355	54,400	2,600	180/125	200/125	376	180	16	108	188	275	11	180	1.89	1.0
400	76,400	2,300	200/140	236/140	416	200	16	114	208	325	0	260	3.6	1.44

1. Mass and moment of inertia are values without bore's machining.
2. Refer to SSM type for dimension of B, F.

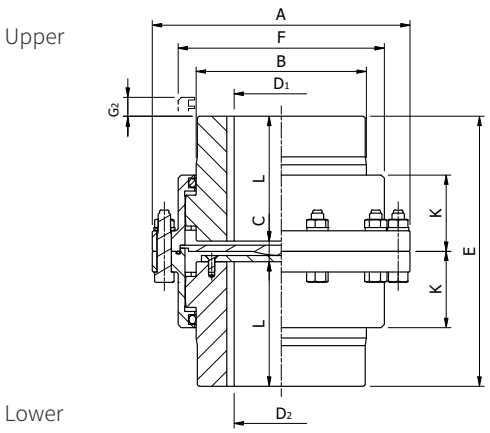
CEM Type

Size (O.D A)	Rated Torque (kNm)	Max speed (rpm)	Dimensions(mm)											
			Inner bore D (max/min)	Inner bore D_E (max/min)	E	L_1	C	K	P	H	G_2	Mass (kg)	Moment of inertia (kgm^2)	Quantity of grease (Kg)
450	110	2,100	205/140	225/140	418	200	18	151	209	320	75	300	4.9	1.9
500	160	1,900	236/170	270/170	470	224	22	168	235	380	80	441	9.2	2.8
560	250	1,700	275/190	305/190	522	250	22	187	261	430	90	635	17.1	3.5
630	410	1,500	325/224	355/224	588	280	28	213	294	500	100	944	33	5.4
710	600	1,300	360/250	400/250	658	315	28	242	329	565	125	1,343	59.5	7.7
800	860	1,150	405/280	450/280	738	355	28	267	369	635	130	1,891	105	10
900	1,200	1,050	475/315	510/315	832	400	32	295	416	715	130	2,756	196	13.5
1,000	1,700	950	510/355	570/355	932	450	32	322	466	800	130	3,800	336	18
1,120	2,400	850	600/400	640/400	1,040	500	40	360	520	900	160	5,462	616	26
1,250	3,300	750	710/500	800/500	1,160	560	40	399	580	1,060	175	8,045	1,183	36

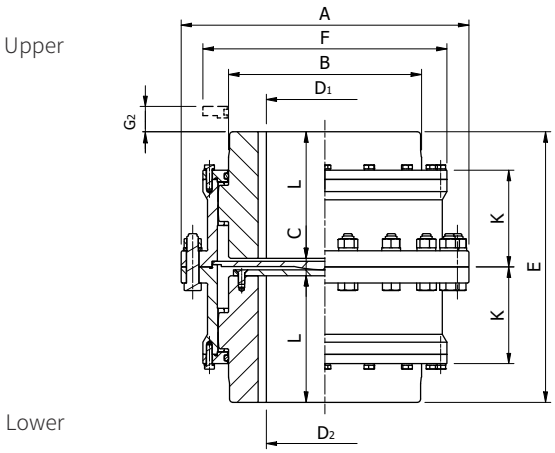
1. Mass and moment of inertia are values without bore's machining.
2. Refer to CCM type for dimension of B, F.

Dimensions

SVM Type



CVM Type



※ G_2 : Dimensions for shaft's alignment.

SVM Type

Size (OD A)	Rated Torque (Nm)	Max speed (rpm)	Dimensions(mm)													
			Inner bore			E	L	C	B	F	K	G_2	Mass (kg)	Moment of inertia (kgm^2)	Quantity of grease(Kg)	
			max D_1	max D_2	min										Upper	Lower
100	421	5,000	32	22	17	88	35	18	46	67	34	15	3	0.003	0.025	0.02
112	788	5,000	40	32	17	98	40	18	58	79	40	19	4.2	0.005	0.035	0.025
125	1,400	5,000	50	40	22	108	45	18	70	92	43	20	6	0.008	0.05	0.04
140	2,010	5,000	56	50	22	134	58	18	80	107	47	15	9	0.016	0.07	0.06
160	3,080	5,000	65	60	22	170	76	18	95	120	52	7	14	0.03	0.09	0.08
180	4,730	5,000	75	70	32	190	86	18	105	134	56	5	19	0.05	0.12	0.1
200	6,750	4,700	85	82	32	210	96	18	120	149	61	5	26	0.08	0.15	0.12
224	9,810	4,200	100		42	236	108	20	145	174	65	1	40	0.16	0.22	0.17
250	14,400	3,800	115		42	262	121	20	165	200	74	1	57	0.29	0.37	0.29
280	22,900	3,400	135		42	294	136	22	190	224	82	1	81	0.51	0.45	0.36
315	36,100	3,000	160		100	334	156	22	225	260	98	11	124	1.03	0.74	0.62
355	54,400	2,600	180		125	376	177	22	250	288	108	11	174	180	0.9	0.75
400	76,400	2,300	200		140	416	197	22	285	329	114	0	249	3.3	1.3	1.0

※ Mass and moment of inertia are values without bore's machining.

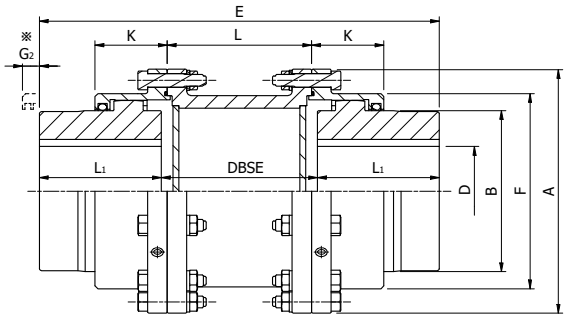
CVM Type

Size (OD A)	Rated Torque (kNm)	Max speed (rpm)	Dimensions(mm)													
			Inner bore			E	L	C	B	F	K	G_2	Mass (kg)	Moment of inertia (kgm^2)	Quantity of grease(Kg)	
			max D_1	max D_2	min										Upper	Lower
450	110	2,100	205		140	418	196	26	290	372	151	6	305	5.2	1.65	1.4
500	160	1,900	236		170	470	220	30	335	424	168	7	436	9.3	2.5	2.1
560	250	1,700	275		190	522	245	32	385	475	187	13	629	17.2	3.2	2.7
630	410	1,500	325		224	588	275	38	455	544	213	25	936	33.1	5	4.2

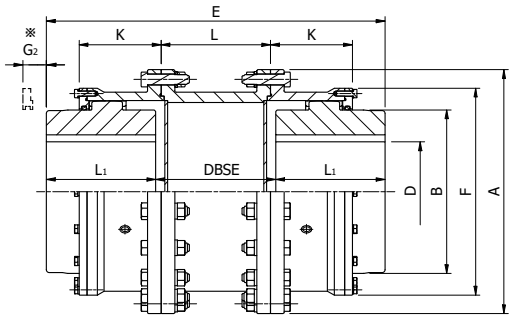
※ Mass and moment of inertia are values without bore's machining.

Dimensions

SAM Type



CAM Type

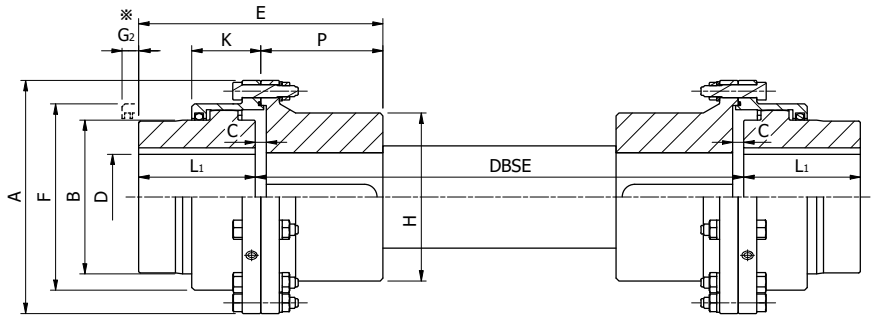


※ G_2 : Dimensions for shaft's alignment.

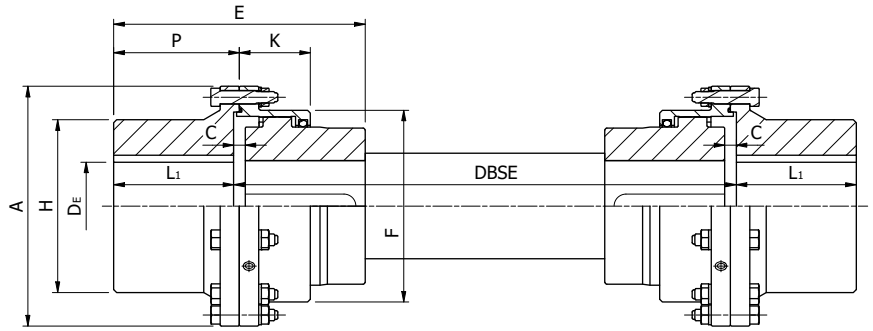
Type	Size (OD A)	Dimensions(mm)							
		Inner bore D (min/max)	L_1	B	F	K	E	DBSE	L
SAM	100	32/17	40	46	67	34	According to customer specifications		
	112	40/17	45	58	79	40			
	125	50/22	50	70	92	43			
	140	56/22	63	80	107	47			
	160	65/22	80	95	120	52			
	180	75/32	90	105	134	56			
	200	85/32	100	120	149	61			
	224	100/42	112	145	174	65			
	250	115/42	125	165	200	74			
	280	135/42	140	190	224	82			
	315	160/100	160	225	260	98			
	355	180/125	180	250	288	108			
	400	200/140	200	285	329	114			
CAM	450	205/140	200	290	372	151			
	500	236/170	224	335	424	168			
	560	275/190	250	385	475	187			
	630	325/224	280	455	544	213			
	710	360/250	315	510	622	242			
	800	405/280	355	570	690	267			
	900	475/315	400	670	792	295			
	1,000	510/355	450	720	858	322			
	1,120	600/400	500	840	990	360			
	1,250	710/500	560	960	1,126	399			

1. Intermediate plate may not be included acc. to the dimension of DBSE, contact NARA when ordering.
2. Refer to SSM, CCM type for rated torque.
3. Dimensions not listed in the dimension table are the same as for SSM and CCM types.
4. Quantity of grease is two times of SEM, CEM type.

SFM Type



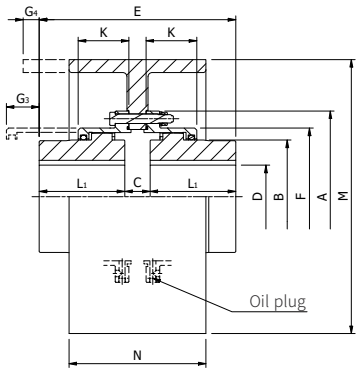
SHM Type



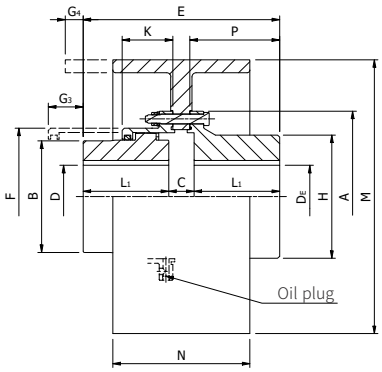
1. Dimensions and torque are the same as for SEM type.
2. "DBSE" is available in optional lengths upon request.
3. Quantity of grease is two times of SEM type.

Dimensions

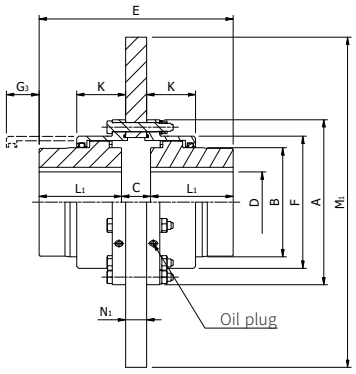
SSMB Type



SEMB Type



SSMD Type



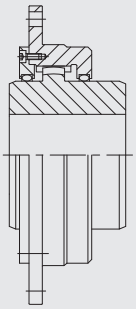
※ G_3 ,G_4 : Dimensions for shaft's alignment.

SSMB, SEMB, SSMD Type

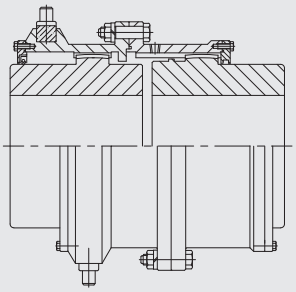
Size (OD A)	Max speed (rpm)	Inner bore D (max)	Inner bore D_E (max)	Inner bore D (min)	寸法(mm)									Quantity of grease (Kg)	
					E	L_1	C	K	P	H	B	F	G_3	SSMB/ SSMD	SEMB
100	3,580	32	40	17	98	40	18	34	44	55	46	67	15	0.05	0.04
112	3,580	40	50	17	108	45	18	40	49	70	58	79	19	0.06	0.05
125	2,850	50	56	22	124	50	24	43	54	80	70	92	20	0.09	0.08
140	2,850	56	65	22	150	63	24	47	67	90	80	107	15	0.12	0.10
160	2,290	65	75	22	186	80	26	52	85	105	95	120	7	0.16	0.14
180	2,290	75	80	32	209	90	29	56	95	115	105	134	5	0.19	0.16
200	1,800	85	95	32	229	100	29	61	105	135	120	149	5	0.27	0.22
224	1,610	100	105	42	261	112	37	65	118	150	145	174	1	0.38	0.33
250	1,430	115	125	42	287	125	37	74	131	180	165	200	1	0.6	0.5
280	1,270	135	150	42	319	140	39	82	147	210	190	224	1	0.8	0.7
315	1,140	160	180	100	359	160	39	98	167	250	225	260	11	1.2	1.0
355	1,020	180	200	125	406	180	46	108	188	275	250	288	11	1.5	1.3
400	750	200	236	140	446	200	46	114	208	325	285	329	0	2.2	1.8

1. Max. speed, mass and inertia moment depand on the size of brake drum or brake disc.
2. Refer to SSM type for rated torque.
3. The dimensions of "M", "N", "M_1", "N_1", "G_3", "G_4" are determined by the size of the brake drum and brake disc. Contact NARA when ordering.

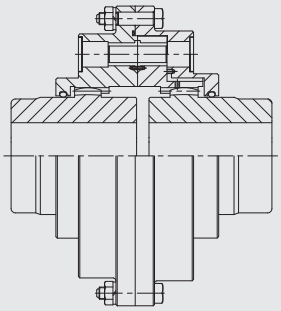
Advanced Application



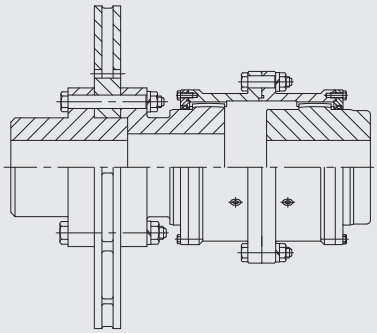
Drum coupling (gear type)



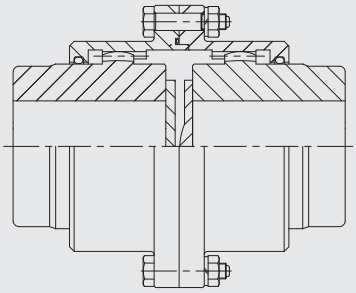
Clutch type



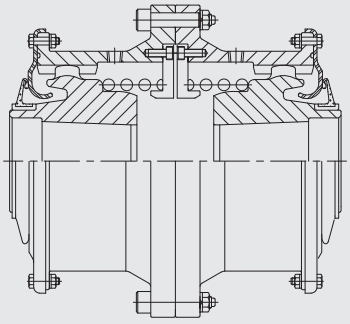
Shear-pin type



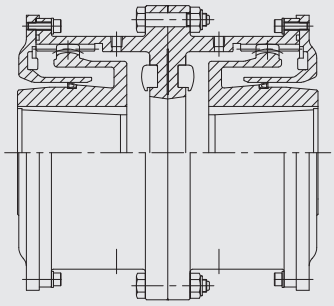
Disc brake type



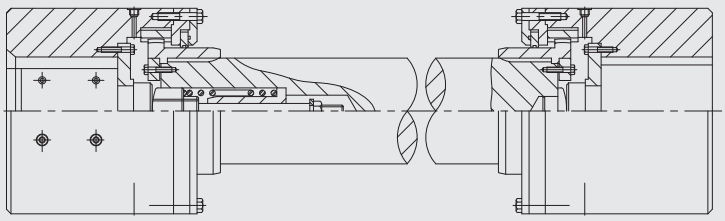
Limited movement type



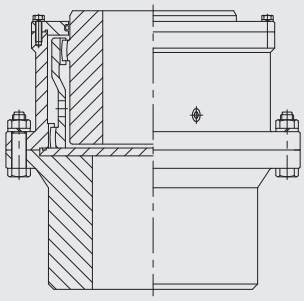
For rail vehicles (spring type)



For rail vehicles (Non-spring type)



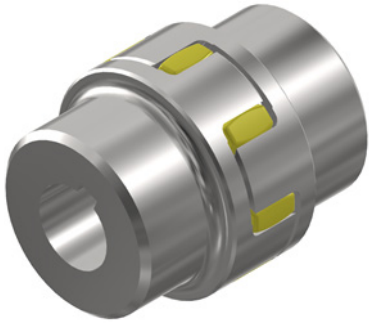
Spindle coupling



Vertical type

JAW COUPLING

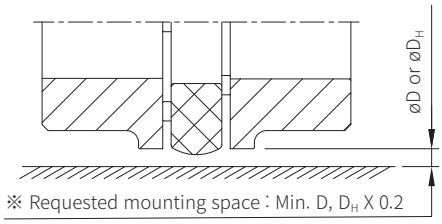
Features



- Excellent capability for absorption of shocks and vibration.
- Excellent anti-wear and resistance against ozone, oil, chemical material.
- Simple structure and small size compared to transmission capacity.
- Lubrication is not required.

Caution

Deformation under load

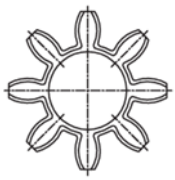


Element is under compressive load, and the elastic element protrudes slightly to the outside. Therefore, sufficient space has to be required when installing other devices from the outer diameter of the coupling.

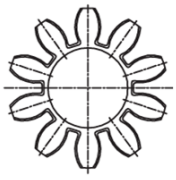
Element features

Element Type (Hardness Shore)		92 Shore-A 	92 Shore-A(TPU) 
Size		24~100	115~160
Material		Polyurethane(PU)	Thermoplastic Polyurethane(TPU)
Allowable temprature	Continuous Temp.	-40°C ~ +90°C	-50°C ~ +120°C
	Max. at short term	-50°C ~ +120°C	-50°C ~ +150°C
Features		- Excellent vibration damping - Suitable for all hub materials	- Long service life - High temperature resistance - Improved vibration damping - Suitable for all hub materials

NJ 24~100



NJ 115~160



Selection

Step 1

• Calculation of transmitted torque (Tw)

$$Tw(Nm) = 9550 \times \frac{P(kW)}{N(rpm)}$$

P : Prime motor Power(kW)
N : Coupling rotation speed(rpm)

However, when appling to the servo motor or stepping motor, apply the maximum torque (Ts).

$$Tw(Nm) = Ts(Nm)$$

Step 2

• Calculation of required torque (Tr)

$$Tr(Nm) = Tw(Nm) \times F_1 \times F_2 \times F_3 \times F_4$$

Service factor F
F_1 : Load factor
F_2 : Usage hours coefficient
F_3 : Starting frequency coefficient
F_4 : Ambient temperature coefficient

Load factor (F_1)

Load type	Constant load	Light variable load	Medium variable load	High variable load
F_1	1	1.3	1.8	2.3

Usage hours coefficient(F_2)

Hour/day	~8	~16	~24
F_2	1	1.2	1.3

Starting Frequency coefficient(F_3)

Frequency/hour	~10	~50	~100	~200	~more than 200
F_3	1	1.3	1.5	2	2.5

Ambient temperature coefficient(F_4)

Temperature(°C)	-30~30	~40	~60	~80
F_4	1	1.2	1.4	2

Step 3

• Select in which the Rated torque (Tn) of the coupling is larger than the required torque (Tr) according to the specifications and dimension table.

$$Tn > Tr$$

Step 4

• Check whether the peak torque (Tp) of the prime motor and driven machine is less or equal to the maximum torque (Tmax.) in the specification table.

$$Tmax. > Tp$$

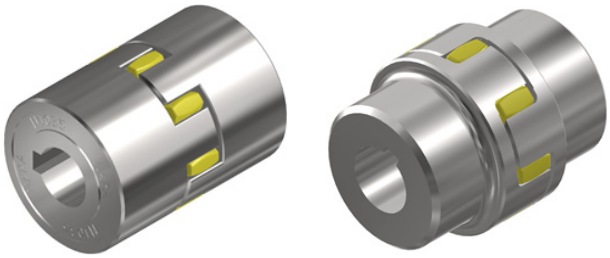
Step 5

• Check whether max. bore diameter of the coupling meets the shaft diameter of the prime motor and driven machine.
• Check whether max. rotation speed of the coupling meets the rotation speed of the prime motor

※ In case of applying to the device severe vibration occurs, Contact NARA .

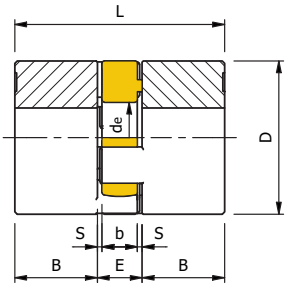
NJ type (Standard)

Features

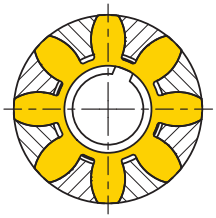


• Hubs made from sintered metal (NJ038 or smaller) or carbon steel. (NJ045 or larger)
• No maintenance required.
• Excellent dynamic balance and flexibility, vibration damping and low mass inertia due to its compact design.
• Application
- Hydraulic pump, elevator drive, industrial pump, industrial machine, steel plant
- Insulation is possible

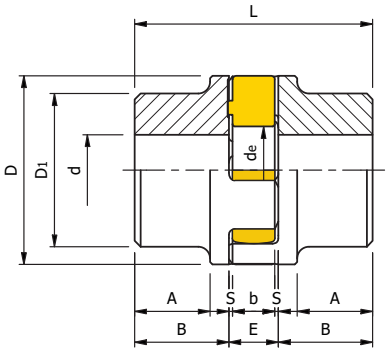
Dimensions



NJ024~NJ038



NJ024~100 : claw 8EA
NJ115~160 : claw 10EA



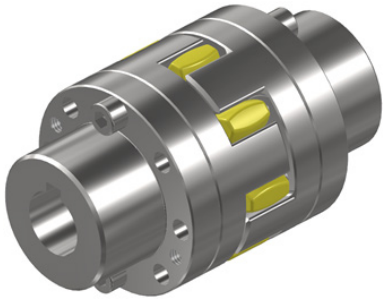
NJ045~NJ160

Size	Hub Material	Rated Torque (Nm)	Max Torque (Nm)	Max speed (rpm)	Dimensions(mm)										Mass (kg)	Moment of inertia (kgm^2)
					Inner bore(d)		D	D_1	L	S	b	E	A	B	de	
					min	max										
024	●	10	20	5,000	7	24	40	-	66	2	12	16	-	25	16	0.5	0.000125
028	●	35	70	5,000	9	28	55	-	78	2	14	18	-	30	24	1	0.000475
038	●	95	190	4,000	11	38	65	-	90	2.5	15	20	-	35	30	1.6	0.00113
045	■	190	380	4,000	13	45	80	70	104	3	18	24	29	40	37	2.8	0.00298
055	■	265	530	4,000	19	55	95	80	116	3	20	26	34	45	45	4.5	0.00678
060	■	310	620	3,600	22	60	105	90	128	3.5	21	28	40	50	51	6	0.011
075	■	625	1,250	3,600	30	75	135	120	175	4.5	26	35	55	70	67	15	0.045
090	■	1,280	2,560	3,000	40	90	160	140	200	5	30	40	63	80	82	24	0.101
100	■	2,400	4,800	2,000	50	100	200	160	225	5.5	34	45	70	90	104	39	0.244
115	■	3,300	6,600	3,350	55	110	225	180	270	6	38	50	89	110	113	40.2	0.25976
125	■	4,800	9,600	2,950	55	120	255	200	295	6.5	42	55	96	120	127	56	0.42027
145	■	6,650	13,300	2,600	60	145	290	230	340	7	46	60	112	140	147	86.2	0.83426
160	■	8,550	17,100	2,350	60	160	320	255	375	7.5	50	65	124	155	165	118.3	1.38607

1. " ● " : Sintered , " ■ " : Steel
2. Mass and moment of inertia are values without bore's machining.
3. For smaller size than NJ-024, refer to Smart Jaw Couplings

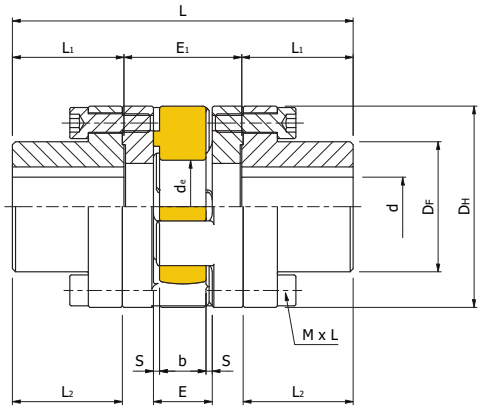
NJS type (Detachable)

Features



- Hubs are made of carbon steel and suitable for high torque.
- It is designed with a detachable flange structure, so it is possible to replace the element without moving the driving or driven machines.
- Electrical insulation.
- Application
  - Hydraulic pump, elevator drive, industrial pump, industrial machines, iron making equipment, etc.

Dimensions

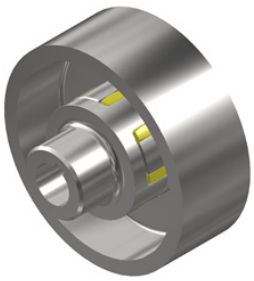


Size	Rated torque (Nm)	Max Torque (Nm)	Max speed (rpm)	寸法(mm)														Mass (kg)	Moment of inertia (kgm^2)
				Inner bore(d)		D_H	D_F	L_1	S	b	E	L_2	E_1	L	de	M×L			
				min	max														
028	35	70	5,000	9	24	55	36	30.5	2	14	18	30	33	94	24	M5×15		1.04	0.000335
038	95	190	4,000	11	28	65	42	35.5	2.5	15	20	35	39	110	30	M6×20		1.68	0.000805
045	190	380	4,000	13	38	80	52	45.5	3	18	24	45	43	134	37	M8×20		2.9	0.00194
055	265	530	4,000	19	42	95	62	51	3	20	26	50	48	150	45	M8×25		4.7	0.00475
060	310	620	3,600	22	48	105	70	57	3.5	21	28	56	50	164	51	M8×25		6	0.008
075	625	1,290	3,600	30	65	135	94	76	4.5	26	35	75	65	217	67	M10×30		13.3	0.027
090	1,280	1,250	3,000	40	75	160	108	86.5	5	30	40	85	75	248	82	M12×40		21.6	0.062
100	2,400	4,800	2,000	50	100	200	142	101.5	5.5	34	45	100	82	285	104	M16×40		38.8	0.171
115	3,300	6,600	3,350	55	110	225	158	111.5	6	38	50	110	97	320	113	M16×50		49.6	0.3068
125	4,800	9,600	2,950	55	120	255	178	122	6.5	42	55	120	103	347	127	M20×50		67.5	0.5385
145	6,650	13,300	2,600	60	145	290	206	142	7	46	60	140	116	400	147	M20×60		102.6	1.0485
160	8,550	17,100	2,350	60	160	320	235	157.5	7.5	50	65	155	128	443	165	M20×60		141.2	1.743

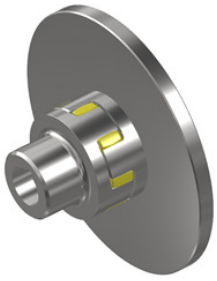
※ Mass and moment of inertia are values without bore's machining.

NJW type (Drum) / NJD type (Disc)

Features



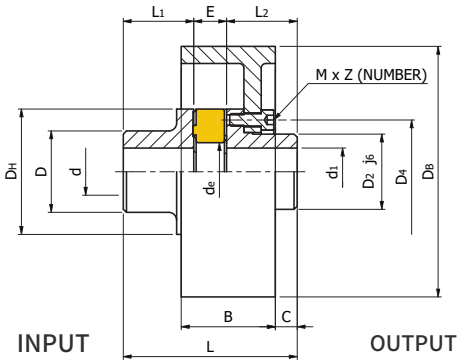
NJW



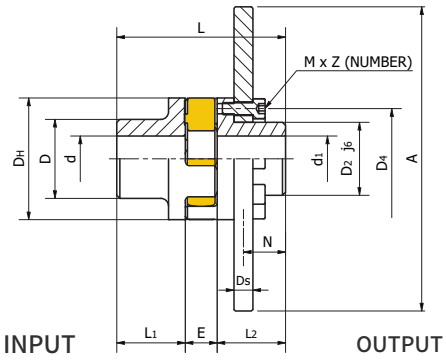
NJD

- Two types of the coupling: NJW type with brake drum and NJD type with brake disc.
- The hub where the brake drum or brake disc is mounted must be assembled on the driven shaft.
- The maximum brake torque must not exceed the rated torque of the coupling.
- Refer to the below table for the combination of brake drum disc and coupling specifications.

Dimensions



BRAKE DRUM TYPE(NJW)



BRAKE DISC TYPE(NJD)

Size	NJW, NJD													
	Dimensions(mm)												Without drum/disc	
	D_H	D	Max bore D	Max Inner bore D_1	de	E	D_2	D_4	L_1, L_2	L	M	Z	Mass(kg)	Moment of inertia(kgm²)
45	80	70	45	34	37	24	50	66	45	114	M8	8	2.1	0.0014
55	95	80	55	42	45	26	60	80	50	126	M8	12	3.24	0.0031
60	105	90	60	48	51	28	68	90	56	140	M8	12	4.41	0.0053
75	135	120	75	65	67	35	92	116	75	185	M10	12	15.4	0.0442
90	160	140	90	75	82	40	106	136	85	210	M12	15	27.6	0.1224
100	200	160	100	100	104	45	140	172	100	245	M16	15	36.9	0.2074
115	225	180	110	100	113	50	156	195	110	270	M16	15	50.9	0.3665
125	255	200	120	110	127	55	176	218	120	295	M20	15	79.1	0.7349
145	290	230	145	130	147	60	204	252	140	340	M20	15	109	1.2292

NJW Type													NJD Type											
Brake drum $D_B \times B$	Dimensions C									Max. Speed (rpm)	Mass (kg)	Moment of inertia (kgm²)	Brake disc $A \times D_S$	Dimensions N								Max. Speed (rpm)	Mass (kg)	Moment of inertia (kgm²)
	45	55	60	75	90	100	115	125	145					45	55	60	75	90	100	115	125	145		
160×60	14									3,550	2.12	0.01	200×12.5	31.3									3,550	2.928	0.015
200×75	9	12	17							2,800	3.45	0.03	250×12.5	31.3	34.3	39.3							2,800	4.662	0.038
250×95	1	4	9	25	33					2,240	6.87	0.08	315×16		32.5	37.5	53.5	61.5					2,240	8.618	0.112
315×118		-5	0	16	24	36				1,800	15	0.28	400×16			37.5	53.5	61.5	73.5	81.5	88.5		1,800	15.23	0.315
400×150		-18	-13	3	11	23	31	38		1,400	31.2	0.89	500×16				53.5	61.5	73.5	81.5	88.5	105	1,400	23.96	0.77
500×190				-12	-4	8	16	23	39	1,120	60	2.7	630×20				51.5	59.5	71.5	79.5	86.5	103	1,120	47.72	2.426
630×236					-22	-10	-2	5	21	900	112	8.01	710×20				51.5	59.5	71.5	79.5	86.5	103	900	60.93	3.915
710×265							-13	-6	10	800	161	14.9	800×25						69	77	84	100	800	94.91	7.879
800×300									-4	710	202	27.2	900×25								84	100	710	119	12.61

1. For other sizes not on the table, contact NARA.
2. The final inner bore is per ISO fit H7
3. Mass and moment of inertia are values without bore's machining.
4. Refer to NJ type for rated and max. torque.

DRUM COUPLING

Features

It is difficult to align perfectly the shafts when connecting the wire drum of the crane and the shaft of the gearbox, Drum coupling is specially engineered to solve the problems that occur in the bearings and gears of the gearbox due to the vertical load and shaft alignment errors that occur when using the crane.

- The power is transmitted by the spherical roller, the tooth has great rigidity against bending loads even when subjected to a large vertical load.
- Allowable angular misalignment is ±1° 30'. However, install it at 0.1° or less for long-term usage.

Selection

NR - DR × 260

- 260 : Size
- DR : Type
- NR : NARA

- Determine the service factor (F_1) according to Tables 1 and 2.
- Obtain the required torque (Tr) using formula below.
  P : Prime Motor power (kW)
  N : Wire drum rotation speed (rpm)

$$\text{Required torque(Tr)} = 9550 \times \frac{\text{Prime motor power(P)}}{\text{Wire drum rotation speed (N)}} \times \text{Service Factor}(F_1)$$

- Select a size from the dimension table, maximum torque (Tmax) of the selected coupling size should be lager than the required torque (Tr).
- Check whether the maximum shaft diameter of the coupling meets gear shaft diameter of gearbox.
- For special installation or operation conditions, contact NARA.

Operating Hours & Load Table (DIN15020)

Table1

Symbol			$V_{0.06}$	$V_{0.12}$	$V_{0.25}$	$V_{0.5}$	V_1	V_2	V_3	V_4	V_5
Operating hour	Daily operation time (hr/day)			0.125 ~ 0.25	0.25 ~ 0.5	0.5 ~ 1	1 ~ 2	2 ~ 4	4 ~ 8	8 ~ 16	16 ~
Load rating	Load term	Description	Drive group								
	Light load	Maximum load occurs occasionally	1Em	1Em	1Dm	1Cm	1Bm	1Am	2m	3m	4m
	Medium Load	Maximum load occurs often	1Em	1Dm	1Cm	1Bm	1Am	2m	3m	4m	5m
	Heavy Load	Continuous maximum load	1Dm	1Cm	1Bm	1Am	2m	3m	4m	5m	5m

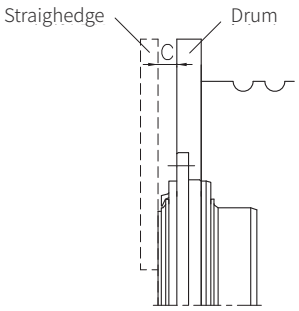
Service Factor(F_1)

Table2

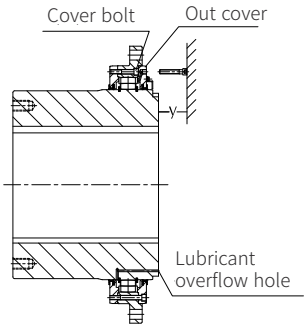
Drive Grop	1Cm	1Bm	1Am	2m	3m	4m	5m
Service factor (F_1)	1	1.12	1.25	1.4	1.6	1.8	2

Installation

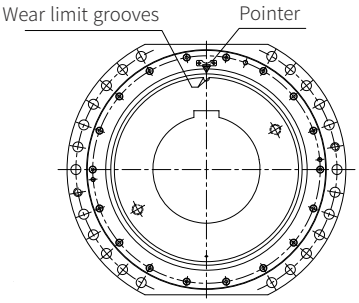
• When installing the drum coupling, wear check indicator and wear limit indicator should be set in the same direction (Fig. 3).
• To assemble the outer cover, assembly space is required for the tightening bolt shown in “y” (Fig. 2), “y” value should be as shown in Table 3.
In case of no assembly space, insert the bolts into the outer cover in advance and perform the assembly.



[Fig.1]



[Fig.2]



[Fig.3]

Table 3

Size	160~180	200~310	340~450	530	560~730	800~1000
y(mm)	50	55	70	80	90	140

Adjustment of the Drum

For accurate shaft connection, attach a straightedge to the side of the hub as shown in Fig 1 and measure “C” dimensions in several places so that the maximum deviation (ΔC) of “C” dimensions does not exceed the range below.
• Drum outer diameter less than 1000 : △C ≤ 0.5mm
• Drum outer diameter more then 1000 or more: △C ≤ 0.8mm

Drum axial adjustment

Before fixing the drum, move the drum in the axial direction so that the front side of the indicator and the edge of hub are aligned as shown in Fig 4, then fix the drum.

Lubrication

• Make sure it is filled with lubricant before operating the crane. Fill in until fresh grease comes out through the lubricant outlet on the opposite side of the grease filler (Fig. 2).

Table 4

Drive Group	Filling intervals	
	Operation hours	interval
1m~3m	2,000	Once in 2 years
4m~5m	1,000	Once a year

※ Refer to table 1 for Drive Group.

• Refer to Table 4 for lubrication intervals.
• Refer to Table 5 and Table 6 for the selection of lubricant and required quantity.

Operating temp. -20 ~ +80°C

Table 5

Company	Specifications
Shell	Shell alvanla grease EP2
Mobil	Mobilux EP2

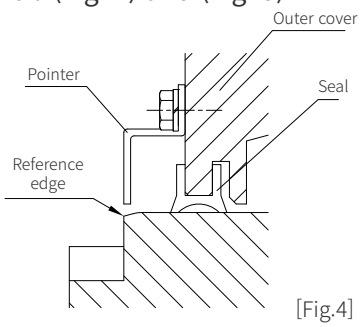
Table 6

Size	Quantity of grease(kg)	Size	Quantity of grease(kg)	Size	Quantity of grease(kg)	Size	Quantity of grease(kg)	Size	Quantity of grease(kg)
160	0.08	240	0.15	340	0.45	560	0.9	800	2.9
180	0.1	260	0.17	420	0.57	600	1	1000	4.1
200	0.12	280	0.19	450	0.65	670	1.3	-	-
220	0.14	310	0.23	530	0.72	730	2	-	-

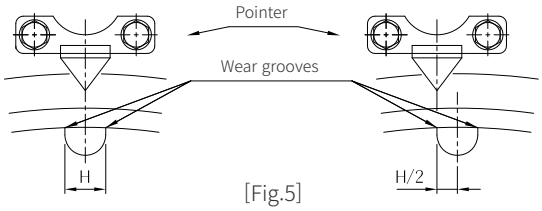
Installation

Whether the drum coupling can be used due to wear during operating is judged by the indicator attached to the sleeve and the wear indicator line marked on the hub (Fig. 4) and (Fig. 5).

Couplings must be replaced in case wear amount exceeds H/2.
Refer to Table 7 for the maximum wear amount H/2.



[Fig.4]

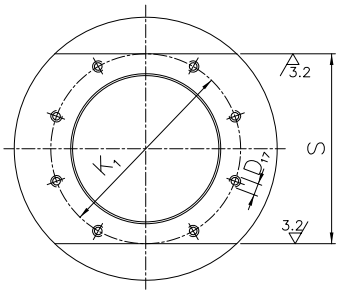


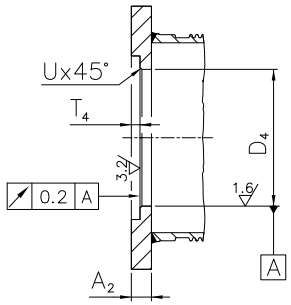
[Fig.5]

Table 7

Size	160	180	200	220	240	260	280	310	340	420	450	530	560	600	670	730	800	1,000
Max wear amount H/2(mm)	4	4	4	4	6	6	6	6	6	8	8	8	8	8	8	8	8	8

Drum flange details





[Fig.6]

Size	Dimensions(mm)							
	A_2min	K_1	S^{F8}	$D_4{}^{F8}$	D_{17}		T_4 min	U
					Bolt	Quantity		
160	25	220	220	160	M12	6	10	3
180	25	250	250	180	M12	6	10	3
200	25	280	280	200	M16	6	10	3
220	25	300	300	220	M16	6	10	3
240	25	320	320	240	M16	6	10	3
260	25	340	340	260	M16	6	10	3
280	25	360	360	280	M16	6	10	3
310	25	380	380	310	M16	6	10	3
340	30	400	400	340	M20	6	10	3
420	30	500	500	420	M20	6	10	3
450	40	530	530	450	M20	8	20	3
530	50	600	580	530	M20	8	25	3
560	50	630	600	560	M20	24	25	5
600	60	660	640	600	M24	24	35	5
670	60	730	700	670	M24	24	35	5
730	60	800	760	730	M24	24	35	5
800	70	875	830	800	M24	30	35	5
1,000	70	1,080	1,020	1,000	M30	30	35	5

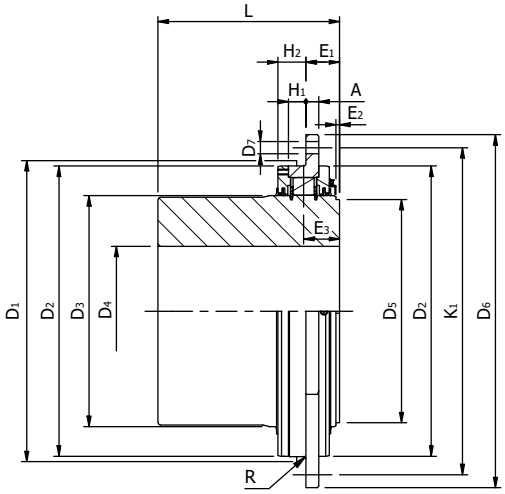
Tightening bolts and Tightening torque

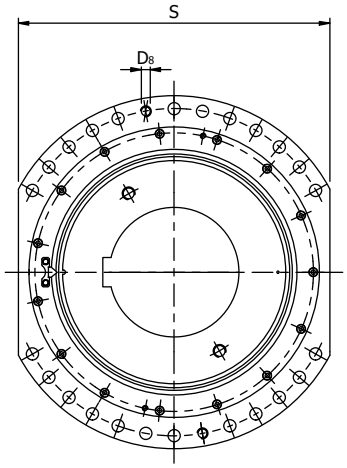
Use strength grade of 8.8 for the drum coupling bolts and drum, and use a torque wrench when tightening. (Refer to Table 8 for tightening torque).

Table 8

Bolt	M8	M10	M12	M16	M20	M24	M30
Tightening torque (Nm)	26.5	51	98	216	421	725	1,400

Dimensions DR



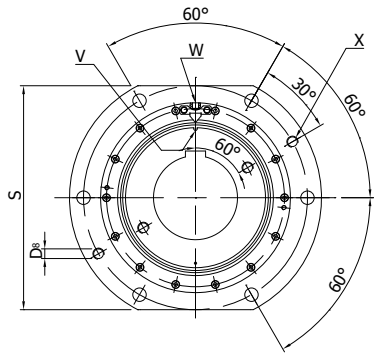


Size	Dimensions(mm)																		
	Max Torque (Nm)	Max radial load (N)	Inner bore D_4		A	D_3	D_2	D_1^{h6}	D_5	D_6	E_1	E_2	E_3	H_1	H_2	L	max axial clearance	Mass (kg)	Moment of inertia (kgm^2)
			min	max															
160	6,500	17,500	40	65	12	95	159	160	90	250	42	5	44	16	31	95	3	12	0.06
180	8,000	20,000	50	75	12	110	179	180	105	280	42	5	44	16	31	100	3	19	0.13
200	9,500	21,500	60	85	15	125	199	200	120	320	45	5	46	17	32	110	4	23	0.17
220	16,000	27,000	60	95	15	140	219	220	135	340	45	5	46	17	32	125	4	27	0.28
240	21,000	37,000	80	105	15	160	239	240	150	360	45	5	47	19	34	130	4	38	0.33
260	26,000	41,000	80	120	15	180	259	260	170	380	45	5	47	19	34	145	4	48	0.45
280	30,000	45,000	100	135	15	200	279	280	190	400	45	5	47	19	34	170	4	62	0.61
310	41,000	53,000	100	145	15	220	309	310	210	420	45	5	47	19	34	175	4	76	0.83
340	54,000	75,000	100	175	20	260	339	340	250	450	60	9	61	22	40	185	4	106	1.5
420	120,000	130,000	120	205	20	310	419	420	295	550	60	7	61	22	42	240	6	189	3.67
450	180,000	150,000	140	230	20	350	449	450	335	580	60	7	61	22	42	260	6	242	5.31
530	240,000	180,000	160	280	25	415	529	530	400	650	65	7	66	27	47	315	6	403	11.87
560	410,000	315,000	170	300	25	445	559	560	430	680	65	7	69.5	34	54	350	6	499	16.31
600	520,000	360,000	200	315	35	475	599	600	455	710	81	16	85.5	34	56	380	8	616	23.53
670	650,000	400,000	230	355	35	535	669	670	515	780	81	16	85.5	34	56	410	8	827	38.48
730	740,000	475,000	260	400	35	600	729	730	580	850	81	13	85.5	34	59	450	8	1,119	62
800	930,000	525,000	380	440	40	660	789	800	640	940	86	6	92	50	62	500	8	1,342	124
1,000	2,338,000	1,300,000	470	500	50	815	980	1,000	790	1,160	112	12	117	50	75	650	16	1,951	264

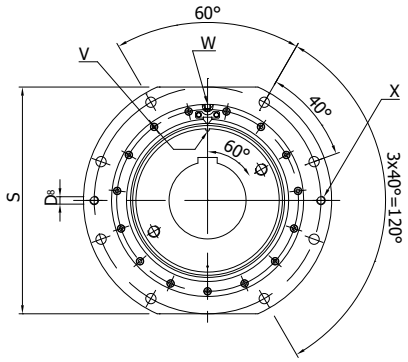
1. Mass and moment of inertia are values without bore's machining.
2. Refer to the dimension table on page 67 k_1, D_7, D_8, S, R dimensions.

Dimensions

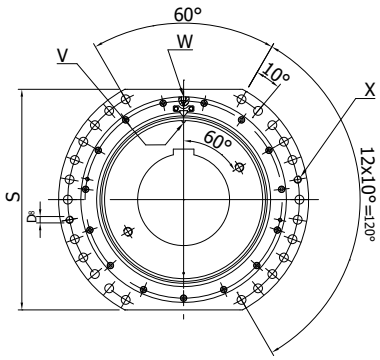
DR 160~420



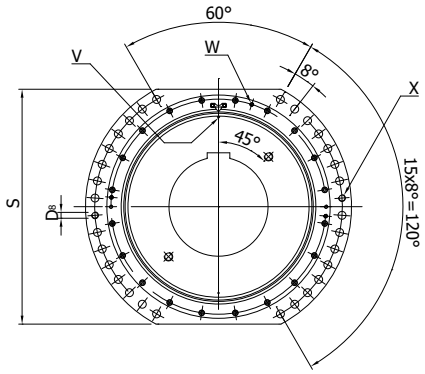
DR 450~530



DR 560~730



DR 800~1000



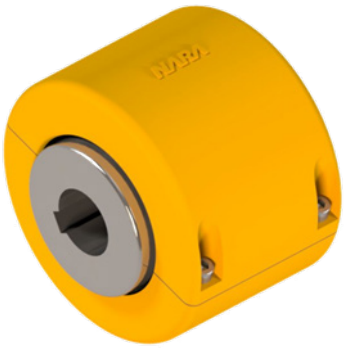
※ V : Wear indicator line W : Grease filling hole X : Service tap for disassembly

Size	Dimensions(mm)							
	bolt			K_1	D_1^{h6}	S^{h9}	R	D_8
	D_7	screw	Q'ty					
160	15	M12	6	220	160	220	2.5	M12
180	15	M12	6	250	180	250	2.5	M12
200	19	M16	6	280	200	280	2.5	M16
220	19	M16	6	300	220	300	2.5	M16
240	19	M16	6	320	240	320	2.5	M16
260	19	M16	6	340	260	340	2.5	M16
280	19	M16	6	360	280	360	2.5	M16
310	19	M16	6	380	310	380	2.5	M16
340	24	M20	6	400	340	400	2.5	M20
420	24	M20	6	500	420	500	2.5	M20
450	24	M20	8	530	450	530	2.5	M20
530	24	M20	8	600	530	580	2.5	M20
560	24	M20	24	630	560	600	4	M20
600	28	M24	24	660	600	640	4	M24
670	28	M24	24	730	670	700	4	M24
730	28	M24	24	800	730	760	4	M24
800	28	M24	30	875	800	830	4	M24
1,000	33	M30	30	1,080	1,000	1,020	4	M24

※ D_7, K_1, D_1, R Dimensions are the same as in the dimension table and drawings on page 66.

CHAIN COUPLING

Features



This coupling consists of two sprockets and a standard two-row roller chain.

- Easy installation and maintenance.
- Aluminum case to prevent grease leakage.
- Machine protection from shaft's misalignment.

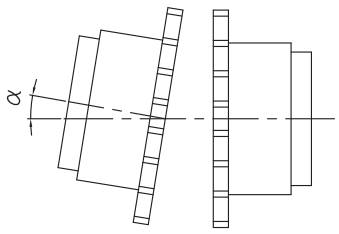
Selection

NR - 5016

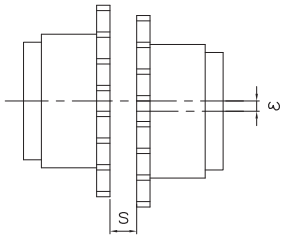
- 5016 → Size
- NR → NARA

※ For size selection, refer to the Panflex coupling selection guide on page 25.

Installation



Angular misalignment (α)

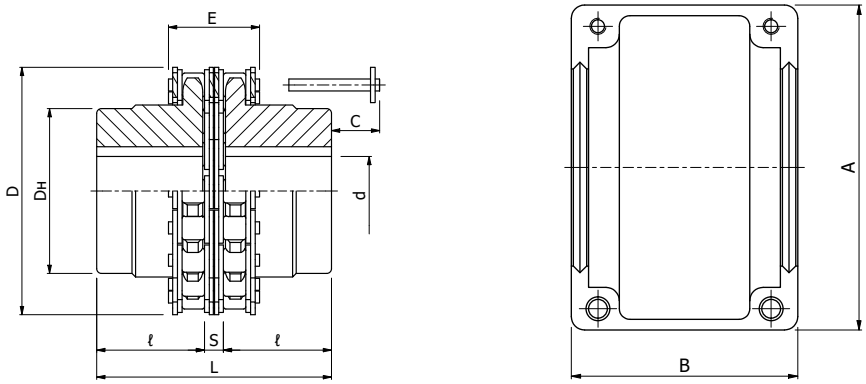


Parallel misalignment (ε)

Operation conditions	Grease filling intervals	
	First filling	Second & refilling
When exceed a half of the maximum rotation speed	1,000 hours	2,000 hours
When less than a half of the maximum rotation speed	2,000 hours	4,000 hours

- Adjust the gap (S) between the sprockets.
- Allowable parallel misalignment (ε) is within 0.5% of chain pitch.
- Allowable angular misalignment (α) is within 0.1°.
- After applying grease on two sprockets, assembly the chain.
- After applying enough grease to the inside of the case and on the chain, assembly the case.
- Grease refilling intervals are shown in the above table.

Dimensions



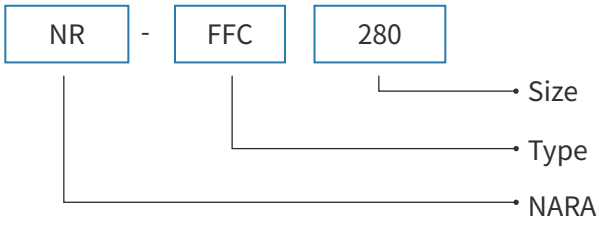
Size	Rated torque (Nm)	Max speed (rpm)	Inner bore(d) (mm)		Dimensions(mm)								Mass (kg)	Moment of inertia (kgm^2)	case		
			min	max	D	D_H	L	ℓ	S	E	C	Chain Pitch			A	B	Mass (kg)
NR4012	165	4,800	12	22	61	35	79.4	36	7.4	32.6	10	12.7	0.8	0.00075	75	75	0.38
NR4016	295	4,800	16	32	77	50	87.4	40	7.4	32.6	6	12.7	1.6	0.0017	92	75	0.56
NR5016	560	3,600	18	40	96	60	99.7	45	9.7	40.5	12	15.875	2.8	0.0045	111	85	0.76
NR5018	710	3,000	18	45	106	70	99.7	45	9.7	40.5	12	15.875	3.6	0.0067	122	85	0.92
NR6018	1,338	2,500	22	56	128	85	123.5	56	11.5	51	15	19.05	6.5	0.016	142	106	1.4
NR6022	1,796	2,500	28	71	152	110	123.5	56	11.5	51	15	19.05	10.3	0.034	167	106	1.7
NR8018	2,962	2,000	32	80	170	115	141.2	63	15.2	64.8	30	25.4	13.8	0.058	186	130	2.3
NR8022	4,252	2,000	40	100	203	140	157.2	71	15.2	64.8	22	25.4	21.7	0.116	220	130	2.7
NR10020	6,688	1,800	45	110	233	160	178.8	80	18.8	78.5	30	31.75	32.6	0.232	250	140	3
NR12018	10,032	1,500	50	125	256	170	202.7	90	22.7	99.2	50	38.1	43.9	0.425	307	181	4.8
NR12022	12,993	1,200	56	140	304	210	222.7	100	22.7	99.2	40	38.1	69	0.87	357	181	5.9
NR16018	21,688	1,000	63	160	341	224	254.1	112	30.1	127.3	68	50.8	96.3	1.63	406	220	11.1
NR16022	31,815	1,000	80	200	405	280	310.1	140	30.1	127.3	40	50.8	166.8	3.57	472	220	12
NR20018	43,375	800	88	205	426	294	519.5	241	37.5	155.5	0	63.5	294.4	5.98	496	260	15.6
NR20022	54,649	600	98	260	507	374	519.5	241	37.5	155.5	0	63.5	461.6	13	578	260	17.5
NR24022	98,406	600	120	310	608	420	751.1	353	45.1	191.3	0	76.2	871.4	27	725	355	45
NR24026	119,425	500	150	380	705	520	751.1	353	45.1	191.3	0	76.2	1,276	57	780	355	98.5
NR32022	194,902	400	200	430	806	570	860.1	400	60.1	258.7	0	101.4	1,791	108	880	384	184.4

※ Mass and moment of inertia are values without bore's machining.

FLEXIBLE FLANGED COUPLING

Features

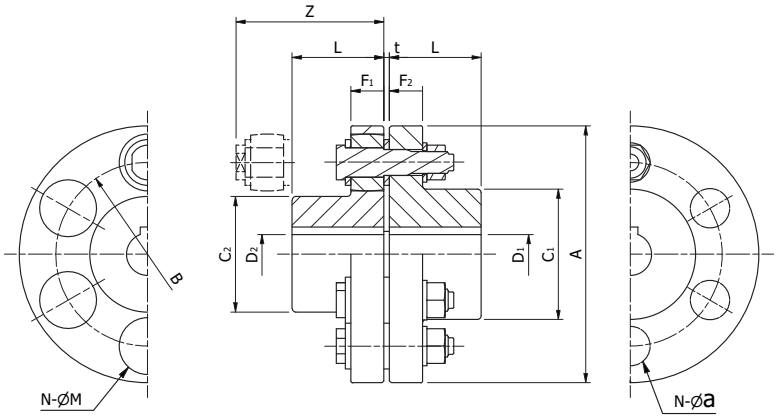
- Easy and quick mounting and disassembly.
- Lubrication and maintenance are almost not required.
- Excellent vibration absorption capability.



※ For size selection, refer to the Panflex coupling selection guide page 25.

Dimensions

FFC



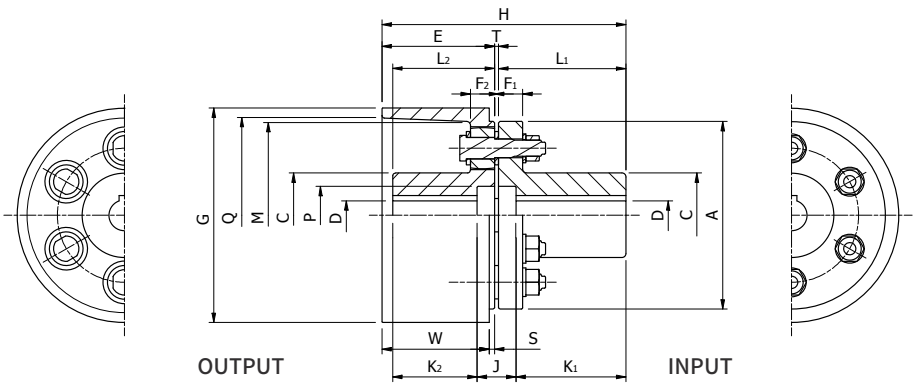
Size	Rated torque (Nm)	Max speed (rpm)	Inner bore (mm)			Dimensions(mm)											Coupling bolts	Mass (kg)	Moment of inertia (kgm^2)
			min	max D_1	max D_2	A	L	C_1	C_2	B	F_1	F_2	N-a	M	t	Z			
112	15.7	4,000	16	28		112	40	50		75	16		4-10	23	3	56	#2	2.64	0.004
125	24.5	4,000	18	32	28	125	45	56	50	85	18		4-14	32	3	64	#3	3.59	0.007
140	49	4,000	20	38	35	140	50	71	63	100	18		6-14	32	3	64	#3	4.88	0.011
160	110	4,000	25	45		160	56	80		115	18		8-14	32	3	64	#3	6.7	0.019
180	157	3,500	28	50		180	63	90		132	18		8-14	32	3	64	#3	8.98	0.03
200	245	3,200	32	56		200	71	100		145	22.4		8-20	41	4	85	#4	13.9	0.06
224	392	2,850	35	63		224	80	112		170	22.4		8-20	41	4	85	#4	18.1	0.096
250	618	2,550	40	71		250	90	125		180	28		8-25	51	4	100	#5	26.6	0.18
280	980	2,300	50	80		280	100	140		200	28	40	8-28	57	4	116	#6	37.4	0.32
315	1,570	2,050	63	90		315	112	160		236	28	40	10-28	57	4	116	#6	50.3	0.53
355	2,450	1,800	71	100		355	125	180		260	35.5	56	8-35.5	72	5	150	#7	79.2	1.11
400	3,920	1,600	80	110		400	125	200		300	35.5	56	10-35.5	72	5	150	#7	100	1.78
450	6,180	1,400	90	125		450	140	224		355	35.5	56	12-35.5	72	5	150	#7	132	2.88
560	9,800	1,150	100	140		560	160	250		450	35.5	56	14-35.5	72	5	150	#7	207	6.83
630	15,700	1,000	110	160		630	180	280		530	35.5	56	18-35.5	72	5	150	#7	271	11

1. In case exceeding max. speed, Contact NARA.
2. Mass and moment of inertia are values without bore's machining.
3. Dimension "Z" is the space required for bolt's assembly and disassembly.

BRAKE DRUM COUPLING

Dimensions

BDC

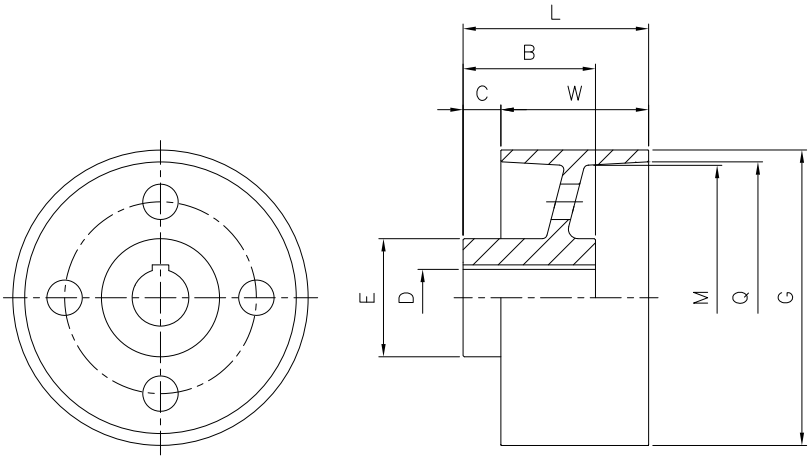


Size (G)	Dimensions(mm)																	Mass (kg)	Moment of inertia (kgm^2)
	Inner bore(D)		W	S	E	L_1	L_2	H	T	C	K_1	K_2	J	P	M	Q	A		
	min	max																	
160	20	37	80	4	84	95	76	182	3	63	82	63	29	43	140	145	140	9	0.05
200	28	53	100	4	104	128	96	235	3	90	112	80	35	60	178	184	180	19	0.08
250S	35	66	125	4	129	128	106	261	4	112	112	90	36	75	224	230	224	34	0.2
250L	35	66	125	4	129	158	106	291	4	112	142	90	36	75	224	230	224	36	0.2
315	40	75	160	4	164	158	128	326	4	125	142	112	36	85	285	292	250	57	0.6
355	50	84	180	4	184	160	130	348	4	140	142	112	40	95	320	330	280	80	1.1
400	63	95	200	4	204	190	158	398	4	160	172	140	40	105	362	374	315	110	1.7
450	71	105	224	4	228	195	163	428	5	180	172	140	51	125	410	422	355	160	3.4
500	80	115	250	4	254	235	183	494	5	200	212	160	51	135	445	462	400	250	6.5
560	90	130	280	4	284	240	188	529	5	224	212	160	61	150	495	516	450	310	10.5
762	110	165	362	4	366	240	208	611	5	280	212	160	61	190	690	710	630	580	40

1. Dimensions F_1 , F_2 , B and bolt sets are the same as per flexible flanged coupling dimension table. (in case flange outer diameter "A" is the same)
2. Rated max. torque are the same as for flexible flange coupling. (in case flange outer diameter "A" is the same)
3. All parts are machined precisely considering vibration, Additional balancing-work is not required. (Incase exceeding max. speed, contact NARA)
4. Mass and moment of inertia are values without bore's machining.

BRAKE DRUM

Dimensions



Size	Dimensions(mm)												Mass (kg)	Moment of inertia (kgm^2)
	Inner bore(D)		G	W	C	L	B	E	M	Q	T	N-Ød		
	min	max												
160	20	37	160	80	32	112	82	63	140	145	16	-	6	0.18
200	28	48	200	100	32	132	112	80	178	184	16	-	10	0.053
250	35	60	250	125	32	157	112	100	224	230	16	2-30	18	0.14
315	40	60	315	160	35	195	112	100	285	292	20	2-30	29	0.43
355	50	67	355	180	40	220	142	112	320	330	20	2-40	40	0.78
400	63	75	400	200	40	240	142	125	362	374	25	2-40	60	1.38
450	71	96	450	224	55	279	172	160	410	422	25	2-40	85	2.35
500	80	108	500	250	60	310	212	180	445	462	28	2-40	130	4.5
560	90	120	560	280	65	345	212	200	495	516	28	2-40	180	8.25
762	110	135	762	362	80	442	212	224	690	710	35	2-40	340	31

1. All parts are machined precisely considering vibration, Additional balancing-work is not required.
2. Mass and moment of inertia are values without bore's machining.

FLUID COUPLING

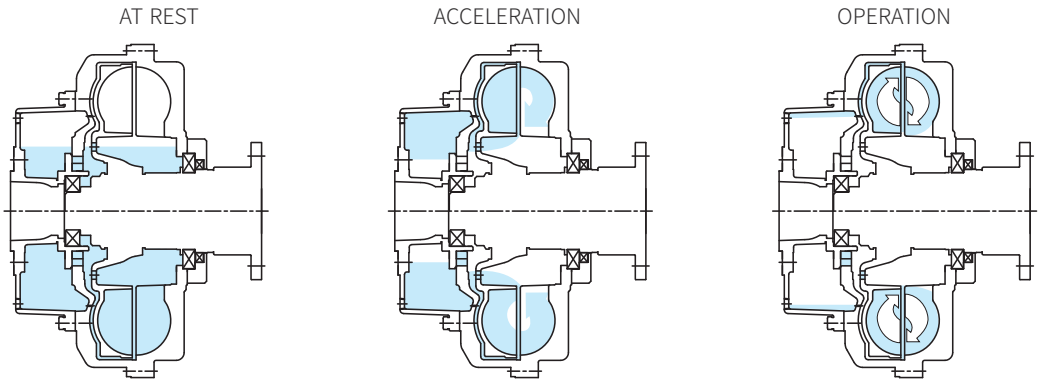
Features

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

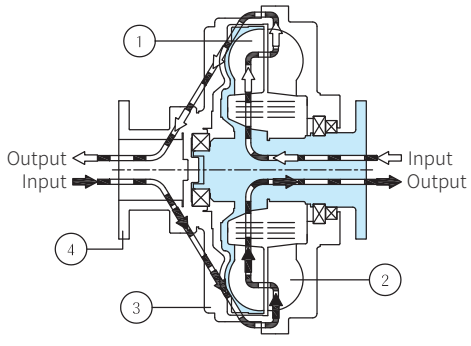
Oil in the chamber flows into the circuit through the nozzle when it is at rest and flows into the circuit when operating, therefore the start-up time is extended and smooth operation is possible during start-up. During normal operation after start-up, oil in the chamber is in the working circuit, resulting 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%.

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

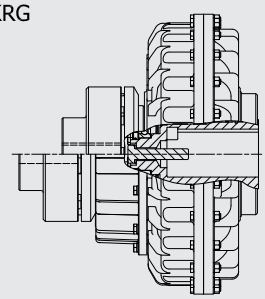


[Fig.1]

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

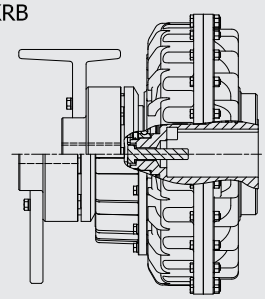
Line-up

KRG



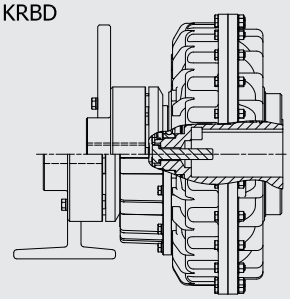
CKRG, CCKRG

KRB



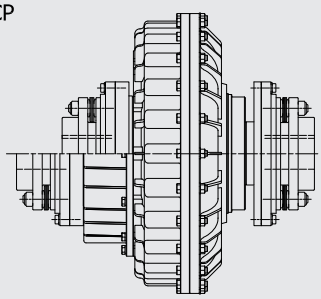
CKRBD, CCKRBD

KRBD



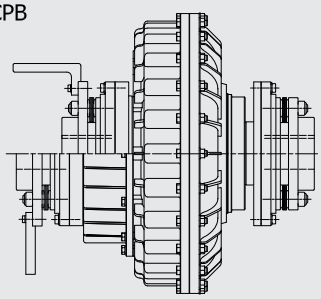
CKRB, CCKRB

KCP



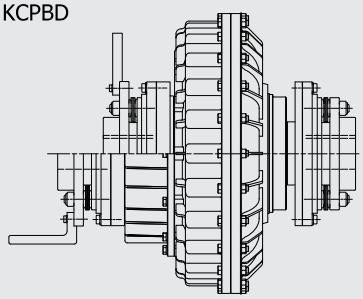
CKCP, CCKCP

KCPB



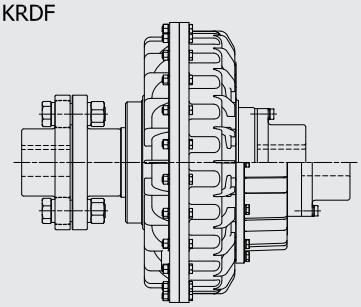
CKCPBD, CCKCPBD

KCPBD



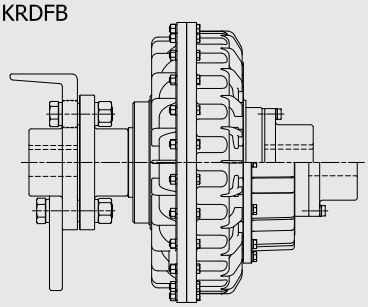
CKCPB, CCKCPB

KRDF



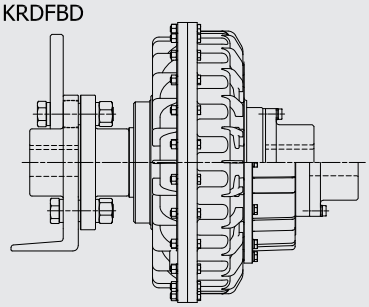
CKRDF, CCKRDF

KRDFB



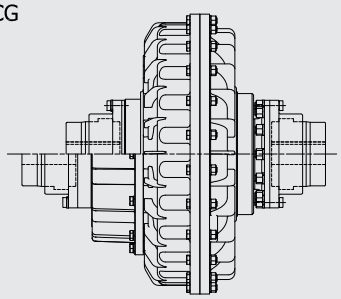
CKRDFBD, CCKRDFBD

KRDFBD



CKRDFB, CCKRDFB

KCG

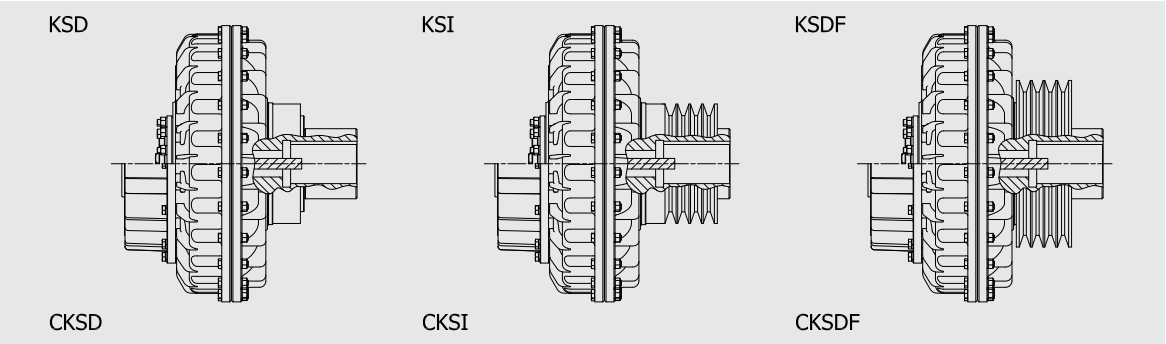


CKCG, CCKCG

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.

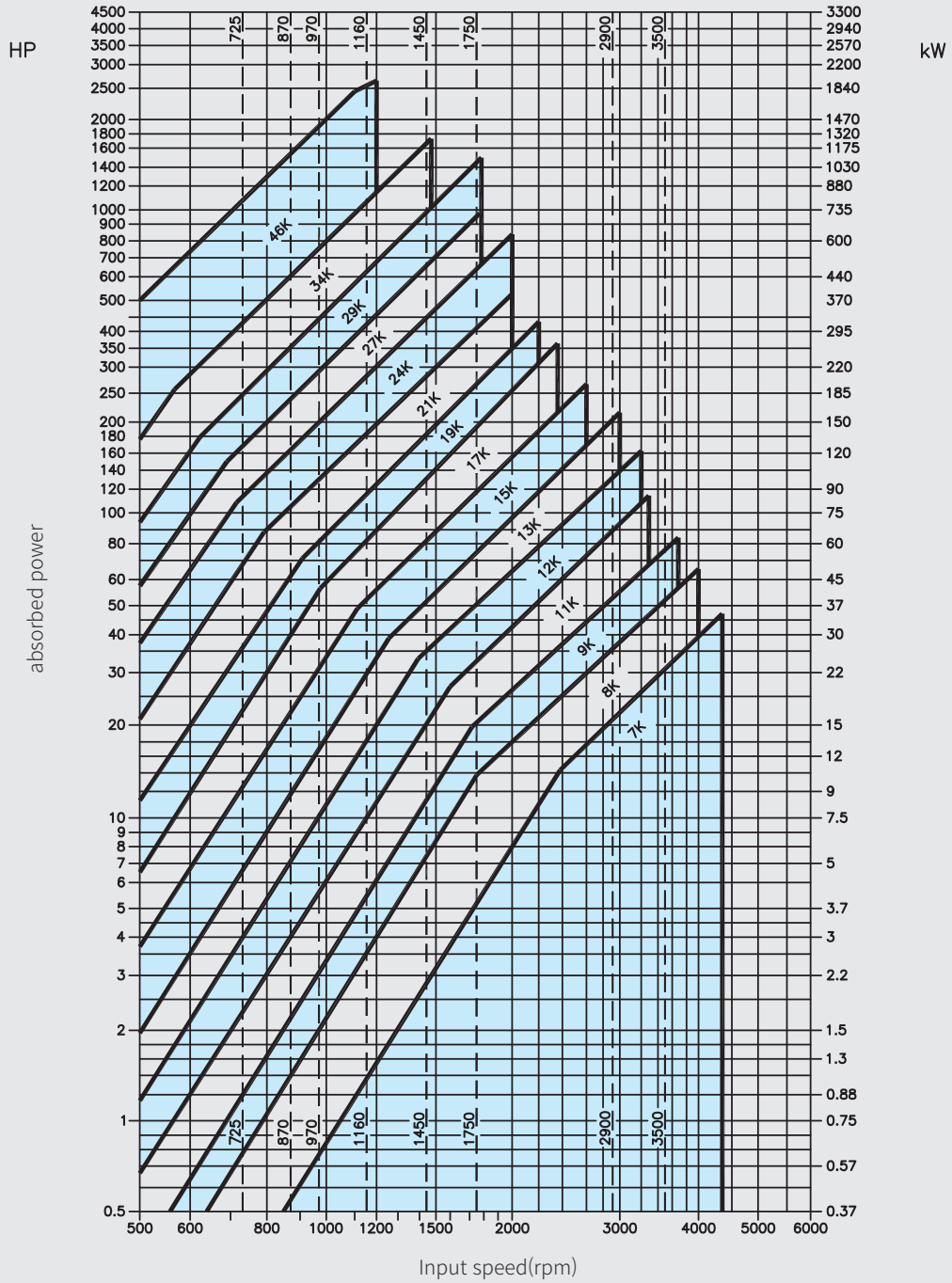
Selection

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

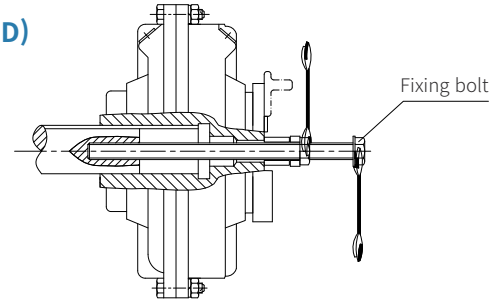


Installation

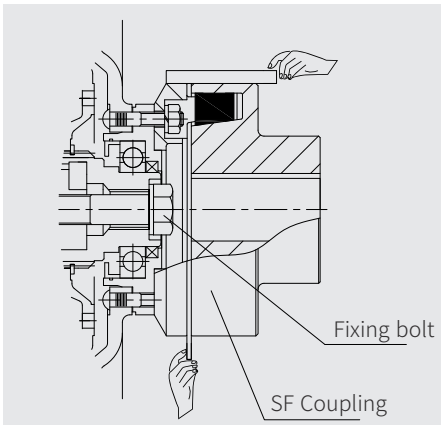
KRG, CKRG, CCKRG, KRB(D), CKRB(D), CCKRB(D)

- 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]



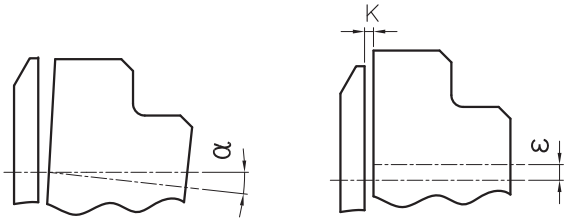
[Fig.3]

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



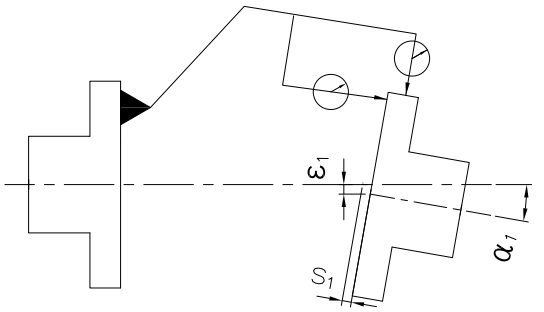
KSI, KSDF, CKSI, CKSDF

- 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.

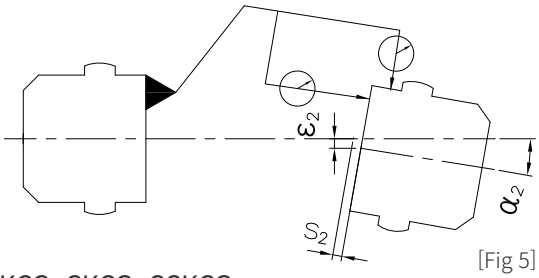


KCP, CKCP, CCKCP
KRDF, CKRDF, CCKRDF

[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

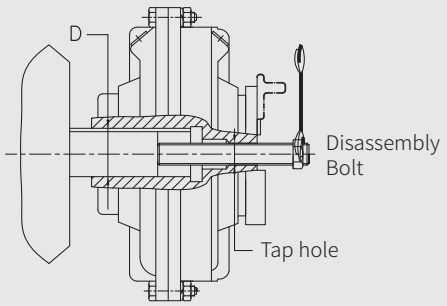
Disassembly

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.)

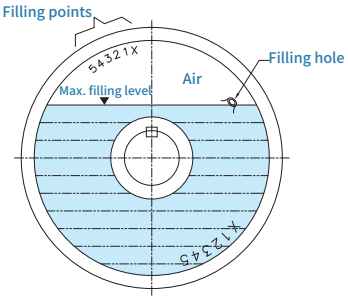
⑦ If the injection point is unknown, fill at “X” for standard type (without oil chamber) and “2” for chamber type (with oil chamber).

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.

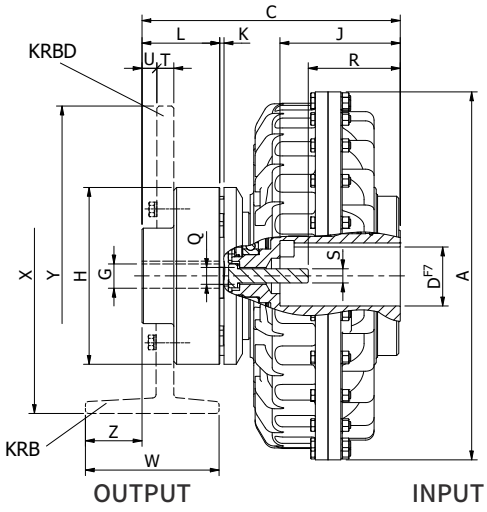
• Standard temperature for fusible plugs is 145°C. In case 120°C or 175°C required, contact Nara.

• Change oil every 4,000 hours of operation.

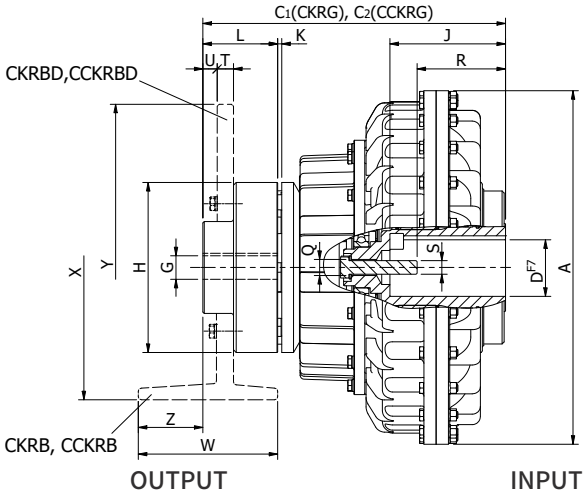
Warning) Reverse rotation of the driven machine can cause people injury and damage to the equipment. And make sure to install a braking device that can get over full power of driven machine.

Dimensions

KRG



CKRG, CCKRG

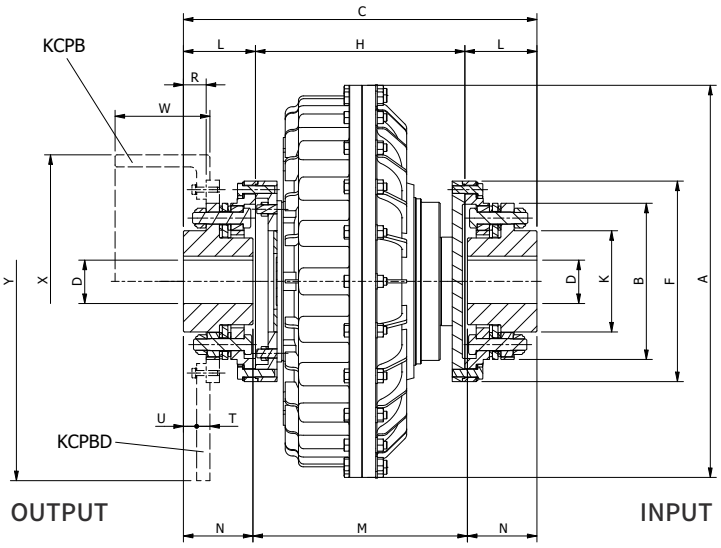


Size	Dimensions(mm)													flexible coupling	Mass(kg) - (without oil)		
	D	J	A	G_{MAX}	C	C_1	C_2	H	K	L	Q	R	S		KRG	CKRG	CCKRG
9	28 38 60 80		295	55	249	-	-	132	2	80	M16	43 54	M10 M12	SF20	16	-	-
	42 ●48	110									M20	74	M16				
11	28 38 60 80		325		258	-	-				M16	42 63	M10 M12		18	-	-
	42 ●48	110									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

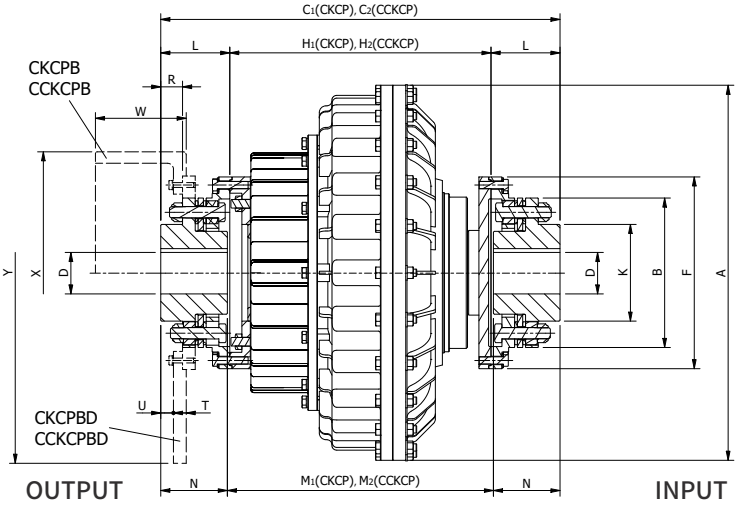
1. " ● " : Low-sized key should be applied. (DIN 6885/2)
2. Dimensions "X", "W", "Z", "Y", "U", "T" are determined by the size of the brake drum and brake disc. Contact NARA when ordering.
3. Refer to page 79 (Table 4) for oil quantity.

Dimensions

KCP



CKCP, CCKCP



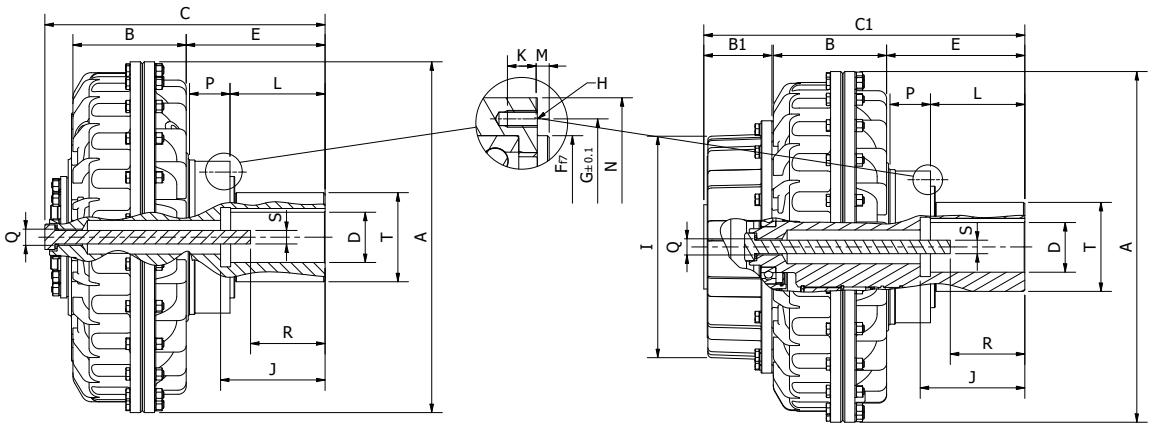
Size	Dimensions(mm)																	Mass(kg) - (without oil)		
	A	B	C	C_1	C_2	D_{max}	K	H	H_1	H_2	L	M	M_1	M_2	N	R	F	KCP	CKCP	CCKCP
9	295	145	299.5	-	-	55	103	188.5	-	-	55.5	199.5	-	-	50	10.5	195	22.5	-	-
11	325	145	309	-	-	55	103	198	-	-	55.5	209	-	-	50	10.5	195	24.3	-	-
12	370	145	309	376	-	55	103	198	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

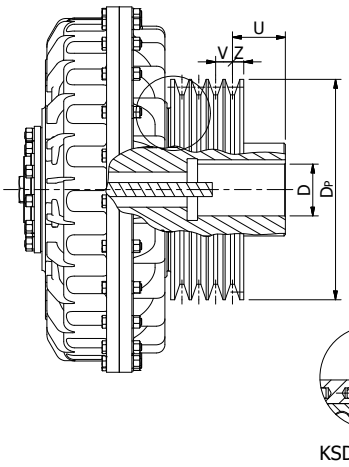


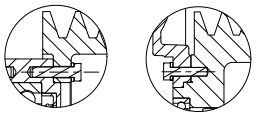
Size	Dimensions(mm)																							Mass(kg)-(without oil)	
	D		J		A	B	B_1	C_{MAX}	C_{1MAX}	E	F	G	H	I	K	L	M	N	P	Q	R		S		T_{max}	KSD	CKSD
9	28	38	60	80	295	96	-	250	-	116	96	114	8 × M8	-	13	85	5	128	20	M16	39	45	M10	M12	69	13	-
	42	48	110																	M20	78		M16				
11	28	38	60	80	325	107	-	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

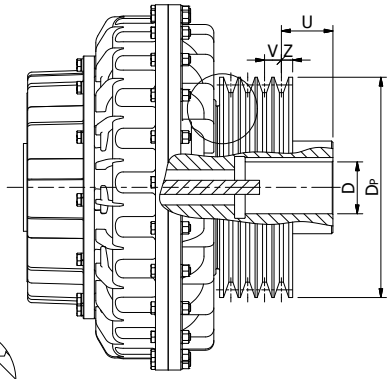




KSDF-CKSDF

KSI-CKSI

CKSI, CKSDF



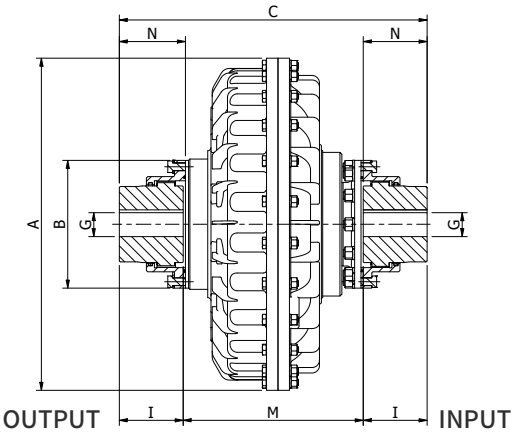
V-belt Type	V	Z
M	10	9.5
A	15	10
B	19	12.5
C	25.5	17
D	37	24
3V	10.3	8.7
5V	17.5	12.7
8V	28.6	19

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		

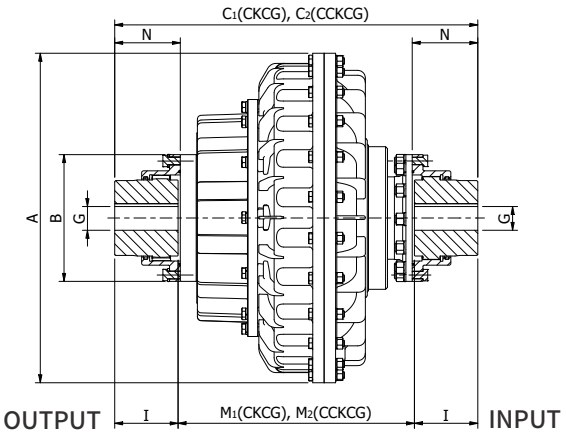
1. Dimensions are the same as KSD and CKSD types, except for the V-belt pulley.
2. Refer to page 79 (Table 4) for oil quantity.

Dimensions

KCG



CKCG, CCKCG

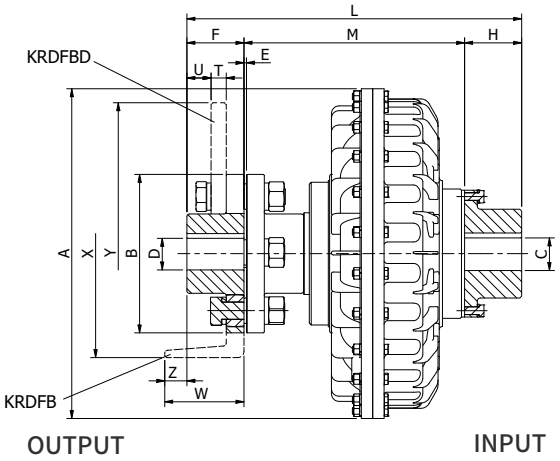


Size	Dimensions(mm)										Mass(kg)- (without oil)			gear coupling set			
	A	C	C_1	C_2	G_{max}	I	M	M_1	M_2	N	KCG	CKCG	CCKCG	SIZE		Mass (kg)	Amount of grease (ℓ)
9	295	287	-	-	65	50	187	-	-	51.5	14	-	-	NGG15	153	8	0.1
11	325	296	-	-			196	-	-		16	-	-				
12	370	308	375	-			208	275	-		21	24	-				
13	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

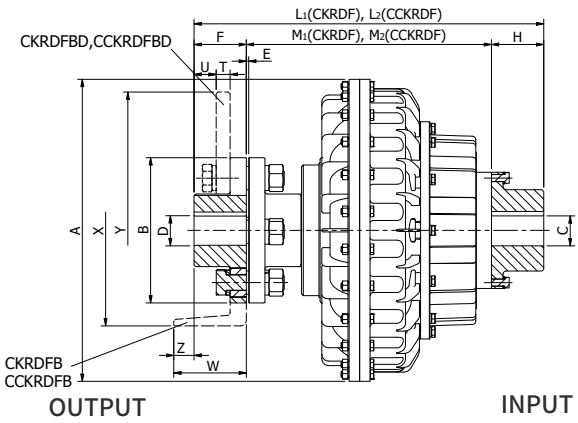
1. Refer to page 79 (Table 4) for oil quantity.
23. Fill grease in the gear coupling.

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.

Service Factor(F_1)

Service factor for Motor and Turbine drive (AGMA 922-A96)

Application	Typical Service Factor
Agitators	
Pure Liquids	1.00
Liquids and Solids	1.25
Liquids - variable density	1.25
Blowers	
Centrifugal	1.00
Lobe	1.50
Vane	1.25
Brewing and Distilling	
Bottling machinery	1.00
Lauter tub	1.25
Briquetter machines	2.00
Can Filling machines	1.00
Cane Knives	2.00
Car Dumpers	2.50
Car Pullers-Intermittent duty	1.50
Clay Working machinery	1.75
Compressors	
Centrifugal	1.25
Lobe	1.50
Reciprocating - multi-cylinder	2.00
Conveyors - unformly loaded	
Apron	1.25
Assembly	1.00
Belt	1.00
Bucket	1.25
Chain	1.25
Flight	1.25
Oven	1.50
Screw	1.25
Conveyors - Heavy duty not unformly fed	
Apron	1.50
Assembly	1.25
Belt	1.25
Bucket	1.50
Chain	1.50
Flight	1.50
Oven	1.50
Reciprocating	2.50
Screw	1.50
Shaker	2.50
Cranes and Hoists	
Main Hoists	2.00
Reversing	2.00
Skip Hoists	1.75
Trolley Drive	1.75
Bridge Drive	1.75
Slope	1.50
Crushers	
Ore	2.75
Stone	2.75
Dredges	
Cable reels	1.75
Conveyors	1.50
Cutter Head dirves	2.25
Jig drives	2.25
Maneuvering winches	1.75
Pumps	1.75
Screen drive	1.75
Stackers	1.75
Utility winches	1.50
Elevators	
Buckets	1.75
Centirifugal discharge	1.50
Freight	2.00
Gravity discharge	1.50
Fans	
Centrifugal	1.00
Cooling Towers	2.00
Forced Draft	1.50
Induced draft without damper control	2.00

Application	Typical Service Factor
Feeders	
Apron	1.25
Belt	1.25
Disc	1.25
Reciprocating	2.50
Screw	1.25
Food Industry	
Beet Slicer	1.75
Cereal Cooker	1.25
Dough Mixer	1.75
Meat Grinders	1.75
Bottling, can filling machine	1.00
Generators (not welding)	1.00
Hammer Mills	2.00
Laundry washers	
Reversing	2.00
Laundry Tumblers	2.00
Lumber Industry	
Barkers - drum type	2.00
Edger feed	2.00
Live rolls	2.00
Log Haul - incline	2.00
Log Haul - well type	2.00
Off bearing rolls	2.00
Planer feed chains	1.75
Planer tilting hoist	1.75
Planer floor chains	1.75
Slab conveyor	1.50
Sorting table	1.50
Trimmer feed	1.75
Machine tools	
Bending roll	2.00
Plate Planer	1.50
Punch press-gear driven	2.00
Tapping machines	2.50
Other machine tools	
Main drives	1.50
Auxiliary drives	1.25
Metal Mills	
Draw bench - carriage	2.00
Draw bench - main drive	2.00
Forming machines	2.00
Slitters	1.50
Table conveyors	
Non-reversing	2.25
Reversing	2.50
Wire drawing & flattening machine	2.00
Wire winding machine	1.75
Mills, Rotary type	
Ball	2.25
Cement kilns	2.00
Dryers & coolers	2.00
Kilns	2.00
Pebble	2.00
Rod	2.00
Tumbling barrels	2.00
Mixers	
Concrete mixers	1.75
Drum type	1.50
Oil Industry	
Chillers	1.25
Oil well Pumping	2.00
Paraffin filter press	1.75
Rotary kilns	2.00
Paper Mills	
Barker auxiliaries, hydraulic	2.00
Barker, mechanical	2.00
Barking drum (spur gear only)	2.25
Beater & pulper	1.75
Bleacher	1.00
Calenders	2.00
Converting machine, except cutters, platers	1.50
Couch	1.75
Cutters, Platers	2.00
Cyliners	1.75
Dryers	1.75

Application	Typical Service Factor
Paper Mills(continued)	
Felt Stertcher	1.25
Felt whipper	2.00
Jordans	1.75
Log Haul	2.00
Presses	2.00
Reel	1.50
Stock chests	1.50
Suction roll	1.75
Washers and thickeners	1.50
Winders	1.50
Printing presses	1.50
Pullers	
Barge haul	2.00
Pumps	
Centrigugal	1.00
Reciprotating	
Double acting	2.00
Single acting	
1 or 2 cylinders	2.25
3 or more cylinders	1.75
Rotary-gear, lobe, vane	1.50
Rubber Industry	
Mixer-Bandury	2.50
Rubber calender	2.00
Rubber mill (2 or more)	2.25
Seeter	2.00
Tire building machines	2.50
Tire & tube press openers	1.00
Tubers and strainers	2.00
Screens	
Air washing	1.00
Rotary - stone or gravel	1.50
Travel water intake	1.25
Sewage disposal equipment	
Bar screens	1.25
Chemical feeders	1.25
Collectors, circular or straight line	1.25
Dewatering screens	1.25
Grit collectors	1.25
Scrum breakers	1.25
Slow or rapid mixers	1.25
Sludge collectors	1.25
Thickeners	1.25
Vacuum filters	1.25
Steering Gear	1.00
Stokers	1.00
Textile Industry	
Batchers	1.25
Calenders	1.75
Card machines	1.50
Cloth finishing machines	
(Washers, pads, tenters)	1.50
(Dryers, calenders, etc)	1.75
Dry cans	
Dryers	1.50
Dyeing machinery	1.25
Looms	1.50
Mangles	1.25
Nappers	1.25
Soapers	1.25
Spinners	1.50
Tenter frames	1.50
Winders (other than batchers)	1.50
Windlass	1.75

Service Factors for engine Drive

No. of Cylinder	4 or 5						6 or more					
Motor/Turbine Service Factor	1.00	1.25	1.50	1.75	2.00	2.50	1.00	1.25	1.50	1.75	2.00	2.50
Engine Service Factor	2.00	2.25	2.50	2.75	3.00	3.50	1.50	1.75	2.50	2.25	2.50	3.00

1. Find motor/turbine service factor(F1) acc. to driven application machine.
2. Apply engine service factor acc. to No. of Cylinder.

Overseas Network

Japan

31F, Osaka Kokusai Bldg, 2-3-13, Azuchi-Matchi, Chou-ku, Osaka, Japan
TEL. +81-6-6121-6862

China

Jintai Fudi Buliding 1609, 9, Anning Zhuangxi Road, Haidian District, Beijing, China
TEL. +86-10-82744199, 82744299 (ext:8016)

Russian Federation

Kolomenskaya St. 12-1-32, Moscow, Russian Federation
TEL. +7-916-360-65-65

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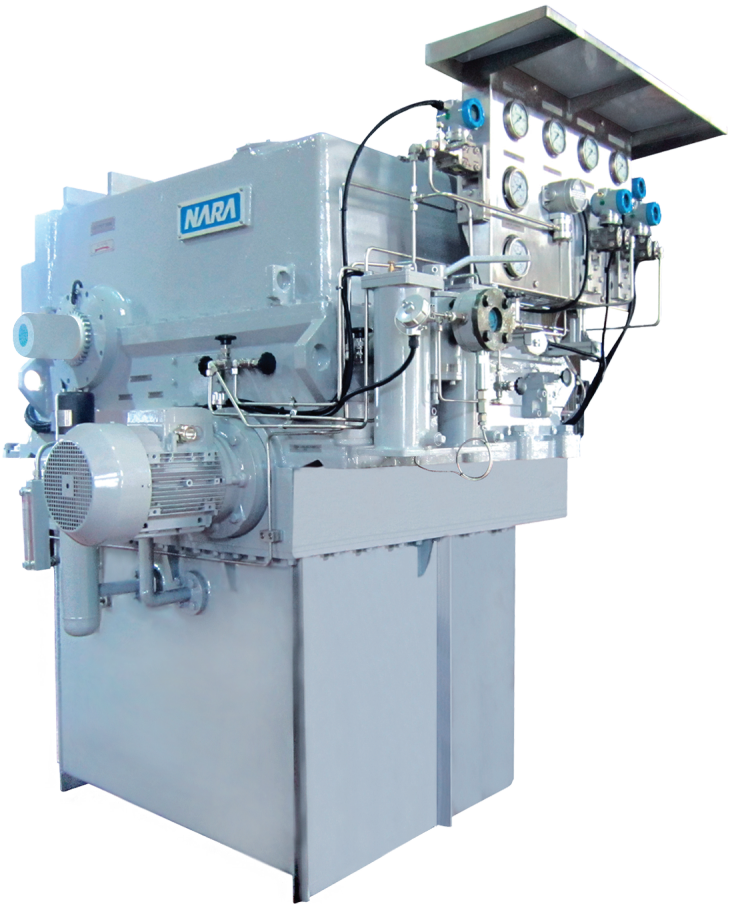

VARIABLE SPEED FLUID COUPLING

NARA

Head office
(46743) 194-33, Gwahaksandan-ro, Gangseo-gu,
Busan, Republic of Korea
TEL : +82-51-790-7500 FAX : +82-51-714-4107
http://www.naracorp.com e-mail : nara@naracorp.com

Seoul office
(14353) Gwangmyeong Station M cluster Bldg. 719,
17, Deogan-ro 104beon-gil, Gwangmyeong-si, Gyeonggi-do,
Republic of Korea
TEL : +82-31-429-7655

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