

MOUNTING, OPERATING, TESTING & MAINTENANCE INSTRUCTIONS FOR ROTEX 5/2, 3/2 CONVERTIBLE NAMUR SOLENOID VALVE MODEL 51424, 51424LW, 51424IS

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ROTEX will not be responsible for any damage whatsoever arising from the use of the Solenoid Valve, due to misuse or incorrect installation or misinterpretation of the information contained herein.

SPECIFICATION OF STANDARD SOLENOID VALVE

TYPE	:	5 Port 2 Position, 3 Port 2 Position Convertible
OPERATION	:	INTERNAL PILOT OPERATED POPPET TYPE NAMUR PORTED SOLENOID VALVE
ORIFICE = NW	:	6 mm
OPERATING PRESSURE	:	2-10 bar (2-8 bar for 51424IS)
MANUAL OVERRIDE	:	For pressure range 2-10 bar, provided with Push & Turn type.
SEALS & SEAT	:	The valve is provided with NBR Seals & Seat material
ELECTRICAL INSULATION	:	The Solenoid is having Class F insulation.

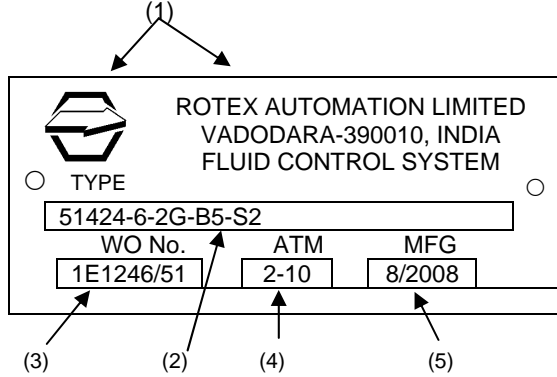
CONSTRUCTION

Body Internal	Aluminium Al., Br., SS (*)	Brass Brass, SS316 (B2)	SS316 SS316 (B5)	Aluminium SS316 (B1)			
Core Tube	SS304						
Core Plug & Plunger	SS430, Electroless Nickel Plated						
Seals	NBR (*)	EPDM (S1)	Viton (S2)	PTFE (S4)			
Springs	SS302						
Manual Override	Nil (MO)	Push & Turn (M6) *	Push Type (M8)				
Operating Voltage	6, 12, 24, 27, 38, 42, 48, 73, 110, 125, 220, 242, 256, 440						
Current	DC, 50Hz, 60Hz						
Solenoid Construction	Weatherproof IP 67		Code	Explosionproof IP 67		Cable Entry	
	Flying Lead		01, 04, 05	1/2" NPT		M20 X 1.5	
	Flying Lead with Cable Entry		07, 08, 09	Junction Box with LED EExd IIC T4 or T5 or T6		37	39
	Terminal Box		16.19	IS Solenoid with Circuit Ex ia IIC T6, IP 67 – Voltage 24V DC only			
	Terminal Box with LED		17, 18				
	Plug In PG9		25	IS Solenoid with Circuit Exd Enclosure		63	64
	Plug In PG9 with LED		21, 26	Low Power IS Solenoid Ex ia IIC T6, IP 67			
	Plug In PG9 36mm		22	Exd Enclosure		72	73
	TB Multi Pin Connector		70	Terminal Box Enclosure		67	68
				Plug In Enclosure		65CR (Cable Entry PG9)	
Insulation	Class 'F' (*)		Class 'H' (H)				
Special Version	MR, T6 LC NP CO LW SS IS						
	WEATHERPROOF SOLENOID			EXPLOSION PROOF SOLENOID			
OPTION AVAILABLE	Terminal Box	Plug In	Junction Box – Exd	IS Solenoid with CKT	Low Power IS Solenoid		
Latch	✓	✓	✓				
MR	✓	✓	✓		✓		
CO	✓		✓	✓			
APPROVAL							
IP 67	✓	✓	✓	✓	✓		
UL (NEMA 6P)	Applied For		Applied For				
UL (NEMA 7&9)							
CE		✓	✓	✓	✓		
ATEX			✓	✓	✓		
DGMS			✓	✓	✓		
CCOE			✓	✓	✓		
CMRI			✓	✓	✓		
BIS			✓	✓	✓		

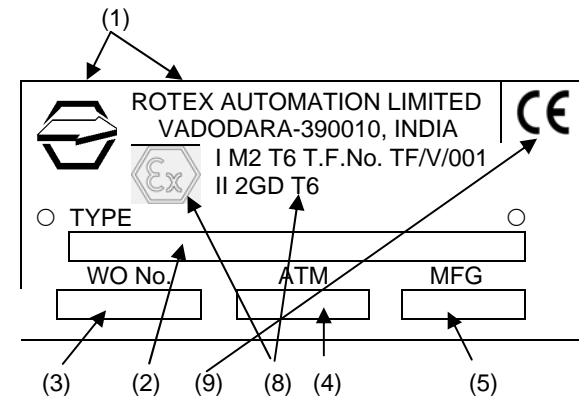
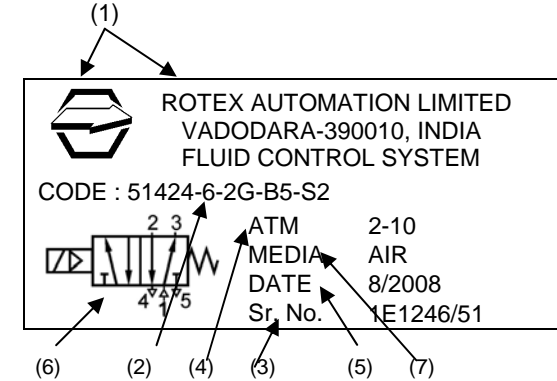
IDENTIFICATION ON THE SOLENOID VALVE

a) **VALVE LABEL**

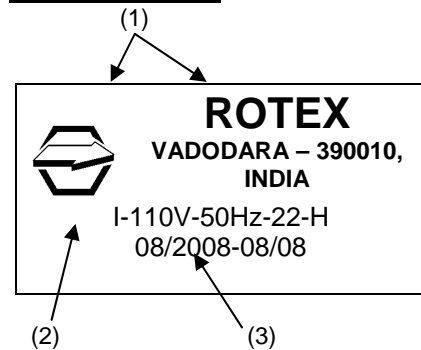
Label on the **ROTEX** Solenoid Valve shows the following details :



- (1) Logo + Manufacturer's Name & address
- (2) Valve Type / Code
 - 51424 = Valve Model
 - Suffix = Nil
 - 6 = Orifice
 - 2G/3G = 1/4" / 3/8" Port Connection (BSP)
 - B5 = Body Material (SS316)
 - S2 = Seal Material (Viton)
 - = Manual Override (Push & Turn)
 - 110V = Solenoid Voltage
 - 50Hz = Current (AC)
 - 22 = Solenoid Construction (Enclosure : Plug In)
 - H = Solenoid Class 'H' Insulation
 - Sp. Version = Nil
- (3) Manufacturer's Work Order reference / Sr. No. of the Valve
- (4) Operating Pressure
- (5) Manufacturing Month & Year
- (6) Valve Symbol
- (7) Media
- (8) ATEX Ex mark for Valve (Non Electrical Part)
- (9) "CE" mark for ATEX and/or PED compliance.



b) **SOLENOID LABEL**



- (1) Logo + Name of the Manufacturer
- (2) Solenoid Type
 - I = Solenoid Size I
 - 110V = Solenoid Voltage
 - 50 Hz = Solenoid Current
 - 22 = Solenoid Construction (Plug In DIN)
 - H = Solenoid Class H Insulation
- (3) Plan No. & Manufacturing Month / Year

c) **PORT IDENTIFICATION**

A solenoid Valve with NPT (F) threading is normally marked "N" near the port and with Metric threads are marked "M". For ports with BSP threads, there is no marking.

- d) Voltage, current & other details are additionally marked/punched on the solenoid.

NOTE : The product without label is out of warranty and risk.

CONNECTION

VALVE TYPE	Inlet	Outlet	Outlet	Exhaust	Exhaust	Pilot Vent	External Pilot Inlet
51424	1	NAMUR	NAMUR	4	5	6	-

A) OPERATING PRINCIPLE

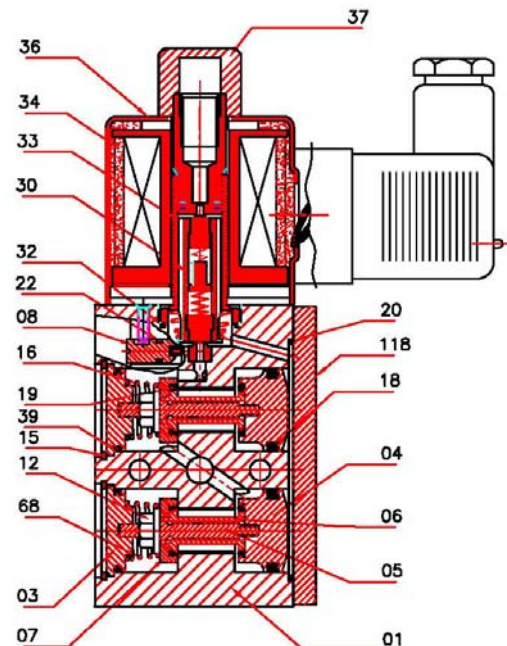
When the solenoids is de-energised and pressure applied at the inlet port, a part of media from the inlet is drawn through the pilot passage which is blocked under Plunger (Part-30). In case of External Pilot Operated Valve the pilot passage is blocked by Gasket (Part-00) and pilot air connected to Port-7 of the valve is blocked under Plunger (Part-30). Port-2 to 4 and Port 1 to 3 are connected, Port-5 is blocked.

On energisation of the solenoid, Plunger (Part-30) moves up thereby blocking pilot vent orifice. The air from pilot passage acts on the piston assembly thus, pushing the poppet assembly down and connecting to Port-1 to Port-2 and Port-3 to Port-5 and blocking Port-4.

On de-energising the solenoid, the pilot air is vented through pilot vent thereby the spring and media air pressure pushing the poppet assembly up.

NOTE : IN CASE WHEN THE VALVE IS OPERATED AS EXTERNAL PILOT OPERATED VALVE, THE PILOT AIR PRESSURE SHOULD BE MINIMUM 2 bar OR \geq MAIN FLUID PRESSURE WHICHEVER IS MORE.



01	COVER PLATE	24	118	AL	
01	VALVE SPRING	22	68	SS	
02	BODEN 'O' RING	21	39	NBR	
01	DOME NUT	20	37	NYLON	
01	NAME PLATE	19	36	AL	
01	COIL ASSLY.	18	34	-	
01	GUIDE ASSLY.	17	33	SS	
01	GUIDE 'O' RING	16	32	NBR	
01	ANKER ASSLY.	15	30	SS	
01	M.A. 'O' RING	14	22	NBR	
01	BODY 'O' RING	13	20	NBR	
04	SEAT 'O' RING	12	19	NBR	
02	KOLBEN 'O' RING	11	18	NBR	
01	VALVE SPRING	10	16	SS	
02	INTERNAL CIRCLIP	09	15	SS	
02	NUT	08	12	M.S.	
01	MANUAL ACTUATOR	07	08	BR	
02	VETILTTELLER	06	07	BR	
02	DISTANHULSE	05	06	BR	
02	VENTILSCHAFT	04	05	SS	
02	KOLBEN	03	04	BR	
02	BODEN	02	03	AL	
01	GEHAUSE	01	01	AL	
QTY.	DESCRIPTION	SR.No.	POS.No.	MATERIAL	REMARKS







51424



(B) MOUNTING/INSTALLATION PROCEDURE :

1. ENSURE THAT :
 - a) While storing, keep the valve in cool, dry, dust free area.
 - b) On receipt of the valve, in case if the same is to be removed from the sealed plastic bag for inspection/testing, put them back with dust plugs on its ports and sealing the plastic bag as soon as the inspection/testing is over.

- c) The valve should be removed from its card board and/or plastic bag just before the installation.
-  d) Flush lines before installing the valve.
-  e) To avoid pressure drop and to achieve optimum parameters, Pipe / Tube / Fitting from the source of pressure to the valve and to the connected equipment should have ID which is \geq NW (Orifice) of the valve.
- f) To avoid pressure drop, if more than one valve is being operated simultaneously from a common header, then minimum ID of the header can be calculated as under.

$$\text{ID Header} = \sqrt{(\text{NW}^2 \times n)}$$
 n = Number of Valves operating at a time and which are connected to a common header,
 NW = Orifice of the Valve.
-  g) Incorporate filter in the line to avoid hard particles entering into the valve.
- h) Do not try to drill any additional holes or machine, modify any of the valve components.
- i) Inlet pressure does not exceed rated pressure.
- j) Hemp-Filaments, 'Jute' or even Teflon-Ribbons are normally not required, as the port connections of ROTEX Valve is accurately machined.
- k) Do not cover first two thread pitches with Teflon tape or sealant. To avoid over lap of the Teflon ribbon or cuts generated while tightening, getting carried away into the valve.
-  l) **For Solenoid Valve to be installed in European Union, check the applicability for ATEX, PED Directives. Refers separate Instruction Manual for ATEX approved Solenoid Valve.**
2. Provide Dust Cap on the exhaust port or ensure that the valve is mounted such a way that dust particles / rain water / process fluid do not enter into the valve through exhaust port of the valve. You can connect bend pipe of $\text{ID} \geq$ NW of the valve so that the exhaust port is not directly (straight) open into the atmosphere.
3. The process fluid etc. do not fall on the valve body.
-  4. Install valve in such a way that the rain water / other process fluid dripping along the cable does not fall on the SOV and has no possibility to run along the cable and enter into the Terminal area.
5. In case if the valve is installed in potentially Hazardous area, check for the temperature class of the Solenoid to avoid explosion due to heated Solenoid / other components.
6. Provide fuse of proper rating to avoid excess current passing through the Solenoid and thereby avoiding over heating.
7. It is not likely however, the user is advised to protect the valve against lightening as the same is not assessed.
8. Check internal components (wetted) parts for its compatibility with fluid passing through the valve.
-  9 **It is recommended to replace all the Rubber Parts including Plunger Assembly (Repair Kit – Code 99) in case if the valve is to be installed and put in service after 2 years from the date of manufacture.**
10. Install valve matching Port A of the Actuator (active port) to the Port 2 of the Solenoid Valve.
11. Fix M5 Grub Screw in one of the M5 free hole of the Actuator. This is to avoid turning at the valve during maintenance (Refer Photo-XX).
12. **Procedure to convert 5/2 to 3/2.**
- a) Remove Valve.
- b) Check disk position at Port-4 of the solenoid valve.
- c) To convert valve from 5/2 to 3/2, remove disk at Port-4 and refix the same after turning 180°. (Refer Photo-XX).
13. 51424 can be operated with 6 Watt / 8 Watt Solenoid.
14. 51424LW can be operated with 2 Watt Solenoid.
15. 51424IS can be operated with Low Power Intrinsically Safe Solenoid.
16. Use SP2 Spacer Plate with long bolts in case when the solenoid interferes with Actuator body.

ELECTRICAL

1. Verify name plate affixed on the Solenoid.
2. Connect the power supply according to the voltage rating of the Solenoid
3. Ensure that the cover of Junction Box/Terminal Box is properly tightened wherever applicable.
4. Install valve in such a way that the rain water / other process fluid dripping along the cable does not fall on the SOV and has no possibility to run along the cable and enter into the Terminal area.
5. Fill in the space between cable and gland entry with a proper sealant. If necessary, you may mount the valve upside down or in any other direction.
6. Ensure that the Solenoid enclosure meets process and local authority requirement.
7. The Plug In, Terminal Box, FPJB, IS Solenoids are provided with test leads. Remove them before final installation.
-  8. Check for proper connections for the Solenoid which are polarity sensitive e.g. (a) Latched Solenoid (b) EEx ia Solenoid.
-  9. **Refer separate manual for construction of the Solenoid and for specific instructions related to Solenoid e.g. (a) EEx ia (b) Latched Solenoid (c) EExd Solenoid IP 67, IP 54**
10. Ensure that the solenoid construction is selected properly meeting the environment in which the valve is supposed to be installed e.g. use of Exd or Ex ia solenoid for valve to be installed in hazardous location or Weatherproof Solenoid having IP 67 for outdoor installation.

- ⚠ 11. Flying Lead Solenoid is not recommended to be used for outdoor or indoor application where water/liquid splashing or high humidity is present.

MANUAL OVERRIDE OPERATION

(A) **PUSH & TURN TYPE (M6)**

When the solenoid is deenergised (Photo-4) and inlet and outlet ports connected, applying rated pressure, the valve can be operated either pressing the Manual Override, when the same is released, the valve returns back to the normal position. The valve can also be locked in energized (Photo-3) position by pushing the Manual Override and rotating clockwise. To avoid Manual Override returning back to normal condition, ensure that the same is turned above 90°. The valve can be brought to normal condition by turning Manual Override anti clockwise.

Without connecting air supply to the valve operate Manual Override. Energise and De-energise Solenoid to check for plunger movement (normally movement should not be there) which can be felt by click sound.

After operating Manual Override if plunger movement is found, reduce length by 0.3mm of the manual override from its taper end. Continue this till click sound stops.

TESTING OF THE VALVE AT THE TEST BENCH

- ⚠ Check at least once in 3 years or following your routine maintenance schedule.

- a) Apply rated pressure at inlet port of the valve.
- b) Plug outlet ports.
- c) Check operation of the valve and leakage at the exhaust ports and pilot vent at the rated and minimum working pressure by applying 75% to 120% rated voltage.
- d) While keeping the solenoid de-energised, check operation and leakage from exhaust and pilot vent ports of the valve at the rated and minimum working pressure by operating Manual Override.

- ⚠ Check at least once in 3 years or following your routine maintenance schedule.

- a) Apply rated pressure at inlet port of the valve.
- b) Plug outlet ports.
- c) Check operation of the valve and leakage at the exhaust ports and pilot vent at the rated and minimum working pressure by applying 75% to 120% rated voltage.
- e) While keeping the solenoid de-energised, check operation and leakage from exhaust and pilot vent ports of the valve at the rated and minimum working pressure by operating Manual Override.

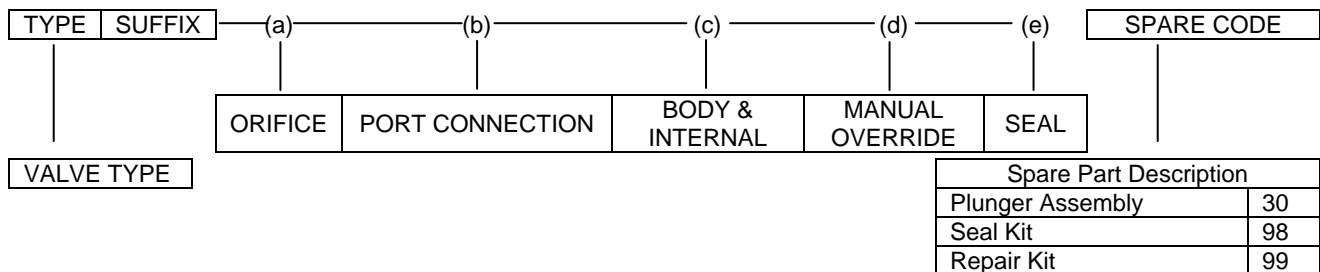
- ⚠ f) Without connecting air supply to the valve, operate Manual Override. Energise and De-energise Solenoid to check for the plunger movement (normally movement should not be there) which can be checked by click sound. After operating Manual Override if plunger movement is found, reduce length of the manual override by 0.3mm from its taper end. Continue this till click sound stops.

- g) Check the insulation resistance of the Solenoid by applying 500V DC at terminals and the solenoid housing. It should be more than 100 Mega Ohms.

RECOMMENDED SPARES

- a) Seal Kit (O Ring) (Code – 98).
- b) Plunger assembly (Part No. 30).
- c) Spare Solenoid. (Code – 34)
- d) Repair Kit (Code – 99)

SPARE ORDERING CODE



SPECIAL TOOLS

- Guide Opening Tool : **ROTEX** Ref No. WN 1219 / M28 (Photo-1) or WN1219 / M22 (Photo-2) (ROTEX make).
- Kolben Opening Tool.




RECOMMENDED MAINTENANCE

- Replacement of Complete Set of O Ring
- Solenoid O Ring (Part 35), Guide O Ring (Part 32),
- MA O Ring (Part 22), Body O Ring (Part 20),
- Seat O Ring (Part 19), Piston O Ring (Part 18)
- Replacement of Plunger Assembly
- Replacement of the Solenoid
- Check of Insulation Resistance, Resistance of the Solenoid...
- Check Resistance of the Solenoid... ..
(Not applicable for Solenoid with IS, RC options or
AC Solenoid with ≥ 11 Watt power).

PREVENTIVE

- Once in 5 years or 2 million operations.
- Once in 5 years or 2 million operations
- As and when required.
- Once in a year (should be ≥ 100 MOhms @
500V DC.
- Replace Solenoid if the resistance reduces more
than 5% computed at 20°C as compared to its
Initial value.

MAINTENANCE – GENERAL INSTRUCTION

- The Solenoid Valve must be removed from the site and has to be maintained under safe conditions.
-  • All air and electrical connections must be switched off before removing valve from the line.
-  • It is recommended to replace complete set of O Ring even if one of the O Ring is damaged. This is to ensure trouble free operation of the valve and will avoid its premature failure.
- Using Grease other than Silicon base Molykote M55 will lead to premature failure of O Rings of the **ROTEX** Solenoid valve.
-  • If necessary to clean the components, **do not use Kerosene, Diesel, Petrol to clean valve as this damages the O Rings and other rubber material. Instead use light Detergent Soap Solution.**
- Ensure that the components are free from dust, dirt, lint and metal burrs.
- Twisting of O Ring should be avoided. Ensure that the twist is removed before fitting matching part.
- While closing the matching part, the matching part should be pushed in a straight line. Turning motion should be avoided.
- Pinching of O Ring at the groove corner at the time of closing gland should be avoided.
- User is requested to use safe practice for maintenance.
- It is important to place the dismantled Valve Parts on a clean paper or cloth in same sequence in which you have dismantled them.
- Ensure to keep all the components of the valve separately to avoid their mixing up. The component appears to be same may have small differences which will cause malfunction if interchanged.
- In case of difficulty you should contact the Agent, Distributor or **ROTEX** directly.
- Using **ROTEX** genuine spares will **Guarantee** you trouble free operation and will avoid premature failure.

(A) TO REPLACE SOLENOID

- 1) Open dome nut (Part 37) and pull out solenoid (Part 34)
- 2) Replace new solenoid ensuring the construction, voltage and current meets the requirements.
- 3) Tighten the dome nut (Part 37) applying torque of 0.2 kgm to 0.35 kgm to avoid over tightening of the solenoid.
- 4) Measure and record resistance of the Solenoid.

(B) TO REPLACE GUIDE ASSEMBLY (CORE TUBE) (Part 33) / PLUNGER (Part 30)

- 1) Open dome nut (Part 37) and pull out solenoid (Part 34).
- 2) Open Guide Assembly (Core Tube) (Part 33) using guide opening tool as per Photo - 2 or 3 (depending on the Guide Assembly (Core Tube) fitted on the valve).
- 3) Remove Plunger Assembly (Part 30).
- 4) Replace the necessary defective parts ensuring that the plunger assembly spring and the retaining ring is as per Photo - 5 or as per Photo – 6 & 7.
- 5) The Plunger as per Photo - 6 & 7 is interchangeable and can be fitted in the existing Guide Assembly (Core Tube).
- 6) Fix Guide Assembly (Core Tube) using correct tool.
- 7) Fix the solenoid and dome nut as per Point-4 of procedure A.
- 8) Eventhough it is not recommended, in case if required, the Guide Assembly (Core Tube) (Part 33) can be opened using plier or other similar tool ensuring that the same does not damage anything or component and the plier is tighten above weld joint (weld joint should be at the centre of plier jaw width).

(C) REPLACEMENT OF MANUAL OVERRIDE (PART 8)

- 1) Remove Grub Hex Socket Set Screw (Part 115) and pull out Manual Override (Part 8).
- 2) Replace new Manual Override applying light layer of Silicon Grease Molykot M55 and tighten the grub screw fully till the Manual Override stops traveling in and out.
- 3) Open the Grub Hex Socket Set Screw slightly (1/4 turn) and check the smooth movement of the grub screw.
- ⚠ 4) Without connecting air supply to the valve, operate Manual Override. Energise and De-energise Solenoid to check for the plunger movement (normally movement should not be there) which can be checked by click sound. After operating Manual Override if plunger movement is found, reduce length of the manual override by 0.3mm from its taper end. Continue this till click sound stops.

(D) REPLACEMENT OF O RINGS

- 1) Remove solenoid if necessary as per Procedure "A".
- 2) Remove Deckel (Cover) (Part 2) by opening four screws.
- 3) Remove bottom plate by opening 4 Nos. CSK Allen Head screws.
- 4) Remove Ventilboden (Valve Bottom) (Part-3).
- 5) Remove Ventilfeder (Valve Spring) (Parts-16 & 68). Ensure that the location of the same are not interchanged.
- 6) Open piston assembly using special tool at Kolben (Part-4) and opening Nut (Part-12).
- 7) Pull out Ventilteller (Pressure Plate) (Part-7) and Kolben Assembly.
- 8) Pull out Hulse (Part-116) and remove all O Rings [Piston O Ring (Part-18), Seat O Ring (Part-19)].
- 9) Clean components.
- 10) Fix new O Rings applying light layer of Molykot M55 grease.
- 11) Ensure that the O Rings and other rubber parts are compatible to the media passing through the valve.
- 12) Replace MA O Ring (Part-22), Body Pilot O ring (Part-39) and Guide O ring (Part-32) following procedure "B".
- 13) Reassemble the valve.
- 14) Check operation and leakage of the valve.
- 15) Contact ROTEX in case of any difficulty.

STORING, CLEANING AND MOUNTING OF ELASTOMERS : SYNTHETIC RUBBER PRODUCTS

- Store Plunger, O Ring Set in sealed polyethylene bag, kept in cool, dry, dust free area and avoid direct contact with all light sources emitting ultra violet rays, or contact with fumes, solvents, fuels, lubricants, chemicals, acids, disinfectants.
- Follow Maintenance General Instruction & specific procedures to replace O Ring set as listed above.



3/2 Disk Position
Photo - 1



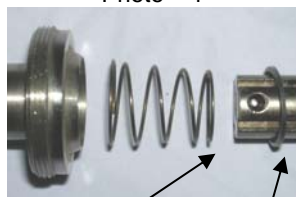
5/2 Disk Position
Photo - 2



Manual Override "ON"
Photo - 3



Manual Override "OFF"
Photo - 4



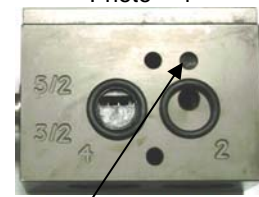
Spring Dia (Small)
Flat Face this side
Photo - 5



Plunger with fixed conical & cylindrical seal (Old Plunger)
Photo - 6



Plunger with moving seal (New Design Plunger)
Photo - 7



Locating spot for Grub Screw
Photo - 8

Contact :

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