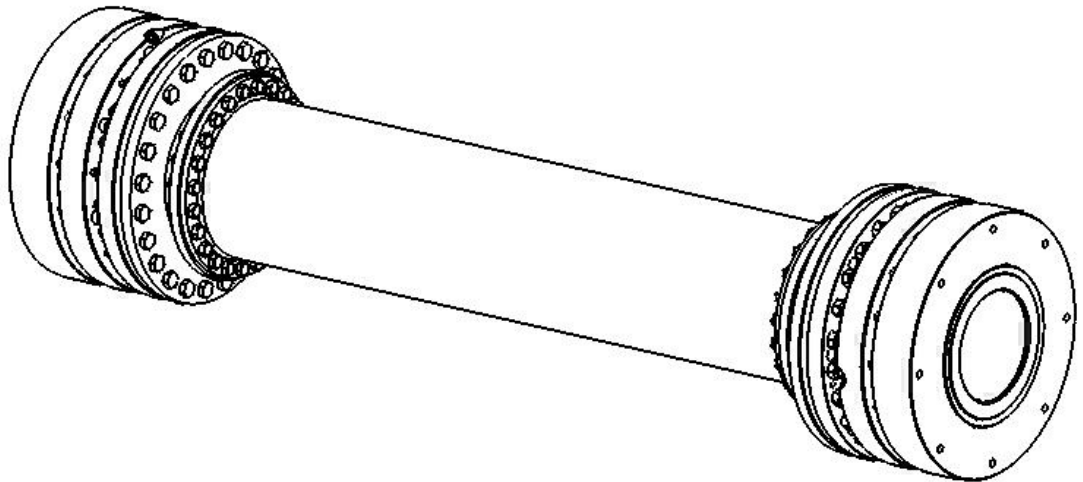


HTC/Flex Coupling Assembly HC-4291 Installation and Maintenance Instructions



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Appendices (Reference only - Check for Current Revision)

A	HC-4291	HTC/Flex Coupling Assembly Drawing	Riverhawk Company
B	DB-413737	Ameriflex Coupling Drawing	Ameridrives International
C	GT-4604	Installation and Removal Kit	Riverhawk Company
D	MP-2349	Hydraulic Pump and Hose Kit	Riverhawk Company
E	Form. No. 367-SH	High Performance Couplings Installation and Maintenance Manual	Ameridrives International

1.0 General Description

This unit consists of an Ameriflex® high performance flexible coupling with a Riverhawk Hydraulic Torque Coupler and hub on each end to interface with the customer shaft.

The Hydraulic Torque Coupler (HTC) connects the hub to the shaft. It accomplishes this by squeezing the hub OD with very high pressure. This pressure forces the hub to squeeze down onto the shaft producing a tight fit. Squeeze is produced when hydraulic pressure is applied. This separates the piston and cylinder of the HTC. As these rings separate, they ride up the slopes of the collet generating interference. Figure 1a shows the hub mounted on the shaft using an HTC. Prior to assembly, the hub and shaft have been machined to produce a keyless, cylindrical slip fit.

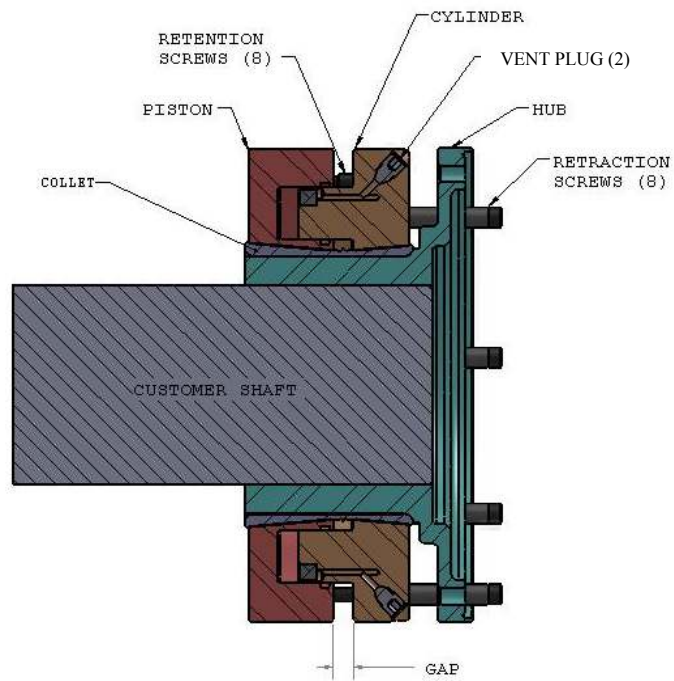


FIGURE 1a - HTC/Hub Assembly Cross Section

The Ameriflex® flexible coupling consists of two flanged flexible diaphragm sub assemblies and a flanged spacer tube. It also includes all of the applicable hardware. Consult Ameridrives Manual Form No. 367-SH for a complete description of the coupling assembly.

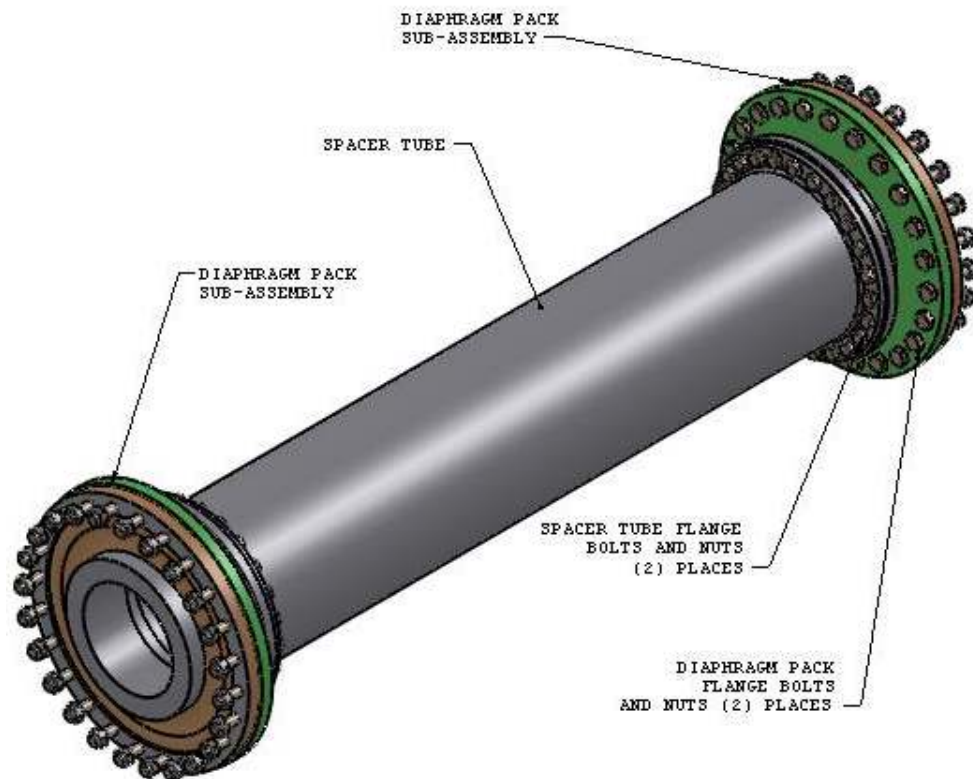


FIGURE 1b: Ameriflex® Coupling Assembly

1.1 Warnings & Cautions

Below is a list of warnings and cautions. Be sure to heed the warnings and cautions as they apply to each step of assembly and disassembly.

Caution: Possible equipment damage. Do not put excessive torque on the hydraulic port adapter. Do not pull on hydraulic port adapter (See Figure 4).

Caution: **DO NOT** use the "MAX GAP" listed on drawing HC-4291. This is a limit value, Do Not Exceed it.

Warning: **Crush hazard, Keep fingers and objects out of the gap when releasing pressure.**

Caution: Watch three things while applying hydraulic pressure.

- **First:** watch the gap. **Stop pumping** if it exceeds the "MAX GAP" stated on the drawing.
- **Second:** **Do Not** apply more than 8,000 psi.
- **Third:** retract all screws completely. Make sure that all set screws are fully retracted before releasing the pressure.

1.2 Tools and Hardware Required

The following are tools required to install, operate, and remove HC-4291.

Part Number	Description	Installation	Removal
MP-2349	Hydraulic pump and hose kit capable of 8,000 psi. (Riverhawk supplies pumps designed to simplify HTC operation)	x	x
	Set of inch hex keys	x	x
	Dial caliper (or Gap Tool Below)	x	
	Oil Drain Pan	x	x
	Set of Inch Combination Wrenches	x	x
	(2) Dial Indicators	x	x
GT-4604	Installation and Removal Kit includes:		
	7500485 Gap Tool, HTC	x	
	2001992 3/8-24 Hydraulic Port Adapter Fitting	x	x
	2001299 3/8-24 Hydraulic Port Plug	x	x

1.3 Reference Documents

Please obtain and read carefully the latest revision of the following documents before proceeding with installation.

<u>Document Number</u>	<u>Title</u>	<u>Source</u>
IM - 232	HTC/Flex Coupling Assembly HC-4291 Installation and Maintenance Instructions	Riverhawk Company
HC-4291	HTC/Flex Coupling Assembly Drawing	Riverhawk Company
DB-413737	Ameriflex Coupling Drawing	Ameridrives International
Form. No. 367-SH	High Performance Couplings Installation and Maintenance Manual	Ameridrives International

1.4 General Installation Procedure

Below is a very abbreviated summary on the installation of the HC-4291. Also noted is the section of this manual in which you will find more detailed descriptions and diagrams. Be sure to read these instructions completely before proceeding with installation.

- 1.4.1 Align the machinery shafts and set the Distance Between Shaft Ends to be 30.00 +/- .0625 inches.
- 1.4.2 Install both Hydraulic Torque Couplers (HTC) on to Hubs - See section 2.0 of this manual
- 1.4.3 Install both HTC/Hub Assemblies onto the Shafts - See section 2.4 of this manual
- 1.4.4 Install the Diaphragm packs onto the hubs- See section 3.1 of this manual
- 1.4.5 Install the coupling spacer tube- See section 3.2 of this manual

2.0 HTC/Hub Assembly Installation

This section of the manual covers how to install the HTC onto the hub and then the HTC/hub assembly onto the shaft.

2.1 Hub and Shaft Inspection

Inspect the hub and shaft to assure that they have been machined to the proper tolerances.

The HTC should slide onto the hub with a sliding or light press fit. The hub should fit the shaft in the same manner. Remove any burrs or proud metal that could interfere using a white India Stone.

2.2 Cleaning

The hub OD, ID and the shaft OD must be smooth and free of debris. Clean using a solvent that leaves no residue such as acetone. Cleaning of these surfaces is especially important because contamination can make the surfaces slippery and cause the surfaces to slip prematurely during operation. Take special care to remove any thick oils or waxes using a solvent.

2.3 Mount HTC on Hub.

Usually you will receive the HTC and Hub already assembled together. If the HTC and hub are already assembled go to Section 2.3.3. If they are not together, assemble them as follows. Note the HTC and Hub have been factory balanced as an assembly. Each is marked with a part number similar to 7500472-X where X is the serial number. The serial number on the hub must match the serial number on the HTC in order to ensure proper balance.

2.3.1 Remove the vent plugs (see Figure 1a). Tighten the retraction screws to 10-15 ft-lbs. Be sure the gap is closed (see Figure 2a).

2.3.2 Put the hub face down on a table. Align the match marks on the collet, Hub, and HTC to as shown in Figure 2a to ensure proper balance. Slide the HTC onto it until stop as shown in Figure 2b. Be sure to slide the HTC onto the hub evenly as there may be a slight interference fit. Always push on the collet, not on the HTC when sliding the HTC on hub.

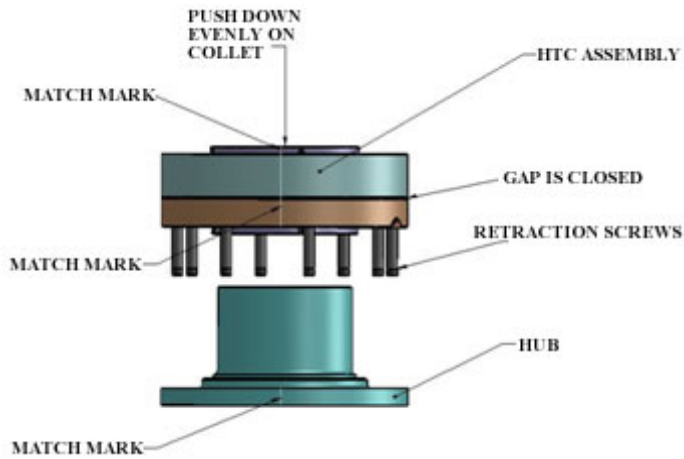


Figure 2a

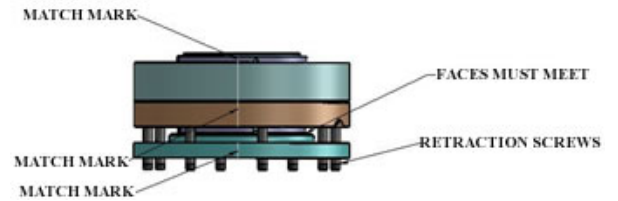


Figure 2b

2.3.3 Remove the retraction screws.

2.3.4 Verify that the match marks are properly aligned as in Figure 2b.

2.3.5 If the HTC is loose on the hub, lightly hand tighten the socket head set screws (retention screws) just until the HTC will no longer rotate on the hub. This will allow you to handle the assembly without the match marks becoming misaligned. Note - if you over tighten these screws the assembly will not fit onto the shaft.

2.3.6 Again verify the match marks are aligned as in Figure 2b.

2.4 Mounting the HTC/Hub Assembly on the shaft

2.4.1 Gently slide the hub onto the shaft until the face of the shaft is flush with the face of the flange.

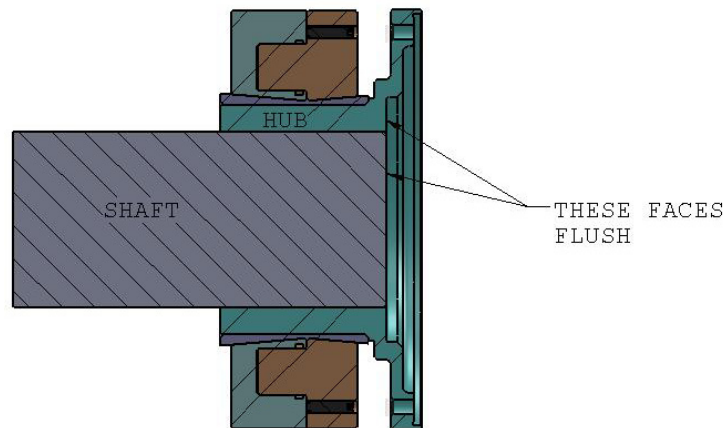


Figure 3. Shaft Assembly Cross-section

2.4.2 Verify all (8) retraction screws have been fully removed.

2.4.3 Turn the HTC/Hub assembly so that the hydraulic ports are at the 12 and 6 o'clock positions. This will facilitate draining of the oil in latter steps. Remove vent plugs from both ports if not already done.

2.4.4 Thread the Hydraulic Port Adapter fitting (Riverhawk PN 2001992) into one of the hydraulic ports on the HTC as shown in Figure 4.

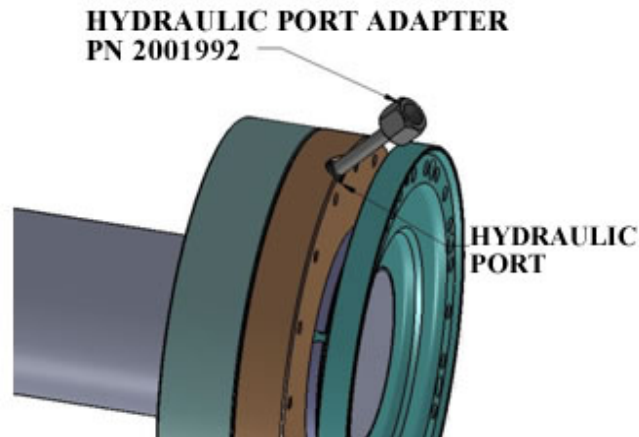


Figure 4

2.4.5 Thread Hydraulic Plug 2001299 into the other hydraulic port located 180° from the Port Adapter Fitting.

2.4.6 Attach Riverhawk pump kit MP-2349 or equivalent to the Port Adapter Fitting.

2.4.7 Slowly apply hydraulic pressure and stop the pump when the hub will no longer turn on the shaft by hand. This is known as the "first grip" position and is important for correctly setting the HTC. Note and record the pump pressure setting at this first grip position.

2.4.8 Release the pump pressure to allow the hub to move freely on the shaft again.

2.4.9 Re-position the hub on the shaft end in the correct position for proper alignment.

2.4.10 Slowly pump to apply hydraulic pressure and stop when the first grip pressure setting last noted is achieved. Maintain this position by holding the hydraulic pressure for the next step.

2.4.11 The proper setting of the HTC is accomplished by the separation or gap between the two halves of the clamp (see Figure 1). A special Gap Tool (Riverhawk PN 7500485) has been provided to facilitate this setting. Be sure you maintain the First Grip Position from the previous step until the tool is in place. Thread the gap tool into one of the retraction screw holes until the outer sleeve aligns with the first scribe line on the rod (see Figure 5a). The tool is spring loaded so you will need to push and turn in order to start the thread.

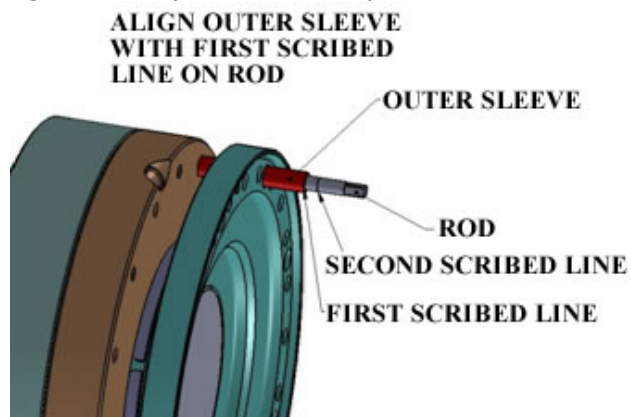


Figure 5a - Setting Initial Grip Position

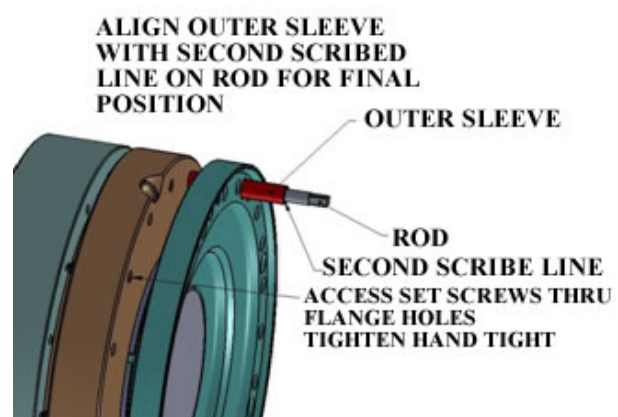


Figure 5b - Setting Final Position

2.4.12 Apply more hydraulic pressure. The HTC halves will separate causing the outer sleeve of the tool to move towards the second scribe line on the rod. When the outer sleeve is aligned with the second scribe line as shown in figure 5b, stop the hydraulic pump while holding pressure. This is the final position of the clamp. Hold hydraulic pressure here for the next step.

Note: The Gap Tool is supplied so that proper gap on the HTC can be set through the hub flange. In the event that the gap tool is unavailable, the actual gap can be measured with gage pins or a caliper. Measure the Gap for the "First Grip Position" in step 2.4.7 above. Add 0.231 inches to that measurement to calculate the Total Required Gap. Apply hydraulic pressure while monitoring the gap until the measurement is equal to the Total Required Gap.

2.4.13 Tighten the eight retention screws (socket head set screws) hand tight with a hex wrench. The screws are accessed through the flange face as shown in Figure 5b.

2.4.14 Release the hydraulic pressure from the pump.

2.4.15 Remove the gap setting tool

2.4.16 Place a drain pan under the HTC and remove the hydraulic plug and then the adapter fitting. Allow hydraulic oil to drain from the HTC. Blow compressed air (100 psi max) into the top port to fully drain the oil. Failure use compressed air to blow out oil will leave residual oil in the clamp and may cause problems with the balance of the unit.

2.4.17 The retraction screws, hydraulic plugs, adapter fitting, and gap tool will be required for future removal and installation of the clamp. Store them where they will not be lost.

2.4.18 Place vent plugs 2002429 in both hydraulic ports after all oil is drained (see Figure 1a).

3.0 Flexible Coupling and Spacer Tube Installation

The instructions given in this section for installation of the Flexible Coupling and spacer tube are summarized from Ameridrives manual Form No 367-SH (see Appendix A) sections 3.0 through 4.0. It is imperative that the user consult the Ameridrives manual before attempting installation or removal of HC-4291 as it contains important notes and information that will not be repeated here. In the event of conflicting information, Form No 367-SH supersedes this document.

3.1 Diaphragm Pack Installation

3.1.1 Disassemble the coupling by removing all bolts from the flange interfaces. Use the jacking holes in the spacer tube flange to separate the spacer tube from the diaphragm pack flange (Reference Form 367-SH, section 4.5.1.1)

3.1.2 Clean exposed surfaces with a clean rag dampened with cleaning solvent to remove the protective coating from the diaphragm surfaces. (Reference Form 367-SH, section 4.5.1.2). Inspect all pilots and remove any debris, nicks, dents, or other damage.

3.1.3 Verify the Distance Between Shaft ends to be 30.00 inches.

3.1.4 Install one of the diaphragm packs onto the hub as shown in Figure 6 using Qty(4) supplied bolts and nuts spaced 90 degrees apart. Be sure the 1/4"-28 jacking tap holes located in the diaphragm pack do not line-up with any holes in the HTC hub flange. "V" marks may be located on the hub and diaphragm pack rims as an aid (see Figure 6). Aligning the V marks, although not required, will ensure the jacking taps are in the correct position. Tighten the bolts in a criss-cross pattern to seat the pilot. (Reference Form 367-SH, section 4.5.1.3)

3.1.5 Install the remaining bolts and torque evenly in a criss-cross pattern to 250 in-lb of torque (Reference Form 367-SH, section 4.5.1.5).

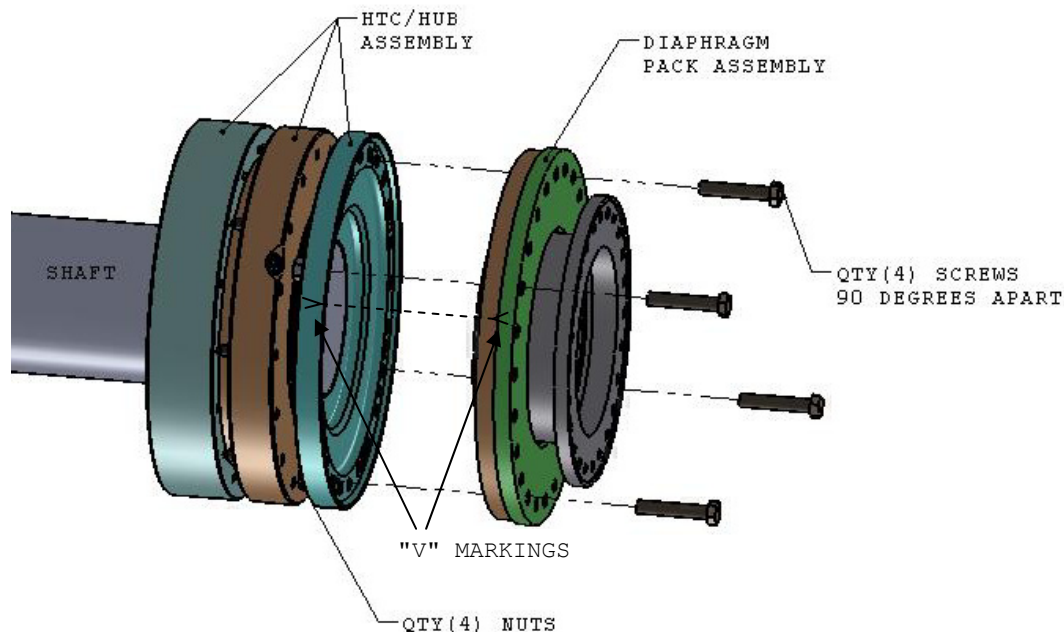


Figure 6 - Diaphragm Pack Installation

3.1.6 Repeat Section 3.1 for the opposite shaft

3.2 Spacer Tube Installation

3.2.1 Loosen the shipping screw jam nut and the shipping screws. Use (2) dial indicators placed 180° apart to measure deflection between the outer flange of the diaphragm pack and the coupling guard as shown in Figure 7. Tighten the shipping screws to draw up (or compress) the diaphragm pack .070 inches on each of the dial indicators.

Caution - Do not exceed 0.070 inches draw up. Exceeding .070 inches may damage the diaphragm pack. The use of jacking screws other than those shipped with the unit may damage the diaphragm pack and cause coupling failure.

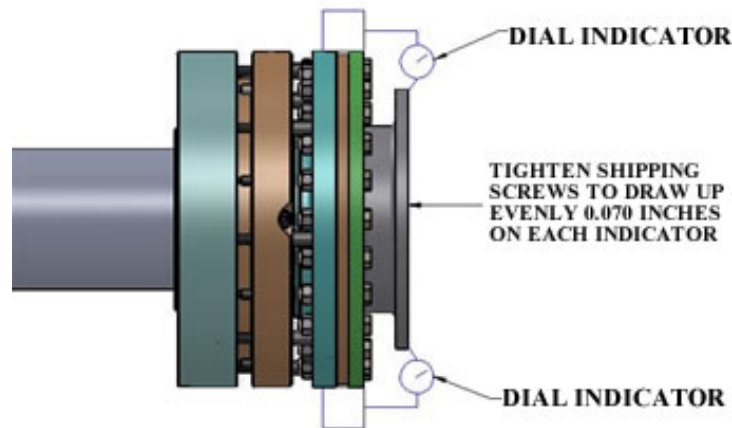


Figure 7 - "Drawing up" the Diaphragm Pack Subassembly

3.2.2 Remove the dial indicators and repeat last step for the other shaft end.

3.2.3 Position and support the spacer tube between the diaphragm packs. Align the match marks and identification letters at each end. Rotation of the shafts may be required to align the match marks.

Warning - Failure to align match marks and end identification letters may result in improper balance

3.2.4 Loosely install four bolts and nuts spaced 90° apart on each end. Do not tighten or seat the pilots yet.

3.2.5 Loosen and remove the shipping hardware. **Do not discard - Save for future coupling removal and installation.**

3.2.6 Tighten the four bolts evenly in a criss-cross pattern to seat the pilots. Repeat on opposite shaft end.

3.2.7 Install all remaining spacer bolts and nuts and torque evenly in a criss-cross pattern to 125 in-lb.

4.0 Ameriflex® Coupling Removal

This section covers the basic steps for removal of the Ameriflex® Spacer Tube and diaphragm pack assemblies. Before attempting to remove the coupling the user should obtain the latest revision of Ameridrives Manual Form No. 376-SH section 4.7.

4.1 Removal of the Spacer Tube

4.1.1 Loosely install the shipping hardware. Note - the shipping screws and mating tapped holes are color coded at the factory to identify the proper screw length.

Caution - Only use the original shipping screws supplied with the coupling or exact replacements. Use of an incorrect screw may damage the diaphragm and cause equipment failure.

4.1.2 Remove the spacer tube flange bolts and nuts on one side of the spacer tube (see Figure 1b).

4.1.3 Support the spacer tube and use the tapped jacking holes in the spacer tube flange to compress the diaphragm pack and separate the pilot to obtain a clearance of .005 to .010 inches.

4.1.4 Tighten the shipping hardware to retain the compression of the coupling.

4.1.5 Repeat section 4.1.1 through 4.1.4 for the other end of the spacer tube. Remove the jacking screws.

4.1.6 Remove the spacer tube.

4.2 Diaphragm Pack Removal

Two methods are available for diaphragm pack removal - using jacking holes in the diaphragm pack, or use of removal tool.

4.2.1 Jacking Holes:

4.2.1.1 Remove all of the diaphragm subassembly flange bolts and screws.

4.2.1.2 Loosen the shipping screws completely and retighten them hand tight. Tighten the jam nut on the shipping screws so that the diaphragm is unable to flex.

4.2.1.3 Four jacking holes, 0.25"-28 thread, are located in the flange of the diaphragm assembly. Insert 0.25"-28 bolt/screws in each jacking hole, and tighten by hand until the end contacts the hub face.

4.2.1.4 Using the proper wrench/tool, tighten each bolt, against the hub face. Turn only a small amount, and then move to the opposite hole for turning.

4.2.1.5 Move in a criss-cross pattern turning the bolt a small amount each time to avoid cocking of the diaphragm pack.

4.2.1.6 Continue until the diaphragm pack is free from the hub. Remove jacking bolts from the diaphragm pack.

4.2.2 Removal Tool:

4.2.2.1 Remove all of the diaphragm subassembly flange bolts and screws.

4.2.2.2 Loosen the shipping screws completely and retighten them hand tight. Tighten the jam nut on the shipping screws so that the diaphragm is unable to flex.

4.2.2.3 A removal tool is sometimes provided with the coupling that allows the pilots to be separated from the flange end. Place the tool as shown in Figure 8. If the 1/2 inch hex bolts contact the shaft before the disc contacts the flange face, loosen the 1/2 inch bolts.

4.2.2.4 Install (4) of the flange bolts that were previously removed to secure the tool. See Figure 8.

4.2.2.5 Support the diaphragm pack assembly so that when it separates from the hub it does not fall and become damaged.

4.2.2.6 Tighten the 1/2 inch hex bolts until they both contact the shaft. Tighten each bolt one half turn alternating between the two until the diaphragm assembly is free from the hub.

4.2.2.7 Remove the (4) flange bolts and remove the tool from the diaphragm pack assembly.

4.2.2.8 Repeat the steps above for the other diaphragm pack assembly.

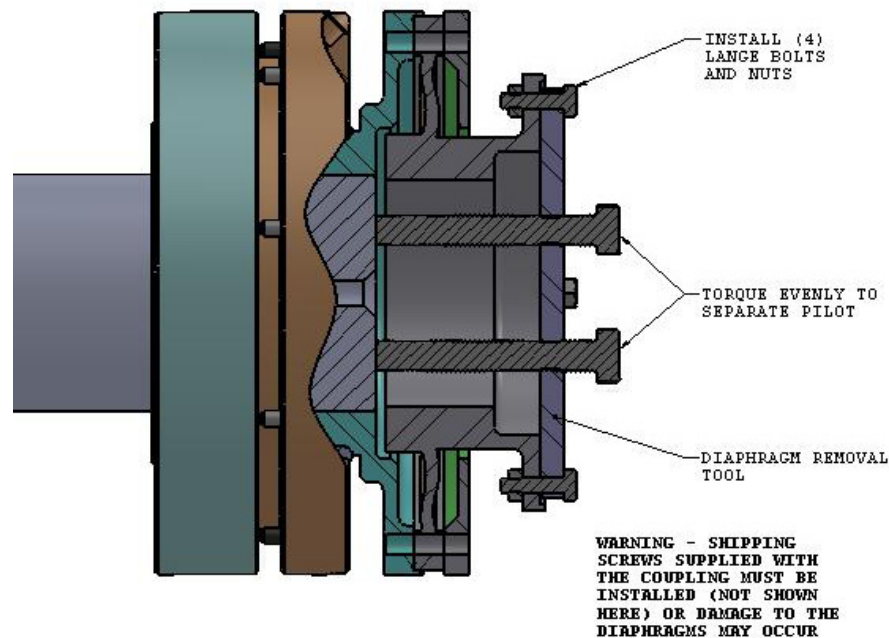


FIGURE 8: Use of the Diaphragm Removal Tool

5.0 Removal of HTC/Hub Assembly

This section explains how to remove the HTC/Hub assemblies from the shafts.

5.1 Remove vent plugs from both hydraulic ports.

5.2 Install the hydraulic adapter in one port as in Figure 4.

5.3 Install one hydraulic plug in the opposite port on the HTC.

5.4 Connect the hydraulic pump and slowly apply pressure while attempting to loosen one of the retention set screws. The retention set screws are accessed thru the face of the flange as shown in Figure 5b. As soon as the screw is free to rotate stop the pump.

Caution - Over stroking the HTC will cause damage to it. Stop increasing pressure the moment the retention screws are free to turn. Do not, under any circumstances, exceed 8,000 psi hydraulic pressure. Normal pressure required ranges from 4,000 - 5,000 psi.

5.5 Remove all of the retaining screws (8). Save retaining screws for future use. Do not mix with retaining screws from other units. Screws are weight matched in sets of (8) for proper balance.

5.6 Release the hydraulic pressure. Allow a 20 seconds or more for the clamp to close and oil to drain back into the pump. The HTC/Hub assembly should now be loose on the shaft.

Warning: Crush hazard, Keep fingers and objects out of the gap when releasing pressure.

Caution: Watch while pumping.

- **Do Not apply more than 8,000 psi.**
- **Make sure that all set screws are fully retracted before releasing the pressure.**

5.7 If the hub does not slide easily on the shaft, the HTC may not be fully closed. Make sure the retention screws are completely loosened. Install the (8) retraction screws (see Figure 1). Tighten the retraction screws to 10 ft-lbs. The retraction screws will draw the clamp closed and loosen the hub on the shaft.

5.8 You may partially activate the clamp for the purpose of lifting the hub/HTC assembly without the hub sliding off. Remove the retraction screws. Re-install and tighten the retention screws evenly using only hand torque. This will partially open the gap and cause the HTC to grip only the hub, not the shaft, so it won't slide off the hub during lifting and handling.

5.9 Remove hydraulic connections, plug, and adapter fitting. Catch any residual hydraulic fluid with a drain pan or rag. Add vent plugs back into both hydraulic ports.

5.10 Carefully slide the hub assembly off the shaft.

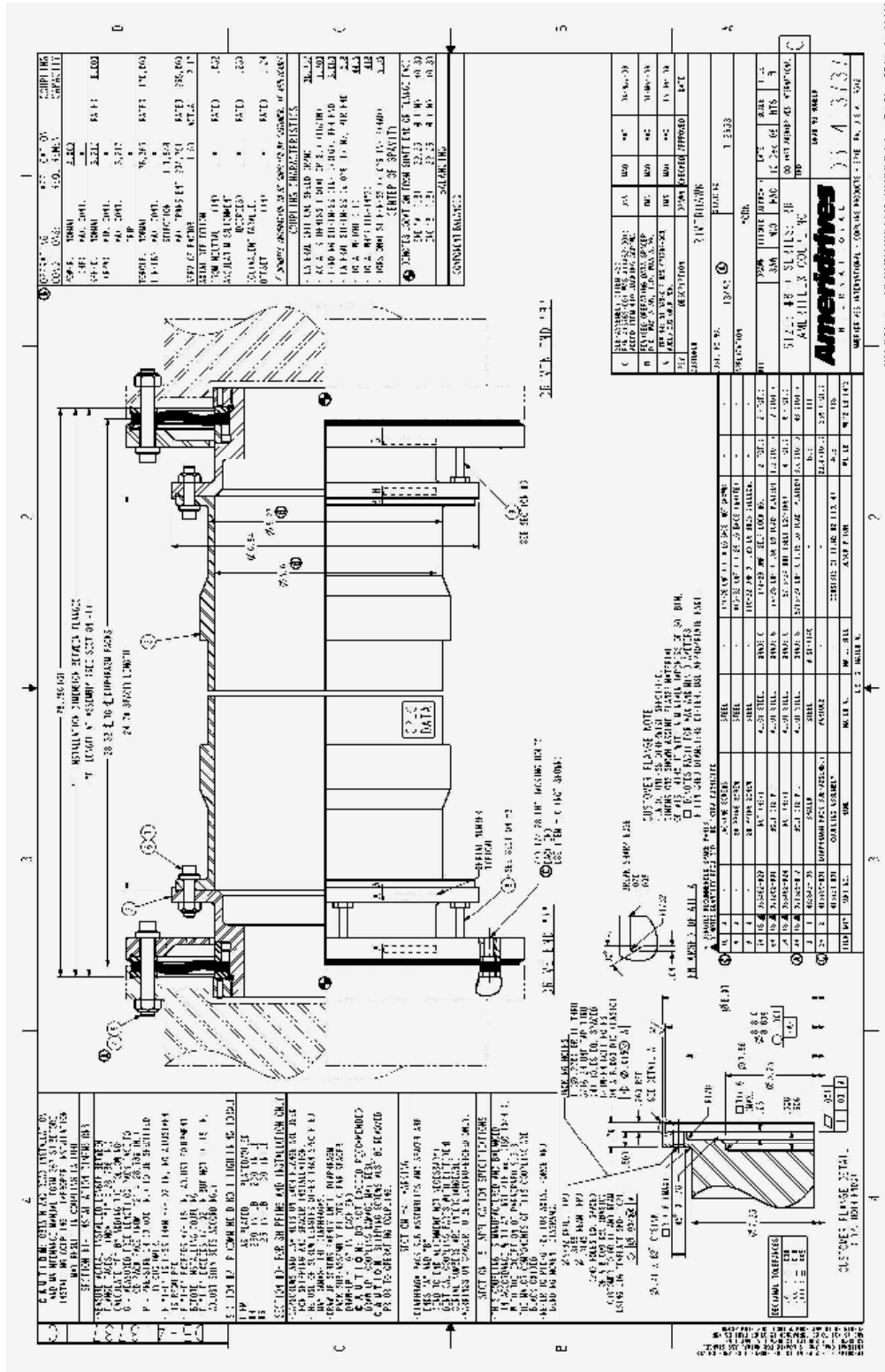
5.11 Repeat the procedure above for the other shaft end.

Technical Drawing Details:

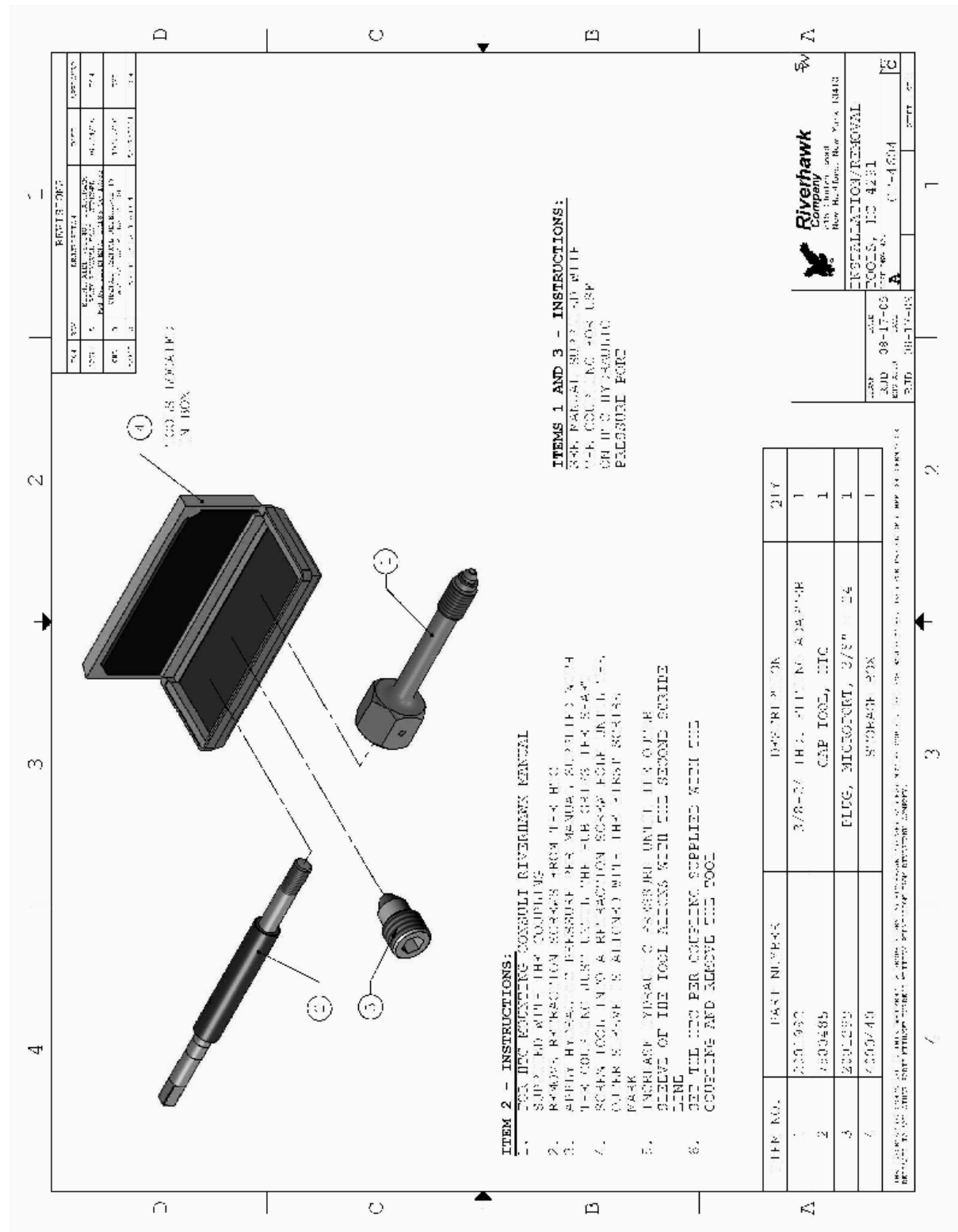
- Section A-A:** A cross-sectional view of the assembly, showing internal components and dimensions. Key dimensions include:
 - Overall length: 100.000
 - Internal diameters: $\phi 1.000$, $\phi 1.125$, $\phi 1.250$, $\phi 1.375$, $\phi 1.500$, $\phi 1.625$, $\phi 1.750$, $\phi 1.875$, $\phi 2.000$, $\phi 2.125$, $\phi 2.250$, $\phi 2.375$, $\phi 2.500$, $\phi 2.625$, $\phi 2.750$, $\phi 2.875$, $\phi 3.000$, $\phi 3.125$, $\phi 3.250$, $\phi 3.375$, $\phi 3.500$, $\phi 3.625$, $\phi 3.750$, $\phi 3.875$, $\phi 4.000$, $\phi 4.125$, $\phi 4.250$, $\phi 4.375$, $\phi 4.500$, $\phi 4.625$, $\phi 4.750$, $\phi 4.875$, $\phi 5.000$, $\phi 5.125$, $\phi 5.250$, $\phi 5.375$, $\phi 5.500$, $\phi 5.625$, $\phi 5.750$, $\phi 5.875$, $\phi 6.000$, $\phi 6.125$, $\phi 6.250$, $\phi 6.375$, $\phi 6.500$, $\phi 6.625$, $\phi 6.750$, $\phi 6.875$, $\phi 7.000$, $\phi 7.125$, $\phi 7.250$, $\phi 7.375$, $\phi 7.500$, $\phi 7.625$, $\phi 7.750$, $\phi 7.875$, $\phi 8.000$, $\phi 8.125$, $\phi 8.250$, $\phi 8.375$, $\phi 8.500$, $\phi 8.625$, $\phi 8.750$, $\phi 8.875$, $\phi 9.000$, $\phi 9.125$, $\phi 9.250$, $\phi 9.375$, $\phi 9.500$, $\phi 9.625$, $\phi 9.750$, $\phi 9.875$, $\phi 10.000$.
 - Other dimensions: 1.000, 1.125, 1.250, 1.375, 1.500, 1.625, 1.750, 1.875, 2.000, 2.125, 2.250, 2.375, 2.500, 2.625, 2.750, 2.875, 3.000, 3.125, 3.250, 3.375, 3.500, 3.625, 3.750, 3.875, 4.000, 4.125, 4.250, 4.375, 4.500, 4.625, 4.750, 4.875, 5.000, 5.125, 5.250, 5.375, 5.500, 5.625, 5.750, 5.875, 6.000, 6.125, 6.250, 6.375, 6.500, 6.625, 6.750, 6.875, 7.000, 7.125, 7.250, 7.375, 7.500, 7.625, 7.750, 7.875, 8.000, 8.125, 8.250, 8.375, 8.500, 8.625, 8.750, 8.875, 9.000, 9.125, 9.250, 9.375, 9.500, 9.625, 9.750, 9.875, 10.000.
- Section B-B:** A perspective view of the assembly, showing the overall shape and internal structure.
- Table of Specifications:**

ITEM	DESCRIPTION	QUANTITY	UNIT
1	CAST IRON PUMP BODY	1	PC
2	CAST IRON PUMP COVER	1	PC
3	CAST IRON PUMP BASE	1	PC
4	CAST IRON PUMP MOUNTING	1	PC
5	CAST IRON PUMP FLANGE	1	PC
6	CAST IRON PUMP GASKET	1	PC
7	CAST IRON PUMP O-RING	1	PC
8	CAST IRON PUMP SCREW	1	PC
9	CAST IRON PUMP NUT	1	PC
10	CAST IRON PUMP WASHER	1	PC
11	CAST IRON PUMP PIN	1	PC
12	CAST IRON PUMP RIVET	1	PC
13	CAST IRON PUMP BOLT	1	PC
14	CAST IRON PUMP WELD	1	PC
15	CAST IRON PUMP BRASS	1	PC
16	CAST IRON PUMP STEEL	1	PC
17	CAST IRON PUMP ALUMINUM	1	PC
18	CAST IRON PUMP COPPER	1	PC
19	CAST IRON PUMP ZINC	1	PC
20	CAST IRON PUMP NICKEL	1	PC
21	CAST IRON PUMP CHROME	1	PC
22	CAST IRON PUMP SILVER	1	PC
23	CAST IRON PUMP GOLD	1	PC
24	CAST IRON PUMP PLATINUM	1	PC
25	CAST IRON PUMP IRIDIUM	1	PC
26	CAST IRON PUMP RUTHENIUM	1	PC
27	CAST IRON PUMP RHODIUM	1	PC
28	CAST IRON PUMP PALLADIUM	1	PC
29	CAST IRON PUMP ARGON	1	PC
30	CAST IRON PUMP NEON	1	PC
31	CAST IRON PUMP HELIUM	1	PC
32	CAST IRON PUMP HYDROGEN	1	PC
33	CAST IRON PUMP NITROGEN	1	PC
34	CAST IRON PUMP OXYGEN	1	PC
35	CAST IRON PUMP CARBON	1	PC
36	CAST IRON PUMP SILICON	1	PC
37	CAST IRON PUMP BORON	1	PC
38	CAST IRON PUMP FLUORINE	1	PC
39	CAST IRON PUMP CHLORINE	1	PC
40	CAST IRON PUMP BROMINE	1	PC
41	CAST IRON PUMP IODINE	1	PC
42	CAST IRON PUMP TELLURUM	1	PC
43	CAST IRON PUMP SELENIUM	1	PC
44	CAST IRON PUMP SULFUR	1	PC
45	CAST IRON PUMP PHOSPHORUS	1	PC
46	CAST IRON PUMP ARSENIC	1	PC
47	CAST IRON PUMP ANTIMONY	1	PC
48	CAST IRON PUMP BISMUTH	1	PC
49	CAST IRON PUMP LEAD	1	PC
50	CAST IRON PUMP TIN	1	PC
51	CAST IRON PUMP ZINC	1	PC
52	CAST IRON PUMP ALUMINUM	1	PC
53	CAST IRON PUMP MAGNESIUM	1	PC
54	CAST IRON PUMP CALCIUM	1	PC
55	CAST IRON PUMP STRONTIUM	1	PC
56	CAST IRON PUMP BARIUM	1	PC

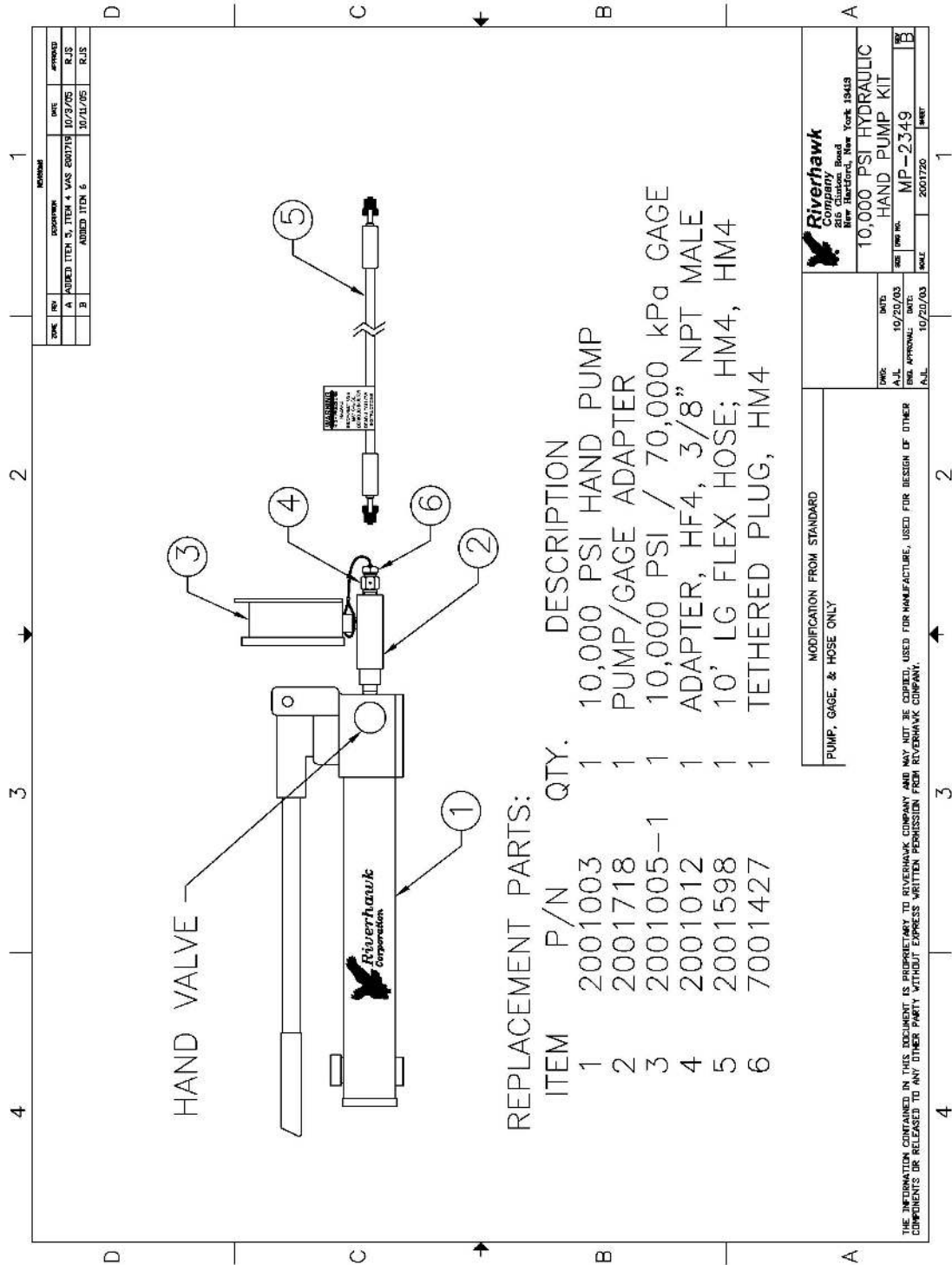
Appendix B - Ameriflex Coupling Drawing



Appendix C - HTC Installation and Removal Kit GT-4604



Appendix D - Hydraulic Pump and Hose Kit MP-2349



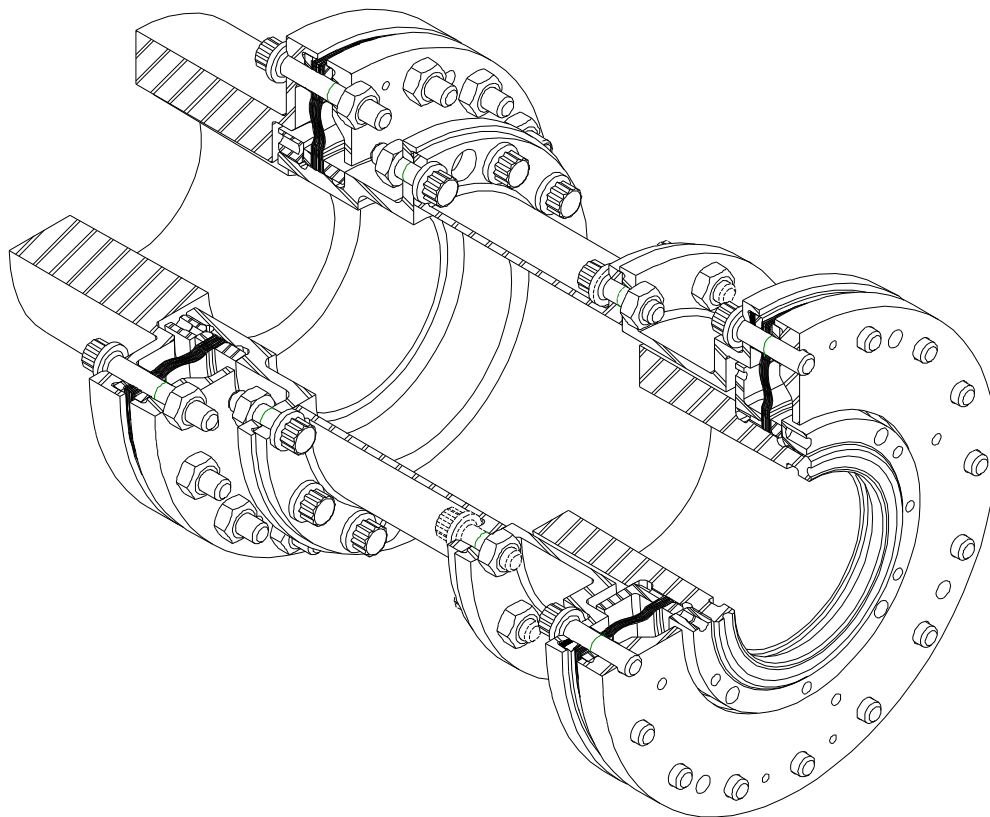
Appendix E - Ameriflex® High Performance Couplings
Installation And Maintenance Manual



a division of **Altra Industrial Motion**

Ameriflex®

High Performance Couplings Installation and Maintenance Manual



Ameridrives International
Coupling Products



Form. No. 367-SH, 6/00

Ameriflex Installation and Maintenance Manual

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WARNING

ACCIDENTS INVOLVING ROTATING EQUIPMENT MAY RESULT IN LOSS OF LIFE, SERIOUS BODILY INJURY OR PROPERTY DAMAGE. THE PURCHASER OF THIS EQUIPMENT MUST ASSURE THAT THE EQUIPMENT IS PROPERLY ASSEMBLED, INSTALLED, SHIELDED, OPERATED AND MAINTAINED. THIS EQUIPMENT MUST NOT BE OPERATED AT CONDITIONS THAT EXCEED MANUFACTURER'S SPECIFICATIONS.

PURCHASER MUST FOLLOW ALL FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS COVERING THE SAFE OPERATION AND MAINTENANCE OF THE EQUIPMENT, INCLUDING, WITHOUT LIMITATION, THE USDOL-OSHA "LOCKOUT/TAGOUT" PROCEDURE SET FORTH IN 29 CFR 1910.147.

IT IS THE PURCHASERS RESPONSIBILITY TO IMPLEMENT AND FOLLOW ITS OWN SAFETY, MAINTENANCE, AND EMPLOYEE TRAINING PROGRAM REGARDING THE SAFE AND PROPER OPERATION AND MAINTENANCE OF THE EQUIPMENT.

NOTE: THIS DOCUMENT SUPERSEDES IM3-001, IM3-005, IM3-006, IM3-008, IM3-010, AND IM3-014.

1. **INTRODUCTION**

This Installation Manual is intended to be used as a guide for the installation and maintenance of Ameriflex diaphragm couplings. For specific operating capacities and coupling data, refer to the Ameridrives Sales Drawing. The Sales Drawing Number along with other important information has been electro-etched on the coupling spacer at the factory.

2. **DESCRIPTION OF TERMINOLOGY**

This section is intended to assist anyone not familiar with the terms used to describe the components of an Ameriflex coupling. Refer to the following Figures for the coupling type specified on the Ameridrives Sales Drawing. These Figures identify components and terms referred to in this manual.

Figure 2-1 Components and terms described are common to both the Reduced Ratio (RR) and the High Performance (HP) series couplings.

Figure 2-2 RR and HP Diaphragm Pack Sub-Assemblies.

Figure 2-3 Reduced Moment (RM) series coupling.

Figure 2-4 RM Diaphragm Pack Sub-Assembly.

Figure 2-5 Components and terms described are common to both the Reduced Ratio Short (RS) and the High Performance Short (HP Short) design couplings.

Figure 2-6 RS and High Performance Short Diaphragm Pack Sub-Assemblies.

Figure 2-7 Split series Ameriflex coupling (i.e., RR/RM).

Split series couplings are used when application requirements can not be met with a single series coupling (i.e., envelope limitations, over-hung moment requirements, etc.). When this style of coupling is used, the appropriate sections of this manual should be used for the different ends of the coupling.

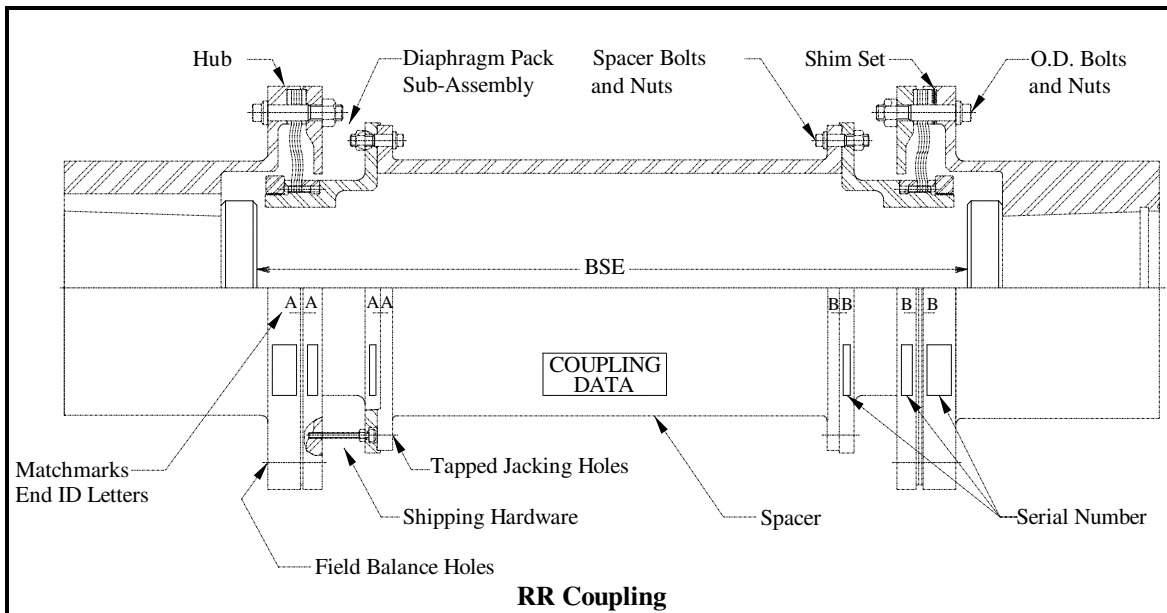


Figure 2-1

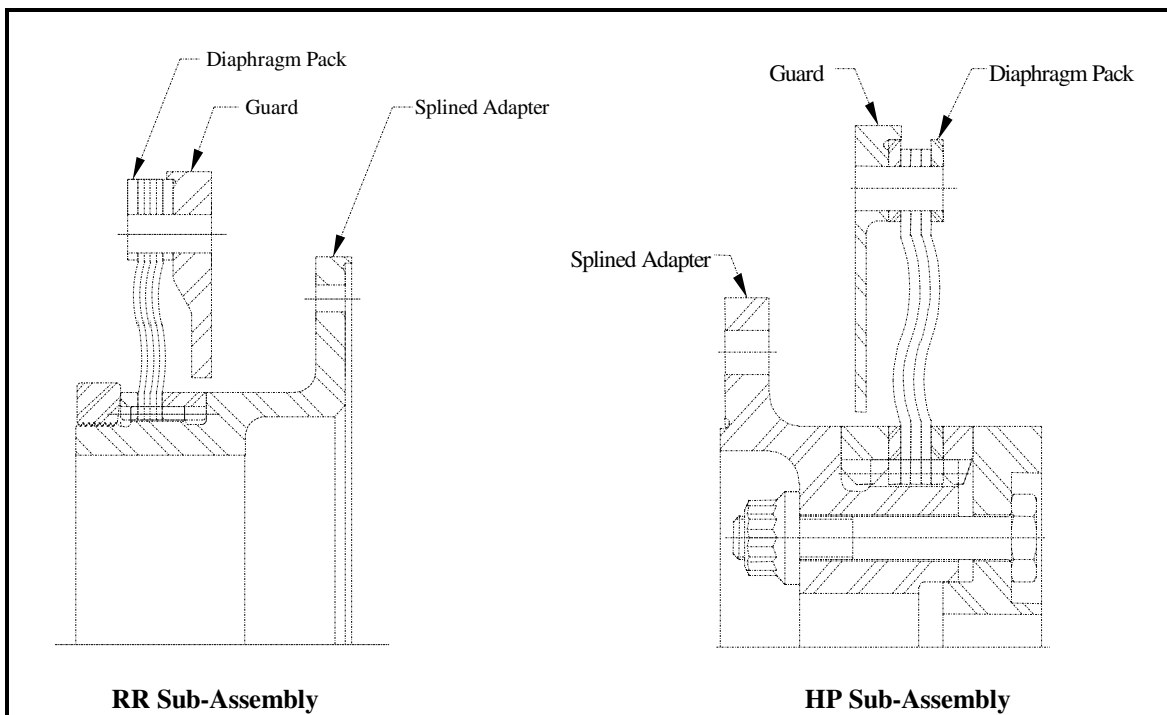


Figure 2-2

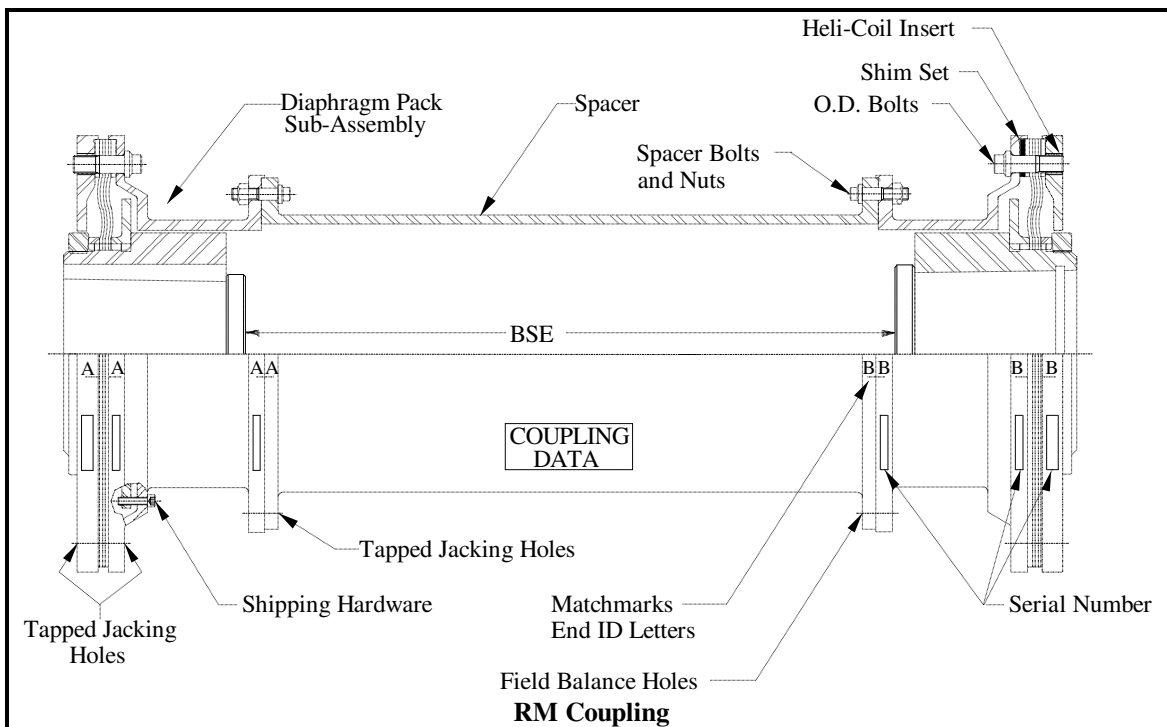


Figure 2-3

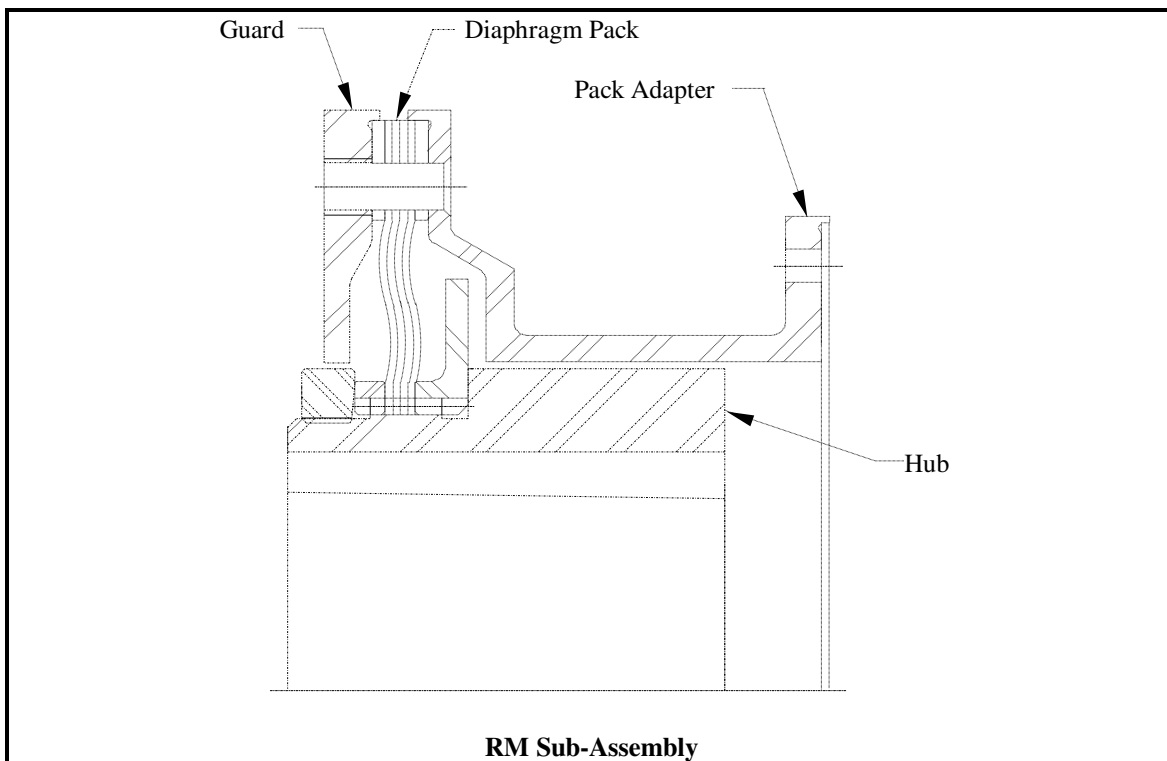


Figure 2-4

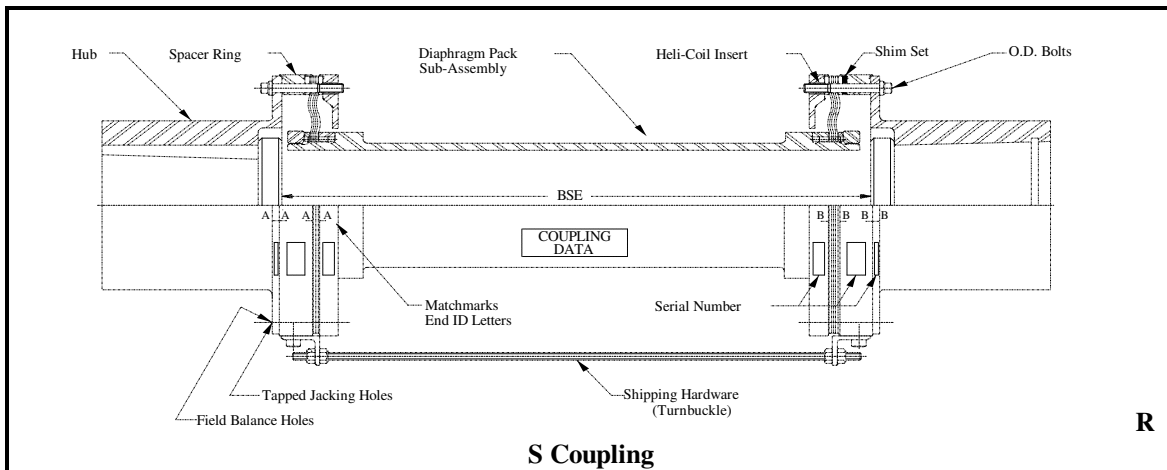


Figure 2-5

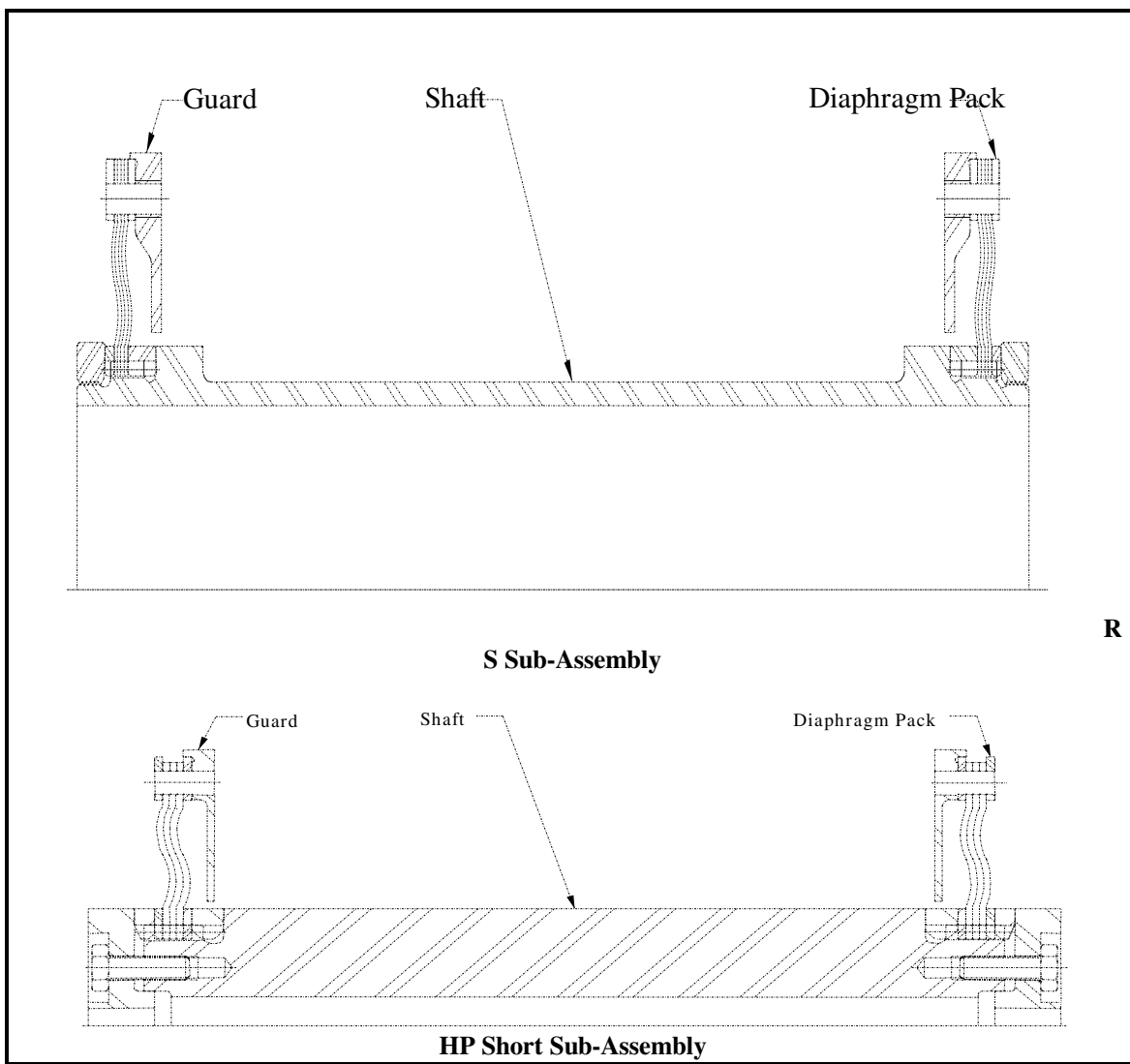


Figure 2-6

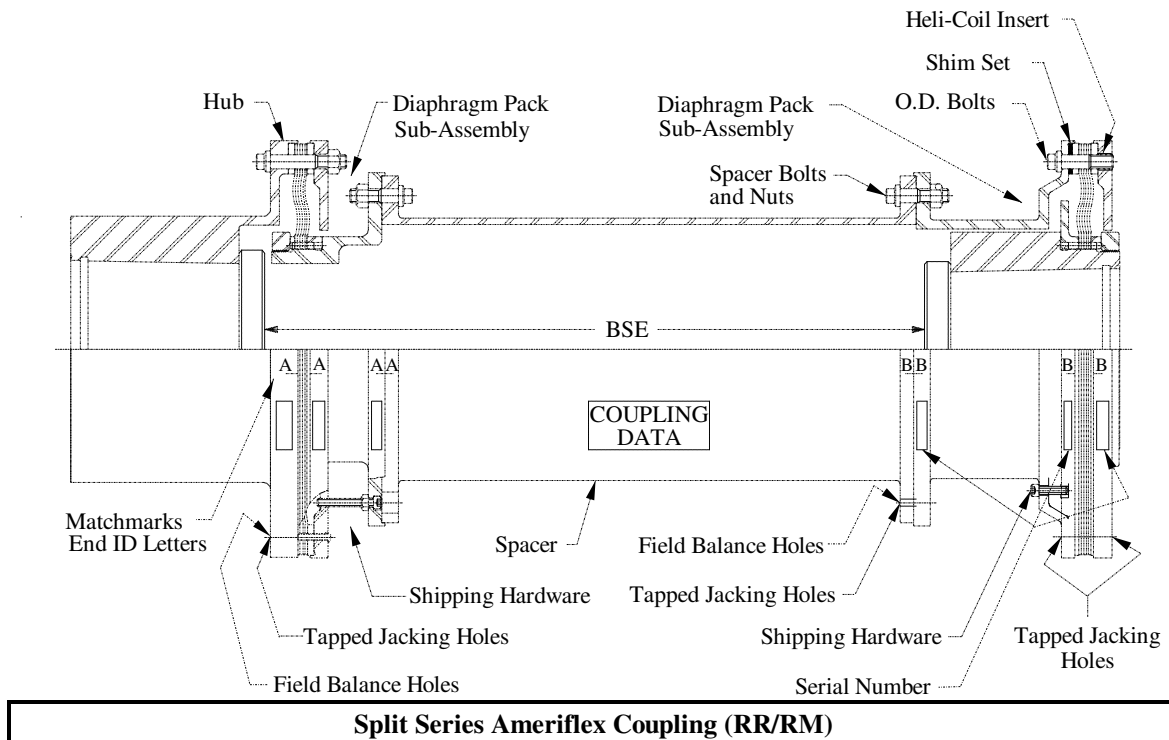


Figure 2-7

3. GENERAL INFORMATION

Ameriflex couplings are shipped from the factory assembled with one shim set installed and a minimal number of bolts and nuts in each flange. The remaining shim set and fasteners are shipped in the same crate as the coupling.

As soon as possible after receipt of a new Ameriflex coupling, check for damaged or missing parts. The "List of Materials" on the Ameridrives Sales Drawing should be used as a check list when taking inventory of the coupling parts.

Refer to the Ameridrives Sales Drawing for recommended spare parts and part interchangeability.

Each coupling is assigned a unique Serial Number at the factory. The Serial Number is etched on all major components of the coupling assembly. This number should be referenced whenever contacting the factory with any questions or problems. Refer to the Ameridrives Sales Drawing for serial number locations.

The end identification letters and matchmarks are marked on each mating flange and should be aligned at assembly to assure proper assembly and balance (all "A's" in line on one end and all "B's" in line on the other end).

Shipping hardware is provided to rigidize the coupling during shipping and handling and to prevent the coupling from being damaged. The shipping hardware is also used to compress the diaphragm packs during installation and removal of the coupling.

The standard bolt is a 12-point external wrenching design. The equivalent strength Grade C all-metal prevailing torque hex locknuts should retain their locking feature after being tightened and loosened up to 5 times. The bolts and nuts are provided in weigh balanced sets as to size, length and weight. This allows any OD bolt to be placed in any OD hole and any OD nut to be placed on any OD bolt, similarly with the spacer bolts and nuts. Replacement fastener sets are also weigh balanced and are intended to be replaced in sets. These sets can not be interchanged with individual fasteners from a similar set or coupling.

Heli-coil inserts are used on all RM and RS designs since 1993. These inserts have a locking feature design which complies with MIL-I-8846. Heli-coil inserts should be reusable for up to 15 times.

Tapped holes located in the hub or spacer flanges provide a location for field trim balance weights and are provided upon request. These series of holes are drilled and tapped in the axial direction between the OD bolt holes on the hub or between the spacer bolt holes on the spacer.

Tapped jacking holes are provided (typically four) at every flange interface to allow for uniform disengagement of the pilot. The thread size used is that of a bolt that is provided with the coupling, usually an OD bolt or spacer bolt or in some cases the shipping hardware. .

CAUTION: STEEL STAMPING OF THE COUPLING SURFACE MAY WEAKEN THE COUPLING AND CREATE A STRESS RISER THAT COULD ULTIMATELY LEAD TO COUPLING FAILURE.

4. COUPLING INSTALLATION

This manual is intended as a general guide only. Check with the equipment manufacturer for special instructions and recommended procedures. In the event of a conflict between the Sales Drawing and this manual, follow the Sales Drawing or call Ameridrives Customer Service.

Prior to installation, check that the following items are on hand:

- A. A print of the Ameridrives Sales Drawing.
- B. A copy of the drive and driven equipment manufacturer installation manual.
- C. All coupling components (Reference the Ameridrives Sales Drawing for quantities).
- D. Hub installation tooling (if required).
- E. Suitable means to uniformly heat the hubs, i.e., electric oven, induction heater, or both etc. (if required). Heating with a torch is not recommended.
- F. Alignment equipment.
- G. Measuring instruments.
- H. Torque wrench.
- I. C-clamps.
- J. Miscellaneous hand tools.
- K. Ameridrives Customer Service Telephone Number (814) 871-6150.

4.1 PRE-INSTALLATION PROCEDURE

- 4.1.1 Thoroughly clean and prepare the shaft ends. Remove any raised metal, nicks, burrs, dents, gouges, etc., prior to coupling installation.

- 4.1.2 Disassemble the coupling by removing all bolts and nuts from the OD and spacer flanges (do not remove any heli-coils). Using the tapped jacking holes provided in the hubs, spacer rings, or flange adapters, remove the hubs, spacer rings, or flange adapters from the OD of the RR/HP/RS/HP Short diaphragm pack sub-assemblies. Remove the RM diaphragm pack sub-assemblies from the pack adapters using the tapped jacking holes provided in the pack adapter. Remove the RR/HP sub-assemblies, or RM pack adapters from each end of the spacer using the tapped jacking holes provided.

CAUTION: ANY SCRATCH, DENT, OR ANY OTHER MARK ON THE DIAPHRAGM SURFACE MAY CAUSE COUPLING FAILURE.

- 4.1.3 Thoroughly clean the exposed surfaces of all components, hubs, flange adapters, spacer rings, sub-assemblies, and spacer to remove the protective coating applied at the factory. Do not immerse the diaphragm pack sub-assemblies in cleaning solvent. Use a damp cloth to wipe clean the protective coating from the exposed surfaces.

CAUTION: DO NOT IMMERSE THE DIAPHRAGM PACK SUB-ASSEMBLIES IN CLEANING SOLVENT OR ANY OTHER ABRASIVE CLEANER. THIS MAY CAUSE DETERIORATION OF THE DIAPHRAGM SURFACE AND MAY LEAD TO COUPLING FAILURE.

ONLY USE A CLEAN CLOTH DAMPENED WITH A CLEANING SOLVENT TO WIPE THE PROTECTIVE COATING FROM THE EXPOSED DIAPHRAGM SURFACES.

- 4.1.4 Set the distance between the shaft ends (BSE) to the dimension shown on the Ameridrives Sales Drawing. The between shaft end dimension (Figure 4-1) is the distance between the very ends of the drive and driven equipment shafts. In the case of a flanged connection it is the distance to the face at the bolt circle diameter.

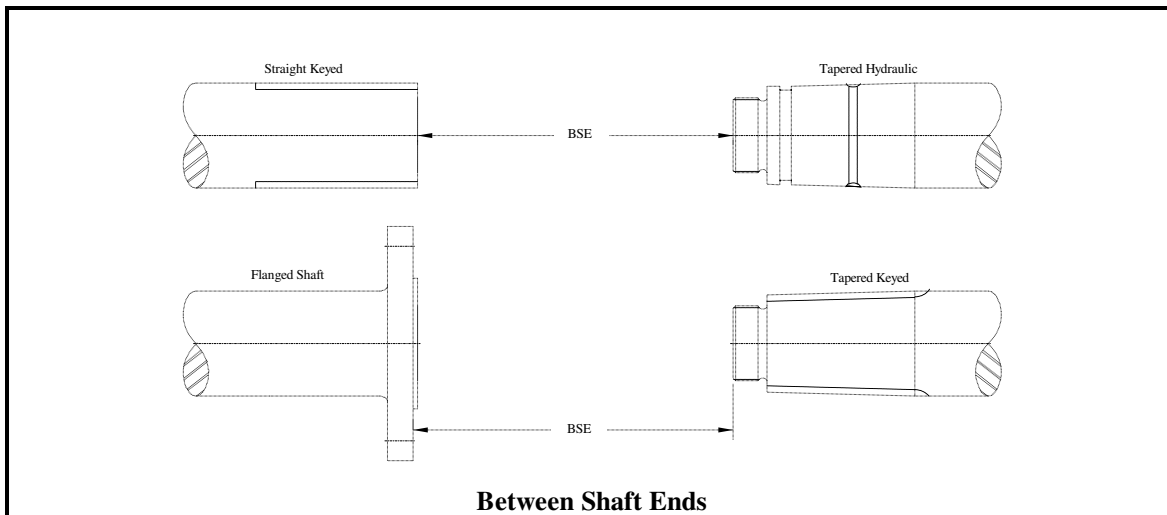


Figure 4-1

4.2 HUB MOUNTING PROCEDURE

4.2.1 Straight Bore with Keyway(s)

CAUTION: AMERIDRIVES MANUFACTURED THE COUPLING INTERFACE BASED ON THE SHAFT DATA SUPPLIED BY THE PURCHASER. AMERIDRIVES 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.

4.2.1.1 Measure the shaft diameter and the bore diameter to determine the interference fit. If the measured interference differs from the value on the Ameridrives Sales Drawing, contact Ameridrives Customer Service or the equipment manufacturer.

4.2.1.2 Verify that the engagement length between the bore and shaft is correct.

4.2.1.3 Check the key(s) and keyway(s) for proper fit. Key(s) should be fitted to the keyway(s) to minimize their effect on balance. Refer to AGMA-9002-A86 or other industry standard for recommended key fits.

4.2.1.4 Install the key(s) into the shaft and measure the shaft to key or key to key dimension. Compare this measurement with the measurement of the bore to keyway or keyway to keyway dimension of the hub to assure proper fit. If an interference exists between key(s), and hub, correct the situation or contact the equipment manufacturer or Ameridrives Customer Service.

4.2.1.5 Expand the bore with a uniform heat source (oven, induction heater, etc.) taking care not to exceed 550° F (288° C). The following equations will help determine the temperature required to expand the bore to install the hub onto the shaft.

BORE EXPANSION:

E = BORE EXPANSION (IN.)
e = BORE EXPANSION (MM)
B = BORE DIAMETER (IN.)
b = BORE DIAMETER (MM)
T = TEMPERATURE RISE
ABOVE AMBIENT (° F)
t = TEMPERATURE RISE
ABOVE AMBIENT (° C)

$$T = \frac{E}{B \times 0.0000064}$$

$$t = \frac{e}{b \times 0.0000115}$$

CAUTION: DO NOT EXCEED 550° F (288° 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.

4.2.1.6 Position the hub and key as shown on the Ameridrives Sales Drawing, typically flush with the shaft end (see Figure 4-2).

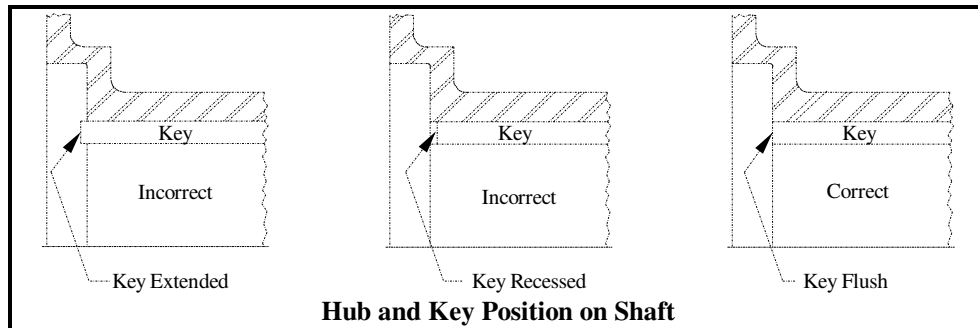


Figure 4-2

4.2.2 Tapered Bore With Keyway(s)

CAUTION: AMERIDRIVES MANUFACTURED THE COUPLING INTERFACE BASED ON THE SHAFT DATA SUPPLIED BY THE PURCHASER. AMERIDRIVES 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.

- 4.2.2.1 Verify that the engagement length between the bore and tapered shaft end is correct.
- 4.2.2.2 Check the key(s) and keyway(s) for proper fit. Key(s) should be fitted to the keyway(s) to minimize their affect on balance. Refer to AGMA-9002-A86 or other industry standard for recommended key fits.
- 4.2.2.3 Install the key(s) into the shaft and measure the shaft to key or key to key dimension. Compare this measurement with the measurement of the bore to keyway or keyway to keyway dimension of the hub to assure proper fit. If an interference exists between key(s), and hub, correct the situation or contact the equipment manufacturer or Ameridrives Customer Service.
- 4.2.2.4 With the key(s) installed in the shaft, perform a blue contact check between the bore and tapered shaft end. Refer to the Ameridrives Sales Drawing for the recommended contact area per API-671.
- 4.2.2.5 Remove the bluing from the shaft and bore.

- 4.2.2.6 Install the hub, hand tight, onto the shaft. Using feeler gages, install a positive stop onto the shaft corresponding to the draw-up specified on the Ameridrives Sales Drawing (see Figure 4-3).

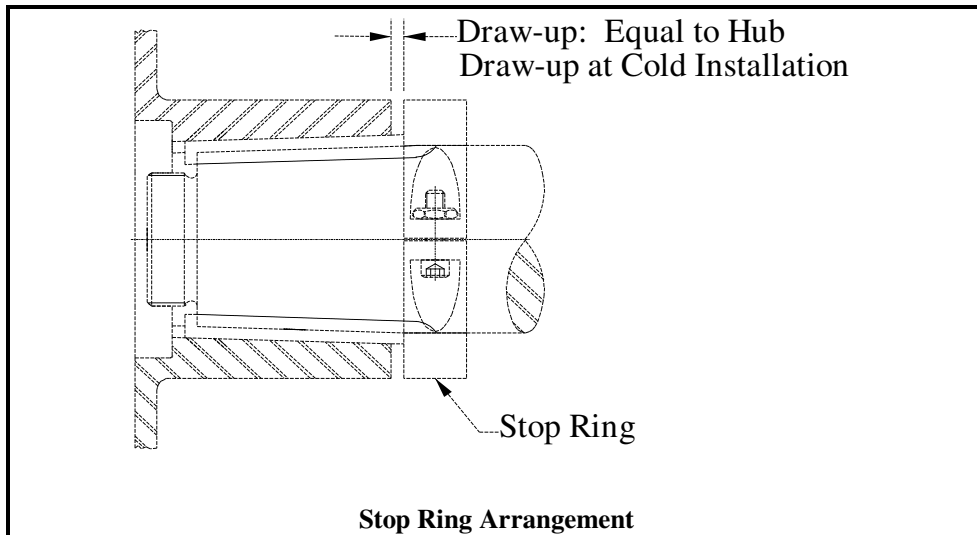


Figure 4-3

- 4.2.2.7 Remove the hub from the shaft and expand the bore with a uniform heat source (oven, induction heater, etc.) taking care not to exceed 550° F (288° C). The following equations will help determine the temperature required to expand the bore to install the hub on the shaft.

BORE EXPANSION:

E = BORE EXPANSION (IN.)
 e = BORE EXPANSION (MM)
 B = BORE DIAMETER (IN.)
 b = BORE DIAMETER (MM)
 T = TEMPERATURE RISE
 ABOVE AMBIENT (° F)
 t = TEMPERATURE RISE
 ABOVE AMBIENT (° C)

$$T = \frac{E}{B \times 0.0000064}$$

$$t = \frac{e}{b \times 0.000115}$$

CAUTION: DO NOT EXCEED 550° F (288° 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.

- 4.2.2.8 Install the hub flush against the positive stop and install the shaft nut hand tight to retain the hub in this position.
- 4.2.2.9 After the hub has cooled, tighten the shaft nut and lock it in place. Remove the stop ring.

4.2.3 Hydraulic Bore

CAUTION: AMERIDRIVES MANUFACTURED THE COUPLING INTERFACE BASED ON THE SHAFT DATA SUPPLIED BY THE PURCHASER. AMERIDRIVES 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.

- 4.2.3.1 Verify that the engagement length between the bore and tapered shaft end is correct.
- 4.2.3.2 Without o-rings or back-up rings, perform a blue contact check between the bore and the tapered shaft end. Refer to the Ameridrives Sales Drawing for the recommended contact area.
- 4.2.3.3 Clean the bluing from the shaft and bore.
- 4.2.3.4 Install the hub, hand tight, onto the shaft without o-rings and back-up rings. Using feeler gages, position a positive stop onto the shaft corresponding to the draw-up dimension specified on the Ameridrives Sales Drawing (see Figure 4-4).

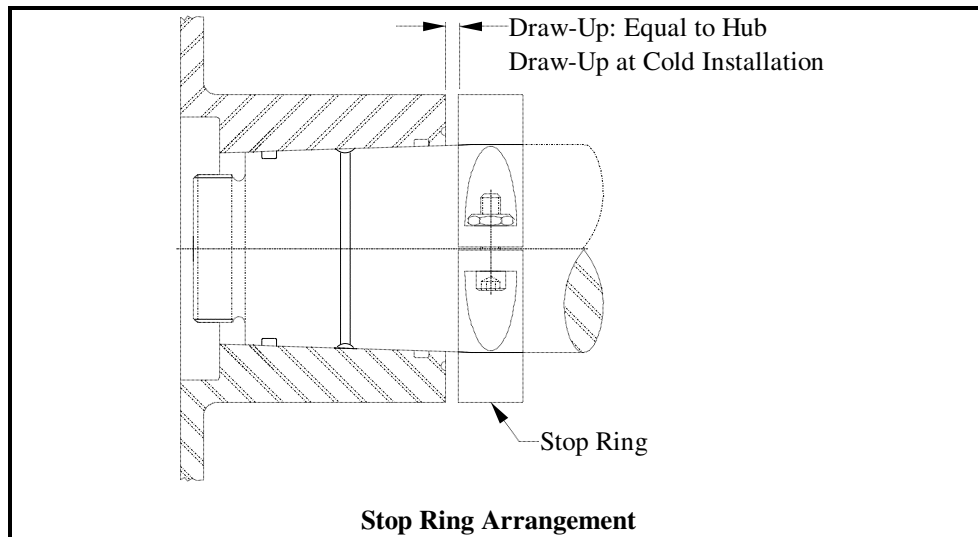


Figure 4-4

- 4.2.3.5 Lubricate the o-rings and back-up rings with hydraulic fluid or other light oil. Install the o-rings and back-up rings into the hub and onto the shaft.

- 4.2.3.6 Mount the hub onto the shaft using a hydraulic mounting device until the hub bottoms against the positive stop. Refer to AGMA 9003-A91 or other industry standard for more information about hydraulic mounting (see Figure 4-5).

WARNING: DO NOT APPLY EXCESSIVE HYDRAULIC PRESSURE DURING THE INSTALLATION OF THE HUB ON THE SHAFT. ACCIDENTS RESULTING FROM THE APPLICATION OF EXCESSIVE HYDRAULIC PRESSURE COULD RESULT IN LOSS OF LIFE, SERIOUS BODILY INJURY OR PROPERTY DAMAGE. THE APPLICATION OF EXCESSIVE HYDRAULIC PRESSURE DURING HUB INSTALLATION COULD FORCE THE HUB FROM THE SHAFT, DESTROY SEALS, AND HYDRAULIC LINES, AND/OR SPLIT THE HUB.

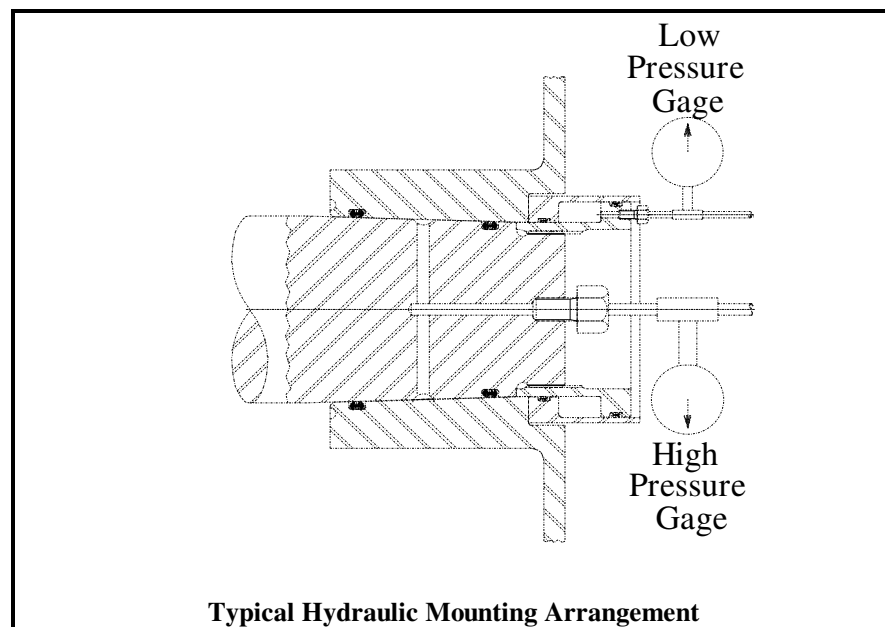


Figure 4-5

- 4.2.3.7 Heat mounting may also be used. However, if o-rings are used, care must be taken not to exceed the maximum temperatures allowed by the o-ring manufacturer. If o-rings are not used, do not exceed 550° F (288° C).
- 4.2.3.8 After a sufficient waiting period to allow the hydraulic oil to drain from the interface (a minimum of one (1) to two (2) hours), remove the hydraulic mounting equipment and stop ring. Install the shaft nut and lock it in place. Adequate time must elapse before applying torque to the coupling to permit any remaining trapped oil to drain.

4.2.4 FLANGE ADAPTERS

CAUTION: AMERIDRIVES MANUFACTURED THE COUPLING INTERFACE BASED ON THE SHAFT DATA SUPPLIED BY THE PURCHASER. AMERIDRIVES 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.

- 4.2.4.1 Measure the mating pilots to verify the proper interference fit according to the original equipment manufacturers recommendation.
- 4.2.4.2 Check both the equipment flange and the mating adapter flange. Remove any dirt, dents, raised metal or any other condition that might prevent the mating faces and pilot from seating properly.
- 4.2.4.3 Install a minimum of four (4) bolts approximately 90° apart through both flanges and tighten the bolts evenly in a criss-cross pattern to seat the pilot. Refer to the Ameridrives Sales Drawing for proper bolt and nut orientation and also to check if the bolts are supplied by Ameridrives.
- 4.2.4.4 Install the remaining fasteners and torque all fasteners in a criss-cross pattern to the value specified on the Ameridrives Sales Drawing. If the flange interface fasteners are not supplied by Ameridrives, consult the fastener supplier for the proper tightening torque.

4.3 ALIGNMENT

- 4.3.1 All Ameriflex couplings are designed to transmit 100% of the ratings stated on the Ameridrives Sales Drawing for normal torque, axial and angular misalignment simultaneously. However, if the exact amount of axial and angular movement from "cold" to "hot" running condition is not known, we recommend not exceeding 25% of the combined axial and angular capacities at installation.
- 4.3.2 All measurements taken during alignment should be made with the equipment shafts in their normal running position (i.e., thrust bearings against their active faces, motor rotors on their magnetic centers, etc.).

CAUTION: FAILURE TO TAKE MEASUREMENTS DURING ALIGNMENT WITH THE EQUIPMENT SHAFTS IN THEIR NORMAL RUNNING POSITION MAY RESULT IN COUPLING DAMAGE OR FAILURE DUE TO OVER EXTENSION OR COMPRESSION OF THE DIAPHRAGMS (SEE PARAGRAPH 4.3.2).

- 4.3.3 Equipment alignment should be accomplished in the manner specified by the equipment manufacturer.
- 4.3.4 The Ameriflex coupling is capable of operating at 100% of the axial and angular capacity stated on the Ameridrives Sales Drawing. If installed such that during normal "hot" operation the axial and angular misalignments are at or near zero, the loads induced by the coupling are further reduced, thereby increasing equipment bearing life.

4.4 MEASURING FOR INSTALLATION AND SETTING SHIM THICKNESS

Shims are provided to adjust the length of the coupling at installation to accommodate variations in flange-to-flange dimensions ("I" dimension as shown in Figure 4-7 through 4-10) within the limits specified on the Ameridrives sales drawing. The coupling spacer is intentionally made short by the thickness of one shim set. This allows for flange-to-flange adjustability equivalent to the thickness of one shim set in either direction. Two shim sets are normally provided (see Figure 4-6). Refer to the Ameridrives Sales Drawing for location and quantity of shims.

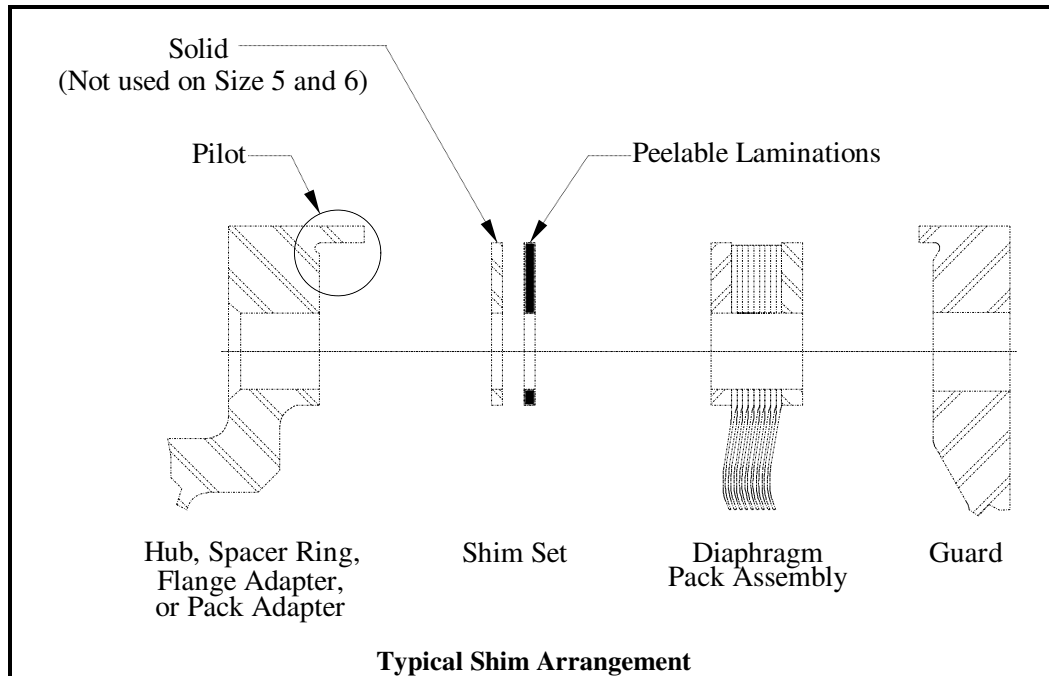


Figure 4-6

NOTE: WORKSHEETS ARE PROVIDED IN THIS MANUAL FOR RECORDING THE DIMENSIONS AND PERFORMING THE CALCULATIONS REQUIRED TO DETERMINE THE PROPER THICKNESS OF SHIM REQUIRED (REFERENCE PARAGRAPH 4.4.5). A SAMPLE HAS ALSO BEEN INCLUDED FOR YOUR CONVENIENCE (REFERENCE PARAGRAPH 4.4.6). WHEN A COMPLETE COUPLING IS SHIPPED FROM THE FACTORY, THE "G" DIMENSION IS MEASURED AND RECORDED ON A TAG ATTACHED TO THE COUPLING. SPARE COMPONENTS WILL NOT BE MARKED IN THIS MANNER AND MUST BE MEASURED AS DESCRIBED IN THIS SECTION.

4.4.1 RR and HP Series Couplings

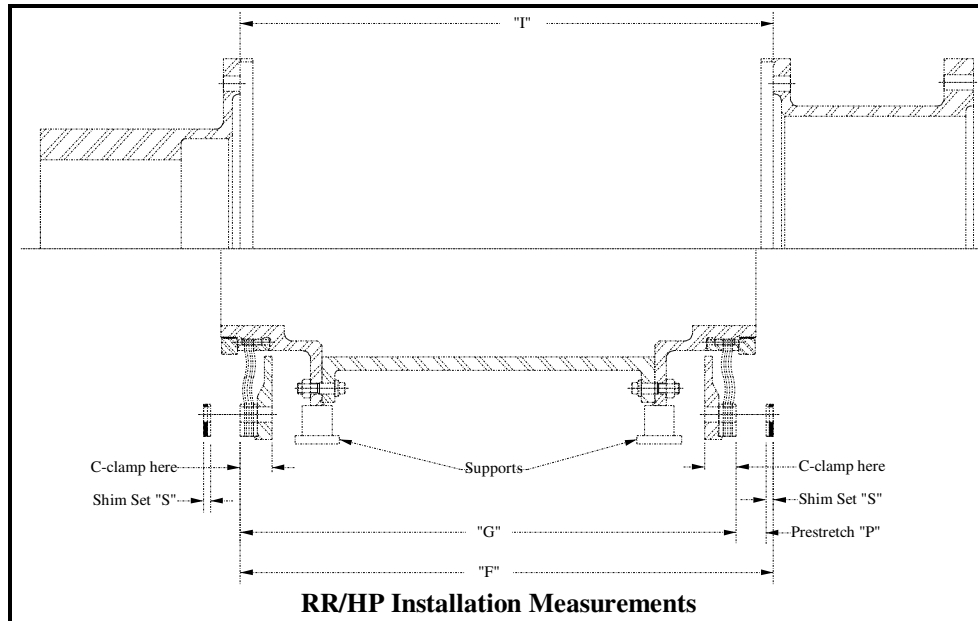


Figure 4-7

- 4.4.1.1 Measure and record, on the worksheet in Paragraph 4.4.5, the installation Length "I" (distance between mounted flange faces) at four (4) places approximately 90° apart (see Figure 4-7).
- 4.4.1.2 Assemble the diaphragm pack sub-assemblies onto the spacer taking care to realign the matchmarks and end identification letters. Install a minimum of four (4) bolts approximately 90° apart through each flange and tighten the bolts evenly in a criss-cross pattern to seat the pilots. Support as shown in Figure 4-7.
- 4.4.1.3 Loosen the jam nuts on the shipping hardware and relax, but do not remove, the cap screws on both sub-assemblies.
- NOTE: DOUBLE CHECK TO ASSURE THAT THE SHIPPING HARDWARE IS NOT COMPRESSING OR EXTENDING THE DIAPHRAGM PACK SUBASSEMBLIES.**
- 4.4.1.4 Measure and record, on the worksheet in Paragraph 4.4.5, the coupling free length "G" (distance between diaphragm pack sub-assembly outer diaphragm pack faces) at four (4) places approximately 90° apart. It is recommended that C-clamps be used to compress the diaphragm pack at the location the measurements are being taken (see Figure 4-7).
- 4.4.1.5 Refer to the Ameridrives Sales Drawing for one shim set thickness "S" and the amount of pre-stretch "P". Record those values on the worksheet provided in Paragraph 4.4.5.
- 4.4.1.6 Calculate the thickness of shim required using the worksheet in Paragraph 4.4.5.
- 4.4.1.7 Proceed to Paragraph 4.5.1.

4.4.2 RM Series Couplings

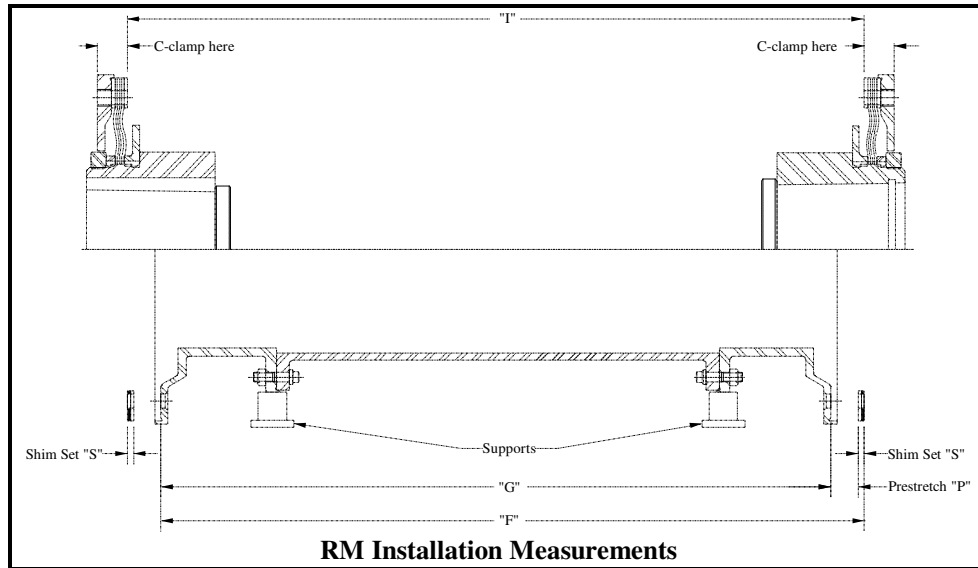


Figure 4-8

- 4.4.2.1 Measure and record, on the worksheet in Paragraph 4.4.5, the installation length "I" (distance between mounted diaphragm pack faces) at four (4) places approximately 90° apart. It is recommended that C-clamps be used to compress the diaphragm pack at the location the measurements are being taken (see Figure 4-8).
- 4.4.2.2 Assemble the pack adapters onto the spacer taking care to re-align the matchmarks and end identification letters. Install a minimum of four (4) bolts approximately 90° apart through each flange and tighten the bolts evenly in a criss-cross pattern to seat the pilots. Support as shown in Figure 4-8.
- 4.4.2.3 Measure and record, on the worksheet in Paragraph 4.4.5, the coupling free length "G" (distance between pack adapter outer flange faces) at four (4) places approximately 90° apart (see Figure 4-8).
- 4.4.2.4 Refer to the Ameridrives Sales Drawing for one shim set thickness "S" and the amount to prestretch "P". Record these values on the work sheet provided in Paragraph 4.4.5.
- 4.4.2.5 Calculate the thickness of shim required using the worksheet in Paragraph 4.4.5.
- 4.4.2.6 Proceed to Paragraph 4.5.2.

4.4.3 RS/HP Short Series Couplings.

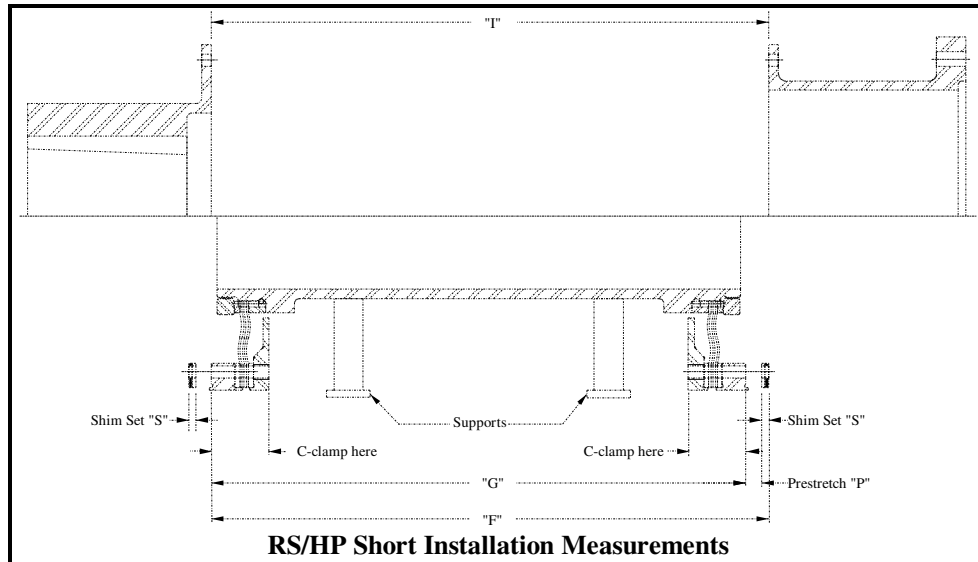


Figure 4-9

- 4.4.3.1 Measure and record, on the worksheet provided in Paragraph 4.4.5, the installation length "T" (distance between mounted flange faces) at four (4) places approximately 90° apart (see Figure 4-9).
- 4.4.3.2 Assemble the spacer rings, as shown on the Ameridrives Sales Drawing, onto both ends of the diaphragm pack sub-assembly taking care to re-align the matchmarks and end identification letters. Install a minimum of four (4) bolts approximately 90° apart through each spacer ring and tighten the bolts evenly in a criss-cross pattern to seat the pilots. On some size couplings the grip length of the bolts is too long to allow seating of the pilots in this manner. When this condition exists, a spacer plate, washers, shorter bolts, or C-clamps (not supplied) may be required to seat the pilots. Support as shown in Figure 4-9).

NOTE: REFER TO THE AMERIDRIVES SALES DRAWING FOR SPACER RING PILOT ORIENTATION.

- 4.4.3.3 Measure and record, on the worksheet in Paragraph 4.4.5, the coupling free length "G" (distance between spacer ring outer flange faces) at four (4) places approximately 90° apart. It is recommended that C-clamps be used to compress the diaphragm pack at the location the measurements are being taken (see Figure 4-9).
- 4.4.3.4 Refer to the Ameridrives Sales Drawing for one shim set thickness "S" and the amount of prestretch "P". Record these values on the worksheet provided in Paragraph 4.4.5.
- 4.4.3.5 Calculate the thickness of shim required using the worksheet in Paragraph 4.4.5.
- 4.4.3.6 Proceed to Paragraph 4.5.3.

4.4.4 Split Series Couplings (i.e., RR/RM)

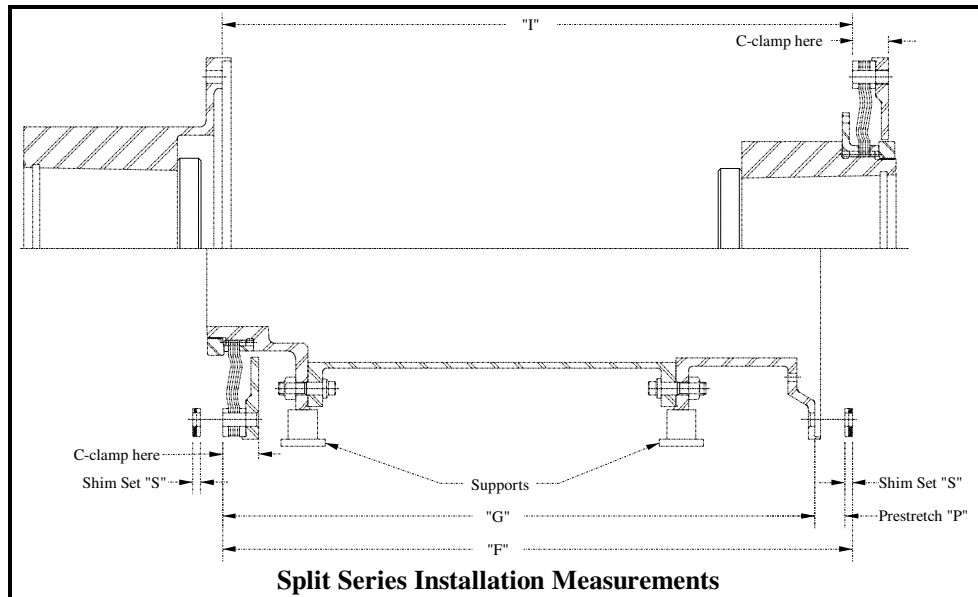


Figure 4-10

- 4.4.4.1 When installing and servicing a split series coupling, refer to the relative section for each series involved. For example, an RR/RM coupling: refer to Paragraphs 4.4.1, 4.5.1, and 4.7.1 for information relating to the RR end and refer to Paragraphs 4.4.2, 4.5.2, and 4.7.2 for information relating to the RM end (see Figure 4-10).

4.4.5 Work Sheet for Determining Shim Requirements

1. Installation Dimension "I". Measured four (4) places at 90° apart.

I₁ _____

I₂ _____

I₃ _____

I₄ _____

TOTAL _____ = "I" = _____
4

2. Coupling Free Length "G". Measured four (4) places at 90° apart.

G₁ _____

G₂ _____

G₃ _____

G₄ _____

TOTAL _____ = "G" = _____
4

3. Calculate the coupling installation length "F" by adding the following:

NOTE: Refer to the Installation
Section of the Ameridrives Sales
Drawing for Shim Set Thickness

"G" _____
+ "S" _____
+ "P" _____

_____ "S" and Prestretch "P" Dimensions.

"F" = _____

4. Solve for "I" minus "F":

NOTE: Refer to the Installation
Section of the Ameridrives Sales
Drawing for Acceptable
Values for "I" minus "F".

"I" _____
- "F" _____

shim adjustment = _____

5. If "I" minus "F" is negative, remove that thickness of shim from the peelable shim of one shim set and install only the remainder of that shim with the coupling. If "I" minus "F" is positive, install that thickness of shim along with one full shim set with the coupling. Refer to the Installation Section of the Ameridrives Sales Drawing for the maximum allowable shim set thickness for each end of the coupling.

4.4.6 Sample Work Sheet for Determining Shim Requirements

1. Installation Dimension "I". Measured four (4) places at 90° apart.

I₁ 16.458 IN.

I₂ 16.461 IN.

I₃ 16.458 IN.

I₄ 16.463 IN.

TOTAL $\frac{65.840 \text{ IN.}}{4}$ = "I" = 16.460 IN.

- 2 Coupling Free Length "G". Measured four (4) places at 90° apart.

G₁ 16.289 IN.

G₂ 16.237 IN.

G₃ 16.294 IN.

G₄ 16.224 IN.

TOTAL $\frac{65.044 \text{ IN.}}{4}$ = "G" = 16.261 IN.

3. Calculate the coupling installation length "F" by adding the following:

NOTE: Refer to the Installation
Section of the Ameridrives Sales
Drawing for Shim Set Thickness
IN.
"S" and Prestretch "P" Dimensions.

"G" 16.261 IN.
+ "S" .125 IN.
+ "P" .035

"F" = 16.421 IN.

4. Solve for "I" minus "F":

NOTE: Refer to the Installation
Section of the Ameridrives Sales
Drawing for Acceptable Values
for "I" Minus "F".

"I" 16.460 IN.
- "F" 16.421 IN.

shim adjustment = .039 IN.

5. "I" minus "F" equals positive .039 IN. so an additional shim .039 IN. thick along with a full shim set (.125 IN. thick) is required.

4.5. SUB-ASSEMBLY AND SPACER MOUNTING

4.5.1 RR and HP Series Coupling

- 4.5.1.1 Separate the diaphragm pack sub-assemblies from the spacer using the tapped jacking holes provided.
- 4.5.1.2 Inspect the mating flange faces and pilots. Remove any dirt, dents, raised metal or any other condition that might prevent the mating faces and pilot from seating properly.
- 4.5.1.3 Install the diaphragm pack sub-assembly by aligning the end identification letters and matchmarks. Install a minimum of four (4) bolts approximately 90° apart through the flange, shim(s) (if required) and diaphragm pack. Refer to the Ameridrives Sales Drawing for proper bolt and nut orientation. Pilots are an interference fit. Tighten the bolts evenly in a criss-cross pattern to seat the pilots properly.
- 4.5.1.4 Repeat Paragraph 4.5.1.3 at the opposite end making sure the end identification letters and matchmarks are aligned.
- 4.5.1.5 Install all remaining OD fasteners and torque evenly in a criss-cross patterns to the value specified on the Ameridrives Sales Drawing. Repeat the bolt tightening procedure to verify that all fasteners are torqued to the proper value.
- 4.5.1.6 Loosen the shipping screw jam nuts and tighten the shipping screws evenly to draw-up both diaphragm pack sub-assemblies to the dimension specified on the Ameridrives Sales Drawing. The use of two dial indicators at 180° apart or determining the number of screw turns required based on thread pitch (refer to Table 4-1) are common ways of measuring draw-up. The shipping screw head and corresponding tapped hole in the guard are color coded at the factory to maintain proper screw lengths within a coupling. If the original screws are lost, refer to the Ameridrives Sales Drawing for the correct size and length or call Ameridrives customer service for assistance.

DRAW-UP FOR ONE (1) FULL TURN OF SHIPPING HARDWARE							
THREAD SIZE	#5-40	#8-32	#10-32	1/4-28	5/16-24	3/8-24	1/2-20
DRAW-UP (IN.)	0.025	0.031	0.031	0.036	0.042	0.042	0.050
DRAW-UP (MM.)	0.635	0.794	0.794	0.907	1.058	1.058	1.270

Table 4-1

CAUTION: DO NOT EXCEED THE RECOMMENDED DRAW-UP STATED ON THE AMERIDRIVES SALES DRAWING. EXCEEDING THE RECOMMENDED DRAW-UP MAY DAMAGE THE DIAPHRAGM PACK.

THE USE OF SCREWS LONGER THAN ORIGINALLY SHIPPED WITH DIAPHRAGM PACK SUB-ASSEMBLY MAY DAMAGE THE DIAPHRAGM PACK AND CAUSE COUPLING FAILURE.

- 4.5.1.7 Position and support the spacer between the two diaphragm pack sub-assemblies. Align the matchmarks and end identification letters. This may require rotation of the equipment shafts. Do not use coupling components as a leverage point for equipment rotation.
 - 4.5.1.8 Install, but do not tighten, a minimum of four (4) bolts approximately 90° apart through the spacer and diaphragm pack sub-assembly flanges at each end of the coupling. Refer to the Ameridrives Sales Drawing for proper bolt and nut orientation.
 - 4.5.1.9 Loosen and remove the shipping hardware. **Do not discard - save for future coupling removal and installation.**
 - 4.5.1.10 Pilots are an interference fit. Tighten the bolts evenly in a criss-cross pattern to seat the pilots properly.
 - 4.5.1.11 Install all remaining spacer hardware and torque evenly in a criss-cross pattern to the value specified on the Ameridrives Sales Drawing. Repeat the bolt tightening procedure to verify that all fasteners are torqued to the proper value.
 - 4.5.1.12 Remove the spacer support.
 - 4.5.1.13 Proceed to Paragraph 4.6.
- 4.5.2 RM Series Couplings
- 4.5.2.1 Separate the pack adapters from the spacer using the tapped jacking holes provided.
 - 4.5.2.2 Inspect the mating flange faces and pilots. Remove any dirt, dents, raised metal or any other condition that might prevent the mating faces and pilots from seating properly.
 - 4.5.2.3 Install the pack adapter onto the diaphragm pack sub-assembly by aligning the end identification letters and matchmarks. Install a minimum of four (4) bolts approximately 90° apart through the pack adapter flange, shim(s) (if required) and diaphragm pack. Refer to the Ameridrives Sales Drawing for proper bolt orientation. Pilots are an interference fit. Tighten the bolts evenly in a criss-cross pattern to seat the pilots properly.
 - 4.5.2.4 Repeat Paragraph 4.5.2.3 at the opposite end making sure the end identification letters and matchmarks are aligned.
 - 4.5.2.5 Install all remaining OD fasteners and torque evenly in a criss-cross pattern to the value specified on the Ameridrives Sales Drawing. Repeat the bolt tightening procedure to verify that all fasteners are torqued to the proper value.

- 4.5.2.6 Install the shipping screws through the pack adapters into the tapped holes in the back-up rings. Tighten the shipping screws evenly to draw-up both pack adapters to the dimension specified on the Ameridrives Sales Drawing. The use of two dial indicators at 180° apart or determining the number of screw turns required based on thread pitch (refer to Table 4-1) are common ways of measuring draw-up. The shipping screw head and corresponding clearance hole in the pack adapter are color coded at the factory to maintain proper screw lengths within a coupling. If the original screws are lost, refer to the Ameridrives Sales Drawing for the correct size and length or call Ameridrives customer service for assistance.

CAUTION: DO NOT EXCEED THE RECOMMENDED DRAW-UP STATED ON THE AMERIDRIVES SALES DRAWING. EXCEEDING THE RECOMMENDED DRAW-UP MAY DAMAGE THE DIAPHRAGM PACK.

THE USE OF SCREWS LONGER THAN ORIGINALLY SHIPPED WITH DIAPHRAGM PACK SUB-ASSEMBLY MAY DAMAGE THE DIAPHRAGM PACK AND CAUSE COUPLING FAILURE.

- 4.5.2.7 Position and support the spacer between the two diaphragm pack sub-assemblies. Align the matchmarks and end identification letters. This may require rotation of the equipment shafts. Do not use coupling components as a leverage point for equipment rotation.
- 4.5.2.8 Install but do not tighten, a minimum of four (4) bolts approximately 90° apart through the spacer and pack adapter flanges at each end of the coupling. Refer to the Ameridrives Sales Drawing for proper bolt and nut orientation.
- 4.5.2.9 Loosen and remove the shipping screws. **Do not discard - save for future coupling removal and installation.**
- 4.5.2.10 Pilots are an interference fit. Tighten the bolts evenly in a criss-cross pattern to seat the pilots properly.
- 4.5.2.11 Install all remaining spacer fasteners and torque evenly in a criss-cross pattern to the value specified on the Ameridrives Sales Drawing.
- 4.5.2.12 Remove the spacer support.
- 4.5.2.13 Proceed to Paragraph 4.6.

4.5.3 RS/HP Short Series Couplings

- 4.5.3.1 If shimming is required, disassemble the spacer rings from the diaphragm pack assembly using the tapped jacking holes in the spacer rings.
- 4.5.3.2 Inspect the mating flange faces and pilots. Remove any dirt, dents, raised metal or any other condition that might prevent mating faces and pilots from seating properly.

- 4.5.3.3 Assemble the diaphragm pack sub-assembly, spacer rings, and shim(s) (if required) making sure the end identification letters and matchmarks are aligned.

CAUTION: WHEN SHIMS, ARE USED, THEY MUST BE INSTALLED BETWEEN THE SPACER RINGS AND DIAPHRAGM PACKS. REFER TO THE AMERIDRIVES SALES DRAWING FOR THE MAXIMUM SHIM THICKNESS AND SPACER RING PILOT ORIENTATION AT EACH END.

- 4.5.3.4 Install four (4) turnbuckles evenly on the OD of the spacer rings. Refer to the Ameridrives Sales Drawings for location.
- 4.5.3.5 Tighten the turnbuckles evenly to compress (draw-up) the diaphragm pack sub-assembly to the dimension specified on the Ameridrives Sales Drawing. The use of two dial indicators at 180° apart or determining the number of screw turns required based on thread pitch (refer to Table 4-1) are common ways of measuring draw-up.

CAUTION: DO NOT EXCEED THE RECOMMENDED DRAW-UP STATED ON THE AMERIDRIVES SALES DRAWING. EXCEEDING THE RECOMMENDED DRAW-UP MAY DAMAGE THE DIAPHRAGM PACK.

- 4.5.3.6 Position and support the diaphragm pack sub-assembly between the two (2) mounted flanges. Align the matchmarks and end identification letters. This may require rotation of the equipment shafts. Do not use coupling components as a leverage point for equipment rotation.
- 4.5.3.7 Install but do not tighten a minimum of four (4) bolts approximately 90° apart through the hub flanges, spacer rings, and shim(s) (if required) into the diaphragm pack sub-assembly at each end of the coupling.
- 4.5.3.8 Loosen and remove the turnbuckle assemblies. Do not discard - save for future coupling removal and installation.
- 4.5.3.9 Pilots are an interference fit. Tighten the bolts evenly in a criss-cross pattern to seat the pilots properly.
- 4.5.3.10 Install all remaining bolts and torque evenly in a criss-cross pattern to the value specified on the Ameridrives Sales Drawing.
- 4.5.3.11 Remove the sub-assembly support.
- 4.5.3.12 Proceed to Paragraph 4.6.

4.6. ASSEMBLY CHECK LIST

A thorough inspection of the coupling and its connected equipment is recommended prior to operation.

- 4.6.1 Check the drive and driven equipment to be sure they are ready for operation. Refer to the original equipment manufacturers operating manual.

- 4.6.2 Recheck and verify that the alignment values for axial, angular, and parallel offset are within the limits specified on the Ameridrives Sales Drawing.
- 4.6.3 Check that all fasteners are tightened to the proper values specified on the Ameridrives Sales Drawing.
- 4.6.5 Check that all shipping hardware has been removed from both ends of the coupling.
- 4.6.6 Check that all tools, mounting equipment, and supports used during installation are removed and the coupling and equipment are free to turn. A coupling guard should be in place to prevent personnel from accessing the rotating coupling and shafts during operation.

CAUTION: EXCESSIVE VIBRATION DURING INITIAL START-UP IS AN INDICATION THAT THERE IS A POTENTIAL PROBLEM WITH INSTALLATION OF THE COUPLING OR THE CONNECTED EQUIPMENT. SHUT THE SYSTEM DOWN IMMEDIATELY AND DETERMINE THE SOURCE OF THE VIBRATION.

4.7. COUPLING DISASSEMBLY

Successful removal depends heavily on the care and good judgment of those performing the work. Ameridrives will not be held liable for any personal injury or equipment damage that may occur during or as a result of removing a coupling or hub.

4.7.1 RR and HP Series Couplings

- 4.7.1.1 Install but do not draw-up the shipping hardware. Refer to the Ameridrives Sales Drawing for size and location. The shipping screw head and mating tapped hole in the guard are color coded at the factory to maintain proper screw lengths within a coupling.

CAUTION: USE ONLY THE ORIGINAL SHIPPING HARDWARE SHIPPED WITH THE COUPLING OR EXACT REPLACEMENTS. USE OF INCORRECT HARDWARE MAY DAMAGE THE DIAPHRAGM PACK. REFER TO THE AMERIDRIVES SALES DRAWING FOR THE CORRECT SIZE AND LENGTH OR CALL AMERIDRIVES CUSTOMER SERVICE FOR ASSISTANCE.

- 4.7.1.2 Remove the spacer flange bolts at one end of the spacer. Support the spacer and, using the tapped jacking holes provided, disengage the pilot at that end to obtain a clearance of .005 - .010 IN. (.127 - .254 mm) between the spacer and the splined adapter pilots (see Figure 4-11).
- 4.7.1.3 Tighten the shipping hardware at that end of the coupling to retain the compression of the diaphragm pack sub-assembly obtained in Paragraph 4.7.1.2.

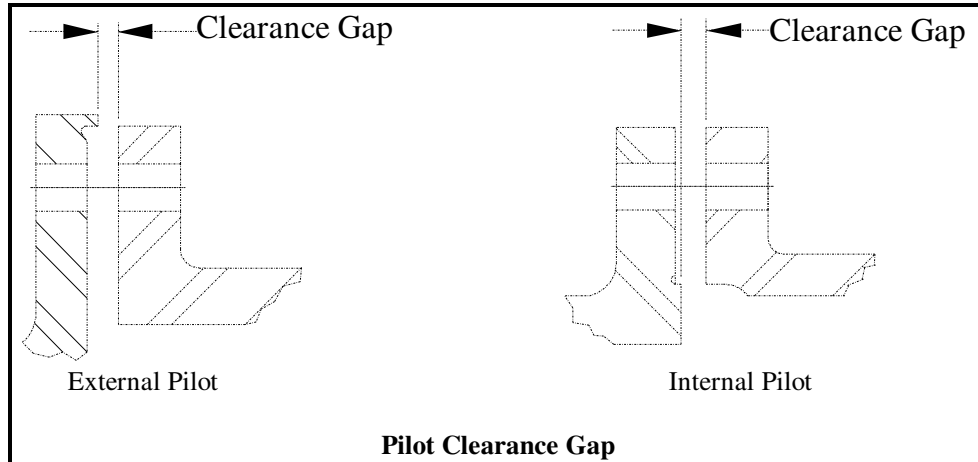


Figure 4-11

- 4.7.1.4 Repeat Paragraphs 4.7.1.2 and 4.7.1.3 for the opposite end.
- 4.7.1.5 Remove the spacer.
- 4.7.1.6 Remove the OD fasteners. Support the diaphragm pack sub-assembly. Using the tapped jacking holes provided in the hub or flange adapter, disengage the diaphragm pack pilot and remove the diaphragm pack sub-assembly.
- 4.7.1.7 Repeat Paragraph 4.7.1.6 for the opposite end.
- 4.7.1.8 If diaphragm pack inspection is required, remove the two (2) rivets retaining the guards (see Figure 4-12). Using the tapped jacking holes provided in the guard, disengage the guard to diaphragm pack pilot. Pull the guard back to inspect the outer diaphragms for any cracks, dents, distress areas or other abnormalities.

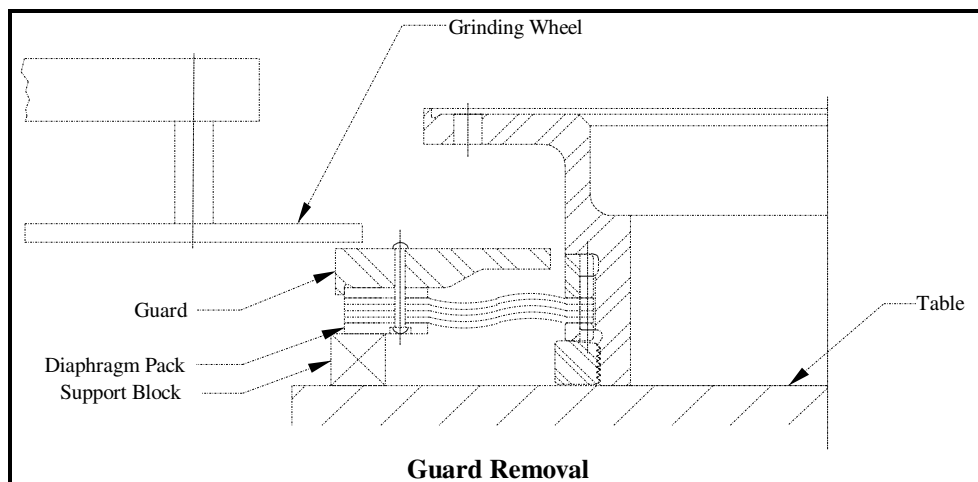


Figure 4-12

CAUTION: DO NOT DISASSEMBLE THE DIAPHRAGM PACK SUB-ASSEMBLY BEYOND WHAT IS DESCRIBED IN PARAGRAPH 4.7.1.8. THE SAFE OPERATION OF THE DIAPHRAGM PACK SUB-ASSEMBLY IS DEPENDENT UPON SPECIFIC CLAMP FORCES OBTAINED AT THE FACTORY DURING ASSEMBLY. ANY REDUCTION IN THESE CLAMP FORCES MAY CAUSE COUPLING FAILURE.

- 4.7.1.9 If the inspection performed in Paragraph 4.7.1.8 does not identify a problem and the diaphragm pack sub-assembly is to be returned to service, re-attach the guard to the diaphragm pack using two (2) new rivets. The rivet should extend above the guard approximately 3/16-1/4 in. to allow for peening. Proper support must be provided for the diaphragm pack during riveting to avoid possible damage (see Figure 4-13). The rivet head must not protrude beyond the face of the diaphragm pack.

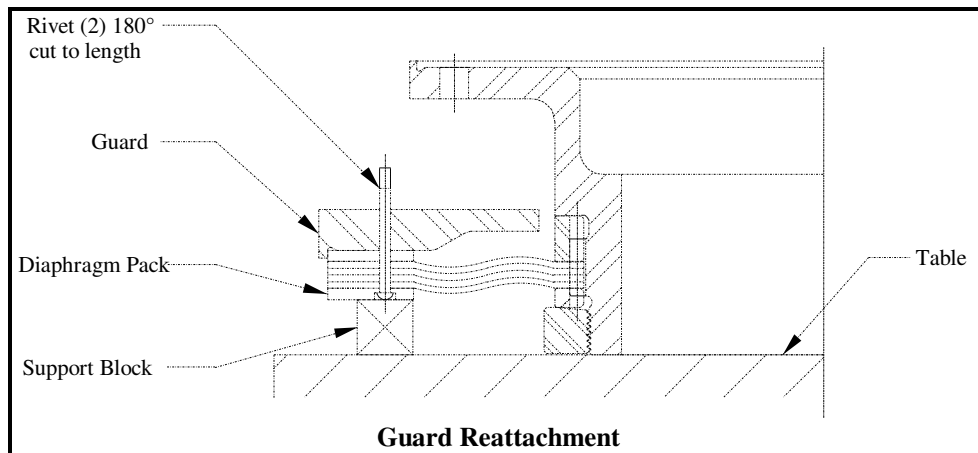


Figure 4-13

CAUTION: IF THE CONDITION OF THE OUTER DIAPHRAGMS IS QUESTIONABLE, DO NOT USE THAT DIAPHRAGM PACK SUB-ASSEMBLY. REPLACE THE QUESTIONABLE UNIT WITH A NEW ONE AND RETURN THE QUESTIONABLE DIAPHRAGM PACK SUB-ASSEMBLY TO AMERIDRIVES FOR EVALUATION.

4.7.1.10 Hub Removal.

- 4.7.1.10.1 Hydraulic hubs may be removed by using hydraulic mounting equipment to expand the bore. The shaft nut or some other similar device should be used to retain the hub once it breaks free from the shaft. Refer to AGMA 9003-A91 or other industry standard for further information. Support the hub prior to removal.

WARNING: DO NOT APPLY EXCESSIVE HYDRAULIC PRESSURE DURING THE REMOVAL OF THE HUB FROM THE SHAFT. ACCIDENTS RESULTING FROM THE APPLICATION OF EXCESSIVE HYDRAULIC PRESSURE COULD RESULT IN LOSS OF LIFE, SERIOUS BODILY INJURY OR PROPERTY DAMAGE. THE APPLICATION OF EXCESSIVE HYDRAULIC PRESSURE DURING HUB REMOVAL COULD UNEXPECTEDLY FORCE THE HUB FROM THE SHAFT, DESTROY SEALS, AND HYDRAULIC LINES, AND/OR SPLIT THE HUB.

PURCHASER SHOULD REFER TO THE OPERATOR'S MANUAL SUPPLIED BY THE HYDRAULIC DEVICE MANUFACTURER FOR INSTRUCTIONS ON THE SAFE OPERATION OF THE HYDRAULIC EQUIPMENT.

4.7.1.10.2 Keyed hubs may be removed by uniformly heating the hub barrel to expand the bore and using a hub puller or similar device to pull the hub off the shaft. Support the hub prior to removal. An induction heater of sufficient capacity to heat the hub rapidly is the preferred method. However, if not available, two (2) torches at 180° apart with flame spreader (rose bud) tips may be used. If using torches, a hub puller should be attached prior to heating the hub and the torches or hub must be continuously rotated to avoid localized hot spots. Do not exceed 550° F (288° C) surface temperature.

4.7.2 RM Series Couplings

4.7.2.1 Install but do not tighten the shipping hardware. Refer to the Ameridrives Sales Drawing for size location. The shipping screw head and mating clearance hole in the pack adapter are color coded at the factory to maintain proper screw lengths within a coupling.

CAUTION: USE ONLY THE ORIGINAL SHIPPING HARDWARE SHIPPED WITH THE COUPLING OR EXACT REPLACEMENTS. USE OF INCORRECT HARDWARE MAY DAMAGE THE DIAPHRAGM PACK. REFER TO THE AMERIDRIVES SALES DRAWING FOR THE CORRECT SIZE AND LENGTH OR CALL AMERIDRIVES CUSTOMER SERVICE FOR ASSISTANCE.

4.7.2.2 Remove the spacer flange bolts at one end of the spacer. Support the spacer and using the tapped jacking holes provided, disengage the pilot at that end to obtain a clearance of .005 - .010 IN (.127 - .254 mm) between the spacer and the pack adapter pilots (see Figure 4-11).

4.7.2.3 Tighten the shipping hardware at that end of the coupling to retain the compression of the diaphragm pack sub-assembly obtained in Paragraph 4.7.2.2.

- 4.7.2.4 Repeat Paragraphs 4.7.2.2 and 4.7.2.3 for the other end.
- 4.7.2.5 Remove the spacer.
- 4.7.2.6 Remove the OD fasteners and the shipping hardware.
- 4.7.2.7 Support the pack adapter prior to removal. Using the tapped jacking hole provided, disengage the pilot and remove the pack adapter from the diaphragm pack.
- 4.7.2.8 Repeat Paragraph 4.7.2.7 for the other end.
- 4.7.2.9 Hub Removal
 - 4.7.2.9.1 Hydraulic hubs may be removed by using hydraulic mounting equipment to expand the bore. The shaft nut or some other similar device should be used to retain the hub once it breaks free from the shaft. Refer to AGMA 9003-A91 or other industry standard for further information. Support the hub prior to removal.

WARNING: DO NOT APPLY EXCESSIVE HYDRAULIC PRESSURE DURING THE REMOVAL OF THE HUB FROM THE SHAFT. ACCIDENTS RESULTING FROM THE APPLICATION OF EXCESSIVE HYDRAULIC PRESSURE COULD RESULT IN LOSS OF LIFE, SERIOUS BODILY INJURY OR PROPERTY DAMAGE. THE APPLICATION OF EXCESSIVE HYDRAULIC PRESSURE DURING HUB REMOVAL COULD UNEXPECTEDLY FORCE THE HUB FROM THE SHAFT, DESTROY SEALS, AND HYDRAULIC LINES, AND/OR SPLIT THE HUB.

PURCHASER SHOULD REFER TO THE OPERATOR'S MANUAL SUPPLIED BY THE HYDRAULIC DEVICE MANUFACTURER FOR INSTRUCTIONS ON THE SAFE OPERATION OF THE HYDRAULIC EQUIPMENT.

- 4.7.2.9.2 Keyed hubs may be removed by uniformly heating the hub barrel to expand the bore and using a hub puller or similar device to pull the hub off the shaft. Support the hub prior to removal. An induction heater of sufficient capacity to heat the hub rapidly is the preferred method. However, if not available, two (2) torches at 180° apart with flame spreader (rose bud) tips may be used. If using torches, a hub puller should be attached prior to heating the hub and the torches or hub must be continuously rotated to avoid localized hot spots. Do not exceed 550° F (288° C) surface temperature. Support the hub prior to removal.

CAUTION: DO NOT USE A TORCH FOR HUB REMOVAL UNLESS THE ENTIRE DIAPHRAGM PACK HAS BEEN COVERED WITH A HEAT RESISTANT COVER (WELDERS BLANKET, KOA-WOOL OR EQUIVALENT). DIAPHRAGMS WILL HEAT UP RAPIDLY WHEN EXPOSED TO AN OPEN FLAME AND THIS MAY CAUSE DAMAGE AND/OR PREVENT PROPER HUB EXPANSION.

- 4.7.2.9.3 After the diaphragm pack sub-assembly has been removed from the shaft end, inspect the diaphragms for cracks, dents, distress areas, heat discoloration (localized blue or purple spots) or any other abnormalities.

CAUTION: IF THE CONDITION OF THE OUTER DIAPHRAGMS IS QUESTIONABLE, DO NOT USE THAT DIAPHRAGM PACK SUB-ASSEMBLY. REPLACE THE QUESTIONABLE UNIT WITH A NEW ONE AND RETURN THE QUESTIONABLE DIAPHRAGM PACK SUB-ASSEMBLY TO AMERIDRIVES FOR EVALUATION.

4.7.3 RS/HP Short Series Couplings

- 4.7.3.1 Remove the OD fasteners.
- 4.7.3.2 Install but do not tighten the shipping hardware (turnbuckles). Refer to the Ameridrives Sales Drawing for location.
- 4.7.3.3 Support the diaphragm pack sub-assembly.
- 4.7.3.4 Using the tapped jacking holes provided in the flanges, disengage the spacer ring to flange pilots at both ends of the coupling to obtain a clearance of .005 - .010 IN. (.127 - .254 mm) between the spacer ring pilot and the flange at both ends of the coupling (see Figure 4-11).
- 4.7.3.5 Tighten the turnbuckles to retain the compression of the diaphragm pack sub-assembly obtained in Paragraph 4.7.3.4.
- 4.7.3.6 Remove the diaphragm pack sub-assembly.
- 4.7.3.7 If inspection of the diaphragm pack is required, disengage the guard to diaphragm pack pilots using the tapped jacking holes provided in the guards. Pull the guards back to inspect the outer diaphragms for any cracks, dents, distress areas or other abnormalities.

CAUTION: IF THE CONDITION OF THE OUTER DIAPHRAGMS IS QUESTIONABLE - DO NOT USE THAT DIAPHRAGM PACK SUB-ASSEMBLY. REPLACE THE QUESTIONABLE UNIT WITH A NEW ONE AND RETURN THE QUESTIONABLE DIAPHRAGM PACK SUB-ASSEMBLY TO AMERIDRIVES FOR EVALUATION.

4.7.3.8 Hub Removal

- 4.7.3.8.1 Hydraulic hubs may be removed by using hydraulic mounting equipment to expand the bore. The shaft nut or some other similar device should be used to retain the hub once it breaks free from the shaft. Refer to AGMA 9003-A91 or other industry standard for further information. Support the hub prior to removal.

WARNING: DO NOT APPLY EXCESSIVE HYDRAULIC PRESSURE DURING THE REMOVAL OF THE HUB FROM THE SHAFT. ACCIDENTS RESULTING FROM THE APPLICATION OF EXCESSIVE HYDRAULIC PRESSURE COULD RESULT IN LOSS OF LIFE, SERIOUS BODILY INJURY OR PROPERTY DAMAGE. THE APPLICATION OF EXCESSIVE HYDRAULIC PRESSURE DURING HUB REMOVAL COULD UNEXPECTEDLY FORCE THE HUB FROM THE SHAFT, DESTROY SEALS, AND HYDRAULIC LINES, AND/OR SPLIT THE HUB.

PURCHASER SHOULD REFER TO THE OPERATOR'S MANUAL SUPPLIED BY THE HYDRAULIC DEVICE MANUFACTURER FOR INSTRUCTIONS ON THE SAFE OPERATION OF THE HYDRAULIC EQUIPMENT.

- 4.7.3.8.2 Keyed hubs may be removed by uniformly heating the hub barrel to expand the bore and using a hub puller or similar device to pull the hub off the shaft. Support the hub prior to removal. An induction heater of sufficient capacity to heat the hub rapidly is the preferred method. However, if not available, two (2) torches at 180° apart with flame spreader (rose bud) tips may be used. If using torches, a hub puller should be attached prior to heating the hub and the torches or hub must be continuously rotated to avoid localized hot spots. Do not exceed 550° F (288° C) surface temperature.

5. **OVERSPEED TEST / SOLO OPERATION**

5.1 RR/HP Series Coupling

- 5.1.1 Remove the spacer and diaphragm pack sub-assemblies as described in Section 4 Paragraph 4.7.1.1 through 4.7.1.7.
- 5.1.2 Check the hub, key(s), shaft nut, etc. to assure they are secure. If any loose parts are found, they must be secured before solo operation.
- 5.1.3 Equipment is now ready for solo operation.

5.2 RM Series Couplings

- 5.2.1 Remove the spacer as described in Section 4 Paragraph 4.7.2.1 through 4.7.2.5.

- 5.2.2 Loosen the shipping hardware until the diaphragm pack is no longer compressed.
- 5.2.3 Tighten the shipping hardware evenly to draw-up the pack adapter on the overspeed trip end only to the dimensions specified on the Ameridrives Sales Drawing. The use of two (2) dial indicators at 180° apart (see Figure 5-1) or determining the number of screw turns required based on thread pitch (see Table 5-1) are common ways of measuring draw-up.

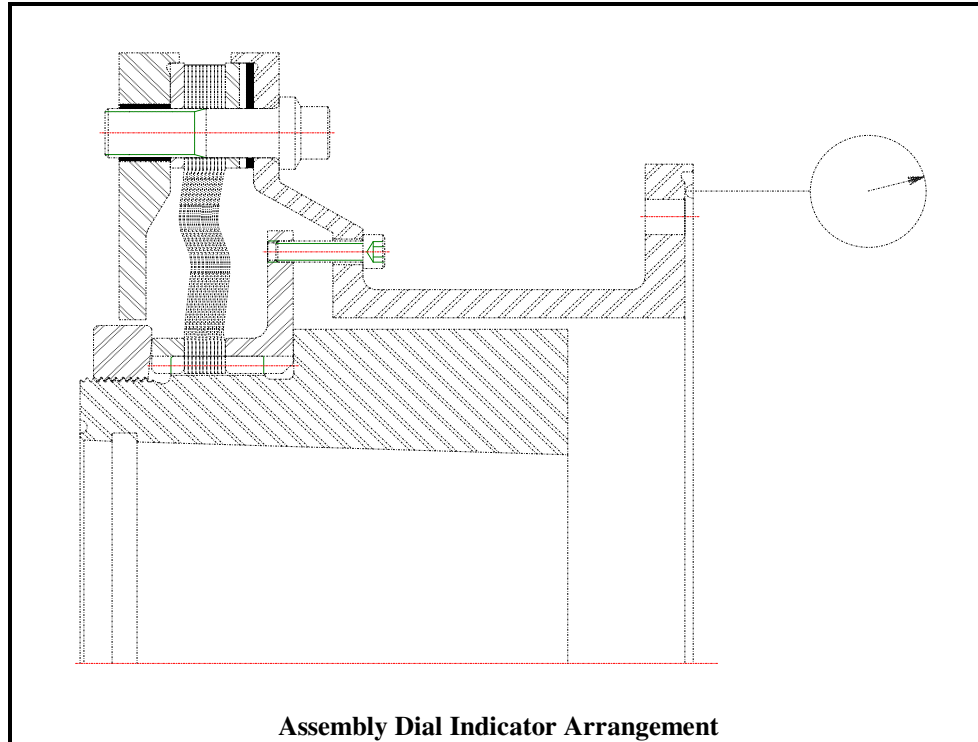


Figure 5-1

DRAW-UP FOR ONE (1) FULL TURN OF SHIPPING HARDWARE							
THREAD SIZE	#5-40	#8-32	#10-32	1/4-28	5/16-24	3/8-24	1/2-20
DRAW-UP (IN.)	0.025	0.031	0.031	0.036	0.042	0.042	0.050
DRAW-UP (MM.)	0.635	0.794	0.794	0.907	1.058	1.058	1.270

Table 5-1

CAUTION: DO NOT EXCEED THE RECOMMENDED DRAW-UP STATED ON THE AMERIDRIVES SALES DRAWING. EXCEEDING THE RECOMMENDED DRAW-UP MAY DAMAGE THE DIAPHRAGM PACK.

THE USE OF SCREWS LONGER THAN ORIGINALLY SHIPPED WITH DIAPHRAGM PACK SUB-ASSEMBLY MAY DAMAGE THE DIAPHRAGM PACK AND CAUSE COUPLING FAILURE.

- 5.2.4 Place a dial indicator on the spacer connecting flange of the pack adapter and loosen the shipping hardware screws as needed to achieve a pack runout of less than .001 IN. (4) places at 90° apart on the pack adapter flange O.D. and face (see Figure 5-2).

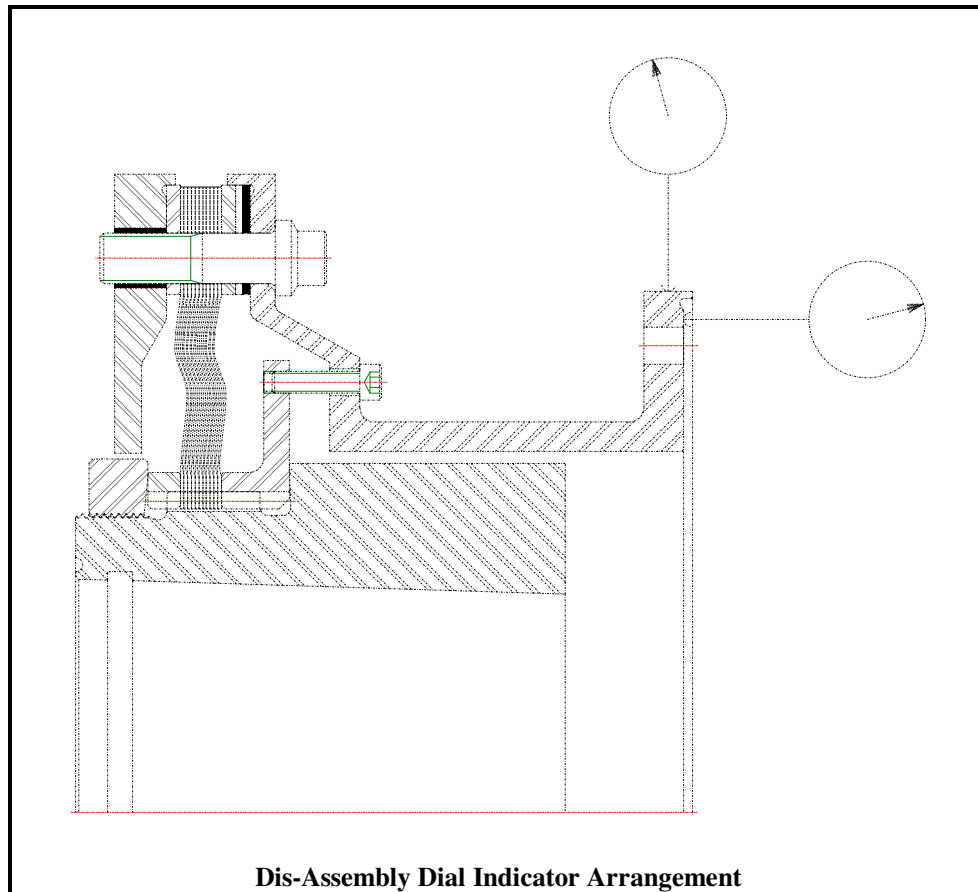


Figure 5-2

- 5.2.5 Check the hub, key(s), shaft nut, etc. to assure they are secure. If any loose parts are found, they must be secured before solo operation.
- 5.2.6 Equipment is now ready for solo operation.
- 5.3 RS/HP Short Series Couplings
- 5.3.1 Remove the diaphragm pack sub-assembly and spacer rings as described in section 4 Paragraph 4.7.3.1 through 4.7.3.6.
- 5.3.2 Check the hub, key(s), shaft nut, etc. to assure they are secure. If any loose parts are found, they must be secured before solo operation.
- 5.3.3 Equipment is now ready for solo operation.

6. **MAINTENANCE**

The Ameriflex coupling has been designed to be maintenance free. However, inspection of the following items during normal equipment maintenance is recommended.

- 6.1 Inspect for loose fasteners, keys, hubs, flange adapters and pilot joints.
- 6.2 Inspect the tightening torque of the fasteners. Refer to the Ameridrives Sales Drawing for the proper fastener tightening torque.
- 6.3 An alignment check is recommended to determine any shift in equipment foundations or if bearing wear is excessive.
- 6.4 Slowly rotate the equipment and listen for any abnormal noises. Cracked diaphragms have an audible clicking sound.

CAUTION: IF ANY OF THE CHECKS LISTED ABOVE IDENTIFY A PROBLEM, THEN DO NOT OPERATE THE EQUIPMENT UNTIL THE CONDITION HAS BEEN CORRECTED.

- 6.5 Fastener sets should be replaced after repeated use (5 times for bolts and nuts, 15 times for bolts and heli-coils).
- 6.6 Component balanced and assembly check balanced couplings permit field replacement of components without adversely affecting the final coupling unbalance. Assembly balanced couplings do not. Refer to the Ameridrives Sales Drawing or contact Ameridrives Customer Service for part interchangeability.

7. **FIELD SERVICE TECHNICIAN**

Should you desire assistance during installation of our couplings, Field Service Technicians are available for on-site technical support. For further information contact Ameridrives Customer Service at 814/480-5000.

8. **ORDERING INFORMATION**

- 8.1 When ordering replacement or spare parts for your Ameriflex coupling, please include the following:
 - 8.1.1 Coupling size and series.
 - 8.1.2 Serial Number (etched on all major components).
 - 8.1.3 Part Number and name of part (Refer to Ameridrives Sales Drawing).
 - 8.1.4 Sales Drawing Number (etched on the spacer).
- 8.2 Mail all correspondence to:

***Ameridrives International
Coupling Products
P.O. Box 4000
1802 Pittsburgh Avenue
Erie, PA 16512-4000
Phone: 814/480-5000
Fax: 814/453-5891***