MOUNTING, OPERATING, TESTING & MAINTENANCE INSTRUCTIONS FOR ROTEX 3/2 DIRECT ACTING HIGH ORIFICE SUBBASE SOLENOID VALVE MODEL: 30316, 30317

All details within this manual and the catalogue are subject to change without manner.

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 THE SOLENOID VALVE

TYPE	:	3 Port 2 Position
OPERATION	:	DIRECT ACTING HIGH ORIFICE SUBBASE SOLENOID VALVE
ORIFICE = NW	:	5 mm for 30316, 7mm and 10mm for 30317
OPERATING PRESSURE	:	0-10 bar
MANUAL OVERRIDE	:	Not provided. Manual Override provided optionally.

CONSTRUCTION

Body	Aluminium	(※)	Brass	(B2)	SS316	(B5)	Aluminium	(B1)
Internal	Al.,Br., SS316		Brass, SS316		SS316		SS316	
Core Tube	SS304							
Core Plug & Plunger	SS430, Electroless Nickel Plated							
Seals	NBR (※)	EPDM (S1)	Viton (S2)					
Springs	SS302							
Manual Override	Nil ※	Push & Turn (M6)	Push Type (M8)					
Operating Voltage	6, 12, 24, 27, 38, 42, 48, 73, 110, 125, 220, 242, 256							
Current	DC, 50Hz, 60Hz							

Solenoid Construction	**Weatherproof IP 67**	**Code**	**Explosionrproof IP 67**	**Cable Entry**	
				1/2" NPT	M20 X 1.5
	Terminal Box	16.19	Junction Box with LED EExd IIC T4 or T5 or T6	37	39
	Terminal Box with LED	17, 18			
	Plug In PG9	25	**IS Solenoid with Circuit Ex ia IIC T6, IP 67 – Voltage 24V DC only**		
	Plug In PG9 with LED	21, 26	IS Solenoid with Circuit Exd Enclosure	63	64
	Plug In PG9 36mm	22	**Low Power IS Solenoid Ex ia IIC T6, IP 67**		
	TB Multi Pin Connector	70	Exd Enclosure	72	73
			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			

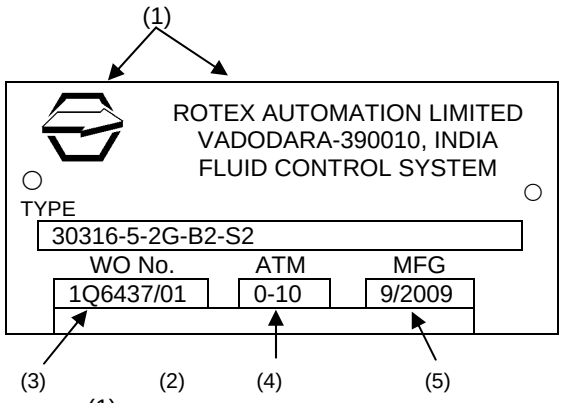
	WEATHERPROOF SOLENOID		**EXPLOSION PROOF SOLENOID**		
OPTION AVAILABLE	Terminal Box	Plug In	Junction Box – Exd	IS Solenoid with CKT	Low Power IS Solenoid
Latch	✓	✓	✓		
MR	✓	✓	✓		✓
CO	✓		✓	✓	
APPROVAL					
IP 67	✓	✓	✓	✓	✓
UL (NEMA 6P)	Applied For		Applied For		
UL (NEMA 7&9)					
CE		✓	✓	✓	✓
ATEX			✓	✓	✓
DGMS			✓	✓	✓
CCOE			✓	✓	✓
CMRI			✓	✓	✓
BIS			✓	✓	✓

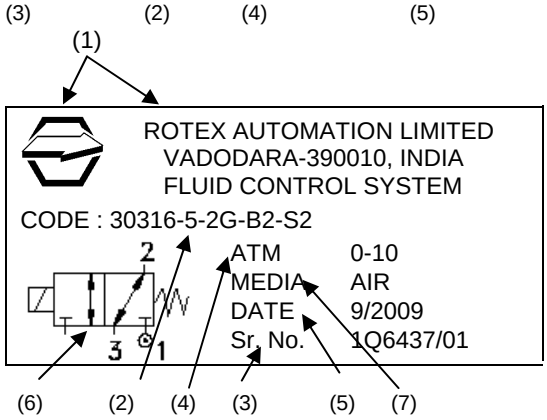
⚠ **NOTE** : **1) FOR "AC" (50 Hz & 60Hz) VOLTAGE, SELECT SOLENOID WITH "FR" OPTION.**
⚠ **2) INTRINSICALLY SAFE SOLENOID CANNOT BE SUPPLIED WITH VALVE**

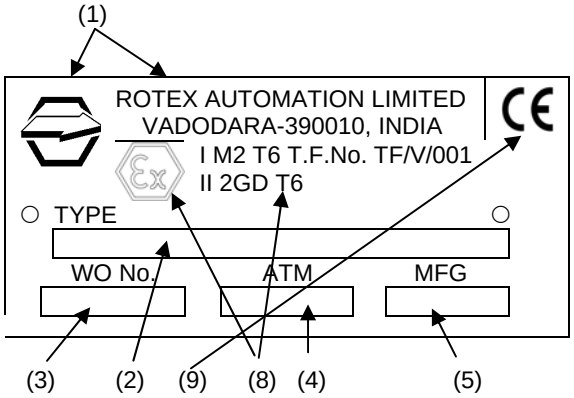
IDENTIFICATION ON THE SOLENOID VALVE

a) VALVE LABEL

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





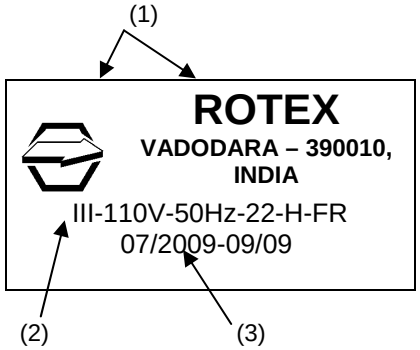


(1) Logo + Name & address of the Manufacturer
(2) Valve Type / Code

30316	=	Valve Model
Suffix	=	Nil
5	=	Orifice ∅
2G	=	Port Connection (BSP)
B2	=	Body Material (Brass)
S2	=	Seal Material (Viton)
110 V	=	Solenoid Voltage
50 Hz	=	Current (AC)
22	=	Solenoid Construction (Enclosure : Plug In)
H	=	Solenoid Class 'H' Insulation
Sp. Version	=	Nil

(3) Work Order reference / Sr. No. of the Valve
(4) Operating Pressure
(5) Month & Year of manufacture
(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

III	=	Solenoid Size III
110V	=	Solenoid Voltage
50 Hz	=	Solenoid Current
22	=	Solenoid Construction (Plug In DIN)
H	=	Solenoid Class H Insulation
FR	=	Full Rectifier

(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

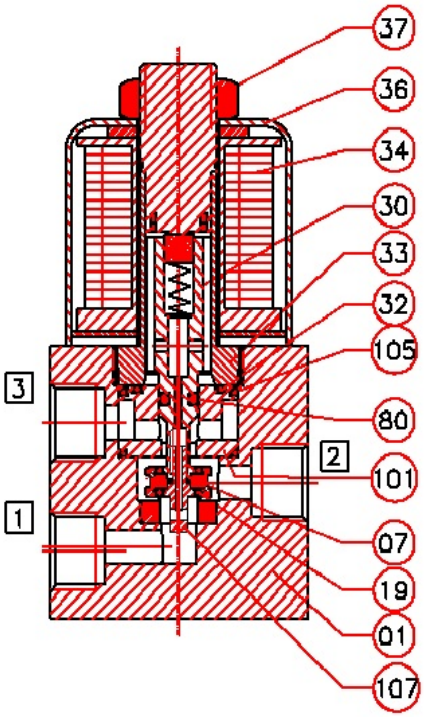
VALVE TYPE	FUNCTION	IN	OUT	EXHAUST
30316, 30317	NC	1	2	3
	NO	3	2	1
	Mixiing	1,3	2	-
	Diverting	2	1,3	-

(A) OPERATING PRINCIPLE

The valve is 3/2 Direct Acting pressure balance design i.e. area at the Seat (Part-19) and balancing Plunger O Ring (Part-80) are same, thereby air force acting on the Plunger Seat is nullified which makes the valve to work merely on the spring force throughout its pressure range.

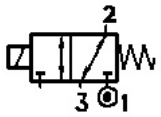
Because of this feature, the valve is Universe in nature and can be used as NC / NO / Diverting / Mixing type.

In the de-energised condition of the valve Port-1 is blocked and Port-3 is connection to Port-2. On energizing the valve, Plunger (30) pulls up thereby connecting Port-1 and Port-2 and blocking Port-3. When the inlet is connected to Port-1, air passes through the small hole provided in the Plunger and acts on upper side of Plunger O Ring (80). When the valve is energized, the Plunger (30) pulls up because of which the lower orifice opens up thereby connecting Port-1 to the outlet Port-3 and the upper orifice at Part-101gets blocked. In this condition force acting on the Plunger (30) due to seat at Part- 101 and on the Plunger (30) due to Plunger O Ring (80) are same because of their equal area.



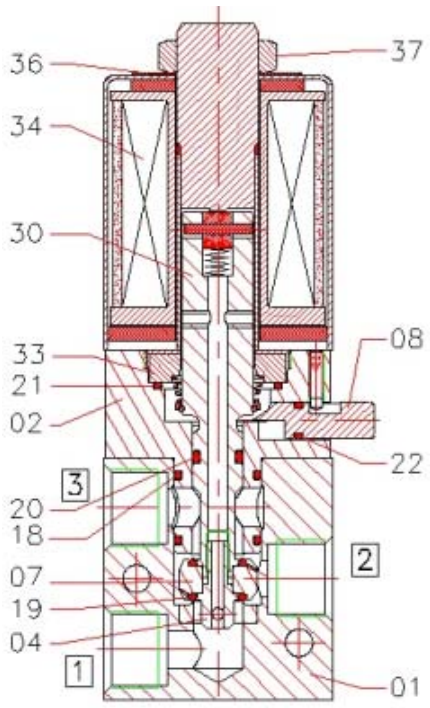
CONNECTION

1. INLET
2. OUTLET
3. EXHAUST



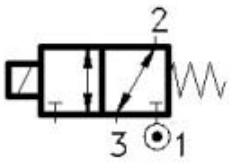
QTY.	DESCRIPTION	POS.No.	MATERIAL
01	M HOLDER	107	SS316
02	SLEEVE 'O' RING	105	NBR/Viton/EPDM
01	SLEEVE	101	BRASS/SS316
01	PLUNGER 'O' RING	80	NBR/Viton/EPDM
01	NUT	37	NYLON/SS
01	DATA PLATE	36	–
01	COIL ASSLY.	34	–
01	GUIDE ASSLY.	33	SS304/SS410
01	GUIDE 'O' RING	32	NBR/Viton/EPDM
01	PLUNGER ASSLY.	30	SS410/SS430
02	SEAT 'O' RING	19	NBR/Viton/EPDM
01	PRESSURE PLATE(VENTILTELLER)	07	BRASS/SS
01	BODY (GEHAUSE)	01	AL/BRASS/SS3316

VALVE MODEL 30316



CONNECTION

1. INLET
2. OUTLET
3. EXHAUST



01	NUT	15	37	NYLON/SS
01	NAME PLATE	14	36	–
01	COIL ASSLY.	13	34	–
01	GUIDE ASSLY.	12	33	SS304+SS410
01	PLUNGER ASSLY.	11	30	SS410/SS430
01	GUIDE "O" RING	10	21	NBR/VITON/EPDM/NEOPRENE
01	M.A. "O" RING	09	22	NBR/VITON/EPDM/NEOPRENE
01	PLUNGER "O" RING	08	20	NBR/VITON/EPDM/NEOPRENE
02	SEAT "O" RING	07	19	NBR/VITON/EPDM/NEOPRENE
02	BODY "O" RING	06	18	NBR/VITON/EPDM/NEOPRENE
01	MANUAL ACTUATOR	05	08	BR/SS316
01	VENTILTELLER (PRESSURE PLATE)	04	07	BR/SS316
01	MHOLDER	03	04	SS316
01	DECKEL (COVER)	02	02	AL/BR/SS316
01	GEHAUSE (BODY)	01	01	AL/BR/SS316
QTY.	DESCRIPTION	SR.No.	POS.No.	MATERIAL

VALVE MODEL 30317

B) **<u>MOUNTING/INSTALLATION PROCEDURE</u>** :

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 ≥ 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 <u>ID of t</u>he header can be calculated as under.
     ID Header = $\sqrt{(NW^2 \times n)}$
     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) The valve should be installed for the media for which it is intended for. This is to avoid the malfunction of seals and the valve. In case if you intend to use valve for media other than the one specified on that valve, check compatibility of media to Body Seal material and grease. Consult **ROTEX** in case if any doubt.
   - i) Do not try to drill any additional holes or machine, modify any of the valve components.
   - j) In case if the valve is used for dangerous fluid gas/liquid then, the user is hereby advised to maintain during operation and maintenance of the valve below LEL or above UEL to avoid explosion due to internal spark as the valves have not been assessed for the same.
   - k) Inlet pressure does not exceed rated pressure.
   - l) Hemp-Filaments, 'Jute' or even Teflon-Ribbons are normally not required, as the port connections of ROTEX Valve is accurately machined.
   - m) To avoid over lap of the Teflon ribbon or cuts generated while tightening, getting carried away into the valve. Do not cover first two thread pitches with Teflon tape or sealant.
   - ⚠ n) **<u>For Solenoid Valve to be installed in European Union, check the applicability for ATEX. Refer separate Instruction Manual for ATEX approved Solenoid Valve.</u>**
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 ID <u>≥</u> 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. In case if the surrounding atmosphere has traces or some other substance other than Air, check its compatibility with the Body material of the valve , Solenoid enclosure & other exposed parts.
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.**

ELECTRICAL

1. Verify name plate affixed on the Solenoid.
2. **For AC Voltage (50Hz or 60Hz), select solenoid with option "FR"**.
3. Connect the power supply according to the voltage rating of the Solenoid
4. Ensure that the cover of Junction Box/Terminal Box is properly tightened wherever applicable.
5. 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.
6. 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.
7. Ensure that the Solenoid enclosure meets process and local authority requirement.
8. The Plug In, Terminal Box, FPJB, IS Solenoids are provided with test leads. Remove them before final installation.
9. Check for proper connections for the Solenoid which are polarity sensitive e.g. (a) Latched Solenoid.
10. **Refer separate manual for construction of the Solenoid and for specific instructions related to Solenoid e.g. (a) Latched Solenoid (b) EExd Solenoid IP 67, IP 54**
11. 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 solenoid for valve to be installed in hazardous location or Weatherproof Solenoid having IP 67 for outdoor installation.
12. **Flying Lead Solenoid is not recommended to be used for outdoor or indoor application where water/liquid splashing or high humidity is present.**
13. **Intrinsically Safe Solenoid can not be supplied with the Valve.**

MANUAL OVERRIDE OPERATION – OPTIONALLY PROVIDED

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

When the solenoid is de-energised (Photo-1) and inlet and outlet ports connected to the 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-2) 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 90º. The valve can be brought to normal condition by turning Manual Override anti clockwise.

(B) **PUSH TYPE (M8)**

When the solenoid is de-energised, inlet and outlet ports connection and rated pressure applied, the valve can be brought to energized position by pressing Manual Override / Lever. The valve remains in this position till Manual Override / Lever is pressed. As soon as the same is released, the valve returns back to the normal position.

TESTING OF THE VALVE AT THE TEST BENCH

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

For Valve Model 30316, 30309, 30329, 30333, 30334, P3005

a) Apply rated pressure at inlet port of the valve.
b) Plug outlet port.
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.
e) 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.
f) 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.

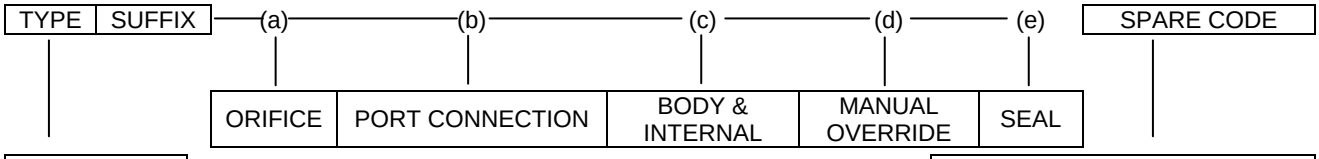
For Valve Model 30316, 30309, 30329, 30333, 30334, P3005

a) Apply rated pressure at inlet port of the valve.
b) Do not Plug outlet port.
c) For NC valve, without energizing the solenoid, check leakage at outlet port.
d) For NO valve after energizing the solenoid, check leakage at outlet port.

RECOMMENDED SPARES

a) Seal Kit (O Ring) (Code – 98).
b) Spare Solenoid Kit. (Code –)
c) Repair Kit (Code – 99)

SPARE ORDERING CODE



Spare Part Description	
Spare Solenoid Kit	97
Seal Kit	98
Repair Kit	99

SPECIAL TOOLS

- Guide Opening Tool **:** Spanner 12-13.

RECOMMENDED MAINTENANCE	**PREVENTIVE**
• 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)	Once in 5 years or 2 million operations.
• Replacement of Plunger Assembly … … …	Once in 5 years or 2 million operations
• Replacement of the Solenoid … … …	As and when required.
• Check of Insulation Resistance, Resistance of the Solenoid…	Once in a year (shouldbe ≥ 100 MOhms @ 500V DC.
• Check Resistance of the Solenoid… … … (Not applicable for Solenoid with IS, RC options or AC Solenoid with ≥ 11 Watt power).	Replace Solenoid if the resistance reduces more than 5% computed at 20ºC 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 tobe 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), SET OF 'O' RING**

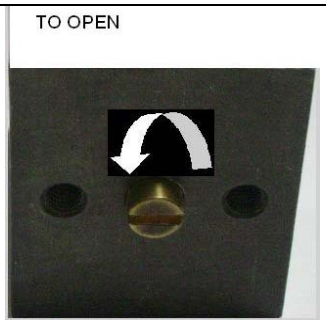
1) Open dome nut (Part 37) and pull out solenoid (Part 34).
2) Open Guide Assembly (Core Tube) (Part 33) using guide opening tool / spanner.
3) Pull out Plunger Assembly (30) alongwith Sleeve (Parts 101 & 07).
4) Insert a small pin in the hole of magnet holder (Part) and second pin in the Plunger (Part 30).
5) Open the same by rotating anti clockwise. Remove old 'O' Rings and clean metallic parts.
6) Replace all the 'O' Rings like Plunger O Ring(Part 80), Seat O Ring (Part 19) and reassemble magnet holder I (Part 107) into the Plunger (Part 30) using small amount of Locktite 242 on the thread of magnet holder (Part 107).
7) Reassemble Sleeve (Part 07) alongwith Sleeve O Ring (Part 105) and insert assembly in the body.
8) Fix the Guide Assembly (Part 33) ensuring that Guide O Ring (Part 32) and Sleeve O Ring (Part 105) are well placed.
9) Check the valve for operation and leakage.

(C) **REPLACEMENT OF MANUAL OVERRIDE (PART 8) – OPTIONALLY PROVIDED**

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-eneerigse 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 tapper end. Continue this till click sound stops.

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.

	
Manual Override "OFF" Photo – 1	Manual Override "ON " Photo – 2

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