Linear Motion Component - Couplings

(1) Coupling is a mechanism unit used in transmitting torque and rotating angle. Each model is purposed. Please select as your requirement from the table below.

(2) Take spec and hole size on the list for reference to select product you need.

(3) Confirm rated torque, Max. speed and dimension of selected coupling matched with the equipment you are going to use.

(4) Max. torque is double of allowable torque in coupling, and torque produced in continuous rotation shall not exceed to allowable torque.

## Spiral Beam type

Flexible Coupling	GOOFAMS	GOOFACS	GOOFAMML	GOOFAMMS	GOOFSMML	GOOFSMMS	GOOFACML	GOOFACMS	GOOFSCML	GOOFSCMS
page	P.0097	P.0098	P.0099	P.0100	P.0101	P.0102	P.0103	P.0105	P.0105	P.0106
Zero Rotation Backlash	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
High Torque Rigidity	Excellent	Excellent	Good	Good	Good	Good	Good	Good	Good	Good
High Torque	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Allowable Axis Deviation			Good		Good		Good		Good	
Flexibility			•				•		•	
Complete Miniature	•	•		•		•		•		•
Stainless Steel					•	•			•	•
Constant Velocity										
Screw Fixing Type	•		•	•	•	•				
Clamp Fixing Type		•					•	•	•	•
Allowable Angular Deflection	•	•	•	•	•	•	•	•	•	•
Allowable Parallel Offset	•	•	•	•	•	•	•	•	•	•
Low Inertial Torque	•	•	•	•	•	•	•	•	•	•
Torque Range(N·m)	0.5~3	0.5~3	0.1~8	0.1~4	0.2~8	0.2~3.5	0.4~8	0.4~4	0.3~8	0.3~3.5

Product Character

◆ Coupling slitted in aluminum or stainless steel material is as structure as spiral beam type allowable offset.
◆ Difference of material and beam types cause variation in transmitting torque and allowable offset.
◆ Due to zero backlash required in high rotation accuracy, meanwhile, position accuracy meets the same requirement.

Oldham type / Jaw type (Large shaft diameter use) / Zero Backlash type(Spindle use)

Flexible Coupling	GOOFACPL	GOOFACPS	GOOFAMN	GOOFACU	GOOFAME	GOOFAMK	GOOFACE	GOOFACK	GOOFACE	GOOFASE	GOOFCSE
Page	P.0123	P.0124	P.0125	P.0126	P.0130	P.0131	P.0132	P.0133	P.134	P.135	P.135
Zero Rotation Backlash				Good	Good	Good	Good	Good	Good		
High Torque Rigidity	Good	Good	Good	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent		
High Torque	Excellent	Good	Good	Good	Excellent	Excellent	Excellent	Excellent	Excellent		
Allowable Axis Deviation	Excellent	Excellent	Excellent	Good	Good	Good	Good	Good	Good		
Vibration Absorbability	Good	Good	Good		Good	Good	Good	Good	Good		
Isolation	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent		
Flexibility					•	•	•	•	•		
Complete Miniature	•	•	•								
Screw Fixing Type			•		•	•					
Clamp Fixing Type	•	•		•			•	•	•		
Key Way Type						•		•	•		
Allowable Angular Deflection	•	•	•	•	•	•	•	•	•		
Allowable Parallel Offset	•	•	•	•	•	•	•	•	•		
Low Inertial Torque	•	•	•	•	•	•	•	•	•		
Torque Range(N·m)	0.7~9	0.2~2.8	0.7~9	0.3~6	0.7~17	4~17	0.7~17	4~17	60~190		

Zero Backlash type(Spindle use) GOOFASE:
1. Zero rotation backlash
2. Hight torsion
3. High torque
4. Low Inertia
5. High rigidity
6. Variation resistance
7. High friction
8. Intergrated clamping nut for bolt assembly easily

Zero Backlash type(Spindle use) GOOFCSE:
1. Zero rotation backlash
2. Hight torsion
3. High torque
4. Low Inertia
5. High rigidity
6. Variation resistance
7. High friction
8. Intergrated clamping nut for bolt assembly easily

Product Character

◆ Oldham type
◆ Jaw type

◆ Few friction resistance, apply to braking system (Ex: braking mechanism, relay shfat). Light torque corresponds to larger parallel offset and angular deviation.
◆ Press-in type of the PU insert; select hardness through Polyurethane to make difference of vibration absorbability technically.
◆ Press-in type applied in low torque makes zero backlash, and equipped with good adjustment of vibration absorbability as well.

(Large shaft diameter use):
◆ Usage temperature: -20°C ~ 90°C
◆ Offset of angular and axial deviation are individual allowed values. Thus, the coupling unit allowable value will be reduced in case couple reasons of axial offset appearing at the same time.
◆ Available to make key ways on request. Refer to P. 2 for Key way marking options.

GOOFASE (P.135):
◆ Usage temperature: -20°C ~ 90°C
◆ Offset of angular and axial deviation are individual allowed values. Thus, the coupling unit allowable value will be reduced in case couple reasons of axial offset appearing at the same time.
◆ No rotation backlash, high accuracy clamping prestress design.
◆ Light aluminum shaft bushing offers small inertia.
◆ Tight clamping force to bring high friction moment.
◆ Stable rotation to perform a high linear speed 40m/s.

GOOFCSE (P.135):
◆ Usage temperature: -20°C ~ 90°C
◆ Offset of angular and axial deviation are individual allowed values. Thus, the coupling unit allowable value will be reduced in case couple reasons of axial offset appearing at the same time.
◆ No rotation backlash, high accuracy clamping prestress design.
◆ Tight clamping force to bring high friction moment.
◆ Stable rotation to perform a high linear speed 40m/s.

GOOYii

Coupling Selection & Character Comparison

Metal Disk type						Bellows type				Oldham type					
GOOFACCL	GOOFACCS	GOOFACHL	GOOFACHS	GOOFACTL	GOOFACTS	GOOFAMB	GOOFSMB	GOOFACB	GOOFSCB	GOOFSMG	GOOFSCG	GOOFSMP	GOOFSCP	GGOOFAMJ	GOOFACJ
P.0107	P.0108	P.0109	P.0110	P.0111	P.0112	P.0113	P.0114	P.0115	P.0116	P.0117	P.0118	P.0119	P.0120	P.0121	P.0122
Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent						
Excellent	Good	Excellent	Excellent	Good	Good	Good	Good	Good	Good	Excellent	Excellent	Good	Good	Good	Good
Good	Good	Good	Excellent	Good	Good	Good	Good	Good	Good	Excellent	Excellent	Good	Good	Good	Good
Good		Good		Good		Good	Good	Good	Good	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
•		•		•											
	•		•		•										
							•		•						
						•	•	•	•	•		•		•	
						•	•	•	•		•		•		•
•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
1.2~25	1.2~25	0.7~9	0.7~9	2~10	2~10	0.3~2	0.5~3	0.3~2	0.5~3	3~50	3~50	0.3~28	1.6~18	30~80	26~72

Metal Disk type
◆ Composed of body and disc, which is bended, to creat its allowable offset structure.
◆ Difference of body or strength & material of disc cause variation in transmitting torque and allowable offset.
◆ Due to zero rotation backlash required in rotation accuracy, meanwhile, position accuracy meets the same requirement.
◆ Widely ranges from standard to high torque change due to variable matches of dimesnions and materials for disc.

Bellows type
◆ Uniform turning with allowable offset suits for constant velocity like encoder application.

Oldham type
◆ Oldham type
◆ Jaw type
◆ Few friction resistance, apply to braking system (Ex: braking mechanism, relay shfat). Light torque corresponds to larger parallel offset and angular deviation.
◆ Press-in type of the PU insert; select hardness through Polyurethane to make difference of vibration absorbability technically.
◆ Press-in type applied in low torque makes zero rotation backlash, and equipped with good adjustment of vibration absorbability as well.

Rigidity Coupling	GOORAM	GOORSM	GOORACS	GOORSCS	GOORAB	GOORSB	GOORACL	GOORSCL
Page	P.0138	P.0139	P.0140	P.0141	P.0142	P.0143	P.0144	P.0145
Zero Rotation Backlash	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
High Rigidity Torque	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
High Torque	Good	Good	Good	Good	Good	Good	Good	Good
Stainless Steel		•		•		•		•
Screw Fixing Type	•	•						
Clamp Fixing Type			•	•	•		•	•
2-Piece Type					•	•		
Low Inertial Torque	•	•	•	•	•	•	•	•
Torque Range(N·m)	0.3~4	0.3~2	0.3~4	0.3~2	0.3~2	0.3~2	0.3~2	0.3~2
Product Character	◆ Coupling having frequently powerful shaft-combination. ◆ Having no allowable offset applys to condition in axial side absorbing angular deviation. ◆ To install lock screw on coupling secures the shaft well.							

GOOYii

Coupling - Fixing

(1) There are five ways to fix coupling onto shaft as below. Please select coupling as your demand.

(2) Set screw or clamping screw (hexagonal countersink screw) shall be secured by screw driver or torque wrench. Securing torque refer to product specifications.

Set Screw Fixing

This fixing in low cost is the most traditional.
Front of screw contacting with shaft directly may cause damage or difficult disassembly.

Clamping Fixing

Use sink screw securing to narrow the slit for clamping shaft tightly.
Clamped fix and easy disassembly won't cause damage of shaft.

Separation Fixing

Use separated bushings to fix and disassemble without moving your equipment.

Key Way Fixing

This type is also traditonal, like set screw fixing, suits for transmission in higher torque. Prevent from parallel movement, it's usually used with set screw fixing and clamp fixing together.

Zero Backlash Type

Zero backlash type coupling is designed to be equipped high precision clamping nut as one unit, performs high friction moment and reliable movement which is suitable for spindle transmission of the machine.

GOOYii

To maintain installation completeness of all kinds of couplings, it's recommended to install as follow charts to avoid direct contact of two shafts and to have a regular run.

Oldham Type
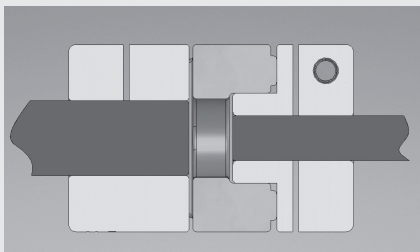
Bellows Type

Spiral Beam Type

Metal Disk Type

Rigidity Coupling

Zero Backlash Type

GOOYii

Coupling - Deviation Adjustment

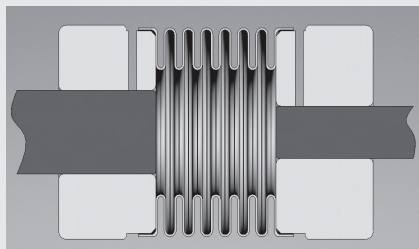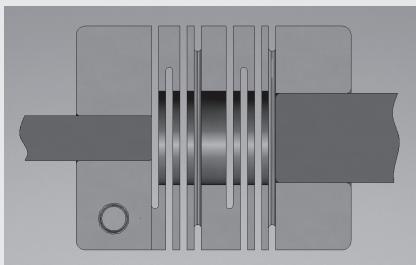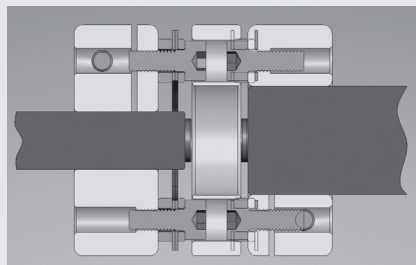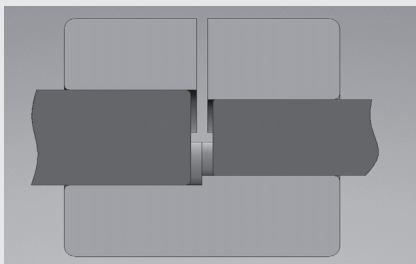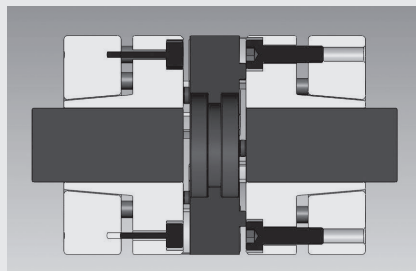(1) Flexible coupling transmits torque and rotation angle, and absorb deviation from shaft installation. It may cause vibration or shortening life hours of coupling, while deviation is over allowed range. Thus, make sure and take perfect adjustment for deviaiton.

(2) There are three deviation for shaft, as parallel deviation, angular deviation and axial deviation. Please adjust deviation lower than allowed range listed in the product spec offered by our catalog.

(3) The max. allowable deviation listed in our catalog is in case of only one deviation existing. While two or more deviation existing at same time, allowable range shall be lower than 1/2 x max. deviation listed in the spec of catalog.

(4) Deviaiton happened not only on equipment installation, but caused by vibration in running progress, heated expansion, bearing abrasion. Thus, it's recommended to adjust axial deviation lower than 1/3 x Max. range.

Parallel Deviation
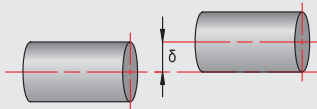
Complex Deviation in Parallel and Angular
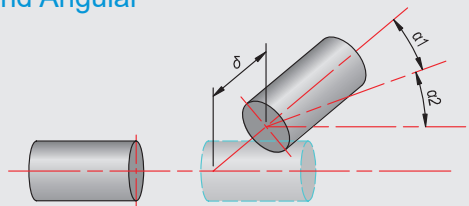
Symmetry Angular Deviation

Axial Deviation

Asymmetry Angular Deviation

Run Out

Coupling - Noun Explanation

Torque

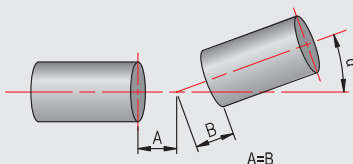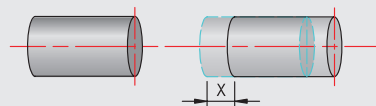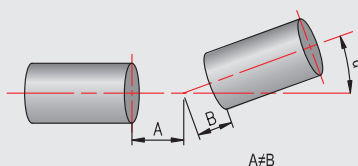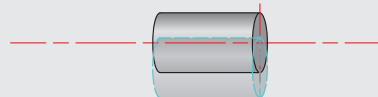In physics, torque is defined as "force in vertical" x "distance to rotating center", metric unit (N·m), divided by acceleration of gravity 9.8m/ sec^2, unit could be converted to familar (kg-m). Imperial uint lb-ft, in case of conversion to metric unit, just take lb-ft divided by 7.22. Torque we called is not force unit, but a kind of the moment of force, which means capacity of energy transforming, We could see the connection from normal unit used in calculating torque (Kgm), and generally judging from words: Kgm stands for the capacity of rising an object weighed 1 kg in 1 meter movement. This is a kind of the moment of force, so inappropriate to call it force. Motor producing force per time unit is decided by RPM and torque of motor, and REC out shown in motor, (W) shown in Japan, (HP) power output shown in USA and Europe.
(1HP=746w=0.746kw)

Coupling - Allowed Torque
Transmitted torque occurs in allowed speed range rotating continuously.

Max. Torque in Driven Side
Max. torque in driven side being hitted in the moment, ex: torque produced while breaking.

Allowable Angular (Deflection)
The deflection between two shafts while connecting two shafts.

Allowable Axial Deviaiton Displacement
Displacement caused in axial while connecting two shafts.

Inertial Torque
It's not easy to change running status of object with big mass (whether from static to running or running to static); equally, rotating inertial or inertial torque is to show keeping object in running status, bigger inertia torque makes tough rotation.

Static Torsional Stiffness
Required (N·m) to rotate 1 radian.

GOOYii

Motor

Induction Motor
(1) More than triple torque occurs in case of running momently.
(2) Shaft axis center of the motor has ±1.5mm movement back and forth while running, and it's not recommended to use spiral beam type.
(3) DC motor could be used in working environment with dust.

Stepping Motor
(1) Without triple torque in case of running momently, but max. rated torque of motor occurs.
(2) Larger torque in low speed than servo motor in same level.
(3) Higher RPM, smaller torque in motor.
(4) Motor have temperature rise in case of running continuously.
　　 (to improve by using disk type coupling)
　　 ※Force output in stepping motor is smaller than servo motor.

Servo Motor
(1) More than triple torque occurs in case of running momently.
(2) Under rated RPM range, cause rated torque.
(3) Same torque produce in low speed and high speed
(4) Temperature rise is small in case of running continuously.

Encoder
(1) Built-in in servo motor, has tiny driven torque.
(2) Or connected to stepping motor. (optional)

Coupling - life Calculation

Coupling Life Calculation

(1) Capacity output of driven machine：P
usage rotational speed：n
Find the torque applied to the coupling

Safety Factor

Based on Load Character Usage and Factor：K

	Load Character			
	steady	small change	medium change	large change
	1.0	1.25	1.75	2.25

(2) Decide on the usage factor based on load conditions：K
Find the correction torque applied to the coupling：Td
$Td = Ta * K°$ (please refer to below description)
In the case of servo motor drive

(3) Select appropriate dimensions to make coupling allowable torque：Tn
On correction torque：Td above
$Tn \geqq Td$

(4) According to coupling bore dimension, there is limit condition of coupling allowable torque to be clamped by clamping force (shaft holding force).

(5) Make sure that the mounting shaft is below the max. bore of coupling. In the device of periodic acutely change, in addition to the above selection, a review of torsional vibration is required.

Ex：Servo Motor HP is 443W, Rotational Speed is n3000rpm

(1) Find the torque applied to the coupling (N.m)
A：(1) 443w=0.443kw
Ta=9550*0.443(kw) / 3000(rpm)=1.41(N·m)

(2) Find the motor max. toque moment (N.m)
A：(2) 1.41*3=4.23(N·m)

Correction Torque Calculation

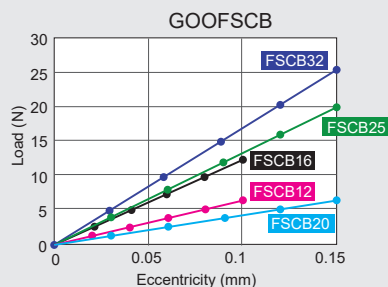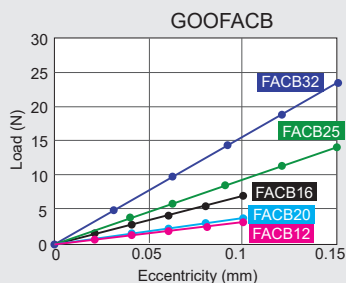| No Plastic Spacer	Including Plastic Spacer
Correction Torque=A*B*C*D	Correction Torque=A*B*C*D / E

★Allowed Torque≧Correction Torque

Parameter Explanation

A：Power source maximum torque (please refer to the original product manual or to the original equipment supplier)

B：Load Character
Correction Factor

C：Operation Time
Correction Factor

D：Starting End
Frequency Factor

E：Surrounding Environment
Temperature Factor
(plastic spacer)

B-1. normal 1.0
B-2. medium change 1.25
B-3. medium change 1.75
B-4. large change 2.25

C-1.1~2Hrs / D 0.8
C-2.3~4Hrs / D 0.9
C-3.5~8Hrs / D 1.0
C-4.9~16Hrs / D 1.12
C-5.17~24Hrs / D 1.25

D-1.1~10回 / Hrs 1.0
D-2.11~30回 / Hrs 1.1
D-3.31~60回 / Hrs 1.3
D-4.61~120回 / Hrs 1.5
D-5.121~240回 / Hrs 2.0
D-6.241~360回 / Hrs 3.0

E-1.-20~30℃ 1.00
E-2. 31~40℃ 0.80
E-3. 41~60℃ 0.70
E-4. 61~100℃ 0.55

Coupling - Rigidity Standard

Bellows type - Rigidity Standard

Eccentric Reaction Force

GOOFACB

Load (N) vs Eccentricity (mm): FACB32, FACB25, FACB16, FACB20, FACB12

GOOFSCB

Load (N) vs Eccentricity (mm): FSCB32, FSCB25, FSCB16, FSCB12, FSCB20

Thrust Reaction Force

GOOFACB

Load (N) vs Compression (mm): FACB32, FACB16, FACB25, FACB12, FACB20

GOOFSCB

Load (N) vs Compression (mm): FSCB16, FSCB16, FSCB25, FSCB12, FSCB20
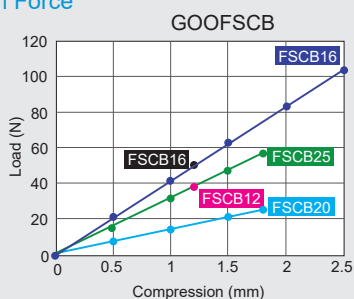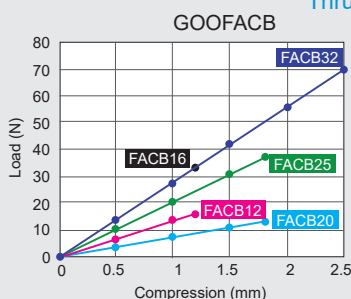
Spiral Beam Type - Rigidity Standard

GOOFAMML   GOOFAMMS   GOOFACML   GOOFACMS   GOOFAMS   GOOFACS

Torque rigidity and flexibility -
Balance acquired among incompatible functions.
These flexible couplings apply to stepping motor.

High torque rigidity, light and complete miniature.
These flexible couplings apply to servo motor.

Character Comparison

Torque load/ function curve: Torque (N.m) vs Radian(rad) — FAMS FACS, FAMMS FACMS, FAMML FACML

Radial load / function curve: Load (N) vs Distortion(mm) — FAMS FACS, FAMMS FACMS, FAMML FACML