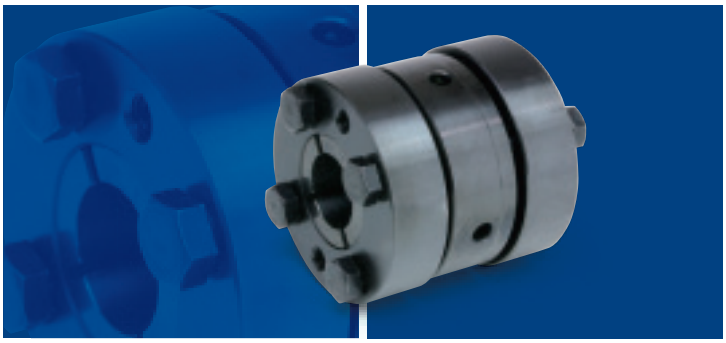
High-rigidity Couplings
SERVORIGID

Ultra-high stiffness | Low inertia | No backlash | RoHS

Max. rated torque [N·m]	490
Bore ranges [mm]	ϕ 16 ~ 48
Operating temperature [℃]	−30 ~ 120
Driver	Servo motor
Application	Machine tools

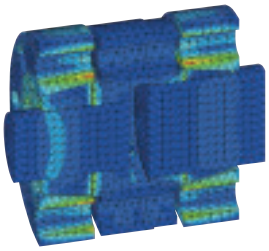
Rigid Couplings with Ultra-high Torsional Stiffness

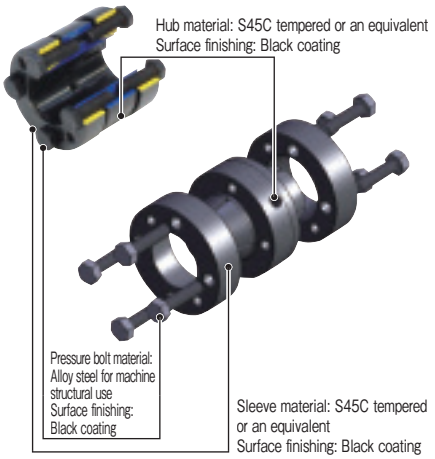


Rigid couplings with ultra-high torsional stiffness that were developed for servo motor applications. Unlike flexible couplings, they have no element to absorb differences between the centers of two shafts, so they have very high torsional stiffness. Since the outer diameter relative to torque can be reduced compared to flexible couplings, smaller couplings can be used, which helps reduce the moment of inertia.

Structure and Materials

Modeling uses the latest CAE Systems and 3D-CAD. Shape and hardness was calculated using the support of the latest finite element method (FEM) analysis software for optimal designs.





Other Specifications and Options

Through-bolt Construction

By using a through-bolt construction for the sleeve and hub on one side, the drive shaft and driven shaft can be engaged simply by tightening the pressure bolt on one side.



Taper Adapter

Allows coupling via friction when an optional taper adapter is mounted on the tapered shaft of a servo motor.



Clamp Type

A clamp-type high-rigidity coupling can also be manufactured.



*Specifications may not be identical. Contact Miki Pulley for details.

SRG Models

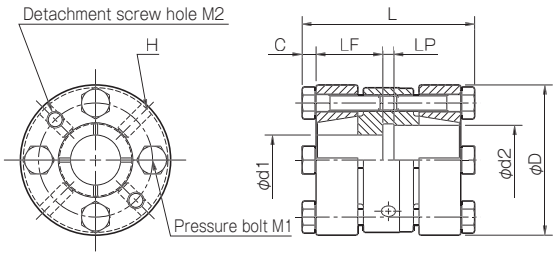
Specifications

Model	d1 • d2 [mm]		Rated torque [N·m] compared to the standard bore diameters, d1 and d2 [mm]																		Max. rotation speed [min⁻¹]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m²]	Mass [kg]
	Min.	Max.	16	17	18	19	20	22	24	25	28	30	32	35	36	38	40	42	45	48				
SRG-050DS	16	22	90	100	110	120	130	140													15000	60000	0.16×10^{-3}	0.45
SRG-060DS	18	25			80	100	110	145	180	190											13000	115000	0.29×10^{-3}	0.67
SRG-070DS	22	35						150	200	220	290	340	390	460							12000	340000	0.55×10^{-3}	0.85
SRG-080DS	30	48										180	220	270	290	320	360	390	440	490	9500	1335000	1.21×10^{-3}	1.17

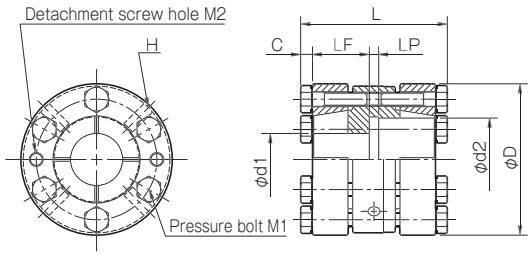
* The shaft coupling employs friction, so rated torque is determined by bore diameter. The rated torque of the side with the smallest diameter serves as the rated torque of the coupling.
* Max. rotation speed does not take into account dynamic balance.
* The torsional stiffness, moment of inertia, and mass are measured for the maximum bore diameter.

Dimensions

SRG-050, 060



SRG-070, 080



Unit [mm]

Model	Standard bore diameter d1, d2	D	L	LF	LP	C	H	M1	M2
SRG-050DS	16 • 17 • 18 • 19 • 20 • 22	48	52.8	20	4	4.4	4-5.1	4-M6	2-M6
SRG-060DS	18 • 19 • 20 • 22 • 24 • 25	54	62	24	4	5	4-5.1	4-M6	2-M6
SRG-070DS	22 • 24 • 25 • 28 • 30 • 32 • 35	64	62	24	4	5	4-5.1	6-M6	2-M6
SRG-080DS	30 • 32 • 35 • 36 • 38 • 40 • 42 • 45 • 48	78	63	25.5	4	4	4-5.1	6-M6	2-M6

* The nominal diameters of the pressure bolt M1 and detachment screw hole M2 are equal to the quantity minus the nominal diameter of the screw threads. Quantities are for a single side.

How to Place an Order

SRG-070DS-22K-35K

- Size
- Type
- Material
  S: Steel
- Affixing method and countershaft tolerance
  K: Frictional coupling h7
- Bore dia. d1 (Small dia.)
- Bore dia. d2 (Large dia.)

* For positive tolerances for bore diameters of 35 ($35^{+0.010}_{0}$), use 35KS to distinguish the setting from that of h7 class.

SRG Models

Items Checked for Design Purposes

Precautions for Handling

SERVORIGID SRG model is, as the name suggests, a high-rigidity coupling with no element to absorb differences between the centers of two shafts. For that reason, when mounting, the two shafts must be carefully centered. Please keep that in mind and take extra precautions when handling.

(1) Couplings are designed for use within an operating temperature from -30℃ to 120℃ . Although the couplings are designed to be waterproof and oilproof, do not subject them to excessive amounts of water and oil as it may cause part deterioration.

(2) Do not tighten up pressure bolts until after inserting the mounting shaft.

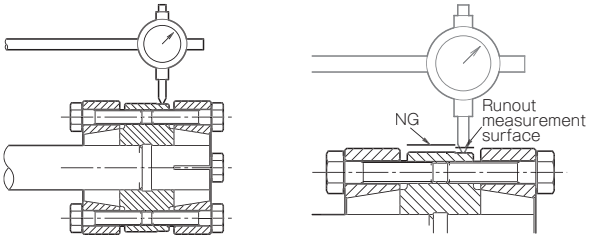
Mounting

(1) Check that coupling pressure bolts have been loosened 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 Insert each shaft for a length listed in the table below measured from the sleeve edge. However, be sure that mounting shafts do not come into contact with each other.

Coupling size	050	060	070	080
Insert length of shaft [mm]	20 or more	24 or more	24 or more	25.5 or more

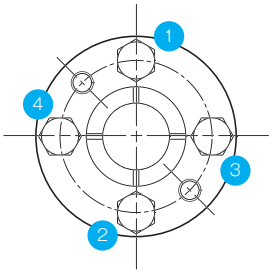
(3) After deciding the place to insert, hold a dial gauge against the outer diameter uneven surface of coupling as shown below.



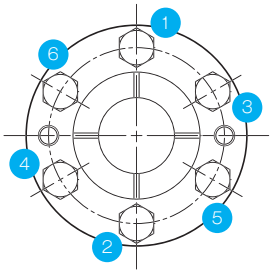
(4) Gently rotate the motor shaft manually and tighten the pressure bolt by adjusting it to make sure the value of dial gauge is zero.

Tighten the pressure bolts evenly, a little at a time, on the diagonal, guided by the tightening procedure of the figure below. However, there is sometimes no need to follow the procedure, depending on the value of dial gauge.

■ SRG-050 • 060



■ SRG-070 • 080



(5) Finally, use a calibrated torque wrench to tighten all the pressure bolts to the appropriate tightening torques of the table below, make sure that there is no bolts loosened and that the runout is small (the value almost near to zero), and tighten the driven shaft using the same procedure.

Coupling size	050	060	070	080
Pressure bolt size	M6	M6	M6	M6
Tightening torque [N·m]	14	14	14	14

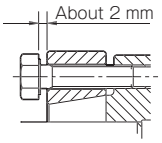
■ Suitable Torque Wrench

Torque wrench (Single-function)	Wrench attachment
N230SPCK × 14N • m	230SCK 10mm

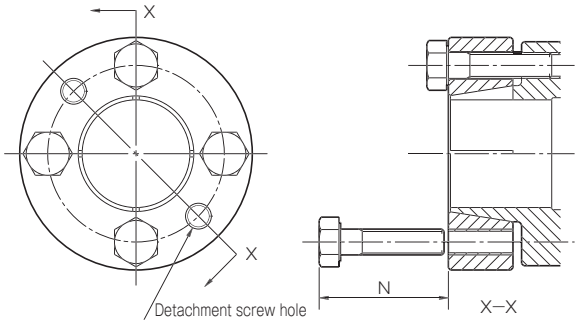
Removal

(1) Be sure to check that the main power of the equipment is off before removing to avoid incorrect operation of the drive. Take extra precautions if any of the components are damaged as it may be sharpened.

(2) Loosen all the pressure bolts placing pressure on the sleeve until the gap between bearing seat and sleeve is about 2 mm.



In the case of a tapered coupling system that tightens a pressure bolt from the axial direction, the sleeve will be self-locking, so the coupling between flange and shaft cannot be released simply by loosening the pressure bolt. (Note that in some cases, a coupling can be released by loosening a pressure bolt.)
For that reason, when designing devices, a space must be installed for inserting a detachment screw.



Coupling size	050	060	070	080
Nominal diameter of pressure bolt × Length	M6 × 20	M6 × 24	M6 × 24	M6 × 25
RecommendedN dimension [mm]	26	30	30	31.5

(3) Insert the bolt into detachment screw holes and tighten them alternately. The coupling will be released. It is recommended to use the bolt whose dimension is same as that of pressure bolt.

Note that if the bolt is too short, couplings may no be able to release.

Points to Consider Regarding the Feed Screw System

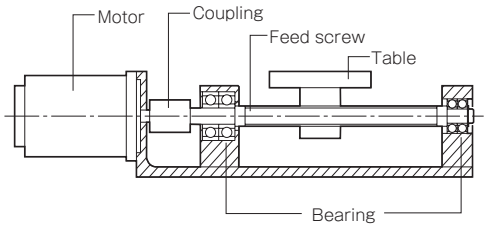
■ Servo motor oscillation

When the torsional natural frequency of the overall feed screw system is 400 to 500 Hz or less, gain adjustment of the servo motor may cause the servo motor to oscillate.
Oscillation 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 or the tuning function (filter function) for the electrical control system in the servo motor adjusted during the design stage.
Please contact Miki Pulley with any questions regarding servo motor oscillation.

How to Find the Natural Frequency of a Feed Screw System

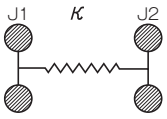
(1) Select a coupling based on the nominal and maximum torque of the servo motor.

(2) Find the overall natural frequency, Nf, from the torsional stiffness of the coupling and feed screw, κ , the moment of inertia of driving side, J1, and the moment of inertia of driven side, J2, for the feed screw system shown below.



$$Nf = \frac{1}{2\pi}\sqrt{\kappa\left(\frac{1}{J1}+\frac{1}{J2}\right)}$$

Nf: Overall natural frequency of a feed screw system[Hz]
κ : Torsional stiffness of the coupling and feed screw [N·m/rad]
J1: Moment of inertia of driving side [kg·m^2]
J2: Moment of inertia of driven side [kg·m^2]



Selection Procedures

(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$Ta\ [N{\cdot}m] = 9550 \times \frac{P\ [kW]}{n[min^{-1}]}$$

(2) Determine the factor κ from the load properties, and find the corrected torque, Td, applied to the coupling.

Td = Ta × K (Refer to the table below for values)

Load properties	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
K	1.0	1.25	1.75	2.25

■ Service factor based on operating time: K2

Hrs./day	~ 8	~ 16	~ 24
K2	1.0	1.12	1.25

For servo motor drive, multiply the maximum torque, Ts, by the usage factor K = 1.2 to 1.5.

Td = Ts × (1.2 to 1.5)

(3) Set the size so that the rated coupling torque, Tn, is higher than the corrected torque, Td.

Tn ≧ Td

(4) Check that the mount shaft is no larger than the maximum bore diameter of the coupling.

Contact Miki Pulley for assistance with any device experiencing extreme periodic vibrations.