

**Table of Contents**

<b>Section</b>	<b>Title</b>	<b>Page</b>
1	Scope	2
2	Reference Documents	2
3	Suitability	2
4	Use	2
5	Name Plate	2
6	Ball Valve Installation On Pipeline	3
7	Valve Disassembly For Maintenance	4
8	Maintenance	6
9	Lubrication	6
10	Valve Assembled	6
11	Final Recommendations	8
12	Spare Parts	10
13	Storage	11

**1. SCOPE**

1.1 The purpose of this manual is to furnish the right indications for Installation, Operation and Maintenance of VRG PRCV Pipeline Rotary Control Valves (Type 54 & 55).

**2. Reference Documents**

2.1 Use and maintenance manual for valves conformed to the follow specifications:  
 API 6D / ISO 14313, Directive 97/23/CE (PED)

**3. SUITABILITY**

3.1 This document is only for PRCV Pipeline Rotary Control Valves (Type 54 & 55), installation on pipeline with operating conditions described on chapter 4.

**4. USE**

4.1 The VRG CONTROLS's PRCV Pipeline Rotary Control Valves (Type 54 & 55) are designed for services of process control in the pipeline.

4.2 The valve's operations shall be done using the instruments and actuators furnished and selected for the valve by VRG CONTROLS. VRG CONTROLS refuses any responsibility for maneuver done with operators provided by another supplier. Exceptions may be made on a case-by-case basis with written confirmation via VRG CONTROLS.

**5. NAME PLATE**

5.1 The name plate installed on VRG CONTROLS's valves in accordance to the European Directive Certificate, for the pressure vessels. Below, find an explanation table of typical name plates applied to the valves.

**Table 1 – Typical PRCV Name Plate Details**

<b>SIZE DN</b>	Nominal Diameter	<b>Serial N°</b>	Serial number
<b>MONTH/YEAR</b>	Production Month/Year	<b>CLASS</b>	Pressure Class
<b>BODY</b>	Body Material	<b>PT</b>	Hydrostatic shell pressure test
<b>M.O.P./T<sub>min</sub></b>	Maximum operating pressure at minimum operating temp.	<b>STEM</b>	Stem material
<b>CATEGORY</b>	PED(97/23/EC)'s Category	<b>M.O.P./T<sub>max</sub></b>	Maximum operating pressure at maximum operating temp.
<b>DISC</b>	Ball Material	<b>MODULE</b>	Evaluation of adopted conformity
<b>SEAT</b>	Seat Material	<b>FLUID</b>	Fluid type
<b>TYPE</b>	Type of valve		
<b>FACE TO FACE / END TO END</b>	<b>Face to face / end to end dimension</b>		

## 6. INSTALLATION

- 6.1 Before the control valve installation, it should be carefully checked in order to verify there is no damage due to the shipping and handling. It is very important verifying that the inside bore of the valve is free from any foreign particles that might damage the seats and ball.
- 6.2 Use the appropriate lifting hooks to lift the valve; if these are not available, use a sling rope around the lateral closures or around the body valve; never use the actuator or valve topworks alone for valve handling. During handling of the valve, lateral ports must be always appropriate covered with wood or plastic covers to avoid entry of foreign materials and damage to the flange faces.
- 6.3 The control valve should be installed per the flow direction arrow. The PRCV is capable of bi-directional flow, but there is a preferred flow direction for optimal performance. Reference your original VRG INVOICE or PACKING SLIP for details, or contact VRG CONTROLS.
- 6.4 During the installation in the pipeline of the PRCV, the ball should be in the OPEN position if permissible to prevent damage to the ball element surface.
- 6.5 Remove the PRCV flange protective covers and clean the surfaces with a rust inhibitor.
- 6.6 Prior to installation of the PRCV flange bolts between valve and pipeline flanges, insert a suitable flange gasket among the contact faces. Tightening of flange bolts should be performed on diametrically opposed bolts (Star Pattern Tightening Procedure). For bolting torque, see table 2 in this manual.
- 6.7 PRCV's with WELD ENDS (WE), welding connection to the pipeline should be carefully carried out with ball in open position and avoid an overheating of the body that can damage seals, gasket and seat ring.
- 6.8 After PRCV installation, clear the pipeline of any foreign materials or dirt. Close and open the valve at least three times and verify the correct operation.
- 6.9 The PRCV valve is in OPEN position when stem keyway is in line with the pipeline. The PRCV valve is in CLOSED position when stem keyway perpendicular to the pipeline.
- 6.10 The actuator is TYPICALLY arranged such as the valve stem is rotated clockwise to close the valve and anti-clockwise to open. The actuator has adjustable stops and these are TYPICALLY factory adjusted and TYPICALLY do NOT require adjustment.
- 6.11 PRCV's may be fitted with pneumatic, hydraulic or electric actuators. Specific instructions should be followed, as provided by VRG CONTROLS or other applicable actuator manufacturer.

- 6.12 No specific routine maintenance is necessary except operating the valve periodically, even if only partially, to verify that the valve operation is satisfactory. It may be recommended to confirm valve shutoff tightness on annual basis and/or stroke the PRCV using the control valve actuator to confirm satisfactory operation. VRG CONTROLS RHPA control valve actuators are pre-lubricated and typically require no maintenance.

## 7. PRCV DISASSEMBLY FOR MAINTENANCE

### 7.1 Removing PRCV From Pipeline

- 7.1.1 Isolate the pipeline and remove all pressure from the PRCV and its cavities using appropriate and safe methods.
- 7.1.2 Rotate the ball to the OPEN position if permissible, remove the valve from the pipeline and put the PRCV assembly in a safe and convenient for disassembly.

### 7.2 Adaptor disassembly

- 7.2.1 Remove the control valve actuator based upon manufacturer's guidelines.
- 7.2.2 Unscrew the key's capscrew if it is present and remove the key (21) from the stem (4).
- 7.2.3 Unscrew the adaptor plate's (20) bolt (10) and pull up the adaptor plate (20) from its position.

### 7.3 Top cover DisAssembly

- 7.3.1 Unscrew the grease fitting (30) from the top cover (5) and unscrew the top cover's capscrews (9), and remove from its housing. Pull up the top cover (5) helping with two opposite screwdrivers to lever, pay attention to score the stem (4) during the pull out of the top cover, and do not lose the centering pins (36c).
- 7.3.2 Remove the top cover (5), remove the stem's fire sage seal (19), stem's o-rings (12) and clean it with a degreasing fluid and verify the integrity of the o-rings. Make the same operation for the top cover o-ring/graphite (15 and 18). In case of o-ring damage, any affected o-ring should be replaced.

### 7.4 Stem DisAssembly

- 7.4.1 Screw on the top of the stem a lifting hook and pull up the stem (4).
- 7.4.2 Remove the upper thrust washer (22) and degrease, verify the integrity replace if damaged.

Closure disAssembly (applicable only for valves type 54 and 55)

- 7.4.3 Put the valve in vertical position with a closure (2) turned to the ground.
  - 7.4.4 Unscrew and remove the body's nuts (8) and the bolts (7). Pull up the closure (2) in order to avoid sudden movements and follow the vertical axes.
  - 7.4.5 Remove body-closure's o-ring and graphite (11-16) from the closure (2).
  - 7.4.6 Verify the o-ring's integrity after cleaning and degreasing and replace if damaged
- 7.5 Seat ring disAssembly (applicable only for valves type 54 and 55)
- 7.5.1 Remove the seat rings (25 and 26 for valve type 55 and 25b for valve type 54) from the closures by using two opposite screwdrivers to lever.
  - 7.5.2 After cleaning and degreasing them, verify that seat rings (25 and 26 or 25b) are not scored. If there are some damages, they may be removed by using fine sand paper.
  - 7.5.3 For valve type 55, in case of damages of the seat's o-ring (13), it must be replaced. For valve type 54, inspect the insert and, replace the seat ring insert (25b) if damaged
  - 7.5.4 Extract the inner seat ring (25), remove the grease seal o-ring (only for valve type 55 position 48) and seat seal o-ring (14) and execute the cleaning operation, with a wet cloth. Verify the flexion that the radial surface have no laceration that requires the complete replacement of the rings.
  - 7.5.5 Clean the seat seal housing and the closure seal housing before replacing the seal in their housing.
  - 7.5.6 Extract the seat's springs (27) from their housing and then clean well. Moreover verify that they are not flattened or compressed, in this case they need to be replaced.
- 7.6 Ball disAssembly (applicable for only valves type 54 and 55)
- 7.6.1 For valve type 55, extract the ball (3) with relating supports (32), for this operation use a non-metallic rope through the ball bore and the side of the ball. For the valve type 54, screw the capscrews (52) and remove the lower trunnion; (51) pay attention to the bearing on the lower trunnion (58), at this point you can pull up the ball.
  - 7.6.2 Remove the centering pins (46) and rest the ball and the support to a clean place in order to clean the ball's surface and remove the supports from the ball's hubs; pay attention to the two bearings (33) and to the lower trust washer (23). Clean and control the bearing (33) and the lower trust washer (23); if they are damaged they should be substituted.
  - 7.6.3 Disassemble the closure still bolted on the body that is the one where the valve was resting.

### 7.7 Body and closure (applicable only for valves type 54 and 55)

- 7.7.1 Clean the body in every part with an appropriate solution.
- 7.7.2 If the valve has been extracted from the line, it will be possible to check it accurately. Particularly, it will be possible to check the closures in the seal areas in order to verify the existence of corrosions of frictional pick-up.

## 8. MAINTENANCE

- 8.1 PRCV Pipeline Rotary Control Valves typically do not require regular lubrication. In the event of unsatisfactory operation, VRG CONTROLS recommends use of MOBIL SHC 220 grease for lubrication. Mobil SHC 220 grease is available from VRG CONTROLS or from your local MOBIL products distributor.
- 8.2 Internal PRCV maintenance other than lubrication should be made with the PRCV depressurized and removed from the pipeline.
- 8.3 Clean accurately the metallic parts using an oil wet cloth. Do not clean elastomers with solvents. In case of damage of soft parts, replace them.
- 8.4 Control accurately the ball and the seats, to avoid damage. If the ball and the seats are slightly scratched, it is possible to remove the damages by wiping them lightly with very light sand paper roughness maximum 1200. This operation should be executed from technical staff. In doubt and for better results, we suggest to replace the damaged parts.
- 8.5 Verify the functionality of the valve making one stroking cycle per year minimum

## 9. LUBRICATION

- 9.1 Every metallic surface in contact with the ball during the ball movement, should be lubricated with MOLYCOTE G-n Plus or equivalent grease.
- 9.2 The thrust washer (22 and 23) and bearing (33) are auto-lubricated, so they do not require any lubrication.
- 9.3 Lubricate the screw thread with anti-frictional pick up.

## 10. ASSEMBLY

Before starting to reassemble the PRCV, ensure that all parts are accurately cleaned and free from any external materials. Ensure that the assembly will be made in a clean area and also that every packaged parts are kept as cleanest as possible. REPLACE ALL THE FIRE GASKETS SINCE THEY CANNOT BE UTILIZED AFTER DISASSEMBLY. The Assembly instructions are opposite to the disAssembly instructions. For a correct screwing of the bolting, see table 2 closing torque.

### 10.1 Closure Assembly

- 10.1.1 Position the closure (2) which is situated downwards with the area of seat lodging facing upwards.
- 10.1.2 Insert the seat's springs (27) in the spring seat's hole in the closure, helped by a grease if necessary.
- 10.1.3 Put the seat seal in the right position, grease o-ring (48 only for valve 55) and seat gasket o-ring (14). During this operation pay attention to pinch the o-rings.
- 10.1.4 Put the body-closures o-ring and graphite (11-16) in the closure using a grease if necessary.

### 10.2 Ball Assembly

- 10.2.1 Put the upper and lower bearings (33) on the ball hubs.
- 10.2.2 Put the lower thrust washer (23) on the lower ball hub.
- 10.2.3 Put the supports (32) on the ball hubs.
- 10.2.4 Put the centering pins (46) in the hole on the supports lateral surfaces.
- 10.2.5 Insert the assembly compound of the ball and two supports on the closure pay attention that the pins on the support must be centered with the closure pins holes.
- 10.2.6 Put the ball in close position.

### 10.3 Body Assembly

- 10.3.1 Put the body (1) vertically on the closure so that the bolts (7) enter through their hole in the closure.
- 10.3.2 Verify that the top cover's hole in the body is aligned with the upper ball trunnion.
- 10.3.3 Assembly with the body the other closure completed with the seat ring, following the procedure described in the precedent points.
- 10.3.4 Screw the nuts (8) on the bolt (7) starting with the bolts positioned in the lower part of the valve.
- 10.3.5 Screw the drain plug (40b) on the body.

### 10.4 Stem Assembly

- 10.4.1 Position the stem (4) on the ball (4) with the key (21) in axes with the flow axe.
- 10.4.2 Add the upper thrust washer (22) on the stem.

### 10.5 Top cover Assembly

- 10.5.1 Place the top cover's o-ring/graphite (15 and 18) in their housing at the end of the top cover, at the top of the body hole.
- 10.5.2 Place the stem o-rings (12), in their housing inside the top cover (5).
- 10.5.3 Screw the grease fittings (30) at the top cover (5).
- 10.5.4 Place the top cover (5) on the body (1), using a pin hole between the body and the top cover, center the top cover in the correct position; pay attention to scratch the stem during this operation.
- 10.5.5 Fix the top cover to body screwing well the capscrews (9) to have correct seal.
- 10.5.6 Put the pin (36c) in their hole in the top cover.

### 10.6 Adaptor flange Assembly

- 10.6.1 Insert the graphite (19), place the gland bushing (6) in its housing on the top of the cover.
- 10.6.2 Place the adaptor flange (20) on the top cover, centering the adaptor flange pin's hole position (20) with the top cover pin's hole position (5).
- 10.6.3 Place the capscrews (10) in their hole on the adaptor flange, screwing them.
- 10.6.4 Place the key (21) on its stem housing and fix it screwing the capscrew (21a).

## 11. FINAL RECOMMENDATION

- 11.1 After Assembly the valve, move the PRCV from close position to open position multiple times to ensure satisfactory stroking.
- 11.2 With the PRCV in open position, verify that they key position is in parallel with the flow direction, and when the valve is in close position, the key position should be perpendicular to the flow axis.
- 11.3 For a correct tightening of the bolts, refer to Table 2 – Torque Wrench Settings.



**Table 2 – Torque Wrench Settings [TORQUE ± 5%]**

Bolt Size	A 193 B7 A 320 L7		A 193 B7M A 320 L7M A 453 Gr.600B		A 193 B8	
	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs
<b>M 8</b>	26	230	20	177	25	221
<b>M 10</b>	51	451	39	345	49	434
<b>M 12</b>	90	797	68	602	86	761
<b>M 14</b>	126	1,115	96	850	121	1,071
<b>M 16</b>	197	1,744	151	1,336	189	1,673
<b>M 18</b>	270	2,390	206	1,823	259	2,292
<b>M 20</b>	386	3,416	295	2,611	295	2,611
<b>M 22</b>	532	4,709	406	3,593	406	3,593
<b>M 24</b>	666	5,895	509	4,505	509	4,505
<b>M 27</b>	988	8,745	755	6,682	617	5,461
<b>M 30</b>	1,334	11,807	1,019	9,019	834	7,382
<b>M 33</b>	1,568	13,878	1,198	10,603	951	8,417
<b>M 36</b>	2,168	19,188	1,656	14,657	1,039	9,196
<b>M 39</b>	2,807	24,844	2,144	18,976	1,345	11,904
<b>M 42</b>	3,547	31,394	2,710	23,986		
<b>M 45</b>	4,428	39,191	3,383	29,942		
<b>M 48</b>	5,429	48,051	4,147	36,704		
<b>M 52</b>	6,989	61,858	5,338	47,245		
<b>M 56</b>	8,431	74,621	6,440	56,999		
<b>M 60</b>	10,487	92,818	8,011	70,903		
<b>M 64</b>	12,878	113,980	9,838	87,074		
<b>M 68</b>	15,631	138,346	11,940	105,678		
<b>M 72</b>	18,718	165,668	14,299	126,557		
<b>M 76</b>	22,158	196,115	16,926	149,808		
<b>M 80</b>	26,027	230,358	19,882	175,971		
<b>M 85</b>	31,462	278,462	24,033	212,710		
<b>M 90</b>	37,609	332,868	28,729	254,273		
<b>M 95</b>	44,442	393,345	33,949	300,474		
<b>M 100</b>	52,142	461,496	37,296	330,097		

## 12. SPARE PARTS

ASSEMBLY POSITION	DESCRIPTION	TYPE "54" (Qty.)	TYPE "55" (Qty.)
11	CLOSURE O-RING	2	2
12	STEM O-RING	2	2
13	SEAL O-RING	-	2
14	SEAT GASKET O-RING	2	2
15	TOP COVER O-RING	1	1
16	CLOSURE FS GASKET	1	1
18	TOP COVER FS GASKET	1	1
19	STEM FS GASKET	1	1
25b	SEAT WITH INSERT	2*	-
39	BODY O-RING	1	1
48	"U" CUP O-RING	-	2
59	LOWER TRUNNION O-RING	1	-

\*Recommended part for 2 years of operation

### START UP / COMISSIONING

SUGGESTED SPARE PARTS: 1 kit of all spare parts indicated in table, a kit is valid for 5 valves of same type.

### 2 YEARS OF OPERATION

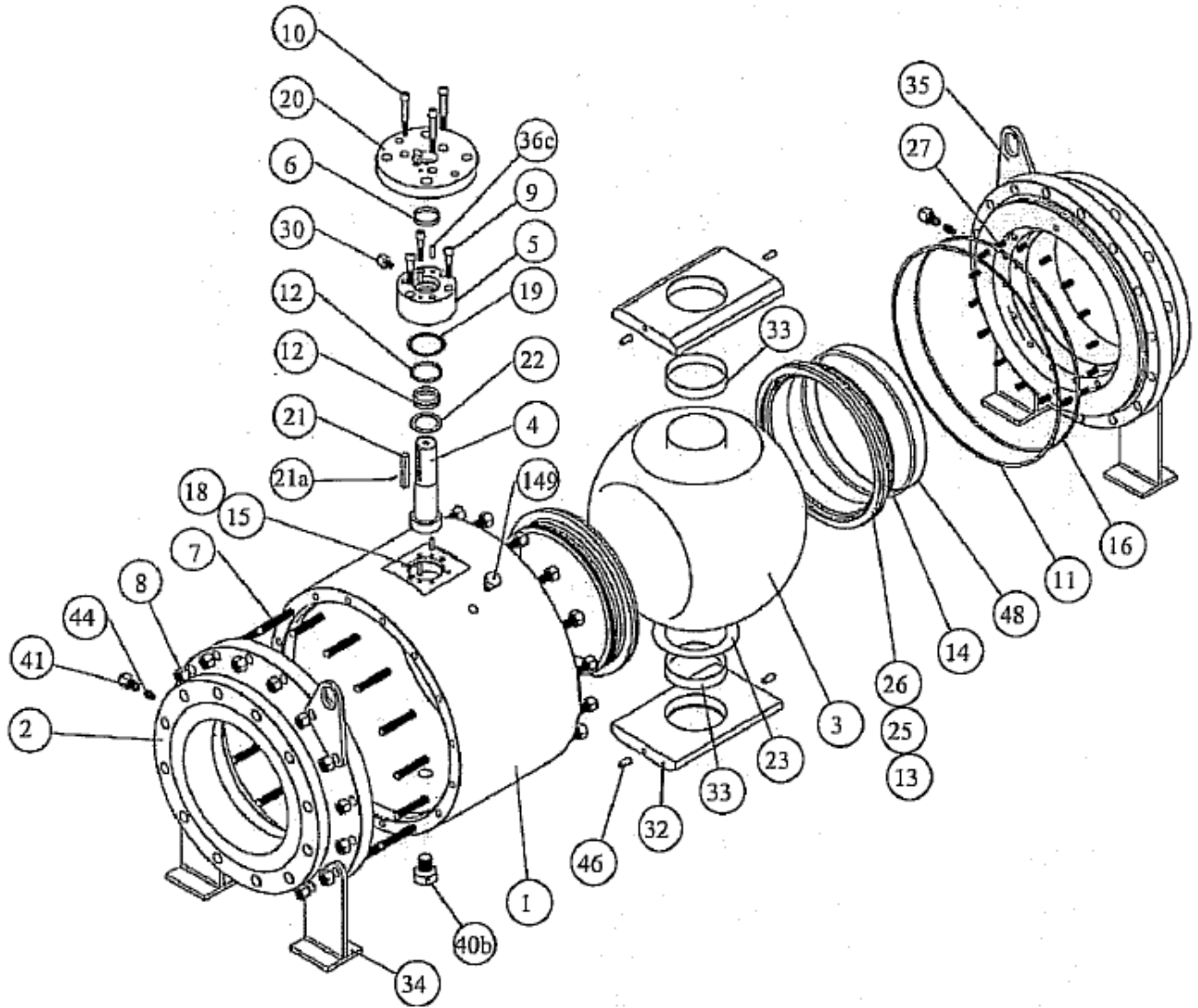
SUGGESTED SPARE PARTS: 1 kit of all spare parts indicated in table, a kit is valid for 5 valves of same type.

**13. STORAGE**

- 13.1 PRCV's are furnished with wood or plastic cover applied at the end, and they shall be removed before the installation in the pipeline.
- 13.2 For the storage, the ball shall be in open position if permissible.
- 13.3 The valve shall remain in their original package for more than 18 months, in a clean, dry, and cover place or in a controlled environment warehouse.
- 13.4 If the storage is in external ambient for a period of more than 12 months, advise VRG CONTROLS before the order.

**14. ASSEMBLY DRAWING (Type 54 – See Figure 1.0 – PRCV Pipeline Rotary Control Valve (Type 54))**

Pos.	Description	Pos.	Description
20	ADAPTOR FLANGE	149	DRAIN PLUG
19	STEM FIRE SAFEF GASKET	48	“U” CUP RING
18	TOP COVER FS GASKET	46	SUPPORT PIN
16	CLOSURE FS GASKET	44	CHECK VALVE
15	TOP COVER O-RING	41	GREASE FITTING
14	SEAT GASKET O-RING	40b	DRAIN CONNECTION
13	SEAL O-RING	38c	STOP PIN
12	STEM O-RING	35	LIFTING LUG
11	CLOSURE O-RING	33	SUPPORT BEARING
10	ADAPTOR FLANGE CAPSCREW	34	LEG
9	TOP COVER CAPSCREW	32	SUPPORT
8	NUT	30	STEM GREASE FITTING
7	BODY BOLT	27	SEAT SPRING
6	GLAND BLUSHING	28	SEAT ESTERNAL RING
5	TOP COVER	25b	SEAT INNER RING
4	STEM	23	LOWER THRUST WASHER
3	BALL	22	UPPER THRUST WASHER
2	CLOSURE	21a	KEY CAPSCREW
1	BODY	21	STEM KEY



**Figure 1.0 – PRCV Pipeline Rotary Control Valve (Type 54)**