आशिदा

ASHIDA NUMERICAL 3 POLE DIFFERENTIAL RELAY

Type: ADR133A
ADR233A
(ADITYA Series)

Features :

- Online display of Phase Current / Differential Current.
- Latching of fault current value.
- High Speed operation 30ms at 5 times.
- Operation is based on fundamental frequency value.
- Harmonics restrain for Transformer charging and CT saturation condition.
- Cross harmonics restrain, the relay will restrain all 3 Phases even if harmonic is detected in any one phase.
- Programmable operating current.
- Programmable Internal ICT (Interposing CT) ratio to match different transformers having different vector groups.
- Programmable dual bias setting.
- Wide setting range 10% - 50% for bias in steps of 5%.
- Programmable 2nd HRM restrain 10% - 80%.
- SCADA compatibility. IEC60870-5-103 protocol. Two Communication port 1) RS232 on Front and 2) RS485 at Rear. (For ADR233A relay only)
- Latching of Last 5 fault along with date and time stamp.
- 25 Cycle of disturbance record and 100 Event memory (for ADR233A)

Applications

- Two winding power transformers.
- Auto transformers.
- Biased differential protection for generators.

General :

ADR133A is member of Ashida Numerical Relay family (Aditya Series) designed to meet demand of low and medium transformer protection requirement. It consists of all the basic function required for the protection of transformer such as harmonic restrain, dual bias differential protection.

Note: Due to our policy to upgrade our products constantly, we reserve the right to supply products which may vary slightly from that indicated above.

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The ADR133A is designed using high-speed micro DSP, which sample all three-phase current through CT connection. The high-speed micro-controller **samples** this current through a **12-bit A/D converter**. The micro-controller performs powerful **Digital Algorithms** to find out Amplitude of current signal, then this value is used for protection and metering function. All measurement is tuned to fundamental frequency. Each input current is also displayed on 20 x 4 LCD display for metering.

1. Protection Functions:

The ADR133A gives maximum benefit/cost ratio. The ADR133A gives all the advantages of numerical relay at affordable cost. Following is summery of different protection functions provided by relay.

ANSI	***IEC***	***Protection Functions***
87	-	Dual Bias Differential Protection

2. Supervision Function:

2.1. Self-supervision:

The relay continuously keeps track on its internal hardware and software and the moment it detects any failure of any component, it give message on LCD display as error code, details of error code are available in User's manual. The relay is also having dedicated potential free contact for external ALARM. This feature is very useful to give pre information to avoid any mal-operation. In such situation it uses the default setting and remains in protection mode.

3. Working Principle and Design:

The ADR133A monitors HV and LV current of power transformer through respective CT. The sample current values are processed by powerful DSP controller. It converts these current samples into equivalent vectors and number of parameters such as RMS values of IHV and ILV and phases. IHV represent HV current and ILV represent LV current. Normally to match HV and LV CT ratio, phase shift between two winding due to transformer vector group, ICTs (interposing CTs) are needed. In ADR133A ICTs are software selectable. There are two separate ICT ratio and vector groups provided, one for HV value and another for LV value. After applying this corrective factor, relay calculates operating and restraining signal from IHx and ILx (IH1 and IL1 is HV and LV current after applying ICT correction factor. x denote phase, 1 for R, 2 for Y and 3 for B). Based on these settings the relay decides to operate or to restrain.

Operating Current
$Iox = IHx - ILx$

Restraining Current
$Ibx = (|IHx| + |ILx|) / 2$

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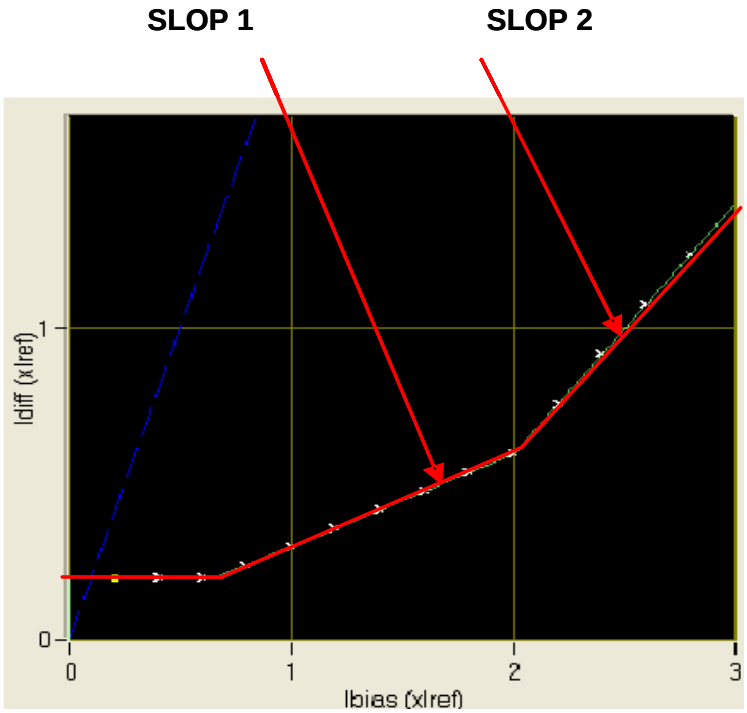
Relay operate when Io is greater than pick-up current setting and
Iox > = S Ibx
Where S = set bias. (Slope 1)

The relay supports dual bias characteristic. The bias (slop 1) is settable from 10% to 50%, this is a normal bias characteristic. The relay follows this characteristic till Ibx becomes equal to 2nd Bias I setting. During heavy through fault due to CT saturation large difference current might generate, which leads to mal-operation of the relay. To prevent this mal-operation during such heavy through fault the relay is provided with dual bias characteristic. In which after 2nd Bias I setting the relay changes it bias setting from set value to 80% automatically.



The relay is provided with differential high-set protection, where |IHx-ILx| is greater than the preset value the relay will provide high-set protection. High-set setting can be bypassed when it is not required. The relay detects transformer charging condition from 2nd harmonics contents. If 2nd harmonics are more than set limit then relay blocks tripping operation. Similarly relay detects over excitation condition from 5th harmonics and restrain it operation.

Most of the relays are multifunction and having large number of settings. The ADR series relay is having big 4 line 20 character back lit LCD display and very strong user interface, this makes very easy to manage the relay setting.

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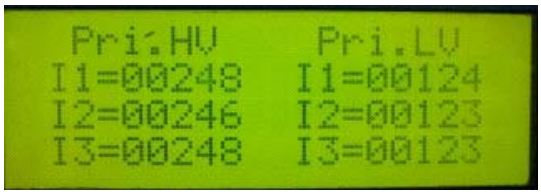
All settings are arranged in menus for easy understanding of parameter.

Maximum settings in one display

The relay shows all the parameters such current before ICT current after ICT, Primary current, Bias and difference current.

Similarly relay latches fault current, type of fault with date and time stamp**. If relay is upgrade to communication then it can provide full disturbance record in COMTRADE format for detail analysis.**



4. Current Transformer Requirement

For high speed operation under all fault conditions the minimum current transformer knee point voltage should equal or exceed $Vt \geq 4 * I_F (A + C)$

Where

I_F = Either the maximum three phase through fault current (as limited by the Tx impedance) or the highset setting, whichever is greater.

A = The secondary winding resistance of each star connected CT

C = The CT Secondary loop lead resistance for internal earth faults.

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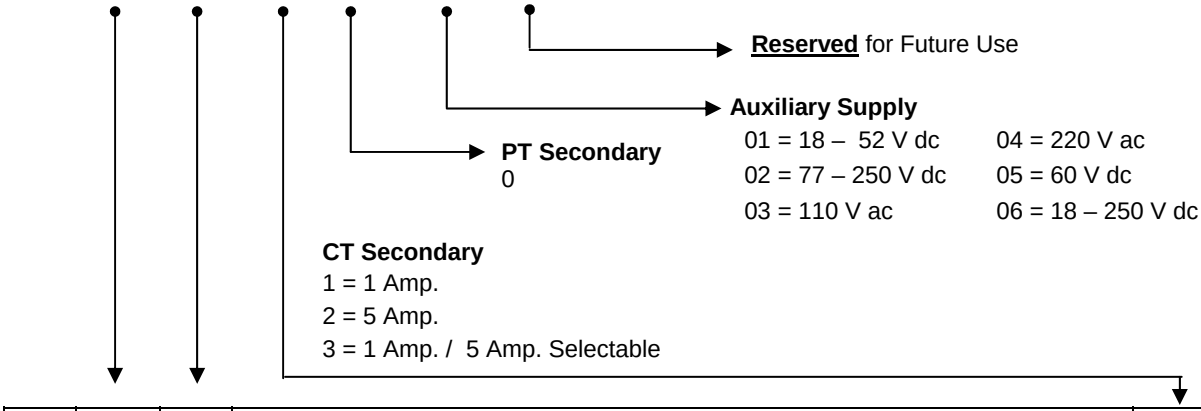
While Ordering Specify the following Information for **ADR133A** Relay

Definition of Model No of Aditya Series of Relays

AM XXX–XX – X – X – XX – X



AM	XXX	XX			X
Transformer Differential Relay					
	001	01	Relay with Fix CT. Compatible with ACDF31H	CSD – V –120	1 / 2
	001	02	Relay with Fix CT. Compatible with ACDF31H with Extra NO Contact	CSD – V –120	1 / 2
		03	Reserved		
		04	Relay with selectable CT. and draw-out cabinet	CSD – V –150D	3
	001	05	Relay with Selectable CT, non draw-out cabinet with (1) one extra contact and wide setting range	CSD – V –120	3
	002	**04**	**Relay with Selectable CT, draw-out cabinet with (3) three extra contacts and wide setting range.**	**CSD – V –150D**	**3**
	002	**05**	**Relay with Selectable CT, non draw-out cabinet with (3) three extra contacts and wide setting range.**	**CSD – V –120**	**3**

Ordering information:

A	**D**	**R**	**1**	**3**	**3**	**A**	-	A	M	-	X	X	X	-	X	X	-	X	-	X	-	X	X	-	X

Example
ADR133A – AM – 002 – 05 – 3 – 0 – 06 – 0
Type: ADR133A with wide setting and Non-drawout case, and extra contact
Auxiliary Supply: 18 – 250 V dc
CT sec: 1/5 Amp.

ADR233A – AM – 002 – 05 –3 – 0 – 06 – 2
Type: ADR233A with wide setting and Non-drawout case, and extra contact, communication port RS232 & RS485
Auxiliary Supply: 18 – 250 V dc
CT sec: 1/5 Amp.

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Technical Specifications:

Sr. No.	Specification	Particulars
I.	Aux. Supply	: 18 - 250VDC or 77 - 250VDC. To be specified while ordering.
II.	CT Inputs	: Suitable for CT secondary 1Amp., 5Amp., 1 Amp. / 5 Amp. Selectable.
III.	Operating Current	: 10% to 100% adjustable in steps of 5%
IV.	Bias	: Bias setting is adjustable 10% to 50% in steps of 5%
V.	2nd Harmonics Restrain	: 10% to 80 % settable in steps of 5%
VI.	Instantaneous Differential High Set setting with harmonic restrain (HF setting)	: 100% to 2000% in steps of 100%
VII.	Definite time Differential High Set setting without harmonic restrain for backup (HF NRST)	: 1000% to 2000% in steps of 100%
VIII.	Definite time delay for Differential High Set setting without harmonic restrain for backup (for HF NRST)	: 0.04 to 1.00 sec in steps of 0.02s
IX.	Vector group compensation for HV winding	: **VH :-** Yy0, Yy2, Yy4, Yy6, Yy8, Yy10, Yd1, Yd3, Yd5, Yd7, Yd9, Yd11, Ydy0 and Ydy6
X.	Vector group compensation for LV winding	: **VL :-** Yy0, Yy2, Yy4, Yy6, Yy8, Yy10, Yd1, Yd3, Yd5, Yd7, Yd9, Yd11, Ydy0 and Ydy6
XI.	Output Contact	: 2 NO for Trip : 1 NO for Relay Operated : 1 NC for Relay Faulty : 1 NO for HF(Instantaneous) Operated
XII.	Operational Indicators (Flags)	: Green LED indicates Power ON : Red LED indicates Relay Pickup Self Reset (SR) type. : Red LED indicates Fault condition Hand Reset (HR) type. : Green LED indicates output close relay contact closer. Programmable as HR or SR
XIII.	Operating Time	: Less then 30ms at 5 Times of rated current value
XIV.	Burden on CTs	: Less than 0.2VA.
XV.	Burden on Aux. Supply	: Less than 10VA on any supply.
XVI.	Control Contacts	: 2 NO contacts (SR) are given for Trip & Annunciation. - Trip Duty
XVII.	Contact Rating for Trip Contract	: Make and Carry for continuous – 5A : Make and Carry for 0.5 sec. – 30A : Make and Carry for 3 sec. – 15A

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XVIII.	Thermal Withstand Capacity	: x40 times the normal current for 3sec. : x2 Continuous	
XIX.	Drawing Reference	: For Electrical Connection	ACD01603
		: For Back Terminal Arrangement Model AM00204 / AM00205	ACD01703
		: For Cabinet Type	MAC00402 (CSD-V-120 / 150D)
		: For Isometric View	MAC00403

Revision Note

Revision	Date	Description
01	30.03.08	Add extra 3 Ann. Contact in original as HF Operated, R faulty and R operated.
02	06.11.08	Electrical connection drawing format change. Minor type corrected.
03	29.11.08	LED indication information added and Type Test details deleted.
04	25.03.10	Back Terminal Arrangement Changed, ADR233A specs added.
05	10.04.10	Addition of Drawout Model AM00204-xx-x-x-xx-x
06	09.01.2012	Photograph modified

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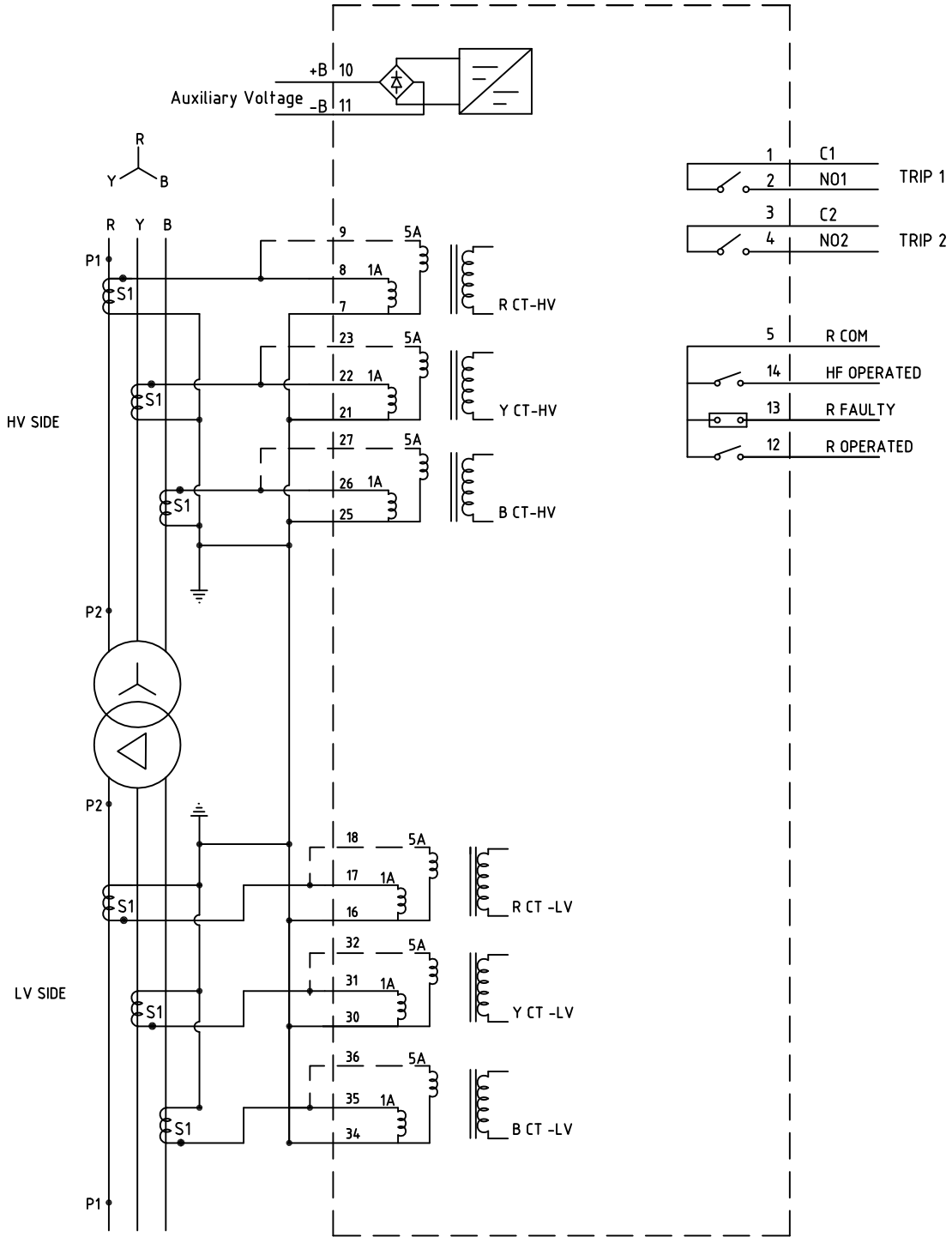
Rev No	Revision note	Date	Signature	Checked
01	Original Revision (Drg. No ACD01602)	01.03.08	SMK	
02	Revision As per Discussion on 21.10.08 with GETCO	06.11.08	SMK	
03	Revision of R Faulty contact.	08.10.09	SMK	



NOTE : REFER THIS DRAWING FOR BACK TERMINAL CONNECTIONS.

Dim : MM	TOL :	FINISH:		MATERIAL:	
Perpaed by JD	Checked by SMK	Approved by - date SMK	Filename ACD01603	Date 08.10.09	Scale NTS

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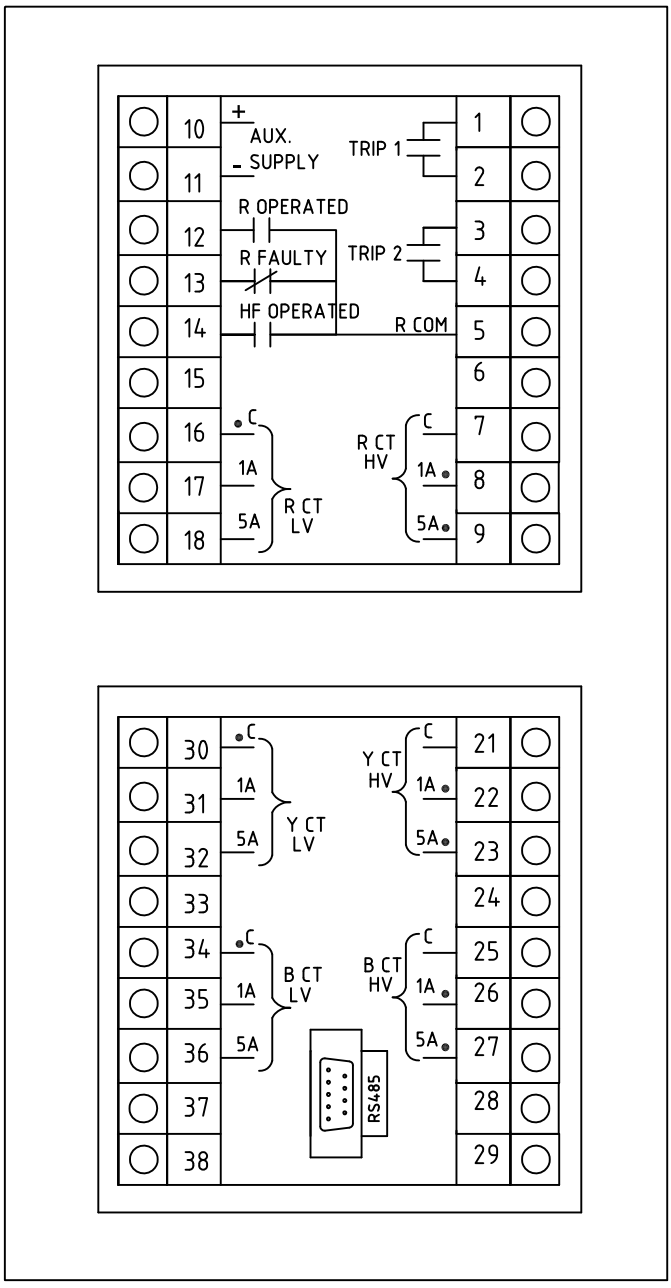
Title : - BLOCK DIAGRAM FOR ELECTRICAL CONNECTION OF NUMERICAL 3 PHASE Tx. DIFFERENTIAL PROTECTIOIN RELAY-ADR 133A

Drawing__ Ref. ACD01603 | Edition 03 | Sheet 1 OF 1

RevNo	Revision note		Date	Signature	Checked

Back Terminal Arrangement Numerical Transformer Differenital Relay

Type ADR 133A / ADR 233A (Drawout) Model : AM00204 & (Non Drawout) Model : AM00205



Note:

1. For Terminal numbers in the wiring diagram refer to relay back-plate.
2. Auxiliary supply to Terminals 10(+) & 11(-).
3. Contacts 1-2 & 3-4 are potential-free NO.
4. RS485 PORT for ADR233A (Drawout) Model : AM00204 & (Non Drawout) Model : AM00205

Dim : MM	TOL :	FINISH:		MATERIAL:	
Perpaed by JD	Checked by SMK	Approved by - date SMK	Filename ACD01703	Date 08.10.09	Scale NTS

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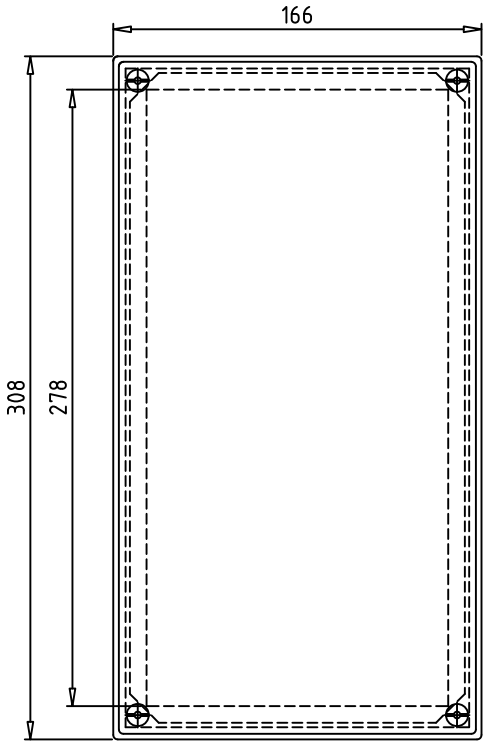
TITLE : - Back Terminal Arrangement Neumerical Transformer Differential Relay ADR 133A/ADR 233A

Drawing__ Ref. ACD01703 | Edition 00 | Sheet 1 OF 1

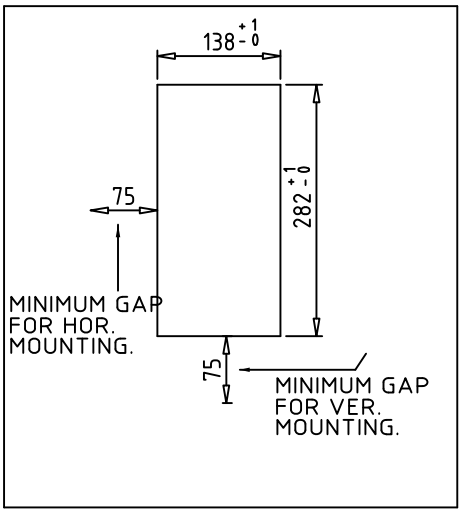
RevNo	Revision note	Date	Signature	Checked
01	Drawing Format Changed	14.09.02		
02	Cabinet Terminology Changed	19.12.08		

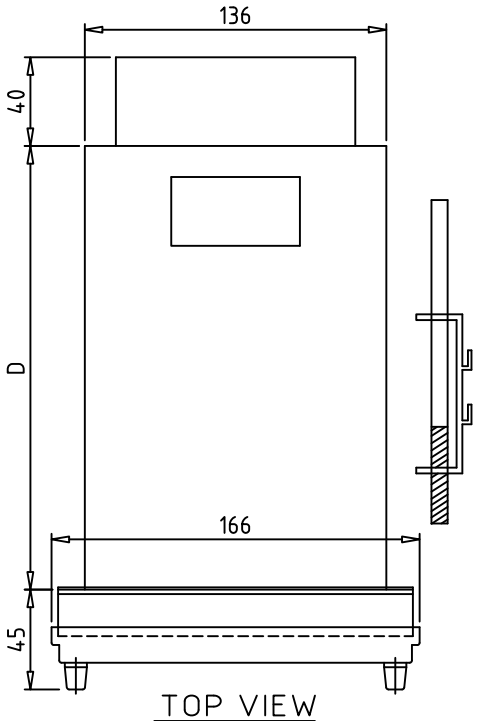


FRONT VIEW

D	CAB. STYLE	
120	CSD-V - 120	NON-DRAWOUT
150	CSD-V - 150D	DRAWOUT

PANEL CUTOUT REQUIRED





TOP VIEW

Note

1. Front Bezel 160mm x 302 mm.
2. Front Bezel + Front Cover 166mm x 308mm.
3. Box 136mm x 278mm & Cutout 138mm x 282mm

ALL DIMENSIONS IN MM

Dim : MM	TOL :	FINISH:			MATERIAL:	
Perpaed by JD		Checked by SG	Approved by - date SMK	Filename MAC00402	Date 29.12.08	Scale NTS

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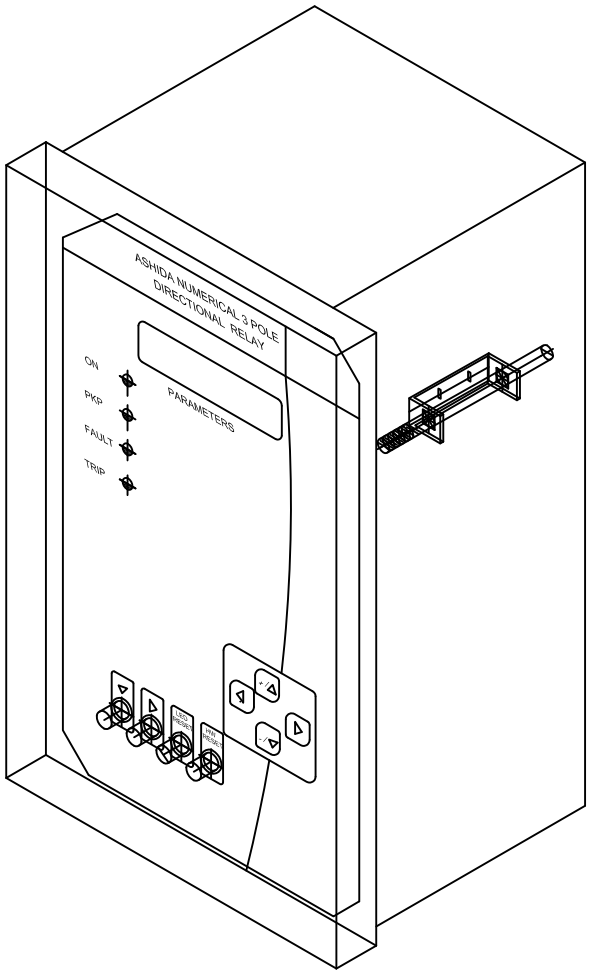
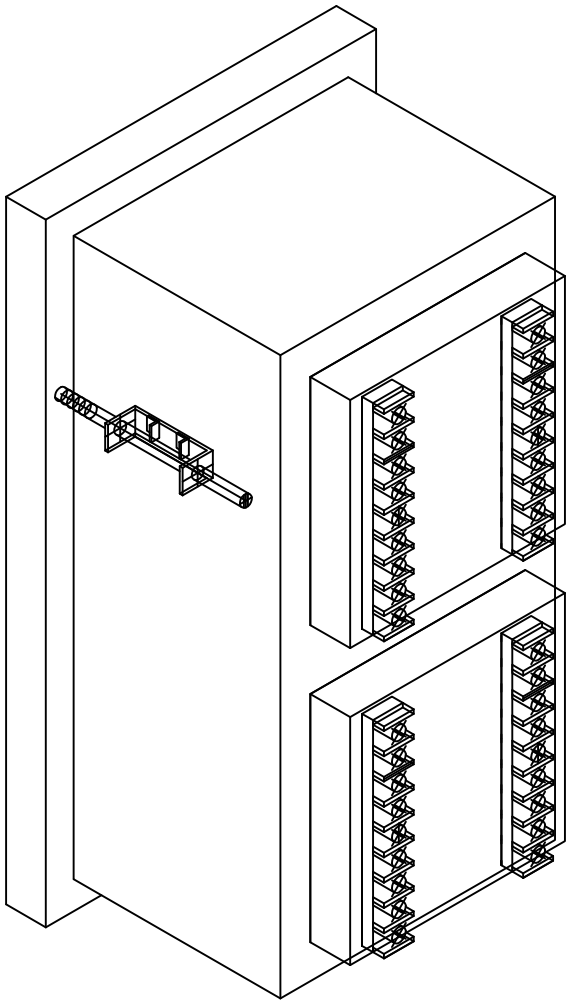
TITLE : MECHANICAL DETAILS FOR CSD VER. CABINET

Drawing__ Ref. MAC00402 | Edition 02 | Sheet 1 OF 1

RevNo	Revision note	Date	Signature	Checked



FRONT VIEW



REAR VIEW

Dim : MM	TOL :	FINISH:			MATERIAL:	
Perpaed by JD		Checked by SMK	Approved by - date SMK	Filename MAC00403	Date 29.12.08	Scale NTS

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TITLE : ISOMETRIC VIEW FOR CSD VERTICAL CABINET

Drawing__ Ref. MAC00403	Edition 00	Sheet 1 OF 1