Operating Manual for

ASHIDA Numerical Voltage

Protection Relay

Type : ADR112E / ADR212E

Model : AM–230–XX–XX–XX–XX-XX–XX

Preface

The ADR112E Neutral Displacement Voltage Protection Relay, Operating Manual describes common aspects of single pole voltage protection application and use of product. It includes the necessary information to safety, set, test, and operate the relay functionality. The operating manual can be used by power engineers and other experienced protective relaying applications.

It is not the intention of this manual to cover all details and variations in equipment/relay, nor does this manual provide data for every possible contingency regarding installation or operation. The availability and design of all features and options are subject to modification without notice.

Contents

1 SAFETY GUIDE

1.1 INTRODUCTION

This guide and the relevant operating or service manual documentation for the equipment provide full information of safe handling, commissioning and testing of this equipment and also includes description of equipment label markings.

The technical data in this safety guide is typical only see the technical data section of the relevant product publication(s) for data specific to particular equipment.

Before carrying out any work on the equipment the user should be familiar with the contents of this Safety Guide and the ratings on the equipment's rating label.

Reference should be made to the external connection diagram before the equipment is installed, commissioned or serviced.

1.2 HEALTH AND SAFETY

This information in the Safety Section of the equipment documentation is intended to ensure that equipment is properly installed and handled in order to maintain it in a safe condition.

It is assumed that everyone who will be associated with the equipment will be familiar with the contents of that Safety Section, or this Safety Guide.

When electrical equipment is in operation, dangerous voltages will be present in certain parts of the equipment. Failure to warning notices, incorrect use, or improper handling may endanger personnel / equipment, causing personal injury or physical damage.

Before working in the terminal strip area, the equipment must be isolated.

Proper and safe operation of the equipment depends on appropriate shipping and handling, proper storage, installation and commissioning and on careful operation, maintenance and servicing. For this reason only qualified personal may work on or operate the equipment.

Qualified personnel are individuals who

- Are familiar with the installation, commissioning, operation of the equipment and of the system to which it is being connected.
- Are able to safely perform switching operation in accordance with accepted safety and to isolate ground and label it.
- Are trained in the care and use of safety apparatus in accordance with safety engineering practices.
- Are trained in emergency procedures (first aid).

The operating manual for the equipment gives instruction for its installation, commissioning and operation. However, the manual cannot cover all conceivable circumstances or include detailed

information on all topics. In the event of questions or specific problems, do not take any action without proper authorization. Contact the appropriate person of Ashida Technical / Sales office and request the necessary information.

SYMBOLS AND EXTERNAL LABELS ON THE EQUIPMENT

For safety reasons the following symbols and external labels, which may be used on the equipment or referred to in the equipment documentation, should be understood before the equipment is installed or commissioned.

 Caution: refer to equipment documentation	 Caution: risk of electric shock
 Protective Conductor (Earth*) terminal	 Functional / Protective Conductor (*Earth) terminal. Note: This symbol may also be used for a Protective Conductor (Earth) Terminal if that terminal is part of a terminal block or sub-assembly e.g. power supply.

**NOTE:THE TERM EARTH USED THROUGHOUT THIS GUIDE IS THE DIRECT EQUIVALENT OF THE NORTH AMERICAN TERM GROUND.*

INSTALLING, COMMISSIONING AND SERVICING

Equipment connections

Personnel undertaking installation, commissioning or servicing work for this equipment to be aware of the correct working procedures to ensure safety. The equipment documentation should be consulted before installing, commissioning or servicing the equipment. Terminals exposed during installation, commissioning and maintenance may present a hazardous voltage unless the equipment is electrically isolated. Any disassembly of the equipment may expose parts at hazardous voltage; also electronic parts may be damaged if suitable electrostatic voltage discharge (ESD) precautions are not taken.

If there is unlocked access to the rear of the equipment, care should be taken by all personnel to avoid electric shock or energy hazards. Voltage and current connections should be made using insulated crimp terminations to ensure that terminal block insulation requirements are maintained for safety.

To ensure that wires are correctly terminated the correct crimp terminal and tool for the wire size should be used. The equipment must be connected in accordance with the appropriate connection diagram.

Protection Class I Equipment

Before energizing the equipment it must be earthed using the protective conductor terminal, if provided, or the appropriate termination of the supply plug in the case of plug connected equipment.

The protective conductor (earth) connection must not be removed since the protection against electric shock provided by the equipment would be lost.

The recommended minimum protective conductor (earth) wire size is 2.5 mm^2 or as per industries standard practice. The protective conductor (earth) connection must be of low-inductance and as short as possible.

All connections to the equipment must have a defined potential.

Before energizing the equipment, the following points should be checked:

- Voltage rating / polarity (rating label / equipment documentation);
- CT circuit rating (rating label) and integrity of connections;
- Integrity of the protective conductor (earth) connection (where applicable);
- Voltage and current rating of external wiring, applicable to the application.

Accidental touching of exposed terminals

If working in an area of restricted space, such as a cubicle, where there is a risk of electric shock due to accidental touching of terminals which do not comply with IP20 rating, then a suitable protective barrier should be provided.

Equipment Use

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Removal of the equipment front panel / cover

Removal of the equipment front panel / cover may expose hazardous live parts which must not be touched until the electrical power is removed.

UL and CSA/CUL Listed or Recognized equipment

To maintain UL and CSA/CUL Listing / Recognized status for North America the equipment should be installed using UL or CSA Listed or Recognized parts for the following items: connection cables, protective fuses / fuse holders or circuit breakers, insulation crimp terminals

and replacement internal battery, as specified in the equipment documentation.

For external protective fuses a UL or CSA Listed fuse shall be used. The Listed type shall be a Class J time delay fuse, with a maximum current rating of 15A and a minimum D.C. rating of 250 Vdc. for example type AJT15.

Where UL or CSA Listing of the equipment is not required, a high rupture capacity (HRC) fuse type with a maximum current rating of 16 Amps and a minimum D.C. rating of 250 Vdc. may be used, for example Red Spot type NIT or TIA.

Equipment operating conditions

The equipment should be operated within the specified electrical and environmental limits.

Current transformer circuits

Do not open the secondary circuit of a live CT since the high voltage produced may be lethal to personnel and could damage insulation.

Generally, for safety, the secondary of the line CT must be shorted before opening any connections to it.

For most equipment with ring-terminal connections, the threaded terminal block for current transformer termination has automatic CT shorting on removal of the module. Therefore external shorting of the CTs may not be required, but it is advisable to use external CT shorting as general practice.

External resistors, including voltage dependent resistors (VDRs)

Where external resistors, including voltage dependent resistors (VDRs), are fitted to the equipment, these may present a risk of electric shock or burns, if touched.

Battery replacement

Where internal batteries are fitted they should be replaced with the recommended type and be installed with the correct polarity to avoid possible damage to the equipment, buildings and persons.

Insulation and dielectric strength testing

Insulation testing may leave capacitors charged up to a hazardous voltage. After the completion of test, to discharge capacitors the voltage should be gradually reduced to zero before the test leads are disconnected.

Insertion of modules and PCB cards

Modules and PCB cards must not be inserted into or withdrawn from the equipment whilst it is energized, since this may result in damage.

Insertion and withdrawal of extender cards

Extender cards are available for some equipment. If an extender card is used, this should not be inserted or withdrawn from the equipment whilst it is energized. This is to avoid possible shock or damage hazards. Hazardous live voltages may be accessible on the extender card.

Fiber optic communication

Where fibre optic communication devices are fitted, these should not be viewed directly. Optical power meters should be used to determine the operation or signal level of the device.

Cleaning

The equipment may be cleaned using a lint free cloth dampened with clean water, when no connections are energized.

1.3 DECOMMISSIONING AND DISPOSAL

Decommissioning

The supply input (auxiliary) for the equipment may include capacitors across the supply or to earth. To avoid electric shock or energy hazards, after completely isolating the supplies to the equipment (both poles of any dc supply), the capacitors should be safely discharged via the external terminals prior to decommissioning.

Disposal

It is recommended that incineration and disposal to water courses is avoided. The equipment should be disposed of in a safe manner. Any equipment containing batteries should have them removed before disposal, taking precautions to avoid short circuits. Particular regulations within the country of operation, may apply to the disposal of batteries.

1.4 TECHNICAL SPECIFICATIONS FOR SAFETY

1.4.1 Protective Fuse Rating

The recommended maximum rating of the external protective fuse for equipments is 8A, high rupture capacity (HRC) Red Spot type NIT, or TIA, or equivalent, unless otherwise stated in the technical data section of the equipment documentation. The protective fuse should be located as close to the unit as possible.

DANGER - CTs must NOT be fused since open circuiting them may produce lethal hazardous voltages 7.2 Protective Class

1.4.2 Protective Class

IEC 60255-27: 2005 **EN 60255-27: 2005**	Class I (unless otherwise specified in the equipment documentation). This equipment requires a protective conductor (earth) connection to ensure user safety.

1.4.3 Installation Category

IEC 60255-27.2005 **Category III** **(Overvoltage Category III)**	: At 2.5kV, 50Hz/ 60Hz between all terminals connected together and earth for 1 minute Distribution level, fixed installation. Equipment in this category is qualification tested at 5kV peak, 1.2/50µs, 500Ω, 0.5J, between all supply circuits and earth and also between independent circuits

1.4.4 Environment

The equipment is intended for indoor installation and use only. If it is required for use in an outdoor environment then it must be mounted in a specific cabinet or housing which will enable it to meet the requirements of IEC 60529 with the classification of degree of protection IP52 (dust and splashing water protected).

Pollution Degree 2 Compliance is demonstrated by reference to safety standards.
Altitude Operation up to 2000m
IEC 60255-27:2005
EN 60255-27: 2005

1.5 CE MARKING

CE Directives: Compliance demonstrated by reference to safety standards

2 INTRODUCTION AND SPECIFICATIONS

2.1 Overview

ASHIDA has designed economical & reliable Neutral Displavement Protection, Control and metering Relay. The ADR112E is Single phase neutral displacement voltage protection relay. The simple and compact construction of ADITYA series, ADR112E relay continuously monitors line voltage and provides integrated Protection, Control and Monitoring functions for low and medium switchgear Control.

2.2 Applications

ADR112E numerical Neutral Displavement Protection relay is member of ADITYA series designed to meet demand of low and medium switchgear control systems. Relay designed with fast and selective tripping ensures the stability and availability of electrical power system.

2.3 Features

Key Protection & Control Functions:

- Definite Time Neutral Displacement Voltage protection (59N).
- Two independent stages i.e. Alarm and Trip are provided.
- Password Protection.
- Metering function.
- Fault Recording on HMI display (5nos.)
- Non-Volatile memory.
- Fully communicable with IEC standard open protocol IEC60870-5-103 (Available in ADR212E).
- PC front port communication for convenient relay settings (Available in ADR212E).
- User friendly local operation with key pad.
- Large Liquid crystal display (16X2) with backlight

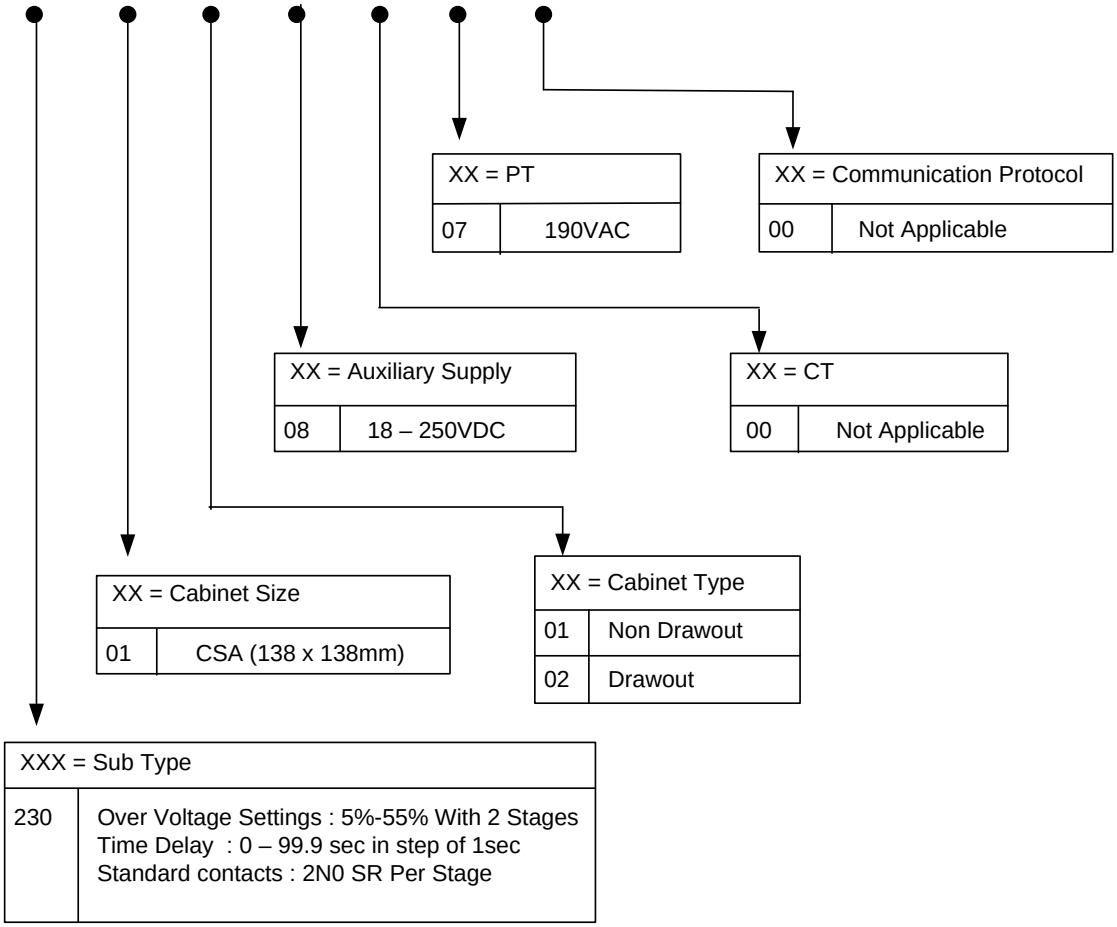
Software Support:

- Online Setting Editor.
- Settings upload / download.
- Online Measurement.
- Event & Fault History analysis.

2.4 Ordering Information

Definition of Model No For Aditya Series Relays

AM XXX – XX – XX – XX – XX – XX – XX



2.5 Technical Specifications

Voltage Input		
1.	PT secondary	: 190 VAC
2.	Nominal Burden at VT	: Less than 1.0VA.
3.	Thermal Withstand Capacity	: x 2 times the rated voltage for 3sec. : x 1.5 Continuous
4.	Measurement Accuracy	: Typical ± 2% at Vn

Auxiliary Supply Voltage		
1.	Nominal operating range	: 24 – 230V DC
2.	Voltage operating range	: 80% of lower nominal range and 120% of upper nominal range

3.	Nominal Burden on 24 – 230V Auxiliary Power Supply	: Less than 10VA.
4.	Tolerable AC ripple	: Up to 15% of highest dc supply, As per IEC 60255-11
5.	Relay power up time	: <50ms

Output contact:			
1.	Output Contacts	Make & carry	: 1250 VA/ W 5Amp & 660V AC /DC
		Make & carry for 3 sec	: 7500 VA /W 30Amp & 660V AC /DC
		Breaking capacity	: 1250 VA 5Amp & 660V AC : 100 W Resistive : 50 W Inductive 5A/660V DC
2.	Durability	Loaded Contact	10,000 operation minimum
		Unloaded Contact	1,00,000 operation minimum

Accuracy of protection function:			
1.	**Neutral Displacement Voltage :**		
	For operating Value	Pick-up	: Within 1.1 times of set value
		Drop –off	: Within 90% of set value.
	For operating Time	DT Operation	± 5% or ± 50ms whichever is greater*
		* Reference Condition	Fault voltage 1.5 times above set value

Operational Indicators (Flags)		
1.	ON	: Green LED indicates Relay OK : In case of following condition LED become off 1. Problem in relay Hardware. 2. Auxiliary supply is not sufficient for relay operation.
	PKP	: Red LED indicates relay pickup (timer start)
	FAULT	: Red LED's indicates the UV/OV relay trip, Hand Reset (HR) Type.
	TRIP	: Indicates that Trip pulse is being executed. When BYPASS P.B. is pressed, actual trip is not executed.

2.6 Type Test Details

Sr. No.	Tests	Standard
1.	High Voltage Test	: IEC 60255-5
2.	Impulse Voltage Test	: IEC 60255-5
3.	High Frequency test	: IEC 60255-22-1
4.	Electro static Discharge	: IEC 60255-22-2 and IEC 61000-4-2
5.	Irradiation with radio frequency field, pulse-modulated,	: IEC 60255-22-3 and IEC 61000-4-2
6.	Fast transient interference/bursts	: IEC 60255-22-3 and IEC 61000-4-3
7.	Shock Test	: IEC 60255-21-2 class 1
8.	Vibration Test	: IEC 60255-21-1 class 1 / IEC 60068-2-6

*Detailed Type test reports are available on request

2.7 Drawing Reference

Drawing References:		
1.	: For Cabinet Type	CSA - 150 (MAC00101)
	: For Electrical Connection and Back terminals (Non Draw out)	ACR01503
	: For Electrical Connection and Back terminals (Draw out)	ACR01504

3 PC SOFTWARE INFORMATION (ONLY FOR ADR212)

3.1 Overview

ASHIDA Relay Talk Software Provides solution to customizes settings and analyse events, faults of ADR212E Voltage Protection Relay and the other ASHIDA products.

This section describes how to get started with the ADR212E and Relay Talk software. It particularly explains about the software setup and working procedure.

3.1.1 Relay-Talk Software Features

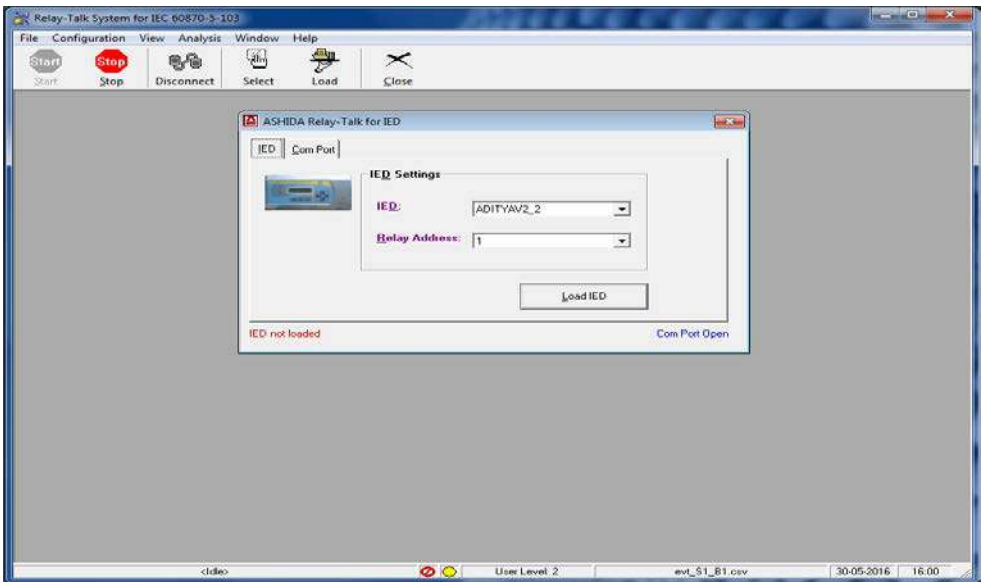
Connections	Connect ADR212E to the PC through Front port as well as Rear port.
Settings	Provides online utility to interface with ASHIDA Relay series,
History Faults	Provides History fault analysis tool
Synchronization	Local clock time synchronized data is available.
Parameter Display	Provides online power system parameter measurements
Auxiliary Status	Provides status of the input, output and protection functions tool.
Control	Provides the control function tool (output, LED)

3.2 ASHIDA Relay Talk System

Following is a brief step by step instruction to down load relay data using ASHIDA Relay Talk software.

- Start Relay Talk program from program menu

Following is the main screen of Relay talk system.



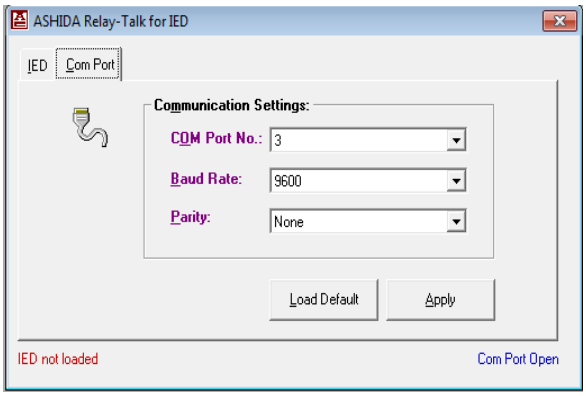
Main window of Relay Talk System

For successful communication, setting of relay should match with software settings.

Here we have shown essential screens for ADR112E relay.

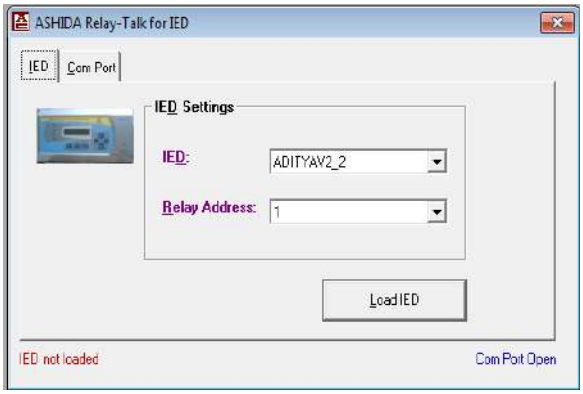
- To check communication setting click Com Port button:

After pressing Com Port button display will show following screen, and follow steps



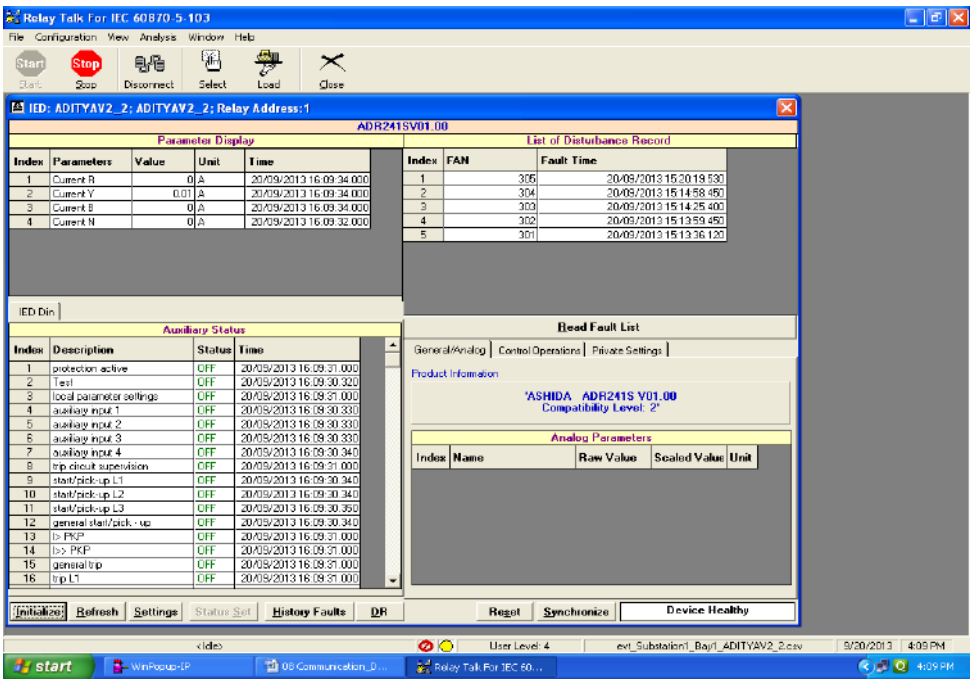
Communication Setting

- Now set communication setting it should be match with relay settings.
- After selecting the communication setting, click on Apply button.



IED Setting

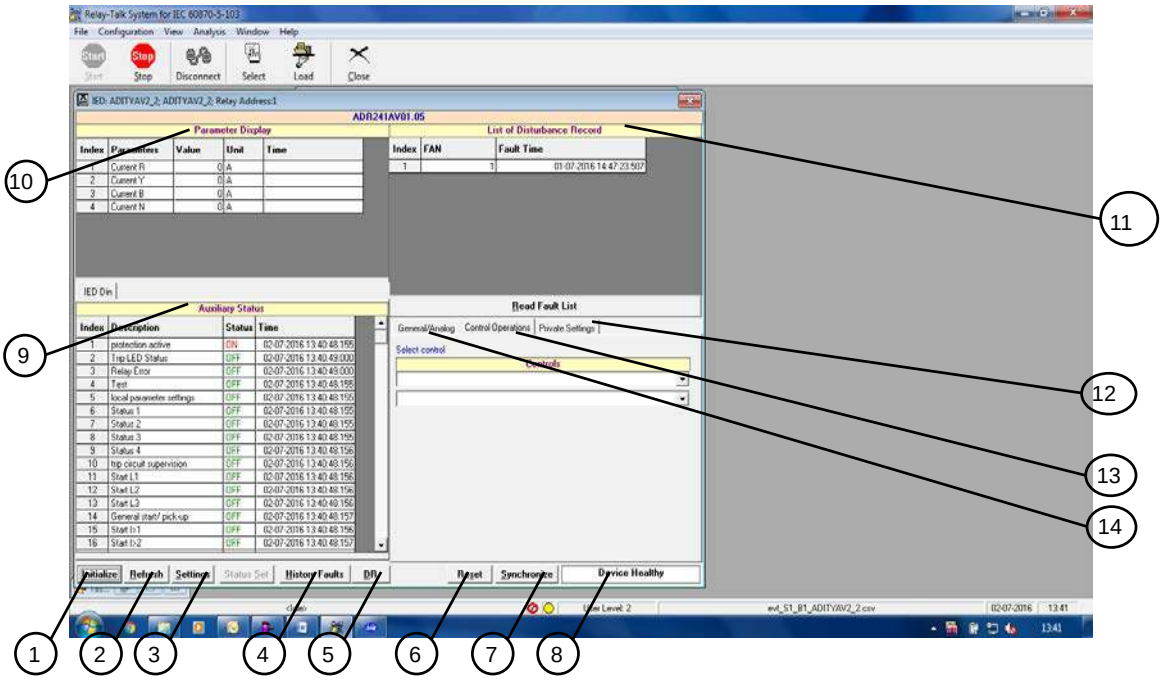
- Now press the Load IED button, the display will show following IED Main screen.



IED main screen

3.3 ADR112E IED Main Screen

After checking all settings and loading the IED, the following window will display on the PC screen.



IED Main screen

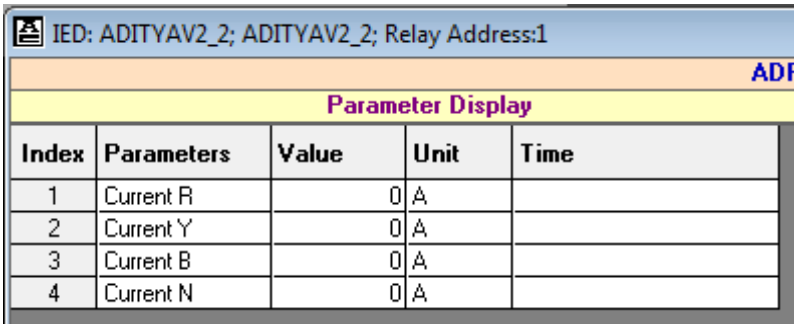
The windows/Buttons functions are as follows

Sr. No	Name	Description
1	Initialize	This will initialize relay communication.
2	Refresh	It will refresh all windows and parameters
3	Settings	This will display the relay Settings
4	History Faults	It will read all fault data (which is also available on LCD display)
5	*Disturbance Recorder	This is used to view the disturbance with the help of waveform as well as parameters
6	Reset	This is use to reset the relay.
7	Synchronize	This is use to synchronize the relay date and time with PC
8	Device Healthy	This window indicates the healthy condition of the relay with software
9	Auxiliary Status	This is use to view the input status received by the relay
10	Parameter Display	This is use to view the parameters of current.
11	*List of Disturbance Recorder	This is use to view the last 5 faults saved in the relay with fault number.
12	Private settings	This is use to view the current value and the expected value
13	Control Operation	This is use to operate, relay control operation through PC
14	General/Analogue	This used to view Relay name, Version and compatibility.

*NOTE: The above features are generally provided with all the ASHIDA Relays but the * marked features are not applicable to this product*

3.3.1 Parameter Display

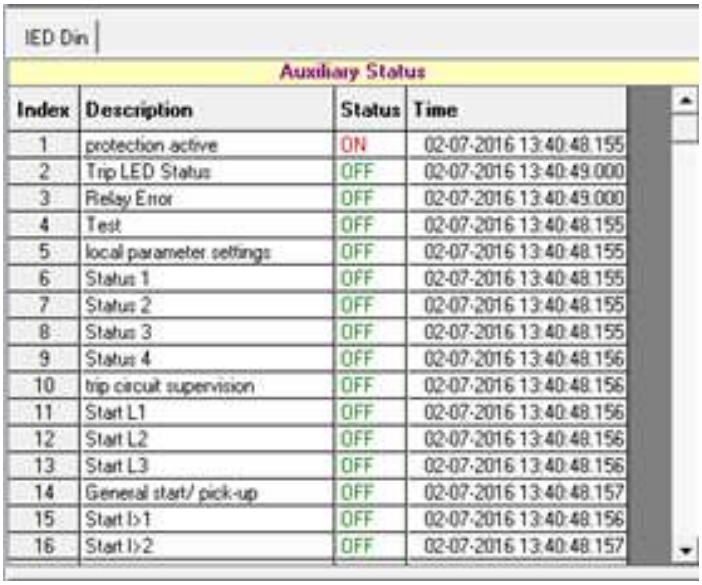
Online Parameters along with their values & units are displayed and refreshed on successful communication.



Parameter Display

3.3.2 IEDs Din Display

These are IED Din s; these IEDs along with their online status are display.

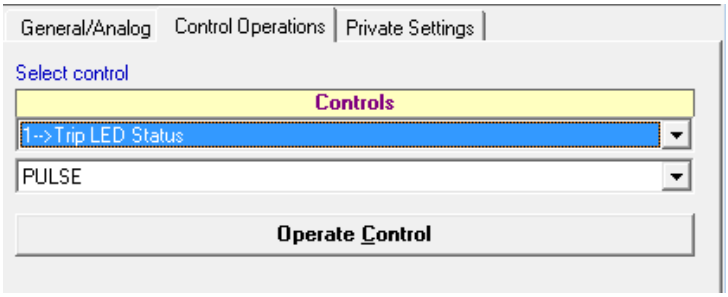


Index	Description	Status	Time
1	protection active	ON	02-07-2016 13:40:48.155
2	Trip LED Status	OFF	02-07-2016 13:40:49.000
3	Relay Error	OFF	02-07-2016 13:40:49.000
4	Test	OFF	02-07-2016 13:40:48.155
5	local parameter settings	OFF	02-07-2016 13:40:48.155
6	Status 1	OFF	02-07-2016 13:40:48.155
7	Status 2	OFF	02-07-2016 13:40:48.155
8	Status 3	OFF	02-07-2016 13:40:48.155
9	Status 4	OFF	02-07-2016 13:40:48.156
10	trip circuit supervision	OFF	02-07-2016 13:40:48.156
11	Start L1	OFF	02-07-2016 13:40:48.156
12	Start L2	OFF	02-07-2016 13:40:48.156
13	Start L3	OFF	02-07-2016 13:40:48.156
14	General start/ pick-up	OFF	02-07-2016 13:40:48.157
15	Start I>1	OFF	02-07-2016 13:40:48.156
16	Start I>2	OFF	02-07-2016 13:40:48.157

Auxiliary Status

3.3.3 Control Operation

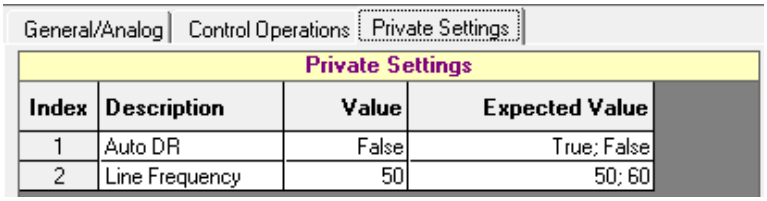
The IEDs Controls are listed in the list and depending on their type either pulse or latch the control operation



Control Operation

3.3.4 Private Setting

These settings for IEDs are displayed along with their current values and expected values.



Index	Description	Value	Expected Value
1	Auto DR	False	True; False
2	Line Frequency	50	50; 60

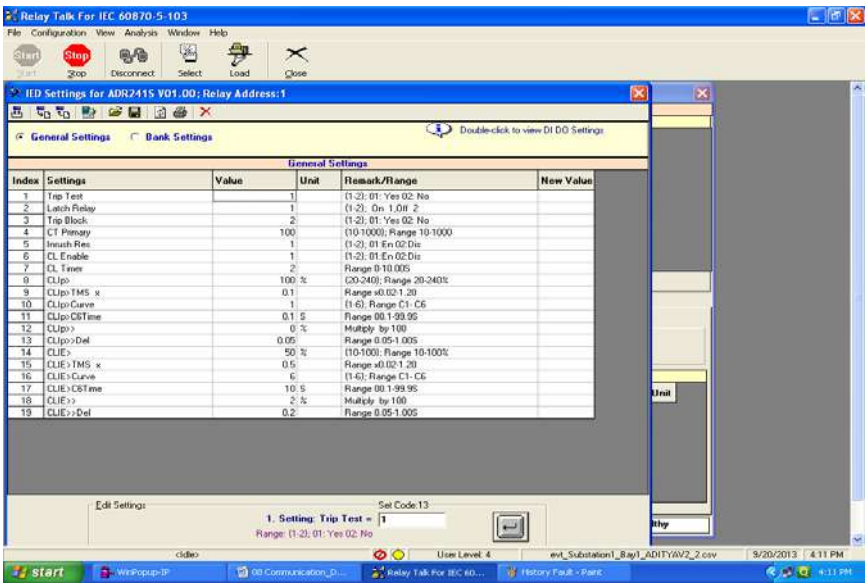
Private Setting

3.3.5 Settings

This window is to view and edit the parameter of the relay. The settings are of two types General Settings and Bank Settings.

3.3.5.1 General Settings

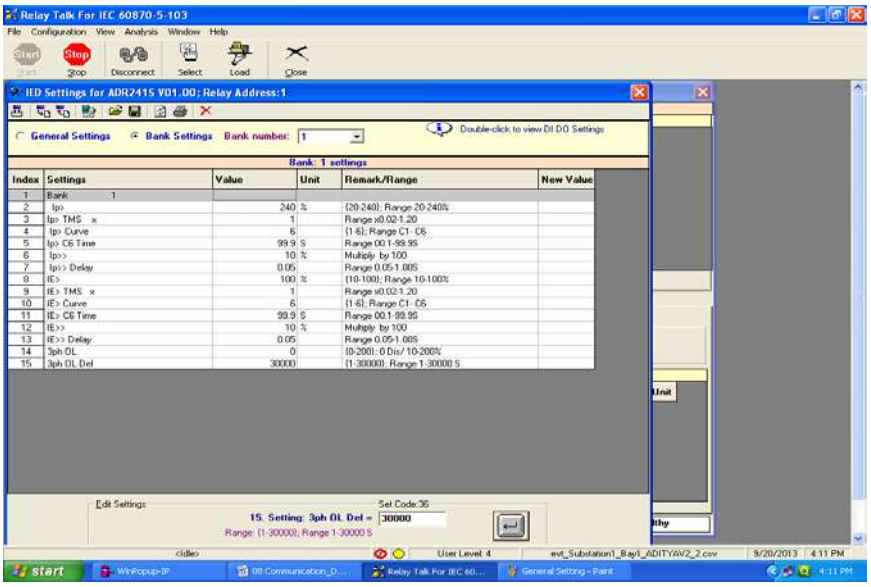
This window is to view and edit the parameters in general settings of the relay



General Setting

3.3.5.2 Relay Settings

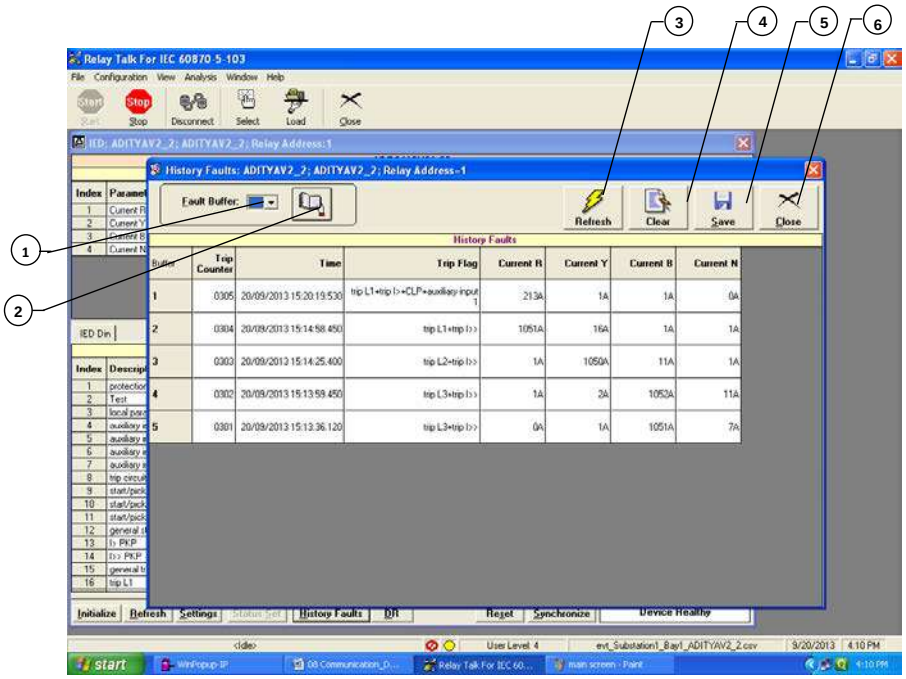
This window is to view and edit the parameters in Bank settings of the relay.



Relay Setting

3.3.6 History Fault

When the History fault selected, the following window displayed



History Fault

The windows/Buttons functions are as follows

Sr. No	Name	Description
1	Fault Buffer	To view the fault buffer number
2	Read Fault	To read the fault selected in the fault buffer
3	Refresh	To refresh all windows and parameters
4	Clear	To clear the screen
5	Save	To save the fault data in history fault
6	Close	To close the History fault window

4 PROTECTION LOGIC

4.1 Neutral Displacement Voltage (50N/51N)

ADR112E relay provides Neutral displacement voltage protection with Definite Time Delay. The ADR112E sense the input voltage (Open Delta) from line PT.

The NDV protection provides two independent stages Alarm and Trip with difinite Time delay.

The voltage can be set from 5% to 55% in step of 5%. The Definite Time Delay range from 0 – 99.9 Sec in step of 0.1sec.

4.2 On Line Testing

The ADR112E relay is provided with online testing facility. By pressing TEST key (provided on front panel) the relay immediately provides trip command. This trip command also gets extended to circuit breaker, thus entire trip operation from relay to circuit breaker can be checked. This trip command is recorded as “T” flag on LCD display.

If the CB (circuit breaker) operation is un-desirable then, pressing BYPASS key, the relay trip command can be blocked from extending to CB coil.

5 SETTING SHEET

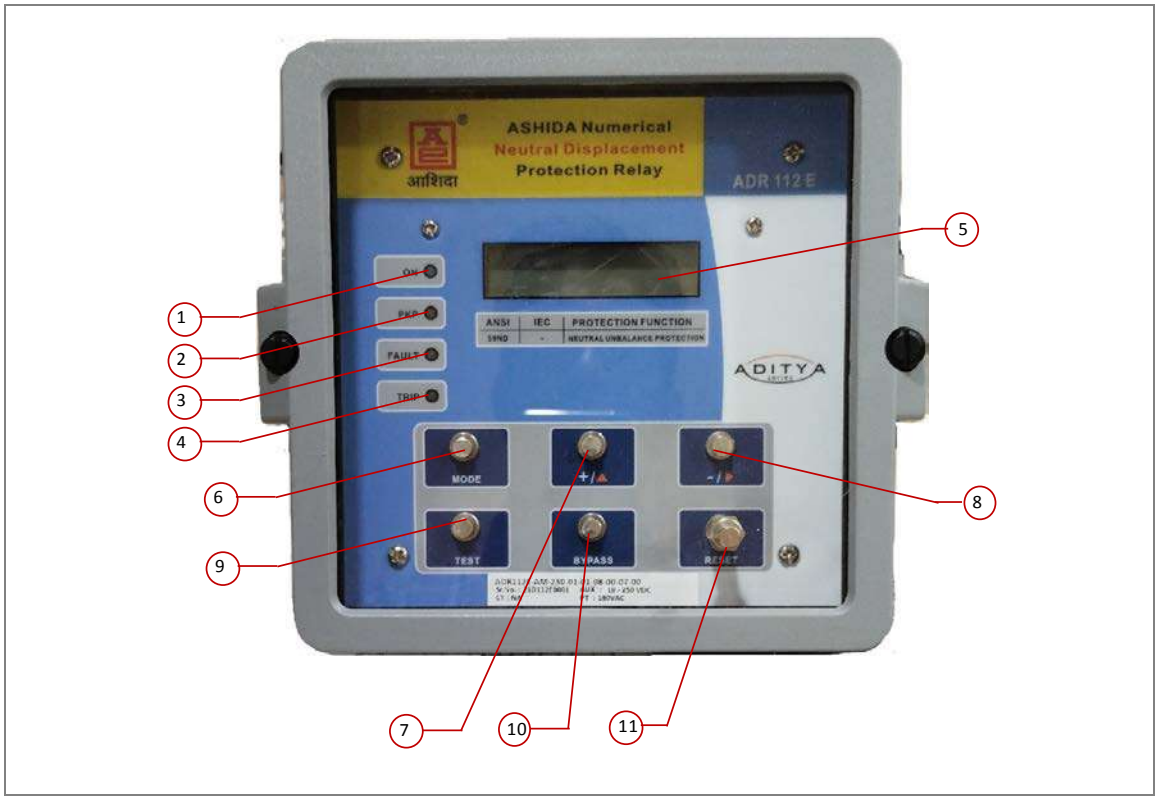
All the relay parameters can be customized using RTV2 Software and HMI as per the functional requirements. The function wise parameter settings are described in the following sections.

5.1 Relay settings

Sr. No	Parameter	Setting / Ranges
1.	Password	000 to 999
2.	New Password	000 to 999 in steps of 1
3.	Unit ID	001 to 250 in steps of 1
4.	Alarm OV%	5% to 55% in steps of 5%
5.	Alarm Delay	0 to 99.9 s in steps of 0.1s
6.	Trip OV%	5% to 55% in steps of 5%
7.	Trip Delay	0 to 99.9 s in steps of 0.1s
8.	Trip Test	Yes / No
9.	Ann. Cont.	SR / HR

6 USER GUIDE

6.1 Front Panel and Control



Front panel

Sr. No	Legend	Function
1.	ON	GREEN LED – Power '**ON**' indicator.
2.	PKP	RED LED – Relay '**PKP** Indication, switched ON when relay is picked up on protection functions
3.	FAULT	RED LED – Relay '**FAULT**' Indicator, switched ON when relay is tripped on protection functions. This will remain ON even though FAULT is cleared and it is manual/hand reset (HR).
4.	TRIP	GREEN LED – Relay '**TRIP**' indicator (SR) Type.
5.	LCD Display	To observe settings and parameters of the relay.
6.	MODE	Feather Touch Key to 'ENTER' in settings to Edit.
7.	+ / ▲	Feather Touch Key [+] Plus to 'INCREMENT' the values & [▲] to SCROLL the Main Menu.
8.	- / ▶	Feather Touch Key [**-**] Minus to 'DECREMENT' the values & [▶] to View Settings
9.	TEST	Feather Touch Key **'TEST'** for online Testing.

10.	BYPASS	Feather Touch Key **'BYPASS'** for Bypassing Trip command.
11.	RESET	Feather Touch Key '**RESET'** for Reset the Hardware of relay.

6.2 USER INTERFACE

6.2.1 LCD Display

16 x 2 LCD with back-lit is used as humans machine interface (HMI) for the followings:

- Display of relay type and Unit ID
- Display of software version
- Display of menu driven Protection Settings
- Display of online measurement of parameters
- Display of fault data

6.2.2 Touch Keys

The function of relay is controlled by the following keys provided on the Front Plate:

- RESET: The RESET key is used to reset the hardware of relay.
- TEST: The 'TEST' key is used for online testing.
- BYPASS: The 'BYPASS' key is use for bypassing the TRIP command.
- MODE: The MODE Key is used to Save Settings.
- (+ / ▲) Plus / Up Arrow: (+) Plus is used to increment the setting value. The (▲) Up arrow is used to scroll the menu.
- (- / ▶) Minus / Right Arrow: (-) Minus is used to decrement the setting value. The (▶) Right Arrow is used to scroll the menu and to reset the LED & Contacts.

Note: At the time of setting if changes are not carried within 100s then the display will reset itself and return to the main menu.

6.2.3 LEDs

The ADR112E Relay is having total 4 LED of high intensity for easy identification of type of fault for easy user interface.

Sr. No.	Legend	Description
1	ON	GREEN LED – Power '**ON**' indicator.
2	PKP	RED LED – Relay '**PKP** Indication, switched ON when relay is picked up on protection functions
3	FAULT	RED LED – Relay '**FAULT**' Indicator, switched ON when relay is tripped on protection functions. This will remain ON even though FAULT is cleared and it is manual/hand reset (HR).
4	TRIP	GREEN LED – Relay '**TRIP**' indicator (SR) Type.

6.2.4 Communication Ports (Available in ADR212E)

1. RS232 port is provided at front side. It is used to retrieve Fault Records (last 5 faults); parameterization using Relay Talk software.
2. RS485 (2 wire) port is provided at rear side for SCADA communication.
3. Relay is provided with IEC-60870-5-103 protocol for external communication.

6.2.5 Password

6.2.5.1 Password Entry and changing the password

To enter password in all **ADR112E** refer following steps (User can go to this screen by pressing TEST + RESET Simultaneously

Ashida Neutral **Disp. Vol. Relay**	This is default window showing the relay name
ADR112E V1.01 **Unit ID = 001**	This is default window showing the relay type and unit ID.
Model AM00201 **100% = 190V**	This is default window showing the Model Number and Rated PT Secondary.
Voltage = 000.0V	This is default window showing the actual Secondary Voltage. Press the Right arrow key (▸) to move to the next option.
Measurement	This window is showing Main Menu. Press the Plus / Up arrow key (+ / ▴) to move to the next option.
Relay Settings	Password protected window for “Relay Setting” for setting New Password, Unit ID, Alarm OV%, Alarm Delay, Trip OV%, Trip Delay, Trip Test and Ann Cont. Press the MODE push button to move to the next option.

Password = 000 **Use Inr/Dec**	To Enter the previously set Password By using the plus / up arrow key (+ / ▲) or the minus / down arrow key (- / ▶) a given value can be set for each of the digits. The range is from 0 to 099. Press the left arrow key (◀) to move to the next option. Note: Default password setting is '000' The set Password will remain common for all the settings. Press the MODE push button to move to the next option.
Password = 000 **New Password**	To Change Password (New Password) By using the plus / up arrow key (+ / ▲) or the minus / down arrow key (- / ▶) a given value can be set for each of the digits. The range is from 0 to 099. Press the MODE push button to move to the next option.
Unit ID = 001	Press the MODE push button to move to the next option. Note : Continue to Press the MODE push button till the relay displays this option.
Save Settings? **Mode for Save**	Press the MODE push button. The Relay will save the Settings. The 'OK' window will appear for a moment and the control will automatically return to Main Menu.
OK	
→ Relay Settings ←	

6.2.5.2 Clear Password & Fault Memory

There are unlinking event when user forgets the password, in such case password can be cleared by pressing following sequences.

Voltage = 000.0V	This is default window showing the actual Secondary voltage. 1. Press 'RESET' + 'TEST' and MODE Push Buttons this will initialize relay hardware. 2. Release 'RESET' + 'TEST' and keeping the MODE pressed till the following message is display. This will Reset password to '0' (Zero).
Ashida Neutral **Disp. Vol. Relay**	This is default window showing the relay name
ADR112E V1.01 **Unit ID = 001**	This is default window showing the relay type and unit ID.
Model AM00201 **100% = 190V**	This is default window showing the Model Number and Rated PT Secondary.
Password & Fault **Memory clear**	This window shows Password & Fault Memory clear.
Voltage = 000.0V	This is default window showing the actual Secondary Voltage.

6.3 MENUS

6.3.1 Default Display

After **Power ON** or when the RESET key is pressed; the relay will display the following message.

Ashida Neutral **Disp. Vol. Relay**	This window will flash momentarily showing the following Relay Name: Ashida Numerical UV/OV Protection Relay Then the control will go automatically to next window.
ADR112E V1.01 **Unit ID = 001**	This window will flash momentarily showing the following Relay Type: ADR112E, Software Version: V2.01 Unit ID = 0001
Model AM00201 **100% = 190V**	This is default window showing the Model Number and Rated PT Secondary.
Voltage = 000.0V	This window shows the actual Secondary Voltage. Press the Right arrow key (▸) to move to the Main Menu.
MEASUREMENTS	

6.3.2 Main Menu List

Voltage = 000.0V	This is default window showing the actual Secondary Voltage. Press the Right arrow (▸) Push Button to move to the next option.
Measurement **Relay setting** **Fault 1** **Fault 2** **Fault 3** **Fault 4** **Fault 5**	Measurement, Relay setting, Fault 1, Fault 2, Fault 3, Fault 4, and Fault 5 these are the **Main Menus** available in this relay. Since the LCD Display consist only of 2 Lines, the Main Menu list can be scrolled up by using the Plus / up arrow (**+ /** ▲) Push Button.

6.3.3 Main Menu Details

Measurement	This is default window showing the actual Secondary Voltage. Press the Plus / up arrow (**+ / ▲**) Push Button to move to the next option.
Relay Settings	Password protected window for **"Relay Settings"** for setting New Password, Unit ID, Alarm OV%, Alarm Delay, Trip OV%, Trip Delay, Trip Test and Ann Cont. Press the Plus / up arrow (**+ / ▲**) Push Button to move to the next option.
Fault 1	This menu is to view the **latest Fault** data stored by the relay. That is Trip Flags, Fault Voltage, and Trip Counter (TC) Press the Plus / up arrow (**+ / ▲**) Push Button to move to the next option.
Fault 2	This menu is to view the **First latest Fault** data stored by the relay. That is Trip Flags, Fault Voltage, and Trip Counter (TC) Press the Plus / up arrow (**+ / ▲**) Push Button to move to the next option.
Fault 3	This menu is to view the **second latest Fault** data stored by the relay. That is Trip Flags, Fault Voltage, and Trip Counter (TC) Press the Plus / up arrow (**+ / ▲**) Push Button to move to the next option.
Fault 4	This menu is to view the **third latest Fault** data stored by the relay. That is Trip Flags, Fault Voltage, and Trip Counter (TC) Press the Plus / up arrow (**+ / ▲**) Push Button to move to the next option.

Fault 5	This menu is to view the **fourth latest Fault** data stored by the relay. That is Trip Flags, Fault Voltage, and Trip Counter (TC) Press the Plus / up arrow (**+ / ▲**) Push Button to move to the next option.
Measurement	

6.3.4 MEASUREMENT

6.3.4.1 To View – MEASUREMENT

Measurement	This menu is to view the actual Secondary Voltage Load. Press the right arrow (▸) Push button to move to the next option.
Voltage = 000.0V	This window will show actual Secondary Voltage. Press the right arrow (▸) Push Button to move to the Main Menu.
Measurement	

6.3.5 Relay Settings

6.3.5.1 To Set – Relay Settings

Relay Settings	Password protected window for **"Relay Settings"** for setting New Password, Unit ID, Alarm OV%, Alarm Delay, Trip OV%, Trip Delay, Trip Test and Ann Cont. Press the MODE Push Button to move to the next option.

Password = 0000 **Use Inr/Dec**	Enter the previously set password, by using the plus / up arrow (+ /▲) or the minus / Right arrow (- /▶) Push Button. The setting range is 000 to 099. *As per the Enter the Password selection.* ***Note : Default password setting is '000'*** Press the MODE Push Button to move to the next option.
Password = 0000 **New Password**	By using the plus / up arrow (+ /▲) or the minus / Right arrow (- / ▶) Push Button ***New Password*** can be set. The setting range is 000 to 099 in steps of 1. Press the MODE Push Button to move to the next option.
Unit ID = 001	By using the plus / up arrow (+ /▲) or the minus / Right arrow (- /▶) Push Button the desired **Unit ID** address can be set. The unit address can be set from 001 to 255 in steps of 001, which means total 255 devises can be connected to single computer. The 250TH address is reserved for special command. These settings are required to communicate with the SCADA computer. Press the MODE Push Button to move to the next option.
Alarm OV% = 055 **Range 5 – 55%**	By using the plus / up arrow (+ /▲) or the minus / Right arrow (- / ▶) Push Button the desired **Alarm OV%** can be set. The setting range is from 5% to 55% in steps of 5%. Press the Mode Push Button to move to the next option.
Alarm Delay = 00.0 **Range Ins – 99.9s**	By using the plus / up arrow (+ /▲) or the minus / Right arrow (- / ▶) Push Button the desired **Alarm Delay** can be set. The setting range is from Inst. to 99.9S in steps of 0.1s Press the MODE Push Button to move to the next option.
Trip OV% = 055 **Range 5 – 55%**	By using the plus / up arrow (+ /▲) or the minus / Right arrow (- / ▶) Push Button the desired **Trip OV%** can be set. The setting range is from 5% to 55% in steps of 5%.

	Press the Mode Push Button to move to the next option.
Trip Delay = 00.0 **Range Ins – 99.9s**	By using the plus / up arrow (+ **/▲**) or the minus / Right arrow (- **/ ▶**) Push Button the desired **Trip Delay** can be set. The setting range is from Inst. to 99.9S in steps of 0.1s Press the MODE Push Button to move to the next option.
Trip Test = 001 **01: Yes 02: No**	By using the plus / up arrow (+ **/▲**) or the minus / Right arrow (- **/ ▶**) Push Button the desired **Trip Test** can be set. i.e. 01: Yes / 02: No Press the MODE Push Button to move to the next option.
Ann. Cont. = SR **SR = 1 / HR = 2**	By using the plus / up arrow (+ **/▲**) or the minus / Right arrow (- **/ ▶**) Push Button the desired ***Ann. Cont.*** can be selected i.e. 01 : SR / 02: HR. Press the MODE Push Button to move to the next option.
Save Setting? **Mode For Save**	To **Save** any changes. Press the MODE Push Button the relay will save the changes and the following message is display. ***Note:*** *If changes made are* ***not to be saved*** *press RESET or leave key pad untouched for 100 sec.*
OK	This window will flash for moment The control will return to the Main Menu.
Relay Settings	

6.3.5.2 To View – Relay Settings

Relay Settings	Press the right arrow key (▸) to view the Relay Settings.
Unit ID = 001	This window will show **Unit Id** setting done previously. Press the right arrow key (▸) to move to the next option.
Alarm OV% = 055% **Alarm Delay = 00.0**	This window will show **Alarm OV** and **Alarm Delay** setting done previously. Press the right arrow key (▸) to move to the next option.
Trip OV% = 055% **Trip Delay = 00.0**	This window will show **Trip OV** and **Trip Delay** setting done previously. Press the right arrow key (▸) to move to the next option.
Trip Test = Yes **Ann. Cont. = SR**	This window will show **Trip Test** and **Ann. Contact** setting done previously. Press the right arrow key (▸) to move to the next option.
Relay Settings	

6.3.6 Faults

6.3.6.1 To View – Faults

Fault 1	This window shows the **Fault 1** Press the right arrow (▸) Push Button to move to the next option.
F : TC : 0001 **V: 000.0 v**	This window shows the type of Fault, Trip counter and voltage magnitude Press the right arrow (▸) Push Button to the Main Menu.

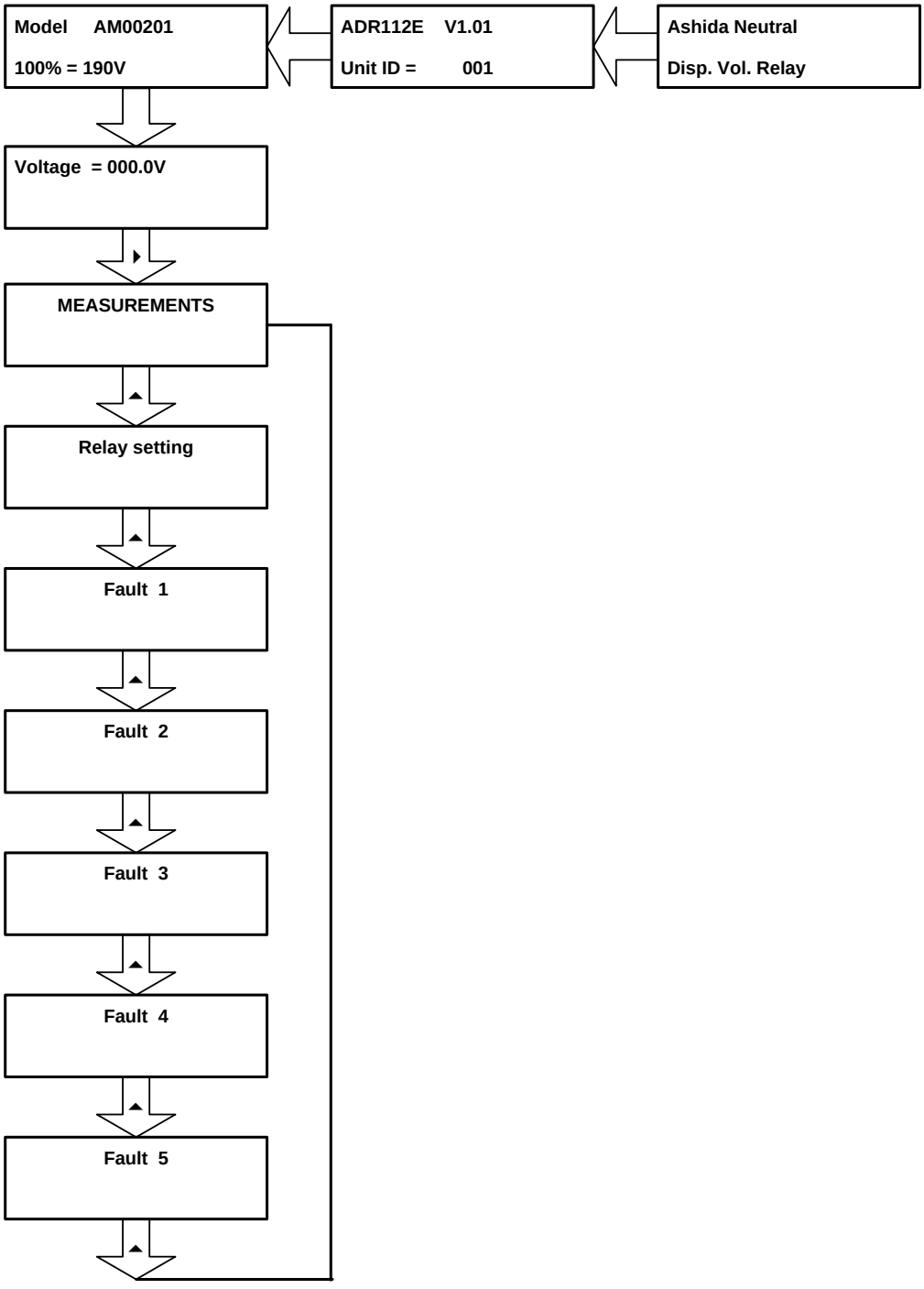
Fault 1	

Display windows for Fault 2 to Fault 5 will be similar to that of Fault 1.

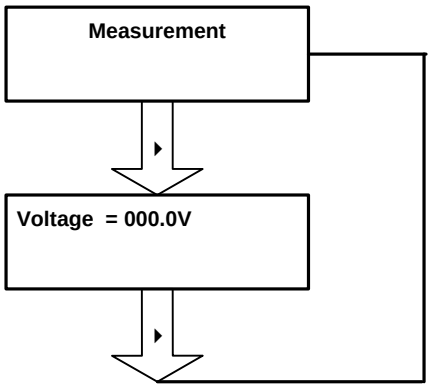
7 FLOW CHART

7.1 Main Menu

After the Power ON or when the relay is reset the following windows will be displayed and the user can scroll the main menu as given below

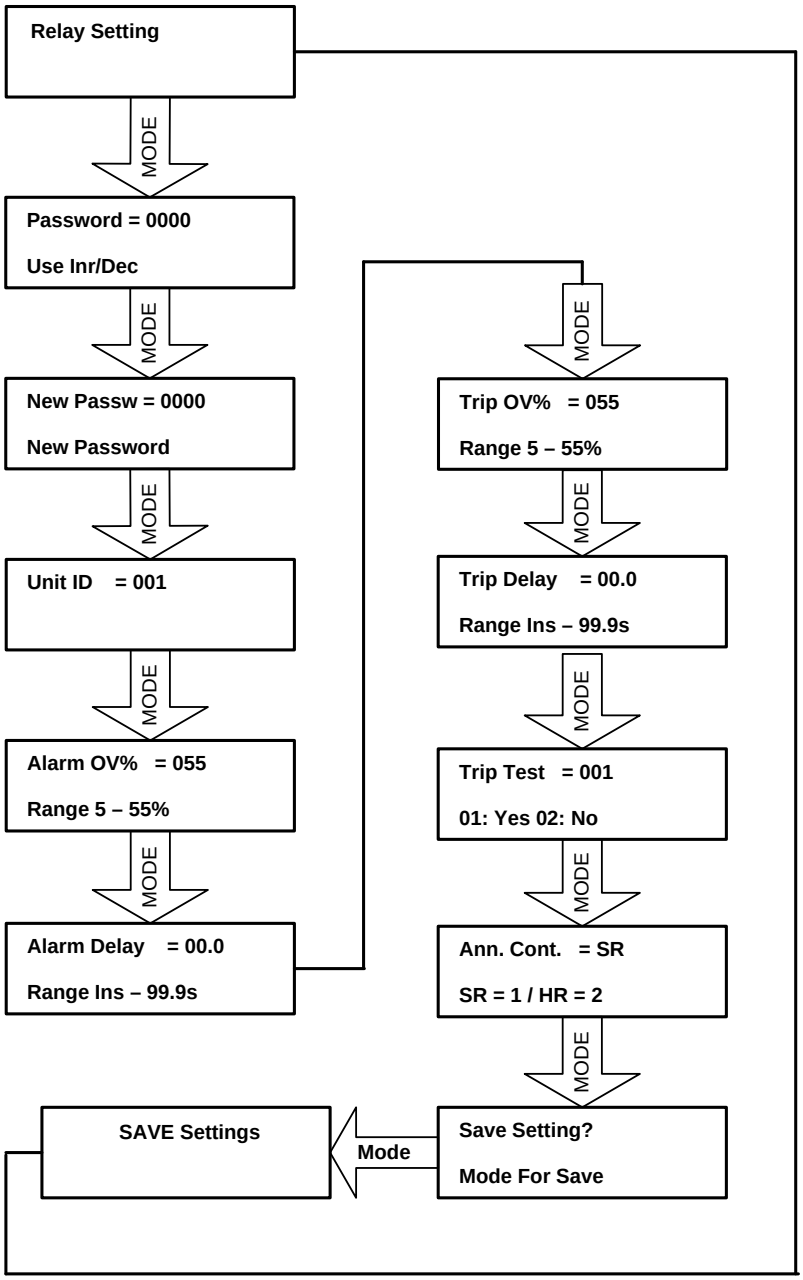


7.2 To View – Measurement.

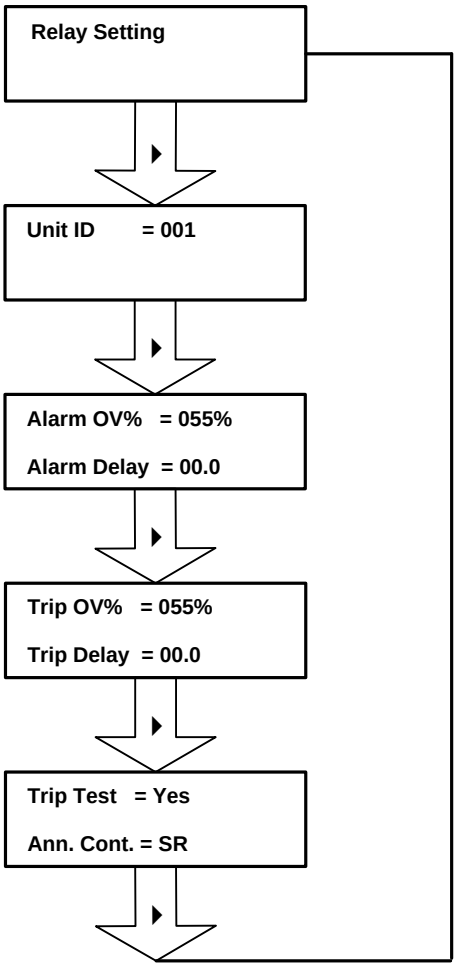


7.3 Relay Settings.

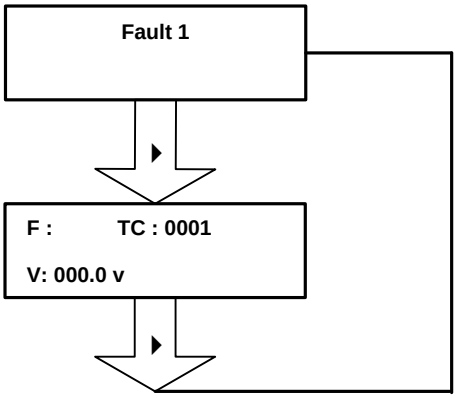
7.3.1 To Set – Relay Settings.



7.3.2 To View – Relay Settings.



7.4 To View – Faults.



8 INSTALLATION, COMMISSIONING & TESTING

8.1 Overview

The first steps in applying the ADR112E Voltage Relay are installing and connecting the relay. This section describes common installation features and requirements.

To install and connect the relay safely and effectively, user must be familiar with relay configuration features and options. User should carefully plan relay placement, cable connections, and relay communication.

This section contains drawings of typical ac and dc connections to the ADR112E. Use these drawings as a starting point for planning your particular relay application.

8.2 Installation Procedure

8.3 Safe Mounting

ADR112E supports flush panel mounting and can be mounted into panels using M5 X 12 screws.

For mounting the relay in to the panel follow this procedure

Loose the M5 x 12 screws and then insert the Relay in to the panel cut-out as show below.

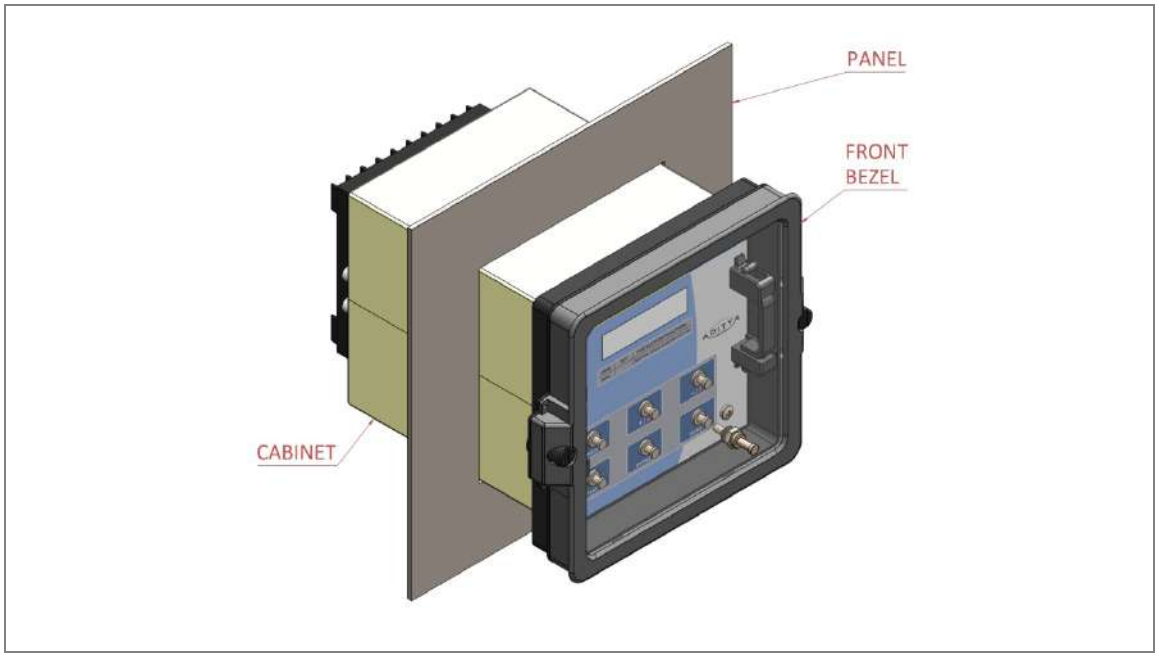


Figure 1: Inserting relay in to the panel cut-out

After inserting the Relay in the Panel, use M5 X 12 Screws to fasten the relay in the Panel as shown below.

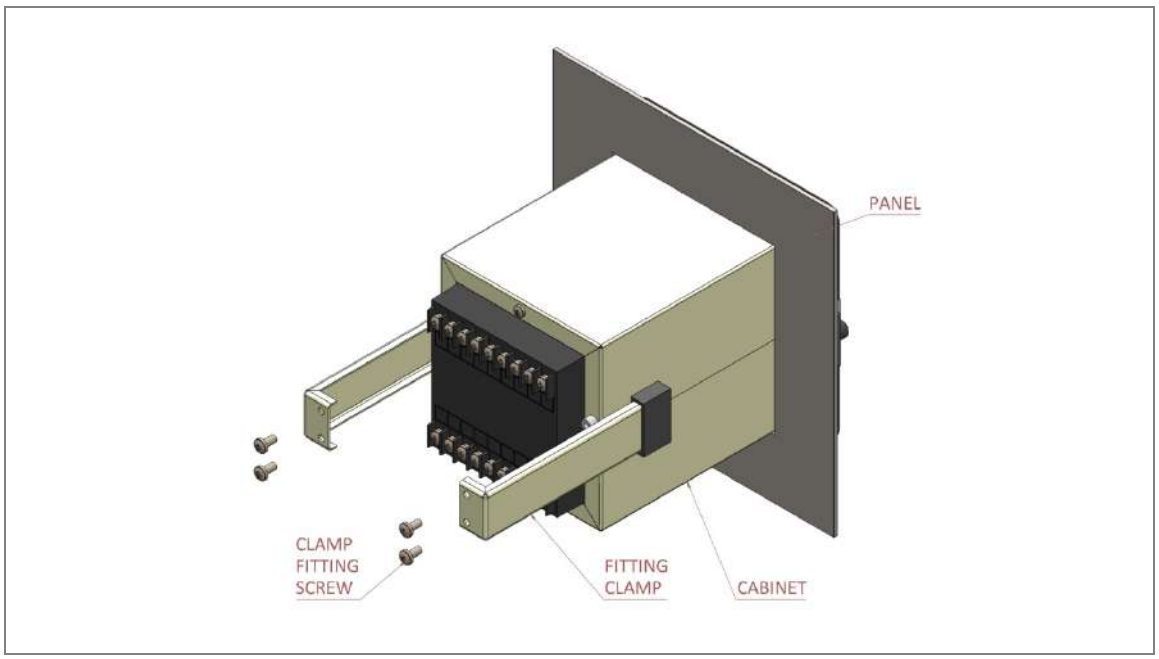


Figure 2: Tightening Fitting clamps

Caution: All screws are to be properly tightened.

The Relay after fastening to the Panel with the help of M5 X 12 Screws is shown below.

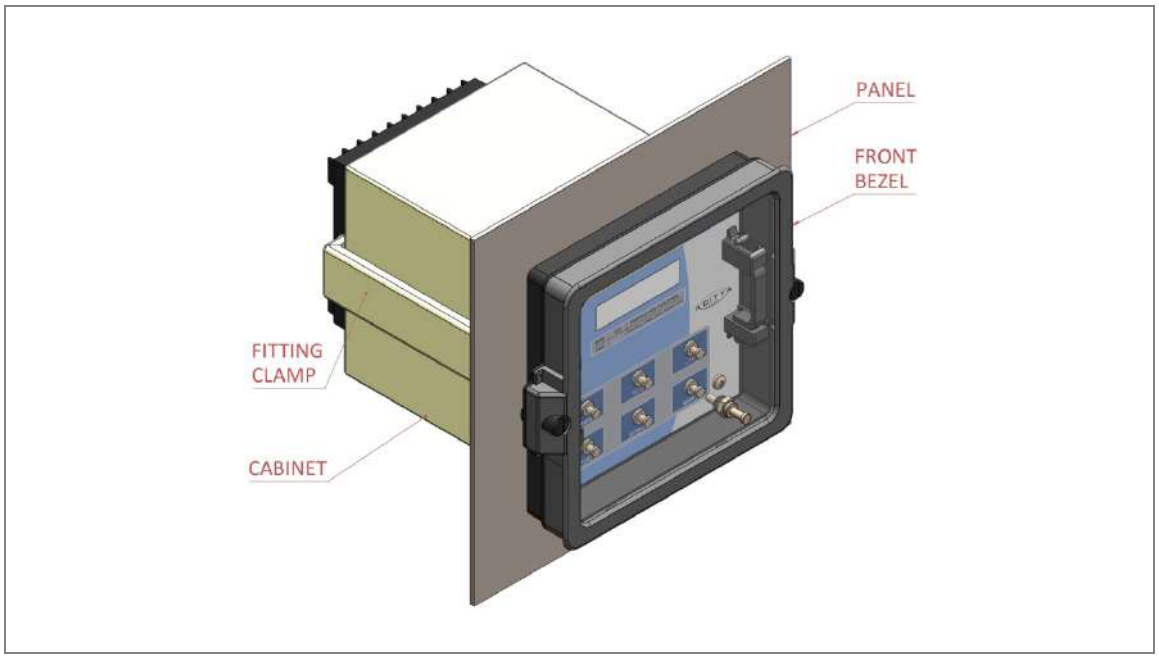


Figure 3: Relay mounted on the panel-front view

8.4 Commissioning Test, Equipment Required

The following tests help user to configure the settings in ADR112E and verify whether the relay is properly working or not.

The tests are conducted to ensure whether the relay settings and logics are correct or not. The procedure can be modified as necessary to conform to standard practices. For initial relay installation this procedure can be used but user can configure the relay according to the required application.

- The ADR112E installed and connected according to your protection design.
- Digital Multimeter True RMS
- Timer with precision 1ms.
- Required Auxiliary supply
- For Calibration and measurement check & Pick up test, time test, logic operation test use Power system Simulator DOBEL make F6150 or any Protective relay ac test source:
- A PC with serial port, terminal emulation software, and serial communications cable with the following software (minimum configuration)
  - For IEC 60870-5-103 communication check: Ashida Relay Talk-V1 software.
  - Ashida Relay Assist software (Electrical Parameter Calculator) to verify
  - Measured value of normal and sequence current.

8.5 Checking of External Circuitry

Connection Tests

Step 1: Remove control ac signals from the ADR112E by opening the appropriate breaker(s) or removing fuses

Step 2: Isolate the relay contact assigned to be the TRIP output

Step 3: Verify correct ac and dc connections by performing point-to-point continuity checks on the associated circuits.

Step 4: Apply ac or dc control voltage to the relay.

Step 5: Use the appropriate serial cable to connect a PC to the relay.

Step 6: Start the PC terminal emulation software and establish communication with the relay.

Step 7: Set the correct relay time and date by using either the front panel or serial port commands

Step 8: Verify the relay ac connections.

Step 9: Connect the ac test source voltage to the appropriate relay terminals. Disconnect the VT secondary from the relay prior to applying test source quantities.

Step 10: Apply rated voltage.

8.6 Check Relay Setting

The relay setting check ensures that all of application specific relay setting for the particular installation have been correctly applied to the relay. Enter all setting manually via the relay front panel interface.

The commissioning of following points:

- Ensure NDV Alarm and Trip setting.
- Ensure DT Delay setting of Alarm and Trip are entered correctly as per required time grading.
- Ensure connection of Trip and Alarm contacts is as per requirement.
- Ensure measure of applied voltage is same as the voltage measure in PT secondary

Final Check

After completion of all relay functionality testing and relay setting check. Remove all tests as temporary shorting leads etc. if it is necessary to disconnect any of the external wiring from the relay in order to perform the wiring verification test. It should be ensured with the PT connection are replaced in accordance with the relevant external connection or schemes diagram. Ensure all fault & contacts have been reset before leaving relay.

If relay ADR112E is a newly installed or the CB has been just maintained the trip counter of Relay should be zero. This counter can be reset by pressing the 'MODE' and 'RESET' key simultaneously.

8.7 Post instillation / Commissioning observation

After successful installation confirm amount of existing voltage. This can be confirmed with Analogue/ Digital voltage meter available on panel with relay primary and secondary voltage measurement window.

8.8 Relay Testing

8.8.1 Relay Calibration & Measurement

Before conducting actual test, confirm relay callibration by following method.

- Connect ADR112E relay to voltage source and timer.
- Following chart shows terminal numbers of connections.

Source Terminal	Relay Terminal	Relay Connection
Binary Output	1 – 2	TRIP
	3 – 4	TRIP
	5 – 6	ALARM
	7 – 8	ALARM

Voltage Source	11 – 12	PT
Auxiliary Supply (+ / -)	17 – 18	Power Supply (+ / -)

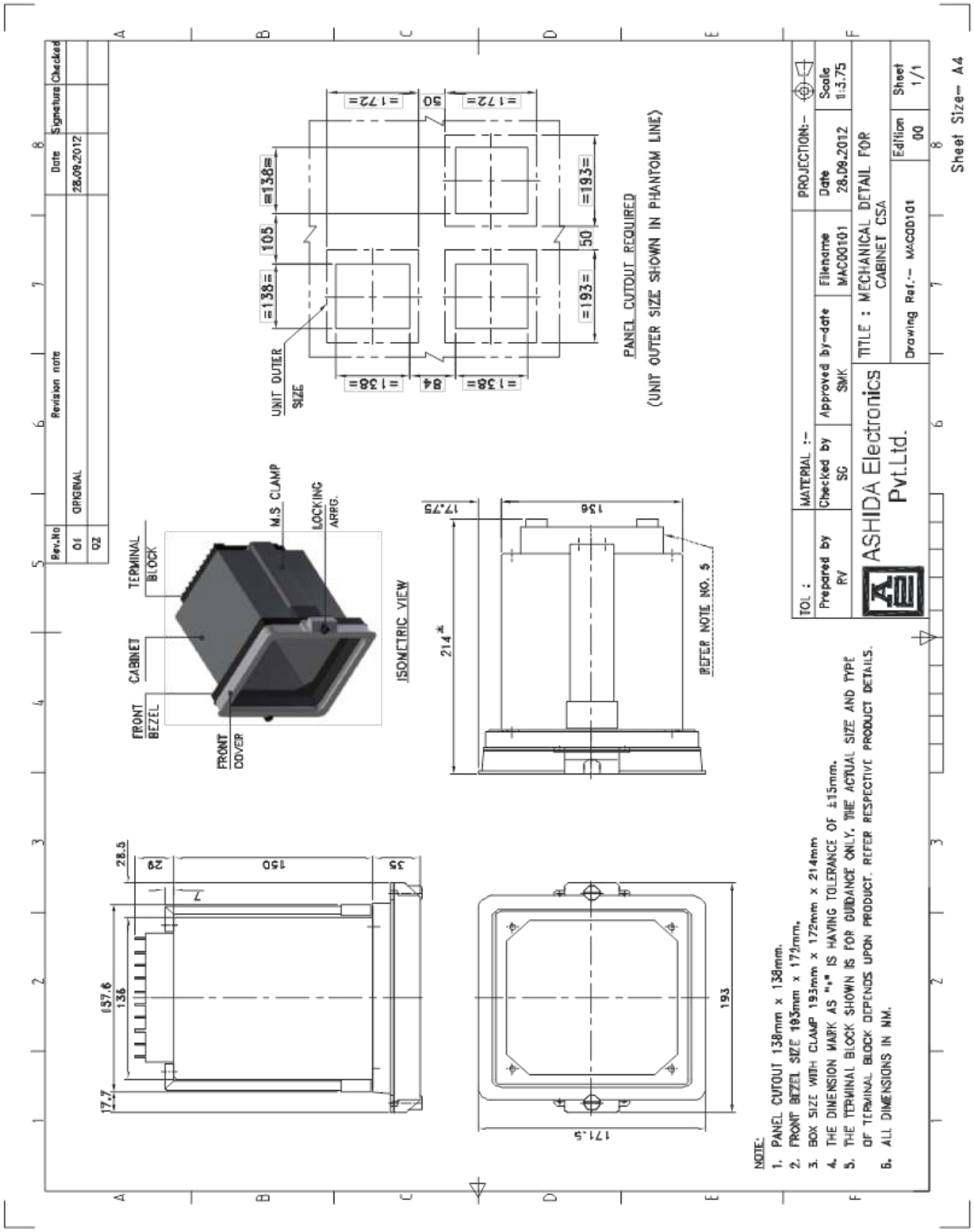
Step1. Connect the PT terminals to voltage injector as per the chart.

Step2. Adjust rated PT voltage (190 V AC). Observe the voltage value from measurement menu. The actual voltage should match with relay display.

8.8.2 Pick up and Trip Test

- Connect voltage source at PT input terminals.
- Set Alarm OV setting value to 30%, DT delay at Minimum (00.0s) value.
- Start voltage injector to & increase voltage value till relay get pick up and trip. The operating value should be within 1 to 1.1 times of set pickup value.
- Set the DT Delay at 1.00s.
- Connect the assigned trip contact to Timer.
- Set and apply 1.2 times voltage of set value and measure the timing on timer.
- The measured timing should be ±5% of actual timing (1.00 Sec).
- Repeat the above procedure to test Trip OV function.

8.9 Case dimensions



Note: *All dimensions in mm.*

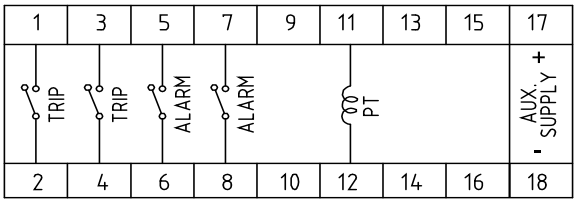
8.10 Back Terminal and Electrical wiring connection diagrams for ADR112E (Non Draw out)

Rev. No	Revision note		Date	Signature	Checked
01	Model Am00202 added		30-10-07		

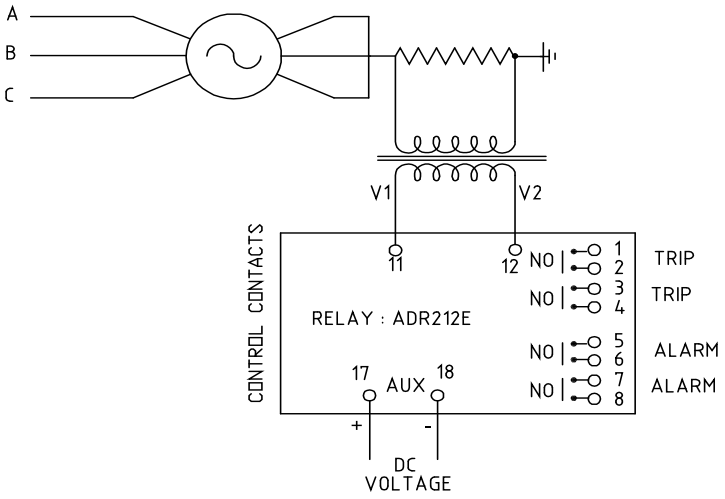
ASHIDA NUMERICAL NEUTRAL DISPLACEMENT RELAY

TYPE : ADR 112E / ADR212E (Model: AM00202)

Terminal Arrangement For
ADR 112E / ADR 212E(Model: AM00201)



TYPICAL APPLICATION CIRCUIT



Note:
1. Typical wiring diagram for guidance only.
2. Follow established standard engineering practices.
3. RS 485 Port for communication in Model ADR 212E only.

Dim : MM TOL :	FINISH:			MATERIAL:	
Perpaed by PD	Checked by SMK	Approved by - date SMK	Filename ACR01503	Date 30.10.07	Scale NTS

ASHIDA Electronics Pvt. Ltd.

TITLE : - Electrical Connection & Back Terminal Arrnagment for ADR112E/ ADR212E(AM00201)

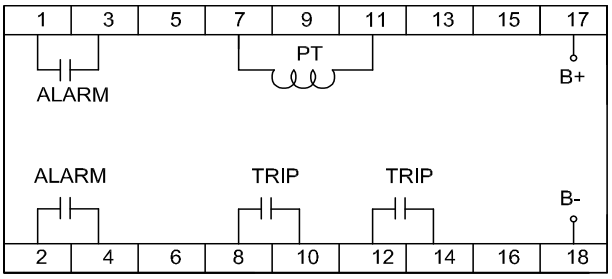
Drawing__ Ref. ACR01503 | Edition 01 | Sheet 1 OF 1

8.11 Back Terminal and Electrical wiring connection diagrams for ADR112E (Draw out)

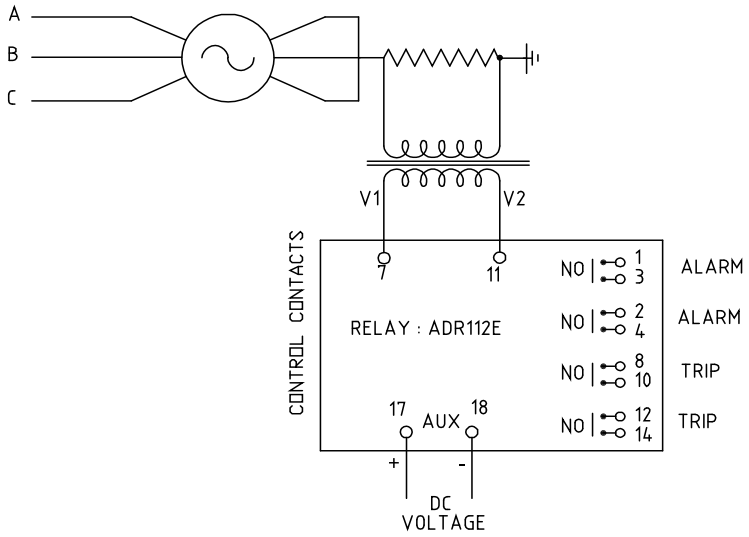
Rev. No	Revision note		Date	Signature	Checked

ASHIDA NUMERICAL NEUTRAL DISPLACEMENT RELAY
TYPE : ADR 112E / ADR212E

Terminal Arrangement For ADR 112E / ADR212E



TYPICAL APPLICATION CIRCUIT



Note:
1. Typical wiring diagram for guidance only.
2. Follow established standard engineering practices.
3. RS 485 Port for communication in Model ADR 212E only.

Dim : MM	TOL :	FINISH:			MATERIAL:	
Perpaed by JD		Checked by SJ	Approved by - date SMK	Filename ACR01505	Date 09.04.2022	Scale NTS

ASHIDA Electronics Pvt. Ltd.

TITLE : - Electrical Connection & Back Terminal Arrnagment for ADR112E / ADR212E

Drawing__ Ref. ACR01505 | Edition 01 | Sheet 1 OF 1

9 REVISION CONTROL SHEET

Rev. No. with Date	Brief description of Revision	Prepared by	Reviewed by	Approved by
R1 09.04.2022	Original Version	Saurabh	-	Suyash

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