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ROTO-FLATE™ VALVE

USER'S GUIDE

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I. OVERVIEW

INTENTED USE

The Roto-Flate™ is a quarter-turn, inflatable seal valve designed primarily for dry solids & slurries. It uses compressed air or gas to inflate an elastomer seal against the dome.

Roto-Disc, Inc. provides a wide-range of features and options with respect to materials of construction (M.O.C.), controls, seating/sealing types, flange drilling, flange adaptors and surface finishes/coatings/hardfacing, etc.

All Roto-Disc, Inc. valves are specified and built based on the expected application conditions and other guidance as given by the specifying entity and as agreed to with Roto-Disc, Inc. Use of the valve in a manner that differs from that for which the valve was built may result in poor performance and/or premature wear of the valve and its components and is hereby not authorized by Roto-Disc, Inc.

TEMPERATURE RATING

The temperature rating for an individual valve depends on the application conditions and valve features. Refer to the specifying entity or contact Roto-Disc, Inc. to determine the temperature rating for a specific Roto-Flate valve.

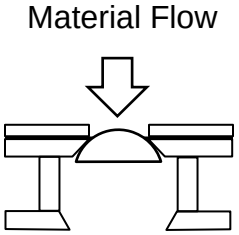
PRESSURE RATING

Roto-Flate valves are suitable for use in applications with a pressure range from full vacuum to 150psig

II. INSTALLATION & SETTINGS

ORIENTATION

The recommended orientation of the Roto-Flate valve is 'dome-up'. In some applications, it may be useful to install the valve in the 'dome-down' position. Consult Roto-Disc, Inc. before installing the valve in the dome-down position.



'Dome-up' Orientation (valve shown in closed position)
Illustration #1

DOME ROTATION SPEED

Air flow controls are installed on the exhaust ports of actuator solenoids to manage dome rotation speed. If no solenoid is supplied, air flow controls are installed on the actuator air ports. *Without these controls the dome may slam open and/or closed, which can adversely affect the life of the shafts, coupling or actuator and increases the chance for injury to personnel.*

Turn the adjustments screw counter-clockwise to increase dome rotation speed or clockwise to decrease dome speed.

INFLATABLE SEAL PRESSURE

In order to maximize seal life, the inflatable seal pressure should be set to the lowest level necessary to obtain an acceptable process seal. Typically this will be 15psi greater than whatever pressure is being contained (165psi max). Many solenoids require a minimum air supply pressure (typically 35psi) and thus this will dictate the minimum air supply pressure for the inflatable seal.

The inflatable seal pressure for vacuum applications should be set to the lesser of the minimum inflatable seal solenoid pressure requirement or 35psi.

INFLATABLE SEAL AIR VOLUME

The chart below indicates the volume of air required to inflate the seal by valve size.

Valve Size	Volume of Air (cu.in)
3”	7
4”	10
6”	14
8”	17
10”	24
12”	32
14”	35
16”	33
18”	40

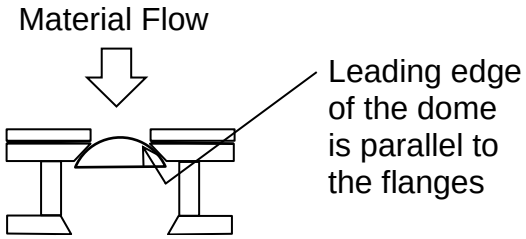
OPEN & CLOSE SETTINGS

ALERT! Your Position Indicator Is Properly Calibrated – Do Not Adjust!

The visible beacon on most position indicators signifies open and closed based on 90° of rotation. When a Roto-Flate valve rotates *more than* 90° to reach the fully open position, the beacon will suggest the valve is not fully open because the beacon has traveled *past* the 90° “open” mark when in fact this is not the case. Beacon indicators are calibrated at the factory to be properly aligned to the closed position. Therefore, the imperfection of the beacon indicator will be exhibited when the valve is in the fully open position.

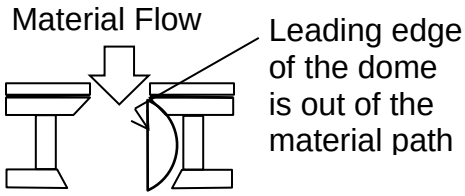
Contact Roto-Disc, Inc. before attempting to adjust actuator stop settings to correct readings in the beacon indicator.

FULLY CLOSED: Roto-Flate valves are considered fully *closed* when the dome is rotated into the path of the material flow and the leading edge is parallel to the top flange of the valve body.



Roto-Flate Fully Closed
Illustration #2

FULLY OPEN: Roto-Flate valves are considered fully open when the leading edge of the dome has been rotated out of the material flow path.

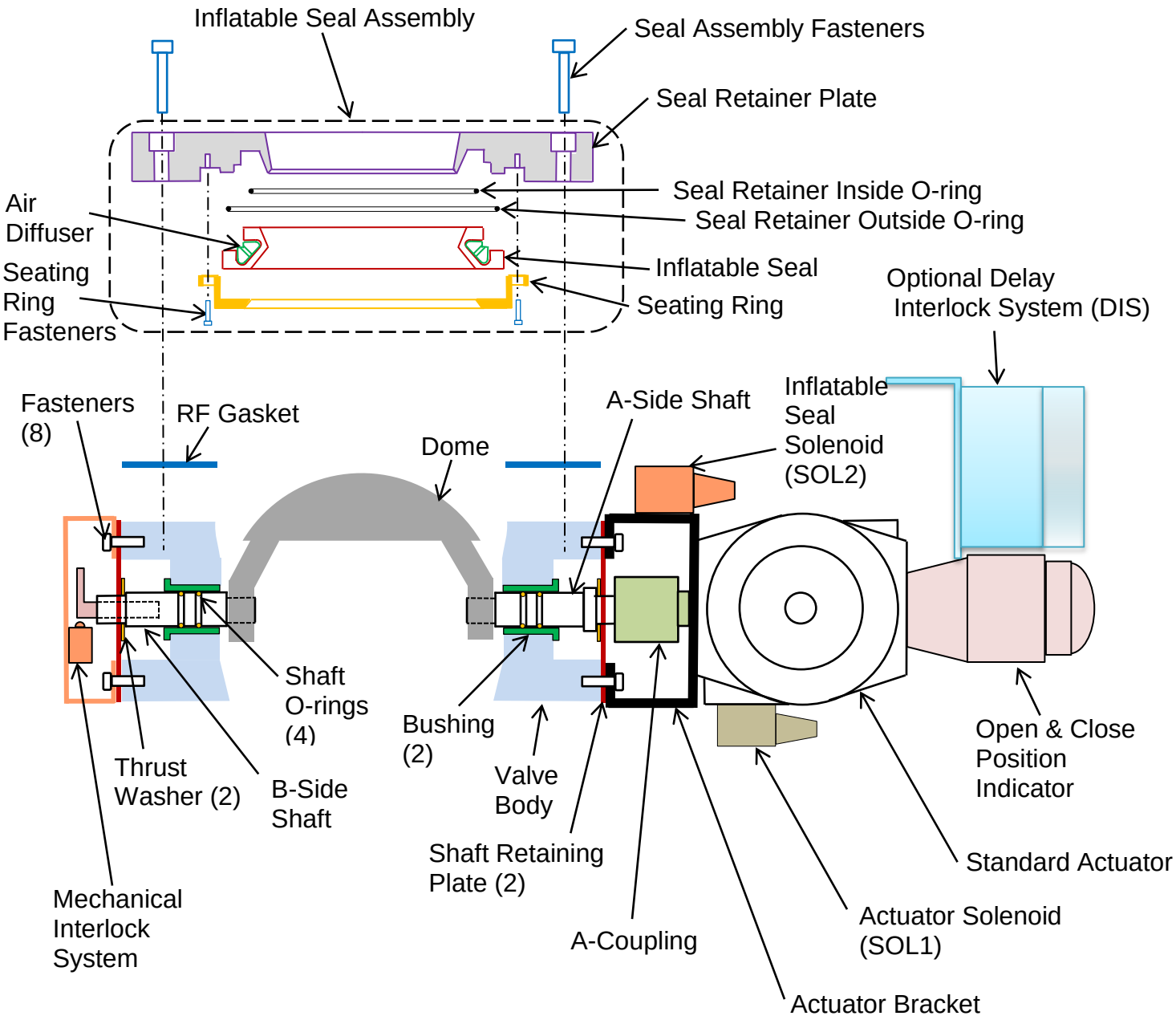


Roto-Flate Fully Open
Illustration #3

OPEN & CLOSED STOPS

There are no mechanical stops on the Roto-Flate valve itself. Stops positions are controlled by the actuating device (actuator, lever or wheel). These are set at the factory during final assembly of the valve and are confirmed during the multi-point inspection process and should not require further adjustment. Contact Roto-Disc, Inc. before making any adjustments to the actuator stop settings.

III. VALVE COMPONENTS (TYPICAL ASSEMBLY)



Roto-Flate Valve Components
Illustration #4

MATING FLANGE GASKETS

Unless otherwise agreed to, Roto-Disc, Inc. does not supply mating flange gaskets.

SOLENOIDS

Most solenoids are supplied with dry contact leads for the specified voltage (typically 120VAC or 24VDC) and will have an NPT (female) conduit connection point. If specified, solenoid controls may be wired to the position indicator terminal block for further connection to user's control source.

Most solenoids are pilot operated and require 35psi minimum to operate (shift the spool) properly. The voltage rating on the solenoids must match the customer supplied constant input power.

Refer to the solenoid manufacturer's literature for additional information.

POSITION INDICATORS

Position Indicators do not control dome rotation. They indicate dome position via micro-switches and visible beacon, coupled to the actuator. They typically have two (2) SPDT switches. Unless otherwise directed by the customer or specifying entity, Roto-Disc, Inc. sets Switch #1 ("bottom" switch) to make when the dome is at the full CLOSED position. Switch #2 ("top" switch) is set to make when the dome is fully OPEN.

The switches are wired to a terminal strip inside the position indicator housing. The switch settings are independent of the visible beacon, and therefore can be set relatively accurately to indicate open and closed position of the Roto-Flate valve.

See section 3.1 for more information about the inaccuracy of visible beacon indicators.

INFLATABLE SEAL MECHANICAL INTERLOCK

The inflatable seal mechanical interlock prevents air from reaching the inflatable seal before the dome is closed. This device is not designed, nor is it intended, to alleviate or remove the requirement for proper sequencing of the dome rotation and seal inflation as described in section IV below

SPECIAL (THROTTLING) CONTROLS

Occasionally, Roto-Flate valves are supplied with controls other than those described above. Consult Roto-Disc, Inc. if you need direction in use of these controls with the Roto-Flate valve

IV. SEQUENCE OF OPERATION

OVERVIEW

Opening of the Roto-Flate valve is accomplished by two operations which must occur in proper sequence. First, the inflatable seal must be deflated. Then the dome must be rotated open. Conversely, closing of the valve is accomplished by rotating the dome closed, then inflating the seal.

Seal inflation is typically accomplished with a 3-way, normally open* (NO*) solenoid air control valve (seal solenoid). When used with a 3-way, NO solenoid valve, the mechanical interlock system provides a close & inflate valve response upon electric failure.

Roto-Disc, Inc. recommends each new valve be cycled (opened and closed) prior to installation to aid visualization and understanding of the valve's operation and condition. Use caution as the dome rotates open since it may protrude below the bottom flange.

ALERT!

IT IS IMPERATIVE THAT THE DOME IS IN THE FULLY-CLOSED POSITION BEFORE THE SEAL IS INFLATED. Inflating the seal before the dome has rotated fully closed may cause the seal to burst. It is also imperative that the dome not begin to rotate open until the seal is deflated. Rotating the dome before the seal is deflated may cause excess wear on the inflatable seal and/or the actuator.

TIMING

To prevent potential seal damage from pre-mature inflation, it is recommended that inflation be initiated at least one full second after any closed position indication is given. This will ensure that the dome has fully rotated closed before the seal is inflated. Additionally, it is recommended that rotation of the dome to the open position is delayed by one full second after the seal is deflated. This will ensure that the seal has completely relaxed and is no longer in contact with the dome when it begins to rotate.

**Roto-Flate valves supplied prior to summer 2012 typically employed a 3-way normally closed (NC) solenoid valve to control seal inflation. Consult Roto-Disc, Inc. for direction on sequencing with NC seal solenoids.*

OPEN SEQUENCE

When Step 1 is initiated, the dome is stationary in the fully closed position and the seal is inflated.

Step 1: Receive “Open” signal from control source
Step 2: Deflate the seal by energizing seal solenoid air valve
Step 3: Delay (1 second minimum)
Step 4: Rotate dome to fully open by energizing the actuator solenoid
Step 5: Provide / receive confirmation that dome is fully open

CLOSED SEQUENCE

When Step 1 is initiated, the dome is stationary in the fully open position and the seal is deflated.

Step 1: Receive “Close” signal from control source
Step 2: Rotate the dome to fully closed by de-energizing the actuator solenoid
Step 3: Provide / Receive confirmation that dome is fully closed
Step 4: Delay (1 second minimum)
Step 5: Inflate Seal by de-energizing seal solenoid air valve

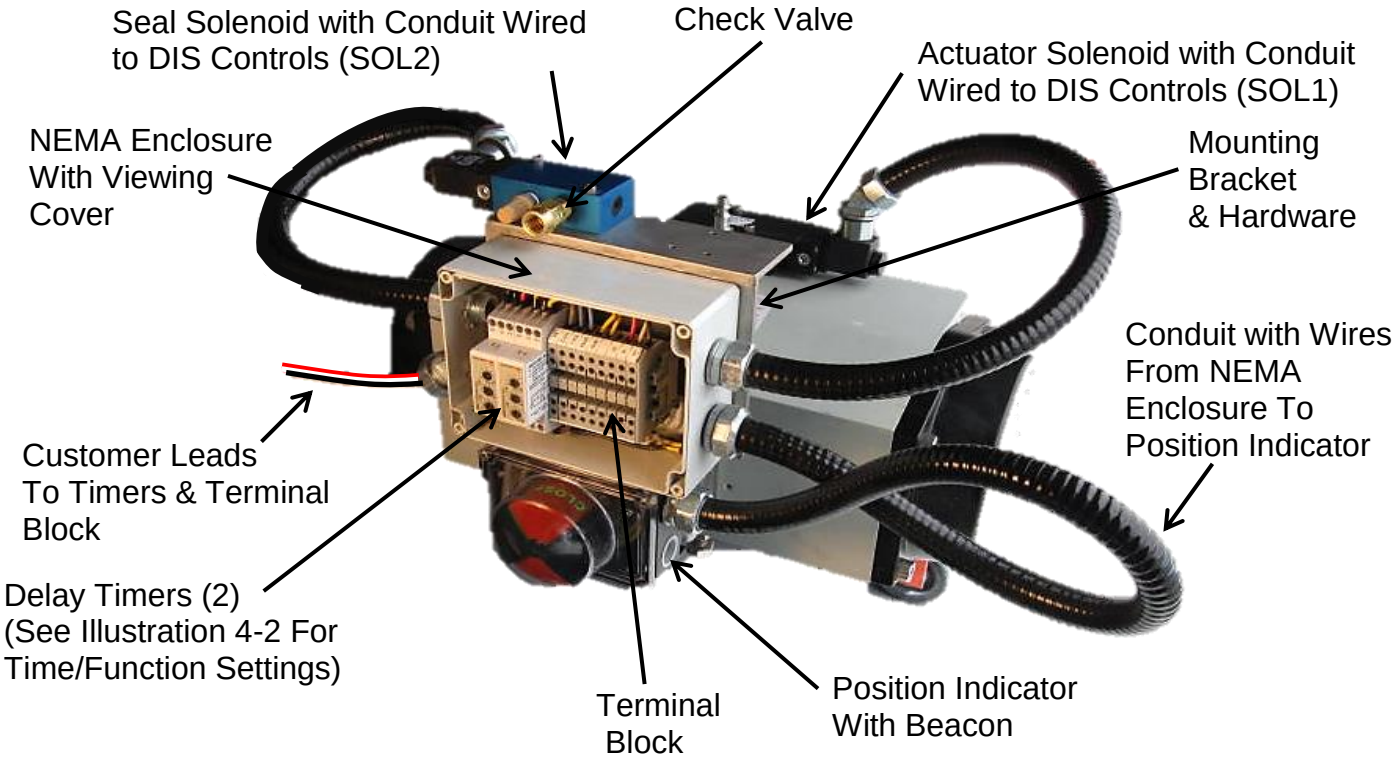
V. DELAY INTERLOCK SYSTEM (DIS™)

OVERVIEW

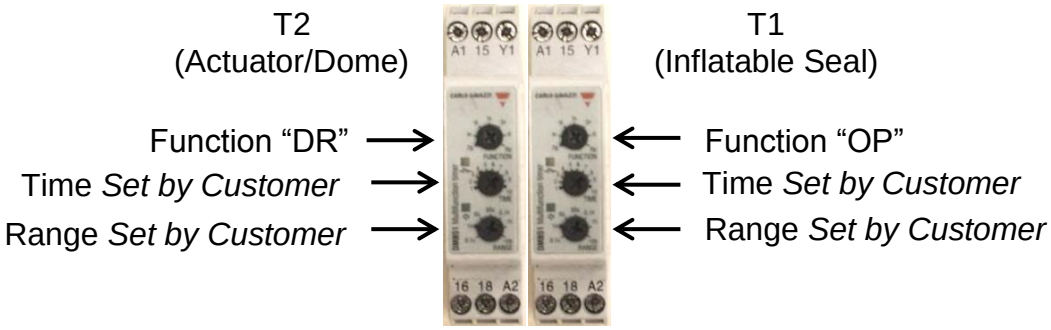
The optional Roto-Flate DIS automates the individual sequencing steps described in section IV, therby allowing the Roto-Flate to be controlled like most other (single-stage) open/closed valves. The open & close delays are controlled by two (2) timers which are independently adjustable from .1 seconds to 100 hours.

The DIS controls the same solenoids as typically supplied with Roto-Disc, Inc. valves. The DIS also typically uses a similar position indicator, except the position indicator has three (3) switches instead of two (2). Switches #1 & #2 are set to confirm dome position (i.e. open or closed). The DIS uses Switch #3 to provide confirmation of the dome-closed position in order to allow for proper functioning of the Delay Timers (T1 & T2).

Switches #1 and #2 are isolated contacts that can also be used by the customer for other monitoring.



DIS (NEMA 4 Enclosure)
Illustration #5



Multi-Function Timer Settings
Illustration #6

Unless otherwise instructed, “Time” is set for “4”, and “Range” is set for “1s” at the factory, resulting in a 4 second delay. See the timer manufacturer’s literature for more information on Time & Range adjustments.

DEFINITIONS

- Full Open: The Inflatable Seal is deflated and the dome is fully rotated to the open position, which allows the flow of material through the Roto-Flate valve.
- Full Closed: The dome is fully rotated to the closed position and the inflatable seal is inflated.
- SOL1: Actuator Solenoid
- SOL2: Seal Solenoid
- T1: Seal Timer
- T2: Actuator Timer

INPUT POWER & SIGNAL REQUIREMENTS

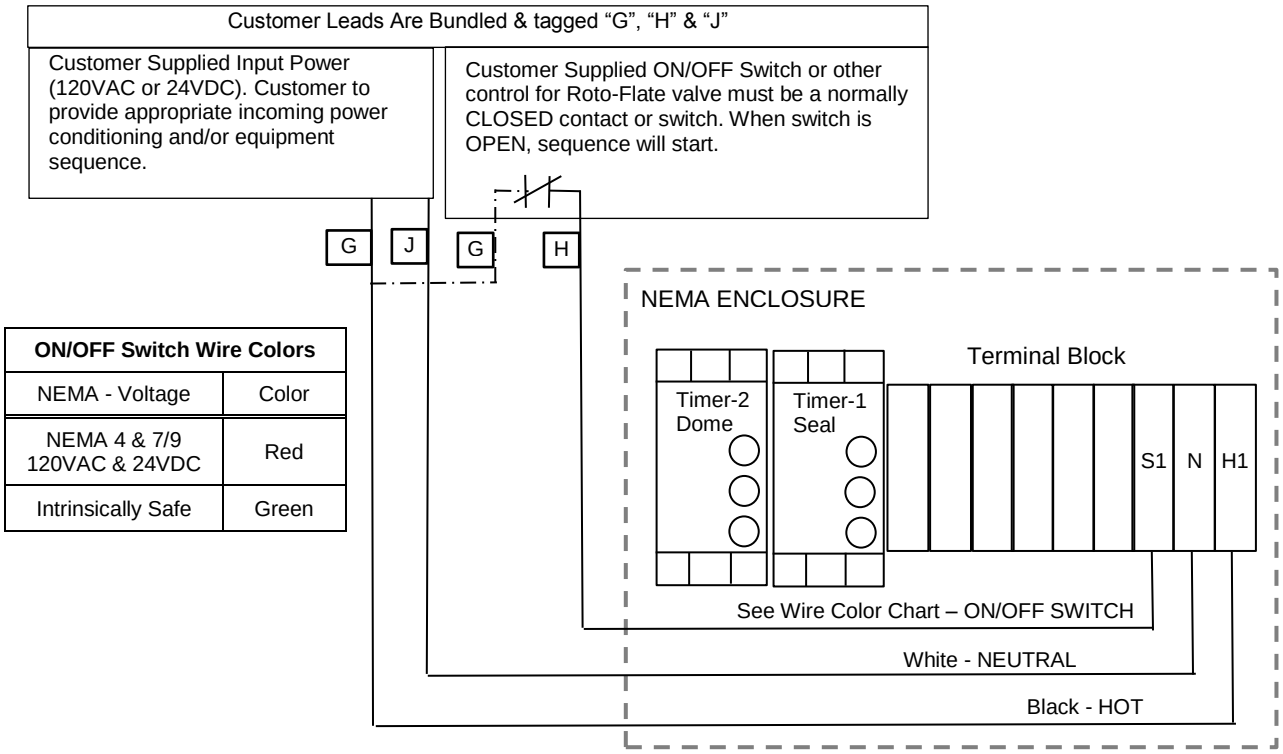
Customer supplied constant input power ‘Hot’ is connected to the wire labeled ‘G’. Wire labeled ‘G’ is connected to terminal block labeled ‘H1’ inside the DIS enclosure. The ‘Neutral’ or common is connected to the wire labeled ‘J’. The wire labeled ‘J’ is connected to terminal block labeled ‘N’ inside the DIS enclosure.

Customer supplied switch or other control to open Roto-Flate valve.

> *NOTE: THIS SWITCH OR OTHER CONTROL MUST BE A NORMALLY CLOSED DRY CONTACT, WHICH IS ISOLATED FROM ALL OTHER POWER SOURCES EXCEPT THE POWER SOURCE FEEDING THE DIS SYSTEM. AN ISOLATION RELAY IS NORMALLY USED.*

One side of this normally CLOSED contact, or switch, is connected to wire labeled ‘H’. Wire labeled ‘H’ is connected to terminal block labeled ‘S1’ inside the DIS enclosure. The other side of the switch is connected to wire labeled ‘G’. Wire labeled ‘G’ is connected to terminal labeled ‘H1’ of the DIS terminal block inside the NEMA enclosure.

CUSTOMER CONNECTIONS (FOR 120VAC, 24VDC & INTRISICALLY SAFE DIS)



ON/OFF Switch Wire Colors	
NEMA - Voltage	Color
NEMA 4 & 7/9 120VAC & 24VDC	Red
Intrinsically Safe	Green

Delay Interlock System (DIS) Customer Wiring & Color Codes
Illustration#7

OPEN SEQUENCE

An ‘Open’ signal energizes seal solenoid (SOL2) which allows the inflated seal to immediately deflate by exhausting to atmosphere through the SOL2 exhaust port. The actuator timer (T2) in the DIS enclosure provides the customer defined time delay, using the ‘Time’ & ‘Range’ settings on the timer in illustration 4-2 and the Timer manufacturer literature for more information.

When the actuator timer (T2) delay countdown has expired, the actuator solenoid (SOL1) is energized causing the actuator to rotate the dome open. The dome will stay in the open position, and the seal remains deflated, until a customer-supplied input OPEN signal is removed.

CLOSE SEQUENCE

The close sequence starts when the CUSTOMER OPEN signal is removed. This de-energizes the actuator solenoid (SOL1), causing SOL1 spool to shift plant air to the “close” port of the Air Actuator. This action rotates the dome to the CLOSED position.

The DIS is interlocked with Position Indicator switch #3 to prevent inflation of the seal before the dome reaches full closed position. Only upon closing switch #3 will the seal delay timer (T1) begin the customer defined time delay countdown to seal inflation. Upon T1 time delay expiration, the circuit to the seal solenoid (SOL2) will open. This de-energizes SOL2, allowing plant air to inflate the seal against the dome.

The Seal will stay inflated and the dome will stay closed until a CUSTOMER OPEN signal is initiated.

FAILURE MODES

ID	DIS Loss Mode	Valve Status at Loss	Effect	*IMMEDIATE* Action upon Restoration
1	Power	Valve at FULL Closed	The Seal Solenoid is Normally Open which causes the seal to remain inflated.	The dome remains closed
2	Power	Valve at FULL Open	Because the dome is open, the seal is already deflated. The spool in the actuator solenoid (SOL1) is spring loaded and pushes plant air to "closed" port of air actuator, which closes the dome. Inflatable seal will inflate when dome reaches closed position and engages inflatable seal mechanical interlock	The dome will re-open as long as the customer OPEN signal is maintained.
3	Power	Close Seq. in Progress	The dome continues to rotate until closed. The seal solenoid is Normally Open which causes the seal to inflate when the dome reaches the closed position. The Mechanical Interlock system prevents premature inflation as described in section 6.	Seal timer (T1) countdown restarts (from the beginning) and proceeds as described in Normal Operation if there is no customer OPEN signal.
4	Power	Open Seq. in Progress	The spring–loaded spool in the actuator solenoid (SOL1) shifts plant air to the "closed" port of the actuator, which causes the dome to close. The seal solenoid is Normally Open which causes the seal to inflate when the dome reaches the closed position. The Mechanical Interlock System prevents premature inflation as described in Sect. 6.	The dome will resume rotating open so long as the customer OPEN signal is maintained.
5	Plant Air	Valve at FULL Open	When the valve is Fully Open, the seal is already deflated, and remains deflated. When main air returns, the dome will remain Open, and the seal will remain deflated as long as the CUSTOMER OPEN signal is maintained.	**CAUTION**! IF PLANT AIR IS RESTORED and THERE IS NO CUSTOMER OPEN SIGNAL, THE VALVE WILL *IMMEDIATELY* CLOSE.
6	Plant Air	Valve at FULL Closed	The inflatable seal begins to loose pressurization and the dome will remain closed.	The seal inflates around the closed dome as long as there is no CUSTOMER OPEN signal.
7	Plant Air	Close Seq. in Progress	The Dome will stall, thus preventing switch #3 in the Position Indicator from making. The Seal will remain deflated.	The dome will resume rotating to CLOSED so long as there is no CUSTOMER OPEN signal.
8	Plant Air	Open Seq. in Progress	The Dome will stall, thus preventing switch #2 in the Position Indicator from making.	The dome will resume rotating to OPEN as long as the CUSTOMER OPEN signal is maintained.

START-UP AFTER POWER/AIR LOSS

It is recommended that plant air is applied to *both* the Actuator Solenoid (SOL1) and the Inflatable Seal Solenoid (SOL2) BEFORE power is applied to the DIS.

If power is applied WITHOUT a CUSTOMER OPEN signal to the DIS, the dome will remain in the closed position, switch #3 will close, the seal timer (T2) will begin countdown, and the seal will inflate upon expiration of the countdown. If power is applied WITH a CUSTOMER OPEN signal to the DIS, the actuator solenoid (SOL1) will rotate the dome open.

VI. MAINTENANCE

ALERT!

Roto-Disc, Inc. recommends the valve be removed from service for all maintenance. Under no circumstance should the Actuator, Position Indicator, brackets or shaft retaining plates be removed while the valve is pressured above atmospheric pressure. Make sure the seal cannot inflate and dome cannot rotate by disconnecting the valve from air and electrical connections.

INFLATABLE SEAL REMOVAL

1. Disconnect *all* air and electrical connections, and remove the valve from service.
2. Remove the (2) air fittings and tubing from the perimeter of the seal retaining plate.
3. Remove the socket head cap screws from the top flange face of the seal retainer plate. The seal assembly should now be free for separation from the valve body.

Note: Seal assemblies on large valves are heavy. Take precaution when lifting the seal assembly from the valve body. Threaded eye bolt holes are present on large valves to assist step 4.

4. Remove the seal assembly from the valve body
5. Place the seal assembly upside-down on a work surface so the seating ring is accessible. Remove small socket head fasteners in the seating ring flange
6. Lift the seating ring away from the seal retainer plate to expose the inflatable seal with aluminum air diffuser.
7. Remove the inflatable seal. Then separate the aluminum air diffuser for seal inspection and possible replacement.
8. Remove the two (2) O-rings from their grooves in the seal retainer plate, and inspect the grooves for nicks or burrs, which can affect the sealing efficiency and life of an O-ring.

INFLATABLE SEAL INSTALLATION

1. Inspect the two (2) air inlet ports in the seal retainer plate to ensure the air paths are completely open.
2. Install new O-rings as needed, using O-ring lubricant generously.
3. Install the aluminum air diffuser ring into the outer cavity of the inflatable seal.
4. Place the inflatable seal (with diffuser) into the mating profile of the seal retainer plate.
5. Locate the seating ring over the inflatable seal.

6. Align the counter-bored holes in the flange of the seating ring with the blind threaded holes in the seal retainer plate. Then install the socket head fasteners to create the seal assembly unit.
7. Inspect the RF gasket shown in illustration 2-1 for wear, distortion,or chemical degrading. Replace if necesssary. Locate the RF gasket over the top flange of the body, lining up the gasket ID with body ID, and all fastener hole patterns.

Note: As stated above, seal assemblies on large valves are heavy. Take all necessary precautions when lifting & positioning the seal assembly in the next step.

8. Invert the seal assembly, then lower the seating ring portion of the seal assembly down into the body, aligning the two (2) air inlet holes on the seal retaining plate perimeter face *perpendicular* to the bushing bosses on the valve body.
9. Once the seal assembly is in place, check it is level by confirming the RF gasket is consistently sandwiched between the seal retainer plate and the body flange all around the perimeter of the valve.
10. Fasten the seal assembly to the valve body with the large socket head fasteners.
11. Install the two (2) air fittings into the threaded air inlet holes on the perimeter face of the seal assembly.

ALERT!

Do NOT connect seal air supply to the seal retainer plate fittings at this time.

12. Rotate the dome to the closed position. Then check for clearance between the (deflated) seal and the dome sphere all around using feeler gauges or other physical means of confirming clearance.

Note: In the event the clearance check in step 12 indicates contact of the deflated seal with the dome, contact Roto-Disc, Inc.

13. Attach and calibrate any controls (actuator, position indicator, Mechanical Interlock System) or valve options, such as the Delay Interlock System (DIS).

Note: Roto-Disc, Inc. recommends performing a final test of the reassembled valve before attaching air hoses to the seal assembly and putting it back into service.

DOME REMOVAL

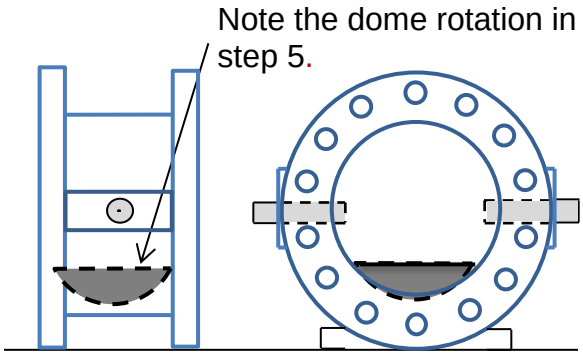
When replacing a dome, Roto-Disc, Inc. recommends purchasing a dome, both shafts & shaft O-rings.

1. Disconnect *all* air and electrical connections, and remove the valve from service.
2. Mark the body on the actuator side to maintain orientation for reassembly. Then remove the actuator, position indicator and brackets.
3. Remove the valve controls & seal assembly described in section 5.1.

4. Place valve on its side, as shown in illustration #8 on a flat, stable surface.

   Note: The perimeter of the dome is an edge. Roto-Disc, Inc. advises using gloves or applying heavy tape over this edge to protect personnel when handling the dome.

   Take precaution not to scar or nick the sealing surface of the dome sphere during removal or temporary storage.



Valve orientation for dome removal
Illustration #8

5. Rotate the dome downward to the open position as shown in illustration 5-1.

Note: Take precaution to capture the dome as the shafts disengage from the dome ear. When working with large valves, install sections of cardboard, or cloth, between the dome face and body to protect the dome face and support the weight of the dome

6. Remove the shaft retaining plates from each side to access the shafts.
7. Push/drive the shafts through each dome ear from the inside of the valve. Domes of large valves are heavy. Carefully allow the weight of the dome to rotate itself, as needed, in order to free it from valve body. The dome should now be free for removal from the valve body.

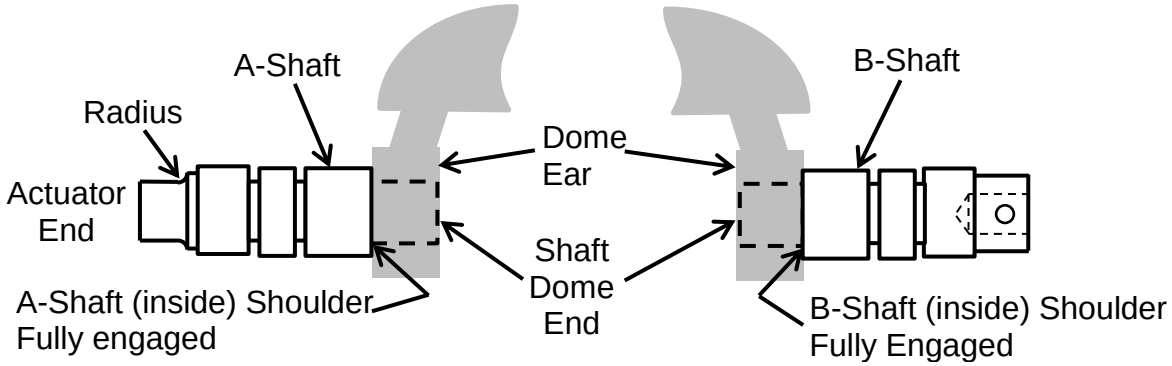
DOME INSTALLATION

1. Install new O-rings on each shaft as described in section 5.3.
2. Place the valve body on a flat, secure surface with the bottom flange down.
3. Insert the 'dome end' of the actuator shaft (*longer* of the two shafts) through the bushing on the actuator side of the valve, as marked in step 2 of dome removal.

Note: The 'dome end' of both shafts is identified by the square shaft (inside) shoulder shown in illustrations 5-2 & 5-3. (The 'actuator end' of the A-Shaft is identified by a radius on the opposite end of the shaft.)

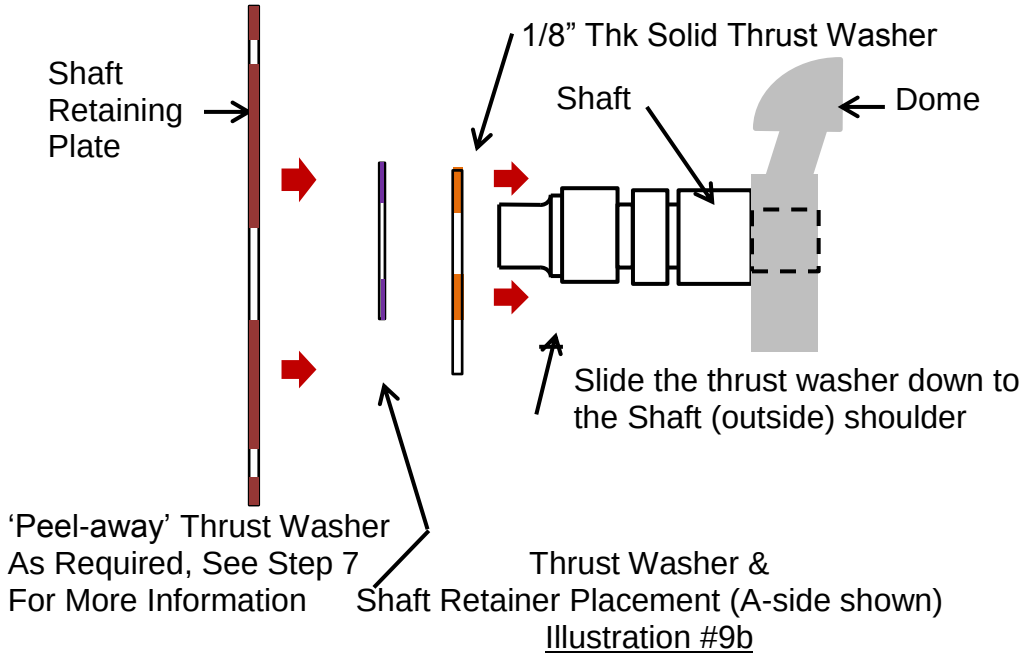
Insert the A-shaft until it is fully visible inside the body cavity.

4. Insert the 'dome end' of the B-Shaft through the bushing on the other side of the valve until the 'dome end' of the shaft is fully visible inside the body cavity
5. Carefully place the dome inside the valve body. *Place cardboard protection as noted before step 6 of dome removal instructions to support the dome.* Insert the shafts through the square holes in each dome so the dome is supported by both shafts. *The shaft is in place when the shaft (inside) shoulder is seated against the outer face of the dome ear, as shown in Illustration 9a.*



Shaft To Dome Orientation
& Engagement, Illustration #9a

Roto-Flate valves make use of thrust washers & shaft retaining plates to keep the dome in position laterally. After both shafts are fully engaged at the dome ears place one 1/8" thick (solid) thrust washer over the exposed end of each shaft outside the body, until it sits flush against the shaft (outside) shoulder, as shown in Illustration 9b .



Thrust Washer & Shaft Retainer Placement (A-side shown)
Illustration #9b

6. Slide the shaft retaining plates over each exposed shaft until it is flush against the thrust washer. The thrust washers must be firmly sandwiched between the shaft retaining plates and each shaft when the shaft retaining plate is fastened to the mounting bosses on the body.

Thrust Washer Check: If either thrust washer can be rotated when the shaft retainer plates are fastened in place, the union is loose, *which allows room for the dome to shift*. In this situation, it may be necessary to add a peel-away thrust washer to one or both sides.

7. Rotate the dome manually to ensure smooth rotation, and there is no interference from the valve body and then proceed with seal assembly installation as described in the inflatable seal installation on page 18.
8. Attach the actuator bracket; actuator, and position indicator (if applicable). Re-check the dome to seal clearance to ensure the dome has not shifted during the process of mounting the actuator to the A-Coupling & A-Shaft.

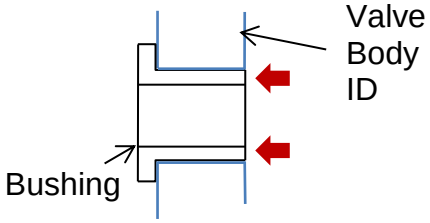
Note: Roto-Disc, Inc. recommends performing a final test of the reassembled valve before putting it back into service

SHAFT O-RING REPLACEMENT

1. Remove the four (4) worn O-rings from both shafts.
2. Inspect the shafts at the O-ring grooves for nicks or burrs that may have occurred during removal of the shafts from the valve body. Any nicks or burrs can impact the sealing efficiency and life of an O-ring.
3. Install new O-rings into the grooves on each shaft.
4. Apply O-ring lubricant generously over all four (4) O-rings.

BUSHING REMOVAL

1. Disconnect *all* air and electrical connections and remove the valve from service.
2. Mark the body on the actuator side to maintain orientation for re-assembly. Then remove the actuator, position indicator and brackets.
3. Remove the seal assembly as described on page 18.
4. Remove the valve dome & shafts as instructed on page 20.
5. Remove the worn bushings from the valve body by forcefully tapping the inside end of each bushing outward, as shown in illustration 10



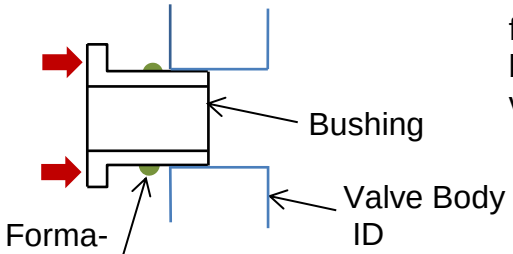
Bushing Removal
Illustration #10

6. Clean the inside of the body bushing bores of any debris.

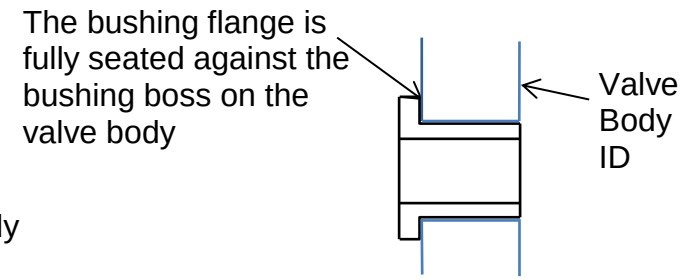
BUSHING INSTALLATION

Roto-Flate bushings are designed to be press-fit into the valve body to prevent leakage between the body and bushing OD. The resulting compression on the bushing OD may cause the (new) bushing ID to collapse slightly. Therefore, it is possible the bushing ID may require reaming *after it is installed*, to regain clearance for the shaft (with O-Rings) to easily slide through the bushing into the body interior. A hand reaming tool, such as a spiral fluted hand reamer, is recommended for this purpose.

1. Apply a bead of Forma-Gasket™ type sealant around the OD of each bushing approximately mid-way on the barrel as shown in Illustration 11a
2. Drive the bushings into the valve body with a mandrel, or other tool that keeps constant contact on the outside face of the bushing flange. The bushing flange should be fully seated against the face of the bushing boss on the valve body as shown in Illustration 11b



Bushing Installation
Illustration #11a



Bushing Installation Complete
Illustration #11b

3. The ID of the bushing should be smooth before installing the shafts. If smoothing is necessary, a flap wheel or honing tool is recommended for this purpose.

Note: Roto-Disc, Inc. recommends performing a final test of the reassembled valve before putting it back into service.

VI. SPARE PARTS

OVERVIEW

This following list represents typical replacement parts needed for the Roto-Disc® valve. The items are rank ordered in terms of likely need for replacement but this can vary depending on application conditions. As such, regular inspection of the valve is recommended to ensure long service life. For a complete listing of all parts, see the bill of materials section on the assembly drawings.

ITEM	REQ QTY	DESCRIPTION
1	1	Inflatable Seal Assembly (includes Inflatable Seal, Seal Retainer Inside O-Ring & Seal Retainer Outside O-Ring) – material as supplied with the valve
2	4	Shaft 'O' Rings- material as supplied with the valve
3	2	Bushings – material as supplied with the valve
4	1	Actuator Repair Kit – for actuator as supplied with the valve
5	1	Dome – material & hardfacing/coating (if any) as supplied with the valve
6	1	A-Side (Actuator) Shaft – material as supplied with the valve
7	1	B-Side (undriven side) shaft – material as supplied with the valve

ORDERING GUIDANCE NOTES

1. For routine valve refurbishing, Roto-Disc, Inc.. recommends (1) new seat and (4) new shaft 'O' rings.

2. For complete overhaul, we recommend (2) new bushings and a new dome with shafts in addition to the parts listed in note #1.

3. If the actuator has obtained more than (1) million cycles, it should be evaluated for possible rebuild or replacement.

4. Roto-Disc© bushings are designed to press-fit into the valve body in order to prevent leakage between the body and the bushings OD. The resulting compression on the OD causes the ID to collapse slightly. Thus, the bushing ID must be bored out or reamed after it is installed to gain enough clearance between the shaft and the bushing ID to allow the shafts, with the 'O' rings installed, to easily slide into and through the bushing. Consult the applicable Roto-Disc Valve co. user's guide for more information on bushing replacement.

5. As of January 1, 2011, Roto-Disc, Inc. no longer supplies dome assemblies with taper pins. As an alternative, we offer our new bare-stem design. The new design is more robust and will fit into any Roto-Disc valve that was originally supplied with taper pins. The bare-stem design requires a new coupling for the actuator, (2) shaft retaining plates, and thrust washers, in addition to the dome assembly. Please notify Roto-Disc, Inc. of the actuator style (make/model) when requesting a quote.

6. Roto-Disc, Inc. supplies valves with a wide range of materials of construction. When ordering spare parts, please reference the job number (RD-XXXX) and/or the serial number of the valve for which the parts are intended. This will ensure that the proper replacement parts are supplied. These numbers will be found on the name plate on the valve and all quotes, acknowledgements, packing lists, and invoices from Roto-Disc, Inc.