

ANTI PUMPING DEVICE / RELAY (APD or APC)



APD with Acrylic Cove



Isolated NO & NC

:“ANTIPUMPING” function is essential for the CIRCUIT BREAKERS .

Antipumping prevents the continuous CLOSE -TRIP transitions if close & trip commands both exist simultaneously.Refer Frequently Asked question (P5Q1)

ADVANTAGES

The ‘INVENTA’ make solid state antipumping contact is the most versatile component used in CIRCUIT BREAKERS. It has two input terminals and two output terminals, or Four Outputs depending on the type of APD relay . The output is N/C potential free contact . The catalog specifies different types along with the rating of input voltage and current.

- TRANSIENT REQUIREMENT [noisy environment].
- VIBRATION RESISTANCE.
- LOW LEVEL OF WIRING & ITS REPLACEABILITY. One contact is saved due to timer design ,

It uses solid state contacts to ensure the state of art technology provides almost infinite life, minimum human errors, noiseless operations.

According to the requirement of different users INVENTA Antipumping devices are manufactured in three different types of out put contact requirements.

- 1. Out put NC only,**
- 2. Output contact NC & NO with common terminal**
- 3. Output contact with isolated NC & NO**
- 4. Solid state NO contact with sturdy loads up to 20A, operating from 17-270VAC/DC, there is no Potential free contact**



TYPE	Input Rated Voltage	Label Color Code
APD 24-40XXXXX	24VDC--40VDC(- 20%,+10%)	Yellow
APD 110-220 XXXXX	110VDC-220VDC(- 20%,+10%)	Blue
APD 110-230 A XXXXX	230VAC (- 20%,+10%)	White

OPTIONS : 1 APDs with different contact configuration are available. Types are

N/C only - Refer Fig 1 ;

Ordering codes

APD24-40 NC - 24 & 40VDC Circuit Breakers

APD110-220 NC - 110 & 220VDC Circuit Breakers

APD110-230A NC - 110 & 220V AC Circuit

C/O (Com-NC-NO) Refer Fig 2

Ordering codes

APD24-40C/O - 24 & 40VDC Circuit Breakers

APD110-220C/O - 110 & 220VDC Circuit Breakers

APD110-230A C/O - 110 & 220V AC Circuit

N/O & N/C independent Refer Fig-3

Order codes

APD24-40NCNO - 24 & 40VDC Circuit Breakers

APD110-220NCNO - 110 & 220VDC Circuit Breakers

APD110-230A NCNO - 110 & 220V AC Circuit

2. Acrylic Finger cover is optional (at extra cost).(shown photo is with Cover)
3. Din Rail Mounting Arrangement (at extra cost)

ROUTINE TEST:

Testing performed makes the APD most reliable product. INVENTA's effort to have well designed product with almost no FAILURES have added to the quality of the product. SIMULATION was the key during design. The device was designed & tested in simulated environment. The design concept has added the reliability to APD. The concept is based on first opening of 52a /b in series of closing coil. The design takes care of REVERSE voltage during opening of 180W coils.

- 1 High voltage Isolation: Between input and Output contacts 2.5 KV
2. Operating Range 70% —130% of rated Voltage range
3. On Delay Time 100 msec. < T < 400 msec

TYPE TEST:(per Batch)

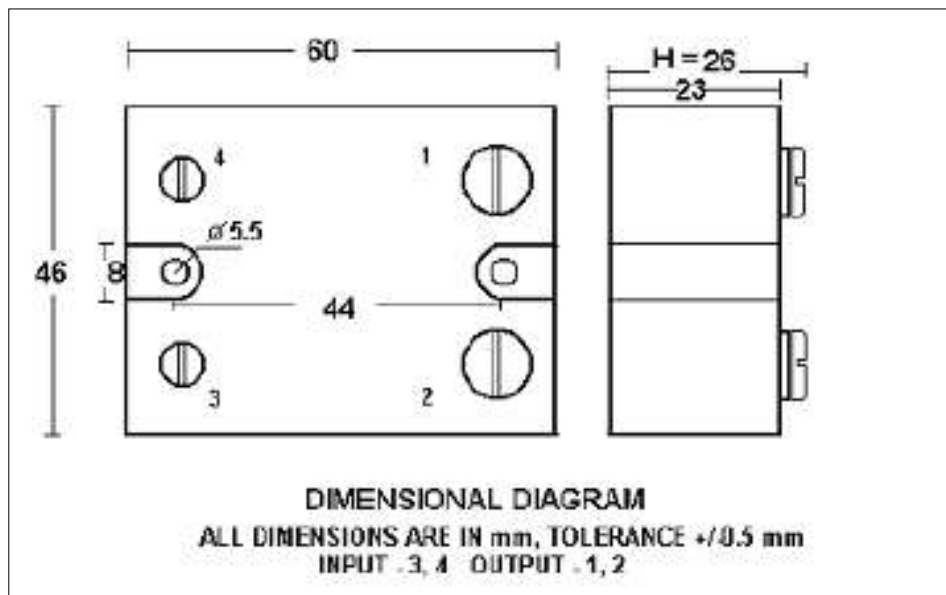
- Sample plan : 1 of each type - in 1000 pieces of total delivery .
 Endurance Test : 500 operations under simulated Load condition of 52a
 Endurance Test : 10,000 operations under simulated Load condition of 52a

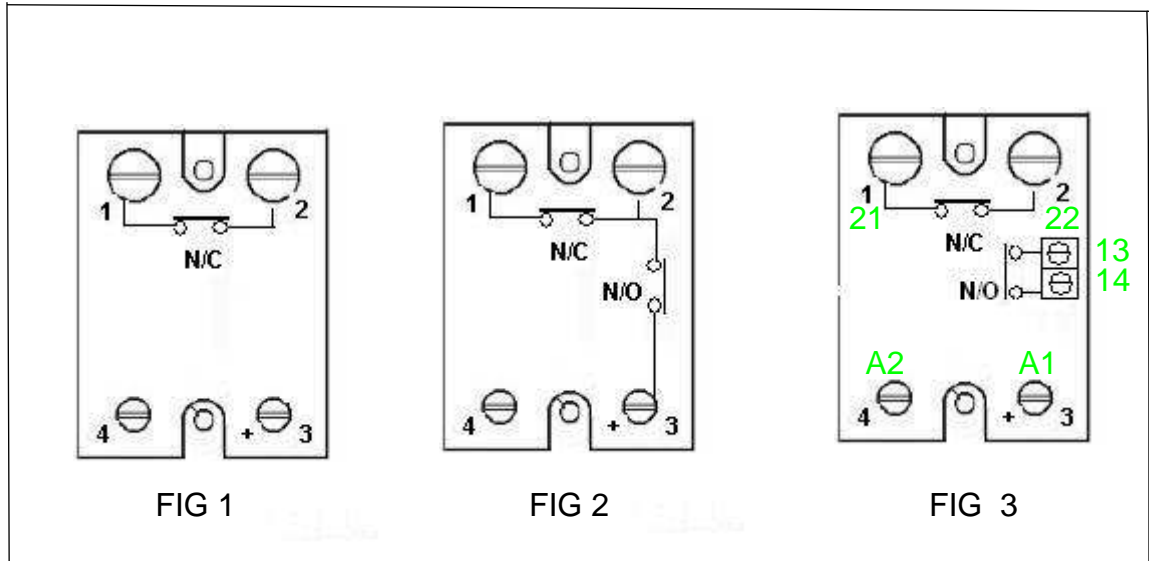
ONE UNIT CONTAINS:

1. M4 X 25 ChHd screws : 2 Nos.
 2. M4 Nuts : 2 Nos.
 3. Packed in a poly. Bag
- Optional (extra Cost)
1. Finger cover (transparent) is optional at extra cost.
 2. Din Rail Mounting attachment at extra cost

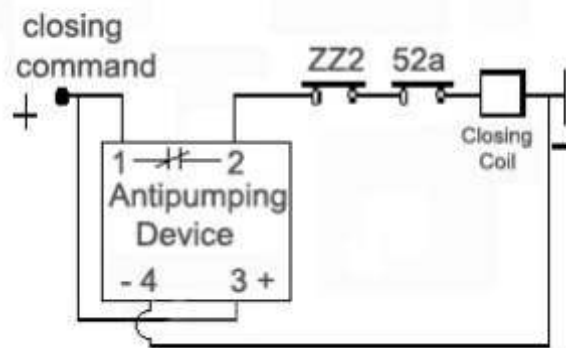
Specifications subjected to change without notice

Dimensions & Drilling guide





APD CONNECTION DIAGRAM (Recomended)
ref - Fig-1



The ckt diagram is recomended , but users can use additional N/O contact with their control as perivew.

Design criticality : 52a or Braeker changeover contact must be in series with APD contact.

Connection of 3,4 are polarity sensitive. Reverse connection though doesnt damages the APD, but Antipumping action is not seen.

ENDURANCE TESTING of ANTIPUMPING DEVICE

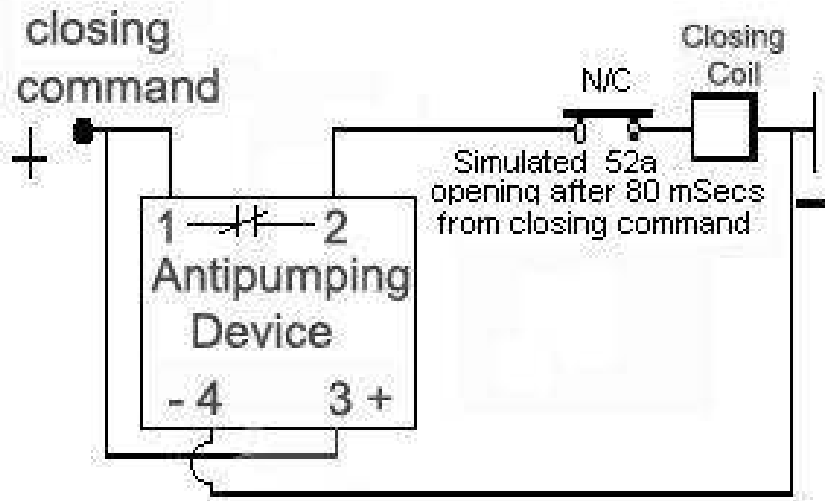
Test Date 06 Oct 2008 till 08 Oct 2008
 Testing Conditions : Ambient 30° C
 Circuit used for testing : As mentioned in the test Ckt
 Tested for : 24 VDC

Test Procedure :

Close command (simulated) on for 3 Sec
 Close command off for 1 Sec
 10000 Cycle of On-Off for 24 VDC of coil

After 2000 cycles the timing was tested. Test conducted for timing variation while endured

TEST CKT:



CONCLUSION of the TEST:

The Test result mentioned overleaf was found within limits.
 Sr No 0721030 was declared OK

Validated by
 C M Choudhari
 CEO



TEST DOCUMENT No 04/0809
Sr no 721008

Date	Start Time	End Time	No of Operations	Timing / Input (control) Current			Remarks
				19 VDC (70%)	24VDC (100%)	32VDC (30%)	
06 th Oct 08	3:00PM	-	0000	275 (23 mas)	215 (mas)	198 (mas)	Initial Readings before the endurance test
06 th Oct 08	-	5:30PM	2445 (initial)	273 (23 mas)	213 (31 mas)	193 (49 ma)	Readings before endurance actually.
07 th Oct 08	9:00 AM	11:30AM	5000	260 (23 mas)	207 (31 mas)	191 (49 mas)	Readings started for endurance
07th Oct 08	12:00 PM	2:30PM	7500	255 (23 mas)	201 (31 mas)	182 (48 mas)	Readings started for endurance
07th Oct 08	3:00PAM	5:30PM	10000	252 (23 mas)	198 (31 mas)	181 (47 mas)	Readings started for endurance
08 th Oct 08	9:00 AM	11:30AM	12500	250 (23 mas)	196 (30 mas)	180 (47 mas)	Readings started for endurance



Antipumping Device : Frequently Asked Questions

Q.1. What is Antipumping device ? It's relevance according to IEC.

Ans: The antipumping device is the word defined in **IEC62271-100 for HV Switchgear & Control Gear**. The definition at 3.6.128 directs to the vocabulary at IEC 441-16-48 where the device is defined as **"a device which prevents reclosing after a close-open operation as long as the device initiating closing is maintained in the position for closing"**

The definition depicts the functioning of an Antipumping relay functions , defined as an "DEVICE" not as an Relay. Inventa Antipumping device hence is not a relay nor timer. The innovative concept was launched in 2004 after deep study of the switchgear functioning.

Q .2. What is new in "INNOVATIVE" design of INVENTA APD, ?

Ans. The old design concepts of Antipumping device was current based design. But added with electronics,time dimension. i.e. not the timer. Old concepts had a CONTACTOR for breaking coil current. The contactor was using holding contact for it's latching till "CLOSE" command is released.The cost of contactor was high & up to INR 670 (USD 15).

While designing breaker Solid State Relays our design section realized no need of HOLDING contact . The design was clubbed with " high energy DC switching off " with energy absorbers at the contact & a little well defined time delay.

The design is simple to take care of EMI / radiation effects at HT environment. Power noise or RF generation is not there atall. Hence passes EMI EMC tests such as:

2KV 1 MHz damped oscillation test, recommended for Switchyard equipments & Surge (lightening) test : 5KV/usec at 6KV for 50uSecs are passed easily.

Q.3. What is cost implication of APD over old system?

Ans. The average APD cost is INR 270(USD 6) .Connecting only 4 connections

While at OLD design

1. Relay cost by INR 670

2. connecting cable extra for holding contact INR 27

3. Extra labor for contactor / relay wiring INR 32

Saving by new design INR 459 per breaker. i.e. saving 63% !!

FOR 1000 BREAKERS/MONTH saving is INR 4,59,000=00.The best bargain.