



The coil winding is protected for back surges and polarity using solid state devices. As there is limitation of the power to the coil, 3/2 & 2/2 Direct Acting Valves are de-rated in pressure v/s orifice.

The Plunger and orifice are different compared to standard valves and hence "IS" is added to a valve code for distinguishing the same.

INSTALLATION

Ensure that :

- ⚠ The solenoid valve is properly installed in desired position ensuring that water / process fluid cannot enter the coil provided (a) the coil cover is properly fitted & cable gland is of good quality fitted using correct engineering practice.
- ⚠ **Using IS Solenoid Valve alone does not certify installation for Intrinsic Safe. It is necessary to connect power supply to the solenoid from approved and certified power source.**
- For Cable length calculation, refer Page-2 and Data Sheet of Barrier and Cable.
- Connect solenoid to the certified source meeting output parameter as indicate in Table-1.
- The solenoid is suitable for Zone 0,1 & 2 installations.
- The wiring, cable gland fixing etc. should meet local regulations and sound engineering practice is followed.
- Provide earthing to the solenoid if needed by local authorities.
- The cable ends are properly fixed by tightening terminal screws provided in the termination area.
- Product certified for Group IIC and can be used for Group IIA, IIB also.
- Temperature Class T6 approved solenoid can be installed in any of the temperature class.
- ⚠ The solenoid is provided with test leads those are to be removed before final installation.
- ⚠ **The solenoid is polarity sensitive. Please ensure that the leads are connected correctly.**
- ⚠ **Refer to the name plate for details of ATEX/EX protection coding / temperature Class for selection and use before putting into service.**

Exd (FPJB) & TERMINAL BOX

- ⚠ Select approved and Ex certified cable gland matching to the cable entry provided on the solenoid and the diameter of the cable.
- The cover of the solenoid should fully tightened with rubber gasket in its usual place.
- Cable gland threads are properly matching to that provided in the solenoid cable entry.
- Tighten Terminal Box cover properly with rubber gasket in its usual place.

Exd (FPJB)

The diametrical clearance between the cover and the bore in the coil housing should not be more than 0.2mm. Verify this if the cover is damaged.

Code (DD)	Cable Entry (DD)		Identification Mark on Solenoid
71, 71-CO	3/4" ET	(F)	-
72,72-CO	1/2" NPT	(F)	N
73, 73-CO	M20 x 1.5	(F)	M
FOR ATEX ADD SUFFIX "01" e.g. 72-01, 72-01-CO			

TERMINAL BOX

Code (DD)	Cable Entry (DD)		Identification Mark on Solenoid
66, 66-CO	3/4" ET	(F)	-
67, 67-CO	1/2" NPT	(F)	N
68,68-CO	M20 x 1.5	(F)	M
FOR ATEX ADD SUFFIX "01" e.g. 67-01, 67-01-CO			

PLUG IN

Cannot be used with armoured cable.

Code (DD)	Cable Entry (DD)	Identification Mark on Solenoid
65-CR	PG9	NIL
FOR ATEX ADD SUFFIX "01" e.g. 65CR-01		



CAUTION

- Excessive tightening of the coil nut can damage the Solenoid.

OPERATION

- ⚠ Connect solenoid to certified source meeting output parameter as indicated in Table-1.
- Solenoid can be fitted on any type of the valve having Suffix "IS".

REMOVING / REPLACING SOLENOID

- ⚠ **Not suitable to operate 30309, 30318, 30316 type valves.**
- It is advisable to switch off the electrical supply before opening cover.
- Remove cable from terminal and then cable gland from the solenoid.
- Ensure that the new solenoid has the same voltage, current rating, cable entry, insulation, temperature class, special version etc. Check label contents completely.
- Remove solenoid by opening nut (Part NO. 37).
- Fix new solenoid and tighten the nut till solenoid just stops rotating.
- The solenoid is polarity sensitive. Take care while connecting cable leads.

CHECKING OF THE SOLENOID

- Mega Ohms insulation between winding and solenoid housing should be more than 100 mega Ohms at 500V DC.
- If possible, conduct High voltage test between winding and the housing at 1500 V for AC for 1 minute and trip current sensitivity @ 25 mA.
- In safe area check the operation of the solenoid valve with the Low Power IS coil by applying 14VDC to the solenoid. Also check its operation applying 24VDC.

TERMINAL BOX

- Check the soundness of the O Ring and Gasket fitted on the cover. It should not have any crack or deformity due to ageing.

APPROVAL


ATEX	CMRI	CCOE	DGMS	BIS
✓	✓	✓	Applied for	✓



Exd Enclosure Plug In Enclosure Terminal Box Encl.



Positive Negative
Wiring Diagram

ROTEX VADODARA	INSTRUCTION MANUAL FOR LOW POWER INTRINSICALLY SAFE SOLENOID ENCLOSURE : Exd (Exia(d) IIC T6 IP67) / TERMINAL BOX (Exia IIC IP67) / PLUGIN (Exia IIC IP67)	NO.: IM/C/003 Rev. : 2 Date : 12/05/09 Page : 2 of 4	
	<p align="center">TECHNICAL DATA</p>		

DUTY CYCLE

100% ED (Continuous Duty)

INSULATING CLASS, EPOXY, WINDING WIRE

EPOXY CLASS F/H, WIRE CLASS 'H' (180°C)

AMBIENT TEMPERATURE

UPTO -40°C to 70°

MOUNTING POSITION

ANY

LIMITING SAFETY VALUES OF THE INTRINSICALLY SAFE COIL

TABLE - 1

	Group IIC
Open Circuit Voltage	32V
Short Circuit Current	75 mA

- WATTAGE : P i 0.75 W
- INDUCTANCE : 0 (Not measurable)
- CAPACITANCE : 0 (Not measurable)

OPERATING PARAMETER

- VOLTAGE : 16.5V DC to 32V DC
- MIN. OPERATING CURRENT: 10 mA
- MIN. OPERATING VOLTAGE : 16.5V DC @ 3 bar.
- MINIMUM WATTAGE : ≤ 0.14 W
- PLUNGER DROP OUT : 6 mA, 11V

MAXIMUM PERMISSIBLE CABLE LENGTH

ASSUMPTION

1) **SOURCE (Barrier/Zenner) : MTL3021 (for Exia IIC T6)**

U _A	L _a	C _a
≤ 28V	≤ 4.2 mH	≤ 130 nF

2) **CABLE : 0.75mm² FR+HR 105°C Single Core Unsheathed Copper Cable for Voltage of 1100 Volts AC**

R'	C'	L'
(26x2) 52 Ω / km	0.4 nF / km	1.25 mH / km

3) **SOLENOID : ROTEX – Low Power IS Coil Type :**

Exd (FPJB) : 71 / 72 / 73 for Aluminium Construction Gr. II Cat 1.

Terminal Box : 66 / 67 / 68 for SS Construction Gr. II Cat 1 & Gr.I M1

Plug In : 65-CR for SS Construction Gr. II Cat 1 & Gr.I M1

4) **The solenoid valve is to be installed in IIC area.**

a) **Cable length Limited by Capacitance, Find Following :**

Equip-ment	Parameter	Source of Data	Value	
Barrier	Maximum allowable Capacitance	Product data sheet / Certificate	130 nF	C _a
Cable	Capacitance	Manufacturer's Data Sheet	0.4 nF/km	C'
Solenoid	Capacitance	Data sheet/ Certificate	0.04 nF	C _c

Maximum permissible cable length limited by capacitance

$$= S_c = \frac{C_a - C_c}{C'} \text{ i.e. } \frac{130 - 0.00}{0.4} = 325 \text{ km}$$

b) **Cable Length Limited by Inductance, Find Following :**

Equip-ment	Parameter	Source of Data	Value	
Barrier	Maximum allowable Inductance	Certificate & Data Sheet	4.2 mH	L _a
Cable	Inductance	Data Sheet	1.25 mH/ km	L'
Solenoid	Inductance	Certificate & Data Sheet	0	L _c

Maximum permissible cable length limited by Inductance

$$= S_L = \frac{L_a - L_c}{L'} \text{ i.e. } \frac{4.2 - 0}{1.25} = 3.36 \text{ km}$$

c) **Cable length Limited by Resistance, Find Following :**

Equip-ment	Parameter	Source of Data	Value	
Barrier	Output voltage @ Min, Op. Current	Data Sheet	20.5V @ 10.0 Ma	V _a
Cable	Resis-tance / km	Data Sheet	52 Ω / km	R'
Solenoid	Min. Op. Current	Data Sheet	10.0 mA	I _c
	Min. Op. Voltage	Data Sheet	17 V	V _L

Allowable voltage drop across cable

$$= V' = V_a - V_L = 20.5 - 17 = 3.5 \text{ V}$$

Maximum allowable resistance of the cable

$$= R_c = \frac{V}{I_c} = \frac{3.5}{0.010} = 350$$

Maximum permissible cable length limited by resistance

$$= S_R = \frac{R_c}{R'} = \frac{350}{52} = 6.73 \text{ km}$$

Select Minimum of S_c, S_L, S_R i.e. = 3.36 km limitation due to inductance.

→ **REPLACE DATA OF SOURCE & CABLE, AT THE RELEVANT PLACES TO CALCULATE MAXIMUM PERMISSIBLE CABLELENGTH FOR YOUR APPLICATION.**


SUITABLE SOLENOID DRIVERS FOR LOW POWER INTRINSICALLY SAFE SOLENOID

MANUFACTURER	MODEL	MAXIMUM PERMISSIBLE LENGTH OF THE CABLE PAIR in meter				
		WITH 0.5 sq mm AREA	WITH 0.75 sq mm AREA	WITH 1 sq mm AREA	WITH 1.5 sq mm AREA	WITH 2.5 sq mm AREA
MTL	MTL3021	8700	13050	17400	25550	42600
	MTL3022	10700	16050	21400	31350	52250
	MTL4021	7150	10750	14350	21050	35050
	MTL4021S	7150	10750	14350	21050	35050
	MTL4023	7950	11950	15950	23350	38950
	MTL4024	7150	10750	14350	21050	35050
	MTL4025	6550	10000	13300	19500	32550
	MTL5021	7050	10550	14100	20650	34450
	MTL5022	7650	11500	15300	22450	37450
	MTL5023	7050	10550	14100	20650	34450
	MTL5024	7050	10550	14100	20650	34450
	MTL5025	5800	8750	11650	17100	28500
PEPPERL & FUCHS	KFD2-SD-Ex1.48	7400	11100	14800	21700	36150
	KFD2-SD-Ex1.48.90A	7400	11100	14800	21700	36150
	KFD2-SD-Ex1.17	800	1200	1600	2350	3950
	KFD2-SL-Ex1.48	7350	11050	14750	21650	36100
	KFD2-SL-Ex1.48.90A	7400	11100	14800	21700	36150
	KFD2-VD-Ex1.1560	1250	1900	2550	3750	6250
	KFD2-VD-Ex1.1835	5100	7650	10250	15000	25050
	KFD2-VM-Ex1.35.L	5350	8000	10700	15700	26200
	KFD2-SL2-Ex1	9300	14000	18650	27400	45650
	KFD2-SL2-Ex1.B	9300	14000	18650	27400	45650
	KFD2-SL2-Ex1.LK	8700	13050	17400	25500	42500
	KFD2-SL2-Ex2	9300	13950	18600	27300	45500
	KFD2-SL2-Ex2.B	9300	13950	18600	27300	45500
	KSD2-BO-Ex	9300	14000	18650	27400	45650
	KSD2-BO-Ex2.2	9300	14000	18650	27350	45650
STAHL	9475/12-04-11	2350	3550	4700	6950	11550
	9475/12-04-21	8200	12300	16400	24050	40100
	9475/22-04-21	8200	12300	16400	24050	40100
	9475/12-04-31	7350	11050	14700	21600	36000
	9475/12-08-51	2250	3400	4550	6650	11100
	9475/22-08-51	2250	3400	4550	6650	11100
	9475/12-08-61	8000	12000	16000	23450	39150
	9475/22-08-61	8000	12000	16000	23450	39150



SUITABLE SOLENOID DRIVERS FOR LOW POWER INTRINSICALLY SAFE SOLENOID

MANUFACTURER	MODEL	MAXIMUM PERMISSIBLE LENGTH OF THE CABLE PAIR in meter				
		WITH 0.5 sq mm AREA	WITH 0.75 sq mm AREA	WITH 1 sq mm AREA	WITH 1.5 sq mm AREA	WITH 2.5 sq mm AREA
TURCK	MK72-S09-Ex/24VDC	10250	15350	20500	30050	50100
	MK72-S12-Ex/24VDC	1900	2850	3800	5600	9350
	MK72-S13-Ex/24VDC	2550	3800	5100	7500	12500
	MK72-S14-Ex/24VDC	2550	3800	5100	7500	12500
	MK72-S15-Ex/24VDC	2550	3800	5100	7500	12500
	MK72-S16-Ex/24VDC	2550	3800	5100	7500	12500
	MK72-S17-Ex/24VDC	5100	7650	10250	15000	25050
	MK72-S18-Ex/24VDC	5100	7650	10250	15000	25050
	MK72-S19-Ex/24VDC	12800	19200	25600	37550	62650
	MK72-S20-Ex/24VDC	12800	19200	25600	37550	62650
	MK72-S21-Ex/24VDC	15350	23050	30750	45100	75150
	MK72-S22-Ex/24VDC	15350	23050	30750	45100	75150