MOUNTING, OPERATING, TESTING & MAINTENANCE INSTRUCTIONS FOR ROTEX 2/2 DUAL FLOW SOLENOID VALVE MODEL : 24110

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 STANDARD SOLENOID VALVE

TYPE	:	2 ports, 2 positions
OPERATION	:	DUAL FLOW SOLENOID VALVE
ORIFICE = NW	:	12 mm, 25 mm, 40 mm, 50 mm
OPERATING PRESSURE	:	0.5-25 bar,
MANUAL OVERRIDE	:	Not Provided.
SEALS & SEAT	:	The valve is provided with NBR, Hytrel, EPDM, Viton Seals & Seat material
ELECTRICAL INSULATION	:	The Solenoid can have Class H or Class F insulation.

CONSTRUCTION

Body	Aluminium (Cast)	(B15)	Brass Forging	(B17)	CF8M (SS316 Cast)	(B12)
Internal						
Core Tube	SS304					
Core Plug & Plunger	SS430, Electroless Nickel Plated					
Seals	HYTREL + NBR (S11)	EPDM (S1)	Viton (S2)			
Springs	SS302					
Manual Override	Nil (※)					
Operating Voltage	6, 12, 24, 27, 38, 42, 48, 72, 110, 220					
Current	DC, 50Hz, 60Hz					

Solenoid Construction	Weatherproof IP 67	Code	Explosion proof IP 67	Cable Entry	
				1/2" NPT	M20 X 1.5
	Terminal Box	16.19			
	Terminal Box with LED	16-LD, 19-LD	Junction Box EExd IIC T4 or T5 or T6	37	39
	Plug In PG9	25	Junction Box EExd IIC T4 or T5 or T6	37-LD	39-LD
	Plug In PG9 with LED	22-LD, 25-LD			
	Plug In PG9 36mm	22	**IS Solenoid with Circuit Ex ia IIC T6, IP 67 – Voltage 24V DC only**		
	TB Multi Pin Connector	70	IS Solenoid with Circuit Exd Enclosure	63	64
			Low Power IS Solenoid Ex ia IIC T6, IP 67		
			Exd Enclosure	72	73
			Terminal Box Enclosure	67	68
			Plug In Enclosure	65CR (Cable Entry PG9)	

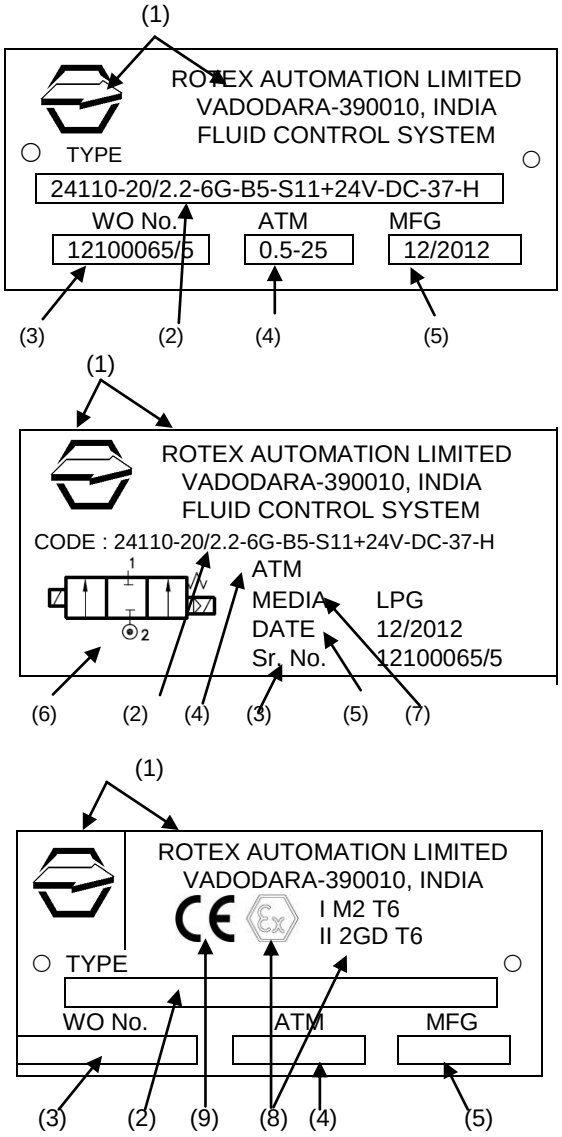
Insulation	Class 'F' (※)	Class 'H' (H)			
Special Version	T6 OX LC AM NP CO LW IS SS				

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

IDENTIFICATION ON THE SOLENOID VALVE

a) VALVE LABEL

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

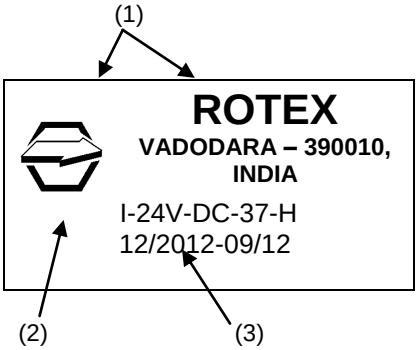


(1) Logo + Name & address of the Manufacturer
(2) Valve Type / Code

24110	=	Valve Model
Suffix	=	Nil
20/2.2	=	Orifice ∅
6G	=	Port Connection (3/4" BSP)
B5	=	Body Material (CF8M-SS316)
S11	=	Seal Material (Hytrel + NBR)
※	=	Manual Override Not provided
24 V	=	Solenoid Voltage
DC	=	Current (DC)
37	=	Enclosure : FPJB
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

I	=	Solenoid Size I
24V	=	Solenoid Voltage
DC	=	Solenoid Current
37	=	Solenoid Construction (FPJB)
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

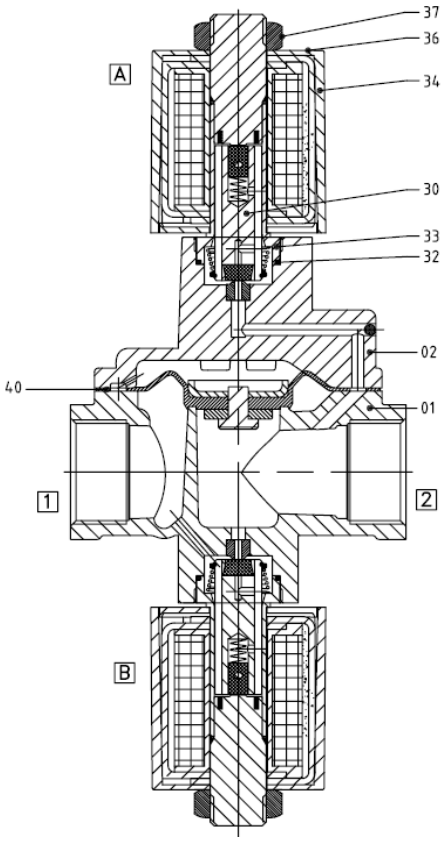
VALVE TYPE	FUNCTION	IN	OUT
24110	NC	2	1

(A) **OPERATING PRINCIPLE**

When de-energized, part of media will flow through the pilot holes and remain blocked beneath both the plungers. This pilot media will keep diaphragm pushed downward resulting in no flow between inlet and outlet.

On energisation of coil A, lifting of plunger causes pilot media to enter duse from area above diaphragm, thus resulting in higher pressure below the diaphragm. This causes diaphragm to be lifted and connection between inlet and outlet is established.

On energisation of coil B, lifting of plunger causes media to enter the duse and exits from outlet. In this case, diaphragm remains seated. Thus, we get reduced flow in this case.



CONNECTION

2 INLET

1 OUTLET

QTY.	DESCRIPTION	SR.No	POS.No	MATERIAL
01	DIAPHRAGM	08	40	HYTREL
02	NUT	08	37	PLASTIC
01	COIL DATA PLATE	07	36	AL
02	COIL ASSLY A & B.	06	34	–
02	GUIDE ASSLY.	05	33	SS304+SS430
02	GUIDE 'O' RING	04	32	NBR
02	PLUNGER ASSLY.	03	30	SS430
01	DECKEL (COVER)	02	02	CF8M (SS316)
02	GEHAUSE (BODY)	01	01	CF8M (SS316)

(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 overlap 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 overheating.
⚠ 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.
10. Refer separate manual for construction of the Solenoid and for specific instructions related to Solenoid e.g. (a) EEx ia (b) Latched Solenoid (c) EEx d Solenoid IP 67, IP 54.

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

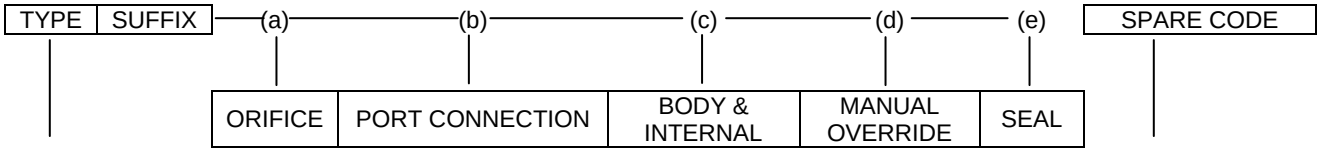
e) Check the insulation resistance of the Solenoid by applying 500V DC at terminals and the solenoid housing. It should be more than 100 Mega Ohms.

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.

RECOMMENDED SPARES

a) Diaphragms Assembly (Part No. 100).
b) Seal Kit (Part No. 98).
c) Spare Solenoid. (Code – 34)
d) Repair Kit (Code – 99)

SPARE ORDERING CODE



Spare Part Description	
Seal Kit	98
Repair Kit	99

RECOMMENDED MAINTENANCE **PREVENTIVE**

- Replacement of Complete Set of O Ring - Guide O Ring (Part 32), … … 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 ≥ 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 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 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 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 nut (Part 37) and pull out solenoid (Part 34).
2) Open Guide Assembly (Core Tube) (Part 33) using spanner.
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 - 1 or as per Photo – 2 & 3.
5) The Plunger as per Photo - 2 & 3 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 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**

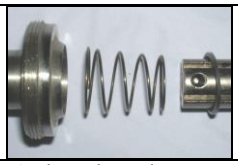
1) Remove solenoid if necessary as per Procedure (A).
2) Remove Guide (Part 33) using appropriate tools.
3) Replace the Guide O Ring (Part 32).
4) Clean components.
5) Fix new O Rings applying light layer of Molykot M55 grease.
6) Ensure that the O Rings and other rubber parts are compatible to the media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

(D) **REPLACEMENT OF DIAPHRAGM**

1) Remove cover (Part No.2) by opening Bolts.
2) Replace new Diaphragm / Diaphragm Assembly ensuring that the seat (solid portion) is facing downward towards the body and the ribs are facing Diaphragm Assembly cover.
3) Fix Body & cover with bolt matching shape.

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.

		
Spring Dia (Small) Flat Face this side Photo – 1	Plunger with fixed conical & cylindrical seal (Old Plunger) Photo – 2	Plunger with moving seal (New Design Plunger) Photo – 3

Contact :
ROTEX AUTOMATION LIMITED
987/11, GIDC, MAKARPURA, VADODARA – 390010, INDIA
Tel. : +91 265 2638136, 2638746, 2638795 Fax : +91 265 2638130
E-mail : rotexbrd@rotexindia.com Website : www.rotexindia.com