Innovation in Motion
TSUBAKI

NEW

TSUBAKI
LARGE BORE
POWER-LOCK®

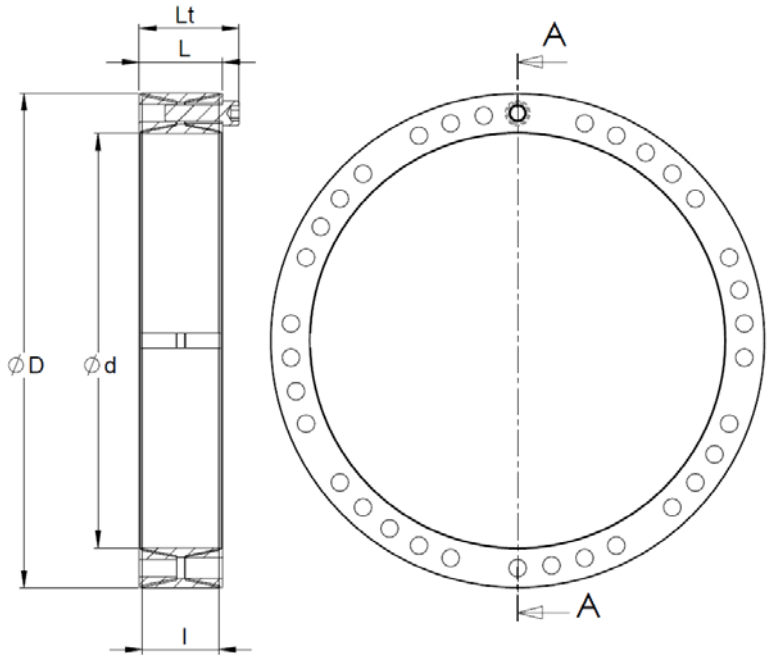
- Keyless Locking Device
- Space Saving
- High Transmissible Torque

PL-500mm

PL-50mm

How do you mount your large ideas?

LARGE BORE POWER-LOCK®



T1 = Shaft Tolerance
T2 = Bore Tolerance

The best design is the simplest design.

- Locking assembly that eliminates the problems associated with key systems
- High durability against reversing and impacting loads
- Thrust load capability
- Easy assembly and disassembly

The ability to transmit torque from shaft to rotating device relies on a clamping unit's ability to grasp both the shaft and bore securely. Tsubaki's Power-Lock® keyless locking device provides guaranteed* transmissible torque ratings and clamping strength. Torque ratings can be misleading as companies tend to publish average torque ratings. By definition this means that half the samples tested were below this rating and half were above. At Tsubaki, we publish the Minimum Torque rating minus a conservative safety factor.

*Certain conditions apply

Dimensions and Ratings

Part No.	Power Lock Dimensions							Rated Torque Mt		Axial Force Pax		Pressures				Bolt Information			
	d	T_1	D	T_2	L	l	Lt	kNm	kgfm	kN	kgf	Contact pressure on shaft, P MPa	Contact pressure on shaft, P kgf/mm²	Contact pressure on hub bore, P' MPa	Contact pressure on hub bore, P' kgf/mm²	No. Bolts Z	Bolt Type S	Max Bolt Torque, Ma Nm	Max Bolt Torque, Ma kgfm
PL320X405AS	320	+.000 -.089	405	+.089 -.000	78	72	98	210	21,400	1,310	134,000	152	15.5	120.54	12.3	29	M20X70	568.4	58
PL340X425AS	340		425		78	72	98	223	22,800	1,310	134,000	143	14.6	114.66	11.7	29	M20x70	568.4	58
PL360X455AS	360		455		90	84	112	294	30,000	1,640	167,000	144	14.7	113.68	11.6	29	M22x80	764.4	78
PL380X475AS	380		475		90	84	112	311	31,700	1,640	167,000	136	13.9	109.76	11.2	29	M22x80	764.4	78
PL400X495AS	400		495		90	84	112	327	33,400	1,640	167,000	129	13.2	104.86	10.7	29	M22x80	764.4	78
PL420X515AS	420	+.000 -.097	515	+.097 -.000	90	84	112	379	38,700	1,800	184,000	136	13.9	111.72	11.4	32	M22x80	764.4	78
PL440X545AS	440		545		102	96	126	459	46,800	2,090	213,000	131	13.4	106.82	10.9	32	M24x90	980	100
PL460X565AS	460		565		102	96	126	480	49,000	2,090	213,000	126	12.9	102.9	10.5	32	M24x90	980	100
PL480X585AS	480		585		102	96	126	532	54,300	2,210	226,000	128	13.1	104.86	10.7	34	M24x90	980	100
PL500X605AS	500		605		102	96	126	555	56,600	2,210	226,000	123	12.6	101.92	10.4	34	M24x90	980	100

All Dimensions are in millimeters unless otherwise indicated
Dimension and Performance Data are subject to change without notice

Innovation in Motion TSUBAKI

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Power-Lock

The traditional and popular "industry standard", the keyed mount has a number of widely acknowledged limitations. In a keyed connection the clearances that must exist between the component hub, shaft, keyway, and key allow for metal-to-metal contact leading to fretting and corrosion. The poor fit also allows "backlash" to occur during the starting, stopping and transmitting power during normal operation. The process of machining the keyway into the shaft is tedious, permanent and expensive. It also reduces the strength and amount of torque a given shaft size can transmit. Another popular connection system, the interference fit also has limitations. Interference fits or welds prevent the operator from being able to easily remove the shaft from the hub for maintenance or replacement.
Tsubaki has been a leader within the power transmission industry in the quest to find a better way to connect components to shafts.

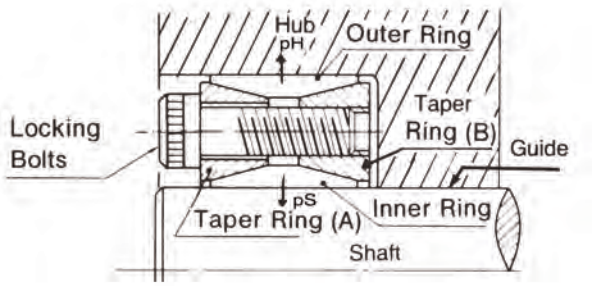
The Tsubaki Power-Lock is a well-engineered, adjustable and affordable device that solves engineering and maintenance difficulties associated with other connection alternatives. Tsubaki Power-Lock is a shaft-to-hub friction connection that relies on concentric surface pressure to affix gears, sprockets, and other drive components to a motor-driven shaft. Power-Lock improves the connection of a drive component to a shaft. It helps to eliminate problems with keyway connections and limitations for QD and tapered bushings. This frictional, keyless system enables transmission of high-torque and axial loads, and accommodates reversing, dynamic or shock loading. Tsubaki Power-Locks can be used in such common applications as the connection of timing pulleys, sheaves, conveyor pulleys, indexing applications, sprocket, gears, cams, levers, motors and hydraulics, clutches and brakes and flange couplings. Power-Lock is available in both Inch and Metric sizes in a variety of styles.

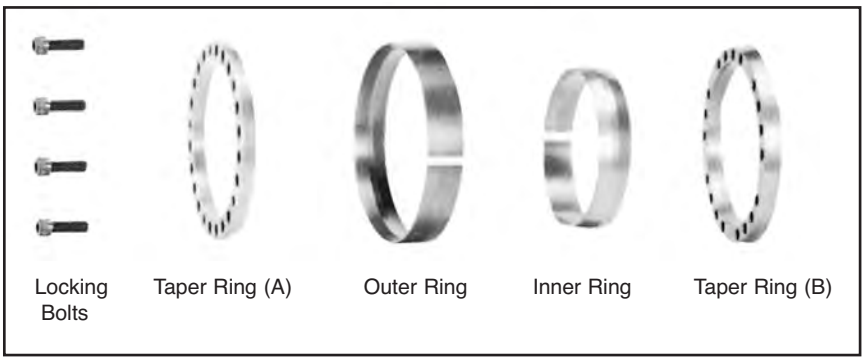
The Power-Lock allows for easy attachment of shaft to hub without time and money spent on machining or extra assembly labour. Power-Lock connects hubs solidly to shafts, using a keyless mechanical interference fit to transmit torque or to withstand axial thrust. This mechanical interference fit utilizes screw tension in the Power-Lock, converted into radial pressure. This pressure expands the Power-Lock to eliminate the gap between the hub and the shaft. The Power-Lock uses the friction bond between the Power-Lock and the shaft/hub to create a zero backlash connection. This connection is easily releasable to remove the mechanical interference fit.

The contact pressures created using a Power-Lock can be greater than traditional interference fit pressures, allowing for more torque to be transmitted or shorter hubs to be used. The easy installation also allows the hub to be positioned more accurately on the shaft, and can facilitate angular timing of the hub.

AS type Power-Locks are our most popular style. They can be assembled and disassembled frequently so that maintenance or replacement of worn hubs is simple and easy as compared to other methods. They are easy to install, adjust or remove, but are not self-centering. A precentering hub section is usually required. The Tsubaki AS Power-Lock uses an inner, collet-like, sleeve with a tapered O.D. and an outer sleeve with a tapered I.D. The tapers are identical, but opposing to one another. The inner sleeve fits around the shaft while the outer sleeve fits inside the hub bore of the component to be mounted, such as a pulley, gear, chain sprocket or other component. Upon tightening the loading mechanism, the bolts forces the inner sleeve to squeeze onto the shaft and the outer sleeve to expand outward against the component hub bore. This mechanical shrink fit resists shock and torque reversals eliminating key wallowing, backlash and fretting corrosion associated with a keyed mount. The AS Power-Lock allows a given shaft size to transmit more torque than if it had a keyway, or both the shaft and peripheral components can be downsized reducing weight and cost. With a keyless connection, the gripping stress is evenly distributed 360° around the O.D. of the shaft and the I.D. of the component hub bore instead of being concentrated at the key and keyway. These units are most commonly used on applications in general engineering to transmit high torques and axial loads utilizing larger machining tolerances. AS Power-Locks are available in inch and metric sizes and also in stainless steel.

Construction





The Power-Lock is made up of five parts: taper ring (A), taper ring (B), outer ring, inner ring, and locking bolts. Locking is achieved by tightening the bolts.

Section F

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Selection Guide:

1. a) Determine the required maximum torque (MtC) to be transmitted:

$$\text{Torque MtC} = \frac{5252 \times HP}{RPM} \quad \text{(ft-lb)}$$

b) If combined torsional and axial loads are to be transmitted, calculate the resulting torque as follows:

$$M_{t\ res} = \sqrt{MtC^2 + \left(\frac{F \times d}{24}\right)^2} \leq M_t$$

Where:
Mt res = resultant torque to be transmitted
MtC = actual or maximum torque to be transmitted (ft-lb). This value is calculated in step 1 a) above.
F = axial load/thrust to be transmitted (lbs)
d = shaft diameter (inches)
Mt = maximum transmissible torque (ft-lb) of the Power Lock as specified in the AS Power-Lock specification tables.

2. Select a Power-Lock for the shaft diameter (d) from the AS Power-Lock specification tables in this catalogue and verify that the corresponding maximum transmissible torque (Mt) meets the torque requirement that was calculated in step 1 a) above. If torque is the primary requirement, select the necessary torque (Mt) from the same specification tables and determine the corresponding shaft diameter (d).
Note: Required peak torque should never exceed specified transmissible torque (Mt).

To increase transmissible torque (Mt):
Install 2 or 3 Power-Locks in series, increasing transmissible torque as follows:
- with 2 Power-Locks: Mtrans.= 2 x Mt
- with 3 Power-Locks: Mtrans.= 3 x Mt
The hub must be long enough to accommodate the assemblies.

3. Determine the recommended minimum hub outside diameter (D_N) for the Power-Lock selected from the specification tables (which show the D_N for material with a yield point of 32,000 p.s.i.) For other yield point materials, calculate the hub outside diameter (D_N) by using the following equation:

$$D_N \geq D \times \sqrt{\frac{YP + (K_3 \times pH)}{YP - (K_3 \times pH)}} \quad \text{(inches or mm)}$$

Where
D= Outer diameter of the Power-Lock and hub counter bore inside diameter (inches or mm).
YP = yield point of hub material (p.s.i. or MPa)
pH = Contact pressure between the Power-Lock and hub bore. See specification tables (p.s.i. or MPa).
K_3 = 0.6 (one Power-Lock)
K_3 = 0.8 (2 or 3 Power-Locks in series)
See Hub layout diagram on next page for more detail on value of K_3

Note: Use either all imperial values (inches/p.s.i.) or all metric values (mm/MPa) when calculating the value of D_N.

4. Verify that the hub length (B) is adequate for the selected Power-Lock; see Example below.

5. Check the applicable machining tolerance for the shaft and hub bore in the specification tables. A surface finish of 125 micro-inches for shafts and bores is generally adequate.

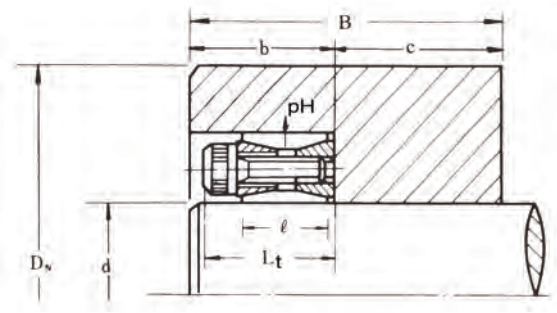

Fig. 1 (Single Power-Lock)
where $B \geq 2\ell$

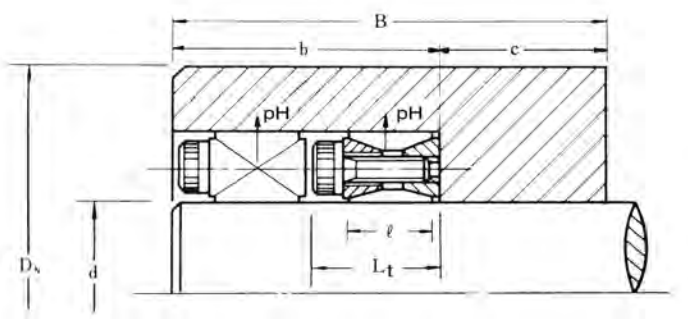

Fig. 2 (Multiple Power-Locks)
$B \geq n \cdot 2Lt$
where n = number of Power-Locks
and where $2 \leq n \leq 4$
$K_3=0.8$

EXAMPLE

A sprocket is to be mounted on a 1.50" shaft capable of transmitting a peak torque of 400 ft-lb. The sprocket is made of 1144 steel with a yield point of 56,000 p.s.i. Select the proper Power-Lock and determine the required hub dimensions and proper machining tolerances.

a. The shaft diameter (d) is specified at 1.50".

b. The AS Power-Lock specification tables indicate that a 1.5" Power-Lock is capable of transmitting a torque (Mt) of 658 ft-lb, which is more than the required amount of torque (400 ft-lb) given in this example. Select the PL 1 1/2 Power-Lock.

c. Use the formula in step 3 in the Selection Guide on the previous page, to determine that the selected PL 1 1/2 Power-Lock requires a minimum hub outer diameter (D_N) of 3.03" based on Y.P. 56,000 psi hub material.

d. The hub length (B) shown in figure 1 should be $\geq 2 \times \ell$. The specification table for AS Power Lock PL 1 1/2 indicates that $\ell = 0.709$" therefore, $B \geq 2 \times 0.709 \geq 1.418$

e. According to the AS Power-Lock specification tables, the machining tolerances for the selected AS Power-Lock are as follows:
shaft (d): 1.50" +.000/-.0015"

f. Order the following assembly:
Size 1 1/2
AS Inch: PL 1 1/2

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Installation

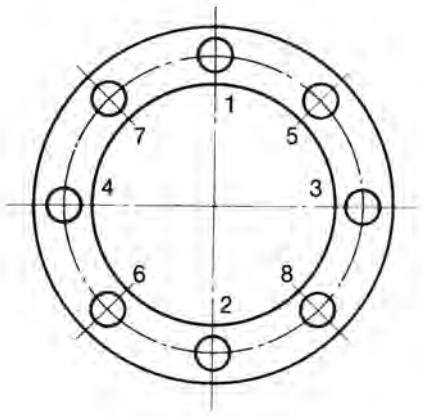
1. Verify that all contact surfaces, including the screw threads and screw head bearing surfaces, are clean and lightly oiled.

Note: Do NOT use Molybdenum Disulfide, “Molykote” or any other similar lubricants.

2. Slide the Power-Lock onto the shaft and into the hub bore, aligning them as required.
3. Tighten the locking screws gradually in the sequence illustrated in Figure 1 below. The tightening sequence is as follows:
a) Hand-tighten 3 or 4 equally spaced locking screws until they make contact. Align and adjust the connection.
b) Hand-tighten and take up all remaining locking screws.
c) Use a torque wrench to tighten the screws further to approximately one-quarter the specified torque (M_A - as found in the AS Power-Lock specification tables).
d) Increase the tightening torque to 1/2 of M_A.
e) Finally, use the torque wrench to tighten the screws to the full tightening torque (M_A).
f) Verify that the screws are completely tight by applying the specified tightening torque (M_A).

Notes:
i) Even tightening is best accomplished by turning each screw in increments of approximately 90°.

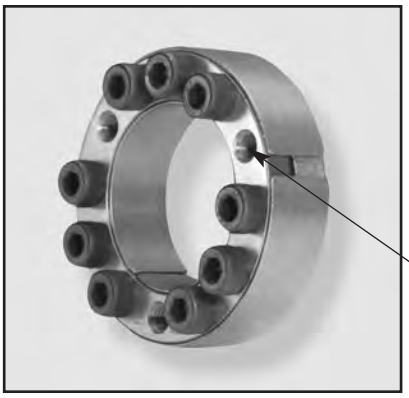
Fig. 1: Tightening Sequence For Locking Screws.
(This is only an example - other number of
locking screws is possible)



Removal

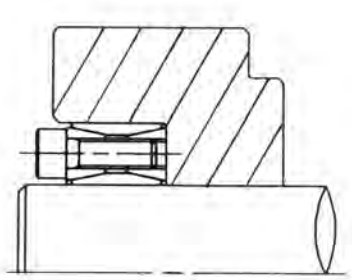
AS Power-Locks are not self-locking. The individual rings are tapered so that the inner and outer rings will spring apart after the last screw has been loosened.
1. Loosen the locking screws in several steps following a diametrically opposite sequence. Do not remove the screws completely.
2. Remove the hub and Power-Lock from the shaft.

Note: If the AS Power-Lock is still locked even after loosening the bolts, then insert bolts into the jack screw holes (see photo below) and screw them in until it unlocks.

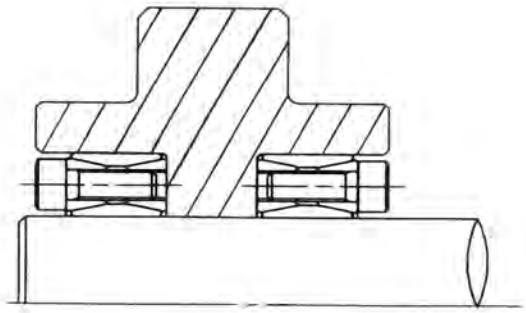


Design Examples

1. Hub mounting utilizing one Power-Lock.

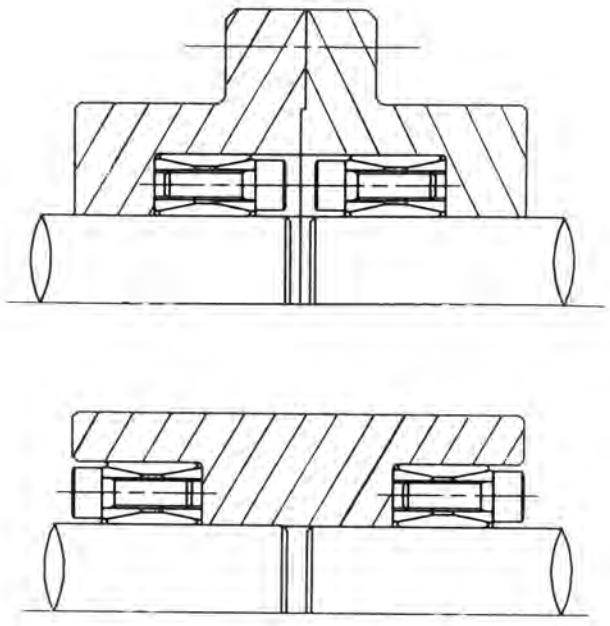


2. Hub mounting with Power-Lock located on opposite sides of hub:

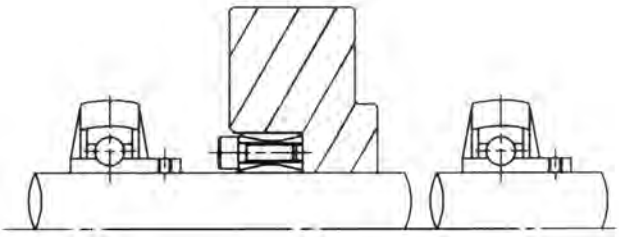


With this arrangement, twice the torque will be transmitted.

3. Rigid shaft coupling mounting with two Power-Locks:

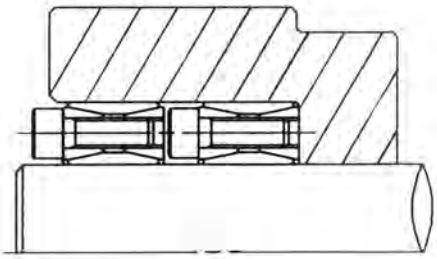


4. Hub mounting in the middle of a shaft:



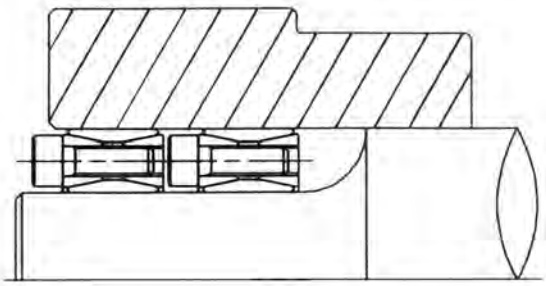
Power-Lock can be used at any place on the shaft without keyway.

5. Hub mounting utilizing two Power-Locks:



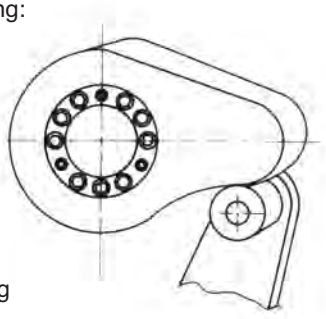
In this arrangement, Power-Lock transmits twice torque.

6. Hub mounted on a stepped shaft:



This arrangement is often used in conjunction with thin hub wall applications, for hubs with a straight through bore.

7. Lever or cam mounting:



Positioning and adjusting are extremely easy.

Section F

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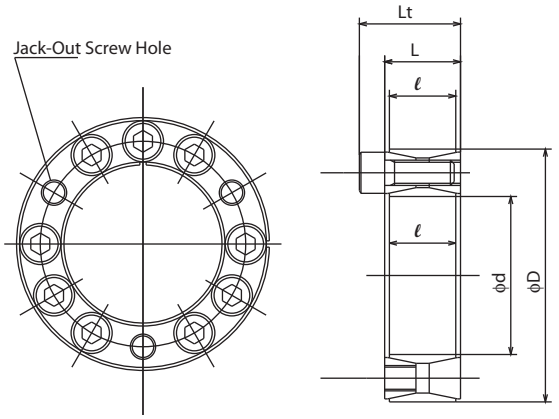
Specification Table

d = inside diameter of Power-Lock and outside diameter of the shaft.
T_1 = machining tolerances for shaft.
D = outer diameter of Power-Lock and hub counter bore inside diameter.
T_2 = machining tolerances for hub counter bore (D)
ℓ, L, Lt = width dimensions after tightening of the screws.
F = maximum transmissible axial force.
M_t = maximum transmissible torque.
pH = contact pressure between Power-Lock and hub bore.
pS = contact pressure between Power-Lock and shaft.
M_A = required tightening torque per locking screw.
D_N = Minimum hub outside diameter for single Power-Lock installation (K_3=0.6) and is based on Y.P. 32,000 psi hub material.
For other hub materials, calculate the hub o.d. per the Selection Guide.



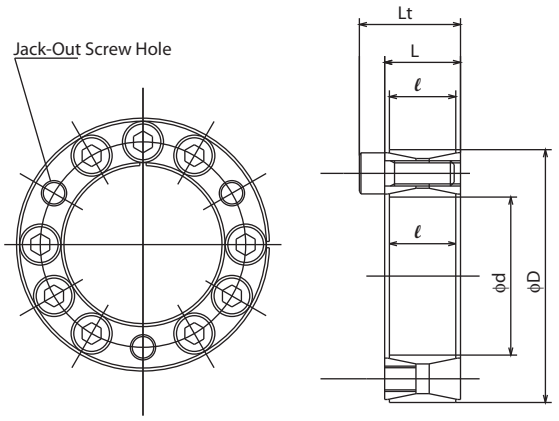
All dimensions in inches unless otherwise stated.

Model Number	Power Lock Dimensions							Max. F (lbf)	Max. M_t (ft-lb)	Pressures		Locking Screws			Minimum Hub Dia. D_N
	d	T_1	D	T_2	ℓ	L	Lt			pH (psi)	pS (psi)	Qty.	Size (mm)	M_A (ft-lb)	
PL 3/4	0.750		1.850		0.709	0.787	1.024	5,940	188	12,370	30,290	6	M6 x 18	12	2.345
PL 7/8	0.875	+0	1.850	-0	0.709	0.787	1.024	5,940	217	12,370	26,020	6	M6 x 18	12	2.345
PL1	1.000	-0.0013	1.969	+0.0013	0.709	0.787	1.024	7,480	318	14,650	29,010	8	M6 x 18	12	2.615
PL1 1/8	1.125		2.165		0.709	0.787	1.024	7,480	354	13,370	25,450	8	M6 x 18	12	2.790
PL1 3/16	1.188		2.159		0.709	0.819	1.055	7,480	376	13,370	24,320	8	M6 x 18	12	2.790
PL1 1/4	1.250		2.362		0.709	0.787	1.024	9,460	499	15,360	29,010	10	M6 x 18	12	3.180
PL1 3/8	1.375		2.365		0.709	0.773	1.009	9,460	550	15,360	26,310	10	M6 x 18	12	3.185
PL1 7/16	1.438	+0	2.559	-0	0.709	0.787	1.024	10,560	637	15,500	27,730	11	M6 x 18	12	3.455
PL1 1/2	1.500	-0.0015	2.559	+0.0015	0.709	0.787	1.024	10,560	658	15,500	26,590	11	M6 x 18	12	3.455
PL1 5/8	1.625		2.953		0.827	0.945	1.260	15,840	1,085	17,490	31,570	9	M8 x 22	30	4.155
PL1 11/16	1.688		2.953		0.827	0.945	1.260	15,840	1,122	17,490	30,480	9	M8 x 22	30	4.155
PL1 3/4	1.750		2.953		0.827	0.945	1.260	15,840	1,164	17,490	29,940	9	M8 x 22	30	4.155
PL1 7/8	1.875		3.150		0.827	0.945	1.260	15,840	1,244	16,350	27,440	9	M8 x 22	30	4.325
PL1 15/16	1.938		3.150		0.827	0.945	1.260	15,840	1,287	16,350	26,590	9	M8 x 22	30	4.325
PL2	2.000		3.346		0.827	0.945	1.260	19,360	1,627	18,910	31,570	11	M8 x 22	30	4.850
PL2 1/8	2.125		3.346		0.827	0.945	1.260	19,360	1,729	18,910	29,360	11	M8 x 22	30	4.850
PL2 3/16	2.188		3.543		0.827	0.945	1.260	19,360	1,779	17,780	28,870	11	M8 x 22	30	5.015
PL2 1/4	2.250		3.543		0.827	0.945	1.260	19,360	1,827	17,780	28,070	11	M8 x 22	30	5.015
PL2 3/8	2.375		3.531		0.827	1.008	1.323	19,360	1,931	17,780	26,590	11	M8 x 22	30	4.995
PL2 7/16	2.438	+0	3.740	-0	0.827	0.945	1.260	21,120	2,170	18,340	28,010	12	M8 x 22	30	5.355
PL2 1/2	2.500	-0.0018	3.740	+0.0018	0.827	0.945	1.260	21,120	2,228	18,340	27,300	12	M8 x 22	30	5.355
PL2 9/16	2.563		3.737		0.827	0.962	1.277	21,120	2,278	18,340	26,730	12	M8 x 22	30	5.350
PL2 5/8	2.625		4.337		0.984	1.073	1.467	31,020	3,400	19,340	31,940	11	M10 x 25	60	6.345
PL2 11/16	2.688		4.337		0.984	1.073	1.467	31,020	3,480	19,340	31,200	11	M10 x 25	60	6.345
PL2 3/4	2.750		4.337		0.984	1.073	1.467	31,020	3,537	19,340	30,430	11	M10 x 25	60	6.345
PL2 7/8	2.875		4.528		0.984	1.102	1.496	31,020	3,732	18,490	29,150	11	M10 x 25	60	6.505
PL2 15/16	2.938		4.528		0.984	1.102	1.496	31,020	3,812	18,490	28,580	11	M10 x 25	60	6.505
PL3	3.000		4.724		0.984	1.102	1.496	31,020	3,855	17,780	28,010	11	M10 x 25	60	6.685
PL3 3/8	3.375		4.921		0.984	1.102	1.496	33,660	4,745	18,630	27,160	12	M10 x 25	60	7.090
PL3 7/16	3.438		5.118		0.984	1.102	1.496	33,660	4,846	17,920	26,730	12	M10 x 25	60	7.260
PL3 1/2	3.500		5.118		0.984	1.102	1.496	33,660	4,933	17,920	26,160	12	M10 x 25	60	7.260
PL3 3/4	3.750	+0	5.305	-0	0.984	1.151	1.544	36,520	5,729	18,770	26,590	13	M10 x 25	60	7.665
PL3 15/16	3.938	-0.0021	5.708	+0.0021	1.142	1.302	1.774	45,100	7,378	18,490	26,730	11	M12 x 30	105	8.200
PL4	4.000		5.843		1.142	1.299	1.772	45,100	7,522	18,060	26,310	11	M12 x 30	105	8.315
PL4 7/16	4.438		6.496		1.142	1.299	1.772	49,280	9,114	17,780	25,880	12	M12 x 30	105	9.190
PL4 1/2	4.500		6.496		1.142	1.299	1.772	49,280	9,258	17,780	25,600	12	M12 x 30	105	9.190
PL4 15/16	4.938		7.087		1.339	1.496	1.969	61,600	12,730	17,350	24,890	15	M12 x 35	105	9.935
PL5	5.000		7.087		1.339	1.496	1.969	61,600	12,870	17,350	24,600	15	M12 x 35	105	9.935
PL5 1/2	5.500	+0	7.492	-0	1.339	1.438	1.910	65,560	15,120	17,490	23,750	16	M12 x 35	105	10.535
PL6	6.000	-0.0025	8.268	+0.0025	1.399	1.496	1.969	77,880	19,530	18,770	25,580	19	M12 x 35	105	11.945
PL6 1/2	6.500		8.858		1.575	1.732	2.283	90,200	24,450	17,210	23,460	16	M14 x 40	167	12.380
PL7	7.000		9.252		1.575	1.732	2.283	95,700	27,990	17,490	23,180	17	M14 x 40	167	13.010
PL7 1/2	7.500		9.823		1.890	2.144	2.695	112,640	35,220	16,210	21,330	20	M14 x 45	167	13.445
PL7 7/8	7.875		10.235		1.890	2.052	2.603	118,360	38,910	16,350	21,190	21	M14 x 45	167	14.050
PL8	8.000	+0	10.504	-0	1.890	2.047	2.598	118,360	39,560	15,930	20,900	21	M14 x 45	167	14.295
PL8 1/2	8.500	-0.0028	11.220	+0.0028	2.008	2.205	2.835	141,020	50,050	16,640	22,040	18	M16 x 50	257	15.436
PL9	9.000		11.669		2.008	2.205	2.835	141,020	53,020	15,930	20,760	18	M16 x 50	257	15.880
PL9 1/2	9.500		12.154		2.008	2.205	2.835	156,640	62,200	17,210	21,900	20	M16 x 50	257	16.985
PL10	10.000		12.795		2.008	2.205	2.835	180,180	75,220	18,770	23,890	23	M16 x 50	257	18.485
PL10 1/2	10.500		13.319		2.008	2.205	2.835	180,180	78,840	18,060	22,750	23	M16 x 50	257	18.950
PL11	11.000	+0	14.000	-0	2.402	2.482	3.191	207,240	95,480	16,500	20,900	22	M18 x 60	351	19.277
PL11 13/16	11.813	-0.0032	14.762	-0.0032	2.402	2.606	3.314	224,400	111,400	17,060	21,330	24	M18 x 60	351	20.565

Notes: All models from PL 3/4 to PL4 are also available in stainless steel. Inner ring and outer ring are Type 304 stainless steel. All other parts are Type 630 SS.

Specification Table

d = inside diameter of Power-Lock and outside diameter of the shaft.
T_1 = machining tolerances for shaft.
D = outer diameter of Power-Lock and hub counter bore inside diameter.
T_2 = machining tolerances for hub counter bore (D)
ℓ, L, Lt = width dimensions after tightening of the screws.
F = maximum transmissible axial force.
M_t = maximum transmissible torque.
pH = contact pressure between Power-Lock and hub bore.
pS = contact pressure between Power-Lock and shaft.
M_A = required tightening torque per locking screw.
D_N = Minimum hub outside diameter for single Power-Lock installation (K_3=0.6) and is based on Y.P. 32,000 psi hub material.
For other hub materials, calculate the hub o.d. per the Selection Guide.



All dimensions in inches unless otherwise stated.

Model Number (d x D in mm)	Power Lock Dimensions							Max. F (lbf)	Max. M_t (ft-lb)	Pressures		Locking Screws			Minimum Hub Dia. D_N
	d	T_1	D	T_2	ℓ	L	Lt			pH (psi)	pS (psi)	Qty.	Size (mm)	M_A (ft-lb)	
PL019X47	0.748		1.850		0.709	0.787	1.024	5,960	181	12,330	30,470	6	M6 x 18	12	2.342
PL020X47	0.787		1.850		0.709	0.787	1.024	5,960	196	12,330	28,870	6	M6 x 18	12	2.342
PL022X47	0.866	+0	1.850	-0	0.709	0.787	1.024	5,960	217	12,330	26,260	6	M6 x 18	12	2.342
PL024X50	0.945	-0.0013	1.969	+0.0013	0.709	0.787	1.024	7,490	297	14,660	30,620	6	M6 x 18	12	2.610
PL025X50	0.984		1.969		0.709	0.787	1.024	7,490	311	14,660	29,460	8	M6 x 18	12	2.610
PL028X55	1.102		2.165		0.709	0.787	1.024	7,490	347	13,350	26,129	8	M6 x 18	12	2.796
PL030X55	1.181		2.165		0.630	0.787	1.024	7,490	376	13,350	24,520	8	M6 x 18	12	2.796
PL032X60	1.260		2.362		0.709	0.787	1.024	9,470	499	15,380	28,730	10	M6 x 18	12	3.178
PL035X60	1.378		2.362		0.709	0.787	1.024	9,470	550	15,380	26,260	10	M6 x 18	12	3.178
PL038X65	1.496		2.559		0.709	0.787	1.024	10,570	658	15,530	26,550	11	M6 x 18	12	3.441
PL040X65	1.575	+0	2.559	-0	0.709	0.787	1.024	10,570	695	15,530	25,250	11	M6 x 18	12	3.441
PL042X75	1.654	-0.0015	2.953	+0.0015	0.827	0.945	1.260	15,880	1,100	17,560	31,050	9	M8 x 22	30	4.157
PL045X75	1.772		2.953		0.827	0.945	1.260	15,880	1,181	17,560	29,020	9	M8 x 22	30	4.157
PL048X80	1.890		3.150		0.827	0.945	1.260	15,880	1,225	16,400	27,290	9	M8 x 22	30	4.328
PL050X80	1.969		3.150		0.827	0.945	1.260	15,880	1,306	16,400	26,120	9	M8 x 22	30	4.328
PL055X85	2.165		3.346		0.827	0.945	1.260	19,390	1,764	18,860	29,170	11	M8 x 22	30	4.843
PL060X90	2.362		3.543		0.827	0.945	1.260	19,390	1,926	17,850	26,700	11	M8 x 22	30	5.019
PL065X95	2.559	+0	3.740	-0	0.827	0.945	1.260	21,170	2,280	18,280	26,700	12	M8 x 22	30	5.346
PL070X110	2.756	-0.0018	4.331	+0.0018	0.984	1.102	1.496	31,050	3,542	19,300	30,470	11	M10 x 25	60	6.327
PL075X115	2.953		4.528		0.984	1.102	1.496	31,050	3,830	18,430	28,440	11	M10 x 25	60	6.492
PL080X120	3.150		4.724		0.984	1.102	1.496	31,050	4,052	17,850	26,700	11	M10 x 25	60	6.692
PL085X125	3.346		4.921		0.984	1.102	1.496	33,750	4,701	18,570	27,420	12	M10 x 25	60	7.078
PL090X130	3.543		5.118		0.984	1.102	1.496	33,750	4,989	17,850	25,830	12	M10 x 25	60	7.249
PL095X135	3.740	+0	5.315	-0	0.984	1.102	1.496	36,670	5,712	18,720	26,560	13	M10 x 25	60	7.668
PL100X145	3.937	-0.0021	5.709	+0.0021	1.142	1.299	1.772	45,225	7,380	18,430	26,700	11	M12 x 30	105	8.186
PL110X155	4.331		6.102		1.142	1.299	1.772	45,225	8,192	17,410	24,380	11	M12 x 30	105	8.564
PL120X165	4.724		6.496		1.142	1.299	1.772	49,500	9,668	17,850	24,380	12	M12 x 30	105	9.201
PL130X180	5.118		7.087		1.339	1.496	1.969	61,650	13,140	17,410	24,090	15	M12 x 35	105	9.945
PL140X190	5.512		7.480		1.339	1.496	1.969	65,700	15,130	17,560	23,800	16	M12 x 35	105	10.530
PL150X200	5.906	+0	7.874	-0	1.339	1.496	1.969	74,020	18,230	18,720	24,960	18	M12 x 35	105	11.361
PL160X210	6.299	-0.0025	8.268	+0.0025	1.339	1.496	1.969	78,070	20,440	18,720	24,670	19	M12 x 35	105	11.929
PL170X225	6.693		8.858		1.575	1.732	2.284	90,450	25,170	17,270	22,780	16	M14 x 40	166	12.394
PL180X235	7.087		9.252		1.575	1.732	2.284	95,850	28,340	17,560	22,930	17	M14 x 40	166	13.024
PL190X250	7.480		9.843		1.890	2.047	2.589	112,950	35,130	16,250	21,330	20	M14 x 45	166	13.482
PL200X260	7.874	+0	10.236	-0	1.890	2.047	2.589	118,570	38,990	16,400	21,180	21	M14 x 45	166	14.065
PL220X285	8.661	-0.0028	11.220	+0.0028	2.008	2.205	2.835	141,300	51,000	16,690	21,620	18	M16 x 50	257	15.511
PL240X305	9.449		12.008		2.008	2.205	2.835	157,050	61,840	17,410	22,060	20	M16 x 50	257	16.851
PL260X325	10.236		12.795		2.008	2.205	2.835	180,670	76,750	18,720	23,360	23	M16 x 50	257	18.461
PL280X355	11.024	+0	13.976	-0	2.402	2.598	3.307	207,670	95,200	16,540	20,890	22	M18 x 60	351	19.260
PL300X375	11.811	-0.0032	14.764	+0.0032	2.402	2.598	3.307	225,000	111,400	17,120	21,330	24	M18 x 60	351	20.593

Notes: All models also available in stainless steel. Inner and outer ring are type 304 stainless steel. All other parts are type 630SS.

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The AD Metric Series Power-Lock has the similar construction to the AS Metric Series Power-Lock. The major difference is that the AD Series has over two times greater transmissible torque than that of the AS Series. The AD Metric Series and the AS Metric Series have the same inside and outside diameter.

Selection Guide:

1. a) Determine the required maximum torque (MtC) to be transmitted:

$$\text{Torque MtC} = \frac{5252 \times HP}{RPM} \quad \text{(ft-lb)}$$

b) If combined torsional and axial loads are to be transmitted, calculate the resulting torque as follows:

$$M_{t\,res} = \sqrt{MtC^2 + \left(\frac{F \times d}{24}\right)^2} \leq M_t$$

Where:
Mt res = resultant torque to be transmitted
MtC = actual or maximum torque to be transmitted (ft-lb). This value is calculated in step 1 a) above.
F = axial load/thrust to be transmitted (lbs)
d = shaft diameter (inches)
Mt = maximum transmissible torque (ft-lb) of the Power Lock as specified in the AD Power-Lock specification tables.

2. Select a Power-Lock for the shaft diameter (d) from the AD Power-Lock specification tables in this catalogue and verify that the corresponding maximum transmissible torque (Mt) meets the torque requirement that was calculated in step 1. a) above. If torque is the primary requirement, select the necessary torque (Mt) from the same specification tables and determine the corresponding shaft diameter (d).
Note: Required peak torque should never exceed specified transmissible torque (Mt).

To increase transmissible torque (Mt):
Install 2 or 3 Power-Locks in series, increasing transmissible torque as follows:
- with 2 Power-Locks: Mtrans.= 2 x Mt
- with 3 Power-Locks: Mtrans.= 3 x Mt

The hub must be long enough to accommodate the assemblies.

3. Determine the recommended minimum hub outside diameter (D_N) for the Power-Lock selected from the specification tables (which show the D_N for material with a yield point of 32,000 p.s.i.) For other yield point materials, calculate the hub outside diameter (D_N) by using the following equation:

$$D_N \geq D \times \sqrt{\frac{YP + (K_3 \times pH)}{YP - (K_3 \times pH)}} \quad \text{(inches or mm)}$$

Where
D= Outer diameter of the Power-Lock and hub counter bore inside diameter (inches or mm).
YP = yield point of hub material (p.s.i. or MPa).
pH = Contact pressure between the Power-Lock and hub bore. See specification tables (p.s.i. or MPa).
K_3 = Form factor depending on hub design-see Fig. 1, Fig. 2 or Fig. 3

Note: Use either all imperial values (inches/p.s.i.) or all metric values (mm/MPa) when calculating the value of D_N.

4. Verify that the hub length (B) is adequate for the selected Power-Lock.

5. Check the applicable machining tolerance for the shaft and hub bore in the specification tables. A surface finish of 125 micro-inches for shafts and bores is generally adequate.

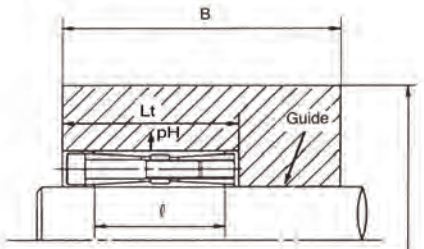


Fig. 1 (Long Hub with Guide)
where $B \geq 2\ell$
K_3=0.6

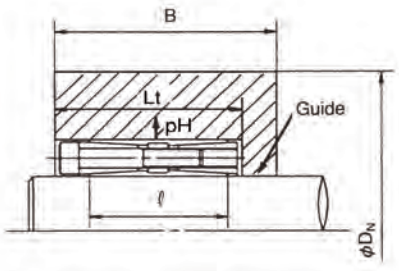


Fig. 2 (Short Hub with Guide)
where $Lt < B < 2\ell$
K_3=1.0

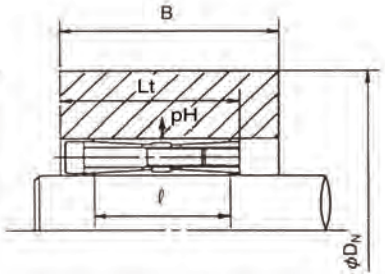


Fig. 3 (Short Hub without Guide)
K_3=1.0

Section F

Installation

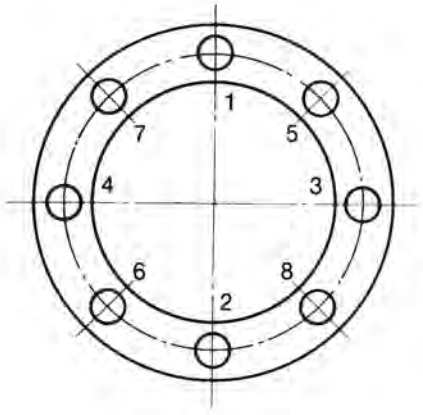
1. Verify that all contact surfaces, including the screw threads and screw head bearing surfaces, are clean and lightly oiled.

Note: Do NOT use Molybdenum Disulfide, “Molykote” or any other similar lubricants.

2. Slide the Power-Lock onto the shaft and into the hub bore, aligning them as required.
3. Tighten the locking screws gradually in the sequence illustrated in Figure 1 below. The tightening sequence is as follows:
a) Hand-tighten 3 or 4 equally spaced locking screws until they make contact. Align and adjust the connection.
b) Hand-tighten and take up all remaining locking screws.
c) Use a torque wrench to tighten the screws further to approximately one-quarter the specified torque (M_A - as found in the AD Power-Lock specification tables).
d) Increase the tightening torque to 1/2 of M_A.
e) Finally, use the torque wrench to tighten the screws to the full tightening torque (M_A).
f) Verify that the screws are completely tight by applying the specified tightening torque (M_A).

Notes:
i) Even tightening is best accomplished by turning each screw in increments of approximately 90°.

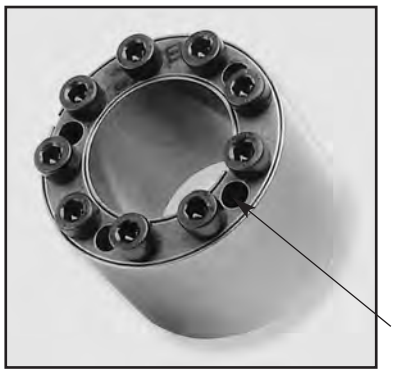
Fig. 1: Tightening Sequence For Locking Screws.
(This is only an example - other number of
locking screws is possible)



Removal

AD Power-Locks are not self-locking. The individual rings are tapered so that the inner and outer rings will spring apart after the last screw has been loosened.
1. Loosen the locking screws in several steps following a diametrically opposite sequence. Do not remove the screws completely.
2. Remove the hub and Power-Lock from the shaft.

Note:
• If the AD Power-Lock is still locked even after loosening the bolts, then insert bolts into the jack screw holes (see photo below) and screw them in until it unlocks.



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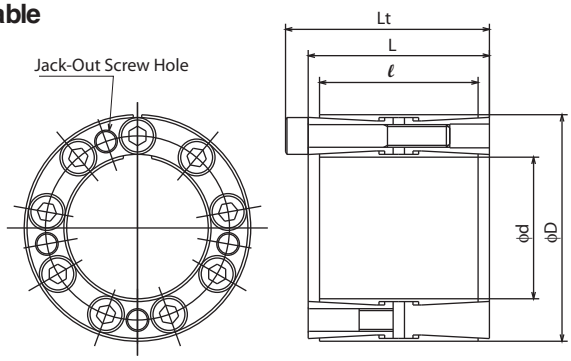
Specification Table



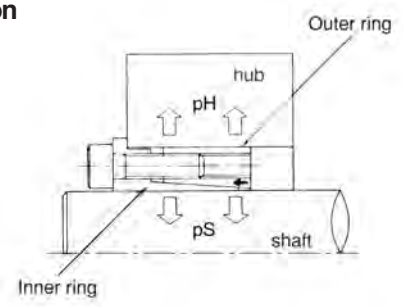
d = inside diameter of Power-Lock and outside diameter of the shaft.
T_1 = machining tolerances for shaft.
D = outer diameter of Power-Lock and hub counter bore inside diameter.
T_2 = machining tolerances for hub counter bore (D)
ℓ, L, Lt = width dimensions after tightening of the screws.
F = maximum transmissible axial force.
M_t = maximum transmissible torque.
pH = contact pressure between Power-Lock and hub bore.
pS = contact pressure between Power-Lock and shaft.
M_A = required tightening torque per locking screw.
D_N = Min. hub o.d. for single Power-Lock installation (form factor K_3=0.6) and is based on Yield Point 32,000 psi hub material. **For other hub materials, calculate the hub o.d. per the Selection Guide.**

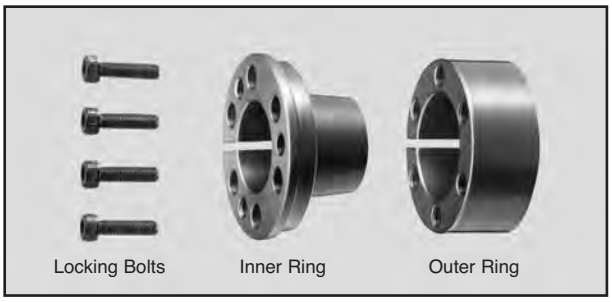
All dimensions in inches unless otherwise stated.

Model Number (d x D in mm)	Power Lock Dimensions							Max. F (lbf)	Max. M_t (ft-lb)	Pressures		Locking Screws			Minimum Hub Dia. D_N
	d	T_1	D	T_2	ℓ	L	Lt			pH (psi)	pS (psi)	Qty.	Size (mm)	M_A (ft-lb)	
PL019X47AD	0.748		1.850		1.181	1.378	1.610	9,110	190	13,930	34,370	6	M6 x 28	12	2.418
PL020X47AD	0.787		1.850		1.181	1.378	1.610	9,110	200	13,930	32,630	6	M6 x 28	12	2.418
PL022X47AD	0.866	+0	1.850	-0	1.181	1.378	1.610	9,110	220	13,930	29,590	6	M6 x 28	12	2.418
PL024X50AD	0.945	-0.0013	1.969	+0.0013	1.378	1.575	1.810	12,170	320	14,940	31,040	8	M6 x 30	12	2.625
PL025X50AD	0.984		1.969		1.378	1.575	1.810	12,170	335	14,940	29,730	8	M6 x 30	12	2.625
PL028X55AD	1.102		2.165		1.378	1.575	1.810	12,170	375	13,490	26,540	8	M6 x 30	12	2.804
PL030X55AD	1.181		2.165		1.378	1.575	1.810	12,170	390	13,490	24,800	8	M6 x 30	12	2.804
PL032X60AD	1.260		2.362		1.772	1.969	2.200	18,260	630	14,650	27,400	10	M6 x 35	12	3.110
PL035X60AD	1.378		2.362		1.772	1.969	2.200	18,260	680	14,650	24,950	10	M6 x 35	12	3.110
PL038X65AD	1.496		2.559		2.047	2.244	2.480	20,020	825	12,760	21,900	11	M6 x 40	12	3.268
PL040X65AD	1.575	+0	2.559	-0	2.047	2.244	2.480	20,020	875	12,760	20,880	11	M6 x 40	12	3.268
PL042X75AD	1.654	-0.0015	2.953	+0.0015	2.205	2.520	2.835	38,180	1,750	12,760	27,850	9	M8 x 50	30	3.997
PL045X75AD	1.772		2.953		2.205	2.520	2.835	38,180	2,820	15,670	25,970	9	M8 x 50	30	3.997
PL048X80AD	1.890		3.150		2.205	2.520	2.835	38,180	3,005	14,660	24,380	9	M8 x 50	30	4.173
PL050X80AD	1.969		3.150		2.205	2.520	2.835	38,180	3,105	14,660	23,510	9	M8 x 50	30	4.173
PL055X85AD	2.165		3.346		2.205	2.520	2.835	38,180	3,400	13,780	21,330	9	M8 x 50	30	4.370
PL060X90AD	2.362		3.543		2.205	2.520	2.835	46,790	4,550	15,960	23,940	11	M8 x 50	30	4.825
PL065X95AD	2.559	+0	3.740	-0	2.205	2.520	2.835	46,790	4,990	12,910	18,860	11	M8 x 50	30	4.787
PL070X110AD	2.756	-0.0018	4.331	+0.0018	2.756	3.071	3.465	74,390	8,560	16,540	25,970	11	M10 x 70	60	5.968
PL075X115AD	2.953		4.528		2.756	3.071	3.465	74,390	9,075	15,820	24,320	11	M10 x 70	60	6.147
PL080X120AD	3.150		4.724		2.756	3.071	3.465	74,390	10,630	16,540	24,810	12	M10 x 70	60	6.510
PL085X125AD	3.346		4.921		2.756	3.071	3.465	81,010	11,290	15,820	23,360	12	M10 x 70	60	6.682
PL090X130AD	3.543		5.118		2.756	3.071	3.465	81,010	12,920	16,540	23,940	13	M10 x 70	60	7.053
PL095X135AD	3.740	+0	5.315	-0	2.756	3.071	3.465	87,850	13,650	15,960	22,640	13	M10 x 70	60	7.237
PL100X145AD	3.937	-0.0021	5.709	+0.0021	3.543	3.937	4.409	119,600	19,560	15,670	22,780	12	M12 x 90	105	7.226
PL110X155AD	4.331		6.102		3.543	3.937	4.409	129,800	23,390	15,960	22,490	13	M12 x 90	105	8.301
PL120X165AD	4.724		6.496		3.543	3.937	4.409	149,700	29,450	17,270	23,800	15	M12 x 90	105	9.090
PL130X180AD	5.118		7.087		4.095	4.567	5.118	175,500	37,420	16,110	22,200	13	M14 x 90	105	9.680
PL140X190AD	5.512		7.480		4.095	4.567	5.118	202,600	46,420	17,560	23,800	15	M14 x 90	105	10.530
PL150X200AD	5.906	+0	7.874	-0	4.095	4.567	5.118	216,100	53,060	17,850	23,800	16	M14 x 90	105	11.150
PL160X210AD	6.299	-0.0025	8.268	+0.0025	4.095	4.567	5.118	229,600	60,150	17,850	23,650	17	M14 x 90	105	11.710
PL170X225AD	6.693		8.858		5.276	5.748	6.378	280,400	78,230	15,960	21,180	15	M16 x 120	166	12.008
PL180X235AD	7.087		9.252		5.276	5.748	6.378	300,200	88,560	16,400	21,330	16	M16 x 120	166	12.713
PL190X250AD	7.480		9.843		5.276	5.748	6.378	317,900	98,890	16,400	21,470	17	M16 x 120	166	13.524
PL200X260AD	7.874	+0	10.236	-0	5.276	5.748	6.378	317,900	104,100	15,670	20,310	17	M16 x 120	166	13.860
PL220X285AD	8.661	-0.0028	11.220	+0.0028	5.276	5.748	6.378	375,300	135,100	17,120	21,770	20	M16 x 120	257	15.650
PL240X305AD	9.449		12.008		5.276	5.748	6.378	412,800	162,400	17,410	21,910	22	M16 x 120	257	16.851
PL260X325AD	10.236		12.795		5.276	5.748	6.378	412,800	175,600	13,200	16,540	22	M16 x 120	257	16.474
PL280X355AD	11.024	+0	13.976	-0	6.496	6.969	7.756	585,000	268,600	17,120	21,770	20	M20 x 150	351	19.495
PL300X375AD	11.811	-0.0032	14.764	+0.0032	6.496	6.969	7.756	644,600	316,600	17,850	22,530	22	M20 x 150	351	20.911

KE Power-Locks are self-centering and are ideal for A type sprockets and narrow gears. It is designed with a slit construction and special taper angle to cover a wide tolerance of shaft sizes, such as motor shafts. Available in a variety of sizes, including fractional inch sizes for smaller motors.

Construction





Selection Guide:

1. a) Determine the required maximum torque (MtC) to be transmitted:

$$\text{Torque MtC} = \frac{5252 \times HP}{RPM} \quad \text{(ft-lb)}$$

b) If combined torsional and axial loads are to be transmitted, calculate the resulting torque as follows:

$$\text{Mt res} = \sqrt{MtC^2 + \left(\frac{F \times d}{24}\right)^2} \leq M_t$$

Mt res = resultant torque to be transmitted
MtC = actual or maximum torque to be transmitted (ft-lb). This value is calculated in step 1 a) above.
F = axial load/thrust to be transmitted (lbs)
d = shaft diameter (inches)
Mt = maximum transmissible torque (ft-lb) of the Power-Lock as specified in the specification tables in this catalogue.

2. Select a Power-Lock for the shaft diameter (d) from the KE specification tables in this catalogue and verify that the corresponding maximum transmissible torque (Mt) meets the torque requirement that was calculated in step 1. a) above. If torque is the primary requirement, select the necessary torque (Mt) from the same specification tables and determine the corresponding shaft diameter (d). Note: Required peak torque should never exceed specified transmissible torque (Mt).

To increase transmissible torque (Mt):
Install 2 Power-Locks in series, increasing transmissible torque as follows:
- with 2 Power-Locks: Mtrans.= 2 x Mt
The hub must be long enough to accommodate the assemblies.

3. Determine the recommended minimum hub outside diameter (D_N) for the Power-Lock selected from the specification tables (which show the D_N for material with a yield point of 32,000 p.s.i.) For other yield point materials, calculate the hub outside diameter (D_N) by using the following equation:

$$D_N \geq D \times \sqrt{\frac{YP + (K_3 \times pH)}{YP - (K_3 \times pH)}} \quad \text{(inches or mm)}$$

Note: Use either all imperial values (inches/p.s.i.) or all metric values (mm/MPa) when calculating the value of D_N.

Where
D= Outer diameter of the Power-Lock and hub counter bore inside diameter (inches or mm).
YP = yield point of hub material (p.s.i. or MPa)
pH = Contact pressure between the Power-Lock and hub bore. See KE Power-Lock Specification Tables (p.s.i. or MPa).
K_3 = Form factor depending on hub design (see Fig.1, Fig.2, or Fig.3).

4. Verify that the hub length (B) is adequate for the selected Power-Lock.
5. Determine the applicable machine tolerance from the KE Power-Lock Specification Table.

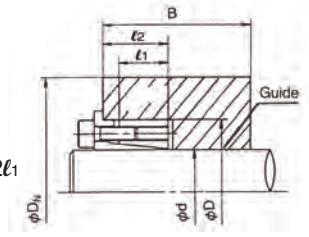


Fig. 1
(Long hub
with guide)
where $B \geq 2\ell_1$
K_3=0.8

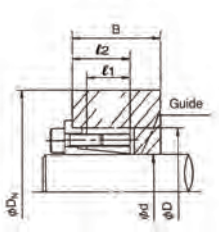


Fig. 2
(Short Hub
with Guide)
where $\ell_2 < B < 2\ell_1$
K_3=1.0

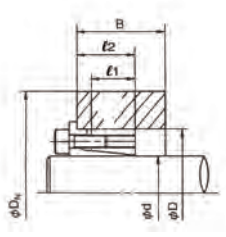


Fig. 3
(Short Hub
without Guide)
K_3=1.0

Section F

Tsubaki of Canada Limited, 1630 Drew Road, Mississauga, ON L5S 1J6 Tel: 905-676-0400 Fax: 905-676-0904 Toll-Free: 800-263-7088 www.tsubaki.ca e-mail: info@tsubaki.ca

Installation

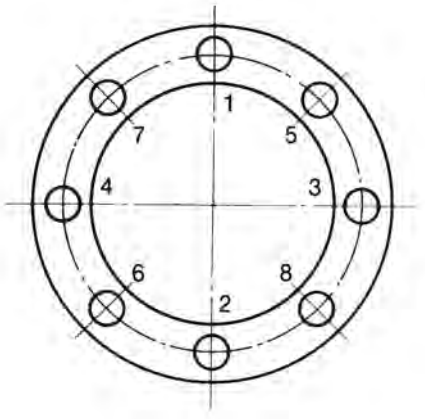
1. Verify that all contact surfaces, including the screw threads and screw head bearing surfaces, are clean and lightly oiled.

Note: Do NOT use Molybdenum Disulfide, “Molykote” or any other similar lubricants.

2. Slide the Power-Lock onto the shaft and into the hub bore, aligning them as required.
3. Tighten the locking screws gradually in the sequence illustrated in Figure 1 below. The tightening sequence is as follows:
a) Hand-tighten 3 or 4 equally spaced locking screws until they make contact. Align and adjust the connection.
b) Hand-tighten and take up all remaining locking screws.
c) Use a torque wrench to tighten the screws further to approximately one-quarter the specified torque (M_A - as found in the KE Power-Lock specification tables).
d) Increase the tightening torque to 1/2 of M_A.
e) Finally, use the torque wrench to tighten the screws to the full tightening torque (M_A).
f) Verify that the screws are completely tight by applying the specified tightening torque (M_A).

Notes:
i) Even tightening is best accomplished by turning each screw in increments of approximately 90˚.

Fig. 1: Tightening Sequence For Locking Screws.
(This is only an example - other number of
locking screws is possible)

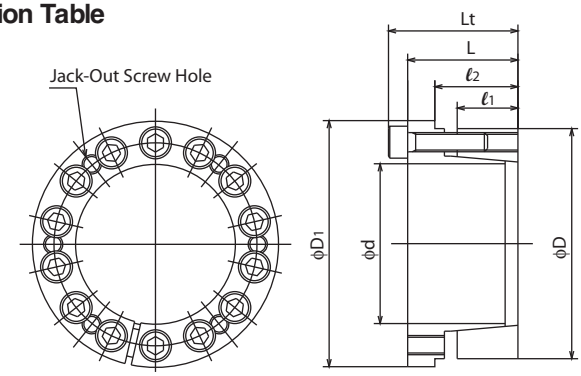


Removal

KE Power-Locks are not self-locking. The individual rings are tapered so that the inner and outer rings will spring apart after the last screw has been loosened.
1. Loosen the locking screws in several steps following a diametrically opposite sequence. Do not remove the screws completely.
2. Remove the hub and Power-Lock from the shaft.

Note:
• If the KE Power-Lock is still locked even after loosening the bolts, then insert bolts into the jack screw holes (see photo below) and screw them in until it unlocks.

Specification Table



d = inside diameter of Power-Lock and outside diameter of the shaft.
T_1 = machining tolerances for shaft.
T_w = special wider machining tolerances for shaft. Transmissible axial force and transmissible torque will be 90% of the ratings shown in the specification table below.
D_1 = outer diameter of Power-Lock.
D = hub counter bore inside diameter
T_2 = machining tolerances for hub counter bore (D)
ℓ_1, ℓ_2, L, Lt = width dimensions after tightening of the screws.
F = maximum transmissible axial force.
Mt = maximum transmissible torque.
pH = contact pressure between Power-Lock and hub bore.
pS = contact pressure between Power-Lock and shaft.
M_A = required tightening torque per locking screw.
D_N = Minimum hub outside diameter for single Power-Lock installation (form factor K_3=0.8) and is based on Y.P. 32,000 psi hub material.
For other hub materials, calculate the hub o.d. per the Selection Guide.

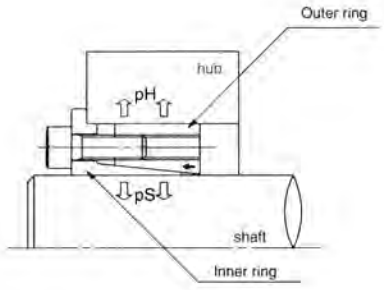
All dimensions in inches unless otherwise stated.

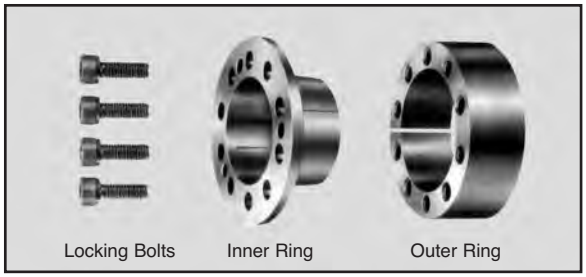
	Power Lock Dimensions										Max. F	Max. Mt	Pressures		Locking Screws			Minimum Hub Dia.
Model Number	d	T_1	T_w	D_1	D	T_2	ℓ_1	ℓ_2	L	Lt	(lbf)	(ft-lb)	pH (psi)	pS (psi)	Qty.	Size (mm)	M_A (ft-lb)	D_N
PL 3/8KE	0.375	+0.0006 -0.0009	+0.0006 -0.0023	1.063	0.938	-0 +.0013	0.394	0.563	0.650	0.807	1,340	20	11,300	28,260	3	M4 x 12	4	1.254
PL 1/2KE	0.500	+0.0007	+0.0007	1.188	1.063	-0 ~ +0.0013	0.394	0.563	0.650	0.807	1,780	40	13,330	28,260	4	M4 x 12	4	1.503
PL 5/8KE	0.625	-0.0011	-0.0028	1.313	1.188	-0 ~ +0.0015	0.472	0.688	0.807	0.965	2,680	74	14,930	28,260	6	M4 x 16	4	1.758
PL 3/4KE	0.750			1.438	1.313		0.472	0.688	0.807	0.965	2,680	90	13,480	23,620	6	M4 x 16	4	1.864
PL 7/8KE	0.875	+0.0007	+0.0010	1.750	1.563	-0	0.591	0.813	0.984	1.181	4,380	170	14,780	26,380	6	M5 x 20	7	2.303
PL1 KE	1.000	-0.0011	-0.0011	1.875	1.688	+0.0015	0.591	0.813	0.984	1.181	5,830	260	18,260	30,870	8	M5 x 20	7	2.763
PL1 1/8KE	1.125			2.000	1.875		0.669	0.938	1.102	1.299	6,560	325	16,380	27,250	9	M5 x 20	7	2.897
PL1 3/16KE	1.188			2.063	1.938	-0 ~ +0.0015	0.669	0.938	1.102	1.299	7,290	380	17,540	28,550	10	M5 x 20	7	3.101
PL1 1/4KE	1.250			2.125	2.000		0.669	0.938	1.102	1.299	7,290	400	16,960	27,250	10	M5 x 20	7	3.144
PL1 3/8KE	1.375			2.250	2.125		0.669	0.938	1.102	1.299	7,290	445	15,940	24,780	10	M5 x 20	7	3.240
PL1 7/16KE	1.438			2.500	2.313		0.748	1.063	1.260	1.496	8,230	525	14,780	28,910	8	M6 x 25	12	3.409
PL1 1/2KE	1.500	+0.0010	+0.0010	2.563	2.375	-0	0.748	1.063	1.260	1.496	10,290	680	18,120	28,550	10	M6 x 25	12	3.870
PL1 5/8KE	1.625	-0.0015	-0.0039	2.688	2.500	+0.0018	0.748	1.063	1.260	1.496	10,290	740	17,100	26,380	10	M6 x 25	12	3.948
PL1 11/16KE	1.688			2.750	2.563		0.748	1.063	1.260	1.496	10,290	765	16,810	25,360	10	M6 x 25	12	4.011
PL1 3/4KE	1.750			2.813	2.625		0.748	1.063	1.260	1.496	10,290	795	16,380	24,490	10	M6 x 25	12	4.055
PL1 7/8KE	1.875			2.938	2.750		0.748	1.063	1.260	1.496	12,350	1,020	18,700	27,390	12	M6 x 25	12	4.565
PL1 15/16KE	1.938			3.000	2.813		0.748	1.063	1.260	1.496	13,380	1,145	19,860	28,840	13	M6 x 25	12	4.848
PL2 KE	2.000			3.063	2.875		0.748	1.125	1.358	1.594	13,380	1,180	19,420	27,830	13	M6 x 25	12	4.885
PL2 1/8KE	2.125			3.188	3.000	-0	0.748	1.125	1.358	1.594	14,400	1,350	20,000	28,260	14	M6 x 25	12	5.196
PL2 3/16KE	2.188			3.250	3.063	+0.0018	0.748	1.125	1.358	1.594	14,400	1,390	19,565	27,390	14	M6 x 25	12	5.229
PL2 1/4KE	2.250			3.313	3.125		0.748	1.125	1.358	1.594	14,400	1,430	19,275	26,670	14	M6 x 25	12	5.285
PL2 3/8KE	2.375			3.438	3.250		0.748	1.125	1.358	1.594	15,440	1,620	19,855	27,100	15	M6 x 25	12	5.602
PL2 7/16KE	2.438			3.500	3.313		0.748	1.125	1.358	1.594	15,440	1,660	19,420	26,380	15	M6 x 25	12	5.629
PL2 1/2KE	2.500	+0.0012	+0.0012	3.563	3.375		0.748	1.125	1.358	1.594	15,440	1,700	19,130	25,800	15	M6 x 25	12	5.681
PL2 5/8KE	2.625	-0.0018	-0.0047	3.688	3.500	-0	0.748	1.125	1.358	1.594	15,440	1,790	18,400	24,490	15	M6 x 25	12	5.756
PL2 11/16KE	2.688			3.938	3.750	+0.0021	0.866	1.250	1.594	1.909	22,810	2,710	22,320	30,580	12	M8 x 30	30	7.040
PL2 3/4KE	2.750			4.000	3.813		0.866	1.250	1.594	1.909	22,810	2,770	21,590	29,860	12	M8 x 30	30	6.974
PL2 7/8KE	2.875			4.125	3.938		0.866	1.250	1.594	1.909	22,810	2,900	20,870	28,550	12	M8 x 30	30	7.024
PL2 15/16KE	2.938			4.188	4.000		0.866	1.250	1.594	1.909	22,810	2,960	20,580	27,970	12	M8 x 30	30	7.065
PL3 KE	3.000			4.188	4.063		0.866	1 250	1.594	1.909	22,810	3,020	20,290	27,390	12	M8 x 30	30	7.105
PL3 3/8KE	3.375			4.625	4.438	-0	0.866	1.313	1.634	1.949	26,620	3,970	21,590	28,400	14	M8 x 30	30	8.118
PL3 7/16KE	3.438			4.688	4.500	+0.0021	0.866	1.313	1.634	1.949	26,620	4,040	21,300	27,830	14	M8 x 30	30	8.149
PL3 1/2KE	3.500	+0.0014	+0.0014	5.000	4.750		1.142	1.688	2.126	2.520	42,270	6,530	24,350	33,040	14	M10 x 40	60	9.631
PL3 3/4KE	3.750	-0.0021	-0.0055	5.250	5.063	-0	1.142	1.688	2.126	2.520	42,270	7,000	22,750	30,730	14	M10 x 40	60	9.657
PL3 5/16KE	3.938			5.500	5.250	+0.0025	1.142	1.688	2.126	2.520	42,270	7,350	22,030	28,730	14	M10 x 40	60	9.754
PL4 KE	4.000			5.500	5.313		1.142	1.688	2.126	2.520	42,270	7,470	21,740	28,840	14	M10 x 40	60	9.768

Tsubaki of Canada Limited, 1630 Drew Road, Mississauga, ON L5S 1J6 Tel: 905-676-0400 Fax: 905-676-0904 Toll-Free: 800-263-7088 www.tsubaki.ca e-mail: info@tsubaki.ca

The AE Metric Series Power-Lock features a single taper design with a self-locking taper to provide good self-centering action and concentricity. The AE Metric Series Power-Lock is used wherever self-centering action and good concentricity of mounted components is essential and where hubs with straight-thru bores are used. The AE Metric Series Power-Lock has the same inside diameter and outside diameter as the AS Metric Series Power-Lock; and so they are interchangeable with each other in many applications..

Construction





Selection Guide:

1. a) Determine the required maximum torque (MtC) to be transmitted:

$$\text{Torque MtC} = \frac{5252 \times HP}{RPM} \quad \text{(ft-lb)}$$

b) If combined torsional and axial loads are to be transmitted, calculate the resulting torque as follows:

$$\text{Mt res} = \sqrt{MtC^2 + \left(\frac{F \times d}{24}\right)^2} \leq M_t$$

Mt res = resultant torque to be transmitted
MtC = actual or maximum torque to be transmitted (ft-lb). This value is calculated in step 1 a) above.
F = axial load/thrust to be transmitted (lbs)
d = shaft diameter (inches)
Mt = maximum transmissible torque (ft-lb) of the Power-Lock as specified in the specification tables in this catalogue.

2. Select a Power-Lock for the shaft diameter (d) from the AE specification tables in this catalogue and verify that the corresponding maximum transmissible torque (Mt) meets the torque requirement as calculated in step 1. a) above. If torque is the primary requirement, select the necessary torque (Mt) from the same specification tables and determine the corresponding shaft diameter (d). Note: Required peak torque should never exceed specified transmissible torque (Mt).

To increase transmissible torque (Mt):
Install 2 or 3 Power-Locks in series, increasing transmissible torque as follows:
- with 2 Power-Locks: Mtrans.= 2 x Mt
- with 3 Power-Locks: Mtrans.= 3 x Mt

The hub must be long enough to accommodate the assemblies.

3. Determine the recommended minimum hub outside diameter (D_N) for the Power-Lock selected from the specification tables (which show the D_N for material with a yield point of 32,000 p.s.i.) For other yield point materials, calculate the hub outside diameter (D_N) by using the following equation:

$$D_N \geq D \times \sqrt{\frac{YP + (K_3 \times pH)}{YP - (K_3 \times pH)}} \quad \text{(inches or mm)}$$

Note: Use either all imperial values (inches/p.s.i.) or all metric values (mm/MPa) when calculating the value of D_N.

Where
D= Outer diameter of the Power-Lock and hub counter bore inside diameter (inches or mm).
YP = yield point of hub material (p.s.i. or MPa).
pH = Contact pressure between the Power-Lock and hub bore. See AE Power-Lock Specification Tables (p.s.i. or MPa).
K_3 = Form factor depending on hub design (see Fig.1, Fig.2, or Fig.3).

4. Determine the applicable machine tolerance from the AE Power-Lock Specification Table.

Fig. 1
(Long hub
with guide)
where $B \geq 2\ell_1$
K_3=0.8

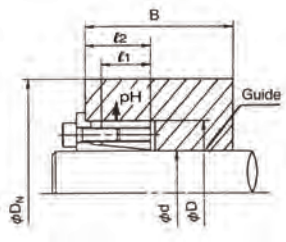


Fig. 2
(Short Hub
with Guide)
where $\ell_2 < B < 2\ell_1$
K_3=1.0

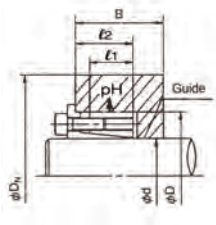
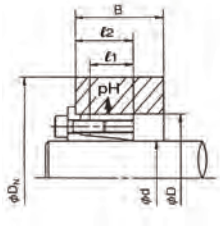


Fig. 3
(Short Hub
without Guide)
K_3=1.0



Section F

Installation

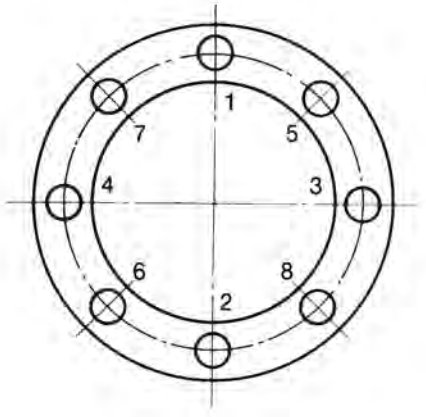
1. Verify that all contact surfaces, including the screw threads and screw head bearing surfaces, are clean and lightly oiled.

Note: Do NOT use Molybdenum Disulfide, “Molykote” or any other similar lubricants.

2. Slide the Power-Lock onto the shaft and into the hub bore, aligning them as required.
3. Tighten the locking screws gradually in the sequence illustrated in Figure 1 below. The tightening sequence is as follows:
a) Hand-tighten 3 or 4 equally spaced locking screws until they make contact. Align and adjust the connection.
b) Hand-tighten and take up all remaining locking screws.
c) Use a torque wrench to tighten the screws further to approximately one-quarter the specified torque (M_A - as found in the AE Power-Lock specification tables).
d) Increase the tightening torque to 1/2 of M_A.
e) Finally, use the torque wrench to tighten the screws to the full tightening torque (M_A).
f) Verify that the screws are completely tight by applying the specified tightening torque (M_A).

Notes:
i) Even tightening is best accomplished by turning each screw in increments of approximately 90˚.

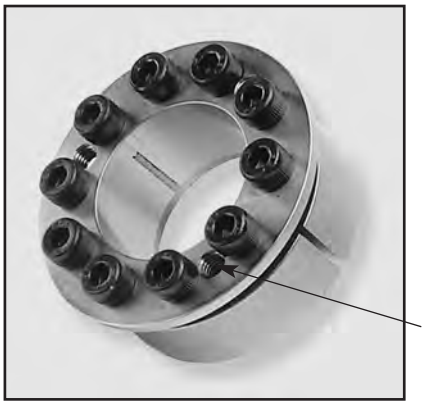
Fig. 1: Tightening Sequence For Locking Screws.
(This is only an example - other number of
locking screws is possible)



Removal

AE Power-Locks are not self-locking. The individual rings are tapered so that the inner and outer rings will spring apart after the last screw has been loosened.
1. Loosen the locking screws in several steps following a diametrically opposite sequence. Do not remove the screws completely.
2. Remove the hub and Power-Lock from the shaft.

Note:
• If the AE Power-Lock is still locked even after loosening the bolts, then insert bolts into the jack screw holes (see photo below) and screw them in until it unlocks.



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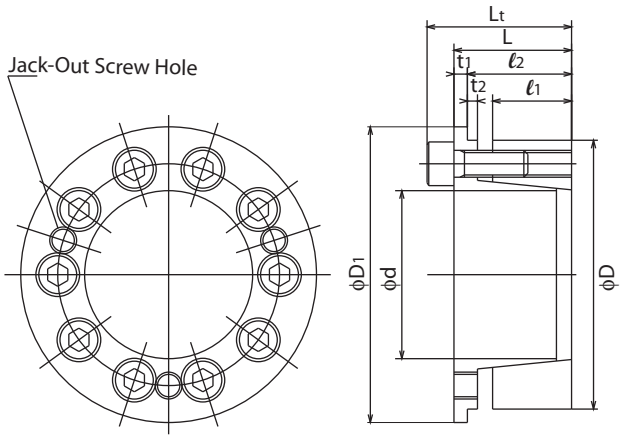
Specification Table



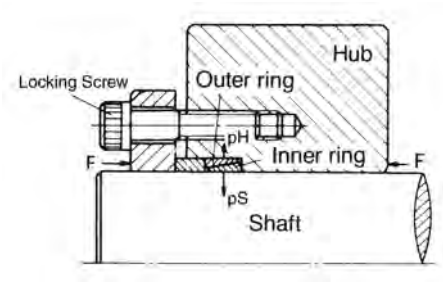
d = inside diameter of Power-Lock and outside diameter of the shaft.
T_1 = machining tolerances for shaft.
D = outer diameter of Power-Lock and hub counter bore inside diameter.
T_2 = machining tolerances for hub counter bore (D)
ℓ_1, ℓ_2, L, Lt, t_1, t_2 width dimensions after tightening of the screws.
F = maximum transmissible axial force.
Mt = maximum transmissible torque.
pH = contact pressure between Power-Lock and hub bore.
pS = contact pressure between Power-Lock and shaft.
M_A = required tightening torque per locking screw.
D_N = Minimum hub outside diameter for single Power-Lock installation (form factor K_3=0.8) and is based on Y.P. 32,000 psi hub material.
For other hub materials, calculate the hub o.d. per the Selection Guide.

All dimensions in inches unless otherwise stated.

Model Number (d x D in mm)	Power Lock Dimensions											Max. F (lbf)	Max. M_t (ft-lb)	Pressures		Locking Screws			Min. Hub Dia. D_N
	d	T_1	D_1	D	T_2	ℓ_1	ℓ_2	L	Lt	t_1	t_2			pH (psi)	pS (psi)	Qty.	Size (mm)	M_A (ft-lb)	
PL019X47AE	0.748		2.087	1.850		0.748	0.976	1.075	1.311	0.098	0.079	6,320	195	13,490	41,640	6	M6 x 18	12	2.628
PL020X47AE	0.787		2.087	1.850		0.748	0.976	1.075	1.311	0.098	0.079	6,320	200	13,490	39,470	6	M6 x 18	12	2.628
PL022X47AE	0.866	+0	2.087	1.850	-0	0.748	0.976	1.075	1.311	0.098	0.079	6,320	225	13,490	35,980	6	M6 x 18	12	2.628
PL024X50AE	0.945	-0.0013	2.244	1.969	+0.0013	0.748	0.996	1.095	1.331	0.098	0.079	7,380	290	14,800	39,760	7	M6 x 18	12	2.903
PL025X50AE	0.984		2.244	1.969		0.748	0.996	1.095	1.331	0.098	0.079	7,380	305	14,800	40,920	7	M6 x 18	12	2.903
PL028X55AE	1.102		2.441	2.165		0.748	0.996	1.126	1.362	0.130	0.079	8,440	380	15,380	39,030	8	M6 x 18	12	3.248
PL030X55AE	1.181		2.441	2.165		0.748	0.996	1.126	1.362	0.130	0.079	8,440	415	15,380	36,420	8	M6 x 18	12	3.248
PL032X60AE	1.260		2.638	2.362		0.807	1.075	1.217	1.453	0.142	0.098	10,570	550	16,400	38,740	10	M6 x 18	12	3.652
PL035X60AE	1.378		2.638	2.362		0.807	1.075	1.217	1.453	0.142	0.098	10,570	605	16,400	35,400	10	M6 x 18	12	3.652
PL038X65AE	1.496		2.874	2.559		0.807	1.083	1.224	1.461	0.142	0.098	10,570	660	15,090	33,080	10	M6 x 18	12	3.806
PL040X65AE	1.575	+0	2.874	2.559	-0	0.807	1.083	1.224	1.461	0.142	0.098	10,570	690	15,090	31,490	10	M6 x 18	12	3.806
PL042X75AE	1.654	-0.0015	3.268	2.953	+0.0015	0.807	1.213	1.370	1.685	0.158	0.118	17,590	1,210	18,860	41,350	9	M8 x 22	30	4.927
PL045X75AE	1.772		3.268	2.953		0.807	1.213	1.370	1.685	0.158	0.118	17,590	1,290	18,860	38,600	9	M8 x 22	30	4.927
PL048X80AE	1.890		3.465	3.150		0.807	1.221	1.378	1.693	0.158	0.118	19,550	1,520	19,730	40,630	10	M8 x 22	30	5.407
PL050X80AE	1.969		3.465	3.150		0.807	1.221	1.378	1.629	0.158	0.118	19,550	1,595	19,730	39,130	10	M8 x 22	30	5.407
PL055X85AE	2.165		3.701	3.346		0.925	1.213	1.370	1.693	0.158	0.118	19,550	1,735	18,570	35,110	10	M8 x 22	30	5.532
PL060X90AE	2.362		3.898	3.543		0.925	1.213	1.370	1.685	0.158	0.118	19,550	1,880	17,700	31,780	10	M8 x 22	30	5.700
PL065X95AE	2.559	+0	4.095	3.740	-0	0.925	1.213	1.370	1.685	0.158	0.118	23,390	2,460	19,880	35,690	12	M8 x 22	30	6.452
PL070X110AE	2.756	-0.0018	4.724	4.331	+0.0018	1.102	1.437	1.614	1.685	0.177	0.158	30,900	3,540	19,150	35,840	10	M10 x 25	60	7.294
PL075X115AE	2.953		4.921	4.528		1.102	1.437	1.614	2.008	0.177	0.158	30,900	3,760	18,280	33,370	10	M10 x 25	60	7.416
PL080X120AE	3.150		5.118	4.724		1.102	1.437	1.614	2.008	0.177	0.158	37,080	4,850	21,040	37,080	12	M10 x 25	60	8.477
PL085X125AE	3.346		5.315	4.921		1.102	1.437	1.614	2.008	0.177	0.158	37,080	5,140	20,170	35,400	12	M10 x 25	60	8.572
PL090X130AE	3.543		5.118	5.118		1.102	1.476	1.693	2.087	0.217	0.158	37,080	5,500	19,440	34,970	12	M10 x 25	60	8.702
PL095X135AE	3.740	+0	5.709	5.315	-0	1.102	1.476	1.693	2.087	0.217	0.158	43,480	6,725	21,910	38,740	14	M10 x 25	60	9.832
PL100X145AE	3.937	-0.0021	6.102	5.709	+0.0021	1.339	1.732	1.969	2.362	0.236	0.158	46,570	7,600	17,850	31,595	15	M10 x 25	105	9.226
PL110X155AE	4.331		6.575	6.102		1.339	1.732	1.969	2.362	0.236	0.158	46,570	8,410	16,830	28,730	15	M10 x 25	105	9.557
PL120X165AE	4.724		6.969	6.496		1.339	1.732	1.969	2.362	0.236	0.158	55,840	11,000	18,680	31,595	15	M10 x 25	105	10.777
PL130X180AE	5.118		7.677	7.087		1.496	1.969	2.244	0.756	0.276	0.236	67,770	14,460	18,720	31,050	15	M12 x 35	105	11.772
PL140X190AE	5.512	+0	8.071	7.480	-0	1.496	1.987	2.244	0.756	0.276	0.236	67,770	15,570	17,850	28,730	15	M12 x 35	105	12.089
PL150X200AE	5.906	-0.0025	8.465	7.874	+0.0025	1.496	1.987	2.284	0.315	0.315	0.236	81,230	19,930	20,310	32,070	18	M12 x 35	105	13.781

EL Power-Locks are a frictional keyless locking device for connecting hubs and shafts that are subject to large torque variations. The EL Power-Lock is a simple structure consisting of two tapered rings. They are ideal for fastening gears, pulleys, sprockets, cams, etc. to metric sized shafts from 10mm to 150mm. They are perfect for applications requiring timing and backlash-free connections. When locking force (F) is applied to the EL Power-Lock, it pushes the inner and outer rings together, generating radial direction pressures (pH and pS) on the shaft and to the hub bore. These pressures (pH and pS) create the friction fit connection.

Construction



Selection Guide

EL Series Power-Locks must be used with metric shaft sizes.

1. a) Determine the required maximum torque (MtC) to be transmitted:

$$\text{Torque MtC} = \frac{5252 \times HP}{RPM} \quad \text{(ft-lb)}$$

b) If combined torsional and axial loads are to be transmitted, calculate the resulting torque as follows:

$$M_{t\,res} = \sqrt{MtC^2 + \left(\frac{F \times d}{24}\right)^2} \leq M_t$$

Where:
Mt res = resultant torque to be transmitted
MtC = actual or maximum torque to be transmitted (ft-lb). This value is calculated in step 1 a) above.
F = axial load/thrust to be transmitted (lbs)
d = shaft diameter (inches)
Mt = maximum transmissible torque (ft-lb) of the Power-Lock as specified in the specification tables in this catalogue.

2. Select an EL Series Power-Lock for the shaft diameter (d) from the specification tables and verify that the corresponding maximum transmissible torque (Mt) meets the torque requirements.
Note: Required peak torque should never exceed specified transmissible torque (Mt). Catalogue values for (Mt) are based on a contact pressure of 14,220 p.s.i. between the shaft and the EL Series Power-Lock in a lightly oiled installation. Higher torque capacities can be obtained by using 2 or more EL Series Power-Locks in series.

3. Determine the required locking force (P_A) from the EL Power-Lock Specification Tables.

For EL Series Power-Lock, in addition to (P_A), a preload (PO) is required to bridge the clearance for the specified fit. The required total locking force for solid EL Series Power-Locks is: $P_A' = P_O + P_A$
(see the EL Power-Lock specification tables).
The locking force is normally obtained by using multiple locking screws and a clamp ring or flange.
4. Determine the number, size and grade of screws to be used based on the required locking force and individual screw clamp load (see Table 1).

$$\text{Clamp load/ locking screw} = \frac{\text{required locking force } (P_A') \text{ or } P_A}{\text{number of locking screws}}$$

Table 1: Clamp Load

Bolt Size	CLAMP LOAD TABLE					
	S.A.E. Grade 2		S.A.E. Grade 5		S.A.E. Grade 8	
	Load* (lbs)	Torque (lb-in)	Load* (lbs)	Torque (lb-in)	Load* (lbs)	Torque (lb-in)
4 - 40	250	5	380	8	540	12
4 - 48	275	6	420	9	600	13
6 - 32	375	10	580	16	820	23
6 - 40	420	12	640	18	920	25
8 - 32	580	19	900	30	1 260	41
8 - 36	610	20	940	31	1 320	43
10 - 24	725	27	1 120	43	1 580	60
10 - 32	825	31	1 285	49	1 800	68
	(lbs)	(lb-ft)	(lbs)	(lb-ft)	(lbs)	(lb-ft)
1/4 - 20	1 300	5	2 000	8	2 850	12
1/4 - 28	1 500	6	2 300	10	3 250	14
5/16 - 18	2 150	11	3 350	17	4 700	24
5/16 - 24	2 400	13	3 700	19	5 200	27
3/8 - 16	3 200	20	4 950	30	6 950	45
3/8 - 24	3 600	22	5 600	35	7 900	50
7/16 - 14	4 400	30	6 800	50	9 600	70
7/16 - 20	4 900	35	7 550	55	10 700	80
1/2 - 13	5 850	50	9 050	75	12 800	105
1/2 - 20	6 550	55	10 200	85	14 400	120
9/16 - 12	7 550	70	11 600	110	16 400	115
9/16 - 18	8 350	80	13 000	120	18 300	170

* Clamp load (lbs) is equal to 75% of bolt proof load.

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Selection Guide (Continued)

5. Determine the size of clamp ring or flange based on the bolt circle diameter and the thickness of the clamp ring or flange.
c) Recommended clearance “x” and maximum values for R are shown in the EL Power-Lock Specification Tables.
6. Determine the hub outside diameter (D_N) using the EL Power-Lock Selection Tables shown in this section.

Clamp Plate Mounting and Removal

There are two basic methods for mounting the clamp plate:
1. Hub bolting permits axial positioning of the hub as well as angular adjustment.
2. Shaft bolting requires the hub to be backed against a shoulder to support the clamping force.

EL Series Power-Lock Installation

Since the torque is transmitted by contact pressure and friction between the frictional surfaces, the condition of the contact surfaces and the proper tightening of the locking screws are important.

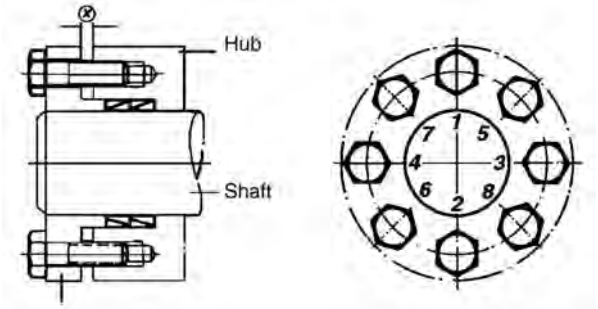


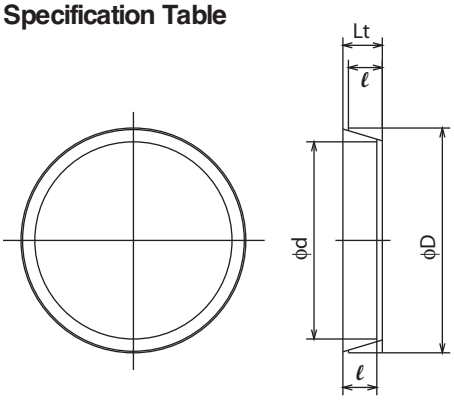
Fig.1 Tightening sequence example

1. Carefully clean and lightly oil the shaft, hub bore, spacer sleeves and EL Series Power-Locks.
Note: Do NOT use a Molybdenum Disulphide LUBRICANT (“MOLYKOTE” OR THE LIKE).
2. Install the parts in the following order:
a) Hub (the play between hub bore and shaft affects the true running of the hub).
b) Spacer sleeve to bridge the undercut (if needed)
c) Outer ring/inner ring (both parts must slide on easily). For one EL Series Power-Lock install the outer ring first. Otherwise, install the inner ring first.
d) Spacer sleeve and clamp flange or clamp ring (both parts should slide on easily).
e) Carefully oil the locking screw threads and head bearing surfaces.
Note: Do NOT use Molybdenum Disulphide.
3. Tighten the locking screws evenly and in several steps following the diametrically opposite sequence illustrated in Fig. 1
a) Tighten the screws by hand until a slight positive contact is established. Make final alignment adjustments to the connection.
b) Tighten the screws to approx. one-half the specified torque using an extended key or torque wrench.
c) Tighten the screws to full tightening torque using a torque wrench.
d) Verify that the screws are fully tightened by applying the specified torque.
4. Check the clearance (x) between the clamp flange and the hub. The clamp ring should not make contact with the face of the hub. The gap between the clamp ring and hub face should be even all the way around.

EL Series Power-Lock Removal

Note: EL Series Power-Locks are not self-locking.
1. Remove any accumulated contaminant's from the connection.
2. Loosen the locking screws in several stages following a diametrically opposite sequence.
3. Remove the hub and EL Series Power-Locks from the shaft. If the EL Series Power-Lock is jammed, loosen it by tapping it with a light hammer.

Specification Table



d = inside diameter of Power-Lock and outside diameter of the shaft.
T_1 = machining tolerances for shaft.
D = outer diameter of Power-Lock and hub counter bore inside diameter.
T_2 = machining tolerances for hub counter bore (D)
ℓ, Lt = width dimensions after tightening of the screws.
P_o = initial pressure required for contact with shaft and hub bore.
P_A = actual locking pressure to generate pS = 14,290 p.s.i.
F = maximum transmissible axial force.
Mt = maximum transmissible torque of one EL Power-Lock.
pH = contact pressure between Power-Lock and hub bore.
pS = contact pressure between Power-Lock and shaft.

All dimensions in inches unless otherwise stated.

Model Number (d x D in mm)	EL Power Lock Dimensions						P_o (lbf)	P_A (lbf)	Max. F (lbf)	Max. M_t (ft-lb)	Pressures	
	d	T_1	D	T_2	ℓ	Lt					pH (psi)	pS (psi)
PL010X013E	0.394		0.512		0.146	0.177	1,320	1,390	310	5	10,950	14,290
PL012X015E	0.472		0.591		0.146	0.177	1,120	1,650	365	7	11,380	14,290
PL013X016E	0.512		0.630		0.146	0.177	1,060	1,800	400	9	11,520	14,290
PL014X018E	0.551	+0	0.709	-0	0.209	0.248	1,830	2,770	615	14	11,090	14,290
PL015X019E	0.591	-0.00043	0.748	+0.00071	0.209	0.248	2,310	2,970	660	16	11,240	14,290
PL016X020E	0.630		0.787		0.209	0.248	2,200	3,170	705	19	11,380	14,290
PL017X021E	0.669		0.827		0.209	0.248	2,070	3,370	750	21	11,520	14,290
PL018X022E	0.709		0.866		0.209	0.248	2,000	3,560	790	23	11,660	14,290
PL019X024E	0.748		0.945		0.209	0.248	2,770	3,760	835	26	11,240	14,290
PL020X025E	0.787		0.984		0.209	0.248	2,660	3,960	880	29	11,380	14,290
PL022X026E	0.866		1.024		0.209	0.248	2,000	4,360	970	35	12,090	14,290
PL024X028E	0.945	+0	1.102	-0	0.209	0.248	1,850	4,750	1,060	42	12,230	14,290
PL025X030E	0.984	-.00051	1.181	+.00083	0.209	0.248	2,180	4,850	1,100	45	11,810	14,290
PL028X032E	1.102		1.260		0.209	0.248	1,610	5,544	1,230	56	12,510	14,290
PL030X035E	1.181		1.378		0.209	0.248	1,870	5,940	1,320	65	12,230	14,290
PL032X036E	1.260		1.417		0.209	0.248	1,740	6,340	1,410	74	12,660	14,290
PL035X040E	1.378	+0	1.575	-0	0.236	0.275	2,220	7,830	1,740	101	12,520	14,290
PL036X042E	1.417	-.00063	1.654	+.00098	0.236	0.275	2,550	8,050	1,780	105	12,230	14,290
PL038X044E	1.496		1.732		0.236	0.275	2,440	8,510	1,890	118	12,230	14,290
PL040X045E	1.575		1.772		0.260	0.315	3,040	9,900	2,190	144	12,660	14,290
PL042X048E	1.654	+0	1.890	-0	0.260	0.315	3,430	10,340	2,310	159	12,520	14,290
PL045X052E	1.772	-.0015	2.047	+.0015	0.339	0.393	5,740	14,520	3,210	237	12,380	14,290
PL048X055E	1.890		2.165		0.339	0.393	5,410	15,400	3,430	270	12,380	14,290
PL050X057E	1.969		2.244		0.339	0.393	5,210	16,060	3,565	292	12,520	14,290
PL055X062E	2.165		2.441		0.339	0.393	4,770	17,600	3,915	355	12,660	14,290
PL056X064E	2.205		2.520		0.409	0.472	6,420	21,780	4,840	445	12,520	14,290
PL060X068E	2.362		2.677		0.409	0.472	6,030	23,320	5,170	510	12,520	14,290
PL063X071E	2.480	+0	2.795	-0	0.409	0.472	5,740	24,420	5,435	565	12,660	14,290
PL065X073E	2.559	-.0018	2.874	+.0018	0.409	0.472	5,590	25,300	5,610	600	12,660	14,290
PL070X079E	2.756		3.110		0.480	0.551	6,820	31,900	7,085	815	12,660	14,290
PL071X080E	2.795		3.150		0.480	0.551	6,730	32,340	7,195	840	12,660	14,290
PL075X084E	2.953		3.307		0.480	0.551	7,570	34,100	7,590	933	12,660	14,290
PL080X091E	3.150		3.583		0.591	0.669	10,580	44,880	9,900	1,310	12,520	14,290
PL085X096E	3.346		3.780		0.591	0.669	10,010	47,520	10,560	1,475	12,520	14,290
PL090X101E	3.543		3.976		0.591	0.669	9,480	50,380	11,220	1,655	12,660	14,290
PL095X106E	3.740	+0	4.173	-0	0.591	0.669	9,000	53,240	11,880	1,845	12,800	14,290
PL100X114E	3.937	-.0021	4.488	+.0021	0.736	0.826	13,420	69,740	15,620	2,545	12,520	14,290
PL110X124E	4.331		4.882		0.736	0.826	14,390	76,780	17,160	3,075	12,660	14,290
PL120X134E	4.724		5.276		0.736	0.826	13,240	83,820	18,700	3,650	12,800	14,290
PL130X148E	5.118	+0	5.827	-0	0.984	1.102	21,050	122,760	27,280	5,785	12,520	14,290
PL140X158E	5.512	-.0025	6.220	+.0025	0.984	1.102	19,650	132,220	29,370	6,725	12,660	14,290
PL150X168E	5.906		6.614		0.984	1.102	18,410	141,630	31,460	7,740	12,660	14,290

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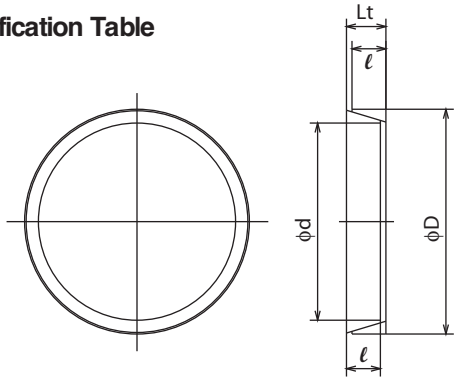
Specification Table



X = Recommended clearance between clamp flange and hub.
d_1 = spacer sleeve inside diameter.
D_1 = spacer sleeve outside diameter.
R = radius in hub outer bore.
D_N = Minimum hub outside diameter for single Power Lock installation (form factor K_3 = 0.6) and is based on Y.P. 32,000 psi hub material. **For other hub materials, calculate the hub o.d. per the Selection Tables on next page.**

All dimensions in inches unless otherwise stated.

Model Number	Clearance (X) 1 Power Lock	Clearance (X) 2 Power Locks	Clearance (X) 3 Power Locks	Spacer Sleeve d_1	Spacer Sleeve D_1	Max. Radius R	Minimum Hub Dia. D_N
PL010X013E	0.08	0.08	0.12	0.398	0.508	0.004	1.378
PL012X015E	0.08	0.08	0.12	0.476	0.586	0.004	1.457
PL013X016E	0.12	0.12	0.16	0.516	0.626	0.004	1.496
PL014X018E	0.12	0.12	0.16	0.555	0.705	0.004	1.575
PL015X019E	0.12	0.12	0.16	0.595	0.744	0.004	1.614
PL016X020E	0.12	0.12	0.16	0.634	0.784	0.004	1.654
PL017X021E	0.12	0.12	0.16	0.673	0.823	0.004	1.693
PL018X022E	0.12	0.12	0.16	0.713	0.862	0.004	1.732
PL019X024E	0.12	0.12	0.16	0.756	0.937	0.004	1.811
PL020X025E	0.12	0.12	0.16	0.795	0.976	0.004	1.850
PL022X026E	0.12	0.12	0.16	0.874	1.106	0.004	1.890
PL024X028E	0.12	0.12	0.16	0.953	1.095	0.004	1.969
PL025X030E	0.12	0.12	0.16	0.992	1.173	0.004	2.047
PL028X032E	0.12	0.12	0.16	1.110	1.250	0.004	2.126
PL030X035E	0.12	0.12	0.16	1.181	1.370	0.004	2.244
PL032X036E	0.12	0.12	0.16	1.268	1.409	0.004	2.323
PL035X040E	0.12	0.12	0.16	1.386	1.567	0.004	2.598
PL036X042E	0.12	0.12	0.16	1.425	1.646	0.004	2.677
PL038X044E	0.12	0.12	0.16	1.504	1.724	0.004	2.756
PL040X045E	0.12	0.16	0.20	1.583	1.764	0.004	3.031
PL042X048E	0.12	0.16	0.20	1.661	1.882	0.004	3.071
PL045X052E	0.12	0.16	0.20	1.780	2.039	0.004	3.150
PL048X055E	0.12	0.16	0.20	1.898	2.158	0.004	3.307
PL050X057E	0.12	0.16	0.20	1.976	2.236	0.008	3.386
PL055X062E	0.12	0.16	0.20	2.173	2.433	0.008	3.976
PL056X064E	0.12	0.16	0.20	2.213	2.512	0.008	3.898
PL060X068E	0.12	0.16	0.20	2.480	2.669	0.008	4.055
PL063X071E	0.12	0.16	0.20	2.488	2.787	0.008	4.843
PL065X073E	0.12	0.16	0.20	2.567	2.866	0.008	4.882
PL070X079E	0.12	0.20	0.24	2.768	3.098	0.118	5.236
PL071X080E	0.12	0.20	0.24	2.087	3.138	0.118	5.276
PL075X084E	0.12	0.20	0.24	2.965	3.295	0.118	5.315
PL080X091E	0.16	0.20	0.24	3.161	3.571	0.118	5.669
PL085X096E	0.16	0.20	0.24	3.358	3.768	0.118	5.906
PL090X101E	0.16	0.20	0.24	3.555	3.965	0.118	6.772
PL095X106E	0.16	0.20	0.24	3.752	4.161	0.118	6.969
PL100X114E	0.16	0.24	0.28	3.949	4.476	0.016	6.969
PL110X124E	0.16	0.24	0.28	4.343	4.870	0.016	8.110
PL120X134E	0.16	0.24	0.28	4.736	5.264	0.016	8.465
PL130X148E	0.20	0.28	0.35	5.134	5.811	0.016	8.898
PL140X158E	0.20	0.28	0.35	5.527	6.204	0.016	9.291
PL150X168E	0.20	0.28	0.35	5.921	6.598	0.016	10.472

Selection Table

Minimum Hub Diameter DN (inches)
Form Factor K3=0.6

Model Number	Yield Point of Various Hub Materials (p.s.i.)									
	21,000	25,000	30,000	32,000	35,000	40,000	43,000	50,000	57,000	64,000
PL010X013E	-	1.378	1.378	1.378	1.378	1.378	1.378	1.378	1.378	1.378
PL012X015E	-	1.457	1.457	1.457	1.457	1.457	1.457	1.457	1.457	1.457
PL013X016E	-	1.496	1.496	1.496	1.496	1.496	1.496	1.496	1.496	1.496
PL014X018E	1.575	1.575	1.575	1.575	1.575	1.575	1.575	1.575	1.575	1.575
PL015X019E	-	1.614	1.614	1.614	1.614	1.614	1.614	1.614	1.614	1.614
PL016X020E	-	1.654	1.654	1.654	1.654	1.654	1.654	1.654	1.654	1.654
PL017X021E	-	1.693	1.693	1.693	1.693	1.693	1.693	1.693	1.693	1.693
PL018X022E	-	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732
PL019X024E	1.811	1.811	1.811	1.811	1.811	1.811	1.811	1.811	1.811	1.811
PL020X025E	1.850	1.850	1.850	1.850	1.850	1.850	1.850	1.850	1.850	1.850
PL022X026E	2.008	1.890	1.890	1.890	1.890	1.890	1.890	1.890	1.890	1.890
PL024X028E	2.126	1.969	1.969	1.969	1.969	1.969	1.969	1.969	1.969	1.969
PL025X030E	2.087	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047	2.047
PL028X032E	2.244	2.126	2.126	2.126	2.126	2.126	2.126	2.126	2.126	2.126
PL030X035E	-	2.520	2.323	2.244	2.244	2.244	2.244	2.244	2.244	2.244
PL032X036E	-	2.559	2.362	2.323	2.323	2.323	2.323	2.323	2.323	2.323
PL035X040E	3.228	2.835	2.638	2.598	2.598	2.598	2.598	2.598	2.598	2.598
PL036X042E	3.189	2.835	2.677	2.677	2.677	2.677	2.677	2.677	2.677	2.677
PL038X044E	3.228	2.913	2.756	2.756	2.756	2.756	2.756	2.756	2.756	2.756
PL040X045E	-	3.504	3.150	3.031	2.913	2.874	2.874	2.874	2.874	2.874
PL042X048E	-	3.504	3.228	3.071	3.071	2.992	2.992	2.992	2.992	2.992
PL045X052E	3.898	3.504	3.268	3.150	3.150	3.110	3.150	3.150	3.150	3.150
PL048X055E	4.016	3.622	3.386	3.307	3.307	3.307	3.307	3.307	3.307	3.307
PL050X057E	4.094	3.701	3.504	3.386	3.346	3.346	3.346	3.346	3.346	3.346
PL055X062E	-	4.528	4.134	3.976	3.819	3.661	3.583	3.543	3.543	3.543
PL056X064E	4.764	4.331	4.016	3.898	3.780	3.780	3.780	3.780	3.780	3.780
PL060X068E	4.921	4.488	4.173	4.055	3.937	3.937	3.937	3.937	3.937	3.937
PL063X071E	-	5.630	5.079	4.843	4.646	4.409	4.291	4.094	4.055	4.055
PL065X073E	-	5.669	5.118	4.882	4.685	4.488	4.370	4.173	4.134	4.134
PL070X079E	-	6.063	5.472	5.236	5.039	4.803	4.685	4.449	4.370	4.370
PL071X080E	-	6.102	5.512	5.276	5.079	4.843	4.724	4.528	4.449	4.449
PL075X084E	-	6.063	5.551	5.315	5.157	4.921	4.843	4.606	4.567	4.567
PL080X091E	7.205	6.378	5.906	5.669	5.512	5.276	5.197	5.000	5.000	5.000
PL085X096E	7.402	6.575	6.102	5.906	5.709	5.512	5.394	5.197	5.197	5.197
PL090X101E	-	7.913	7.126	6.772	6.496	6.220	6.063	5.748	5.551	5.394
PL095X106E	-	8.071	7.283	6.969	6.693	6.417	6.260	5.945	5.748	5.591
PL100X114E	8.858	7.835	7.244	6.969	6.772	6.496	6.378	6.142	5.945	5.906
PL110X124E	-	9.370	8.504	8.110	7.835	7.480	7.283	6.969	6.732	6.535
PL120X134E	-	9.646	8.819	8.465	8.189	7.835	7.677	7.362	7.126	6.929
PL130X148E	11.142	9.921	9.213	8.898	8.622	8.346	8.189	7.874	7.638	7.480
PL140X158E	11.457	10.315	9.606	9.291	9.055	8.740	8.583	8.268	8.031	7.874
PL150X168E	13.661	11.929	10.945	10.472	10.118	9.724	9.488	9.094	8.780	8.583

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Selection Table

Minimum Hub Diameter DN (inches)
Form Factor K3=0.8

Model Number	Yield Point of Various Hub Materials (p.s.i.)									
	21,000	25,000	30,000	32,000	35,000	40,000	43,000	50,000	57,000	64,000
PL010X013E	-	0.827	0.748	0.709	0.709	0.669	0.669	0.630	0.630	0.591
PL012X015E	-	0.906	0.866	0.827	0.787	0.787	0.748	0.748	0.709	0.709
PL013X016E	-	0.945	0.906	0.906	0.827	0.827	0.787	0.787	0.748	0.748
PL014X018E	-	1.024	0.984	0.945	0.945	0.906	0.906	0.866	0.827	0.827
PL015X019E	1.102	1.024	0.984	0.945	0.945	0.906	0.906	0.866	0.866	0.827
PL016X020E	1.142	1.063	1.024	0.984	0.984	0.945	0.945	0.906	0.906	0.906
PL017X021E	1.181	1.142	1.063	1.063	1.024	0.984	0.984	0.945	0.945	0.945
PL018X022E	1.220	1.142	1.102	1.102	1.063	1.024	1.024	0.984	0.984	0.984
PL019X024E	-	1.457	1.339	1.299	1.260	1.220	1.220	1.181	1.142	1.102
PL020X025E	-	1.496	1.378	1.339	1.299	1.260	1.260	1.220	1.181	1.142
PL022X026E	-	1.575	1.496	1.417	1.378	1.339	1.299	1.260	1.220	1.220
PL024X028E	1.654	1.535	1.457	1.417	1.378	1.339	1.339	1.299	1.260	1.260
PL025X030E	1.654	1.575	1.496	1.457	1.457	1.417	1.378	1.378	1.339	1.339
PL028X032E	1.969	1.811	1.732	1.693	1.654	1.575	1.575	1.496	1.496	1.457
PL030X035E	2.047	1.890	1.811	1.772	1.732	1.693	1.654	1.614	1.575	1.575
PL032X036E	2.087	1.929	1.850	1.811	1.772	1.732	1.693	1.654	1.614	1.614
PL035X040E	2.402	2.205	2.087	2.047	2.008	1.969	1.929	1.850	1.811	1.811
PL036X042E	2.441	2.244	2.165	2.087	2.047	2.008	1.969	1.929	1.890	1.850
PL038X044E	2.520	2.362	2.244	2.205	2.165	2.087	2.087	2.008	1.969	1.969
PL040X045E	-	2.717	2.559	2.480	2.402	2.323	2.283	2.205	2.126	2.087
PL042X048E	-	2.795	2.638	2.559	2.480	2.402	2.362	2.283	2.244	2.205
PL045X052E	3.110	2.874	2.717	2.677	2.598	2.520	2.480	2.441	2.362	2.323
PL048X055E	3.228	2.992	2.874	2.795	2.717	2.677	2.638	2.559	2.480	2.441
PL050X057E	3.307	3.110	2.953	2.874	2.835	2.756	2.717	2.638	2.598	2.559
PL055X062E	3.543	3.307	3.150	3.071	3.031	2.953	2.913	2.835	2.795	2.756
PL056X064E	3.780	3.543	3.346	3.268	3.189	3.110	3.071	2.992	2.913	2.874
PL060X068E	3.976	3.701	3.504	3.425	3.346	3.268	3.228	3.150	3.071	3.031
PL063X071E	-	4.409	4.094	3.937	3.858	3.701	3.622	3.504	3.386	3.307
PL065X073E	-	4.449	4.173	4.016	3.898	3.780	3.701	3.583	3.465	3.386
PL070X079E	-	4.685	4.370	4.252	4.134	4.016	3.937	3.819	3.701	3.622
PL071X080E	-	4.724	4.449	4.291	4.173	4.055	3.976	3.858	3.740	3.661
PL075X084E	-	4.803	4.567	4.409	4.331	4.173	4.134	3.976	3.898	3.819
PL080X091E	5.630	5.197	4.882	4.764	4.646	4.528	4.449	4.291	4.213	4.134
PL085X096E	5.866	5.394	5.118	4.961	4.882	4.724	4.646	4.528	4.409	4.331
PL090X101E	-	6.260	5.827	5.630	5.433	5.276	5.157	4.961	4.803	4.724
PL095X106E	-	6.417	6.024	5.787	5.630	5.472	5.354	5.157	5.039	4.921
PL100X114E	7.008	6.457	6.102	5.945	5.787	5.630	5.551	5.394	5.276	5.157
PL110X124E	-	7.480	7.008	6.772	6.575	6.378	6.260	6.024	5.866	5.748
PL120X134E	-	7.835	7.362	7.165	6.969	6.772	6.654	6.417	6.260	6.142
PL130X148E	8.976	8.307	7.874	7.638	7.480	7.283	7.165	6.969	6.811	6.693
PL140X158E	9.331	8.701	8.268	8.071	7.874	7.677	7.559	7.362	7.205	7.087
PL150X168E	10.748	9.803	9.252	8.937	8.740	8.465	8.307	8.071	7.874	7.717

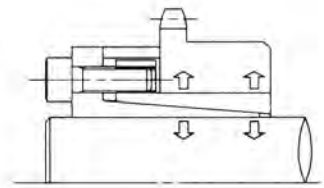
Specifications

Consider these additional types of Power-Locks for your operation.
Each is designed to provide keyless locking power for special applications.
Consult Tsubaki Technical Support for more information on the Power-Locks shown below.

TF Series

Applicable shaft size: 18 to 90 mm

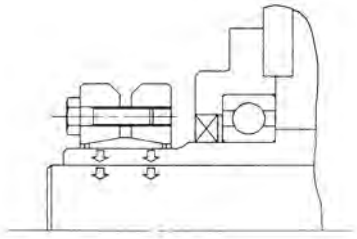
- Designed for hubs with smaller outside diameters.
- Self-centering function aligns the hub and shaft during installation.



SL Series

Applicable shaft size: 19 to 245 mm

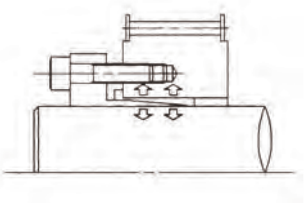
- Connects to the outside of the hub.
- Suited for applications where a thick hub is not possible.
- High transmissible torque.



EF Series

Applicable shaft size: 10 to 120 mm

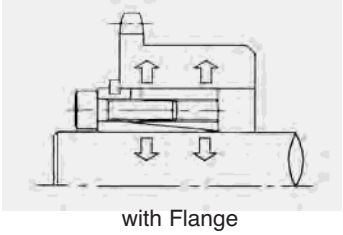
- Same inner and outer diameter as the EL Series.
- Small ratio between inner and outer diameters allows for smaller hub diameters.



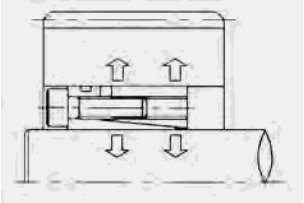
RE Series

Applicable shaft size: 5 to 50 mm

- Stainless steel construction.
- Designed with a convenient removable flange.
- Excellent for small shaft diameters.



with Flange



without Flange

Section F

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