

Coupling Selection Method

Terminology for Couplings·Assembly Procedure

When Selection is Based on Motor

1 Please select appropriate coupling type based on the motor type and the application in which it is to be used.

* Motor type and Coupling type are not limited to the following combinations. Select after confirming each product page.
* When selection is by torque, start from 2.

Coupling Easy Selection Chart

Type	Coupling Characteristics			Motor		
	Zero Backlash	High Torque	Allowable Lateral Misalignment Allowable Angular Misalignment	Servo	Stepping Motor Compact Servo	General-purpose
Disc	○	○	○	○	○	×
Oldham	×	○	○	×	×	○
Slit	○	○	○	○	○	×

Selection Example)

<Prerequisites>

Rotating Direction: One-way rotation
Applications: Transfer Conveyor (Positioning not required)
Motor: General-purpose Motor
<Selection>

As positioning is not required in one-way rotation, zero backlash is not required. General-purpose Motor is used and Oldham Couplings can be selected.

2 Calculate the compensation torque applied to coupling

Connection with Servo Motors / Stepping Motors

Calculate the Compensation Torque by multiplying Compensation Factor with the Motor's Peak Torque. For Compensation Factor, please see products page. Choose a coupling with the torque capacity (shaft slip torque) higher than the calculated compensation torque.

Compensation Torque = Motor's Peak Torque x Compensation Factor

Connection with General-purpose Motor

Calculate the load torque, and the compensation torque should be 1-5 times of the load torque. Choose a coupling with the torque capacity (shaft slip torque) higher than the calculated compensation torque.

$$\text{Load Torque (N} \cdot \text{m)} = 9550 \times \frac{\text{Transmission Power (kW)}}{\text{Rotational Speed (r/min)}}$$

$$\text{Compensation Torque} = \text{Load Torque (N} \cdot \text{m)} \times 1-5$$

3 Check coupling tolerance

Check that the Tolerance (Angular and Lateral misalignments and Max. Rotational Speed) and the Moment of Inertia mentioned in the catalogue meet the conditions of the device.

4 Select shaft bore

Check if the outer diameter of the connecting shaft is included in the inner diameter range of the coupling. If the outer diameter is not included, select a large size.

5 Select shaft connection method

Select in accordance with the clamp, keyed locking, keyless clamping applications.

6 Final confirmation

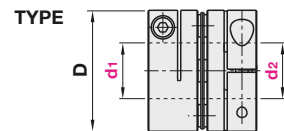
Finally check the dimension table to confirm that the coupling is compatible with the device.

How to Create Coupling Part Number

Part Number (Type, D) - I.D. 1 (d1) - I.D. 2 (d2) $d_1 \leq d_2$

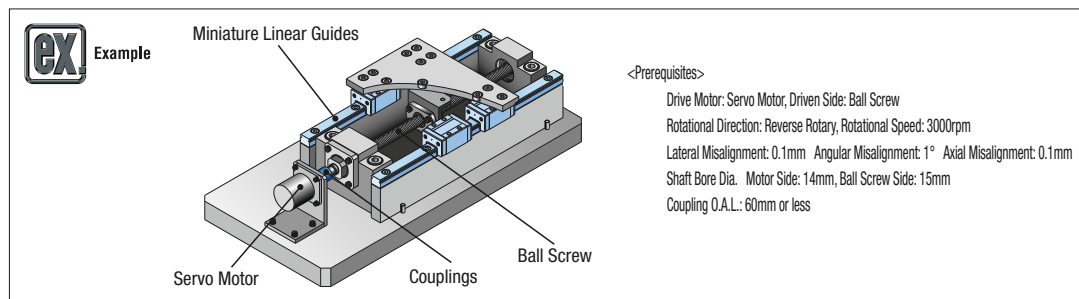
Ex.) TYPE: GCPS When D=33 $d_1=10$ $d_2=11$

GCPS33-10-11



Selection Example

Select on the basis of the following Example.



<Prerequisites>

Drive Motor: Servo Motor, Driven Side: Ball Screw
Rotational Direction: Reverse Rotary, Rotational Speed: 3000rpm
Lateral Misalignment: 0.1mm Angular Misalignment: 1° Axial Misalignment: 0.1mm
Shaft Bore Dia.: Motor Side: 14mm, Ball Screw Side: 15mm
Coupling O.A.L.: 60mm or less

1. Select Coupling Type
Required characteristics of coupling from the above conditions
• Zero Backlash
• Allow lateral/angular misalignments
Refer to the above Coupling Easy Selection Chart, and select.

Compatible Coupling Type ⇒ Disc Couplings: GCPW

2. Calculate the compensation torque applied to coupling

Condition: Servo Motor's Peak Torque: $3.0\text{N} \cdot \text{m}$

Servo Motor's Rated Torque: $1.0\text{N} \cdot \text{m}$

Calculation of Compensation Torque

Compensation Torque = Motor's Peak Torque ($3.0\text{N} \cdot \text{m}$) x Compensation Factor (2.0) = $6.0\text{N} \cdot \text{m}$

Select D(O.D.) with allowable torque $6.0\text{N} \cdot \text{m}$ or more ⇒ GCPW39

* Compensation factor is for reference when using couplings with servo motors in general. Please use the values as reference.

3. Check coupling tolerance
Allowable Lateral Misalignment: 0.25mm Allowable Angular Misalignment: 1° Allowable Axial Misalignment: $\pm 0.5\text{mm}$
Allowable Rotational Speed: 10000rpm
⇒ Conditions are met

4. Select shaft bore

Check if 14mm and 15mm shaft bore can be selected in GCPW39.
14mm and 15mm both fall under the category of D (O.D.) = 39 specification.

$d_1=14, d_2=15$ ⇒ GCPW39-14-15

5. Selecting the method to fasten shaft bore

⇒ GCPW has only clamp, and need not be selected

6. Check that the dimension matches the device

Overall Length: 49.6mm

⇒ Matches with the overall length 60mm or less

Finally selected Part Number ⇒ GCPW39-14-15

Terminology

• Allowable Torque

A torque that a coupling can continuously transmit. Select a allowable torque according to selection method given on P.1061 which would ensure that using load torque is less than the allowable torque of the coupling. In couplings for Servo Motors, compensation factor recommended for each part number is set.

• Slip Torque

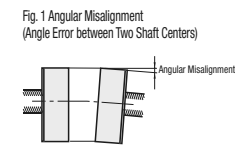
A torque which spins the fastened shaft and coupling, and slides out. Select the shaft slip torque when it is less than the allowable torque according to the selection method given on P.1061, such that the load torque is less than the shaft slip torque of the coupling.

• Misalignment

An error between 2 coupling shaft centers. Misalignments are: Angular Misalignment, Lateral Misalignment and Axial Misalignment. Align (Centering) the shafts to ensure that misalignment between two shafts is less than the mentioned allowable misalignment. When two or more misalignments are combined, the allowable value for respective misalignment is 1/2. (Explanation regarding misalignment is as follows)

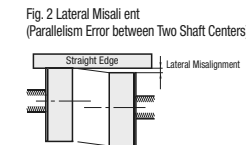
Angular Misalignment

Angle Error between two coupling shafts. (Fig. 1)



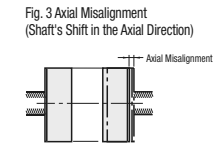
Lateral Misalignment

Angle Error between two coupling shafts. (Fig. 2)



Axial Misalignment

Displacement in the axial direction of various shafts. (Fig. 3); This misalignment occurs at the time of motor acceleration or, due to swelling at the time of rise in temperature.



• Static Torsional Spring Constant (Torsional Rigidity)

Torsional rigidity of the coupling. It shows the phase difference between the rotating direction of input shaft and output shaft, when torque is applied to the coupling. The value given in the catalogue indicates the torsional rigidity for the whole coupling. The responsiveness increases as this value increases, and highly-precise rotation control becomes possible.

• Max. Rotational Speed

Highest available rotational speed. Balancing is necessary when using for high speed rotation, as dynamic balance is not considered in this value.

• Moment of Inertia

Inertia moment of the coupling. Rotatory inertia increases in respect to increase in the value of inertia moment.

• Zero Backlash

A rattling noise occurring in various parts of the coupling, corresponding to the rotating direction. When using Servo Motors, consider using disk coupling or slit couplings with zero backlash for the purpose of highly precise positioning, clock-wise and anti-clockwise rotation.

• Tightening Torque

A bolt tightening torque to fasten the coupling to the shaft. Use torque wrench to tighten the coupling to prescribed torque.

• Temperature Correction Factor

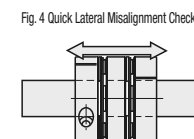
Resin spacer couplings such as Oldham and Jaw Types have allowable torque values that vary depending on the operating temperature. Select couplings by multiplying couplings Allowable Torque, Max. Rotational Speed, etc by Temperature Compensation Factor in the right hand table.

Operating Temperature (°C)	Temperature Correction Factor
-20 ~ 30	1.00
30 ~ 40	0.80
40 ~ 60	0.70
60 ~ 100	0.55

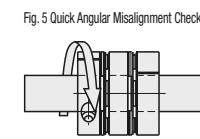
Assembly Procedure

- 1) Confirm that the clamping screws are loosened, and wipe clean the inner bore and shaft surfaces off dust and oils.
- 2) Insert the shaft into the coupling while taking care not to apply excessive compressive/tensile forces on the disc section.
- 3) Adjust the disk coupling in left-right hub concentration in precise manner, using the jig. Quickly check the angular and lateral misalignment using coupling as a base.

3-1) Quick Lateral Misalignment Check (Fig. 4):
Slide the coupling in axial direction while the bolts are loosened and check that it is moving smoothly. Center the coupling properly as the single type coupling does not allow lateral misalignment.



3-2) Quick Angular Misalignment Check (Fig. 5):
Rotate the coupling/shaft and visually check for smooth and even movement.



4) Final assembly: Adjust the shaft insertion as per the dimensions given in the catalogue (Fig. 6) and fasten it with prescribed torque by using the torque wrench. Do not fasten till the prescribed torque at once. Alternate between left and right clamp and tighten it two or three times.

