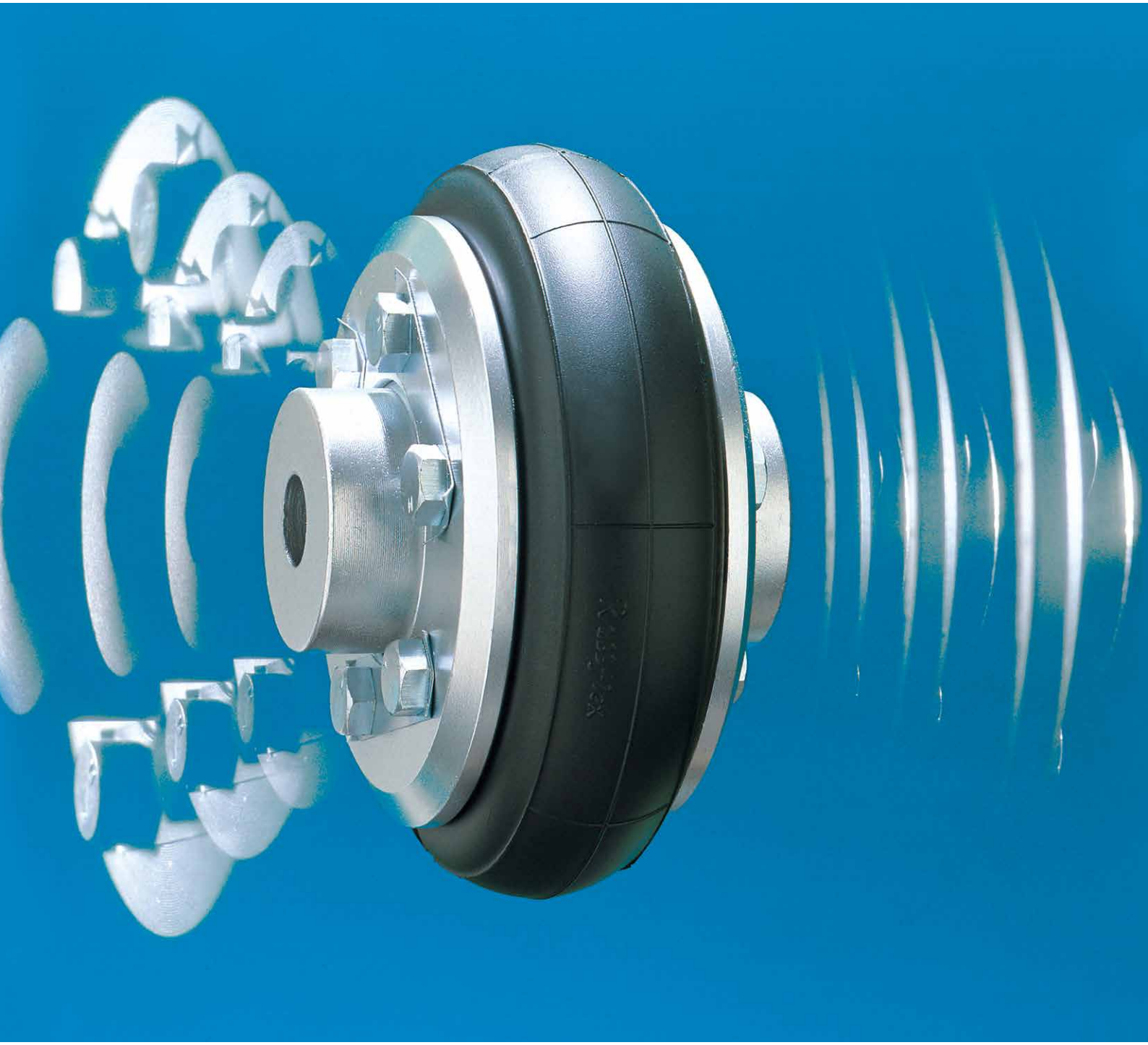
Invention & Innovation
NITTA

Superior Performance and Unrivalled Versatility

TOYO RUBBFLEX COUPLING



NITTA CHEMICAL INDUSTRIAL PRODUCTS CO., LTD.

INTRODUCTION

Have you experienced difficulties in centering and connecting machinery shafts? You may also have suffered from vibrations, shocks and noises after connection.

Toyo Rubbflex Couplings may be the most efficient and economic answer to all these problems. These couplings, with its excellent flexibility and absorption of vibration, incorporate Nitta's years of experience and technical expertise as a major tire manufacturer in Japan.

Toyo Rubbflex Couplings are easy to install and fit. They contribute greatly in vibration and noise suppression, to improve working environment and lengthen machine service life. They can also be used for extended periods without lubrication, contributing to maintenance and labor reduction.

TOYO RUBBFLEX COUPLING
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Note : The metal parts (in silver) of the product shown in the photo were painted for aesthetic reasons. The actual products may appear differently from this photo.

TOYO RUBBFLEX RF/RFH COUPLINGS FEATURES

The flexible element of Rubbflex RF/RFH couplings is formed from tough tire cords and then covered on both sides with rubber specially formulated for increased resistance to bending fatigue.

1. Extreme Flexibility

RF/RFH couplings tolerate a wide range of angular misalignment, parallel misalignment and axial misalignment (end play). Take care when using couplings under such conditions. The resulting stress may cause damage to other equipment. (Refer to ELASTICITY DIAGRAMS on p11 for more details.)

Angular Misalignment

The maximum permissible angular misalignment ($\Delta\theta$) is less than 3˚ for all sizes.

Parallel Misalignment

The maximum permissible parallel misalignment (Δh) is less than 1% of the coupling's outer diameter.

Hub Separation (End Play)

The maximum permissible deviation in hub separation (Z2) is 0 to -2% of the coupling's outer diameter.

Fig. a

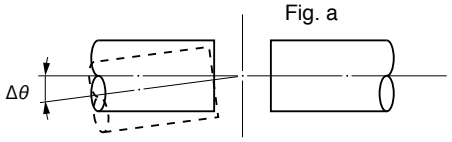


Fig. b

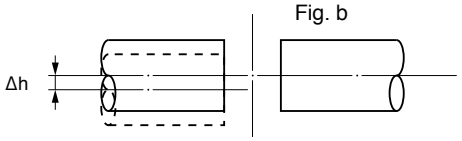
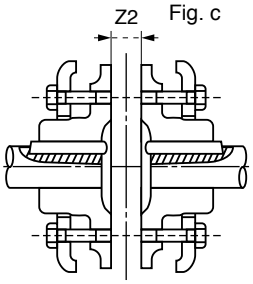
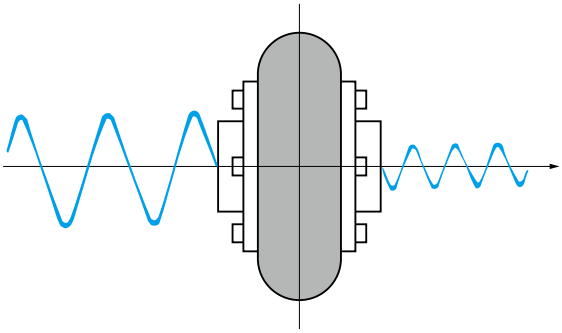


Fig. c



2. Excellent torque shock absorption and torsion damping

Since RF/RFH couplings are highly elastic, they have superior torque shock damping and absorption of torsional vibration. As a result, shaft rotation is quieter and vibration is suppressed. The shaft's torque and the coupling's torsion angle are proportional, and this simplifies design, especially in cases where shaft vibration could pose particular problems.



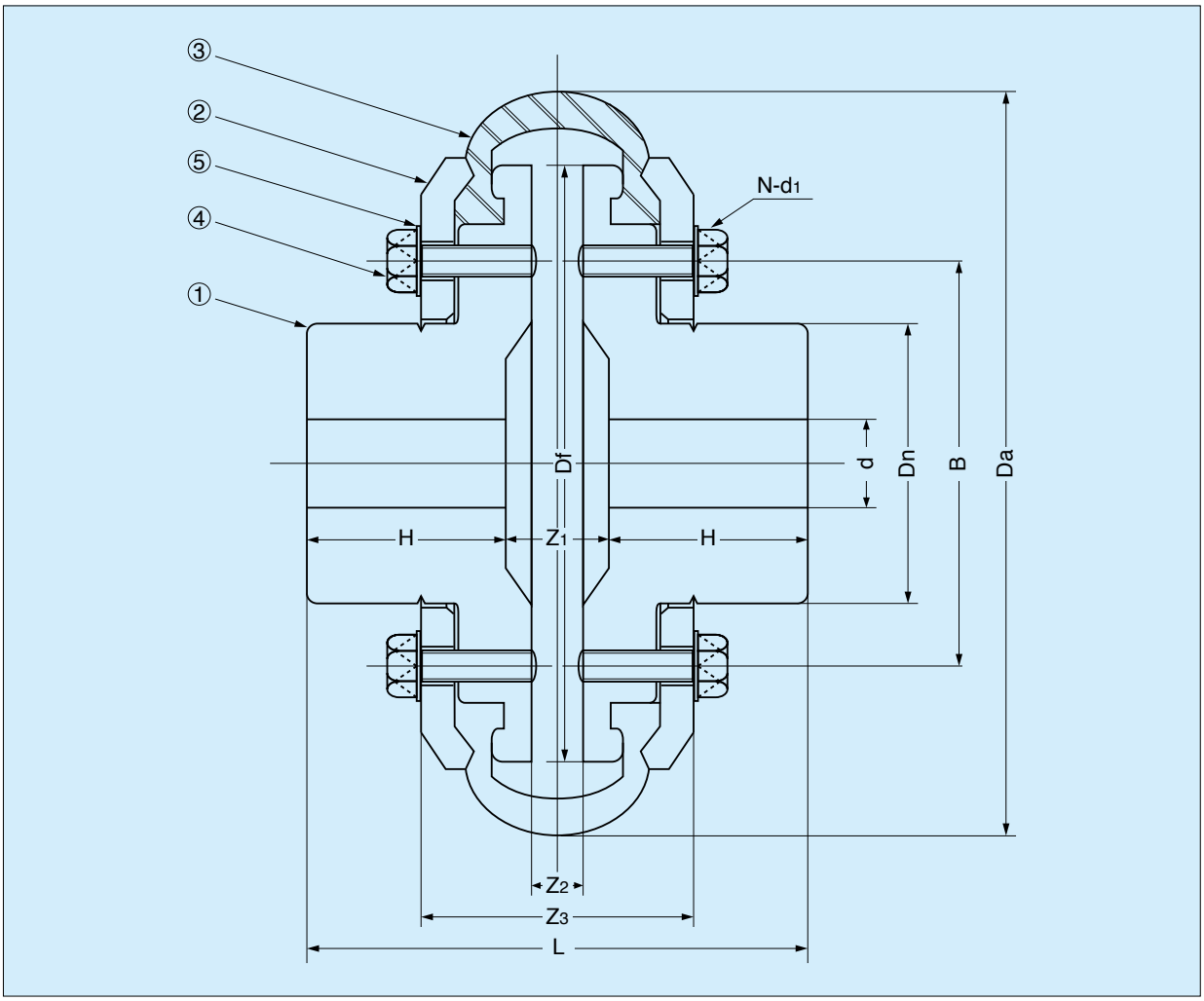
3. Simple Construction and Easy Fitting

Fitting is simple and all it takes is to bolt down the flexible element with pressure rings to a specified position (to the step of the hub-boss for type RF, or groove for type RFH.)
There is a slit in the flexible element to make installation and removal procedures simpler. This allows couplings replacement without a need to move heavy machinery.

4. No Lubrication Required

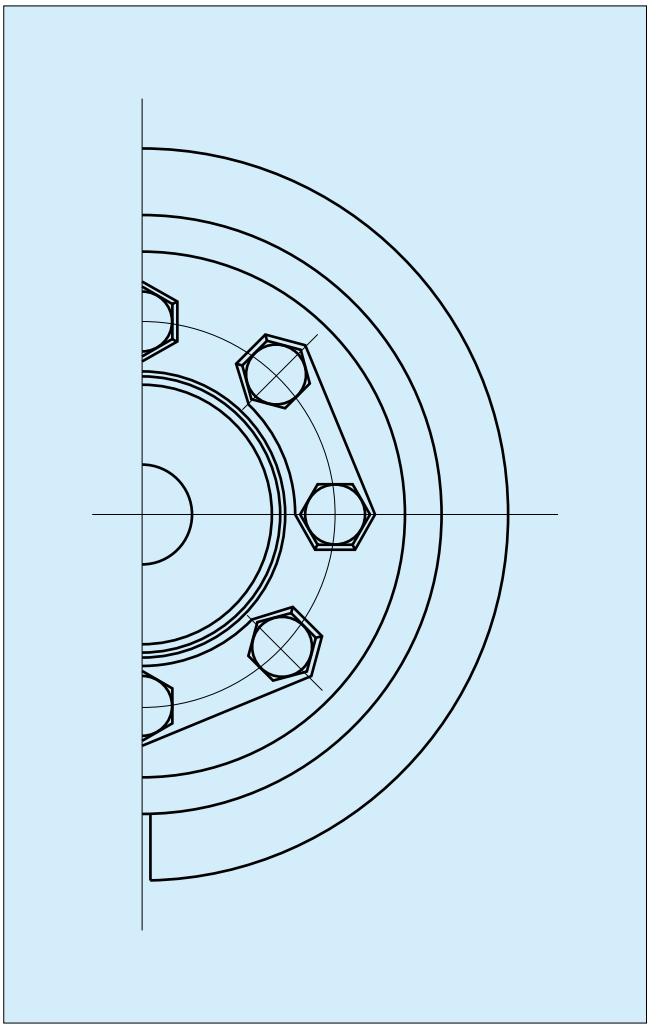
RF/RFH couplings are virtually maintenance free. They are basically not affected by moisture and dirt. Since there are no parts subjected to metallic friction, noise is minimal. They require no lubrication to prevent excessive wear. With good resistance to bending fatigue and requiring less maintenance, the cost involved in the coupling mechanism of RF/RFH couplings is lower than those of conventional couplings on the market.

TOYO RUBBFLEX RFH COUPLING SPECIFICATIONS AND DIMENSIONS



Size No.	Outer dia.	Bore		Outer dia. of boss	Total width	Length of single hub	Outer dia. of hub	Hub separation		
		Min.	Max.							
	Da	d min	d max	Dn	L	H	Df	Z_1	Z_2	Z_3
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
RFH-100	100	10	22	38	63	25	80	13	5	38
RFH-125	125	12.5	30	48	80	31.5	100	17	7	47
RFH-155	155	16	32	60	100	40	124	20	9	58
RFH-180	180	20	35	68	125	50	144	25	10	66
RFH-210	210	25	50	80	140	56	168	28	12	75
RFH-265	265	31.5	60	100	160	63	210	34	16	97
RFH-310	310	40	70	118	200	80	248	40	18	113
RFH-400	400	50	85	152	250	100	320	50	23	143
RFH-450	450	63	100	172	315	125	360	65	25	161
RFH-550	550	80	130	210	355	140	440	75	30	191
RFH-700	700	100	160	266	450	180	560	90	40	246

Note : The figures in this table represent standard measurements at the time of temporary assembly.



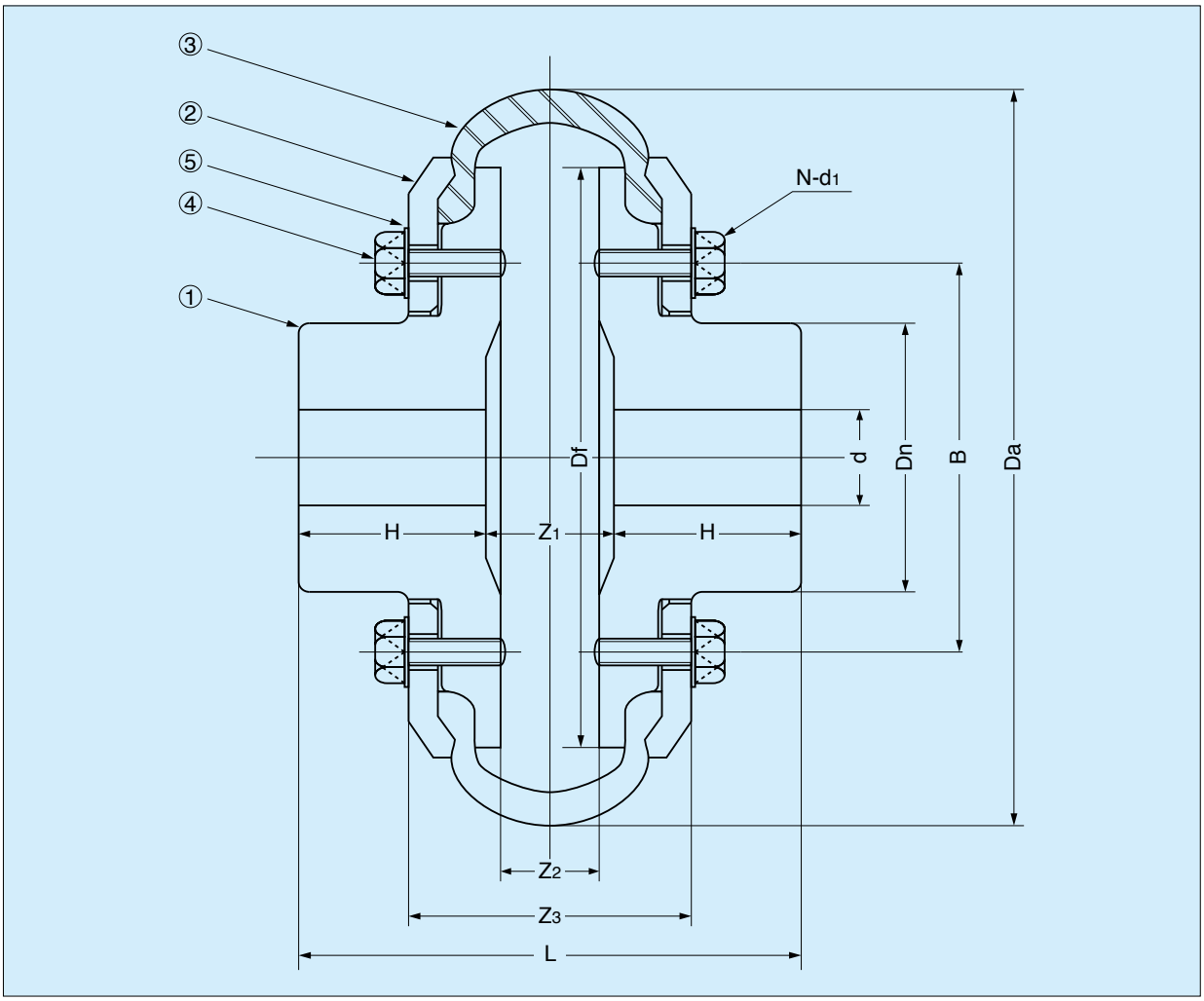
Notes

1. Flange material is FC200. SF440 can also be used instead if specified.
2. The bore size (d) will be finished using the "d min" figure, unless otherwise specified. (Tolerance:ϕd=0 to -1)
3. Specify if electrical insulation between shafts is required.
4. The maximum operating temperature is 60˚C or less.

Prod. No.	Name	Material	Surface treatment
1	Hub	FC200	Lacquer coating
2	Pressure ring	SS400	Lacquer coating
3	Flexible element	Rubber and tire cord	___
4	Bolt	SWCH10R	Zinc electroplating
5	Common washer	SPCC	Zinc electroplating

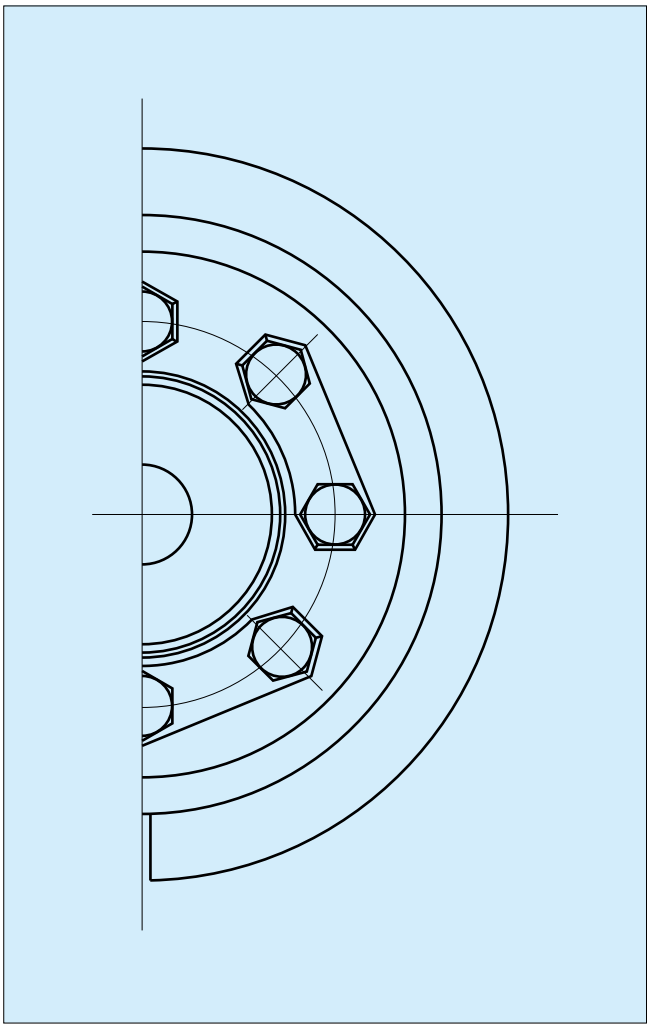
Bolt pitch dia.	Bolt size			Max. rpm	Max. torque	Mass moment of inertia	Vibration moment	Weight	
	Number of bolts	Dia. × pitch	Length						
B	N	$d_1 \times p$	ℓ	n	T	I	GD^2	W	Size No.
mm		mm	mm	r.p.m.	N·m	$N \cdot cm \cdot sec^2$	$N \cdot m^2$	kg	
54	12	M6 × 1	15	5,000	49	0.0951	0.0373	1.22	**RFH-100**
68	12	M6 × 1	20	4,500	98	0.280	0.110	2.12	**RFH-125**
84	12	M8 × 1.25	25	4,200	167	0.804	0.314	4.56	**RFH-155**
95	12	M10 × 1.5	25	3,500	294	1.69	0.657	6.88	**RFH-180**
110	16	M10 × 1.5	30	3,000	490	3.55	1.39	9.79	**RFH-210**
140	16	M12 × 1.75	40	2,500	981	11.2	4.38	20.0	**RFH-265**
165	16	M12 × 1.75	45	2,000	1,370	24.8	9.73	35.0	**RFH-310**
210	16	M16 × 2	55	1,600	3,140	86.3	33.8	75.0	**RFH-400**
240	16	M20 × 2.5	60	1,400	4,900	156	61.1	115	**RFH-450**
280	16	M24 × 3	75	1,100	9,810	422	166	190	**RFH-550**
364	16	M30 × 3.5	100	900	19,600	1,420	557	400	**RFH-700**

TOYO RUBBFLEX RF COUPLING SPECIFICATIONS AND DIMENSIONS



Size No.	Outer dia.	Bore		Outer dia. of boss	Total width	Length of single hub	Outer dia. of hub	Hub separation		
		Min.	Max.							
	Da	d min	d max	Dn	L	H	Df	Z_1	Z_2	Z_3
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
RF- 60	60	8	12	20	32	10.5	44	11	5	25
RF-100	100	10	22	36	66	26	80	14	10	40
RF-135	135	16	30	48	90	35	108	20	14	53
RF-180	180	23	35	64	120	46	144	28	20	70
RF-210	210	28	50	76	143	54	168	35	27	83
RF-265	265	33	60	95	178	67	210	44	32	105
RF-310	310	36	70	112	208	75	248	58	36	121
RF-400	400	40	85	145	270	100	320	70	44	153
RF-450	450	55	100	165	300	110	360	80	50	171
RF-550	550	90	130	200	365	130	440	105	53	196
RF-700	700	100	160	255	460	165	560	130	70	256

Note : (*1) The figures in this table represent standard measurements at the time of temporary assembly.



Note

1. Hub material is FC200 (except RF60 which uses SS400). If required, we can supply hubs wade of SF440 (JIS).
2. Unlike other models, RF-60 uses a spring washer (SWRH4) instead of the usual SS400 common washer
3. The bore size (d) will be finished using the "d min" figure, unless otherwise specified. (Tolerance: ϕd=0 to -1)
4. Specify if electrical insulation between shafts is required.
5. Recommended temperature:+20˚C, Service temperature range:-10~+60˚C.

Prod. No.	Name	Material	Surface treatment
1	Hub	FC200	Lacquer coating
2	Pressure ring	SS400	Lacquer coating
3	Flexible element	Rubber and tire cord	___
4	Bolt	SWCH10R	Zinc electroplating
5	Common washer	SPCC	Zinc electroplating

Bolt pitch dia.	Bolt size			Max. rpm	Max. torque	Mass moment of inertia	Vibration moment	Weight	
	Number of bolts	Dia. × pitch	Length						
B	N	$d_1 \times p$	ℓ	n	T	I	GD^2	W	Size No.
mm		mm	mm	r.p.m.	N·m	$N \cdot cm \cdot sec^2$	$N \cdot m^2$	kg	
29	12	M4 × 0.7	10	4,000	9.8	7.53×10^{-3}	0.0029	0.28	**RF- 60**
54	12	M6 × 1	15	4,000	29	0.0875	0.0343	1.21	**RF-100**
70	12	M8 × 1.25	20	4,000	78	0.384	0.151	2.87	**RF-135**
95	12	M10 × 1.5	25	3,000	147	1.51	0.588	6.38	**RF-180**
110	16	M10 × 1.5	30	3,000	294	3.19	1.25	9.40	**RF-210**
140	16	M12 × 1.75	40	2,000	736	10.1	3.96	19.0	**RF-265**
165	16	M12 × 1.75	45	2,000	1,230	22.4	8.77	31.0	**RF-310**
210	16	M16 × 2	55	1,600	2,700	79.1	31.0	70.0	**RF-400**
240	16	M20 × 2.5	60	1,250	4,900	139	54.6	101	**RF-450**
280	16	M24 × 3	75	1,000	9,810	378	148	170	**RF-550**
364	16	M30 × 3.5	100	800	19,600	1,260	492	358	**RF-700**

TOYO RUBBFLEX COUPLING SIZE SELECTION

1. To determine the coupling size, derive the operating torque (Md) using the formula below.

$$Md=\frac{P(=KW)}{n}\times 9547\times K \quad \text{or} \quad \frac{P(=PS)}{n}\times 7024\times K$$

Md=Operating torque (N·m)
P=Motor's power output (KW or PS)
n=Min. rpm at the point where coupling is used
K=Obtain the impact coefficient from the table below

2. Refer to the Size Table on page 4 & 6, or the right Torque/RPM Table, select a coupling with a T (Max. torque) rating equal to or larger than the required operating torque (Md).
3. If a particular coupling has a bore size (indicated on the Size Table) smaller than your requirement, select a coupling with the next larger bore size.
4. Max. rpm must also be taken into consideration when choosing a coupling.

SI Unit Conversion Table

Figures in ( ) are just numerical examples.

	SI unit	Conventional unit	Approximation	Conversion coefficient
Torque	N·m (981N·m)	kgf·m (100kgf·m)	1kgf·m10N·m	9.80665

SI units (International System of Units)

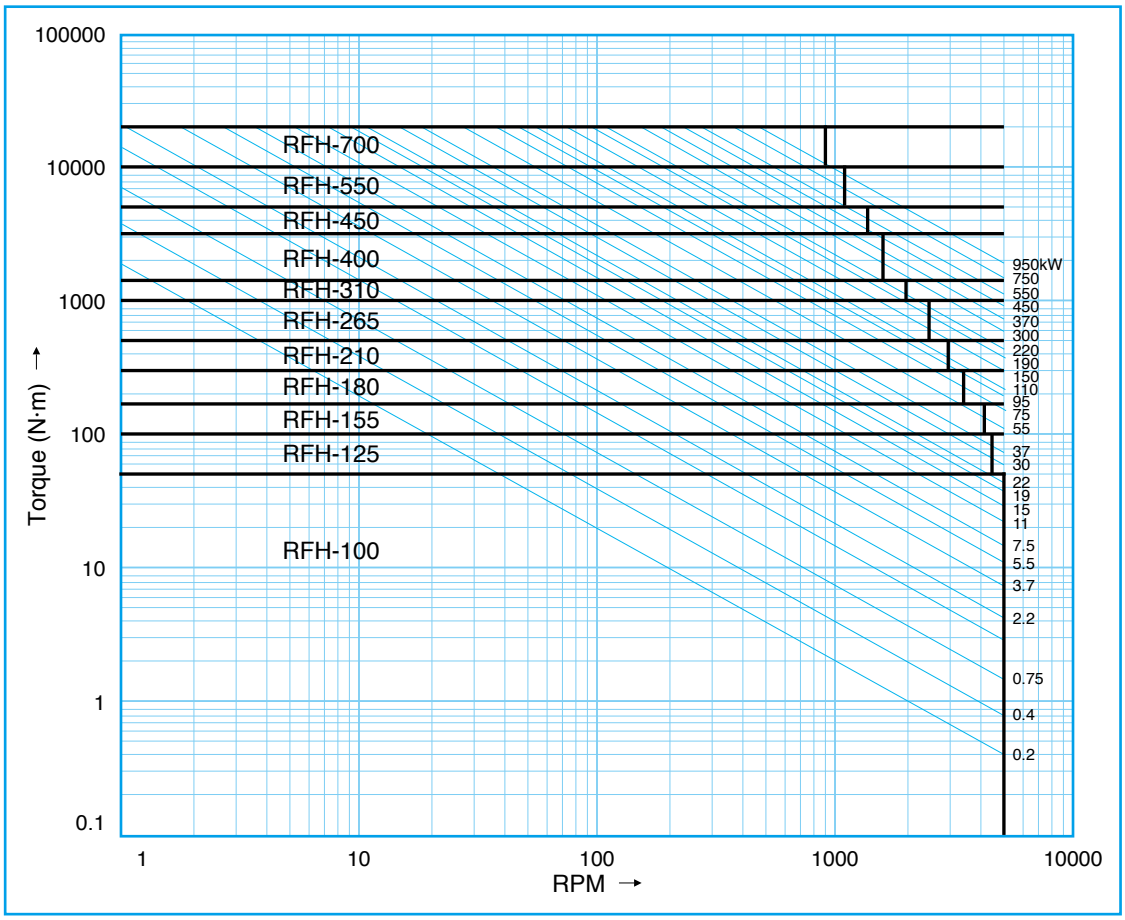
How to Determine Impact Coefficient (K)

		Impact Coefficient (K)			
		A	B	C	D
Type of motor	Electric motor	1.0	1.5	2.0	3.0
	Internal combustion engine (4 cylinders or more)	1.5	2.0	2.5	3.5
	Internal combustion engine (3 cylinders or less)	2.0	2.5	3.5	5.0
Machine characteristics	Frequency and level of torque variation	Minimal	Small	Medium	Large
Application		Small engine Belt conveyor Small machine tool Small hoist (60 rpm or less) Small centrifugal pump Wood working machine Small ventilator	Power motor Chain conveyor Sand blaster Bucket conveyor Ventilator Crane Medium size machine tool Centrifugal pump Hydraulic pump	Large lift Winch Piston Blower Cutter Hoist (300 rpm or less) Grinder Large pump Paper dryer Paper calender	Reciprocating pump with flywheel Hoist (300 rpm or less) Mill Crusher Hot-rolled table roller Compressor Drain pump Large press Drum barker Paper cutter

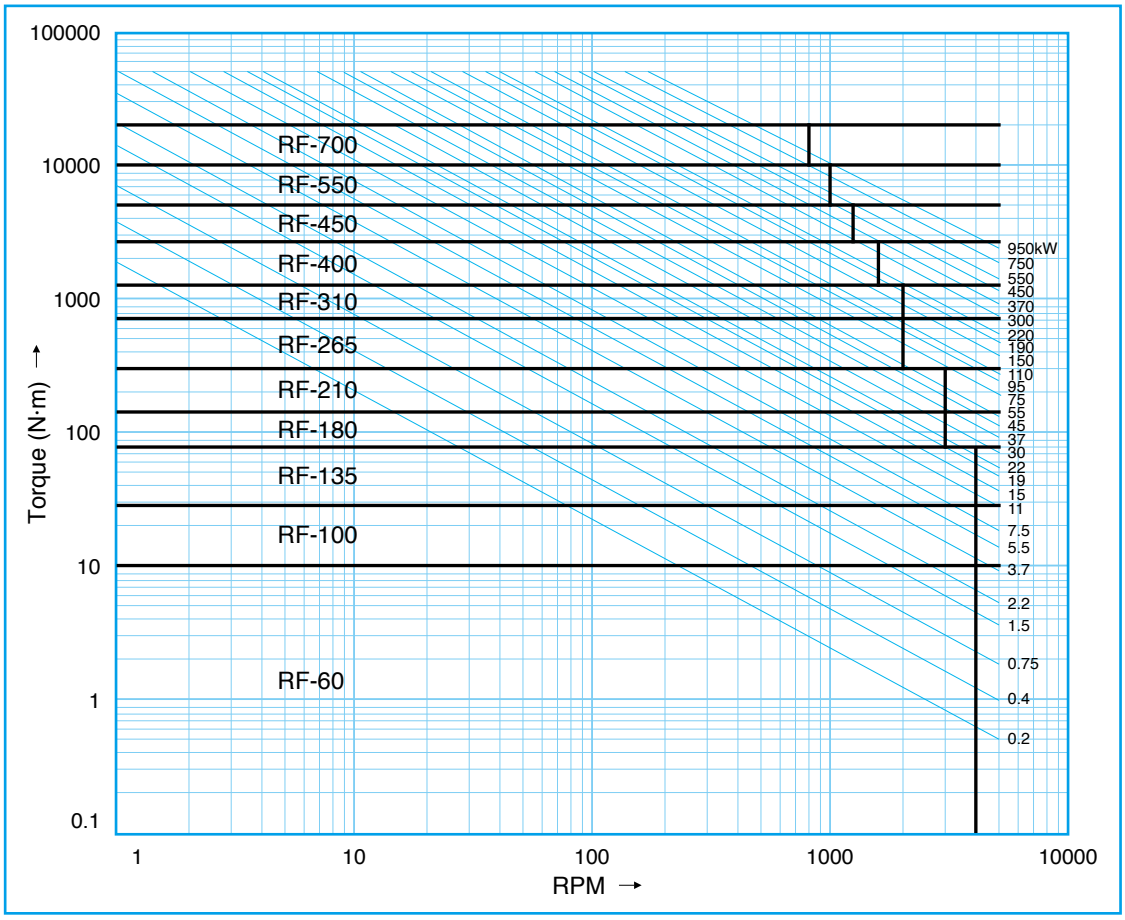
KW·RPM·Torque

$$Md=\frac{P(=KW)}{n}\times 9547\times K(=1)\ \text{ or }\ \frac{P(=PS)}{n}\times 7024\times K(=1)$$

Type RFH



Type RF

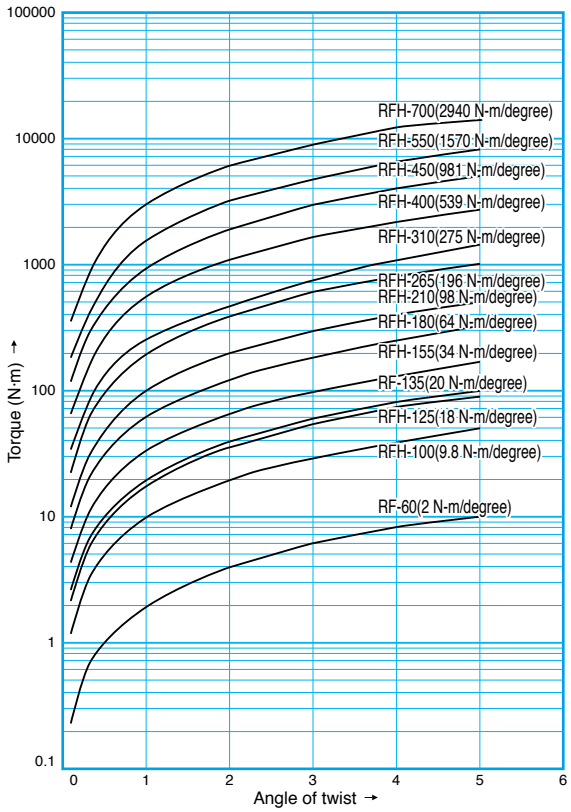


TOYO RUBBFLEX COUPLING ELASTICITY DIAGRAMS

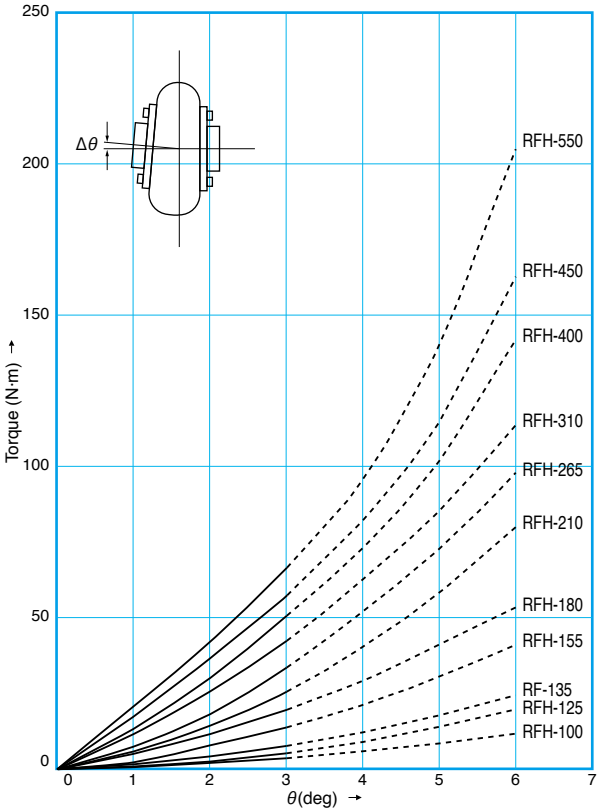
A coupling's flexibility in the direction of rotation, or the spring coefficient, is fairly proportionate to applied torque, all the way to its maximum value.

Characteristic curves are common for both type RFH and type RF.

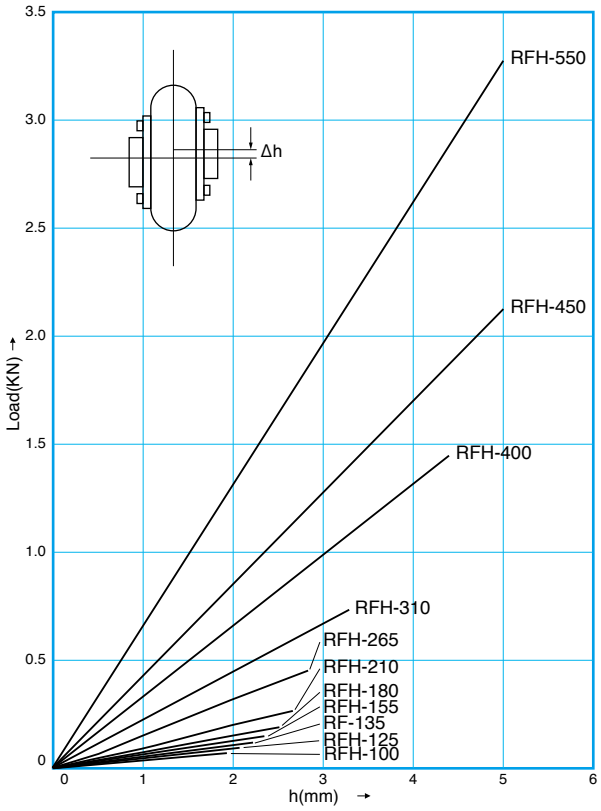
1. Torsion Characteristic Chart (Reference values)



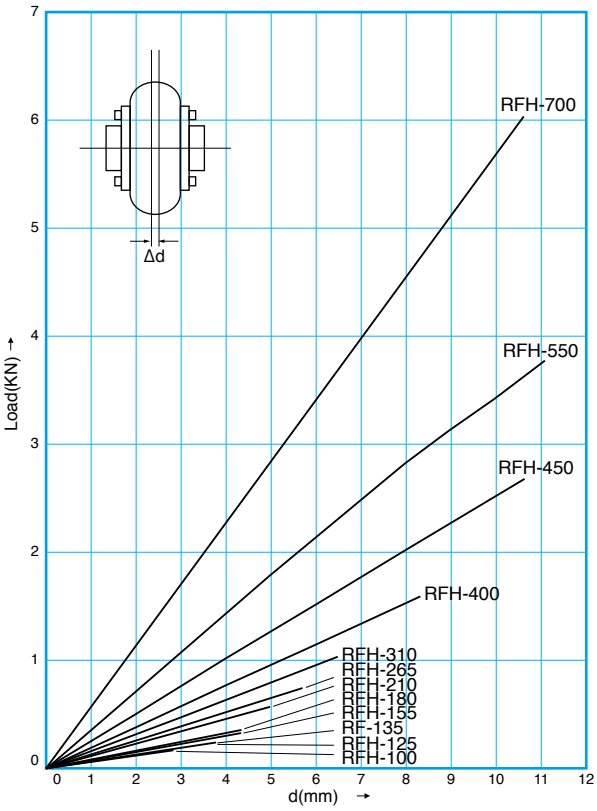
2. Torque vs. Angular Misalignment (Reference values)



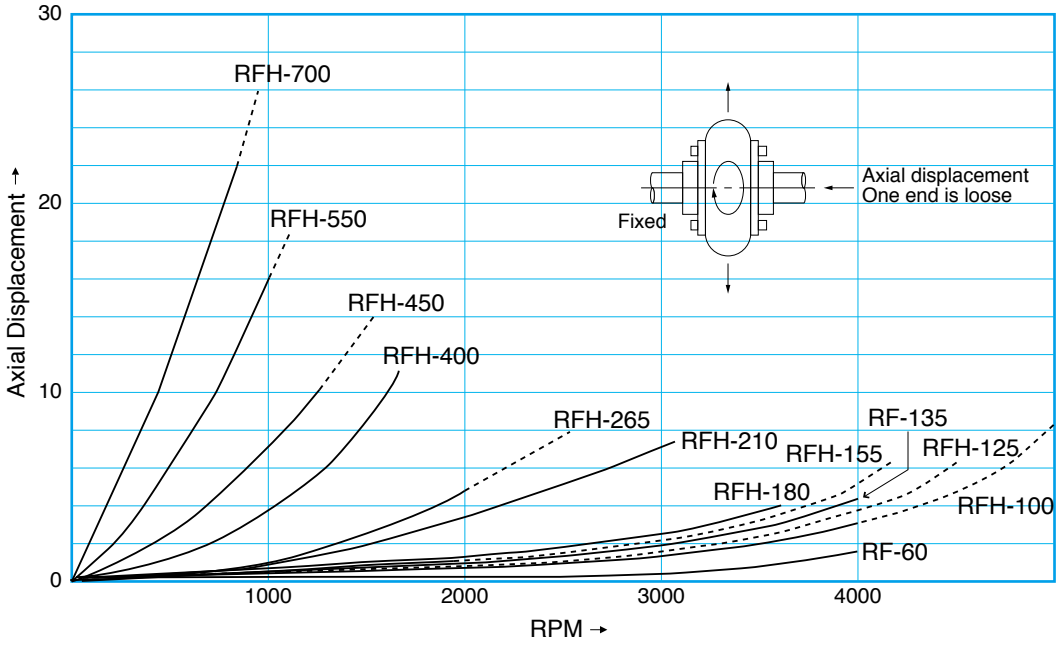
3. Load vs. Parallel Misalignment (Reference values)



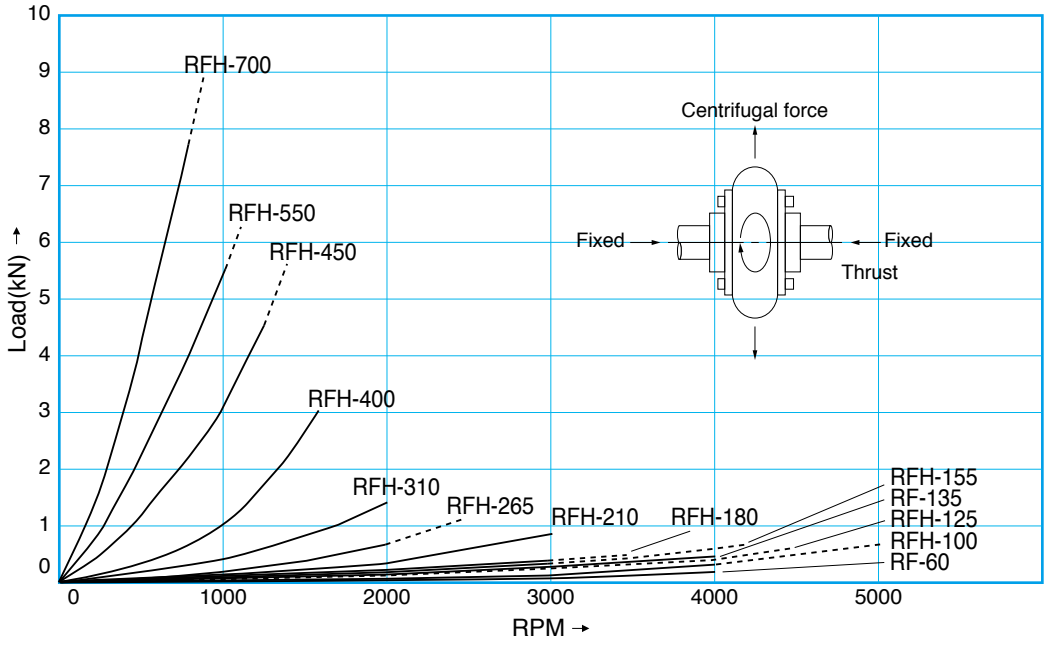
4. Load vs. Axial Misalignment (Reference values)



5. Axial Displacement vs. RPM (Reference values)



6. Thrust Load Due to Centrifugal Force vs. RPM (Reference value)



1. INSTALLATION [TYPE RFH·RF]

Step 1

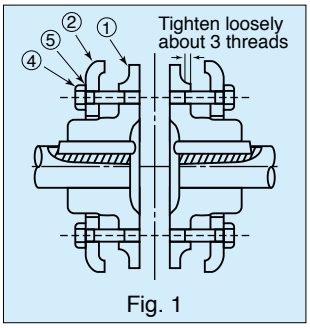


Fig. 1

Install hubs ① on each shaft along the key/keyway. Attach the pressure ring ② and common washers ⑤ using bolts ④. Tighten bolts a few turns but leave plenty of slack. Verify that shaft alignment is within the permissible limit using the Table A below.

Step 2

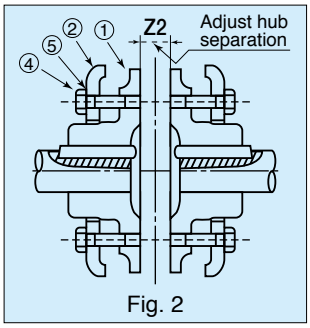


Fig. 2

Adjust hub separation (Z2) to keep it within the specified tolerance listed on p.3-8. This value needs to be uniform around the entire circumference.

Step 3

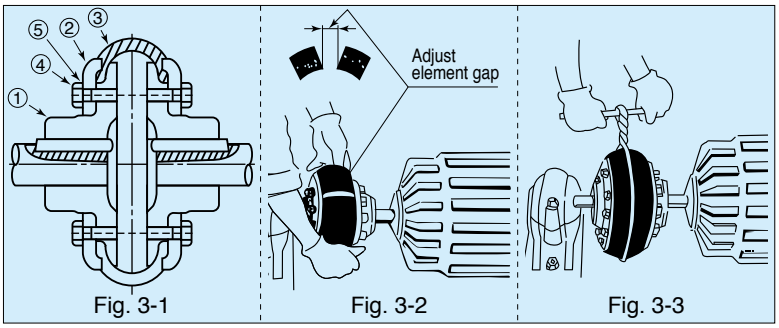


Fig. 3-1 Fig. 3-2 Fig. 3-3

Install the flexible element ③ between the hub ① and pressure ring ② as in Fig. 3-1. The flexible element is cut for easy installation. Make sure that element gap created by both ends of the flexible element stays within specified range listed on Table C and Fig.3-2. Use a rope or cloth to hold down the flexible element as in Fig.3-3 to assist installation. Tap the flexible element around the circumference with a plastic hammer for uniform alignment.

Step 4

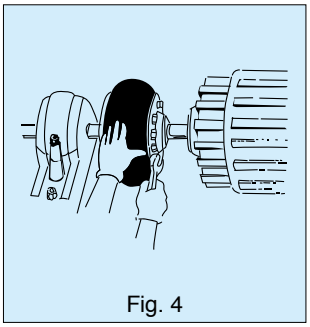


Fig. 4

Tighten pressure ring ② with the pre-attached bolts ④ in crisscross pattern for uniform compression.

Step 5

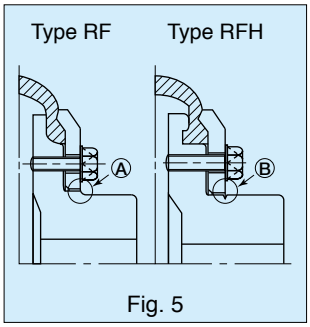


Fig. 5

Type RF has a step on the outer surface of the hub boss while type RFH has a groove as shown in Fig. 5. Tighten bolts ④ until the side of the pressure ring ② is even with the step or groove. Bolts should be tightened further in case of reassembling to prevent loosening.

Step 6

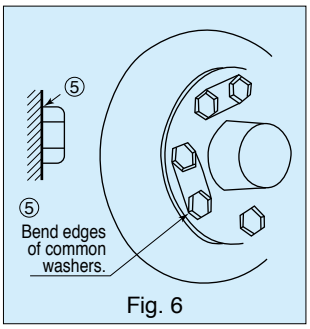


Fig. 6

Bend common washer edges to lock bolts in place. (RF-60 uses spring washers) Watch out for sharp metal edges. Place a protective cover over the coupling for improved safety.

Shaft alignment

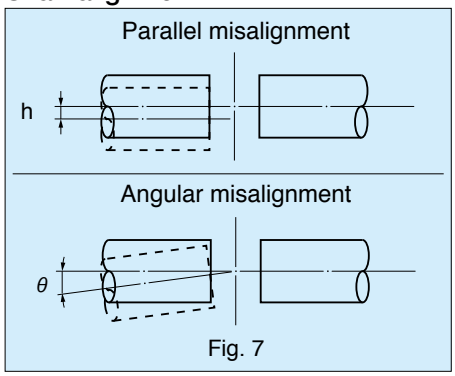


Fig. 7

Table A Standard Installation Measurement and Tolerance

Size	60	100	125	135	155	180	210	265	310	400	450	550	700
Parallel misalignment h(mm)	Less than 1% of the coupling's outer diameter												
Angular misalignment θ(deg)	Less than 3° for all couplings												
element gap (mm)	1	2	2	2	2	2	3	3	3	4	4	6	6

(For both RF and RFH types)

Please contact us for any questions on installation procedure.

2. PRECAUTIONS

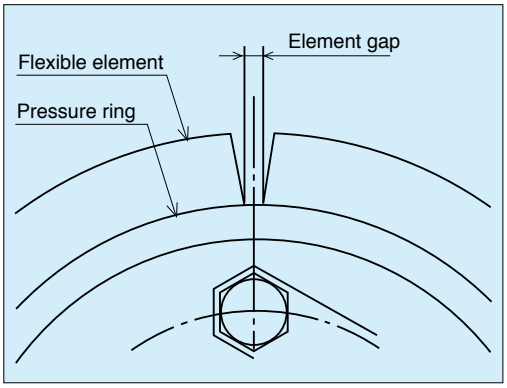
① Be sure not to exceed tolerances of torque, rpm and bore specified on p.3-8. If a coupling in use surpasses these limits, stop its use immediately. Be sure the value of torque multiplied by an appropriate impact coefficient is below the specified maximum torque.

② Make sure washer edges are bent sufficiently to block bolt movement. See fig. 6.

③ The element gap should stay within limits indicated on Table A. If not, reassemble the coupling. (Extra tightening is required after reassembly.)

④ Shaft misalignments must stay within specified limits explained on p2.

⑤ In places where free rotation due to coupling failure is not acceptable, such as a crane, install a brake, fallout prevention and/or other safety mechanism.



⑥ Install a protective cover.

⑦ Rotation creates thrust. Use bearings with adequate rating to withstand this. As for the thrust force, refer to a catalogue.

⑧ Recommended temperature:+20˚C, Service temperature range:-10~+60˚C.

3. MAINTENANCE AND STORAGE

① Avoid oil, grease, acid, alkaline, paint or organic solvent. If accidentally exposed, wipe off immediately.

② Do not expose the flexible element to direct sunlight.

③ Keep away couplings from tight places where it may force the rubber to disfigure, both in use and in storage.

④ Do not damage the flexible element with blades or any other sharp objects.

⑤ For storage seal couplings in polyurethane bags and place them in a dry dark compartment at below 40˚C.

Table B

Depth Limit of a Crack

Size	Limit
60～155	1mm
180～265	2mm
310	3mm
400～550	5mm
700	8mm

Table C

Element Gap Limit

Size	Limit
60	3mm
100～180	5mm
210～310	6mm
400～450	8mm
550～700	10mm

(Common for both RF and RFH types)

4. PERIODIC MAINTENANCE AND REPLACEMENT

Perform periodic maintenance at least once every 6 months. Completely stop the coupling before working. A coupling should be replaced when it matches the condition described below.

① A rip in the flexible element (especially along pressure ring) appears and it reaches the depths indicated on Table B.

② The element gap exceeds the limit specified on Table C.

③ If bolts no longer have tightening freedom to adequately fasten the flexible element.

④ If the flexible element's fiber is exposed or surface irregularities are formed by abrasion.

⑤ If the flexible element or a portion of it is weakened by exposure to oil, grease or any other chemical agents.

⑥ If the flexible element is hardened from high temperature or extended use.

When selecting a coupling or placing a special order, please inform us the following details.

Transmission torque of the drive shaft	Nominal	Peak		
RPM of the drive shaft	Nominal	Peak	Minimum	
Rotating direction of the drive shaft (i.e. right, reverse, unidirectional)				
Type of the motor (i.e. electric motor, internal combustion engine)				
Type of the driven unit (i.e. pump, fan, conveyor)				
Size limit of the coupling	Diameter	or less	Length	or less
Shaft diameter of the motor				
Shaft diameter of the driven unit				
Operating environment (i.e. indoor/outdoor, ambient temperature, existence of oil or other chemicals: see above for details)				

Let us know if a special consideration is required besides what is already listed. If bore processing is required, please inform us diameters of both shafts, keyway dimensions and finish tolerance besides the coupling's size number. (Processing fee is charged separately.)
Please contact us if you have any questions.

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Products:
Coupling, Mounting, Air spring, Solid polyurethane product, PVC hose, Rubber hose, FRP(fiberglass reinforced polyester) product, FRP air pollution control system, Other industrial rubber products, Automobile tire & tube, Polyurethane foam.

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