POWER-LOCK Frequently Asked Questions

Sept 7, 2009

The following are the most frequently asked POWER-LOCK questions. We hope these resolve common questions, and at the same time deepen your knowledge of U. S. Tsubaki's POWER-LOCK product line.

Question:

1. Can the POWER-LOCK be used with a shaft that already has a finished keyway?
2. Can the POWER-LOCK accommodate a bending moment?
3. Can I use the POWER-LOCK if it is a little longer than the length of the shaft?
4. Does it really matter how smooth the surface finish is for the shaft or the hub?
5. Can the POWER-LOCK be used on a hollow shaft?

6. If the hub is shorter than the POWER-LOCK is this okay?
7. What about using a non-centering POWER-LOCK with no hub guide section?
8. If one POWER-LOCK is not strong enough, can we double up?
9. Can POWER-LOCKs be used in applications with large impact loads?

10. Can we use the TF series POWER-LOCK without the included spacer?
11. Do we need a torque wrench when installing a POWER-LOCK?
12. What happens if we tighten the bolts to less than the specified torque?
13. Do we have to apply oil to any parts when installing the POWER-LOCK?
14. What if the locking bolts are not lubricated on POWER-LOCKs that require lubrication?

15. How many times can a POWER-LOCK be reused?
16. Can we reuse a slipped POWER-LOCK?
17. Do the POWER-LOCK bolts ever come loose?
18. Can we use a lock-washer under the POWER-LOCK locking bolts?
19. Are there any particular concerns when installing the AD series POWER-LOCK?

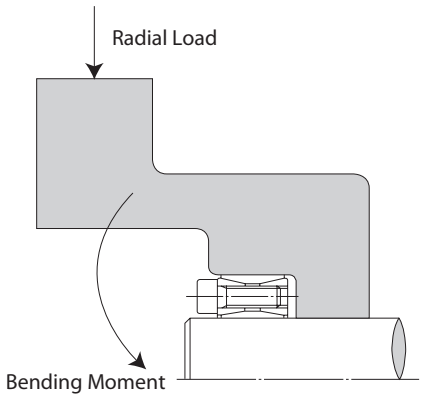
20. Is there a problem if the POWER-LOCK is installed at room temp then used in an oven?
21. Is it possible to use the stainless steel POWER-LOCK in the water or seawater?

Question 1:
Can the POWER-LOCK be used with a shaft that already has a finished keyway?

It is possible to use a POWER-LOCK on a shaft with a keyway, however the transmissible torque and thrust will decrease by 10% of the catalog value.
The exception to this is the EL series, it cannot be used with a shaft that has a finished keyway because it would become impossible to remove the EL units due to plastic deformation.

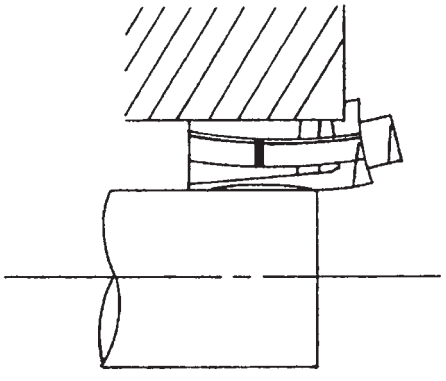
Question 2:
Can the POWER-LOCK accommodate a bending moment?

Generally, keyless locking devices are not designed to receive a bending moment however, there is an acceptable range depending upon the series. If the POWER-LOCK you use experiences a bending moment like that of the diagram on the right, please contact U.S. Tsubaki for more information.



Question 3:
Can I use the POWER-LOCK if it is a little longer than the length of the shaft?

If the shaft length is shorter than the width of the POWER-LOCK, the force to the inner ring becomes unequal and it is impossible to use the POWER-LOCK due to the resulting deformation. Because of the deformation, the accuracy of the centering will also decrease.



Question 4:
Does it really matter how smooth the surface finish is for the shaft or the hub?

The values below, also shown in our POWER-LOCK catalog, are the allowable limits. Rough finishing values greater than this are not acceptable. When the contact pressure is generated on the surface of the shaft or hub, the surfaces' undulation becomes crushed due to the contact pressure and there is a slight plastic deformation of the shaft and hub. Consequently, the shaft outer diameter will become smaller while the hub's inner diameter will grow larger because of the deformation due to surface roughness. Eventually the transmissible torque will decrease. Over time, with an overly rough surface finish, there is a possibility of further plastic deformation.

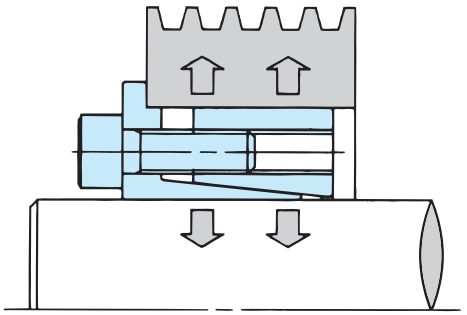
AS	AD	AE	FL	EL	EF	TF	SL	RE	KE
12S	12S	12S	12S	6S	12S	12S	12S	12S	12S

Question 5:
Can the POWER-LOCK be used on a hollow shaft?

For a hollow shaft it is necessary to confirm whether the shaft material and hollow shaft diameter has the strength to withstand the pressure on the shaft due to the locking of the POWER-LOCK.
The calculation formulas and related details are listed in our POWER-LOCK catalog and our general catalog. Please refer to these and contact U.S. Tsubaki with any questions.

Question 6:
Can we use the POWER-LOCK with a short hub width or an "A" style sprocket?

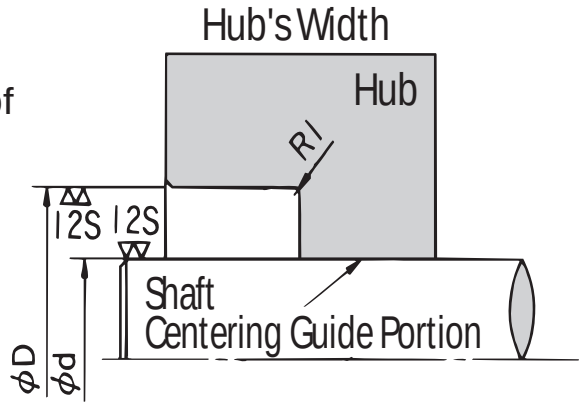
It is possible on a few of the POWER-LOCK series; however, because the outward hub contact pressure becomes quite large. It is necessary to check that the material strength and the hub outer diameter can handle the stress. One step is to calculate the hub contact pressure P'k by using the following formula. If this is your application, contact U.S. Tsubaki for more information.



$$P'k = P' \times \frac{\ell}{B}$$

Question 7:
If I use a POWER-LOCK series with no centering function and a hub with no guide portion, how does this affect centering accuracy?

It's not normally recommended because there can be an extremely large run-out at the edge of the hub which cannot be predicted.
Make sure to always have the guide portion for centering the hub. In general, the longer the guide section and the closer the tolerance, the less run out will be seen on the hub.



Question 8:
One POWER-LOCK is not strong enough for my needs, so I want to use a number of them in series (one behind the other). In this case, what will happen to transmissible torque?

Transmissible torque will increase, but the magnification differs depending on the series. For example, using two AS series POWER-LOCKs provide double the transmissible torque. Please note that with some POWER-LOCKs, using multiple units in series may not be possible.

	Number of Units			
Series	**1**	**2**	**3**	**4**
AS	1	2	3	4
AD	1	2	N/A	N/A
AE	1	2	N/A	N/A
FL	1	2	N/A	N/A
KE	1	2	N/A	N/A
RE	1	1.2/2*	N/A	N/A
TF	1	2	N/A	N/A
EL	1	1.5	1.8	2
EF	1	1.2	N/A	N/A
SL	1	2	N/A	N/A

* Note: RE values changes with or without snapring.

Question 9:
Is it possible to use POWER-LOCK with applications that have large impact loads like press machines and construction equipment?

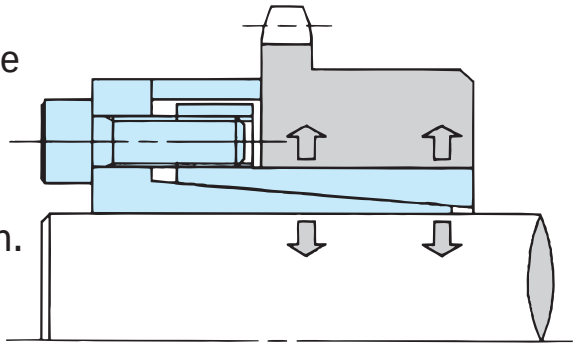
Even when impact load is repeated, you must adequately consider the safety factor. If bolt-tightening torque is done sufficiently, it is possible to use Power Lock. In regard to impact load torque, the safety factor of S.F. = 5 is standard.

Service Factor = POWER-LOCK allowable torque / Impact load torque

Question 10:
Can I use the TF Series POWER-LOCK without the included spacer?

Due to the following reasons, the TF Series cannot be used without a spacer:

- The inner ring will warp.
- The locking bolt will interfere with the hub.
- The hub will not settle in its assembled position.
- The hub will move during assembly.



Question 11:
What would happen if I did not use a torque wrench to install a POWER-LOCK?

The transmissible torque and thrust described in the catalog is the value when the locking bolts are tightened correctly. If a torque wrench is not used, the prescribed axial force will not be achieved, causing the POWER-LOCK to slip, damaging the bolts and/or deforming the POWER-LOCK. This is due to incorrect tightening of the locking bolts. Make sure to use a torque wrench and tighten the locking bolts according to the stipulated torque amount.

Question 12:
The POWER-LOCK torque is more than I need and the recommended hub diameter is bigger than we can use. What if we just lower the torque on the locking bolts to adjust?

The tightening torque and the POWER-LOCK transmissible torque have a proportional relationship. Therefore, if bolt tightening torque is reduced, transmissible torque will also be reduced accordingly, but we cannot recommend this because reducing the bolt tightening torque will possibly allow the locking bolt to loosen. To remain tight, a certain amount of pre-tensioning (stretch) needs to be applied to the bolt. If the pre-tensioning is too low, bolt loosening is possible.

Question 13:
When installing the POWER-LOCK, which portions do I have to apply oil/grease to?

It is best to apply oil/grease to the shaft and hub contact surfaces, as well as the mutual contact areas of the taper ring, inner and outer rings, the bolt's bearing surface, and the bolt screw surface.
It is sometimes misunderstood that applying oil to the tapered surfaces can cause slip, but the lubricating effect is essential for smooth movement on the taper's surface during assembly.
Adding a film of lubrication to the shaft and hub bore has a similar effect in allowing the necessary movement, while the locking bolts are being tightened. Excess lubrication is forced out and the remaining fills the very tiny crevices left from the machining process.
However, do not use oil or grease that includes molybdenum with anti-friction composites. In addition, do not use any oil or grease that contains extreme pressure additives. If oil/grease containing these additives is used, the friction coefficient will significantly decrease, possibly damaging the tightening bolt.

Question 14:
When assembling the POWER-LOCK series that requires an oil/grease coating on the tightening bolt, what would happen if I assembled without applying any oil/grease?

All POWER-LOCKs that require oil or grease on the locking bolts come with a lubrication film from the factory, however, we suggest this film be check and additional lubrication added if felt prudent. If the POWER-LOCK is assembled without applying oil/grease, transmissible torque can decrease by at least 20%. There is also a possibility that the actual tightening torque is considerably less than thought, and over time vibration may cause the locking bolts to loosen. The transmissible torque in the catalog is calculated on the basis of axial force when the locking bolt is in a lubricated condition. Therefore, do not remove any oil/grease from the POWER-LOCK.
However, a few POWER-LOCK series - SL series, stainless steel and electroless nickel-plated series - are shipped with locking bolts having a special dry film lubricated coating, no oil/grease coating is necessary for assembly.

Question 15:
How many times can I reinstall a POWER-LOCK?

About six or seven times is possible for reinstallment for all series, other than the AD Series. However, with each installation insure that the POWER-LOCK has not slipped and has no deformations or scratches.
The construction of the AD Series can deform easily, so it is limited to two installations. When reusing, ensure that all the components are loose and lubrication is present where required, as described in the installation instructions.
If the original POWER-LOCK came with lubrication coated locking bolts, these should be replaced if the condition warrants it.

Question 16:
Can I reuse a slipped POWER-LOCK?

Once the POWER-LOCK has been completely disassembled, and no deformations or scratches have been discovered on any of its parts, by following the procedures for reassembly in the manual, it is possible to reuse it.
The AD Series cannot be disassembled, so carefully inspect the appearance of the POWER-LOCK. The deterioration of the AD series surface roughness can be a problem, so it is limited to two installations.

Question 17:
Do the POWER-LOCK bolts ever come loose?

Assuming the locking bolts have been tightened properly, according to the prescribed tightening torque, the locking bolts will not loosen. Additionally:

- In order to secure the frictional force to prevent the bolts from loosening, a high tightening force is used.
- Using higher quality bolts and a relatively high tightening torque adds a pre-tension to the bolts which assists in holding them in place.
- The POWER-LOCK component that makes contact with the bearing surface of the locking bolts is heat treated. Due to this, surface depressions are minimized.

Question 18:
Can we use a lock-washer under the POWER-LOCK locking bolts?

Under normal assembly circumstances there is no concern that the POWER-LOCK locking bolts will become loose.
When spring washers are used, which add their own opposing force, the locking force decreases when using the same tightening torque. Due to the decrease in the resulting axial force, and decrease in transmissible torque, they cannot be used.

Question 19:
When installing the AD Series, are there any particular concerns I should be aware of?

Compared with other POWER-LOCKs, the AD series has a small taper angle to take a larger transmissible torque.
Quickly tightening the locking bolts will create flaws in the locking bolts and screw holes, so when installing and removing, the locking bolts tightening procedure should be followed as recommended.
When disassembling the AD series POWER-LOCK, make certain to use all of the tap holes for removal and follow the procedures listed in the instruction manual.

Question 20:
I assembled the POWER-LOCK in a place of normal ambient temperature, but the application is in a place with temperatures as high as 250°F. Will this large temperature change lower the transmissible torque of the POWER-LOCK?

If the shaft and hub materials are the same or equivalent to that of the POWER-LOCK, it should be no problem because the shaft, hub and the POWER-LOCK will expand at the same rate.
If the shaft and hub are made of different materials such as stainless steel or aluminum, consult with U.S. Tsubaki, because it will be necessary to examine the possibility of their use. The use of POWER-LOCKs at temperatures in the range of -22°F to 392°F (–30°C to 200°C) is acceptable.

Question 21:
Is it possible to use the stainless steel POWER-LOCK in the water or seawater?

If you don't mind a little rust, then it is possible. Even when using in water the contact surfaces have a high surface pressure which water cannot penetrate. Thus, the POWER-LOCK will not have a decrease in performance. However, if no rust is acceptable, the POWER-LOCK should not be used in these situations.

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