

High precision dual rubber coupling

STEPFLEX STF

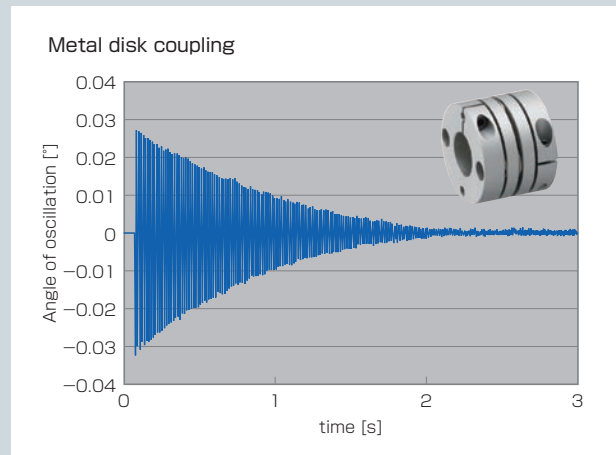
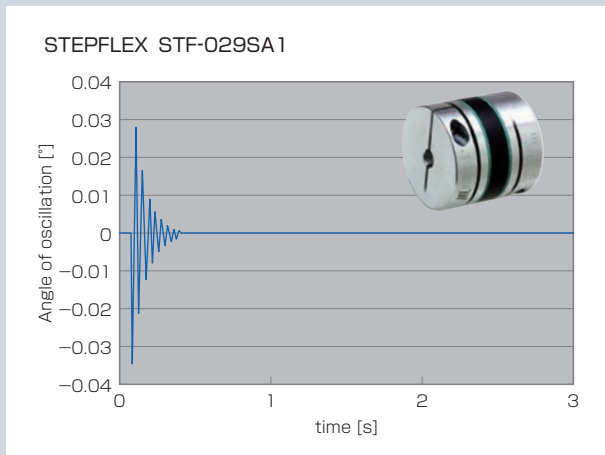


High-damping couplings

Our newly developed laminated rubber element achieves high damping and low reaction force. Their unitized construction with HNBR in the power-transmitting elements provides a backlash-free design. They dampen vibration faster than flexible couplings that use metal in their elastic components. This suppresses the resonance phenomenon that can occur with stepper motors, enabling resonance to be avoided over a wide range of operating speeds. It also provides stable high-speed control. *Patent pending

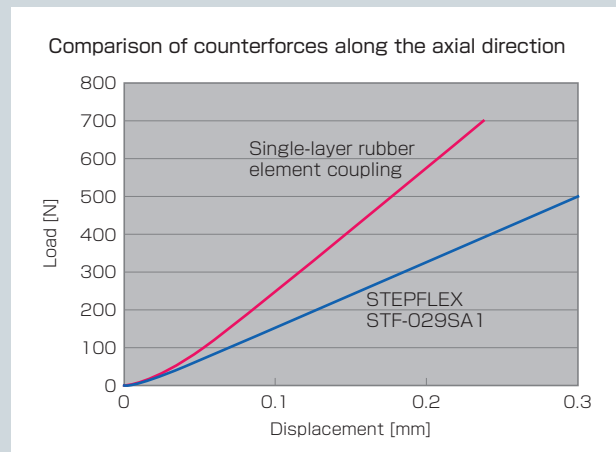
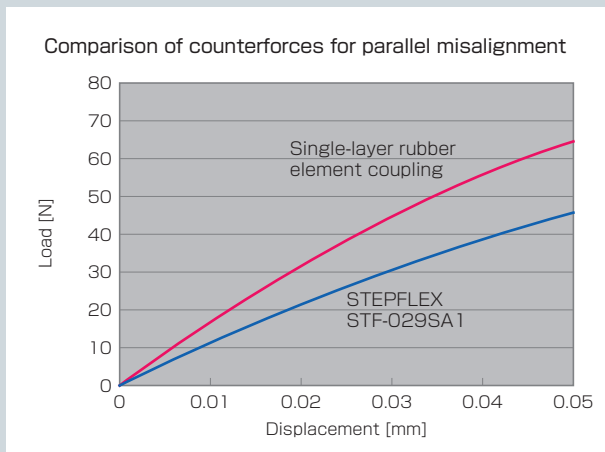
Excellent damping performance

The STEPFLEX laminated rubber element couplings provide better damping performance than standard metal disc couplings.



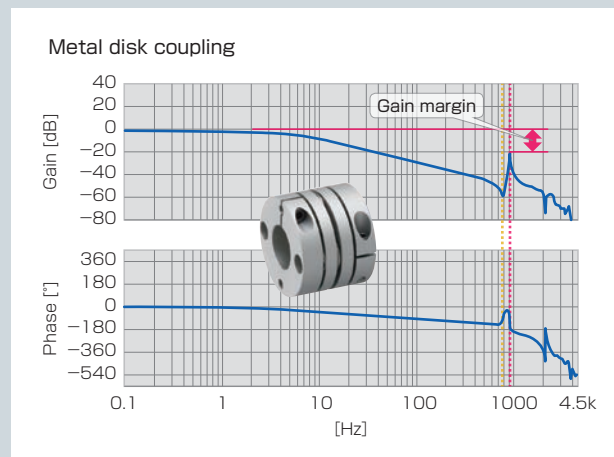
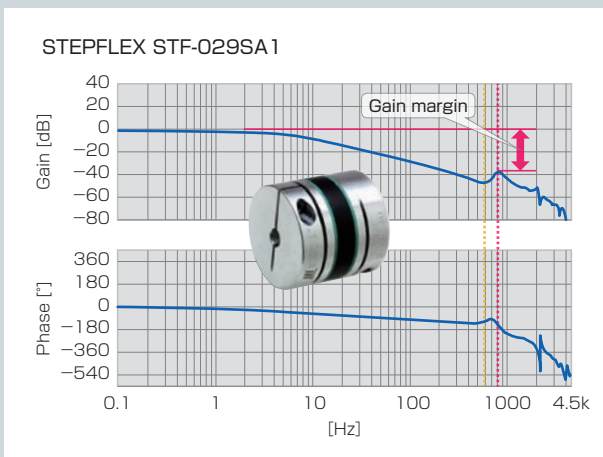
Shaft counterforce is also reduced

Use of a laminated rubber element with layers of varying hardnesses of rubber works to dramatically cut down on counterforces generated along the parallel and axial directions.



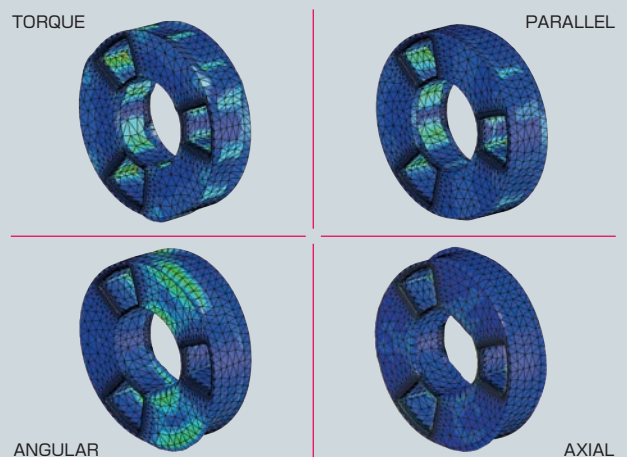
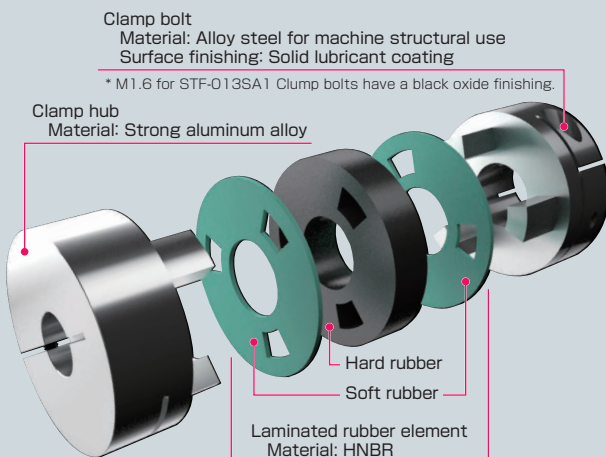
Possible to set higher gain

Damping effect is confirmed from the Bode plot. Gain margin is large compared to metal disk coupling, it is possible to increase the gain.



Laminated element structure made up of hard and soft rubber layers

The couplings have a simple, integrated laminated rubber structure formed of layers of hard rubber sandwiched between layers of soft rubber.



* These measurement results were calculated from actual experiments performed using MIKI PULLEY procedures and are not to be interpreted as guarantees of product performance.

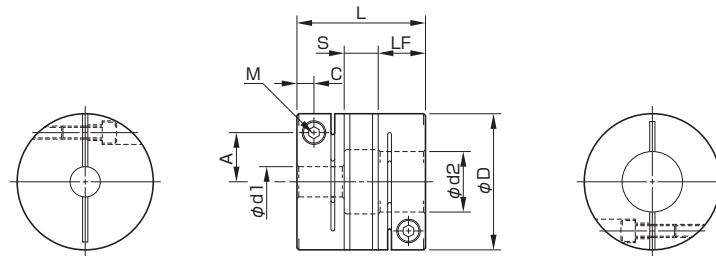
STF Model

Specifications

Model	Torque		Misalignment			Max. rotation speed [min ⁻¹]	Static torsional stiffness [N·m/rad]	Moment of inertia [kg·m ²]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
STF-013SA1	0.5	1	0.15	1.5	±0.2	10000	15	0.11 × 10 ⁻⁶	0.004
STF-016SA1	1	2	0.15	1.5	±0.2	10000	27	0.29 × 10 ⁻⁶	0.008
STF-019SA1	1.5	3	0.15	1.5	±0.2	10000	38	0.70 × 10 ⁻⁶	0.013
STF-024SA1	2.5	5	0.15	1.5	±0.2	10000	127	1.89 × 10 ⁻⁶	0.023
STF-029SA1	4	8	0.2	1.5	±0.3	10000	201	4.40 × 10 ⁻⁶	0.034
STF-034SA1	6	12	0.2	1.5	±0.3	10000	371	9.80 × 10 ⁻⁶	0.056
STF-039SA1	8.5	17	0.2	1.5	±0.3	10000	485	21.15 × 10 ⁻⁶	0.091
NEW STF-044SA1	15	30	0.2	1.5	±0.3	10000	996	37.34 × 10 ⁻⁶	0.120

* Check the Max. Torque for the Shaft Diameter list as there may be limitations on the standard and maximum torque caused by the holding power of the coupling shaft section. * The max. rotation speed values do not take into account dynamic balance. * The static torsional stiffness values are analysis values for the element taken at a temperature of 20°C at maximum bore diameter. * The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



Model	d1 · d2 [mm]		D [mm]	L [mm]	LF [mm]	S [mm]	A [mm]	C [mm]	M Quantity-Nominal dia.	Tightening torque [N·m]
	Min.	Max.								
STF-013SA1	3	5	13	18	6	6	3.9	2	1-M1.6	0.23 ~ 0.28
STF-016SA1	3	6	16	22	7.5	7	4.8	2.5	1-M2	0.4 ~ 0.5
STF-019SA1	3	8	19	25	9	7	5.8 (6)	3.15	1-M2.5 (M2)	1.0 ~ 1.1 (0.4 ~ 0.5)
STF-024SA1	5	10	24	27	9	9	8.7	3.15	1-M2.5	1.0 ~ 1.1
STF-029SA1	5	14	29	30	10	10	11	3.3	1-M2.5	1.0 ~ 1.1
STF-034SA1	5	16	34	34	12	10	12.5	3.75	1-M3	1.5 ~ 1.9
STF-039SA1	6	19	39	41	15.5	10	14	4.5	1-M4	3.4 ~ 4.1
NEW STF-044SA1	8	24	44	48	15.5	17	17	4.5	1-M4	3.4 ~ 4.1

* The nominal diameter for the clamp bolt M is equal to the quantity · the nominal diameter of the screw, where the quantity is for a hub on one side. * The values in () of the STF-019, d1 or d2 is the value in the case of ø8mm. * The escape in the internal diameter of the element is equal to dimension d2 (large diameter) plus ø0.5 mm. * The rated dimension tolerance for countershafts is h7 class.

Standard bore diameters

Model	Standard bore diameters d1 · d2 [mm]																						
	3	4	5	6	6.35	7	8	9	9.525	10	11	12	13	14	15	16	17	18	19	NEW 20	NEW 22	NEW 24	
STF-013SA1	●	●	●																				
STF-016SA1	●	●	●	●																			
STF-019SA1	●	●	●	●	●	●	●																
STF-024SA1			●	●	●	●	●	●	●	●													
STF-029SA1			●	●	●	●	●	●	●	●	●	●	●	●									
STF-034SA1			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●						
STF-039SA1				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
NEW STF-044SA1							●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

* The bore dimensions in cells marked with a "●" are used as standard bore dimensions. * Check the table for information on max. torque for the shaft diameter as there may be limitations on the standard and maximum torque determined by the holding power of the coupling shaft section depending on the bore diameter used.



Max. torque for the shaft diameter

Model	Standard bore diameters [mm] and Max. torque for the shaft diameter [N · m]																					
	3	4	5	6	6.35	7	8	9	9.525	10	11	12	13	14	15	16	17	18	19	20	22	24
STF-013SA1	0.10	0.25	0.40																			
STF-016SA1	0.5	0.6	0.7	0.8																		
STF-019SA1	0.8	1.2	1.6	1.9	1.9	2.3	0.8															
STF-024SA1			1.6	2.1	2.1	2.6	3.3	4.0	4.0	4.7												
STF-029SA1			1.8	2.2	2.2	2.7	3.4	4.1	4.1	4.8	5.5	6.3	7.8	8.0								
STF-034SA1			2.7	3.0	3.0	3.3	4.0	4.8	4.8	5.6	6.5	7.8	9.0	10.7	12.0	12.0						
STF-039SA1				3.4	3.4	4.0	5.0	6.1	6.1	7.1	8.2	9.3	10.4	11.5	12.8	14.0	15.3	16.6	17.0			
STF-044SA1							6.0	8.3	8.3	9.8	11.3	12.8	14.3	16.0	17.3	18.8	20.3	21.8	23.5	24.8	27.8	30.0

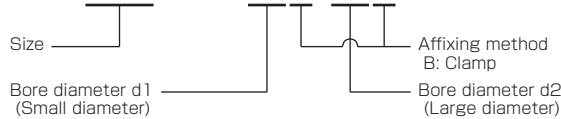
* Check this table as there may be limitations on the standard and maximum torque caused by the holding power of the coupling shaft section. * The max. limit-received torque is a torque value of the small diameter side (d1). However, only in the case that STF-019SA1's d1 or d2 is $\phi 8$ mm does the clamp bolt size down, so the limiting value is 0.8N · m. Please keep this in mind.

Standard bore diameters and Max. torque of STF-019SA1

d1-d2	Max. torque [N · m]	d1-d2	Max. torque [N · m]	d1-d2	Max. torque [N · m]	d1-d2	Max. torque [N · m]	d1-d2	Max. torque [N · m]	d1-d2	Max. torque [N · m]	d1-d2	Max. torque [N · m]
3B-3B	0.8	3B-4B	0.8	3B-5B	0.8	3B-6B	0.8	3B-6.35B	0.8	3B-7B	0.8	3B-8B	0.8
		4B-4B	1.2	4B-5B	1.2	4B-6B	1.2	4B-6.35B	1.2	4B-7B	1.2	4B-8B	0.8
				5B-5B	1.6	5B-6B	1.6	5B-6.35B	1.6	5B-7B	1.6	5B-8B	0.8
						6B-6B	1.9	6B-6.35B	1.9	6B-7B	1.9	6B-8B	0.8
								6.35B-6.35B	1.9	6.35B-7B	1.9	6.35B-8B	0.8
										7B-7B	2.3	7B-8B	0.8
												8B-8B	0.8

How to Place an Order

STF-029SA1-10B-14B



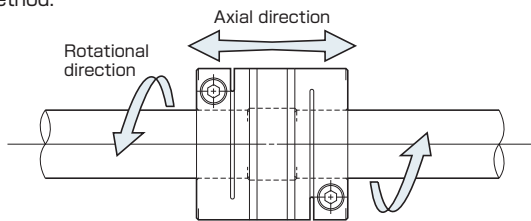
Items Checked for Design Purposes

■ Precautions for handling

- (1) Couplings are designed for use within an ambient temperature range from -20°C to 80°C . Do not attempt to use in environments that are exposed to water, oil, acidic or alkali solutions, ozone, chemicals, or other potentially harmful substances. Make sure to use a suitable cover when using or storing in direct sunlight as sunlight could shorten the life of the element.
- (2) Do not tighten up clamp bolts until after inserting the mounting shaft.

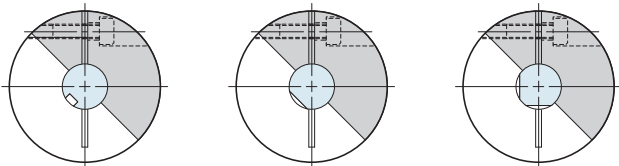
■ Mounting

- (1) Check for loose clamp bolts and remove any rust, dust, oil residue, etc. from the inner diameter surfaces of the shaft and couplings. (Use a waste cloth, etc. to wipe away oil residue or an oil remover as needed.)
- (2) Be careful when inserting the couplings into the shaft so as not to apply excessive force of compression or tensile force to the element. Be particularly careful not to apply excessive compressing force needlessly when inserting couplings into the opposite shaft after attaching the couplings to the motor.
- (3) With two of the clamp bolts loosened, make sure that couplings move gently along the axial and rotational directions. Readjust the centering of the two shafts if the couplings fail to move smoothly enough. This method is recommended as a way to easily check the concentricity of the left and right sides. If unable to use the same method, check the mounting accuracy using machine parts quality control procedures or an alternative method.

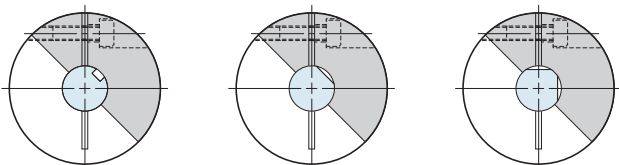


- (4) As a general rule, round shafts are to be used for the paired mounting shaft. If needing to use a shaft with a different shape, be careful not to insert it into any of the locations indicated in the diagrams below. (Do not attempt to face keyed grooves, D-shaped cuts, or other insertions to the grayed areas) Placing the shaft in an undesirable location may cause the couplings to break or lead to a loss in shaft holding power. It is recommended that you use only round shafts to ensure full utilization of the entire range of coupling performance.

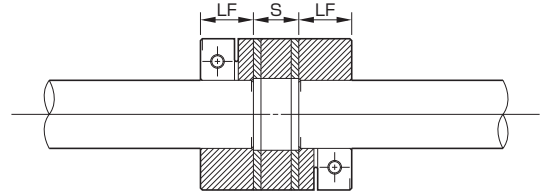
■ Proper mounting examples



■ Poor mounting examples



- (5) Insert each shaft far enough in that the opposite shaft touches the shaft along the entire length of the clamping hub of the coupling (LF length) as shown in the diagram below. In addition, restrict the dimensions between clamp hub faces (S dimensions in the diagram) within the permissible error of the axial direction displacement with respect to a reference value. Note that the tolerance values were calculated based on the assumption that both the level of eccentricity and angle of deviation are zero. Adjust to keep this value as low as possible.



Model	LF [mm]	S [mm]
STF-013SA1	6	6
STF-016SA1	7.5	7
STF-019SA1	9	7
STF-024SA1	9	9
STF-029SA1	10	10
STF-034SA1	12	10
STF-039SA1	15.5	10
STF-044SA1	15.5	17

- (6) Check to make sure that no compression or tensile force is being applied along the axial direction before tightening up the two clamp bolts. Use a calibrated torque wrench to tighten the clamping bolts to within the tightening torque range listed below.

Model	Nominal Clamp bolt diameter	Tightening torque [N · m]
STF-013SA1	M1.6	0.23 ~ 0.28
STF-016SA1	M2	0.4 ~ 0.5
STF-019SA1	M2.5 (M2)	1.0 ~ 1.1 (0.4 ~ 0.5)
STF-024SA1	M2.5	1.0 ~ 1.1
STF-029SA1	M2.5	1.0 ~ 1.1
STF-034SA1	M3	1.5 ~ 1.9
STF-039SA1	M4	3.4 ~ 4.1
STF-044SA1	M4	3.4 ~ 4.1

* Use M2 bolts on STF-019SA1 models with holes with a diameter of $\phi 8$ mm. * The start and end numbers for the tightening torque ranges are between the minimum and maximum values. Tighten bolts to a tightening torque within the specified range for the model used.

■ Compatible torque driver

Nominal bolt diameter	Tightening torque [N · m]	Torque driver	Hexagon bit	Coupling size
M1.6	0.23 ~ 0.28	N3LTDK	CB1.5mm	013
M2	0.4 ~ 0.5	N6LTDK	SB1.5mm	016 · 019
M2.5	1.0 ~ 1.1	N12LTDK	SB2mm	019 · 024 · 029
M3	1.5 ~ 1.9	N20LTDK	SB2.5mm	034
M4	3.4 ~ 4.1	N50LTDK	SB3mm	039 · 044

■ Clamp bolts

Make sure to use the specified clamp bolts as the ones provided by MIKI PULLEY come with solid lubricant coatings (except for on M1.6 bolts for STF-013SA1). Applying a coating of screw-locking compound such as an adhesive compound, oil, or another substance to the clamp bolts may cause the torque factor to change due to the presence of lubricant, which could generate an excessive axial force and cause the clamp bolt or coupling to become damaged. Do not attempt to apply an anaerobic thread-locking compound to the screw threads under any circumstances as such compounds could adversely affect the parts

Points to consider regarding the feed screw system

STF model STEPFLEX couplings, which work to dramatically suppress and prevent resonance caused by the stepper motor and vibration produced in the servo motor using the damping characteristics of the laminated rubber element, can be selected relatively easily.

When needing to base selections on more detailed analysis, consider the below points before making a decision.

Please contact MIKI PULLEY for assistance with inquiries regarding resonance in the stepper motor, vibrations in the servo motor, and other issues.

Resonance phenomena produced by the stepper motor

The resonance phenomena produced by the stepper motor occurs in a certain range of usage speed due to the pulsation frequency of the stepper motor and the overall torsional natural frequency of the system.

To prevent resonance, leave the system as is and work to avoid using the resonant speed, or consider adjusting the torsional natural frequency at the design stage.

Servo motor vibration

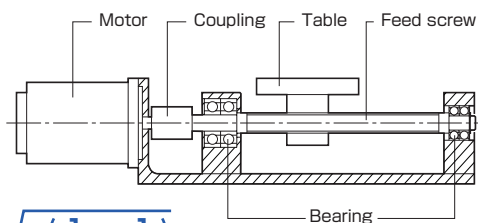
There is a concern that the servo motor will produce vibration caused by adjustment of the servo motor gain when the overall torsional natural frequency of the feed screw system is under 400 Hz to 500 Hz.

Vibration in the servo motor during operation can cause problems particularly with the overall natural frequency and electrical control systems of the feed screw system.

In order for these issues to be resolved, the torsional stiffness for the coupling and feed screw section and the moment of inertia and other characteristics for the system overall will need to be adjusted and the torsional natural frequency for the mechanical system raised during the design stage or the tuning function (filter function) for the electrical control system in the servo motor adjusted.

How to find the natural frequency of a feed screw system

- Select a suitable coupling for the application at hand from the standard and maximum torque of the servo motor and stepper motor.
- Find the overall natural frequency, N_f , from the torsional stiffness of the coupling and feed screw, K , the moment of inertia of the driver, J_1 , and the moment of inertia of the follower, J_2 , for the feed screw system shown below.



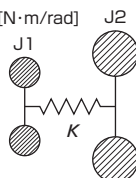
$$N_f = \frac{1}{2\pi} \sqrt{K \left(\frac{1}{J_1} + \frac{1}{J_2} \right)}$$

N_f : Overall natural frequency of a feed screw system [Hz]

K : Torsional stiffness of the coupling and feed screw [N·m/rad]

J_1 : Moment of inertia of the driver [kg·m²]

J_2 : Moment of inertia of the follower [kg·m²]



Selection

- Find the torque T_a applied to the coupling using the output capacity, P , of the driver and the usage speed, n .

$$T_a \text{ [N·m]} = 9550 \times \frac{P \text{ [kW]}}{n \text{ [min}^{-1}\text{]}}$$

- Set the service factors K using the usage conditions, operating conditions, and other conditions, and find the amount of correction torque T_d to apply to the coupling.

$$T_d \text{ [N·m]} = T_a \text{ [N·m]} \times K_1 \times K_2 \times K_3 \times K_4$$

Service factor, K_1 , found using the load properties

Load properties	Constant	Vibration : Small	Vibration : Medium	Vibration : Large
K_1	1.0	1.25	1.75	2.25

Service factor, K_2 , found using the operating time

Hrs./day	to 8	to 16	to 24
K_2	1.0	1.12	1.25

Service factor, K_3 , found using the startup and braking frequencies

Times/min.	to 60	to 120	to 360	Over 360
K_3	1.0	1.3	1.5	*

* Please consult MIKI PULLEY for assistance with items marked with [*].

Service factor, K_4 , found using the ambient temperature

Temp. [°C]	-20 to 30	30 to 40	40 to 50	50 to 60	60 to 70	70 to 80
K_4	1.0	1.1	1.2	1.4	1.6	1.8

- Set the size so that the rated coupling torque, T_n , is higher than the correction torque, T_d .

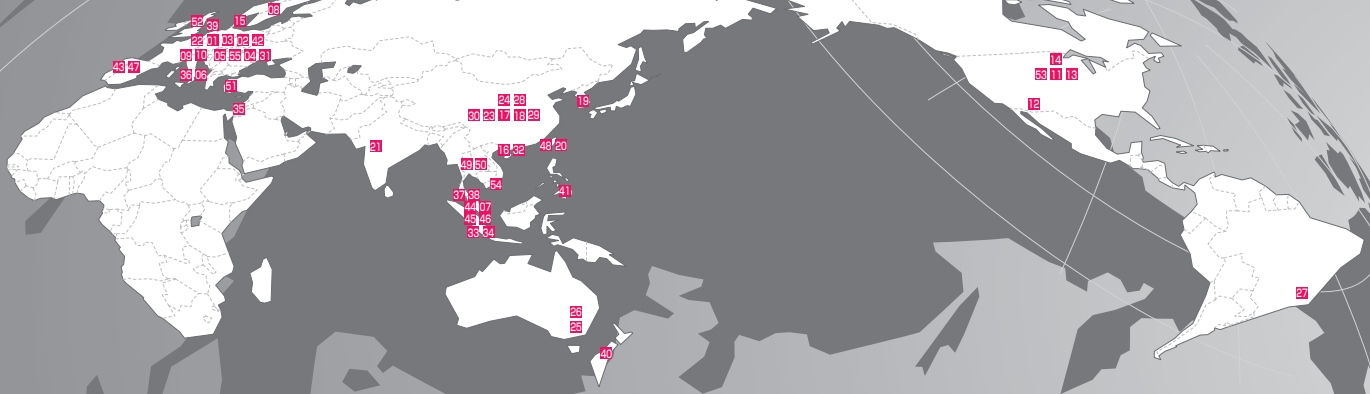
$$T_n \text{ [N·m]} \geq T_d \text{ [N·m]}$$

- Set the size so that the max. torque for the coupling T_m is higher than the peak torque T_s generated on the driver side, follower side, or both sides. Maximum torque refers to the maximum amount of torque that can be applied temporarily and up to around ten instances a day in cases where operated for eight hours.

$$T_m \text{ [N·m]} \geq T_s \text{ [N·m]} \times K_4$$

- Select an appropriate coupling for applications in which the shaft diameter of the required shaft exceeds the max. bore diameter for the selected size. The transmission torque may be limited by the bore diameter of the clamping hub. Check to make sure that the max. torque for the shaft diameter of the selected coupling size is higher than the peak torque T_s applied on the coupling.
- Contact MIKI PULLEY for assistance with any device experiencing extreme periodic vibrations.

World Wide Network



PARTNERS

01 GERMANY
CENTA ANTRIEBE KIRSCHHEY GmbH
BERGISCHE STRASSE 7 42781 HAAN, GERMANY
TEL:49-2129-9120 FAX:49-2129-2790

05 GERMANY
SCHMIDT-KUPPLUNG GmbH
WILHELM-MAST-STRASSE 15 D-38304
WOLFENBUETTEL, GERMANY
TEL:49-5331-9552-500 FAX:49-5331-9552-552

09 SWITZERLAND
BAMATEC AG
FABRIKSTRASSE POSTFACH CH 8734 ERMENSWIL,
SWITZERLAND
TEL:41-55-2868-585 FAX:41-55-2868-525

18 U.S.A.
LOVEJOY, INC.
2855 WISCONSIN AVENUE, DOWNERS GROVE, ILLINOIS
60515, U.S.A.
TEL:1-630-852-0500 FAX:1-630-852-2120

02 GERMANY
INTORQ GmbH & Co.KG
WULMSER WEG 5, D-31855 AERZEN GERMANY
TEL:49-5154-9539-41 FAX:49-5154-9539-10

06 ITALY
MOTOVARIO S. p. A.
VIA QUATTROPASSI, 1/3-411043 FORMIGINE (MO),
ITALY
TEL:39-0595797111 FAX:39-0595797110

10 SWITZERLAND
ROSTA AG
HAUPTSTRASSE 58 SH-5502, HUNZENSCHWIL,
SWITZERLAND
TEL:41-62-897-2421 FAX:41-62-897-1510

03 GERMANY
LENZE SE
PO BOX 10 13 52, D-31763 HAMELN,
HAUSLENZSTRASSE 1, D-31855 AERZEN, GERMANY
TEL:49-5154-92-0 FAX:49-5154-92-2600

07 SINGAPORE
CENTA TRANSMISSIONS FAR EAST PTE., LTD.
NO 75 TUAS SOUTH AVENUE 2 SINGAPORE 637519
TEL:65-6316-2508 FAX:65-6316-2509

11 U.S.A.
CENTA CORPORATION
2570 BEVERLY DRIVE #128 AURORA, ILLINOIS
60502-8588 U.S.A.
TEL:1-630-236-3500 FAX:1-630-236-3565

04 GERMANY
MASCHINENFABRIK MOENNINGHOFF GmbH & CO KG
BESSEMERSTRASSE 100 44793 BOCHUM
P.O BOX 10 17 49, 44717 BOCHUM, GERMANY
TEL:49-234-3336-0 FAX:49-234-3335-200

08 SWEDEN
ETP TRANSMISSION AB.
BOX 1120, S-651 11, LINKÖPING, SWEDEN
TEL:46-13247100 FAX:46-13247190

12 U.S.A.
HELICAL PRODUCTS COMPANY, INC.
9011 WEST MCCOY LANE, P.O BOX 1069, SANTA MARIA,
CALIFORNIA 93456-1069, U.S.A.
TEL:1-805-928-3851 FAX:1-805-928-2369

GROUP COMPANIES

14 U.S.A.
ZERO-MAX, INC.
13200 SIXTH AVENUE NORTH, PLYMOUTH, MINNESOTA
55441, U.S.A.
TEL:1-763-546-4300 FAX:1-763-546-8260

18 CHINA
MIKI PULLEY (TIANJIN) CO., LTD. SHANGHAI BRANCH
RM 2603, 26/F, BUILDING A, FAR EAST INTERNATIONAL
PLAZA, NO.13 XIAN XIA RD, SHANGHAI
TEL:86-21-6249-6161 FAX:86-21-6249-9397

22 SWITZERLAND
MIKI PULLEY (EUROPE) AG
RHEINWEG 5, 8200 SCHAFFHAUSEN, SWITZERLAND
TEL:41-52-625-2424 FAX:41-52-625-2429

16 DENMARK
ZERO-MAX A/S
HAARUP TVÆRVEJ 1, HAARUP, DK-8600 SILKEBORG,
DENMARK
TEL:45-8681-2288 FAX:45-8681-5388

19 SOUTH KOREA
MIKI PULLEY (KOREA) CO., LTD.
302-406 IT BUCHEON TECHNO-PARK SSANGYONG
SCHA 36-1 SAUMJEONG-DONG(397 SEOKCHEON-RO)
QUEONG-GU BUCHEON-SI KYEONGGI-DO SOUTH KOREA 421-742
TEL:82-32-624-1750 FAX:82-32-624-1752

16 HONG KONG
MIKI PULLEY(HONG KONG)CO., LTD.
5TH FL., COT TELECOM BLDG., 11 WU
SHING STREET, FO TAN, HONG KONG
TEL:852-2947-7508 FAX:852-2947-7518

20 TAIWAN
MIKI PULLEY(TAIWAN)CO., LTD.
NO.45-2, KEYA RD., DAYA DISTRICT,
TAICHUNG CITY, 428, TAIWAN
TEL:886-4-3700-7708 FAX:886-4-2565-8700

17 CHINA
MIKI PULLEY(TIANJIN) CO., LTD.
NO.2 LIAO HE BEI DAO, BEI CHEN
HIGH-TECH-PARK TIANJIN, P.C. 300410, CHINA
TEL:86-22-2630-3111 FAX:86-22-2672-3111

21 INDIA
MIKI PULLEY (INDIA) PVT. LTD.
PLOT 5-29/2, MIDC, TALOJA-410 208, DIST : RAIGAD,
NAVAMUNJAL, INDIA
TEL:91-22-2741-1922 FAX:91-22-2741-1933

JOINT VENTURE COMPANIES

23 CHINA
CENTA MP (SHANGHAI) CO., LTD.
D3-1 FNO 479 CHUNDONG ROAD XINGZHUAUNG
INDUSTRY PARK, SHANGHAI 201108, CHINA
TEL:86-21-54831381 FAX:86-21-54831380

24 CHINA
ROSTA MP (SHANGHAI) CO., LTD.
ROOM 201 A BUILDING 1 NO.518 SHENWANG ROAD,
MINHANG DISTRICT, SHANGHAI CHINA
TEL:86-21-5428-9775 FAX:86-21-5428-9852

DISTRIBUTORS

25 AUSTRALIA
NAISMITH ENGINEERING & MANUFACTURING CO. PTY. LTD.
149 HEIDELBERG ROAD, NORTHCOOTE
3070, VICTORIA, AUSTRALIA
TEL:61-3-9439-8811 FAX:61-3-9482-1474

28 CHINA
SHANGHAI HUITONG AUTOMATIC TECHNOLOGY DEVELOPMENT CO., LTD.
16F JINYI MANSION 441 HENAN NORTH ROAD
SHANGHAI 200071 CHINA
TEL:86-21-6357-0803 FAX:86-21-6357-0802

33 INDONESIA
PD. CENTRAL TECHNIK
JL. GUNUNG SARI, KOMP. MARINA MANGGA DUA
BLOCK F NO.1 JAKARTA 14420 - INDONESIA
TEL:62-21-645-5152 FAX:62-21-640-3975

37 MALAYSIA
HIMALAYA POWER TRANSMISSION SDN. BHD.
GROUND & 1ST FLOOR, BINTULU-MINI ROAD, SUBLOT 4,
LOT 1175, BLOCK 32, KEMENA LAND DISTRICT, 97000
BINTULU, SARAWAK, P.O BOX 3052, 97014, MALAYSIA
TEL:60-86-311930 FAX:60-86-311039

41 PHILIPPINES
LELENG COMMERCIAL, INC.
387-393 DASMARINAS STREET P.O. BOX 480, MANILA,
PHILIPPINES
TEL:63-2-241 8901 FAX:63-2-241 4060

45 SINGAPORE
SEIMITSU FACTORY AUTOMATION (S) PTE LTD
NO. 240 MACPHERSON ROAD, #04-08
PINES INDUSTRIAL BUILDING, SINGAPORE 348574
TEL:65-6747-8816 FAX:65-6747-8827

48 THAILAND
ID MART CO. LTD.
168/57 NAKHINWAS ROAD, KHWAENG LADPRAO,
KHET LADPRAO, BANGKOK 10230, THAILAND
TEL:66-2530-3777 FAX:66-2530-6777

53 U.S.A.
BRAKELDITCH LLC
48 VISTA DR. FLANDERS, NEW JERSEY 07836, U.S.A.
TEL:1-973-584-4539 FAX:1-973-584-2371

26 AUSTRALIA
R. R. FISHER & CO., LTD.
UNIT 23 BLOCK E, CARINGBAH BUSINESS PARK 1-3,
ENDEAVOUR ROAD, CARINGBAH NSW 2229, AUSTRALIA
TEL:61-2-9540-4553 FAX:61-2-9540-4079

30 CHINA
TIANJIN ACE PILLAR CO., LTD.
NO.3 WEST 110 AVENUE, TIANJIN AIRPORT
INDUSTRIAL PARK, TIANJIN CHINA, 300308
TEL:86-22-2355-6000 FAX:86-22-2355-6368

34 INDONESIA
PT. HIMALAYA EVEREST JAYA.
JL. DAM MEGATI KM. 10 NO.151 KEDALUNG KALI PESING
POGLAR JAKARTA 11710, INDONESIA
TEL:62-21-544-8965 FAX:62-21-619-4658

36 MALAYSIA
SING HUAT HARDWARE & MACHINERY (M) SDN BHD
LOT 4 JALAN SS 13/4 SUBANG JAYA IND ESTATE, SUBANG
JAYA, 47500 PETALING JAYA, SELANGOR, MALAYSIA
TEL:60-3-5633-7655 FAX:60-3-5633-9700

42 POLAND
ADMECH
KARAKOWSKA 50 STREET, BALICE, 32-083,
POLAND
TEL:48 12 630-47-62 FAX:48 12 630-47-00

46 SINGAPORE
SING HUAT HARDWARE & MACHINERY PTE., LTD.
NO. 240 MACPHERSON ROAD, #04-08
PINES INDUSTRIAL BUILDING, SINGAPORE
TEL:65-6293-6861 FAX:65-6293-8516

50 THAILAND
NAM SAE INTERNATIONAL TRADING CO., LTD.
32-34, SOI SRITHAMMATIRAD, CHARDENKRUNG ROAD,
POMPRAK BANGKOK 10100, THAILAND
TEL:66-2-222-0072 FAX:66-2-224-8071

54 VIETNAM
ANH NGHI SON SERVICE TRADING CO., LTD.
D3 MIEU NOI RESIDENT AREA, DINH TIEN HOANG STREET,
W.3 BINH THANH DIST., HCMC, VIETNAM
TEL:84 8 3517 0401 FAX:84 8 3517 0403

27 BRAZIL
KAISHIN INDUSTRIA E COMERCIO LTDA.
RUA ANTONIO FIDELIS, 398-LAPA DE
BAIXO CEP:05068-001 SAO PAULO-SP-BRAZIL
TEL:55-11-9617-3141 FAX:55-11-3617-3142

31 CZECH REPUBLIC
COROLL s.r.o.
HOSTOVSKÉHO 525, 549 31 HRONOV,
CZECH REPUBLIC
TEL:420-491-483-805 FAX:420-491-483-805

35 ISRAEL
DOR DRIVE SYSTEM JAYA.
KIBBUTZ ENAT 48805, P.O.B. 6, ISRAEL
TEL:972-3-900 7595 FAX:972-3-900 7599

38 NETHERLANDS
AMMERTECH B. V.
ACHTERDIJK 15, 5705 CB HELMOND,
THE NETHERLANDS
TEL:31-492 594 300 FAX:31-492 594 349

43 PORTUGAL
RF PORTUGAL - ROLAMENTOS E COMPONENTES, LDA.
RUA DO CASTANHAL, 682 Z1, DA MAIA
SECTOR II 4475-122 MAIA, PORTUGAL
TEL:351 22 947 8950 FAX:351 22 947 8960

47 SPAIN
RODAMIENTOS FEYC S.A.
C/ PROGRES, 127-133 POL. IND. ALMEDA
08940 CORNELLELA DE LLOBREGAT
TEL:34 934 740 464 FAX:34 934 745 893

51 TURKEY
POLYMERİK MUHENDİSLİK-AHMET COMAK
ESENSEHIR MAH. KURKULER CAD. ERYILMAZ SOK. NO:31
DUDULLU - ESENSEHIR UMRANIYE ISTANBUL TURKEY
TEL:90-216-527 3030 FAX:90-216-527 6510

55 GERMANY
SCHMIDT-KUPPLUNG GmbH
WILHELM-MAST-STRASSE 15 D-38304
WOLFENBUETTEL, GERMANY
TEL:49-5331-9552-500 FAX:49-5331-9552-552

28 CHINA
NANJING ANSEN M & E EQUIPMENT CO., LTD.
WEST BLOCK 2/F, NO.1 BUILDING, SCIENCE & TECHNOLOGY
GARDEN, No.12 DINGHUAIMEN, NANJING
TEL:86-25-8375-2618 FAX:86-25-8373-2698

32 HONG KONG
ON BEAR E & M PRODUCTS LTD.
RM 506-509 5/F, COT TELECOM BUILDING, 11 WU
SHING STREET, FO TAN, HONG KONG
TEL:852-2690-3320 FAX:852-2690-3326

36 ITALY
BIANCHI INDUSTRIAL S. p. A. A SOCIO UNICO
VIA G. ZURETTI, 100, 20125 MILANO, ITALY
TEL:39-02-67861 FAX:39-02-671062

40 NEW ZEALAND
R. R. FISHER & CO., LTD.
13 SPRING STREET, PAPATOETOE, AUCKLAND,
NEW ZEALAND
TEL:64-9-279-4059 FAX:64-9-279-8286

44 SINGAPORE
ACE PILLAR(S) PTE LTD.
NO.1, KAKI BUKIT AVE 3, KB-1, #06-02,
SINGAPORE 416 087
TEL:65-6748-6586 FAX:65-6748-5613

48 TAIWAN
ACE PILLAR CO., LTD.
2F NO.7, LANE 93 SEQ 1, KUANG-FU RD., SAN-CHUNG CITY,
TAIPEI HSIEN 241, TAIWAN
TEL:886-2-2995-8400 FAX:886-2-2995-3466

56 U.K.
HMK TECHNICAL SERVICES LTD.
KAPPA HOUSE HATTER STREET CONGLETON CHESHIRE
CW12 1QU UNITED KINGDOM
TEL:44 1260 279411 FAX:44 1260 281022

MIKI PULLEY CO., LTD.
<http://www.mikipulley.co.jp/>

461 Imainami-cho, Nakahara-ku, Kawasaki-shi, Kanagawa-ken, JAPAN