

# A21M

## Motor Protection Relay

### Instruction Manual

## Preface

The A21F Feeder Management Relay Instruction Manual describes common aspects of feeder protection application and use of product. It includes the necessary information to safety, install, set, test, and operate the relay functionality. The instruction 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.

## SAFETY AND GENERAL INFORMATION

### 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.

### HEALTHY 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<sup>2</sup> 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 fiber 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.

**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.

**TECHNICAL SPECIFICATIONS FOR SAFETY**

**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

**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.**

**Installation Category**

IEC 60255-27.2005  
Category III  
(Overvoltage Category III)

: At 2 KV, 50Hz 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**



### 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

### CE MARKING



**Directives:**

**Compliance demonstrated by reference to safety standards**

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# Section 1

## Introduction and Specifications

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## 1 INTRODUCTION AND SPECIFICATIONS

### 1.1 Overview

ASHIDA has designed economical & reliable Multifunction A21M Protection & Control System. The simple and compact construction of A2 series, A21M relay provides integrated Protection, Control and Monitoring functions for Electric Motors.

### 1.2 Features

#### Key Protection & Control Functions:

- Two Independent Settings Groups
- Thermal Overload Protection (49)
- Non Directional Phase & Ground Over Current Function (50/51/51N/50N)
- Three Independent Stages for Non Directional Phase Over Current Protection.
- Three Stages of Non Directional Ground Over Current Protection.
- Internally Derived Ground Over Current Protection(3I0>)
- Sensitive Earth Fault Protection (50SEF)
- Inverse Time Over Current Protection (IEC & IEEE curves)
- High Impedance Restricted Earth Fault Protection (64R)
- Inverse & Definite time Negative Sequence Over Current Protection (46)
- Locked rotor Protection (50LR)
- Prolong start Protection (66)
- Too many starts / Number starts function
- Under current Protection (37)
- Breaker Failure detection (50BF)
- Speed switch input
- Emergency start
- Trip circuit supervision function
- Programmable Inputs & Outputs
- Watchdog contact
- CB Close / Trip from HMI
- Programmable & Target LEDs for indication with dual colours (8 nos.)
- Self Supervision of relay
- Metering function
- Disturbance Recording (5 nos.)
- Event Recording (512 nos.)
- Fault Recording on HMI display (5nos.)



- Non-Volatile memory.
- Fully communicable with IEC standard open protocol IEC60870-5-103, MODBUS & DNP3.
- Separate communication port for SCADA Communication
- PC front port communication for convenient relay settings
- User friendly local operation with key pad
- Liquid crystal display (16x2) with backlight
- Password Protection.

**Software Support:**

- Setting Editor
- Programmable scheme logic Editor
- Settings upload / download
- Offline Settings Editor
- Online Measurement
- Disturbance analysis
- Event analysis/Fault History
- Relay Assistant Tool for Testing and Commissioning relay

**Communication ports**

USB port is provided at front side. It is used to retrieve Disturbance Records (last 5 faults); faults waveforms and parameterization using RTV2 Software.

RS485 (2 wire) port is provided at rear side and it is used for SCADA communication & It is also used to retrieve Disturbance Records (last 5 faults); faults waveforms and parameterization using RTV2 Software.

Relay is provided with open protocols like IEC60870-5-103, MODBUS and DNP3 (optional) for external communication.

**Monitoring Functions (Fault, Event, Error, Alarm and Disturbance Record):**

Relay provided with the IEC60870-5-103, MODBUS and DNP3.0 communication protocols (refer ordering option for exact model). For detail of protocol function please refer respective document.

Note:- The IEC-60870-5-103 protocol is available on USB and RS 485 communication ports. But DNP3 and MODBUS protocols is available only through RS 485 communication port. There is no specific setting for any protocol selection.

(Please note MODBUS by design do not support event functionality)

**Fault Record**

After every fault relay latched fault data which can be view for detail analysis following is details of fault data

Capacity	: 5 faults
Time-tag	: 1 millisecond
Triggers	: Any selected protection threshold.
Data	: Fault date and time, Type of fault (stage / Phase etc) Fault current magnitude in secondary, Status Flag, Trip Timing and, trip counter.

**Event Record**

Relay continuously monitors the logical and physical status. There are 6 physical inputs are provided marked as IN1 to IN6. Any change in physical or logical input will be recorded as event. These events are stored in internal non-volatile memory along with time stamp. Apart from this some of the logical events are recorded, such as Relay PKP, Relay Reset, CB Trip, etc. The complete list can be found in protocol document. Up to 512 events can be stored and can be retrieved for detailed analysis. The details of event data recorder are given below.

Capacity	: 512 events
Time-tag	: 1 millisecond
Triggers	: Any selected protection alarm and threshold, Logic input change of State, Self-test events, setting changes etc

**Error Record**

The relay is continuously monitoring the healthiness of hardware, if relay detects any fault / error then the corresponding error message /error code is stored in Maintenance Record.

Following is details of maintenance data

Capacity	: 100 records
Triggers	: Any hardware error
Data	: Error Code and Date & Time

**Alarm Record**

The Alarms generated by protection function or control operation are displayed on LCD screen and stored in Alarm Record. This alarm is remaining display on LCD screen till the user acknowledged by TARGET RESET key.

### **Disturbance Record**

Apart from Event record Relay also record actual waveform of current along with all digital and logical status during fault condition. Up to 5 waveforms can be recorded; the duration of disturbance record is 1sec. The disturbance record can be trigger from trip operation of relay. The pre fault duration is programmable from 10% to 90%. This waveform can be downloaded through communication port for further analysis.

#### **Following is details of event data**

Capacity	: 5 records of 800 samples each
Sampling Range	: 16 samples / cycles
Triggers	: Trip signal or Assigned DI
Data	: 5 Analogue channel and 37 digital channels

### **Start up current Record:**

During the motor start, A21M Relay records the actual waveform of RMS current for every 200 seconds.

Capacity	: 1 records for 200 sec
Sampling Range	: 1sample each 5 frequency cycles
Data:	Current true RMS value, maximum value of one of the 3 phase currents

### **Clear Record**

The record data stored in Event Record, Fault Record, Error Record and Disturbance Record can be clear by enabling the respective settings in Clear Record setting. The Thermal State can be reset by enabling the Thermal Reset setting.

### **LCD Display**

- 16x2 LCD with back lit is used as humans machine interface (HMI) for the followings:
- Display of relay type, ID and serial number
- Display of current software version
- Display of menu driven Protection Settings
- Display of online measurement of parameters
- Display of Date & Time.
- Display of current status of all inputs.
- Display of current status of all outputs.
- Display of fault data
- Display of Error Log for hardware and software faults

**Display of fault data:**

In case of fault condition, the type of the fault and fault current are displayed on LCD. The relay measures the fault current and stores it in non-volatile memory.

The relay records and displays the last 5 faults with following attributes

- Trip counter
- Trip Flag and Status Flag
- Trip Time and Date time
- The faulty phase/ phases
- The protection function on which relay is tripped
- The magnitude on which relay is tripped
- The phase wise current and earth current

**Self Diagnostic Features (Error code):**

The relay continuously monitors the healthiness of hardware and detects the hardware fault/error; in case of failure of hardware the corresponding error message/error code will be displayed on LCD and it will add this error into maintenance record menu in REPORTING with time stamping.

**Error Description:**

- The IED performs continuous periodic self diagnostic procedure at every one minute for checking of all errors EXCLUDING SETTING ERROR.
- If the error is cleared during self diagnostic procedure corresponding error bit will be cleared.
- For Setting Error and ADC Error IED goes in OUT OF SERVICE mode (Protection will be blocked) and the ON LED on the front facia of the IED will be continuously blinked with 1 sec interval.
- If more than, one error bits are set then the separate record is saved for each error.

**Watchdog Feature:**

The relays continuously monitor the healthiness of hardware and detect the hardware fault/error, if any. As soon as an internal fault is detected, an ENABLED LED is change from green to red and contact assign to Protready Error will operate.

The contact is assigned to Protready should remain active state when the relay is in Healthy condition, i.e. NO contact will be short and NC contact will be open.

The contact is assigned to Protready will become inactive state if any error is detected / Failure of Auxiliary Supply, i.e. NO contact will be open and NC contact will short.

There are 6 nos. of programmable Trip duty Digital Output having changeover contacts marked as OUT1 to OUT6. Any Digital output can be assigned as watchdog contact (Protready) through AProLogic configuration setting.

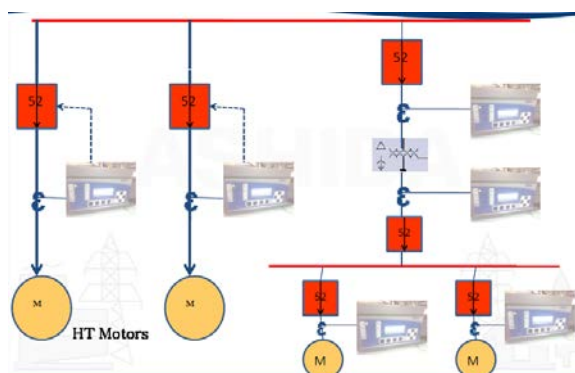
**Model and Options**

Ordering Information												
	1--4	5	6	7	8	9	10	11	12	13	14	15
Model	A21M	X	X	X	X	X	X	X	X	X	X	X
Example	A21M	B	0	0	1	0	0	0	1	2	1	A
Cabinet Details												
Basic Version	B											
Software Details												
Standard	0											
Customer Specific	C											
Language												
English	0											
Protocol												
IEC 103	0											
IEC 103 & MODBUS	1											
IEC 103 & DNP.3	2											
Customize	C											
CT & PT												
PH & EF CT: 1/5 Amp Selectable ( Standard EF CT)	0											
PH & EF CT: 1/5 Amp Selectable ( Sensitive EF CT)	1											
DO												
Default - (B - 6DO)	0											
DI												
Default - (B - 6DI)	0											
DI Setting												
18VDC / 16VAC	0											
35VDC / 33VAC	1											
77VDC / 75VAC	2											
154VDC / 152VAC	3											
Auxiliary Supply												
24VDC - 48VDC	1											
24 - 230 VAC/DC	2											
110VDC - 250VDC	3											
COSTOMER SPECIFIC	C											
Case Detail												
Non Draw out	1											
<b>Communication Port</b>												
Disable / NO rear port	0											
RS 422 rear port	A											
RS 485 rear port	B											

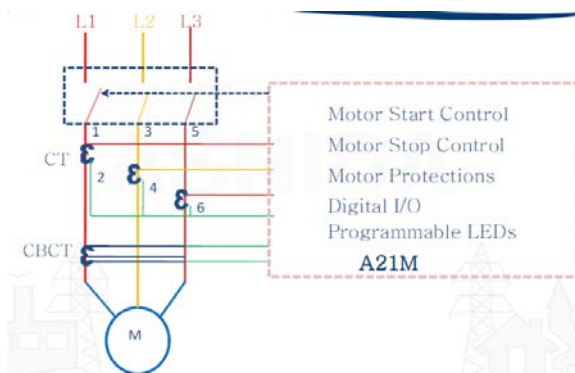
Relay is provided with open protocols like IEC60870-5-103, MODBUS and DNP3 (optional) for external communication.

**Applications:**

A21M numerical multifunction relay designed for electric motor protection applications. Relay designed with fast and selective tripping ensures the stability and availability of electrical power system. A21M relay apply for protection, control & monitoring of radial and ring main feeder to achieve sensitivity and selectivity on phase & ground faults as well as on abnormal conditions.



**Motor Protection application**



**Motor Protection application**

### 1.3 TECHNICAL SPECIFICATIONS

Current Input:		
I.	CT secondary	: 1 / 5 Amp. (Selectable)
II.	Nominal Burden at In (without tripping condition)	: < 0.20 VA at rated current (In)
III.	Thermal Withstand Capacity	: 100 x rated current (In) for 1sec : 50 x rated current (In) for 3sec : 4 x rated current (In) continuous for Phase and EF CT : 2 x rated current (In) continuous for SEF CT
IV.	Measurement Linearity Range for Non – Offset AC Current	: For OC 0.05 – 40 In : For EF 0.05 – 40 In : For SEF 0.002 – 4.000 In
V.	Measurement Accuracy	: Typical $\pm$ 2% at In for Phase and EF
VI.	Nominal Frequency Range For Current Inputs	: 50/60 Hz (Selectable in P253 Menu)
VII.	Frequency measurement range	: 45 Hz – 65 Hz

Auxiliary Supply Input:		
I.	Nominal operating range	: 24 – 230V AC (50Hz / 60Hz) or : 24 – 230V DC
II.	Voltage operating range	: 80% of lower nominal range and 120% of upper nominal range (For DC Supply) : 80% of lower nominal range and 110% of upper nominal range (For AC Supply)
III.	Nominal Burden on 24 – 230V Auxiliary Power Supply	24-230VAC < 9 VA without status energize < 12 VA with all status & output energies
		24-230 VDC < 3 W without status energize < 4.5 W with all status & output energies
IV.	Tolerable AC ripple	: Up to 15% of highest dc supply, As per IEC 60255-26: 2013
V.	Relay power up time	: < 2.50 Sec

Opto Isolated Input:					
I.	Opto Isolated input operating Range	: 24 – 230 VAC or : 24 – 230 VDC			
II.	Threshold setting	Threshold -1 (24-230 V DC/AC)	Threshold -2 (48/60 V DC/AC)	Threshold -3 (110 V DC/AC)	Threshold -4 (230 V DC/ 230 V AC)

	Threshold Voltage for DC	18V +/- 3volts	35V +/- 3volts	77V +/- 3volts	154V +/- 3volts
	Threshold Voltage for AC	16V +/- 3volts	33V +/- 3volts	75V +/- 3volts	152V +/- 3volts
	Maximum operating voltage range (RMS Voltage)	276 VAC or 276 VDC	276 VAC or 276 VDC	276 VAC or 276 VDC	276 VAC or 276 VDC
III.	Drop out	Within 85% of threshold voltage value			
IV.	VA Burden of Opto Isolated Status Input	: For each status < 1.5 Watt / VA			
V.	Filtering Time	: < 40ms			
VI.	Logic input recognition time	: For all Status filtering time + 5ms ± 5 ms			

<b>Output contact:</b>			
I.	Contact	Continuous	Continuous 5A/250Vac
		Make & carry	Make & carry: 30Amp for 3sec AC /DC
		Short time withstand	Carry : 50Amp for 1sec AC /DC
		Breaking capacity	AC- 1250VA max. 5A or 250V(PF 0.4)
			DC- 100W Resistive max. 5A or 300V
			50 Watt Inductive (L/R 45ms) max. 5A or 300V
		Operating Time	<10msec
Minimum no. of operations	10,000 operation loaded condition & unloaded 100,000 operations		

<b>Accuracy of protection function:</b>			
I.	<b>Phase Over current:</b>		
	For operating Value	Pick-up	Setting ±5%
		Minimum Trip Level of IDMT	1.05 x Setting ±5%
		Drop –off	0.95 x Setting ±5%
	For operating Time	IDMT Characteristic shape	As per class5 of 60255-151 cl.5.2** Note 2 or 50ms whichever is greater
		DT Operation	±5% or 55ms whichever is greater* Note 1
	For Reset Time	DT	Set delay ±7.5% or 55ms whichever is greater
IDMT (only for IEEE & US		Calculated time ±10%	



		curve)	
II.	<b>Ground OC: (standard CT / SEF CT)</b>		
	For operating Value	Pick-up	Setting $\pm 5\%$
		Minimum Trip Level of IDMT	1.05 x Setting $\pm 5\%$
		Drop –off	0.95 x Setting $\pm 5\%$
	For operating Time	IDMT Characteristic shape	As per class5 of 60255-151 cl.5.2** Note 2 or 50ms whichever is greater
		DT Operation	$\pm 5\%$ or 55ms whichever is greater * Note 1
	For Reset Time	DT	Set delay $\pm 7.5\%$ or 55ms whichever is greater
IDMT (only for IEEE & US curve)		Calculated time $\pm 10\%$	
III.	<b>Residual OC:</b>		
	For operating Value	Pick-up	Setting $\pm 5\%$
		Minimum Trip Level of IDMT	1.05 x Setting $\pm 5\%$
		Drop –off	0.95 x Setting $\pm 5\%$
	For operating Time	IDMT Characteristic shape	As per class5 of 60255-151 cl.5.2** Note 2 or 50ms whichever is greater
		DT Operation	$\pm 5\%$ or 55ms whichever is greater * Note 1
	For Reset Time	DT	Set delay $\pm 7.5\%$ or 55ms whichever is greater
IDMT (only for IEEE & US curve)		Calculated time $\pm 10\%$	
IV.	<b>NPS Overcurrent:</b>		
	For operating Value	Pick-up	Setting $\pm 5\%$
		Minimum Trip Level of IDMT	1.05 x Setting $\pm 5\%$
		Drop –off	0.95 x Setting $\pm 5\%$
	For operating Time	IDMT Characteristic shape	As per class5 of 60255-151 cl.5.2** Note 2 or 50ms whichever is greater
		DT Operation	$\pm 5\%$ or 55ms whichever is greater * Note 1
	For Reset Time	DT	Set delay $\pm 7.5\%$ or 55ms whichever is greater
IDMT (only for IEEE & US curve)		Calculated time $\pm 10\%$	
V.	<b>Inrush Blocking (2nd Harmonic)</b>		
	For operating Value	2ndHrm Threshold	Setting $\pm 15\%$

		I>UB2H	Setting ±15%
VI.	<b>Thermal Overload</b>		
	Thermal Trip / Alarm	Setting Accuracy	Setting ± 7.5% **** Note 4
		Reset value	97% of thermal setting ± 5%
		Operating Time	± 7.50% of calculated time
Thermal Lockout / Cooling time	Cooling Const.Tr Time	± 15% of theoretical time	
VII.	<b>Under Current:</b>		
	For operating Value	Pick-up	0.95 x settings ± 5%
		Drop –off	1.05 x settings ± 5%
	For operating Time	DT Operation	±5% or 55ms whichever is greater
T inhib	Operating Time	±5% or 55ms whichever is greater	
VIII.	<b>50BF (CB Fail)</b>		
	For CBF operation	DT operation time	±5% or 60ms whichever is greater
	For CBF Reset	CBF Reset time	<30ms *** Note 3
CBF Reset current I< / IN1<		Setting ±5%	
IX.	<b>Load JAM:</b>		
	Start Criteria	52A	As per Opto input Threshold setting
		Pick-up for current input	Setting ± 5%
	Prolonged Start / Load JAM/ LOAD JAM START	Pick-up	Setting ±5%
Operating time		±5% or 55ms whichever is greater	
X.	<b>Ith&gt;:set</b>		
	For operating Value	IFL operating Value	Settings ± 5%
XI.	<b>Number of Start :</b>		
	Supervising Time / Time Betwe Start / Inhib. Strt Time	Operating Time	±5% or 55ms whichever is greater

\* Note 1: Reference Condition : Fault current 2 time above set value

\*\* Note 2: As per IEC60255-151 Class 5 (assigned error 5%) the tolerance calculated as below;

Value of characteristic quantity as multiple of setting value (GS)	2N	5N	10N	20N
Limiting error as multiple of an assigned error	2.5	1.5	1	1
Percentage for time accuracy claim	12.5%	7.5%	5%	5%

\*\*\* Note 3: Filtering time (typically 25ms) is added when timer initiate or reset by external Binary input

\*\*\*\* Note 4: Reference Condition : Fault current less than 2 time

<b>Operating condition:</b>		
I.	Relative Humidity	: Humidity (RH) 95% maximum
II.	Operating temperature range	: -25 °C to +65 °C
III.	Storage temperature range	: -25 °C to +70 °C

<b>Terminals specification:</b>		
I.	AC current Input Terminals	M5 Threaded terminals for ring lug connection. Suitable up to 4 mm <sup>2</sup>
II.	Auxiliary & Input/output Terminals	M4 Threaded terminal. Suitable up to 2.5 mm <sup>2</sup>
III.	Note on M4/M5 Terminal Torque	Use torque control screw driver with 1.2 Nm torque maximum
IV.	Rear Communication Terminal	For two wire RS 485 signal levels Suitable up to 2.5 mm <sup>2</sup>

<b>Mechanical &amp; Environmental specification:</b>		
I.	Design	Flush mounting case
II.	Weight	3.00 kg approximate
III.	Pollution Degree	II

<b>Drawing References:</b>			
I.	Drawing References	: For Cabinet Type	- CSE (MAC01946)
		: For Electrical Connection	- APR09202
		: For Back Terminal Details	- APR09102

**1.4 Conformance to Standards:**

Sr. No.	Specification	Particulars
<b>Insulation Test :</b>		
I.	Dielectric Voltage	IEC 60255-27 2kV / 1 minute earth and between independent circuit 1.5kV across tripping Relay contact.
II.	Impulse Voltage	IEC 60255-27 5KV between all terminal and case

III.	Insulation Resistance Test	EN 60255-27: 2005 > 100 MΩ at 500 Vdc.						
V.	Creepage Distances and Clearances	EN 60255-27:2005 Pollution degree : 2 Overvoltage category : III						
<b>EMC Test :</b>								
I.	High Frequency test	IEC 60255-22-1 and IEC60255-26(ed3.0)-2013 2.5 kV Common Mode a) Between Independent Ckt. and case earth. b) Independent circuit. 1 kV Differential Mode a) Independent circuit.						
II.	Electro static Discharge	IEC60255-26(ed3.0)-2013 and EN61000-4-2:2009 Level 3 and Level 4 15kV air discharge 8kV contact discharge 15kV indirect discharge						
III.	Fast transient interference / bursts	IEC60255-26(ed3.0)-2013 and EN 61000-4-4:2004 + A1:2010 Level 4. 4kV 5 kHz and 100 kHz, applied to all circuits excluding communication ports 2kV 5 kHz and 100 kHz, applied to communication ports						
IV.	Surge Immunity	IEC60255-26(ed3.0)-2013 and EN61000-4-5:2006 Level 4 4KV: Power Supply common mode 2KV Power Supply differential mode 4KV CT/ Input / output ports common mode 2KV CT/ Input / output ports differential mode						
V.	Conducted Emission	IEC60255-26(ed3.0)-2013 <table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: left;">Frequency Range</th> <th style="text-align: right;">Limit</th> </tr> </thead> <tbody> <tr> <td>0.15 – 0.5 MHz</td> <td style="text-align: right;">79 dB/μV (Quasi peak) , 66 dB/μV (Average)</td> </tr> <tr> <td>0.5 – 30 MHz</td> <td style="text-align: right;">73 dB/μV (Quasi peak) 60 dB/μV (Average)</td> </tr> </tbody> </table>	Frequency Range	Limit	0.15 – 0.5 MHz	79 dB/μV (Quasi peak) , 66 dB/μV (Average)	0.5 – 30 MHz	73 dB/μV (Quasi peak) 60 dB/μV (Average)
Frequency Range	Limit							
0.15 – 0.5 MHz	79 dB/μV (Quasi peak) , 66 dB/μV (Average)							
0.5 – 30 MHz	73 dB/μV (Quasi peak) 60 dB/μV (Average)							
VI.	Radiated Emission	IEC60255-26(ed3.0)-2013 and EN55022:2006+A1:2007 <table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: left;">Frequency Range</th> <th style="text-align: right;">Limits</th> </tr> </thead> <tbody> <tr> <td>30 MHz – 230 MHz</td> <td style="text-align: right;">40 dB (μV/m)</td> </tr> <tr> <td>230 MHz – 1000 MHz</td> <td style="text-align: right;">47 dB (μV/m)</td> </tr> </tbody> </table>	Frequency Range	Limits	30 MHz – 230 MHz	40 dB (μV/m)	230 MHz – 1000 MHz	47 dB (μV/m)
Frequency Range	Limits							
30 MHz – 230 MHz	40 dB (μV/m)							
230 MHz – 1000 MHz	47 dB (μV/m)							
VII.	Power Frequency Magnetic Field	IEC60255-26(ed3.0)-2013 and EN61000-4-8:2010 Level 5 Class 5: 100 A/m field applied continuously in all planes for the EUT in a quiescent and tripping state Class 5: 1000 A/m field applied for 3s in all planes for the EUT in a quiescent and tripping state						
VIII.	Pulsed Magnetic Field Immunity	EN 61000-4-9:1993+A1:2001 Level 5 Class 5: 1000A/m field applied continuously in all planes for the EUT in a quiescent and tripping state						

<b>IX.</b>	Damped Oscillatory Magnetic Field	EN61000-4-10:1993 + A1:2001 Level 5 Class 5: 100A/m field applied in all planes at 100kHz / 1MHz with burst duration of 2 Sec.
<b>X.</b>	Damped Oscillatory	EN 61000-4-18: 2007 + A1:2010 100kHz and 1MHz slow damped oscillatory applied in common mode at 2.5 KV 3MHz, 10MHz, 30MHz fast damped oscillatory applied in common mode at 1 KV
<b>XI.</b>	Conducted Disturbance induced by Radio Frequency field	IEC60255-26(ed3.0)-2013 and EN 61000-4-6: 2009 Level 3 Voltage Level 10 V Frequency Range 0.15 – 80 MHz Modulation 80% AM @ 1 KHz Dwell Time 2.85 Sec. Spot Frequency 27, 68 MHz
<b>XII.</b>	Radiated Radio Frequency Electromagnetic Field Disturbance Test	IEC60255-26(ed3.0)-2013 and EN 61000-4-3: 2006+A1:2008 Level 4 Voltage Level 10 V/m and 30 V/m Frequency Range For 10 V/m 80 - 1000 MHz , 1.4 – 2.7 GHz For 30 V/m 800 – 960 MHz , 1.4 – 2 GHz Modulation 80% AM @ 1 KHz Spot Frequency 80, 160, 380, 450, 900,1850 & 2150 MHz
<b>XIII.</b>	AC Voltage Dips	IEC60255-26(ed3.0)-2013 and IEC 61000-4-11 Class A Residual Voltage : 40%for 200ms/70% for 500ms : 80% for 5s
<b>XIV.</b>	DC Voltage Dips	IEC60255-26(ed3.0)-2013 and IEC 61000-4-29 Class A Residual Voltage : 40% for 200 ms - 70% for 500 ms
<b>XV.</b>	AC Voltage Interruptions	IEC60255-26(ed3.0)-2013 and IEC 61000-4-11 Class A AC Auxiliary Supply Interruptions for 10, 20ms with no loss of protection. AC Auxiliary Supply Interruptions for 50ms, 100ms, 200ms, 0.5s, 5s with temporary loss of protection.
<b>XVI.</b>	DC Voltage Interruptions	IEC60255-26(ed3.0)-2013 and IEC 61000-4-29 Class A DC Auxiliary Supply Interruptions for 10, 20ms with no loss of protection. DC Auxiliary Supply Interruptions for 30ms, 50ms, 100ms, 200ms, 300ms, 0.5s, 1s, 5s with temporary loss of protection.
<b>XVII.</b>	Gradual Shut-down / start-up	IEC60255-26(ed3.0)-2013 Shut down time 60 sec. Power Off time 5 min. Start up time 60 sec.
<b>XVIII.</b>	Reversal of DC Power Supply	IEC 60255-11 Duration : 1 Min
<b>XIX.</b>	AC (ripple) in D.C. Supply	IEC60255-26(ed3.0)-2013 and IEC 60255-11 Level: 15% Frequency: 100/120 Hz

<b>Mechanical Tests :</b>			
<b>I.</b>	Vibration Response Tests	IEC 60255-21-1 Class 2	
		Frequency Range	10 Hz to 150 Hz
		Cross Over Frequency	58 to 60 Hz
		Peak displacement before Cross Over	0.075mm
		Peak acceleration after Cross Over	1 gn
		No. of Sweep Cycles per Axis	1
<b>II.</b>	Vibration Endurance Tests	IEC 60255-21-1 Class 2	
		Frequency Range	10 to 250Hz
		Peak acceleration	2 gn
		No. of Sweep Cycles per Axis	20
<b>III.</b>	Shock Response Tests	IEC 60255-21-2 Class 2	
		Peak Acceleration	10 gn
		Pulse Duration	11 ms
		No. of Pulses in each Direction	5
<b>IV.</b>	Shock Endurance Tests	IEC 60255-21-2 Class 2	
		Peak Acceleration	30 gn
		Pulse Duration	11 ms
		No. of Pulses in each Direction	3
<b>V.</b>	Bump Test	IEC 60255-21-2 Class 2	
		Peak Acceleration	20 gn
		Pulse Duration	16 ms
		No. of Pulses in each Direction	1000
<b>VI.</b>	Seismic Test	IEC 60255-21-3 Class 2	
		Freq. Range	1 to 35 Hz
		Cross Over Freq.	8 Hz
		Peak Disp. Before Cross Over X	7.5 mm
		Peak Disp. Before Cross Over Y	3.5 mm
		Peak Acceleration After Cross Over X	2 gn
		Peak Acceleration After Cross Over Y	1 gn
		No. of Sweep Cycles per Axis	1
<b>Environmental Test :</b>			
<b>I.</b>	Dry heat test	IEC 60255-1 and IEC 60068-2-2: 2007 Bd	
		Start up +20°C (EUT energised)	Functional verification tests for 2 hours
		Intermediate +40°C (EUT energised)	Functional verification tests for 2 hours
		High temp claim +65°C (EUT energised at High Rated Voltage)	Operate for 96 hours at highest rated voltage (HRV)

		High temp claim +70°C (EUT not energised)	Storage for 96 hours
		Hot Start +65°C (EUT energised High Rated Voltage)	Operate for 2 hours at highest rated voltage (HRV)
		Last test +20°C (EUT energised)	Functional verification tests for 2 hours
<b>II.</b>	Cold test	IEC 60255-1 and IEC 60068-2-1: 2007	
		Start up +20 °C (EUT energised)	Functional verification tests for 2 hours
		Intermediate 0°C (EUT energised)	Functional verification tests for 2 hours
		Intermediate -10°C (EUT energised)	Functional verification tests for 2 hours
		Low temp - 25°C (EUT energised)	Functional verification tests for 96 hours
		Low temp -25°C(EUT not energised)	Storage for 96 hours
		Cold start -25°C (EUT energised)	Operate for 2 hours
		Last test +20°C (EUT energised)	Functional verification tests for 2 hours
<b>III.</b>	Change of temperature test	IEC 60255-1 and IEC 60068-2-14	
		Lower Temperature	-25°C
		Higher Temperature	+65°C
		Rate of change of temperature	1°C/min
		Duration of Exposure	5 Cycle
		Duration of Cycle	3 + 3 hrs.
<b>IV.</b>	Damp heat steady state	IEC 60068-2-78	
		Operating Temperature	+65°C
		Humidity	93%
		Duration of Exposure	10 Days
<b>V.</b>	Damp heat Cyclic Test	IEC 60068-2-30	
		Lower Temperature	+25°C
		Humidity	97%
		Higher Temperature	+65°C
		Humidity	93%
		Duration of Exposure	6 Cycle
Duration of Cycle	12 + 12 hrs.		
<b>VI.</b>	Enclosure Protection	IEC 60259	
		IP52	For Front
		IP20	For Rear

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# Section 2

## Installation and Procedure

## Contents

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## 2 INSTALATION AND PROCEDURE

### 2.1 Overview

The first steps in applying the A21M Motor Protection Relay are installing and connecting the relay. This section describes common installation features and requirements.

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

This section contains drawings of typical ac and dc connections to the A21M. Use these drawings as a starting point for planning your particular relay application.

### 2.2 Handling

#### 2.2.1 Handling the Goods

Our products are of robust construction but require careful treatment before installation on site. This section discusses the requirements for receiving and unpacking the goods, as well as associated considerations regarding product care and personal safety.



**Caution: Before lifting or moving the equipment, User should be familiar with the Safety Information chapter of this manual.**

#### 2.2.2 Receipt of the Goods

On receipt, ensure the correct product has been delivered. Unpack the product immediately to ensure there has been no external damage in transit. If the product has been damaged, make a claim to the transport contractor and notify us promptly.

For products not intended for immediate installation, repack them in their original delivery packaging.

#### 2.2.3 Unpacking the Goods

When unpacking and installing the product, take care not to damage any of the parts and make sure that additional components are not accidentally left in the packing or lost. Do not discard any CDROMs or technical documentation. These should accompany the unit to its destination substation and put in a dedicated place.

The site should be well lit to aid inspection, clean, dry and reasonably free from dust and excessive vibration. This particularly applies where installation is being carried out at the same time as construction work.

#### **2.2.4 Storing the Goods**

If the unit is not installed immediately, store it in a place free from dust and moisture in its original packaging. Keep any de-humidifier bags included in the packing. The de-humidifier crystals lose their efficiency if the bag is exposed to ambient conditions. Restore the crystals before replacing it in the carton. Bags should be placed on flat racks and spaced to allow circulation around them. The time taken for regeneration will depend on the size of the bag. If a ventilating, circulating oven is not available, when using an ordinary oven, open the door on a regular basis to let out the steam given off by the regenerating silica gel. On subsequent unpacking, make sure that any dust on the carton does not fall inside. Avoid storing in locations of high humidity. In locations of high humidity the packaging may become impregnated with moisture and the de-humidifier crystals will lose their efficiency.

The device can be stored between  $-25^{\circ}$  to  $+65^{\circ}\text{C}$

#### **2.2.5 Dismantling the Goods**

If you need to dismantle the device, always observe standard ESD (Electrostatic Discharge) precautions.

The minimum precautions to be followed are as follows:

- Use an antistatic wrist band earthed to a suitable earthing point.
- Avoid touching the electronic components and PCBs.

### **2.3 Installation Procedure**

#### **2.4 Safe Mounting**

A21M supports flush panel mounting and can be mounted into panels using fitting clamps with M5 X 10 screws.

The fitting clamp and screws are supplied along with the relay.

For mounting the relay in to the panel follow this procedure

By loosening the M5 x 10 screws, remove the fitting clamps on the relay and then insert the Relay in to the panel cut-out as show below.

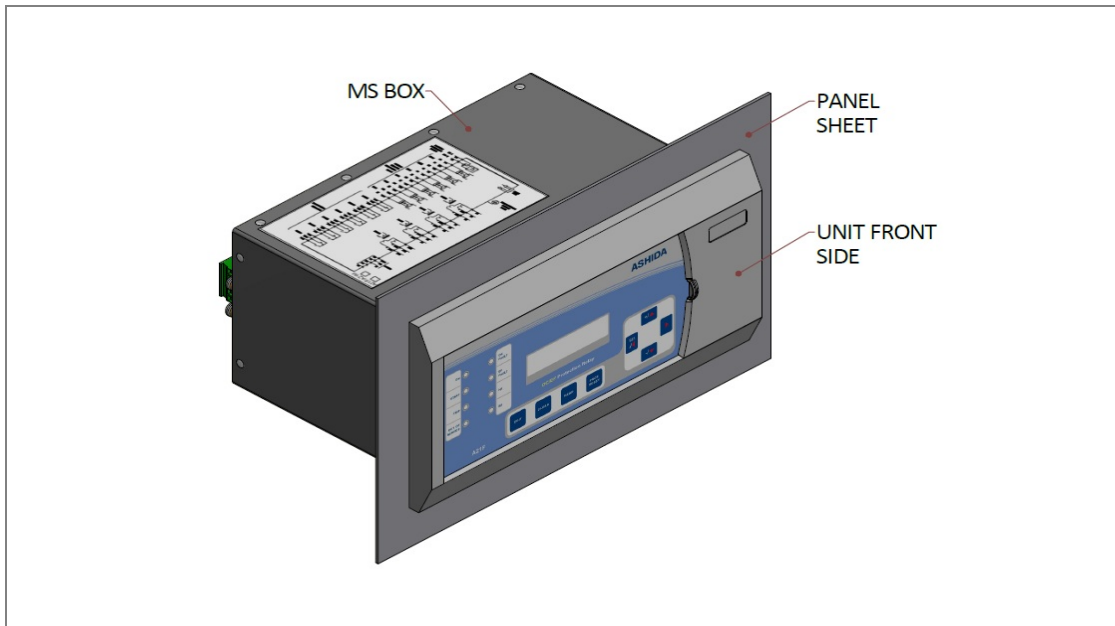


Figure 1: Inserting relay in to the panel cutout

After inserting the Relay in the Panel using the Fitting clamps and the M5 x 10 Screws fasten the relay to the Panel as shown below.

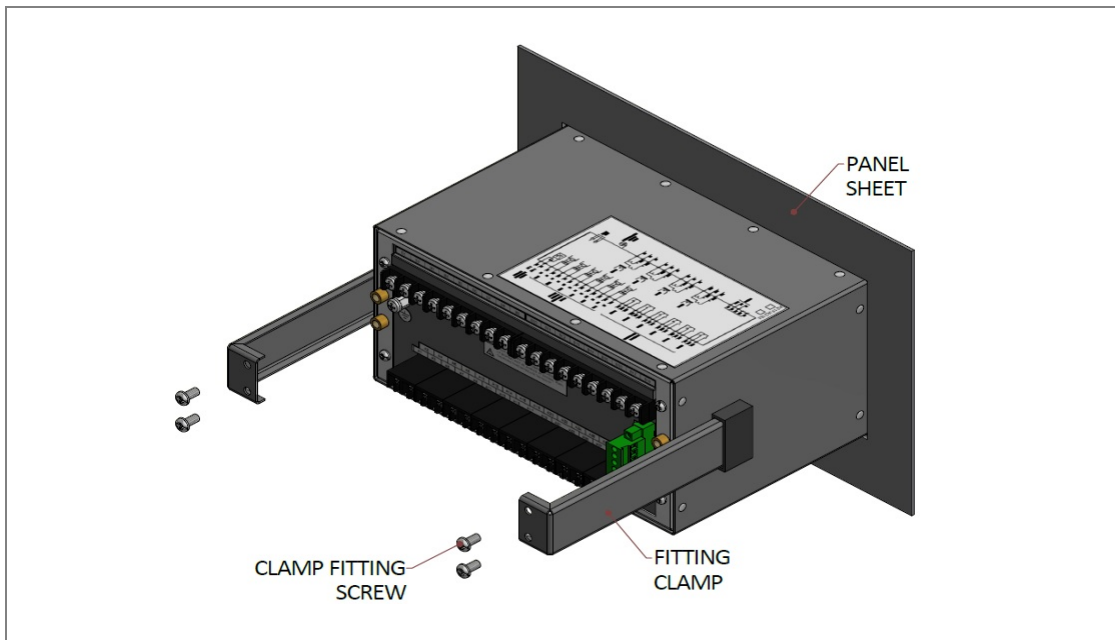


Figure 2: Tightening Fitting clamps



**Caution: All screws of fitting clamps are to be properly tightened.  
Always use M5x10 screws for fitting the clamps.**

The Relay after fastening to the Panel with the help of Fitting clamps and the M5 x 10 Screws is shown below.

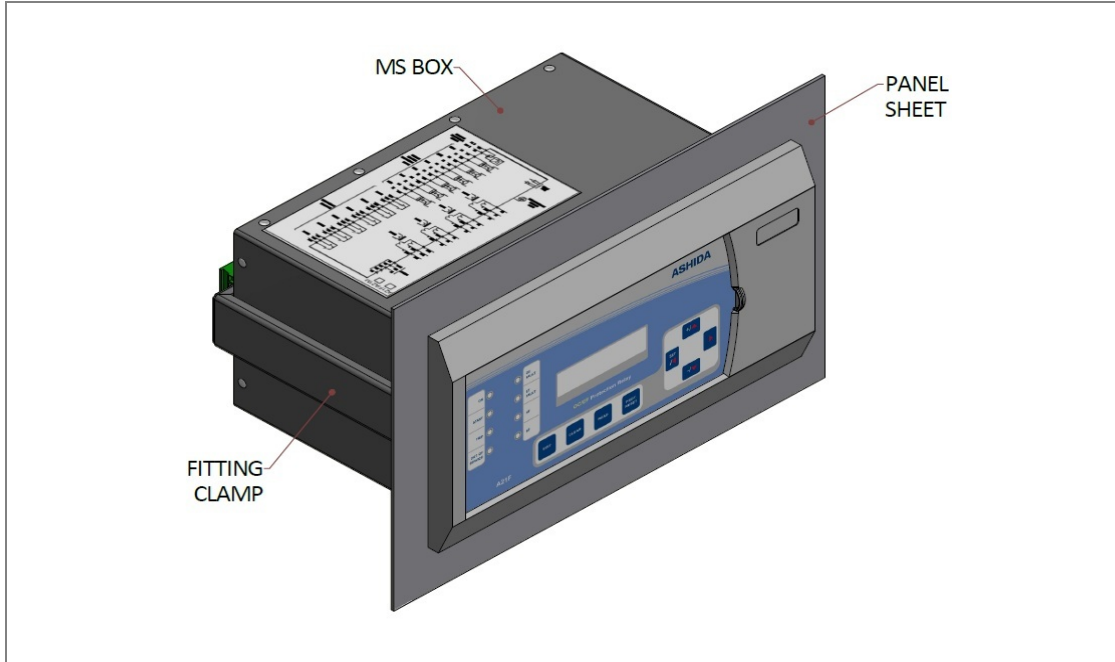


Figure 3: Relay mounted on the panel-front view

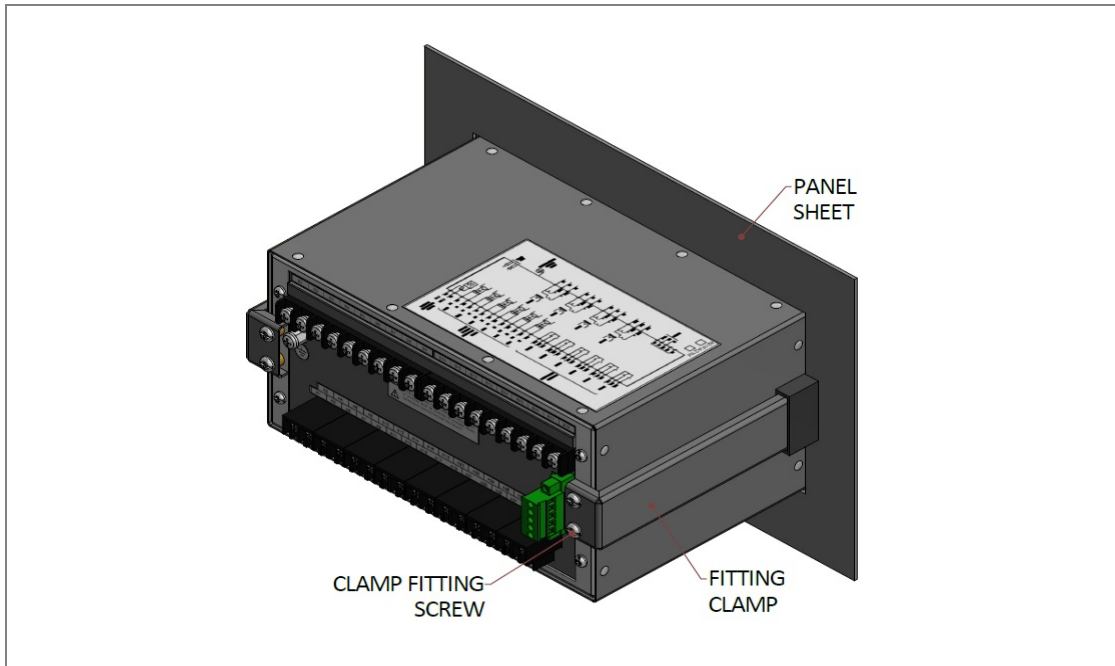


Figure 4: Relay mounted on the panel-rear view

## 2.5 Relay Connection and Diagram

Before installation of the relay check the correct working procedure as to ensure safety. The Terminal exposed during installation may present a hazardous voltage unless the equipment is electrically isolated. Any disassembly of the equipment may expose parts to hazardous voltage. Electronic parts may be damaged if suitable electrostatic discharge (ESD) precautions are not taken. Voltage and current connection should be made using insulated crimp termination 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 wire size should be used. The equipment must be connected in accordance with the appropriate connection diagram.

## 2.6 Before Energizing following should be checked

- a. Voltage rating and polarity.
- b. CT circuit rating and integrity of connection.
- c. Protective fuse rating.
- d. Integrity of the earthing connection.
- e. Voltage and current rating of external wiring, applicable as per application.

## 2.7 Relay Operating Condition

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

## 2.8 Current Transformer (CT) Circuit

Do not open the secondary circuit of a live CT as the high voltage produce may be lethal to personnel and could damage insulation. Generally, for safety, the secondary of the line CT must be shorted before opening any connection to it.

## 2.9 Insulation and dielectric strength testing

Insulation testing may leave capacitors charged up to a hazardous voltage. At the end of each part test, the voltage should be gradually reduced to zero, to discharge capacitors, as this may result in damage.

## 2.10 Cables and Connectors

This section describes the type of wiring and connections that should be used when installing the device. For pin-out details please refer to the wiring diagrams.



**Caution: Before carrying out any work on the equipment, user should be familiar with the Safety Section and the ratings on the equipment's rating label.**

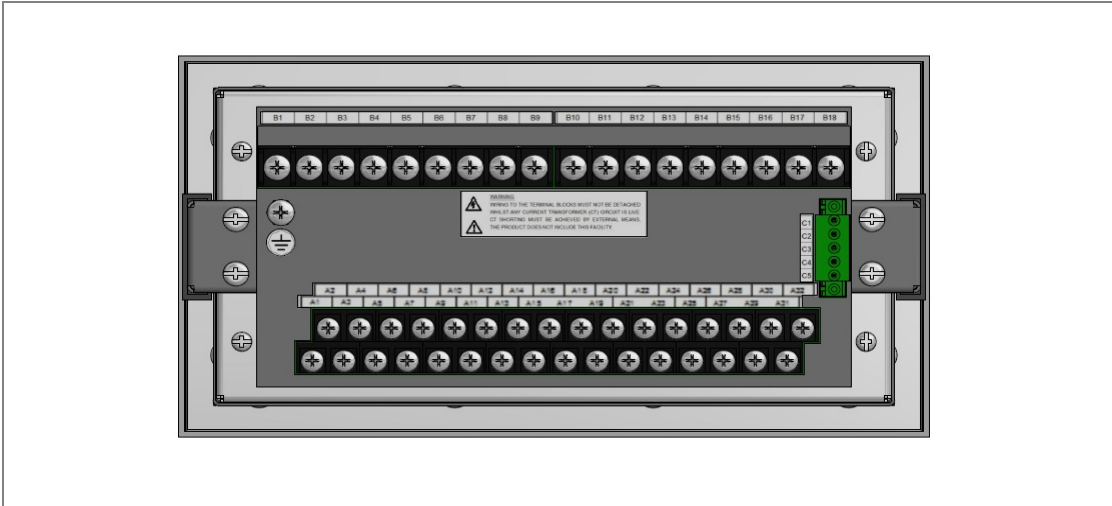


Figure 5: A21M Rear view-Terminal Connection

**2.11 Terminal Blocks**

**2.12 CT/Auxiliary power/Input/ Output connections**

The A21M device use terminal blocks as shown below. The terminal block consists of up to 9 x M5 screw terminals and 20 x M4 screw terminals. M5 terminal blocks are used for CT connections and M4 terminal blocks are used for auxiliary power/ input/output connections. The wires should be terminated with rings using 90° ring terminals, with no more than two rings per terminal. The product is supplied with sufficient M5 & M4 screws for proper connection.

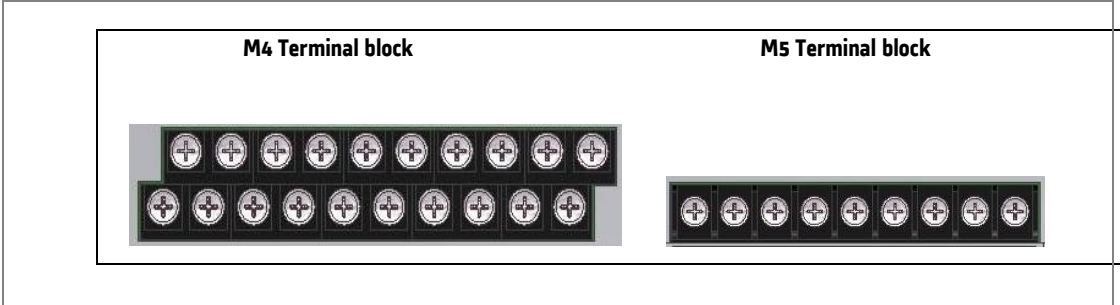


Figure 6: Terminal blocks





**Caution: Always fit an insulating sleeve over the ring terminal.**

### 2.13 Rear Serial Port connection

The rear serial port is intended for use with a permanently wired connection to a remote SCADA system. The physical connectivity is achieved using three screw terminals: C3, C4 terminals for signal connection, and C5 terminal for connecting cable shield. The terminal block is located at the rear of the relay as shown below.

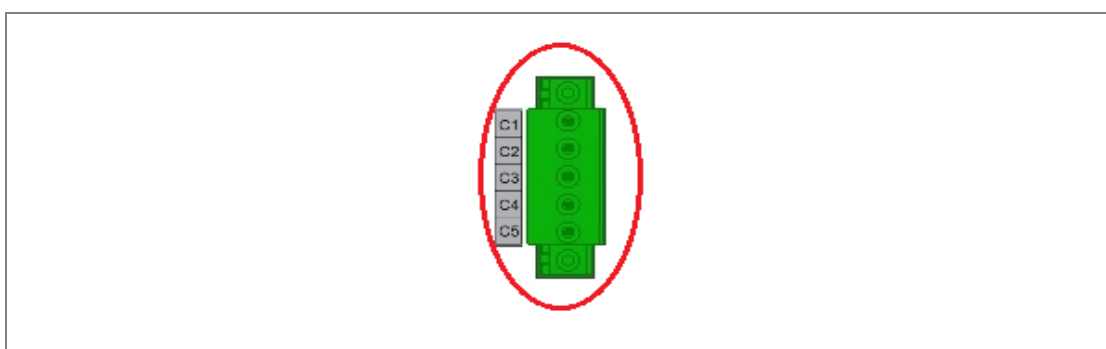


Figure 7: Rear Serial port terminal block

### 2.14 Power Supply Connections

These should be wired with 1.5 mm PVC insulated multi-stranded copper wire terminated with M4 ring terminals. The wire should have a minimum voltage rating of 300 V RMS.

As per the application, in case auxiliary supply input of the relay needs to be wired, then adequate care should be taken to wire as per polarity marking on the Terminal sticker at the rear of the relay. The supply range is also mentioned on the Terminal sticker and before energising, care should be taken to confirm that the auxiliary supply being wired is within range.

### 2.15 Earth Connection

Every device must be connected to the cubicle earthing bar. Earthing terminal is provided on back side of the relay. Ensure that the relay earthing is connected to the local earth bar. With several relays present; make sure that the copper earth bar is properly installed for solidity connecting to the earthing terminal of each relay equipment box.

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<sup>2</sup> or as per industries standard practice. The protective conductor (earth) connection must be of low-inductance and as short as possible.

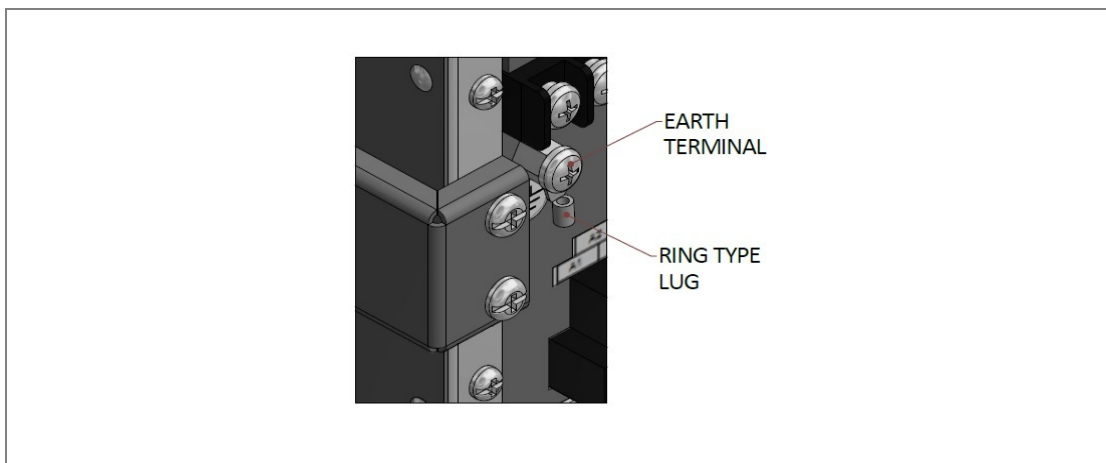


Figure 8: Earthing terminal on the rear side of the relay

**Note:** To prevent any possibility of electrolytic action between brass or copper ground conductors and the rear panel of the product, precautions should be taken to isolate them from one another. This could be achieved in several ways, including placing a nickel-plated or insulating washer between the conductor and the product case, or using tinned ring terminals.

## 2.16 Current Transformers

Current transformers would generally be wired with 2.5 mm<sup>2</sup> PVC insulated multi-stranded copper wire terminated with M5 ring terminals. The wires should be terminated with rings using 90° rings terminals, with no more than two rings per terminal.

Due to the physical limitations of the ring terminal, the maximum wire size you can use is 4.0 mm<sup>2</sup> using ring terminals.

The wire should have a minimum voltage rating of 300 V RMS.



**Caution: Current transformer circuits must never be fused.**

**Terminal blocks must not be detached whilst any current transformer (CT) circuit is live. CT shorting must be achieved by external means; the product does not include this facility.**

**Note 2: For 5A CT secondary, we recommend using 2 x 2.5 mm<sup>2</sup> PVC insulated multi-stranded copper wire.**

### **2.17 EIA (RS) 485 Connections**

For connecting the EIA (RS485), use 2-core screened cable with a maximum total length of 1000 m or 200 nF total cable capacitance.

A typical cable specification would be:

Each core: 16/0.2 mm<sup>2</sup> copper conductors, PVC insulated

Nominal conductor area: 0.5 mm<sup>2</sup> per core

Screen: Overall braid, PVC sheathed

There is no electrical connection of the cable screen to the device. The link is provided purely to link together the two cable screens.

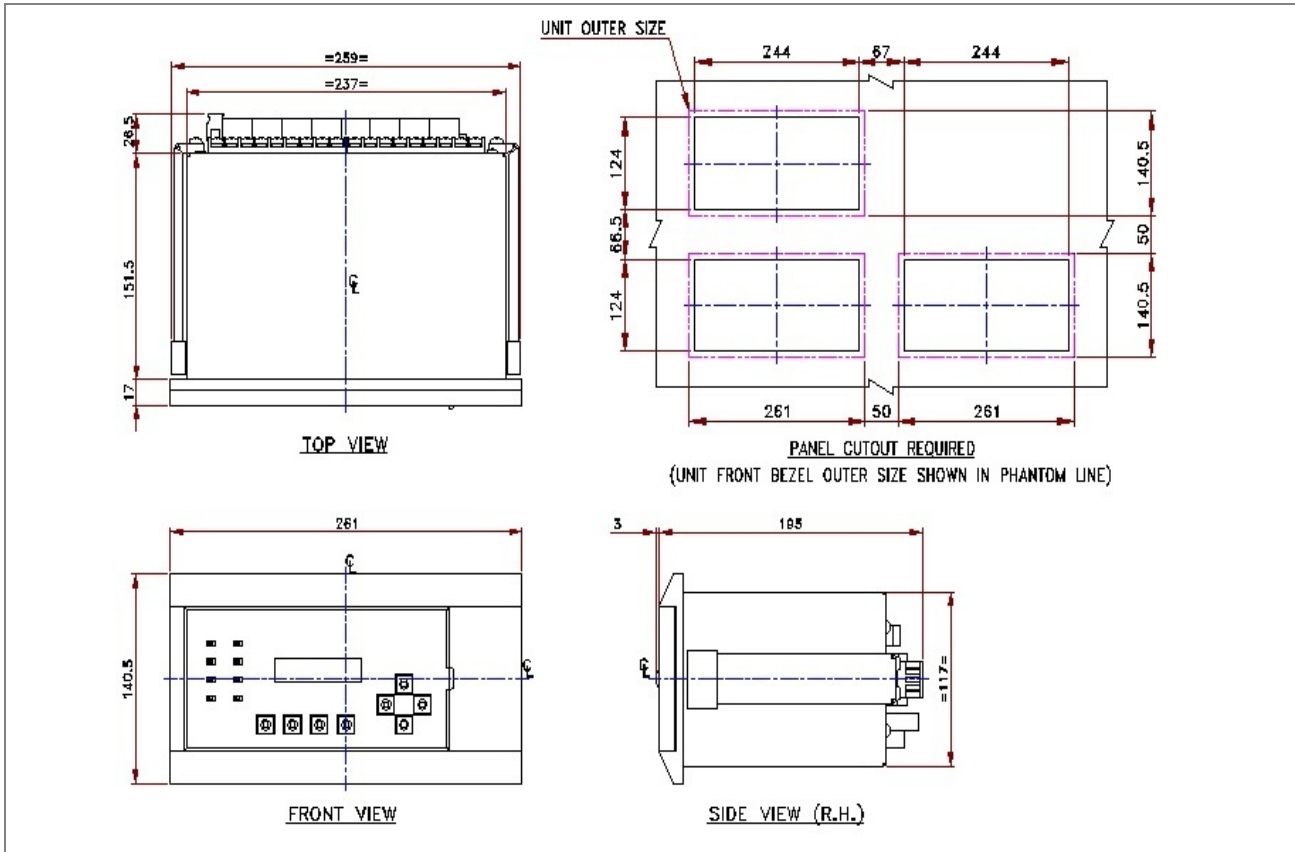
### **2.18 Output Relay Connections**

These should be wired with 1 mm PVC insulated multi-stranded copper wire terminated with M4 ring terminals.

### **2.19 USB Connection**

The IED has a type B USB socket on the front panel. A standard USB printer cable (type A one end, type B the other end) can be used to connect a local PC to the IED. This cable is the same as that used for connecting a printer to a PC.

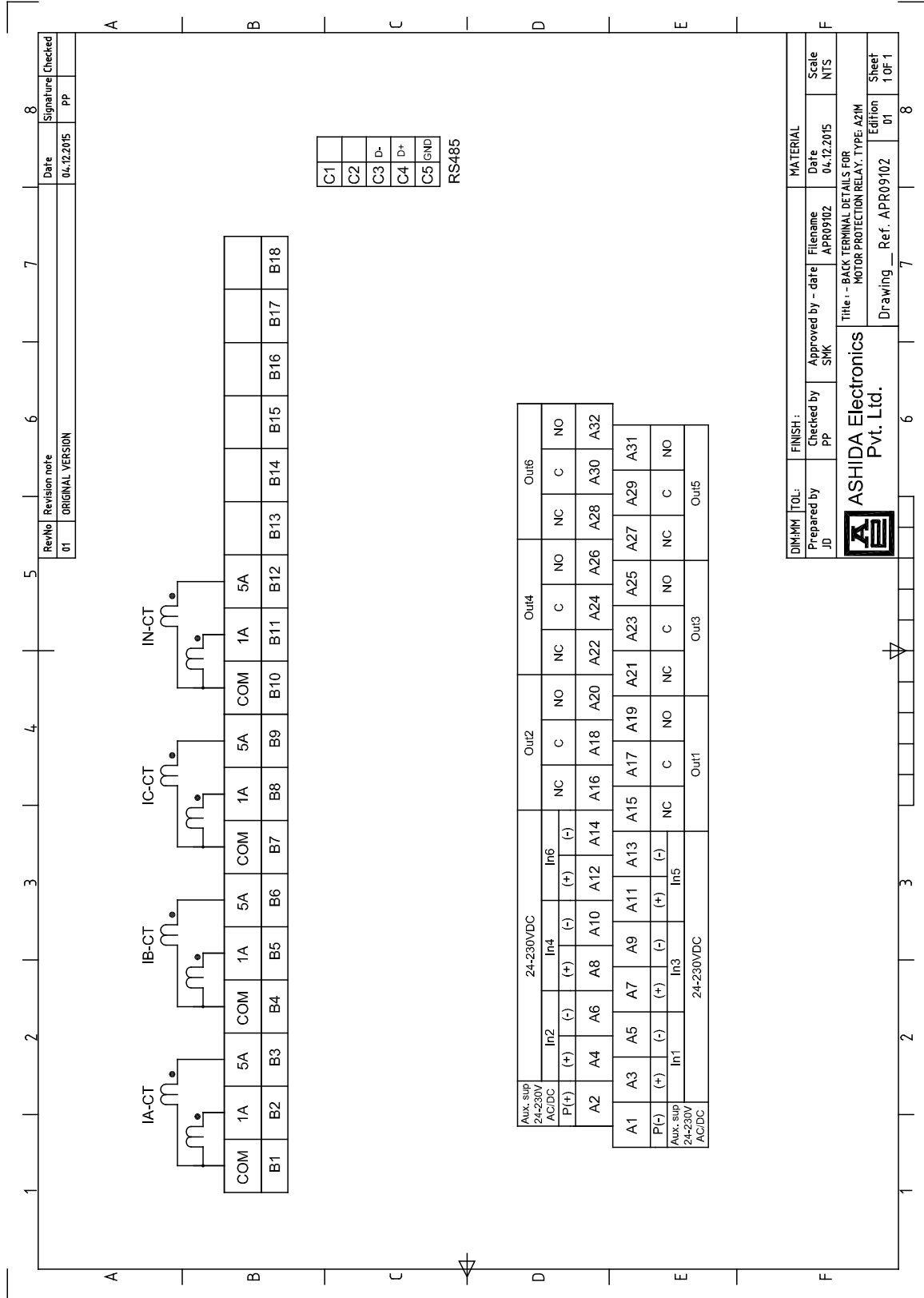
**Case dimensions:**



**Figure 9: Case dimensions**

**Note:** All dimensions in mm.

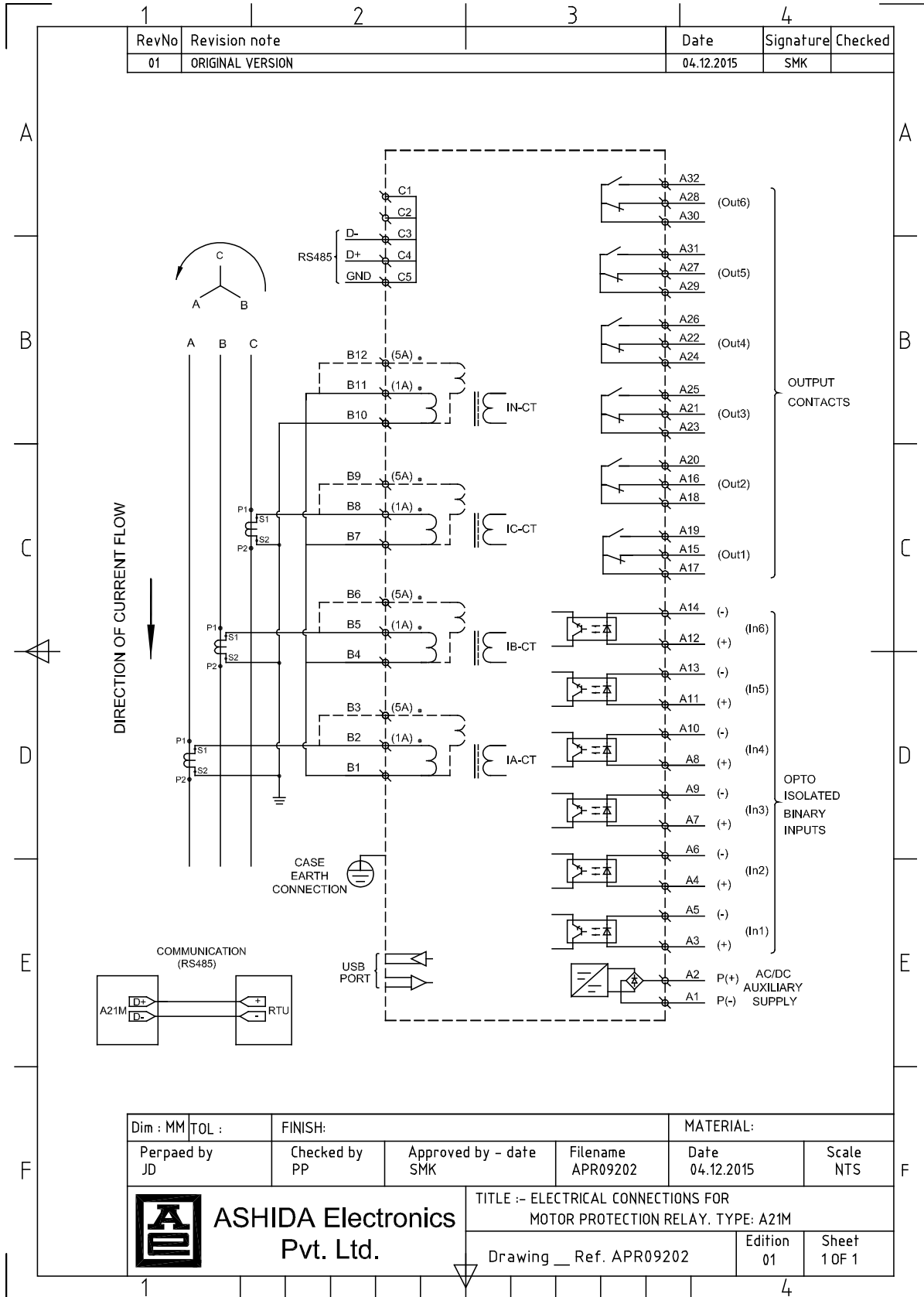
**2.19.1 Back Terminal and Electrical wiring connection diagrams for A21F**



Rev/No	Revision note	Date	Signature	Checked
01	ORIGINAL VERSION	04.12.2015	PP	

DIM/HH	TOL:	FINISH:	MATERIAL
Prepared by	Checked by	Approved by - date	File name
JD	PP	SMK	APR09102
<b>ASHIDA Electronics Pvt. Ltd.</b>			Date: 04.12.2015 Scale: NTS
Title 1 - BACK TERMINAL DETAILS FOR MOTOR PROTECTION RELAY, TYPE: A21M			
Drawing Ref. APR09102			Edition: 01 Sheet: 1 OF 1

Aux. sup		24-230VDC		Out2		Out4		Out6							
A1	A3	A5	A7	A9	A11	A13	A15	A17	A19	A21	A23	A25	A27	A29	A31
P(+)	(+)	(-)	(+)	(-)	(+)	(-)	NC	C	NO	NC	C	NO	NC	C	NO
In1		In3		In5		In6		In4		In2		In6		In4	
24-230V AC/DC		24-230VDC		24-230VDC		24-230VDC		24-230VDC		24-230VDC		24-230VDC		24-230VDC	



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# Section 3

## PC Software Information



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### 3 PC SOFTWARE INFORMATION

#### 3.1 Overview

ASHIDA Provides following Software solution to support the A21F Feeder Protection Relay and the other ASHIDA products.

Sr. No.	Application Software	Description
1	RTV2	Customizes A21F Settings and configure communication, input and output for specific applications
2	Relay Assist	Commissioning Assistance tool
3	Relay-DRV	Com Trade Disturbance Record viewer

This section describes how to get started with the A21F and RTV2 software. It particularly explains about the software setup and working procedure.

#### 3.1.1 RTV2 Software Features

Connections	A21F is connected to the PC through Front port as well as Rear port.
Settings Editor	Provides online as well as offline utility to interface with ASHIDA Relay series,
AProLogic	Allows user to program the inputs, outputs and LEDs
Events	Provides event analysis tools.
History Faults	Provides History fault analysis tool
Disturbance Record	Provides oscillography analysis tools.
Time Synchronization	Local clock time synchronized data is available.
Measurements	Provides online power system parameter measurements
Status	Provides status of the input, output and protection functions tool.
Control	Provides the control function tool (output, input, LED)
*Alias	Allows user to label the outputs and inputs.

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

### 3.2 Installation and Setup

#### 3.2.1 System Requirement

ASHIDA Relay Talk System Version2 requires the following hardware/software platform to run the application

Sr. No.	Requirement	Description
1	Operating System	Windows XP/7/8 (32-bit or 64-bit)
2	Processors	1GHz or above
3	RAM	512MB or above
4	Dot net Framework	Microsoft .Net Framework 3.51

#### 3.2.2 Microsoft .Net Framework 3.5.1

Turn windows features on for “Microsoft .Net Framework” Check the Microsoft .Net Framework and click Ok. If “.Net” feature is not available then use following link to download .Net Framework:<http://www.microsoft.com/en-in/download/details.aspx?id=21>.If the link above fails to work, you may need to search in <http://www.microsoft.com> for Microsoft .Net Framework 3.5.1

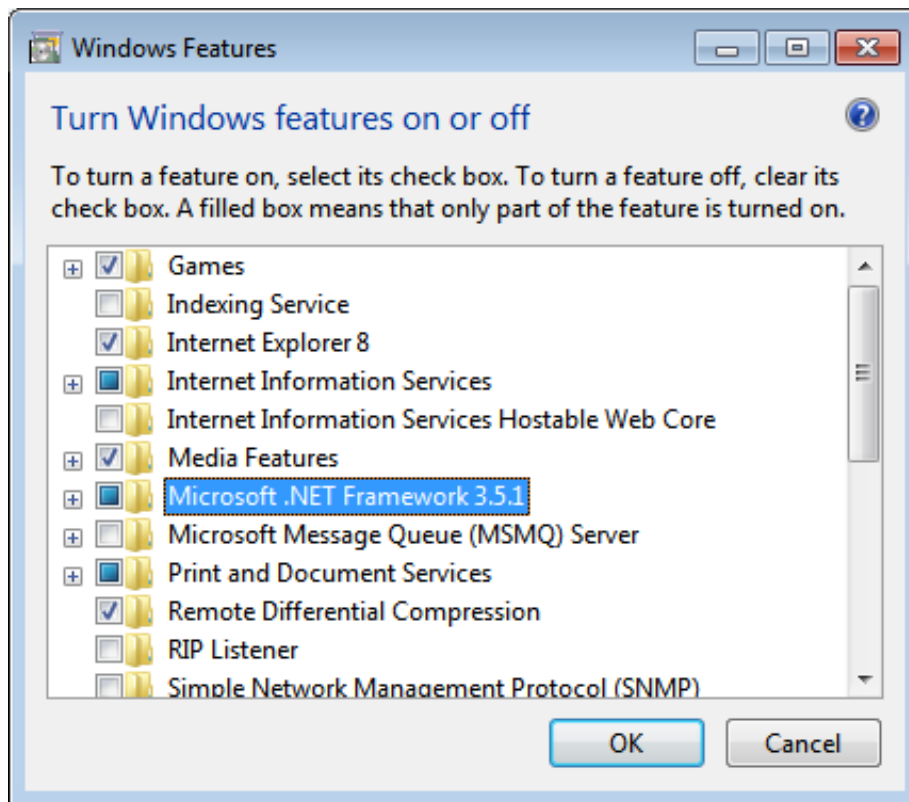


Figure 1: Turn windows features on or off

### 3.2.3 Installing ASHIDA Relay-Talk System

The ASHIDA Relay-Talk System is delivered as a single installation file named 'ASHIDA Relay-Talk System.exe'. To install 'ASHIDA Relay-Talk System' simply open these file and follow the directions.

To install, double click on "ASHIDA Relay-Talk SystemSetup.exe" setup file. Following window will appear.

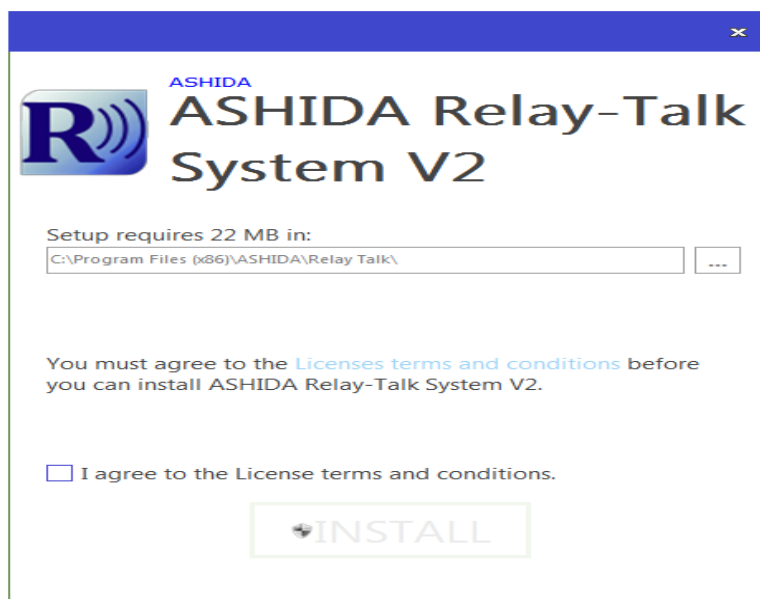


Figure 2: Startup screen of Relay Talk System Version2

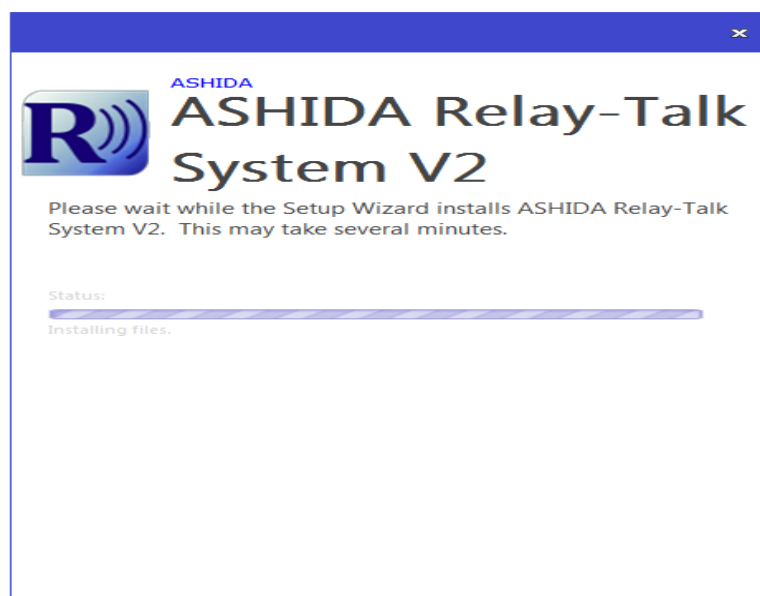
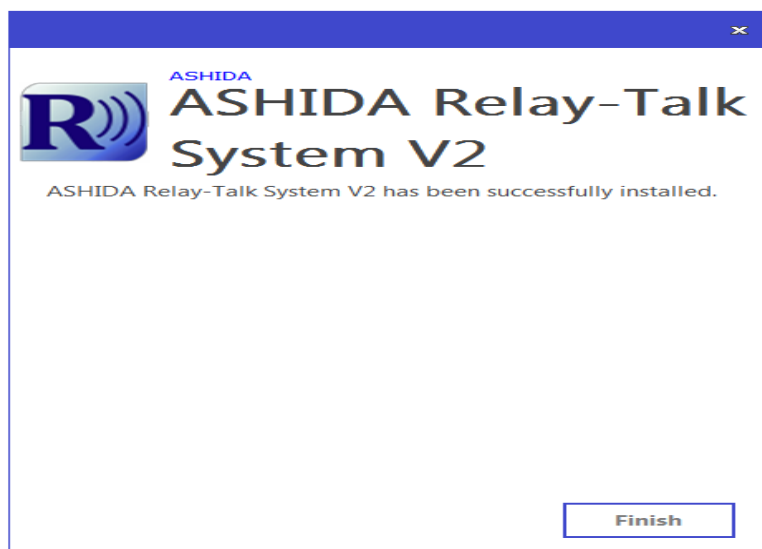


Figure 3: Installing ASHIDA Relay Talk System V2

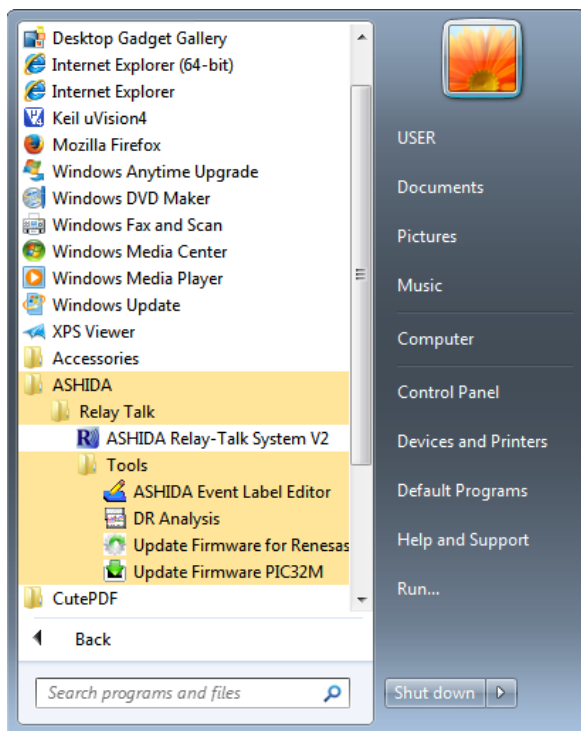


**Figure 4: Relay Talk System Version2 setup installation complete**

This completes the installation of ASHIDA Relay-Talk System. Click “Finish” and start using ASHIDA Relay-Talk System.

In addition to installing the required files on your system the installation application performs the following steps.

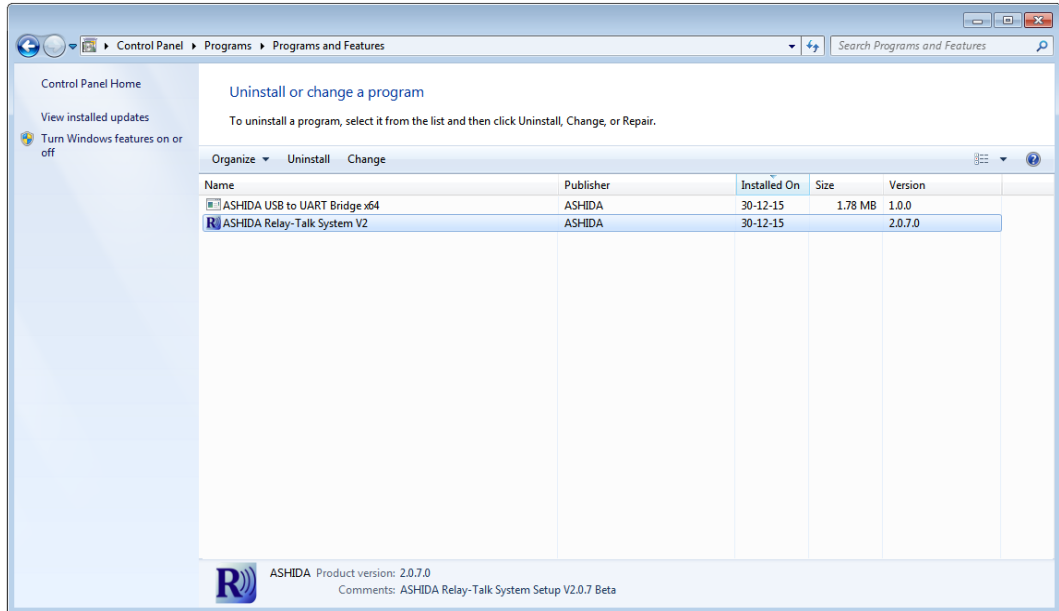
- Creates entries in the Start->Programs menu to access the features of the ASHIDA Relay-Talk System



**Figure 5: Relay Talk System Version2 in programs menu**

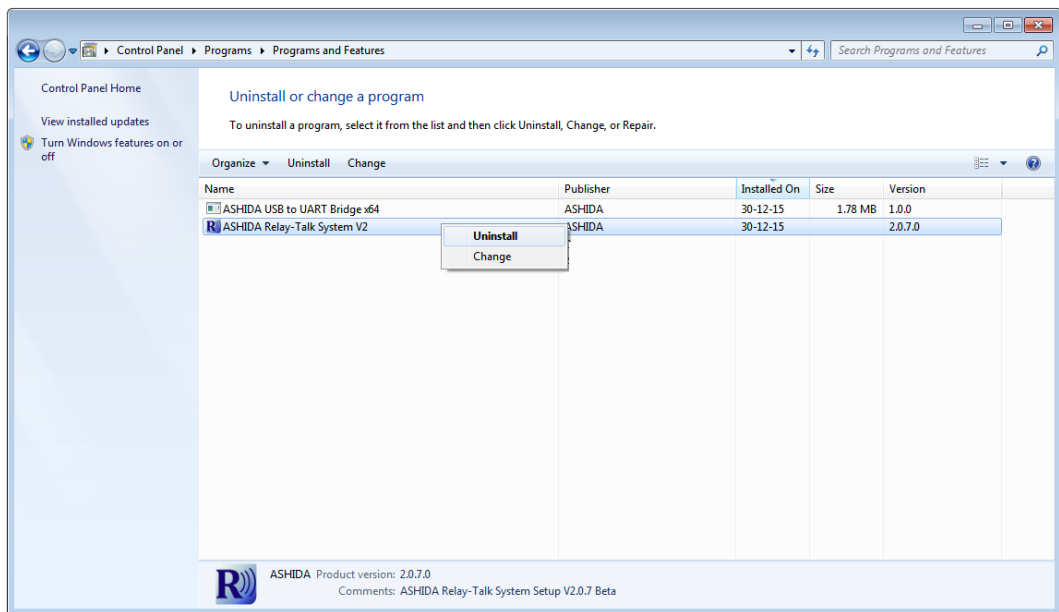
### 3.2.4 Uninstalling and Repair ASHIDA Relay-Talk System

Step1: To Uninstall the software go to windows Control Panel ->'Add/Remove Programs'.



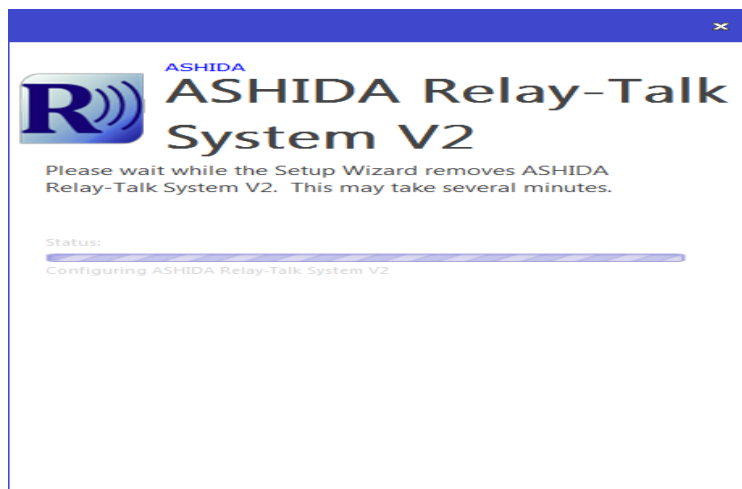
**Figure 6: Relay Talk System Version2 in Programs**

Step2: Right click on ASHIDA Relay-Talk System



**Figure 7: Confirmation to un-install Relay Talk System Version2**

Step3: To uninstall Relay Talk System Version2 click yes button.



Relay Talk System Version2 -Uninstallation in Progress

### 3.3 Procedure

#### 3.3.1 ASHIDA Relay Talk System Version2 (RTV2 S/W)

This section will guide the user for using ASHIDA Relay Talk System Version2, do the configuration for ASHIDA of devices and interface with the device.

To start Relay Talk System Version2:

- Click Start->Programs -> ASHIDA-> Relay Talk-> ASHIDA Relay-Talk System V2
- Or click ASHIDA RelayTalk.exe in the Install directory (e.g. C:\Program Files \ASHIDA\Relay Talk\ ASHIDA RelayTalk.exe)

#### Relay Talk System Version2 -Main Screen

Following is the main screen of ASHIDA Relay Talk System Version2.

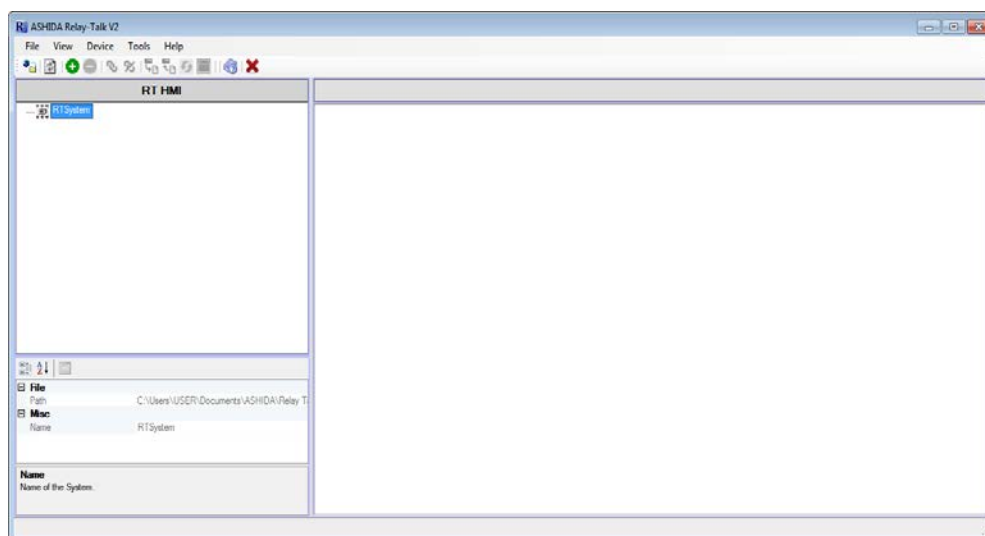


Figure 8: Main window of Relay Talk System Version2

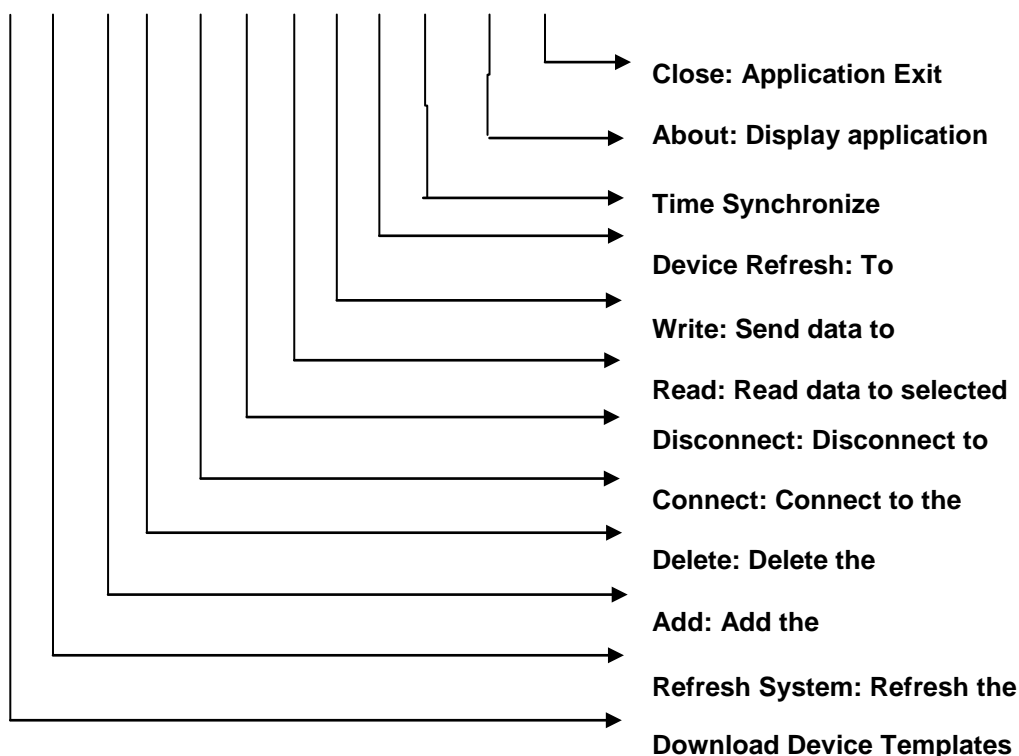
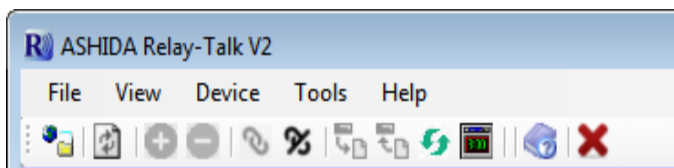


**3.3.2 Features in RTV2 Software**

- Connection: Edit connection preference settings to interface with ASHIDA Relay Series.
- Settings: This function is to edit settings in online/offline mode. Also to read and write Settings from/to device.
- Event list: Can view the event list from device in online mode.
- Disturbance Record viewer: Can view the Disturbance record from device in online mode.
- History Faults: Can read the History Faults from Device with time and date in Online and Offline mode.
- Parameter View: Can read all Analog parameters, Digital status from relay in online mode.
- Status: Can read various events/Faults with date time online.
- Control: Can perform control operations
- Alias: This function is to edit DI/DO labels.

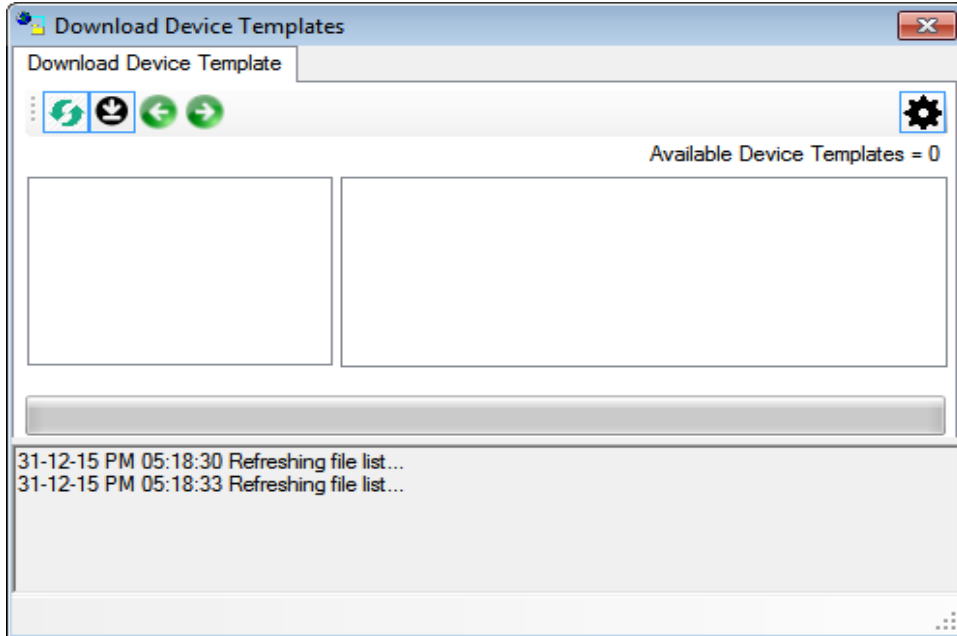
**3.3.3 Standard Toolbar buttons**

Following figure shows description of toolbar buttons:

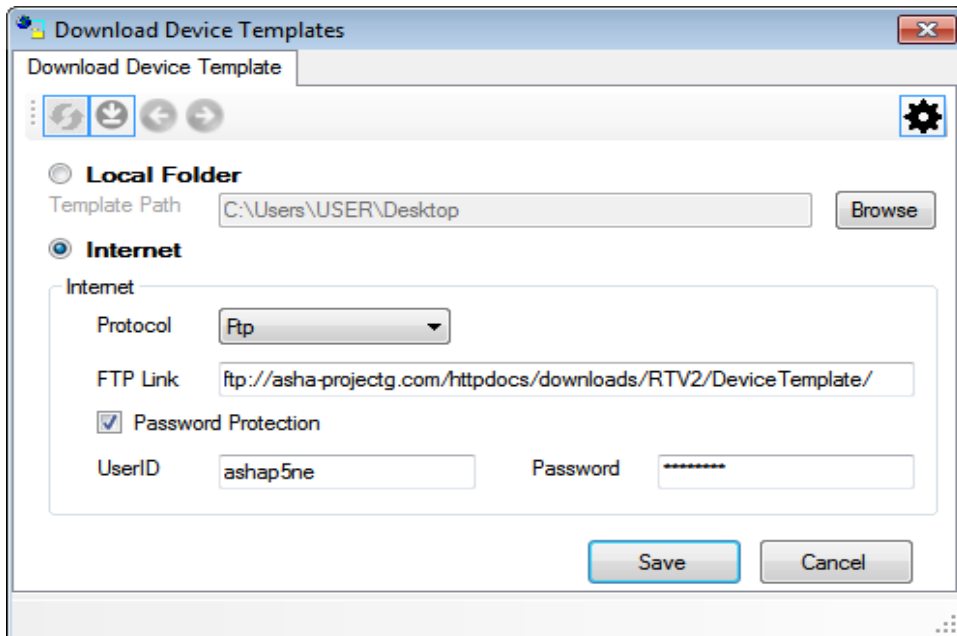


### 3.3.4 Download Device Template

To Download Device template Click on “Download Device Template”. Following window will appear.



**Figure 9: Download Device Template screen**



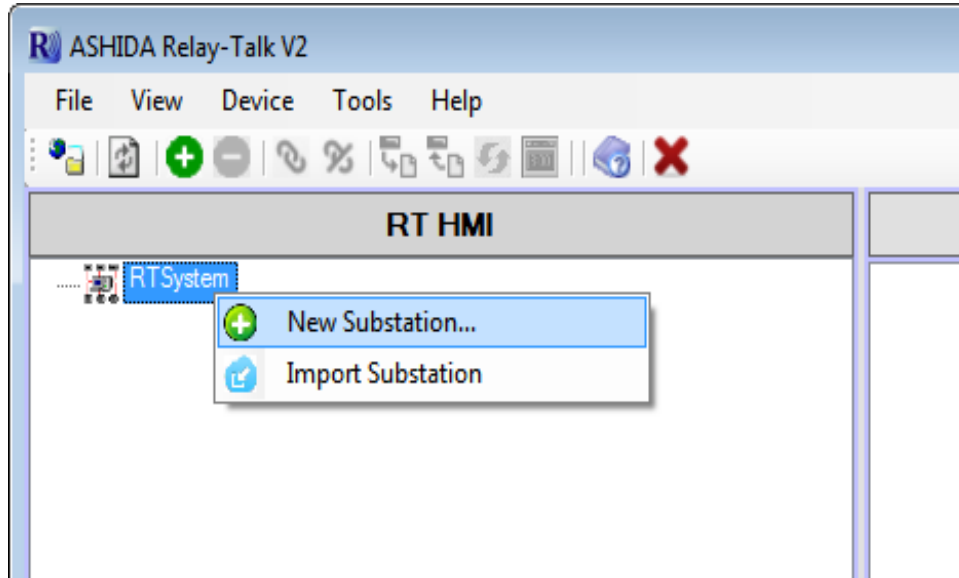
**Figure 10: Download Device Template**

Write Web URL and click save. Then click on Refresh button to check available Device templates. Select suitable Device template to download, and click on Download button.

### 3.4 Substation

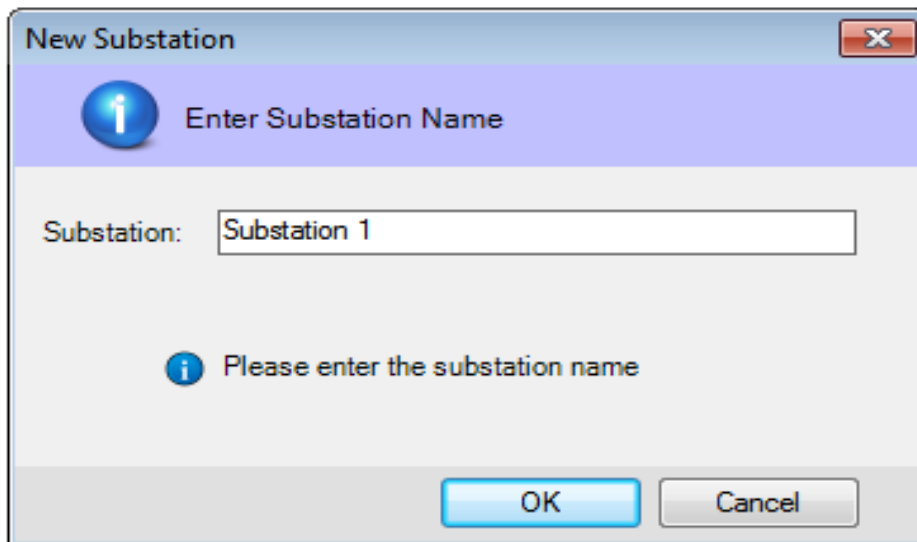
#### 3.4.1 Adding Substation to RT System

To add new substations right click on “RT System”. Following context menu will appear.



**Figure 11: Add new substation**

Now click on “New Substation” following window will appear.

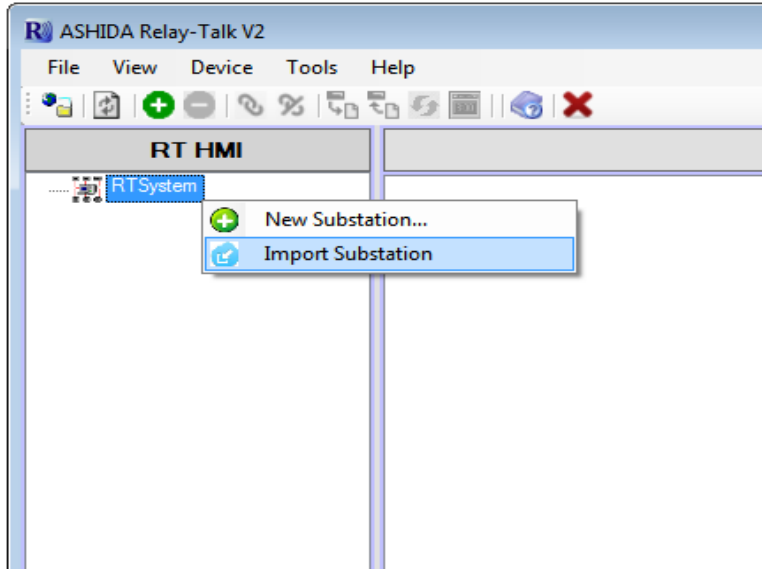


**Figure 12: Write new substation name**

Type a substation name and click OK. A new substation will be added in RT System.

### 3.4.2 Import Substation

To import substation right click on “RT System”. Following context menu will appear.

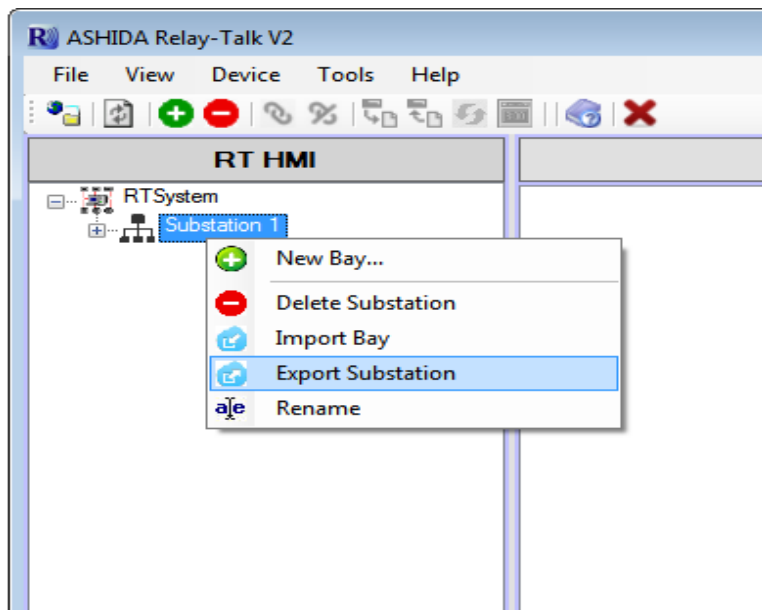


**Figure 13: Import substation**

Now click on “Import Substation” .In the “Import substation” dialogue select a system archive to import and click Open.

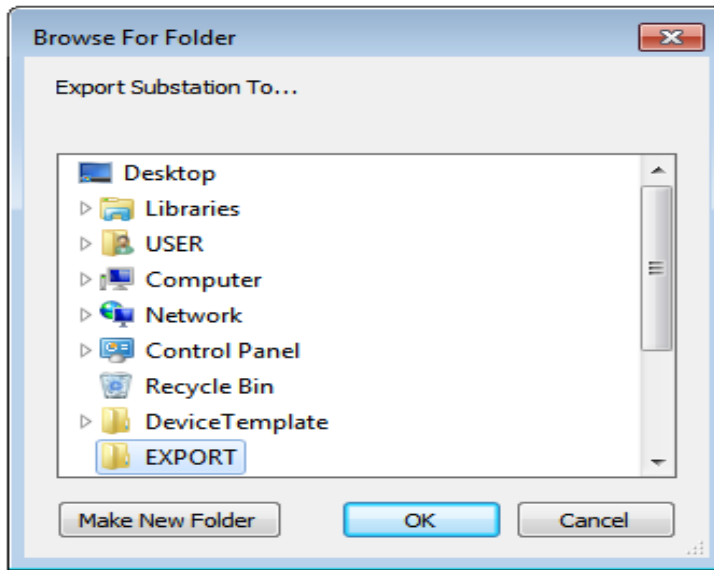
### 3.4.3 Export Substation

To export substation right click on substation. Following context menu will appear.



**Figure 14: Export substation**

Now click on “Export Substation” following window will appear.



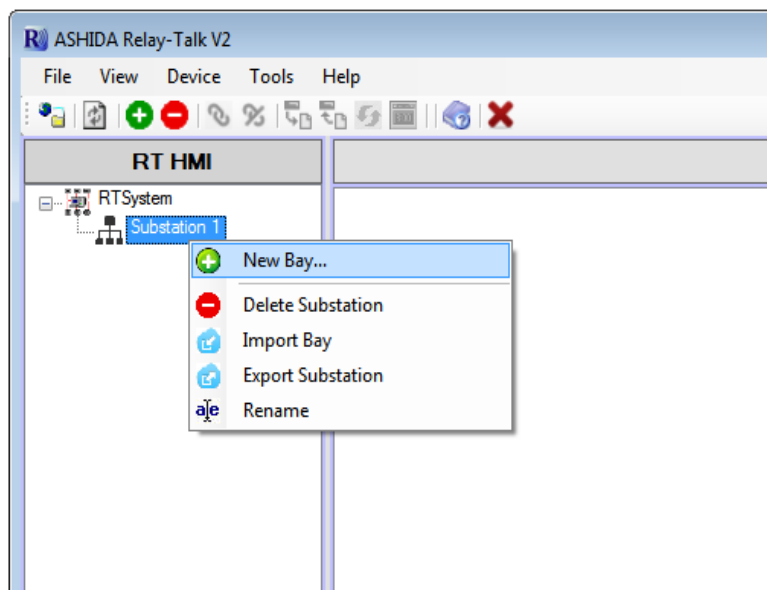
**Figure 15: Export substation dialogue**

In the “Export substation” dialogue, select a destination path and click Ok.

### 3.5 Bay

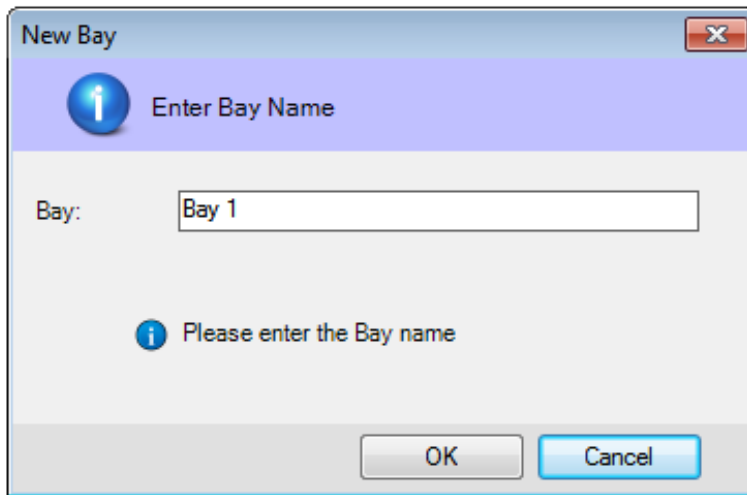
#### 3.5.1 Adding Bay to Substation

To add a new Bay right clicks on substation. Following context menu will appear.



**Figure 16: Add new Bay**

Click on “New Bay” following window will appear.

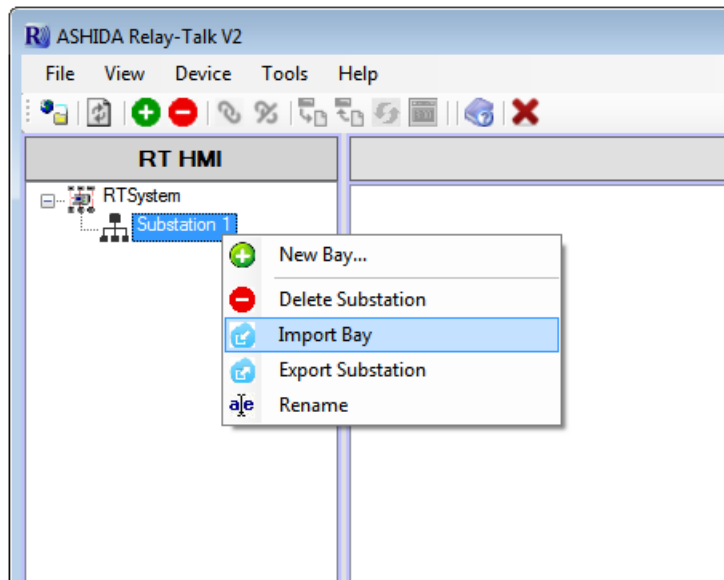


**Figure 17: Add new bay name**

Type a bay name and click OK. A new bay will be added to RT System.

### 3.5.2 Import Bay

To import bay right click on substation. Following context menu will appear.

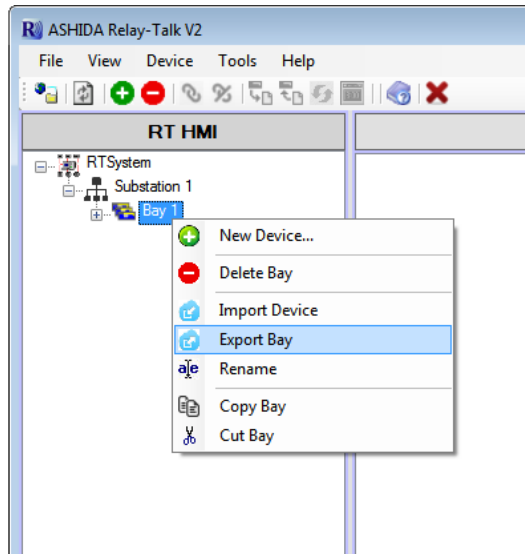


**Figure 18: Import Bay**

Now click on “Import Bay” .In the “Import Bay” dialogue select a system archive to import and click Open.

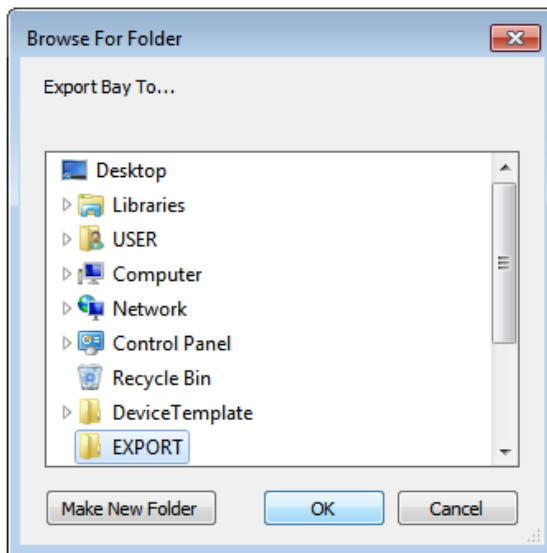
### 3.5.3 Export Bay

To export bay right click on Bay. Following context menu will appear.



**Figure 19: Export Bay**

Now click on “Export Bay” following window will appear.



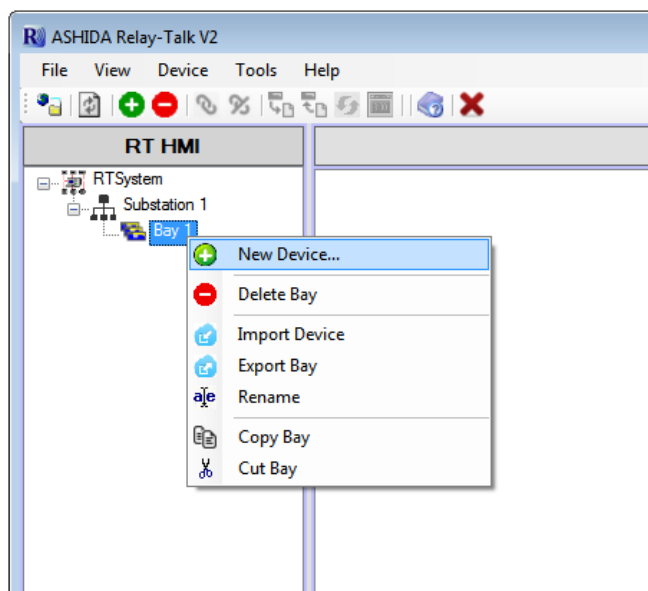
**Figure 20: Export Bay Dialogue**

In the “Export Bay” dialogue, select a destination path and click Ok.

### 3.6 Device

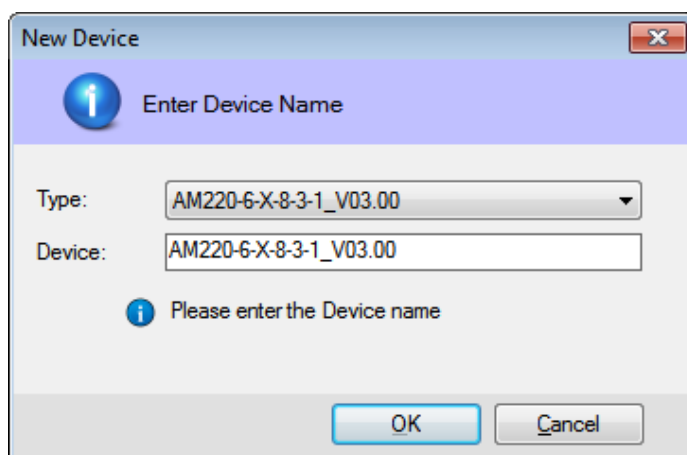
#### 3.6.1 Adding New Device

To add a device right click on bay and select “New Device”



**Figure 21: Add new device**

After Downloading the device template, Click on Add Device then list of Available Device templates will display as follows:



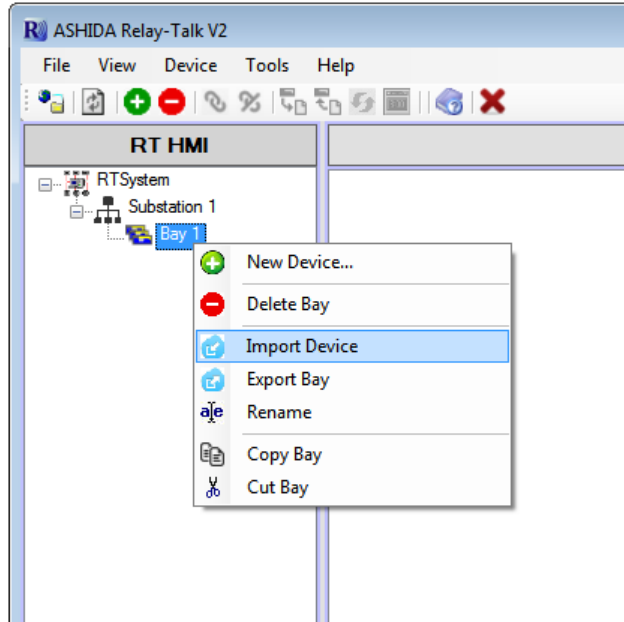
**Figure 22: Enter device name**

Choose suitable Device template from available types, type a device name and click Ok. New Device will be added to selected bay.



### 3.6.2 Import Device

To import device right click on bay. Following context menu will appear.

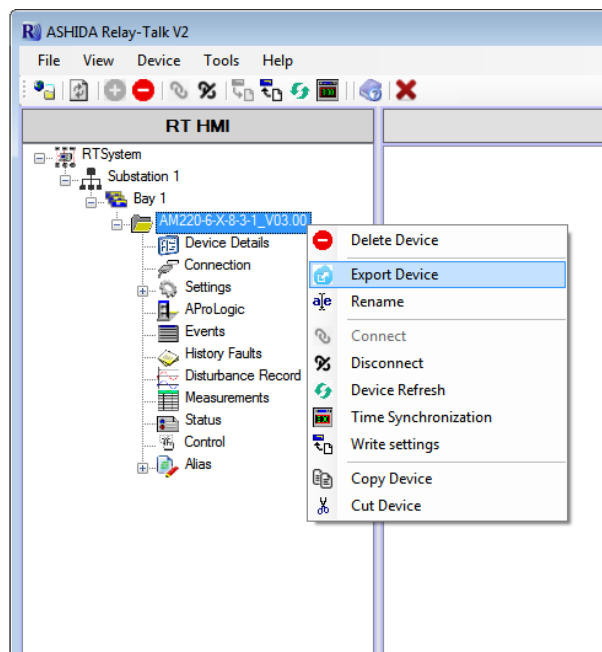


**Figure 23: Import Device**

Now click on “Import Device” .In the “Import Device” dialogue select a system archive to Import and click open.

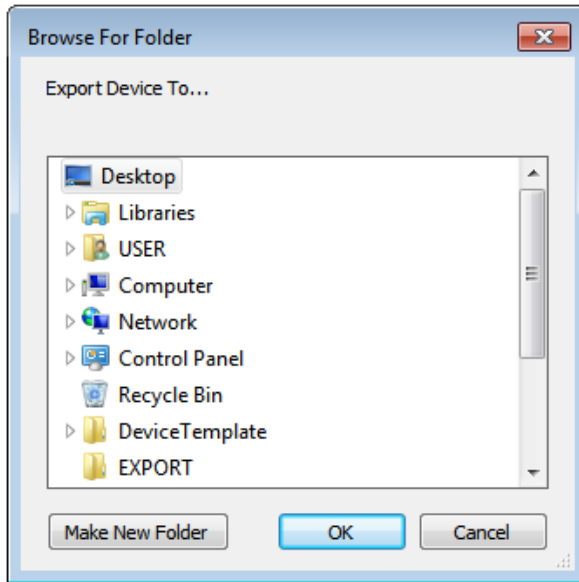
### 3.6.3 Export Device

To export device right click on Device. Following context menu will appear.



**Figure 24: Export Device**

Now click on “Export Device” following window will appear.



**Figure 25: Export Device dialogue**

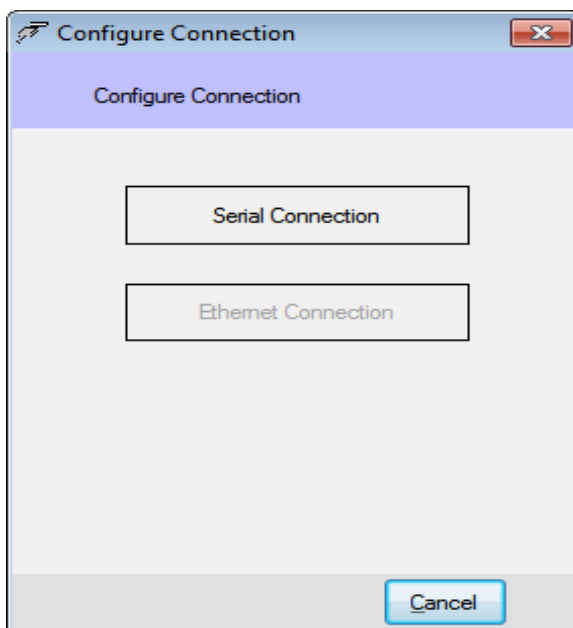
In the “Export Device” dialogue, select a destination path and click Ok.

### 3.7 Communication Setting

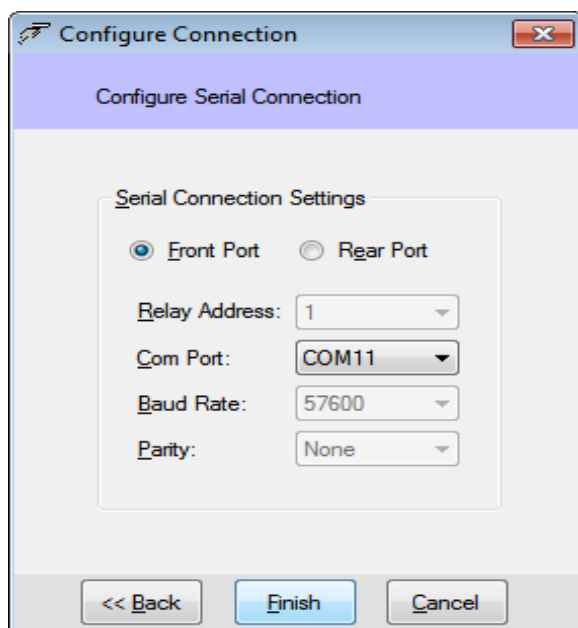
#### 3.7.1 Editing connection settings of Device

To Edit or Initialize Serial communication Settings Double click on Connection button.

Following window will appear on screen.



**Figure 26: Serial Connection**



**Figure 27: Communication settings**

Edit communication settings as required and click Finish to save.

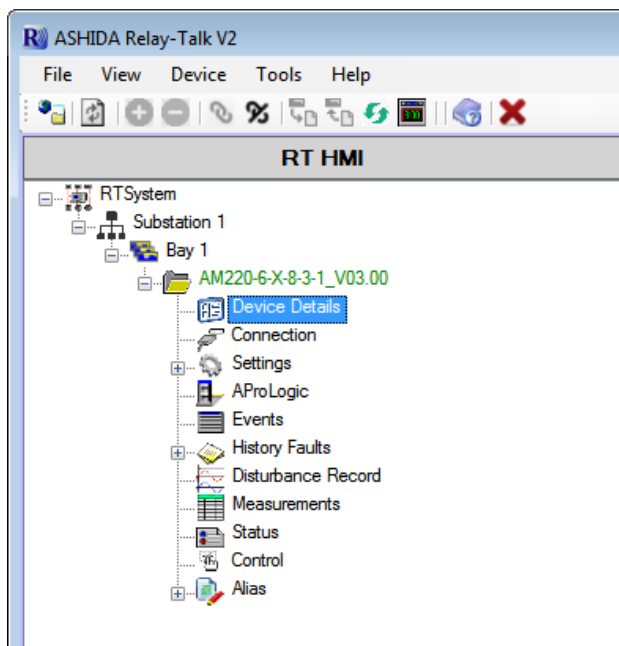
### 3.7.2 Communicating with Device

Once the communication settings are complete, then Device can communicate using ASHIDA Relay Talk System Version2. The Configurator internally uses a separate communication driver to communicate with the device. This communication driver communicates with the device using communication parameters (e.g. com port, baud rate, parity) supplied in device connection. Status of this driver is reflected in bottom status bar at the rightmost corner.



**Figure 28: Offline/Online status**

It is 'offline' in red background at the start of the system & turns to 'online' in green background, once the driver successful loaded. No communication with the device is possible till the driver is successfully started & is 'online'. Select the device and then click on Connect button.



**Figure 29: Connect to device**

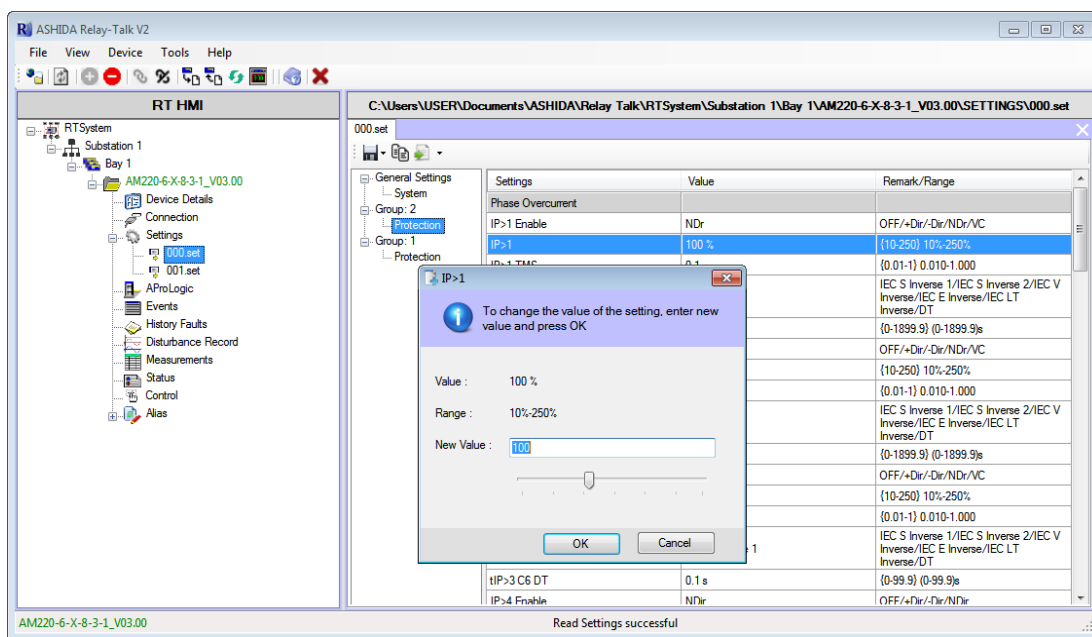
After successful communication device name will turn into green color.

### 3.8 Settings

#### 3.8.1 To View Settings files from Device

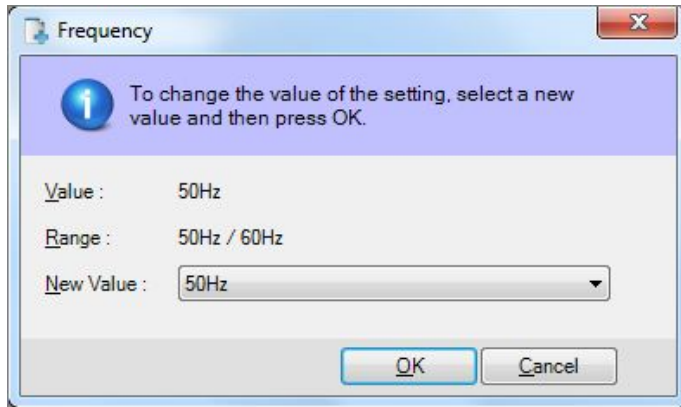
Stored settings can see under Settings node like 000.set etc.

To read the settings from device double click on Settings file, then following settings menu will appear on screen.



**Figure 30: ViewSettings File**

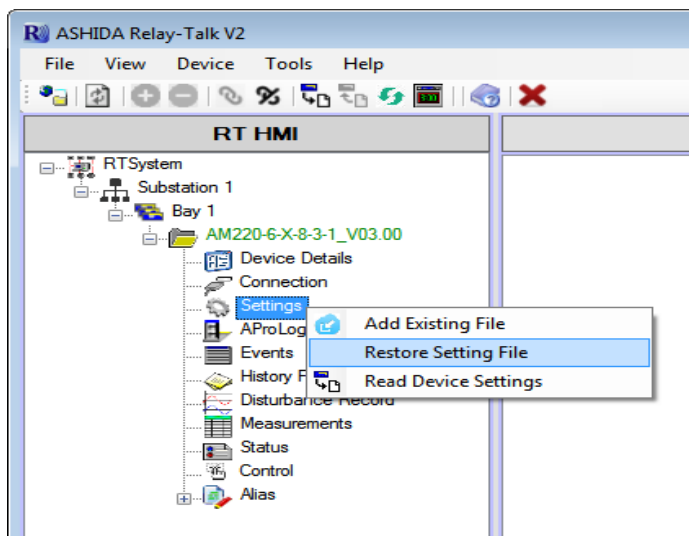
Note: - Settings with gray colored lines are Read-Only Settings. To edit the editable settings double click on the same.



**Figure 31: Edit settings file**

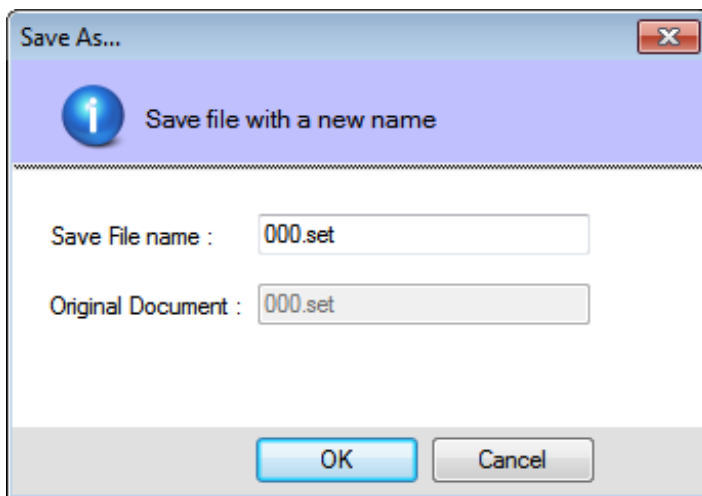
### 3.8.2 Downloading Settings from Device

To download settings from device, right click on Settings node. Following window will appear.



**Figure 32: Read device settings**

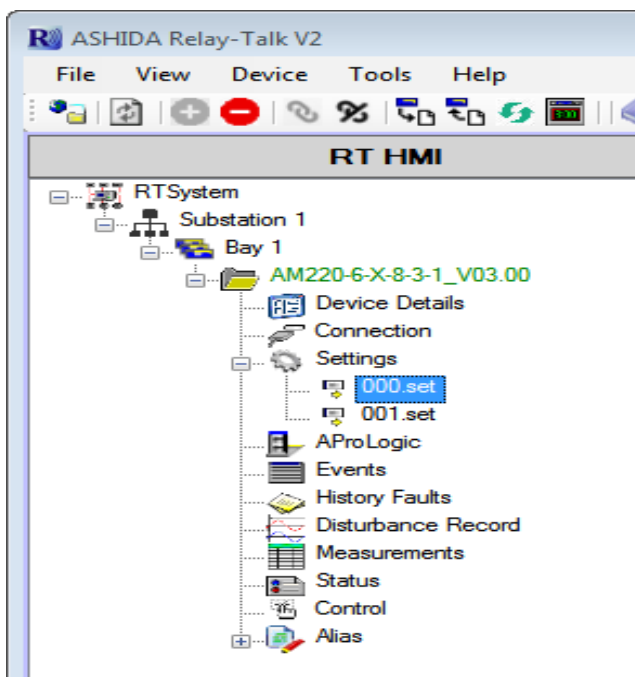
Click “Read Device Settings” to read the settings file. Following window will appear



**Figure 33: Read settings file name**

Type a setting file name and click Ok. It will download the device template.

After successfully reading the settings file of the device double click on set file. Following window will appear.

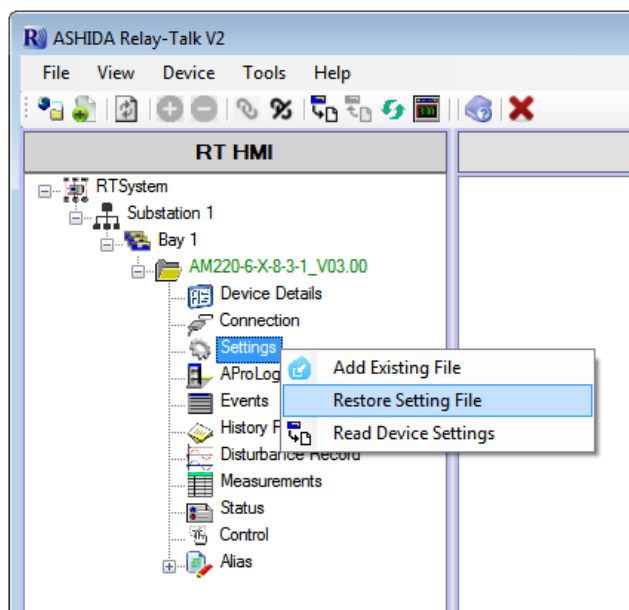


**Figure 34: New setting files display**

### 3.8.3 Restore Settings from Device

If there is no settings file available, it can be retrieve using “Restore Settings File” from Device Template.

To restore settings from device, right click on Settings node. Following window will appear.



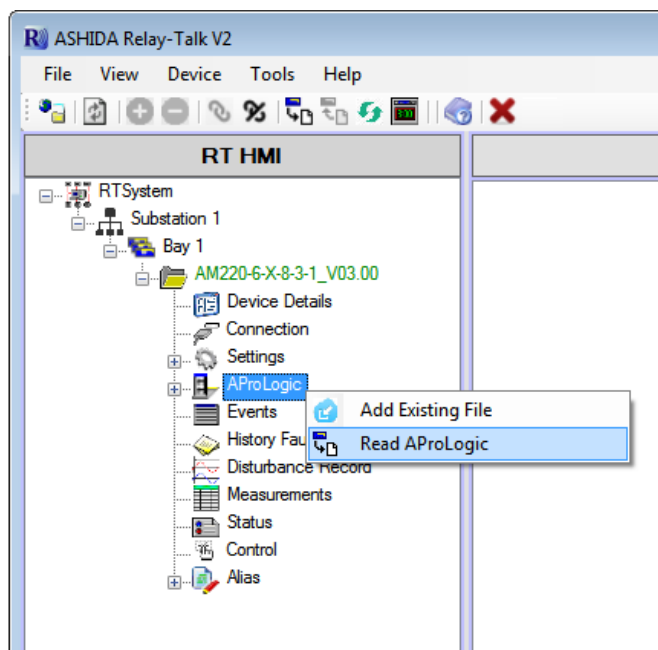
**Figure 35: Restore setting files**

Click “Restore Settings File” to restore the settings.

### 3.9 AProLogic

#### 3.9.1 Read AProLogic

To read new AProLogic file from the device right click on AProLogic and select 'Read AProLogic'. To open existing AProLogic file, double click on \*.apl file.



**Figure 36: Read AProLogic**

Save as dialog box will appear for saving the name of the file. Click OK to save the file.

### 3.9.2 Edit and Write the AProLogic to a Device

Select a device and expand AProLogic node. Double click on iom file and the file will open in the main document window. Select output, assign applicable inputs. Edit TOperating, TReset and HR/SR.

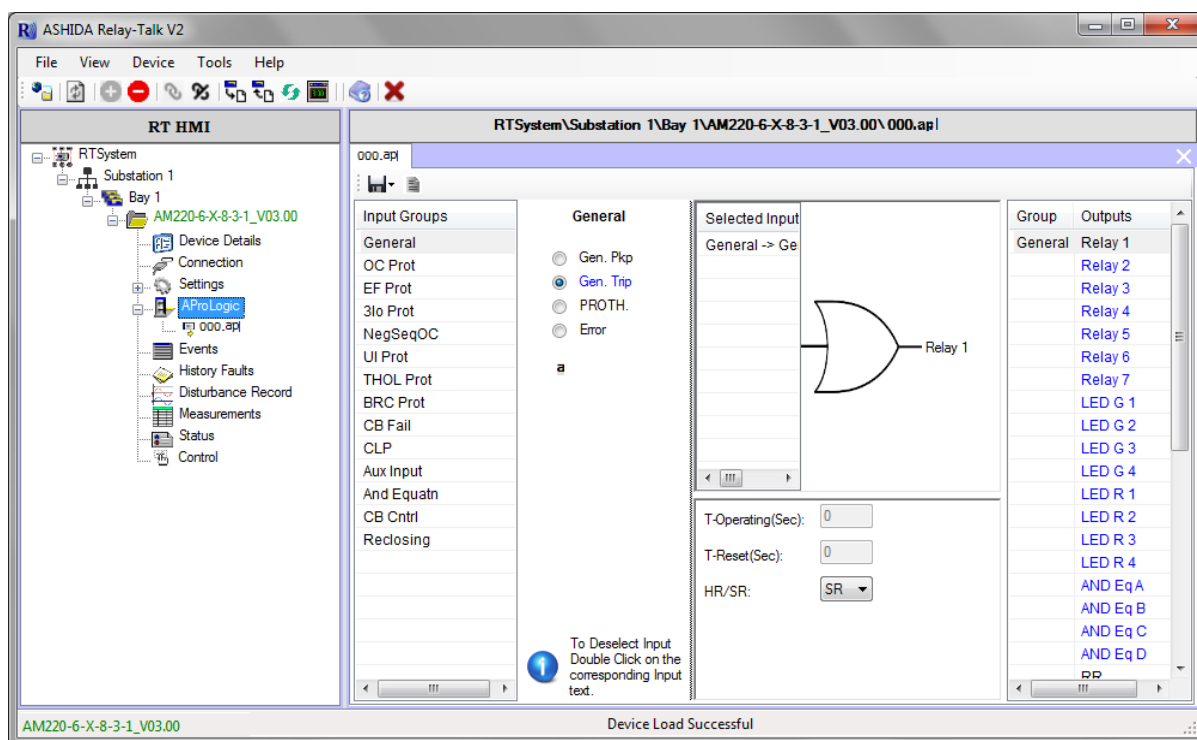


Figure 37: Edit TOperating, TReset and HR/SR

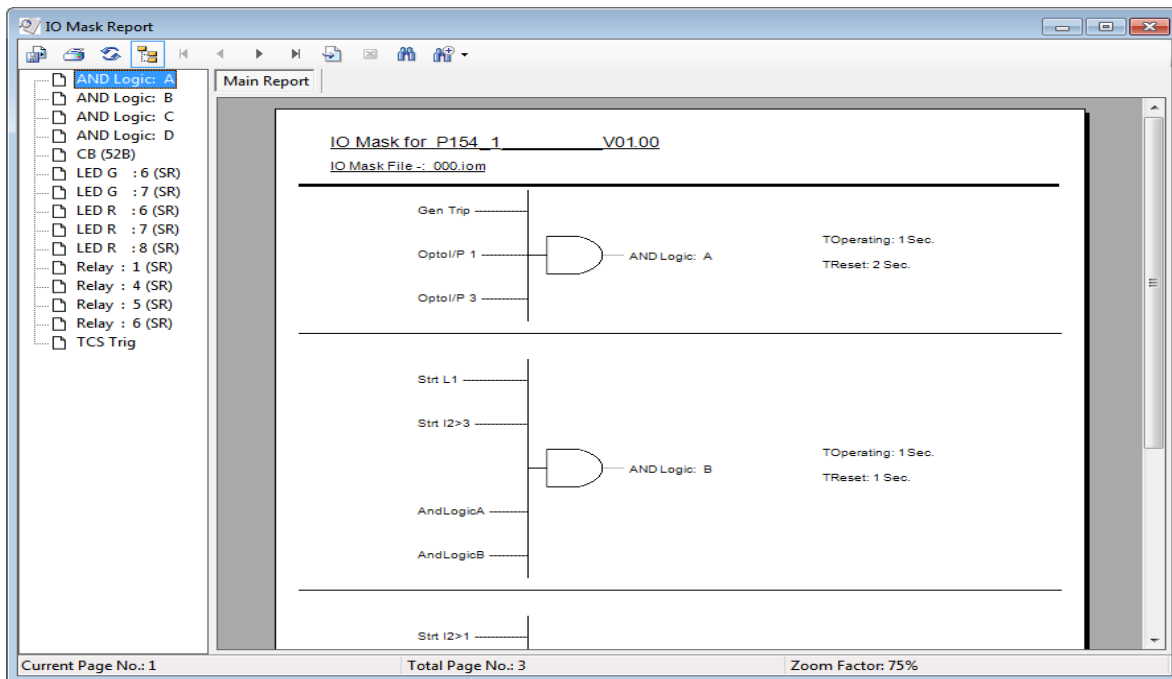
### 3.9.3 View AProLogic Report

To view AProLogic Report open “\*.apl” file and click on Report Option.



Figure 38: Save & Report



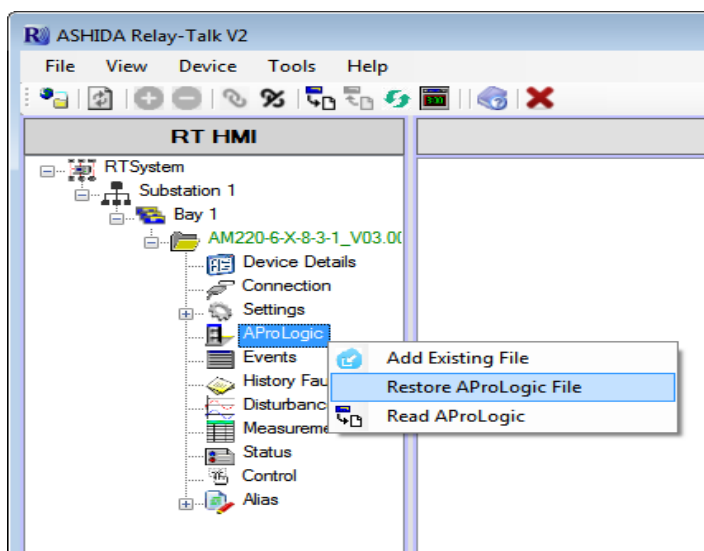


**Figure 39: AProLogic Report**

**3.9.4 Restore AProLogic from Device**

If there is no settings file available, it can be retrieve using “Restore Settings File” from Device Template.

To restore AProLogic from device, right click on AProLogic node. Following window will appear.



**Figure 40: Restore AProLogic files**

Click “Restore AProLogic File” to restore AProLogic.

### 3.10 Events

The event records can view directly on relay screen, or can view in ASHIDA Relay Talk System Version2.

When any Events occurs Event file will automatically generate under Events node or Events can be read from relay using 'Read Events'

#### 3.10.1 Read Events

To read new event file from the device right click on Events and select 'Read Events'.

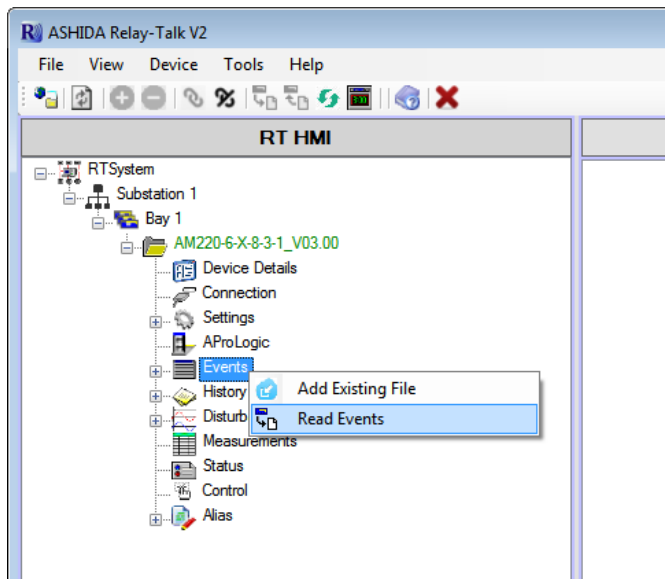
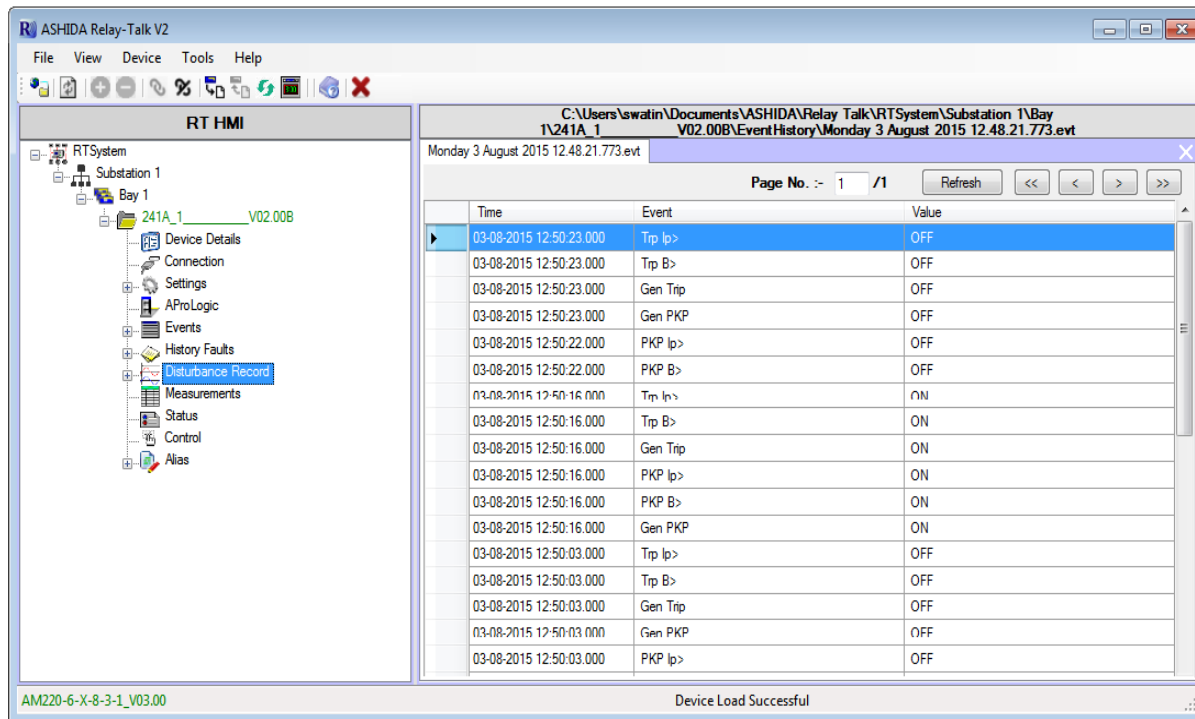


Figure 41: Read IO Mask

**3.10.2 To View Events**

To view events data, double click on Event file. Event list with time, date and parameters will display on screen. Following window will appear on screen.



**Figure 42: View Events**

**3.11 History Faults**

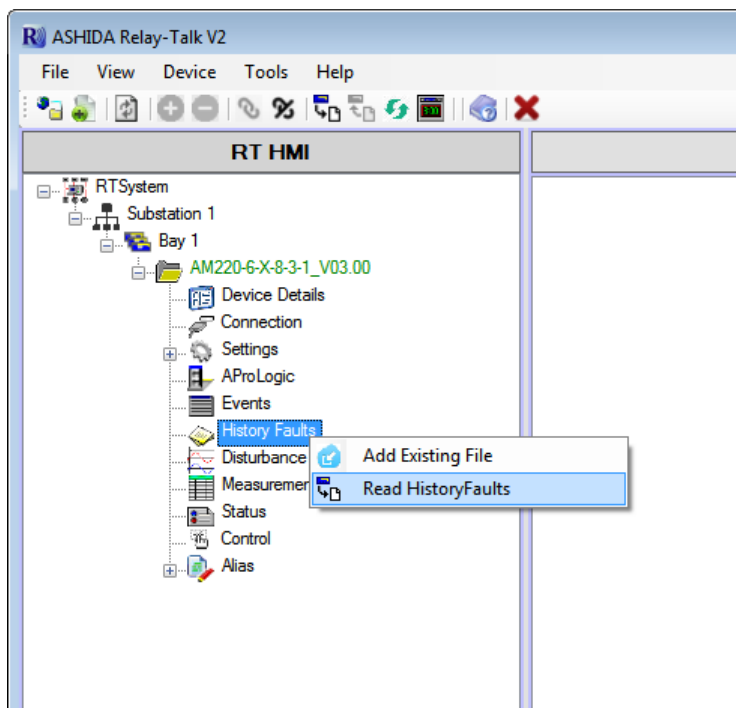
History Faults continuously recorded till the memory is available, when the memory will be full, the oldest fault automatically get erased and the new fault will recorded on the same. (Like First In First Out Logic)

Trip count, Tripping Timing, Fault Flags and Fault Value with Time and date will display in history faults.

**3.11.1 To read the History Faults from Device**

To Read history Faults from device right click on History Faults then click on Read History Faults. Following window will appear on screen.

History file will added under the History Faults node.

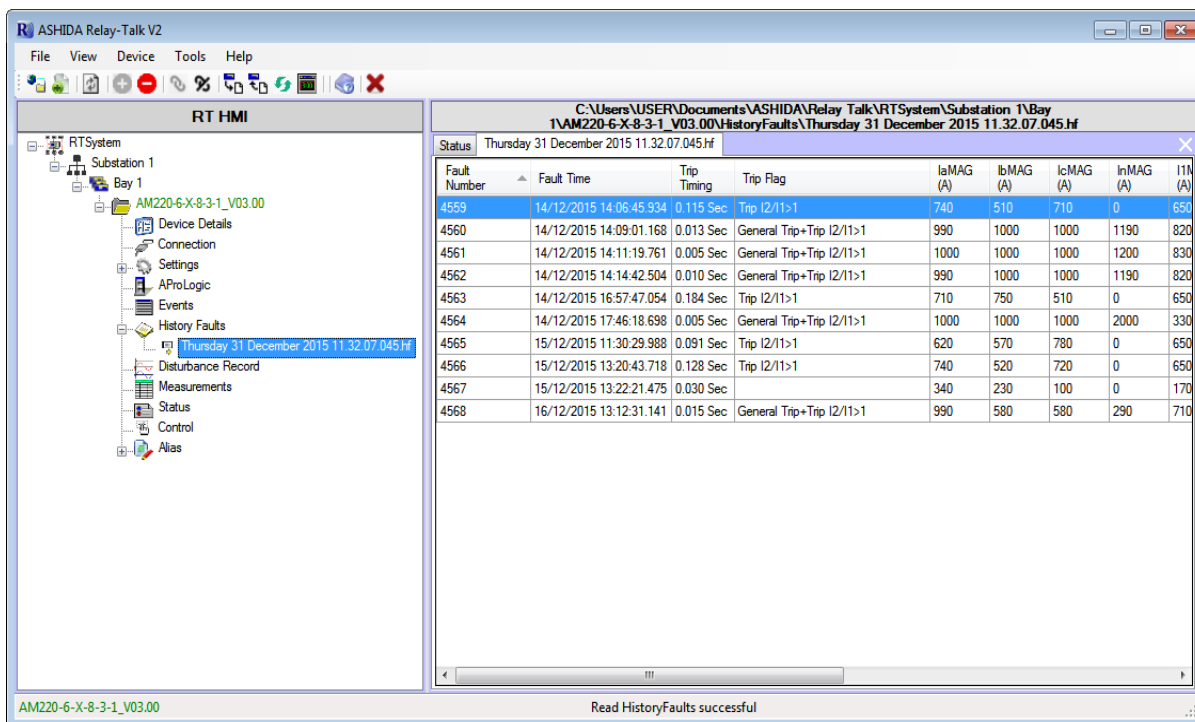


**Figure 43: Read History faults**

**3.11.2 To view the History Faults file**

To View the History Fault file double click on respective History Fault file.

Following window will appear on screen.



**Figure 44: View History Faults file**

### 3.12 Disturbance Record

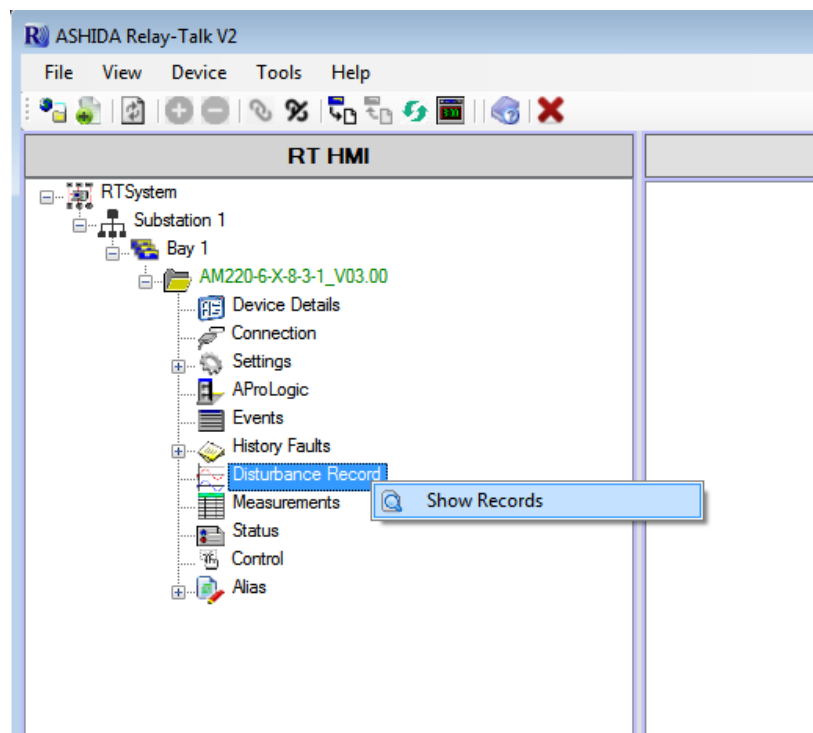
Disturbance record continuously recorded till the memory is available, when the memory will be full, the oldest record automatically gets erased and the new record will record on the same. (Like First In First out Logic).

Disturbance record stores 12 samples per cycle. The same record can be shown in ASHIDA Relay Talk System Version2. The following window shows the recorded disturbance record.

#### 3.12.1 Show the Disturbance Record from Device

To View Disturbance Record right click on 'Disturbance Record'.

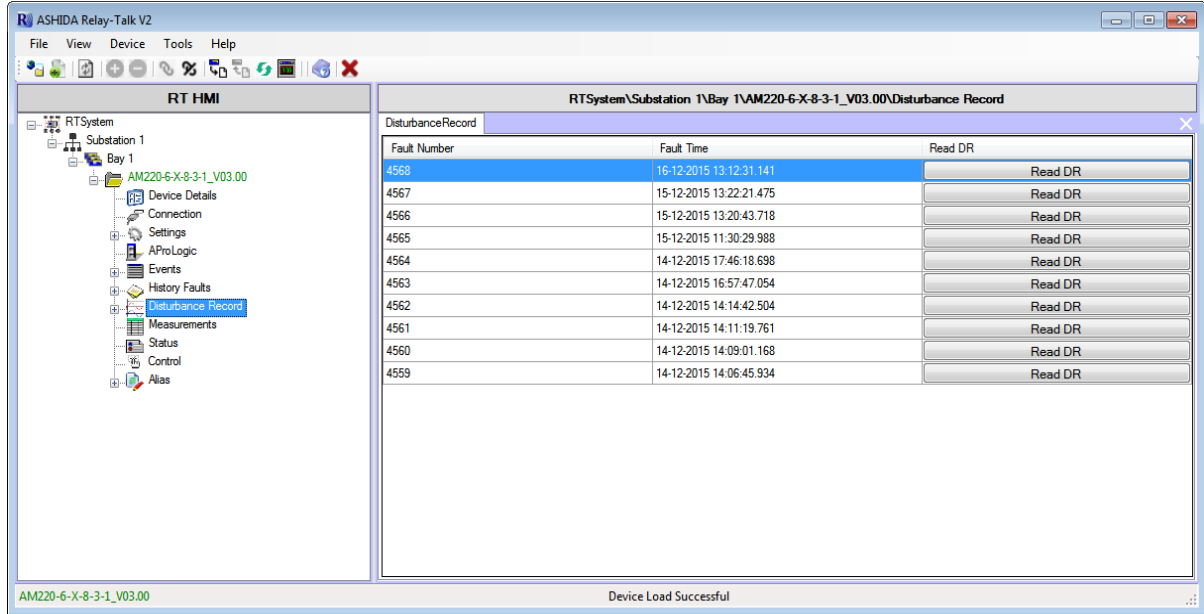
Following window will appear on screen.



**Figure 45: Show Disturbance Record**

**3.12.2 Read Disturbance Record from Device**

To extract disturbance record click “Read DR” from the grid. Following window will appear.

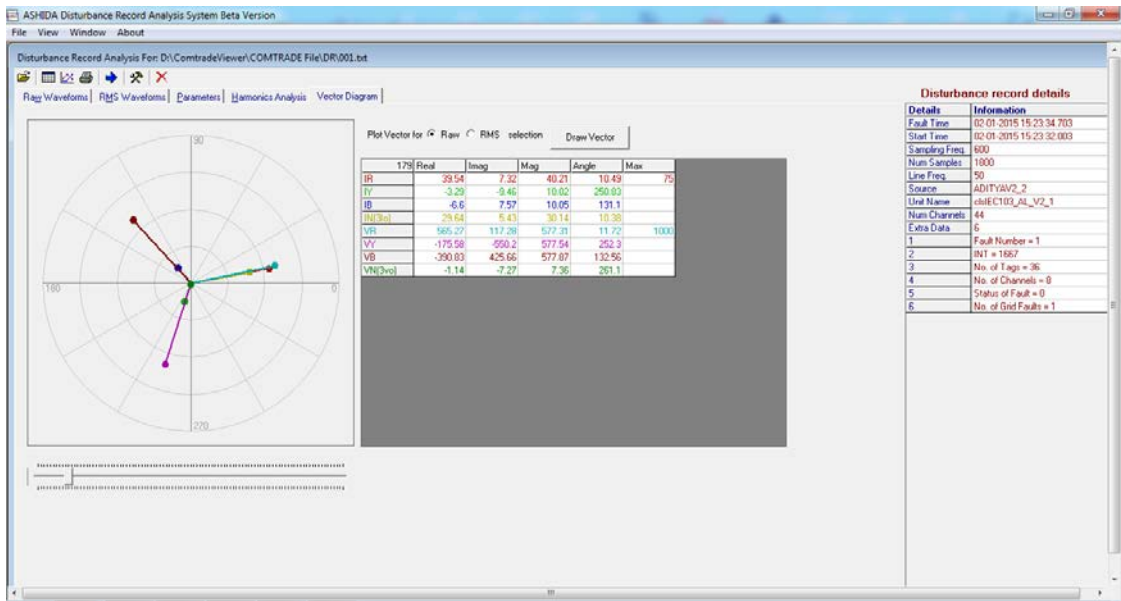


**Figure 46: View Disturbance Record**

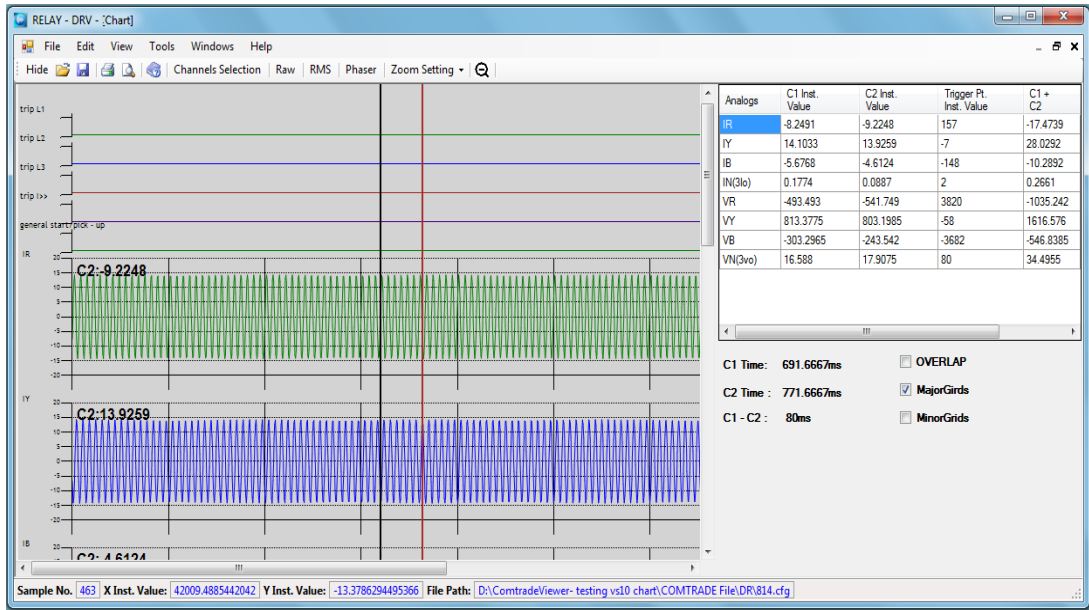
After successful reading, extracted disturbance record file will appear in the Disturbance record node.

**3.12.3 View Disturbance Record file**

To view the disturbance record file double click on the file. It will open the file in DR Analysis and RELAY-DRV.



**Figure 47: View disturbance record in RELAY-DRV**

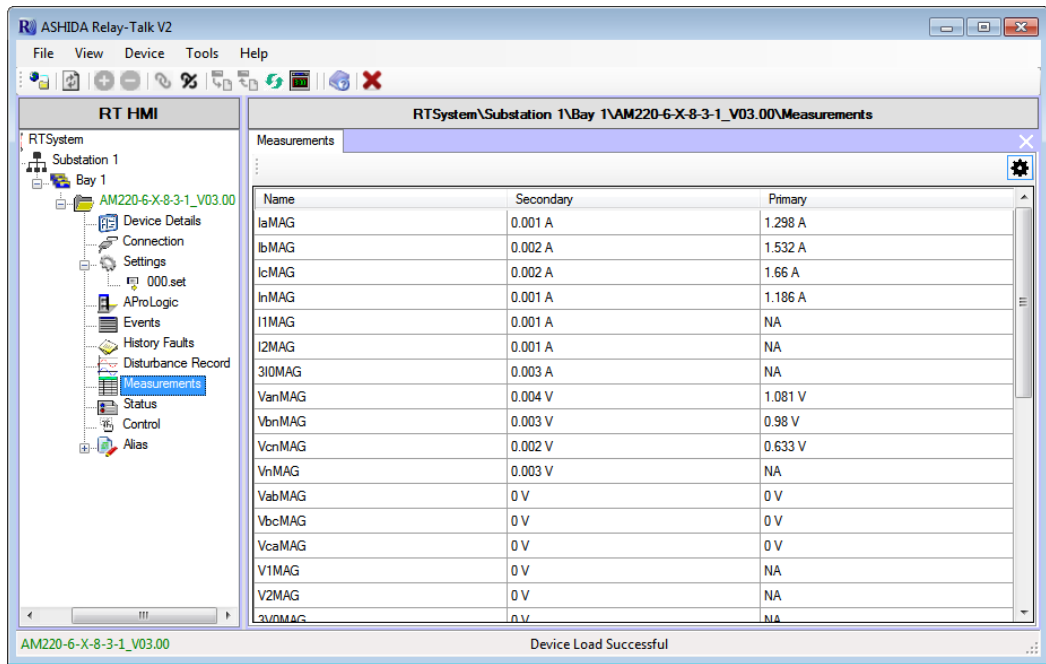


**Figure 48: View disturbance record in RELAY-DRV**

**3.13 Measurements**

The relay produces a variety of both directly measured values and calculated values. These measurement values are updated on a per second basis and can view in the “Measurements” columns on the relay screen or via ASHIDA Relay Talk System Version2.

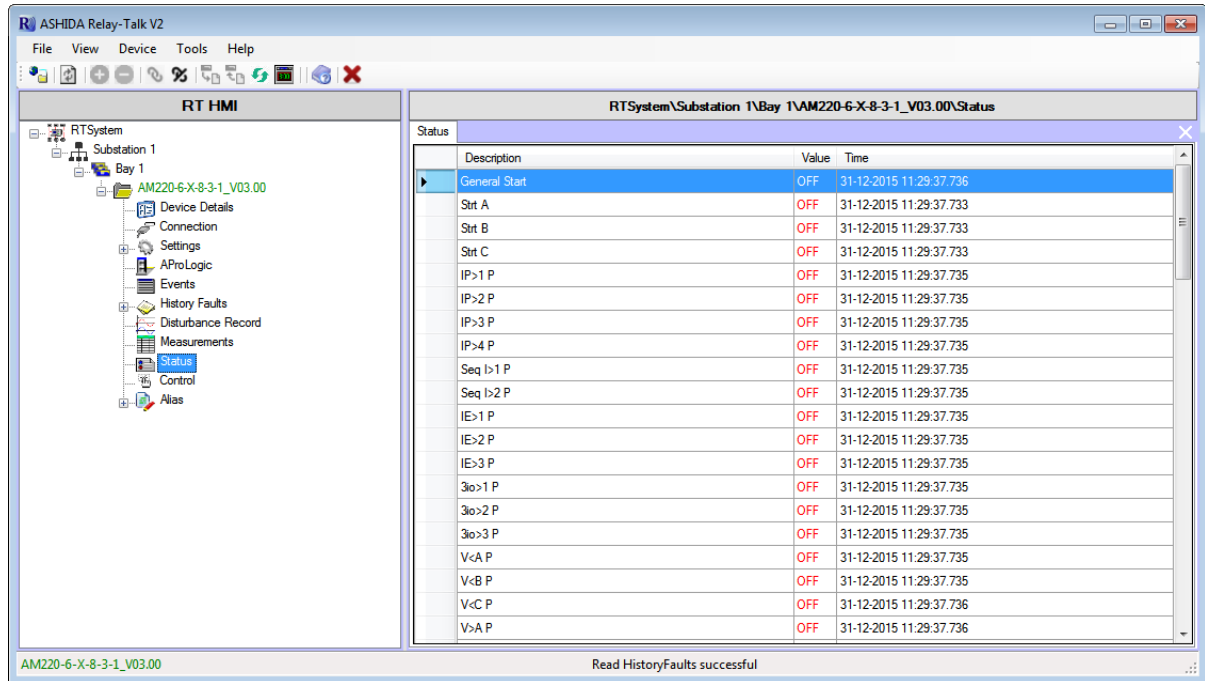
To view online measurements from device double click on Measurement node. Measurements will be shown as follows:



**Figure 49: View Measurements**

### 3.14 Status

Status Screen is provided to view the online value of the status. To view status, right click on Status node and select show status. Status list screen will appear with value and time.



**Figure 50: View Status**

### 3.15 Options

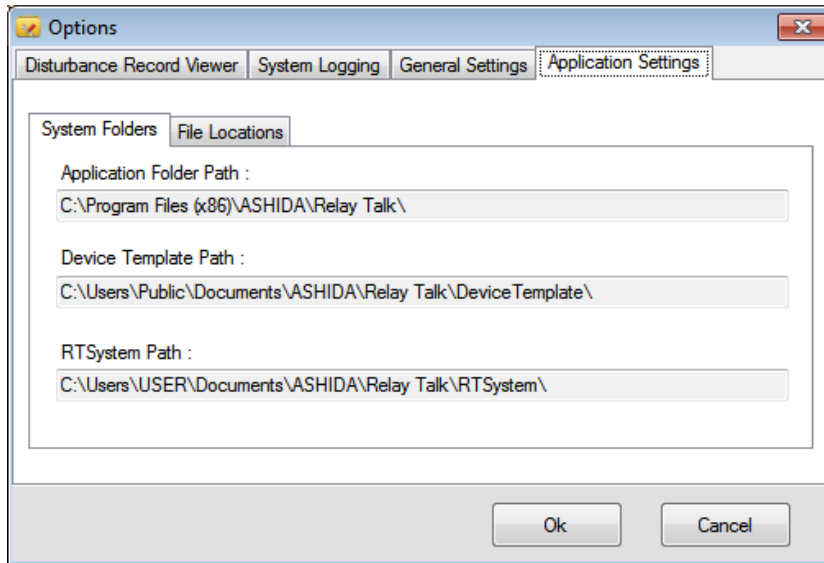
This section will give list of path and Settings associated with this Configurator. To view this screen, click on Options under Tools.

#### 3.15.1 System Folders Information

In this screen user will find Application system paths those are as follows:

- Application Folder Path
- Device Template Path
- RT System Path



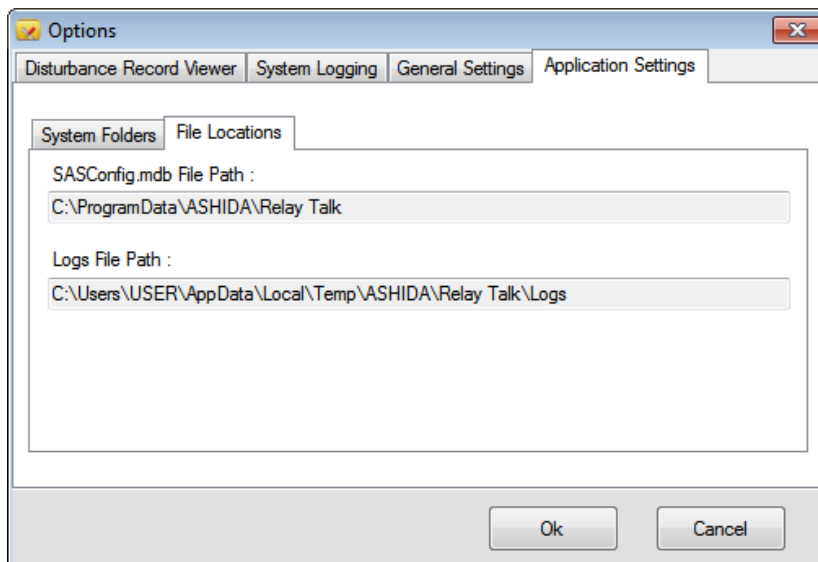


**Figure 51: System Folder Information**

### 3.15.2 File Location Information

In this screen user will find Application file paths those are as follows:

- SASConfig.mdb File Path
- Log File Path



**Figure 52: File Location Information**

### 3.15.3 General Settings Information

In this screen user will find General Setting of Device Timeout those are as follows:

- Device connect Timeout(Sec)
- Device Read Timeout(Sec)
- Read DR Timeout(Sec)

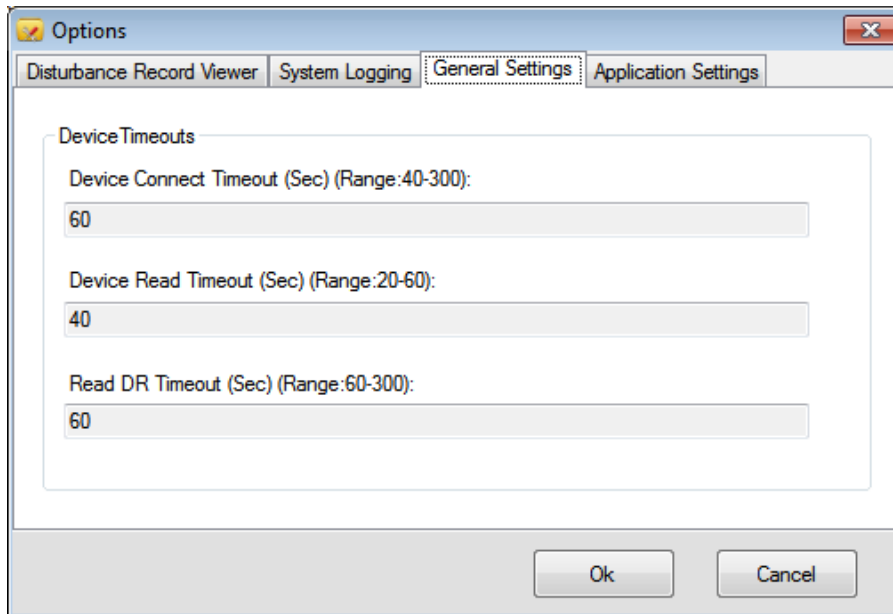


Figure 53: *General Settings Information*

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# Section 4

## Protection and Logic Function

## Contents

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## 4 PROTECTION FUNCTION & LOGIC FUNCTIONS

### 4.1 Overview

This section describes the A21M Motor Protection IED settings, including the protection elements and basic functions, control I/O logic, as well as the settings associated with the protection function.

#### **Application data.**

Describes the list of information that you will need to know about the protected equipment before calculating the relay settings.

#### **GENERAL SETTINGS.**

List of the general settings that need to be configured for the proper operation of the relays.

#### **CB Control By**

Describes all the CB Control and Trip circuit supervision settings and its logic needed for Circuit Breaker control and monitoring

#### **Emergency Restart:**

Describes restart the motor on emergency condition and logic needed for Emergency restart function

#### **Phase Overcurrent.**

Describes all the over current settings and logic needed for protection for the Phase over current fault

#### **Ground OC.**

Describes all the externally measured Ground over current settings and logic needed for protection for the Phase to Ground fault.

#### **Residual OC.**

Describes all the internally derived Ground over current settings and logic needed for protection for the Phase to Ground fault. .

#### **NPS overcurrent.**

Describes all the Negative Sequence Over current settings and logic needed for protection for the Phase reversal or broken conductor fault.

**Thermal Overload.**

Describes all the Thermal Overload IED settings and logic needed for Thermal Overload built by Program logic control.

**Broken Conductor.**

Describes all the Broken Conductor IED settings and logic needed for Broken Conductor.

**Under Current.**

Describes the Under Current settings and logic needed for protection for the under current fault.

**Prolong Start detection.**

Describes all the prolong start detection settings and logic needed for prolong start detection.

**Load Jam.**

Describes all the Load Jam settings and logic needed for stall rotor during running condition.

**Number of starts.**

Describes all the limit no of start setting during hot, cold, and logic needed for limit no of start.

**Breaker Failure (50BF).**

Describes all the Breaker Failure settings and logic needed for Breaker failure on internal protection trip or external BF initiation.

**Programmable Logic control.**

Describes programmable and logic equation that the user can build their own logic for various application

## 4.2 Application Data

It is required to have the field data which is used to calculate the parameter settings which has to be set in the IED. Hence the following inputs are required to calculate the parameter settings in the relay.

Specifications of the protected motor, including the following details:

- Rated full-load current
- Service factor
- Locked rotor current
- Maximum locked rotor time with the motor at ambient and/or operating temperature

- Maximum motor starts per hour, if known
- Minimum time between motor starts, if known
- Full-load slip, per unit
- Locked rotor torque, per unit

Additional data regarding the motor application, including the following information:

- Minimum no load current or power, if known
- Motor accelerating time. This is the normal time required for the motor to reach full speed.
- Maximum time to reach motor full load

This time may be significantly longer than the motor accelerating time, particularly in pump motor applications where the motor may run at full speed for some time before the pump reaches full head and full load.

Current transformer primary and secondary ratings and connections

- System phase rotation and nominal frequency
- Voltage transformer ratios and connections, if used
- Expected fault current magnitudes for motor or cable ground and
- Three-phase faults
- Highest expected load current.
- Current transformer primary and secondary ratings and Connections
- Voltage transformer ratios and connections
- System nominal frequency
- Motor name plate details.
- Expected fault current magnitudes for ground and three-phase Faults

### 4.3 General Settings

#### Communication setting

The Communication settings of A21M IED are listed the below table which is necessary for the communication between the IED and Personal computer.

**Table1. The Communication settings**

Sr. No.	Setting Parameters	Setting ranges
1.	USB Address	0001 - 0250
2.	USB Port	USB/ RS485
3.	USB Parity	None/Even/Odd
4.	USB Baud rate	9600/14400/19200/28800/38400/57600



The above settings are used to establish the proper communication between the IED and Relay Talk V2 software from the Computer. The above settings should be set the same in configuration as well in the IED for the successful communication.

The USB port settings (USB Parity and Baud rate) are fixed i.e. Parity: None and Baud rate: 57600.

**Frequency Setting**

The Current transformer setting is required to set for perfect scaling for current measurement. The primary and secondary values of current settings are set in the IED and system nominal frequency as given below table

**Table 2. The frequency setting**

SL.NO	Setting Parameters	Setting ranges
1.	Frequency	50Hz/60Hz

The above setting is to be set based on the Electrical power system parameters to establish the proper measurement of current in the IED.

**CB Operation**

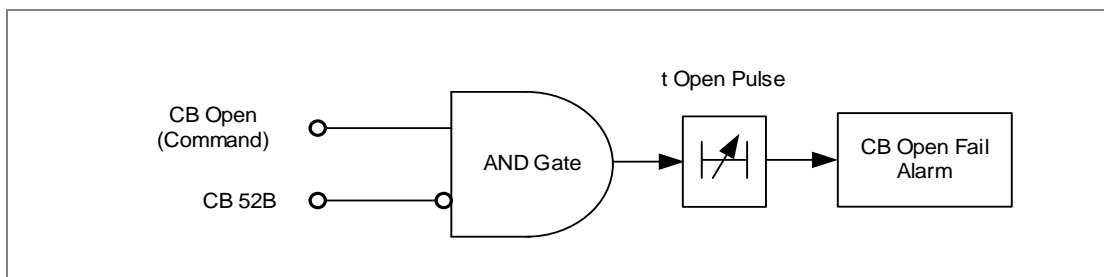
The user can close or open circuit breaker using software at remote end.

The Circuit Breaker (CB) can be control either locally through Relay HMI or remotely through SCADA system Type of Control operation can be set from “CB Control By” menu (i.e. Disable, Local, Remote or Local + Remote) in the “CB Control menu” .

For CB OPEN command:

Once CB Open command is received from locally or remotely, the assigned relay contact to the CB trip will operate, simultaneously the relay starts monitoring Status of opto input CB(52B), if the status of CB(52B) is not active with in “t Open Pulse” (CB open pulse time) (settable in the range of 0.1 to 50 sec), then relay generate “CB Open Fail Alarm” on LCD display and event will be stored in Event Record. The ALARM can be assign to any LED or relay output.

The operation of Open Fail is explained in following diagram:

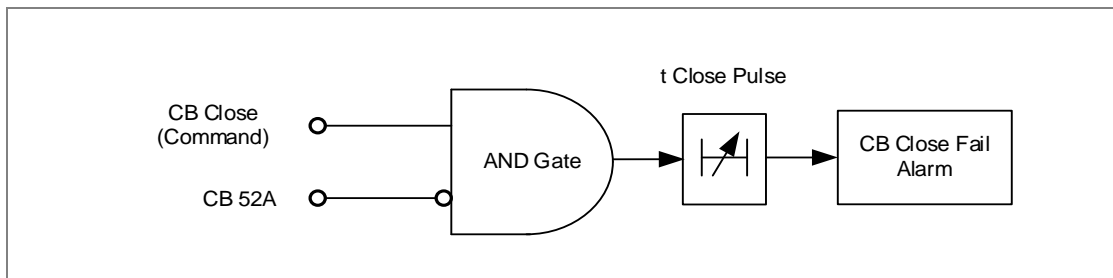


**Figure 1: CB Open Fail Alarm**

For CB CLOSE command:

Once CB Close command is received from locally or remotely, the assigned relay contact to the CB close will operate, simultaneously the relay starts monitoring Status of opto input CB(52A), if the status of CB(52A) is not active with in “t Close Pulse “ time (CB close pulse time) settable in the range of 0.1 to 50 sec, then relay generate “CB Close Fail Alarm” on LCD display and event will be stored in Event Record. The ALARM can be assign to any LED or relay output.

The operation of Close Fail is explained in following diagram:



**Figure 2: CB Close Fail Alarm**

#### 4.4 CB Control By

##### CB Supervision Function:

An operator at a remote location requires a reliable indication of the state of the switchgear. Without an indication that each circuit breaker is either open or closed, the operator has insufficient information to decide on switching operations. The A21M relay incorporate a circuit breaker and trip circuit monitoring function , giving an indication of the position of the circuit breaker contacts and trip circuit healthiness. This indication is available either on the relay front panel or via the communications network.

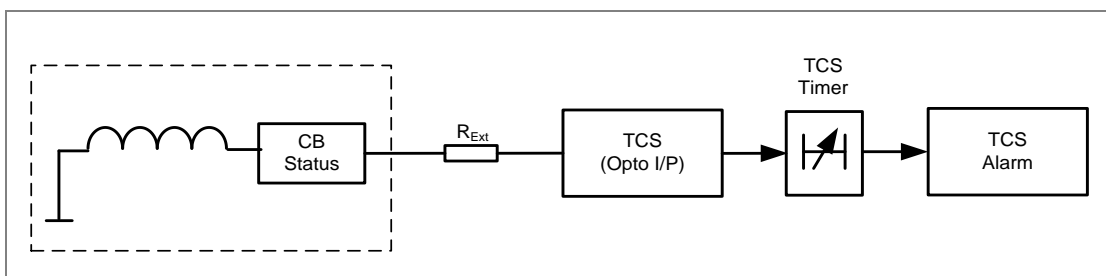
The circuit breaker state monitoring function is available in CB CONTROL menu.

##### Trip Circuit Supervision Alarm

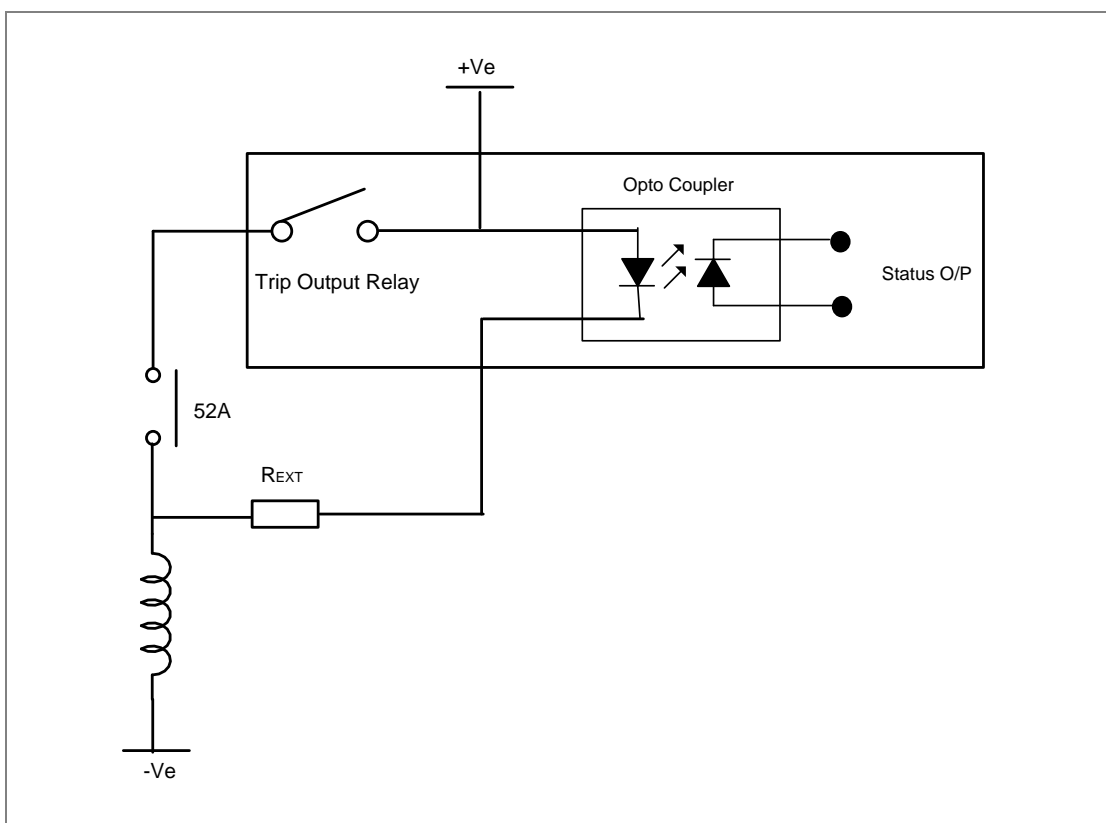
The trip circuit supervision is use to monitor healthiness of circuit breaker. The trip circuit extends beyond the relay enclosure and passes through more components, such as fuse, wires, relay contacts, auxiliary switch contact and so on. The failure of any one of component result bypassing the protection. The relay is provide with special trip circuit supervision function which continuously monitor continuity of trip circuit and generate ALARM to take appropriate action.

The following diagram explain the logic of trip circuit supervision function, It monitor continuity of trip circuit through either normally open (NO) or normally close (NC) contact of CB connected to opto isolator digital input assigned to TCS. If any discontinuity is observed,

then the relay generates TCS Alarm after a settable time delay (TCS Timer). An Alarm message is displayed on LCD display and Event is stored in the Event Record.



**Figure 3: Trip Circuit Supervision Principle Diagram**



**Figure 4: Trip Coil Monitoring external wiring**

**Calculations for External Resistor:**

The value of External Resistor is depending upon the minimum current required for opto coupler for sensing. The minimum current is 0.18 mA for opto coupler which is used in A21M while the maximum current capacity of opto coupler is 10mA. For the safe operation, the current should be always between minimum required current and maximum current capacity of opto coupler in worth condition. The maximum current is limited by internal

resistor ( $R_{Int.}$ ) connected in series with Opto coupler. The value of this internal resistor ( $R_{Int.}$ ) is 82 K $\Omega$  (Ohm).

For safety of trip coil user can use additional external resistance. In case of any failure in internal resistance of opto coupler circuit of A21M relay, this resistance limit the current to safe value. We recommend using a 2.5 K $\Omega$  / 50W resistor for all type of auxiliary power supply.

$$R = V_{aux} / (I_{sense})$$

Where

$$R = R_{Ext.} + R_{Int.}$$

$R_{Int.}$  = Internal Resistance 82 K $\Omega$  (Fix)

$R_{Ext.}$  = Resistance connected Externally (Recommended 2.5 K $\Omega$ )

$V_{aux}$  = Auxiliary Voltage

$I_{sense}$  = Minimum current required for opto coupler for sensing. (0.18mA)

$I_{trip}$  = Minimum current require to operate the trip coil. (1A assumed).

The minimum current calculation at various auxiliary supply voltages are given below:

#### **Lowest auxiliary supply (24 Vdc x 80% ) condition**

$$I_{sense} = V_{aux} / R$$

$$I_{sense} = 19.2 / 84.5 \times 10^3$$

$$I_{sense} = 0.227 \text{ mA.}$$

This is above minimum operating current value.

#### **Maximum auxiliary supply condition (230 Vdc x 120% ) Auxiliary Supply**

$$I_{sense} = V_{aux} / R$$

$$I_{sense} = 276 / 84.5 \times 10^3$$

$$I_{sense} = 3.26 \text{ mA.}$$

This is above minimum operating current value and below maximum current limit

The power dissipated across resistor at this condition.

$$\begin{aligned} P &= I^2 \times R_{Ext} \\ &= 3.26\text{mA} * 3.26\text{mA} \times 2.5\text{kOhm} \\ &= 0.026\text{W} \end{aligned}$$

If Opto input is get shorted to and total auxiliary supply voltage appear across external resistor (considering resistance of trip coil is negligible) the power dissipation across external resistor

$$\begin{aligned} P &= V^2 / R \\ &= 276 \times 276 / 2500 \\ &= 30.47 \text{ W which is below wattage handling capacity of Resistor} \end{aligned}$$

In such condition current flowing through trip coil

$$I = 276/2500$$

= 0.11A which well below to operate trip coil.

Thus, 2.5k / 50W resistor is sufficient for all condition

**CB Open Supervision and CB Open Operation Alarm**

Periodic maintenance of circuit breakers is necessary to ensure that the trip circuit and mechanism operate correctly and also that the breaking capability has not been compromised due to previous fault interruptions. Generally, such maintenance is based on a fixed time interval. These methods of monitoring circuit breaker condition give a rough guide only and can lead to excessive maintenance. The relays record various statistics related to each circuit breaker trip operation, allowing a more accurate assessment of the circuit breaker condition to be determined. For each circuit breaker trip operation the relay records statistics as shown in the following

<b>Record in Measurement</b>	<b>Description</b>
BOT	“Breaker Opening Time” This is a circuit breaker opening time in ms.
BOC	“Breaker Opening Counter” This is counter indicate numbers of CB operation.
TC	“Trip Counter” This counter indicate numbers of protection trip.

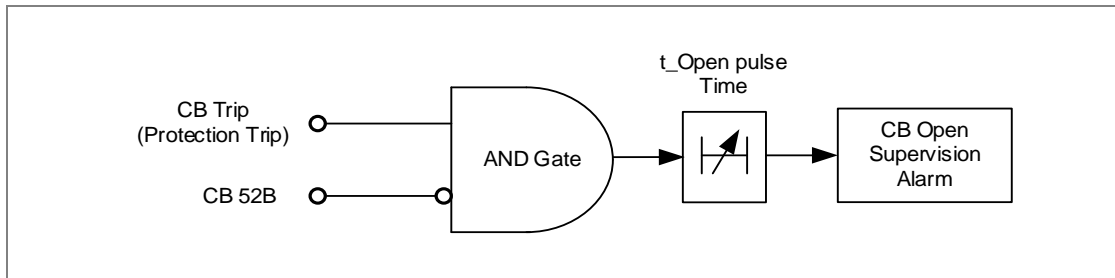
The above counters in the CB condition monitoring function may be reset to zero, after maintenance inspection and overhaul.

CB Open Supervision - Slow CB operation is also indicative of the need for mechanism maintenance. Therefore, an alarm is provided and is settable in the range of 50 ms to 1s. This time is set in relation to the specified breaking time of the circuit breaker.

The diagram indicate operation CB open supervision logic

The relay starts internal timer as soon as any protection function is operated, and monitor CB operation through CB52B contact assign to any of binary input through IO CONFIGURATION.

If breaker opening time is more than set “CB Open Time” then relay generates CB Open Supervision ALARM. An Alarm message is displayed on LCD display and the start LED is start blinking & event is stored in Event Record. (Note that this time also include contact operating time of relay and time between CB main contact and auxiliary contact if any).



**Figure 5: CB Open Supervision**

**CB Open Operation Alarm:** - For each circuit breaker trip operation, the relay records statistics. CB Operations Displays the number of opening commands executed by the CB. Every operation of a circuit breaker results in some degree of wear for its components. Thus, routine maintenance, such as oiling of mechanisms, may be based upon the number of CB operations. The relay A21M monitor the circuit breaker operation maintain by two type of counters, one is TC “Breaker Trip counter” which will increment when relay provide trip command based on operation of protection function and second one is BOC “Breaker Opening Counter” will increment when the state CB 52B Opto I/P change low to high (which is connected to CB NC Contact). The relay compare “Breaker Opening counter” with “CB Open operations” setting when counter cross the set value relay generate CB Open Operation ALARM, indicating when preventative maintenance is due. An Alarm message is displayed on LCD display and the start LED starts blinking & event is stored in Event Record.

## 4.5 PROTECTION

### 4.5.1 Inrush Blocking

An electric distribution circuit experiences a magnetizing inrush current as soon as circuit breaker closed; this high current can cause over current or Earth fault Elements to operate unnecessarily. The A21M relay provide “2nd Hrm BLK” (2nd Harmonic Blocking) function to avoid the maloperation of the relay when feeder circuit experiences a inrush current.

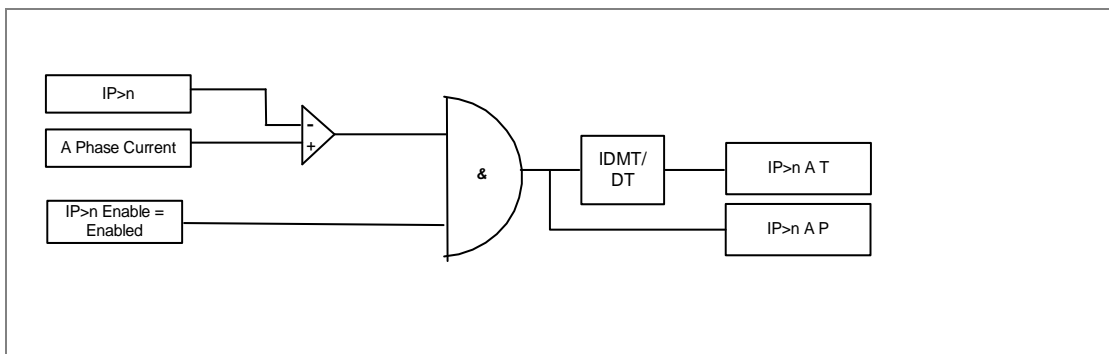
Blocking of a protection function can be prevented if “Disable” is selected in the relevant setting. Blocking of a protection function can be enabled if “Enabled” is selected in the relevant setting.

Through the Inrush Blocking menu, the user can set a 2nd Harmonic blocking threshold and block each over current/ Earth fault and Negative sequence over current protection functions. The relay also provided with “I>UB2H” If fundamental current is become more than this setting relay will disable the blocking function.

**4.5.2 Phase Overcurrent (50/51)**

Phase Over-current function operates for a set value of current with time delay. This function provided with three stages, Each stage can be independently programmable as Inverse Definite Minimum Time (IDMT) or Definite Time (DT) characteristics.

The figure 4 represents the logic diagram of the phase over current protection function.



**Figure 6: Logic Diagram for the phase over current**

The same logic will be applicable for B and C phase over current function.

Where n=1 to 3 stages of Over Current.

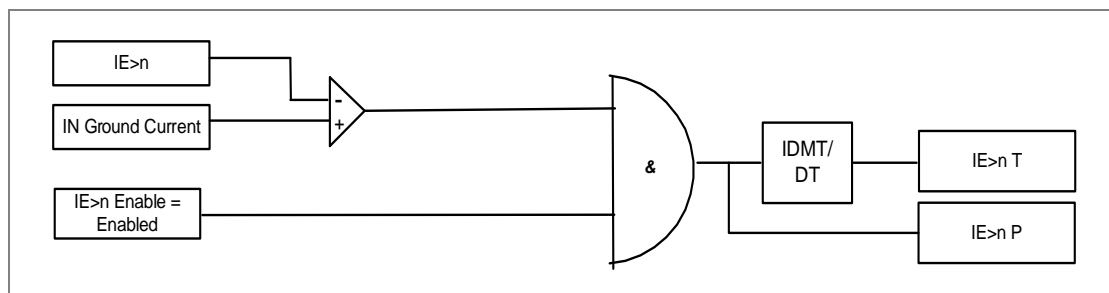
The Phase over Current logic checks the phase current is exceed the pickup value (IP>n) and calculated operating time based on the curve selected in the IP>n Curve setting and IP>n TMS or tIP>n DT parameter settings. After satisfied all the above condition the IED generates the phase over current trip.

**4.5.3 Ground OC (50N/51N)**

Ground Over current function operates for a set value of current with time delay. This function provided with three stages, Each stage can be independently programmable as Inverse Definite Minimum Time (IDMT) or Definite Time (DT) characteristics.

The figure 4 represents the logic diagram of the Ground Over current protection function.

The following diagram figure 5 explains about the Ground over current protection function.



**Figure 7: Logic Diagram for the Ground over current**

Where  $n=1$  to 3 stages of Ground over current.

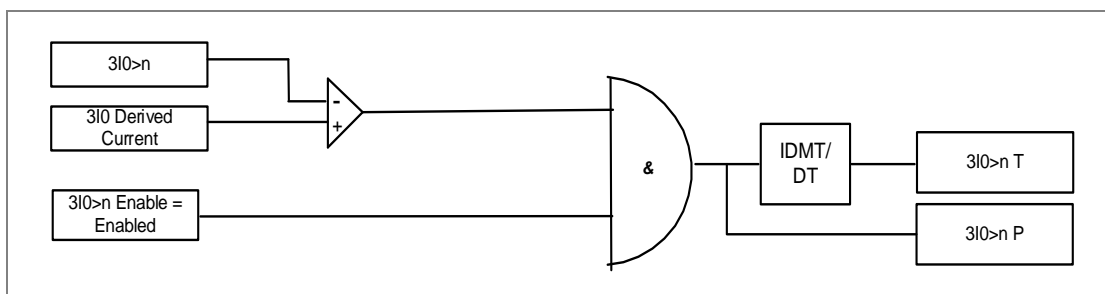
The Ground over Current logic checks the Measured Ground current is exceed the pickup value ( $I_{E>n}$ ) and calculated operating time based on the curve selected in the  $I_{E>n}$  Curve setting and  $I_{E>n}$  TMS or  $tI_{E>n}$  DT Delay parameter settings. After satisfied all the above condition the IED generates the Ground over current trip.

#### 4.5.4 Residual OC (50N/51N)

Residual Over current function operates for a set value of current with time delay. This function provided with three stages, Each stage can be independently programmable as Inverse Definite Minimum Time (IDMT) or Definite Time (DT) characteristics.

The figure 4 represents the logic diagram of the Residual Over current protection function.

The following diagram figure 5 explains about the Residual over current protection function.



**Figure 8: Logic Diagram for the Residual over current**

Where  $n=1$  to 3 stages of Residual over current.

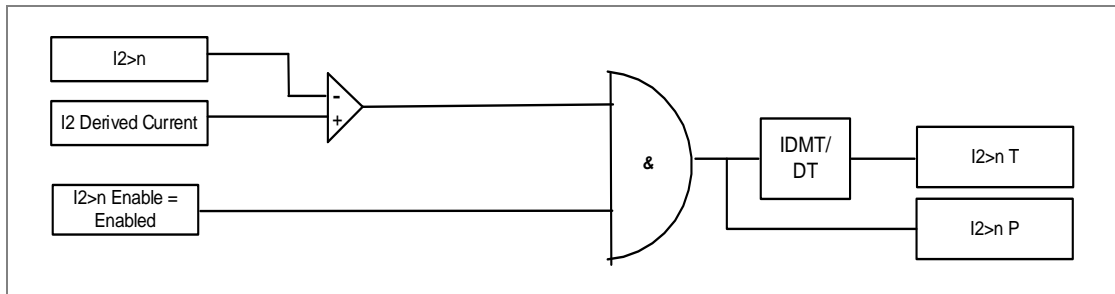
The Residual over Current logic checks the Measured Residual current is exceed the pickup value ( $3I_{0>n}$ ) and calculated operating time based on the curve selected in the  $3I_{0>n}$  Curve setting and  $3I_{0>n}$  TMS or  $t3I_{0>n}$  DT Delay parameter settings. After satisfied all the above condition the IED generates the Residual over current trip.

#### 4.5.5 NPS Over current (46)

Negative Phase Sequence Over current function operates for a set value of current with time delay. This function provided with three stages, Each stage can be independently programmable as Inverse Definite Minimum Time (IDMT) or Definite Time (DT) characteristics.

The following diagram figure 5 explains about the Residual over current protection function.





**Figure 9: Logic Diagram for the Residual over current**

Where  $n=1$  to 3 stages of Residual over current.

The Residual over Current logic checks the Measured Residual current is exceed the pickup value ( $I_{2>n}$ ) and calculated operating time based on the curve selected in the  $I_{2>n}$  Curve setting and  $I_{2>n}$  TMS or  $t_{I_{2>n}}$  DT Delay parameter settings. After satisfied all the above condition the IED generates the Residual over current trip.

#### 4.5.6

#### **IDMT Characteristics**

#### **IDMT Characteristics for Phase, Ground and Negative Sequence OC**

A21M relay provides inverse time over current characteristic for phase over current, ground over current, Residual over current and negative sequence over current elements. The phase and ground over current elements are independently settable with inverse time or definite time characteristic. The following tripping characteristics curves are available

- IEC Standard Inverse
- IEC Standard Inverse 2 Curve for 1.3s
- IEC Very Inverse Curve
- IEC Extremely Inverse Curve
- UK LT Inverse Curve
- Definite time Over current
- IEEE Moderately Inverse Curve
- IEEE Very Inverse Curve (C8)
- IEEE Extremely Inverse Curve
- US Inverse Curve
- US ST Inverse Curve

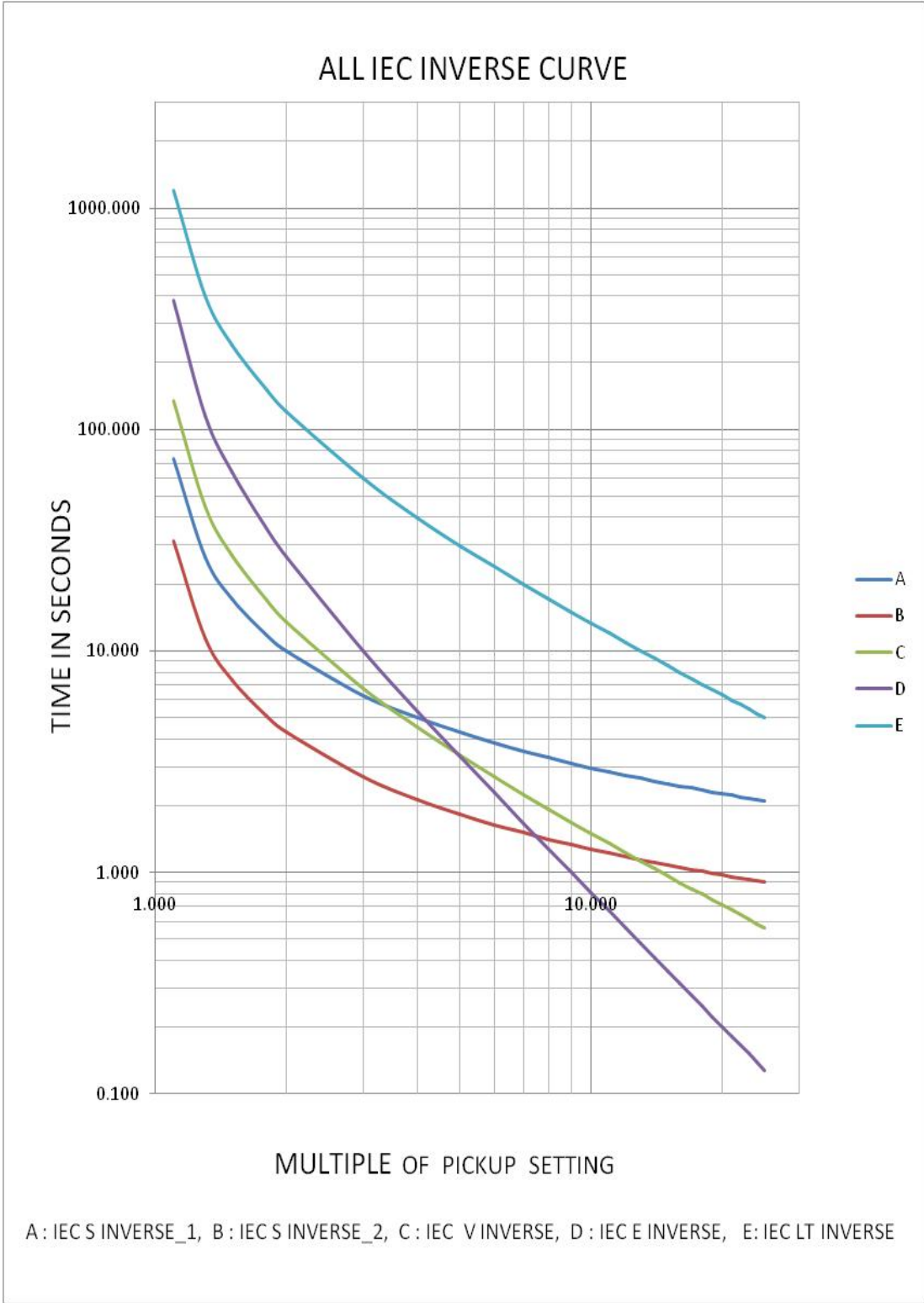
The over current, ground fault, Residual and negative sequence O/C function are programmable as per IDMT characteristic based on IEC and IEEE/ANSI standards. The inverse time delay is calculated with the following mathematical formula:

$$t = T^* \left( \frac{K}{\left( \frac{I}{I_s} \right)^{\alpha} - 1} + L \right)$$

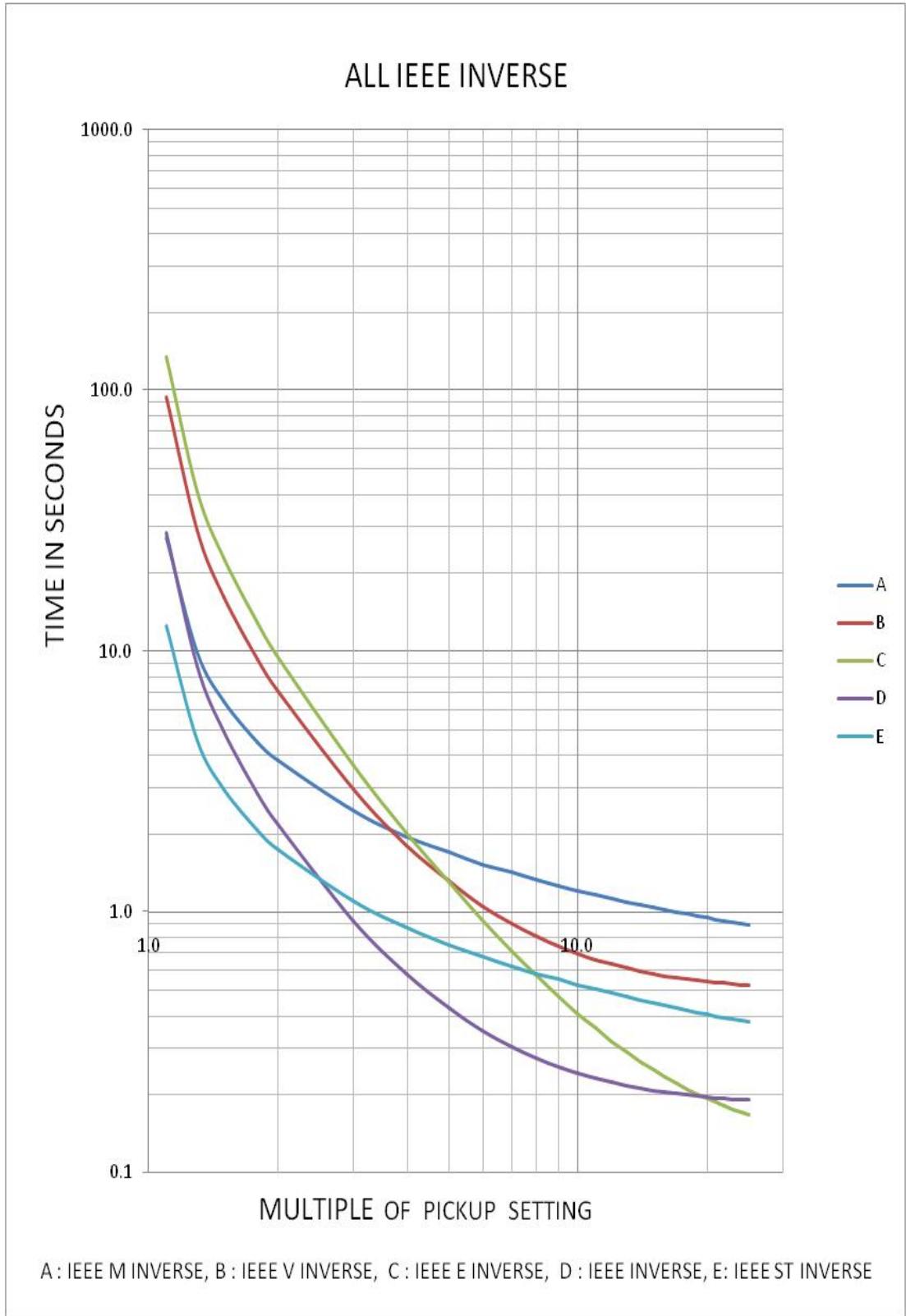
**Where**

- t : Operation time
- K : Constant (see the table)
- I : Measured current
- I<sub>s</sub> : Current threshold setting (also refer as G<sub>s</sub> as IEC standard notation)
- α : Constant (see the table)
- L : ANSI/IEEE constant (zero for IEC curve)
- T : Time multiplier setting (TMS) for IEC & IEEE curves

Description	Standard	K	α	L
IEC Standard Inverse	IEC	0.14	0.02	0
IEC Standard Inverse for 1.3S	IEC	0.06	0.02	0
IEC Very Inverse	IEC	13.5	1	0
IEC Extremely Inverse	IEC	80	2	0
UK LT Inverse	IEC	120	1	0
Definite Time	-	-	-	-
IEEE Moderately Inverse	IEEE	0.0515	0.02	0.114
IEEE Very Inverse	IEEE	19.61	2	0.491
IEEE Extremely Inverse	IEEE	28.2	2	0.1217
US Inverse	IEEE	5.95	2	0.18
US ST Inverse	IEEE	0.0239	0.02	0.0169



**Figure 10 : IDMT Characteristic Graph for IEC Curves**



**Figure 11: IDMT Characteristic Graph for IEEE/ANSI Curves**

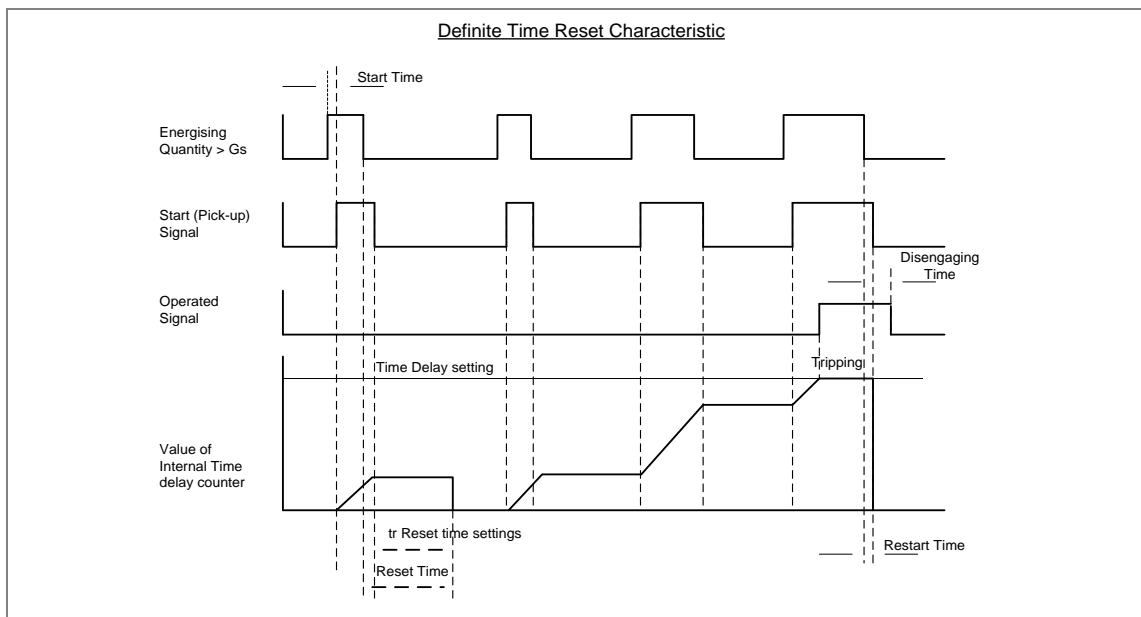
**Timer Hold Facility / Reset Characteristics**

The three stages of phase over current, ground OC (EF), residual OC (3I<sub>o</sub>) and negative phase sequence (NPS) OC protection is provided with a timer hold facility "tD/O Char". It can be programmed as a definite time or IDMT.

A possible situation arises where the reset timer may be used to reduce the fault clearance time where intermittent faults occur.

For example, a cable with plastic insulation application, it is possible that the fault energy melts the cable insulation, which then reseals after clearance, thereby eliminating the cause for the fault. This process repeats itself to give a succession of fault current pulses, each of increasing duration with reducing intervals between the pulses, until the fault becomes permanent.

Following diagram explain the function of definite time reset characteristic



**Figure 12: Definite Time Reset Characteristic**

**4.5.7 Thermal Overload Protection Function**

The thermal withstand capability of the motor is affected by heating in the winding prior to a fault. The RMS value of maximum of three phase current and negative phase sequence currents are used to monitor the thermal state of the motor. This thermal model takes into account the overheating, which will be generated by the negative phase sequence current in the rotor.

The equivalent motor heating current is calculated by:

$$I_{eq} = \sqrt{(I_{rms}^2 + (K \text{ Coefficient} * I_2^2))} \text{ ----- (1)}$$

Where

I<sub>rms</sub>: Root mean square value of max of three phase current in Ampere.

I<sub>2</sub>: Negative phase sequence current in Ampere.

K Co-efficient: is a constant proportional to the thermal capacity of the motor set 0 to 10.

In case of thermal overload function the calculation of the trip time is given by:

$$t = \tau \times \ln ((K^2 - A) / (K^2 - 1))$$

Where

t : Time to trip (in seconds)

τ : Thermal const T<sub>1</sub> if IFLA < I<sub>eq</sub> ≤ 2\* I<sub>th>set</sub> for motor overload

: Thermal const T<sub>2</sub> if I<sub>eq</sub> > 2\* I<sub>th>set</sub> for Motor start-up

τ : Cooling const. T<sub>r</sub> if CB opened, cooling time constant.

K : Thermal overload capacity (I<sub>eq</sub> / k\* I<sub>th>set</sub>)

Where:

I<sub>rms</sub> : RMS current corresponding to the largest phase current

I<sub>th>set</sub>(IFLA): Thermal Trip or Full load current rating (settable)

k : constant is settable.

A : Initial thermal state. If the initial thermal state is 50% then A =0.5

The calculation of the thermal state is given by the following formula:

$$\Theta_{i+1} = (I_{eq} / k * I_{th>set})^2 \cdot [1 - \exp (-t/Te)] + \Theta_i \cdot \exp (-t/Te)$$

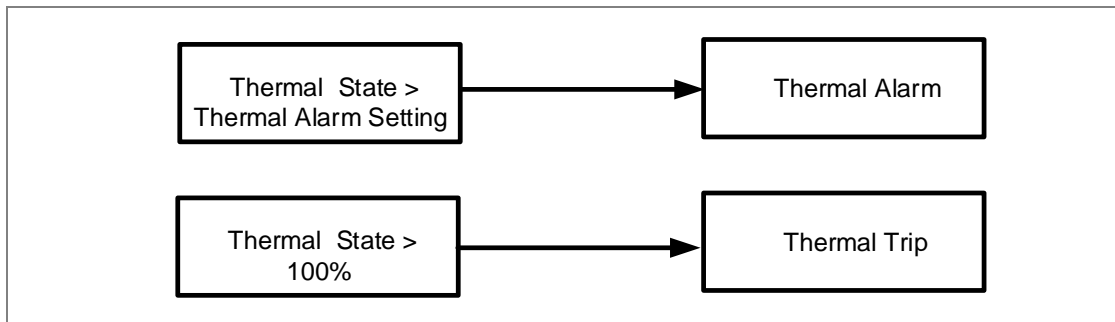
When thermal state reached the “Thermal Alarm” settings then relay generates Thermal ALARM signal and Start LED will Glow, simultaneously relay assigned to alarm relay will be operated. Similarly if Thermal State reached 100% of thermal capacity, then Relay generates “THOL.Trip” and the trip LED will Glow.

### Thermal Alarm Function (Thermal Alarm)

The purpose of this function is to produce an alarm signal indicating that the thermal state θ of the motor has exceeded “Alarm Threshold” setting 20% to 100%. Corrective action can thus be taken before thermal tripping occurs.

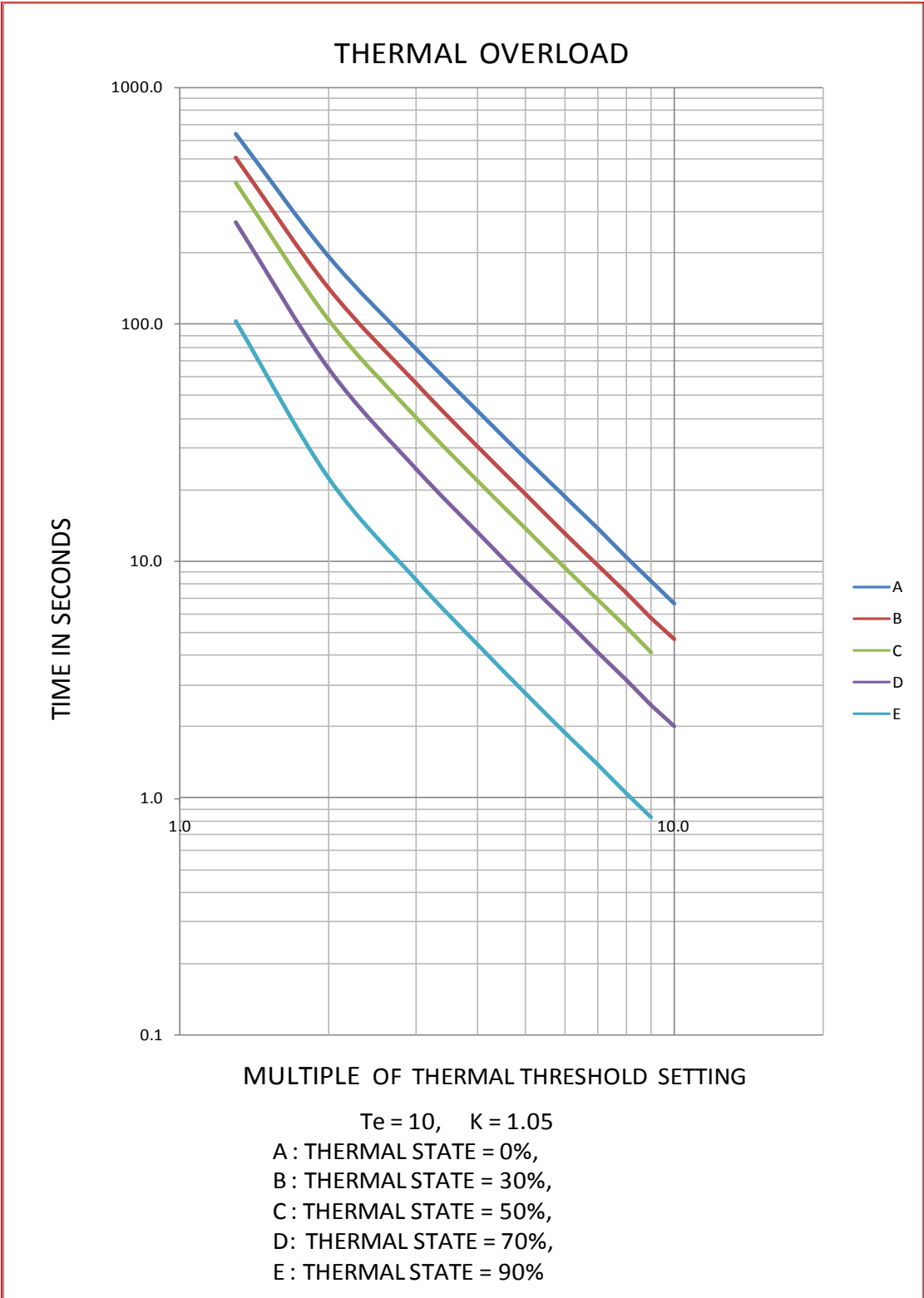
The equation used to calculate the time to the thermal alarm is:

$$\text{Thermal alarm} = \tau \cdot \ln(k^2 / (k^2 - \text{Th Alarm} / 100))$$



**Figure13: Thermal Trip and Alarm Logic**

This functions provided with Thermal inhibit setting "Inhib. Th Trip", which is used to hold the thermal state at 90% and it will not allow further to increase up till the motor is reaching successful start.



**Figure 14 : Thermal Overload Characteristic.**



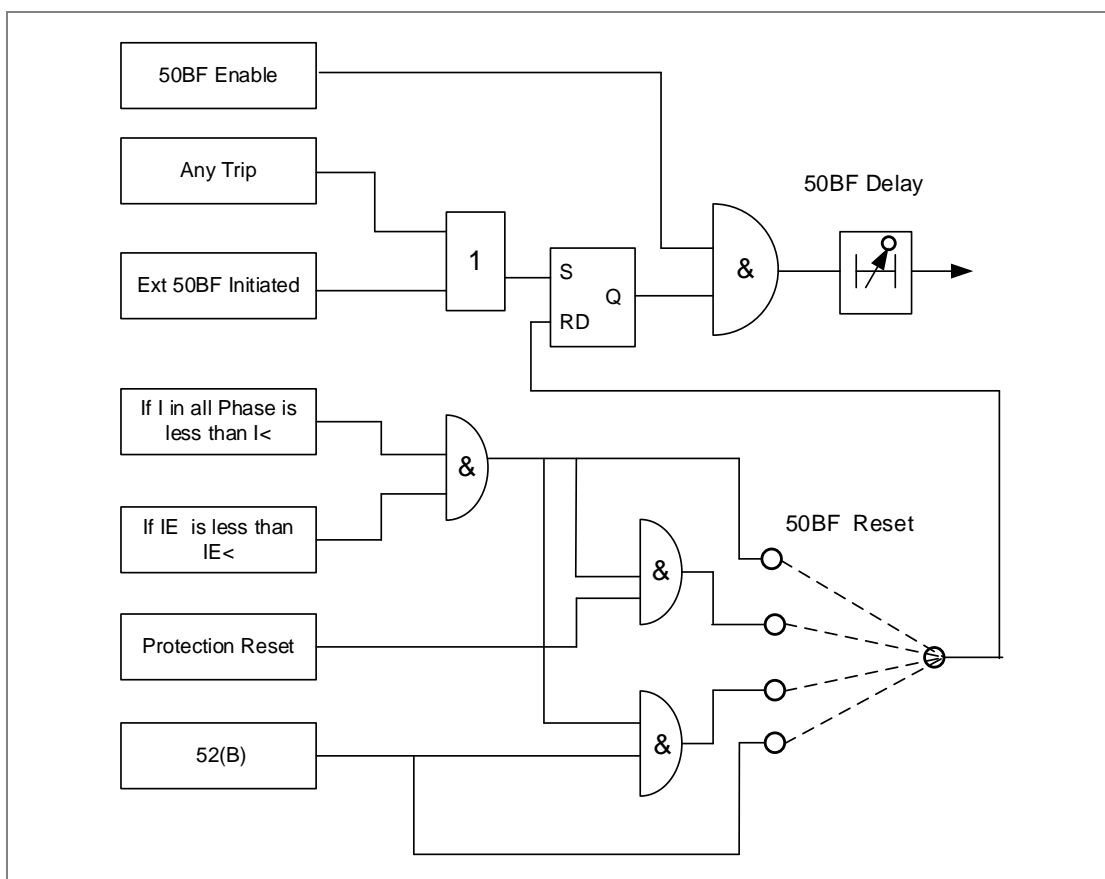
#### 4.6 Under Current (37)

The relay includes undercurrent element that can be used to prevent damage of the power system equipment under loss of load. The undercurrent protection function is available only if the auxiliary contact of the CB status is connected to the relay i.e. when NO contact (CB 52A) of CB is high. (Please note that for proper operation CB (52A) must be assigned to one of the opto input through AProLogic.) This function is deactivated when the motor is shut down (logic input L1 in the 0 state) and also during the inhibit time delay "T inhib".

##### 4.6.1 Breaker Failure Setting (50BF)

If the Circuit Breaker fails to operate within the settable time following the protection trip then relay generates a circuit breaker failure trip signal. Following the inception of a fault one or more main protection devices will operate. Operation of the circuit breaker is essential to isolate the fault, and prevent damage or further damage to the power system.

For transmission and sub-transmission systems, slow fault clearance can also threaten system stability. It is therefore common practice to install circuit breaker failure protection [50BF], which monitors that the circuit breaker has opened within a reasonable time. If the fault current has not been interrupted following a set time delay from circuit breaker trip initiation, breaker failure protection (50BF) will operate. 50BF operation can be use to operate back-trip, upstream circuit breakers to ensure that the fault is isolated correctly.



**Figure 15: Logic Diagram for Breaker Failure Function**

The logic Diagram of Figure.17 is explain about the Breaker failure on protection trip in the IED , the Breaker failure will be initiated on any protection trip or External Breaker Fail initiation through the assigned status.

Normally, after tripping current should become Zero within delay time depend upon type of fault and breaker mechanism. Once the relay trip on fault, then the breaker must open within the time delay setting “50 BF Delay”, if fault is not cleared during this set delay, IED issue Breaker Failure (50BF) trip.

The following are the two ways by which the 50 BF Protection trip (BF Reset = 1) can be reset.

- I<: the 50BF trip will reset when the relevant phase current or ground fault current is less than minimum set current
- CB Open + I<: the 50BF trip will reset when both conditions are satisfied, first condition is when the relevant phase current or ground fault current is less than minimum set current and second condition is CB must be opened (i.e. CB(52B) status is active)

- Prot Reset + I<: the 50BF trip will reset when both conditions are satisfied, first condition is Protection reset and second condition is the relevant phase current or ground fault current is less than minimum set current
- CB Open: CB must be opened (i.e. CB(52B) status is active)

#### 4.1 Prolong Start detection:

The prolonged start function protects the motor against excessive start-up over current. It is deactivated on expiry of the prolong time delay named as “Tstart” delay.

The following three criteria are used to detect a start of the motor:

**Single criteria (52a):** Start Detect is issued as soon as 52a signal is set i.e. from open to close.

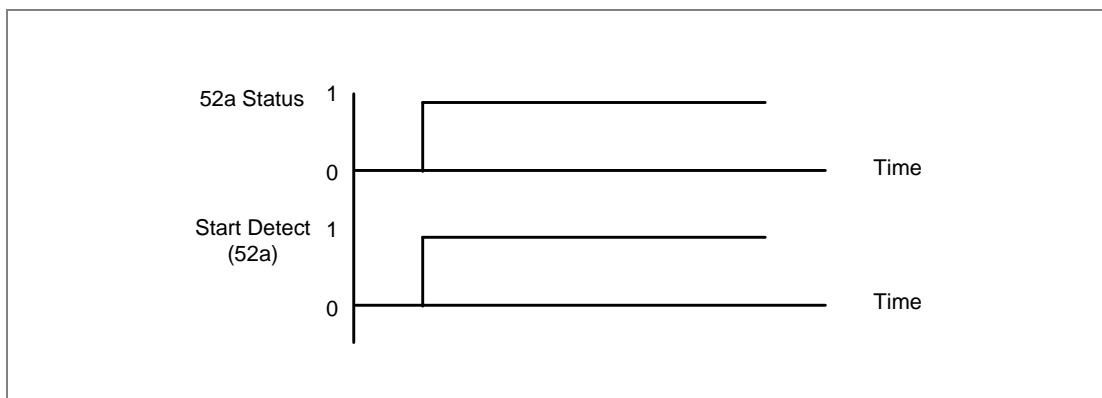


Figure 16: Start Detect using 52a

**Extended criteria (52a+I):** Start Detect is issued as soon as 52a signal is set and the rms current exceeds IFL threshold within 90msec.

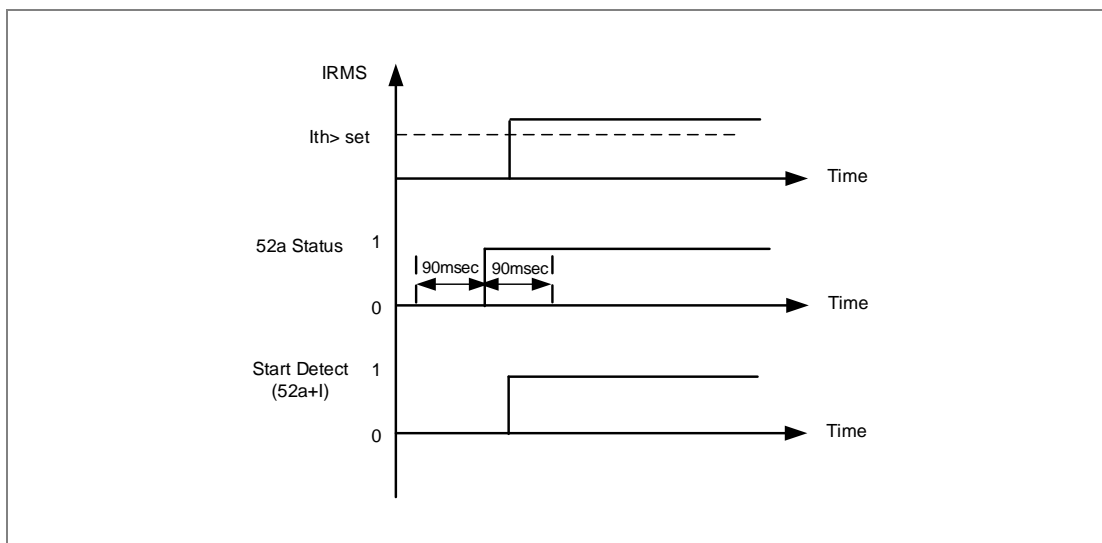
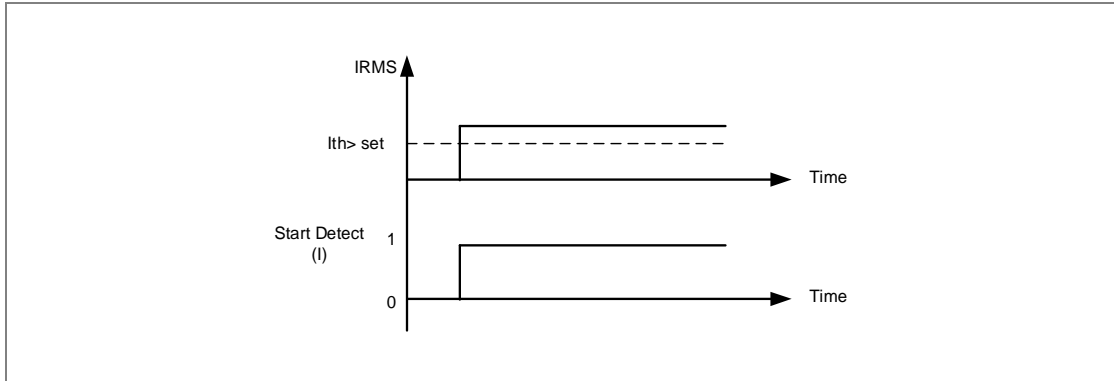


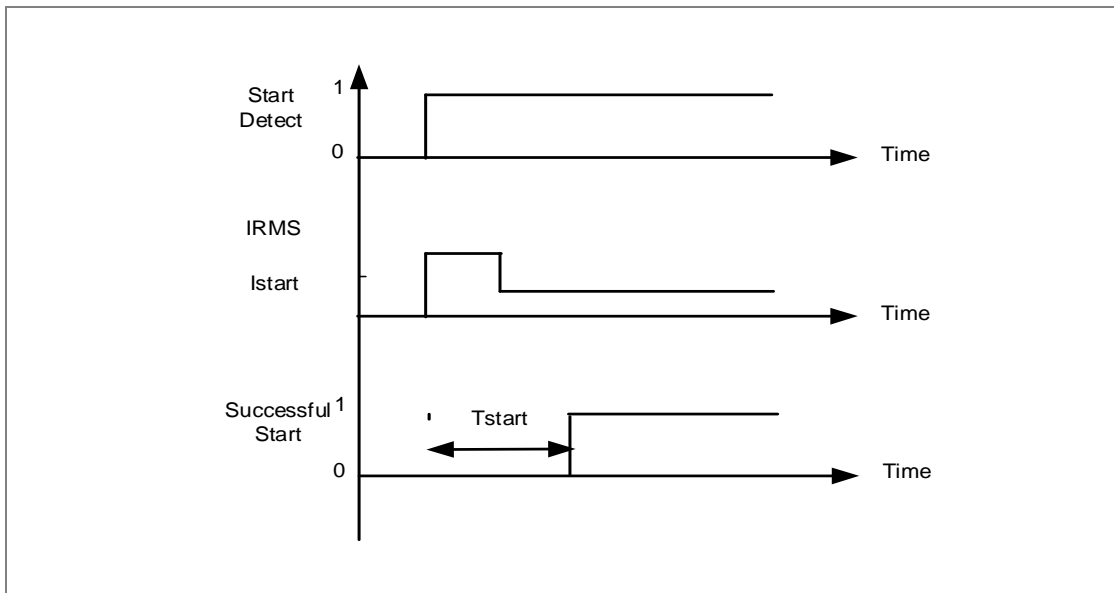
Figure 17: Start Detect using (52a+I)

**Single criteria (I):** Start Detect is issued only the rms current exceeds IFL threshold.



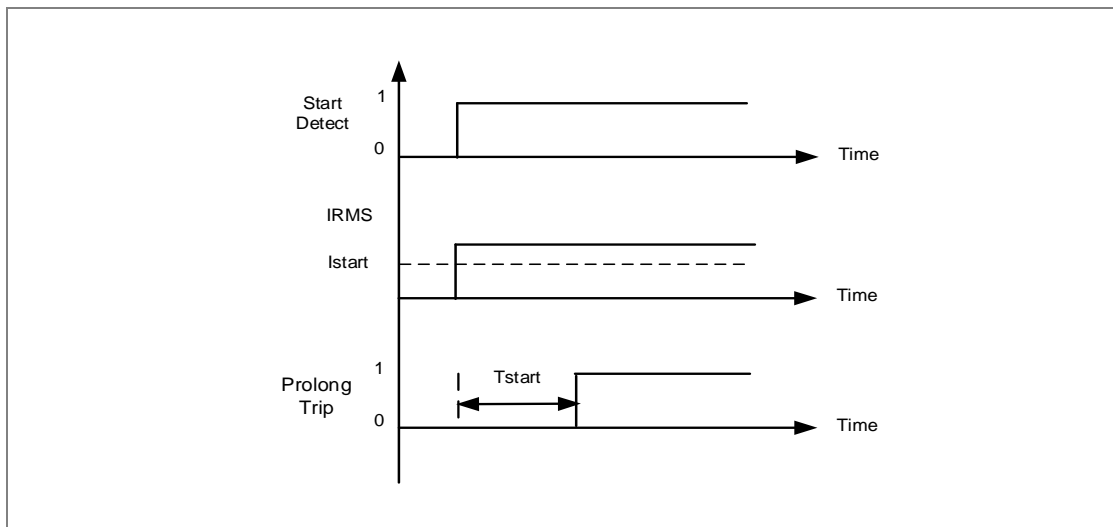
**Figure 18: Start Detect using I**

Once motor start detect signal is active, Successful start is issued, if the rms current falls below the starting current threshold within ProI.Start Time Delay named as “Tstart”. The successful start logic is explained in following fig



**Figure 19: Successful start detection without speed switch**

Once motor start detect signal is active, “Pro long Trip” is issued if the rms current is not fall below the starting current threshold within “Tstart” Delay. The Prolong trip logic is explained in following fig.



**Figure 20: Prolonged Start Trip function**

#### 4.1.1.1 Locked rotor During Start (SpeedSW Input)

For certain applications, such as motors driving high inertia loads, the stall withstand time can be safely exceeded during starting. This can be done without an over temperature condition within the motor. The stall withstand time is less than the start time, therefore time alone cannot be used to distinguish between a start and a stall condition.

The A21M relay overcomes this problem by using a contact from a speed sensing device wired into a specified opto input. Change of state of this contact indicates successful acceleration of the motor. If the line current exceeds the value set in the Starting current and the speed of the motor is equal to zero, the relay trips following the programmed Stall Time.

*Note: The breaker status must be mapped for this function and the breaker must be closed (52a input high) for the relay to operate if a locked rotor is detected.*

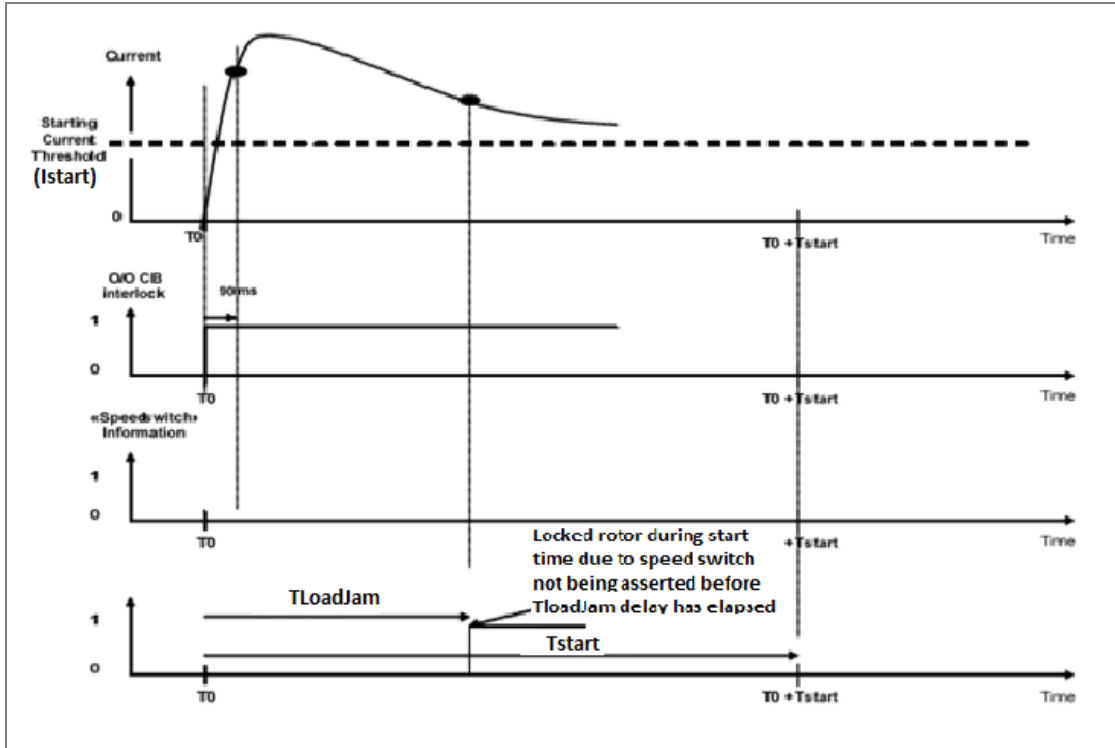


Figure21: Logic of Rotor Locked During Start

**4.1.2 Load Jam (during motor run)**

A stall during running is given by a current exceeding the programmed current threshold, (Load Jam Setting). Following a successful start. The Successful Start signal is issued if the current decreases below the starting current and/or CB still close (depending on start criteria) when Prol. Start Time ( $T_{start}$ ) is timed out. If the current fails to fall below the current threshold before the  $T_{Loadjam}$  time delay has elapsed, a trip is initiated.

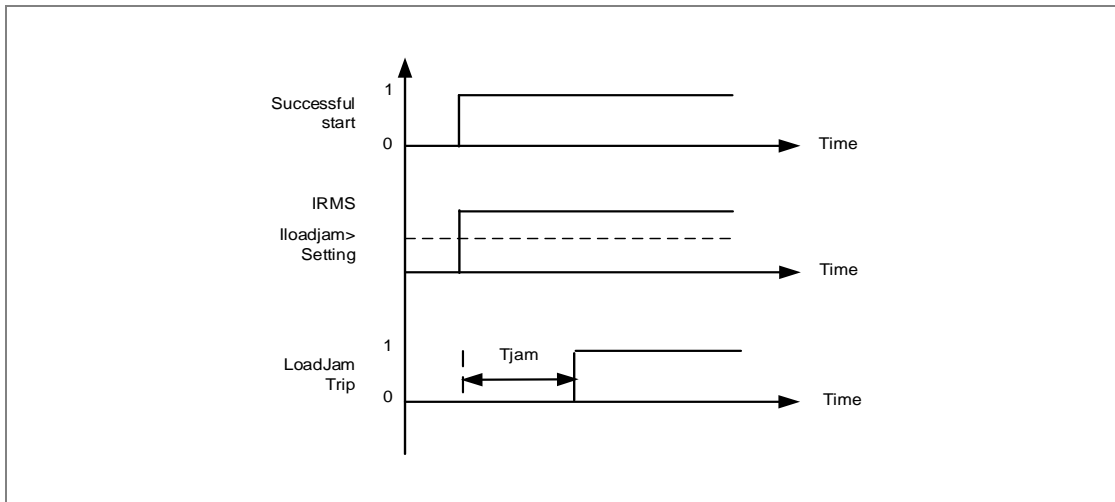


Figure 22: Stall Rotor During Motor Run

## 4.2 Limit Number of Start (Number of Start)

Repeated starting, or intermittent operation of a motor, may generate high temperatures within the motor, unless sufficient time is allowed for cooling between two or more starts. The A21M motor protection relay incorporates a number of starts limitation facilities. This limitation is fully programmable and is applicable to both hot and cold start conditions.

Limit number of start protection uses the following adjustable parameters settings.

“Supervising Time”

Number of hot starts limit “Hot Start Status”

Number of cold starts limit “ColdStart status”

Start inhibit time delay “Inhib.Strt Time”.

Each time a motor start is detected, the “**Supervising Time**” time delay is initiated and the number of starts registered by the counter corresponding to the temperature of the motor hot or cold start.

Examples: Taking as an example cold starts where the limit of the number of cold starts has been set at 3 for a period of Supervision time.

### Case 1:

The number of cold starts limit has been reached and the motor is stopped before the end of the Supervising Time period, hence the “Inhib Strt time” delay is therefore initiated when the motor stops. A new start up is permitted at the end of the “Inhib Strt time” time delay.

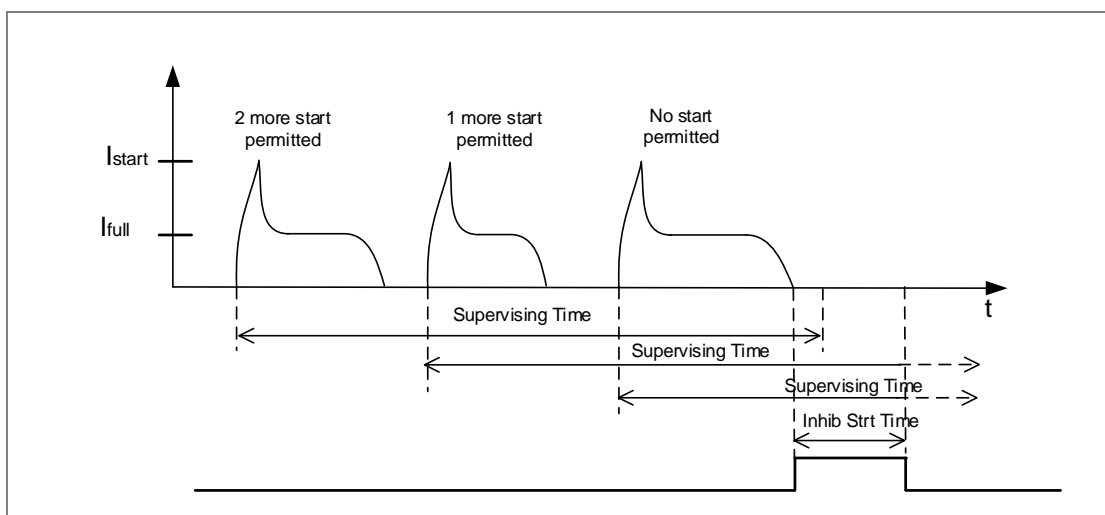
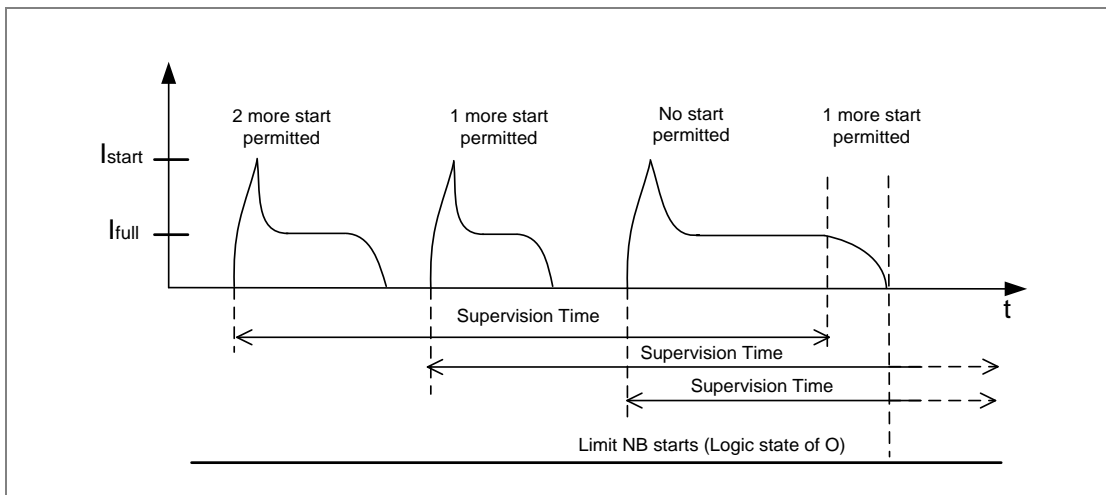


Figure 23: Case 1 For Limit no of start

**Case 2:**

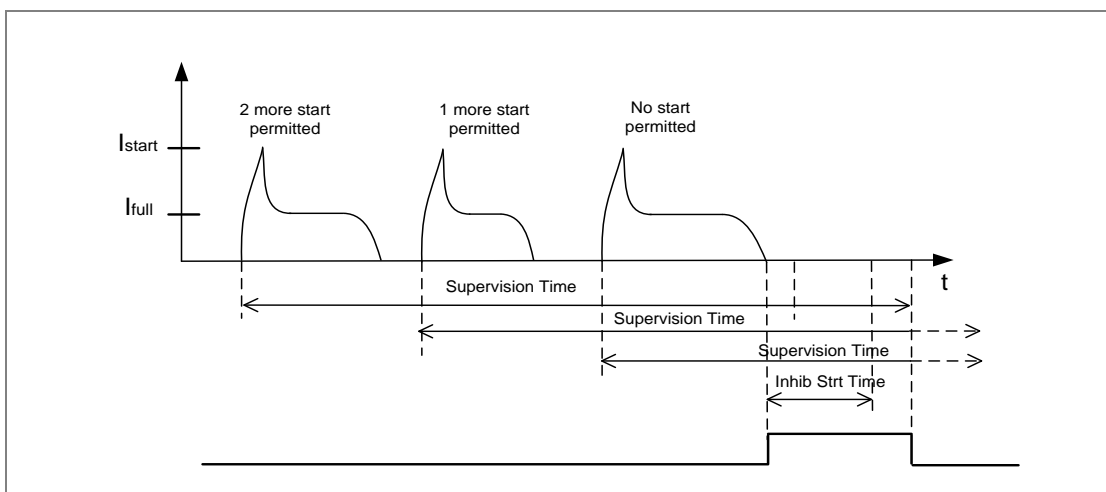
The number of cold starts limit is reached but the motor is not stopped until the end of the Supervising Time period, therefore the “Inhib Strt time” delay is not initiated. There is no start inhibit.



**Figure 24: Case 2 For Limit no of start**

**Case 3:**

Particular cases where at the end of the Supervision time delay, the number of starts counter is reached and the “Inhib Strt time” time delay period is completed while Supervision timer is still running any new start up is inhibited until the end of the Supervision period (the LIMIT NB STARTS signal is extended).



**Figure 25: Case 3 for Limit no of start**

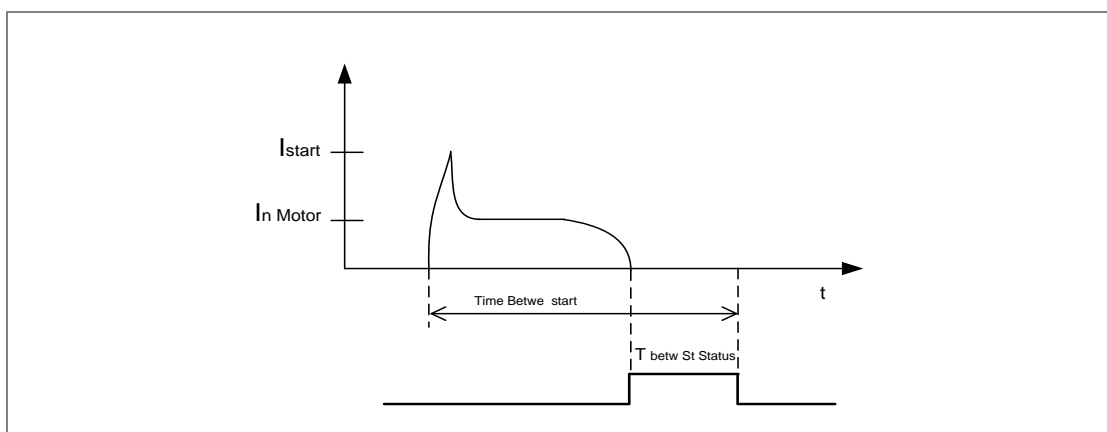


**Time between Two Start Function (T.Betw St Status Function)**

Excessive motor heating caused by two consecutive starts can be avoided by means of the 'T.Betw St Status' function. It is based on the use of an adjustable time delay: minimum time delay "Time Betwe Start" between 2 starts. This time delay is initiated on detection of a motor start up by the A21M relay. When the motor stops and if the "Time Betwe Start" time delay has not reached, the relay starts inhibit signal "Time Betwe start" is generated until the end of the "Time Betwe start" time delay

**Case 1:**

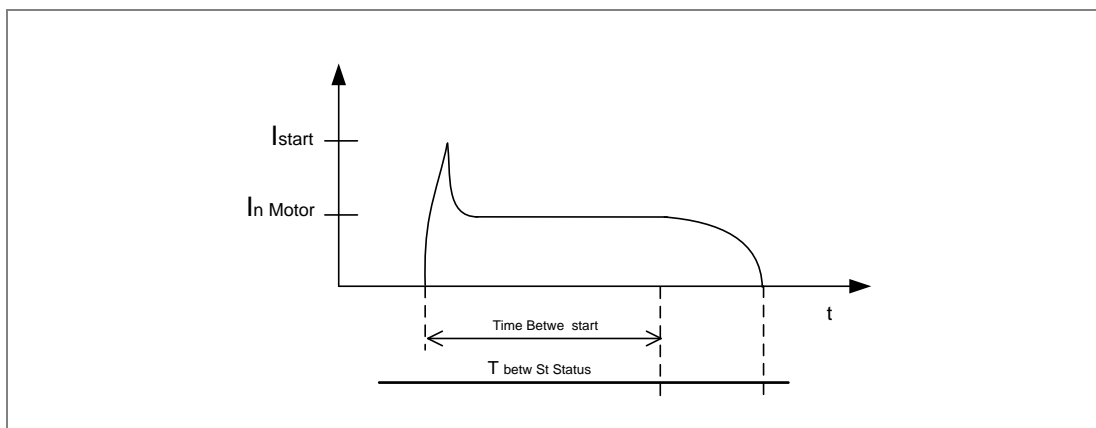
The stopping of the motor takes place before the end of the "Time Betw Start" time delay period. A start inhibit signal "T.Betw St Status" is generated during the "Time Betw Start" period.



**Figure 26: Case 1 for Time Between two start**

**Case 2:**

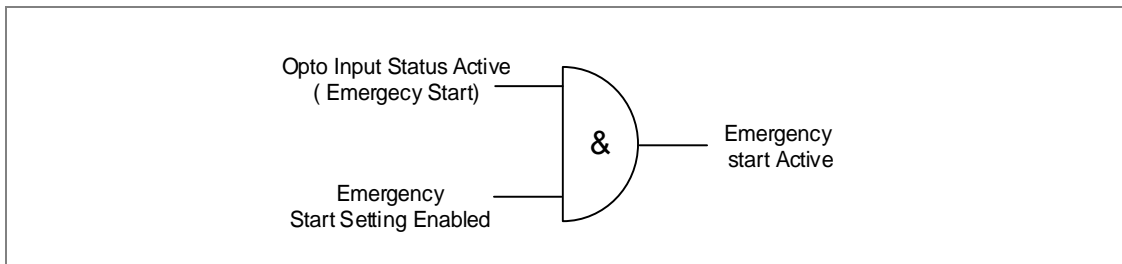
The stopping of the motor takes place after the end of the "Time Betw Start" time delay period, no start inhibit signal is generated.



**Figure 27: Case 2 for Time Between two start**

**4.2.1 Emergency restart (Emergency Start)**

In an emergency restart, the thermal curve during start-up is inhibited, even if this function is not used during a start-up in normal operation. An emergency start may be necessary for safety reasons. That means the motor can start under emergency condition. This feature removes all start inhibits (Thermal lockout, No of Hots starts, No of cold starts, and the Time between starts). This feature resets the thermal memory to 90% if it is greater than 90% or stays as it is if less than 90%.



**Figure 28: Emergency Restart Logic Diagram**

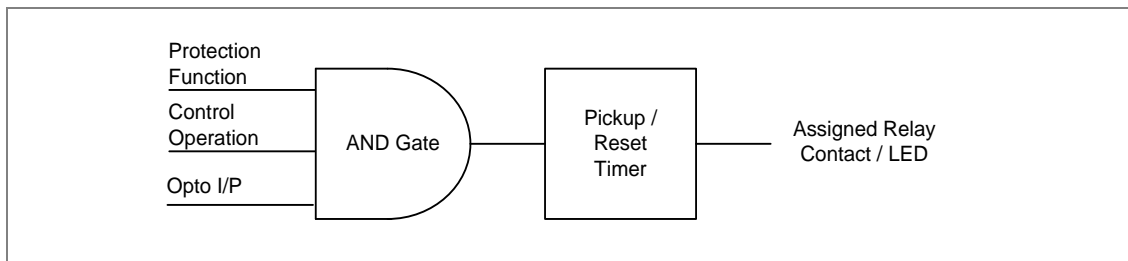
**4.3 Programmable Logic control**

The Basic version of A21M relay provides total 8 nos. of target & programmable LEDs with dual colours indication. The LEDs can be programmed either through HMI or through PC software (RTV2 software).

The A21M relay integrates complete logic equations to allow Customization of the product based on customer application. User can program 4 AND Logic equations with pick up and reset timer at the output. Independent Boolean equations can be used and every result of equation can be time delayed and assigned to any output contacts and LEDs.

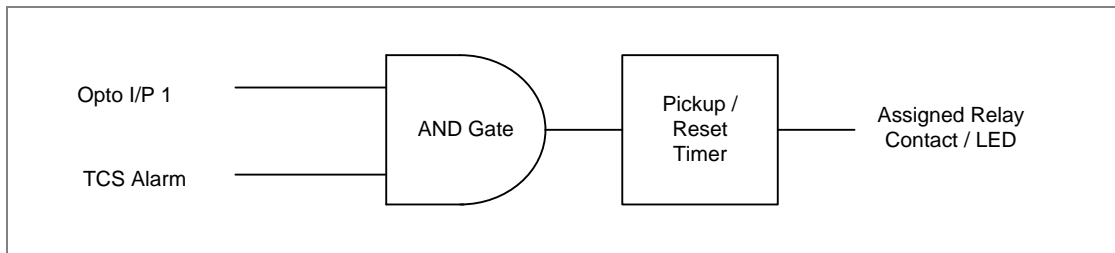
Any protection functions, Control Operations and opto I/Ps are used as inputs to the AND logic equations and result of equation can be time delayed and assigned to any output contacts and LEDs.

The following example explain AND logic equation.



**Figure 29: AND Equation Logic**

An example logic implementation using Boolean Equation is shown below:



**Figure 30: AND Equation Logic Example**

In the above example of logic implementation, there are two inputs to the AND equations, one is SF6 Gas low signal which is externally wired to Opto I/P 1 of relay and other input is TCS Alarm which is internally generated signal. When both the input signals are active. Then the result of AND equation will be active. This output can be used to block all protection functions through an external wiring.

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# Section 5

## Metering Section

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## 5 MEASUREMENT SHEET

### 5.1 Measurement 1

The measuring parameters and their settings are available on LCD screen and these can be viewed using navigation keys from the front panel.

In normal condition, the relay displays Primary and Secondary current value of phases A, B, C and earth current N as per phase/earth CT ratio and Thermal state in %.

Following is list of Measurement parameter.

Parameter	Unit	Description
IA MAG	Amp	Primary current in phase A
IB MAG	Amp	Primary current in phase B
IC MAG	Amp	Primary current in phase C
IN MAG	Amp	Primary current in measured EF
3I0 MAG	Amp	Primary current in derived EF
I0 MAG	AMP	Primary zero Phase sequence current
I1 MAG	AMP	Primary +ve Phase sequence current
I2 MAG	AMP	Primary -ve Phase sequence current
Ia MAG	Amp	Secondary current in phase A
Ib MAG	Amp	Secondary current in phase B
Ic MAG	Amp	Secondary current in phase C
In MAG	Amp	Secondary current in measured EF
3i0 MAG	Amp	Secondary current in derived EF
i0 MAG	Amp	Secondary zero Phase sequence current
i1 MAG	Amp	Secondary +ve Phase sequence current
i2 MAG	Amp	Secondary -ve Phase sequence current
Irms A	Amp	True RMS Secondary current in phase A
Irms B	Amp	True RMS Secondary current in phase B
Irms C	Amp	True RMS Secondary current in phase C
Breaker Opening counter	Counter	Counter for Total number of Breaker operation (Locally & relay protection tripping )
Breaker Trip counter	Counter	Counter for Number of protection trip issued by relay
Breaker operating time	Mill second	The time taken to open the Breaker contact of latest trip is issue

## 5.2 Measurement 2

Parameter	Unit	Description
Thermal State	%	Thermal state of the motor
Load current	%	value of load current (maximum value of three phases)
Time to Th Trip	Min	Time to thermal trip
Nb of Th Trip	counter	Counter for Number of thermal trip
Last Start Time	sec	Last start time
Last St Current	Amp	Last starting current
Nb hot St.Allow	counter	Counter for Number of motor start allowed during hot
Nb Cold St.Allow	counter	Counter for Number of motor start allowed during cold
Time to Next st	Second	Time before another start up authorisation
Total Nb of strt	counter	Counter for Number of starts
Nb Emergency Rst	Counter	Counter for Number of Emergency starts
Motor Run Time	hrs	Total motor running hours



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# Section 6

## Setting Sheet

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## 6 SETTING PARAMETER

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

### 6.1 GENERAL SETTINGS

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	Language	English	Not Editable
2.	Description	ASHIDA A21M	Not Editable
3.	Model Number	A21MxxxAxAxxxxA	Not Editable
4.	Serial Number	xxxA21Mxxx	Not Editable
5.	Software Version	A21M_x_x_0Vx.xx	Not Editable
6.	Frequency	50Hz	50Hz /60Hz in step of 10 Hz
This setting determines to select the system frequency			
7.	USB Address	1	Not Editable
This cell is the fixed USB port address for the relay.			
8.	USB Parity	None	Not Editable
This cell is the fixed USB Parity for the relay.			
9.	USB Baud rate	57600	Not Editable
This cell is the fixed USB Baud rate for the relay.			
10.	Password	0000	0000 to zzzz
This setting is for set new password. (Alphanumeric 4- characters case sensitive)			
11.	Active Group	Group 1	Group 1 / Group 2
This setting displays the active setting group (G1/G2 whichever is selected).			
12.	Opto I/P	Status of the Inputs	Not Editable
This setting displays the current status of Digital input			
13.	Relay O/P	Status of the outputs	Not Editable
This setting displays the current status of Digital output			
14.	CB Opration	No Operation	No Operation / Open / Close
This setting Supports Open and close commands if enabled in the Circuit Breaker Control menu Local or Local + Remote.			
15.	Opto I/P Supply	DC	DC/AC
This setting specifies to select opt coupler i/p to status as AC/DC			

16.	Config Port	USB	USB/RP
This setting specifies to select communication port for 103 communication (RTV2 configurator)			

## 6.2 REPORTING

Sr. No	Parameter	Display value on LCD
1.	Fault Record	Display the Records of fault i.e. parameter value, flag of fault & date and time of Fault
2.	Event Record	Display of all digital events with time stamping (max 512 events)
3.	Error Record	Display of error generated by relay if any, in case of failure of hardware
4.	Alarm Record	Display of alarm generated by relay & date and time of generated alarm.

## 6.3 CB CONTROL settings

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	Password	0000	0000 to zzzz
This setting specifies to enter the set password			
2.	TCS Enable	No	Yes / No
This setting determine to enable (activate) or disable (turn off) the Trip Circuit Supervision Alarm function			
3.	TCS Delay	5.00 S	0.1 s to 10s with steps of 10 ms
This setting is used to set the time-delay for the Trip Circuit supervision if relay detect any discontinuity then relay generate TCS alarm after set Tsup timer is over			
4.	CB Open S'vision	Enabled	Enabled / Disabled
This setting is used to enable (activate) or disable (turn off) the CB Open Supervision function			
5.	CB Open Time	0.30 S	50 ms to 1.0 s with steps of 0.01s
This setting for the time-delay for the CB Open Time monitoring			
6.	CB Open Alarm	Enabled	Enabled / Disabled
This setting determine to enable (activate) or disable (turn off) the CB Open Alarm function			
7.	CB Oper. Counter	2000	1 to 30000 by step of 1
This setting is used to monitor the number CB Open operation and after set number of CB OPEN operations are over relay give Alarm			
8.	CB Control By	Disabled	Disabled/Local/Remote/ Local + Remote
This setting is used to selects the mode of control which is used to control the circuit breaker operation.			
9.	t Close Pulse	00.50 S	00.10 to 50.00 sec in step of 0.01s
This setting defines duration of the close pulse within which the CB should close after a close command is issued			
10.	t Open Pulse	00.50S	00.10 to 50.00 sec in step of 0.01s

This setting defines the duration of the trip pulse within which the CB should trip when a manual or protection trip command is issued			
1.	Emergency Restrtr	No	Yes/No
This setting determine to enable (activate) or disable (turn off) motor restart under emergency condition.			

6.4 **DATE AND TIME settings**

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	Password	0000	0000 to zzzz
This setting specifies to enter the set password.			
2.	Local Time Enable	Fixed	Fixed / Flexible / Disabled
Setting to turn on/off local time adjustments. Fixed - A local time zone adjustment can be defined using the Local Time offset setting and all interfaces will use local time. Flexible - A local time zone adjustment can be defined using the Local Time offset setting and each interface can be assigned to the UTC zone or local time zone with the exception of the local interfaces which will always be in the local time zone. Disabled - No local time zone will be maintained. Time synchronization from any interface will be used to directly set the master clock and all displayed (or read) times on all interfaces will be based on the master clock with no adjustment.			
3.	Local Time Offset	0 Mins	-720 to + 720 in step 15 Mins
Setting to specify an offset of -12 to +12 hrs in 15 minute intervals for local time zone. This adjustment is applied to the time based on the master clock which is UTC/GMT			
4.	DST Enable	Enabled	Enabled / Disabled
Setting to turn on/off daylight saving time adjustment to local time.			
5.	DST Offset	60 Mins.	From 30- 60 Mins in step 30 Mins
Setting to specify daylight saving offset, this will be used for the time adjustment to local time.			
6.	DST Start	Last	First / Second / Third / Fourth / Last
Setting to specify the week of the month in which daylight saving time adjustment starts			
7.	DST Start Day	Sunday	Sunday / Monday / Tuesday / Wednesday / Thursday / Friday/ Saturday
Setting to specify the day of the week in which daylight saving time adjustment starts			
8.	DST Start Month	March	January / February / March / April / May / June / July / August / September / October / November / December
Setting to specify the month in which daylight saving time adjustment starts			
9.	DST Start Mins	60 Mins	0000 to 1425 Mins in step 15 Mins.
Setting to specify the time of day in which daylight saving time adjustment starts. This is set relative to 00:00 hrs on the selected day when time adjustment is to start			

10.	DST End	Last	First / Second / Third / Fourth / Last
Setting to specify the week of the month in which daylight saving time adjustment ends			
11.	DST End Day	Sunday	Sunday / Monday / Tuesday / Wednesday / Thursday / Friday/ Saturday
Setting to specify the day of the week in which daylight saving time adjustment ends			
12.	DST End Month	October	January / February / March / April / May / June / July / August / September / October / November / December
Setting to specify the month in which daylight saving time adjustment ends			
13.	DST End Mins	60 Mins	0 Mins to 1425 Mins in step 15 Mins.
Setting to specify the time of day in which daylight saving time adjustment ends. This is set relative to 00:00 hrs on the selected day when time adjustment is to end			
14.	RP Time Zone	Local	UTC/ Local
UTC / Local (Setting for the rear port 1 interface to specify if time synchronization received will be local or universal time co-ordinated.)			
15.	SET Hours	11 *	00 to 23 Hrs in step 1.
<b>Hour</b> setting needed when relay is not connected to SCADA system			
16.	SET Minutes	35 *	00 to 59 Mins in step 1.
<b>Minutes</b> setting needed when relay is not connected to SCADA system			
17.	SET Seconds	54 *	00 to 59Sec. in step 1.
<b>Seconds</b> setting needed when relay is not connected to SCADA system			
18.	SET Date	28 *	01 to 31 Days in step of 1.
<b>Date</b> needed when relay is not connected to SCADA system			
19.	SET Month	10 *	01 to 12 Months in step of 1.
<b>Month</b> needed when relay is not connected to SCADA system			
20.	SET Year	14 *	00 to 99 Years in step of 1.
<b>Year</b> needed when relay is not connected to SCADA system			

**Note:** \* Relay shows current time, set into the relay

## 6.5 PROTECTIONS settings

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	Password	0000	0000 to zzzz
This setting specifies to enter the set password			
2.	Factory Defaults	No Operation	No Operation / All Settings / Setting Group 1 / Setting Group 2
This setting is determined the settings to restore a setting group to factory default settings.			

To restore the default values to the settings in any Group settings, set the 'restore defaults' cell to the relevant Group number. Alternatively it is possible to set the 'restore defaults' cell to 'all settings' to restore the default values to all of the IED's settings, not just the Group settings.

The default settings will be placed in Flash and will only be used by the IED after they have been confirmed by the user.

Note: Restoring defaults to all settings includes the rear communication port settings, which may result in communication via the rear port being disrupted if the new (default) settings do not match those of the master station

3.	Active Settings	Group 1	Group 1 / Group 2
This setting determines to selects the active setting group.			
4.	Copy From	Group 1	Group 1 / Group 2
This setting allows settings to be copied from a selected setting group.			
5.	Copy To	No Operation	No Operation / Group 1 / Group 2
This setting allows settings to be copied to a selected setting group			
6.	Group 1 Enable	Enabled	Enabled / Disabled
This setting determines to enable/ disable the setting group 1.If the setting group 1 is enabled from the configuration setting, then all associated settings and signals are available in Group 1 setting menu.			
7.	Group 2 Enable	Disabled	Enabled / Disabled
This setting determines to enable/ disable the setting group 2. If the setting group 2 is enabled from the configuration setting, then all associated settings and signals are available in Group 2 setting menu.			
8.	Inrush Blocking	Disabled	Enabled / Disabled
This setting determines to enable or disable the System Configuration menu and it is visible further on in the Group setting menu with the 2nd Harmonic blocking related parameters setting.			
9.	PhaseOvercurrent	Enabled	Enabled / Disabled
This setting determines to enable (activate) or disable (turn off) the Phase Over current Protection function. If this function enabled then all associated settings and signals are available in the Group setting menu. Same for all other Items			
10.	NPS Overcurrent	Disabled	Enabled / Disabled
This setting determines to enable (activate) or disable (turn off) the Negative Sequence OC Protection.			
11.	Ground OC	Enabled	Enabled / Disabled
This setting determines to enable (activate) or disable (turn off) the Measured Earth Fault Protection function			
12.	Residual OC	Enabled	Enabled / Disabled
This setting determines to enable (activate) or disable (turn off) the Derived Earth Fault Protection function.			
13.	Thermal Overload	Disabled	Enabled / Disabled
This setting determines to enable (activate) or disable (turn off) the Thermal Overload function.			
14.	Under Current	Disabled	Enabled / Disabled
This setting determines to enable (activate) or disable (turn off) the Cold Load Pickup function.			



15.	50BF	Disable	Enabled / Disabled
This setting determines to enable (activate) or disable (turn off) the CB Fail Protection.			
16.	Motor Protection	Disabled	Enabled / Disabled
This setting determines to enable (activate) or disable (turn off) Stall Protection.			
17.	Number of Start	Disabled	Enabled / Disabled
This setting determines to enable (activate) or disable (turn off) Limit NB Starts.			
18.	lth>set	1.00*In	0.20In – 4.00In step 0.01
This setting determines to set the full load current			
19.	Phase Rotation	ABC	ABC /RYB
This setting determines to select the representation of Phase sequence. Based on this setting the representation in measurements, records shall change in the IED. No change is expected for the stored records, if any			
20.	Setting Values	Secondary	Primary/Secondary
While editing protection setting to view the setting values in Primary or secondary.			

**6.6 CT/VT Ratio settings**

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	Password	0000	0000 to zzzz
This setting specifies to enter the set password			
2.	Ph CT Primary	100A	1 to 30000 A in step 1A
This setting determines to sets the Phase Current Transformer input primary current rating.			
3.	Ph CT Secondary	1 A	1 A or 5 A
This setting determines to sets the Phase Current Transformer input secondary current rating.			
4.	EF CT Primary	100A	1 to 30000A in step 1A
This setting determines to sets the Earth Current Transformer input primary current rating.			
5.	EF CT Secondary	1 A	1 A or 5 A
This setting determines to sets the Earth Current Transformer input secondary current rating.			

**6.7 CLEAR RECORDS settings**

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	Password	0000	0000 to zzzz
This setting specifies to enter the set password			
2.	Events	No	Yes / No
Selecting “Yes” will cause the existing Events Stored to be erased from the relay.			
3.	Faults	No	Yes / No

Selecting "Yes" will cause the existing Fault Records to be erased from the relay.			
4.	Disturbance	No	Yes / No
Selecting "Yes" will cause the existing Disturbance Records to be erased from the relay.			
5.	Error Records	No	Yes / No
Selecting "Yes" will cause the existing Maintenance Records to be erased from the relay.			
6.	Thermal Reset	No	Yes / No
Selecting "Yes" will cause the existing Thermal state reset to zero.			
7.	Nb of Em Restr	No	Yes / No
Selecting "Yes" will cause the existing number of emergency restart records to be clear to zero.			
8.	Nb of Start	No	Yes / No
Selecting "Yes" will cause the existing number of start records to be clear to zero.			
9.	Motor Run Time	No	Yes / No
Selecting "Yes" will cause the existing Motor run records to be clear to zero.			
10.	CB Data	No	Yes / No
Selecting "Yes" will cause the existing CB records to be clear to zero.			

6.8

**REAR PORT settings**

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	Password	0000	0000 to zzzz
This setting specifies to enter the set password			
2.	Address	1	0 to 247 in steps of 1
This cell sets the unique address for the relay such that only one relay is accessed by master station software.			
3.	Baud rate	57600	9600 / 19200 / 38400 / 57600
This cell controls the communication speed between relay and master station. It is important that both relay and master station are set at the same speed setting.			
4.	Parity	Even	Even / Odd / None
This cell controls the parity format used in the data frames. It is important that both relay and master station are set with the same parity setting.			
5.	Timesync	Disabled	Enabled / Disabled
This setting enables or disables time synchronization with master Clock			

**6.9 AProLogic SETTING**

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	Password	0000	0000 to zzzz
This setting specifies to enter the set password			
2.	Outputs	000000	1 = Assign ; 0 = Not Assign
This setting specifies to set the output contact RL1 – RL6 for desire function.			
3.	Green LED	0000	1 = Assign ; 0 = Not Assign
This setting specifies to set the Green LED L5 – L8 for desire function.			
4.	Red LED	0000	1 = Assign ; 0 = Not Assign
This setting specifies to set the RED LED L5 – L8 for desire function.			
5.	AND Logic	0000	1 = Assign ; 0 = Not Assign
This setting specifies to set AND (A, B, C and D) logic equation.			
6.	Inputs	000000	1 = Assign ; 0 = Not Assign
This setting specifies to set the input Opto I/P 1 – Opto I/P 6 for desire function.			

NOTE: The protection functions assign to Relay Contact, LED Green, LED RED, AND Logic and Opto I/P are explained in 4.4 and 4.5 section.

**6.10 OUTPUT CONFIG Settings**

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	Password	0000	0000 to zzzz
This setting specifies to enter the set password			
2.	Contact HR/SR	000000	1= HR / 0 = SR
This setting specifies to O/P relay contact can be set to Manual/Hand reset (HR) or Self reset (SR)			
3.	OUT-1 Open Time	0.05 S	0 Sec to 1Sec in Step of 0.01
4.	OUT-2 Open Time	0.05 S	0 Sec to 1Sec in Step of 0.01
5.	OUT-3 Open Time	0.05 S	0 Sec to 1Sec in Step of 0.01
6.	OUT-4 Open Time	0.05 S	0 Sec to 1Sec in Step of 0.01
7.	OUT-5 Open Time	0.05 S	0 Sec to 1Sec in Step of 0.01
8.	OUT-6 Open Time	0.05 S	0 Sec to 1Sec in Step of 0.01
This setting specifies the timer is used to hold relay contact after executing trip to conform proper CB opening			
9.	LED G HR/SR	0000	1= HR / 0 = SR
This setting specifies to Green LED can be set to Manual/Hand reset (HR) or Self reset (SR)			
10.	LED R HR/SR	0000	1= HR / 0 = SR

This setting specifies to Red LED can be set to Manual/Hand reset (HR) or Self reset (SR)			
11.	ANDEQ A Op Time	1 Sec	1 Sec to 3600Sec in Step of 1
12.	ANDEQ A Rst Time	1 Sec	1 Sec to 3600Sec in Step of 1
13.	ANDEQ B Op Time	1 Sec	1 Sec to 3600Sec in Step of 1
14.	ANDEQ B Rst Time	1 Sec	1 Sec to 3600Sec in Step of 1
15.	ANDEQ C Op Time	1 Sec	1 Sec to 3600Sec in Step of 1
16.	ANDEQ C Rst Time	1 Sec	1 Sec to 3600Sec in Step of 1
17.	ANDEQ D Op Time	1 Sec	1 Sec to 3600Sec in Step of 1
18.	ANDEQ D Rst Time	1 Sec	1 Sec to 3600Sec in Step of 1
These settings specifies the Set / Reset delay for AND operation.			

**Note:** In RTV2 Configurator, the above settings parameters mentioned form serial no 9 to 18 are available under "IO Mask" file.

**6.11 DISTUBANCE SETTING (DISTUBANCE REC)**

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	Password	0000	0000 to zzzz
This setting specifies to enter the set password			
2.	Pre-Trigger	50%	10% to 90% in step of 1%
This setting specifies the trigger position of latched DR			

**6.12 OUTPUT&LED TEST (COMMISSION TEST)**

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	Password	0000	0000 to zzzz
This setting specifies to enter the set password			
2.	Test Mode	Disabled	Disabled/Test Mode/Contacts Blocked
This setting allows secondary injection testing to be performed on the relay itself.			
3.	Test Output	000000	0 = Not Operated , 1 = Operated
This setting is used to select the output relay contacts that will be tested when the Contact Test cell is set to Apply Test.			
4.	Test Apply	No Operation	No Operation/Apply Test/Remove Test
This setting is used to Test contact operation of relay output.			
5.	Test LEDs	No Operation	No Operation / Apply Test
This setting is used to Test the 4 no's programmable LED's.			

## 6.13 GROUP settings

Following settings are common to Group 1 and 2

### 6.13.1 Inrush Blocking

Sr. No	Parameter	Defaults setting	Settings / Ranges
1.	2nd Hrm BLK	Disabled	Enabled / Disabled
To enable (activate) or disable (turn off) the 2nd Harmonic blocking of the over current/earth fault protection.			
2.	2ndHrm Threshold	20 %	5 % to 70% step 1%
This setting is to specify the 2nd Harm Threshold value, if the level of 2nd harmonic/fundamental in any phase current or neutral current exceeds the setting, the protection function which is enabled with this function will be blocked.			
3.	I>UB2H	10.00 A *In	4 to 32*In in step 0.01*In
The 2nd harmonic blocking is applied only when the fundamental current is above 2nd Harm Thresh and below I> lift setting. The reset levels are 95% of these thresholds			

## 6.13.2 PHASE OVERCURRENT

### 6.13.2.1 IP>1 Enable

Sr. No	Parameter	Defaults setting	Settings / Ranges
1.	IP>1 Enable	IEC S Inverse	Disabled / DT / IEC S Inverse / S Inverse 1.3Sec / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
This setting determines the tripping characteristic for the first stage over current element.			
2.	IP>1	1.00 A*In	If DT 0.05 to 35.00*In in step 0.01*In If IDMT then 0.05 to 4.00*In in step 0.01*In
This setting determines Pick-up setting for first stage overcurrent element.			
3.	IP>1 DT Delay	1.00 S	0 to 100 s in step 0.01s
This setting is used to set the time-delay for the Definite Time (DT) setting if selected for first stage over current element.			
4.	IP>1 TMS	1.000	0.025 to 1.200 in step 0.005
This setting for the time multiplier setting to adjust the operating time of the IEC / UK IDMT characteristic.			
5.	IP>1 Time Dial	1.00	0.01 to 100.00 in step 0.01
This setting for the time multiplier setting to adjust the operating time of the IEEE / US IDMT characteristic.			
6.	tIP>1 D/O Char TMS	DT	IDMT/DT
This setting determines the reset/release characteristic.			
7.	IP>1 D/O Char	1.000	0.025 to 1.2 step 0.005
This setting determines the reset/release time multiplier setting for IEEE IDMT characteristic			
8.	IP>1 tD/O Delay	0.01 S	0 to 100 s in step 0.01s
This setting determines the reset/release time for Definite Time (DT) and all IDMT curve			

9.	I>1 2nd Hrm BLK	Disabled	Enabled / Disabled
<p>This setting determines the enable (activate) or disable (turn off) the first stage over current element to block the trip command in presence of inrush current.</p> <p>If IP&gt;1 Blocking and 2nd Harmonic both setting are enable.</p> <p>This function block the (I&gt;1) trip command in case 2nd harmonics/fundamental in any phase is above the 2nd Hr. Threshold and fundamental current is below I&gt;UB2H setting (set in Inrush Blocking Menu.)</p>			

### 6.13.2.2 IP>2 Function

Sr. No	Parameter	Defaults setting	Settings / Ranges
1.	IP>2 Enable	IEC S Inverse	Disabled / DT / IEC S Inverse / S Inverse 1.3Sec / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
<p>This setting determines the tripping characteristic for the first stage over current element.</p>			
2.	IP>2	1.00 A*In	If DT 0.05 to 35.00*In in step 0.01*In If IDMT then 0.05 to 4.00*In in step 0.01*In
<p>This setting determines Pick-up setting for first stage overcurrent element.</p>			
3.	IP>2 DT Delay	1.00 S	0 to 100 s in step 0.01s
<p>This setting is used to set the time-delay for the Definite Time (DT) setting if selected for first stage over current element.</p>			
4.	IP>2 TMS	1.000	0.025 to 1.200 in step 0.005
<p>This setting for the time multiplier setting to adjust the operating time of the IEC / UK IDMT characteristic.</p>			
5.	IP>2 Time Dial	1.00	0.01 to 100.00 in step 0.01
<p>This setting for the time multiplier setting to adjust the operating time of the IEEE / US IDMT characteristic.</p>			
6.	tIP>2 D/O Char	DT	IDMT/DT
<p>This setting determines the reset/release characteristic.</p>			
7.	IP>2 D/O Char TMS	1.000	0.025 to 1.2 step 0.005
<p>This setting determines the reset/release time multiplier setting for IEEE IDMT characteristic</p>			
8.	IP>2 tD/O Delay	0.01 S	0 to 100 s in step 0.01s
<p>This setting determines the reset/release time for Definite Time (DT) and all IDMT curve</p>			
9.	IP>2 2nd Hrm BLK	Disabled	Enabled / Disabled
<p>This setting determines the enable (activate) or disable (turn off) the first stage over current element to block the trip command in presence of inrush current.</p> <p>If IP&gt;2 Blocking and 2nd Harmonic both setting are enable.</p> <p>This function block the (IP&gt;2) trip command in case 2nd harmonics/fundamental in any phase is above the 2nd Hr. Threshold and fundamental current is below I&gt;UB2H setting (set in Inrush Blocking Menu.)</p>			

**6.13.2.3 IP>3 Enable**

Sr. No	Parameter	Defaults setting	Settings / Ranges
1.	IP>3 Enable	IEC S Inverse	Disabled / DT / IEC S Inverse / S Inverse 1.3Sec / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
This setting determines the tripping characteristic for the first stage over current element.			
2.	IP>3	1.00 A*In	If DT 0.05 to 35.00*In in step 0.01*In If IDMT then 0.05 to 4.00*In in step 0.01*In
This setting determines Pick-up setting for first stage overcurrent element.			
3.	IP>3 DT Delay	1.00 S	0 to 100 s in step 0.01s
This setting is used to set the time-delay for the Definite Time (DT) setting if selected for first stage over current element.			
4.	IP>3 TMS	1.000	0.025 to 1.200 in step 0.005
This setting for the time multiplier setting to adjust the operating time of the IEC / UK IDMT characteristic.			
5.	IP>3 Time Dial	1.00	0.01 to 100.00 in step 0.01
This setting for the time multiplier setting to adjust the operating time of the IEEE / US IDMT characteristic.			
6.	tIP>3 D/O Char	DT	IDMT/DT
This setting determines the reset/release characteristic.			
7.	IP>3 D/O Char TMS	1.000	0.025 to 1.2 step 0.005
This setting determines the reset/release time multiplier setting for IEEE IDMT characteristic			
8.	IP>3 tD/O Delay	0.01 S	0 to 100 s in step 0.01s
This setting determines the reset/release time for Definite Time (DT) and all IDMT curve			
9.	IP>3 2nd Hrm BLK	Disabled	Enabled / Disabled
This setting determines the enable (activate) or disable (turn off) the first stage over current element to block the trip command in presence of inrush current. If IP>3 Blocking and 2nd Harmonic both setting are enable. This function block the (IP>3) trip command in case 2nd harmonics/fundamental in any phase is above the 2nd Hr. Threshold and fundamental current is below I>UB2H setting (set in Inrush Blocking Menu.)			

**6.13.3 NPS OVERCURRENT**
**6.13.3.1 I2>1 Enable**

Sr. No	Parameter	Defaults setting	Settings / Ranges
1.	I2>1 Enable	IEC S Inverse	Disabled / DT / IEC S Inverse / S Inverse 1.3Sec / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse

This setting determines the tripping characteristic for the first stage over current element.			
2.	I2>1	1.00 A*In	If DT 0.05 to 35.00*In in step 0.01*In If IDMT then 0.05 to 4.00*In in step 0.01*In
This setting determines Pick-up setting for first stage overcurrent element.			
3.	I2>1 DT Delay	1.00 S	0 to 100 s in step 0.01s
This setting is used to set the time-delay for the Definite Time (DT) setting if selected for first stage over current element.			
4.	I2>1 TMS	1.000	0.025 to 1.200 in step 0.005
This setting for the time multiplier setting to adjust the operating time of the IEC / UK IDMT characteristic.			
5.	I2>1 Time Dial	1.00	0.01 to 100.00 in step 0.01
This setting for the time multiplier setting to adjust the operating time of the IEEE / US IDMT characteristic.			
6.	tI2>1 D/O Char	DT	IDMT/DT
This setting determines the reset/release characteristic.			
7.	I2>1 D/O Char TMS	1.000	0.025 to 1.2 step 0.005
This setting determines the reset/release time multiplier setting for IEEE IDMT characteristic			
8.	I2>1 tD/O Delay	0.01 S	0 to 100 s in step 0.01s
This setting determines the reset/release time for Definite Time (DT) and all IDMT curve			
9.	I2>1 2nd Hrm BLK	Disabled	Enabled / Disabled
This setting determines the enable (activate) or disable (turn off) the first stage over current element to block the trip command in presence of inrush current. If I2>1 Blocking and 2nd Harmonic both setting are enable. This function block the (I2>1) trip command in case 2nd harmonics/fundamental in any phase is above the 2nd Hr. Threshold and fundamental current is below I>UB2H setting (set in Inrush Blocking Menu.)			

### 6.13.3.2 I2>2 Enable

Sr. No	Parameter	Defaults setting	Settings / Ranges
1.	I2>2 Enable	IEC S Inverse	Disabled / DT / IEC S Inverse / S Inverse 1.3Sec / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
This setting determines the tripping characteristic for the first stage over current element.			
2.	I2>2	1.00 A*In	If DT 0.05 to 35.00*In in step 0.01*In If IDMT then 0.05 to 4.00*In in step 0.01*In
This setting determines Pick-up setting for first stage overcurrent element.			
3.	I2>2 DT Delay	1.00 S	0 to 100 s in step 0.01s
This setting is used to set the time-delay for the Definite Time (DT) setting if selected for first stage over current element.			



4.	I2>2 TMS	1.000	0.025 to 1.200 in step 0.005
This setting for the time multiplier setting to adjust the operating time of the IEC / UK IDMT characteristic.			
5.	I2>2 Time Dial	1.00	0.01 to 100.00 in step 0.01
This setting for the time multiplier setting to adjust the operating time of the IEEE / US IDMT characteristic.			
6.	tI2>2 D/O Char	DT	IDMT/DT
This setting determines the reset/release characteristic.			
7.	I2>2 D/O Char TMS	1.000	0.025 to 1.2 step 0.005
This setting determines the reset/release time multiplier setting for IEEE IDMT characteristic			
8.	I2>2 tD/O Delay	0.01 S	0 to 100 s in step 0.01s
This setting determines the reset/release time for Definite Time (DT) and all IDMT curve			
9.	I2>2 2nd Hrm BLK	Disabled	Enabled / Disabled
This setting determines the enable (activate) or disable (turn off) the first stage over current element to block the trip command in presence of inrush current. If I2>2 Blocking and 2nd Harmonic both setting are enable. This function block the (I2>2) trip command in case 2nd harmonics/fundamental in any phase is above the 2nd Hr. Threshold and fundamental current is below I>UB2H setting (set in Inrush Blocking Menu.)			

**6.13.3.3 I2>3 Enable**

Sr. No	Parameter	Defaults setting	Settings / Ranges
1.	I2>3 Enable	IEC S Inverse	Disabled / DT / IEC S Inverse / S Inverse / 1.3Sec / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
This setting determines the tripping characteristic for the first stage over current element.			
2.	I2>3	1.00 A*In	If DT 0.05 to 35.00*In in step 0.01*In If IDMT then 0.05 to 4.00*In in step 0.01*In
This setting determines Pick-up setting for first stage overcurrent element.			
3.	I2>3 DT Delay	1.00 S	0 to 100 s in step 0.01s
This setting is used to set the time-delay for the Definite Time (DT) setting if selected for first stage over current element.			
4.	I2>3 TMS	1.000	0.025 to 1.200 in step 0.005
This setting for the time multiplier setting to adjust the operating time of the IEC / UK IDMT characteristic.			
5.	I2>3 Time Dial	1.00	0.01 to 100.00 in step 0.01
This setting for the time multiplier setting to adjust the operating time of the IEEE / US IDMT characteristic.			
6.	tI2>3 D/O Char	DT	IDMT/DT
This setting determines the reset/release characteristic.			

7.	I2>3 D/O Char TMS	1.000	0.025 to 1.2 step 0.005
This setting determines the reset/release time multiplier setting for IEEE IDMT characteristic			
8.	I2>3 tD/O Delay	0.01 S	0 to 100 s in step 0.01s
This setting determines the reset/release time for Definite Time (DT) and all IDMT curve			
9.	I2>3 2nd Hrm BLK	Disabled	Enabled / Disabled
<p>This setting determines the enable (activate) or disable (turn off) the first stage over current element to block the trip command in presence of inrush current.</p> <p>If I2&gt;3 Blocking and 2nd Harmonic both setting are enable.</p> <p>This function block the (I2&gt;3) trip command in case 2nd harmonics/fundamental in any phase is above the 2nd Hr. Threshold and fundamental current is below I&gt;UB2H setting (set in Inrush Blocking Menu.)</p>			

### 6.13.4 Ground OC

#### 6.13.4.1 IE>1 Enable

Sr. No	Parameter	Defaults setting	Settings / Ranges
1.	IE>1 Enable	IEC S Inverse	Disabled / DT / IEC S Inverse / S Inverse / 1.3Sec / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
This setting determines the tripping characteristic for the first stage over current element.			
2.	IE>1	1.00 A*In	If DT 0.05 to 35.00*In in step 0.01*In If IDMT then 0.05 to 4.00*In in step 0.01*In
This setting determines Pick-up setting for first stage overcurrent element.			
3.	IE>1DT Delay	1.00 S	0 to 100 s in step 0.01s
This setting is used to set the time-delay for the Definite Time (DT) setting if selected for first stage over current element.			
4.	IE>1TMS	1.000	0.025 to 1.200 in step 0.005
This setting for the time multiplier setting to adjust the operating time of the IEC / UK IDMT characteristic.			
5.	IE>1Time Dial	1.00	0.01 to 100.00 in step 0.01
This setting for the time multiplier setting to adjust the operating time of the IEEE / US IDMT characteristic.			
6.	tIE>1D/O Char	DT	IDMT/DT
This setting determines the reset/release characteristic.			
7.	IE>1D/O Char TMS	1.000	0.025 to 1.2 step 0.005
This setting determines the reset/release time multiplier setting for IEEE IDMT characteristic			
8.	IE>1tD/O Delay	0.01 S	0 to 100 s in step 0.01s
This setting determines the reset/release time for Definite Time (DT) and all IDMT curve			
9.	IE>12nd Hrm BLK	Disabled	Enabled / Disabled
This setting determines the enable (activate) or disable (turn off) the first stage over current element to block			

the trip command in presence of inrush current.  
If IE>1Blocking and 2nd Harmonic both setting are enable.  
This function block the (IE>1) trip command in case 2nd harmonics/fundamental in any phase is above the 2nd Hr. Threshold and fundamental current is below I>UB2H setting (set in Inrush Blocking Menu.)

**6.13.4.1.1 IE>1 Function: Sensitive Earth Fault (Measured ordering Option)**

Sr. No	Parameter	Defaults setting	Settings / Ranges
1.	IE>1 Enable	IEC S Inverse	Disabled / DT / IEC S Inverse / S Inverse 1.3Sec / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
This setting determines the tripping characteristic for the first stage over current element.			
2.	IE>1	1.00 A*In	If DT 0.002 to 2 *In in step 0.001*In If IDMT then 0.002 to 0.200*In in step 0.001*In
This setting determines Pick-up setting for first stage overcurrent element.			
3.	IE>1DT Delay	1.00 S	0 to 200 s in step 0.01s
This setting is used to set the time-delay for the Definite Time (DT) setting if selected for first stage over current element.			
4.	IE>1TMS	1.000	0.025 to 1.200 in step 0.005
This setting for the time multiplier setting to adjust the operating time of the IEC / UK IDMT characteristic.			
5.	IE>1Time Dial	1.00	0.01 to 100.00 in step 0.01
This setting for the time multiplier setting to adjust the operating time of the IEEE / US IDMT characteristic.			
6.	tIE>1D/O Char	DT	IDMT/DT
This setting determines the reset/release characteristic.			
7.	IE>1D/O Char TMS	1.000	0.025 to 1.2 step 0.005
This setting determines the reset/release time multiplier setting for IEEE IDMT characteristic			
8.	IE>1tD/O Delay	0.01 S	0 to 100 s in step 0.01s
This setting determines the reset/release time for Definite Time (DT) and all IDMT curve			
9.	IE>12nd Hrm BLK	Disabled	Enabled / Disabled
This setting determines the enable (activate) or disable (turn off) the first stage over current element to block the trip command in presence of inrush current. If IE>1Blocking and 2nd Harmonic both setting are enable. This function block the (I2>3) trip command in case 2nd harmonics/fundamental in any phase is above the 2nd Hr. Threshold and fundamental current is below I>UB2H setting (set in Inrush Blocking Menu.)			

**6.13.4.2 IE>2 Function**

Sr. No	Parameter	Defaults setting	Settings / Ranges
1.	IE>2 Enable	IEC S Inverse	Disabled / DT / IEC S Inverse / S Inverse 1.3Sec / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
This setting determines the tripping characteristic for the first stage over current element.			
2.	IE>2	1.00 A*In	If DT 0.05 to 35.00*In in step 0.01*In If IDMT then 0.05 to 4.00*In in step 0.01*In
This setting determines Pick-up setting for first stage overcurrent element.			
3.	IE>2DT Delay	1.00 S	0 to 100 s in step 0.01s
This setting is used to set the time-delay for the Definite Time (DT) setting if selected for first stage over current element.			
4.	IE>2TMS	1.000	0.025 to 1.200 in step 0.005
This setting for the time multiplier setting to adjust the operating time of the IEC / UK IDMT characteristic.			
5.	IE>2Time Dial	1.00	0.01 to 100.00 in step 0.01
This setting for the time multiplier setting to adjust the operating time of the IEEE / US IDMT characteristic.			
6.	tIE>2D/O Char	DT	IDMT/DT
This setting determines the reset/release characteristic.			
7.	IE>2D/O Char TMS	1.000	0.025 to 1.2 step 0.005
This setting determines the reset/release time multiplier setting for IEEE IDMT characteristic			
8.	IE>2tD/O Delay	0.01 S	0 to 100 s in step 0.01s
This setting determines the reset/release time for Definite Time (DT) and all IDMT curve			
9.	IE>22nd Hrm BLK	Disabled	Enabled / Disabled
This setting determines the enable (activate) or disable (turn off) the first stage over current element to block the trip command in presence of inrush current. If IE>2Blocking and 2nd Harmonic both setting are enable. This function block the (IE>2) trip command in case 2nd harmonics/fundamental in any phase is above the 2nd Hr. Threshold and fundamental current is below I>UB2H setting (set in Inrush Blocking Menu.)			

**6.13.4.2.1 IE>2 Function: Sensitive Earth Fault (Measured ordering Option)**

Sr. No	Parameter	Defaults setting	Settings / Ranges
1.	IE>2 Enable	IEC S Inverse	Disabled / DT / IEC S Inverse / S Inverse 1.3Sec / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse

This setting determines the tripping characteristic for the first stage over current element.			
2.	IE>2	1.00 A*In	If DT 0.002 to 2.000*In in step 0.001*In If IDMT then 0.002 to 0.200*In in step 0.001*In
This setting determines Pick-up setting for first stage overcurrent element.			
3.	IE>2DT Delay	1.00 S	0 to 200 s in step 0.01s
This setting is used to set the time-delay for the Definite Time (DT) setting if selected for first stage over current element.			
4.	IE>2TMS	1.000	0.025 to 1.200 in step 0.005
This setting for the time multiplier setting to adjust the operating time of the IEC / UK IDMT characteristic.			
5.	IE>2Time Dial	1.00	0.01 to 100.00 in step 0.01
This setting for the time multiplier setting to adjust the operating time of the IEEE / US IDMT characteristic.			
6.	tIE>2D/O Char	DT	IDMT/DT
This setting determines the reset/release characteristic.			
7.	IE>2D/O Char TMS	1.000	0.025 to 1.2 step 0.005
This setting determines the reset/release time multiplier setting for IEEE IDMT characteristic			
8.	IE>2tD/O Delay	0.01 S	0 to 100 s in step 0.01s
This setting determines the reset/release time for Definite Time (DT) and all IDMT curve			
9.	IE>22nd Hrm BLK	Disabled	Enabled / Disabled
This setting determines the enable (activate) or disable (turn off) the first stage over current element to block the trip command in presence of inrush current. If IE>2Blocking and 2nd Harmonic both setting are enable. This function block the (IE>2) trip command in case 2nd harmonics/fundamental in any phase is above the 2nd Hr. Threshold and fundamental current is below I>UB2H setting (set in Inrush Blocking Menu.)			

#### 6.13.4.3 IE>3 Enable

Sr. No	Parameter	Defaults setting	Settings / Ranges
1.	IE>3 Enable	IEC S Inverse	Disabled / DT / IEC S Inverse / S Inverse 1.3Sec / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
This setting determines the tripping characteristic for the first stage over current element.			
2.	IE>3	1.00 A*In	If DT 0.05 to 35.00*In in step 0.01*In If IDMT then 0.05 to 4.00*In in step 0.01*In
This setting determines Pick-up setting for first stage overcurrent element.			
3.	IE>3 DT Delay	1.00 S	0 to 200 s in step 0.01s
This setting is used to set the time-delay for the Definite Time (DT) setting if selected for first stage over current element.			

4.	IE>3 TMS	1.000	0.025 to 1.200 in step 0.005
This setting for the time multiplier setting to adjust the operating time of the IEC / UK IDMT characteristic.			
5.	IE>3 Time Dial	1.00	0.01 to 100.00 in step 0.01
This setting for the time multiplier setting to adjust the operating time of the IEEE / US IDMT characteristic.			
6.	tIE>2D/O Char	DT	IDMT/DT
This setting determines the reset/release characteristic.			
7.	IE>2 D/O Char TMS	1.000	0.025 to 1.2 step 0.005
This setting determines the reset/release time multiplier setting for IEEE IDMT characteristic			
8.	IE>2 tD/O Delay	0.01 S	0 to 100 s in step 0.01s
This setting determines the reset/release time for Definite Time (DT) and all IDMT curve			
9.	IE>2 2nd Hrm BLK	Disabled	Enabled / Disabled
This setting determines the enable (activate) or disable (turn off) the first stage over current element to block the trip command in presence of inrush current. If IE>2Blocking and 2nd Harmonic both setting are enable. This function block the (IE>2) trip command in case 2nd harmonics/fundamental in any phase is above the 2nd Hr. Threshold and fundamental current is below I>UB2H setting (set in Inrush Blocking Menu.)			

#### 6.13.4.3.1 IE>3 Function: Sensitive Earth Fault (Measured ordering Option)

Sr. No	Parameter	Defaults setting	Settings / Ranges
1.	IE>3 Enable	IEC S Inverse	Disabled / DT / IEC S Inverse / S Inverse / 1.3Sec / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
This setting determines the tripping characteristic for the first stage over current element.			
2.	IE>3	1.00 A*In	If DT 0.04 to 2.000* In in step 0.001*In If IDMT then 0.002 to 0.2* In in step 0.001*In
This setting determines Pick-up setting for first stage overcurrent element.			
3.	IE>3 DT Delay	1.00 S	0 to 200 s in step 0.01s
This setting is used to set the time-delay for the Definite Time (DT) setting if selected for first stage over current element.			
4.	IE>3 TMS	1.000	0.025 to 1.200 in step 0.005
This setting for the time multiplier setting to adjust the operating time of the IEC / UK IDMT characteristic.			
5.	IE>3 Time Dial	1.00	0.01 to 100.00 in step 0.01
This setting for the time multiplier setting to adjust the operating time of the IEEE / US IDMT characteristic.			
6.	tIE>2D/O Char	DT	IDMT/DT
This setting determines the reset/release characteristic.			

7.	IE>2 D/O Char TMS	1.000	0.025 to 1.2 step 0.005
This setting determines the reset/release time multiplier setting for IEEE IDMT characteristic			
8.	IE>2 tD/O Delay	0.01 S	0 to 100 s in step 0.01s
This setting determines the reset/release time for Definite Time (DT) and all IDMT curve			
9.	IE>2 2nd Hrm BLK	Disabled	Enabled / Disabled
This setting determines the enable (activate) or disable (turn off) the first stage over current element to block the trip command in presence of inrush current. If IE>2Blocking and 2nd Harmonic both setting are enable. This function block the (IE>2) trip command in case 2nd harmonics/fundamental in any phase is above the 2nd Hr. Threshold and fundamental current is below I>UB2H setting (set in Inrush Blocking Menu.)			

### 6.13.5 Residual OC

#### 6.13.5.1 3I0>1 Function

Sr. No	Parameter	Defaults setting	Settings / Ranges
1.	3I0>1 Enable	IEC S Inverse	Disabled / DT / IEC S Inverse / S Inverse / 1.3Sec / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
This setting determines the tripping characteristic for the first stage over current element.			
2.	3I0>1	1.00 A*In	If DT 0.1 to 35.00*In in step 0.01*In If IDMT then 0.1 to 4.00*In in step 0.01*In
This setting determines Pick-up setting for first stage overcurrent element.			
3.	3I0>1 DT Delay	1.00 S	0 to 200 s in step 0.01s
This setting is used to set the time-delay for the Definite Time (DT) setting if selected for first stage over current element.			
4.	3I0>1TMS	1.000	0.025 to 1.200 in step 0.005
This setting for the time multiplier setting to adjust the operating time of the IEC / UK IDMT characteristic.			
5.	3I0>1 3 Time Dial	1.00	0.01 to 100.00 in step 0.01
This setting for the time multiplier setting to adjust the operating time of the IEEE / US IDMT characteristic.			
6.	t3I0>1D/O Char	DT	IDMT/DT
This setting determines the reset/release characteristic.			
7.	3I0>1 D/O Char TMS	1.000	0.025 to 1.2 step 0.005
This setting determines the reset/release time multiplier setting for IEEE IDMT characteristic			
8.	3I0>1 tD/O Delay	0.01 S	0 to 100 s in step 0.01s
This setting determines the reset/release time for Definite Time (DT) and all IDMT curve			
9.	3I0>1 2nd Hrm BLK	Disabled	Enabled / Disabled

This setting determines the enable (activate) or disable (turn off) the first stage over current element to block the trip command in presence of inrush current.  
If 3I0>1 Blocking and 2nd Harmonic both setting are enable.  
This function block the (3I0>1) trip command in case 2nd harmonics/fundamental in any phase is above the 2nd Hr. Threshold and fundamental current is below I>UB2H setting (set in Inrush Blocking Menu.)

**6.13.5.2 3I0>2 Function**

Sr. No	Parameter	Defaults setting	Settings / Ranges
1.	3I0>2 Enable	IEC S Inverse	Disabled / DT / IEC S Inverse / S Inverse / 1.3Sec / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
This setting determines the tripping characteristic for the first stage over current element.			
2.	3I0>2	1.00 A*In	If DT 0.1 to 35.00*In in step 0.01*In If IDMT then 0.1 to 4.00*In in step 0.01*In
This setting determines Pick-up setting for first stage overcurrent element.			
3.	3I0>2 DT Delay	1.00 S	0 to 200 s in step 0.01s
This setting is used to set the time-delay for the Definite Time (DT) setting if selected for first stage over current element.			
4.	3I0>2TMS	1.000	0.025 to 1.200 in step 0.005
This setting for the time multiplier setting to adjust the operating time of the IEC / UK IDMT characteristic.			
5.	3I0>2 Time Dial	1.00	0.01 to 100.00 in step 0.01
This setting for the time multiplier setting to adjust the operating time of the IEEE / US IDMT characteristic.			
6.	t3I0>2D/O Char	DT	IDMT/DT
This setting determines the reset/release characteristic.			
7.	3I0>2 D/O Char TMS	1.000	0.025 to 1.2 step 0.005
This setting determines the reset/release time multiplier setting for IEEE IDMT characteristic			
8.	3I0>2 tD/O Delay	0.01 S	0 to 100 s in step 0.01s
This setting determines the reset/release time for Definite Time (DT) and all IDMT curve			
9.	3I0>2 2nd Hrm BLK	Disabled	Enabled / Disabled
This setting determines the enable (activate) or disable (turn off) the first stage over current element to block the trip command in presence of inrush current. If 3I0>2 Blocking and 2nd Harmonic both setting are enable. This function block the (3I0>2) trip command in case 2nd harmonics/fundamental in any phase is above the 2nd Hr. Threshold and fundamental current is below I>UB2H setting (set in Inrush Blocking Menu.)			



**6.13.5.3 3I0>3 Function**

Sr. No	Parameter	Defaults setting	Settings / Ranges
1.	3I0>3 Enable	IEC S Inverse	Disabled / DT / IEC S Inverse / S Inverse 1.3Sec / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse
This setting determines the tripping characteristic for the first stage over current element.			
2.	3I0>3	1.00 A*In	If DT 1.0 to 35.00* In in step 0.01*In If IDMT then 0.10 to 4.00* In in step 0.01*In
This setting determines Pick-up setting for first stage overcurrent element.			
3.	3I0>3 DT Delay	1.00 S	0 to 200 s in step 0.01s
This setting is used to set the time-delay for the Definite Time (DT) setting if selected for first stage over current element.			
4.	3I0>3 TMS	1.000	0.025 to 1.200 in step 0.005
This setting for the time multiplier setting to adjust the operating time of the IEC / UK IDMT characteristic.			
5.	3I0>3 Time Dial	1.00	0.01 to 100.00 in step 0.01
This setting for the time multiplier setting to adjust the operating time of the IEEE / US IDMT characteristic.			
6.	t3I0>3D/O Char	DT	IDMT/DT
This setting determines the reset/release characteristic.			
7.	3I0>3 D/O Char TMS	1.000	0.025 to 1.2 step 0.005
This setting determines the reset/release time multiplier setting for IEEE IDMT characteristic			
8.	3I0>3 tD/O Delay	0.01 S	0 to 100 s in step 0.01s
This setting determines the reset/release time for Definite Time (DT) and all IDMT curve			
9.	3I0>3 2nd Hrm BLK	Disabled	Enabled / Disabled
This setting determines the enable (activate) or disable (turn off) the first stage over current element to block the trip command in presence of inrush current. If 3I0>3 Blocking and 2nd Harmonic both setting are enable. This function block the (3I0>3) trip command in case 2nd harmonics/fundamental in any phase is above the 2nd Hr. Threshold and fundamental current is below I>UB2H setting (set in Inrush Blocking Menu.)			

**6.13.6 THERMAL OVERLOAD**

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	Inhib. Th Trip	Disabled	Disabled/ Enabled
This Setting determines the block thermal tripping before successful start.			
2.	Kco-efficient	3.00 *In	0 to 10*In in step 1*In
This setting determines the Negative sequence current heating factor to increase the influence of negative sequence current			

3.	Th.Trip Enable	Enabled	Disabled/ Enabled
This setting determines Enables or disables tripping of the relay when the thermal setting is exceeded.			
4.	Th.Alarm Enable	Enabled	Disabled / Enabled
This setting determines Enables or disables the setting of an alarm threshold for the thermal state.			
5.	Ith>Alarm	70%	20 to 100% in step 1%
This setting determines the thermal state threshold corresponding to a percentage of the trip threshold at which an alarm will be generated.			
6.	Th.TConst.1	20 Mins	1 to 180 min step 1
This setting is used when the equivalent thermal current I <sub>eq</sub> is less than 2 times of full load current			
7.	Th.TConst.2	20 Mins	1 to 360 min step 1
This setting is used when the equivalent thermal current I <sub>eq</sub> is greater than 2 times of full load current.			
8.	TCooling	60 Mins	1 to 999 min step 1
This setting determines the thermal time constant when motor is in Cold condition.			
9.	Th.Lockout	Enabled	Disabled / Enabled
This setting determines Enables or disables the lockout of a restart if the thermal state exceeds a threshold.			
10.	Th.LockThresh.	90 %	20 to 100%
This setting determines thermal state for the thermal lockout protection.			
11.	Service Factor	1.00	1 to 1.5
This setting specify the service factor of thermal over load function			

### 6.13.7 UnderCurrent

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	I< Enable	Disabled	Enabled / Disabled
This setting determines to enable (activate) or disable (turn off) the Loss of load protection.			
2.	I< Set	1.00 A *I <sub>n</sub>	0.1A*I <sub>n</sub> – 1.0A*I <sub>n</sub> in step 0.01*I <sub>n</sub>
This setting determines Pick-up setting for under current element.			
3.	tI<1 delay	1.00 S	0.2s to 100s in step 0.01s
This setting determines the time-delay for tripping.			
4.	TI <sub>nhib. I&lt;</sub>	12.00 S	0.05s to 300s in step 0.01s
This setting determines the time-delay for tripping.			

### 6.13.8 50BF (Circuit Breaker Fail) PROTECTION

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	50BF Enable	Enabled	Disabled / Enabled

This setting determines the enable (activate) or disable (turn off) the CB Fail Status			
2.	50BF Delay	0.10 S	0s to 50s step 0.01s
This setting for the time-delay for the CB Fail Timer			
3.	50BF Reset	CB Open + I<	1=I< Only 2=CB Open + I< 3=Prot Reset + I< 4= CB Open
This setting is for the logic condition used to reset CBF operation.			
4.	50BF_IP<	1.00 A*In	0.05 *In - 3.20*In in step 0.01
This setting determines Reset setting for CBF phase under current.			
5.	50BF_IE<	1.00 A*In	0.05*In - 3.20*In in step 0.01 A
This setting determines Reset setting for CBF Earth under current.			
6.	Remove IP> P	Disabled	Disabled / Enabled
This setting for block phase over current function during CBF is operated			
7.	Remove IE> P	Disabled	Disabled / Enabled
This setting for block Earth fault over current function during CBF is operated			

### 6.13.9 Motor Protection

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	Start Criteria	I	52a / I / (52a+I)
This setting determines Criteria to detect successful start of motor			
2.	Prolong Start	Enabled	Disabled / Enabled
This setting determines the disable or enables protection before successful start of motor.			
3.	IStart	5.0 A	1.0In to 5.0In step 0.1
This setting determines Current setting to protect motor before successful start.			
4.	TStart	15.00 S	From 1.00s to 200.00s step 0.01s
This Setting for the operating time delay for prolonged start protection.			
5.	Speed Switch	Enabled	Disabled / Enabled
This setting determines disable or enables locked rotor protection at start.			
6.	Load Jam	Enabled	Disabled / Enabled
This Setting to disable / enable protection after successful start of motor.			
7.	ILoad Jam	2.5 A	1.0In to 5.0In step 0.1
This Current setting to protect motor after successful start.			
8.	TLoad Jam	6.00 S	From 1.00s to 200.00s step 0.01s

This setting determines the operating time delay for stall rotor protection.

### 6.13.10 Number of Start

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	Hot Start Status	Disabled	Disabled / Enabled
This setting is for disable / enables function Hot Start Status.			
2.	No of Hot Start	2	From 1 to 5 step of 1
This setting determines the maximum no of hot starts that can be allowed.			
3.	Cold Strt Stat	Disabled	Disabled / Enabled
This Setting is for disable / enable function to allow cold starts.			
4.	No of Cold Start	3	From 1 to 5 step of 1
This setting determines the maximum no of Cold starts that can be allowed.			
5.	Supervising Time	10 min	From1 to 120 min step 1 min
This setting determines the Supervising period for the number of hot and cold starts.			
6.	T.Betw.Start En	Disabled	Disabled / Enabled
This setting is for Enables or disables the setting of a minimum time between two starts.			
7.	T.Betw.St	20 min	From 1 min to 120min step 1min
This setting determines minimum time between two starts.			
8.	TInhib. Start	10 min	From 1 min to 120min step 1min
This setting determines the maximum number of starts (hot or cold) is reached; this time delay will start and inhibit a new start before it ends.			

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# Section 7

## Communication

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## 7 SCADA COMMUNICATIONS

### 7.1 MODBUS:

This section describes how the MODBUS standard is applied to the RTV2 platform. It is not a description of the standard itself. The level at which this section is written assumes that the reader is already familiar with the MODBUS standard.

The MODBUS protocol is a master/slave protocol, defined and administered by the MODBUS Organization. For further information on MODBUS and the protocol specifications please see the Modbus web site ([www.modbus.org](http://www.modbus.org)).

Overview: Physical Connection and Link Layer

For connecting on MODBUS use:

- a) Rear serial port 1 - for permanent SCADA connection via EIA(RS)485

The MODBUS interface uses 'RTU' mode communication rather than 'ASCII' mode as this provides more efficient use of the communication bandwidth. This mode of communication is defined by the MODBUS standard.

The IED address and baud rate can be selected using the front panel menu or with P50 Agile Configurator.

When using a serial interface, the data format is: 1 start bit, 8 data bits, 1 stop bit (a total of 10 bits per character).

#### 7.1.1 MODBUS Protocol Map

##### 7.1.1.1 Function Codes supported:

Code	Function Name	Addresses starts with
02	Read Input Status	1x addresses
03	Read Holding Registers	4x addresses
04	Read Input Registers	3x addresses
05	Force Single Coil	0x addresses
16	Preset Multiple Registers	4x addresses

##### 7.1.1.2 Exception Codes generated in case of an error:

Code	MODBUS Response Name	Product interpretation
01	Illegal Function Code	The function code received in query is not supported by the IED.
02	Illegal Data Address	The start address received in the query is not an allowable value. NOTE: If the start address received is correct but the range includes unsupported address this error is produced.



*NOTE: The addresses of the MODBUS registers start from 1 and the user may have to subtract 1 from the addresses, depending upon the configuration of the Master station configuration.*

Sr. No.		Function Code	Register	No. of Regs	Format	Reg. Type	Address Map
1	Product Information	03					
			Manufacturer Name	10	20-Bytes ASCII	R	4x00001 – 4x00010
			Relay Name	10	20-Bytes ASCII	R	4x00011 – 4x00020
			Model	10	20-Bytes ASCII	R	4x00021 – 4x00030
			Version	10	20-Bytes ASCII	R	4x00031 – 4x00040
			Relay Description	10	20-Bytes ASCII	R	4x00041 – 4x00050

Sr. No.		Function Code	Register	No. of Regs	Format	Reg. Type	Address Map
2	Relay Configuration	03					
			Num Status (s)	1	16 bit	R	40258
			Num Controls (c)	1	16 bit	R	40259
			Num Parameters (p)	1	16 bit	R	40260
			Num Faults (f)	1	16 bit	R	40261

**Inverted IEC 870-5-4 CP56Time2a Format**

Time Synchronization – For ASHIDA RTV2 IEDs on Modbus, time synchronization is possible via a broad cast command to 800H (4x02049 through 4x02052). The format is Inverted IEC 870-5-4 CP56Time2a.																	
Words	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	
1	0	0	0	0	0	0	0	0	Year							00....99	
2	0	0	0	0	Month				Day of Week		Day of Month				1...12 1...7 1...31		
3					Hours				lv0 Minutes		0....23 0....59						
4	Milliseconds Hi								Milliseconds Lo								0.....59999 (second + mill seconds)
Su	(=0 standard, =1 Summer Time)																
iv	(=0 valid, =1 nonvalid or nonsynchronized system case)																
	First Day of week is Monday																

Sr. No.		Function Code	Register	No. of Regs	Format	Reg. Type	Address Map
3	Time Synchronization (Unicast/Broadcast)	03/16					
			Year	1	16 bit	R/W	42049
			Month- Day	1	16 bit	R/W	42050
			Hour, Min	1	16 bit	R/W	42051
			Milliseconds	1	16 bit	R/W	42052

Sr. No.		Function Code	Register	No. of Regs	Format	Reg. Type	Address Map
4	Status and Logical Status	02					
			General P	1	1 bit	R	12769
			L1 P	1	1 bit	R	12770
			L2 P	1	1 bit	R	12771
			L3 P	1	1 bit	R	12772
			IP>1 P	1	1 bit	R	12773
			IP>2 P	1	1 bit	R	12774
			IP>3 P	1	1 bit	R	12775
			IP2>1 P	1	1 bit	R	12776
			IP2>2 P	1	1 bit	R	12777
			IP2>3 P	1	1 bit	R	12778
			IE>1 P	1	1 bit	R	12779
			IE>2 P	1	1 bit	R	12780
			IE>3 P	1	1 bit	R	12781
			3I0>1 P	1	1 bit	R	12782
			3I0>2 P	1	1 bit	R	12783
			3I0>3 P	1	1 bit	R	12784
			46BC P	1	1 bit	R	12785
			TH Alarm	1	1 bit	R	12786
			I< P	1	1 bit	R	12788
			50BF P	1	1 bit	R	12789
			I> 50BF B	1	1 bit	R	12790
			IE> 50BF B	1	1 bit	R	12791
			Test Mode	1	1 bit	R	12792
			CloseFail	1	1 bit	R	12793
			Open Fail	1	1 bit	R	12794
			Rly Error	1	1 bit	R	12795
			General T	1	1 bit	R	12796
			L1 T	1	1 bit	R	12797
			L2 T	1	1 bit	R	12798
			L3 T	1	1 bit	R	12799
			IP>1 T	1	1 bit	R	12800
			IP>2 T	1	1 bit	R	12801

			IP>3 T	1	1 bit	R	12802
			I2>1 T	1	1 bit	R	12803
			I2>2 T	1	1 bit	R	12804
			I2>3 T	1	1 bit	R	12805
			IE>1 T	1	1 bit	R	12806
			IE>2 T	1	1 bit	R	12807
			IE>3 T	1	1 bit	R	12808
			3I0>1 T	1	1 bit	R	12809
			3I0>2 T	1	1 bit	R	12810
			3I0>2 T	1	1 bit	R	12811
			46BC T	1	1 bit	R	12812
			THOL Trip	1	1 bit	R	12813
			I< T	1	1 bit	R	12815
			50BF T	1	1 bit	R	12816
			Ext Trip	1	1 bit	R	12817
			CBOpr Alm	1	1 bit	R	12818
			IN1	1	1 bit	R	12819
			IN 2	1	1 bit	R	12820
			IN 3	1	1 bit	R	12821
			IN 4	1	1 bit	R	12822
			IN 5	1	1 bit	R	12823
			IN 6	1	1 bit	R	12824
			TCS Alarm	1	1 bit	R	12825
			Trip LED	1	1 bit	R	12826
			CBOPn Sup	1	1 bit	R	12827
			46BC Alarm	1	1 bit	R	12828
			EmRestart	1	1 bit	R	15001
			Loadjam P	1	1 bit	R	15002
			Suprvsn T	1	1 bit	R	15003
			TInhibSt.	1	1 bit	R	15004
			TbetwSt.	1	1 bit	R	15005
			TH Lock	1	1 bit	R	15006
			Prolong T	1	1 bit	R	15007
			Loadjam T	1	1 bit	R	15008
			Speed Sw	1	1 bit	R	15009
			MotorStrt	1	1 bit	R	15010
			Moto Run	1	1 bit	R	15011
			StrtDFail	1	1 bit	R	15012

Sr. No.		Function Code	Register	No. of Regs	Format	Reg. Type	Address Map
5	Status and Logical Status	05					
			LED Reset	1	16 bit	W	03025
			Trip	1	16 bit	W	03026

			Close	1	16 bit	W	03027
			Output 1	1	16 bit	W	03028
			Output 2	1	16 bit	W	03029
			Output 3	1	16 bit	W	03030
			Output 4	1	16 bit	W	03031
			Output 5	1	16 bit	W	03032
			Output 6	1	16 bit	W	03033

Sr. No.		Function Code	Register	No. of Regs	Format	Reg. Type	Address Map
6	Parameters	04					
			IL1	2	32 bit Float	R	33281– 33282
			IL2	2	32 bit Float	R	33283– 33284
			IL3	2	32 bit Float	R	33285 – 33286
			IE	2	32 bit Float	R	33287 – 33288
			3I0	2	32 bit Float	R	33289 – 33290
			I2	2	32 bit Float	R	33291 – 33292
			I1	2	32 bit Float	R	33293 – 33294
			Th State	2	32 bit Float	R	33295 – 33296
			I2/I1	2	32 bit Float	R	33297 – 33298
			L1-RMS	2	32 bit Float	R	33299 – 33300
			L2-RMS	2	32 bit Float	R	33301– 33302
			L3-RMS	2	32 bit Float	R	33303– 33304
			TC	2	32 bit Float	R	33305– 33306
			BOC	2	32 bit Float	R	33307– 33308
			BOT	2	32 bit Float	R	33309– 33310

## 7.2 IEC60-870-5-103:

### 7.2.1 Overview:

The specification IEC 60870-5-103 (Telecontrol Equipment and Systems Part 5 Section 103: Transmission Protocols), defines the use of standards IEC 60870-5-1 to IEC 60870-5-5, which were designed for communication with protection equipment.

This section describes how the IEC 60870-5-103 standard is applied to the A21F Relay. It is not a description of the standard itself. The level at which this section is written assumes that the reader is already familiar with the IEC 60870-5-103 standard.

This section should provide sufficient detail to enable understanding of the standard at a level required by most users.

The IEC 60870-5-103 interface is a master/slave interface with the device as the slave device.

The device conforms to compatibility level 2, as defined in the IEC 60870-5-103 standard.

The following IEC 60870-5-103 facilities are supported by this interface:

- Initialization (reset)
- Time synchronisation

- Event record extraction
- General interrogation
- Cyclic measurements
- General commands
- Disturbance record extraction

## 7.2.2 Physical Connection and Link Layer

For connecting on IEC 60870-5-103 there are two options:

- Front USB Port.
- Rear serial port 1 - for permanent SCADA connection via EIA(RS)485.

The IED address and baud rate can be selected using the front panel menu or with RTV2 Software.

## 7.2.3 Initialisation

Whenever the device has been powered up, or if the communication parameters have been changed, a reset command is required to initialize the communications. The device will respond to either of the two reset commands; Reset CU or Reset FCB (Communication Unit or Frame Count Bit). The difference between the two commands is that the Reset CU command will clear any unsent messages in the transmit buffer, whereas the Reset FCB command does not delete any messages.

The device will respond to the reset command with an identification message ASDU 5. The Cause of Transmission (COT) of this response will be either Reset CU or Reset FCB depending on the nature of the reset command.

The relay will also produce a power up event, when the relay is powered up.

## 7.2.4 Time Synchronisation

The time and date can be set using the time synchronisation feature of the IEC 60870-5-103 protocol. The device will correct the transmission delay depending on communication speed. For this, transmission time, required for the time synchronization frame from the Master to IED, considering current baud rate is added in the received time.

The device will correct the transmission delay depending on baud rate. If the time synchronisation message is sent as a send/confirm message then the device will respond with a confirm message. A time synchronisation Class 1 event will be generated/produced whether the time-synchronisation message is sent as a send confirm or a broadcast (send/no reply) message.

## 7.2.5 Spontaneous Events

Events are categorized using the following information:

- a) Function type

b) Information Number

The IEC 60870-5-103 profile in the Menu Database contains a complete listing of all events produced by the device.

**7.2.6 General Interrogation (GI)**

The GI request can be used to read the status of the device, the function numbers, and information numbers that will be returned during the GI cycle. These are shown in the IEC 60870-5-103 profile in the Menu Database.

**7.2.7 Cyclic Measurements**

The device will produce measured values using ASDU 3 or ASDU 9. ASDU3 will be reported with information number 147 and ASDU9 is reported with information number 148 and 155. These three frames are reported alternately. This can be read from the device using a Class 2 poll. For every query the current online data is reported.

The device transmits its measurands at 2.4 times the rated value of the analogue value.

**7.2.8 Commands**

A list of the supported commands is contained in the section 2.2.12 Protocol Mapping (Sr. No.8). The device will respond to valid Control Command with ASDU1 and a cause of transmission indicating 'Positive (COT-20) / Negative (COT-21) acknowledgement'. The device will respond to commands with invalid FUN/ INF combination with an ASDU 1, with a cause of transmission indicating 'negative acknowledgement'.

**7.2.9 Test Mode**

It is possible to enable test mode in the relay using the front panel menu. An event will be produced to indicate both entry to and exit from test mode. Spontaneous events and cyclic measured data transmitted whilst the device is in test mode will have a COT of 'test mode'.

**7.2.10 Disturbance Records**

The disturbance records are stored in uncompressed format and can be extracted using the standard mechanisms described in IEC 60870-5-103. This relay supports up-to 5 records.

**7.2.11 Configuration**

To configure the IED for this protocol, please see the Configuration chapter.

**7.2.12 Protocol Mapping:**

Sr. No.	INF	Description	GI	TYP	COT	FUN
1	Semantics of INFORMATION NUMBER : System Functions in monitor direction					
	0	End of general interrogation	-	8	10	255

0	Time synchronization	-	6	8	255
2	Reset FCB	-	5	3	160
3	Reset CU	-	5	4	160
4	Start/Restart	-	5	5	160
5	Power on	-	5	6	160

Note: X under GI heading means DI Status is included in General Interrogation response.

Sr. No.	INF	Description	GI	TYP	COT	FUN
2	Semantics of INFORMATION NUMBER : Status Indications in monitor direction					
19		Trip LED	X	1	1,7,9,11,12,20,21	160
22		Local parameter setting	X	1	11,12	160
27		In1	X	1	1,7,9,	160
28		In 2	X	1	1,7,9,	160
29		In3	X	1	1,7,9	160
30		In4	X	1	1,7,9	160
31		In5	X	1	1,7,9	127
32		In6	X	1	1,7,9	127
36		TCS Alarm	X	1	1,7,9	160
134		Password Reset	-	2	1,7	124
135		CBOpr Alm	X	2	1,7,9	124

Sr. No.	INF	Description	GI	TYP	COT	FUN
3	Semantics of INFORMATION NUMBER : Fault indications in monitor direction					
84		General P	X	2	1,7,9	160
64		L1 P	X	2	1,7,9	160
65		L2 P	X	2	1,7,9	160
66		L3 P	X	2	1,7,9	160
117		IP>1 P	X	2	1,7,9	126
103		IP>2 P	X	2	1,7,9	126
105		IP>3 P	X	2	1,7,9	126
126		IP2>1 P	X	2	1,7,9	126
146		IP2>2 P	X	2	1,7,9	126
147		IP2>3 P	X	2	1,7,9	126
143		IE>1 P	X	2	1,7,9	126
144		IE>2 P	X	2	1,7,9	126
145		IE>3 P	X	2	1,7,9	126
140		3I0>1 P	X	2	1,7,9	126
141		3I0>2 P	X	2	1,7,9	126
142		3I0>3 P	X	2	1,7,9	126
25		46BC P	X	2	1,7,9	124
200		TH Alarm	-	2	1,7,9	126

178	I< P	X	2	1,7,9	126
26	50BF P	X	2	1,7,9	124
154	I> 50BF B	-	2	1,7	124
155	IE> 50BF B	-	2	1,7	124
22	Test Mode	-	2	1,7	124
156	CloseFail	-	2	1,7	124
157	Open Fail	-	2	1,7	124
145	Rly Error	-	2	1,7	127
68	General T	-	2	1,7	160
69	L1 T	-	2	1,7	160
70	L2 T	-	2	1,7	160
71	L3 T	-	2	1,7	160
90	IP>1 T	-	2	1,7	160
91	IP>2 T	-	2	1,7	160
104	IP>3 T	-	2	1,7	126
158	I2>1 T	-	2	1,7	124
127	I2>2 T	-	2	1,7	126
128	I2>3 T	-	2	1,7	126
123	IE>1 T	-	2	1,7	126
124	IE>2 T	-	2	1,7	126
125	IE>3 T	-	2	1,7	126
92	3I0>1 T	-	2	1,7	160
93	3I0>2 T	-	2	1,7	160
121	3I0>2 T	-	2	1,7	126
9	46BC T	-	2	1,7	124
202	THOL Trip	-	2	1,7	126
201	Th Lock	-	2	1,7	126
177	I< T	-	2	1,7	126
85	50BF T	-	2	1,7	160
205	Prolong T	-	2	1,7	126
206	Loadjam T	-	2	1,7	126
207	Speed Sw	-	2	1,7	126
165	Motor Strt	-	2	1,7	124
166	Motor Run	-	2	1,7	124
2	Ext Trip	-	2	1,7	124
1	CBOpr Alm	-	2	1,7	124
3	Opto I/P 1	-	2	1,7	124

Sr. No.	INF	Description	GI	TYP	COT	FUN
4	Semantics of INFORMATION NUMBER : Measurands in monitor direction					
	148	Measurand I <sub>L1,2,3</sub>	-	9	2, 7	160
	155	IE,Th State, 3I0, I2, I1, I2/I1 Ratio, IrmsR, IrmsY, IrmsB.	-	9	2,7	160



1	Trip Counter, Breaker Operation Counter, Breaker Operating Time	-	244	2,7	127
---	---	---	-----	-----	-----

*NOTE: The measurands transmitted by the relay are sent as a proportion of 2.4 times of the rated value of the analog value.*

Sr. No.	INF	Description	GI	TYP	COT	FUN
5	Semantics of INFORMATION NUMBER: Fault list in monitor direction					
	0	List of Recorded DR	-	23	31	160

Sr. No.	INF	Description
6	Semantics of Actual Channel : Used for DR Transmission	
	ACC	Description
	1	IL1 - Primary
	2	IL2
	3	IL3
	4	3I0
	74	IE

Sr. No.	INF	Description	GI	TYP	COT	FUN
7	Semantics of INFORMATION NUMBER : System Functions in control direction					
	0	Initialization of general interrogation	-	7	9	255
	0	Time synchronization	-	6	8	255

Sr. No.	INF	Description	GI	TYP	COT	FUN
8	Semantics of INFORMATION NUMBER : General commands in control direction					
	19	LED Reset	ON	20	20	160
	124	Trip	ON/OFF	20	20	127
	125	Close	ON/OFF	20	20	127
	94	Output 1	ON/OFF	20	20	127
	95	Output 2	ON/OFF	20	20	127
	96	Output 3	ON/OFF	20	20	127
	97	Output 4	ON/OFF	20	20	127
	98	Output 5	ON/OFF	20	20	127
	99	Output 6	ON/OFF	20	20	127

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# Section 8

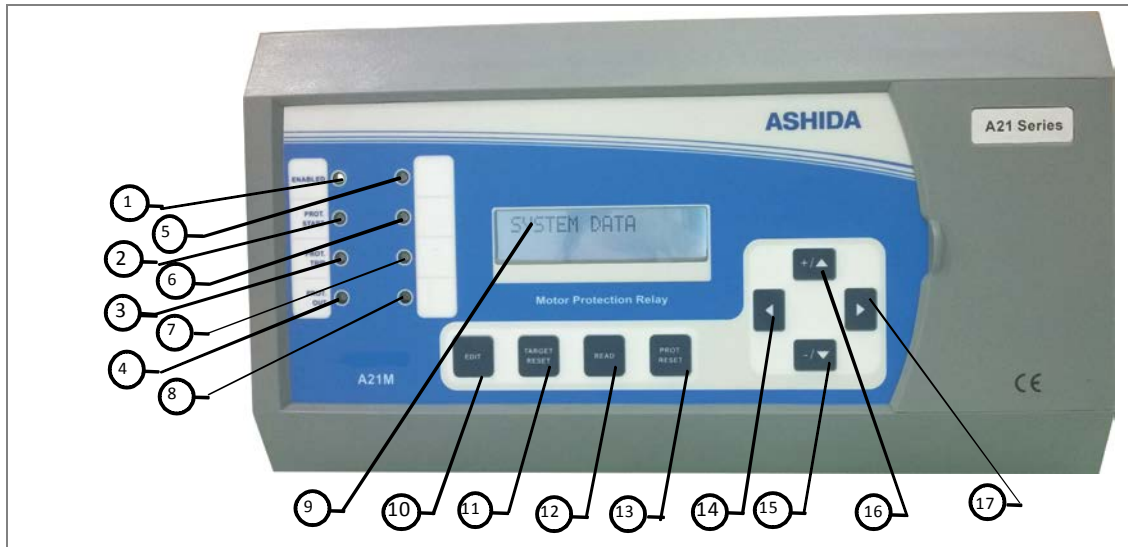
## User Guide

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## 8 FRONT PANEL AND CONTROL



**Figure 1: Front panel**

No	Legend	Function
1	L1-ENABLED	GREEN LED – This LED is ON when the IED is in correct working order and should be ON at all times. RED LED – This LED is ON if the unit's self-tests show there is an error in the hardware.
2	L2-PROT START	AMBER LED – This LED flashes when the IED registers an alarm triggered by a fault. The LED flashes until the alarms have been acknowledged by pressing READ key, and then this LED is constantly ON. The LED switches OFF when the TARGET RESET key is pressed.
3	L3-PROT TRIP	RED LED – This LED switches ON when the IED issues a trip signal. It is cleared when the associated fault is cleared and TARGET RESET key is pressed.
4	L4-PROT OUT	AMBER LED – This LED flashes when the IEDs protection is blocked.(Setting Error, ADC Error is detected by unit's self-tests)
5	L5	User Programmable Dual Colour LED.
6	L6	User Programmable Dual Colour LED.
7	L7	User Programmable Dual Colour LED.
8	L8	User Programmable Dual Colour LED.
9	LCD Display	To observe setting and parameters of the relay.
10	EDIT	Feather Touch Key to 'EDIT' the setting.
11	TARGET RESET	Feather Touch Key 'TARGET RESET' to clear the fault LED indications, clear the Alarms and 'RESET' the Relay Contacts.

No	Legend	Function
12	READ	Feather Touch Key 'READ' to view the Fault, Maintenance, Event and Alarm Record.
13	PROT. RESET	Feather Touch Key for PROT. RESET is provided for Hardware Reset. This key is interlocked with EDIT key.
14	◀	Feather Touch Key [◀] for navigating through the menus and submenus.
15	- / ▼	Feather Touch Key [ - ] Minus to 'DECREMENT' the values & [▼] to SCROLL the Main Menu down.
16	+ / ▲	Feather Touch Key [ + ] Plus to INCREMENT the values & [▲] to SCROLL the Main Menu up.
17	▶	Feather Touch Key [▶] to VIEW the settings and to navigate through the menus and submenus.

## 8.1 USER INTERFACE

### 8.1.1 LCD Display

Back-lit LCD display 16 x 2 characters is provided for the parameter and setting display, and for easy viewing of measurement, setting, fault records, date & time and error message. Back-lit will automatically switch OFF if any key is not pressed for more than 100sec. Back-lit is also automatically turned ON when any tripping occurs.

### 8.1.2 Touch Keys

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

- EDIT: The EDIT key is used to activate the settings to be modified and to bring the cursor.
- TARGET RESET: The TARGET RESET key is used to reset the LEDs indication, clear the Alarms and to DISCARD the change in settings.
- READ: The 'READ' is used to view the Fault, Maintenance, Event and Alarm Record.
- PROT. RESET: The 'PROT. RESET' key is not required in normal operation but it is used to reset total hardware of relay. This key is interlocked with EDIT key. This is normally required during firmware update of relay.
- SET: The SET Key is used to Save Settings.
- (◀) Left Arrow: When the Left Arrow key (◀) is pressed the user returns to the main menu if the setting is not edited.
- (+ / ▲) Plus / Up Arrow: (+) Plus is used to increment the setting value in the display. The (▲) Up Arrow is used to scroll the menu in UP direction.
- (- / ▼) Minus / Down Arrow: (-) Minus is used to decrement the setting value in the display. The (▼) Down Arrow is used to scroll the menu in DOWN direction.

- ( ▶ ) Right Arrow: The Right Arrow key is used to VIEW the settings and to navigate through the menus and submenus.

*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.*

### 8.1.3 LEDs

The A21M Relay is having total 8 LED of high intensity for easy identification of type of fault for easy user interface.

Sr. No	Legend	Function
1	L1-ENABLED	GREEN LED – This LED is ON when the IED is in correct working order and should be ON at all times.  RED LED – This LED is ON If the unit's self-tests show there is an error in the hardware.
2	L2-PROT. START	AMBER LED – This LED flashes when the IED registers an alarm triggered by fault. The LED flashes until the alarms have been acknowledged by pressing READ key, and then this LED is constantly ON. The LED switches OFF when the TARGET RESET key is pressed.
3	L3-PROT. TRIP	RED LED – This LED switches ON when the IED issues a trip signal. It is cleared when the associated fault is cleared and TARGET RESET key is pressed.
4	L4-PROT. OUT	AMBER LED – This LED flashes when the IED's protection is blocked.(Setting Error, ADC Error is detected by unit's self-tests)
5	L5	User Programmable Dual Colour LED.
6	L6	User Programmable Dual Colour LED.
7	L7	User Programmable Dual Colour LED.
8	L8	User Programmable Dual Colour LED.

### 8.1.4 RS485 Port

RS485 Port is provided at the back side of relay (near to terminal block) for permanent SCADA connectivity. The separate 5 Pin connector is used to avoid accidental Short Circuit with Power Wiring. Using RS485 port the Fault data, Live Event and Disturbance Record can be downloaded.



**8.1.5 USB Port**

The USB port includes a USB full-speed function controller, USB transceiver, oscillator, EEPROM, and asynchronous serial data bus (UART). No other external USB components are required.

The USB Communication port is provided on front panel of relay, after opening of front cover this port is available. This is very useful for downloading relay data and analysis it. For proper operation the user must select the proper communication port in the System Data Setting.

**8.2 EDITING AND SAVING SETTINGS**

<b>GENERAL SETTING</b>	<b>Step 1:</b> Press the Right arrow key (▶) to move to the next option.
Language English	<b>Step 2:</b> Press the Minus / Down arrow key (- / ▼) to move to the next option.
Frequency 60Hz	<b>Step 3:</b> Press the Minus / Down arrow key (- / ▼) till the relay displays this option. Press 'Edit' key to edit the setting.
Password = 000 <u>1</u>	[All editable settings are password protected so when the Edit key is pressed it will display the password and the settable number/text will start blinking].
Password = 000 <u>0</u>	<b>Step 4:</b> Enter the password by using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼). The Password is four (4) digits alpha numeric.
Password = 0000 ** Password OK **	<b>Step 5:</b> After editing the Password, press the Edit Key, the "Password OK" message is displayed and the relay will move to the next option.  Note: When the password is set, modification to the relay can be done in any settings within 15minutes. After the lapse of 15minutes the relay will once again ask to restore the password.

<div style="border: 1px solid black; padding: 5px;"> <p><b>Frequency</b> <u>60</u>Hz</p> </div>	<p>The settable Number/Text will start blinking</p> <p><b>Step 6:</b> By using the Plus / Up arrow key (+ /▲) or the Minus / Down arrow key (- /▼) the desired selection can be set as shown in the display.</p>
<div style="border: 1px solid black; padding: 5px;"> <p><b>Frequency</b> <u>50</u>Hz</p> </div>	<p><b>Step 7:</b> After setting press the Edit Key, the text will stop blinking and move to the next option.</p> <p><b>Step 8:</b> Press the Left arrow key (◀) / Right arrow key (▶) it will ask if you want to save the setting, and move to the next option.</p>
<div style="border: 1px solid black; padding: 5px;"> <p>◀ For Save TRSET For Cancel</p> </div>	<p><b>Step 9:</b> When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<div style="border: 1px solid black; padding: 5px;"> <p><b>SAVE Settings</b></p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 1px solid black; padding: 5px;"> <p><b>GENERAL SETTINGS</b></p> </div>	

*Note: The user can DISCARD SETTINGS by using the Clear Key.*

<div style="border: 1px solid black; padding: 5px;"> <p>◀ For Save TRSET For Cancel</p> </div>	<p><b>Step 10:</b> When the (TRSET) key (i.e. TARGET RESET) is it will DISCARD the changes and move to the next option.</p>
<div style="border: 1px solid black; padding: 5px;"> <p><b>DISCARD Settings</b></p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 1px solid black; padding: 5px;"> <p><b>GENERAL SETTINGS</b></p> </div>	

### 8.3 MENUS

#### 8.3.1 Default Display

After **Power ON** or when the PROT. RESET + EDIT key is pressed, the relay will display the following message.

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>ASHIDA A21M</b></p> <p><b>Motor Protect'n</b></p> </div>	<p>This window will flash momentarily showing the following.</p> <p>Relay Name: <b>A21M</b></p> <p>Relay Type: <b>Motor Protection</b></p> <p>Then the control will automatically move to next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>ID = 1</p> <p>SW = V1.00</p> </div>	<p>This window will flash momentarily showing the following.</p> <p>Unit ID = 1</p> <p>Software Version =V1.00</p> <p>Then the control will automatically move to the default window.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>GENERAL SETTINGS</b></p> </div>	

#### 8.3.2 Main Menu Details

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>GENERAL SETTING</b></p> </div>	<p>Password protected window for “<b>General Setting</b>” i.e. Language, Description, Model Number, Serial Number, Software Version, Frequency, USB Address, USB Parity, USB Baud Rate, Password, Active Group, Opto I/P Status, Relay O/P Status. CB Operation, Opto I/P and Config Port.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>REPORTING</b></p> </div>	<p>This menu is to view Fault Record, Event Record, Error Record and Alarm records.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>MEASUREMENTS</b></p> </div>	<p>This menu is to view the measured and derived actual load current <b>Measurement 1</b> (i.e. Phase current, Measured and derived EF current, Negative and Positive phase sequence current and zero sequence current) as per CT Primary and</p>

	<p>Secondary current selection, RMS value of Phase Current, BOC (Breaker Operation Counter), TC (Trip Counter), BOT (Breaker Operating Time), and <b>Measurement 2</b> (i.e. Thermal State, Load Current, Time to Th Trip, Nb of Th Trip, Last Start Time, Last St Current, Nb Hot St Allow, Nb Cold St Allow, Time to Next St, Total Nb of Strt, Nb Emergency Rst and Motor Run Time)</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>CB CONTROL</b></div>	<p>Password protected window for “<b>CB CONTROL</b>” setting. i.e. TCS Enable, TCS Delay, CB Open S'vision Disabled / Enabled (CB Open Time), CB Open Alarm Disabled / Enabled (CB Oper Counter) CB Control By, (t Close Pulse, t Open Pulse) and Emergency Restrtr.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>DATE AND TIME</b></div>	<p>Password protected window for “<b>DATE AND TIME</b>” setting i.e. Local Time Enable, Local Time Offset. DST Enable, DST Offset, DST Start, DST Start Day, DST Start Month, DST Start Mins, DST End, DST End Day, DST End Month, DST End Mins, RP Time Zone, SET Hours, SET Minutes, SET Seconds, SET Date, SET Month and SET Year.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>PROTECTION</b></div>	<p>Password protected window for “<b>PROTECTION</b>” settings i.e. Factory Defaults, Active Settings, Copy From, Copy To, Group 1 Enable Enabled/Disabled, Group 2 Enable Enabled/Disabled, Inrush Blocking Enabled/Disabled, Phase Overcurrent Enabled/Disabled, NPS Overcurrent Enabled/Disabled, Ground OC Enabled/Disabled, Residual OC Enabled/Disabled, Thermal Overload Enabled/Disabled, Under Current Enabled/Disabled, 50BF Enabled/Disabled, Motor Protection Enabled/Disabled, Number of Start Enabled/Disabled, Ith&gt;Set, Phase Rotation, and setting Values.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>CT/VT RATIOS</b></div>	<p>Password protected window for “<b>CT/VT RATIO</b> ” setting Ph CT Primary and Ph CT Secondary, EF CT Primary and EF CT Secondary.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>CLEAR RECORDS</b></div>	<p>Password protected window for “<b>CLEAR RECORDS</b>” setting i.e. Events Yes/No, Faults Yes/No, Disturbance Yes/No, Error Record Yes/No, Thermal State Yes/No, Nb of Em. Restrtr Yes/No, Nb of Start Yes/No, Motor RunTime Yes/No and CB Data Yes/No.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>REAR PORT</b></div>	<p>Password protected window for “<b>REAR PORT</b>” for setting Address, Baud Rate, Parity and Time Sync.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>AProLogic</b></div>	<p>Password protected window for “<b>AProLogic</b>” settings i.e. Outputs, LED G, LED R, AND and Inputs.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>OUTPUT CONFIG</b></div>	<p>Password protected window for “<b>OUTPUT CONFIGURATION</b>” for setting Contact HR/SR, OUT–1 Open Time, OUT–2 Open Time, OUT–3 Open Time, OUT–4 Open Time, OUT–5 Open Time and OUT–6 Open Time, LED G HR/SR, LED R HR/SR, AND A Op Time, AND A Rst Time, AND B Op Time, AND B Rst Time, AND C Op Time, AND C Rst Time, AND D Op Time and AND D Rst Time.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>DISTURBANCE</b></div>	<p>Password protected window for “<b>DISTURBANCE RECORD</b>” for setting Pre – Trigger.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>OUTPUT&amp;LED TEST</b></div>	<p>Password protected window for “<b>OUTPUT&amp;LED TEST</b>” for setting Test Mode, Test Output, Test Apply and Test LED.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>GROUP 1</b></div>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p><i>Note: Group 1 Setting will be seen only when it is enabled in Configuration setting.</i></p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>GROUP 2</b></div>	<p>Password protected window for “<b>GROUP 2</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p><i>Note: Group 2 Setting will be seen only when it is enabled in Configuration setting.</i></p>

## 8.4 GENERAL SETTINGS

### 8.4.1 To View / Set – General Settings

<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>General Setting</b></div>	<p>Password protected window for “<b>General Setting</b>” setting i.e. Language, Description, Model Number, Serial Number, Software Version, Frequency, USB Address, USB Parity, USB Baud Rate, Password, Active Group, Opto I/P Status, Relay O/P Status. CB Operation Open/Close, Opto I/P Supply and Config Port.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>Language</b> <b>English</b></div>	<p>Read-only</p> <p>This window shows user interface is in English <b>Language</b>.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<p><b>Description</b> ASHIDA A21M</p>	<p>Read-only This window shows <b>Description</b> of the relay. Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Model Number</b> A21MBxxxxxxxxxA</p>	<p>Read-only This window shows the <b>Model Number</b> of the relay. Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Serial Number</b> xxxA21Mxxxx</p>	<p>Read-only This window shows the <b>Serial Number</b> of the relay. Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Software Version</b> A21MB_xxx_Vx.xx</p>	<p>Read-only This window shows the <b>Software Version</b> of the relay. Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Frequency</b> 50Hz</p>	<p>Editable setting This window shows the <b>System Frequency</b> of the relay. The desired <b>Frequency</b> can be selected. i.e. 50/ 60 Hz. Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>USB Address</b> 1</p>	<p>Read-only This window shows the <b>USB Address</b>. Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>USB Parity</b> None</p>	<p>Read-only This window shows the <b>USB Parity</b>. Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<div style="border: 1px solid black; padding: 5px;"> <p><b>USB Baud Rate</b> 57600</p> </div>	<p>Read-only</p> <p>This window shows the <b>USB Baud Rate</b></p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px;"> <p><b>Password</b> ****</p> </div>	<p>Editable setting</p> <p>This window is for setting the <b>Password</b> of the relay</p> <p>The desired alpha numeric case sensitive password can be selected from 0000 to zzzz and each digit can be set i.e. 0 to 9 / A to Z / a to z.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px;"> <p><b>Active Group</b> 1</p> </div>	<p>Read-only</p> <p>This window shows the <b>Active Group</b> selected in configuration.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px;"> <p><b>Opto I/P</b>      654321 <b>Status</b>        000000</p> </div>	<p>Read-only</p> <p>This window shows the online status of <b>Opto Input Status</b>.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px;"> <p><b>Relay O/P</b>      654321 <b>Status</b>        000000</p> </div>	<p>Read-only</p> <p>This window shows the online status of <b>Relay Output Status</b>.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px;"> <p><b>CB Operation</b> No operation</p> </div>	<p>Editable setting</p> <p>This window shows the <b>CB Operation</b> of the relay (for control operation through relay HMI)</p> <p>The desired <b>CB Operation</b> can be selected. i.e. No Operation/CB Open/CB Close</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>



<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Opto I/P Supply</b> DC</p> </div>	<p>Editable setting</p> <p>This window shows the <b>Opto I/P Supply</b> of the relay (selection of input voltage connected to status input)</p> <p>The desired <b>Opto Input</b> can be selected. i.e. DC / AC.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Config Port</b> USB</p> </div>	<p>Editable setting</p> <p>This window shows the <b>Config Port</b> of the relay (used to communicate with Configurator)</p> <p>The desired <b>Config Port</b> can be selected. i.e. USB / RP</p> <p>Press the Left arrow key (◀) or Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>◀ For Save TRSET For Cancel</p> </div>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>SAVE Settings</b></p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>GENERAL SETTINGS</b></p> </div>	

## 8.5 REPORTING

### 8.5.1 To View Reporting

<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>REPORTING</b></p> </div>	<p>This menu is to view Fault Record, Event Record, Error Record and Alarm record.</p> <p>Press the right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Fault Record</b></p> </div>	<p>This window is to view the <b>Fault Record</b></p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<p><b>Event Record</b></p>	<p>This window is to view the <b>Event Record</b> Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Error Record</b></p>	<p>This window is to view the <b>Error Record</b> Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Alarm Record</b></p>	<p>This window is to view the <b>Alarm Record</b> Press the left arrow key ( ◀ ) to move to the Main Menu.</p>
<p><b>REPORTING</b></p>	

**8.5.2 To View – Fault Records (REPORTING)**

<p><b>REPORTING</b></p>	<p>This menu is to view Fault Record, Event Record, Error Record and Alarm record. Press the right arrow key ( ▶ ) to move to the next option.</p>
<p><b>Fault Record</b></p>	<p>This window shows the Fault Record Press the right arrow key ( ▶ ) to move to the next option.</p>
<p><b>Fault Num = 1</b></p>	<p>This window shows the Fault Number of latest fault. Press the right arrow key ( ▶ ) to move to the next option.</p>
<p><b>IP &gt;1: I&lt;: Th IE&gt;1: 3IO&gt;1: I2&gt;1:</b></p>	<p>This window will show trip flag of Stage 1: Phase Overcurrent, Ground OC, Residual OC, NPS Overcurrent, Under Current and Thermal Overload.  Note: This window is seen when relay operates in respective protection function.  Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IP &gt;2: LR STL</b> <b>IE&gt;2: 3IO&gt;2: I2&gt;2:</b></p> </div>	<p>This window will show trip flag of Stage 2: Phase Overcurrent, Ground OC, Residual OC, NPS Overcurrent, Lock Rotor and Stall trip.</p> <p>Note: This window is seen when relay operates in respective protection function.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IP&gt;3: PRLG</b> <b>IE&gt;3: 3IO&gt;3: I2&gt;3:</b></p> </div>	<p>This window will show trip flag of Stage 3: Phase Overcurrent, Ground OC, Residual OC, NPS Overcurrent and Prolong Start.</p> <p>Note: This window is seen when relay operates in respective protection function.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IN1 IN3 IN5 50F</b> <b>IN2 IN4 IN6 EXT Trip</b></p> </div>	<p>This window will show status flag (IN1, IN2, IN3, IN4, IN5, IN6, 50BF – CB Fail, EXT Trip – External Trip)</p> <p>Note: This window is seen when status flag is operated</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Ia MAG = 0.00 A</b> <b>Ib MAG = 0.00 A</b></p> </div>	<p>This window will show Secondary Fault Current values.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>ic MAG = 0.00 A</b> <b>i1 MAG = 0.00 A</b></p> </div>	<p>This window will show Secondary Fault Current values.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>in2 MAG = 0.00 A</b> <b>i2 MAG = 0.00 A</b></p> </div>	<p>This window will show Secondary Fault Current values.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<p><b>i1 MAG = 0.00 A</b> <b>i0 MAG = 0.00 A</b></p>	<p>This window will show Secondary Fault Current values. Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Thermal State</b> <b>0%</b></p>	<p>This window will show Thermal State. Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Trip Counter</b> <b>0</b></p>	<p>This window will show Trip Counter. Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Trip Timing (Sec)</b> <b>0.000</b></p>	<p>This window will show Trip Time. Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>14/05/16</b> <b>16:15:30:225</b></p>	<p>This window will show Date &amp; Time of Fault. Press the right arrow key ( ▶ ) to move to the Main Menu.</p>
<p><b>REPORTING</b></p>	

**8.5.3 To View – Event Records (REPORTING)**

<p><b>REPORTING</b></p>	<p>This menu is to view Fault Record, Event Record, Error Record and Alarm record. Press the right arrow key ( ▶ ) to move to the next option.</p>
<p><b>Fault Record</b></p>	<p>This window shows the Fault Record Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Event Record</b></p>	<p>This window shows the Event Record Press the right arrow key ( ▶ ) to move to the next option.</p>

<p><b>Event Num = 1</b></p>	<p>This window shows the Event Number of latest event. By using the Plus / Up arrow key (+ / ▲) or Minus / Down arrow key (- / ▼) the relay will scroll between Event Numbers 01 to 512. Press the right arrow key (▶) to move to the next option.</p>
<p><b>Dt: 210/05/2016</b> <b>Tm: 12:15:30:225</b></p>	<p>This window will show Date &amp; Time of Event. Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Event Num = 001</b> <b>Trip IE&gt;1 ON</b></p>	<p>This window shows the latest Event and Event Number. Press the Right arrow key (▶) to move to the Main Menu.</p>
<p><b>REPORTING</b></p>	

**8.5.4 To View – Error Records (REPORTING)**

<p><b>REPORTING</b></p>	<p>This menu is to view Fault Record, Event Record, Error Record and Alarm record. Press the right arrow key (▶) to move to the next option.</p>
<p><b>Fault Record</b></p>	<p>This window shows the Fault Record Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Event Record</b></p>	<p>This window will show Event Record Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Error Record</b></p>	<p>This window will show Error Record Press the right arrow key (▶) to move to the next option.</p>

<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <b>Main't Rec Num =</b> 1         </div>	<p>This window will show latest Error Record i.e. 1 Press the right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <b>Errorcode : 0004</b> RTC Error         </div>	<p>This window shows the latest Error code and Error Number. Press the right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <b>17/11/2014</b> <b>17:20:30:596</b> </div>	<p>This window shows the Date and Time of error. Press the right arrow key ( ▶ ) to move to the Main Menu</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <b>REPORTING</b> </div>	

### 8.5.5 To View – Alarm Record (REPORTING)

<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <b>REPORTING</b> </div>	<p>This menu is to view Fault Record, Event Record, Error Record and Alarm record. Press the right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <b>Fault Record</b> </div>	<p>This window shows the Fault Record Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <b>Event Record</b> </div>	<p>This window will show Event Record Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <b>Error Record</b> </div>	<p>This window will show Maintenance Record Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <b>Alarm Record</b> </div>	<p>This window will show Alarm Record Press the right arrow key ( ▶ ) to move to the next option.</p>

<p><b>TCS Alarm</b></p>	<p>This window will show latest operated Alarm. Press the right arrow key ( ▶ ) to move to the next option.</p>
<p><b>14/05/2016</b> <b>12:35:40:025</b></p>	<p>This window shows the Date and Time of latest operated Alarm. Press the right arrow key ( ▶ ) to move to the Main Menu</p>
<p><b>REPORTING</b></p>	

## 8.6 MEASUREMENTS

### 8.6.1 To View – Measurements 1

<p><b>MEASUREMENTS</b></p>	<p>This menu is to view the Measurement 1 &amp; Measurement 2</p>
<p><b>Measurement 1</b></p>	<p>This menu is to view the measured and derived actual load current in <b>Measurement 1</b> (i.e. Phase current, Measured and derived EF current, Negative and Positive phase sequence current and zero sequence current) as per CT Primary and Secondary current selection, RMS value of Phase Current, BOC (Breaker Operation Counter), TC (Trip Counter), BOT (Breaker Operating Time), Press the right arrow key ( ▶ ) to move to the next option.</p>
<p><b>IA MAG = 0 A</b> <b>IB MAG = 0 A</b></p>	<p>This window shows primary value of load current as per the CT Primary selection in Phase A and Phase B. Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>
<p><b>IC MAG = 0 A</b> <b>IN MAG = 0 A</b></p>	<p>This window shows primary value of load current as per the CT Primary selection in Phase C and EF/SEF. Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>3Io MAG = 0 A</b></p> <p><b>IO MAG = 0 A</b></p> </div>	<p>This window shows primary value of internally derived EF current and Zero sequence current (IN2/3).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>I1 MAG = 0 A</b></p> <p><b>I2 MAG = 0 A</b></p> </div>	<p>This window shows primary value of Positive sequence current and Negative sequence current.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>ia MAG = 0.00 A</b></p> <p><b>ib MAG = 0.00 A</b></p> </div>	<p>This window shows secondary value of load current in Phase A and Phase B.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>ic MAG = 0.00 A</b></p> <p><b>in MAG = 0.00 A</b></p> </div>	<p>This window shows secondary value of load current in Phase C and EF/SEF.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>3io MAG = 0.00 A</b></p> <p><b>i0 MAG = 0.00 A</b></p> </div>	<p>This window shows secondary value of internally derived EF current and Zero sequence current (IN2/3).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>i1 MAG = 0.00 A</b></p> <p><b>i2 MAG = 0.00 A</b></p> </div>	<p>This window shows secondary value of Positive sequence current and Negative sequence current.</p> <p><i>Press the Minus / Down arrow key (- / ▼) to move to the next option.</i></p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Irms A = 0.00 A</b></p> <p><b>Irms B = 0.00 A</b></p> </div>	<p>This window shows secondary value of RMS Current in Phase A and Phase B.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>



<p><b>Irms C = 0.00 A</b> <b>BOC : 0</b></p>	<p>This window shows secondary value of RMS Current in Phase and Breaker operation counter. Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>TC : 0</b> <b>BOT : 0 msec</b></p>	<p>This window shows Trip Counter and Breaker Operating Time Press the right arrow key (▶) to move to the Main Menu.</p>
<p><b>MEASUREMENTS</b></p>	

### 8.6.2 To View – Measurements 2

<p><b>MEASUREMENTS</b></p>	<p>This menu is to view the Measurement 1 &amp; Measurement 2 Press the right arrow key (▶) to move to the next option.</p>
<p><b>Measurement 1</b></p>	<p>This menu is to view the measured and derived actual load current in Measurement 1 Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Measurement 2</b></p>	<p>This menu is to view the motor parameter <b>Measurement 2</b> (i.e. Thermal State, Load Current, Time to Th Trip, Nb of Th Trip, Last Start Time, Last St current, Nb Hot st Allow, Nb Cold St Allow, Time to Next St, Total Nb of Strt, Nb of Emergency Rst, and Motor Run Time. Press the right arrow key (▶) to move to the next option.</p>
<p><b>Thermal State</b> <b>0 %</b></p>	<p>This window shows Thermal status of the motor Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Load Current</b> <b>0 %</b></p>	<p>This window shows Load current value in % (maximum value of three phase currents in % of IFL setting)</p>

	Press the Minus / Down arrow key (- / ▼) to move to the next option.
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Time to Th Trip</b> 0 S</p> </div>	<p>This window shows Time remaining to Thermal Trip.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Nb of Th Trip</b> 0</p> </div>	<p>This window shows counter of Thermal Trip operation.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Last Start Time</b> 0.00 S</p> </div>	<p>This window shows time of successful start of motor at Last Start Time</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Last St Current</b> 0.00 A</p> </div>	<p>This window shows starting current of successful start of motor at Last St Current.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Nb Hot St Allow</b> 2</p> </div>	<p>This window shows available allowable hot start number.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Nb Cold St Allow</b> 3</p> </div>	<p>This window shows available allowable cold start number.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Time to Next St</b> 0 S</p> </div>	<p>This window shows Time remains to allowed for next start.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Total Nb of Strt</b> 0</p> </div>	<p>This window shows Number of starts detected by motor</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<p><b>Nb Emergency Rst</b> 0</p>	<p>This window shows Number of Emergency starts operated. Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Motor Run Time</b> 0.000 hrs</p>	<p>This window shows Total motor running hours. Press the right arrow key (▶) to move to the Main Menu.</p>
<p><b>MEASUREMENTS</b></p>	

## 8.7 CB CONTROL SETTINGS

### 8.7.1 To View / Set – CB CONTROL Settings (if all settings are disabled)

<p><b>CB CONTROL</b></p>	<p>Password protected window for “<b>CB CONTROL</b>” setting. i.e. TCS Enable, TCS Delay, CB Open S'vision Enabled / Disabled (CB Open Time), CB Open Alarm Enabled / Disabled (CB Oper. Counter) CB Control By, (t Close Pulse, t Open pulse) and Emergency Restart. Press the Right arrow key (▶) to move to the next option.</p>
<p><b>TCS Enable</b> No</p>	<p>Editable Setting By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>TCS Alarm</b> can be set i.e. Yes / No. Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>CB Open S'vision</b> Disabled</p>	<p>Editable Setting By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>CB Open Supervision</b> can be set. i.e. Enabled/Disabled, Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>CB Open Alarm</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>CB Open Alarm</b> can be set. i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>CB Control by</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>CB Control By</b> can be set. i.e. Disabled / Local / Remote / Local + Remote.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Emergency Restr</b> <b>No</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Emergency Restr</b> can be set i.e. Yes / No.</p> <p>Press the Left arrow key (◀) or Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>◀ For Save</b> <b>TRSET For Cancel</b></p> </div>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>SAVE Settings</b></p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>CB CONTROL</b></p> </div>	

**8.7.2 To View / Set – CB CONTROL Settings (If all settings are enabled)**

<p><b>CB CONTROL</b></p>	<p>Password protected window for “<b>CB CONTROL</b>” setting. i.e. TCS Enable, TCS Delay, CB Open S'vision Enabled / Disabled (CB Open Time), CB Open Alarm Enabled / Disabled (CB Oper. Counter) CB Control By, (t Close Pulse, t Open pulse) and Emergency Restart.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<p><b>TCS Enable</b> Yes</p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲ ) or the Minus / Down arrow key (- / ▼ ) the desired <b>TCS Enable</b> can be set i.e. Yes / No.</p> <p>Press the Minus / Down arrow key (- / ▼ ) to move to the next option.</p>
<p><b>TCS Delay</b> 5.00S</p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲ ) or the Minus / Down arrow key (- / ▼ ) the desired <b>TCS Delay</b> can be set. The setting range is from 0.1s to 10.00s in steps of 10ms.</p> <p>Press the Minus / Down arrow key (- / ▼ ) to move to the next option.</p>
<p><b>CB Open S'vision</b> Enabled</p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲ ) or the Minus / Down arrow key (- / ▼ ) the desired <b>CB Open Supervision</b> can be set. i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼ ) to move to the next option.</p>
<p><b>CB Open Time</b> 0.30S</p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲ ) or the Minus / Down arrow key (- / ▼ ) the desired <b>CB Open Time</b> can be set. The setting range is from 50 ms to 1.0 s in steps of 10 ms</p> <p>Press the Minus / Down arrow key (- / ▼ ) to move to the next option.</p>

<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>CB Open Alarm</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>CB Open Alarm</b> can be set. i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>CB Open Counter</b> <b>2000</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>CB Open Counter</b> can be set. The setting range is from 1 to 30000 in steps of 1.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>CB Control by</b> <b>Local+Remote</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>CB Control By</b> can be set. i.e. Disabled / Local / Remote /Local + Remote.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>t Close Pulse</b> <b>0.50S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>t Close Pulse</b> can be set. The setting range is from 0.1s to 50s in steps 0.01s</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>t Open Pulse</b> <b>0.50S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>t Open Pulse</b> can be set. The setting range is from 0.1s to 50s in steps of 0.01s</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<p><b>Emergency Restrt</b> Yes</p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Emergency Restart</b> can be set. i.e. Yes / No</p> <p>Press the Left arrow key (◀) or Right arrow key (▶) to move to the next option.</p>
<p>◀ For Save TRSET For Cancel</p>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<p><b>SAVE Settings</b></p>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<p><b>CB CONTROL</b></p>	

## 8.8 DATE AND TIME SETTINGS

### 8.8.1 To View / Set – DATE AND TIME Settings (If the settings are disabled)

<p><b>DATE AND TIME</b></p>	<p>Password protected window for “<b>DATE AND TIME</b>” settings i.e. Local Time Enable, Local Time Offset, DST Enable, DST Offset, DST Start, DST Start Day, DST Start Month, DST Start minutes, DST End, DST End Day, DST End Month, DST End minutes, RP Time Zone, SET Hours, SET Minutes, SET Seconds, SET Date, SET Month and SET Year.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<p><b>Tm: 11:30:25</b> <b>Dt : 31/03/16 Thu</b></p>	<p>Read-only</p> <p>This window shows the set Date &amp; Time</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Local Time Enable</b> Disabled</p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Local Time Enable</b></p>

	<p>can set i.e. Disabled / Fixed / Flexible.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>DST Enable</b> Disabled</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>DST Enable</b> can set i.e. Enabled/Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>RP Time Zone</b> Local</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>RP Time Zone</b> can set i.e. Local / UTC</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>SET Hours</b> 11</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>SET Hours</b> can be set. The setting range is from 00 to 23 in steps of 1.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>SET Minutes</b> 30</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>SET Minutes</b> can be set. The setting range is from 00 to 59 in steps of 1.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>SET Seconds</b> 25</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>SET Seconds</b> can be set. The setting range is from 00 to 59 in steps of 1.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>



<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>SET Date</b></p> <p>31</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>SET Date</b> can be set. The setting range is from 1 to 31 in steps of 1.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>SET Month</b></p> <p>03</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>SET Month</b> can be set. The setting range is from 1 to 12 in steps of 1.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>SET Year</b></p> <p>16</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>SET Year</b> can be set. The setting range is from 00 to 99 in steps of 1.</p> <p>Press the Left arrow key (◀) or the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>◀ For Save</p> <p>TRSET For Cancel</p> </div>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>SAVE Settings</b></p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>DATE AND TIME</b></p> </div>	

**8.8.2 To View / Set – DATE AND TIME Settings (If the settings are enabled)**

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>DATE AND TIME</b></p> </div>	<p>Password protected window for “<b>DATE AND TIME</b>” settings i.e. Local Time Enable, Local Time Offset, DST Enable, DST Offset, DST Start, DST Start Day, DST Start</p>
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	<p>Month, DST Start minutes, DST End, DST End Day, DST End Month, DST End minutes, RP Time Zone, SET Hours, SET Minutes, SET Seconds, SET Date, SET Month and SET Year.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Tm: 11:30:25</b> <b>Dt : 31/03/16 Thu</b></p> </div>	<p>Read-only</p> <p>This window shows the set Date &amp; Time</p> <p>Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Local Time Enable</b> <b>Fixed</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>Local Time Enable</b> can set i.e. Disabled / Fixed / Flexible.</p> <p>Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Local Time Offset</b> <b>0 Mins</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>Local Time Offset</b> can be set. The setting range is from -720 mins to 720 mins in step 15 mins.</p> <p>Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>DST Enable</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>DST Enable</b> can set i.e. Enabled/Disabled.</p> <p>Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>DST Offset</b> <b>60 Mins</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>DST Offset</b> can be set. i.e. 30Mins / 60Mins.</p> <p>Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>

<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>DST Start</b> <b>Last</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ /▲) or the Minus / Down arrow key (- /▼) the desired <b>DST Start</b> can set i.e. First / Second/ Third / Fourth / Last.</p> <p>Press the Minus / Down arrow key (- /▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>DST Start Day</b> <b>Sunday</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ /▲) or the Minus / Down arrow key (- /▼) the desired <b>DST Start Day</b> can set i.e. Sunday to Saturday.</p> <p>Press the Minus / Down arrow key (- /▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>DST Start Month</b> <b>March</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ /▲) or the Minus / Down arrow key (- /▼) the desired <b>DST Start Month</b> can set i.e. January to December</p> <p>Press the Minus / Down arrow key (- /▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>DST Start Mins</b> <b>60 Mins</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ /▲) or the Minus / Down arrow key (- /▼) the desired <b>DST Start minutes</b> can be set. The setting range is from 0 to 1425Mins in steps of 15Mins.</p> <p>Press the Minus / Down arrow key (- /▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>DST End</b> <b>Last</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ /▲) or the Minus / Down arrow key (- /▼) the desired <b>DST End</b> can set i.e. First / Second/ Third / Fourth / Last.</p> <p>Press the Minus / Down arrow key (- /▼) to move to the next option.</p>

<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>DST End Day</b></p> <p><b>Sunday</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>DST End Day</b> can set i.e. Sunday to Saturday.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>DST End Month</b></p> <p><b>October</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>DST End Month</b> can set i.e. January to December</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>DST End Mins</b></p> <p><b>60 Mins</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>DST End minutes</b> can be set. The setting range is from 0 to 1425Mins in steps of 15Mins.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>RP Time Zone</b></p> <p><b>Local</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>RP Time Zone</b> can set i.e. Local / UTC</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>SET Hours</b></p> <p><b>11</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>SET Hours</b> can be set. The setting range is from 00 to 23 in steps of 1.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>SET Minutes</b></p> <p><b>30</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus /</p>

	<p>Down arrow key (- / ▼) the desired <b>SET Minutes</b> can be set. The setting range is from 00 to 59 in steps of 1.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>SET Seconds</b></p> <p>25</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>SET Seconds</b> can be set. The setting range is from 00 to 59 in steps of 1.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>SET Date</b></p> <p>31</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>SET Date</b> can be set. The setting range is from 1 to 31 in steps of 1.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>SET Month</b></p> <p>03</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>SET Month</b> can be set. The setting range is from 1 to 12 in steps of 1.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>SET Year</b></p> <p>16</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>SET Year</b> can be set. The setting range is from 00 to 99 in steps of 1.</p> <p>Press the Left arrow key (◀) or the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>◀ For Save</p> <p>TRSET For Cancel</p> </div>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>

<b>SAVE Settings</b>	This window will flash for a moment and the control will return to the Main Menu.
<b>DATE AND TIME</b>	

**8.9 PROTECTION SETTINGS**

**8.9.1 To View / Set – PROTECTION Settings**

<b>PROTECTION</b>	<p>Password protected window for “<b>PROTECTION</b>” settings i.e. Factory Defaults, Active Settings, Copy From, Copy To, Group 1 Enable Enabled/Disabled, Group 2 Enable Enabled/Disabled, Inrush Blocking Enabled/Disabled, Phase Overcurrent Enabled/Disabled, NPS Overcurrent Enabled/Disabled, Ground OC Enabled/Disabled, Residual OC Enabled/Disabled, Thermal Overload Enabled/Disabled, Under Current Enabled/Disabled, 50BF Enabled/Disabled, Motor Protection Enabled/Disabled, Number of Start Enabled/Disabled, Ith&gt;Set, Phase Rotation, and setting Values.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<b>Factory Defaults</b> <b>No Operation</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Factory Defaults</b> can be set i.e. No Operation / All Settings / Setting Group 1 / Setting Group 2.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>Active Settings</b> <b>Group 1</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Active Setting</b> can be set i.e. Group 1 / Group 2.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Copy from Group 1</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired setting can be set i.e. Group 1 / Group 2.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Copy to No Operation</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired setting can be set i.e. No Operation / Group 1 / Group 2.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Group 1 Enable Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Group 1 Enable</b> can be set i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Group 2 Enable Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Group 2 Enable</b> can be set i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Inrush Blocking Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Inrush Blocking</b> can be set i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Phase Overcurrent Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Phase Overcurrent</b> can be set</p>

	<p>i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>NPS Overcurrent</b> Enabled</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>NPS Overcurrent</b> can be set i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Ground OC</b> Enabled</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Ground OC</b> can be set i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Residual OC</b> Enabled</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Residual OC</b> can be set i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Thermal Overload</b> Enabled</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Thermal Overload</b> can be set i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Under Current</b> Enabled</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Under Current</b> can be set i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>



<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>50BF</b></p> <p><b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>50BF</b> can be set i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>Motor Protection</b></p> <p><b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Motor Protection</b> can be set i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>Number of Start</b></p> <p><b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Number of Start</b> can be set i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>lth&gt; set</b></p> <p><b>1.00</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>lth&gt; set</b> can be set. The setting range is 0.20In – 4.00In step 0.01</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>Phase <span style="color: red;">Rotation</span></b></p> <p><b>ABC</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Phase Rotation</b> can be set i.e. ABC / RYB.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<p><b>Setting Values</b> <b>Secondary</b></p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Setting Values</b> can be set i.e. Primary / Secondary.</p> <p>Press the Left arrow key (◀) or the Right arrow key (▶) to move to the next option.</p>
<p>◀ For Save TRSET For Cancel</p>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<p><b>SAVE Settings</b></p>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<p><b>PROTECTION</b></p>	

## 8.10 CT/VT RATIOS SETTINGS

### 8.10.1 To View / Set – CT/VT RATIOS Settings

<p><b>CT/VT RATIOS</b></p>	<p>Password protected window for “<b>CT/VT RATIOS</b>” settings i.e. Ph CT Primary and Ph CT Secondary, EF CT Primary and EF CT Secondary.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<p><b>Ph CT Primary</b> <b>100 A</b></p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Ph CT Primary</b> can be set. The setting range is from 1A to 30000A step 1A.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Ph CT Secondary</b> <b>1 A</b></p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Ph CT Secondary</b> can be set. i.e. 1A / 5A.</p>

	Press the Minus / Down arrow key (- / ▼) to move to the next option.
<b>EF CT Primary</b> <b>100 A</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>EF CT Primary</b> can be set. The setting range is from 1A to 30000A step 1A.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>EF CT Secondary</b> <b>1 A</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>EF CT Secondary</b> can be set. i.e. 1A / 5A.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>◀ For Save</b> <b>TRSET For Cancel</b>	When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.
<b>SAVE Settings</b>	This window will flash for a moment and the control will return to the Main Menu.
<b>CT/VT RATIOS</b>	

## 8.11 CLEAR RECORD SETTINGS

### 8.11.1 To View / Set – CLEAR RECORD Settings

<b>CLEAR RECORD</b>	<p>Password protected window for “<b>CLEAR RECORD</b>” setting i.e. Events Yes/No, Faults Yes/No, Disturbance Yes/No, Error Record Yes/No, Thermal State Yes/No, Nb of Em Restrt Yes/No, Nb of Start Yes/No, Motor RunTime Yes/No and CB Data Yes/No.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
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<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>Events</b></p> <p><b>No</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Events</b> can be set i.e. Yes / No (set Yes to clear event data stored in memory)</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>Faults</b></p> <p><b>No</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Faults</b> can be set i.e. Yes / No. (set Yes to clear Fault data stored in memory)</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>Disturbance</b></p> <p><b>No</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Disturbance</b> can be set i.e. Yes / No. (set Yes to clear Disturbance Record data stored in memory)</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>Error Record</b></p> <p><b>No</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Error Record</b> can be set i.e. Yes / No. (set Yes to clear Error Record data stored in memory)</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>Thermal State</b></p> <p><b>No</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Thermal State</b> can be set i.e. Yes / No. (set Yes to Reset Thermal State to zero)</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Nb of Em Restrtr</b></p> <p><b>No</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Nb of Em Restrtr</b> can be set i.e. Yes / No. (set Yes to Reset counter of Emergency Restart to zero)</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Nb of Start</b></p> <p><b>No</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Nb of Start</b> can be set i.e. Yes / No. (set Yes to Reset counter of Motor Start to zero)</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Motor Run Time</b></p> <p><b>No</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Motor Run Time</b> can be set i.e. Yes / No. (set Yes to Reset Motor Running Hours to zero)</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>CB Data</b></p> <p><b>No</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>CB Data</b> can be set i.e. Yes / No. (set Yes to Reset CB Data)</p> <p>Press the Left arrow key (◀) or the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>◀ For Save</b></p> <p><b>TRSET For Cancel</b></p> </div>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>SAVE Settings</b></p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>

<b>CLEAR RECORDS</b>	
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## 8.12 REAR PORT SETTINGS

### 8.12.1 To View / Set – Rear Port Settings

<b>REAR PORT</b>	<p>Password protected window for “<b>REAR PORT</b>” settings i.e. Address, Baud Rate, Parity and Time Sync.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<b>Address</b> 1	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Address</b> can be set. The setting range is from 1 to 247 in steps of 1.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>Baud Rate</b> 57600	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Baud Rate</b> can be set. i.e. 9600 / 19200 / 38400 / 57600.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>Parity</b> Even	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Parity</b> can be set i.e. Even / Odd / None.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>Time Sync</b> Disabled	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Time Sync</b> can be set i.e. Enabled / Disabled.</p> <p>Press the Left arrow key ( ◀ ) or the Right arrow key ( ▶ ) to</p>

	move to the next option.
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                 ◀ For Save TRSET For Cancel             </div>	When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                 SAVE Settings             </div>	This window will flash for a moment and the control will return to the Main Menu.
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                 REAR PORT             </div>	

## 8.13 APROLOGIC SETTINGS

### 8.13.1 To View / Set – APROLOGIC Settings

<div style="border: 1px solid black; padding: 5px; width: fit-content;">                 APROLOGIC             </div>	Password protected window for “ <b>APROLOGIC</b> ” for setting Output, LED Green, LED Red, AND Logic and Input.  Press the Right arrow key (▶) to move to the next option.
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                 Output : 654321 Gen Strt 000000             </div>	Editable Setting  By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Output</b> can be set as 1= assigned / 0= not assigned. i.e. OUT1 to OUT6 [1 correspond to OUT1, 2 correspond to OUT2 in their respectively manner and 6 correspond to OUT6].  Press the Right arrow key (▶) to move to the next option.
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                 LED-G : 8765 Gen Strt 0000             </div>	Editable Setting  By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>LED Green Configuration</b> can be set as 1= assigned / 0= not assigned. i.e. 5 correspond to L5, 6 correspond to L6, 7 correspond to L7 and 8 correspond to L8.  Press the Right arrow key (▶) to move to the next option.

<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>LED-R : 8765</b></p> <p><b>Gen Strt 0000</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>LED Red Configuration</b> can be set as 1= assigned / 0= not assigned.i.e. 5 correspond to L5, 6 correspond to L6, 7 correspond to L7 and 8 correspond to L8.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>AND A : DCBA</b></p> <p><b>Gen Strt 0000</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>AND Logic</b> Configuration can be set as 1= assigned / 0= not assigned. i.e. A to D.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Input : 654321</b></p> <p><b>Rem. Rst. 000000</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Input</b> can be set as 1= assigned / 0= not assigned [1 correspond to Input 1, 2 correspond to Input 2 in their respectively manner and 6 correspond to Input 6].</p> <p>Press the Left arrow key ( ◀ ) or the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>◀ For Save</b></p> <p><b>TRSET For Cancel</b></p> </div>	<p>When the Left arrow key ( ◀ ) key is it will <b>SAVE</b> the changes and move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>SAVE Settings</b></p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>CLEAR RECORDS</b></p> </div>	



**8.13.1.1 List of the Sub menus of Output, LED Green, LED Red and AND Logic of Output/LED Configuration**

**8.13.1.2 Output Configuration:**

Output can be assigned by selecting any function given in the sub menus. There are in all 6 Nos of Outputs i.e. Out1 to Out6 [1 corresponds to Out1, 2 corresponds to Out2 in their respectively manner and Out6 corresponds to Out6].

**8.13.1.3 LED Green Configuration:**

LED G (Green) can be assigned by selecting any function given in the sub menus. There are in all 4 No's of LEDs L5 to L8 i.e. 5 corresponds to L5, 6 corresponds to L6, 7 corresponds to L7 and 8 corresponds to L8.

**8.13.1.4 LED Red Configuration:**

LED R (Red) can be assigned by selecting any function given in the sub menus. There are in all 4 Nos of LEDs L5 to L8 i.e. 5 corresponds to L5, 6 correspond to L6, 7 correspond to L7 and 8 correspond to L8.

**8.13.1.5 AND Logic:**

AND Logic can be assigned by selecting any function given in the sub menus. There are in all 4 No's of AND Logic and they are A, B, C & D.

The functions assigned to Relay, LED G, LED R & AND Logic are listed below.

Sr. no.	Function	Description
1	General P	General start
2	L1 P	Start detected in phase A
3	L2 P	Start detected in phase B
4	L3 P	Start detected in phase C
5	IP>1 P	Start Phase OC stage 1
6	IP>2 P	Start Phase OC stage 2
7	IP>3 P	Start Phase OC stage 3
8	I2>1 P	Start Neg seq. OC stage 1
9	I2>2 P	Start Neg seq. OC stage 2
10	I2>3 P	Start Neg seq. OC stage 3
11	IE>1 P	Start Ground OC stage 1
12	IE>2 P	Start Ground OC stage 2
13	IE>3 P	Start Ground OC stage 3

14	3I0>1 P	Start Residual OC stage 1
15	3I0>2 P	Start Residual OC stage 2
16	3I0>3 P	Start Residual OC stage 3
17	Th. Alarm	Start Thermal Alarm
18	I< P	Start Under current
19	50BF P	Start Breaker Failure
20	IP> 50BF B	Block O/C protection during CB Fail
21	IE> 50BF B	Block E/F protection during CB Fail
22	Inhib I<	Inhibit under current stage
23	CloseFail	During control operation Closing of CB is Fail
24	Open Fail	During control operation Opening of CB is Fail
25	Protready	Relay OK
26	EmRestart	Emergency Restart of Motor
27	Loadjam P	Load Jam Pickup
28	Suprvsn T	Supervision Time
29	TInhibSt.	Thermal Inhibit Start
30	TBetwSt.	Time Between Start
31	General T	General Trip
32	L1 T	Trip in phase A
33	L2 T	Trip in phase B
34	L3 T	Trip in phase C
35	IP>1 T	Trip in Phase OC stage 1
36	IP>2 T	Trip in Phase OC stage 2
37	IP>3 T	Trip in Phase OC stage 3
38	I2>1 T	Trip in Neg seq. OC stage 1
39	I2>2 T	Trip in Neg seq. OC stage 3
40	I2>3 T	Trip in Neg seq. OC stage 2
41	IE>1 T	Trip in Ground OC stage 1
42	IE>2 T	Trip in Ground OC stage 2
43	IE>3 T	Trip in Ground OC stage 3
44	3I0>1 T	Trip in Residual OC stage 1
45	3I0>2 T	Trip in Residual OC stage 2

46	3I0>3 T	Trip in Residual OC stage 3
47	Th Trip	Trip in Thermal overload
48	Th Lock	Thermal Lockout
49	I< T	Trip in Under Current
50	50BF T	Trip in Breaker Fail
51	Prolong T	Prolong Trip
52	Loadjam T	Load Jam Trip
53	Speed Sw	Speed Switch input
54	MotorStrt	Motor Start
55	MotorRun	Motor Run
56	CBOper Alm	CB Open operation Alarm
57	IN 1	Opto Input 1
58	IN 2	Opto Input 2
59	IN 3	Opto Input 3
60	IN 4	Opto Input 4
61	IN 5	Opto Input 5
62	IN 6	Opto Input 6
63	AND A	AND logic equation A
64	AND B	AND logic equation B
65	AND C	AND logic equation C
66	AND D	AND logic equation D
67	CB Trip	Circuit Breaker Trip
68	CB Close	Circuit Breaker Close
69	TCS Alarm	Trip circuit supervision Alarm
70	CBOpn Sup	CB Open supervision

### 8.13.2 List of the Sub menus of Opto I/P Configuration

Status can be assigned by selecting any function given in the sub menus. There are in all 6 Nos of Status i.e. Opto I/P 1 to Opto I/P 6 [1 corresponds to Opto I/P 1, 2 corresponds to Opto I/P 2 in their respectively manner and 6 corresponds to Opto I/P 6].

The functions assigned to Opto Input are listed below.

Sr. No	Function	Description
1.	Rem. Rst.	This Status is used to reset relay contact and LED indication (HR)
2.	50BF Init	This Status is used to Initiate Breaker Fail
3.	Sel Grp2	This Status is used to enable Group 2 setting
4.	Ext Trip	This Status is used to operate assigned relay for CB Trip function
5.	DR Trig	This Status is used to trigger Disturbance Record
6.	CB (52A)	This Status is used to detect CB close indication
7.	CB (52B)	This Status is used to detect CB open indication
8.	IP>1 B	This Status is used to Block Trip in Phase OC stage 1
9.	IP>2 B	This Status is used to Block Trip in Phase OC stage 2
10.	IP>3 B	This Status is used to Block Trip in Phase OC stage 3
11.	I2>1 B	This Status is used to Block Trip in NPS stage 1
12.	I2>2 B	This Status is used to Block Trip in NPS stage 2
13.	I2>3 B	This Status is used to Block Trip in NPS stage 3
14.	IE>1 B	This Status is used to Block Trip in Ground OC stage 1
15.	IE>2 B	This Status is used to Block Trip in Ground OC stage 2
16.	IE>3 B	This Status is used to Block Trip in Ground OC stage 3
17.	3I0>1 B	This Status is used to Block Trip in Residual OC stage 1
18.	3I0>2 B	This Status is used to Block Trip in Residual OC stage 2
19.	3I0>3 B	This Status is used to Block Trip in Residual OC stage 3
20.	THOL B	This Status is used to Block Trip in Thermal Overload
21.	I< B	This Status is used to Block Trip in Under Current
22.	EmRestart	This Status is used to allow Restart the motor in emergency
23.	Speed Sw	This Status is used to detect locking of rotor
24.	TCS Trig	This Status is used for Trip Circuit Supervision

## 8.14 OUTPUT CONFIGURATION SETTINGS

### 8.14.1 To View / Set – OUTPUT CONFIGURATION Settings

<div style="border: 2px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <b>OUTPUT CONFIG</b> </div>	<p>Password protected window for “<b>OUTPUT CONFIGURATION</b>” for setting Contact HR/SR, OUT–1 Open Time, OUT–2 Open Time, OUT–3 Open Time, OUT–4 Open Time, OUT–5 Open Time and OUT–6 Open Time, LED–G HR/SR, LED–R HR/SR, AND A Op Time, AND Rst Time, AND B Op Time, AND B Rst Time, AND C Op Time, AND C Rst Time, AND D Op Time and AND D</p>
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	<p>Rst Time.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Contact HR/SR</b></p> <p><b>000000</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>Contact HR/SR</b> can be set. i.e. 1=HR /0=SR.</p> <p>Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>OUT-1 Open Time</b></p> <p><b>0.50 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>OUT-1 Open Time</b> can be set. The setting range is from 0 Sec to 1Sec in steps of 0.01s</p> <p>Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>OUT-2 Open Time</b></p> <p><b>0.50 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>OUT-2 Open Time</b> can be set. The setting range is from 0 Sec to 1Sec in steps of 0.01s</p> <p>Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>OUT-3 Open Time</b></p> <p><b>0.50 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>OUT-3 Open Time</b> can be set. The setting range is from 0 Sec to 1Sec in steps of 0.01s</p> <p>Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>OUT-4 Open Time</b></p> <p><b>0.50 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>OUT-4 Open Time</b> can be set. The setting range is from 0 Sec to 1Sec in steps of 0.01s</p>

	Press the Minus / Down arrow key (- / ▼) to move to the next option.
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>OUT-5 Open Time</b> <b>0.50 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>OUT-5 Open Time</b> can be set. The setting range is from 0 Sec to 1Sec in steps of 0.01s</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>OUT-6 Open Time</b> <b>0.50 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>OUT-6 Open Time</b> can be set. The setting range is from 0 Sec to 1Sec in steps of 0.01s</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>LED-G HR/SR</b> <b>0000</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>LED GREEN HR/SR</b> can be set. i.e. 1=HR /0=SR.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>LED-R HR/SR</b> <b>0000</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>LED RED HR/SR</b> can be set. i.e. 1=HR /0=SR.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>AND A Op Time</b> <b>1 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>AND Equation A Operation Time</b> can be set. The setting range is from 1 Sec to 3600 Sec in steps of 1 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the</p>

	next option.
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>AND A Rst Time</b> 1 S</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>AND Equation A Reset Time</b> can be set. The setting range is from 1 Sec to 3600 Sec in steps of 1 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>AND B Op Time</b> 1 S</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>AND Equation B Operation Time</b> can be set. The setting range is from 1 Sec to 3600 Sec in steps of 1 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>AND B Rst Time</b> 1 S</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>AND Equation B Reset Time</b> can be set. The setting range is from 1 Sec to 3600 Sec in steps of 1 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>AND C Op Time</b> 1 S</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>AND Equation C Operation Time</b> can be set. The setting range is from 1 Sec to 3600 Sec in steps of 1 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>AND C Rst Time</b> 1 S</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>AND Equation C Reset Time</b> can be set. The setting range is from 1 Sec to 3600 Sec in steps of 1 Sec.</p>

	Press the Minus / Down arrow key (- /▼) to move to the next option.
<b>AND D Op Time</b> 1 S	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ /▲) or the Minus / Down arrow key (- /▼) the desired <b>AND Equation D Operation Time</b> can be set. The setting range is from 1 Sec to 3600 Sec in steps of 1 Sec.</p> <p>Press the Minus / Down arrow key (- /▼) to move to the next option.</p>
<b>AND D Rst Time</b> 1 S	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ /▲) or the Minus / Down arrow key (- /▼) the desired <b>AND Equation D Reset Time</b> can be set. The setting range is from 1 Sec to 3600 Sec in steps of 1 Sec.</p> <p>Press the Left arrow key (◀) or the Right arrow key (▶) to move to the next option.</p>
◀ For Save TRSET For Cancel	When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.
<b>SAVE Settings</b>	This window will flash for a moment and the control will return to the Main Menu.
<b>OUTPUT CONFIG</b>	

## 8.15 DISTURBANCE RECORD SETTINGS

### 8.15.1 To View / Set – DISTURBANCE RECORD Settings

<b>DISTURBANCE</b>	<p>Password protected window for “<b>Disturbance Record</b>” settings i.e. Trigger Position</p> <p>Press the Right arrow key (▶) to move to the next option.</p>



<p><b>Pre-Trigger</b> 50 %</p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Pre-Trigger</b> can be set. The setting range is from 10% to 90% in steps of 1.</p> <p>Press the Left arrow key (◀) or the Right arrow key (▶) to move to the next option.</p>
<p>◀ For Save TRSET For Cancel</p>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<p><b>SAVE Settings</b></p>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<p><b>DISTURBANCE</b></p>	

## 8.16 OUTPUT&LED TEST SETTINGS

### 8.16.1 To View / Set –OUTPUT&LED TEST Settings

<p><b>OUTPUT&amp;LED TEST</b></p>	<p>Password protected window for “<b>OUTPUT&amp;LED TEST</b>” settings i.e. Test Mode, Test output, Test Apply and Test LED.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<p><b>Test Mode</b> Disabled</p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Test Mode</b> be set. i.e. Disabled/Test Mode/Contacts Blocked.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Test Output</b> 000000</p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Test Output</b> can be set. i.e. 1=Operated / 0=Not-Operated.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Test Apply</b></p> <p><b>No Operation</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Test Apply</b> can be set. i.e. No Operation / Apply Test / Remove Test</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Test LED</b></p> <p><b>No Operation</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Test LED</b> can be set. i.e. No Operation / Apply Test.</p> <p>Press the Left arrow key (◀) or the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>◀ For Save</b></p> <p><b>TRSET For Cancel</b></p> </div>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>SAVE Settings</b></p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>OUTPUT&amp;LED TEST</b></p> </div>	

## 8.17 GROUP 1 SETTINGS

### 8.17.1 To View / Set – GROUP 1 Settings

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>GROUP 1</b></p> </div>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p><i>Note: Group 1 Setting will be seen only when it is enabled in Configuration setting.</i></p> <p>Press the Right arrow key (▶) to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>Inrush Blocking</b></div>	<p>Password Protected window for <b>Inrush Blocking</b> i.e. 2nd Hrm BLK Disabled/Enabled, 2ndHrm Threshold, and I&gt;UB2H</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>Phase Overcurrent</b></div>	<p>Password Protected window for <b>“Phase Overcurrent”</b> i.e. IP&gt;1 Enable, IP&gt;2 Enable and IP&gt;3 Enable. (With respective to Disabled / Definite Time / IEC S Inverse / ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse Curves).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>NPS Overcurrent</b></div>	<p>Password Protected window for <b>Negative Phases Sequence Overcurrent</b> i.e. I2&gt;1 Enable, I2&gt;2 Enable and I2&gt;3 Enable. (With respective to Disabled / Definite Time / IEC S Inverse / ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse Curves).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>Ground OC</b></div>	<p>Password Protected window for <b>Ground OC</b> i.e. Measured, IE&gt;1 Enable, IE&gt;2 Enable, and IE&gt;3 Enable, (With respective to Disabled / Definite Time / IEC S Inverse / ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse Curves).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"><b>Residual OC</b></div>	<p>Password Protected window for <b>Residual OC</b> i.e. Derived 3Io&gt;1 Enable, 3Io&gt;2 Enable, and 3Io&gt;3 Enable. (With respective to Disabled / Definite Time / IEC S Inverse / ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse Curves).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

	option.
<b>Thermal Overload</b>	<p>Password Protected window for <b>Thermal Overload</b> i.e. Inhib. Th Trip, Kco-efficient, Th. Trip Enable, Th. Alarm Enable, lth&gt; Alarm, Th.TConst.1, Th. TConst.2, Tcooling, Th. Lockout, Th. LockThresh. Service Factor</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>Undercurrent</b>	<p>Password Protected window for <b>Undercurrent</b> i.e. l&lt; Enable, l&lt; Set, tl&lt; Delay and TInhib. l&lt;</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>50BF</b>	<p>Password Protected window for <b>50BF (CB FAIL)</b> i.e. 50BF Enable, (50BF Delay, 50BF Reset), 50BF_IP&lt;, 50BF_IE&lt;, Remove IP&gt; P and Remove IE&gt; P</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>Motor Protection</b>	<p>Password Protected window for <b>“Motor Protection”</b> i.e. Start Criteria, Prolonged Start (Istart and Tstart), Speed Switch and Load Jam (lLoadjam and TLoadjam).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>Number of Start</b>	<p>Password Protected window for <b>“Number of Start”</b> i.e. Hot Start Status (No of Hot Start), Cold Start Stat (No of Cold Start), Supervising Time, T.Betw. Start En (T. Betw. St.), TInhib. Start</p> <p>Press the Left arrow key (◀) to move to the Main Menu.</p>
<b>GROUP 1</b>	

**8.17.2 GROUP 1 – INRUSH BLOCKING SETTINGS**

**8.17.2.1 To View / Set – Inrush Blocking Settings (if 2nd Hrm BLK is Disabled)**

<b>GROUP 1</b>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<b>INRUSH BLOCKING</b>	<p>Password Protected window for <b>INRUSH BLOCKING</b> i.e. 2nd Hrm BLK Disabled/Enabled, 2ndHrm Threshold, and I&gt;UB2H</p> <p>Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>
<b>2nd Hrm BLK Disabled</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>2nd Hrm BLK</b> can be set i.e. Disabled/Enabled,</p> <p>Note: When the setting is set as Disabled.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<b>◀ For Save TRSET For Cancel</b>	<p>When the Left arrow key ( ◀ ) key is it will SAVE the changes and move to the next option.</p>
<b>SAVE Settings</b>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<b>GROUP 1</b>	

**8.17.2.2 To View / Set – Inrush Blocking Settings (If 2nd Hrm BLK is Enabled)**

<b>GROUP 1</b>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under</p>
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	Current, 50BF, Motor Protection and Number of Start. Press the Right arrow key (▶) to move to the next option.
<b>INRUSH BLOCKING</b>	Password Protected window for <b>INRUSH BLOCKING</b> i.e. 2nd Hrm BLK Disabled/Enabled, 2ndHrm Threshold, and I>UB2H Press the Minus / Down arrow key (- /▼) to move to the next option.
<b>2nd Hrm BLK Enabled</b>	Editable Setting By using the Plus / Up arrow key (+ /▲) or the Minus / Down arrow key (- /▼) the desired <b>2nd Hrm BLK</b> can be set i.e. Disabled/Enabled, Note: When the setting is set as Enabled Press the Right arrow key (▶) to move to the next option.
<b>2ndHrm Threshold 20 %</b>	Editable Setting By using the Plus / Up arrow key (+ /▲) or the Minus / Down arrow key (- /▼) the desired <b>2nd Harmonic Threshold</b> can set. The setting range is 5% to 70% in steps of 1%. Press the Minus / Down arrow key (- /▼) to move to the next option.
<b>I&gt;UB2H 10.00 A</b>	Editable Setting By using the Plus / Up arrow key (+ /▲) or the Minus / Down arrow key (- /▼) the desired <b>I&gt;UB2H</b> can set. The setting range is 4.00 to 32.00 In in steps of 0.01 In. Press the Right arrow key (▶) to move to the next option.
<b>◀ For Save TRSET For Cancel</b>	When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.
<b>SAVE Settings</b>	This window will flash for a moment and the control will return to the Main Menu.

<b>GROUP 1</b>	
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**8.17.3 GROUP 1 – PHASE OVERCURRENT SETTINGS**

**8.17.3.1 To View / Set – Phase Overcurrent Settings (if IP>1, IP>2 and IP>3 Enable are Disabled)**

<b>GROUP 1</b>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<b>Phase Overcurrent</b>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>Phase Overcurrent</b>.</p> <p>Password Protected window for “<b>Phase Overcurrent</b>” i.e. IP&gt;1 Enable, IP&gt;2 Enable and IP&gt;3 Enable. (With respective to Disabled / Definite Time / IEC Curves/ IEEE Curves)</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<b>IP&gt;1 Enable</b> <b>Disabled</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;1 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>IP&gt;2 Enable</b> <b>Disabled</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;2 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p>

	<p>Note: When the setting is set as Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>IP&gt;3 Enable</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;3 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as Disabled.</p> <p>Press the Right arrow key (▶) to move to the Main Menu.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>GROUP 1</b></p> </div>	

**8.17.3.2 To View / Set – Phase Overcurrent Settings (if IP>1 Enable is selected for IEC curves)**

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>GROUP 1</b></p> </div>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>Phase Overcurrent</b></p> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>Phase Overcurrent</b>.</p> <p>Password Protected window for <b>Phase Overcurrent</b> i.e. IP&gt;1 Enable, IP&gt;2 Enable and IP&gt;3 Enable. (With respective to Disabled / Definite Time / IEC Curves/ IEEE Curves)</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>IP&gt;1 Enable</b> <b>IEC S Inverse</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;1 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite</p>



	<p>Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as any IEC Curve Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IP&gt;1</b> <b>1.00 A</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;1</b> can be set. The setting range is from 0.05 to 4.00 In in steps of 0.01 In.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IP&gt;1 TMS</b> <b>1.000</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;1 TMS</b> can be set. The setting range is from 0.025 to 1.200 in steps of 0.005.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>tIP&gt;1 D/O Char</b> <b>DT</b></p> </div>	<p>Read-only Setting</p> <p><b>tIP&gt;1 D/O Char</b> is fixed i.e. DT (Definite Time).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IP&gt;1 tD/O Delay</b> <b>1.00 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;1 tD/O Delay</b> can be set. The setting range is from 0 to 100 Sec in steps of 0.01 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IP&gt;1 2nd HrmBLK</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;1 2<sup>nd</sup> Hrm BLK</b> function can set i.e. Enabled / Disabled.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>◀ For Save TRSET For Cancel</p> </div>	<p>When the Left arrow key ( ◀ ) key is it will SAVE the changes and move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>SAVE Settings</p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>GROUP 1</p> </div>	

**8.17.3.3 To View / Set – Phase Overcurrent Settings (if IP>1 Enable is selected for IEEE / US Curves)**

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>GROUP 1</p> </div>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>Phase Overcurrent</p> </div>	<p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) select <b>Phase Overcurrent</b>.</p> <p>Password Protected window for <b>Phase Overcurrent</b> i.e. IP&gt;1 Function, IP&gt;2 Enable and IP&gt;3 Enable. (With respective to Disabled / Definite Time / IEC Curves/ IEEE Curves)</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>IP&gt;1 Enable IEEE M Inverse</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>IP&gt;1 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as any IEEE Curve</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>

<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IP&gt;1</b> <b>1.00 A</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;1</b> can be set. The setting range is from 0.05 to 4 In in steps of 0.01 In.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IP&gt;1 Time Dial</b> <b>1.00</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;1 Time Dial</b> can be set. The setting range is from 0.01 to 100.00 in steps of 0.01.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>tIP&gt;1 D/O Char</b> <b>DT</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>tIP&gt;1 D/O Char</b> can be set. i.e. IDMT / DT (Definite Time).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IP&gt;1 tD/O Delay</b> <b>1.00 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;1 tD/O Delay</b> can be set. The setting range is from 0 to 100 Sec in steps of 0.01 Sec.</p> <p>Note: If <b>tIP&gt;1 D/O Char</b> selected as DT</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IP&gt;1 D/O CharTMS</b> <b>1.000</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;1 D/O Char TMS</b> can be set. The setting range is from 0.025 to 1.200 in steps of 0.005</p> <p>Note: If <b>tIP&gt;1 D/O Char</b> selected as IDMT</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>IP&gt;1 2nd Hrm BLK</b></p> <p><b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;1 2<sup>nd</sup> Hrm BLK</b> function can set i.e. Enabled / Disabled.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>◀ <b>For Save</b></p> <p><b>TRSET For Cancel</b></p> </div>	<p>When the Left arrow key (◀) key is it will <b>SAVE</b> the changes and move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>SAVE Settings</b></p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>GROUP 1</b></p> </div>	

**8.17.3.4 To View / Set – Phase Overcurrent Settings (if IP>1 Enable is selected for Definite Time)**

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>GROUP 1</b></p> </div>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Phase Overcurrent</b></p> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>Phase Overcurrent</b>.</p> <p>Password Protected window for <b>Phase Overcurrent</b> i.e. IP&gt;1 Enable, IP&gt;2 Enable and IP&gt;3 Enable. (With respective to Disabled / Definite Time / IEC Curves/ IEEE Curves)</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>IP&gt;1 Enable</b></p> <p><b>Definite Time</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;1 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC</p>

	<p>E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set Definite Time.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IP&gt;1</b> <b>1.00 A</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;1</b> can be set. The setting range is from 0.05 to 35.0 In in steps of 0.01 In.</p> <p>Note: The setting range is from 1.0 - 35.0 In in steps of 0.01 In for I&gt;3 Function.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>tIP&gt;1 DT Delay</b> <b>1.00 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>tIP&gt;1 DT Delay</b> can be set. The setting range is from 00.00 to 100.00 Sec in steps of 0.01 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>tIP&gt;1 D/O Char</b> <b>DT</b></p> </div>	<p>Read-only</p> <p>The tIP&gt;1 D/O Char is fixed i.e. DT (Definite Time).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IP&gt;1 tD/O Delay</b> <b>1.00 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;1 tD/O Delay</b> can be set. The setting range is from 0 to 100 Sec in steps of 0.01 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IP&gt;1 2nd Hrm BLK</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IP&gt;1 2nd Hrm BLK</b></p>

	function can set i.e. Enabled / Disabled. Press the Right arrow key ( ▶ ) to move to the next option.
<div style="border: 2px solid black; padding: 5px; width: fit-content;">                 ◀ For Save TRSET For Cancel             </div>	When the Left arrow key ( ◀ ) key is it will SAVE the changes and move to the next option.
<div style="border: 2px solid black; padding: 5px; width: fit-content;">                 SAVE Settings             </div>	This window will flash for a moment and the control will return to the Main Menu.
<div style="border: 2px solid black; padding: 5px; width: fit-content;">                 GROUP 1             </div>	

*Note: The settings of IP>2 Enable and IP>3 Enable should be set the same as IP>1 Enable.*

#### 8.17.4 GROUP 1 – NPS OVERCURRENT SETTINGS

##### 8.17.4.1 To View / Set – NPS Overcurrent Settings (if I2>1, I2>2 and I2>3 Enable are Disabled)

<div style="border: 2px solid black; padding: 5px; width: fit-content;">                 GROUP 1             </div>	Password protected window for “ <b>GROUP 1</b> ” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start. Press the Right arrow key ( ▶ ) to move to the next option.
<div style="border: 2px solid black; padding: 5px; width: fit-content;">                 NPS Overcurrent             </div>	By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) select <b>NPS OVERCURRENT (Negative Phase Sequence)</b> .  Password Protected window for <b>NPS OVERCURRENT</b> i.e. I2>1 Enable, I2>2 Enable and I2>3 Enable. (With respective to Disabled / Definite Time / IEC Curves/ IEEE Curves) Press the Right arrow key ( ▶ ) to move to the next option.
<div style="border: 2px solid black; padding: 5px; width: fit-content;">                 I2&gt;1 Enable Disabled             </div>	Editable Setting  By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>I2&gt;1 Enable</b> can set i.e.

	<p>Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>I2&gt;2 Enable</b></p> <p><b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;2 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>I2&gt;3 Enable</b></p> <p><b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;3 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as Disabled.</p> <p>Press the Right arrow key (▶) to move to the Main Menu</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>GROUP 1</b></p> </div>	

**8.17.4.2 To View / Set – NPS Overcurrent Settings (if I2>1 Enable is selected for IEC curves)**

<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>GROUP 1</b></p> </div>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
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<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>NPS Overcurrent</b></p> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>NPS OVERCURRENT (Negative Phase Sequence)</b>.</p> <p>Password Protected window for <b>NPS OVERCURRENT</b> i.e. I2&gt;1 Enable, I2&gt;2 Enable and I2&gt;3 Enable. (With respective to Disabled / Definite Time / IEC Curves/ IEEE Curves)</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>I2&gt;1 Enable</b></p> <p><b>IEC S Inverse</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;1 Enable</b> can set. i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as any IEC Curve</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>I2&gt;1</b></p> <p><b>1.00 A</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;1</b> can be set. The setting range is from 0.10 to 4.00 In in steps of 0.01.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>I2&gt;1 TMS</b></p> <p><b>1.000</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;1 TMS</b> can be set. The setting range is from 0.025 to 1.200 in steps of 0.005.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>tI2&gt;1 D/O Char</b></p> <p><b>DT</b></p> </div>	<p>Read-only</p> <p>The <b>tI2&gt;1 D/O Char</b> is fixed i.e. DT (Definite Time).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>



<p><b>I2&gt;1 tD/O Delay</b> 1.00 S</p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;1 tD/O Delay</b> can be set. The setting range is from 0 to 100 Sec in steps of 0.01Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>I2&gt;1 2nd Hrm BLK</b> Disabled</p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;1 2nd Hrm BLK</b> function can set i.e. Enabled / Disabled.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<p>◀ For Save TRSET For Cancel</p>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<p><b>SAVE Settings</b></p>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<p><b>GROUP 1</b></p>	

**8.17.4.3 To View / Set – NPS Overcurrent Settings (if I2>1 Enable is selected for IEEE / US Curves)**

<p><b>GROUP 1</b></p>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<p><b>NPS Overcurrent</b></p>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>NPS OVERCURRENT (Negative Phase Sequence)</b>.</p> <p>Password Protected window for <b>NPS OVERCURRENT</b> i.e. I2&gt;1 Enable, I2&gt;2 Enable and I2&gt;3 Enable. (With respective</p>

	to Disabled / Definite Time / IEC Curves / IEEE Curves) Press the Right arrow key ( ▶ ) to move to the next option.
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>I2&gt;1 Enable</b> <b>IEEE M Inverse</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;1 Enable</b> can set. i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as any IEEE Curve Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>I2&gt;1</b> <b>1.00 A</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;1 Current Setting</b> can be set. The setting range is from 0.10 to 4.00 In in steps of 0.01 In.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>I2&gt;1 Time Dial</b> <b>1.00</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;1 Time Dial</b> can be set. The setting range is from 0.01 to 100.00 in steps of 0.01.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>tI2&gt;1 D/O Char</b> <b>DT</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>tI2&gt;1 D/O Char</b> can be set .i.e. IDMT / DT (Definite Time).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>I2&gt;1 tD/O Delay</b> <b>1.00 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;1 tD/O Delay</b> can be set. The setting range is from 0 to 100 Sec in steps of</p>

	<p>0.01 Sec.</p> <p>Note: If <b>tI2&gt;1 D/O Char</b> set as DT</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>I2&gt;1 D/O Char TMS</b> 1.000</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;1 D/O Char TMS</b> can be set. The setting range is from 0.025 to 1.200 in steps of 0.005</p> <p>Note: If <b>tI2&gt;1 D/O Char</b> set as IDMT</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>I2&gt;1 2nd Hrm BLK</b> Disabled</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;1 2nd Hrm BLK</b> function can set i.e. Enabled / Disabled.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>◀ For Save TRSET For Cancel</p> </div>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>SAVE Settings</p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>GROUP 1</p> </div>	

**8.17.4.4 To View / Set – NPS Overcurrent Settings (if I2>1 Enable is selected for Definite Time)**

<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>GROUP 1</p> </div>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
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<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>NPS Overcurrent</b></p> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>NPS OVERCURRENT (Negative Phase Sequence)</b>.</p> <p>Password Protected window for <b>NPS OVERCURRENT</b> i.e. I2&gt;1 Enable, I2&gt;2 Enable and I2&gt;3 Enable. (With respective to Disabled / Definite Time / IEC Curves / IEEE Curves)</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>I2&gt;1 Enable</b> <b>Definite Time</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;1 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set Definite Time.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>I2&gt;1</b> <b>1.00 A</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;1</b> can be set. The setting range is from 0.10 to 35.0 In in steps of 0.01 In.</p> <p>Note: The setting range is from 1.0 - 35.0 In in steps of 0.01 In for I2&gt;3 Enable.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>I2&gt;1 DT Delay</b> <b>1.00 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;1 DT Delay</b> can be set. The setting range is from 000.00 to 100.00 Sec in steps of 0.01 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>tI2&gt;1 D/O Char</b> <b>DT</b></p> </div>	<p>Read-only</p> <p>The <b>tI2&gt;1 D/O Char</b> is fixed i.e. DT (Definite Time).</p>

	Press the Minus / Down arrow key (- / ▼) to move to the next option.
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>I2&gt;1 tD/O Delay</b> <b>1.00 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;1 tD/O Delay</b> can be set. The setting range is from 0 to 100 Sec in steps of 0.01 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>I2&gt;1 2nd Hrm BLK</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I2&gt;1 2nd Hrm BLK</b> function can set i.e. Enabled / Disabled.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>◀ For Save</b> <b>TRSET For Cancel</b></p> </div>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>SAVE Settings</b></p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>GROUP 1</b></p> </div>	

*Note:*

*The settings of I2>2 Enable and I2>3 Enable should be set the same as I2>1 Enable.*

**8.17.5 GROUP 1 – Ground OC SETTINGS**

**8.17.5.1 To View / Set – Ground OC Settings (if IE>1, IE>2 and IE>3 Enable are Disabled)**

<p style="text-align: center;"><b>GROUP 1</b></p>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<p style="text-align: center;"><b>Ground OC</b></p>	<p>By using the Plus / Up arrow key (+ / ▲ ) or the Minus / Down arrow key (- / ▼ ) select <b>Ground OC</b>.</p> <p>Password Protected window for <b>Ground OC</b> i.e. Measured, IE&gt;1 Enable, IE&gt;2 Enable, and IE&gt;3 Enable, (With respective to Disabled / Definite Time / IEC Curves/ IEEE Curves)</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<p style="text-align: center;"><b>Measured</b></p>	<p>Read-only</p> <p>Description for <b>Ground OC</b>.</p> <p>Press the Minus / Down arrow key (- / ▼ ) to move to the next option.</p>
<p style="text-align: center;"><b>IE&gt;1 Enable</b> <b>Disabled</b></p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲ ) or the Minus / Down arrow key (- / ▼ ) the desired <b>IE&gt;1 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼ ) to move to the next option.</p>
<p style="text-align: center;"><b>IE&gt;2 Enable</b> <b>Disabled</b></p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲ ) or the Minus / Down arrow key (- / ▼ ) the desired <b>IE&gt;2 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p>

	Inverse / IEEE E Inverse / US Inverse / US ST Inverse). Note: When the setting is set as Disabled. Press the Minus / Down arrow key (- / ▼) to move to the next option.
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IE&gt;3 Enable</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IE&gt;3 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as Disabled. Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>GROUP 1</b></p> </div>	

**8.17.5.2 To View / Set – Ground OC Settings (if IE>1 Enable is selected for IEC curves)**

<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>GROUP 1</b></p> </div>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Ground OC</b></p> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>Ground OC</b>.</p> <p>Password Protected window for <b>Ground OC</b> i.e. Measured, IE&gt;1 Enable, IE&gt;2 Enable, and IE&gt;3 Enable, (With respective to Disabled / Definite Time / IEC Curves/ IEEE Curves)</p> <p>Press the Right arrow key (▶) to move to the next option.</p>

<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>Measured</b> </div>	<p>Read-only</p> <p>Description for Ground OC.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>IE&gt;1 Enable</b> <b>IEC S Inverse</b> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IE&gt;1 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as any IEC Curve</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>IE&gt;1</b> <b>1.00 A</b> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IE&gt;1</b> can be set. The setting range is from 0.05 to 4 In in steps of 0.01 In.</p> <p><i>NOTE: For SEF (Ordering Option) setting range is 0.002 to 0.200 In in step of 0.001 In.</i></p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>IE&gt;1 TMS</b> <b>1.000</b> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IE&gt;1 TMS</b> can be set. The setting range is from 0.025 to 1.200 in steps of 0.005.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>tIE&gt;1 D/O Char</b> <b>DT</b> </div>	<p>Read-only</p> <p>The <b>tIE&gt;1 D/O Char</b> is fixed i.e. DT (Definite Time).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>



<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IE&gt;1 tD/O Delay</b> 1.00 S</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IE&gt;1 tD/O Delay</b> can be set. The setting range is from 0 to 100 Sec in steps of 0.01 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IE&gt;1 2nd Hrm BLK</b> Disabled</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IE&gt;1 2nd Hrm BLK</b> can set i.e. Enabled / Disabled.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>◀ For Save TRSET For Cancel</p> </div>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>SAVE Settings</b></p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>GROUP 1</b></p> </div>	

**8.17.5.3 To View / Set – Ground OC Settings (if IE>1 Enable is selected for IEEE / US Curves)**

<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>GROUP 1</b></p> </div>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Ground OC</b></p> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>Ground OC</b>.</p> <p>Password Protected window for <b>Ground OC</b> i.e. Measured, IE&gt;1 Enable, IE&gt;2 Enable, and IE&gt;3 Enable, (With respective to Disabled / Definite Time / IEC Curves/ IEEE</p>

	Curves) Press the Right arrow key ( ▶ ) to move to the next option.
<b>Measured</b>	Read-only Description for Ground OC. Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.
<b>IE&gt;1 Enable</b> <b>IEEE M Inverse</b>	Editable Setting By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>IE&gt;1 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse). Note: When the setting is set as any IEEE Curve Press the Right arrow key ( ▶ ) to move to the next option.
<b>IE&gt;1</b> <b>1.00 A</b>	Editable Setting By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>IE&gt;1</b> can be set. The setting range is from 0.05 to 4 In in steps of 0.01 In. <i>NOTE: For SEF (Ordering Option) setting range is 0.002 to 0.200 In in step of 0.001In</i> Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.
<b>IE&gt;1 Time Dial</b> <b>1.00</b>	Editable Setting By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>IE&gt;1 Time Dial</b> can be set. The setting range is from 0.01 to 100.00 in steps of 0.01. Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.
<b>tIE&gt;1 D/O Char</b> <b>DT</b>	Editable Setting By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>tIE&gt;1 D/O Char</b> can be

	<p>set .i.e. IDMT / DT (Definite Time).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IE&gt;1 tD/O Delay</b> <b>1.00 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IE&gt;1 tD/O Delay</b> can be set. The setting range is from 0 to 100 Sec in steps of 0.01 Sec.</p> <p>Note: If <b>tIE&gt;1 D/O Char</b> set as DT</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IE&gt;1 D/O Char TMS</b> <b>1.000</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IE&gt;1 D/O Char TMS</b> can be set. The setting range is from 0.025 to 1.200 in steps of 0.005</p> <p>Note : If <b>tIE&gt;1 D/O Char</b> set as IDMT</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IE&gt;1 2nd Hrm BLK</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IE&gt;1 2nd Hrm BLK</b> can set i.e. Enabled / Disabled.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>◀ For Save</b> <b>TRSET For Cancel</b></p> </div>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>SAVE Settings</b></p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>

<b>GROUP 1</b>	
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**8.17.5.4 To View / Set – Ground OC Settings (if IE>1 Enable is selected for Definite Time)**

<b>GROUP 1</b>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<b>Ground OC</b>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>Ground OC</b>.</p> <p>Password Protected window for <b>Ground OC</b> i.e. Measured, IE&gt;1 Enable, IE&gt;2 Enable, and IE&gt;3 Enable, (With respective to Disabled / Definite Time / IEC Curves/ IEEE Curves)</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<b>Measured</b>	<p>Read-only</p> <p>Description for Ground OC.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>IE&gt;1 Enable Definite Time</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IE&gt;1 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set Definite Time.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<b>IE&gt;1 1.00 A</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IE&gt;1</b> can be set. The setting range is from 0.05 to 35.0 In in steps of 0.01 In.</p>

	<p>Note: The setting range is from 1.0 - 35.0 In in steps of 0.01In for IE&gt;3 Function.</p> <p><i>For SEF (Ordering Option) setting range is 0.002 to 0.200 In in steps of 0.001In for IE&gt;1 and IE&gt;2 and 0.002 to 2.000 In in step of 0.001 In for IE&gt;3</i></p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>tIE&gt;1 DT Delay</b> <b>1.00 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>tIE&gt;1 DT Delay</b> can be set. The setting range is from 000.00 to 100.00 Sec in steps of 0.01 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>tIE&gt;1 D/O Char</b> <b>DT</b></p> </div>	<p>Read-only</p> <p>The <b>tIE&gt;1 D/O Char</b> is fixed i.e. DT (Definite Time).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IE&gt;1 tD/O Delay</b> <b>1.00 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IE&gt;1 tD/O Delay</b> can be set. The setting range is from 0.00 to 100.00 Sec in steps of 0.01 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>IE&gt;1 2nd Hrm BLK</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IE&gt;1 2nd Hrm BLK</b> function can set i.e. Enabled / Disabled.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>◀ For Save</b> <b>TRSET For Cancel</b></p> </div>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>

<b>SAVE Settings</b>	This window will flash for a moment and the control will return to the Main Menu.
<b>GROUP 1</b>	

*Note:*

*The settings of IE>2 Enable and IE>3 Enable to be set in similar manner as that of IE>1 Enable.*

### 8.17.6 GROUP 1 – Residual OC SETTINGS

#### 8.17.6.1 To View / Set – Residual OC Settings (if 3lo>1, 3lo>2 and 3lo>3 Enable are Disabled)

<b>GROUP 1</b>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<b>Residual OC</b>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>Residual OC</b>.</p> <p>Password Protected window for <b>Residual OC</b> i.e. Derived, 3lo&gt;1 Enable, 3lo&gt;2 Enable, and 3lo&gt;3 Enable, (With respective to Disabled / Definite Time / IEC Curves/ IEEE Curves).</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<b>Derived</b>	<p>Read-only</p> <p>Description for Residual OC.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>3lo&gt;1 Enable Disabled</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>3lo&gt;1 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite</p>

	<p>Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as Disabled.</p> <p>Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>3lo&gt;2 Enable</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>3lo&gt;2 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as Disabled.</p> <p>Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>3lo&gt;3 Enable</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>3lo&gt;3 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as Disabled.</p> <p>Press the Right arrow key ( ► ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>GROUP 1</b></p> </div>	

**8.17.6.2 To View / Set – Residual OC Settings (if 3lo>1 Enable is selected for IEC curves)**

<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>GROUP 1</b></p> </div>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key ( ► ) to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <b>Residual OC</b> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>Residual OC</b>.</p> <p>Password Protected window for <b>Residual OC</b> i.e. Derived, 3lo&gt;1 Enable, 3lo&gt;2 Enable, and 3lo&gt;3 Enable, (With respective to Disabled / Definite Time / IEC Curves/ IEEE Curves).</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <b>Derived</b> </div>	<p>Read-only</p> <p>Description for Residual OC.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <b>3lo&gt;1 Enable</b> <b>IEC S Inverse</b> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>3lo&gt;1 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as any IEC Curve</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <b>3lo&gt;1</b> <b>1.00 A</b> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>3lo&gt;1</b> can be set. The setting range is from 0.05 to 4 In in steps of 0.01 In.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <b>3lo&gt;1 TMS</b> <b>1.000</b> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>3lo&gt;1 TMS</b> can be set. The setting range is from 0.025 to 1.200 in steps of 0.005.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>



<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>t3lo&gt;1 D/O Char</b> DT         </div>	<p>Read-only</p> <p>The <b>t3lo&gt;1 D/O Char</b> is fixed i.e. DT (Definite Time).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>3lo&gt;1 tD/O Delay</b> 1.00 S         </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>3lo&gt;1 tD/O Delay</b> can be set. The setting range is from 0 to 100 Sec in steps of 0.01 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>3lo&gt;1 2nd Hrm BLK</b> Disabled         </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>3lo&gt;1 2nd Hrm BLK</b> function can set i.e. Enabled / Disabled.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>◀ For Save</b> TRSET For Cancel         </div>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>SAVE Settings</b> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>GROUP 1</b> </div>	

**8.17.6.3 To View / Set – Residual OC Settings (if 3lo>1 Enable is selected for IEEE / US Curves)**

<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>GROUP 1</b> </div>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <b>Residual OC</b> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>Residual OC</b>.</p> <p>Password Protected window for <b>Residual OC</b> i.e. Derived, 3lo&gt;1 Enable, 3lo&gt;2 Enable, and 3lo&gt;3 Enable, (With respective to Disabled / DT / IEC Curves/ IEEE Curves).</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <b>Derived</b> </div>	<p>Read-only</p> <p>Description for Residual OC.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <b>3lo&gt;1 Enable</b> <b>IEEE M Inverse</b> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>3lo&gt;1 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set as any IEEE Curve</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <b>3lo&gt;1</b> <b>1.00 A</b> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>3lo&gt;1</b> can be set. The setting range is from 0.05 to 4 In in steps of 0.01In.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <b>3lo&gt;1 Time Dial</b> <b>1.00</b> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>3lo&gt;1 Time Dial</b> can be set. The setting range is from 0.01 to 100.00 in steps of 0.01.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>t3lo&gt;1 D/O Char</b></p> <p><b>DT</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ /▲) or the Minus / Down arrow key (- /▼) the desired <b>t3lo&gt;1 D/O Char</b> can be set .i.e. IDMT / DT (Definite Time).</p> <p>Press the Minus / Down arrow key (- /▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>3lo&gt;1 tD/O Delay</b></p> <p><b>1.00 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ /▲) or the Minus / Down arrow key (- /▼) the desired <b>3lo&gt;1 tD/O Delay</b> can be set. The setting range is from 0 to 100 Sec in steps of 0.01 Sec.</p> <p>Note: If <b>t3lo&gt;1 D/O Char</b> set as DT</p> <p>Press the Minus / Down arrow key (- /▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>3lo&gt;1 D/O Char TMS</b></p> <p><b>1.000</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ /▲) or the Minus / Down arrow key (- /▼) the desired <b>3lo&gt;1 D/O Char TMS</b> can be set. The setting range is from 0.025 to 1.200 in steps of 0.005</p> <p>Note: If <b>t3lo&gt;1 D/O Char</b> set as IDMT</p> <p>Press the Minus / Down arrow key (- /▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>3lo&gt;1 2nd Hrm BLK</b></p> <p><b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ /▲) or the Minus / Down arrow key (- /▼) the desired <b>3lo&gt;1 2nd Hrm BLK</b> function can set i.e. Enabled / Disabled.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>◀ For Save</b></p> <p><b>TRSET For Cancel</b></p> </div>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>SAVE Settings</b></p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>

<b>GROUP 1</b>	

**8.17.6.4 To View / Set – Residual OC Settings (if 3lo>1 Enable is selected for Definite Time)**

<b>GROUP 1</b>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<b>Residual OC</b>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>Residual OC</b>.</p> <p>Password Protected window for <b>Residual OC</b> i.e. Derived, 3lo&gt;1 Enable, 3lo&gt;2 Enable, and 3lo&gt;3 Enable, (With respective to Disabled / Definite Time / IEC Curves/ IEEE Curves).</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<b>Derived</b>	<p>Read-only</p> <p>Description for Residual OC.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>3lo&gt;1 Enable Definite Time</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>3lo&gt;1 Enable</b> can set i.e. Disabled / (Any of the following Curve Selection Definite Time / IEC S Inverse/ ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse).</p> <p>Note: When the setting is set Definite Time.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<b>3lo&gt;1 1.00 A</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus /</p>

	<p>Down arrow key (- / ▼) the desired <b>3lo&gt;1</b> can be set. The setting range is from 0.05 to 35.0 In in steps of 0.01In.</p> <p>Note: The setting range is from 1.0 to 35.0 In in steps of 0.01In for 3lo&gt;3 Enable.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>3lo&gt;1 DT Delay</b> 1.00 S</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>3lo&gt;1 DT Delay</b> can be set. The setting range is from 000.00 to 100.00 Sec in steps of 0.01 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>t3lo&gt;1 D/O Char</b> DT</p> </div>	<p>Read-only</p> <p>The <b>t3lo&gt;1 D/O Char</b> is fixed i.e. DT (Definite Time).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>3lo&gt;1 tD/O Delay</b> 1.00 S</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>3lo&gt;1 tD/O Delay</b> can be set. The setting range is from 0.00 to 100.00 Sec in steps of 0.01 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>3lo&gt;1 2nd Hrm BLK</b> Disabled</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>3lo&gt;1 2nd Hrm BLK</b> function can set i.e. Enabled / Disabled.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>◀ For Save TRSET For Cancel</p> </div>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>

<b>SAVE Settings</b>	This window will flash for a moment and the control will return to the Main Menu.
<b>GROUP 1</b>	

*Note: The settings of 3lo>2 Enable and 3lo>3 Enable to be set in similar manner as that of 3lo>1 Enable.*

### 8.17.7 GROUP 1 – THERMAL OVERLOAD SETTINGS

#### 8.17.7.1 To View / Set – Thermal Overload Settings (if settings are Disabled)

<b>GROUP 1</b>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<b>THERMAL OVERLOAD</b>	<p>By using the Plus / Up arrow key (+ / ▲ ) or the Minus / Down arrow key (- / ▼ ) select <b>Thermal Overload</b>.</p> <p>Password Protected window for <b>Thermal Overload</b> i.e. Inhib. Th Trip, Kco-efficient, Th. Trip Enable, Th. Alarm Enable, lth&gt; Alarm, Th.TConst.1, Th. TConst.2, Tcooling, Th. Lockout, Th. LockThresh and Service Factor.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<b>Inhib. Th Trip Disabled</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲ ) or the Minus / Down arrow key (- / ▼ ) the desired <b>Inhib. Th Trip</b> is set as disabled.</p> <p>Press the Minus / Down arrow key (- / ▼ ) to move to the next option.</p>
<b>Kco-efficient 3</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲ ) or the Minus / Down arrow key (- / ▼ ) the desired <b>Kco-efficient</b> can be set. The</p>

	<p>setting range is 0 to 10 step 1</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Th. Trip Enable</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Th. Trip Enable</b> is set as Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Th. Alarm Enable</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Th. Alarm Enable</b> is set as Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Th.TConst.1</b> <b>20 Mins</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Th.TConst.1</b> can be set. The setting range is from 1 to 180 Mins step 1.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Th. TConst.2</b> <b>20 Mins</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Th. TConst.2</b> can be set. The setting range is from 1 to 360 Mins in steps of 1Min.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Tcooling</b> <b>60 Mins</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Tcooling</b> can be set. The setting range is from 1 to 999 Mins in steps of 1Min.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>Th. Lockout</b>   <b>Disabled</b> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Th. Lockout</b> is set as Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>Service Factor</b>   <b>1</b> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Service Factor</b> can be set. The setting range is from 1.00 to 1.50 in steps of 0.01.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>◀ For Save</b>   <b>TRSET For Cancel</b> </div>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>SAVE Settings</b> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>GROUP 1</b> </div>	

**8.17.7.2 To View / Set – Thermal Overload Settings (if settings are Enabled)**

<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>GROUP 1</b> </div>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>THERMAL OVERLOAD</b> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>Thermal Overload</b>.</p> <p>Password Protected window for <b>Thermal Overload</b> i.e. Inhib. Th Trip, Kco-efficient, Th. Trip Enable, Th. Alarm Enable, Ith&gt; Alarm, Th.TConst.1, Th. TConst.2, Tcooling, Th. Lockout, Th. LockThresh and Service Factor.</p>



	Press the Right arrow key ( ▶ ) to move to the next option.
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Inhib. Th Trip</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Inhib. Th Trip</b> can be set as Enabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Kco-efficient</b> <b>3</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Kco-efficient</b> can be set. The setting range is from 0 to 10 in steps of 1.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Th. Trip Enable</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Th. Trip Enable</b> is set as Enabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Th. Alarm Enable</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Th. Alarm Enable</b> is set as Enabled.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Ith&gt; Alarm</b> <b>70 %</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Ith&gt; Alarm</b> can be set. The Setting range is from 20 to 100% in steps of 1%.</p> <p>Press the Left arrow key ( ◀ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Th. Alarm Enable</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Th. Alarm Enable</b> is set as</p>

	<p>Enabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Th.TConst.1</b> <b>20 Mins</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Th.TConst.1</b> can be set. The setting range is from 1 to 180 Mins in steps of 1Min.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Th. TConst.2</b> <b>20 Mins</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Th. TConst.2</b> can be set. The setting range is from 1 to 360 Mins in steps of 1Min.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Tcooling</b> <b>60 Mins</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Tcooling</b> can be set. The setting range is from 1 to 999 Mins in steps of 1Min.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Th. Lockout</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Th. Lockout</b> is set as Enabled.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Th. LockThresh.</b> <b>90 %</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Th. LockThresh</b> can be set. The setting range is from 20 to 100% in step of 1%</p> <p>Press the Left arrow key (◀) to move to the next option.</p>

<p><b>Th. Lockout</b> <b>Enabled</b></p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Th. Lockout</b> is set as Enabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Service Factor</b> <b>1</b></p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>K</b> can be set. The setting range is from 1.00 to 1.50 in steps of 0.01.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<p><b>◀ For Save</b> <b>TRSET For Cancel</b></p>	<p>When the Left arrow key (◀) key is it will <b>SAVE</b> the changes and move to the next option.</p>
<p><b>SAVE Settings</b></p>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<p><b>GROUP 1</b></p>	

**8.17.8 GROUP 1 – Under Current Protection SETTINGS**

**8.17.8.1 To Set – Undercurrent Protection Settings (if I< Status is set as Disabled)**

<p><b>GROUP 1</b></p>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<p><b>Undercurrent</b></p>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>Under Current</b>.</p> <p>Password Protected window for <b>Undercurrent</b> i.e. I&lt; Enable, I&lt; Set, tI&lt;1 Delay and TI&lt;1 Inhib. I&lt;.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>I&lt; Enable</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I&lt; Enable</b> can be set i.e. Enabled / Disabled.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>GROUP 1</b></p> </div>	

**8.17.8.2 To Set – Under Current Protection Settings (if I< Status is set as Enabled)**

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>GROUP 1</b></p> </div>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>Undercurrent</b></p> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>Under Current</b>.</p> <p>Password Protected window for <b>Undercurrent</b> i.e. I&lt; Enable, I&lt; Set, tI&lt;1 Delay and tInhib. I&lt;.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>I&lt; Enable</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I&lt; Enable</b> can be set i.e. Enabled / Disabled.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>I&lt; Set</b> <b>1.00 A</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>I&lt;</b> can be set. The setting range is from 0.10 to 1.00 In in steps of 0.01 In.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<p><b>t I&lt; Delay</b> <b>1.00 S</b></p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>t I&lt; Delay</b> can be set. The setting range is from 0.20 to 100.00 Sec in steps of 0.01 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>TInhib. I&lt;</b> <b>12.00 S</b></p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>TInhib. I&lt;</b> can be set. The setting range is from 0.05 to 300 Sec by steps of 0.1 Sec</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<p><b>◀ For Save</b> <b>TRSET For Cancel</b></p>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<p><b>SAVE Settings</b></p>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<p><b>GROUP 1</b></p>	

**8.17.9 GROUP 1 – 50BF SETTINGS**

**8.17.9.1 To Set – 50BF Settings (If 50BF settings are Disabled)**

<p><b>GROUP 1</b></p>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<p><b>50BF</b></p>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>50BF</b></p> <p>Password Protected window for <b>50BF</b> i.e. 50BF Enable,</p>

	<p>(50BF Delay, 50BF Reset), 50BF_IP&lt;, 50BF_IE&lt;, Remove IP&gt; P and Remove IE&gt; P.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>50BF Enable</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>50BF Enable</b> can be set i.e. Enabled / Disabled</p> <p>Note : If set as Disabled</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>50BF_IP&lt;</b> <b>1.00 A</b></p> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>50BF_IP&lt;</b> can be set. The setting range is from 0.05 to 3.20 In in steps of 0.01In</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>50BF_IE&lt;</b> <b>1.00 A</b></p> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>50BF_IE&lt;</b> can be set. The setting range is from 0.05 to 3.20 In in steps of 0.01In</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Remove IP&gt; P</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Remove IP&gt; P</b> can be set i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Remove IE&gt; P</b> <b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Remove IE&gt; P</b> can be set i.e. Enabled / Disabled</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>

<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>◀ For Save TRSET For Cancel</p> </div>	<p>When the Left arrow key ( ◀ ) key is it will SAVE the changes and move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>SAVE Settings</p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>GROUP 1</p> </div>	

**8.17.9.2 To Set – 50BF Settings (if 50BF settings are Enabled)**

<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>GROUP 1</p> </div>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>50BF</p> </div>	<p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) select <b>50BF</b></p> <p>Password Protected window for <b>50BF</b> i.e. 50BF Enable, (50BF Delay, 50BF Reset), 50BF_IP&lt;, 50BF_IE&lt;, Remove IP&gt; P and Remove IE&gt; P.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>50BF Enable Enabled</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>50BF Enable</b> can be set i.e. Enabled / Disabled</p> <p>Note : if it set as Enabled</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>50BF Delay 0.10 S</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>50BF Delay</b> settings can be set. The setting range is from 00 to 50.00 Sec in steps of</p>

	<p>0.01 Sec.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>50BF Reset</b> <b>CB Open+ I&lt;</b></p> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>50BF Reset</b> can be set. i.e. CB Open + I&lt;, Prot Reset + I&lt;, CB Open / I&lt;</p> <p>Press the Left arrow key (◀) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>50BF Enable</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>50BF Enable</b> can be set i.e. Enabled / Disabled</p> <p>Note : if it set as Enabled</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>50BF_IP&lt;</b> <b>100.00 A</b></p> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>50BF_IP&lt;</b> can be set. The setting range is from 0.05 to 3.20 In in steps of 0.01In</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>50BF_IE&lt;</b> <b>100.00 A</b></p> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>50BF_IE&lt;</b> can be set. The setting range is from 0.05 to 3.20 In in steps of 0.01In</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p><b>Remove IP&gt; P</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Remove IP&gt; P</b> can be set i.e. Enabled / Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>



<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Remove IE&gt; P</b></p> <p><b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Remove IE&gt; P</b> can be set i.e. Enabled / Disabled</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>◀ <b>For Save</b></p> <p><b>TRSET For Cancel</b></p> </div>	<p>When the Left arrow key (◀) key is it will <b>SAVE</b> the changes and move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>SAVE Settings</b></p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>GROUP 1</b></p> </div>	

### 8.17.10 GROUP 1 MOTOR PROTECTION SETTINGS

#### 8.17.10.1 To View / Set – MOTOR PROTECTION Settings (If Settings are disabled)

<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>GROUP 1</b></p> </div>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Motor Protection</b></p> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>Motor Protection</b>.</p> <p>Password Protected window for <b>Motor Protection</b> i.e. Start criteria, Prolong Start Enabled/Disabled, Istart, Tstart, Speed Switch, Load Jam Enabled/Disabled, ILoadjam, TLoadjam.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Start Criteria</b></p> <p><b>I</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Status Criteria</b> can be set i.e. 52a / I / 52a+I</p>

	Press the Minus / Down arrow key (- / ▼) to move to the next option.
<b>Prolonged Start</b> <b>Disabled</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / □) or the Minus / Down arrow key (- / ▼) the desired <b>Prolonged Start</b> can be set i.e. Enabled/Disabled,</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>Speed Switch</b> <b>Disabled</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Speed Switch</b> can be set i.e. Enabled/Disabled,</p>
<b>Load Jam</b> <b>Disabled</b>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Load Jam</b> can be set i.e. Enabled/Disabled.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
◀ For Save TRSET For Cancel	When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.
<b>SAVE Settings</b>	This window will flash for a moment and the control will return to the Main Menu.
<b>GROUP 1</b>	

**8.17.10.2 To View / Set – MOTOR PROTECTION Settings (If Settings are enabled)**

<b>GROUP 1</b>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p>
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	Press the Right arrow key ( ▶ ) to move to the next option.
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>Motor Protection</b></p> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>Motor Protection</b>.</p> <p>Password Protected window for <b>Motor Protection</b> i.e. Start criteria, Prolong Start Enabled/Disabled, Istart, Tstart, Speed Switch, Load Jam Enabled/Disabled, ILoadjam, TLoadjam.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>Start Criteria</b></p> <p>I</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Status Criteria</b> can be set i.e. 52a / I / 52a+I</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>Prolong Start</b></p> <p>Enabled</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Prolong Start</b> is set as Enabled.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>IStart</b></p> <p>5.0 A</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>IStart</b> can be set. The setting range is from 1.0In to 5.0In in steps of 0.1</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>TStart</b></p> <p>15.00 S</p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>TStart</b> can be set. The setting range is from 1.00s to 200.00s in steps of 0.01s</p> <p>Press the Left arrow key ( ◀ ) to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Prolonged Start</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Prolonged Start</b> is set as Enabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Speed Switch</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Speed Switch</b> is set Enabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Load Jam</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Load Jam</b> is set as Enabled.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>ILoadjam</b> <b>2.5 A</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>ILoadjam</b> can be set. The setting range is from 1.0In to 5.0In in steps of 0.1</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>TLoadjam</b> <b>6.00 S</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>TLoadjam</b> can be set. The setting range is from 1.00s to 200.00s in steps of 0.01s</p> <p>Press the Left arrow key (◀) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Load Jam</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Load Jam</b> is set as Enabled.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>

<p>◀ For Save TRSET For Cancel</p>	<p>When the Left arrow key ( ◀ ) key is it will SAVE the changes and move to the next option.</p>
<p>SAVE Settings</p>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<p>GROUP 1</p>	

**8.17.11 GROUP 1 Number of Start SETTINGS**

**8.17.11.1 To View / Set – Number of Start Settings (If Settings are disabled)**

<p>GROUP 1</p>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.. Press the Right arrow key ( ▶ ) to move to the next option.</p>
<p>Number of Start</p>	<p>By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) select <b>Number of Start</b> Password Protected window for <b>NUMBER OF START</b> i.e. Hot Start Status Enabled/Disabled, (No of Hot Start), Cold Start Stat Enabled/Disabled (No of Cold Start), Supervising Time, T.Betw. Start En Enabled/Disabled, T. Betw. St. and TInhib.Start. Press the Right arrow key ( ▶ ) to move to the next option.</p>
<p>Hot Start Status Disabled</p>	<p>Editable Setting By using the Plus / Up arrow key ( + / ▲ ) or the Minus / Down arrow key ( - / ▼ ) the desired <b>Hot Start Status</b> is set as Disabled. Press the Minus / Down arrow key ( - / ▼ ) to move to the next option.</p>

<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Cold Start Stat</b></p> <p><b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Cold Start Stat</b> is set as Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Supervising Time</b></p> <p><b>10 Mins</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Supervising Time</b> can be set. The setting range is from 1 to 120 Mins in steps of 1 Min.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>T.Betw.Start En</b></p> <p><b>Disabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>T.Betw. Start En</b> is set as Disabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>TInhib. Strt</b></p> <p><b>10 Mins</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>TInhib. Strt</b> can be set. The setting range is from 1 to 120 Mins in steps of 1 Min.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>◀ For Save</b></p> <p><b>TRSET For Cancel</b></p> </div>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>SAVE Settings</b></p> </div>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>GROUP 1</b></p> </div>	

**8.17.11.2 To View / Set – Number of Start Settings (If Settings is enabled)**

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>GROUP 1</b></p> </div>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Number of Start</b></p> </div>	<p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select <b>Number of Start</b></p> <p>Password Protected window for <b>NUMBER OF START</b> i.e. Hot Start Status Enabled/Disabled, (No of Hot Start), Cold Start Stat Enabled/Disabled (No of Cold Start), Supervising Time, T.Betw. Start En Enabled/Disabled, T. Betw. St. and TInhib.Start.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Hot Start Status</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Hot Start Status</b> is set as Enabled.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>No of Hot Start</b> <b>2</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>No of Hot Start</b> can be set The setting range is from 1 to 5 in steps of 1.</p> <p>Press the Left arrow key ( ◀ ) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Hot Start Status</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Hot Start Status</b> is set as Enabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p><b>Cold Start Stat</b> <b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Cold Start Stat</b> is set as</p>

	<p>Enabled.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>No of Cold Start</b></p> <p><b>3</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>No of Cold Start</b> can be set The setting range is from 1 to 5 in steps of 1.</p> <p>Press the Left arrow key ( ◀ ) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>Cold Start Stat</b></p> <p><b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Cold Start Stat</b> is set as Enabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>Supervising Time</b></p> <p><b>10 Mins</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Supervising Time</b> can be set. The setting range is from 1 to 120 Mins step 1Min.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>T.Betw.St.Status</b></p> <p><b>Enabled</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼)the desired <b>T.Betw.St.Status</b> is set as Enabled.</p> <p>Press the Right arrow key ( ▶ ) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p><b>T. Betw. St.</b></p> <p><b>20 Mins</b></p> </div>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>Time Betwe Start</b> can be set The setting range is from 1 Min to 120 Mins in steps of 1Min.</p> <p>Press the Left arrow key ( ◀ ) to move to the next option.</p>



<p><b>T.Betw.St.Status</b> <b>Enabled</b></p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>T.Betw.St.Status</b> is set as Enabled.</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>TInhib. Start</b> <b>10 Mins</b></p>	<p>Editable Setting</p> <p>By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) the desired <b>TInhib. Start</b> can be set. The setting range is from 1 to 120 Mins in steps of 1Min.</p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<p><b>◀ For Save</b> <b>TRSET For Cancel</b></p>	<p>When the Left arrow key (◀) key is it will SAVE the changes and move to the next option.</p>
<p><b>SAVE Settings</b></p>	<p>This window will flash for a moment and the control will return to the Main Menu.</p>
<p><b>GROUP 1</b></p>	

**8.18 GROUP 2 SETTINGS**

**8.18.1 To View / Set – GROUP 2 Settings**

<p><b>GROUP 1</b></p>	<p>Password protected window for “<b>GROUP 1</b>” setting i.e. Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC, Residual OC, Thermal Overload, Under Current, 50BF, Motor Protection and Number of Start.</p> <p><i>Note: Group 1 Setting will be seen only when it is enabled in Configuration setting.</i></p> <p>Press the Right arrow key (▶) to move to the next option.</p>
<p><b>Inrush Blocking</b></p>	<p>Password Protected window for <b>Inrush Blocking</b> i.e. 2nd Hrm BLK Disabled/Enabled, 2ndHrm Threshold, and I&gt;UB2H</p>

	Press the Minus / Down arrow key (- / ▼) to move to the next option.
<b>Phase Overcurrent</b>	<p>Password Protected window for “<b>Phase Overcurrent</b>” i.e. IP&gt;1 Enable, IP&gt;2 Enable and IP&gt;3 Enable. (With respective to Disabled / Definite Time / IEC S Inverse / ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse Curves).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>NPS Overcurrent</b>	<p>Password Protected window for <b>Negative Phases Sequence Overcurrent</b> i.e. I2&gt;1 Enable, I2&gt;2 Enable and I2&gt;3 Enable. (With respective to Disabled / Definite Time / IEC S Inverse / ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse Curves).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>Ground OC</b>	<p>Password Protected window for <b>Ground OC</b> i.e. Measured, IE&gt;1 Enable, IE&gt;2 Enable, and IE&gt;3 Enable, (With respective to Disabled / Definite Time / IEC S Inverse / ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse Curves).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<b>Residual OC</b>	<p>Password Protected window for <b>Residual OC</b> i.e. Derived 3Io&gt;1 Enable, 3Io&gt;2 Enable, and 3Io&gt;3 Enable. (With respective to Disabled / Definite Time / IEC S Inverse / ST Inverse 1.3S / IEC V Inverse / IEC E Inverse / UK LT Inverse / IEEE M Inverse / IEEE V Inverse / IEEE E Inverse / US Inverse / US ST Inverse Curves).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>

<p><b>Thermal Overload</b></p>	<p>Password Protected window for <b>Thermal Overload</b> i.e. Inhib. Th Trip, Kco-efficient, Th. Trip Enable, Th. Alarm Enable, lth&gt; Alarm, Th.TConst.1, Th. TConst.2, Tcooling, Th. Lockout, Th. LockThresh. Service Factor</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Undercurrent</b></p>	<p>Password Protected window for <b>Undercurrent</b> i.e. l&lt; Enable, l&lt; Set, tl&lt; Delay and TInhib. l&lt;</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>50BF</b></p>	<p>Password Protected window for <b>50BF (CB FAIL)</b> i.e. 50BF Enable, (50BF Delay, 50BF Reset), 50BF_IP&lt;, 50BF_IE&lt;, Remove IP&gt; P and Remove IE&gt; P</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Motor Protection</b></p>	<p>Password Protected window for <b>“Motor Protection”</b> i.e. Start Criteria, Prolonged Start (Istart and Tstart), Speed Switch and Load Jam (ILoadjam and TLoadjam).</p> <p>Press the Minus / Down arrow key (- / ▼) to move to the next option.</p>
<p><b>Number of Start</b></p>	<p>Password Protected window for <b>“Number of Start”</b> i.e. Hot Start Status (No of Hot Start), Cold Start Stat (No of Cold Start), Supervising Time, T.Betw. Start En (T. Betw. St.), TInhib. Start</p> <p>Press the Left arrow key (◀) to move to the Main Menu.</p>
<p><b>GROUP 1</b></p>	

**Note:**

*The Group 2 Function for the setting Inrush Blocking, Phase Overcurrent, NPS Overcurrent, Ground OC Residual OC, Thermal Overload, Undercurrent, 50BF, Motor Protection and Number of Start settings are similar to Group 1.*

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# Section 9

## Flow Chart

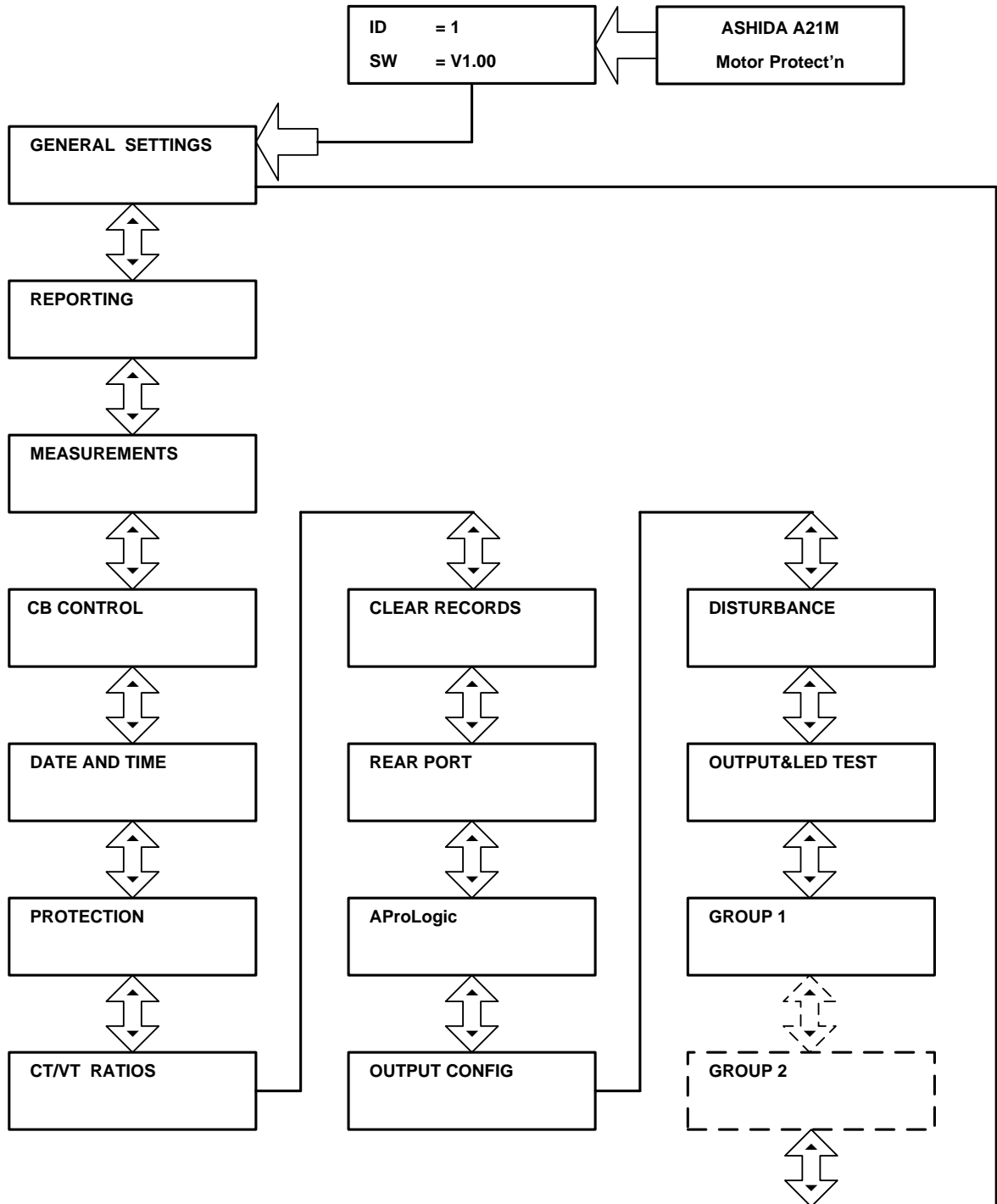
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**9 MAIN MENU**

After the Power ON or When PROT. RESET + EDIT key pressed following windows will be displayed and the user can scroll the main menu as given below



*Note: Group1 and Group 2 Setting will be seen only when it is enabled through Setting Group 1 and Setting Group 2 in Protection setting. If both the settings (i.e. Setting Group 1 and Setting Group 2) are disabled then setting Group1 will be seen.*



### 9.1 Flow Chart – EDIT and SAVE settings

Press the Right arrow key (▶) to enter the setting menu.

By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select the desired setting.

This window shows the set system Frequency.

To change the System Frequency press the EDIT Key.

As soon as the Edit Key is pressed the relay will ask for Password.

By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) enter the set Password i.e. four (4) digits alpha numeric.

Press the EDIT Key

The display will show password OK message, and display the next option.

The Alpha Numerical value will start blinking.

By using the Plus / Up arrow key (+ / ▲) or the Minus / Down arrow key (- / ▼) select the desired frequency.

Press the EDIT Key.

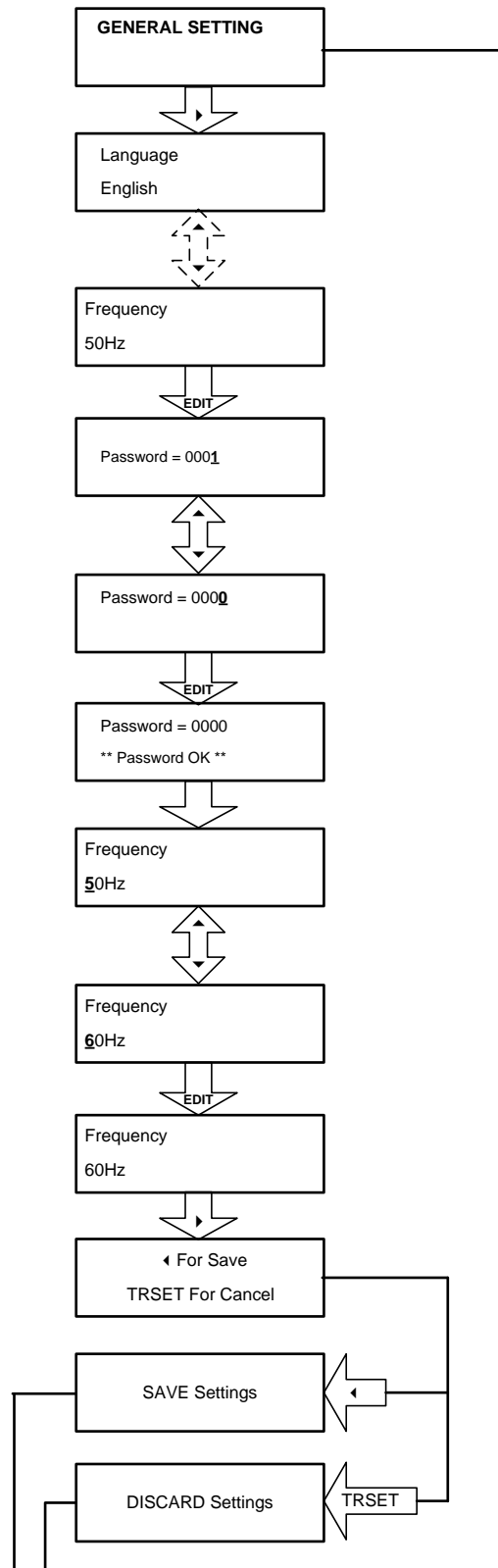
The Alpha Numerical Value will stop blinking.

Press the Right arrow key (▶), the relay will ask the user to SAVE or to CANCEL the settings.

Press the (◀) Key to SAVE the Changes.

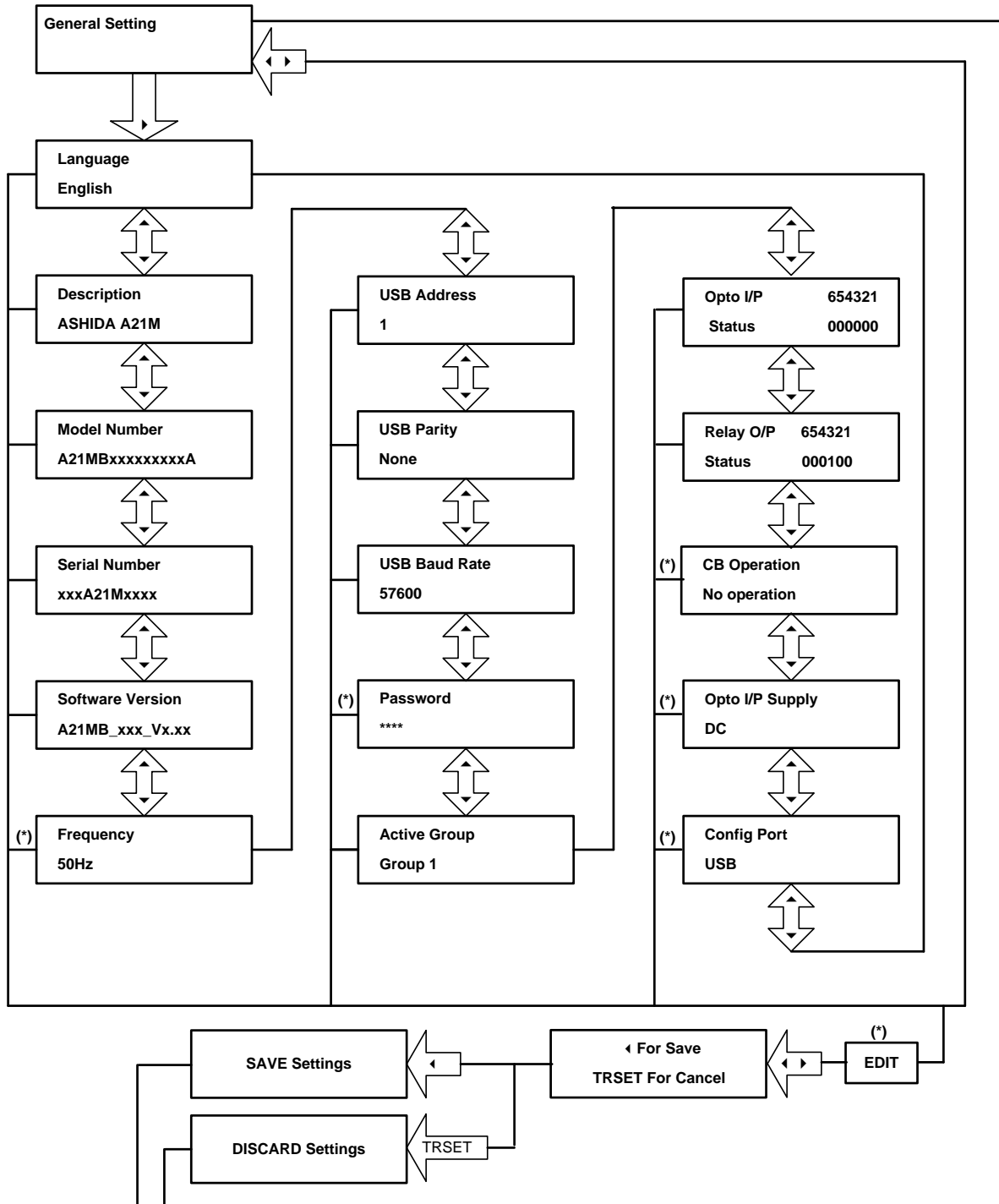
OR

Press the TRSET Key to DISCARD the Changes.



**9.2 Flow Chart – GENERAL SETTING**

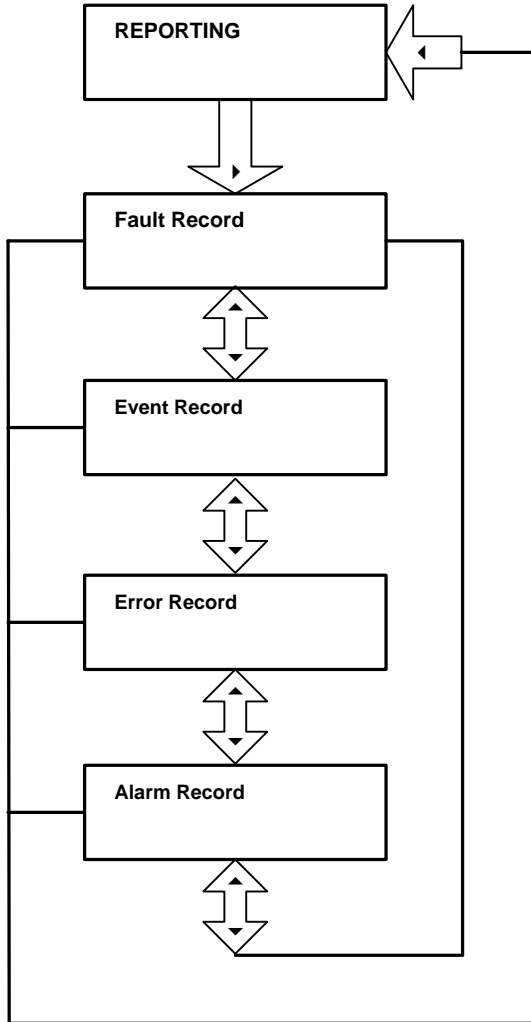
**9.2.1 To View / Set – General Setting**



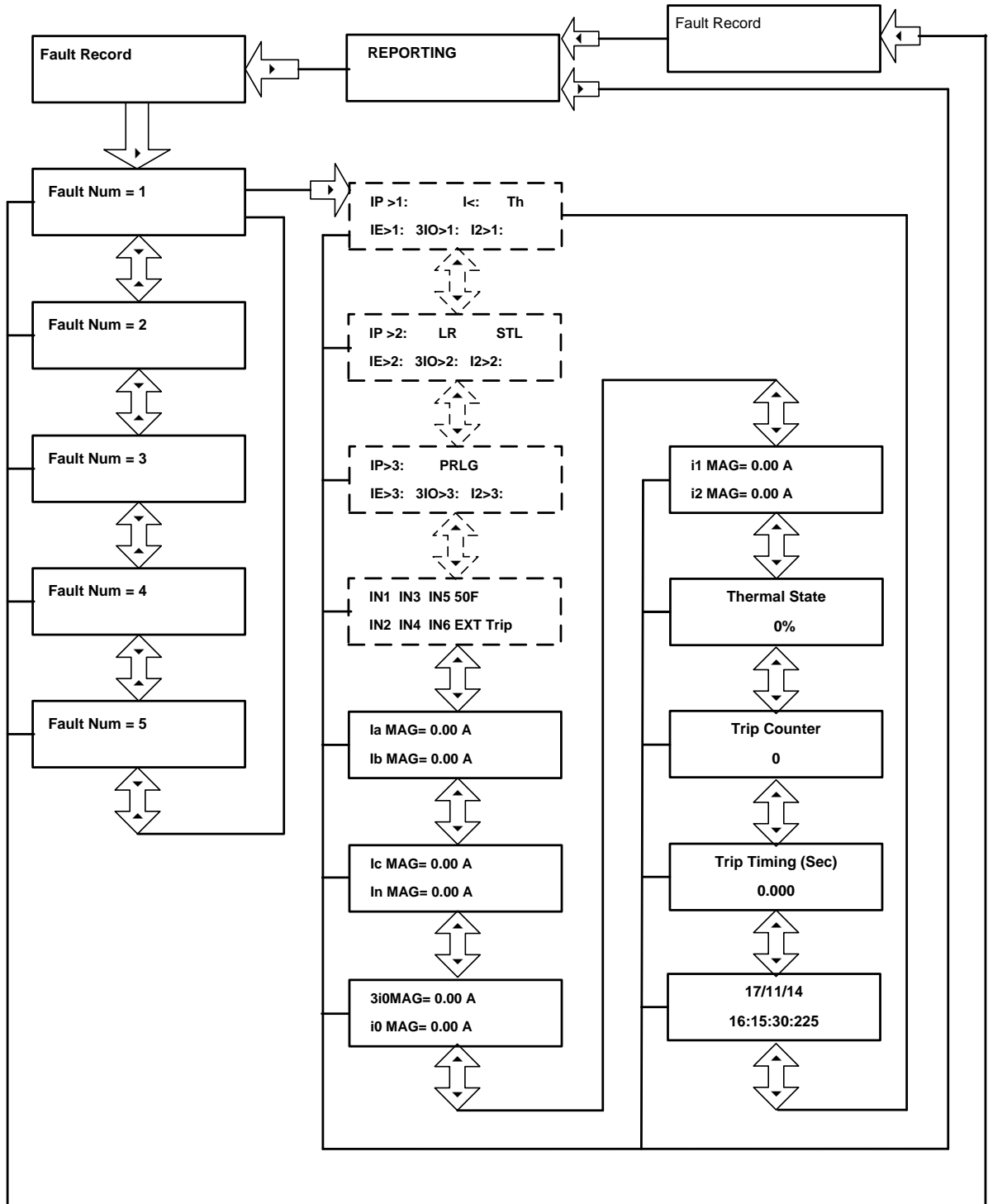
*Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.*

### 9.3 Flow Chart – REPORTING

#### 9.3.1 To View Reporting

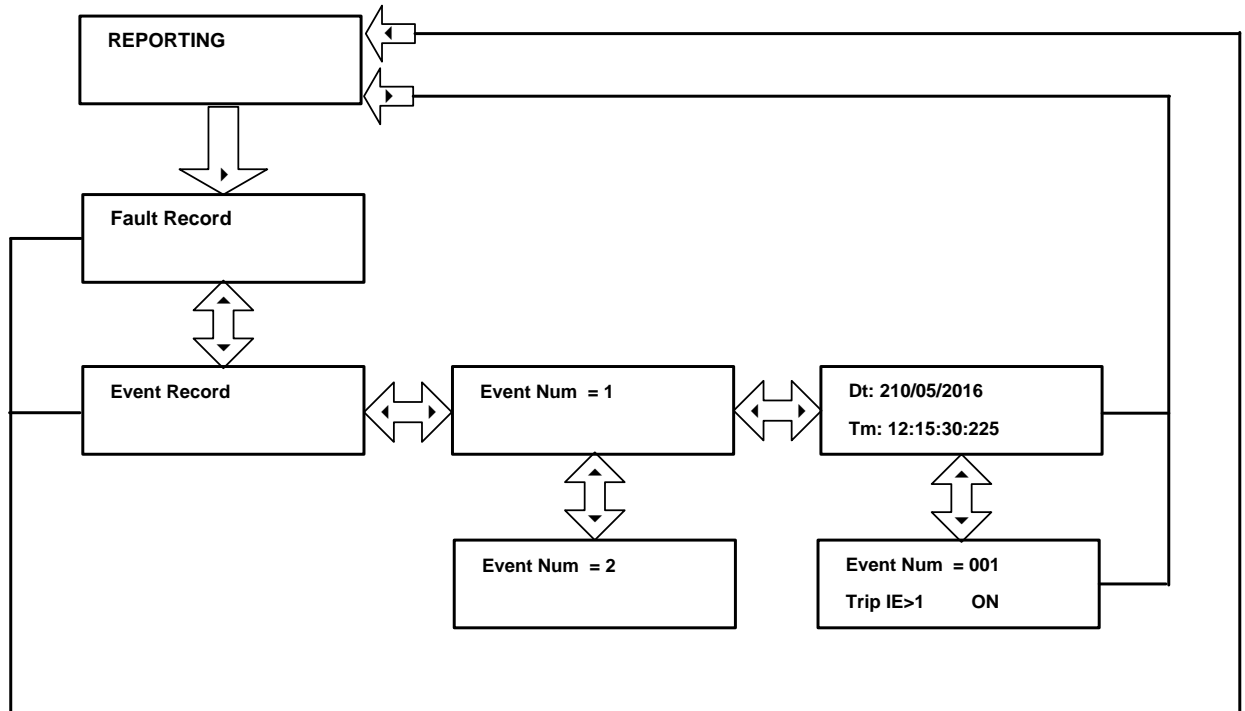


**9.3.2 To View – Fault Records**

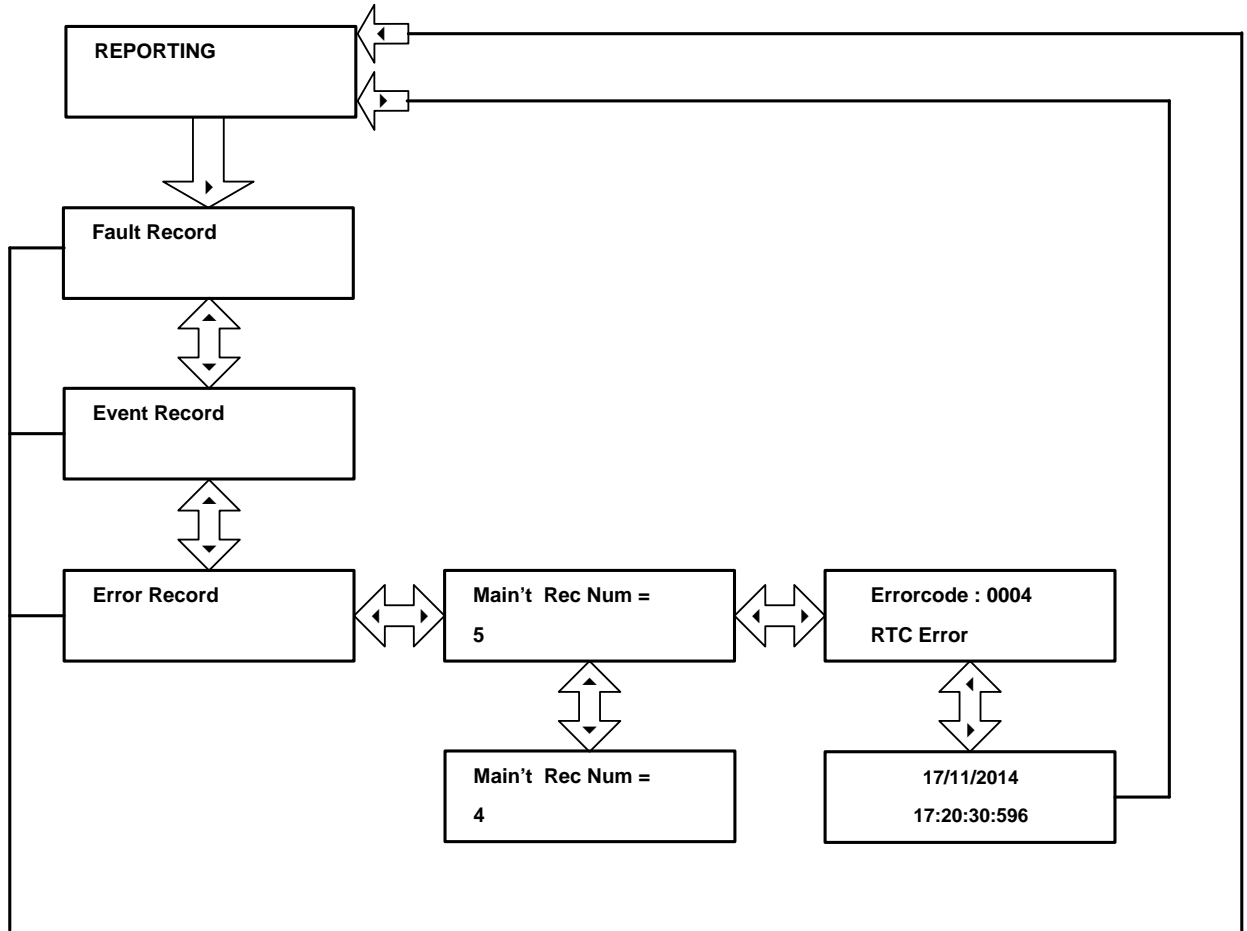


*Note: The display windows shown in dashed lines will be seen if the relay operates in respective protection functions.*

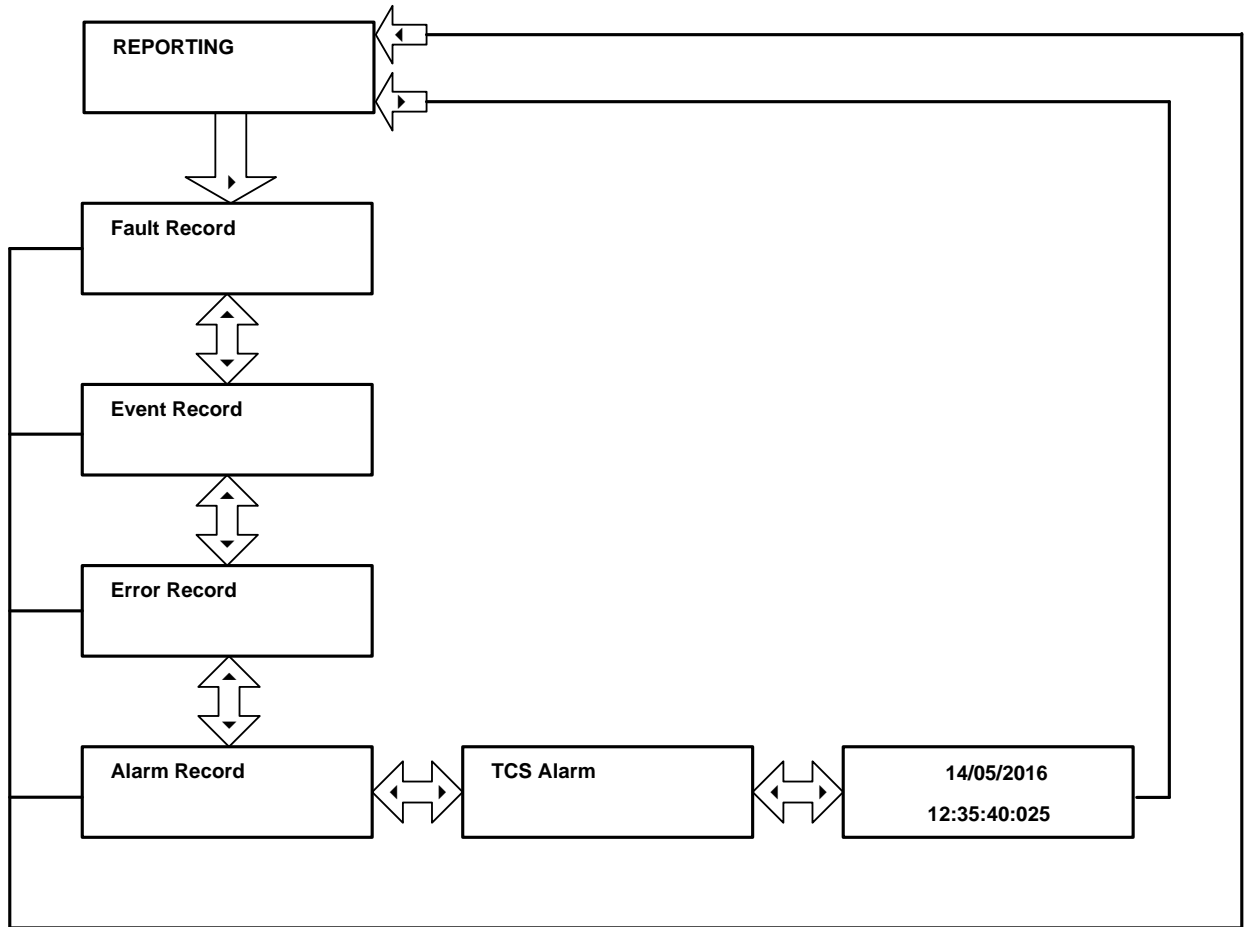
### 9.3.3 To View – Event Records



**9.3.4 To View – Error Records**

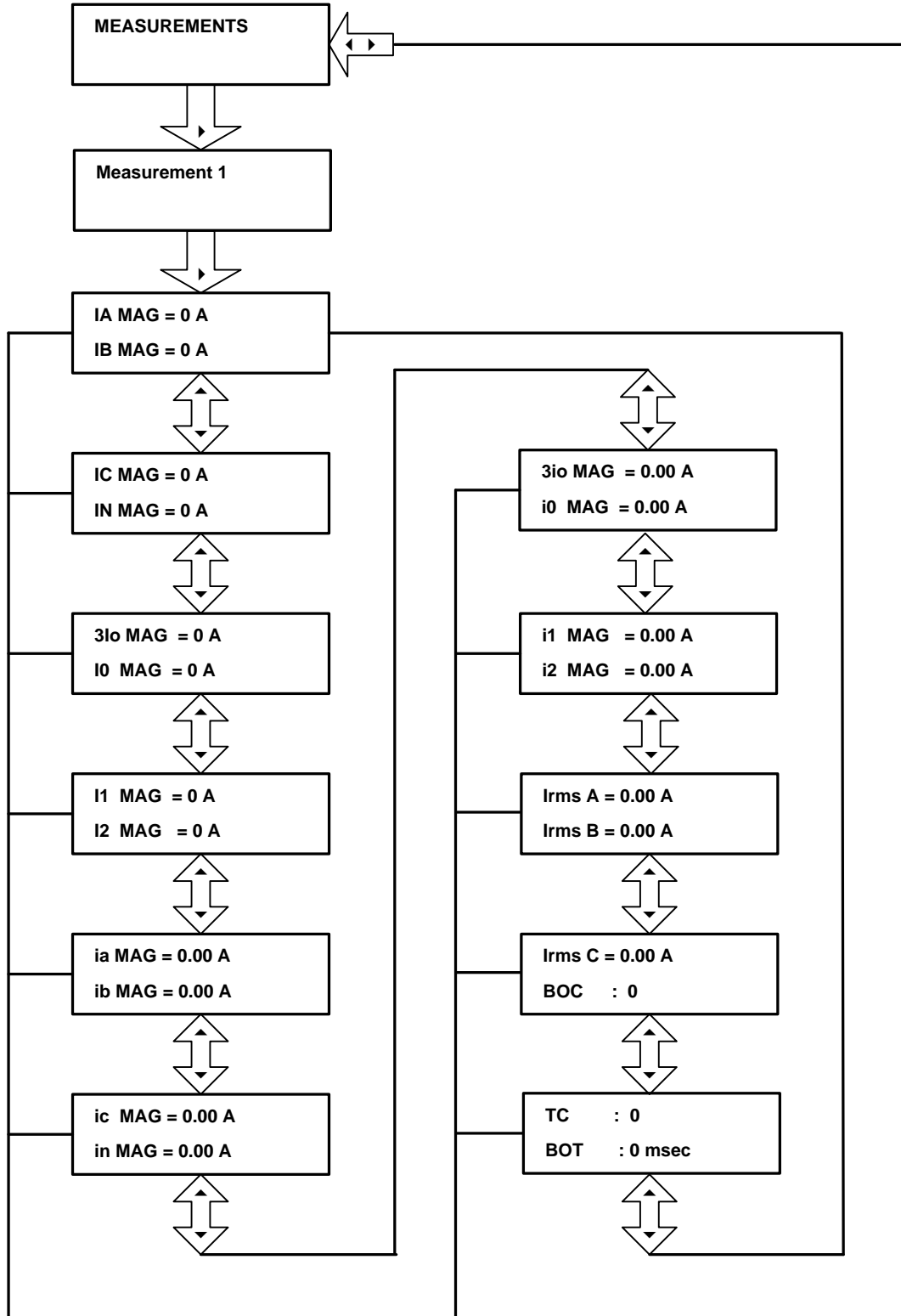


**9.3.5 To View – Alarm Records**



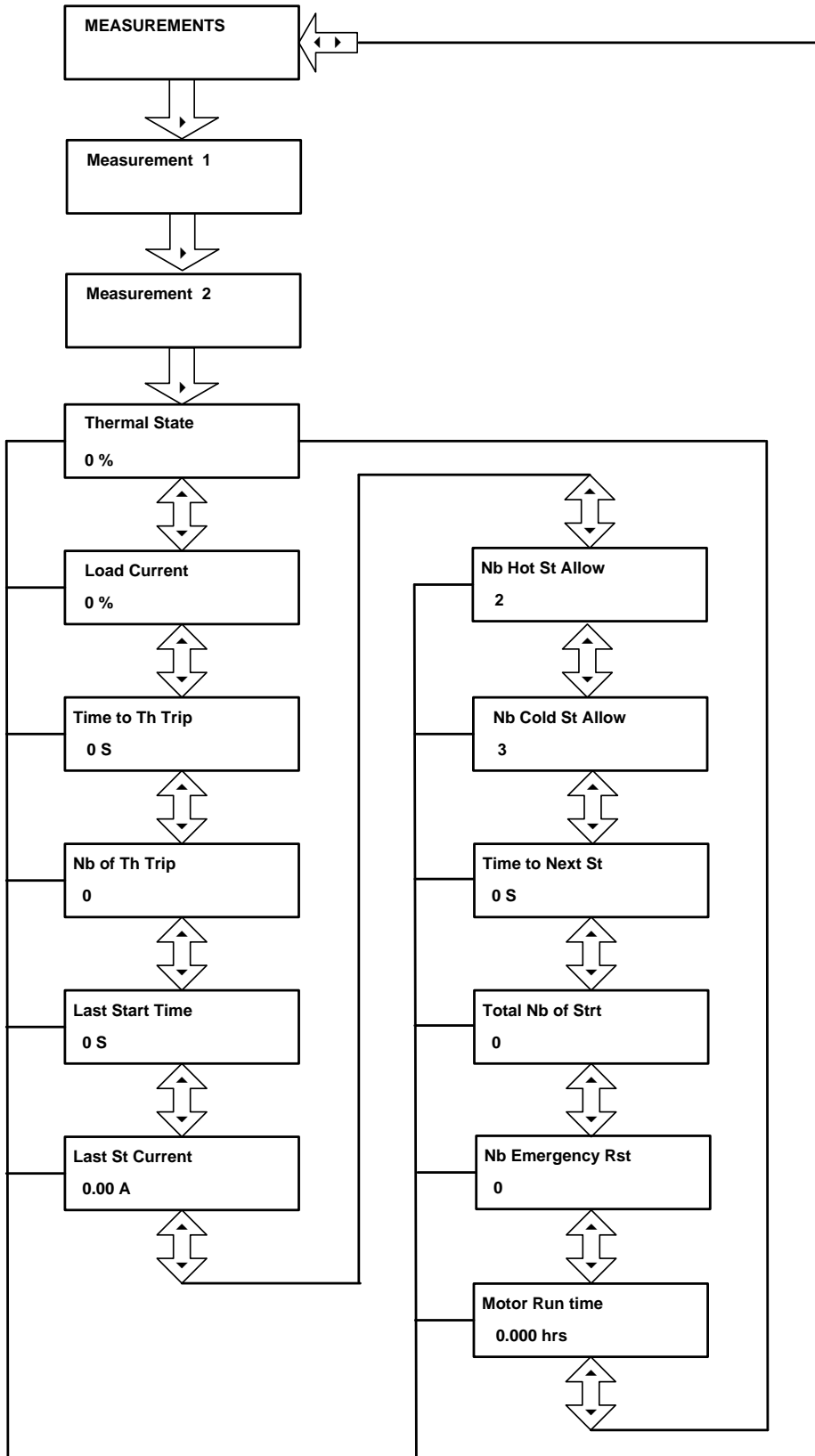
**9.4 Flow Chart – Measurement**

**9.4.1 To View – Measurement 1**



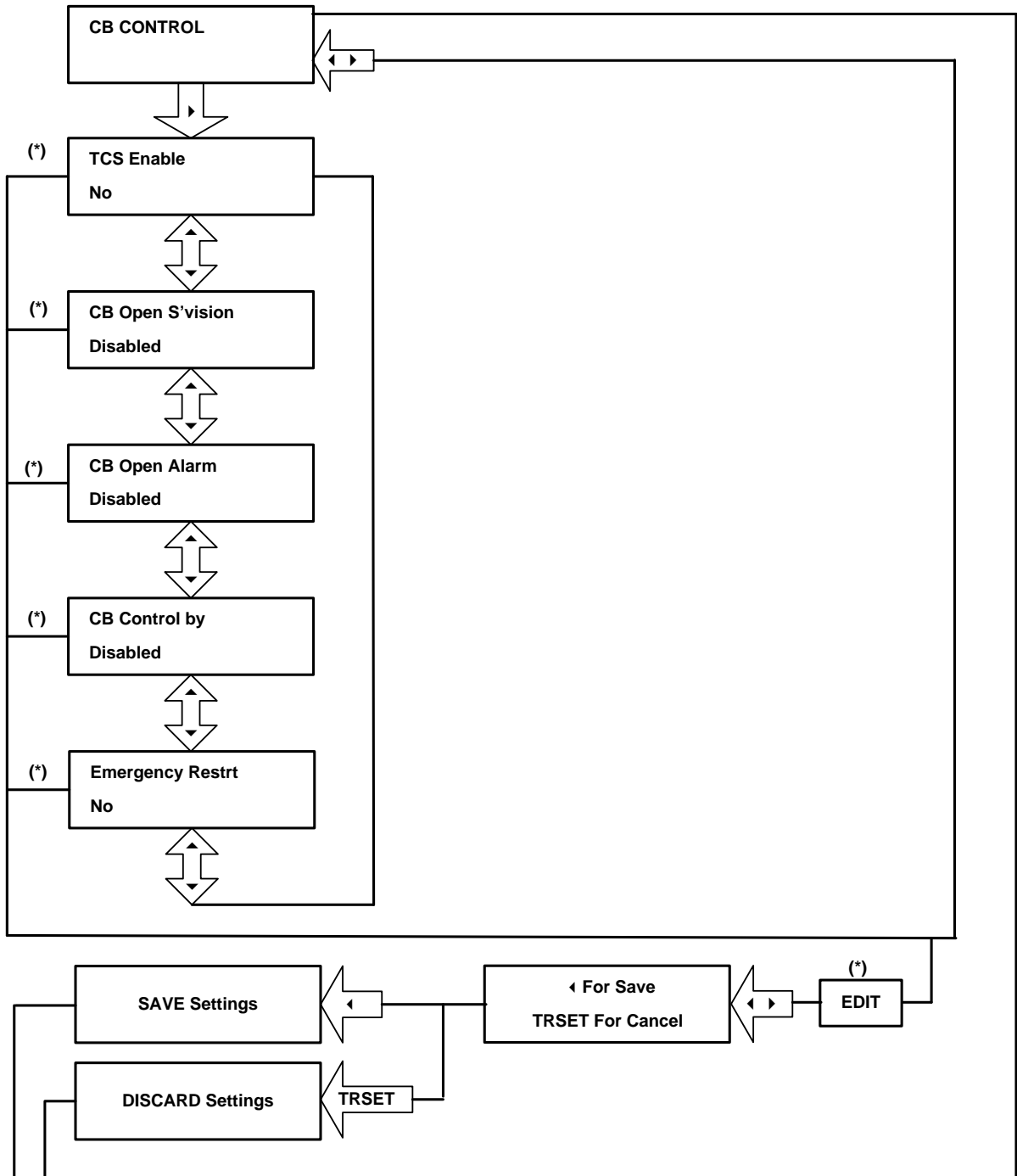


9.4.2 To View – Measurement 2



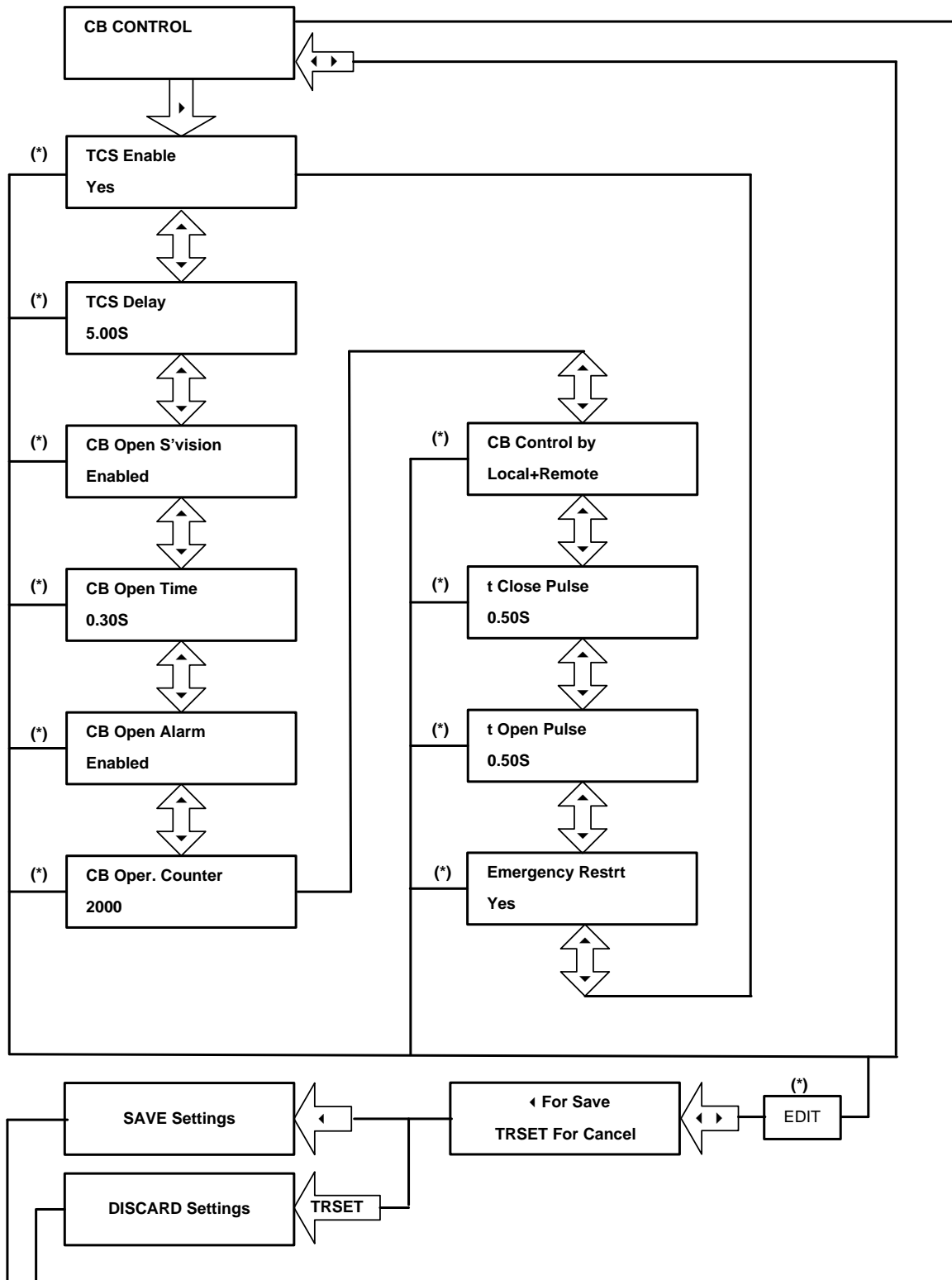
**9.5 Flow Chart – CB CONTROL**

**9.5.1 To View / Set – CB Control (if all settings are disabled)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

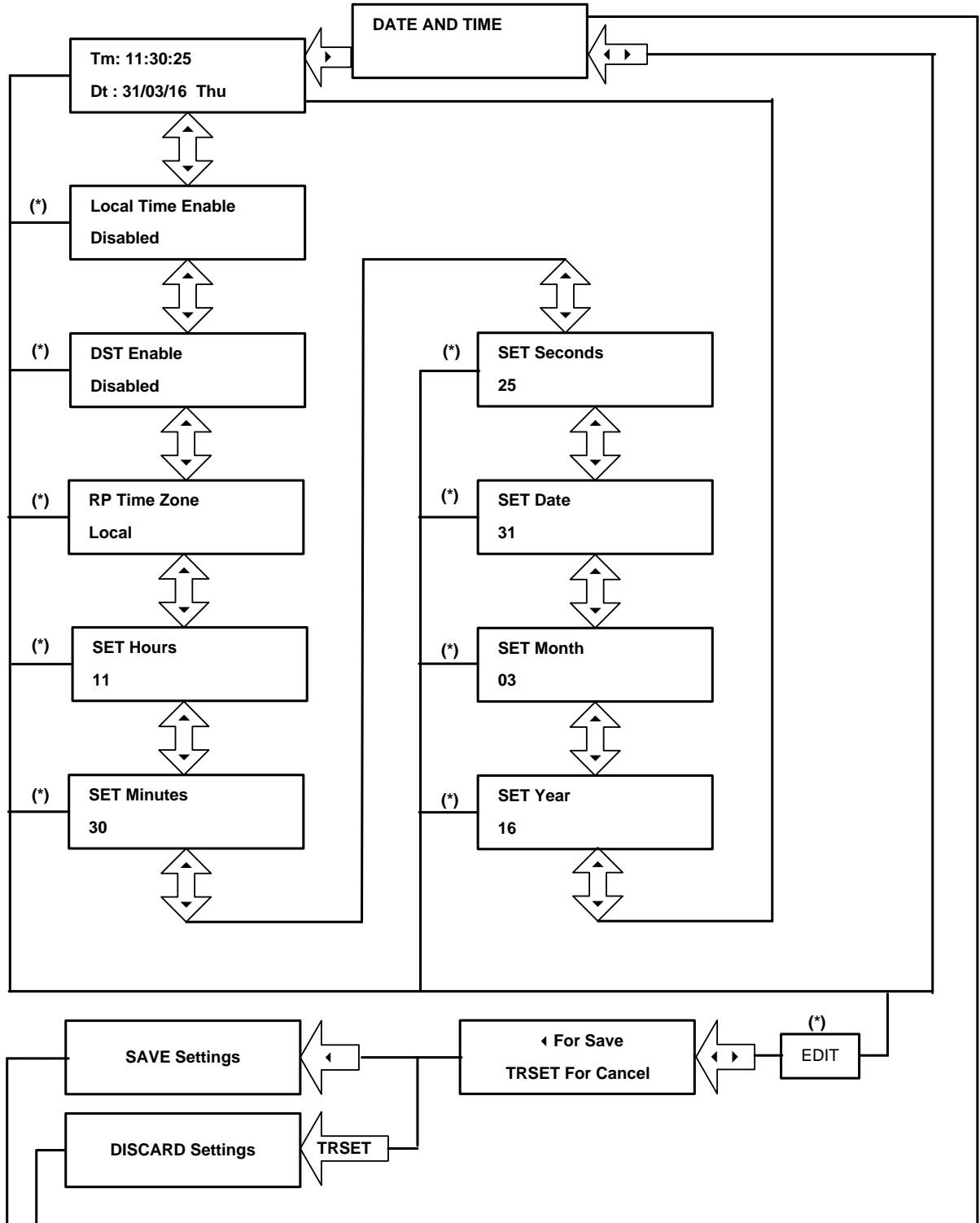
**9.5.2 To View / Set – CB Control (if all settings are enabled)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

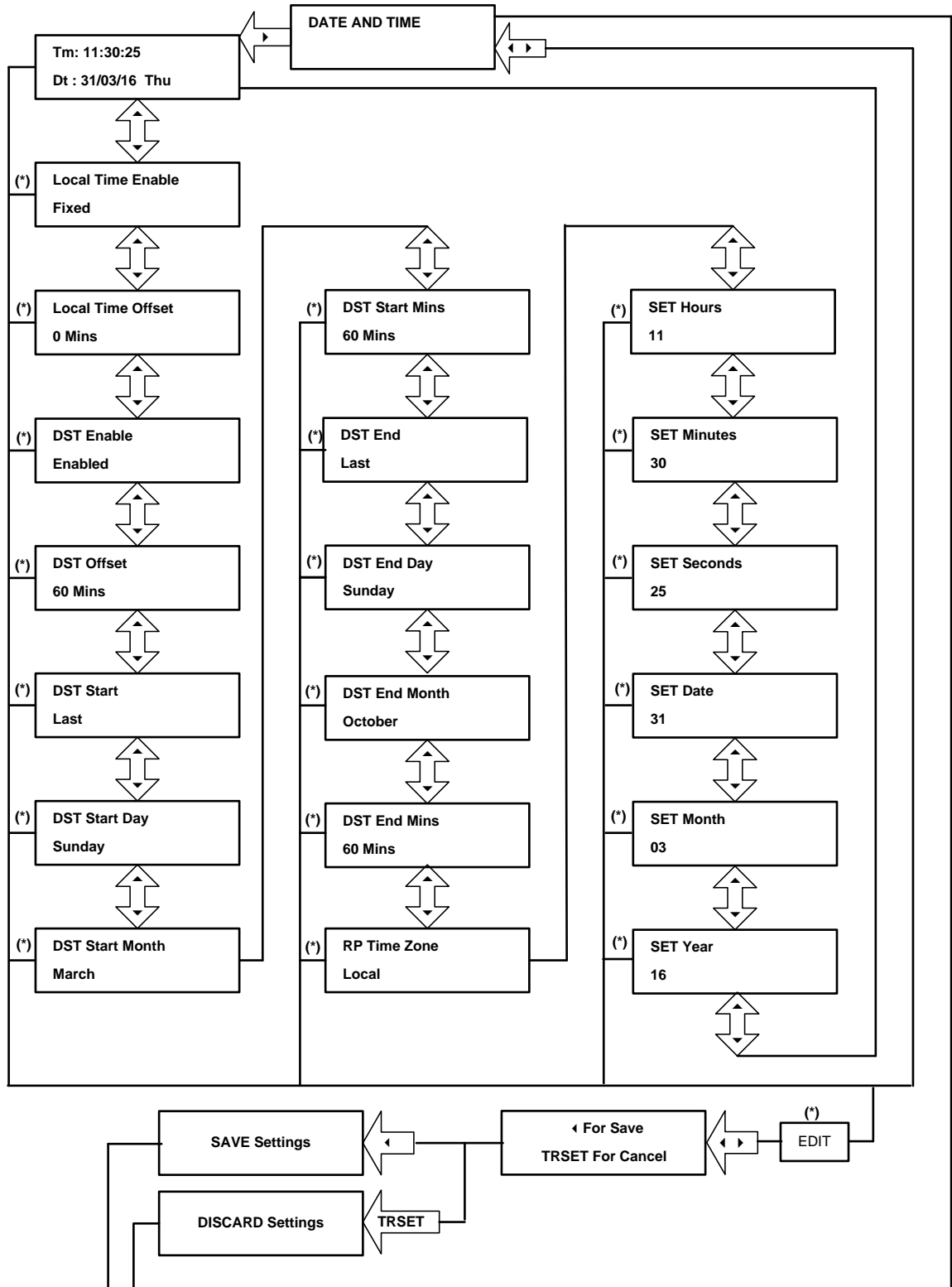
**9.6 Flow Chart – DATE AND TIME**

**9.6.1 To View / Set – Date and Time. (If all settings are disabled)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

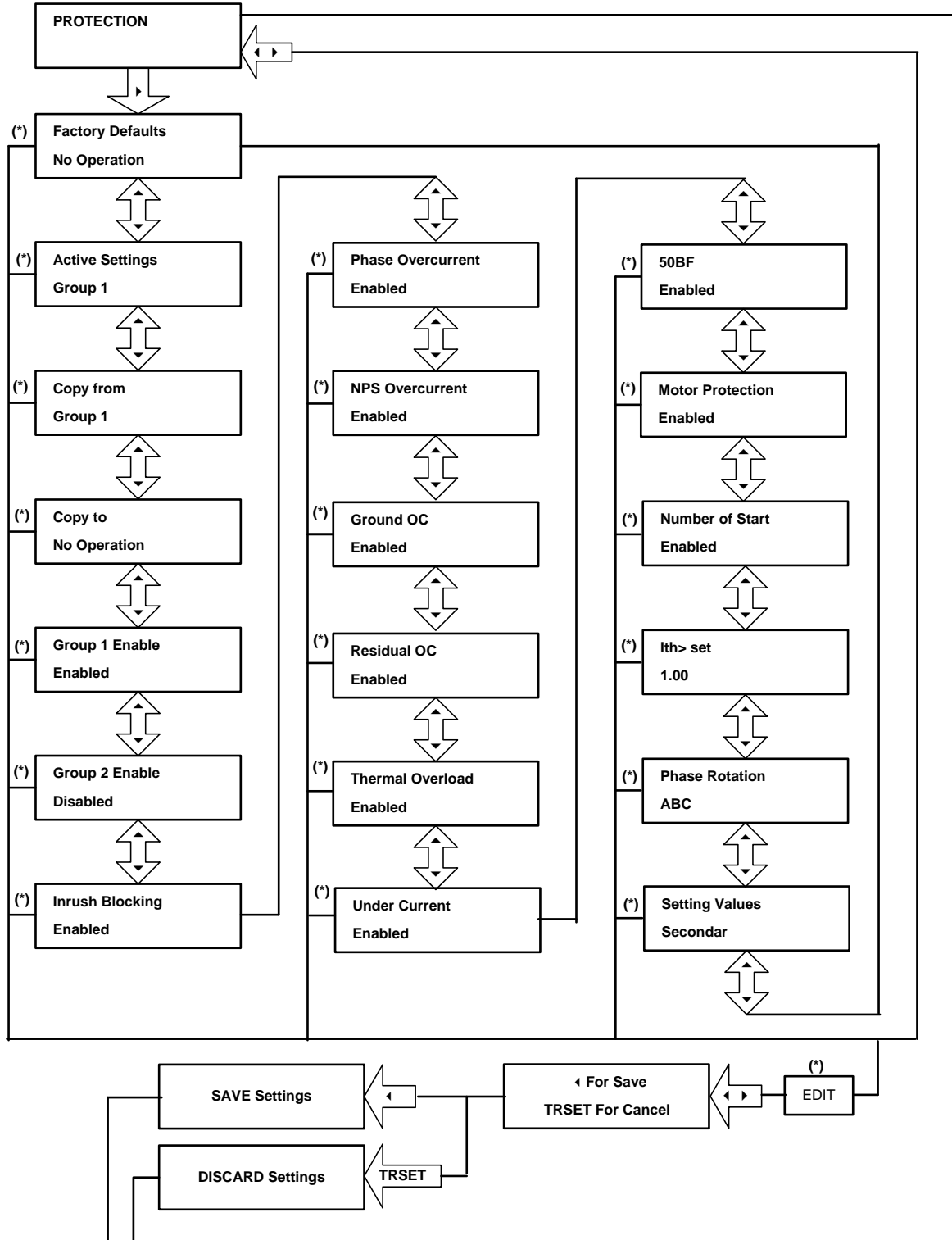
**9.6.2 To View / Set – Date and Time. (If the settings are enabled)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

**9.7 Flow Chart – Protections**

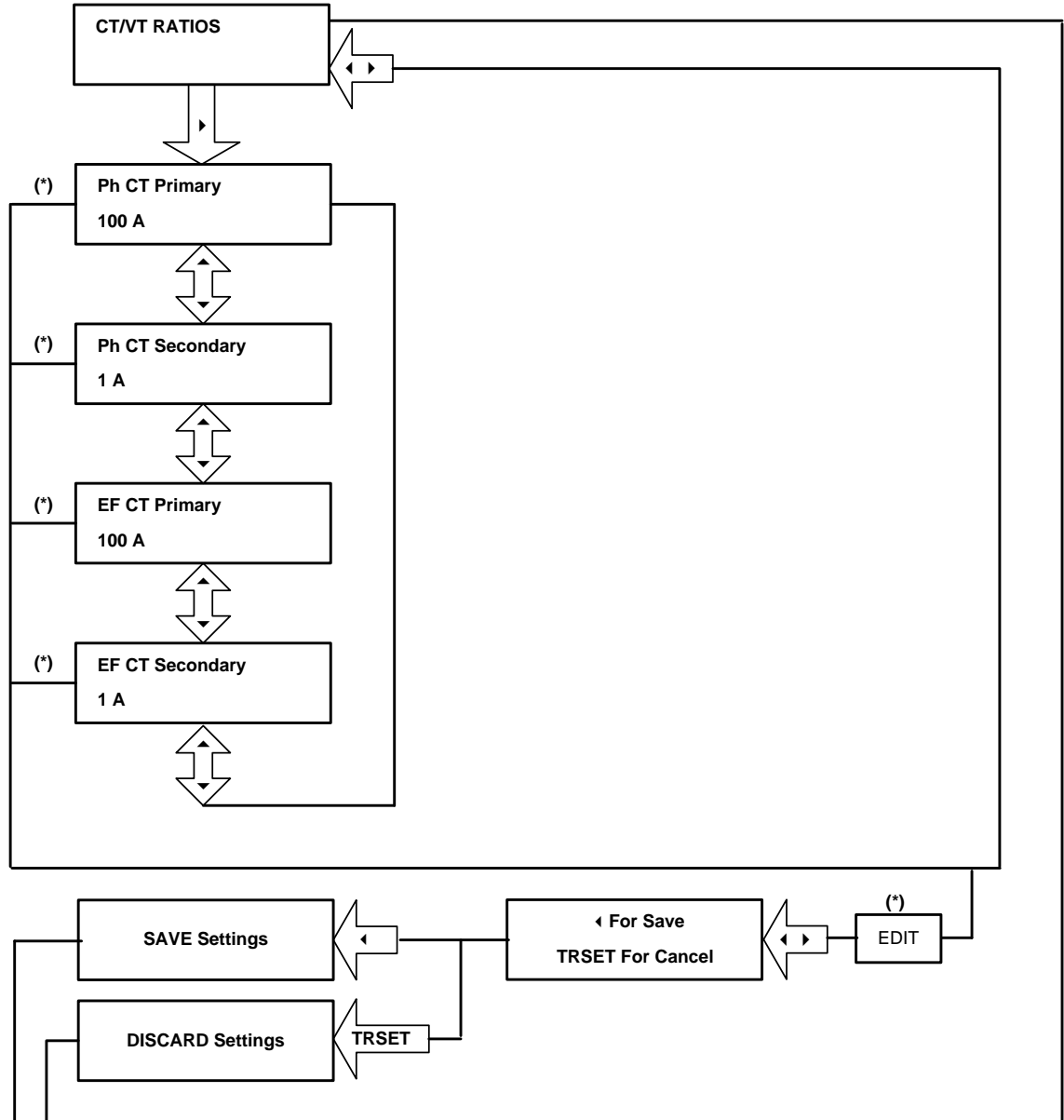
**9.7.1 To View / Set – Protection**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

**9.8 Flow Chart – CT/VT RATIOS**

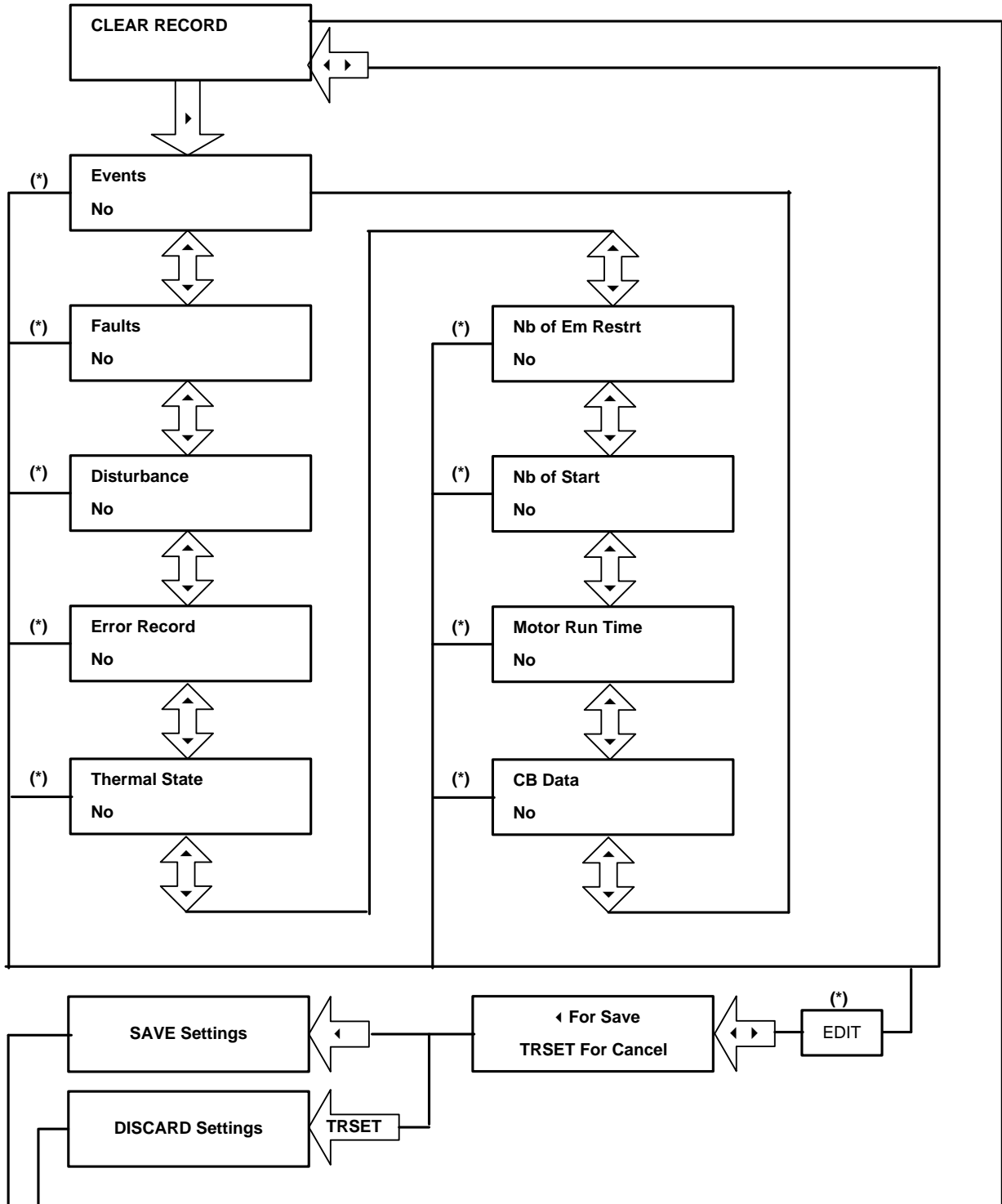
**9.8.1 To View / Set – CT/VT Ratios**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

**9.9 Flow Chart – CLEAR RECORDS**

**9.9.1 To View / Set – Clear Records**

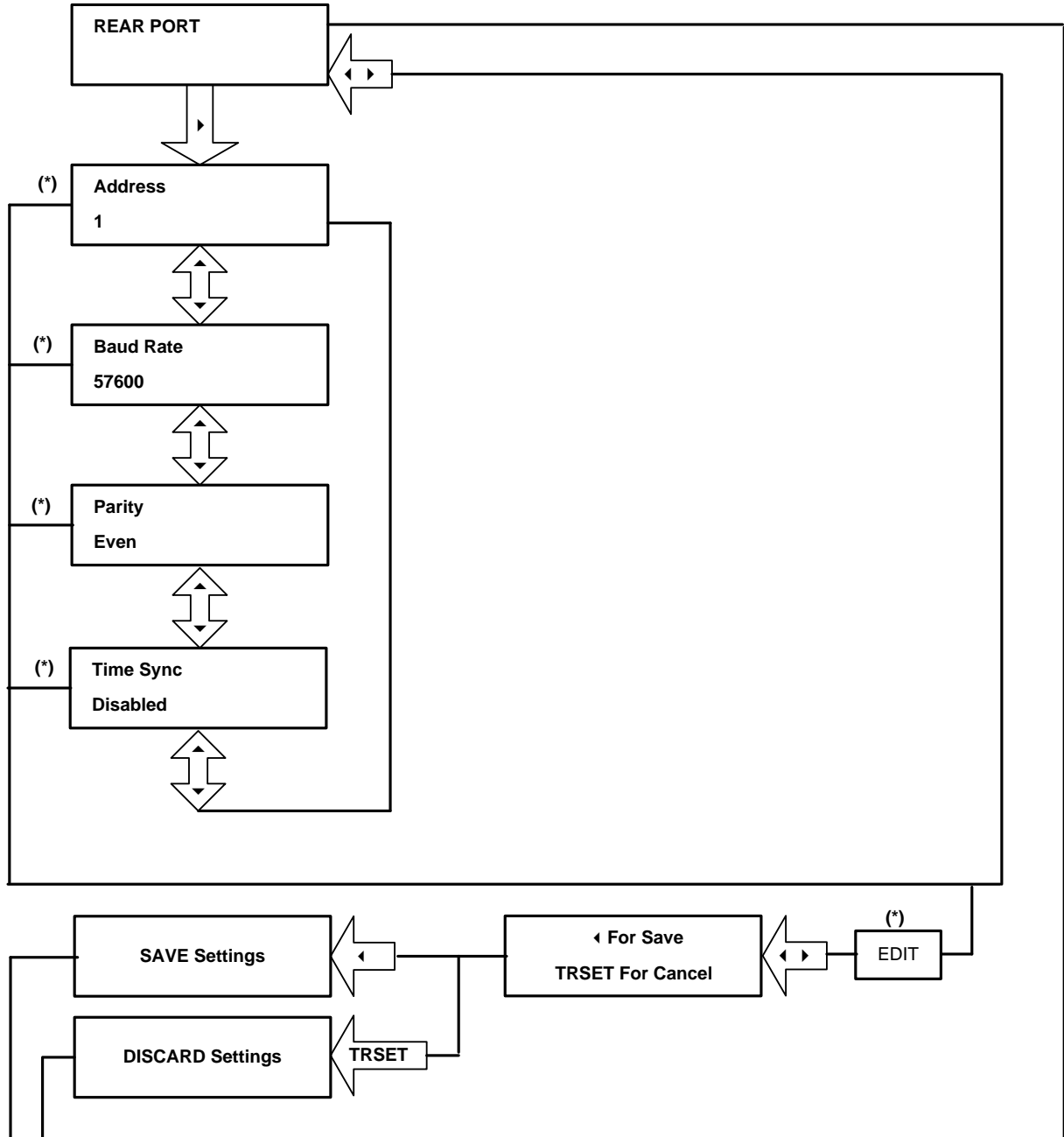


Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.



**9.10 Flow Chart – REAR PORT**

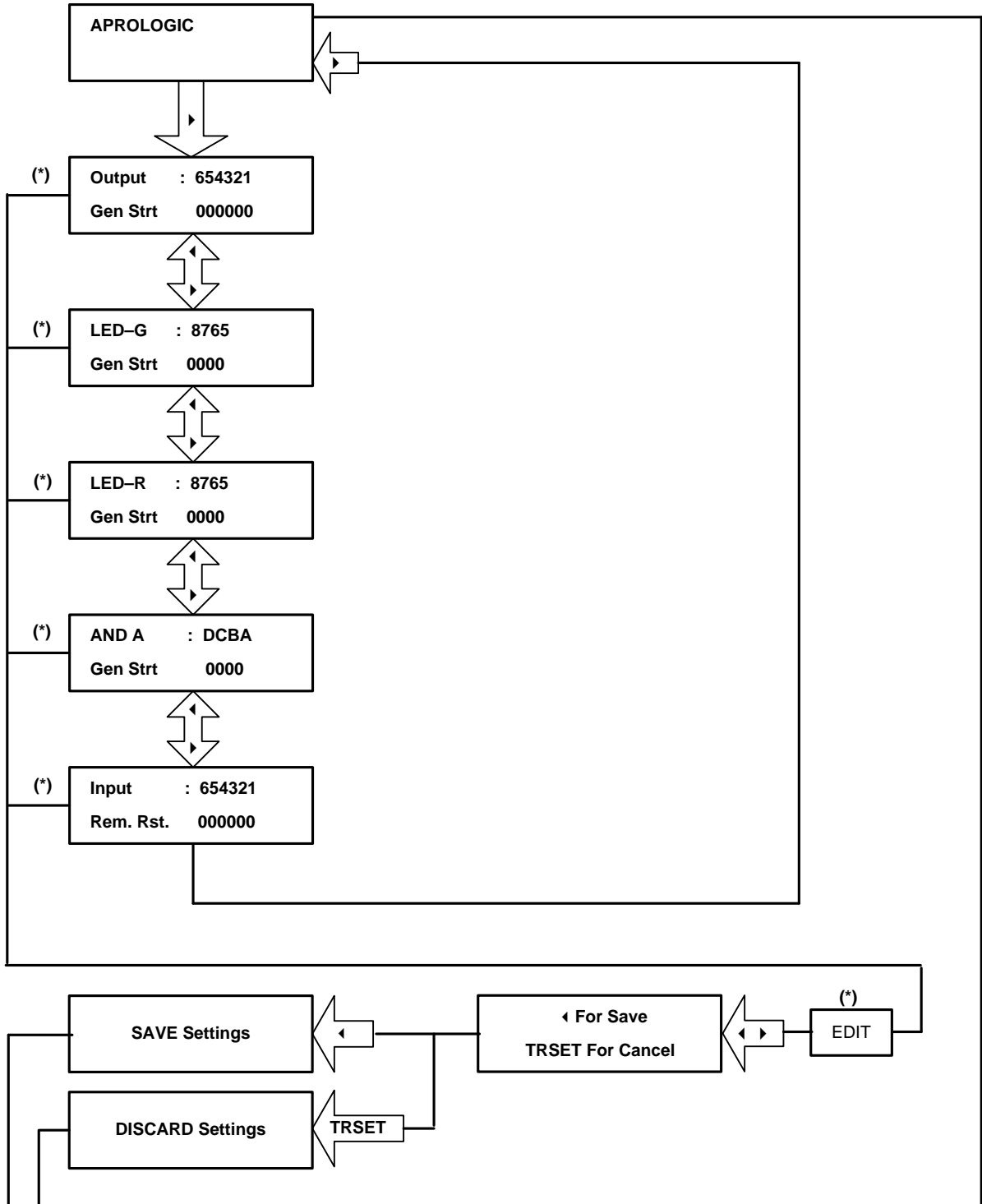
**9.10.1 To View / Set – Rear Port**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

**9.11 Flow Chart – APROLOGIC**

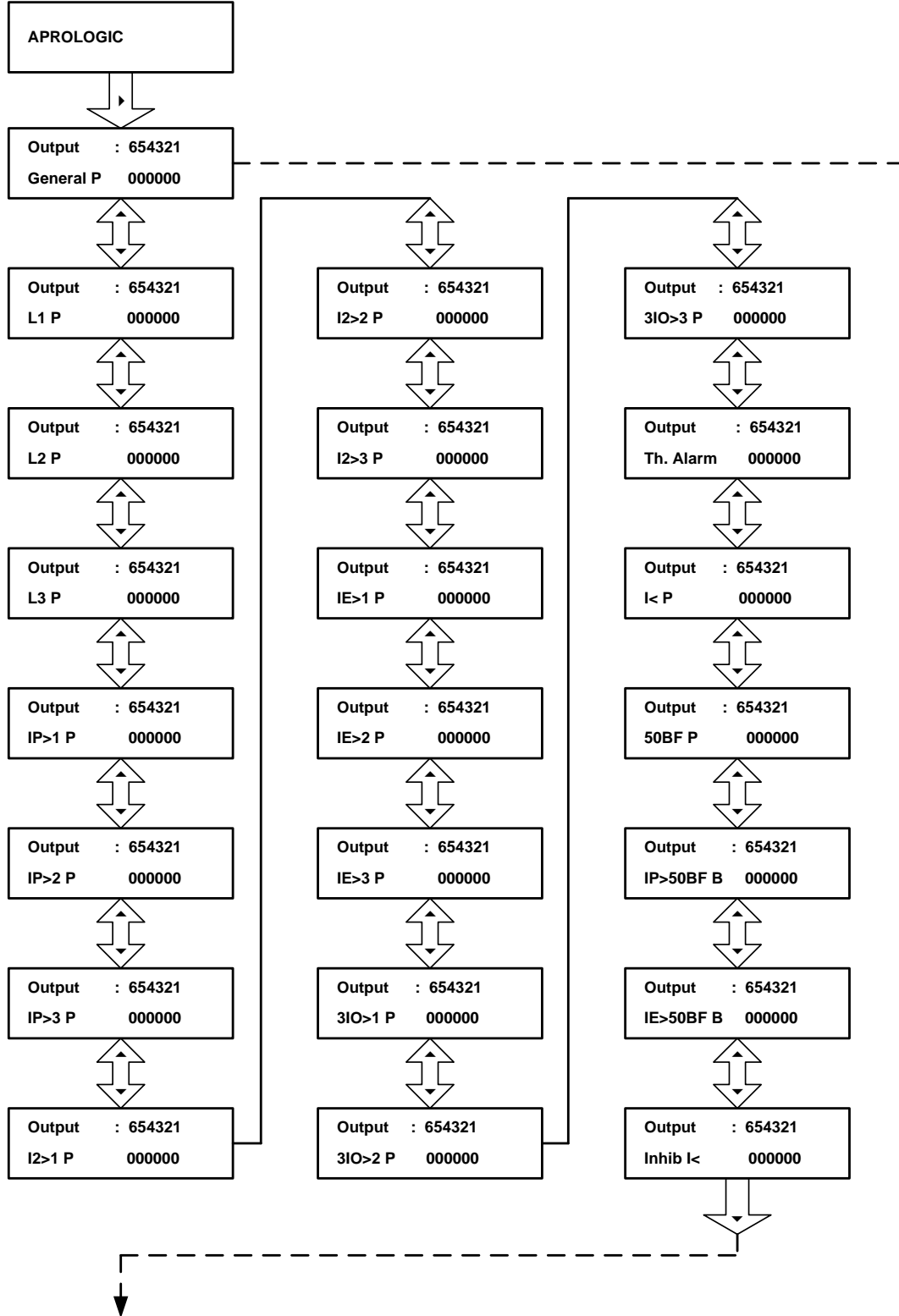
**9.11.1 To View / Set – AProLogic**

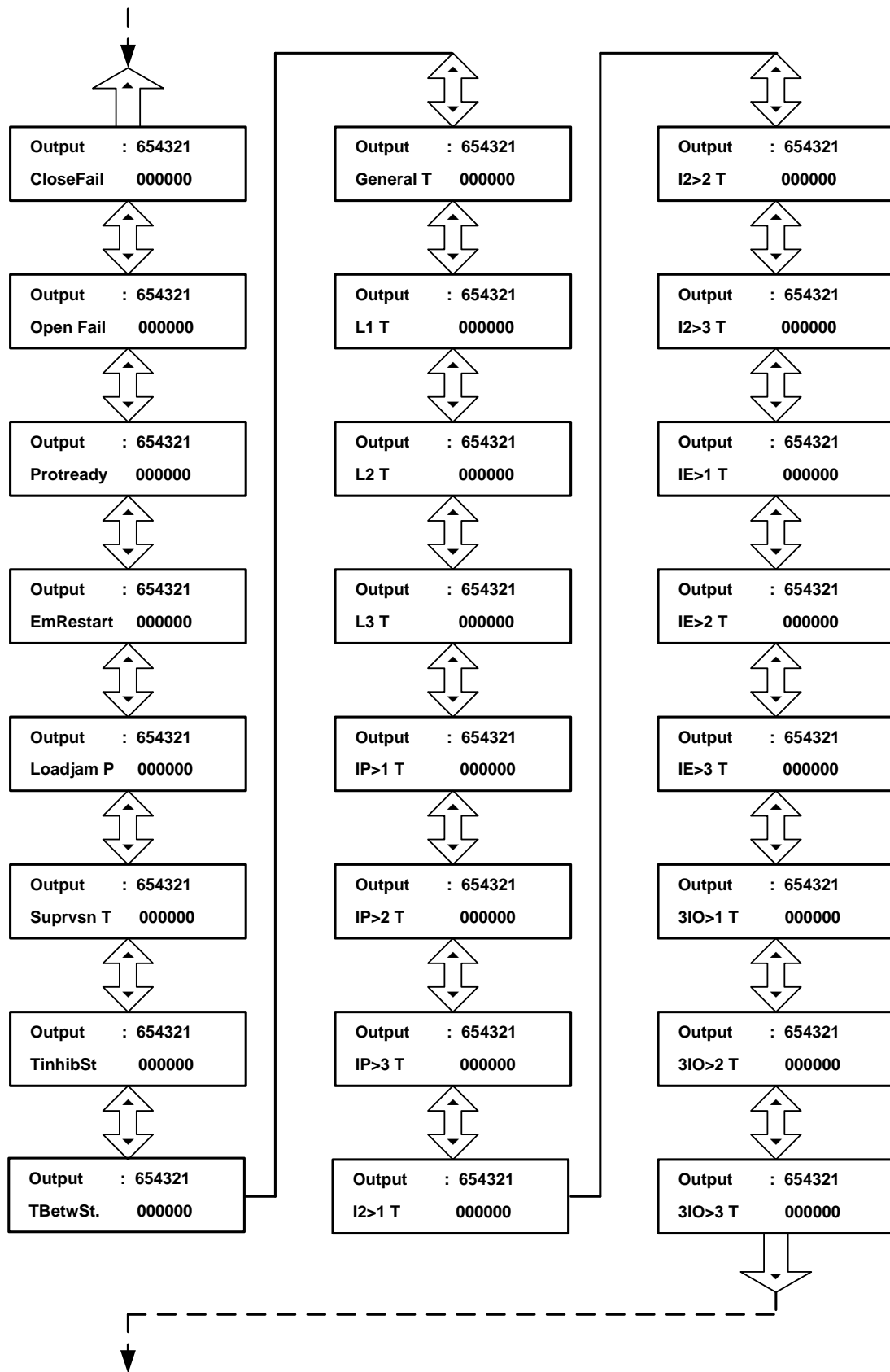


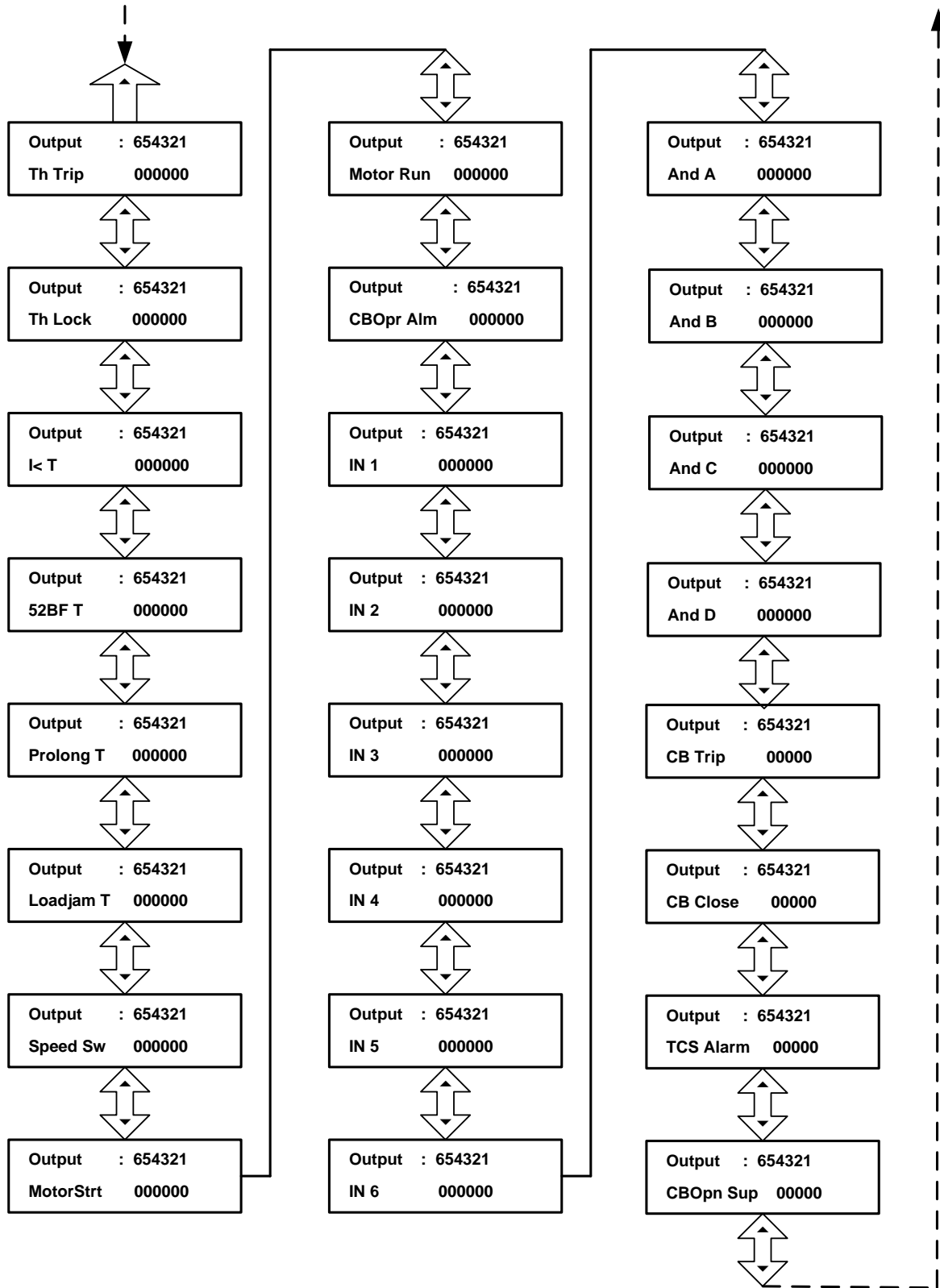
*Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.*

**9.11.1.1 To View / Set – Sub menus of IO Configuration**

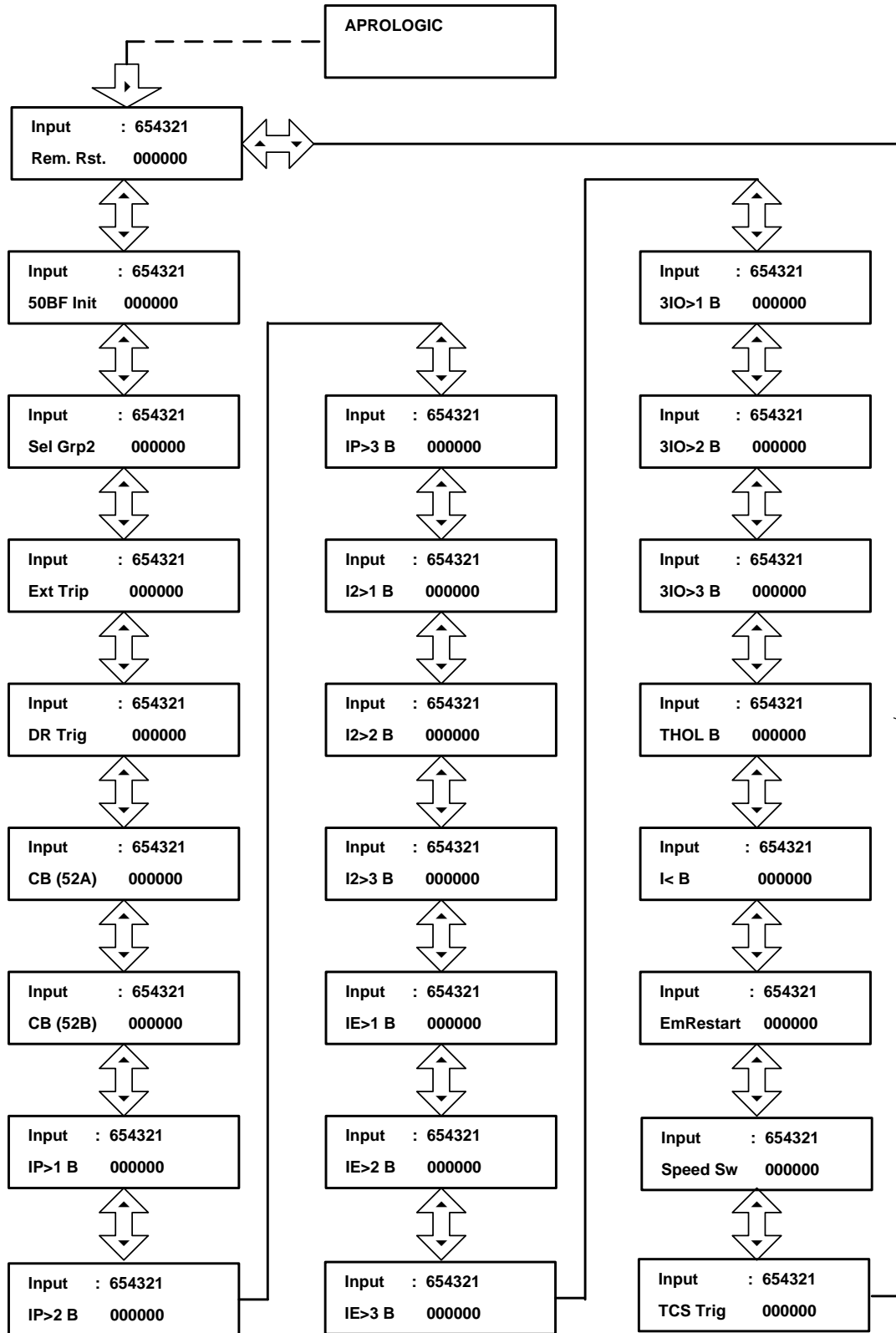
(i.e. Relays, LEDs Green, LEDs Red and AND LOGIC.)





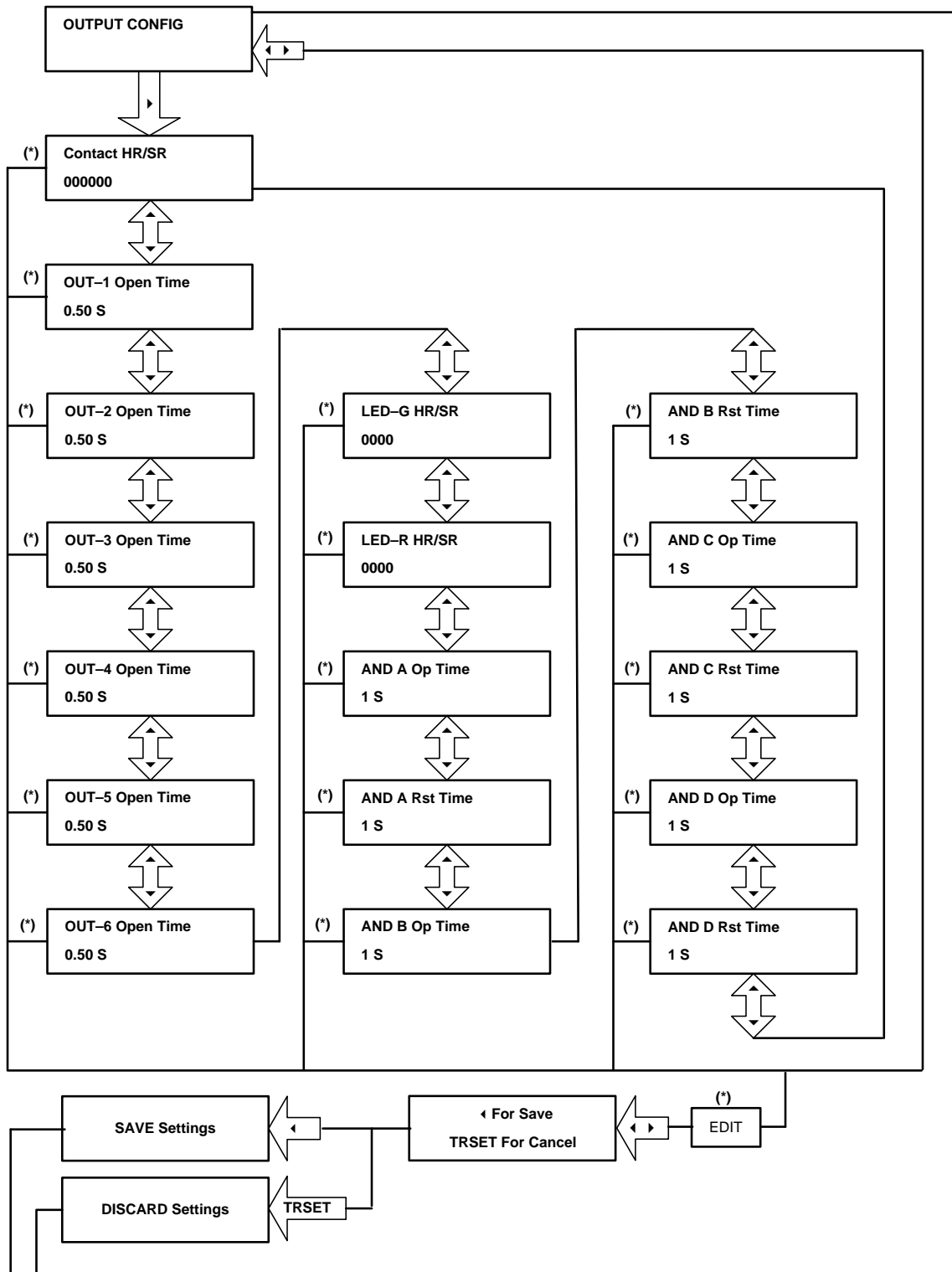


**9.11.1.2 To View / Set – Sub menus of IO Configuration**  
(i.e. Inputs)



## 9.12 Flow Chart – OUTPUT CONFIGURATION

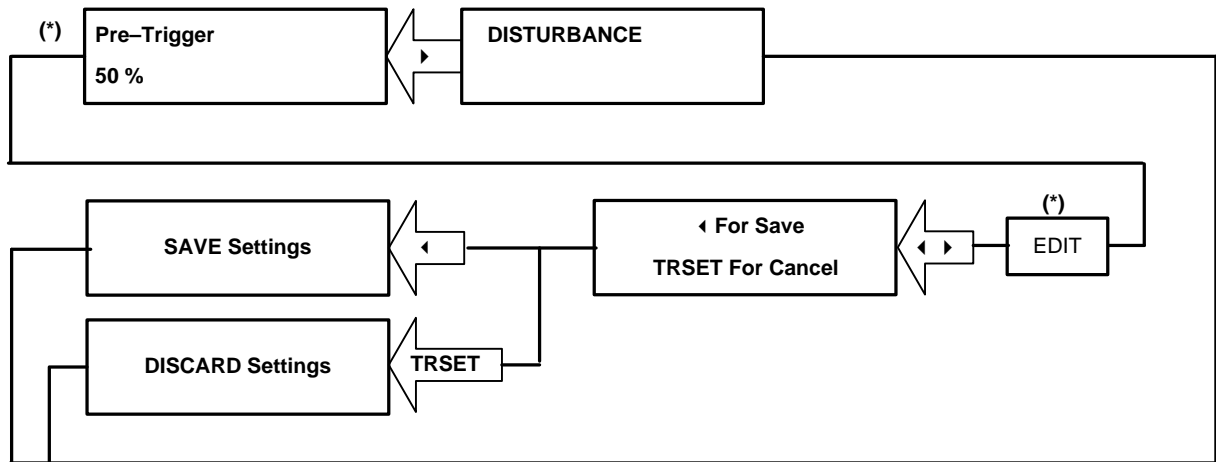
### 9.12.1 To View / Set – Output Configuration



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

**9.13 Flow Chart – DISTURBANCE RECORD**

**9.13.1 To View / Set – Disturbance Record**

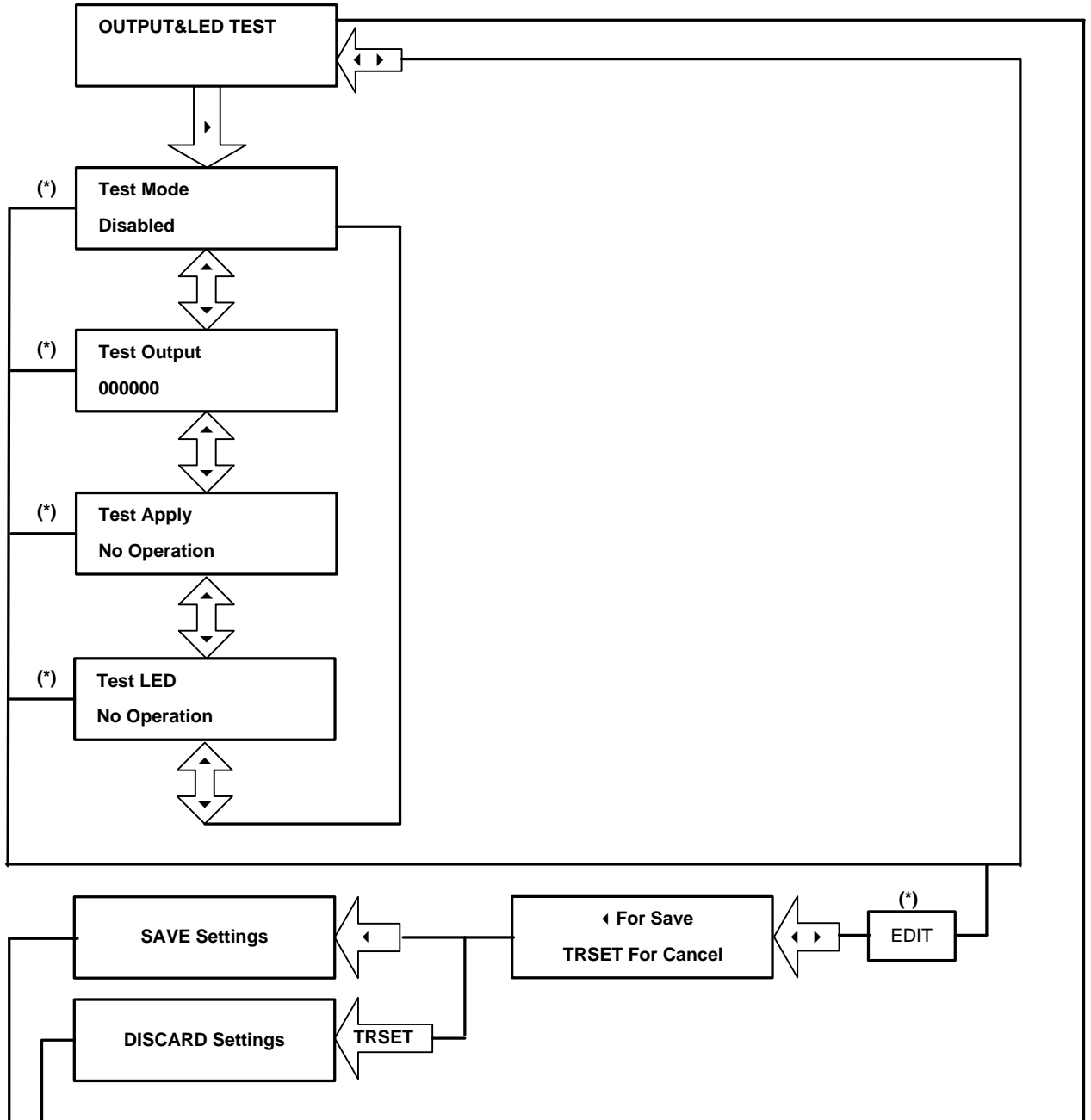


*Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.*



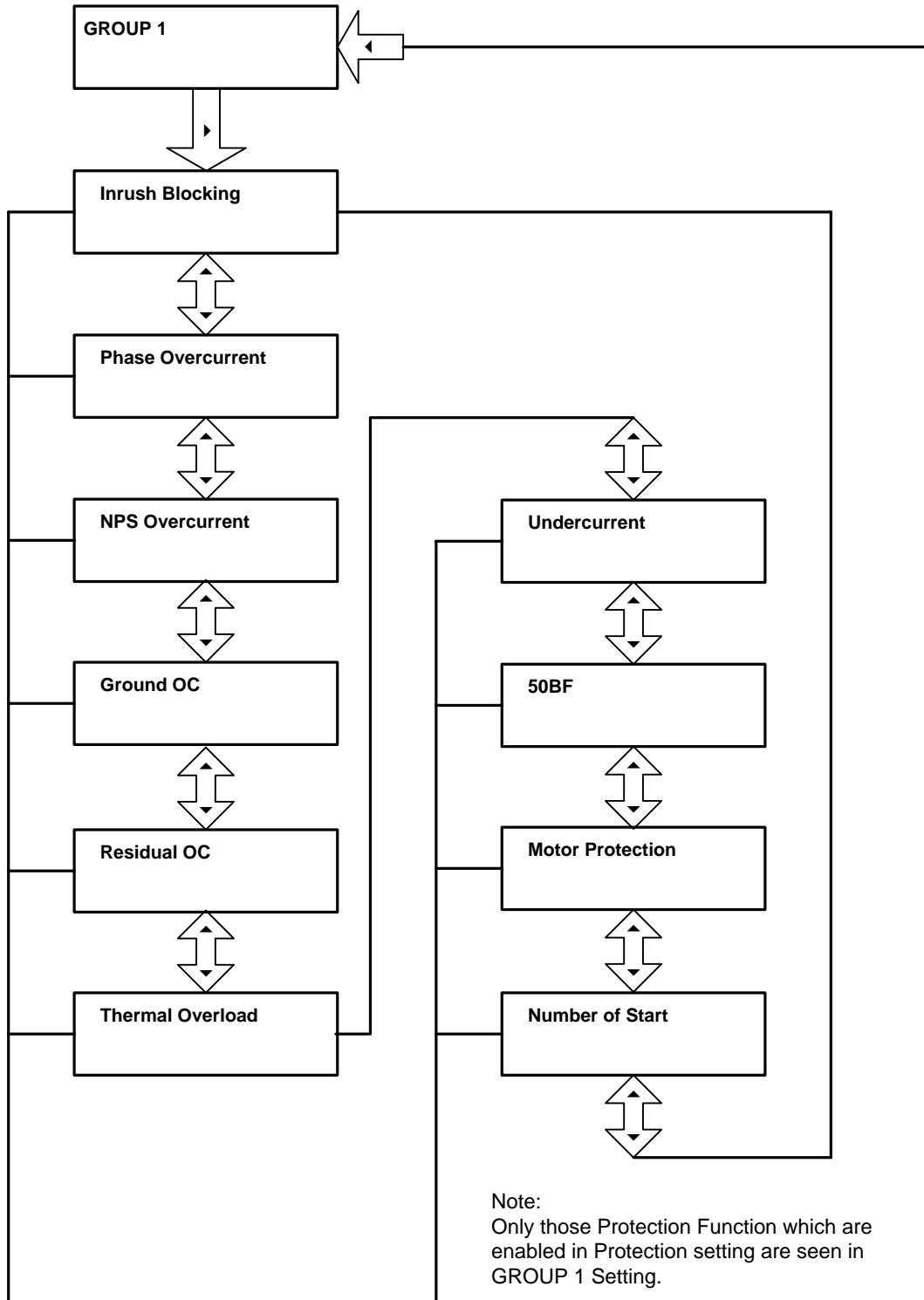
**9.14 Flow Chart – OUTPUT & LED TEST**

**9.14.1 To View / To Set – Output & LED Test**



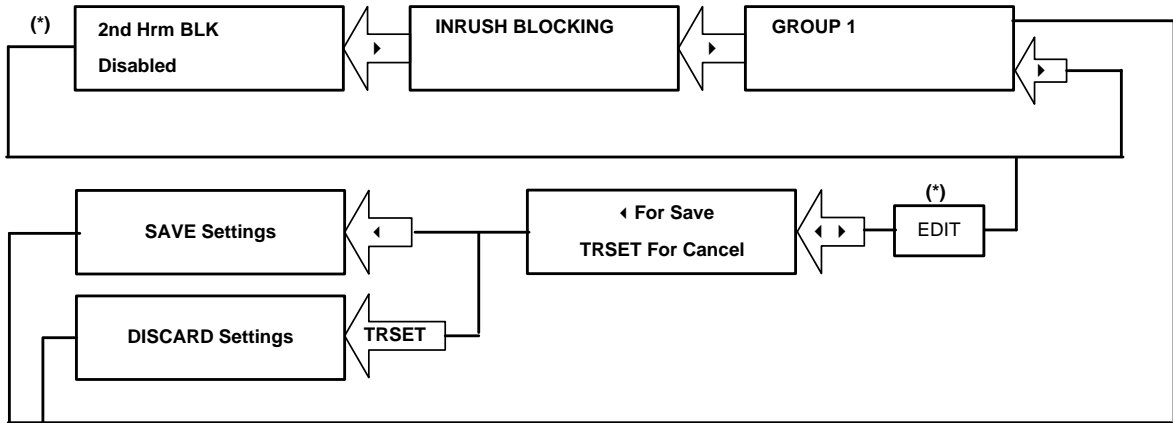
Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

**9.15 Flow Chart – GROUP 1**

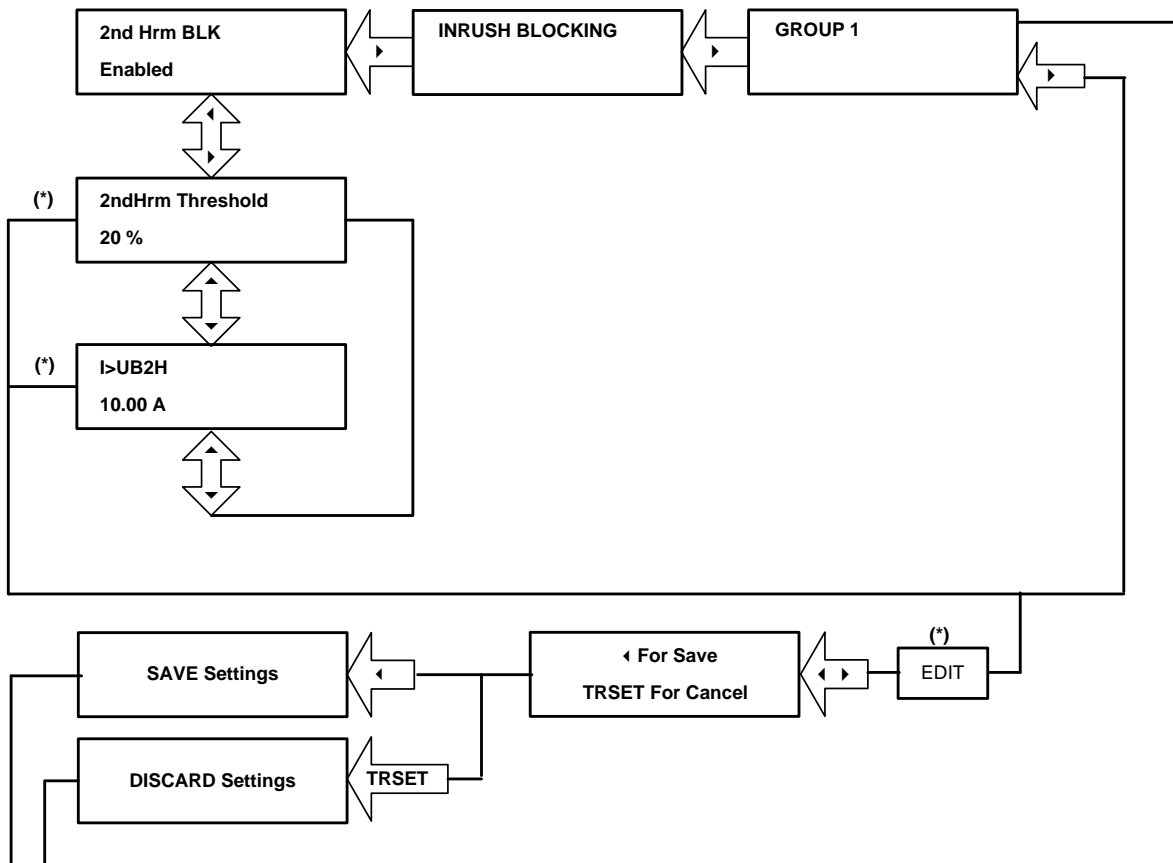


**9.15.1 Flow Chart – INRUSH BLOCKING (Group 1) Setting**

**9.15.1.1 To View / Set – Inrush Blocking (If the Setting is Disabled)**



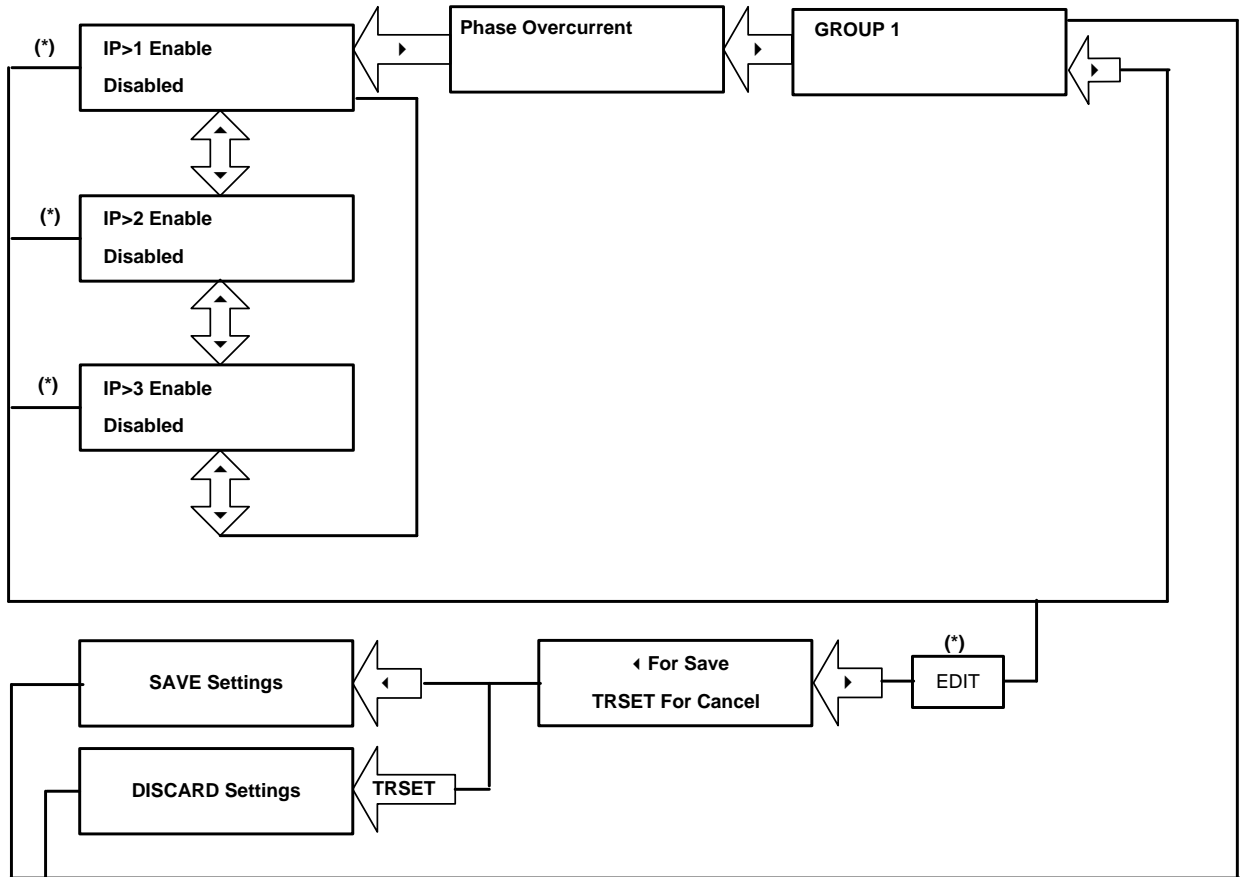
**9.15.1.2 To View / Set – Inrush Blocking (If the Setting is Enabled)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

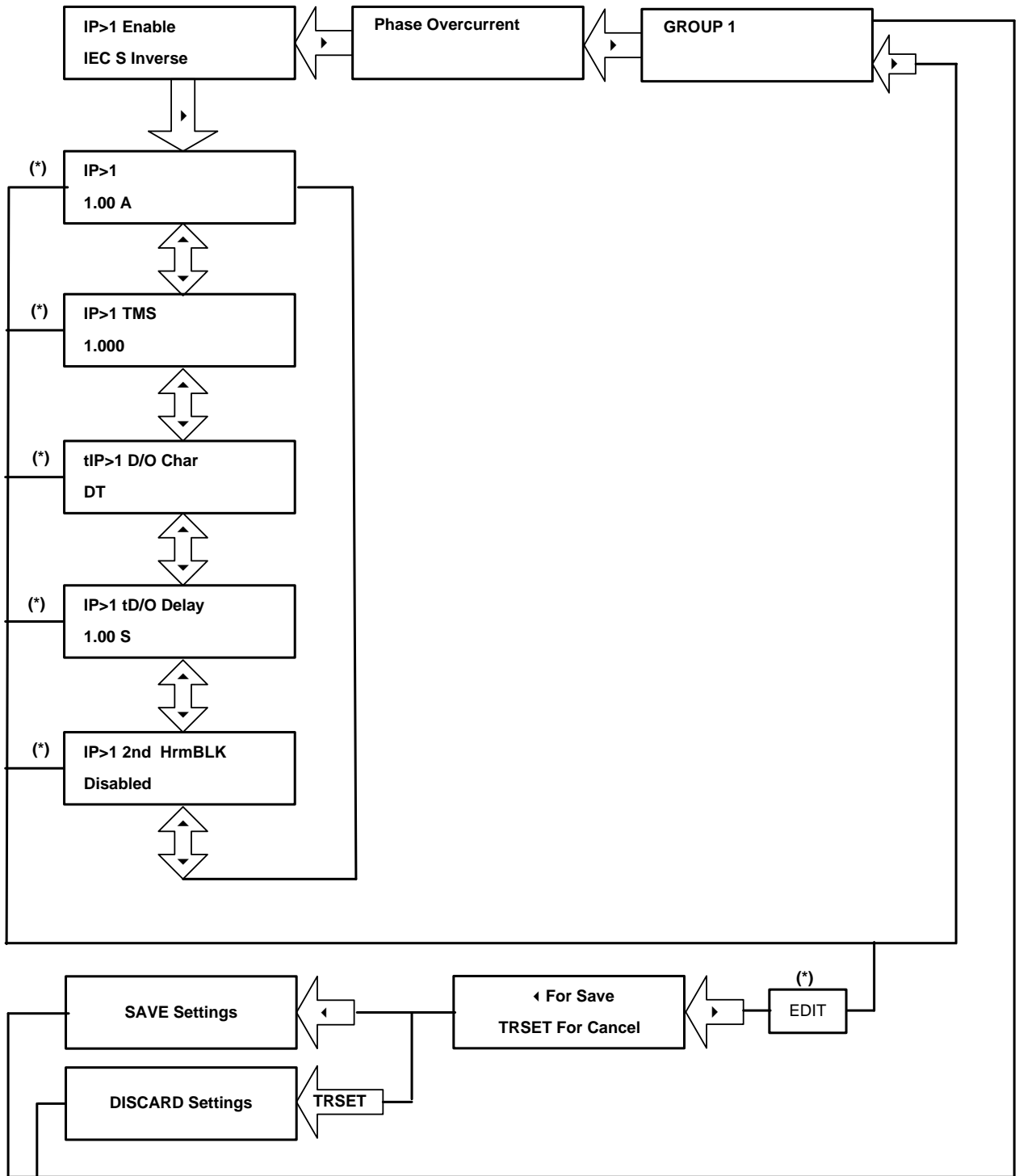
**9.15.2 Flow Chart – PHASE OVERCURRENT (Group 1) Setting**

**9.15.2.1 To View / Set – Phase Overcurrent (If the setting are Disabled)**



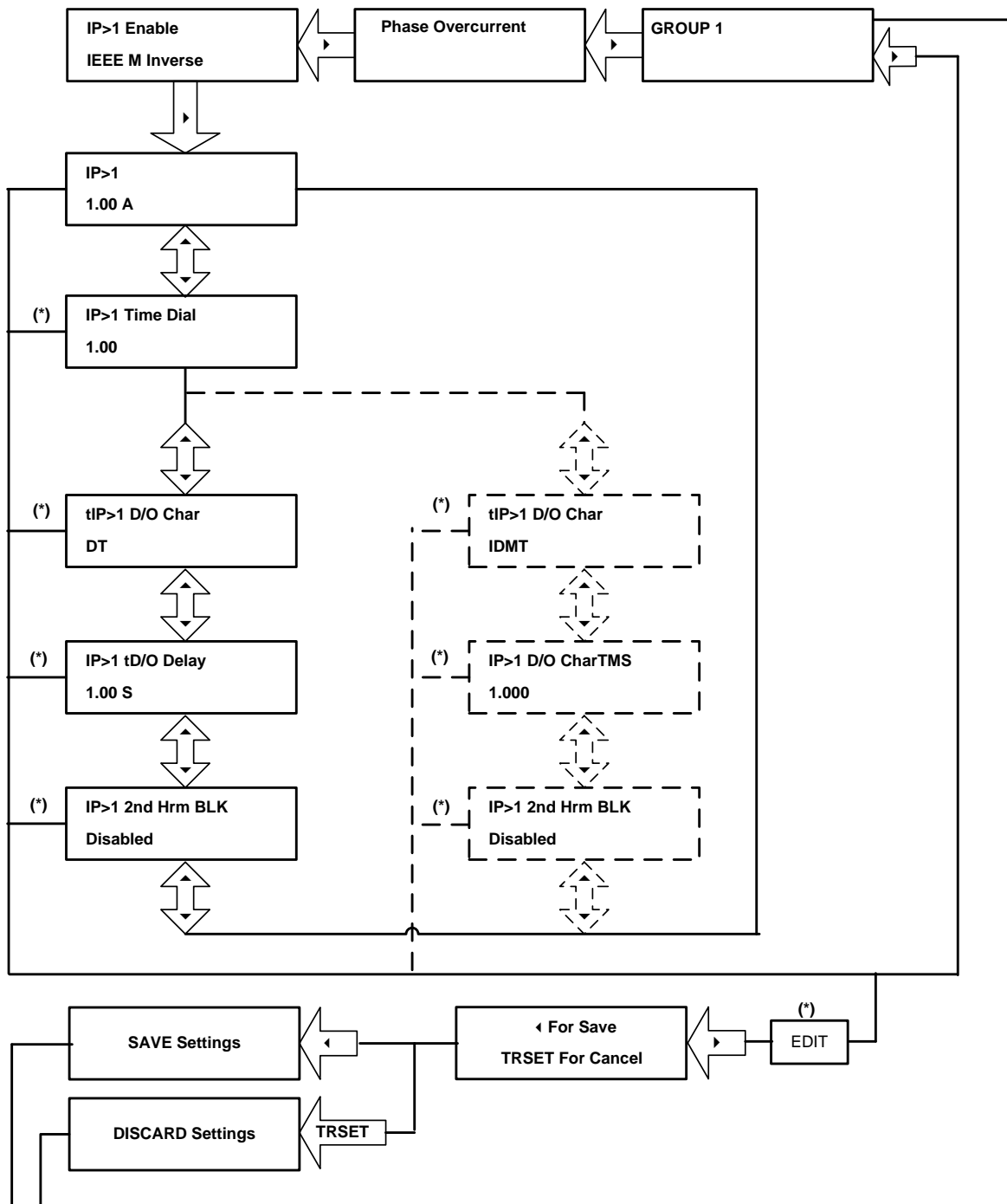
*Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.*

**9.15.2.2 To View / Set – Phase Overcurrent (For all IEC Curves)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

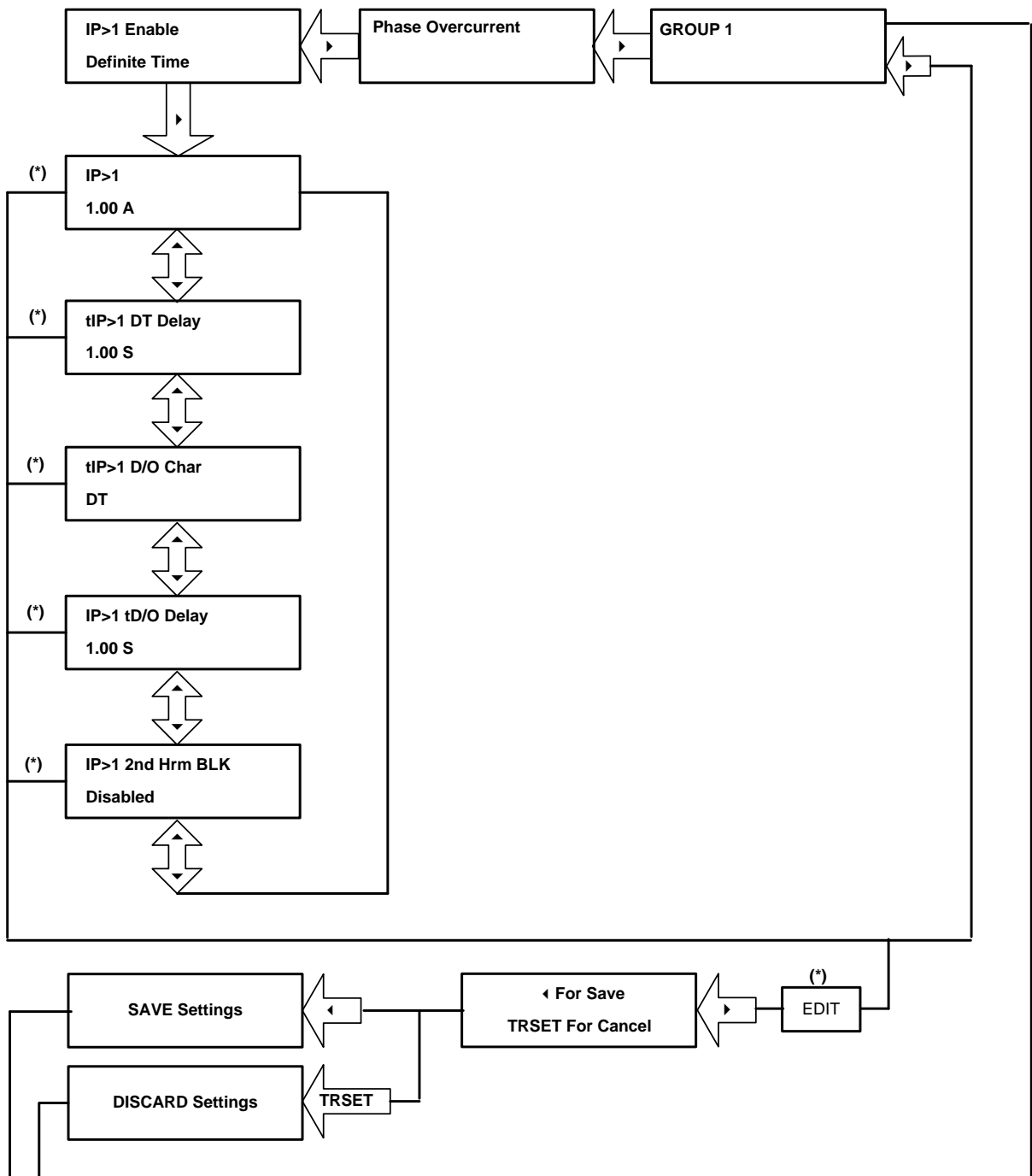
**9.15.2.3 To View / Set – Phase Overcurrent (For all IEEE Curves)**



*Note : The display windows shown in dashed lines will be seen if the tRESET Function is selected as IDMT.*

*Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.*

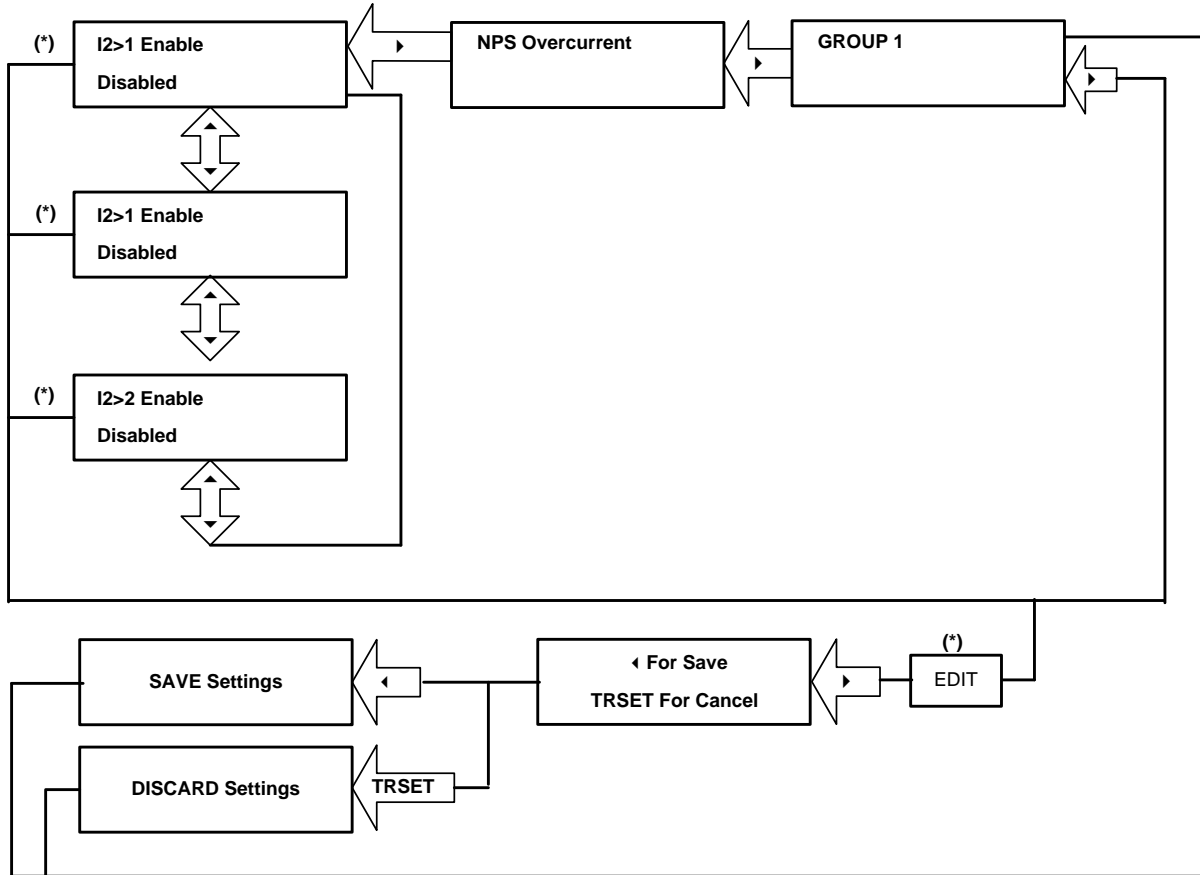
**9.15.2.4 To View / Set – Phase Overcurrent (For Definite Time)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

**9.15.3 Flow Chart – NPS OVERCURRENT SETTING**

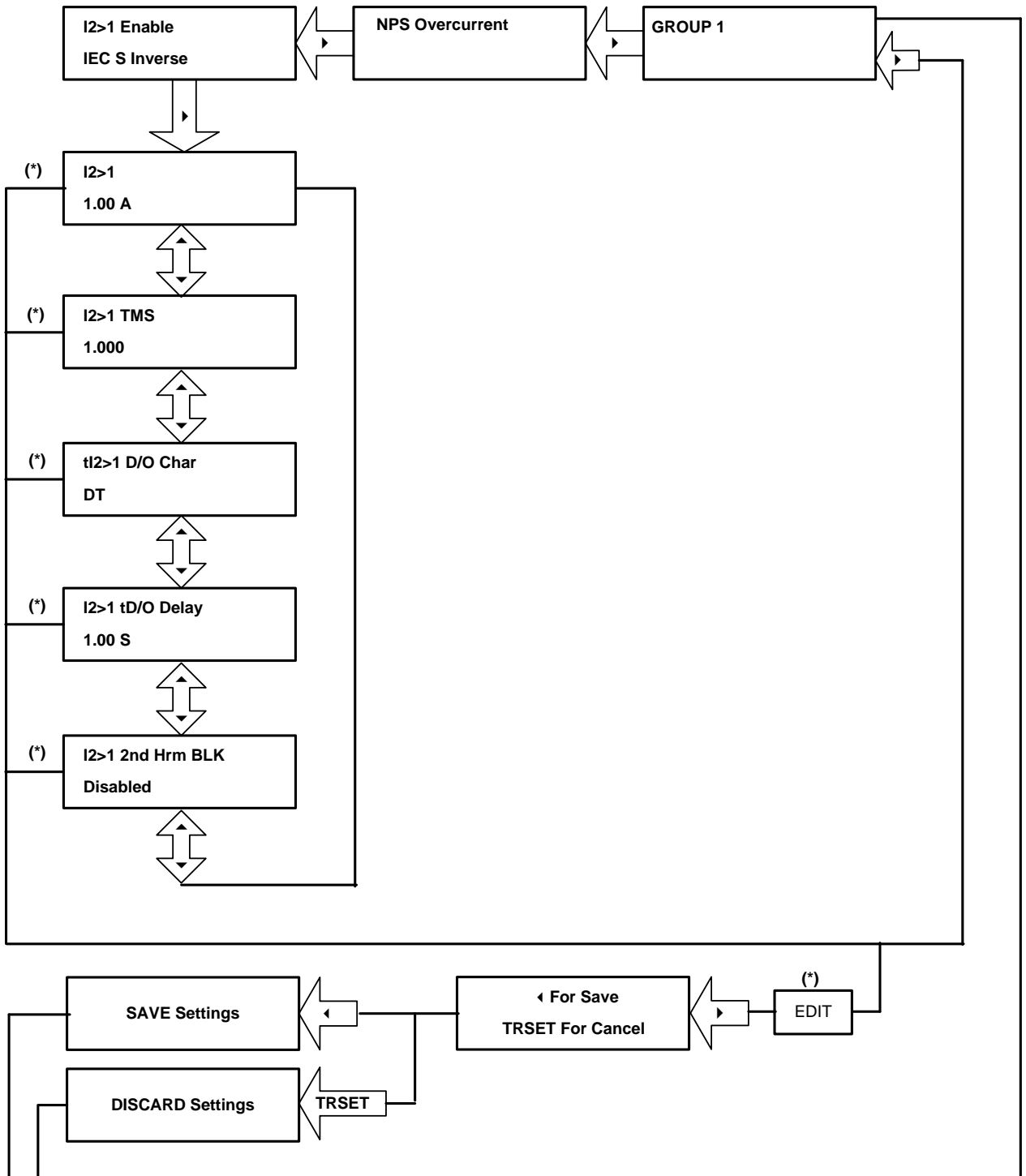
**9.15.3.1 To View / Set – NPS Overcurrent (If the setting are Disabled)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

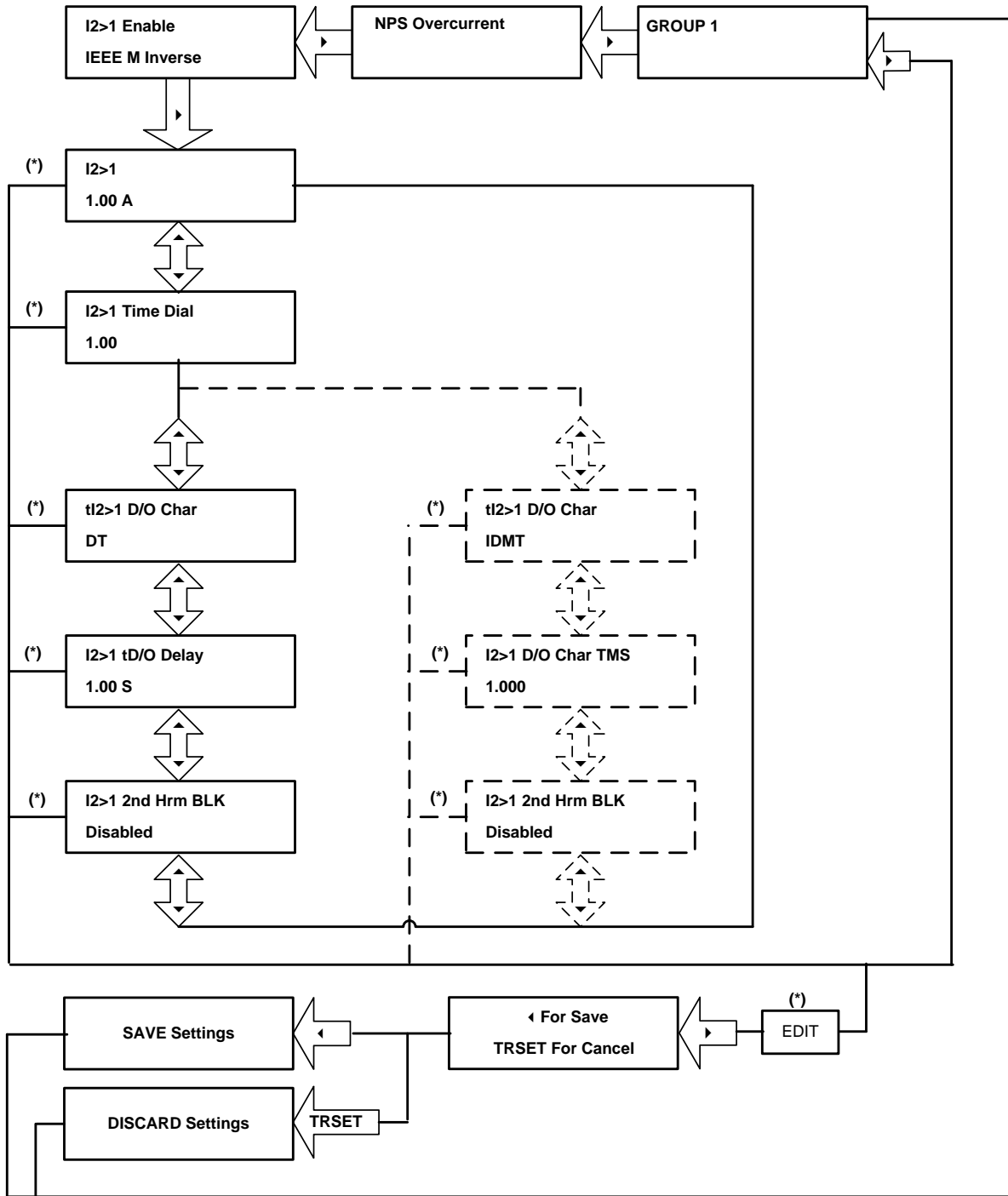


**9.15.3.2 To View / Set – NPS Overcurrent (For all IEC Curves)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

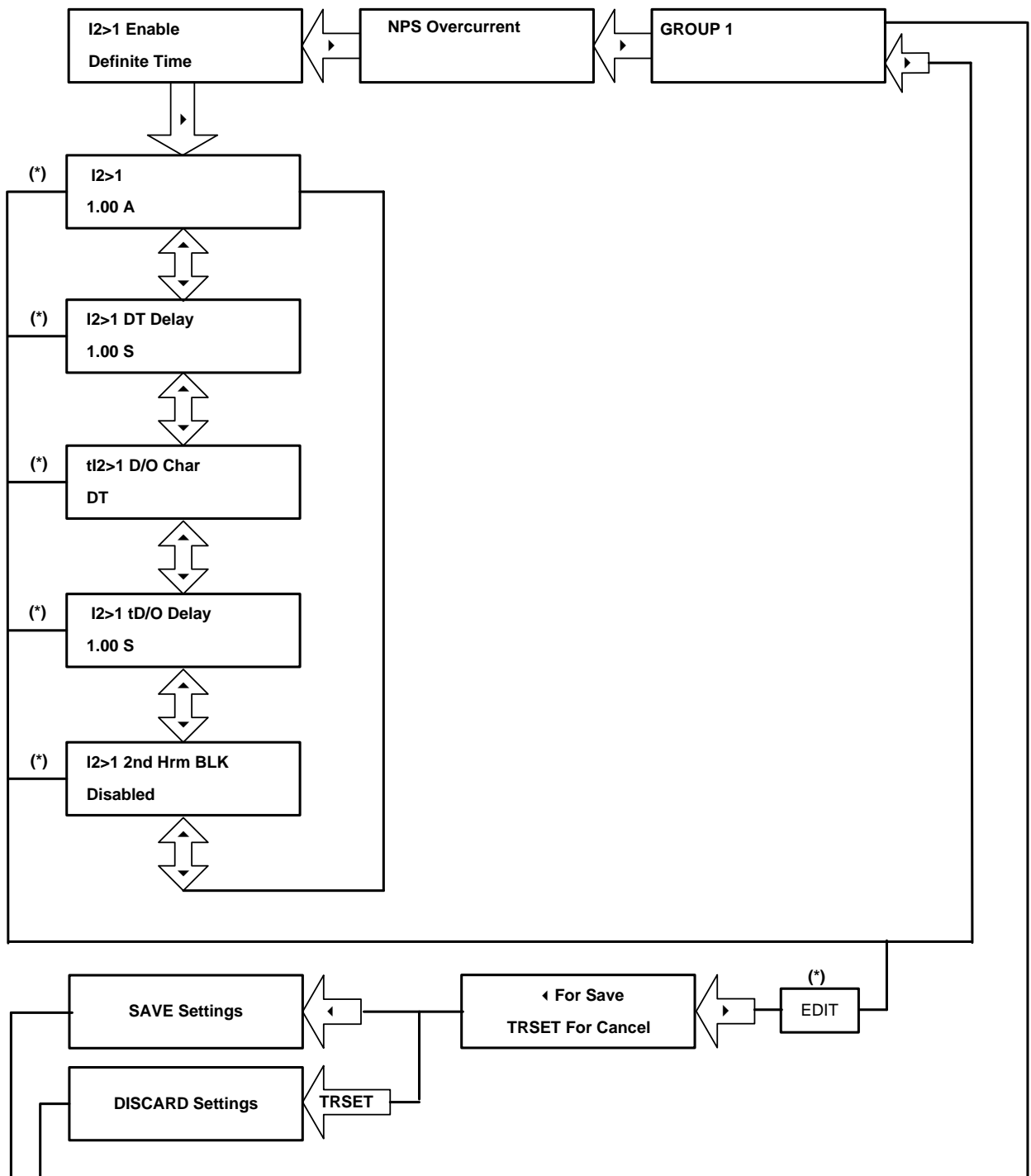
**9.15.3.3 To View / Set – NPS Overcurrent (For all IEEE Curves)**



*Note : The display windows shown in dashed lines will be seen if the tRESET Function is selected as IDMT.*

*Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.*

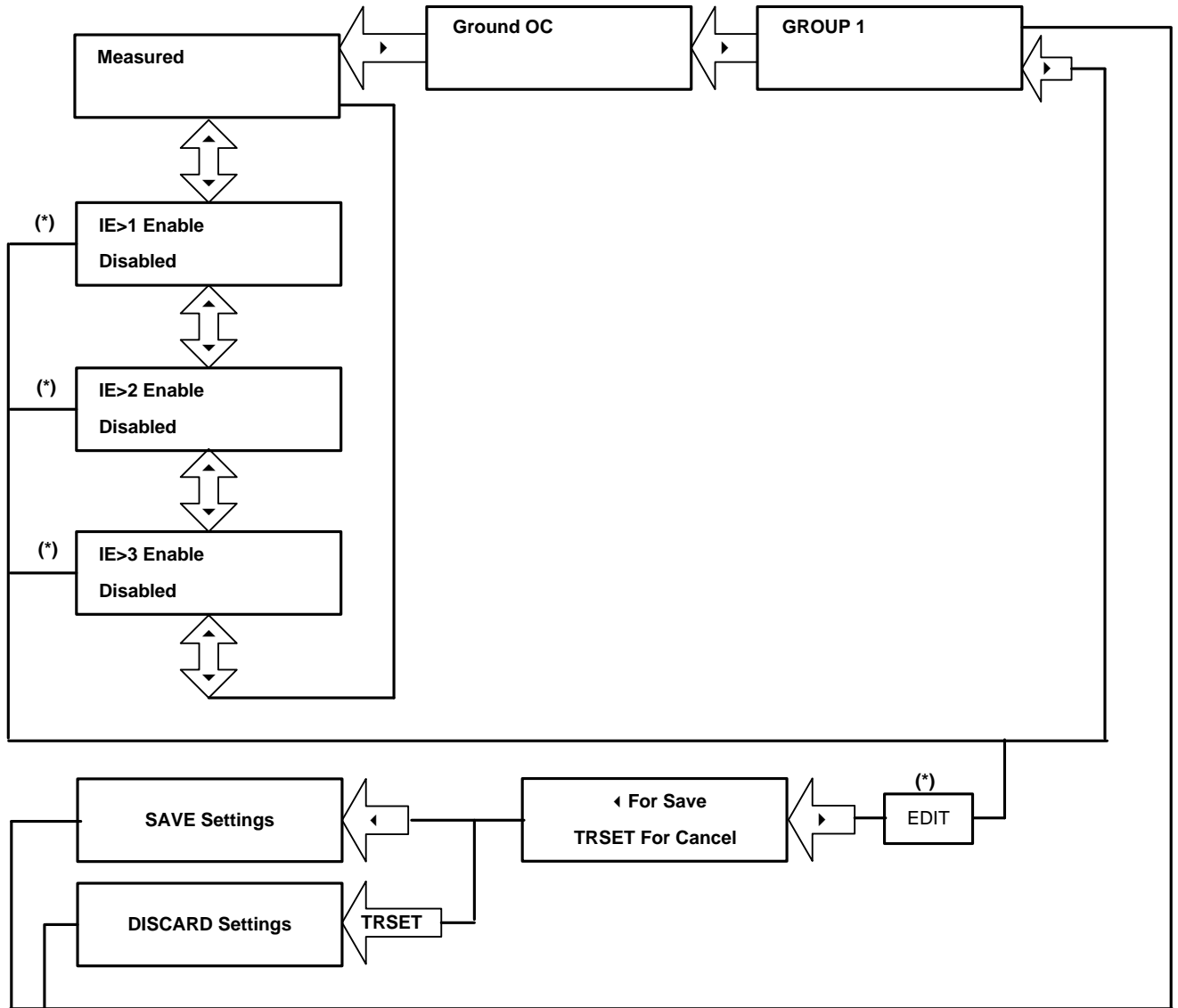
**9.15.3.4 To View / Set – NPS Overcurrent (For Definite Time)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

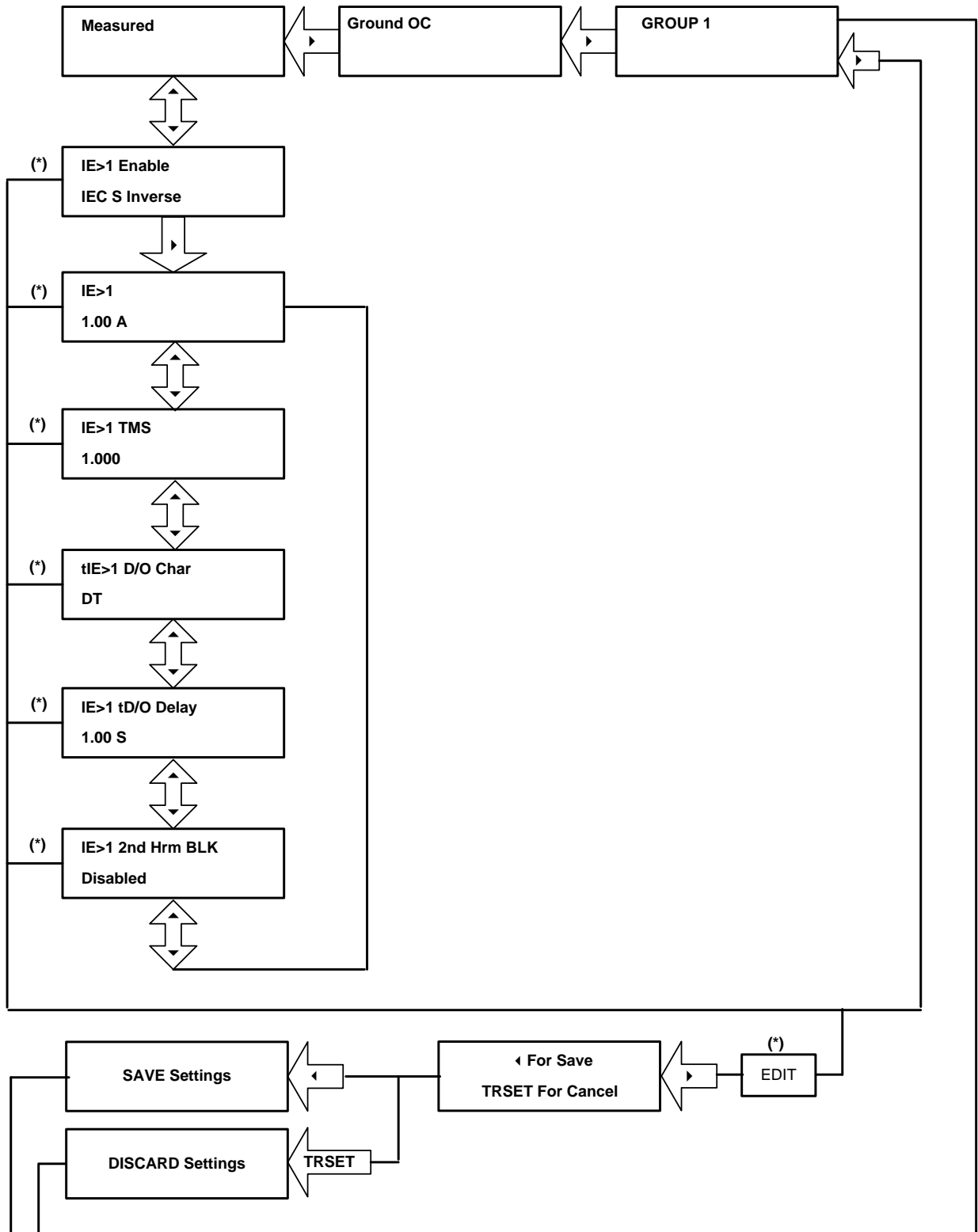
**9.15.4 Flow Chart – GROUND OC (Group 1) setting**

**9.15.4.1 To View / Set – Ground OC (If the setting is Disabled)**



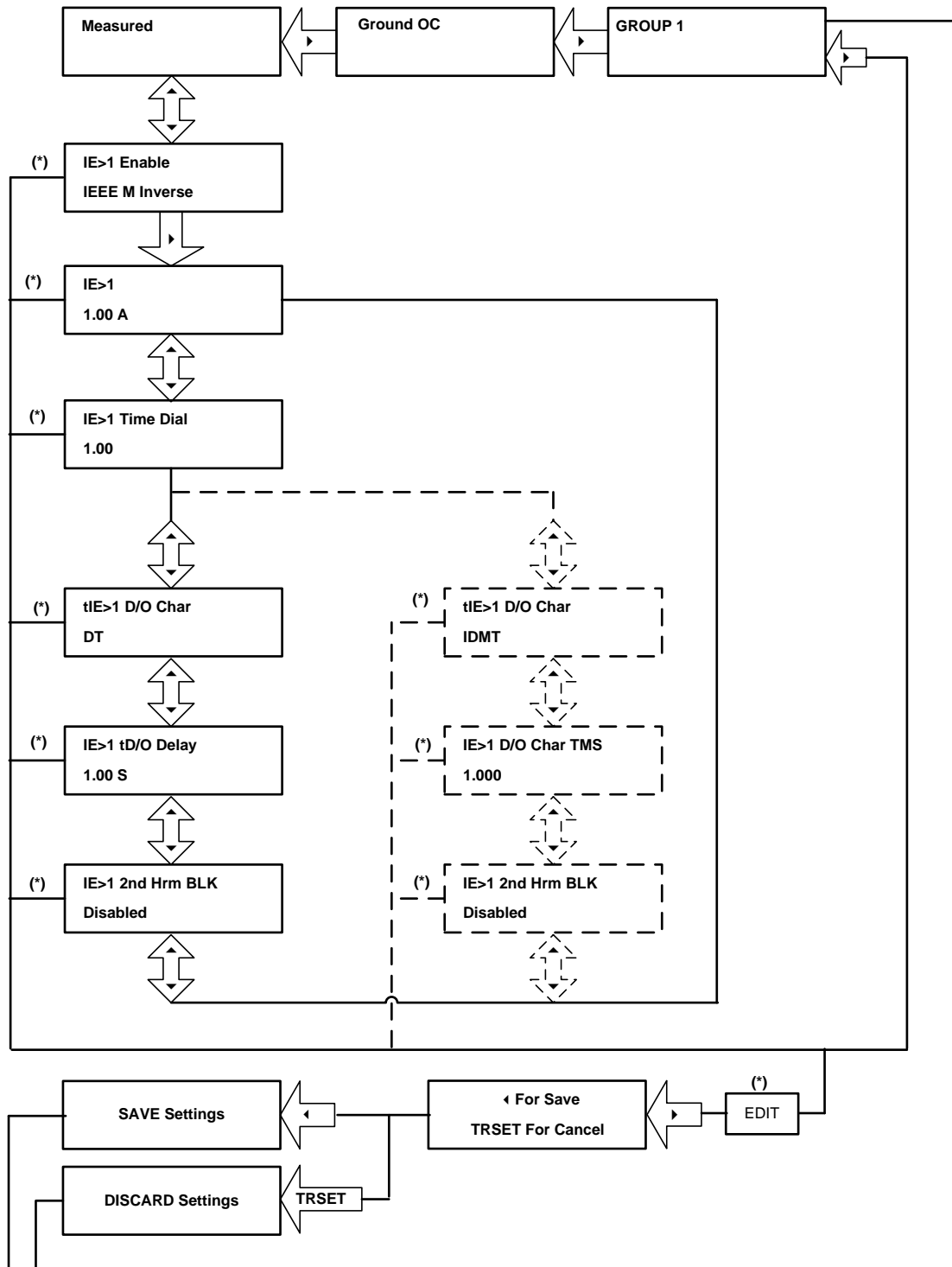
Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

**9.15.4.2 To View / Set – Ground OC (For all IEC Curves)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

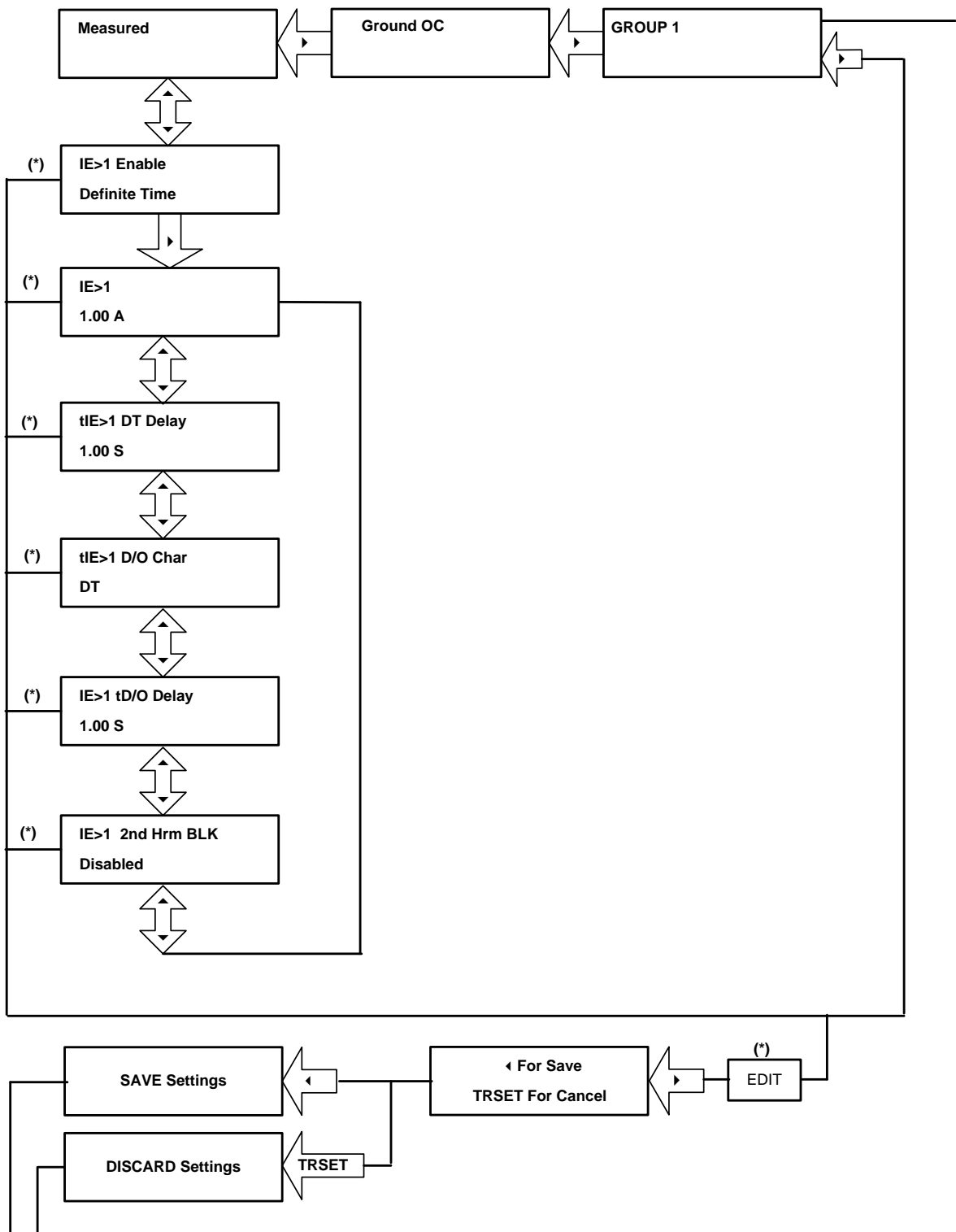
**9.15.4.3 To View / Set – Ground OC (For all IEEE Curves)**



*Note : The display windows shown in dashed lines will be seen if the tRESET Function is selected as IDMT.*

*Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.*

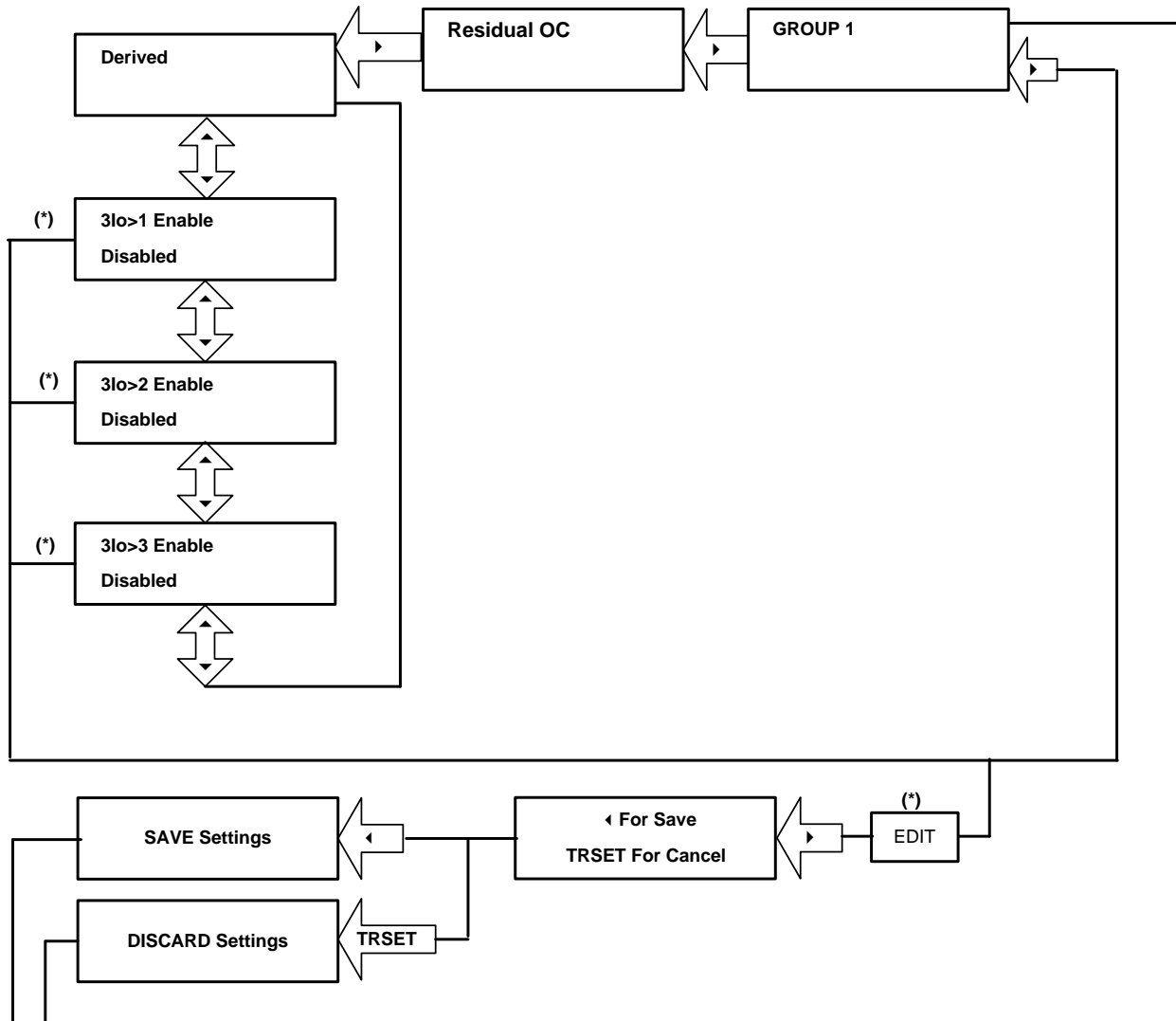
**9.15.4.4 To View / Set – Ground OC (For Definite Time)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

**9.15.5 Flow Chart – RESIDUAL OC (Group 1) setting**

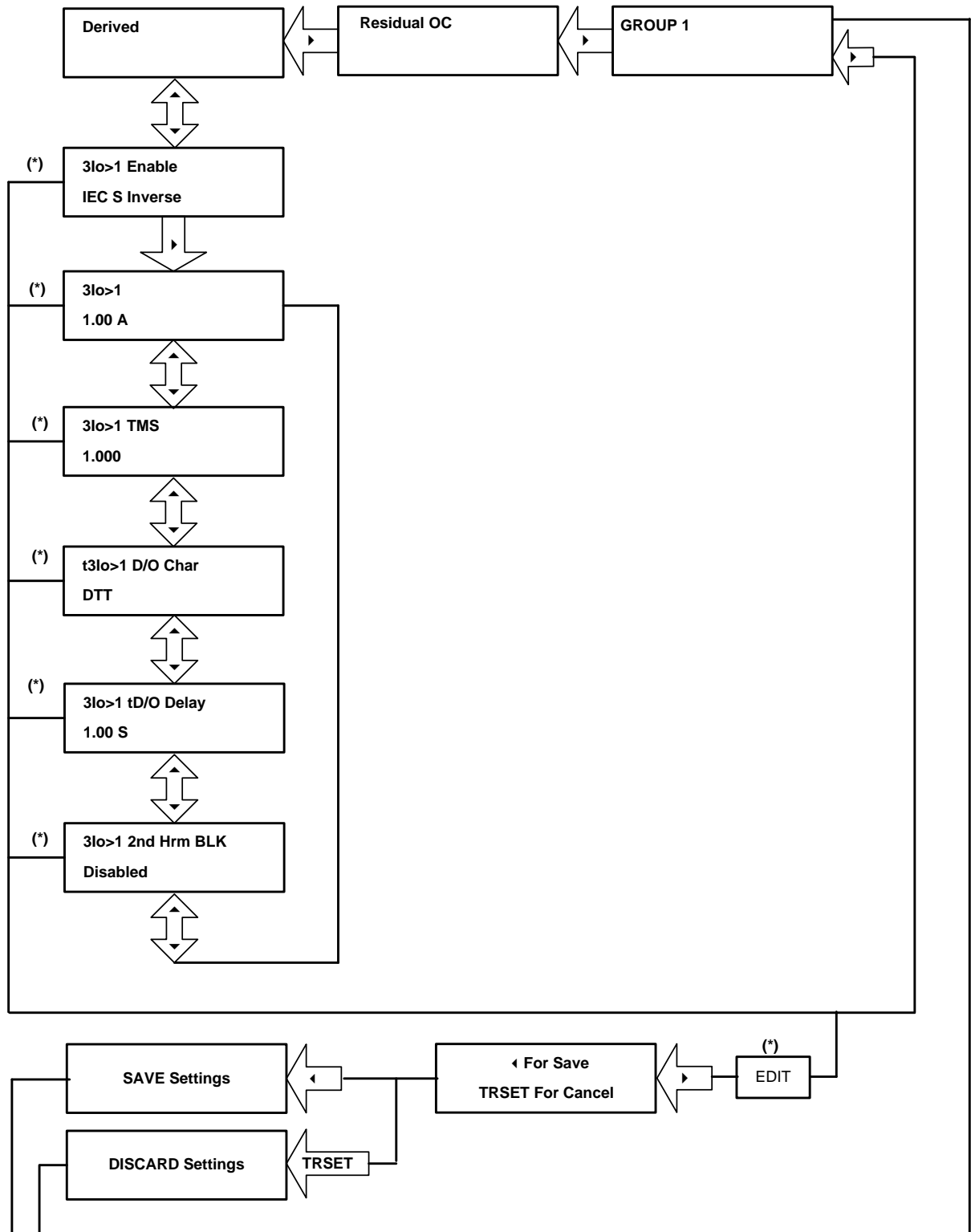
**9.15.5.1 To View / Set – Residual OC (If the setting is Disabled)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

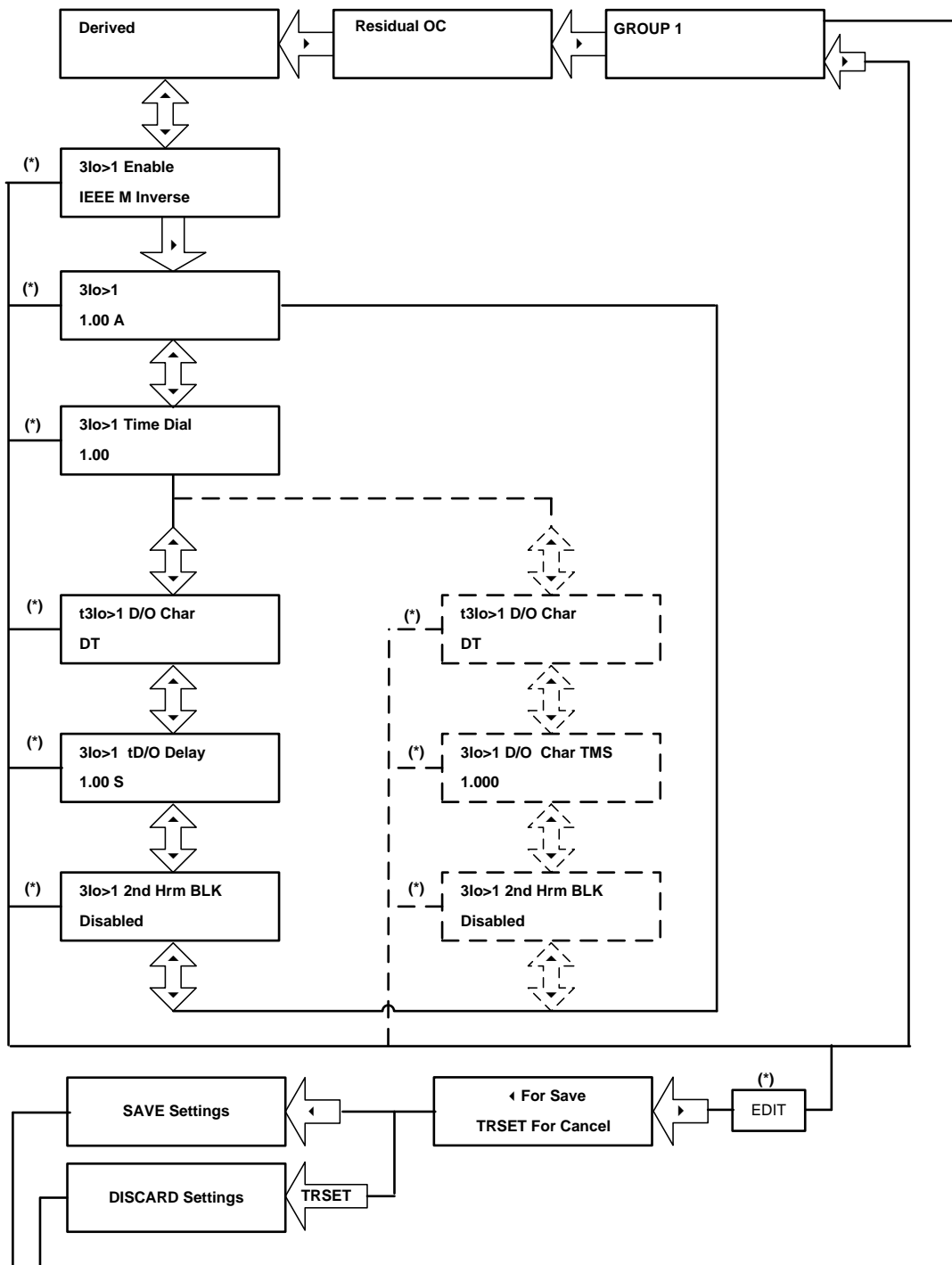


**9.15.5.2 To View / Set – Residual OC (For all IEC Curves)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

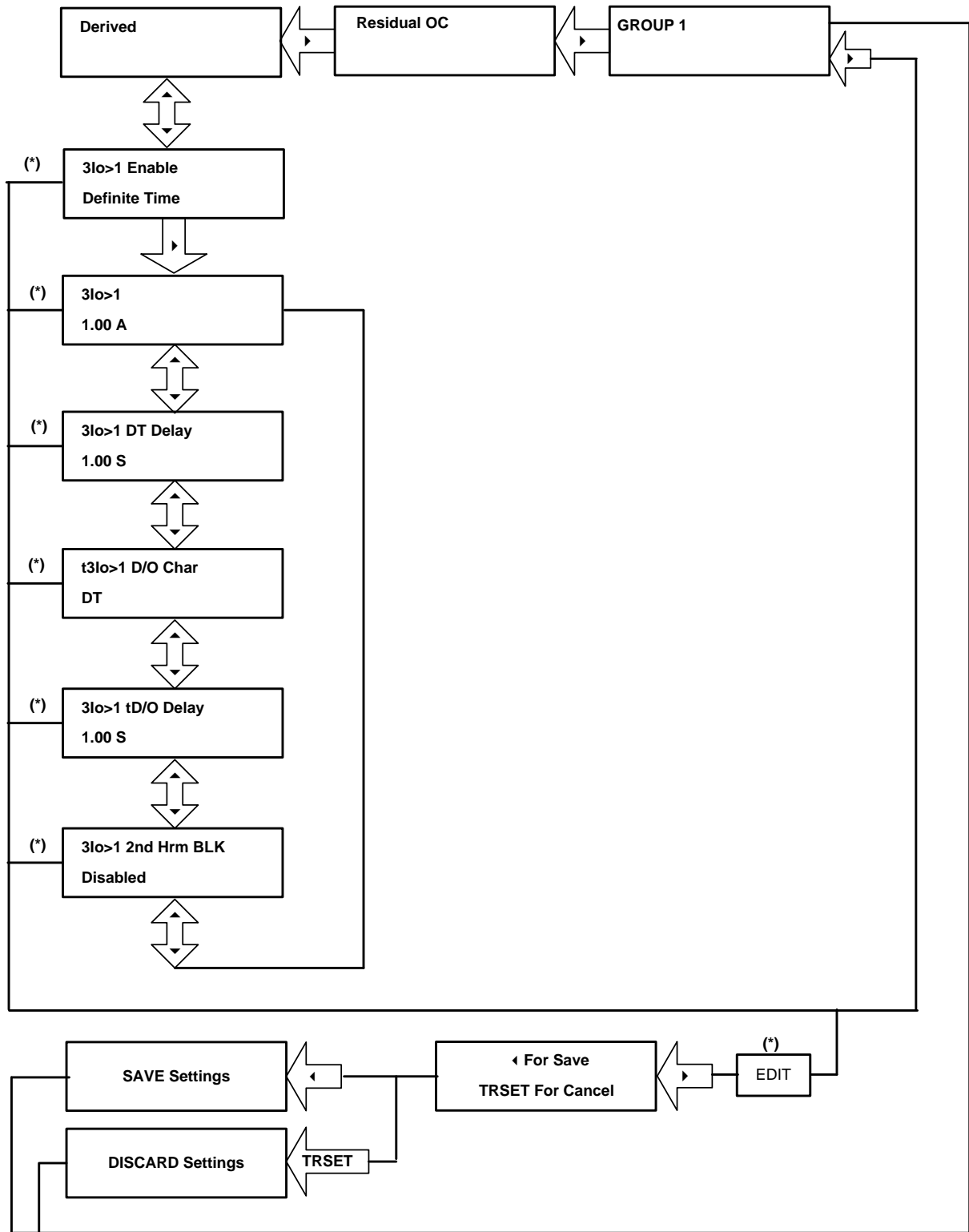
**9.15.5.3 To View / Set – Residual OC (For all IEEE Curves)**



Note : The display windows shown in dashed lines will be seen if the tRESET Function is selected as IDMT.

Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

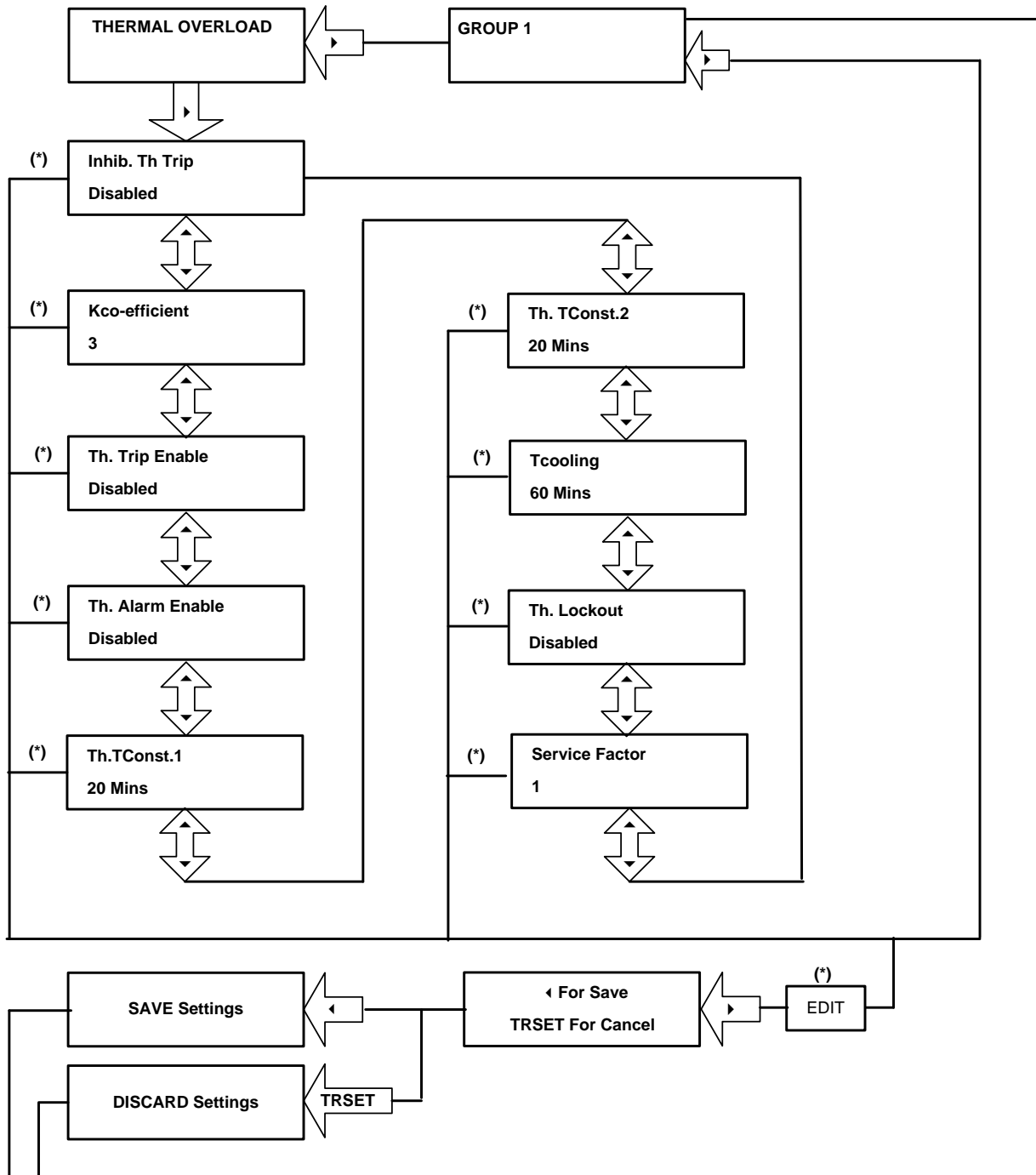
**9.15.5.4 To View / Set – Residual OC (For Definite Time)**



*Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.*

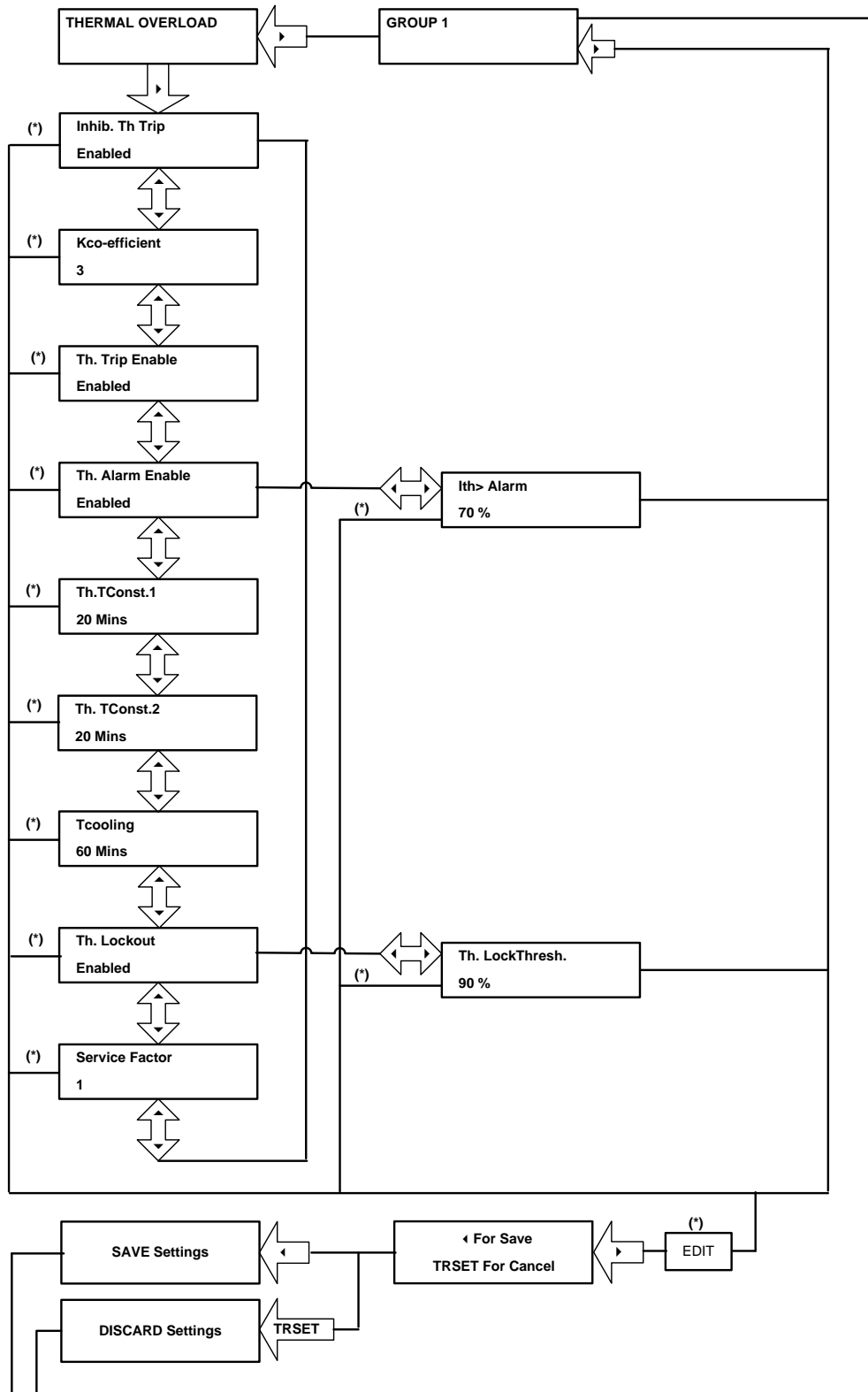
**9.15.6 Flow Chart – THERMAL OVERLOAD (Group 1) setting**

**9.15.6.1 To View / Set – Thermal Overload (If the setting are Disabled)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

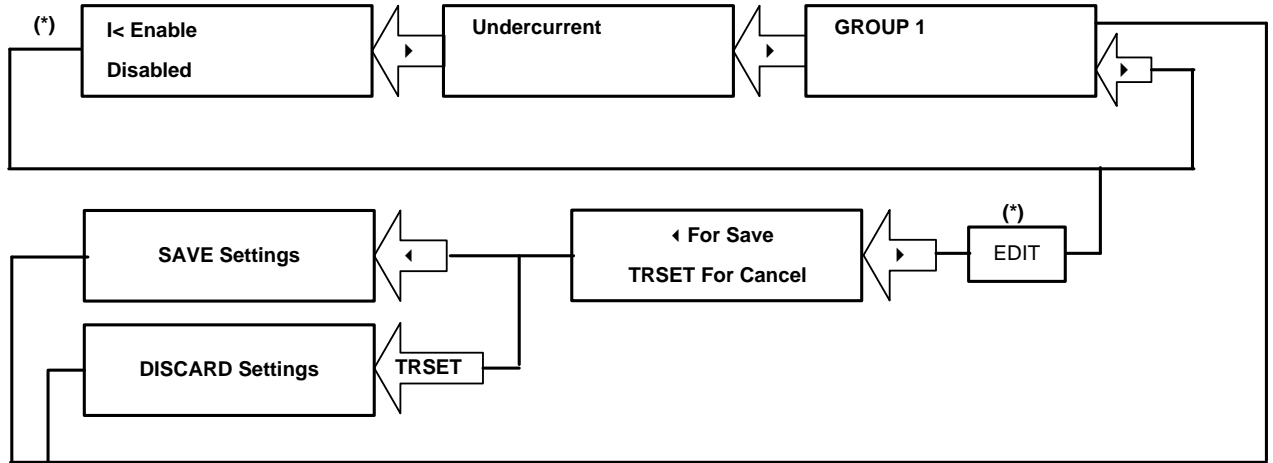
**9.15.6.2 To View / Set – Thermal Overload (If the setting are Enabled)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

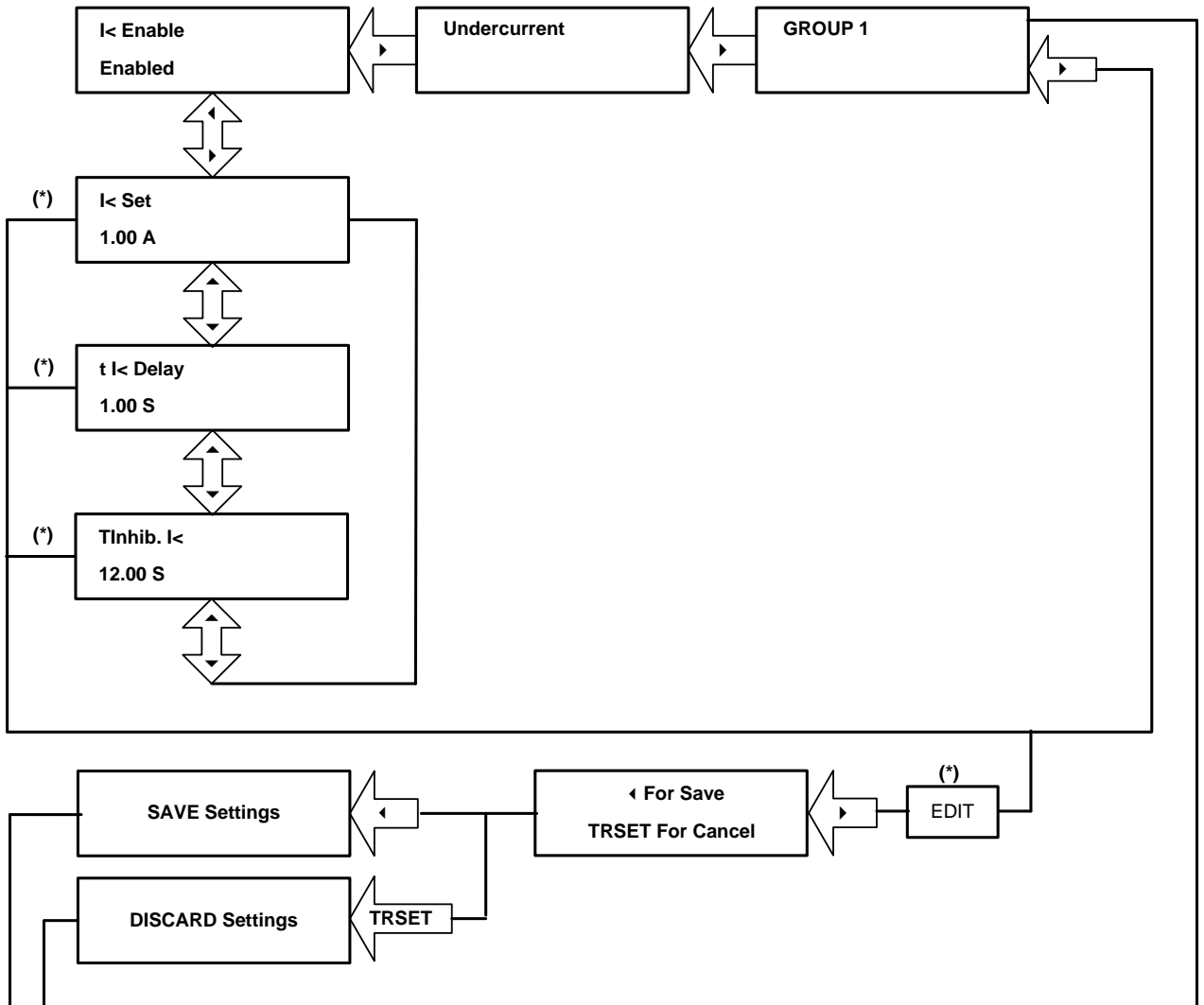
**9.15.7 Flow Chart – UNDERCURRENT (Group 1) setting**

**9.15.7.1 To View / Set – Undercurrent If the Settings are disabled)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

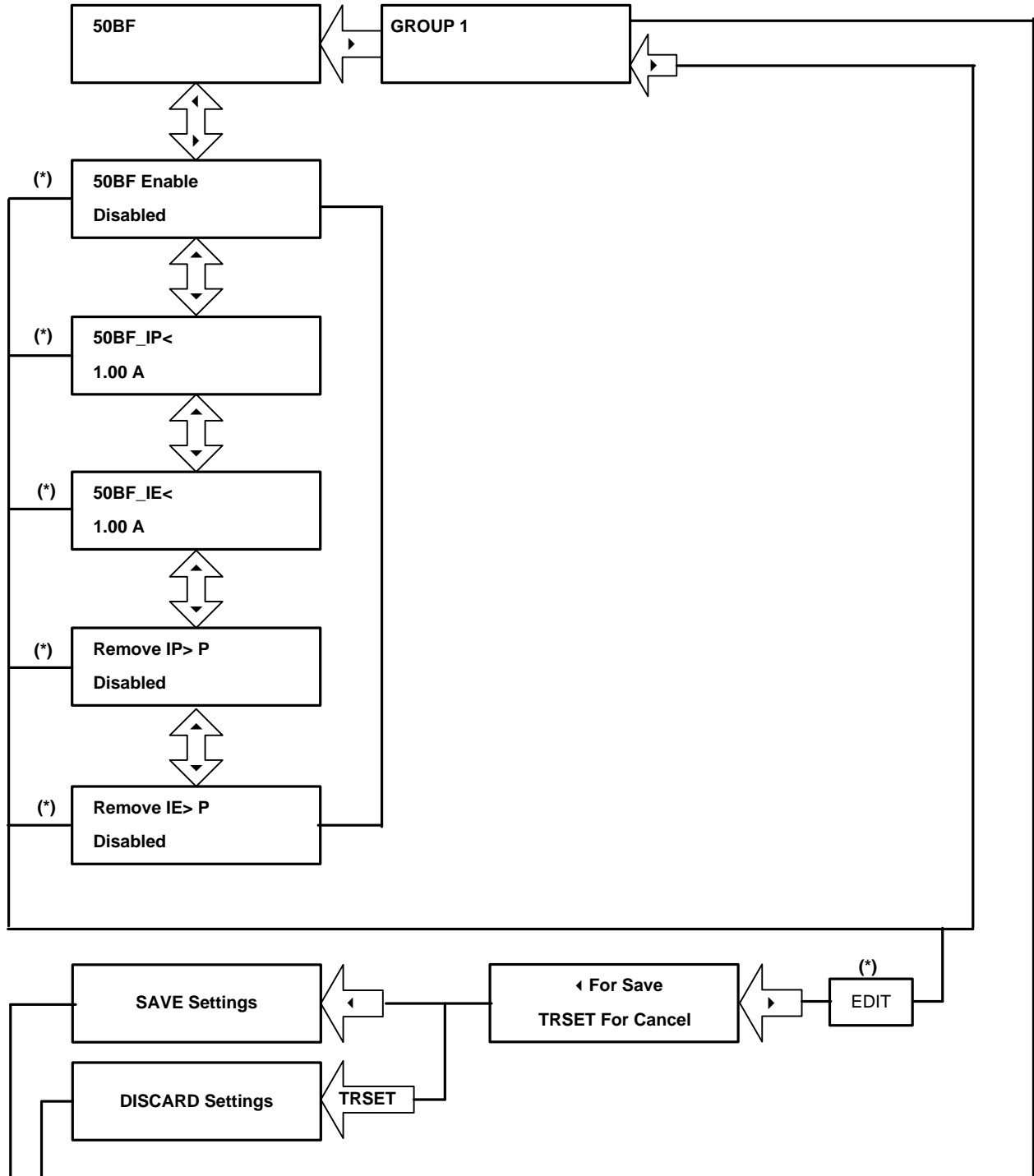
**9.15.7.2 To View / Set – Undercurrent (If the Settings are enabled)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

**9.15.8 Flow Chart – 50BF (Group 1) setting**

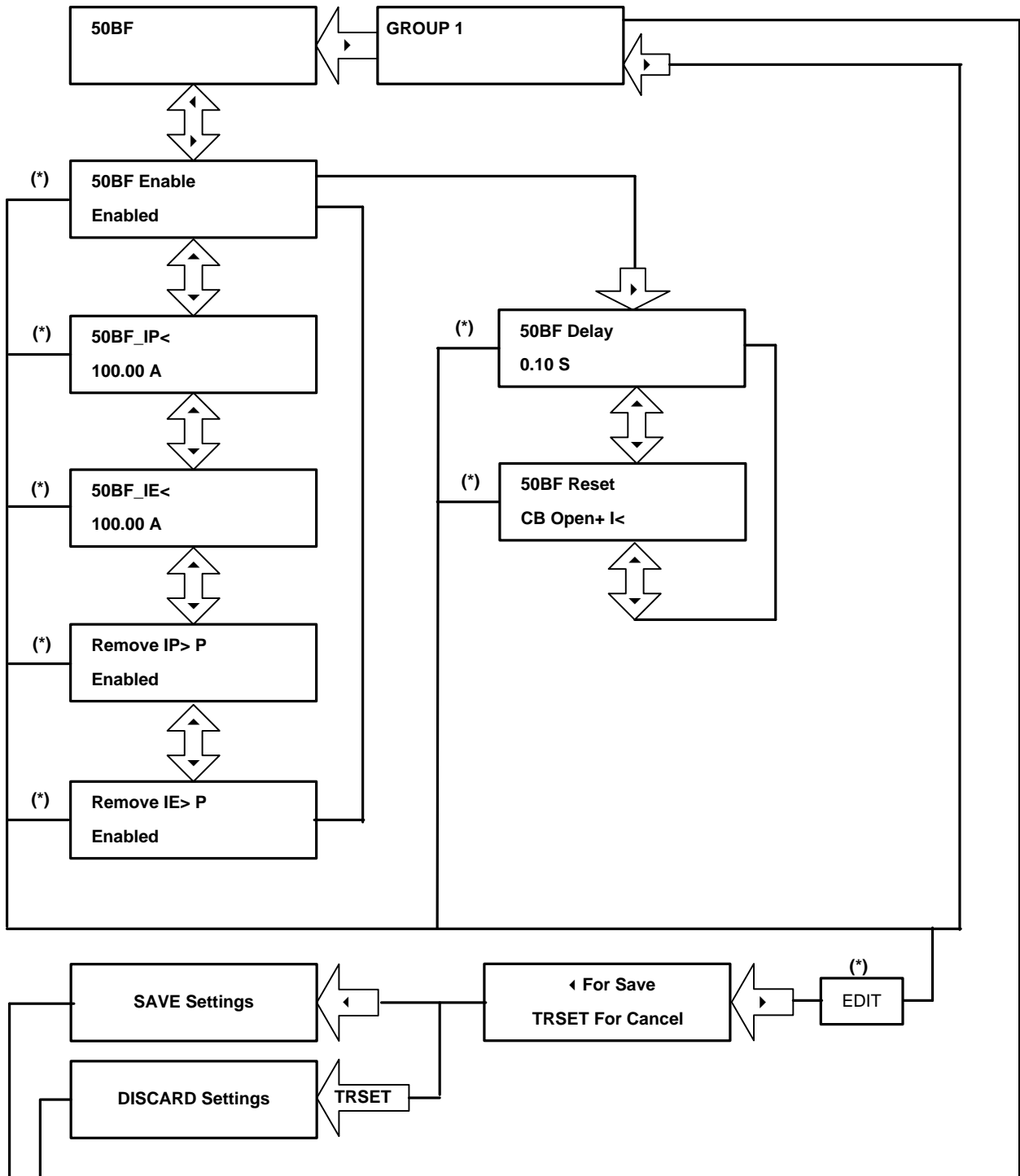
**9.15.8.1 To View / Set – 50BF(If the setting is Disabled)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.



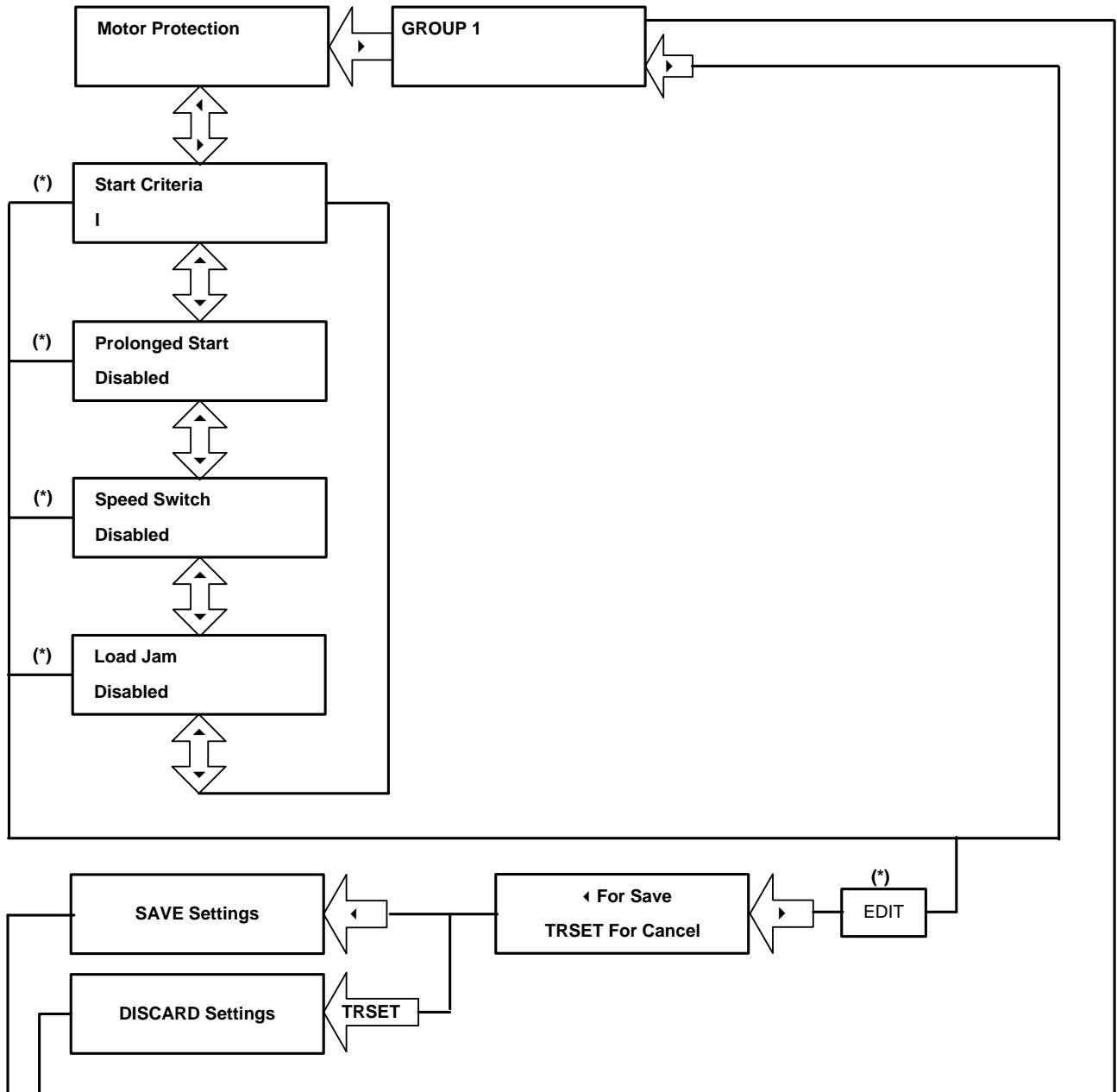
**9.15.8.2 To View / Set – 50BF (If the setting is Enabled)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

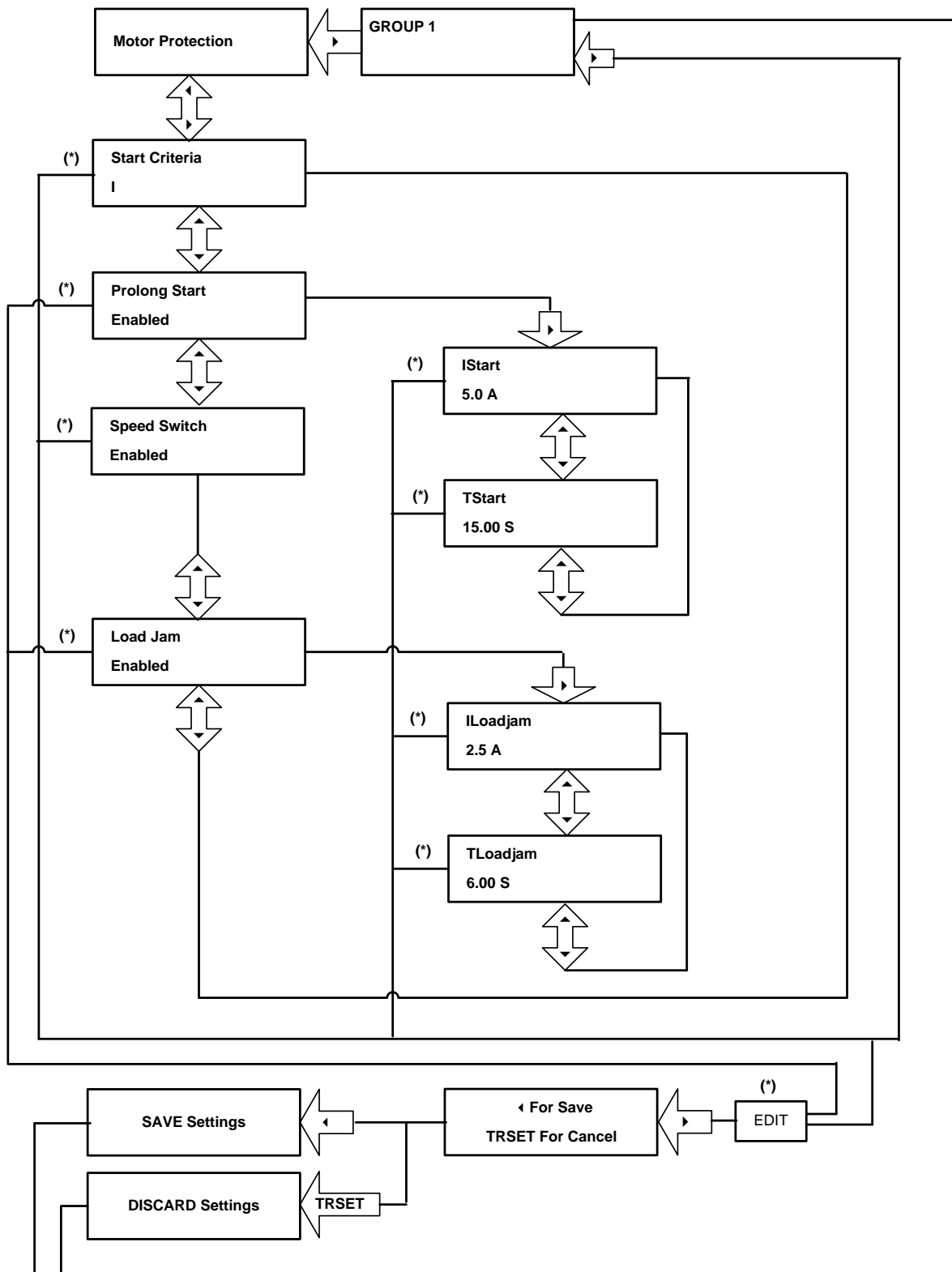
**9.15.9 Flow Chart – MOTOR PROTECTION (Group 1) setting**

**9.15.9.1 To View / Set – Motor Protection (If the setting is Disabled)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

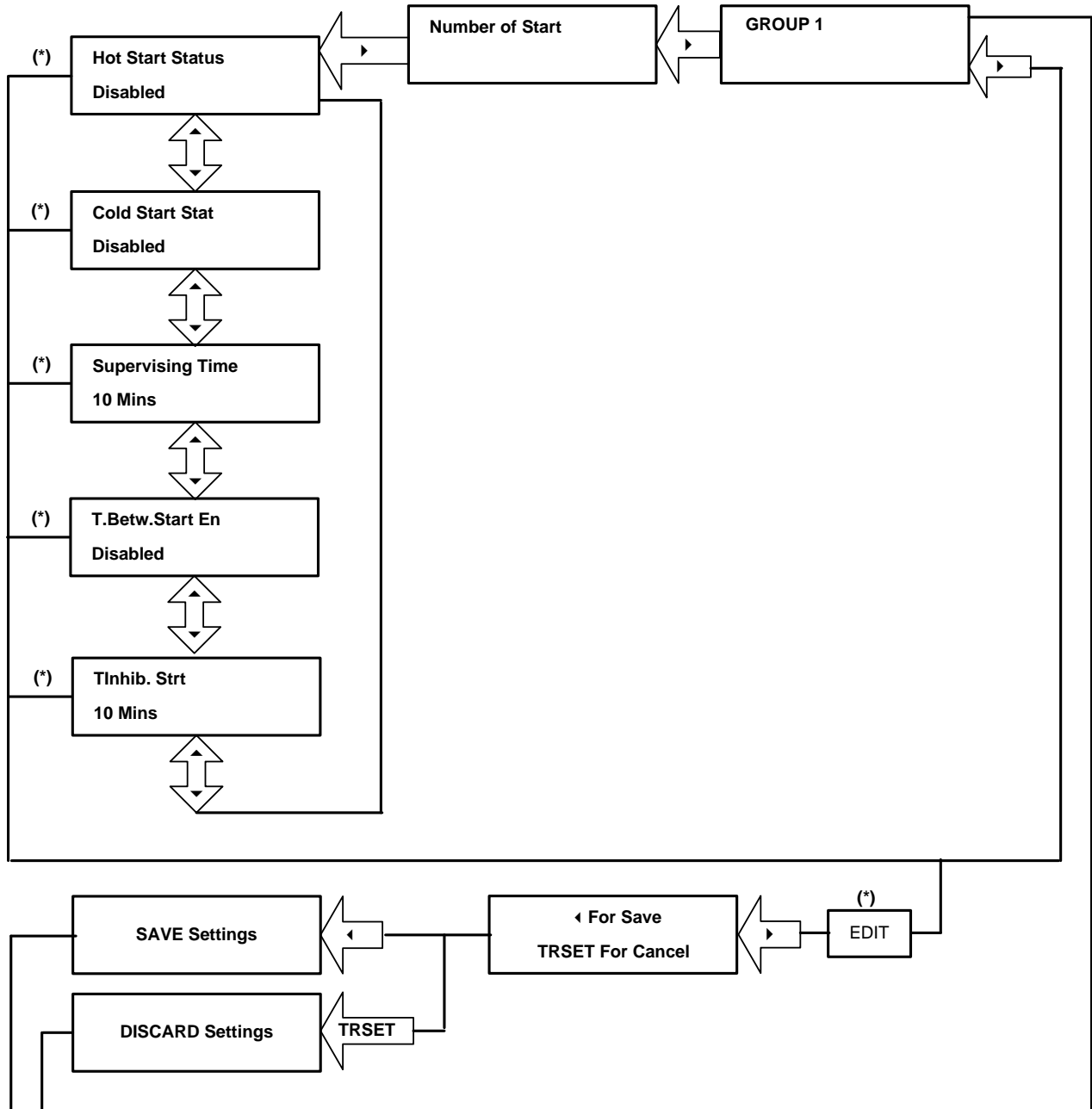
**9.15.9.2 To View / Set – Motor Protection (If the setting is Enabled)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

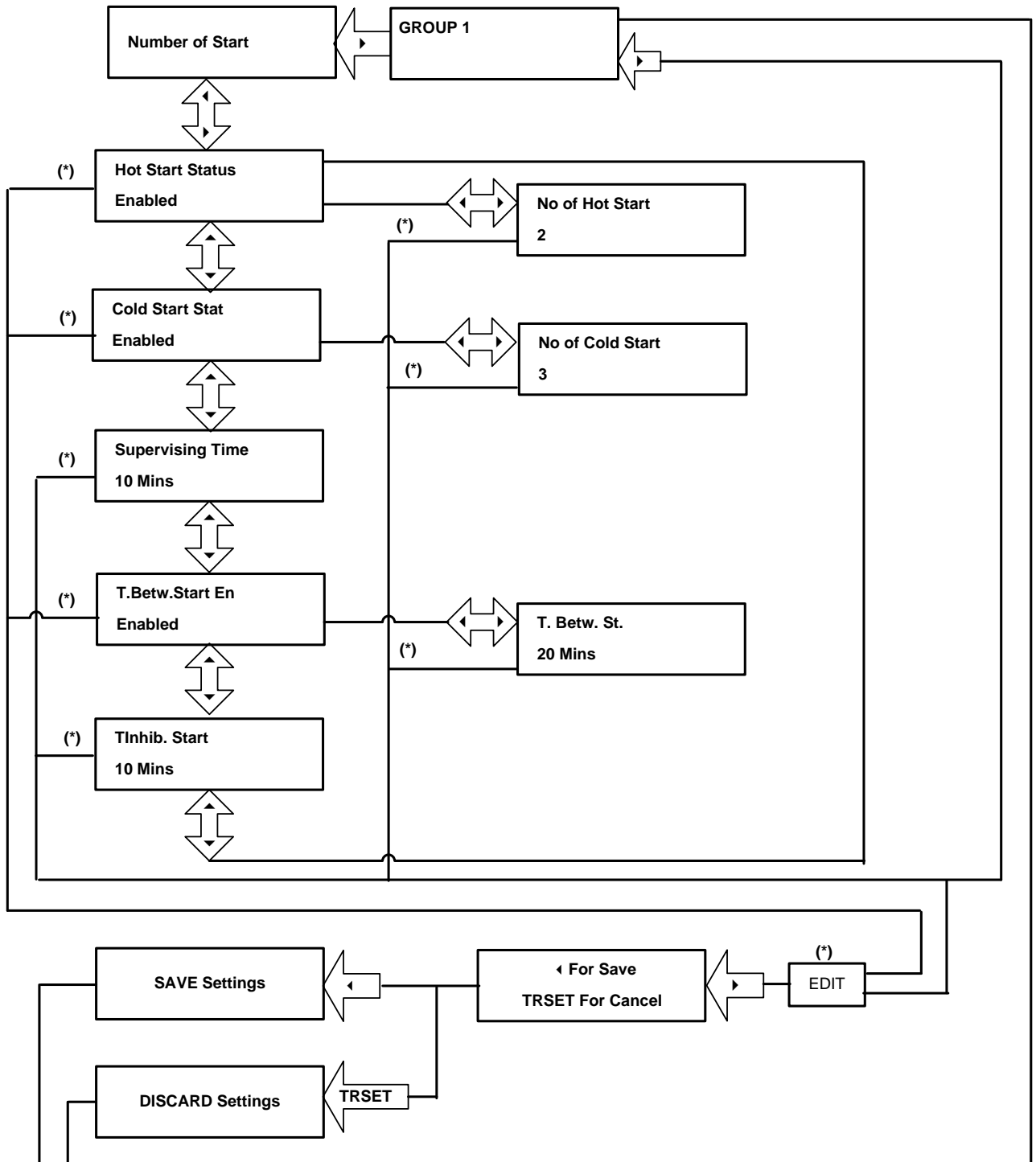
**9.15.10 Flow Chart – NUMBER OF START (Group 1) setting**

**9.15.10.1 To View / Set – Number of Start (If the setting are Disabled)**



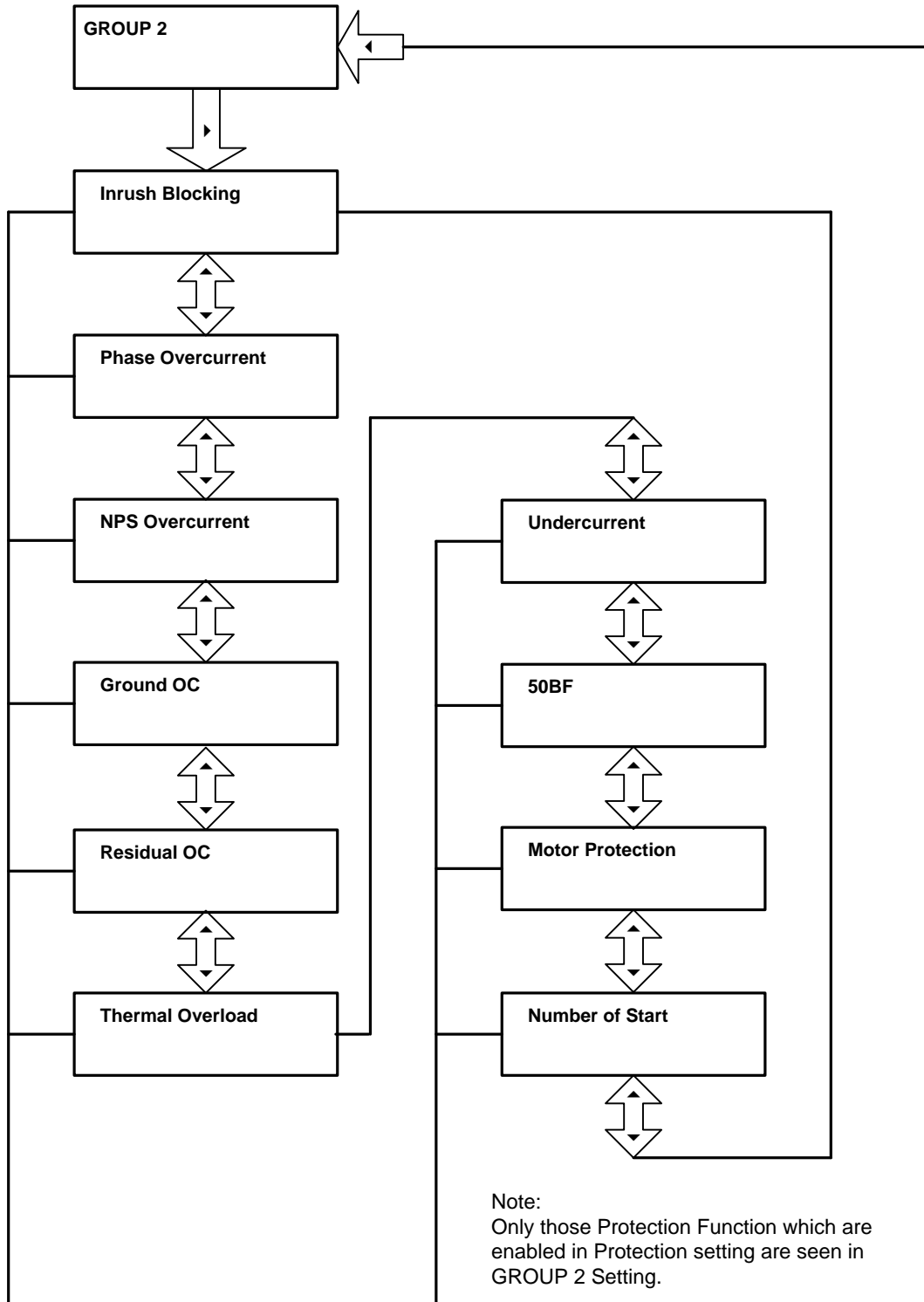
Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

**9.15.10.2 To View / Set – Number of Start (If the setting are Enabled)**



Note : (\*) indicates Edit key used to modify settings. Refer Edit and Save Setting in Flow Chart.

**9.16 Flow Chart – To Set Group 2 Settings**



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# Section 10

## Analyzing Event and Disturbance Record



## Contents

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## 10 ANALYZING EVENT AND DISTURBANCE RECORD

### 10.1 Overview

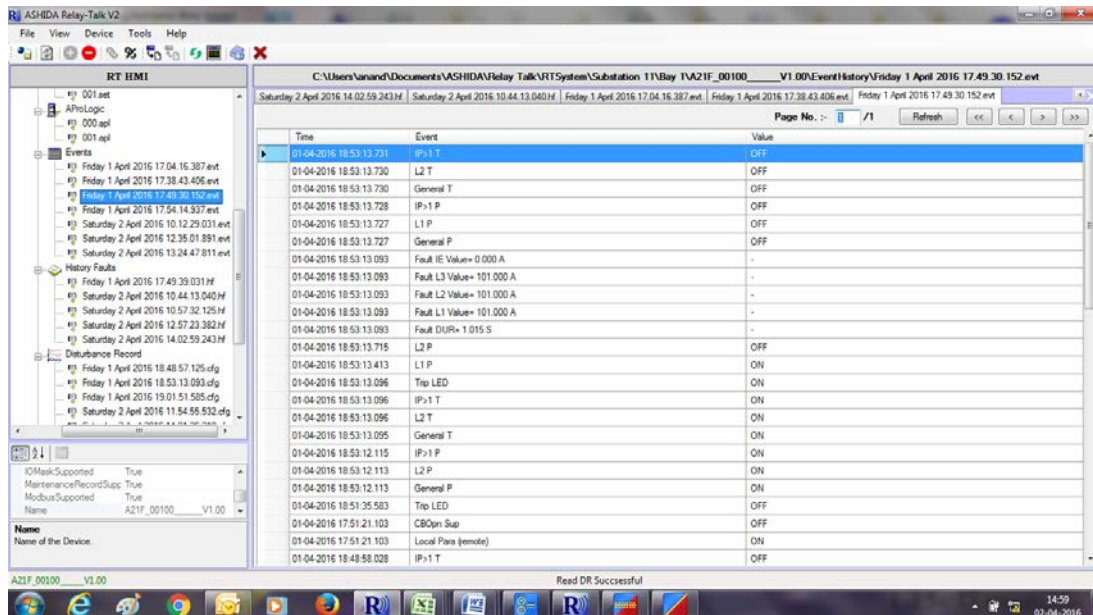
The A21M Motor Protection Relay provides several tools (listed below) to analyze the cause of relay operations. Use these tools to help diagnose the cause of the relay operation and more quickly restore the protected equipment to service.

1. Event Recording
2. Disturbance Recording
3. History Faults Recoding

All reports are stored in non-volatile memory, ensuring that a loss of power to the A21F will not result in lost data.

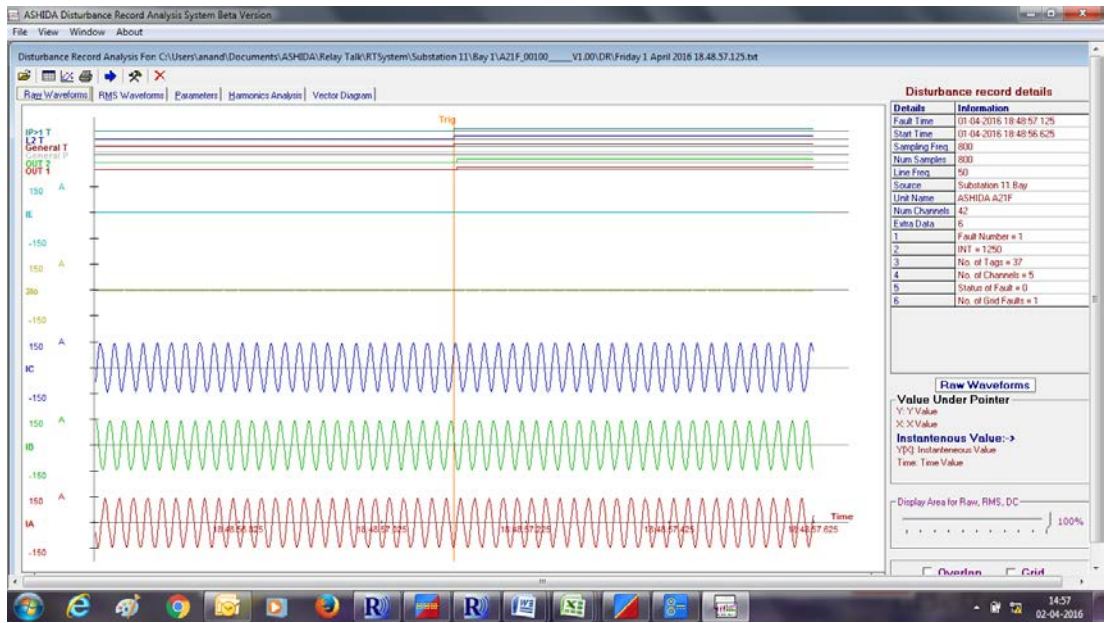
### 10.2 Event recording

A21M relay is providing feature to record and store 512 nos. Of events in non-volatile memory through internally by protection and control functions and externally by triggering of digital inputs, and can be extracted using communication port or viewed on front of LCD display. The event shall be trigger on time stamp through time synchronization or internal clock setting.



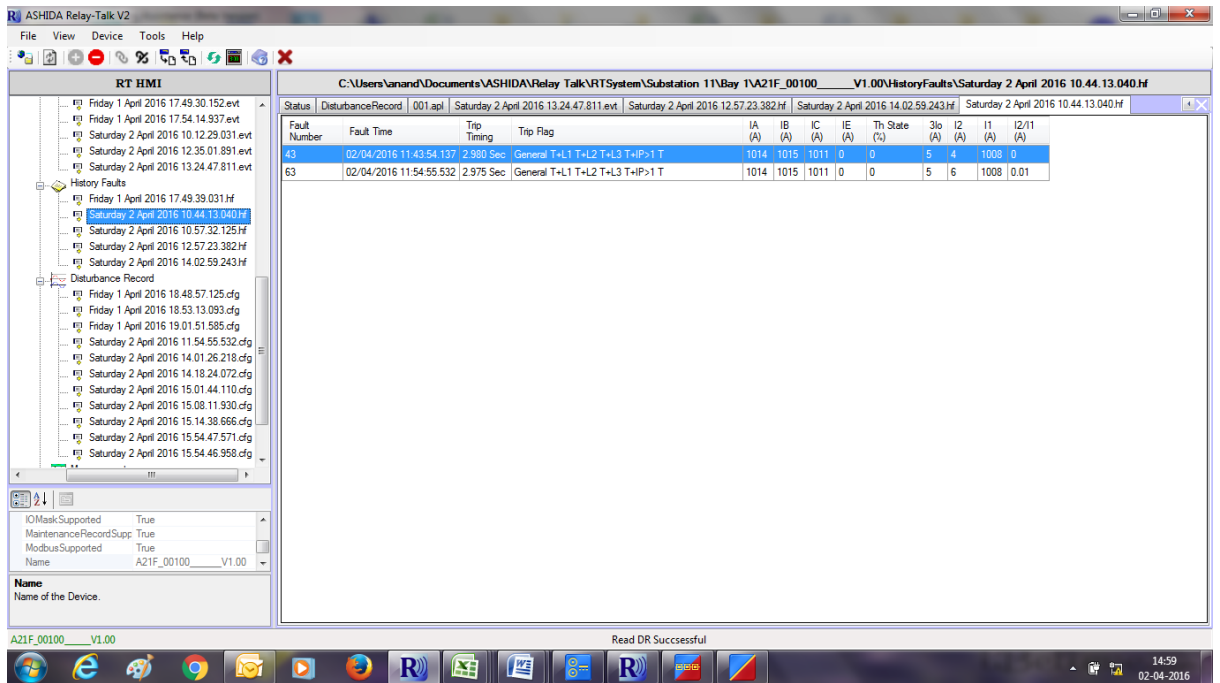
### 10.3 Disturbance recording

A21F relay is provides built in disturbance recording facility for recoding of analogue and digital channels. Relay records 10 nos. of disturbances and store in to non-volatile memory. Disturbance records can be saved in COMTRADE format and same can be analyzed in disturbance analysis software.



### 10.4 History Fault recording

A21F relay provides built-in history fault recording facility for recording the fault with the current, symmetrical components parameter value. Relay records history fault and stores it in non-volatile memory.



The following example is given to analyze the event and Disturbance analyzes Overcurrent function.

### 10.5 Over current function

The following settings are set into the relay for simulate the over current function to operate and observe the waveform in the Disturbance recording and event in the event recording.

Stage1: IP>1 Enable = Yes

IP>1 = 50%

IP>1 TMS = 1

IP>1 Curve = DT

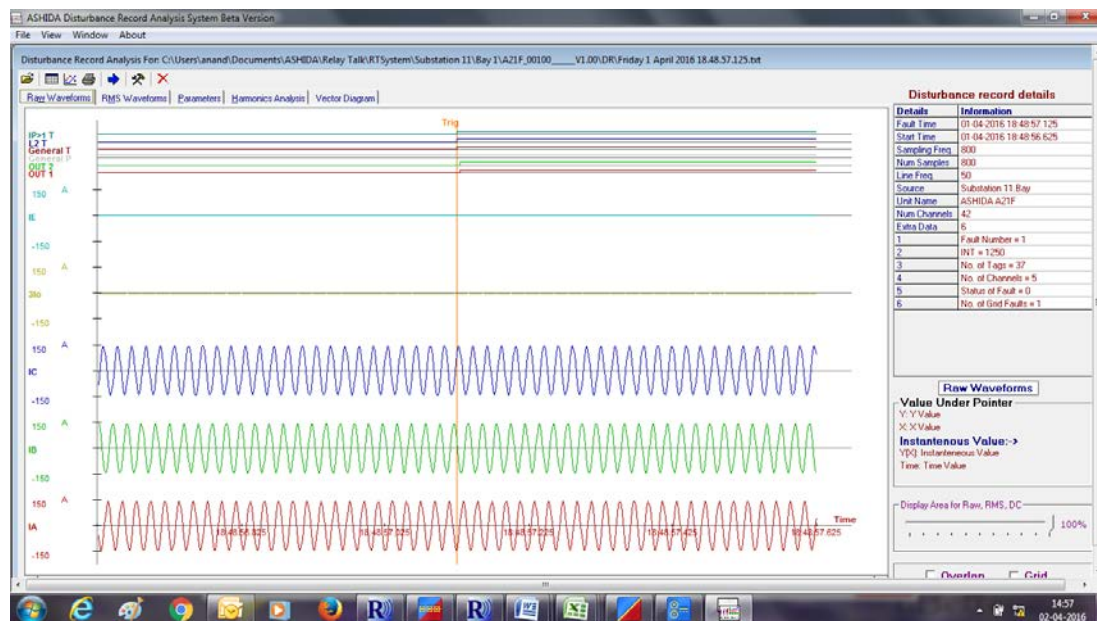
tIP>1 DT Delay = 0

Assign IP>1 trip function in Output relay1 (OUT1).

There are two stages are simulated through the power system simulator for the pre-fault and fault simulation, the first stage is normal condition for 500 millisecond and second stage is fault condition for 500 millisecond as given below.

And the above condition, The I>1 elements is operated when the over current exceeded the pickup value and relevant feedback is received in power system simulator and stopped the current injection. The relevant Waveforms are recorded and it can be analyzed by using the DR analysis software. Analogue and Digital channels should be recorded with pre-fault and post fault conditions. Waveform can be exported to COMTRADE format.

#### Disturbance record:



**Event Record:**

The screenshot displays the ASHIDA Relay-Talk V2 software interface. The main window shows an event log for a substation. The event log table is as follows:

Time	Event	Value
01-04-2016 18:53:13.731	IP>1 T	OFF
01-04-2016 18:53:13.730	L2 T	OFF
01-04-2016 18:53:13.730	General T	OFF
01-04-2016 18:53:13.728	IP>1 P	OFF
01-04-2016 18:53:13.727	L1 P	OFF
01-04-2016 18:53:13.727	General P	OFF
01-04-2016 18:53:13.093	Fault IE Value= 0.000 A	--
01-04-2016 18:53:13.093	Fault L3 Value= 101.000 A	--
01-04-2016 18:53:13.093	Fault L2 Value= 101.000 A	--
01-04-2016 18:53:13.093	Fault L1 Value= 101.000 A	--
01-04-2016 18:53:13.093	Fault DUR= 1.015 S	--
01-04-2016 18:53:13.715	L2 P	OFF
01-04-2016 18:53:13.413	L1 P	ON
01-04-2016 18:53:13.096	Trip LED	ON
01-04-2016 18:53:13.096	IP>1 T	ON
01-04-2016 18:53:13.096	L2 T	ON
01-04-2016 18:53:13.095	General T	ON
01-04-2016 18:53:12.115	IP>1 P	ON
01-04-2016 18:53:12.113	L2 P	ON
01-04-2016 18:53:12.113	General P	ON
01-04-2016 18:51:35.583	Trip LED	OFF
01-04-2016 17:51:21.103	CBOpn Stat	OFF
01-04-2016 17:51:21.103	Local Para (remote)	ON
01-04-2016 18:48:58.028	IP>1 T	OFF

The interface also shows a tree view on the left with categories like RT HMI, APhoLogic, and Events. The status bar at the bottom indicates 'Read DR Successful' and the time is 14:59 on 02-04-2016.

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# Section 11

## Testing and Commissioning

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**11 TESTING AND COMMISSIONING****11.1 Commissioning Test, Equipment Required**

The following connection tests help you enter settings into the A21M and verify that the relay is properly connected.

Brief functional tests ensure that the relay settings are correct. It is unnecessary to test every element, timer, and function in these tests. Modify the procedure as necessary to conform to your standard practices. Use the procedure at initial relay installation; you should not need to repeat it unless major changes are made to the relay electrical connections.

- a. The A21M installed and connected according to your protection design.
- b. Digital Multi meter True RMS
- c. Timer with precision 1ms.
- d. Required Auxiliary supply
- e. For Calibration and measurement check & Pick up test, time test, logic operation test
- f. Use Power system Simulator DOBEL make F6150 or any Protective relay ac test source:
  - Minimum: single-phase current source with phase angle control
  - Preferred: three-phase current source with phase angle **control**
- g. 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-V2 software.
  - Ashida Relay Assist software (Electrical Parameter Calculator) to verify Measured value of normal and sequence current.

**11.2 Checking of External Circuitry**

## Connection Tests

- Step 1: Remove control ac signals from the A21M 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. After the relay is energized, the front-panel green ENABLED LED should illuminate.
- Step 5: Use the appropriate serial cable (USB to serial Cable or equivalent) 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 current to the appropriate relay terminals. Disconnect the current transformer secondary from the relay prior to applying test source quantities.
- Step 10: Apply rated current (1 A or 5 A).
- Step 11: If the relay is equipped with voltage inputs, apply rated voltage for your application.

### 11.3 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:

- a. Ensure over current and earth fault trip setting.
- b. Ensure TMS setting of over current and Earth Fault are entered correctly as per required time grading between feeder and incomer.
- c. Ensure instantaneous HF setting done correctly and its definite time delay is applied properly as per required time grading between feeder and incomer.
- d. Ensure selection of extra annunciation duty contacts is as per required function.
- e. Ensure measure of applied current is same as the current measure in CT 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 CT connection are replaced in accordance with the relevant external connection or schemes diagram. Ensure all fault & Annunciation contacts, trip contacts has been reset before leaving relay.

If relay A21M 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 enabling Load Default Setting menu.

*Note: This will also clear all fault memory and the set password.*

**Post instillation / Commissioning observation**

After successful installation confirm amount of existing load current in each phase (R, Y, and B) and ground overcurrent (3I0). This can be confirmed with Analogue/ Digital current meter available on panel with relay primary and secondary current measurement window. In normal balanced load condition, the i.e. current should be very low.

**11.4 Relay Testing**

**Relay Calibration & Measurement**

**Before conducting actual test, confirm relay calibration by following method.**

- Connect A21M relay to current injector and timer.
- Following chart shows terminal numbers of connections.

Source Terminal	Relay Terminal	Relay Connection
Current Source	B1 – B2	Current R-CT _1A
	B1– B3	Current R-CT _5A
	B4 – B5	Current Y-CT _1A
	B4 – B6	Current Y-CT _5A
	B7 – B8	Current B-CT _1A
	B7 – B9	Current B-CT _5A
	B10 – B11	Current EF-CT _1A
	B10 – B12	Current EF-CT _5A
Power Supply (+ / -)	P(-)-P(+)	Power Supply (+ / -)
Binary Input	A3 – A5	In1
	A4 – A6	In2
	A7 – A9	In3
	A8– A10	In4
	A11– A13	In5
	A12– A14	In6
Binary Output	A15-A17-A19	OUT 1
	A16-A18-A20	OUT 2
	A21-A23-A25	OUT 3
	A22-A24-A26	OUT 4
	A27-A29-A31	OUT 5
	A28-A30-A32	OUT 6

**Step1.** Connect all terminals as per the chart.

**Step2.** Adjust rated CT Secondary Current 1A/5A. Observe the current value from measurement menu. The actual current should match with relay display.

**Step3.** Repeat the same procedure for other element.

**11.5 Pick up and Trip Test:**

1. Connect current source at R CT terminals 1A/5A current input terminal.
2. Set current setting value to 100% i.e. 1A/5A, TMS at Minimum (x0.01) value.
3. Start current injector to & increase current value till relay get pick up and trip. The operating value should be within 1 to 1.1 times of set pickup value.
4. Select the Curve IEC S Inverse 1 and Set the TMS at 1.00.
5. Connect the assigned trip contact to Timer.
6. Set and apply 2 times current value and measure the timing on timer.
7. The measured timing should be  $\pm 5\%$  of actual timing (10.029 Sec).
8. Repeat the above procedure for remaining phases and Earth Fault.

**Phase Protection Test: -**

Setting IP>1: \_\_\_\_\_ IP>1 TMS =: \_\_\_\_\_

Threshold	Theoretical Value	Relay Value
IP>1 Threshold	_____A	_____A
IP>1 Drop Threshold	_____A	_____A

Time Delay Setting = \_\_\_\_\_

IDMT Characteristics = \_\_\_\_\_ 10 Times \_\_\_\_\_ Sec. (take value from selected curve)

	Threshold	Relay
Time Delay at 2 times of IP>1 setting	_____ms	_____ms
Time Delay at 10 times of IP>1 setting	_____ms	_____ms

**Earth Protection Test: -**

Setting 3Io>1: \_\_\_\_\_ 3Io>1 TMS = : \_\_\_\_\_

Threshold	Theoretical Value	Relay Value
3Io>1 Threshold	_____A	_____A
3Io>1 Drop Threshold	_____A	_____A

Time Delay Setting = \_\_\_\_\_

IDMT Characteristics = \_\_\_\_\_ 10 Times \_\_\_\_\_ Sec.

	Threshold	Relay
Time Delay at 2 times of 3lo>1 setting	_____ms	_____ms
Time Delay at 10 times of 3lo>1 setting	_____ms	_____ms

**Testing of Binary Input:**

1. The Binary inputs shall be tested by applying 19-230V DC voltage to respective binary input terminals.
2. Observed binary input status in Status menu on LCD display
3. Following are the binary inputs terminals

Binary Input Terminals	Binary Input
A3 – A5	In1
A4 – A6	In2
A7 – A9	In3
A8– A10	In4
A11– A13	In5
A12– A14	In6

**11.6 Testing of Binary Output:**

**Output Contact Test:**

1. Assign Relay out1 to out7 for any Status input i.e. In1 to In6
2. Then Apply voltage to respective Status input so the respective relay is operates.
3. After tripping, check continuity in between NO and C output contact terminal.
4. After the Remove voltage of status input respective relay is reset.
5. Again check the continuity in between NO and C output contact terminal.

Binary Output Terminals	Binary Output
A15-A17-A19	OUT 1
A16-A18-A20	OUT 2
A21-A23-A25	OUT 3
A22-A24-A26	OUT 4
A27-A29-A31	OUT 5
A28-A30-A32	OUT 6

**11.7 LED Test:**

1. Assign LED-L1 to LED-L8 for any inputs i.e. In1 to In6
2. Then Apply voltage to respective Status input so the respective LED is operates.  
After the Remove voltage of status input respective LED is off.

**REVISION CONTROL SHEET**

<b>Issue</b>	<b>Date</b>	<b>Brief description of Revision</b>
01	23.05.2016	Original Version



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