Schmidt Coupling

Parallel displacement of shaft

A drive or driven shaft can be freely moved parallel within the displacement range during nonrotation or load operation.

Fluctuation is absorbed

The drive and driven-side radial fluctuations are absorbed.

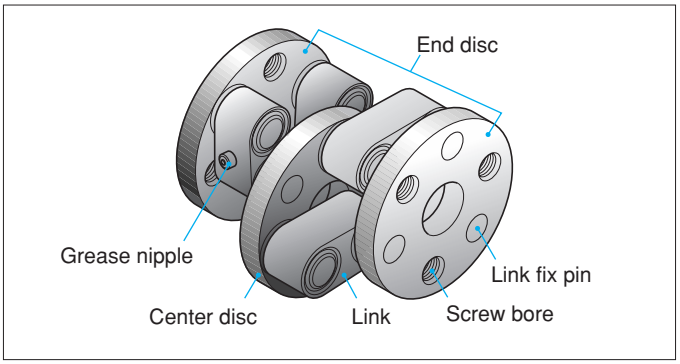
Minimum errors

Fluctuations of angular speed and torque transmission and backlash are very slight.

Model	NSS	DL
Normal operating torque [N·m]	49～1180	93～2310
Operational temp. [℃]	−10 ～ +60	−10 ～ +60
Backlash	Little	Little
Max. permissible eccentric displacement [mm]	65～165 (Liner)	2～4

Principle of operation

Schmidt coupling is a coupling with different shaft centers designed to utilize a crank motion of link. Motive power applied on one end disc is transmitted to the other end disc through a link and center disc.
It removes a small friction loss in a bearing and transmits a rotation speed and torque from the driving side to driven side.



Structure and material

NSS

DL

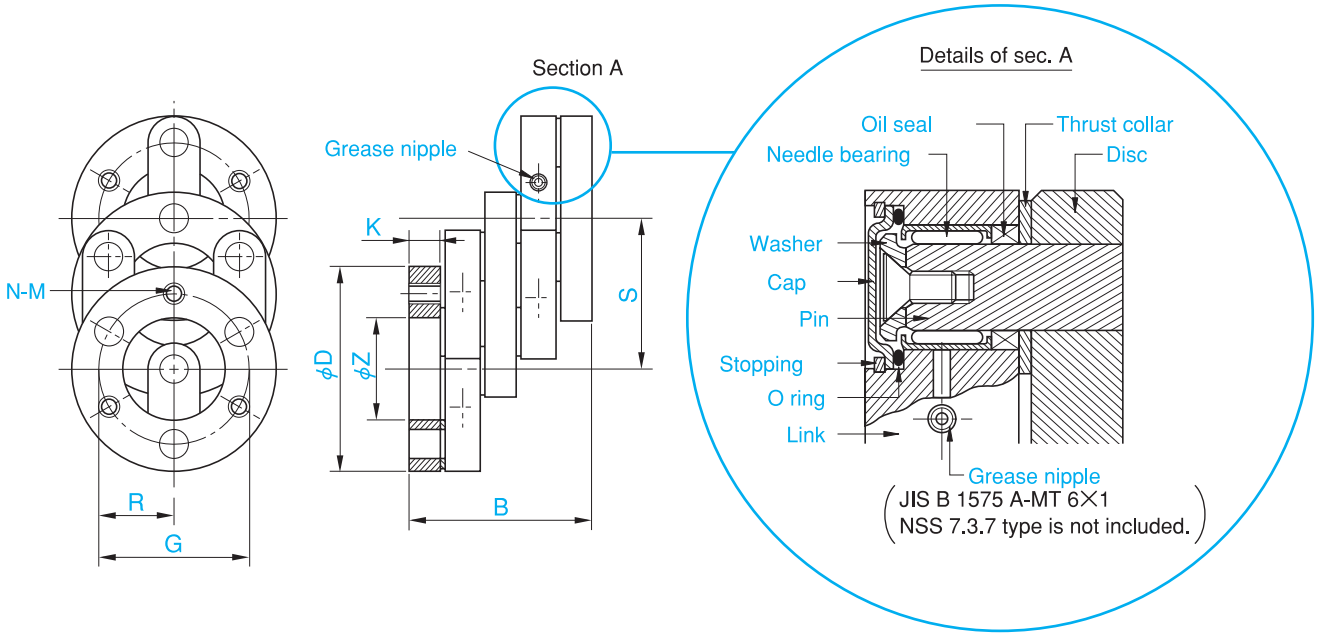
NSS

Schmidt coupling-NSS model

Specification

Model	No. of links	Max. displacement [mm]		Starting peak torque [N·m]	Normal max. torque [N·m]	Max. rotation speed [min⁻¹]	Basic load of bearing [N]	Pitch radius of pin [m]	Moment of inertia [kg·m²]	Mass [kg]	Price
		2S×0.95	Liner				C	R			
NSS 7.3.7	3×2	68	65	137	49	3000	3870	0.024	9.03×10^{-4}	1.3	—
NSS 7.7.9	3×2	133	128	196	68	2500	3870	0.035	2.69×10^{-3}	1.9	—
NSS 10.9.12	3×2	171	165	600	196	2000	8920	0.045	1.15×10^{-2}	4.9	—
NSS 13.9.14	3×2	171	165	1060	350	1800	14120	0.050	2.80×10^{-2}	10.4	—
NSS 16.10.16	3×2	190	183	1850	640	1500	21570	0.057	5.80×10^{-2}	15.7	—
NSS 20.9.20	3×2	171	165	3470	1180	1000	30890	0.075	1.61×10^{-1}	27.0	—
NSS 20.9.20/4	4×2	171	165	4170	1370	600	30890	0.075	1.80×10^{-1}	30	—
NSS 20.9.23/5	5×2	171	165	6280	2060	500	30890	0.090	3.08×10^{-1}	35	—
NSS 20.9.25/6	6×2	171	165	8340	2750	460	30890	0.100	4.48×10^{-1}	43	—
NSS 20.9.33/8	8×2	171	165	15700	5200	300	30890	0.140	1.19	59	—
NSS 20.9.39/10	10×2	171	165	23500	7850	250	30890	0.170	2.25	79	—

* Link numbers except 3 x 2 are available by special order.



Dimensions

Unit [mm]

Model	D	B	S	Z (H7)	G	N	M	K	CAD file No.
NSS 7.3.7	70	74	36	25	48	3	M10	10	—
NSS 7.7.9	92	74	70	45	70	3	M10	10	—
NSS 10.9.12	120	101	90	50	90	3	M12	15	—
NSS 13.9.14	140	134	90	55	100	3	M16	22	—
NSS 16.10.16	160	155	100	60	115	3	M16	25	—
NSS 20.9.20	200	196	90	80	150	3	M20	30	—
NSS 20.9.20/4	200	196	90	80	150	4	M20	30	—
NSS 20.9.23/5	230	196	90	120	180	5	M20	30	—
NSS 20.9.25/6	250	196	90	120	200	6	M20	30	—
NSS 20.9.33/8	330	196	90	210	280	8	M20	30	—
NSS 20.9.39/10	390	196	90	250	340	10	M20	30	—

Ordering Information

N S S 20 . 9 . 20 / 4

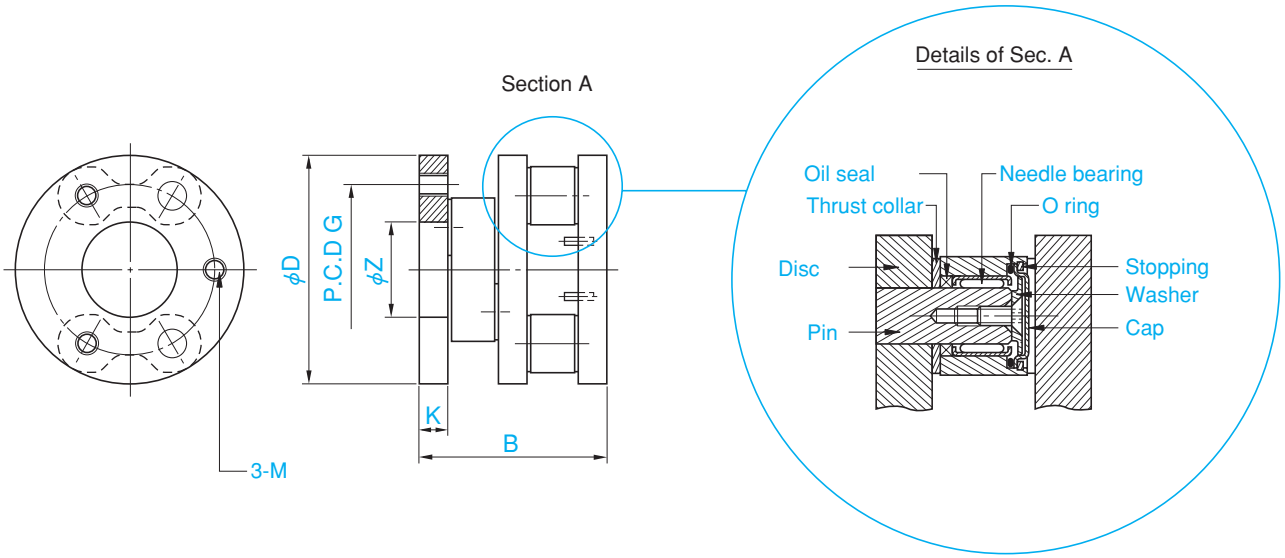
- N: Needle bearing
- S: Steel disc
- S: Steel link
- 20: Width dimension
- 9: Amount of displacement
- 20: Disc diameter
- 4: No. of links

DL

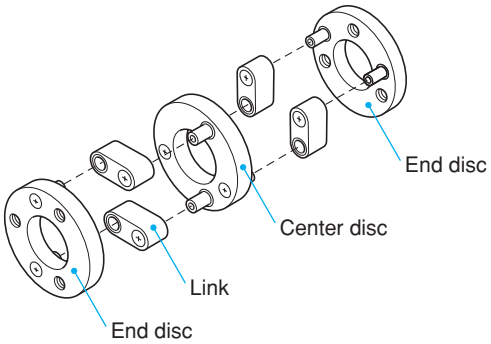
Schmidt coupling-DL model

Specification

Model	No. of links	Parallel offset [mm]	Transmittable torque [N·m]	Max. rotation speed [min⁻¹]	Moment of inertia [kg·m²]	Mass [kg]	Price
DL 7.7-02	2×2	2	93	2000	7.75×10^{-4}	1.1	—
DL 7.9-03	2×2	3	135	1800	2.30×10^{-3}	1.7	—
DL 10.12-04	2×2	4	402	1600	9.98×10^{-3}	4.4	—
DL 13.14-04	2×2	4	706	1400	2.60×10^{-2}	9.1	—
DL 16.16-04	2×2	4	1230	1200	5.10×10^{-2}	13.9	—
DL 20.20-04	2×2	4	2310	1000	1.44×10^{-1}	24.1	—



Dimensions



Unit [mm]

Model	D	B	Z (H7)	G	M	K	CAD file No.
DL 7.7-02	70	74	25	48	M10	10	—
DL 7.9-03	92	74	45	70	M10	10	—
DL 10.12-04	120	101	50	90	M12	15	—
DL 13.14-04	140	134	55	100	M16	22	—
DL 16.16-04	160	155	60	115	M16	25	—
DL 20.20-04	200	196	80	150	M20	30	—

Ordering Information

DL 7 . 7 - 02

- DL: Double links
- 02: Parallel offset
- 7 (before .): Disc diameter
- 7 (after .): Width dimension

Selection of NSS model

Selection procedure

❶ Calculate torque Ta applied to the coupling based on the motor output W and coupling operating rotation speed N.
❷ Refer to the table below. If the loading factor K is equal to 1.5 (K= 1.5), select the type from the simplified graph.

$$T=9550\,\frac{W}{N}$$

●Loading coefficient: K

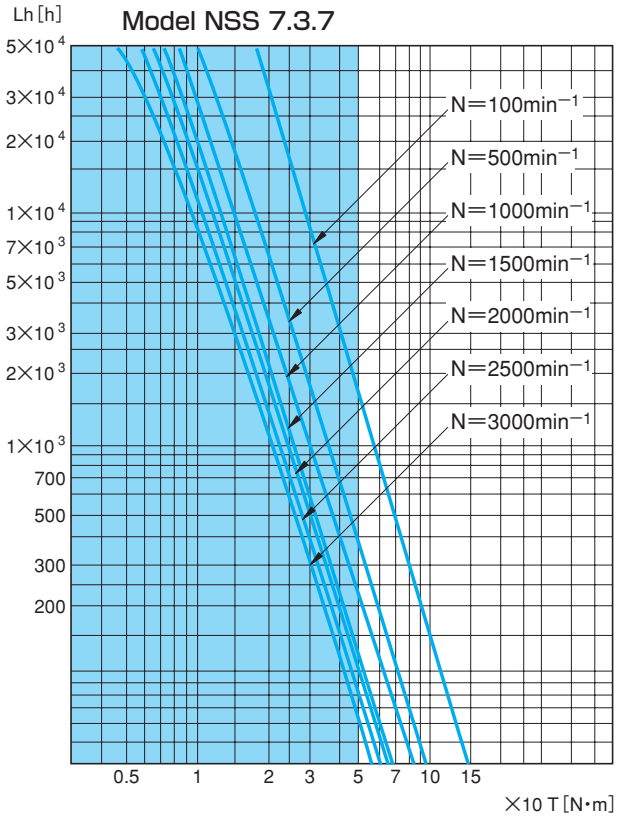
When mounted in shafts with small impact	1.0～1.5
When mounted in shafts with large impact (including the case of rapid axial displacement speed)	1.5～2.0
When mounted in unbalanced equipment where the entire coupling may vibrates	2.0～2.5

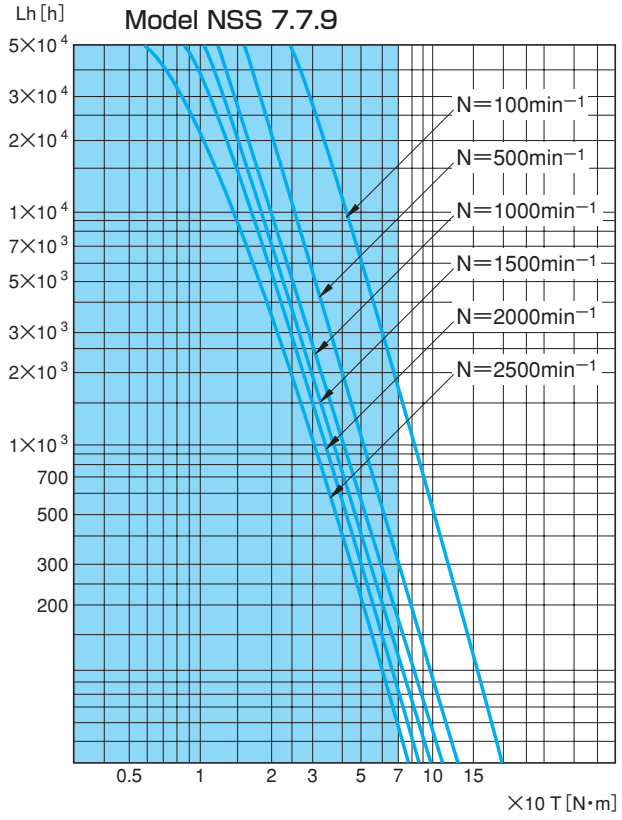
If there are other conditions required other than the specified chart, calculate the operating life hours by the following formula.

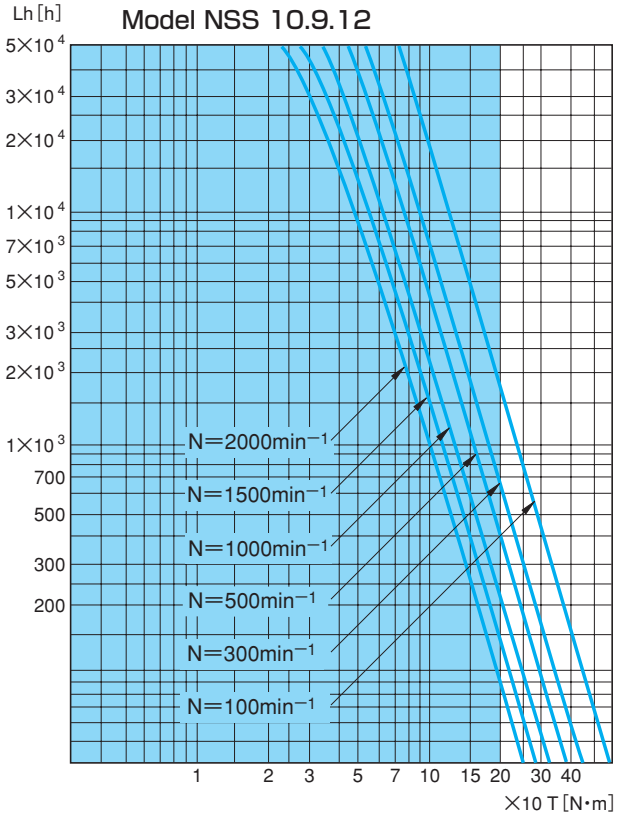
$$P=\frac{4T}{nR}$$

$$Lh=\frac{16666}{N}\left(\frac{C}{P\cdot K}\right)^{\frac{10}{3}}$$

W: Motor output
P: Bearing load
R: Pitch radius of pin
T: Operating torque
n: Total No. of links (3 x 2 for standard products)
L h: Operating life hours
N: Coupling rotation speed
C: Basic load capacity of bearing
K: Loading factor



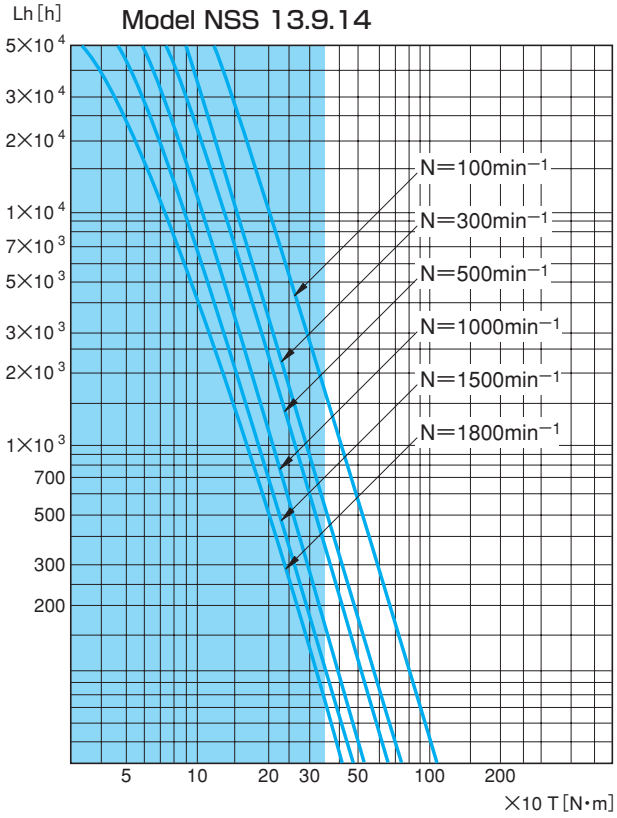




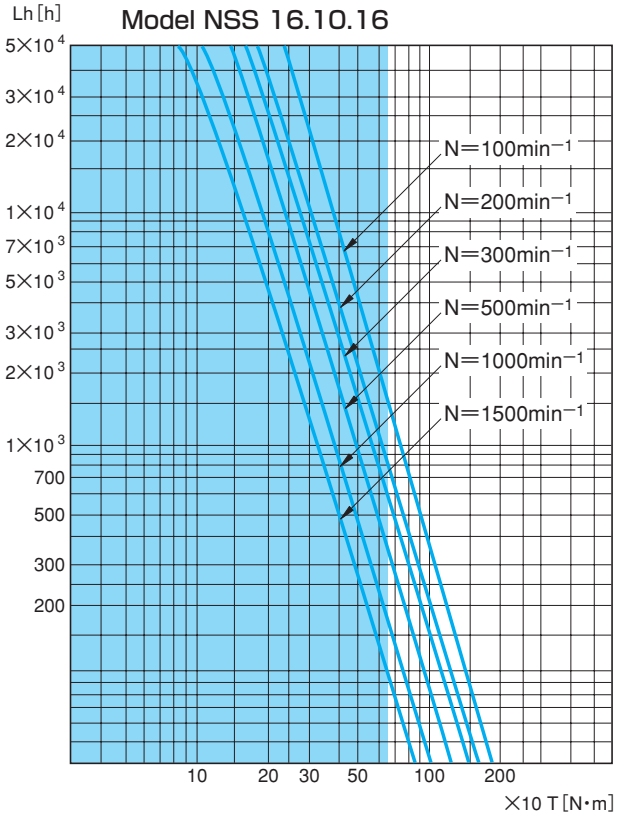
* Safety factor (loading factor K= 1.5) is included in the graph. Use within the range of ( ).

Schmidt

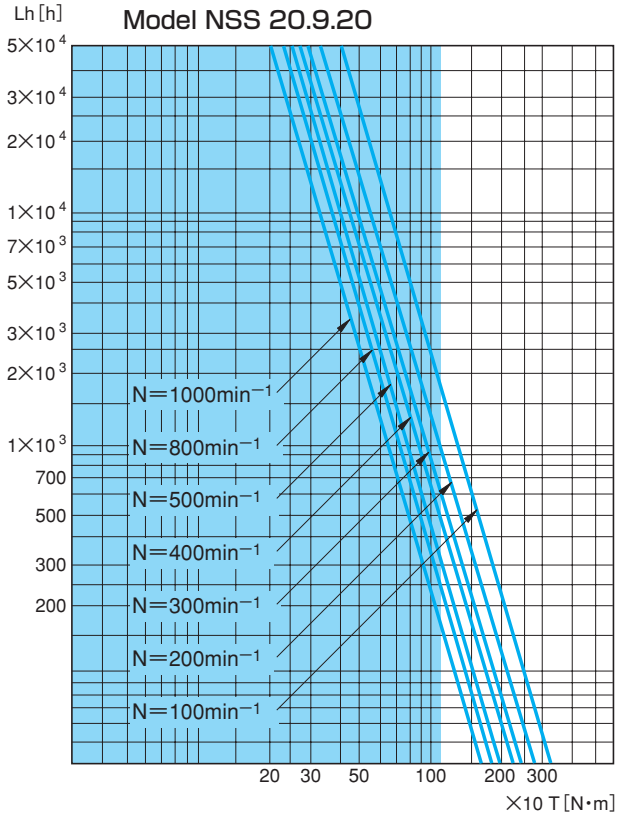
Model NSS 13.9.14



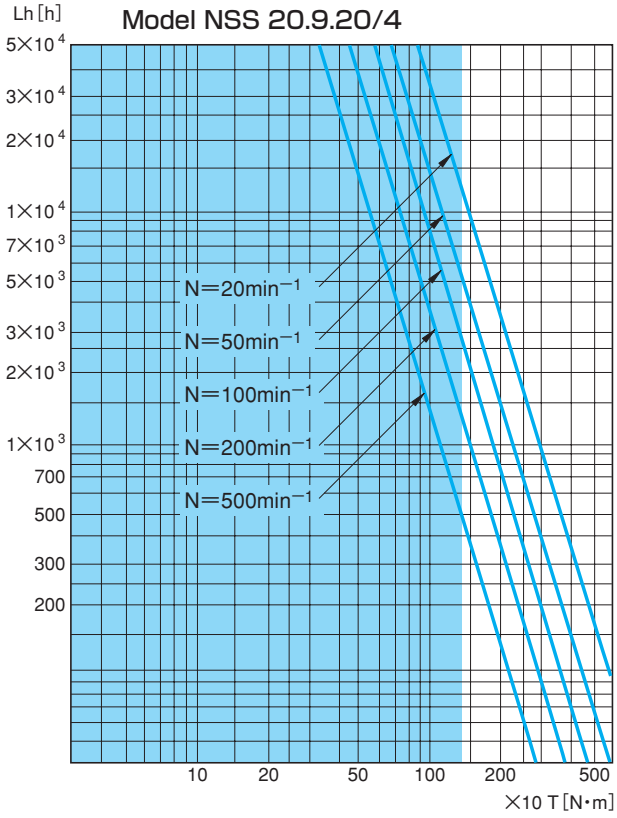
Model NSS 16.10.16



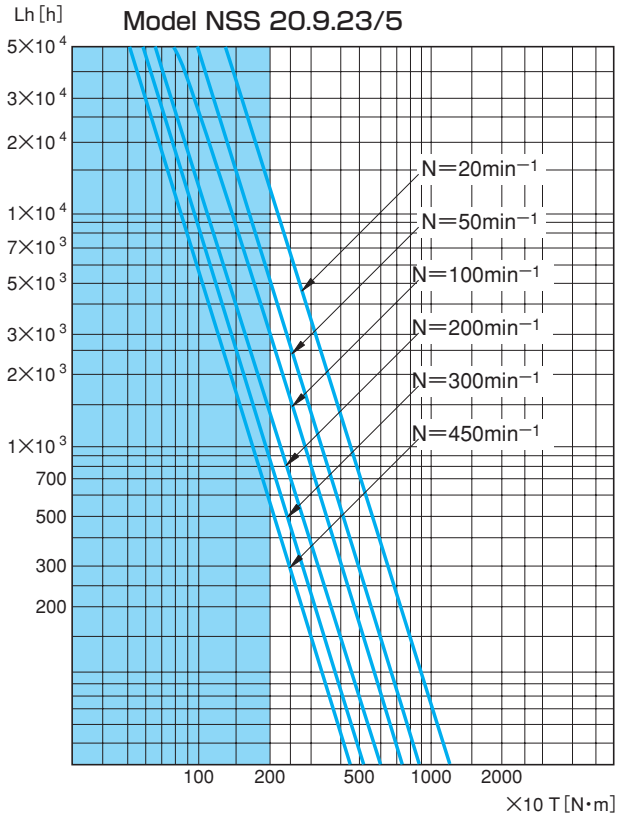
Model NSS 20.9.20

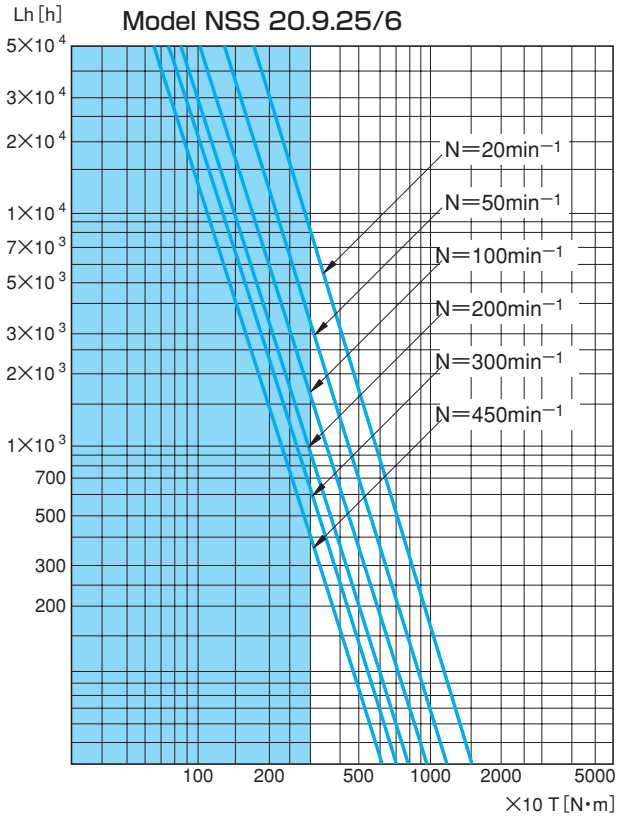


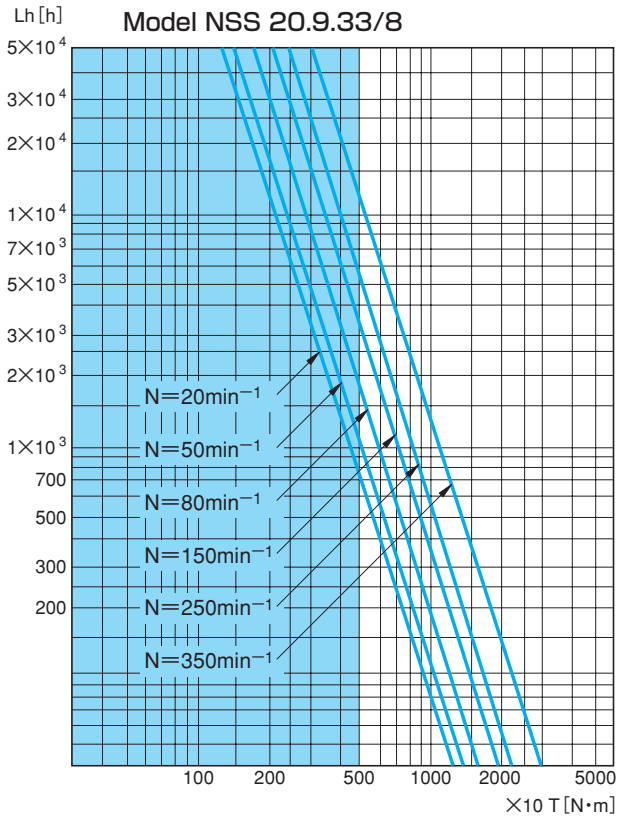
Model NSS 20.9.20/4

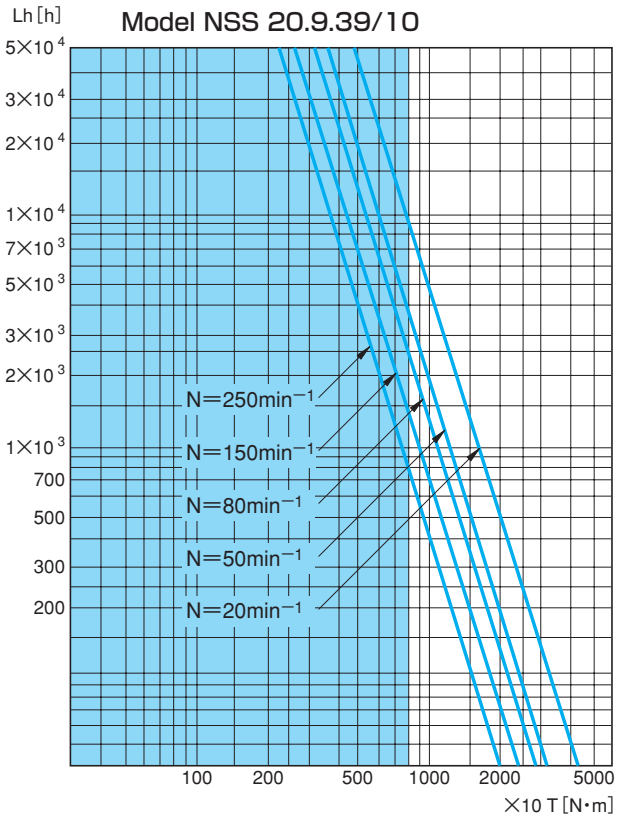


* Safety factor (loading factor K= 1.5) is included in the graph. Use within the range of ( ).





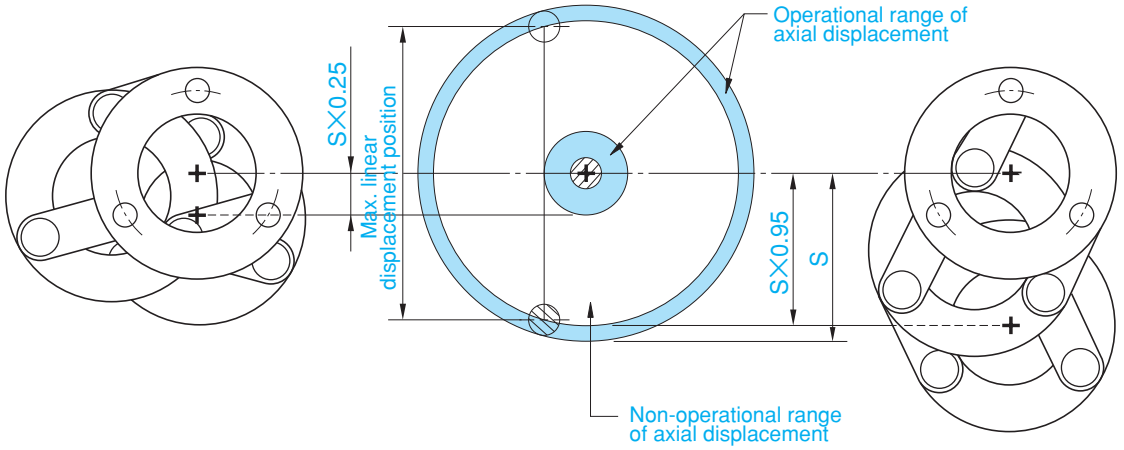




* Safety factor (loading factor K= 1.5) is included in the graph. Use within the range of ( ).

■Design check items in NSS model

❶ The displacement of both shafts must be within the range of Sx0.25 to Sx0.95.

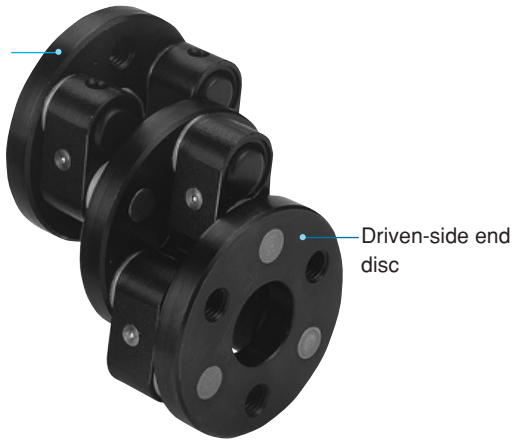


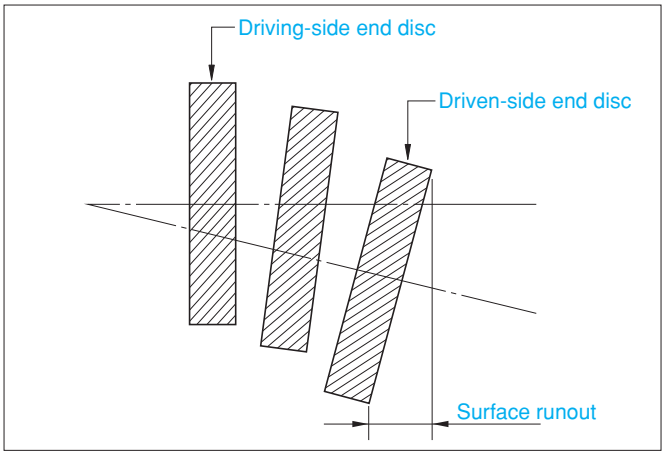
Model / Displacement	NSS 7.3.7	NSS 7.7.9	NSS 10.9.12	NSS 13.9.14	NSS 16.10.16	NSS 20.9.20	NSS 20.9.20/4	NSS 20.9.23/5	NSS 20.9.25/6	NSS 20.9.33/8	NSS 20.9.39/10
S×0.25[mm]	9	18	23	23	25	23	23	23	23	23	23
S×0.95[mm]	34	66	85	85	95	85	85	85	85	85	85
Max. linear [mm]	65	128	165	165	183	165	165	165	165	165	165

❷ Parallelize the drive and driven shafts.
The permissible surface runout after mounting or during operation of each model is described below. Adjust to achieve the mounting angle error of both shafts of coupling to be less than the tolerances.

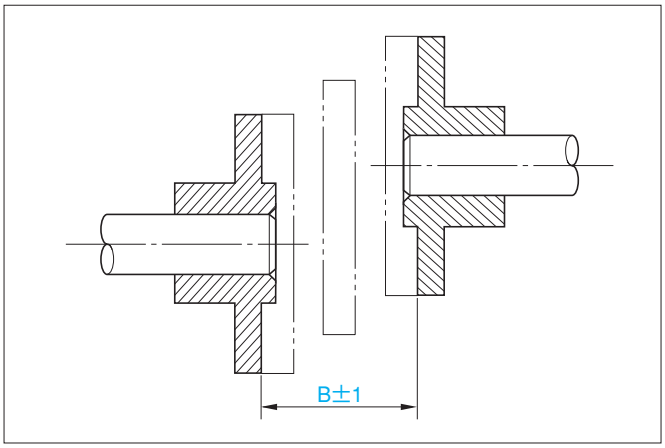
Surface runout tolerances

Model	NSS 7.3.7	NSS 7.7.9	NSS 10.9.12	NSS 13.9.14	NSS 16.10.16	NSS 20.9.20	NSS 20.9.20/4	NSS 20.9.23/5	NSS 20.9.25/6	NSS 20.9.33/8	NSS 20.9.39/10
Tolerance [mm]	0.15 or less		0.2 or less					0.3 or less	0.4 or less	0.5 or less	0.6 or less





❸ Mount couplings in order that the axial length becomes within ±1mm of the basic dimension B.
❹ Bending load or thrust load must not be applied to couplings. Do not use them in installation where couplings are in vertical or slant orientation.
❺ Use bearing lubricating grease equivalent of JIS cup grease K2220 model 1-1 or 1-2.
❻ Attach a protective cover on the rotating part. Please be careful not to sandwich a hand between a disc and link.
❼ A heavy load must be mounted using eyebolts. They can be fixed on both end discs. However, if the eyebolt is wider than the end disc, the eyebolt comes in contact with the link part and can be damaged. Select the appropriate size and mounting position.



Selection of DL model

Selection procedure

❶ Calculate torque Ta applied to the coupling based on the motor output P and coupling operating rotation speed n.

$$T\,[N\cdot m] = 9550 \times \frac{W\,[kW]}{N\,[min^{-1}]}$$

❷ Calculate corrected torque Td applied to the coupling after deciding the service factor K based on operating conditions.

$Td = Ta \times K$ (See next item)

❸ Refer to the diagram describing the permissible torque of each model. Select the appropriate DL model that can be used below the line (permissible torque).

Service factor

K: K1 • K2 • K3

K1: Operating life coefficient

Required operating life [h]	1,000	5,000	10,000	15,000	20,000	25,000	30,000	40,000	50,000
K1	1.0	1.0	1.05	1.1	1.2	1.3	1.4	1.5	1.6

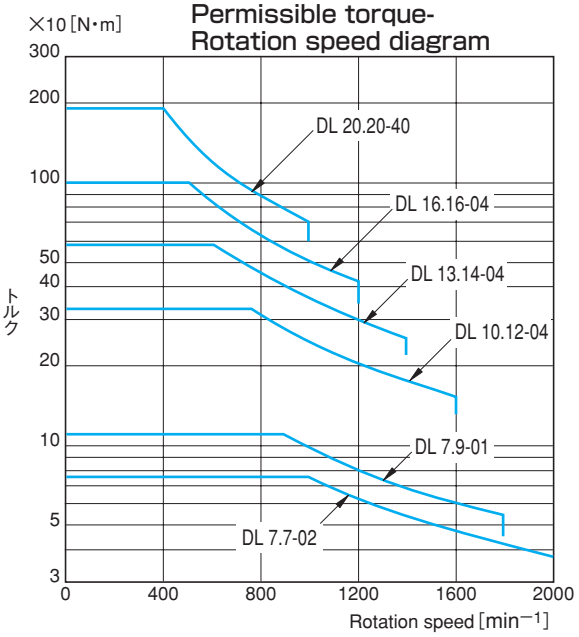
K2: Parallel offset coefficient

Model \ Parallel offset [mm]	0	0.5	1	1.5	2	2.5	3	3.5	4
7.7-02	0	1.1	1.2	1.3	1.4	—	—	—	—
7.9-03	0	1.1	1.2	1.3	1.4	1.5	1.6	—	—
10.2-04～20.20-04	0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8

K3: Load fluctuation coefficient

Load fluctuation	K3
Small	1.0～1.5
Medium	1.5～2.0
Large	2.0～2.5

Permissible torque-Rotation speed diagram

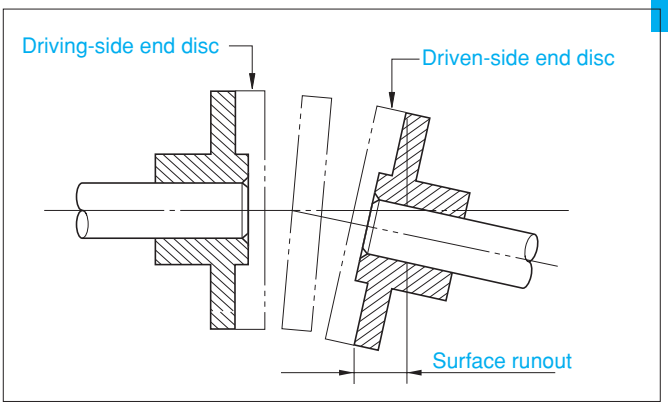


Design check items in DL model

❶ Parallelize the drive and driven shafts.
The permissible surface runout after mounting or during operation of each model is as described below. Adjust to achieve the mounting angle error of both shafts of coupling to be less than the tolerances.

Surface runout tolerances

Model	DL 7.7-02	DL 7.9-03	DL 10.12-04	DL 13.14-04	DL 16.16-04	DL 20.20-04
Tolerance [mm]	0.15 or less		0.2 or less			



❷ Mount couplings in order that the axial length becomes within ±1mm of the basic dimension B.

❸ Axial load must not be applied to couplings. In addition, do not use coupling mounted at an angle or in vertical.