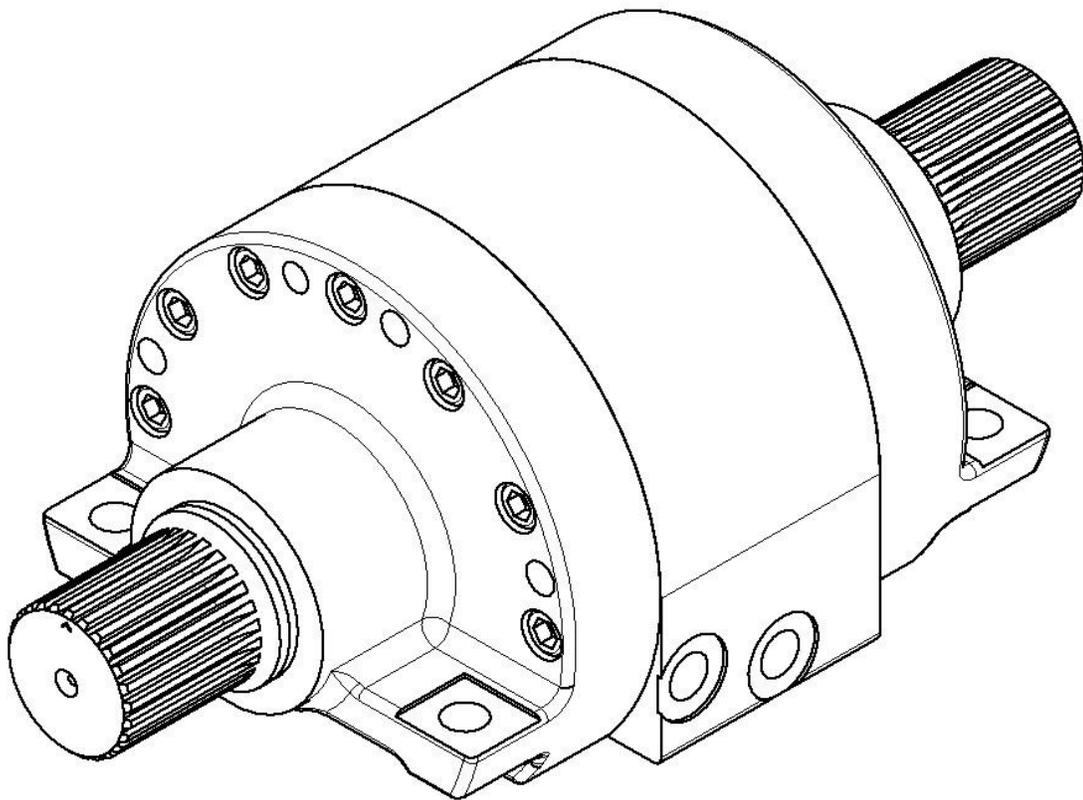


REPAIR PROCEDURES

Rotac[®] Model SS-012 (SPEC.)

Repair Procedure– 26-17-0116
For Bill of Material– 420659-S-B



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REVISION HISTORY

REV.	DATE	ECO	DESCRIPTION	BY
-	15JUN2016		INITIAL RELEASE OF REPAIR AND ASSEMBLY PROCEDURE	R. DAY
A	28JUN2017	10285	ADDED ASSEMBLY TOOLS PRODUCTION PART NUMBER INFO	R. DAY

ACTUATOR DISASSEMBLY, INSPECTION AND ASSEMBLY

INTRODUCTION

These instructions provide overhaul instructions and parts list for the SS-012-1V-FT-Z-B-Z-A-2 (SPEC.) Rotac® Waste Tipper Rotary Vane Actuator.

Do not attempt to overhaul an actuator without having a seal kit on hand. Refer to the parts list, Figure 3, for information regarding seal kits. The exploded view drawing, Figure 3, should be used for reference in following the overhaul instructions.

DISASSEMBLY

Read the special instructions below before proceeding. Reference Figure 3 for relative part location(s).

1. Clean exterior of unit as clean as possible. This will help assure that any material found in the unit is a result of wear, system contamination or damage. A more accurate evaluation of the unit and operation system is thus obtained.
2. Remove all burrs from the shaft (1) extension.
3. Before disassembly, the body (2) heads (5, 6) and shaft (1) should be marked in order to return parts to their relative positions during assembly.
4. Do not hold a rotary actuator in a vise unless special precautions are taken to avoid marring or distorting the body or ends. The preferred method of holding the actuator during disassembly is mounting on a holding fixture, which simulates normal actuator mounting.
5. After removing head screws from both heads (5, 6), strike end of shaft with plastic mallet or aluminum bar stock, and allow the shaft to push the head off. These units have threaded holes in the head that will assist you to separate the head from the body. **DO NOT PRY HEADS OFF!!!** Damage will occur to body or heads.
6. Pull the shaft out, with a straight even pull, being careful that the shaft (1) vane does not fall and nick the body (2).

IMPORTANT: Do not allow the shaft (1) to “cock/tilt” as this may break the sharp edges on the body causing internal leakage during operation.

7. Remove all seals and inspect for cuts, nicks, or any other unusual conditions of the seal. (Compare to new seal kit).

INSPECTION/EVALUATION

1. Examine oil residue inside the actuator. This may give a clue as to why any damage has occurred.
 - A. Dirty or gritty oil will cause scoring of internal surfaces.
 - B. Varnish on internal parts can be a sign of oil in system running too hot.

- C. Metal particles - Metal chips may be found from valve spools, actuator internal parts and other metal components in the system.

The appearance of any of the above will require total flushing and cleaning of the entire system.

2. Wash all parts thoroughly and examine for defects.

A. Shaft (Figure 1)

1. Examine the vane for cracks at "A" diameter, keyways, and any other areas where stress may be applied.

- a. Spot check by Magnaflux can be used to check for cracks. Three different materials are needed and must be applied in order:

- SKC-S Cleaner
- SKL-HF/SKL-S Penetrant
- SKD-S Developer

FOLLOW THE DIRECTIONS ON BACK OF THE CANS CAREFULLY.

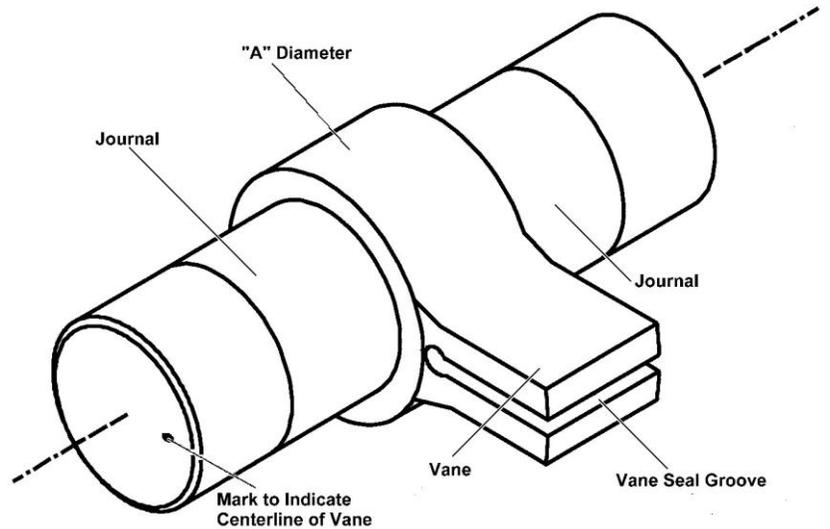


Figure 1 – Shaft Definitions

- c. Scoring on "A" (major) diameter. See Figure 1. Any scratch 0.010 inches or more deep indicates replacement.
- d. Scoring or galling on shaft journal. See Figure 1. This problem can be repaired with hard chrome, however, many critical dimensions must be held. This type of repair should be performed by the actuator manufacturer.
- e. Scoring or galling on end of "A" (major) diameter. See Figure 1. This is another problem that can be repaired; however, it is recommended that this type of repair be performed by the actuator manufacturer.

B. Body

1. Any light scoring can be polished out with 400-grit emery cloth or its equivalent. Scoring of 0.010 inches or more deep indicates replacement of this part. When pressurized, the body will expand and contract. For this reason, plating or sleeving is not recommended by the factory for repair.
2. Cracks may be found across the dowel holes, screw holes, or ports. This indicates replacement of this part.

3. Dowel holes may be elongated or out of round. These holes may be drilled oversize or re-bushed. However, the proper size and location of the dowel hole must be known to accomplish this repair.

C. Heads

1. Scoring on the face of the head must be repaired. Possible causes are:
 - a. Gritty particles in the oil.
 - b. Axial load on shaft.
2. Minor scoring can be polished out with 400-grit emery cloth, or equivalent.
3. Cracks in head are usually around bolt circle or dowel pattern and if this occurs, replacement of the part is necessary.

D. Seals - It is recommended that all seals be replaced.

1. Cut or shaved seal is usually done during assembly.
This can occur in a number of different ways. Refer to the assembly instructions to carry out proper assembly.

SEAL REPLACEMENT AND ASSEMBLY

The assembly area must be clean and free from all dirt, dust, or other harmful material. A plastic or metal-covered workbench is the best. Parts should be re-cleaned if necessary. A small pliable brush should be used to clean seal grooves, dowel holes, screw holes, and other hard-to-get-at areas. Remove all burrs that may be on any part. Do not break corners on shaft "A" diameter or body. These sharp edges are important to the operation and function of the actuator.

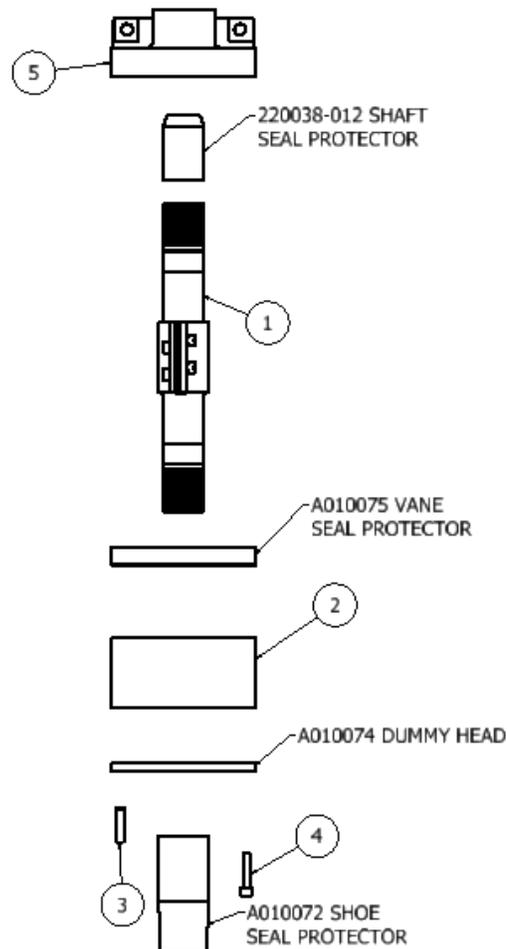


Figure 2 – Assembly Tools

Tools

During the assembly of the unit, the seals need to be protected. Assembly tools are required to install seal kits. The tools are:

- A. A010074 dummy head - to hold the shoe seal during installation.
- B. A010072 shoe seal protector.
- C. A010075 vane seal protector.
- D. 220038-012 shaft seal protector.

Reference Table 3 and Figure 2. Use a lubricant on all seals and internal parts that is compatible with the driving fluid used. DS-ES Lubriplate by Fiske Brothers is used at the actuator factory. Petroleum jelly is also compatible in most hydraulic systems.

Assembly - Reference Figure 3.

- A. Place body (2) on a flat surface. Put the head dowel pins (3) into the body for the dummy head. Attach the dummy head so that it is properly seated. Turn the body and dummy head over so that the dummy head is on the flat surface.
- B. Install the shoe cushion seal (11) and shoe cap seal (10) into the body (2). If they were removed previously, install cross-port plugs (17) into body per Table 1, Torque Specifications.
- C. Lubricate the shoe cap seal (10) and the ID of the body (2).
- D. Insert the vane cushion seal (15) and "C" shaped shaft vane cap seal (14) in vane of the shaft (1). Lubricate to hold the seals in position. Lubricate the "A" diameter of the shaft (see figure 1). Use care to avoid nicking or cutting the vane seals. All vane cap seal corners must remain sharp.
- E. Place the vane seal protector on the body and assure that it is properly seated. Place the shoe seal protector over the shaft extension and place this assembly into the dummy head. Rotate the shaft (1) approximately 90° from the shoe position. Slide the shaft (1) into the body (2) until the vane is fully installed. Remove the vane seal protector and the shoe seal protector.
- F. Install shaft cushion seal (12) and shaft cap seal (13) into the head (5). Smooth out ripples or wrinkles in the installed shaft cap seal (13). Install dirt excluder seal (6) into the head (5). Place wavy spring (7), hub ring seal (8), and hub cap seal (9) into the head (5). Insure that hub cap seal (9) is free to move axially.
- G. Place head O-ring seal (16) into the groove in the head (5).
- H. Lubricate all seals and internal parts with grease sufficient to maintain the seals in position when the head is inverted and installed on the body (2).
- I. Invert the head (5) and carefully slide it down over the shaft (1). Do not hammer on the head (5) or allow the hub cap seal (9) or head O-ring seal (16) to become dislodged from its cavity as the head (5) is mated to the body (2). Install two screws (4) 180° apart and tighten the screws (4) to pull the head (5) onto the body (2).
- J. Install the head dowel pins (3) into the head and the remainder of the screws (4) through the head (5) and into the body (2).
- K. Turn the assembly over and remove the dummy head.
- L. Install shaft cushion seal (12) and shaft cap seal (13) into the second head (5). Smooth out ripples or wrinkles in the installed shaft cap seal (13). Install dirt excluder seal (6) into the head (5). Place wavy spring (7), hub ring seal (8), and hub cap seal (9) into the head (5). Insure that hub cap seal (9) is free to move axially.
- M. Place head O-ring seal (16) into the groove in the head (5).
- N. Lubricate all seals and internal parts with grease, sufficient to maintain the seals in position when the head (5) is inverted and installed on the body (2)
- O. Invert the head (5) and carefully slide it down over the shaft (1). Do not hammer on the head (5) or allow the hub cap seal (9) or head O-ring seal (16) to become dislodged from its cavity as the head (5) is mated to the body (2). Install two screws (4) 180° apart and tighten the screws (4) to pull the head (5) onto the body (2).
- P. Install the head dowel pins (3) into the head (5) and the remainder of the screws (4), through the head (5) and into the body (2).
- Q. For repairs: lightly grease bolt threads (new/factory-built units have pre-waxed bolts). Then apply blue Loctite. This helps ensure proper top torque values are reached.
- R. Torque all head screws (4) per Table 1, Torque Specifications.

Factory-built actuators are then tested for internal by-pass leakage and breakaway pressure. See chart in table 2. Actuator should be cycled 10-20 times before beginning the tests.

TABLE 1 – TORQUE SPECIFICATIONS

MODEL	SCREW SIZE	TORQUE
SS-012 (SPEC.)	7/16-14	70 ft-lb (95 Nm) – lightly greased, Blue Loctite
SS-012 (SPEC.)	3/8-24	35 ft-lb (47 Nm) – Blue Loctite

TABLE 2 – BREAKAWAY & LEAKAGE CHART

MODEL	BREAKAWAY PRESSURE	INTERNAL BY-PASS LEAKAGE (per minute)
SS-012 (SPEC.)	50 PSI	20 cubic inches @ 3000 PSI for repairs

INTERNAL BY-PASS LEAKAGE: Leakage checks to be made at pressure listed. The fluid is measured out the exhaust port of the actuator. Pressure to be maintained at psi listed for one (1) full minute before check is started. The unit is tested in both directions.

BREAKAWAY PRESSURE: An internal pressure, as listed, must accomplish rotation of an actuator shaft through the full stroke. The unit is tested in both directions.

EXTERNAL LEAKAGE: There should be no external leakage from the unit.

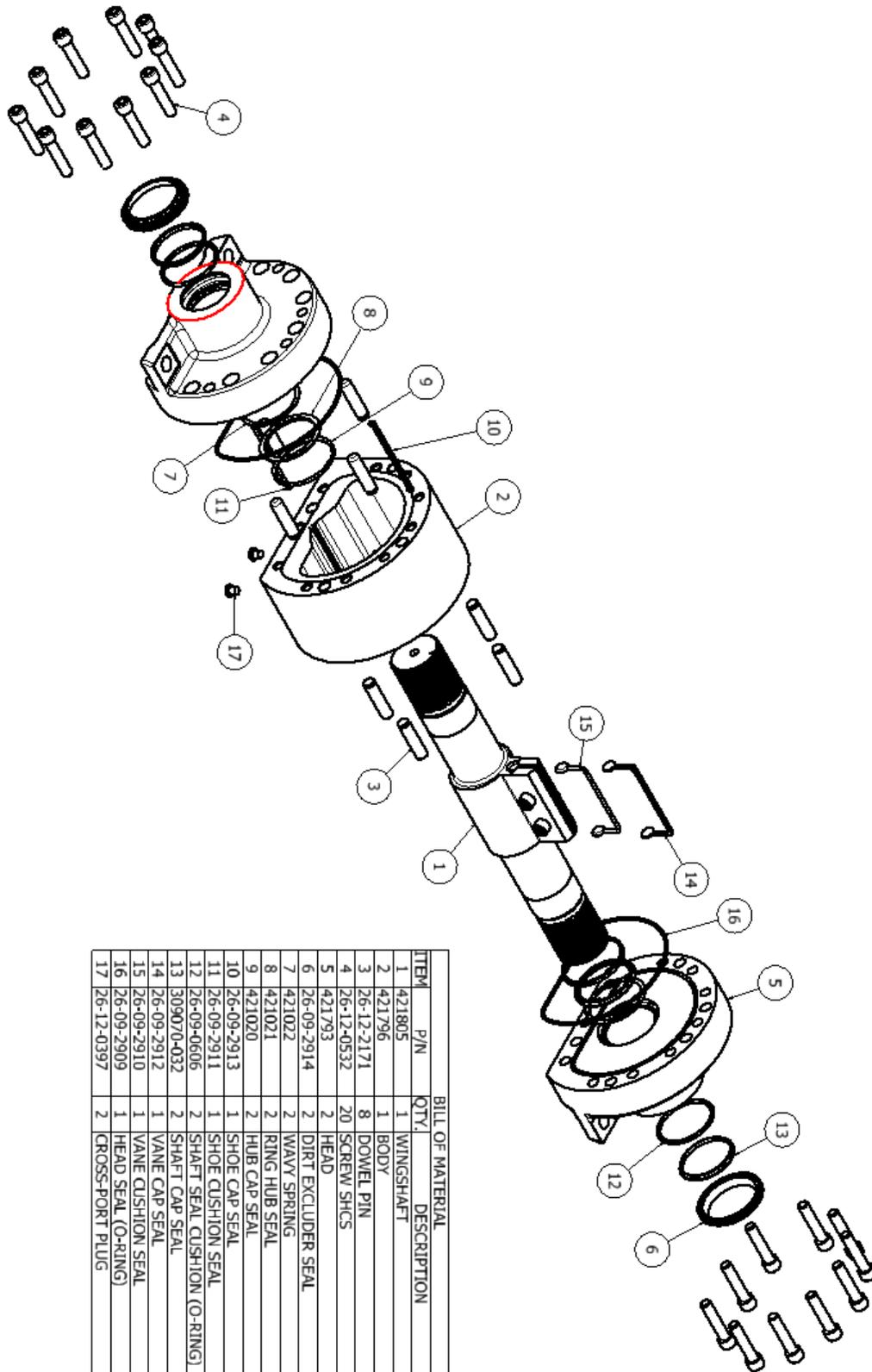
TABLE 3 – Assembly Tools

TOOL	TOOL NUMBER
A010074	Dummy Head
221038-012	Shaft Seal Protector
A010075	Vane Seal Protector
A010072	Shoe Seal Protector

TABLE 4 – Kits

KIT NUMBER	KIT NUMBER
26-97-0274	Seals and Fasteners
420659-K1	Seals Only

FIGURE 3 - Parts View



ITEM	P/N	QTY.	DESCRIPTION
1	421805	1	WINGSHAFT
2	421796	1	BODY
3	26-12-2171	8	DOWEL PIN
4	26-12-0532	20	SCREW SHCS
5	421793	2	HEAD
6	26-09-2914	2	DIRT EXCLUDER SEAL
7	421022	2	WAVY SPRING
8	421021	2	RING HUB SEAL
9	421020	2	HUB CAP SEAL
10	26-09-2913	1	SHOE CAP SEAL
11	26-09-2911	1	SHOE CUSHION SEAL
12	26-09-0606	2	SHAFT SEAL CUSHION (O-RING)
13	309070-032	2	SHAFT SEAL CUSHION (O-RING)
14	26-09-2912	1	VANE CAP SEAL
15	26-09-2910	1	VANE CUSHION SEAL
16	26-09-2909	1	HEAD SEAL (O-RING)
17	26-12-0397	2	CROSS-PORT PLUG

TABLE 5 – Troubleshooting Guide

TROUBLE	PROBABLE CAUSE	REMEDY
External Leakage at Shaft	Defective shaft seal cap(s) (13) or O-ring(s) (12).	Replace defective parts.
	Shaft (1) scored or worn.	Repair or replace defective part.
External Leakage at Joint Between Head (5) and Body (2)	Defective head seal O-rings (16), or damaged sealing surface on head (5) or body (2). Improper torque on the head cap screws (4).	Replace defective O-ring. Replace damaged parts. Tighten cap screws to recommended torque.
Excessive Internal Leakage	Defective shoe seal cap (10), shoe seal cushion (11), vane seal cushion (15), and/or vane seal cap (14)	Replace defective parts.
	Defective hub seal cap (9), hub seal ring (8), or wavy spring (7).	Replace defective parts.
	Worn or scratched end faces on heads (5) or in body (2).	Repair or replace.
	Worn or scratched ID of body (2).	Repair or replace.
	Head cap screws (4) not tightened sufficiently.	Tighten to recommended torque.
	"C" style vane seal cap (14) not seated properly (Applicable to units immediately after overhaul only).	Operate through full cycles for a few minutes to attempt to seat seals.