



**Bulk Solids Handling Equipment**

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# **INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS**



## **HYPERGIENIC ROTARY VALVE (FIXED RAIL ENCLOSURE VERSION)**

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## 1.0 REFERENCES

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- 1.1 This manual is specifically for 'HYPERGIENIC' Fast Clean Rotary valves fitted with FIXED RAILS and designed for operation within an 'ENCLOSURE' (Also known as a Glove Box or Isolator).
- 1.2 See Rota Val Ltd specification sheet for project reference details and serial numbers.
- 1.3 The 'HYPERGIENIC' valve is highly polished internally and satin externally, which means permanent labels of any form is prohibited. Also many parts are either identical or symmetrical, therefore, before any dis-assembly, valve parts and orientation of parts should be fitted with temporary labels, which do not cause any surface damage, do not deteriorate during the cleaning cycle and are easily removed during re-assembly.
- 1.4 The following list will assist with identifying the orientation of some items.
- |                          |   |   |
|--------------------------|---|---|
| Isolator                 | : | The end with a large hole is the DE.  |
| End covers               | : | The cover with the longest rail boss is the NDE   |
| Body                     | : | There are two body designs, these being parallel bore and taper bore. To establish which type is fitted, measure the rotor diameter.  |
| Body (Parallel bore)     | : | The first time the body is installed in the isolator, the body can be positioned either way. However thereafter the body position is fixed and must be labelled prior to removal. |
| Body (Taper bore)        | : | The smaller diameter is the DE and the larger diameter is the NDE.  |
| Rotor                    | : | The end of the NDE shaft has a tapped hole for the extractor tool.  |
| Rotor direction (fitted) | : | The rotor vanes are chamfered and should rotate such that the chamfer is trailing.  |
| Rails                    | : | Shorter rails are the DE with bosses pre-fitted; longer rails are NDE.  |
- 1.5 Throughout this manual various terminology is used, therefore we detail the following explanations :-
- |      |   |  |
|------|---|--|
| DE   | : | <u>D</u> rive <u>E</u> nd (The end of the valve fitted with the geared motor unit)                 |
| NDE  | : | <u>N</u> on <u>D</u> rive <u>E</u> nd (The end of the valve not fitted with the geared motor unit) |
| CIP  | : | <u>C</u> lean <u>I</u> n <u>P</u> lace   |
| GMU  | : | <u>G</u> earred <u>M</u> otor <u>U</u> nit   |
| Barg | : | Pressure differential compared to atmosphere.  |
- 1.6 Gaskets supplied with the isolator must be replaced with exactly the same part (ie Thickness, Hardness and composition) to maintain the tight operating tolerances.
- 1.7 SEALS – This valve incorporates various lipseals, which by design are fragile and require the utmost care when fitting and/or interfacing with other components. (I.e.: When aligning the rotor shaft into the body, ensure all movements are gentle and gradual, continuously observing the seals).

## 2.0 GENERAL OPERATING PARAMETERS

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- 2.1 Rota Val Ltd 'HYPERGIENIC' Rotary Valves are designed to control the flow of dry solids in gravity or pneumatic conveying systems, operating under negative or positive pressure differentials. Close manufacturing tolerances and a wide range of interchangeable components allow each valve to be supplied against particular application data. Therefore all valves have individual specification sheets, which identify all the specific application data against which the valve was designed and supplied. It should be noted that valve size, machining tolerances and certain features are determined by these application requirements; valves should not be used for any other duty than that specified **WITHOUT CONSULTING ROTA VAL TECHNICAL SALES DEPARTMENT**.
- 2.2 This valve is fitted with various pipe connections, each performing various duties and some have multi-functions. The top pipe (21) attached to the hub of each end cover is for direct connection to clients leakage monitor. This will transfer any leakage gas/air from the shaft seal assembly and will confirm that a lipseal (19) has failed (NB: a failed lipseal normally means damage from foreign material, which usually means the air purge is not operating correctly, see 2.3 for more information).
- 2.3 The lower pipe (23) attached to the hub of each end cover is the air purge connection, which ensures a positive flow of air/gas into the body of the valve, thus preventing ingress of powder down the shaft to the lipseals. The air purge pressure should always be 0.3 Barg above the maximum differential pressure in the valve and should always be purging when either the valve is operating and/or the differential pressure is apparent in the valve. (NB: All rotary valves leak whenever a pressure differential is present, this leakage is not affected by rotation and therefore will leak as much through a static valve).
- 2.4 The lower pipe(s) (22) attached directly to the end covers are for pocket purge to clean the bottom most pocket(s). The number of pocket purge pipes is determined by the valve size and/or number of vanes. This purge will require air/gas at a pressure of up to 2 Barg (maximum) and will be activated by client when the rotary valve is stationary.
- 2.5 The air purge (23) and pocket purge (22) can be operated with either dry air or nitrogen (See specification sheet for exact project details).
- 2.6 To identify parts see Section 16.0
- 2.7 Seals – This valve incorporates various lipseal, which by design are fragile and require the utmost care when fitting and/or interfacing with other components. (I.e.: When aligning the rotor shaft into the body, ensure all movements are gentle and gradual, continuously observing the seals).

## 3.0 HEALTH AND SAFETY

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- 3.1 The valve contains moving parts that can be injurious: it is the responsibility of the system installer/user to ensure the safe installation and operation of the valve. In particular it must be adequately protected and guarded, IN COMPLIANCE WITH LOCAL HEALTH AND SAFETY REGULATIONS. The motor must be isolated before any cleaning, maintenance or adjustment is carried out: do not operate the valve with the drive guard, or any other part of the valve, removed. Only competent persons must be used to maintain the valve.
- 3.2 In particular inlet and outlet openings should always be protected to prevent access, even when static. The vane tolerance on these valves is very fine; therefore extreme caution is required at all times.
- 3.3 Read in conjunction with Rota Val document DS55 ~ Safety Features for fast clean or easy clean rotary valves.

**IT IS THE RESPONSIBILITY OF THE PURCHASER/USER OF THIS EQUIPMENT TO ENSURE THAT THESE HEALTH AND SAFETY INSTRUCTIONS ARE PASSED ON TO THOSE PERSONS LIKELY TO BE AT RISK.**

## **4.0 RESIDUAL HAZARDS**

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- 4.1 The valve is intended for connection in to a fully enclosed system and must not be operated whilst **ANY** of the connection ports remain unconnected.
- 4.2 Care must always be exercised when removing and installing the rotor. Beware of trap points and sharp edges paying particular attention to the vane edges, the end cover/body interface and the interconnection of the rotor shaft in the drive hub and tailpiece. Beware also of other personnel with access to the valve that may come into contact with the moving components.
- 4.3 Deterioration of the gland seals will be indicated by the leakage monitor (supplied by others) there may be some product retention in the gland housing.
- 4.4 The valve is fitted with various safety switches to protect the operator(s). These switches need to be connected to client's safety circuit, which will stop or prevent the valve from operating if any of the safety switches are activated.
- 4.5 To ensure both end covers are correctly positioned two sets of safety switches are fitted, one set (28) is directly mounted to the NDE end cover, the other safety switch (26) is fitted to the drive shaft guard on the DE. Note : Although the safety switches confirm that the end covers are in place, it does not indicate that they are locked in position, therefore client/end user must incorporate text in their standard procedures to ensure that all quick release clamps and fixings are correctly tightened prior to start-up.
- 4.6 The other safety switch (41) is an integral part of the "extractor tool" docking port (40). The extractor tool (34) is utilised to lock the rotor to the NDE end cover prior to being withdrawn for cleaning. Before operating the valve the extractor tool **MUST** be returned to the docking port, which will de-activate the safety switch. Note : This valve **MUST NOT**, under any circumstances, be operated with the extraction tool still in the NDE end cover as this will cause damage to the valve.
- 4.7 The valve is fitted with a sensor (49) to indicate rotor position such that only a maximum of two pockets are open, with the others being fully closed. This positioning then allows the open pockets to be blown clean via the pocket purge pipe(s) prior to opening the lower interface (Flanged or Tri-Clamp) connection and/or working below the valve. **Note** for isolator supplier: Sufficient time must be allowed for the material and dust clouds to settle. The sensor should be connected to a suitable control circuit.
- 4.8 If the product being handled is a potentially explosive dust, precautions must be taken to ensure the risk of explosion is eliminated prior to the cleaning or maintenance period.
- 4.9 There may be a head of material above the valve, this must be removed or isolated before opening the valve.
- 4.10 Read in conjunction with Rota Val document DS56 ~ Residual Hazards for fast clean or easy clean rotary valves.

## **5.0 NOISE**

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- 5.1 The noise generated by the valve is insignificant compared to the motor and gearbox under normal conditions. Any significant noise generation, is an indication of product build up, trapped particles or mechanical failure and as such can be addressed (see operation and commissioning).

## 6.0 HANDLING

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- 6.1 This section relates to the handling of the valve prior to installation in the isolator.
- 6.2 When the valve is supplied in component form and palletised. It should remain in its packing until ready for installation in the isolator.
- 6.3 It may be moved using fork truck or similar while in this condition.
- 6.4 When removed from packaging the individual components may be moved using overhead crane and slings and assembled into the isolator directly, as described in the Section 7.0.
- 6.5 Surface finish is one of the primary requirements for this valve, therefore extreme measures are required when handling any components. Any item (sling / lifting gear), location or area that comes into contact with the valve, should be covered with soft material to ensure parts are not damaged and/or scratched.

## 7.0 INSTALLATION

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- 7.1 This section will assist with removal and re-installation. Any work carried out on this valve should be done by a COMPETENT fitter. This work should NOT be rushed, items must be offered up to each other slowly and smoothly. If any resistance is encountered DO NOT CONTINUE, go back, re-check, re-measure and adjust accordingly. Some stages may have to be adjusted several times to achieve final alignment, this is because the tolerances on this valve are very tight.
- 7.2 Follow the instructions in the given order below. Access will be gained through the various openings in the isolator, which are located in the top, end and side. Isolator must be supplied with relevant gaskets, seals and flexible connections.

### **ENSURE YOU READ AND UNDERSTAND THE WHOLE MANUAL BEFORE YOU ATTEMPT TO HANDLE THE VALVE**

- 7.3 Lower the empty body (1) through the top of the isolator and bring to rest (in the correct orientation) on the lower isolator flange (do not attach).
- 7.4 Fit the NDE rails (5) into the NDE end cover (2) bosses, lift and slide this assembly through the side of the isolator and fit to the NDE of the body. The weight and length of the NDE rails and end cover assembly make this a difficult operation, therefore great care is needed when lifting and sliding into the isolator. The NDE end cover is then secured to the body by tightening the swing bolts (30 & 31). The rails need to be pushed through the end cover bosses and into the body rail clamps (39); to assist with this operation the end cover fixings may have to be slightly relaxed to allow final alignment. When aligned re-tighten the end cover fixings and the rail body clamps.

### **NOTE : DO NOT FIT THE ROTOR UNTIL INSTRUCTED TO DO SO**

- 7.5 Fit end bosses (36) to the free end of the NDE rails.
- 7.6 Swivel the body to align the NDE bosses with the isolator pillars. Securely fit the rail NDE end bosses to the isolator pillars, the body clamps may have to be relaxed to assist with final alignment. Ensure these rails are a) perpendicular to the end cover; b) parallel to each other and c) horizontally level. Secure the body to the lower flange in the isolator.
- 7.7 Lift and slide the DE end cover (3) through the side of the isolator and attached to the DE of the body. Ensure the parts are handled with care and are offered up to each other slowly.
- 7.8 Slide the DE rails (6) into the DE end cover (3) bosses, the rails need to be pushed through the end cover bosses and into the body rail clamps (39); to assist with this operation the end cover fixings may have to be slightly relaxed to allow alignment. In first instance these rails may need to be pushed in slightly further to allow the interface flange to be positioned.

- 7.9 In preparation for future use the large flexible connection (which eventually connects the interface flange with the isolator) needs to be passed over both DE rails.
- 7.10 Lift and slide the interface flange (42) through the end of the isolator and mount onto the end of the DE rails, these rails are already fitted with connecting bosses (37).
- 7.11 Referring to the planning in drawing appended to this manual, the distance from the centre line of the rotary valve and the interface flange needs to be accurately measured and fixed by securing the body rail clamps.
- 7.12 Install the GMU mounting bracket (50) onto the studs and align / temporarily secure to the interface flange (do not fully tighten these nuts at this stage). Adjust GMU mounting bracket to level the DE rails and temporarily secure in this position.
- 7.13 Mount the GMU (51) and secure with bolts through both interface flange and GMU mounting bracket.
- 7.14 The GMU should already be fitted with the sensor target (44) assembly, if these needs to be removed then mark the GMU shaft prior to removal.
- 7.15 The whole assembly now needs to be re-checked for alignment such that all rails are i) perpendicular to the end cover. ii) Parallel to each other and most critical. iii) horizontally level.
- 7.16 Ensure all fixings are now secured. Note : Further adjustments maybe needed when the rotor is fitted.
- 7.17 Fit the large flexible seal between the isolator body and the interface flange and secure with retaining clips.
- 7.18 Release and slide both end covers along the rails away from the body. Fit 'O' ring seals (32) to both ends of the body and secure with a food quality adhesive.
- 7.19 Slide the DE end cover back along the rails and secure to the body by fully tightening the swing bolts (30 & 31). This means that the swing bolts are to be secured as much as possible by hand, such that the 'O' ring seal is compressed and there is metal to metal contact between the DE end cover and the body.
- 7.20 Lift and slide the rotor (4) through the side of the isolator and slide the NDE of the rotor into the NDE end cover (2). Take care not to damage or scratch either the rotor or the end cover. Screw the extractor tool (34) into the NDE of the rotor, continue rotating until the rotor is tight against the end cover. Note: Tight means secured as much as possible by hand.
- 7.21 Extractor tool (34) must be fitted with PTFE washer.
- 7.22 The rotor (mounted on the NDE end cover) can now be offered up to the body by pushing the whole assembly along the rails. This operation needs to be done slowly and very carefully, because this is point where the most damage could occur. In the first instance position the DE of the rotor approx 1mm away from the NDE of the body and visually look to see if the rotor is central, if not then check rails and body for alignment; tightness of bolts and entrapment of foreign bodies. (Note : because the isolator is influenced by the weight of the GMU, both NDE and DE rails may need checking).

**NOTE : THE INTENTION OF THIS LENGTHY ROTOR PROCEDURE IS TO PREVENT CONTACT AND POSSIBLE DAMAGE TO THE BODY.**

**ROTOR ALIGNMENT CAN TAKE UP TO ONE HOUR - THERE IS NO QUICK FIX**

- 7.23 When visually central slowly move the rotor into the housing by approx 25mm, again check that the rotor is central and adjust accordingly. Continue to slowly push the rotor in the housing 25mm at a time, always checking the rotor is central. IF AT ANY TIME THE ROTOR TOUCHES THE BODY BORE OR IT BECOMES MORE DIFFICULT TO MOVE THEN **STOP**, CHECK ROTOR ALIGNMENT AND ADJUST AS NECESSARY.

- 7.24 When the rotor is correctly positioned it should move freely up and down the rails and fully into the body without coming into contact with the body bore. To ensure the rotor can be fully positioned into the body, the DE hub (18) needs to be manually rotated until it lines up with the rotor shaft tongue.
- 7.25 When the rotor is fully home the NDE end cover can be secured to the body by fully tightening the swing bolts. This means that the swing bolts are to be secured as much as possible by hand, such that the 'O' ring seal is compressed and there is metal to metal contact between the NDE end cover and the body.
- 7.26 Remove extractor tool (34) to release rotor (4), spring-loaded wave springs (15) will automatically position the rotor within the body.

**NOTE : EXTRACTOR TOOL MUST BE REMOVED BEFORE THE VALVE IS ROTATED**

- 7.27 Fit drive shaft (24) between the DE drive hub (18) and the GMU drive hub (43). To achieve final alignment the DE hub may need rotating (Note: if rotation is not possible check i) extractor tool has been removed and ii) the wave springs have released the rotor). Place drive shaft guard (25) over the shaft such that the safety switches (26) are aligned.
- 7.28 Fit the extractor tool docking port (40) to the isolator body. Fit the proximity sensor (41) to the docking port, which will detect if the extractor tool (34) is present. Fit the safety switches (28 & 26) to the NDE end cover/body and the drive shaft guard/interface flange. Fit the rotor pocket sensor (49) in the interface flange (42).
- 7.29 The safety switches and the extractor tool docking port sensor switch need to be connected to a suitable safety circuit to ensure the motor supply is isolated, if any of these switches are activated. Which means that either the valve is not correctly closed and/or the extractor tool is not correctly positioned after cleaning.
- 7.30 Connect all pipe connections (21, 22 & 23).
- 7.31 When installing the unit in the system it must be noted that **THE VALVE HOUSING MUST NOT BE STRESSED OR USED TO SUPPORT ANCILLARY EQUIPMENT**. Fit compressible seals to inlet and outlet, ensuring the connection prevents unauthorised access to the valve internals.
- 7.32 The motor must be connected to a suitable electrical supply in accordance with the manufacturer's nameplate, operation and maintenance instructions. Check that the Geared Motor Unit is filled with lubricant, in accordance with the manufacturer's instructions. Top up or fill as necessary. Check that the valve rotates in the correct direction.
- 7.33 The valve is now correctly installed and ready to operate.

## **8.0 COMMISSIONING**

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- 8.1 Before running the valve ensure the following actions are carried out in order.
- 8.1.1 Check the sensors and safety switches are working correctly.
  - 8.1.2 Ensure the end-covers slide freely and the rotor does not come into contact with the body bore.
  - 8.1.3 Check all end-cover fixings are secure and tight as possible, manually.
  - 8.1.4 Check the drive shaft is secure.
  - 8.1.5 Check all purge points are connected and secure. That they are operating at the correct pressure and in the correct sequence.
  - 8.1.6 Check all other connections are secure.
- 8.2 Check the valve is running in the right direction.

- 8.3 Check that the rotor stops with a vane bottom dead centre. Adjust the time delay between sensing the rotor position and isolating the motor. Note: this only applies to controlled shut downs where the motor is isolated according to the target sensor and does not apply to emergency shut downs, activation of safety switches and/or power failure, because on these occasions the valve must stop immediately.
- 8.4 The pocket purge sequence must be adjusted until material discharge is acceptable. It is recommended that some initial checks be made to ascertain the extent of build-up on the rotor before engaging the purge (i.e. an inspection of the rotor on removal from the body before cleaning is commenced). Apply the purge as follows, in order, until the pockets are being cleaned effectively (only moving on to the next stage if the last proves ineffective):
- 8.4.1 Apply purge of 0.1 Barg after valve has stopped (pulse time of 5 seconds should be sufficient).
  - 8.4.2 Increase purge pressure in stages of 0.2 to 0.3 Barg up to maximum of 2 Barg.
  - 8.4.3 Increase the purge time in stages up to 30 seconds.
  - 8.4.4 Employ a continuous pulse purge, lasting one complete rotor revolution, once every 5 minutes.
  - 8.4.5 Increase the frequency in stages to once every minute.
  - 8.4.6 Run the purge continuously at the lowest pressure that reliably clears the pockets.

For a dry free-flowing product, which exhibits no adhesive properties, there should be no need to move beyond step 8.4.1.

## 9.0 OPERATION

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- 9.1 The valve performance is related to the system performance and any major departure from the specified throughput (as detailed in the specification sheet) will require investigation. Common causes of deterioration in performance are given below.
- 9.1.1 Material not present or held up in the inlet, the latter may be a result of increased gas flow past the rotor clearances, which in turn could be due to increased pressure differential or worn vane edges.
  - 9.1.2 Due to increased moisture content in the product or failure of the pocket purge to fully clear the pocket.
  - 9.1.3 Material density changes.
  - 9.1.4 Valve incorrectly installed and/or assembled
  - 9.1.5 Change in working environment (ie : increase in humidity or temperature, thus effecting the characteristics of the material).
- 9.2 Difficulties experienced when cleaning the valve internals such as contact between rotor and bore or end-cover face indicates bearing wear or movement of the rail positions.

## 10.0 CLEANING

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- 10.1 Ensure the feed into the Rotary Valve is clear of product.
- 10.2 Exchange the purge connections from purge gas to cleaning fluid. Run stage one of the CIP sequence, the rotor will turn during this part of the cleaning sequence.
- 10.3 Extract the rotor as follows:
- 10.3.1 Isolate the GMU (51).

**WARNING - ALWAYS ENSURE MOTOR POWER IS OFF BEFORE PROCEEDING FURTHER**

10.3.2 Disconnect purge supply pipes and allow to drain.

10.3.3 Remove rotor extractor tool (34) from the docking port (40). Slide the extractor tool through the NDE bearing housing and rotate clockwise **against the extractor retainer** to pull the rotor shaft through the bearing housing, continue to rotate until the rotor is tight against the end cover. Note : Tight means secured as much as possible by hand.

**CAUTION - DO NOT USE ANY OTHER TOOL, DAMAGE MAY OCCUR FROM OVERTIGHTENING**

10.3.4 Loosen the NDE swing bolts (30 & 31) and push them clear.

10.3.5 Pull the NDE end cover (2) away from the body and along the rails (5). The rotor (4) will be fixed to the NDE by the extractor tool (34).

**CAUTION - BEWARE OF SLIDING PARTS & TRAP POINTS - KEEP HANDS AND FINGERS CLEAR**

10.3.6 The rotor may be cleaned at this stage, DO NOT ATTEMPT TO ROTATE THE ROTOR WHILE ATTACHED TO THE END COVER.

10.3.7 To clean the bottom most pockets the rotor needs to be placed back into the body, secure the swing bolts, release the extractor tool, remove the drive shaft guard, remove the drive shaft and rotate the drive hub 180° (this will also turn the rotor through 180°). Re-install the drive shaft, re-install the drive shaft guard and repeat the rotor removal procedure above. The bottom pockets are now at the top and can therefore be cleaned.

**WARNING - DO NOT ROTATE THE ROTOR WHILE ATTACHED TO THE END COVER AND DO NOT WORK ON THE ROTOR WITHOUT THE EXTRACTOR TOOL FITTED.**

10.4 Remove the DE end cover as follows.

10.4.1 Lift and remove the drive shaft guard (25).

10.4.2 Loosen fixings and remove the drive shaft (24).

10.4.3 Disconnect purge supply pipes and allow to drain.

10.4.4 Loosen the DE swing bolts and push them clear.

10.4.5 Pull the DE end cover (3) away from the body (1) and along the rails (6).

**CAUTION - BEWARE OF SLIDING PARTS & TRAP POINTS - KEEP HANDS AND FINGERS CLEAR**

10.5 Fit the "BLANK" polycarbonate end-covers, the end cover with the spray-ball is the NDE. Run stage 2 of the CIP sequence (This is an optional extra, see specification sheet for exact details).

10.6 Remove "BLANK" polycarbonate end-covers (This is an optional extra, see specification sheet for exact details).

10.7 Check cleaning has been effective, paying particular attention to the rotor journals. If the NDE end cover and/or rotor journal need to be inspected proceed as follows:

10.7.1 Slide the DE end cover (3) back onto the body and fully tighten the swing bolts (30 & 31). This means that the swing bolts are to be secured as much as possible by hand, such that the 'O' ring seal is compressed and there is metal to metal contact between the DE end cover and the body

10.7.2 Slide the NDE end cover (2) complete with rotor (4) fully into the body (1) and fully tighten the swing bolts. Remove extractor tool (34) and lift extractor retainer (35). Re-insert extractor tool fully into rotor shaft. Lower extractor retainer. Release swing bolts. Rotate extractor tool anti-

clockwise, the NDE end cover will now move along the rails (5) away from the housing and rotor shaft. Continue until the extractor tool is separated from the rotor. Place extractor tool in docking port (40).

- 10.7.3 Slide the NDE end cover (2) away from the housing leaving the rotor in the housing DO NOT MOVE THE ROTOR - THIS WILL DAMAGE THE BODY BORE. The NDE cover and rotor journal are now accessible for viewing.

### **CAUTION - BEWARE OF SLIDING PARTS & TRAP POINTS - KEEP HANDS AND FINGERS CLEAR**

- 10.8 Slide the NDE end cover back onto the rotor shaft as far as possible. Using the swing bolts, draw the NDE end cover fully home to operating position.
- 10.9 Replace all purge pipes on both end covers.
- 10.10 Re-connect electrical supply to motor

## **11.0 MAINTENANCE**

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- 11.1 Rota Val Ltd 'HYPERGIENIC' Rotary Valves are designed to require minimum maintenance: however, regular attention in accordance with the following instruction will prolong valve life.
- 11.2 ROTOR (4)  
Rotor clearance is critical, the rotor clearance should be checked on a regular basis, the rotor should be replaced if gas or product leakage is causing operational problems.
- 11.3 ROTOR BEARINGS (13)  
Rotor bearings are greased packed and sealed for life, no maintenance being necessary. Bearings should be checked for wear and damage on a yearly basis and replaced if necessary. Bearings should be replaced after 10,000 operating hours (See DISMANTLING and RE-ASSEMBLY).
- 11.4 RAIL BEARINGS (53)  
Rail bearings should be inspected every 12 months and checked for wear. Replaced as necessary.
- 11.5 LIPSEALS  
Inspect on a monthly basis for wear and damage, these seals are not adjustable and leakage can only be cured by replacement.
- 11.6 'O' RING SEALS  
Inspect on a monthly basis for damage and replace as necessary.
- 11.7 SEAL AND POCKET PURGE  
Ensure that all pipes do not become blocked.
- 11.8 GEARED MOTOR UNIT (51)  
Geared units are proprietary items and need to be maintained in accordance with the manufacturer's instructions.

## **12.0 DISMANTLING**

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- 12.1 Complete dis-assembly of the valve requires full isolator access through the side and end openings. If the body needs to be removed then access is also required through the top of the isolator, therefore equipment above the isolator also needs to be removed (before working on the valve, ensure all material is removed).

12.2 Read sections 7.0 (Installation) and 10.0 (Cleaning) before proceeding with this section.

12.3 Isolate motor and disconnect supply cable.

12.4 Remove main components from isolator as follows:

12.4.1 Remove rotor from the body as detailed in section 10.3.2 to 10.3.7. To fully remove the rotor it needs to be supported through the whole of this operation. Remove extractor tool to allow the rotor to be carefully pulled away from the NDE end cover. Remove the rotor through the side of the isolator. Place extractor tool in docking port.

12.4.2 Remove drive shaft guard, drive shaft and large flexible sleeve between the interface flange and the isolator.

12.4.3 Remove GMU assembly (refer to section 7.0)

12.4.4 Remove DE rails and interface flange (refer to section 7.0).

12.4.5 Remove DE end cover (refer to section 7.0).

12.4.6 Release NDE bosses from the isolator pillars.

12.4.7 Remove the NDE rails and end cover together (refer to section 7.0).

12.4.8 Remove all safety switches and cables prior to body removal.

12.4.9 Remove body through the top of the isolator (refer to section 7.0).

12.5 Dismantle DE end cover, as follows

12.5.1 Remove the bearing retainer (7) complete with outer bearing seal (8) and extract the bearing assembly.

12.5.2 Remove inner bearing seal (16).

12.5.3 Hold the bearing assembly in soft jaws around the flange behind the innermost bearing. Release the tab from the bearing lock nut (10) and remove the nut with a suitable 'C' spanner, remove the tab washer (11) and spacer (12).

12.5.4 Draw off each bearing (13) in turn, noting the spacer (17) position.

12.5.5 Remove the shaft seal retainer (20) and remove the rotor shaft seals (19).

12.5.6 The linear rail bearings (53) and lipseal (52) should only be removed if they are to be replaced. Use internal bearing pullers or a suitable drift.

12.6 Dismantle NDE end cover, as follows:

12.6.1 Remove the bearing retainer (7) complete with outer bearing seal (8) and extract the bearing assembly.

12.6.2 Remove inner bearing seal (16).

12.6.3 Hold the bearing assembly in soft jaws around the flange behind the innermost bearing. Release the tab from the bearing lock nut (10) and remove the nut with a suitable 'C' spanner, remove the tab washer (11), spacer (14) and wave springs (15).

12.6.4 Draw off each bearing (13) in turn, noting the spacer (14) and wave spring (15) positions.

12.6.5 Remove the shaft seal retainer (20) and remove the rotor shaft seals (19).

12.6.6 Remove the extractor retainer (35).

- 12.6.7 The linear rail bearings (53) and lipseal (52) should only be removed if they are to be replaced. Use internal bearing pullers or a suitable drift.
- 12.7 Slide rails are shrink fitted into their respective support boss, each must be replaced as an assembly if the rails are worn.
- 12.8 GMU
- 12.8.1 Support the GMU (51) and interface flange (42), remove the interconnecting fixings. Draw the interface flange off, remove the lip seal (45) and rotation sensor (49).
- 12.8.2 Remove GMU drive hub (43), sensor target (44) and earth brush assembly (46, 47 and 48).

## 13.0 INSPECTION & REFURBISHING

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- 13.1 Wear and tear within the rotary valve is always uneven, usually affecting all internal components. Some improvement of performance may be achieved by replacing the most worn component(s), the improvement in most cases will be marginal and temporary.
- 13.2 Inspection of internal surfaces can be performed with reference to cleaning instructions, section 10. Check all surfaces for scoring and wear, any high spots may be eased away using emery cloth, a smooth file or grind stone. Acceptance of deep score marks or excessive wear will depend on the duty requirement and the characteristics of the media handled. If in doubt consult Rota Val Ltd technical sales department.
- NOTE - EXPLOSION AND/OR FLAME CONTAINMENT IS DEPENDANT ON THE TOLERANCE BETWEEN THE BODY BORE AND THE ROTOR BEING MAINTAIN BELOW A CERTAIN LEVEL. THEREFORE TO MUCH WEAR WILL INVALIDATE THE VALVE AS A CONTAINMENT DEVICE. IF IN DOUBT CONTACT ROTA VAL TECHNICAL SALES DEPARTMENT.**
- 13.3 Check rotor shaft ends for burrs, dress away as necessary using emery cloth, smooth file or grind stone. Check seal journal for wear, any excessive wear in this area will require replacement of rotor or alternatively the area may be built up using a recognised cold reclaim technique and reground.
- 13.4 Inspection of internal components seals, bearings etc. may be carried out after reference to dismantling instructions, section 12. Check journals on tailpiece (9) and drive hub (18), for wear, check bearing housing for signs of damage. Check rotor extractor tool (34) for damage, refurbish or replace as necessary.
- 13.4 Replace earth brush (48), seals (8, 16, 19, 32, 33, 38, 45 and 52), roller bearings (13) and linear rail bearings (53), as necessary.

## 14.0 RE-ASSEMBLY

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- 14.1 Ensure all surfaces are clean and free from burrs and accidental damage prior to each step.
- 14.2 Press the rotor shaft seals (19) into the end cover hub, all positioned with the lip innermost. Refit the shaft seal retainer (20).
- 14.3 Mount bearings (13), spacers (14) and wave springs (15) on the tailpiece (9). Mount the assembly in the NDE bearing housing, fit the tab washer (11) and lock nut (10), tighten until there is no axial play in the bearings, lock the tab.

### **CAUTION - DO NOT OVERTIGHTEN THE LOCK NUT**

- 14.4 Assemble the extractor retainer (35) onto the NDE bearing retainer (7). Fit the whole assembly to the NDE end cover.

14.5 Replace the bearings (13) and spacers (17) on the drive hub (18). Mount in the DE bearing housing, fit the tab washer (11) and lock nut (10), tighten until there is no axial play in the bearings, lock the tab. Fit the DE bearing retainer (7).

**CAUTION - DO NOT OVERTIGHTEN THE LOCK NUT**

14.6 Assemble the linear rail bearings (53) and lip seals (52) into each end cover boss, ensuring all are lubricated with suitable food quality grease.

14.7 Re-mount the GMU (51) and interface flange (42) on the foot mounting.

14.8 Repeat relevant steps in section 7.0 (Installation) and section 8.0 (Commissioning).

## **15.0 DISPOSAL**

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15.1 The valve may be removed from its installed position using slings as specified in “Handling” section. For disposal purposes, the parts list in section 16 specifies all materials of construction. Components may be recycled, reused or destroyed as dictated by local or national regulations.

## 16.0 ASSEMBLY DRAWINGS / MATERIALS OF CONSTRUCTION

Item	Description	Qty	Material
1	Body	1	316 Stainless Steel
2	NDE end cover	1	316 Stainless Steel
3	DE end cover	1	316 Stainless Steel
4	Rotor	2	316 Stainless Steel
5	NDE rails	2	316 Stainless Steel - Hardened
6	DE rails	2	316 Stainless Steel - Hardened
7	Bearing retainer	2	316 Stainless Steel
8	Outer bearing seal	2	PTFE seal with silicon 'O' ring
9	Tail piece (NDE only)	1	316 Stainless Steel
10	Lock nut	2	Nickel plated steel
11	Tab washer	2	Nickel plated steel
12	Spacer	2	316 Stainless Steel
13	Bearings – sealed for life	4	Alloy steel with food quality grease
14	NDE bearing spacer	1	316 Stainless Steel
15	Wave springs	1set	Sprung steel
16	Inner bearing seal	2	PTFE seal with silicon 'O' ring
17	DE bearing spacer	1	316 Stainless Steel
18	DE drive hub	1	316 Stainless Steel
19	Rotor shaft seals	4	PTFE seal with silicon 'O' ring
20	Shaft seal retainer	2	316 Stainless Steel
21	"Leakage detection" pipe	2	316 Stainless Steel
22	"Rotor pocket purge" pipe	2or4	316 Stainless Steel
23	"Air purge" pipe	2	316 Stainless Steel
24	Drive shaft	1	316 Stainless Steel
25	Drive shaft guard	1	316 Stainless Steel
26	"Drive shaft guard" safety switch	1set	Stainless steel ferrogard
27	"Safety switch" mounting bracket	1	316 Stainless Steel
28	"NDE end cover" safety switch	1set	Stainless steel ferrogard
29	"Safety switch" mounting bracket	1	316 Stainless Steel
30	Swing bolt toggle	1set	Nitronic 60 (anti gauling)
31	Swing bolt handle	1set	316 Stainless Steel
32	'O' ring seal – End cover to body	2	White silicon
33	Inlet 'O' ring seal – For flanged version only	1	Silicon
34	Extractor tool with PTFE washer	1	316 Stainless Steel
35	Extractor retainer	1	316 Stainless Steel
36	NDE rail support blocks	2	316 Stainless Steel
37	DE rail interface boss (Shrink fitted)	2	316 Stainless Steel
38	'O' ring seal – DE rail interface boss	2	Silicon
39	Rail clamps – (Individually marked)	4	316 Stainless Steel
40	Docking port	1	316 Stainless Steel
41	"Docking port" safety switch	1	P&F Proximity switch
42	Interface flange	1	316 Stainless Steel
43	GMU drive hub	1	316 Stainless Steel
44	Sensor target	1	316 Stainless Steel
45	Lip seal – Interface flange to GMU drive hub	1	PTFE seal with silicon 'O' ring
46	Earth brush holder	1	316 Stainless Steel
47	Earth brush spring	1	Sprung steel
48	Earth brush	1	Aluminium Bronze
49	Rotation sensor	1	P&F Proximity switch
50	GMU mounting bracket	1	316 Stainless Steel
51	GMU	1	See specification sheet
52	Lip seal – Rail bosses to rail	8	PTFE seal with silicon 'O' ring
53	Linear rail bearings	6	Stainless steel

