



DILR & DILRA Disc Coupling Installation Instructions

***DILR & DILRA Disc Coupling
will use the existing Rigid Hubs.
They do not need to be removed.***

1. Introduction

Although a coupling may have been correctly specified at time of order, operational conditions can sometimes change before the coupling is installed. Lovejoy, Inc. has information available to advise on the selection and limitations of their power transmission products, but the purchaser is ultimately responsible for verifying the suitability of their choice of product for the actual service conditions.

Correct installation and alignment will insure long life and trouble free operation of your coupling. Please read through these instructions carefully before you set the coupling into operation. Make sure you follow all safety guidelines during the installation. These Instructions are part of your product, and should be retained for future reference.

2. Safety

Accidents involving rotating equipment may result in loss of life, serious bodily harm or property damage. The purchaser of this equipment must assure that the equipment is properly assembled, installed, safeguarded, operated and maintained. This equipment must not be operated at conditions that exceed manufacturer's specifications.

Consult all applicable Federal, State and local laws and regulations covering the safe operation and maintenance of equipment, including, without limitation, the USDOL-OSHA "Lockout / Tagout" procedure set forth in 29 CFR 1910.147.

Because of the possible danger to persons or property from accidents which may result from the improper use or unapproved modification of the product, this product must be installed, maintained and operated in accordance with the procedures, standards and engineering specifications specified in the product literature. To assure safe operation, this product should be inspected in accordance with the disc coupling inspection procedure. Proper guards and any suitable safety equipment or procedures as may be necessary, or as may be specified in safety codes, should be installed by the user. Safety equipment and shields are not provided, nor are they the responsibility of Lovejoy, Inc.



Warning! This symbol indicates safety measures which must be observed to avoid **personal injury**.

Caution! This symbol indicates safety measures which must be observed to avoid **damage to coupling**.

3. Check Product

Before beginning installation, the coupling should be examined for any signs of damage that may have occurred during shipping and handling. Confirm that all components ordered are there.

For maximum protection, the coupling and components should be stored in the original packaging.

Measurements should be made to verify correctness of parts to meet application requirements, such as; hub bore diameter, shaft diameter, shaft separation, etc.

Note: DILR Series Disc Couplings are shipped assembled except for the Shim Pack Kit.

Note: DILRA Series Disc Couplings are shipped assembled. The Shaft Locking Device (SLD) is not pre-tightened, so the adjustable flange adapter assembly is not securely fastened to the shaft, but simply slid on.

<i>Table 1</i>	<i>Components</i>		
Size	Spacer Assembly	DILR Shim Pack Kit	Hardware
090-6	1	1	Customer must supply the new mounting hardware
110-6	1	1	
132-6	1	1	
158-6	1	1	
185-6	1	1	
202-6	1	1	
228-6	1	1	
255-6	1	1	
278-6	1	1	
302-6	1	1	
325-6	1	1	
345-6	1	1	
380-6	1	1	
410-6	1	1	
440-6	1	1	
475-6	1	1	
505-6	1	1	



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Caution!

Lovejoy manufactured the coupling interfaced based on the shaft data supplied by the purchaser. Lovejoy is not responsible for inaccurate or incomplete information supplied by the purchaser.

It is the purchasers responsibility to assure that the interface connections (Flanges, Bolts, Keys, Hydraulic Fits, Etc.) between the coupling and the connected equipment are capable of handling the anticipated loads.

4. Tools Required

- Caliper
- Sockets
- Torque Wrench
- Open End Wrenches
- Alignment Equipment



Warning!

Before beginning coupling installation make sure the machinery is made safe. Discount all power.

5. DILR Component Preparation

Clean the exposed surfaces of all components, hubs, sub-assemblies, spacers, etc., to remove any protective coating applied at the factory. All parts must be clean and free of any foreign materials before attempting installation or assembly, use a clean cloth dampened with a nonflammable solvent.

Check Hubs, Shafts, Flange Adapters and Shims for any raised metal, nicks, burrs, dents, gouges, etc., dress if necessary.

- Support the spacer assembly only by the center shaft,** loosen the red shipping bolts in the new drop in spacer assembly until only the Red Spacers can be removed, leaving the red shipping bolts engaged.
- With the **red shipping bolts loosened or removed to allow the disc packs to fully extend,** measure the length of the spacer assembly and verify the length matches the **Distance Between Flange Faces (DBFF)** less half the thickness of the shim pack kit.
- Prior to removing the dropout section of the existing floating shaft gear coupling, **check the measurement of the DBFF** between the rigid hubs of the coupling and compare that to the drop in spacer assembly and shim pack kit of the new disc coupling to verify fit.

- The difference between the length of the spacer assembly and the distance between the existing rigid hub flanges will determine the **number of shims needed** for the application. If the DBFF is greater than the total length of the spacer assembly and all the shims or the DBFF is less than the length of the spacer assembly the existing hubs will have to be moved to accommodate the new spacer assembly).
- Once all necessary measurements are taken and all components are verified as correct, the **red shipping bolts can be snugged up to compress the disc packs.** This compression should allow adequate clearance when installing the spacer assembly between the hubs. **(Do Not Use Power Tools)**

Caution!

With the red **shipping spacers removed** it is possible to **Over Compress** the disc packs, when re-tightening the red shipping bolts, causing the disc packs to deform and making the coupling impossible to properly align or compromise its strength.

- Remove the dropout shaft section of the existing coupling.

6. Existing Hub Adjustment (DILR only)

Once it has been determined that one or both of the existing rigid hubs have to be moved to accommodate the new spacer assembly, a target DBFF needs to be established.

Caution!

Do Not Spot Heat the Hub or Distortion May Occur.

- To determine a target DBFF:** use the uncompressed measured length of the spacer assembly plus one half the supplied shim pack kit width for a target DBFF.
- Once the target DBFF has been established move one or both existing rigid hubs, keeping each rigid hub's movement to within one half the supplied shim pack kits width in either direction.

Caution!

Do Not Exceed 500°F (260°C) During the Heating or Installation of the Hub. Excessive Heat may soften the Hub and Reduce the Strength of the Steel. Excessive Heat may also affect the Performance Characteristics of the Hub.

Regardless of method used, heat **MUST** be applied evenly to avoid distortion. This is especially important when using open flame heating. In any event, extreme care must be exercised when handling heated hubs to avoid Injury to personnel



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Caution!

When Unpacking or Moving the DILRA coupling, care must be taken not to let the **Adjustable Flange Adapter Assembly slide off** the spacer shaft. The Shaft Locking Device is not pre-tightened and the Flange Adapter Assembly could slide off of the spacer shaft if the DILRA coupling is moved or picked up incorrectly.

7. DILRA Component Preparation

Clean the exposed surfaces of all components, hubs, sub-assemblies, spacers, etc., to remove any protective coating applied at the factory. All parts must be clean and free of any foreign materials before attempting installation or assembly, use a clean cloth dampened with a nonflammable solvent.

Check Hub Bores, Keyways and Shafts for any raised metal, nicks, burrs, dents, gouges, etc., dress if necessary.

- a. **Support the spacer assembly only by the center shaft** and remove the Red Shipping Bolts and Spacers.
- b. With the **red shipping bolts removed to allow the disc packs to fully extend**, measure the length of the spacer assembly and verify the length matches the **Distance Between Flange Faces (DBFF)**.
- c. Prior to removing the dropout section of the existing floating shaft gear coupling, **check the measurement of the DBFF** between the rigid hubs of the coupling and compare that to the drop in spacer assembly of the new disc coupling to verify fit.

Note: *The DILRA coupling comes packaged with the Adjustable Flange Adapter Assembly positioned closer to its minimum coupling Overall Length. You may have to consult the drawing to verify fit rather than measuring the DILRA coupling.*

8. DILR Coupling Assembly

- a. For the **DILR series coupling** when attaching to existing Rigid Flange style hubs, all parts must be clean and free of any foreign materials before attempting installation or assembly, use a clean cloth dampened with a nonflammable solvent to clean the grease from the existing hubs and shafts.
- b. Place the DILR spacer assembly between the existing hubs and align the bolt holes of the spacer assembly's flange adapter with the bolt holes of the existing rigid hub (**Do not install fasteners**).

- c. On the side of the coupling that will be fastened last (typically the most accessible side) **place one or two bolts and hand tighten the nuts** to keep the coupling in place while fastening the least accessible side.
- d. Take **one half of the estimated number of shims required for the installation**, align them to form one common shim pack and using a bolt as an aid to install them on the least accessible side of the coupling.
- e. After the first bolt is inserted through the hub, shim pack and flange adapter add the locknut and hand tighten. **Do Not Torque the Locknut** at this time.
- f. With one bolt in place, adjust the shim pack so that all bolt holes are in-line with the mating rigid hub and flange adapter. Install a second bolt at the opposite end of the bolt circle, add the locknut and hand tighten. **Do Not Torque the Locknut** at this time.
- g. Install all remaining bolts and locknuts on that end of the coupling and hand tighten each one. **Do Not Torque the Locknuts** at this time.
- h. **Remove the Red Shipping bolts** used to compress the disc packs during placement of the spacer assembly from that end of the coupling.
- i. **Torque all the Locknuts** on the least accessible side of the coupling following the torqueing procedure in Section 11.

Caution!

After all the locknuts are properly torqued, inspect each one to verify that at least **two threads from each bolt are exposed** at each locknut (this ensures adequate thread engagement). If at least two threads from each bolt are not exposed at each locknut, either too many shims have been used or the bolts are not long enough.

1. If **too many shims** have been used (more than one half of the supplied shim pack per side of the coupling), shims must be removed or the DILR spacer assembly will have to be removed and the hubs moved closer together (see Section 6).
2. If the **bolts are not long enough** for adequate thread engagement, even without shims, new fasteners will need to be used. (Contact Lovejoy Application Engineering for assistance in identifying the correct fasteners.)

- j. Take the **remaining one half of the shims from the estimated number of shims required for the installation**, remove the one or two bolts holding the hub in place, and insert the shim pack between the flange adapter and the other rigid hub.



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- l. After the first bolt is inserted through the hub, shim pack and flange adapter add the locknut and hand tighten. **Do Not Torque the Locknut** at this time.
- m. With one bolt in place, adjust the shim pack so that all bolt holes are in-line with the mating rigid hub and flange adapter. Install a second bolt at the opposite end of the bolt circle, add the locknut and hand tighten. **Do Not Torque the Locknut** at this time.
- n. **Remove all the Red Shipping bolts**, install all the remaining flange bolts, and hand tighten each one. **Do Not Torque the Locknuts** at this time.
- k. If the other half of the estimated number of shims is either to thick or to narrow to fit properly the shim pack must be adjusted.
 - I. If the other half of the **estimated number of shims is to thick** to fit between the rigid hub and the flange adapter, remove one shim at a time until the shim pack fits with no play.
 - II. If the other half of the **estimated number of shims is to thin**, allowing to much play between the rigid hub and the flange adapter, add one shim at a time until the shim pack fits with no play.
 - III. Ideally, **each side of the coupling should have the same number of shims**. The adding or subtracting of shims on one side of the coupling should not adversely affect this balance. If it does, shims may have to added or subtracted from the other side of the coupling to keep the balance as close as possible.
 - IV. **A proper shim pack fit** will give resistance, but will slide in between the rigid hub and the flange adapter without to much force.
- b. Place the DILRA spacer assembly between the rigid hubs with the fixed end of the coupling on the least accessible side and align the bolt holes of the spacer assembly's flange adapter with the bolt holes of the rigid hub.
- c. On the fixed end of the coupling install the bolts and hand tighten the locknuts. **Do Not Torque the Locknut** at this time.
- d. **If all the Red Shipping bolts** have been removed, **Torque the Locknuts** on the least accessible side of the coupling following the torquing procedure in Section 10.
- e. On the opposite end of the coupling **mate the Flange Adapter Assembly to the rigid hub**, rotate the flange adapter so that the bolt holes line up with the hub bolt holes, and install the bolts and hand tighten the locknuts. **Do Not Torque the Locknut** at this time.
- f. **If all the Red Shipping bolts** have been removed, **Torque the Locknuts** on the adjustable side of the coupling following the torquing procedure in Section 11.
- g. Tighten the Shaft Locking Device (see Section 10) and follow the alignment instructions in Section 12.

Make sure all Red Shipping Bolts have been removed.

- o. **Torque all the Locknuts** on this side of the coupling following the torquing procedure in Section 11.
- p. Follow the alignment instructions in Section 12.

9. DILRA Coupling Assembly

- a. For the **DILRA series coupling** when attaching to existing Rigid Flange style hubs, all parts must be clean and free of any foreign materials before attempting installation or assembly, use a clean cloth dampened with a nonflammable solvent to clean the grease from the existing hubs and shafts.

Table 2		SLD 900 Series				
Size mm	Locking Bolt Size	Qty	Locking Bolt Socket Size mm	Torque Wrench Drive Size in	Torque Nm	Torque ft-lb
62	M6	10	10	1/4	12	9
68	M6	10	10	1/4	12	9
75	M8	7	13	3/8	30	22
80	M8	7	13	3/8	30	22
90	M8	10	13	3/8	30	22
100	M8	12	13	3/8	30	22
110	M10	9	17	3/8	60	44
115	M10	9	17	3/8	60	44
125	M10	12	17	3/8	60	44
130	M10	12	17	3/8	60	44
140	M12	10	19	3/8	100	74
155	M12	12	19	3/8	100	74
165	M16	8	24	1/2	250	184
175	M16	8	24	1/2	250	184
185	M16	10	24	1/2	250	184
195	M16	12	24	1/2	250	184
200	M16	12	24	1/2	250	184
220	M16	15	24	1/2	250	184
240	M20	12	30	3/4	490	361



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Caution!

DO NOT USE any Anti-Seize on the Spacer's Adjustable Shaft surfaces or the inside locking surfaces of the Shaft Locking Device (SLD) as this could cause slippage.

10. Shaft Locking Device (SLD 900 Series)

- a. With the Shaft Locking Device mated to the flange assembly hub face, hand tighten 3 to 5 equally spaced locking bolts, while making sure the SLD 900 is parallel to the shaft, then hand tighten the remaining locking bolts.
- b. **Now torque all the locking bolts (see Table 2) to 1/3 the specified value, then to 2/3's the specified value, and then to the final specified torque value in sequence. It is best to torque all locking bolts in sequence in multiple steps, until the specified bolt tightening torque is maintained.**
- c. Verify that all the locking bolts are tightened to the specified torque.

11. Flange Bolt Torqueing Procedure

Note: If room permits, always tighten the locknut, not the bolt since part of the tightening torque is needed to overcome friction. As there is additional friction when turning the bolt, more of the effort goes into friction than in to stretching the bolt.

- A. Always remember to **properly seat the bolt** before tightening the nut. Drawing the bolt through the flange by tightening the locknut could result in insufficient preloading of the bolt.
- B. Locknuts should be tightened to the recommended torque specification in the following steps:
 1. All locknuts should be tightened to **one half of the torque** tightening values in a crisscross fashion as shown in Table 3 or 4.
 2. Once all locknuts have been tightened to half of the torque tightening value, follow the same crisscross pattern and torque **to the final torque** value as shown in Table 3 or 4.
 3. Finally, check the first locknut tightened to **assure it has maintained its torque value** after all locknuts have been tightened, if it does not meet the torque value in Table 3 or 4 follow the same crisscross pattern and torque all locknuts again.

For Lovejoy rigid hubs, bolts and locknuts see 'Gear Torqueing Procedure' P/N 69790415409.

Caution!

For Bolt torque specifications OTHER THAN Lovejoy's, refer to that manufactures bolt torque specifications.

12. Machinery Alignment

- a. **Optical methods of alignment** (such as Laser) are recommended
- b. **The useful life of any Disc Coupling** is directly influenced by the operating misalignment; the better the alignment, the longer the coupling life. The coupling alignment should be checked periodically. Even when a coupling is well aligned at installation, subsequent settling of foundations, shifting of equipment, etc., may cause the alignment to deteriorate.
- c. **Realignment of the equipment may not be necessary** if all eight of the Disc Pack Width (PW) measurements (see Section 12-j) are within acceptable limits.
- d. If the **equipment can be realigned without much movement** of the equipment (Only adding a few adjustment shims to the corners of the equipment), then the disc coupling may remain in place during the alignment procedure.
- e. If **major equipment movement is required** (Such as removing all adjustment shims from one or more corners of the equipment), then the disc coupling should be removed prior to the alignment procedure and reinstalled after the equipment is aligned.
- f. **Soft Foot:** The equipment must sit flat on its base. Any soft foot must be corrected now.
- g. **The Axial Displacement** allowable between shafts during installation should not exceed 20% of the allowable displacement given in Table 4. This displacement is a function of the coupling size and the number of bolts utilized. The larger the size, the larger the axial displacement.
- h. The axial displacement creates large stresses in the disc pack. For a long life, it is recommended that the axial spacing of the shafts should be positioned so that **the disc pack is flat when the equipment is operating** under normal conditions. This means there is a minimal amount of waviness in the disc pack when viewed from the side. This will result in a flexing element that is centered and parallel to its mating flange faces. Move the connecting equipment or the hubs on their respective shafts to accomplish this.



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- i. **Thermal expansion** of the shafts should be carefully considered. *Example: if the distance between shaft ends change by 0.015" (the shafts are coming closer to each other) from cold to hot machinery, the distance between shaft ends with cold machinery should intentionally be made larger by 0.015" when the coupling is installed.*
- j. **Measuring using a Caliper & Recording each Disc Pack Width (PW)** at four radial locations (approximately 3, 6, 9 & 12 O'clock) will be the final step in the installation. **If the PW dimension at each location on each disc pack is within the upper and lower limits of Table 4 the installation is complete.**
- k. **For a DILR if the PW dimension on the disc packs are not within the limits**, calculate the average of the PW measurements for the drive and driven side of the coupling.
 - I. Calculate the difference between the recorded average PW value and the Table 5 value of the PW.
 - II. Divide this difference by the thickness of an individual shim's thickness (rounded to the nearest whole number).

- III. This represents the **number of shims that need to be added or removed** from each side of the coupling. **A positive number** indicates expanded disc packs and the need to **add shims**. **A negative number** indicates compressed disc packs and the need to **remove shims**.
- IV. If no shims need to be added or removed, and there is at least one PW measurement that is beyond the upper or lower limit, the equipment may have to be realigned.
- I. **For a DILRA if the PW dimension on the disc packs are not within the limits**, loosening the SLD should allow the coupling to be adjusted.

Caution!
When using the PW measurement to determine axial displacement, remember that angular misalignment will affect the PW measurement.

13. Inspection and Maintenance

For inspection or replacement of the disc packs see Lovejoy's "Disc Coupling Inspection & Maintenance Instructions" P/N 69790415374

Note: When reinstalling the coupling guard verify that the new coupling has enough clearance so as not to come in contact with the guard and that there is visibility to inspect the disc pack during operation.

Table 5		Axial Tolerance									
Size	Axial Misalignment ±ΔKa		Angular Misalign Max Degree	PW Disc Pack Width		+/- Tolerance		PW Low		PW High	
	in	mm		in	mm	in	mm	in	mm	in	mm
090-6	0.0295	0.75	1.5°	0.295	7.5	0.003	0.08	0.292	7.43	0.298	7.58
110-6	0.0413	1.05		0.331	8.4	0.004	0.11	0.327	8.30	0.335	8.51
132-6	0.0512	1.30		0.331	8.4	0.005	0.13	0.326	8.27	0.336	8.53
158-6	0.0610	1.55		0.441	11.2	0.006	0.16	0.435	11.05	0.447	11.36
185-6	0.0728	1.85		0.551	14.0	0.007	0.19	0.544	13.82	0.558	14.19
202-6	0.0748	1.90		0.610	15.5	0.007	0.19	0.603	15.31	0.617	15.69
228-6	0.0827	2.10	1°	0.689	17.5	0.008	0.21	0.681	17.29	0.697	17.71
255-6	0.0925	2.35		0.807	20.5	0.009	0.24	0.798	20.27	0.816	20.74
278-6	0.1024	2.60		0.835	21.2	0.010	0.26	0.825	20.94	0.845	21.46
302-6	0.1122	2.85		0.961	24.4	0.011	0.29	0.950	24.12	0.972	24.69
325-6	0.1280	3.25		1.024	26.0	0.013	0.33	1.011	25.68	1.037	26.33
345-6	0.1358	3.45		1.110	28.2	0.014	0.35	1.096	27.86	1.124	28.55
380-6	0.1496	3.80		1.260	32.0	0.015	0.38	1.245	31.62	1.275	32.38
410-6	0.1614	4.10		1.307	33.2	0.016	0.41	1.291	32.79	1.323	33.61
440-6	0.1732	4.40		1.433	36.4	0.017	0.44	1.416	35.96	1.450	36.84
475-6	0.1870	4.75		1.504	38.2	0.019	0.48	1.485	37.73	1.523	38.68
505-6	0.1988	5.05		1.654	42.0	0.020	0.51	1.634	41.50	1.674	42.51

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