

POWER-LOCK AD-N SERIES

INSTRUCTION MANUAL

NOTICE FOR SAFTY

- Read this instruction manual and other attached documents thoroughly before installing and using the POWER-LOCK.
- Use the POWER-LOCK only after having full knowledge of the equipment and all applicable safety procedures.
- Keep this instruction manual where the user can always refer to it.

Safety precautions in this manual are classified into two categories: “WARNING” and “CAUTION”. These are defined as follows:

 WARNING	Death or serious injury may result from misusing the product without following the instructions.
 CAUTION	Minor or moderate injury, as well as damage to the product may result from misusing the product without following the instructions.

Failure to follow the instructions under  CAUTION may also result in death or serious injury depending on the particular situation.

 WARNING
(General) • If the device is used on equipment for transporting people, install a suitable protection device on the equipment side for safety purposes. Otherwise, an accident resulting in death, injury or damage to the equipment may occur due to accidental runaway. • If the device is used on lifting equipment, install a suitable safety device on the equipment side to prevent materials from falling. Falling materials may cause injury or death to personnel or damage to the equipment. • Comply with all applicable safety standards of the country where the device is used. When revisions are published, the updated revisions shall apply.
 CAUTION
(Delivery) • Verify that you received exactly what you ordered. Using the wrong device may lead to injury or equipment damage. (Installation) • Always use a torque wrench when installing the locking bolts, and adhere to the procedure and torque values listed in this instruction manual. If the bolts are tightened without the use of a torque wrench, the correct torque may not be obtained, causing the POWER-LOCK to slip or deform. • Never use oils containing silicone or molybdenum disulfide lubricants when lubricating the connecting surfaces (e.g. shaft or hub inner surface) of the POWER-LOCK. • Only use the bolts that came with the POWER-LOCK. If bolts are missing or damaged, contact our sales office or dealers to obtain replacements. The use of unauthorized bolts may cause the bolts to break, resulting in an accident. • Never strike the POWER-LOCK with a hammer or other such tool when mounting the POWER-LOCK to the shaft and hub. Doing so may deform the POWER-LOCK and cause an accident. (Removal) • Make sure that no torque or thrust loads are acting on the hub or shaft before removal of the POWER-LOCK. When the locking bolts are loosened, the POWER-LOCK may be suddenly unlocked and the device may begin to spin or pop out. • Especially for elevator applications, never loosen the locking bolts while a load is being held. Doing so may cause the load to drop. (Repeated use) • Completely inspect each part of the POWER-LOCK prior to reusing. If any damage is found, replace the unit.

Thank you for purchasing the AD-N Series POWER-LOCK.

The POWER-LOCK is a frictional, keyless shaft-hub locking device for connecting hubs and shafts that are subject to large torque variations. Fitting is done by locking bolts after installing the POWER-LOCK between the shaft and hub. Since torque is transmitted by the contact pressure and friction between the surfaces in contact with the hub and shaft, the condition of the contact surfaces and proper tightening of the bolts are of great importance. Read the manual thoroughly and then follow all of the instructions carefully so as to ensure satisfactory performance.

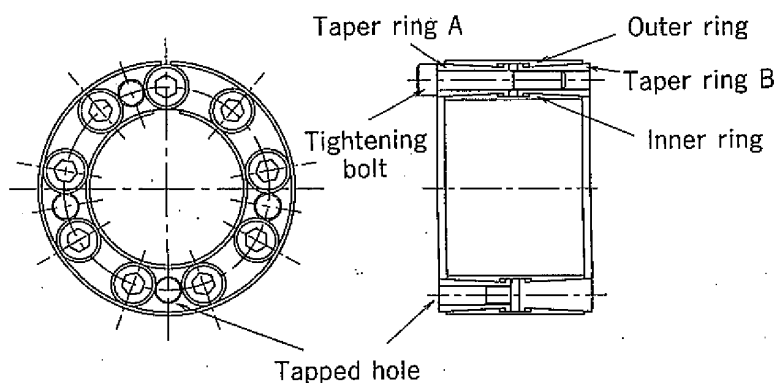


Fig.1 : Configuration

■ Installation

Compared with other series', the AD-N Series POWER-LOCK has a smaller tapered angle. Due to this, a considerable amount of time and care must be taken when installing the locking bolts during the installation and removal of the product. Hastened tightening of the bolts may cause problems with the bolts or tap holes, so be sure to tighten all locking bolts slowly and evenly.

1. Clean the inner surface of the hub and the surface of the shaft, and apply a slight amount of oil to both surfaces. Never use lubricants containing silicone and molybdenum disulfide. Using these lubricants makes it impossible to obtain the specified torque.
2. Remove all of the Power-Lock's locking Bolts, and clean the inside and outside of the POWER-LOCK unit with treated oil to remove any dust. Then either submerge the POWER-LOCK in oil or spray oil in the gaps between the taper rings and inner and outer rings to properly lubricate all areas of the POWER-LOCK. Also, apply oil to the thread portions and bolt-head bearing surface of the locking bolts. If the POWER-LOCK is not sufficiently lubricated, it will be impossible to obtain the specified torque due to the rough movement of parts.

Never use lubricants containing silicone or molybdenum disulfide. If these lubricants are used, the POWER-LOCK or its locking bolts may be damaged.

3. Tighten two locking bolts into diametrically opposite tapped holes for removal from taper ring A until they stop. Lightly tighten the remaining locking bolts into their ordinary holes. Then, after confirming the distance between two taper rings is the maximum, loosen the bolts in the tapped holes one full turn to make a clearance for the POWER-LOCK unit. This completes the pre-assembly of the POWER-LOCK. (Fig. 2)

4. After completing the pre-assembly of the POWER-LOCK, hold the bolts in the tapped holes of taper ring A as shown in figure 3 and insert the POWER-LOCK into the hub and shaft. Never strike the POWER-LOCK with a hammer or other such tools during installation. If the POWER-LOCK is installed horizontally, properly support the hub so that it does not become tilted under its own weight. (This tilt will lead to the deformation or damage of the POWER-LOCK or hub.)

The hub guide makes installation and removal easier.

After inserting the POWER-LOCK, remove the two bolts from the tapped holes in taper ring A and tighten them into their ordinary holes.

(Never tighten the tightening bolts unless the hub and shaft are fully inserted into the POWER-LOCK.

If the tightening bolts are tightened with the POWER-LOCK alone,

the POWER-LOCK may deform and become unusable.)

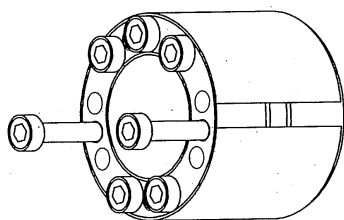


Fig. 2 Pre-assembly

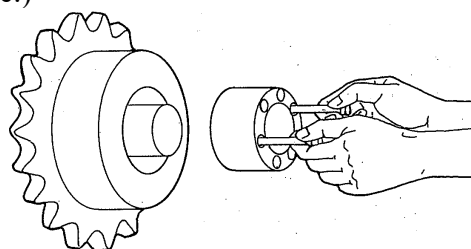


Fig. 3 Insertion example

The AD-N Series is a press fit and pre-assembled structure. With the exception of locking bolts, it is impossible for the customer to disassemble AD-N Series Power Locks. The holes in which locking bolts are not inserted for shipping are tapped holes for removal.

5. After inserting the POWER-LOCK to its specified depth, position the hub and shaft relative to each other (circumference and thrust direction). Set the torque wrench to approximately 1/4 of torque MA (refer to the table below for torque MA), and tighten each of the locking bolts evenly in the sequence shown in figure 4. When tightening the bolts, do not tighten each bolt completely at one time, but tighten each bolt to an approximate 30 degree turn and then move to the next bolt in sequence. Then repeat this process in the sequence given in figure 4 until all the locking bolts have been tightened to this torque.

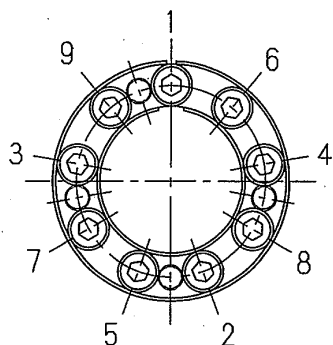


Table 1: Bolt sizes and their respective tightening torque

POWER-LOCK shaft diameter (mm)	Tightening bolt size	Tightening torque MA	
		N · m	{ft · lbs.}
19 --- 40	M6	16.7	{12.3}
42 --- 65	M8	40.2	{29.7}
75 --- 95	M10	81.3	{60.1}
100 --- 120	M12	142	{105}
130 --- 160	M14	225	{167}
170 --- 260	M16	348	{257}
270 --- 300	M20	676	{499}

Fig. 4 : Tightening sequence

6. Raise the torque wrench setting to 1/2 of the torque MA and repeat the procedure given in step 5 above.
7. Raise the torque wrench setting to the full torque MA and repeat the procedure given in step 5 above.
8. Finally, confirm that all locking bolts have been tightened to torque MA. To do this, moving clockwise across the bolts, tighten each one until none of them can be turned by a torque wrench set at MA.

■ Removal

1. Make sure that no torque or thrust loads are acting on the hub or shaft before removal of the POWER-LOCK. Moreover, if the weight of the hub or shaft is heavy, or if a chain is wound, the removal procedure may become quite difficult. Remove the POWER-LOCK by gradually loosening the locking bolts in the proper sequence after the torque and load have been completely eliminated. When the locking bolts are loosened, the POWER-LOCK may be suddenly unlocked and the device may begin to spin or pop out.
2. Apply enough oil or grease to the threads of the locking bolts and the tapped holes for removal in taper ring A. Tighten the locking bolts into all of the tapped holes to remove evenly as in the sequence shown in figure 5.

In this procedure, locking bolts pull taper ring A, and push taper ring B to the opposite direction at the same time.

Use a torque wrench to tighten the locking bolts to the recommended installation torque. To avoid damage to the bolts, do not tighten at or over torque MA.

When tightening the bolts, tighten each bolt at an approximate 30-degree turn, and then move to the next bolt in sequence.

If the bolts do not turn any more and the taper ring has not come off, even though it has been tightened at torque MA, loosen all the bolts once. Then repeat the same procedure from item 2. In this case, it is recommended to turn the locking bolts less than 30-degrees each time.

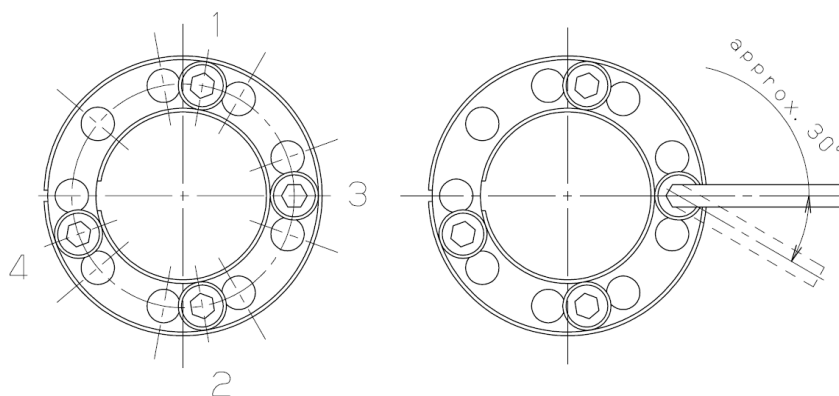


Fig 5 Tightening sequence for removal

3. While tightening the bolts into the tapped holes, the tightening torque will all of a sudden become very light. This means that one of the taper rings (A or B) has come unlocked. By continuing to tighten the bolts, the same thing will occur again, meaning that the other taper ring has been unlocked.

4. It is now possible to remove the POWER-LOCK. Tighten the bolts into the tapped holes and pull the POWER-LOCK away from the shaft and hub.
Refer to Table 2 and Fig. 6 to make sure that the lock has been released.
The “L” dimension shows the distance between the bearing surface of the head of locking bolts and the end face of taper ring A.
If “L” reaches the figure shown in Table 2, the lock will be released. If the lock does not release when it reaches the L figure in Table 2 below, the hub may be loaded by its own weight, and if the POWER-LOCK has not come off, it may still be tightened even though the lock has already been released.
(Note*) “L” in Table 2 is the minimum distance. The POWER-LOCK unit and the locking bolts may be damaged if L becomes equal to or less than the figure in Table 2.

Table 2

Distance “L” between the bearing surface of the head of locking bolts and end face of taper ring A.

POWER-LOCK Shaft Diameter (mm)	L mm(Note *)
19 --- 22	5
24 --- 35	4.5
38 --- 40	6
42 --- 65	12
70 --- 95	23.7
100 --- 120	33
130 --- 160	21.5
170 --- 260	37
280 --- 300	47

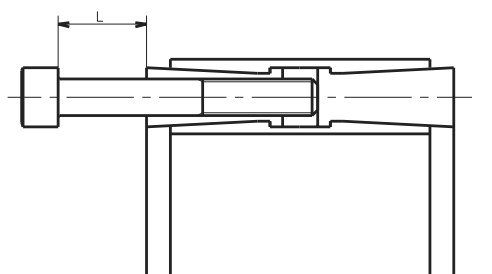


Fig. 6 Taper Rings (unlocked condition)



Important

1. Never use lubricants containing silicone and molybdenum disulfide. Using these lubricants will make it impossible to obtain the specified torque.
2. When tightening the locking bolts, always use a torque wrench. Never use wrenches with no torque adjustment scale, and never tighten by hand with an Allen wrench, as it is inaccurate.
3. Do not use any bolts other than those supplied with the POWER-LOCK. If bolts have been lost or are in need of replacement, contact our distributor or the **TSUBAKIMOTO CHAIN** CS Center. The locking bolt for the AD-N Series is a special and exclusive high tensile strength bolt.
4. Confirm the following before reusing the POWER-LOCK (the AD-N Series can be reused roughly 2 times):
 - 1) There is no deformation to the tip of the locking bolts. If the bolts are deformed and forcibly tightened, tap holes may be damaged. If a bolt is deformed, order a replacement.
 - 2) Make sure there is no deformation or damage to the POWER-LOCK units.
5. The surface of the product may partially turn brownish color, which is caused by oil stain.
Oil stain is a discoloration of the metal surface caused by rust-preventive oil, and occurs when additives and oxidative degradation products contained in the rust-preventive oil react with the metal.
Since this is not an abnormality or defect that degrades the performance of the product, it can be used as is.

■ Warranty:

TSUBAKIMOTO CHAIN CO.: hereinafter referred to as “Seller”

Customer: hereinafter referred to as “Buyer”

Goods sold or supplied by Seller to Buyer: hereinafter referred to as “Goods”

1. Warranty period without charge

Effective 18 months from the date of shipment or 12 months from the first use of Goods, including installation of Goods to Buyer’s equipment or machines - whichever comes first.

2. Warranty coverage

Should any damage or problems with the Goods arise within the warranty period, given that the Goods were operated and maintained according to the instructions provided in the manual, Seller will repair and replace at no charge once the Goods are returned to the Seller.

This warranty does not include the following:

- 1) Any costs related to removal of Goods from the Buyer’s equipment or machine to repair or replace parts.
- 2) Costs to transport Buyer’s equipment or machines to the Buyer’s repair shop.
- 3) Costs to reimburse any profit loss due to any repair or damage and consequential losses caused by the Buyer.

3. Warranty with charge

Seller will charge a fee for any investigation and repair of Goods caused by:

- 1) Improper installation due to not properly following the procedures in the instruction manual.
- 2) Insufficient maintenance or improper operation by the Buyer.
- 3) Incorrect installation of Goods to other equipment or machines.
- 4) Any modifications or alterations of Goods by the Buyer.
- 5) Any repair by engineers other than the Seller or those designated by the Seller.
- 6) Operation in an inappropriate environment not specified in the manual.
- 7) Force Majeure or forces beyond the Seller’s control such as natural disasters and injustices committed by a third party.
- 8) Secondary damage or problems incurred by the Buyer’s equipment or machines.
- 9) Defective parts supplied, or specified by the Buyer.
- 10) Incorrect wiring or parameter setting by the Buyer.
- 11) The end of life cycle of the Goods under normal usage.
- 12) Loss or damage not liable to the Seller.

4. Dispatch service

Service to dispatch a Seller’s engineer to investigate, adjust or trial test Seller’s Goods is at the Buyer’s expense.

5. Disclaimer

- 1) In our constant efforts to improve, TSUBAKIMOTO CHAIN may make changes to this document or the product described herein without notice.
- 2) Considerable effort has been made to ensure that the contents of this document are free from technical inaccuracies and errors. However, any such inaccuracies or errors reported will be gladly examined and amended as necessary.



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