



## PLUG DIVERTER VALVE O&M MANUAL

### HEALTH AND SAFETY NOTES

#### **Important Note**

***ONLY QUALIFIED AND/OR APPROVED PERSONNEL SHOULD UNDERTAKE THE INSTALLATION, START UP, PUTTING INTO SERVICE AND PERIODIC MAINTENANCE OF THE PLUG DIVERTER VALVE AND SAFETY ASPECTS CANNOT BE OVEREMPHASIZED.***

***THE ACTUATOR AND INTERNAL ROTATING PLUG ARE ALL POINTS OF EXTREME CAUTION. THE MACHINE MUST BE FULLY ISOLATED WITH ELECTRICAL POWER LOCKED OUT PRIOR TO WORKING ON THE MACHINE.***

#### **Health and Safety at Work**

In the interest of health and safety at work, it is essential that before installation such matters as application, mounting position, support and other similar matters should be thoroughly investigated.

Technical details relating to this equipment are shown in our relevant specification sheets, which are available upon demand from our sales office. In the event that any further advice is required, please do not hesitate to contact us.

#### **Check List Before Running**

- a. Ensure that the inlets and outlets are protected by the feed and discharge ducting/trunking or other handling equipment so that it is not possible for operators or maintenance personnel to get hands/fingers or any part of their body close to the point where the flap shaft rotates and the actuator is moving.
- b. If attention to the internals or actuator for inspection, cleaning or other purpose is necessary, the supply to the electric controls must be isolated and 'locked out' to prevent accidental startup while servicing.

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## Description

Diverter valves are used in Pneumatic Conveying to re-route powder, pellets or granules from one discharge point to another and the Plug Valve is superior to the alternative flap type in so far as leakage and turbulence is concerned. The Plug Valve is suitable for use in both dilute and dense phase conveying.

The Carolina Conveying Plug Type Diverter consists of a robust body, precision machined to accept spigot located end covers carrying sealed-for-life bearings, together with gland packing shaft seals.

The Plug consists of a cylinder with a machined bore which, when rotated through 150 degrees, lines up with its respective outlet.

All three ports are sealed using precision machined Oilon tube seals which are located in the body and are pressurized against the plug by means of O rings and a pressurizing follower. This system ensures all three legs, including the dead-leg, are sealed at all times thus preventing leakage. The end covers must be air purged through the connection provided with sufficient volume of air to create a cavity pressure in excess of the conveying pressure.

Actuation is by a pneumatic Rotary Actuator directly coupled to the plug, ensuring no loss of torque which can occur with rack and pinion systems.

The actuator is supplied complete with a mounted solenoid valve, and Limit Switches indicate the plug position.

The inlet and outlets from the diverter housing have the facility through bolt-on connections to have either standard flanged connections, or plain pipe end connections for use with pipe couplings which are also available from Carolina Conveying.

## Construction

Housing:	Standard Aluminium with one straight through and one 30 degree divert leg. Alternatives: Cast Iron or Stainless Steel.
End Plates:	Standard Aluminium Alternatives: Cast Iron or Stainless Steel.
O Rings:	Silicon
Seals:	PTFE
Gland Packing:	PTFE
Limit Switches:	2 as specified
Actuator:	Pneumatic Rotary
Solenoid Valve:	Single

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## Installation

The unit is supplied ready for installation and can be bolted up to matching flanges or if tube ends are specified, a clamp type coupling. However, in either case, the valve body should be supported preventing undue stresses being imparted into the valve.

An 80 psi air supply is needed to operate the solenoid valve. Plug the electrical wiring to the limit switches and solenoid valve.

Once the respective services are connected the valve is set for operation.

Please ensure that no product is being conveyed while the valve is switching from one line to the other. This is normally carried out by momentarily stopping the supply of product to the plug valve and after a predetermined time delay, allowing the product in the system to be conveyed away from the valve to its ultimate destination. The valve can then be switched and the product flow restarted.

If the valve is to be used in a dense phase conveying system, it is not recommended that the valve is installed such that the legs are raised above the inlet as product may slip back down the line and get between the close tolerances between the body and plug which may cause the unit to jam.

All valves are fitted with the air purge connections and these should always be used and supplied with air at 10 psi above the line pressure to keep the valve cavity clean.

## Operating and Maintenance Instructions

The valve usage, product handled, frequency of actuation, pressure of the system, etc, will obviously effect the preventative maintenance schedule and it is strongly advised that, at least annually, the sealing in the plug is surveyed, together with the lip seals installed to prevent the escapement of air or product into the atmosphere.

The bearings, because they are sealed-for-life, together with their arc movement and light loading, should not be a problem source.

The effectiveness of the seals can be seen by analyzing dust residues around the plug diameter which will mean the seals at the inlet/outlet to the tube are defective, this problem can be rectified by tightening the seal follower to further pressurize the Oilon seal against the Plug.

### Plug Seal Adjustment

Seal adjustment can only be accurately made with the valve out of the pipeline system and positioned on a workbench.

With access available through the inlet and outlet connections, try to insert a 0.004" feeler gauge between the plug diameter and the face of the PTFE seal. If it is possible to insert it, a slight adjustment may be required.

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### To Adjust Rotor Seals

- a) The profiled PTFE seal (8) has a rubber 'O' ring (28) fitted between it and the rotor seal follower (9). The 'O' ring is fitted to provide a spring effect to maintain a light pressure of the seal against the rotor.
- b) Four socket head screws provide the compression force to the seal, it is suggested that each is tightened by ¼ turn. Access to these screws is through clearance holes provided in the inlet and outlet spigots (12 and 13)
- c) Proceed with adjustments of inlet and both outlet seals in turn, checking that the rotor is still able to rotate freely under pneumatic power.

### To Adjust Shaft Seals

The shaft seals are of PTFE gland packing pressurized by a gland follower. These should be adjusted evenly and to no greater extent than is necessary to prevent leakage.

## PTFE Seal Replacement for Pneumatic Plug Type Conveying Diverters


***Always isolate the valve from the system and disconnect power supply and air supply before attempting any maintenance on the valve.***

- 1) Remove the cylinder mounting box lid. Remove the hexagon head bolt and locking washer from the shaft. Undo the setscrew securing the pinion and slide pinion off the shaft. You can also remove the key.
- 2) Working now on the non-drive side of the valve, undo the M12 bolts securing the end cover. With two of these setscrews insert in jacking holes and jack off the end cover. The Plug (Rotor) may come out also. Remove plug.
- 3) The PTFE Seal is set in a machined groove in the plug, remove the old seal and O-ring backer. Now cut the foam sealing strip to the correct lengths, ensuring that the length allows for the strip to overlap at the corners and junction points of the groove. First fit the medium strip, overlay with low density strip ensuring sticky face is face down in the groove and that allow junction points overlap. The PTFE Seals can now be fitted into the grooves. The PTFE Seals will have a loose fit in the groove.
- 4) The Plug can now be refitted into the body and the drive gear reconnected.

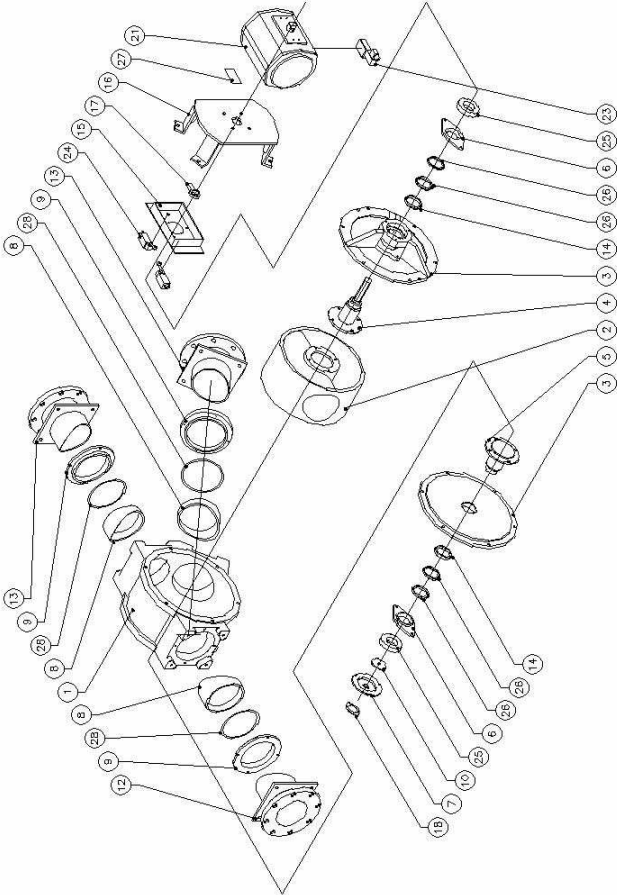
**When the seals have been fitted it is important to check the clearance between the plug seal and the body. A 0.004" feeler should be positively held between the seal and the body. This check should be carried out in all three ports.**

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ITEM	QTY	DESCRIPTION	MATL.
28	-	WHITE O-RING CORD	SILICON
27	1	NAMEPLATE	AI
26	4	GLAND PACKING	PT.FE.
25	2	BEARING	M.S.
24	2	LIMIT SWITCH	ZINC
23	1	SOLENOID	AI
21	1	PNEUMATIC ACTUATOR	AI
18	1	SHAFT COVER	M.S.
17	1	LIMIT SWITCH STRIKER	M.S.
16	1	ACTUATOR MOUNT	M.S.
15	1	LIMIT SWITCH GUARD	M.S.
14	2	LANTERN RING	PH.BR.
13	2	OUTLET SPIGOT	M.S.
12	1	INLET SPIGOT	M.S.
10	1	LOCATING WASHER	M.S.
9	3	ROTOR SEAL FOLLOWER	C.AI.
8	3	ROTOR SEAL	QILON
7	1	BEARING RETAINER	C.AI.
6	2	GLAND FOLLOWER	C.AI.
5	1	TAIL SHAFT	C.SK.
4	1	DRIVE SHAFT	C.SK.
3	2	END COVER	C.AI.
2	1	PLUG ROTOR	C.AI.
1	1	BODY	C.AI.



CLIENT	NAME
SCALE	N.T.S.
DRAWN	CHECKED
PCG	APPROVED
OSMAROG	

TITLE	PLUG DIVERTER VALVE PNEUMATIC OPERATION EXPLODED VIEW
DRAWING No.	PDV-CA-EXP-VW-1
ISSUE	1



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