MOUNTING, OPERATION, TESTING & MAINTENANCE INSTRUCTIONS FOR ROTEX 2/2 INTERNAL PILOT DOUBLE DIAPHRAGM OPERATED TANK MOUNTED PULSE JET SOLENOID VALVE MODEL 24114

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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.

SPECIFICATIONS OF THE SOLENOID VALVE

TYPE	:	2 Ports, 2 Positions
OPERATION	:	INTERNAL PILOT DOUBLE DIAPHRAGM OPERATED TANK MOUNTED PULSE JET VALVE
ORIFICE = NW	:	80 mm
PORT CONNECTION	:	3”
OPERATING PRESSURE	:	0.5-8.5 bar
SEALS & SEAT	:	The valve is provided with Hytrel, NBR, EPDM, or Viton Seals & Seat materials.
ELECTRICAL INSULATION	:	The Solenoid has Class F or H insulation as per costumer’s requirement.

CONSTRUCTION

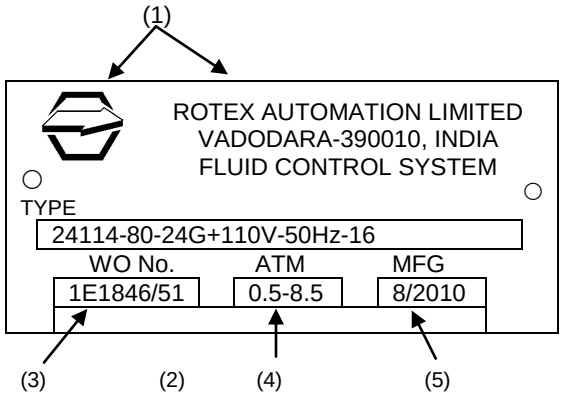
Body, Cover	Aluminium	(※)									
Internal	-										
Core Tube	SS304										
Core Plug & Plunger	SS430, Electroless Nickel Plated										
Diaphragm, Seals	Hytrel+NBR (※)	Hytrel+EPDM (S1)	Viton+Viton (S2)								
Springs	SS302										
Operating Voltage	6,	12,	24,	27,	38,	42,	48,	72,	110,	125,	220, 242
Current	DC,	50Hz,	60Hz								
Solenoid Construction	**Weatherproof IP 67**		**Code**		**Explosionrproof IP 67**			**Cable Entry**			
	Plug In		22					1/2" NPT		M20 x 1.5	
	Terminal Box		16, 19		SIDE CABLE ENTRY (AL Enclosure)			37		39	
	Terminal Box with LED		16L, 19L		Side Cable Entry (SS Enclosure)			37-CO		39-CO	
Insulation	Class F	(※)	Class H	(H)							
Special Version	MR,	OX	LC	AM	PC	NP	CO	NS	LW	SS	EC VC IS

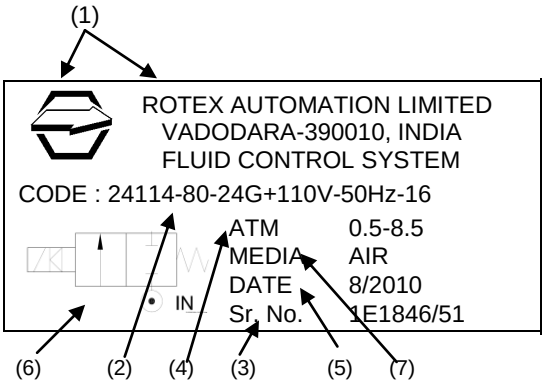
	WEATHERPROOF SOLENOID		**EXPLOSION PROOF SOLENOID**		
OPTION AVAILABLE	Terminal Box	Plug In	Junction Box – Exd	IS Solenoid with Circuit	Low Power IS Solenoid
Latch					
MR					
CO	✓		✓		
APPROVAL					
IP 67	✓	✓	✓		
UL (NEMA 6P)					
UL (NEMA 7&9)					
CE	✓	✓	✓		
ATEX			✓		
DGMS			✓	Applied for	Applied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

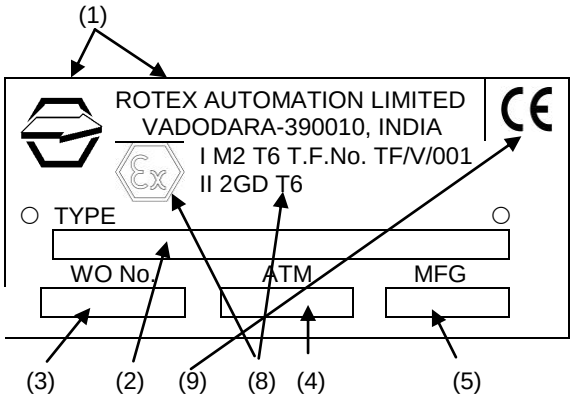
IDENTIFICATION ON THE SOLENOID VALVE

a) **VALVE LABEL**

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



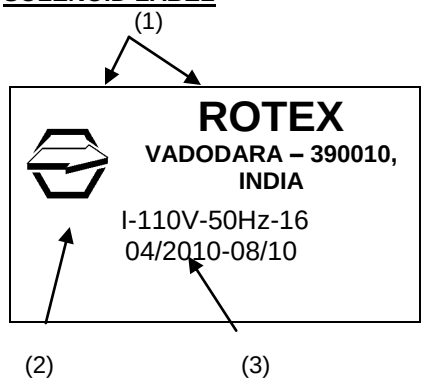




(1) Logo + Name & address of the Manufacturer
(2) Valve Type / Code
- 24114 = Valve Model
- Suffix = Nil
- 80 = Orifice ∅
- 24G = Port Connection (BSP)
- 110 V = Solenoid Voltage
- 50 Hz = Current (AC)
- 16 = Solenoid Construction (Enclosure : Terminal box)
- Sp. Version = Nil

(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
- I = Solenoid Size I
- 110V = Solenoid Voltage
- 50 Hz = Solenoid Current
- 16 = Solenoid Construction (Terminal box)

(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.**

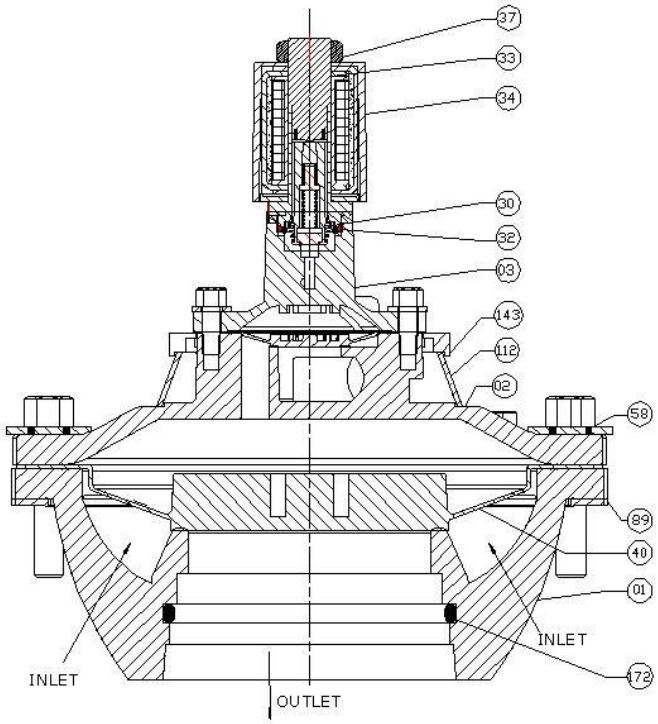
CONNECTION

VALVE TYPE	FUNCTION	IN	OUT
24114	NC	IN	OUT

(A) **OPERATING PRINCIPLE**

24114: When de-energized, pressurized media will pass through pilot hole provided in the bigger diaphragm placed between gehause and middle deckel. This media will pass through a hole provided in the middle deckel and will enter the area above the smaller diaphragm through a pilot hole provided in it. This media will remain blocked below duse until the valve is energized. Thus in de-energized state, both diaphragms will remain in the seated position thus disabling any flow to take place from inlet to outlet.

When energized, plunger will be lifted up and pressurized media blocked below the duse will vent out. This will cause smaller diaphragm to be lifted up and thus allowing pressure developed above the bigger diaphragm to be released. This will, in turn, cause lower pressure above the bigger diaphragm than the one below it. Because of this pressure difference, the bigger diaphragm will be lifted up and connection will be established between inlet and outlet.



QTY.	DESCRIPTION	SR.No.	POS.No.
01	OUTLET O-RING	15	172
01	PLASTIC DISC	14	143
01	MUFFLER	13	112
01	GASKET	12	89
08	WASHER O-RING	11	58
02	DIAPHRAGM	10	40
01	NUT	09	37
01	COIL ASSLY.	07	34
01	GUIDE ASSLY .	06	33
01	GUIDE 'O' RING	05	32
01	PLUNGER ASSEMBLY	04	30
01	TOP DECKEL	03	03
01	MIDDLE DECKEL	02	02
01	GEHAUSE	01	01

VALVE TYPE 24114

(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 ≥ 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.
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) **For Solenoid Valve to be installed in European Union, check the applicability for ATEX. Refer separate Instruction Manual for ATEX approved Solenoid Valve.**

2. The process fluid etc. : do not fall on the valve body.
3. 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.
4. 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.
5. Provide fuse of proper rating to avoid excess current passing through the Solenoid and thereby avoiding over heating.
6. It is not likely however the user is advised to protect the valve against lightening as the same is not assessed.
7. Check internal components (wetted) parts for its compatibility with fluid passing through the valve.
8. **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. 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. 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.

TESTING OF THE VALVE AT THE TEST BENCH

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

a) Apply rated pressure at inlet port of the valve. Check for leakage at mounting bolt, body & tank joint & tank outlet pipe.

b) Energize the valve and again de-energize. Again, check for leakage at mounting bolt, body & tank joint & tank outlet pipe.

c) Plug outlet port.

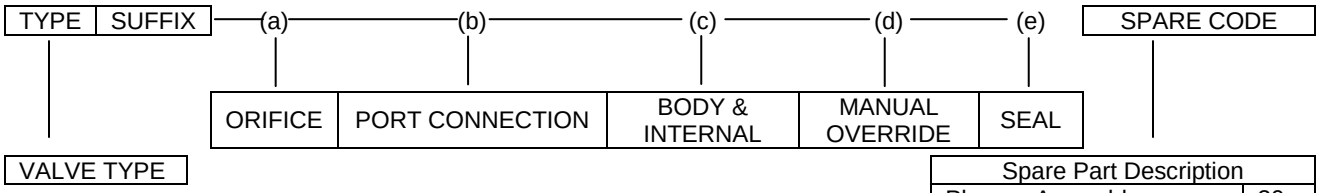
d) Check operation of the valve and leakage at the joints and pilot vent at the rated and minimum working pressure by applying 75% to 120% rated voltage.

e) 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) Diaphragms (Part No. 40).
b) Plunger assembly (Part No. 30).
c) Spare Solenoid. (Code – 34)
d) Repair Kit (Code – 99)

SPARE ORDERING CODE



Spare Part Description	
Plunger Assembly	30
Seal Kit	98
Repair Kit	99

SPECIAL TOOLS

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

RECOMMENDED MAINTENANCE	**PREVENTIVE**
• Replacement of Complete Set of O Ring … … - Guide O Ring (Part 32), - Washer O Ring (Part 58),	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 (should be $\geq$ 100 MOhms @ 500V DC.
• Check Resistance of the Solenoid… … … (Not applicable for Solenoid with IS, RC options or AC Solenoid with $\geq$ 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 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 - 1 or 2 (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 - 3 or as per Photo – 4 & 5.
5) The Plunger as per Photo - 4 & 5 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) Even though 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 O RINGS**

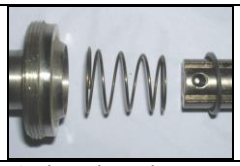
1) Remove solenoid if necessary as per Procedure (A).
2) Remove Guide (Part 33) using appropriate tools.
3) Replace the Guide O Ring (Part 32).
4) Change Outlet O Ring (Part 172).
5) Clean components.
6) Fix new O Rings applying light layer of Molykot M55 grease.
7) Ensure that the O Rings and other rubber parts are compatible to the media passing through the valve.
8) Reassemble the valve.
9) Check operation and leakage of the valve.
10) Contact ROTEX in case of any difficulty.

(D) **REPLACEMENT OF DIAPHRAGM**

1) Remove middle cover “A” (Part No.) by opening 6 Nos. Bolts (B).
2) Replace new Diaphragm ensuring that the seat (solid portion) is facing downward towards the body and the ribs are facing middle cover.
3) Remove 4 bolts “C”, remove Silencer Retain Disc “D” and Silencer “E”.
4) Replace the Diaphragm ensuring that the solid portion is towards the middle Deckel and Ribs are facing top Deckel Port “F”.
5) Fix Silence Port “E” in the groove and silencer retaining disc Part “D” ensuring that the same fits in the groove provided on the top of middle Deckel Port “A”. Refer Photographs given below.
6) Fix Top Cover “F” ensuring that the pilot portion matches the shape provided on the top of the middle deckle.

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.

				
Guide Opening Tool M-28 Photo – 1	Guide Opening Tool M-22 Photo – 2	Spring Dia (Small) Flat Face this side Photo – 3	Plunger with fixed conical & cylindrical seal (Old Plunger) Photo – 4	Plunger with moving seal (New Design Plunger) Photo – 5

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