Innovation in Motion
TSUBAKI

Extended Line-up

TSUBAKI
JAW-FLEX COUPLING
LN SERIES

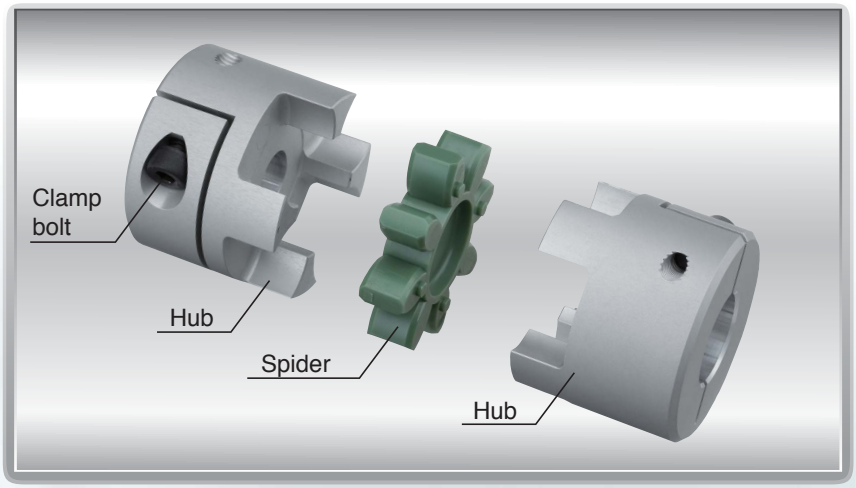
High-Precision Coupling with Excellent

The Jaw-Flex Coupling LN Series has realized unprecedented vibration

Moreover, in addition to our clamp coupling, we also

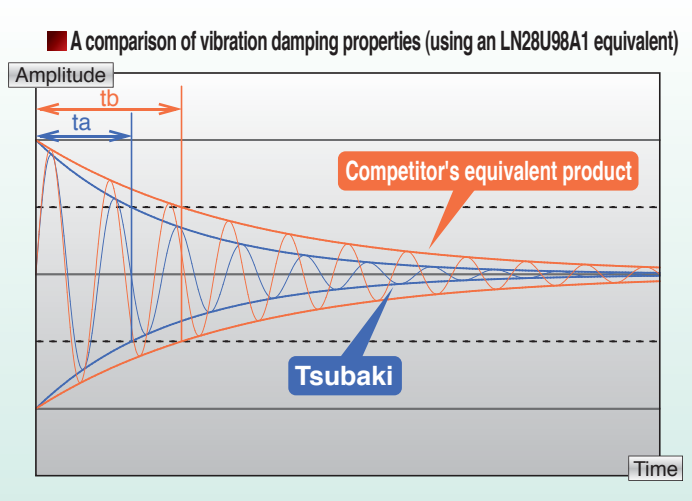
Clamp Coupling

This coupling makes mounting simple; only a single bolt is required to connect the coupling to the shaft. This is the optimum coupling for connecting ball screws to the servo motors for devices such as machine tool feed shafts.



Features

- Vibration control by servo-driven mechanisms and excellent shock-absorption capacity upon start-up and shutdown.
- Optimal combination of spider and hub enables non-backlash torque transmission in Tsubaki's easy to use Jaw-Flex Coupling.
- The spider is selectable from two types: the 98A with excellent vibration damping properties and the 64D with high torsional stiffness and excellent wear resistance.
- The simple structure consists of two hubs and one spider.
- Two hub options are available: Clamping hubs offer easy mounting thanks to the single bolt shaft coupling; and taper lock hubs ensure high power shaft coupling capability and a balanced design.



Vibration Damping Properties!

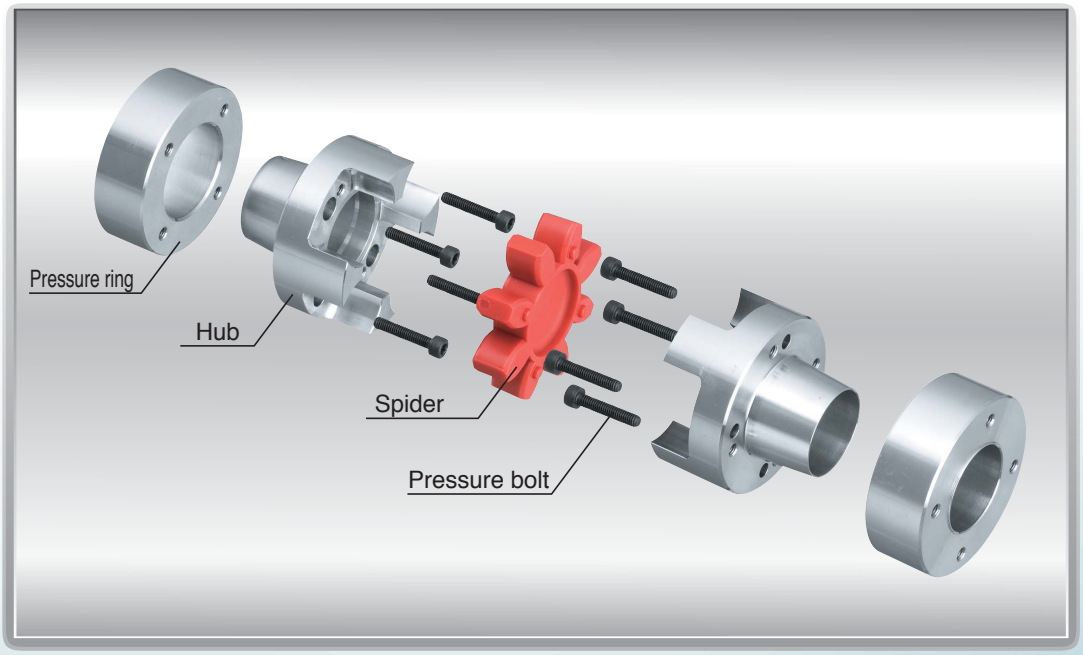
damping properties by employing new materials in the spider.

offer a taper coupling that suits high-speed operation.

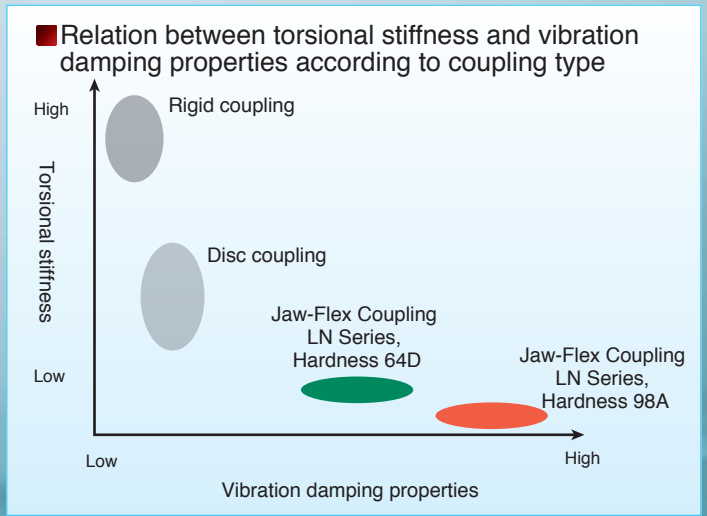
New Product

Taper Lock Coupling

The balanced shaft coupling method is well suited to high-speed operation on spindle shafts of machine tools. The hubs and pressure rings are made of aluminum, which makes them lightweight and therefore provides a low moment of



Compared to conventional high-stiffness type couplings, this coupling has excellent vibration damping properties and does not cause strain to the machine to which it is installed.



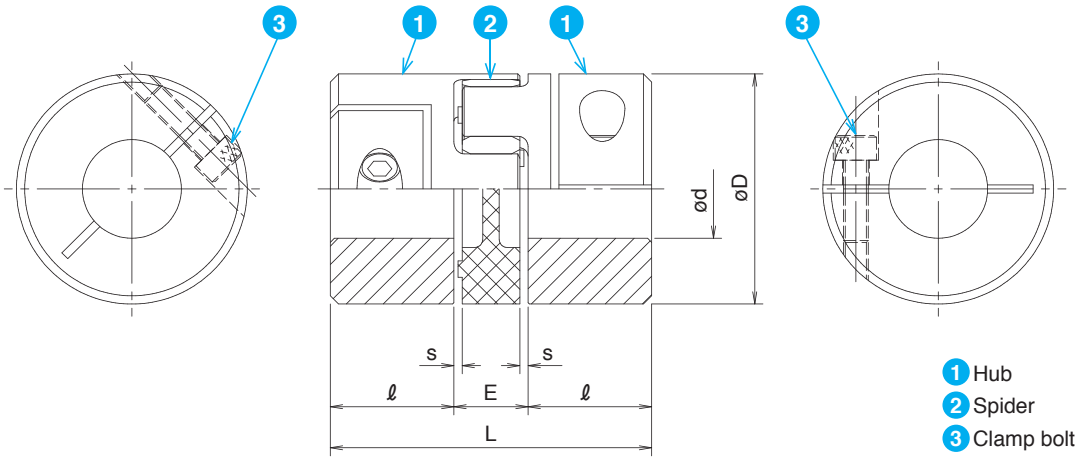
Transmission Capacity Table

Model no.	Spider Hardness	Spider Color	Spider performance torque Rated N•m	Spider performance torque Max. N•m	Torsional stiffness N•m/rad	Allowable misalignment Angular misalignment deg	Allowable misalignment Parallel misalignment mm	Allowable misalignment Axial displacement mm	Clamping coupling Max. speed r/min	Clamping coupling Weight kg	Clamping coupling Moment of inertia kg•m²	Taper lock coupling Max. speed r/min	Taper lock coupling Weight kg	Taper lock coupling Moment of inertia kg•m²
LN24	98A	Red	60	120	2200	0.9	0.10	-0.5 to +1.4	7000	0.35	1.70×10^{-4}	17000	0.35	1.75×10^{-4}
	64D	Green	75	150	5400	0.8	0.07							
LN28	98A	Red	160	320	4000	0.9	0.11	-0.7 to +1.5	5900	0.52	3.72×10^{-4}	15000	0.53	3.77×10^{-4}
	64D	Green	200	400	8800	0.8	0.08							
LN38	98A	Red	325	650	6600	0.9	0.12	-0.7 to +1.8	4800	1.02	10.4×10^{-4}	12000	1.00	10.4×10^{-4}
	64D	Green	405	810	14600	0.8	0.09							

Note) 1. The weight and moment of inertia are the values at maximum shaft bore diameter.
2. The allowable misalignment is based on the assumption that the other two misalignment values are zero.
3. The spider is a consumable product. It is necessary to replace the spider periodically in order to maintain non-backlash performance.

Clamp Coupling

Dimensions



Model no.	Min. shaft bore diameter mm	Max. shaft bore diameter mm	Outer diameter D mm	Total length L mm	Hub length ℓ mm	E mm	s mm
LN24	12	28	56	78	30	18	2
LN28	20	35	66	90	35	20	2.5
LN38	25	42	80	114	45	24	3

Clamp Bolt Tightening Torque and Shaft Coupling Torque

Model no.	Bolt size	Tightening torque N•m	Shaft bore diameter d mm	12	15	16	18	19	20	22	24	25	28	30	32	35	38	42
LN24	M6	10.5	Shaft coupling torque N•m	30	38	39	40	41	44	50	54	55	60					
LN28	M8	25							87	97	105	109	118	124	128	134		
LN38	M8	25										107	122	131	135	146	154	164

Recommended shaft diameter tolerance = h7
*However, the recommended shaft diameter tolerance for ø35 is h7 or (0 to +0.010).

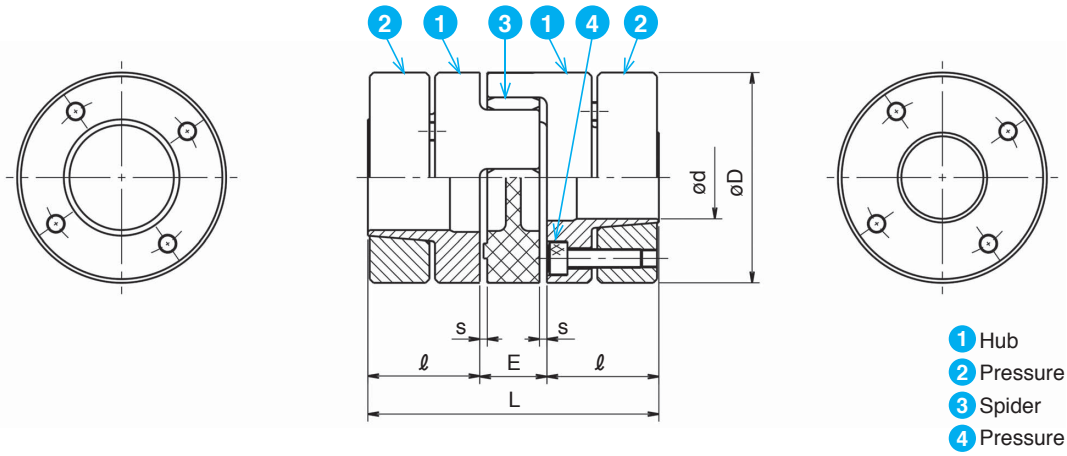
Model No. Example

L N 24 U 98A1 – A 15 C × A 20 C

- L N: Jaw-Flex Coupling LN Series
- 24: Size
- U: Spider material — U: Polyurethane
- 98A1: Spider type — 98A1: Hardness 98A, 64D1: Hardness 64D
- A: Hub material — A: Aluminum
- 15: Shaft bore diameter
- C: Shaft coupling method — C: Clamp, P: Taper lock
- A 20 C: Shaft bore diameter, Shaft coupling method

Taper Lock Coupling

Dimensions



Model no.	Min. shaft bore diameter mm	Max. shaft bore diameter mm	Outer diameter D mm	Total length L mm	Hub length ℓ mm	E mm	s mm
LN24	16	30	56	78	30	18	2
LN28	16	38	66	90	35	20	2.5
LN38	24	45	80	114	45	24	3

Pressure Bolt Tightening Torque and Shaft Coupling Torque

Model no.	Bolt size	Number of bolts	Tightening torque N·m	Shaft bore diameter d mm	16	19	20	22	24	25	28	30	32	35	38	40	42	45
LN24	M5	4	6	Shaft coupling torque N·m	84	107	117	139	129	139	181	192						
LN28	M5	4	6		128	164	182	219	207	223	247	296	300	356	415			
LN38	M6	4	10						315	340	396	472	492	578	668	622	677	762

Recommended shaft diameter tolerance = h6
*However, the recommended shaft diameter tolerance for ø35 is h6 or (0 to +0.010).
*Shafts with a tolerance of k6 can also be supported. Contact a Tsubaki representative for details.

Selection

To ensure a long service life when using the Jaw-Flex Coupling LN Series in a non-backlash operation over long periods, it is necessary to ensure a sufficient safety factor in relation to the rated torque of the spider. Therefore, follow the procedures shown below to perform selection. The spider is a consumable product. It is necessary to inspect the spider periodically in order to maintain non-backlash performance.

1.Use the formula shown below to determine the torque applied to the coupling T (N•m) from the transmitted power of the driving machine P (kW) and the operating speed n (r/min).

$$T=9550 \cdot P/n$$

2.Determine service factors St and Sd according to the usage conditions, and then determine the correction torque applied to the coupling Tr (N•m).

$$Tr=T \cdot St \cdot Sd$$

St : Temperature factor
Sd : Torsional stiffness factor

Perform sizing so that the coupling's rated torque Tn is greater than or equal to the coupling's correction torque Tr.

$$Tn \geqq Tr$$

3. Check that the maximum torque Ts (N•m) that is generated on the drive side, on the load side, or on both sides is less than or equal to the rated torque of the coupling Tn.

Drive-side maximum torque : $Ts=Tas \cdot Ma \cdot Sa$

Load-side maximum torque : $Ts=T\ell s \cdot M\ell \cdot S\ell$

$$Tn \geqq Ts \cdot St \cdot Sd$$

Tas : Maximum drive torque (N•m)
Tℓs : Maximum load torque (N•m)
Ma : Drive-side moment of inertia ratio $Ma=J\ell/(Ja+J\ell)$
Mℓ : Load-side moment of inertia ratio $M\ell=Ja/(Ja+J\ell)$
Sa : Shock load factor (drive side)
Sℓ : Shock load factor (load side)
Ja : Drive-side moment of inertia
Jℓ : Load-side moment of inertia

4.Ensure the shaft diameter does not exceed the allowable mounting shaft diameter for the coupling.
The shaft coupling torque varies depending on the shaft diameter, so the shaft coupling torque may be lower than the rated torque of the spider. Check that the shaft coupling torque of the selected coupling size is greater than or equal to Ts, the maximum torque to apply to the coupling.

Temperature factor

Operating temperature °C	–30 to +30	To +40	To +60	To +80
St	1.0	1.2	1.4	1.8

Torsional stiffness factor

Application	Machine tool main shaft	Positioning	Encoder
Sd	2 to 5	3 to 8	10 or higher

Shock load factor

Load characteristics	Uniform load	Low fluctuation	High fluctuation
Sa(Sℓ)	1.0	1.4	1.8

Mounting

Alignment

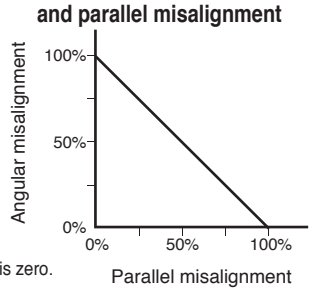
The more accurate the initial centering of the coupling, the less eccentric rotational stress will be experienced during operation.
Wear of the shaft bearing, depressions in the mounting surface, and changes in conditions affected by factors such as temperature and vibration could reduce the service life of the coupling and your equipment.
Please conduct periodic adjustments.
The allowable angular misalignment and parallel misalignment of the coupling act in correlation with each other. When one increases, the other decreases. These factors must, therefore, be considered together.

Table 1. Allowable misalignment

Model no.	Spider hardness	Allowable misalignment		
		Angular misalignment deg	Parallel misalignment mm	Axial displacement mm
LN24	98A	0.9	0.10	-0.5 to +1.4
	64D	0.8	0.07	
LN28	98A	0.9	0.11	-0.7 to +1.5
	64D	0.8	0.08	
LN38	98A	0.9	0.12	-0.7 to +1.8
	64D	0.8	0.09	

The angular misalignment and parallel misalignment values are based on the assumption that the other misalignment value is zero.

Relation between angular misalignment and parallel misalignment

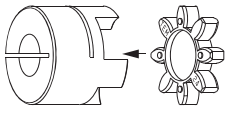


Mounting Hubs on Shafts and Removing Hubs from Shafts

Clamp coupling

Mounting procedure

(1) Check that there are no defects—such as burrs, scratches, stains, or rust—present on the drive and driven shafts and on the hub inner diameter. Wipe away any dirt and oil that are present.
(2) Mount a hub on each shaft. Adjust the hub mounting position and phase, and then tighten the clamp bolt to the required torque, shown on page 3.
(3) Mount the spider on one of the hubs. Attach the spider so that the side with the "TEM" logo is in contact with the hub (see the figure to the right).



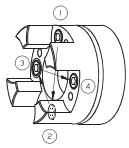
Spider attachment direction

(4) Install the devices in their positions, and then securely align both hubs according to the information under "Alignment" on the previous page.
(5) As the hubs are 'a close-fit', a load will be applied in the shaft direction to the hub on which the spider is attached when the other hub is being connected.
If you do not want to apply a load to the machine, we recommend that you first assemble the coupling, and then mount the coupling to the equipment.
(6) It may be difficult to remove the coupling because the fit between the spider and the hubs is tight. Be careful not to remove the coupling forcibly. Doing so may damage the spider or the machine.

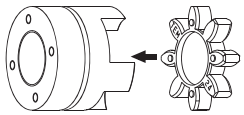
Taper lock coupling

Mounting procedure

(1) Check that there are no defects—such as burrs, scratches, stains, or rust—present on the drive and driven shafts and on the hub inner diameter. Wipe away any dirt and oil that are present.
(2) Thinly apply oil or grease on the shafts.
(Do not use oil or grease that contains silicon or molybdenum anti-friction agent.)
(3) Mount a hub on each shaft. Tighten the pressure bolts by hand.
Adjust the hub mounting position and phase at this point in time.
(4) Tighten the diagonal pressure bolts in order with approximately 1/2 the specified torque listed on page 4 (see the figure to the right).
(5) Use a torque wrench to tighten the bolts with the specified torque listed on page 4 until they will not turn any further.
(6) Mount the spider on one of the hubs.
Attach the spider so that the side with the "TEM" logo is in contact with the hub (see the figure to the right).
(7) Install the devices in their positions, and then securely align both hubs according to the information under "Alignment" on the previous page.
(8) AS the hubs are 'a close-fit', a load will be applied in the shaft direction to the hub on which the spider is attached when the other hub is being connected.
(9) It may be difficult to remove the coupling because the fit between the spider and the hubs is tight. Be careful not to remove the coupling forcibly. Doing so may damage the spider or the machine.

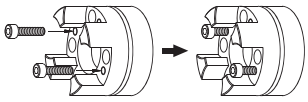


Pressure bolt tightening order


Spider attachment direction

Removal procedure

(1) Check that loads such as torque and thrust loads are not acting on the hubs.
(2) The bolts can be loosened in any order, but progressively loosen the bolts in stages so that they are gradually released, and then remove the bolts.
(3) If the hubs remain coupled together even after all the bolts have been loosened, insert bolts into the removal screw holes. Then, tighten these bolts to release the lock (see the figure to the right).


Using the removal screw holes

Usage Environment

The area of installation should have an ambient temperature of -30 to 80 °C (-22 to 176 °F), be well-ventilated and low in humidity, and have little or no dust.
Avoid use in areas with corrosive liquids and gases, and in explosive or flammable areas.
Avoid use in outdoor locations because this product is not water resistant or corrosion resistant.

Inspection

After operating the equipment for one or two hours, check the angular misalignment and the parallel misalignment once again.
Also, periodically (for example, every 6 to 12 months) check for part abnormalities and spider wear.
The spider is a consumable product. Periodically replace it.

Warranty

1. Warranty period without charge
This warranty is effective for 18 months from the date of shipment or 12 months from the first use of Goods—calculated as being the installation of the Goods to the Buyer's equipment or machine—whichever comes first.

2. Warranty coverage
Should any damage or problem with the Goods arise within the warranty period, given that the Goods were installed, operated, and maintained correctly according to the instructions provided in the manual, the Seller will repair or replace the faulty Goods at no charge once the Goods are returned to the Seller.
However, this warranty only applies to Goods provided by Seller to Buyer and does not include the following:
1) Any costs related to removal of Goods from and installation of Goods on the Buyer's equipment or machine in order to repair or replace Goods.
2) Costs to transport Buyer's equipment or machines to Buyer's repair shop or similar facility.
3) Costs to reimburse any lost profit arising from malfunctions and repairs and other consequential losses.

3. Warranty with charge
Even during the warranty coverage period, Seller will charge for any investigation and repair of Goods caused by:
1) Improper installation attributable to the failure on Buyer to follow the instruction manual.
2) Insufficient maintenance or improper operation performed by the Buyer.
3) Malfunctions arising from the incorrect installation of the Goods on other equipment or machines.
4) Any modifications or alterations of Goods performed by the Buyer.
5) Any repairs performed by engineers other than the Seller or those designated by the Seller.
6) Operation of Goods in an environment other than the proper environment specified in the manual.
7) Malfunctions arising from natural disasters or other instances of Force Majeure and from illegal activities performed by third parties.
8) Secondary malfunctions of Goods caused by the failure of the Buyer's equipment or machines.
9) Malfunctions arising from embedded parts supplied by the Buyer or from the use of parts specified by the Buyer.
10) Malfunctions arising from incorrect wiring or parameter settings configured by the Buyer.
11) The end of the service life of the Goods under normal usage.
12) Other damages for which the Seller is not liable.

4. Engineer dispatch service
Additional charges will be applied for services such as the dispatch of an engineer from the Seller to perform tasks such as investigating, adjusting, and carrying out trial operations of Goods.

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