# ASHIDA Numerical Protection Relay For RMU

**Ashida**
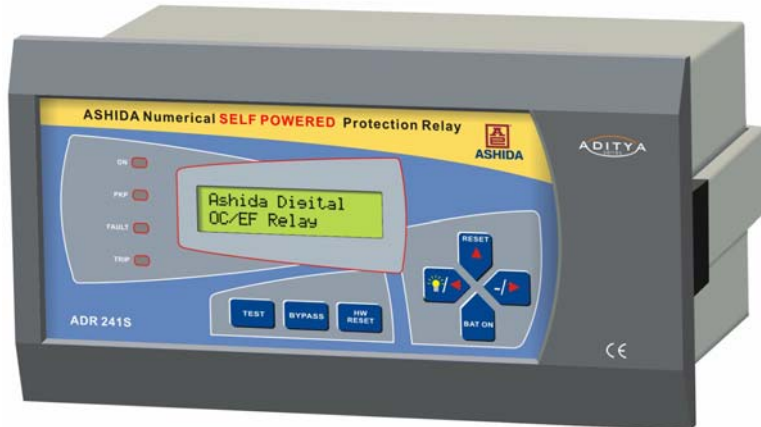


**Features :**

- ✓ **Auxiliary Voltage supplies is not required. (Relay with Aux. supply and option is also available)**
- ✓ Low energy pulse output tripping for RMU.
- ✓ User friendly setting procedure with wide setting range.

- ✓ 4 Element (3 Phase + 1 Earth Fault) Over current IDMT/ Definite time and Instant Trip.
- ✓ RS 232 and RS 485 Communication Port for remote SCADA.
- ✓ Programmable (Non Volatile) setting by local keyboard as well as remote setting by communication port.
- ✓ LCD Display for settings / parameters.
- ✓ Display of Fault current as well as Load current.
- ✓ Latching of last 5 fault with relay time
- ✓ Selectable Inverse Time Characteristics (Five selectable curves) : Normal Inverse1 (C1), Normal Inverse2 (C2), Very Inverse (C3), Extremely Inverse (C4), Long Time Inverse (C5), Define time (C6)
- ✓ Separate curve setting for phase and EF
- ✓ Internal Battery for maintaining LCD display and communication during fault condition.
- ✓ Designed using DSP technology.
- ✓ Latching of Fault Current and storing in a non-volatile memory with time stamping.
- ✓ **Three External status input for SCADA**
- ✓ **Remote trip ( same as selected Auxiliary supply voltage ).**
- ✓ **External latching type potential free contacts.**

**General :**

The ADR 241S is member of ADITYA series designed to meet demand of Ring Main Unit (RMU) type switchgear where Auxiliary supply as well as PT voltage is not available. The relay takes power from CT's and continuously monitors all 3 phases and earth current, through CT connections. The high-speed micro

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controller **samples** this current through a **12 bit A/D converter**. The micro controller performs powerful **Digital Algorithms** to find out Amplitude of fundamental current signal, and then these values are use for protection and metering function. All measurement is tuned to fundamental frequency. Input current is displayed on 16 x 2 LCD display for metering. The relay is buffered by a battery for feeding the LCD display and SCADA communication. After tripping operation relay maintains fault indication on LCD display. During this time, the relay uses power through internal battery. Reading of Fault data and setting of relay can be done on battery. Failure of the battery has no effect on the protection function of the relay. The battery has service life of more than 5 years.

➢ **Over Current / Earth Fault Protection :**

The relay has inverse time over current / earth fault function as well as instantaneous protection for both. Following is summary of different protection functions provided by relay.

| ANSI | IEC | Protection Function |
|------|-----|---------------------|
| 50 | I >> | Instantaneous Over Current Protection |
| 50N | IE >> | Instantaneous Earth Fault Protection |
| 51 | I>T, Ip | Time Over Current Protection (Phase) |
| 51N | IE >t, IEP | Time Over Current Protection (Earth) |

The relay has 4 sensing element 3 O/C and 1 E/F. The tripping current can be set to 20% -200% in steps of 1% for phase and 10% - 80% in steps of 1% for earth fault by keyboard provided on front panel. These settings are available on display. The unit has selection of IDMT characteristic of IEC standard, Normal Inverse1 (C1), Normal Inverse2 (C2), Very Inverse (C3), Extremely Inverse (C4), Long Time Inverse (C5). Or define time (C6) The unit has also Time Multiplier Setting (TMS) from x0.01 to x1.0 in steps of x0.01 (separate for phase and EF) for IDMT delay multiplication. Separate operating curve can be programmed for phase and EF.

The instantaneous tripping function has range of 100% - 3000% in steps of 100% for phase and 100% - 1200% in steps of 100% for earth fault. The high speed CPU continuously monitors all four current inputs and compares with IDMT as well as instantaneous setting. If any one current is above instantaneous setting, the relay provides immediate trip command bypassing IDMT delay. If input current is less than instantaneous setting but more then IDMT setting, CPU calculates IDMT delay as per selected IDMT characteristic, multiplies it with TMS setting and issue trip command if fault is persist even after this time delay.

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➢ **Measurement and Communication Function :**

In normal condition the relay displays all the settings. Using the front keyboard the display can be programmed to show the actual current flowing through the relay. If current is in fault range the relay gives trip command. The type of the fault is displayed on LCD display. During the fault condition, the relay measures the fault current and stores it in non-volatile memory. The fault current can be read using keyboard on LCD display. All settings can be done locally as well as remotely via communication port and saved in non-volatile memory.

➢ **Impulse Output for the Tripping Coil :**

Low Energy tripping coil of the circuit breaker can be connected to the coil terminal marked as (COIL + and –) at back terminal. The trip energy (12 - 24 V DC ± 0.1 W/sec) is provided by a capacitor in the protection relay. Length of the trip impulse is 40ms and pause between the individual pulses depends on the impedance of the tripping coil and the current level. Pulsing is continued until the CB operates and the fault current becomes zero.

➢ **Supervision Function :**

The relay continuously keeps track on its internal hardware and the moment it detects any failure of component, a message is displayed on LCD display. The type of error can be checked by "Error Log" menu. This feature is very useful for giving pre information to avoid mal operation.

➢ **Extra Status for SCADA.**

The relay had provided with extra status input that can be connected to any contact to be monitored such position of isolator switch etc, The status of this hardware is transmitted to remote SCADA station. This status required auxiliary supply.

➢ **Battery Function :**

*Battery Specification*: Capacity 4.5Volt (1.5 x 3) AAA Alkaline non-rechargeable battery, Make Energizer, Panasonic or equivalent.

The ADR241S relay is Self Power relay, it takes power from CT Current for its operation, after the tripping operation and when no current is available to view the Fault Current in the different Phases of the relay, Relay takes power from Battery. When there is no CT Current press "BAT ON" Key to view Fault current. When "BAT ON" Key is pressed relay will remain ON for 1 Minute and after 1 Minute relay becomes OFF to save the battery life, but if before completion of 1 Minute any of the key (Excluding the HW Reset and the Bypass key) is being pressed it will retriggered for 1 Minute

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time slab again. When the CT current is at 20% the relay gets activated. Battery is located in the battery box on the Front Plate and can be easily replaced by opening the cover.

***Conditions of the relay getting switch over momentarily on battery are as follows.***

1. If the relay is in ON Condition and current drops below 10%.
2. When the current exceeds to settings i.e. pkp condition but not tripped and drops below 10%.

***Condition of relay getting switch over on battery for 1 Minute is as follows.***

1. When relay gets tripped and current becomes Zero.

**Note: -**
1. The relay uses battery only for indication purpose. Battery is not required for protection purpose.
2. AAA Alkaline (1.5V x 3) non-rechargeable batteries are placed in Battery Socket.

➢ **Current transformers Requirement :**
The ADR241S relay is self power numerical relay and derived all power required for it internal operation as well as for it CB operation is derived from external CT. The proper operation it necessary to select proper rated CT.
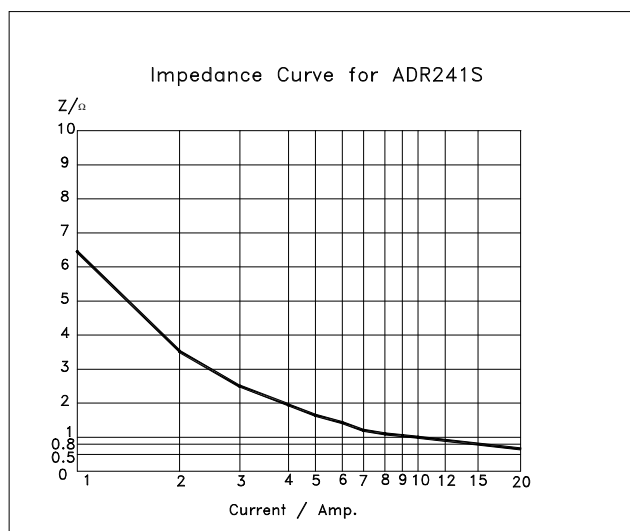


The Impedance to current characterise of ADR241S is as shown in fig. The graph is non linear, i.e. at low current Z of CT input is high while at high current it low.

From impedance Graph Impedance of ADR 241S at fault current of 20 times of rated is $0.7\Omega$ thus maximum Voltage required across relay terminal for proper operation of relay .

V Max. = 0.7 x 20

= 14V

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VA Min. required for external CT

VA $\qquad$ = $\qquad$ $\dfrac{V\ max\ \times\ Safety\ Factor}{Over\ Load\ Factor}$

Safety Factor for Lead resistance / Connecting Impedance Etc
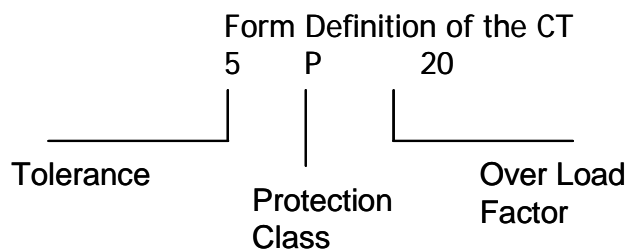
$\qquad$ = $\dfrac{14\ \times 2}{20}$

$\qquad$ = $\dfrac{28}{20}$

$\qquad$ = 1.4 VA for CT Class 5P20

$\qquad$ = 2.8 VA for CT class 5P10

This is minimum VA required.

Generally 4VA CT should be well suitable for relay performance.

Form Definition of the CT
5 $\qquad$ P $\qquad$ 20

Tolerance

Protection
Class

Over Load
Factor

The current transformers (CT) must have the following characteristics:

| | |
|---|---|
| – Rated Secondary Current | 1A |
| – Performance | 3.2 VA mim. |
| – Precision | 5 P 10 |
| – Safety Factor | 15 |
| – Thermal Performance (Ith) | 25 kA (1s - 50 Hz) |
| – Service Frequency | 50-60 Hz |

**For ordering following information is needed:**

The relay is available with nos. of different option. The option is specified by model no. It is user responsibility to specify correct model no. while ordering.

**While Ordering Specify the following Information for ADR241S Relay**

**Definition of Model No of Aditya Series of Relays**

AM XXX – XX – X – X – XX – X

**X** = Reserved for Future Use

**XX = Auxiliary Supply**

| | |
|---|---|
| 01 = 18 – 52 V dc / ac | 06 = 110 V dc /ac |
| 02 = 77 – 250 V dc /ac | 07 = 220 V dc / ac |
| 03 = 24 V dc /ac | 08 = 230 V ac |
| 04 = 30 V dc / ac | |
| 05 = 48 V dc / ac | |

**X = PT Secondary**
0 = No PT

**X = CT Secondary**
1 = 1 Amp.
2 = 5 Amp.

| *XX = Back Terminal Layout & Type of Tripping* | |
|---|---|
| 01 | Without Test Block, Series Trip or RMU |
| 02 | With Test Block, Shunt Trip |
| 03 | With Test Block, Series Trip |
| 04 | With Test Block. RMU. |

| *XX = Specify Type of Functions & O/C & E/F Trip setting* | |
|---|---|
| 01 | RMU, Trip Setting O/C 20-200% & EF 10-80% |
| 02 | Shunt Trip, Trip Setting O/C 50-200% & EF 5-80% |
| 03 | Series Trip, Trip Setting O/C 50-200% & EF 5-80% |
| 04 | RMU, Trip setting O/C 20-240% & EF 10-100% |

| *X= Cabinet Size* | |
|---|---|
| 0 | CSC – 120 |
| 1 | CSG – 122 |
| 2 | CSE – 130 |

**Ordering information:**

| A | D | R | 2 | 4 | 1 | S | - | A | M | - | X | X | X | - | X | X | - | X | + | X | - | X | X | - | X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Example
**ADR241S –AM-201-01-1-0-02-0**
**ADR241S :** Type
**AM**     **:** Ashida Model Number
**201**    **:** Cabinet Size & Type of Functions and O/C & E/F Trip Settings
**01**     **:** Back Terminal Layout (Suitable for Test Block) and Type of Tripping.
**1**      **:** Type of CT
**0**      **:** Type of PT
**02**     **:** Aux supply
**0**      **:** For Future use.

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**Technical Specifications:**

| Sr. No. | Specification | Particulars | |
|---|---|---|---|
| I. | Inputs | : Suitable for CT secondary 1.0 Amp or 5.0 Amp. (To be specified.) with selectable frequency 50Hz/60Hz. | |
| II. | Auxiliary power supply | : Self Power (no supply) for basic operation. Optional supply as per model type. | |
| III. | Protection Relay Setting Range **STANDARD** | : For Phase | - 20 - 200 % in step of 1%. |
| | | : For EF | - 10 - 80 % in step of 1%. (min 20% current in any one of phase or 10% current any 2 phases) |
| | | : Phase Instantaneous: | - 100 - 3000% in steps of 100% and bypass. |
| | | : EF Instantaneous: | - 100 to 1200% in steps of 100%. and bypass. |
| | Protection Relay Setting Range **OPTIONAL** | : For Phase | - 20 - 240 % in step of 1%. |
| | | : For EF | - 10 - 100 % in step of 1%. (min 20% current in any one of phase or 10% current any 2 phases) |
| | | : Phase Instantaneous: | - 50 - 3200% in steps of 50% and bypass. |
| | | : EF Instantaneous: | - 50 to 1200% in steps of 50%. and bypass. |
| IV. | Pickup Current | : Within 1.1 times of set current value. | |
| V. | Resetting Current | : Within 90% of set value. | |
| VI. | Operating Time | : Time: 5 selectable IDMT curve C1, to C5.  Or define time C6 | |
| | | : Instantaneous Time <60ms on 2 times current of setting.  With supply ON. | |
| VII. | Time Accuracy | : Within class 5 As per IS: 3231. | |
| VIII. | Burden on CT | : Ref CT requirement | |
| IX. | Impulse output for the tripping coil | : 12 V - 24 VDC (Energy < 0.1 W/sec). Suitable for sensitive RMU tripping coil | |
| X. | Potential Free Output contact | : 2 Change over latching types contact for Trip (Annunciation & Telesignilling | |
| XI. | Digital status input | : 3 optical isolated status. | |
| XII. | Operational Indicators  (Flags) | | |
| | ON | : Red LED indicates that the actual current is more than the minimum required current. | |
| | PKP | : Red LED indicates OC/EF relay Pickup. | |
| | TRIP | : Red LED Indicates that Trip pulse is being executed. | |
| | Fault | : Red LED Indicates that Fault occurred HR type | |
| XIII. | Thermal Withstand Capacity | : X20 times the normal current for 3sec. | |
| | | : X2 Continuous | |
| XIV. | Battery | : Capacity 4.5Volt (1.5 x 3) AAA Alkaline non-rechargeable battery: Recommended Energizer, Panasonic or equivalent. | |
| XV. | Drawing References | : For Cabinet Type | - CSE -130 (MAC01301) |
| | | : For Operating Characteristics | C1  - APR02201 |
| | | | C2  - APR01801 |
| | | | C3  - APR05101 |
| | | | C4  - APR05201 |
| | | | C5  - APR05301 |
| | | : For Electrical Connection | - APR06608 |

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**Conformance to Standards :**

| Sr. No. | Specification | Particulars |
|---|---|---|
| I. | High Voltage Test | : IEC 60255-5. |
| | | : At 2.5kV 50Hz between all terminal connected together and Earth for 1 minutes |
| II. | Impulse Voltage Test | : IEC60255-5. |
| | | : *Test voltage:* 5KV (peak) 1.2 / 50us, |
| | | : *Energy :* 0.5 J, |
| | | : *Polarity :* + ve and – Ve |
| | | : *Nos. of impulses :* 3 positive and 3 negative impulse |
| | | : *Duration between Impulses :* 5 sec. |
| III. | High Frequency test | : IEC 60255-22-1, |
| | | : *Frequency* : 1MHz Damped Oscillatory |
| | | : *Longitudinal* : 5 KV (peak) |
| | | : *Duration* : sec duration 2 sec. |
| | | Between input current Terminal |
| IV. | Electro static Discharge | : IEC 60255-22-2 Class III and IEC 61000-4-2 class III. |
| | | : *Contact discharge* : 6kV, |
| | | : *Air discharge:* 8KV |
| | | : *Polarity*: both +ve and –Ve polarities. |
| V. | Fast transient interference/bursts | : IEC 60255-22-4 and IEC 61000-4-4, class III |
| | | : Amplitude 2Kv, pulse shape 5/50ns. |
| | | : Burst duration = 15ms. |
| | | : Repetition rate 300ms; |
| | | : Both polarities; Ri = 50$\Omega$; duration 1 min. |
| VI. | Vibration Test | : IEC 60255-21-1 class 1 |
| | | : Frequency Range = 10Hz – 150Hz , |
| | | : Acceleration. = 1g$_n$ (9.8 m/s$^2$) |
| | | : Sweep rate 1 octave/min; 20 cycle in 3 orthogonal axis. |
| VII. | Shock Test | : IEC 60255-21-2 class 1 |
| | | : Acceleration. = 15g$_n$ (15 x 9.8 m/s$^2$) |
| | | : Half sine pulse width 11ms |
| | | Number of shocks per axis 3 per direction. |
| VIII. | Serge Immunity Test | : IEC 60255-22-5 / BS EN 61000-4-5 : 1995 |
| | | : Differncial Mode = 2kV |
| | | : Common Mode = 4kV |
| | | : 1.2/50uS , 5 surges of each polarity |
| IX. | Conducted Emission Test | : BS EN 55011 : 1998 |
| | | : Frequency 0.15MHz – 30MHz |

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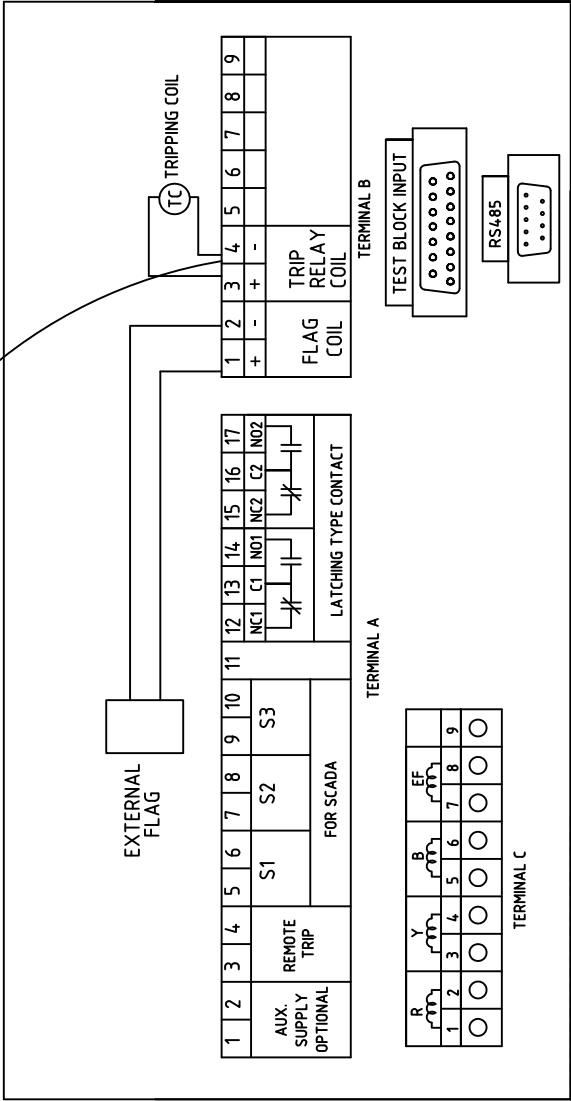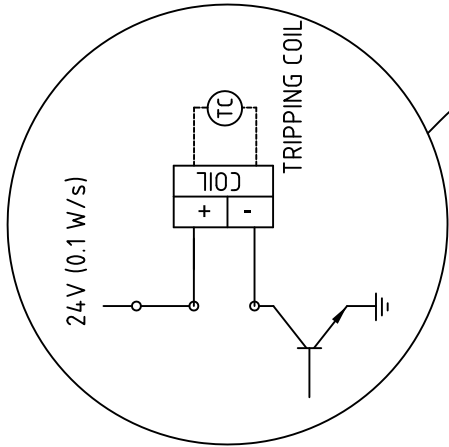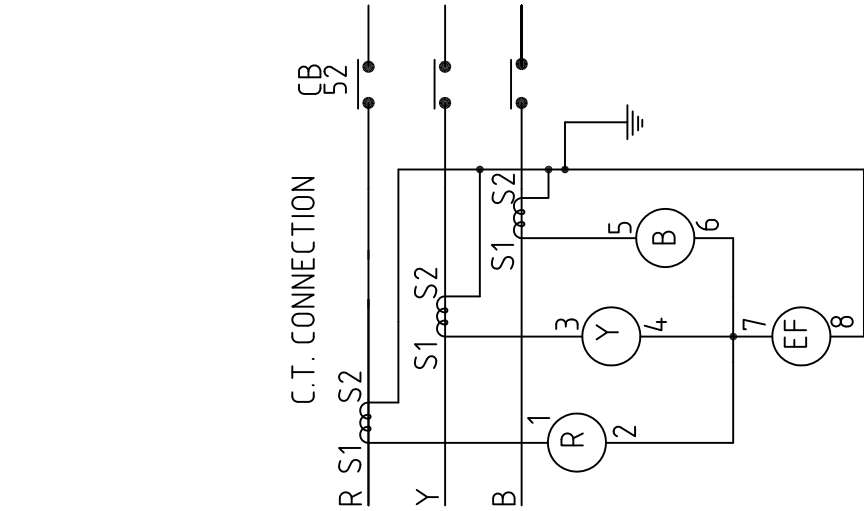
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| X. | Radiated Emission Test | : BS EN 55011 : 1998 |
|---|---|---|
| | | : Frequency 30MHz – 1GHz |
| XI. | Power Frequency Magnetic Test | : BS EN 61000-4-8 : 1994. |
| | | : Freq. 50 Hz, Field 100 A/m for 1 min. 1000 A/m for 3 sec., |
| XII. | Conducted Disturbance induced by Radio Frequency field | : IEC 60255-22-6 / BS EN 61000-4-6: 1996. |
| | | : Freq. 150kHz – 80MHz, Amplitude 10 V, Modulation 80% AM @ 1 KHz |
| XIII. | Radiated Electromagnetic Field Disturbance Test | : IEC 60255-22-3 / BS EN 61000-4-3 : 1995 |
| | | : Freq. 80 MHz – 1000 MHz, Amplitude 10 V / m, Modulation 80% AM @ 1 KHz |

- **Datasheet Change Log for ADR241S**

| Issue No. (Revision) | Date | Description /Changes |
|---|---|---|
| 01 | 12.09.04 | First Prototype specification (cabinet CSA-120) |
| 02 | 18.10.04 | Second Prototype (Cabinet CSC-120) |
| 03 | 01.01.05 | Third Prototype ( with Aux. Status input )<br>1. Battery ON/OFF switch Added |
| 04 | 12.05.05 | Modify to matched  actual production version V3.xx<br>1. Addition Auxiliary supply option<br>2. Min. OC settings changed to 20%<br>3. Auto-power off added for battery saving<br>4. Real Time Clock added |
| 05 | 26.09.05 | 1. Color photo added<br>2. CT Requirement added |
| 06 | 15.04.06 | Ordering Information added |
| 07 | 30.01.07 | 1. Front Plate & Mechanical details changed.<br>2. Additional IEC test added<br>3. Battery make / specification changed |
| 07A | 10.03.07 | Reset value change from 80% ….to 90% |
| 07B | 22.08.07 | 1. Status F. Trip, R. trip , E. Block  are change to S1, S2, S3<br>2. Old wiring Diagram APR06604 New APR06608<br>3. Model definition revised. |
| 07C | 01.06.09 | 1. Battery make / specification changed.<br>2. Setting added in Non bank settings. |
| 07D | 28.08.09 | Modified to Save Battery Life |
| 08 | 21.09.09 | CT requirement & Burden calculations added |
| 08A | 01.12.09 | Photograph of the Unit Modified. |

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# Typical External Connection for Feeder Protection Relay ADR241S

## TRIPPING COIL

24 V (0.1 W/s)

TC

COIL + −

TRIPPING COIL

TC TRIPPING COIL

### TERMINAL B

| 1 + | 2 − | 3 + | 4 − | 5 | 6 | 7 | 8 | 9 |
|-----|-----|-----|-----|---|---|---|---|---|
| FLAG COIL | | TRIP RELAY COIL | | | | | | |

TEST BLOCK INPUT

RS485

### TERMINAL A

| 12 NC1 | 13 C1 | 14 NO1 | 15 NC2 | 16 C2 | 17 NO2 |
|--------|-------|--------|--------|-------|--------|
| | | LATCHING TYPE CONTACT | | | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|----|----|
| AUX. SUPPLY OPTIONAL | | REMOTE TRIP | | S1 | | S2 | | S3 | | |
| | | | | FOR SCADA | | | | | | |

EXTERNAL FLAG

### TERMINAL C

| R | | Y | | B | | EF | |
|---|---|---|---|---|---|----|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

## C.T. CONNECTION

CB 52

R S1 S2
Y S1 S2
B S1 S2

R 1 2
Y 3 4
B 5 6
EF 7 8

IDMT Characteristics C1 (10 times 3.0 sec.) & Instantaneous Element Characteristics (HF).

Fig4 : Characteristics of Instantaneous Element (HF).

N = CURRENT (MULTIPLE OF SETTING)

Normal Inverse 1 :   $t = \dfrac{0.14}{\left(\dfrac{I}{Is}\right)^{0.02} - 1} \times TMS$

I = Input Current
Is = Set Value
TMS = Time Multiplier setting
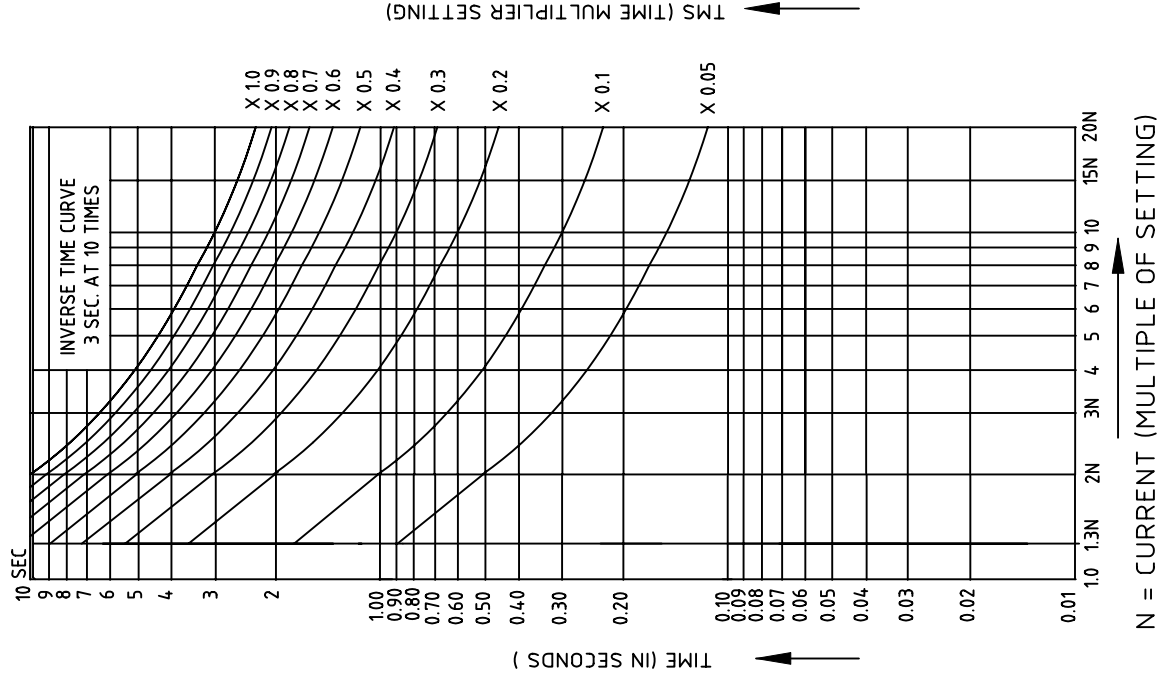
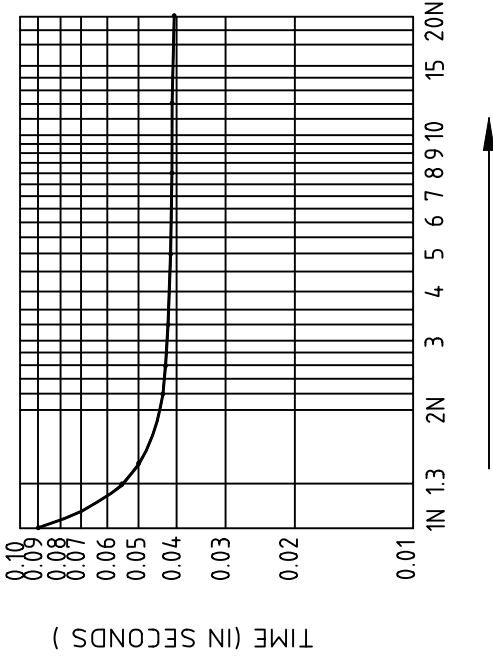Fig3 : IDMT Characteristics C1 of 10 times 3.0 sec.

N = CURRENT (MULTIPLE OF SETTING)

TIME (IN SECONDS)

TMS (TIME MULTIPLIER SETTING)

INVERSE TIME CURVE
3 SEC. AT 10 TIMES

X 1.0
X 0.9
X 0.8
X 0.7
X 0.6
X 0.5
X 0.4
X 0.3
X 0.2
X 0.1
X 0.05

| RevNo | Revision note | Date | Signature | Checked |
|-------|---------------|------|-----------|---------|
| 03 | Drawing Format Updated | 06.12.03 | | |

ASHIDA Electronics Pvt. Ltd.

| DIM:MM | TOL: | FINISH : | | MATERIAL | |
|--------|------|----------|--|----------|--|
| Prepared by JD | Checked by SMK | Approved by - date SMK | Filename APR02201 | Date 06.12.03 | Scale NTS |

TITLE :- CI Type IDMT and HF Characteristic

Drawing __ Ref. :- APR02201

| Edition 03 | Sheet 1 OF 1 |

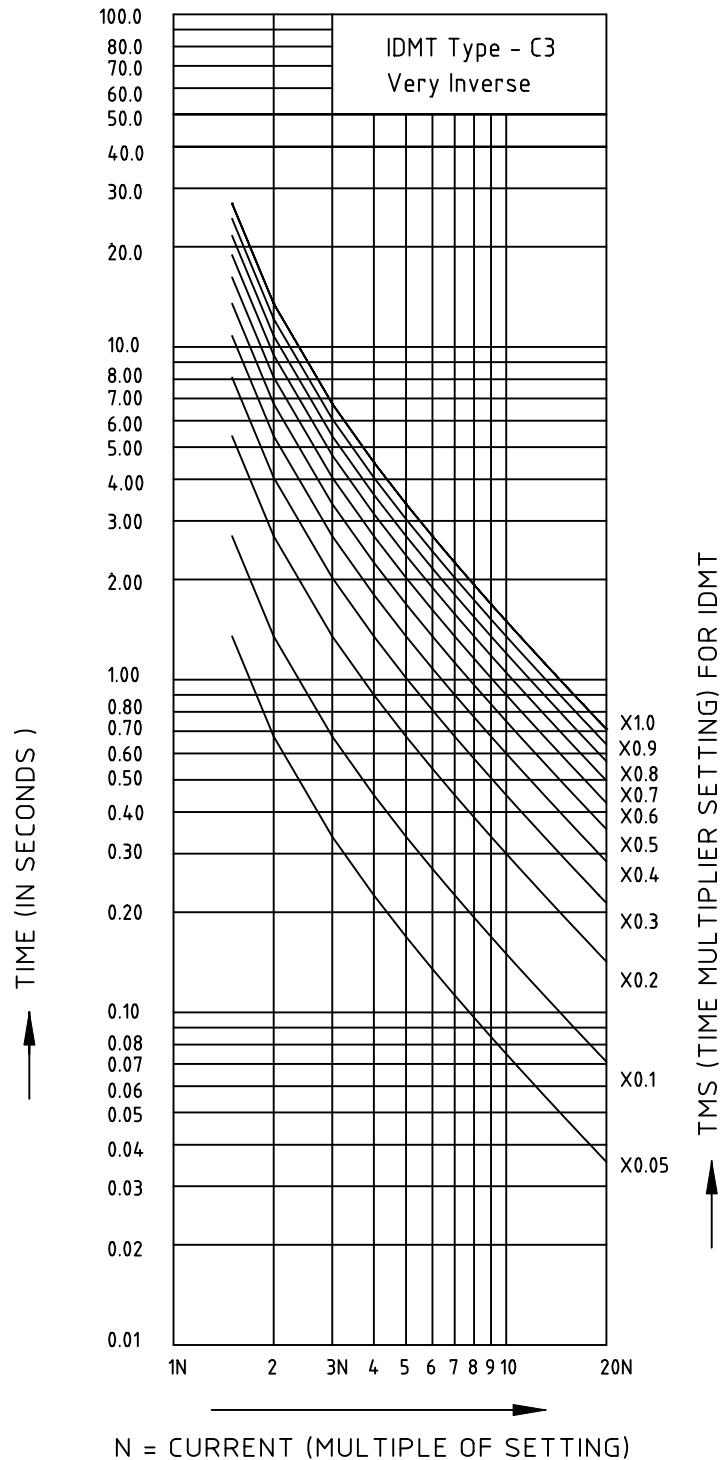IDMT Characteristic C2 (10 times 1.3 Sec.) & Instantaneous Element Characteristic (HF)

Fig2 : Characteristics of Instantaneous Element (HF).

**Normal Inverse 2 :** $t = \dfrac{0.060}{\left(\dfrac{I}{Is}\right)^{0.02} - 1} \times TMS$

I = Input Current

Is = Set Value

TMS = Time Multiplier setting

TIME (IN SECONDS)

N = CURRENT (MULTIPLE OF SETTING)

TMS (TIME MULTIPLIER SETTING) FOR IDMT

X 1.0
X 0.9
X 0.8
X 0.7
X 0.6
X 0.5
X 0.4
X 0.3
X 0.2
X 0.1
X 0.07

TIME (IN SECONDS)
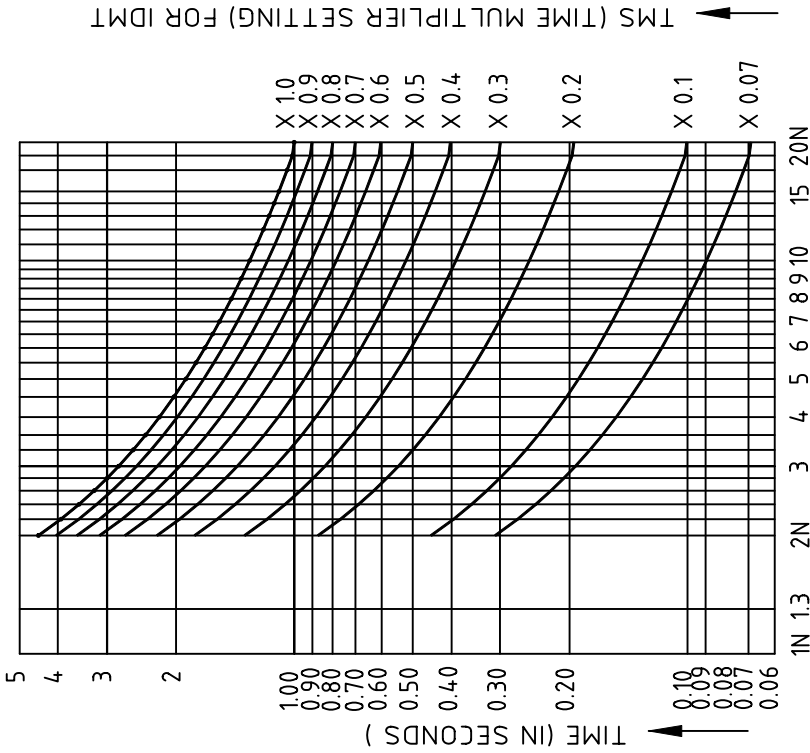
N = CURRENT (MULTIPLE OF SETTING)

Fig1 : IDMT Characteristics C2 of 10 times 1.3 sec.

## IDMT Characteristic C3 – Very Inverse 10 Times 1.5 Sec



IDMT Type – C3
Very Inverse

TIME (IN SECONDS)

N = CURRENT (MULTIPLE OF SETTING)

TMS (TIME MULTIPLIER SETTING) FOR IDMT

X1.0
X0.9
X0.8
X0.7
X0.6
X0.5
X0.4
X0.3
X0.2
X0.1
X0.05

$$\text{Very Inverse} \quad : \quad t \; = \; \frac{13.5}{\left(\dfrac{I}{Is}\right) - 1} \; \times \; TMS$$

I = Input Current
Is = Set Value
TMS = Time Multiplier setting

| Dim : MM | TOL : | FINISH: | | | MATERIAL: | | |
|---|---|---|---|---|---|---|---|
| Perpaed by JD | Checked by SMK | Approved by – date SMK | Filename APR05101 | | Date 06.12.03 | | Scale NTS |

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TITLE :– IDMT Characteristic of TYPE C3 Very Inverse.

Drawing_ Ref. APR05101 | Edition 02 | Sheet 1 OF 1

| RevNo | Revision note | | Date | Signature | Checked |
|---|---|---|---|---|---|
| 02 | Drawing format Updated | | 06.12.03 | | |

## IDMT Charateristic C4 – Extremely Inverse 10 Times 0.8 sec



TIME (IN SECONDS)

IDMT Type – C4
Extremely Inverse

TMS (TIME MULTIPLIER SETTING) FOR IDMT

X1.0
X0.9
X0.8
X0.7
X0.6
X0.5
X0.4
X0.3
X0.2
X0.1
X0.05

N = CURRENT (MULTIPLE OF SETTING)
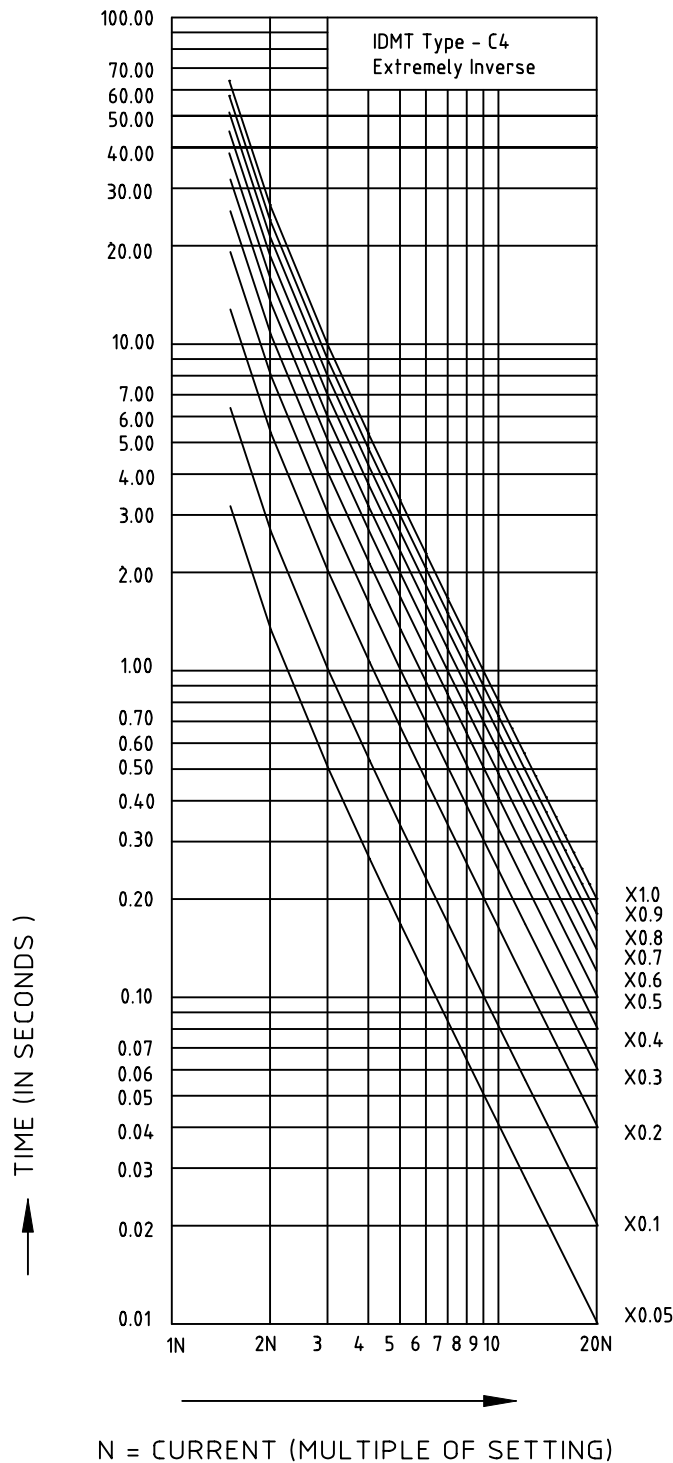
Extremely Inverse : $t = \dfrac{80}{\left(\dfrac{I}{Is}\right)^2 - 1} \times TMS$

I = Input Current
Is = Set Value
TMS = Time Multiplier setting

| Dim : MM | TOL : | FINISH: | | | MATERIAL: | | |
|---|---|---|---|---|---|---|---|
| Perpaed by JD | Checked by SMK | Approved by – date SMK | Filename APR05201 | | Date 06.12.03 | | Scale NTS |

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TITLE :– IDMT Characteristic of TYPE C4
Extremely Inverse.

Drawing__ Ref. APR05201

Edition 02

Sheet 1 OF 1

| | 1 | | 2 | | 3 | | 4 | | |
|---|---|---|---|---|---|---|---|---|---|

| RevNo | Revision note | | | Date | Signature | Checked |
|---|---|---|---|---|---|---|
| 02 | Drawing format Updated | | | 06.12.03 | | |

## IDMT Characteristic C5 – Long Time Inverse of 10 Times 13.3 sec.



TIME (IN SECONDS)

N = CURRENT (MULTIPLE OF SETTING)

TMS (TIME MULTIPLIER SETTING) FOR IDMT

IDMT Type – C5
Long Time Inverse

X1.0
X0.9
X0.8
X0.7
X0.6
X0.5
X0.4
X0.3
X0.2
X0.1
X0.05
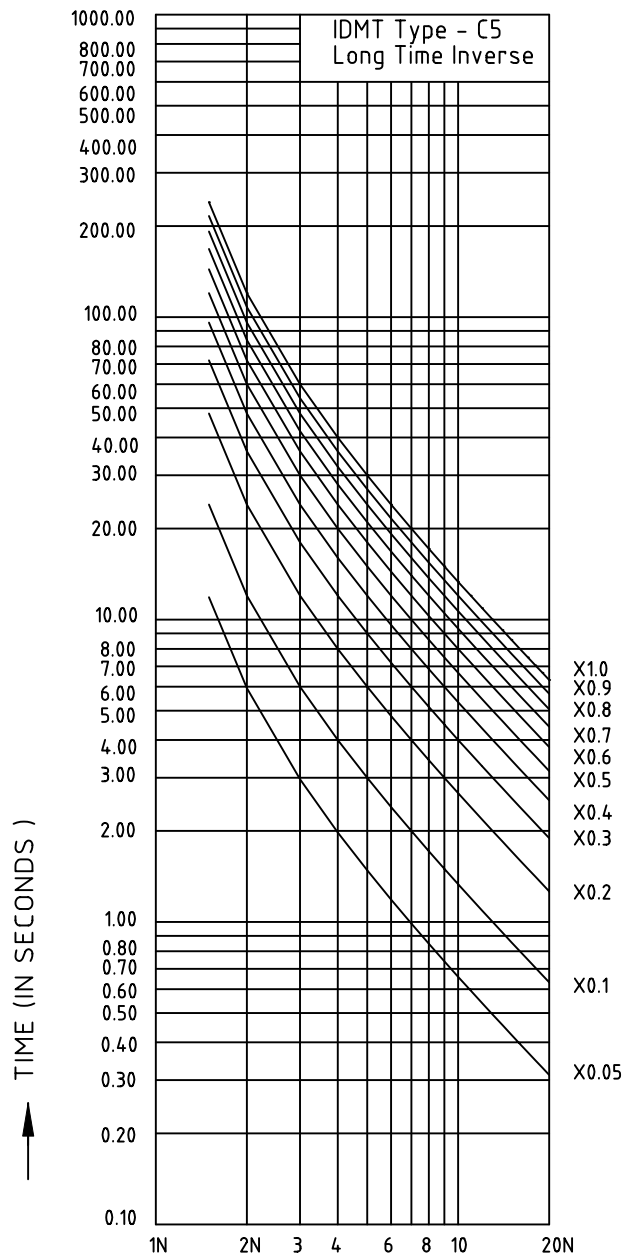
Long Time Inverse : $t = \dfrac{120}{\left(\dfrac{I}{Is}\right) - 1} \times TMS$

I = Input Current
Is = Set Value
TMS = Time Multiplier setting

| Dim : MM | TOL : | FINISH: | | | MATERIAL: | |
|---|---|---|---|---|---|---|
| Perpaed by JD | Checked by FD | Approved by – date SMK | Filename APR05301 | Date 06.12.03 | | Scale NTS |

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TITLE :– IDMT Characteristic of TYPE C5
Long Time Inverse.

| Drawing_ Ref. APR05301 | Edition 02 | Sheet 1 OF 1 |
|---|---|---|

| D | CAB. STYLE |
|---|---|
| 132 | CSE-H – 130 |

**FRONT VIEW**

260
237
140
117

**PANEL CUTOUT REQUIRED**

240
120
75
MINIMUM GAP FOR VER. MOUNTING

240
120
75
MINIMIUM GAP FOR HOR. MOUNTING

**TOP VIEW**

237
30
132
18

MS CLAMP. 2 NOS ON EITHER SIDE

RUBBER COVER FOR PROPER GRIP
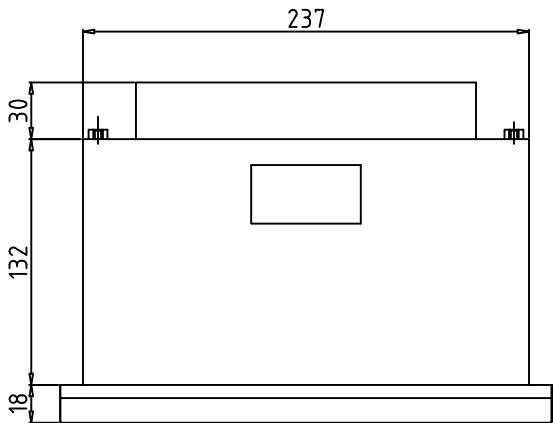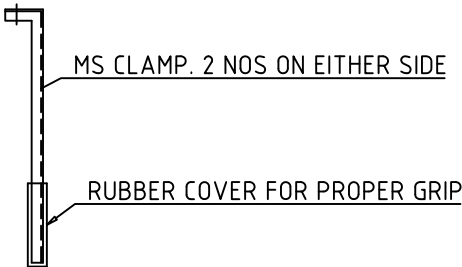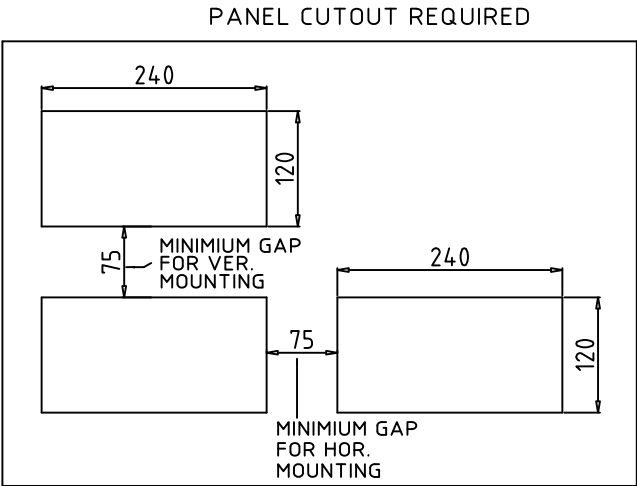
<u>Note</u>
1. Front Bezel 260mm x 140mm.
2. Box  237mm x 117mm.

ALL DIMENSIONS IN MM

| Dim : MM | TOL : | FINISH: | | | MATERIAL: | |
|---|---|---|---|---|---|---|
| Perpaed by JD | Checked by SMK | Approved by – date SMK | Filename MAC01301 | Date 01.09.08 | | Scale NTS |

ASHIDA Electronics Pvt. Ltd.

TITLE : MECHANICAL DETAILS FOR CSE – HOR. CABINET

Drawing__ Ref. MAC01301

| Edition 00 | Sheet 1 OF 1 |
|---|---|