

MiCOM P50 Agile P15D

Technical Manual

Dual Powered overcurrent relay

Platform Hardware Version: A

Platform Software Version: 01

Publication Reference: P15D/EN M/C

Conformity

This product conforms the European Community (EC) directive 2004/108/EC on Electromagnetic Compatibility and European Community (EC) directive 2006/95/EC on Low Voltage (LVD). Conformity to the EMC directive has been demonstrated by the technical file route using IEC60255-26 as the top level standard to demonstrate compliance. Conformity to the LVD directive has been demonstrated by the product safety technical file route using IEC60255-27 as the top level standard to demonstrate compliance.

INTRODUCTION

CHAPTER 1

1 CHAPTER OVERVIEW

This chapter consists of the following sections:

- 1 **Chapter overview**
- 2 **Introduction**
 - 2.1 Features
 - 2.2 Functional overview
 - 2.3 Ordering information

2 INTRODUCTION

2.1 Features

The P15D is a dual powered non-directional overcurrent and earth fault relay which provides protection for applications where no external auxiliary power supply is available, or where the auxiliary supply available does not guarantee the dependability required for protection applications. This relay is mainly deployed in industrial installations, distribution network substations and most specifically in Ring Main Unit (RMU) networks for monitoring and protection purposes.

The relay offers supervision functions including measurement, monitoring and recording functions. Industry and utility protocols are available for transmitting relay data to a supervisory control system via communication networks. The user-friendly operator interface facilitates easy reading of measured values and simple configuration of the relay.

Protection & Control

- Timed and instantaneous phase and earth fault protection (3 independent stages)
- Wide range of IEC/IEEE curves
- Thermal overload protection
- Cold load pickup protection
- Inrush blocking
- 4 Digital inputs
- 2 Digital outputs
- 1A/5A ordering option for CTs
- Low energy pulse output tripping for RMU
- Dual power supply option
- Internal battery for maintaining LCD/ communication during faults
- 2 Setting groups
- Password protection
- Self-supervision & internal diagnostics

Measurement, Recording & Post fault analysis

- Metering of Phase & Neutral currents
- Measurement of thermal state
- Up to 100 time tagged event records
- Up to 5 disturbance records
- Battery-backed indication

Front Panel Interface

- 4 LEDs for status indication
- Backlit LCD display (16 x 2)
- 8 navigation keys for setting and interrogation

Communications

- Front USB port for real-time data viewing, device setting, and upload/download.
- Rear EIA (RS) 485 port for SCADA communication
- Multiple protocols - Modbus/ IEC60870-5-103 (user selectable)

2.2 Functional overview

ANSI	FUNCTION	P15D
50	Definite time overcurrent	•
50N	Neutral/Earth definite time overcurrent	•
51	IDMT overcurrent	•
51N	Neutral/Earth IDMT overcurrent	•
68	Inrush Blocking	•
49	Thermal Overload	•
37	Undercurrent detection (aux. power mode)	•
CLP	Cold load pick-up	•
HMI		
	Backlit LCD display	•
	8 x Touch Keys	•
	4 x status LEDs	•
Communication		
	USB port	•
	Modbus/IEC 60870-5-103 (RS485)	•
Binary Input / Output		
	Binary Input	4
	Binary Output	2
	Low energy pulse output for tripping	•
	Energy output for external flag indicator	•
Analogue Input		
	Phase current input 3x1 ph	•
	Phase current input 1x1 ph	•
General		
	Setting Groups	2
	Self diagnostics	•
	Measurements	•
	Event records	•
	Fault records	•
	Disturbance records	•
Hardware		
	Auxiliary supply	a. Internal from CT b. External : 24-50V DC or 100-230V AC/DC (option)
	Climatic conditions	Operating -25°C to +65°C Storage -25°C to + 65°C

ANSI	FUNCTION	P15D
	Housing	Front : IP 52 Rear : IP20

2.3 Ordering information

Variants	Order Number														
	1-4	5	6	7	8	9	10	11	12-13	14	15				
Model Type Dual Powered Over current Relay	P15D														
Auxilliary Voltage 24 – 50 V DC 100 – 230 VAC/DC	1 2														
Current /Voltage transformer Rating In= 1 A , Vn= N/A In=5 A , Vn= N/A	1 2														
Hardware Options EIA RS485 only	1														
I/O Options Standard Input (1 Remote Trip + 1 CB-NO + 2 General propose Input) Standard Output (1 Low Energy Tripping + 1 External Flag Indication + 1 C/O HR +1 C/O SR)	A														
Communication protocol Modbus / IEC 60870-5-103	1														
Case Non drawout	A														
Language English	0														
Software Reference Initial release (v1.xx)	01														
Customisation / Regionalisation Default Customer specific	0 A														
Hardware design suffix Initial release	A														

Figure 1: Ordering Information

SAFETY INFORMATION

CHAPTER 2

1 HEALTH AND SAFETY

Personnel associated with the equipment must be familiar with the contents of this Safety Information.

When electrical equipment is in operation, dangerous voltages are present in certain parts of the equipment. Improper use of the equipment and failure to observe warning notices will endanger personnel.

Only qualified personnel may work on or operate the equipment. Qualified personnel are individuals who are:

- familiar with the installation, commissioning, and operation of the equipment and the system to which it is being connected.
- familiar with accepted safety engineering practises and are authorised to energise and de-energise equipment in the correct manner.
- trained in the care and use of safety apparatus in accordance with safety engineering practises
- trained in emergency procedures (first aid).

The documentation provides instructions for installing, commissioning and operating the equipment. It cannot, however cover all conceivable circumstances. In the event of questions or problems, do not take any action without proper authorisation. Please contact your local sales office and request the necessary information.

2 SYMBOLS

Throughout this manual you will come across the following symbols. You will also see these symbols on parts of the equipment.



Caution:
Refer to equipment documentation. Failure to do so could result in damage to the equipment



Warning:
Risk of electric shock



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.*



Protective conductor (earth) terminal



Instructions on disposal requirements

Note:

The term 'Earth' used in this manual is the direct equivalent of the North American term 'Ground'.

3 INSTALLATION, COMMISSIONING AND SERVICING

3.1 LIFTING HAZARDS

Many injuries are caused by:

- Lifting heavy objects
- Lifting things incorrectly
- Pushing or pulling heavy objects
- Using the same muscles repetitively

Plan carefully, identify any possible hazards and determine how best to move the product. Look at other ways of moving the load to avoid manual handling. Use the correct lifting techniques and Personal Protective Equipment (PPE) to reduce the risk of injury.

3.2 ELECTRICAL HAZARDS



Caution:
All personnel involved in installing, commissioning, or servicing this equipment must be familiar with the correct working procedures.



Caution:
Consult the equipment documentation before installing, commissioning, or servicing the equipment.



Caution:
Always use the equipment as specified. Failure to do so will jeopardise the protection provided by the equipment.



Warning:
Removal of equipment panels or covers may expose hazardous live parts. Do not touch until the electrical power is removed. Take care when there is unlocked access to the rear of the equipment.



Warning:
Isolate the equipment before working on the terminal strips.



Warning:
Use a suitable protective barrier for areas with restricted space, where there is a risk of electric shock due to exposed terminals.



Caution:
Disconnect power before disassembling. Disassembly of the equipment may expose sensitive electronic circuitry. Take suitable precautions against electrostatic voltage discharge (ESD) to avoid damage to the equipment.



Caution:
NEVER look into optical fibres or optical output connections. Always use optical power meters to determine operation or signal level.



Caution:
Testing may leave capacitors charged to dangerous voltage levels. Discharge capacitors by reducing test voltages to zero before disconnecting test leads.



Caution:
Operate the equipment within the specified electrical and environmental limits.



Caution:
Before cleaning the equipment, ensure that no connections are energised. Use a lint free cloth dampened with clean water.

Note:

Contact fingers of test plugs are normally protected by petroleum jelly, which should not be removed.

3.3 UL/CSA/CUL REQUIREMENTS

The information in this section is applicable only to equipment carrying UL/CSA/CUL markings.



Caution:
Equipment intended for rack or panel mounting is for use on a flat surface of a Type 1 enclosure, as defined by Underwriters Laboratories (UL).



Caution:
To maintain compliance with UL and CSA/CUL, install the equipment using UL/CSA-recognised parts for: cables, protective fuses, fuse holders and circuit breakers, insulation crimp terminals, and replacement internal batteries.

3.4 FUSING REQUIREMENTS



Caution:
Where UL/CSA listing of the equipment is required for external fuse protection, a UL or CSA Listed fuse must be used for the auxiliary supply. The listed protective fuse type is: Class J time delay fuse, with a maximum current rating of 15 A and a minimum DC rating of 250 V dc (for example type AJT15).



Caution:
 Where UL/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 dc rating of 250 V dc may be used for the auxiliary supply (for example Red Spot type NIT or TIA).
 For P50 models, use a 1A maximum T-type fuse.
 For P60 models, use a 4A maximum T-type fuse.



Caution:
 Digital input circuits should be protected by a high rupture capacity NIT or TIA fuse with maximum rating of 16 A. for safety reasons, current transformer circuits must never be fused. Other circuits should be appropriately fused to protect the wire used.



Caution:
 CTs must NOT be fused since open circuiting them may produce lethal hazardous voltages

3.5 EQUIPMENT CONNECTIONS



Warning:
 Terminals exposed during installation, commissioning and maintenance may present a hazardous voltage unless the equipment is electrically isolated.



Caution:
 Tighten M4 clamping screws of heavy duty terminal block connectors to a nominal torque of 1.3 Nm.
 Tighten captive screws of terminal blocks to 0.5 Nm minimum and 0.6 Nm maximum.



Caution:
 Always use insulated crimp terminations for voltage and current connections.



Caution:
 Always use the correct crimp terminal and tool according to the wire size.



Caution:
 Watchdog (self-monitoring) contacts are provided to indicate the health of the device on some products. We strongly recommend that you hard wire these contacts into the substation's automation system, for alarm purposes.

3.6 PROTECTION CLASS 1 EQUIPMENT REQUIREMENTS



Caution:
Earth the equipment with the supplied PCT (Protective Conductor Terminal).



Caution:
Do not remove the PCT.



Caution:
The PCT is sometimes used to terminate cable screens. Always check the PCT's integrity after adding or removing such earth connections.



Caution:
Use a locknut or similar mechanism to ensure the integrity of stud-connected PCTs.



Caution:
The recommended minimum PCT wire size is 2.5 mm² for countries whose mains supply is 230 V (e.g. Europe) and 3.3 mm² for countries whose mains supply is 110 V (e.g. North America). This may be superseded by local or country wiring regulations.
For P60 products, the recommended minimum PCT wire size is 6 mm². See product documentation for details.



Caution:
The PCT connection must have low-inductance and be as short as possible.



Caution:
All connections to the equipment must have a defined potential. Connections that are pre-wired, but not used, should be earthed, or connected to a common grouped potential.

3.7 PRE-ENERGISATION CHECKLIST



Caution:
Check voltage rating/polarity (rating label/equipment documentation).



Caution:
Check CT circuit rating (rating label) and integrity of connections.



Caution:
Check protective fuse or miniature circuit breaker (MCB) rating.



Caution:
Check integrity of the PCT connection.



Caution:
Check voltage and current rating of external wiring, ensuring it is appropriate for the application.

3.8 PERIPHERAL CIRCUITRY



Warning:
Do not open the secondary circuit of a live CT since the high voltage produced may be lethal to personnel and could damage insulation. Short the secondary of the line CT before opening any connections to it.

Note:

For most Alstom equipment with ring-terminal connections, the threaded terminal block for current transformer termination is automatically shorted if the module is removed. Therefore external shorting of the CTs may not be required. Check the equipment documentation and wiring diagrams first to see if this applies.



Caution:
Where external components such as resistors or voltage dependent resistors (VDRs) are used, these may present a risk of electric shock or burns if touched.



Warning:
Take extreme care when using external test blocks and test plugs such as the MMLG, MMLB and P990, as hazardous voltages may be exposed. Ensure that CT shorting links are in place before removing test plugs, to avoid potentially lethal voltages.

3.9 UPGRADING/SERVICING



Warning:
Do not insert or withdraw modules, PCBs or expansion boards from the equipment while energised, as this may result in damage to the equipment. Hazardous live voltages would also be exposed, endangering personnel.



Caution:
Internal modules and assemblies can be heavy and may have sharp edges. Take care when inserting or removing modules into or out of the IED.

4 DECOMMISSIONING AND DISPOSAL

**Caution:**

Before decommissioning, completely isolate the equipment power supplies (both poles of any dc supply). The auxiliary supply input may have capacitors in parallel, which may still be charged. To avoid electric shock, discharge the capacitors using the external terminals before decommissioning.

**Caution:**

Avoid incineration or disposal to water courses. Dispose of the equipment in a safe, responsible and environmentally friendly manner, and if applicable, in accordance with country-specific regulations.

5 STANDARDS COMPLIANCE

Compliance with the European Commission Directive on EMC and LVD is demonstrated using a Technical File.



5.1 EMC COMPLIANCE: 2004/108/EC

Compliance with EN60255-26:2009 was used to establish conformity.

5.2 PRODUCT SAFETY: 2006/95/EC

Compliance with EN60255-27:2005 was used to establish conformity.

Protective Class

IEC 60255-27: 2005 Class 1 (unless otherwise specified in equipment documentation). This equipment requires a protective conductor (earth) to ensure user safety.

Installation category

IEC 60255-27: 2005 Overvoltage Category 3. Equipment in this category is qualification tested at 5kV peak, 1.2/50 μ S, 500 Ohms, 0.5 J, between all supply circuits and earth and also between independent circuits.

Environment

IEC 60255-27: 2005, IEC 60255-26:2009. The equipment is intended for indoor use only. If it is required for use in an outdoor environment, 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 IP54.

5.3 R&TTE COMPLIANCE

Radio and Telecommunications Terminal Equipment (R&TTE) directive 99/5/EC.

Conformity is demonstrated by compliance to both the EMC directive and the Low Voltage directive, to zero volts.

5.4 UL/CUL COMPLIANCE

If marked with this logo, the product is compliant with the requirements of the Canadian and USA Underwriters Laboratories.

The relevant UL file number and ID is shown on the equipment.



5.5 ATEX COMPLIANCE

If marked with the logo, the equipment is compliant with article 192 of European directive 94/9/EC. It is approved for operation outside an ATEX hazardous area. It is however approved for connection to Increased Safety, "Ex e", motors with rated ATEX protection, equipment category 2, to ensure their safe operation in gas zones 1 and 2 hazardous areas.



Equipment with this marking is not itself suitable for operation within a potentially explosive atmosphere.

Compliance demonstrated by Notified Body Type Examination Certificate.



II (2) G

ATEX Potentially Explosive Atmospheres directive 94/9/EC for equipment.

HARDWARE DESIGN

CHAPTER 3

1 CHAPTER OVERVIEW

This chapter consists of the following sections:

- 1 **Chapter overview**
- 2 **Hardware Design**
 - 2.1 Overview of Hardware design
 - 2.2 Microcontroller with DSP module
 - 2.2.1 Microcontroller module (Processor board) features
 - 2.3 Analogue input module
 - 2.4 Power supply module

2 HARDWARE DESIGN

The P15D hardware comprises of following main components:-

- Housing, consisting of a front panel and connections at the rear
- Microcontroller module
- Analogue input circuit
- Digital input circuit
- Digital output circuit
- Impulse output circuit
- Communication circuit
- Power supply unit
- Human machine Interface (HMI) module
- External battery backup circuit

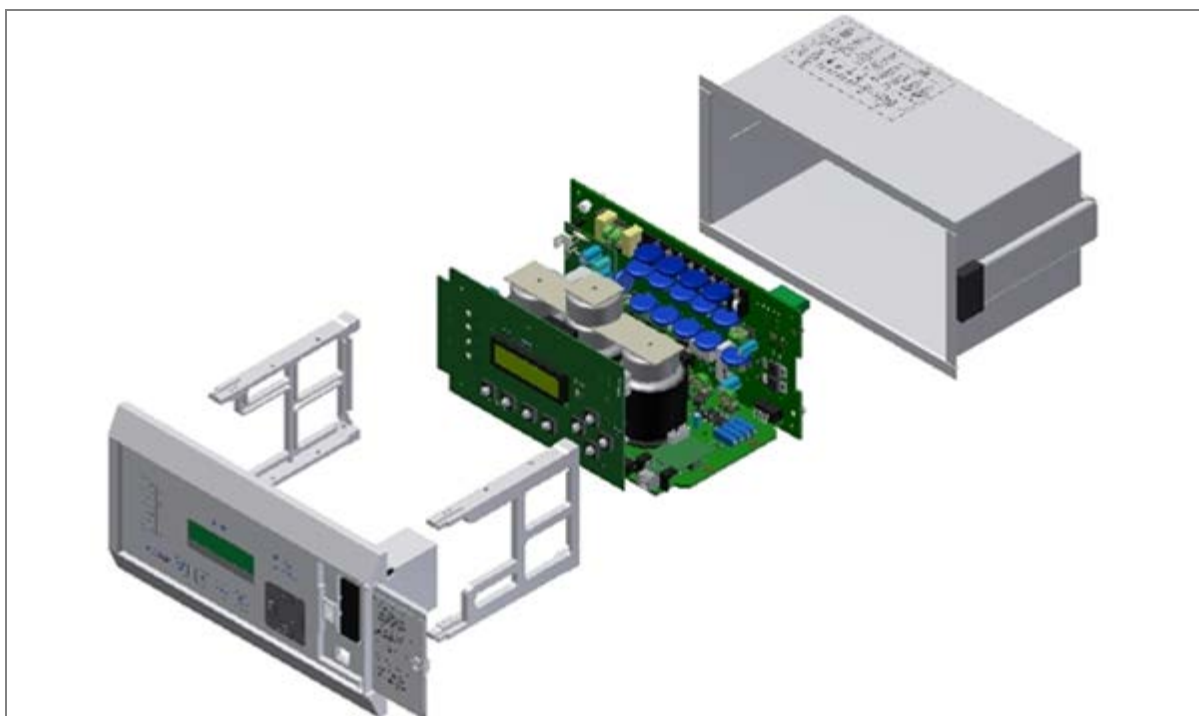


Figure 1: P15D general assembly

2.1 Overview of Hardware design

The P15D hardware design overview is explained with the help of the schematic diagram. The P15D hardware consists of three sets of internal Current Transformers (CTs). Each set consist of three numbers of the CTs basically designed to cater to internal power supply requirements (5 V and 24 V) with rectifier and MOSFET circuit and overcurrent protection requirements. Dedicated CT is available for the earth fault protection requirements. The relay also has provision for the built-in SMPS unit which accepts power supply input of 24-50 V DC or 100-230 V AC/DC from external source and outputs 12 V and 24 V DC for internal circuitry. The current signals acquired as analogue inputs get processed through operational amplifier, filter circuit, multiplexer, ADC (analogue to digital circuit) and finally fed to CPU.

The CPU design is a hybrid of the digital signal processor (DSP) and high speed micro controller which runs complex algorithm for deriving the fundamental & harmonic component from the input current signals. The digital inputs and outputs modules are designed to interface the monitoring, control and protection signals through optically isolated circuit as per the field requirements. The others peripherals modules like 16x2 LCD display, feather touch keys, USB and RS485 communication interfaces, battery backup circuits for relay parameters display, built in memory circuits etc. are integrated as per the schematic diagram and enclosed in the IP-52 enclosure.

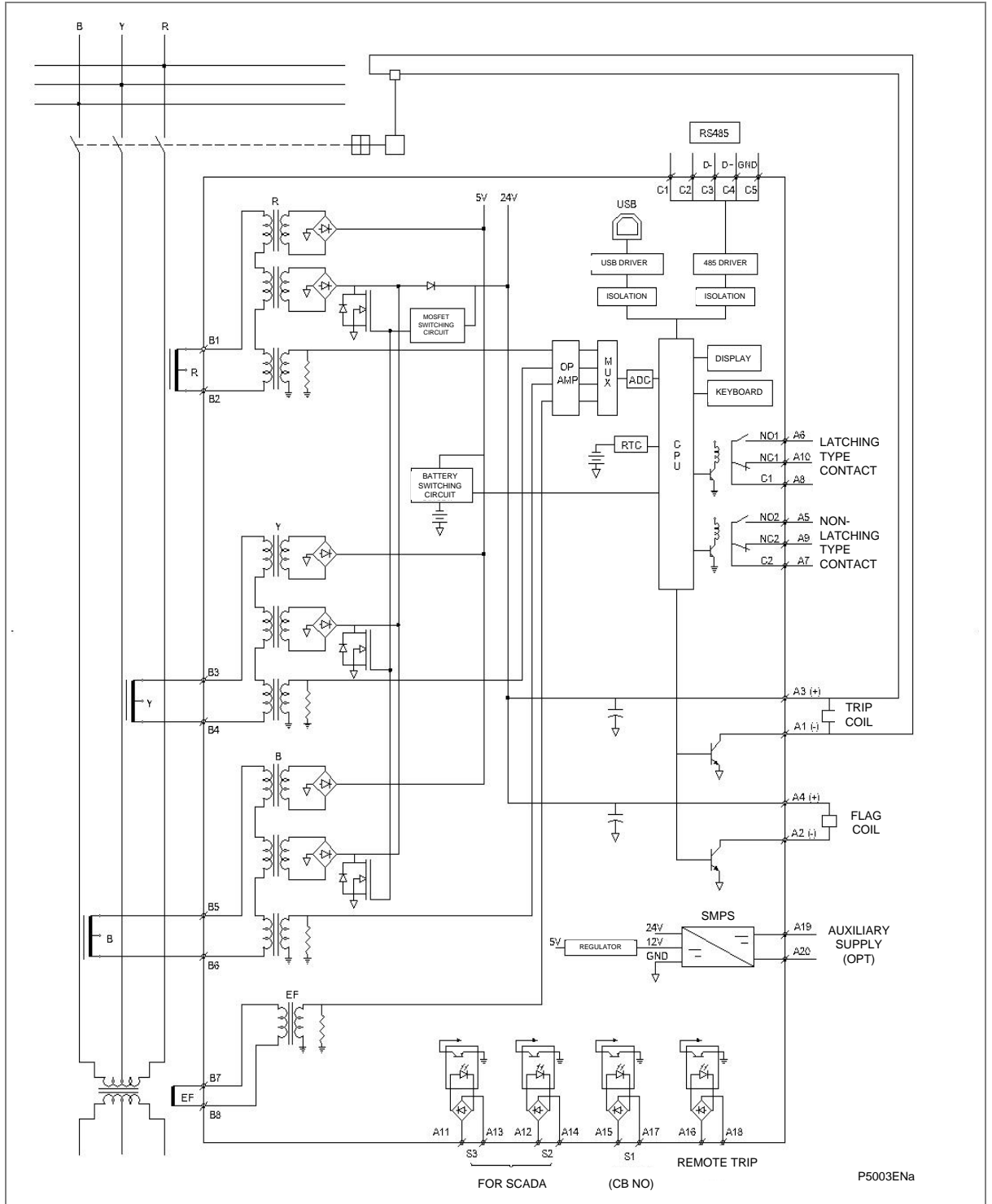


Figure 2: Hardware design overview

2.2 Microcontroller with DSP module

Digital Processing circuit consists of a high speed DSP controller. The high speed DSP controller continuously monitors line phase current and E/F current through CTs, along with different optical isolated status connections. The high-speed micro-controller samples these current signals through A/D converter. The DSP controller performs powerful numerical algorithms to derive fundamental & harmonic contents of the current. All measurement are tuned to fundamental frequency i.e. 50 Hz or 60 Hz depending on the setting, therefore the relay remains stable during distorted waveform caused by various industrial load. These measured values are then used for different protection functions such as IDMT Overcurrent protection, Instantaneous Overcurrent protection, E/F protection etc.

2.2.1 Microcontroller module (Processor board) features

- 16-Bit Single-Chip Microcontroller with built in ADC.
- 256K Bytes built in Reprogrammable Flash memory.
- 20K Bytes Internal SRAM.
- Configurable open-drain output on digital I/O pins
- UART modules with RS-485
- SPI modules
- I2C™ modules
- External Real Time Clock
- 12Bit External ADC with 8 Channels.
- 3 Numbers of FRAM each of 32K Bytes capacity used for storage of events and DR.

2.3 Analogue input module

Analogue input circuit consists of 3 numbers of CT set and 1 number of external EF CT. Each set consists of 3 CTs which are connected in series.

The first CT is used for generation of 24 V, which is required for pulse output for CB operation. The second CT is used for generation of 5 V, which is required for internal circuit supply and the third CT and E/F CT are used for monitoring / protection purposes.

2.4 Power supply module

P15D relay is a dual powered relay, which means the relay is designed to operate on two alternate source power supplies.

- Internal source power supply from built in CT
- External source power supply 24 -50 V DC or 100-230 V AC/DC
- From Internal 3x 1.5 AA size lithium battery *
- From USB *

The optional auxiliary power supply terminals are provided in the relay. The supply range of auxiliary supply is 24-50 V DC or 100 – 230 volts AC/DC. For permanent SCADA connectivity auxiliary supply is required.

**Note: Battery and USB supply used for indication purpose or changing/viewing the relay setting.*

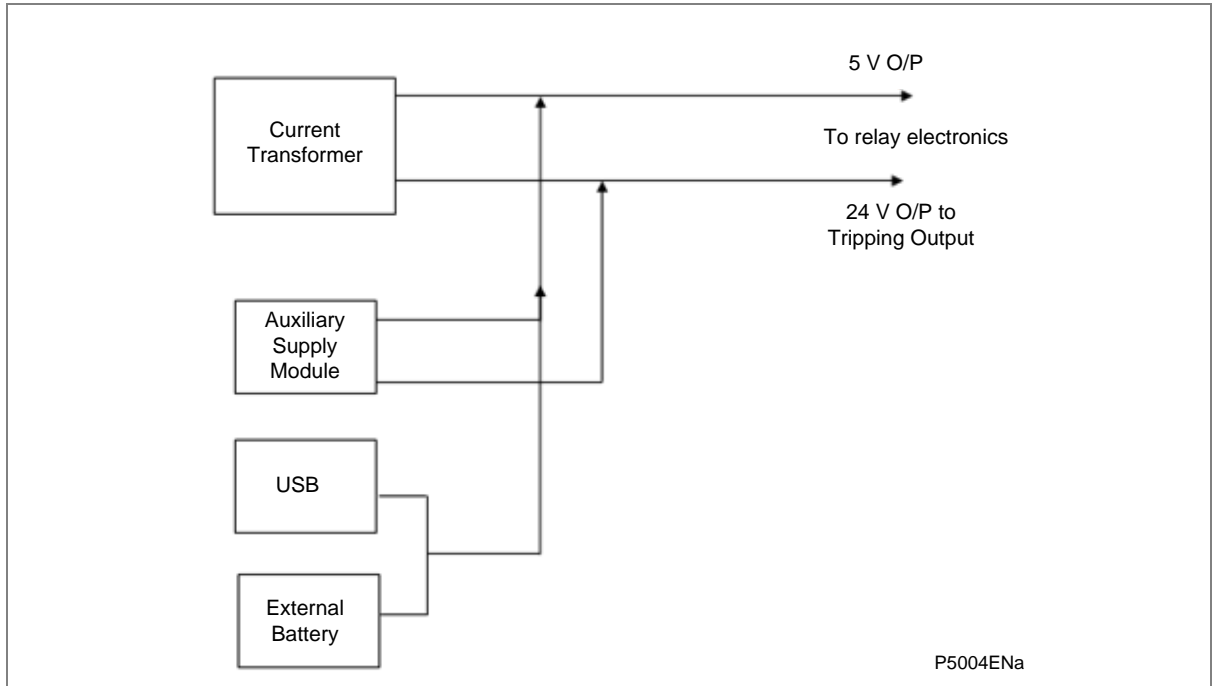


Figure 3: Block diagram of Power supply module

FRONT PANEL

CHAPTER 4

1 CHAPTER OVERVIEW

This chapter consists of the following sections:

- 1 Chapter overview**
- 2 Front panel**
 - 2.1 User Interface
 - 2.1.1 LCD Display
 - 2.1.2 Touch keys
 - 2.1.3 LEDs
 - 2.1.4 RS 485 Port
 - 2.1.5 USB Port

2 FRONT PANEL

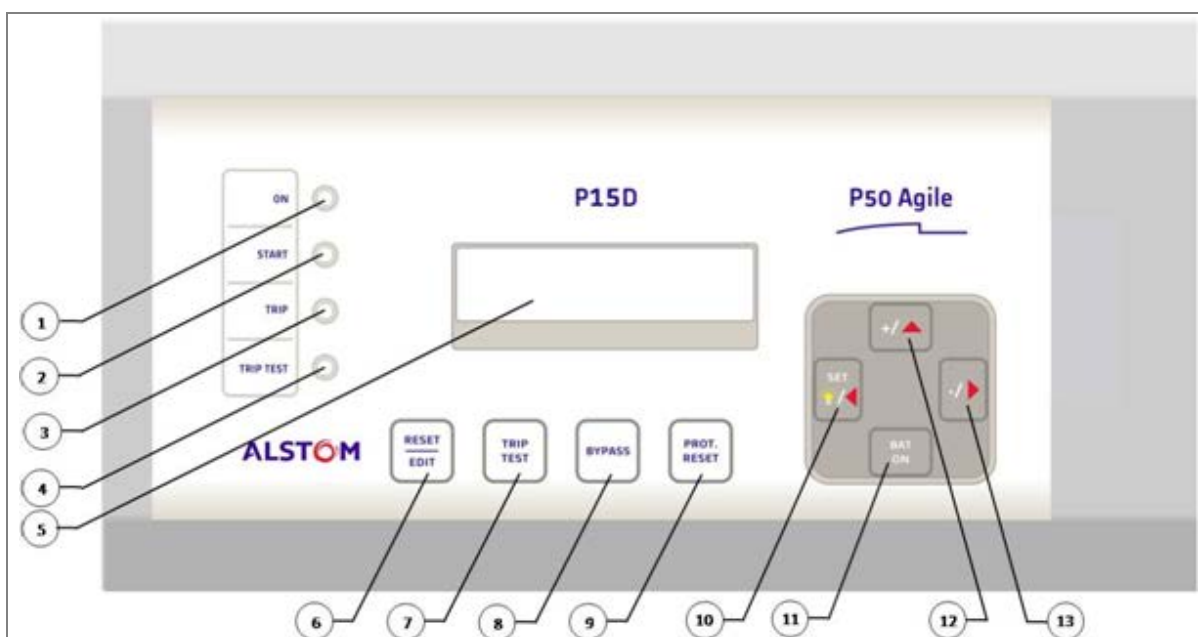


Figure 1: Front panel

SL no	Label	Function
1	ON	Green LED indicates that the power is 'ON' (Requires $\geq 20\%$ of load current) & blinking green LED indicates 'Trip Block function' is enabled or the relay is 'OUT OF SERVICE'.
2	START	Amber LED switches on when the IED registers an alarm. This may be triggered by a fault, event or maintenance record.
3	TRIP	Red LED switches on when the IED issues a trip signal. This will remain on even when fault is cleared and will require a manual/hand reset (HR).
4	TRIP TEST	Amber LED blinks when relay is programmed in test mode. Once switched in test mode, the relay remains in this mode for 15 minutes. After this time, relay automatically returns to service mode.
5	LCD Display	The LCD display is used to view the settings and parameters of the relay.
6	RESET/EDIT	This key performs dual function. <ul style="list-style-type: none"> After the fault, this key functions as 'RESET' key to reset the annunciation and tele signalling contacts (Latch type). During relay configuration, this key functions as 'EDIT' key to edit parameter settings.
7	TRIP TEST	The 'TRIP TEST' key is used for online testing.
8	BYPASS	The 'BYPASS' key is used for bypassing Trip commands.
9	PROT. RESET	The 'PROT. RESET' key is used to reset the hardware. This key to be used along with RESET/EDIT key. Relay will reboot when 'PROT. RESET' + RESET/EDIT pressed simultaneously.
10	SET ☀ / [◀]	☀ The light symbol is used to make backlit display 'ON', / [◀] is for entering parameter setting mode and SET to save settings.
11	BAT. ON	This key is used to switch ON the relay on Battery.
12	+ / ▲	[+] is used to increment the value and [▲] is used to scroll through the Main menu.
13	- / ▶	[-] is used to decrement the value and [▶] is used to view settings
-	USB Port	USB communication port. (access to the USB communication port underneath the cover)

SL no	Label	Function
-	Battery	Capacity 4.5 Volt (1.5 x 3) AA non-rechargeable battery. (access to the Battery underneath the cover)










2.1 User Interface

2.1.1 LCD Display

A backlit LCD display of 16 x 2 characters is provided for parameter and setting display, and for easy viewing of measurement, setting, fault records, date & time and error messages. The backlit display will switch off automatically after 60 seconds if no key is pressed. The backlit display can be switched **ON** by pressing the appropriate key on the front panel. The backlit display will turn **ON** automatically if any tripping occurs.

2.1.2 Touch keys

The function of the relay is controlled by the following keys on the front panel.

	(+) is used to increase the setting value in the display. The (▲) is used to scroll through the menu.
	 Used to turn the backlit LCD ON (◀): left arrow key (◀) is pressed then, you are able to enter the setting mode for modifying settings. SET key is used to save setting changes.
	(-) is used to decrease the setting value in the display. (▶) is used to scroll through the menu.
	BAT ON key used for switching ON the relay on Battery and to view /edit settings and view records.
	RESET key is used to reset the Flag and the annunciation / Tele signalling element. EDIT key is used to edit the setting
	TRIP TEST key is used for performing online testing.
	BYPASS used for bypassing the Trip command
	PROT. RESET key is used for Hardware reset. This key is interlocked with RESET / EDIT key. This key is not required to be pressed in normal operation, but is used to reset the hardware of relay during a relay firmware update.

Note: If changes are not made within 100 s while editing the settings then the display will reset itself and return to the Main Menu.

2.1.3 LEDs

The P15D Relay has 4 high-intensity LEDs for easy identification of fault type and easy user interface.

SL no	Label	Function
LED 1	ON	Green LED indicates that the power is 'ON' (Requires $\geq 20\%$ of load current) & blinking green LED indicates 'Trip Block function' is enabled or the relay is 'OUT OF SERVICE'.
LED 2	START	Amber LED switches on when the IED registers an alarm. This may be triggered by a fault, event or maintenance record.
LED 3	TRIP	Red LED switches on when the IED issues a trip signal. This will remain on even when fault is cleared and will require a manual/hand reset (HR).
LED 4	TRIP TEST	Amber LED blinks when relay is programmed in test mode. Once switched in test mode, the relay remains in this mode for 15 minutes. After this time, relay automatically returns to service mode.

2.1.4 RS 485 Port

RS485 port is provided at the rear of relay (near to terminal block) for permanent SCADA connectivity. The separate 5 Pin connector is used to avoid accidental connection of power wiring to communication input. The RS485 port can be used to download Fault data, Live Event, Disturbance Record etc.

2.1.5 USB Port

The USB port is situated on the front panel in the bottom right hand corner, and can be accessed by opening the flap on the front of the relay. This port is used to communicate with a locally connected PC.

It has three main purposes:

- Transferring settings information to/from the PC from/to the device.
- Downloading firmware updates.
- Downloading relay data for analysis.

The port is intended for temporary connection during testing, installation and commissioning. It is not intended to be used for permanent SCADA communications.

You can connect the unit to a PC with a USB cable up to 15 m in length.

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

For proper operation the user must select the correct communication port in **SYSTEM DATA** menu setting.

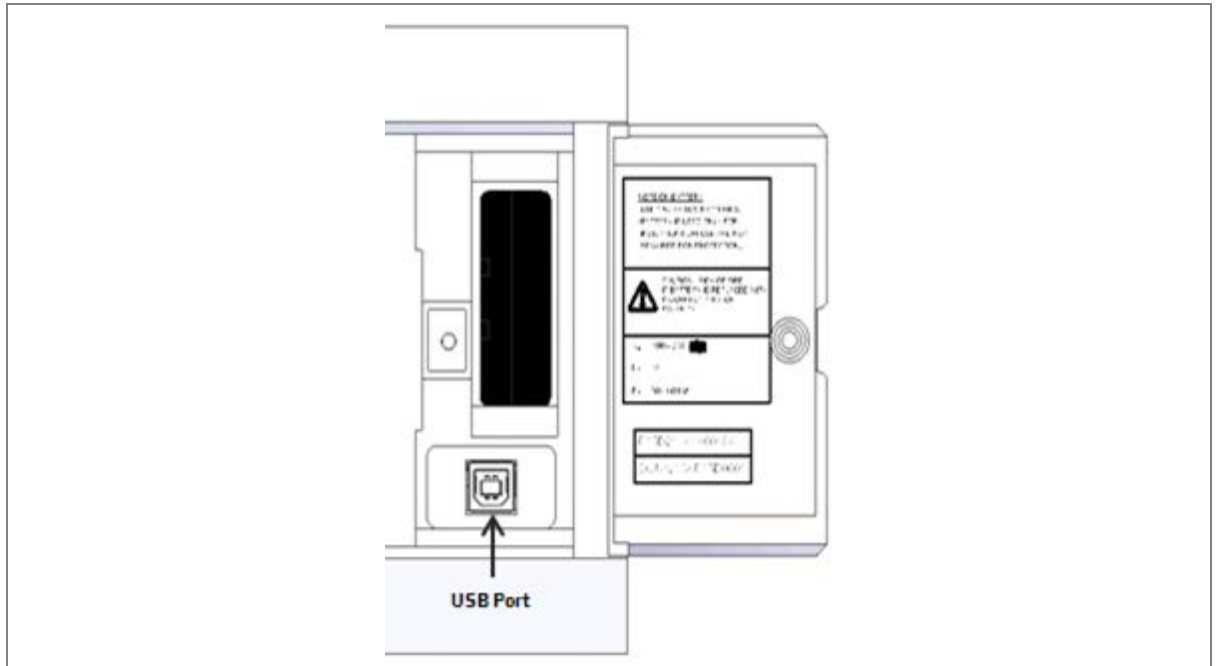


Figure 2: USB port

CONFIGURATION

CHAPTER 5

1 CHAPTER OVERVIEW

This chapter consists of the following sections:

- 1 Chapter overview**
- 2 Configuration**
 - 2.1 Changing the settings
 - 2.2 Procedure for changing the setting of Parameters
 - 2.2.1 General procedure for changing setting of any parameter (with alphabetic value)
 - 2.2.2 General procedure for changing setting of any parameter (with numerical value)
 - 2.3 MENUS
 - 2.3.1 Default display
 - 2.3.2 Main Menu contents
 - 2.3.3 MEASUREMENT menu
 - 2.3.3.1 View contents
 - 2.3.4 CB CONTROL menu
 - 2.3.4.1 Edit settings
 - 2.3.4.2 View settings
 - 2.3.5 DATE AND TIME menu
 - 2.3.5.1 Edit settings
 - 2.3.5.2 View settings
 - 2.3.6 CONFIGURATION menu
 - 2.3.6.1 Edit settings
 - 2.3.6.2 View settings
 - 2.3.7 CT & VT RATIOS menu
 - 2.3.7.1 Edit settings
 - 2.3.7.2 View settings
 - 2.3.8 RECORD CONTROL menu
 - 2.3.8.1 Edit settings
 - 2.3.9 COMMUNICATION menu
 - 2.3.9.1 Edit settings
 - 2.3.9.2 View settings
 - 2.3.10 GROUP 1 menu
 - 2.3.10.1 Edit settings
 - 2.3.11 GROUP 1 – SYSTEM CONFIGURATION submenu
 - 2.3.11.1 Edit settings (if 2nd Harmonic is disabled)
 - 2.3.11.2 Edit settings (If 2nd Harmonic is enabled)
 - 2.3.12 GROUP 1 – OVERCURRENT submenu
 - 2.3.12.1 Edit settings (if I>1Function is disabled)
 - 2.3.12.2 Edit settings (if I>1Function is selected for IEC curve)
 - 2.3.12.3 Edit settings (if I>1Function is selected for IEEE curve)
 - 2.3.12.4 Edit settings (if I>1Function is selected for DT i.e. Definite Time)
 - 2.3.13 GROUP 1 EARTH FAULT submenu
 - 2.3.13.1 Edit settings (if IN>1Function is disabled)
 - 2.3.13.2 Edit settings (if IN>1Function is selected for IEC curve)
 - 2.3.13.3 Edit settings (if IN>1Function is selected for IEEE curve)
 - 2.3.13.4 Edit settings (if IN>1Function is selected for DT i.e. Definite Time)
 - 2.3.14 GROUP 1-THERMAL OVERLOAD submenu
 - 2.3.14.1 Edit settings (if Thermal Overload Characteristic is disabled)
 - 2.3.14.2 Edit settings (if Thermal Overload Characteristic is set as Single)
 - 2.3.15 GROUP 1 - COLD LOAD PICKUP submenu
 - 2.3.15.1 Edit settings (Protection menu)

- 2.3.15.2 Edit settings (for I>1Function, IEC or IEEE curve is selected)
- 2.3.15.3 Edit settings (for I>1Function, DT i.e. Definite Time is selected)
- 2.3.16 GROUP 1 - Under Current Protection submenu
 - 2.3.16.1 Edit settings (if I< Status is set as Disabled)
 - 2.3.16.2 Edit Settings (if I< Status is set as Enabled)
- 2.3.17 GROUP 2 menu
 - 2.3.17.1 Edit settings
- 2.3.18 SYSTEM DATA menu
 - 2.3.18.1 Edit settings
 - 2.3.18.2 View settings
- 2.3.19 VIEW RECORDS menu
 - 2.3.19.1 View contents
 - 2.3.19.2 View Error Log
- 2.4 Configuration flowcharts
 - 2.4.1 Main Menu
 - 2.4.2 View Measurement menu
 - 2.4.3 Edit/View CB Control menu settings
 - 2.4.4 Edit/View Date and Time menu settings
 - 2.4.4.1 Edit settings
 - 2.4.4.2 View settings
 - 2.4.5 Edit/View Configuration menu settings
 - 2.4.5.1 Edit settings
 - 2.4.5.2 View settings
 - 2.4.6 Edit/View CT and VT Ratios menu settings
 - 2.4.7 Edit/View Record Control menu settings
 - 2.4.8 Edit/View Communication menu settings
 - 2.4.9 Edit/View Group 1 menu settings
 - 2.4.10 Edit/View GROUP 1- SYSTEM CONFIG sub menu settings
 - 2.4.10.1 If 2nd Harmonic is Disabled
 - 2.4.10.2 If 2nd Harmonic is Enabled
 - 2.4.11 Edit/View Group 1- Overcurrent sub menu settings
 - 2.4.11.1 If I>1 Function is Disabled
 - 2.4.11.2 For I>1 Function set for IEC curve
 - 2.4.11.3 If I>1 Function set for IEEE curve
 - 2.4.11.4 If I>1 Function set for Definite Time
 - 2.4.12 Edit/View Group 1- Earth Fault sub menu settings
 - 2.4.12.1 If IN>1 Function is Disabled
 - 2.4.12.2 If IN>1 Function is set for IEC curve
 - 2.4.12.3 If IN>1 Function is set for IEEE curve
 - 2.4.12.4 If IN>1 Function is set for Definite Time
 - 2.4.13 Edit/View Group 1-Thermal Overload sub menu setting
 - 2.4.13.1 If the Characteristic is set to Disabled
 - 2.4.13.2 If the Characteristic is set to Single
 - 2.4.14 Edit/View Group 1-Cold Load Pickup sub menu settings
 - 2.4.14.1 Edit/View Cold Load Pickup Protection menu settings
 - 2.4.14.2 Edit/View Cold Load Pickup - I>1 sub menu settings
 - 2.4.15 Edit/View Group 1-Undercurr Prot. Sub menu settings
 - 2.4.15.1 If I< Status is set to Disabled
 - 2.4.15.2 If I< Status is set to Enabled
 - 2.4.16 Edit/View Group 2 menu settings
 - 2.4.17 Edit/View System Data menu settings
 - 2.4.17.1 Edit settings
 - 2.4.17.2 View settings

- 2.4.18 Edit/View Records menu
 - 2.4.18.1 View Fault Record
 - 2.4.18.2 View Error Logs

2 CONFIGURATION

Each product has different configuration parameters according to the functions it has been designed to perform. There is, however, a common methodology used across the entire product to set these parameters.

This chapter describes an overview of this common methodology, as well as providing concise instructions of how to configure the device.

Using the HMI, you can:

- Display and modify settings
- View the digital I/O signal status
- Display measurements
- Display fault records
- Reset fault and alarm indications

The keypad provides full access to the device functionality by means of a range of menu options. Information is displayed on the LCD.

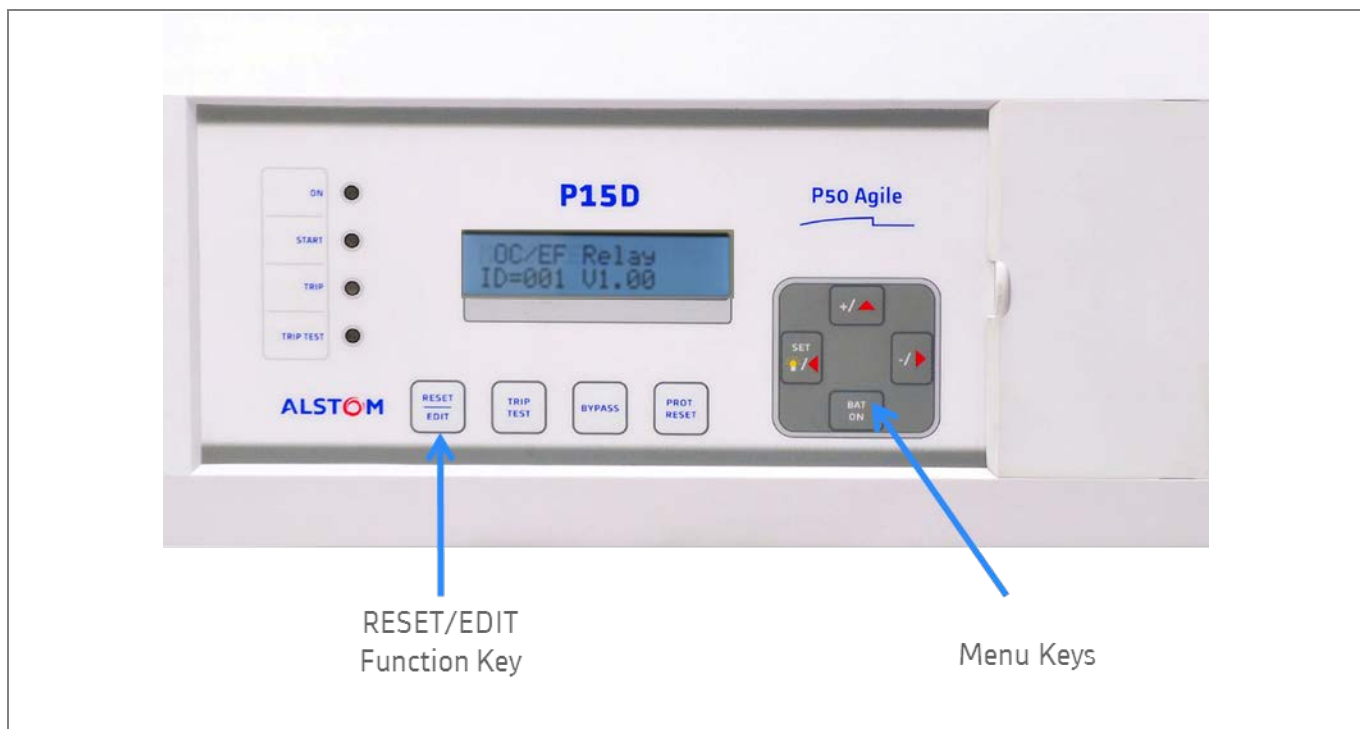


Figure 1: P15D Menu/Function keys

2.1 Changing the settings

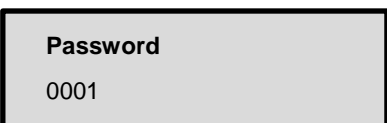
The general procedure for changing settings is explained with an example:

Example: Changing setting for Trip Test function

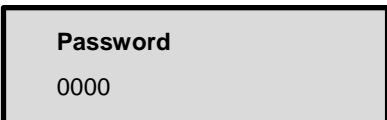
Step 1: Select **CB CONTROL** Menu



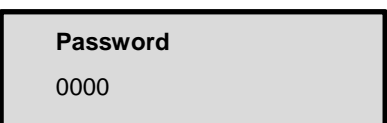
Step 2: Press the (◀) key and password window will appear



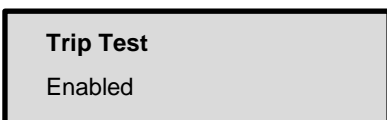
Step 3: Set the desired value using the (+ / ▲) or (- / ▶) key



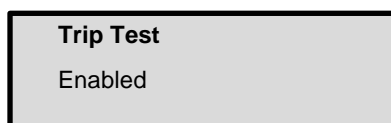
Step 4: After setting the desired password, press the Edit key and the text or number will stop blinking.



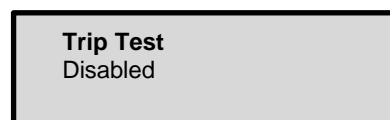
Step 5: Press the (◀) key and the **Trip Test** window will appear



Step 6: Press the Edit key. The text will start blinking and the display will show the following:



Step 7: The desired selection can be set using the (+ / ▲) or (- / ▶) key as shown in the display:

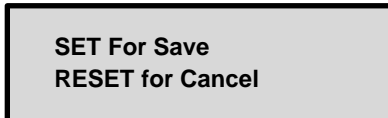


Step 8: After changing the settings, press the Edit key. The text will stop blinking and display the following:

A rectangular box with a black border and a light gray background. The text inside is centered and reads "Trip Test" on the top line and "Enabled" on the bottom line.

Trip Test
Enabled

Step 9: Press the (◀) key. It will ask if you want to save the setting, and display the following:

A rectangular box with a black border and a light gray background. The text inside is centered and reads "SET For Save" on the top line and "RESET for Cancel" on the bottom line.

SET For Save
RESET for Cancel

Step 10: When the (◀) key is pressed again, it will save the changes and display the following:

A rectangular box with a black border and a light gray background. The text inside is centered and reads "OK".

OK

Step 11: If the (+/▲) key is pressed, the relay will display the next setting as follows:

A rectangular box with a black border and a light gray background. The text inside is centered and reads "Latch Relay" on the top line and "Enabled" on the bottom line.

Latch Relay
Enabled

2.2 Procedure for changing the setting of Parameters

2.2.1 General procedure for changing setting of any parameter (with alphabetic value)

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>Trip Test</p> <p>Enabled</p> </div>	<p>Step 1: Press the Edit key, the first alphabet of word will start blinking and shall be displayed as follows.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>Trip Test</p> <p>EEnabled</p> </div>	<p>Step 2: By using the (+ / ▲) or (- / ▸) key, the desired selection can be set as shown in the display.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>Trip Test</p> <p>Disabled</p> </div>	<p>Step 3: After setting, press the Edit key, the text will stop blinking and move to next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>Trip Test</p> <p>Disabled</p> </div>	
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>Trip Test</p> <p>Disabled</p> </div>	<p>Step 4: Press the (◀) key, it will ask if you want to save the setting, and move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>Trip Test</p> <p>Disabled</p> </div>	
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>SET For Save</p> <p>RESET For Cancel</p> </div>	<p>Step 5: When the SET key is pressed it will SAVE the changes, the OK message is displayed and relay will return to the Main Menu. If RESET key is pressed, it will CANCEL the changes and relay returns to the Main Menu.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>OK</p> </div>	
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>OK</p> </div>	
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>OK</p> </div>	
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>OK</p> </div>	
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>CB CONTROL</p> </div>	

2.2.2 General procedure for changing setting of any parameter (with numerical value)

<div style="border: 1px solid black; padding: 5px; text-align: center;">Password = 0000</div>	<p>Step 1: Press the Edit Key the last digit of the number will start blinking and shall be displayed as follows.</p> <p>By using the left arrow key (<input type="checkbox"/>) shifted from right to left.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">Password = 0000</div>	<p>Step 2: By using the (+ ▲) or (- / ▸) key, set the desired numerical Setting</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">Password = 0001</div>	<p>Step 3: After setting press the Edit key, the Number will stop blinking and move to next option.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">Password = 0001</div>	<p>Step 4: When the (◀) key is pressed 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; text-align: center;"> <p>SET For Save</p> <p>RESET For Cancel</p> </div>	<p>Step 5: When the SET key is pressed it will SAVE the changes, the OK message is displayed and relay will return to the Main Menu.</p> <p>If RESET key is pressed, it will CANCEL the changes and relay returns to the Main Menu.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">OK</div>	
<div style="border: 1px solid black; padding: 5px; text-align: center;">SYSTEM DATA</div>	

2.3 MENUS

2.3.1 Default display

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

<div style="border: 1px solid black; padding: 5px; text-align: center;">P50 Agile P15D</div>	<p>This window will flash momentarily showing the following Relay Name: P50 Agile P15D Then the control will go automatically to next window</p>
--	--

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>OC/EF Relay</p> <p>ID = 001 V1.05</p> </div>	<p>This window will flash momentarily showing the following Relay Type: OC/EF Relay Software Version: V1.05 Unit ID = 001 Then the control will go automatically to default window</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>A=0000 A</p> <p>B=0000 A</p> </div>	<p>This window shows actual Primary load current as per the CT Primary selection. Press the (◀) or (▶) key to return to the Main Menu.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>MEASUREMENTS</p> </div>	

2.3.2 Main Menu contents

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>MEASUREMENTS</p> </div>	<p>This menu is to view the Measurement parameters. Press the (+ / ▲) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>CB CONTROL</p> </div>	<p>Password protected window for “CB CONTROL” setting. i.e. Trip Test (Enabled / Disabled), Trip Block (Enabled / Disabled) and Latch Relay (Enabled/ Disabled). Press the (+ / ▲) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>DATE AND TIME</p> </div>	<p>Password protected window for “DATE AND TIME” setting i.e. Local Time Enable, SET Year, SET Month, SET Date, SET Seconds, SET Minutes, SET Hours, RP Time Zone, DST End minutes, DST End Month DST End Day, DST End, DST start minutes DST start Month, DST start Day, DST start, DST Offset, DST Enable and Local Time Offset. Press the (+ / ▲) key to move to the next option</p>

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>CONFIGURATION</p> </div>	<p>Password protected window for “CONFIGURATION” settings i.e. Restore Defaults, Under Current Protection (Enabled / Disabled), Measure’t Setup, Cold Load Pickup (Enabled/Disabled), Thermal Overload (Enabled / Disabled), Earth Fault (Enabled/ Disabled), Over current (Enabled / Disabled), System Configuration (Enabled /Disabled), Setting Value, Setting Group 1, Setting Group 2 and Active Settings. Press the (+ / ▲) key to move to the next option</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>CT AND VT RATIOS</p> </div>	<p>Password protected window for “CT AND VT RATIO ” setting Ph CT Primary and E/F CT Primary Press the (+ / ▲) key to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;">RECORD CONTROL</div>	<p>Password protected window for "RECORD CONTROL" setting i.e. Clear Events, Clear Maint, Clear Dist Rec, Clear Faults and Reset Thermal State.</p> <p>Press the (+ / ▲) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;">COMMUNICATION</div>	<p>Password protected window for "COMMUNICATION" for setting RP1 Address, RP1 Time sync, RP1 Parity and RP1 Baudrate.</p> <p>Press the (+ / ▲) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;">GROUP 1</div>	<p>Password protected window for "GROUP 1" setting i.e. System Configuration, Under Current Protection, Cold Load Pick-up, Thermal Overload, Earth Fault and Over Current Protection.</p> <p>Press the (+ / ▲) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;">GROUP 2</div>	<p>Password protected window for "GROUP 2" setting i.e. System Configuration, Under Current Protection, Cold Load Pick-up, Thermal Overload, Earth Fault and Over Current Protection.</p> <p>Press the (+ / ▲) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;">SYSTEM DATA</div>	<p>Password protected window for "SYSTEM DATA" setting i.e. Frequency, Com. Port and Password.</p> <p>Press the (+ / ▲) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;">VIEW RECORDS</div>	<p>This menu is to view Fault Records and Error logs</p> <p>Press the (+ / ▲) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;">MEASUREMENTS</div>	

2.3.3 MEASUREMENT menu

2.3.3.1 View contents

<div style="border: 2px solid black; padding: 5px; text-align: center;">MEASUREMENTS</div>	<p>Press the (- / ►) key to view the Measurement parameters.</p>

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>A=0000 A</p> <p>B=0000 A</p> </div>	<p>This window shows actual Primary load current as per the CT Primary selection.</p> <p>Press the (+ / ▲) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>C=0000 A</p> <p>N=0000 A</p> </div>	<p>This window shows actual Primary load current as per the CT Primary selection.</p> <p>Press the (+ / ▲) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>a=00.00 b=00.00A</p> <p>c=00.00 n=00.00A</p> </div>	<p>This window shows actual Secondary load current.</p> <p>Press the (+ / ▲) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>Thermal State</p> <p>0000%</p> </div>	<p>This window shows actual Thermal State.</p> <p>Press the (+ / ▲) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>A=0000 A</p> <p>B=0000 A</p> </div>	<p>The window displays the first Measurement parameters.</p> <p>Press the (◀) or (- / ►) key to return to the Main Menu.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>MEASUREMENTS</p> </div>	

2.3.4 CB CONTROL menu

2.3.4.1 Edit settings

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>CB CONTROL</p> </div>	<p>Password protected window for "CB CONTROL" settings i.e. Trip Test, Trip Block and Latch Relay.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>Password = 0001</p> </div>	<p>Press the Edit Key, the number will start blinking.</p> <p>Enter the previously set password by using the (+ / ▲) or (- / ►) key. The Password setting range is 0000 to 9999. The default Password is "0000"</p> <p>After editing the Password, press the Edit key. The number will stop blinking.</p> <p>Press the (◀) key to move to the next option.</p>

<p>Trip Test Enabled</p>	<p>Press the Edit Key, the text will start blinking. By using the (+ / ▲) or (- / ▸) key, Trip Test can be set i.e. Enabled or Disabled. After selecting the desired setting, press the Edit key. The text will stop blinking.** Press the (- / ▸) key to move to the next option. *</p>
<p>Trip Block Enabled</p>	<p>Press the Edit Key, the text will start blinking. By using the (+ / ▲) or (- / ▸) key, the desired Trip Block can be set i.e. Enabled or Disabled. After selecting the desired setting, press the Edit key. The text will stop blinking.** Press the (- / ▸) key to move to the next option. *</p>
<p>Latch Relay Enabled</p>	<p>Press the Edit Key, the text will start blinking. By using the (+ / ▲) or (- / ▸) key, Latch Relay can be set i.e. Enabled or Disabled. After selecting the desired setting, press the Edit key. The text will stop blinking.** Press the (- / ▸) key to move to the next option. *</p>
<p>Trip Test Enabled</p>	<p>The window displays the first setting of the CB Control. Press the (◀) key to move to the next option. *</p>
<p>SET For Save RESET For Cancel</p>	<p>Press the SET / (◀) key to SAVE the changes. Press the RESET key to CANCEL the changes. .</p>
<p>OK</p>	<p>When the SET / (◀) key is pressed the relay will SAVE the changes and this window will flash for moment. The control will return to the main menu.</p>
<p>CB CONTROL</p>	

Note:

* The User can scroll the previous settings by using the (+ / ▲) key.

** After Editing any sub menus of the CB Control setting, If the SET / (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.

2.3.4.2 View settings

<div style="border: 2px solid black; padding: 5px; text-align: center;"> CB CONTROL </div>	Press the (- / ▶) key to view the CB Control settings.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> Trip Test Enabled </div>	This window shows the Trip Test setting done previously. Press the (+ / ▲) key to move to the next option. ***
<div style="border: 2px solid black; padding: 5px; text-align: center;"> Trip Block Enabled </div>	This window shows the Trip Block setting done previously. Press the (+ / ▲) key to move to the next option. ***
<div style="border: 2px solid black; padding: 5px; text-align: center;"> Latch Relay Enabled </div>	This window shows the Latch Relay setting done previously. Press the (+ / ▲) key to move to the next option. ***
<div style="border: 2px solid black; padding: 5px; text-align: center;"> Trip Test Enabled </div>	The window displays the first setting of the CB Control. Press the (◀) or (▶) key to return to the Main Menu.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> CB CONTROL </div>	

*Note: *** By using the (◀) or (▶) key, the relay will return to Main Menu.*

2.3.5 DATE AND TIME menu

2.3.5.1 Edit settings

<div style="border: 2px solid black; padding: 5px; text-align: center;"> DATE AND TIME </div>	Password protected window for "DATE AND TIME" 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, SET Year, Press the (◀) key to move to the next option.

<p>Password = 0000</p>	<p>Press the Edit Key, the number will start blinking.</p> <p>Enter the previously set password by using the (+ / ▲) or (- / ▸) key. The Password setting range is 0000 to 9999. The default Password is "0000"</p> <p>After editing the Password, press the Edit key. The number will stop blinking.</p> <p>Press the (◀) key to move to the next option.</p>
<p>Local Time Enable</p> <p>Fixed</p>	<p>Press the Edit Key the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, Local Time Enable can be set i.e. Fixed / Flexible / Disabled.</p> <p>After selecting the desired Local Time Enable, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option. *</p>
<p>Local Time Offset</p> <p>+000 Mins</p>	<p>Press the Edit Key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, Local Time Offset can be set. The setting range is from +720 to -720 in steps of 15.</p> <p>After editing the setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option. *</p>
<p>DST Enable</p> <p>Yes</p>	<p>Press the Edit Key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, DST Enable can be set i.e. Yes / No</p> <p>After selecting the desired setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option.*</p>
<p>DST Offset</p> <p>60 Mins</p>	<p>Press the Edit Key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, DST Offset can be set. The setting range is 30 / 60</p> <p>After editing the setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option. *</p>
<p>DST Start</p> <p>Last</p>	<p>Press the Edit Key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, DST Start can be set i.e. First / Second / Third / Fourth / Last.</p> <p>After selecting the desired setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option.*</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>DST Start Day</p> <p>Sunday</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, DST Start Day can be set i.e. Sunday to Saturday.</p> <p>After selecting the desired setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>DST Start Month</p> <p>March</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, DST Start Month can be set i.e. January to December</p> <p>After selecting the desired setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>DST Start mins</p> <p>0060 Mins</p> </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, DST Start minutes can be set. The setting range is from 0 to 1425 in steps of 15.</p> <p>After setting the desired DST Start minutes, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>DST End</p> <p>Last</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, DST End can be set i.e. First / Second / Third / Fourth / Last.</p> <p>After selecting the desired setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option.*</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>DST End Day</p> <p>Sunday</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, DST End Day can be set i.e. Sunday to Saturday.</p> <p>After selecting the desired setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>DST End Month</p> <p>October</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, DST End Month can be set i.e. January to December</p> <p>After selecting the desired setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>DST End mins</p> <p>0060 Mins</p> </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, DST End minutes can be set. The setting range is from 0 to 1425 in steps of 15.</p> <p>After editing the desired DST End min, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option.*</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>RP Time Zone</p> <p>Local</p> </div>	<p>Press the Edit, key the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, RP Time Zone can be set i.e. Local / UTC</p> <p>After selecting the desired RP Time Zone, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option.*</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>SET Hours</p> <p>16</p> </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, SET Hours can be set. The setting range is from 0 to 23 in steps of 1.</p> <p>After setting the desired SET Hrs, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option.*</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>SET Minutes</p> <p>27</p> </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, SET Minutes can be set. The setting range is from 0 to 59 in steps of 1.</p> <p>After setting the desired SET Minutes, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>SET Seconds</p> <p>08</p> </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, SET Seconds can be set. The setting range is from 0 to 59 in steps of 1.</p> <p>After setting the desired SET Seconds, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>SET Date</p> <p>16</p> </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, SET Date can be set. The setting range is from 1 to 31 in steps of 1.</p> <p>After setting the desired SET Date, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option. *</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>SET Month</p> <p>01</p> </div>	<p>Press the Edit Key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, SET Month can be set. The setting range is from 1 to 12 in steps of 1.</p> <p>After editing the setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>SET Year</p> <p>14</p> </div>	<p>Press the Edit Key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, SET Year can be set. The setting range is from 00 to 99 in steps of 1.</p> <p>After editing the setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>Local Time Enable</p> <p>Fixed</p> </div>	<p>The Window displays the first setting of Date and Time.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>SET For Save</p> <p>RESET For Cancel</p> </div>	<p>Press the SET / (◀) key to SAVE the changes.</p> <p>Press the RESET key to CANCEL the changes.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>OK</p> </div>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the main menu.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>DATE AND TIME</p> </div>	

Note:

* The User can scroll the previous settings by using the (+ / ▲) key.

** After Editing any sub menus of the DATE AND TIME setting, If the SET/ (▼) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.

2.3.5.2 View settings

<p>DATE AND TIME</p>	<p>Press the (- / ►) key to view the DATE AND TIME setting.</p>
<p>Tm: 15:25:25 Dt: 20/02/14 Thu</p>	<p>This window shows the Date & Time setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Local Time Enable Fixed</p>	<p>This window shows the Local Time Enable setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Local Time Offset +000 Mins</p>	<p>This window shows the Local Time Offset setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>DST Enable Yes</p>	<p>This window shows the DST Enable setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>DST Offset 60 Mins</p>	<p>This window shows the DST Offset setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>DST Start Last</p>	<p>This window shows the DST Start setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>DST Start Day Sunday</p> </div>	<p>This window shows the DST Start Day setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>DST Start Month March</p> </div>	<p>This window shows the DST Start Month setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>DST Start mins 0060 Mins</p> </div>	<p>This window shows the DST Start minutes setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>DST End Last</p> </div>	<p>This window shows the DST End setting done previously. Press the (+ / ▲) key the relay will display as follows. ***</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>DST End Day Sunday</p> </div>	<p>This window shows the DST End Day setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>DST End Month October</p> </div>	<p>This window shows the DST End Month setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>DST End mins 0060 Mins</p> </div>	<p>This window shows the DST End minutes setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>RP Time Zone Local</p> </div>	<p>This window shows the RP Time Zone setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>Tm: 15:25:25 Dt: 20/02/14 Thu</p> </div>	<p>This window shows the Date & Time setting done previously. i.e. first window of Date and Time settings. Press the (◀) or (▶) key to return to the Main Menu.</p>

DATE AND TIME	
----------------------	--

*Note:*** By using the (◀) or (▶) key the relay will return to Main Menu.*

2.3.6 CONFIGURATION menu

2.3.6.1 Edit settings

CONFIGURATION	<p>Password protected window for "CONFIGURATION" settings i.e. Restore Defaults, Active Settings, Setting Group1, Setting Group 2, System Configuration, Over Current, Earth Fault, Thermal Overload, Cold Load Pick-up, Measure't Setup, Under Current protection and Setting Value.</p> <p>Press the (◀) key to move to the next option.</p>
Password = 0000	<p>Press the Edit key, the number will start blinking.</p> <p>Enter the previously set password by using the (+ / ▲) or the (- / ▶) key. The Password setting range is 0000 to 9999. The default Password is "0000"</p> <p>After editing the Password, press the Edit key. The number will stop blinking.</p> <p>Press the (◀) key to move to the next option.</p>
Restore Defaults No Operation	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▶) key, Restore Defaults can be set i.e. No Operation / All Settings / Setting Group 1 / Setting Group 2.</p> <p>After selecting the desired Restore Default setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ▶) key to move to the next option. *</p>
Active Settings Group 1	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▶) key, Active Setting can be set i.e. Group 1 / Group 2.</p> <p>After selecting the desired Active Settings, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ▶) key to move to the next option. *</p>

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>Setting Group 1</p> <p>Enabled</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, Setting Group 1 can be set i.e. Enabled or Disabled.</p> <p>After selecting the desired Setting Group 1 setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>Setting Group 2</p> <p>Enabled</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, Setting Group 2 can be set i.e. Enabled or Disabled.</p> <p>After selecting the desired Setting Group 2 setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>System Config</p> <p>Enabled</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, System Configuration can be set i.e. Enabled or Disabled.</p> <p>After selecting the desired System Configuration setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>Overcurrent</p> <p>Enabled</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, Overcurrent can be set i.e. Enabled or Disabled.</p> <p>After selecting the desired Overcurrent setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>Earth Fault</p> <p>Enabled</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, Earth Fault can be set i.e. Enabled or Disabled.</p> <p>After selecting the desired Earth Fault setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>Thermal Overload</p> <p>Enabled</p> </div>	<p>Press the Edit Key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, Thermal Overload can be set i.e. Enabled or Disabled.</p> <p>After selecting the desired Thermal Overload setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>Cold Load Pickup</p> <p>Enabled</p> </div>	<p>Press the Edit Key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, Cold Load Pickup can be set i.e. Enabled or Disabled.</p> <p>After selecting the desired Cold Load Pickup setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>Measure't setup</p> <p>ABC</p> </div>	<p>Press the Edit Key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, Measure't Setup can be set i.e. ABC or RYB.</p> <p>After selecting the desired Measure't setup setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>UnderCurr Prot</p> <p>Enabled</p> </div>	<p>Press the Edit Key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, Under Current Protection can be set i.e. Enabled or Disabled.</p> <p>After selecting the desired Under Current Protection setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>Setting Value</p> <p>Secondary</p> </div>	<p>This is Non Editable Setting.</p> <p>Press the (- / ▸) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>Restore Defaults</p> <p>No Operation</p> </div>	<p>The window displays the first setting of the Configuration menu.</p> <p>Press the (◀) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>SET For Save</p> <p>RESET For Cancel</p> </div>	<p>Press the SET / (◀) key to SAVE the changes.</p> <p>Press the RESET key to CANCEL the changes.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>OK</p> </div>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes, this window will flash for moment. The control will return to the main menu.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>CONFIGURATION</p> </div>	

Note:

* *The User can scroll the previous settings by using the (+ / ▲) key.*

** *After Editing any sub menus of the CONFIGURATION setting, If the SET/ (▼) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.*

2.3.6.2 View settings

<p>CONFIGURATION</p>	<p>Press the (- / ►) key to view the Configuration setting</p>
<p>Restore Defaults No Operation</p>	<p>This window shows the Restore Defaults setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Active Setting Group 1</p>	<p>This window shows the Active setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Setting Group 1 Enabled</p>	<p>This window shows the Setting Group 1 setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Setting Group 2 Enabled</p>	<p>This window shows the Setting Group 2 setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>System Config Enabled</p>	<p>This window shows the System Configuration setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Overcurrent Enabled</p>	<p>This window shows the Over Current setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>

<p>Earth Fault</p> <p>Enabled</p>	<p>This window shows the Earth Fault setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Thermal Overload</p> <p>Enabled</p>	<p>This window shows the Thermal Overload setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Cold Load Pickup</p> <p>Enabled</p>	<p>This window shows the Cold Load Pickup setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Measure't Setup</p> <p>ABC</p>	<p>This window shows the Measure't Setup setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>UnderCurr Prot</p> <p>Enabled</p>	<p>This window shows the Under Current Protection setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Setting Value</p> <p>Secondary</p>	<p>This window shows the Setting Value setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Restore Defaults</p> <p>No Operation</p>	<p>This window is the first window of Configuration settings. Press the (◀) or (▶) key to return to the Main Menu.</p>
<p>CONFIGURATION</p>	

*Note: *** By using the (◀) or (▶) key, the relay will return to Main Menu.*

2.3.7 CT & VT RATIOS menu

2.3.7.1 Edit settings

<div style="border: 2px solid black; padding: 5px; text-align: center;"> CT AND VT RATIOS </div>	<p>Password protected window for "CT AND VT RATIOS settings i.e. Phase CT Primary and E/F CT Primary.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> Password = 0000 </div>	<p>Press the Edit Key, the number will start blinking.</p> <p>Enter the previously set password by using the (+ / ▲) or (- / ▶) key. The Password setting range is 0000 to 9999. The default Password is "0000"</p> <p>After editing the Password, press the Edit key. The number will stop blinking.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> Phase CT Primary 00100 A </div>	<p>Press the Edit Key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▶) key, Phase CT Primary can be set. The setting range is from 1 to 30000 in steps of 1.</p> <p>After editing the Phase CT Primary setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ▶) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> E/F CT Primary 00100 A </div>	<p>Press the Edit Key the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▶) key, E/F CT Primary can be set. The setting range is from 1 to 30000 in steps of 1.</p> <p>After editing the E/F CT Primary setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ▶) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> Phase CT Primary 00100 A </div>	<p>The window displays the first setting of the CT & VT RATIOS.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> SET For Save RESET For Cancel </div>	<p>Press the SET / (◀) key to SAVE the changes.</p> <p>Press the RESET key to CANCEL the changes.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> OK </div>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the main menu.</p>

CT AND VT RATIOS	
-------------------------	--

Note:

* The User can scroll the previous settings by using the (+ / ▲) key.

** After editing any sub menus of the CT AND VT RATIOS setting, If the SET/ (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.

2.3.7.2 View settings

CT AND VT RATIOS	Press the (- / ▶) key to view the CT AND VT RATIOS settings.
Phase CT Primary 00100 A	This window shows the Phase CT Primary setting done previously. Press the (+ / ▲) key to move to the next option. ***
Phase CT Sec'y 00001 A	This window shows the Phase CT Secondary setting done previously. Press the (+ / ▲) key to move to the next option. ***
E/F CT Primary 00100 A	This window shows the E/F CT Primary setting done previously. Press the (+ / ▲) key to move to the next option. ***
E/F CT Secondary 00001 A	This window shows the E/F CT Secondary setting done previously. Press the (+ / ▲) key to move to the next option. ***
Phase CT Primary 00100 A	The window displays the first setting of the CT & VT RATIOS. Press the (◀) or (▶) key to return to the Main Menu.

CT AND VT RATIOS	
-------------------------	--

*Note: *** By using the (◀) or (▶) key the relay will return to Main Menu.*

2.3.8 RECORD CONTROL menu

2.3.8.1 Edit settings

RECORD CONTROL	<p>Password protected window for "RECORD CONTROL" settings i.e. Clear Events, Clear Faults, Clear Dist Records and Clear Maint. Reset Thermal State</p> <p>Press the (◀) key to move to the next option.</p>
Password = 0000	<p>Press the Edit Key, the number will start blinking.</p> <p>Enter the previously set password by using the (+ / ▲) or (- / ▶) key. The Password setting range is 0000 to 9999. The default Password is "0000"</p> <p>After editing the Password, press the Edit key. The number will stop blinking.</p> <p>Press the (◀) key to move to the next option..</p>
Clear Events No	<p>Press the Edit Key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▶) key, Clear Events can be set i.e. Yes / No.</p> <p>After selecting the desired Clear Events setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ▶) key to move to the next option. *</p>
Clear Faults No	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▶) key, Clear Faults can be set i.e. Yes / No.</p> <p>After selecting the desired Clear Faults setting press the Edit key, the text will stop blinking. **</p> <p>Press the (- / ▶) key to move to the next option. *</p>
Clear Dist Rec No	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▶) key, Clear Disturbance Rec can be set i.e. Yes / No.</p> <p>After selecting the desired Clear Dist Rec setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ▶) key to move to the next option. *</p>

<p>Clear Maint</p> <p>No</p>	<p>Press the Edit Key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, Clear Maint can be set i.e. Yes / No.</p> <p>After selecting the desired Clear Maint setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<p>Thermal Reset</p> <p>No</p>	<p>Press the Edit Key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, Thermal Reset can be set i.e. Yes / No.</p> <p>After selecting the desired Thermal Reset setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<p>Clear Events</p> <p>No</p>	<p>The window displays the first setting of the Record Control.</p> <p>Press the (◀) key the relay show as follows</p>
<p>SET For Save</p> <p>RESET For Cancel</p>	<p>Press the SET / (◀) key to SAVE the changes.</p> <p>Press the RESET key to CANCEL the changes.</p>
<p>OK</p>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the main menu.</p>
<p>RECORD CONTROL</p>	

Note:

* The User can scroll the previous settings by using the (+ / ▲) key.

** After Editing any sub menus of the RECORD CONTROL, If the SET/ (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.

2.3.9 COMMUNICATION menu

2.3.9.1 Edit settings

<p style="text-align: center;">COMMUNICATION</p>	<p>Password protected window for "COMMUNICATION" settings i.e. RP1 Address, RP1 Baudrate, RP1 Parity and RP1 Timesync. Press the (▶) key to move to the next option.</p>
<p style="text-align: center;">Password = 0000</p>	<p>Press the Edit Key, the number will start blinking. Enter the previously set password by using the (+ / ▲) or (- / ▶) key. The Password setting range is 0000 to 9999. The default Password is "0000" After editing the Password, press the Edit key. The number will stop blinking. Press the (◀) key to move to the next option.</p>
<p style="text-align: center;">RP1 Address 001</p>	<p>Press the Edit Key, the number will start blinking. By using the (+ / ▲) or (- / ▶) key, the desired RP1 Address can be set. The setting range is from 1 to 247 in steps of 1. After editing the RP1 Address setting, press the Edit key. The number will stop blinking. ** Press the (- / ▶) key to move to the next option. *</p>
<p style="text-align: center;">RP1 Baudrate 57600 BPS</p>	<p>Press the Edit Key, the number will start blinking. By using the (+ / ▲) or (- / ▶) key, RP1 Baudrate can be set. i.e. 9600 / 14400 / 19200 / 28800 / 38400 / 57600 After editing the RP1 Baudrate setting, press the Edit key. The number will stop blinking. ** Press the (- / ▶) key to move to the next option. *</p>
<p style="text-align: center;">RP1 Parity Even</p>	<p>Press the Edit Key, the text will start blinking. By using the (+ / ▲) or (- / ▶) key, RP1 Parity can be set i.e. Even / Odd / None. After selecting the RP1 Parity setting, press the Edit key. The text will stop blinking. ** Press the (- / ▶) key to move to the next option. *</p>
<p style="text-align: center;">RP1 Timesync Enabled</p>	<p>Press the Edit Key, the text will start blinking. By using the (+ / ▲) or (- / ▶) key, RP1 Timesync can be set i.e. Enabled / Disabled After selecting the RP1 Timesync setting, press the Edit key. The text will stop blinking. ** Press the (- / ▶) key to move to the next option. *</p>

<p>RP1 Address</p> <p>001</p>	<p>The window displays the first setting of the Communication Menu. Press the (◀) key the relay show as follows</p>
<p>SET For Save</p> <p>RESET For Cancel</p>	<p>Press the SET / (◀) key to SAVE the changes. Press the RESET key to CANCEL the changes..</p>
<p>OK</p>	<p>When the SET / (◀) key is pressed , the relay will SAVE the changes and this window will flash for moment. The control will return to the main menu.</p>
<p>COMMUNICATION</p>	

Note:

* The User can scroll the previous settings by using the (+ / ▲) key.

** After Editing any sub menus of the COMMUNICATION setting, If the SET/ (◀) key is pressed, the Relay display SET to SAVE the changes or RESET to CANCEL the changes.

2.3.9.2 View settings

<p>COMMUNICATION</p>	<p>Press the (- / ▶) key to view the communication settings.</p>
<p>RP1 Address</p> <p>001</p>	<p>This window shows the RP1 Address setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>RP1 Baudrate</p> <p>57600 BPS</p>	<p>This window shows the RP Baudrate setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>

<p>RP1 Parity Even</p>	<p>This window shows the RP1 Parity setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>RP1 Timesync Disabled</p>	<p>This window shows the RP1 Timesync setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>RP1 Address 1</p>	<p>The window displays the first setting of the Communication menu. Press the (◀) or (▶) key to return to Main Menu.</p>
<p>COMMUNICATION</p>	

*Note: *** By using the (◀) or (▶) key, the relay will return to Main Menu.*

2.3.10 GROUP 1 menu

2.3.10.1 Edit settings

<p>GROUP</p>	<p>Password protected window for “GROUP 1” settings i.e. System Configuration Over Current, Earth Fault, Thermal Overload, Cold Load Pickup and Under Current Protection. Press the (◀) key to move to the next option.</p>
<p>Password = 0000</p>	<p>Press the Edit Key, the number will start blinking. Enter the previously set password by using the (+ / ▲) or (- / ▶) key. The Password setting range is 0000 to 9999. The default Password is “0000” After editing the Password, press the Edit key. The number will stop blinking. Press the (◀) key to move to the next option. By using the (+ / ▲) or (- / ▶) key, the Protection Function setting menu can be scrolled and will be displayed as below.</p>
<p>SYSTEM CONFIG</p>	<p>Password protected window for “SYSTEM CONFIGURATION” settings.</p>

OVERCURRENT	Password protected window for "OVERCURRENT" Protection settings.
EARTH FAULT	Password protected window for "EARTH FAULT" Protection settings.
THERMAL OVER LOAD	Password protected window for "THERMAL OVERLOAD" Protection settings.
COLD LOAD PICKUP	Password protected window for "COLD LOAD PICKUP" Protection settings.
UNDERCURRE PROT	Password protected window for "UNDERCURRENT" Protection settings.

2.3.11 GROUP 1 – SYSTEM CONFIGURATION submenu

2.3.11.1 Edit settings (if 2nd Harmonic is disabled)

System Config	By using the (+ / ▲) or (- / ▸) key, select the System Configuration setting menu in Group 1. Press the (◀) key to move to the next option.
2nd Harmonic Disabled	Press the Edit Key, the text will start blinking. By using the (+ / ▲) or (- / ▸) key, 2nd Harmonic can be set i.e. Enabled / Disabled After selecting the 2 nd Harmonic setting, press the Edit key. The text will stop blinking. # Press the (◀) key to move to the next option.
SET For Save RESET For Cancel	Press the SET / (◀) key to SAVE the changes. Press the RESET key to CANCEL the changes.

OK	When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the main menu.
GROUP 1	

2.3.11.2 Edit settings (If 2nd Harmonic is enabled)

System Config	By using the (+ / ▲) or (- / ▼) key, select the System Configuration setting menu in Group 1. Press the (◀) key to move to the next option.
2nd Harmonic Disabled	Press the Edit Key, the text will start blinking. By using the (+ / ▲) or (- / ▼) key, 2nd Harmonic can be set i.e. Enabled / Disabled After selecting the desired 2 nd Harmonic setting, press the Edit key. The text will stop blinking. # Press the (◀) key to move to the next option.
2nd Harm Thresh 20%	Press the Edit Key, the number will start blinking. By using the (+ / ▲) or (- / ▼) key, 2nd Harmonic Threshold can be set. The setting range is from 5% to 70% in steps of 1%. After editing the 2 nd Harmonic Threshold setting, press the Edit key. The number will stop blinking. ** Press the (- / ▼) key to move to the next option. *
I>Lift 2H 10.00 A	Press the Edit Key, the number will start blinking. By using the (+ / ▲) or (- / ▼) key, I>Lift 2H can be set. The setting range is from 4 to 32*In in steps of 1. After editing the I> Lift 2H setting, press the Edit key. The number will stop blinking. ** Press the (- / ▼) key to move to the next option. *
2nd Harm Thresh 20%	The window displays the first setting of the System Configuration menu. Press the (◀) key to move to the next option.
SET For Save RESET For Cancel	Press the SET / (◀) key to SAVE the changes. Press the RESET key to CANCEL the changes.

OK	When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the main menu.
GROUP 1	

Note:

#. If the function is set as **enable** then the relay will allow to edit the settings of respective sub menus. If the function is set as **disable** then the relay will not allow to edit the settings.

* The User can scroll the previous settings by using the (+ / ▲) key.

** After Editing any sub menus of the System Configuration setting, If the SET/ (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.

2.3.12 GROUP 1 – OVERCURRENT submenu

2.3.12.1 Edit settings (if I>1Function is disabled)

Overcurrent	By using the (+ / ▲) or (- / ▶) key, select the Over Current setting menu in Group 1. Press the (◀) key to move to the next option.
I>1 Function Disabled	Press the Edit Key, the text will start blinking. By using the (+ / ▲) or (- / ▶) key the desired I>1 Function (Curve Selection) can be set i.e. Disabled / US ST Inverse / US Inverse / IEEE E Inverse / IEEE V Inverse / IEEE M Inverse / UK LT Inverse / IEC E Inverse / IEC V Inverse / S Inverse (1.3 Sec) / IEC S Inverse and DT. # After selecting the desired I>1 Function, press the Edit Key. The text will stop blinking. Press the (◀) key to move to the next option.
SET For Save RESET For Cancel	Press the SET / (◀) key to SAVE the changes. Press the RESET key to CANCEL the changes.

<div style="border: 2px solid black; padding: 5px; width: 100px; margin: 0 auto;">OK</div>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the Main Menu.</p>
<div style="border: 2px solid black; padding: 5px; width: 100px; margin: 0 auto;">GROUP 1</div>	

2.3.12.2 Edit settings (if I>1Function is selected for IEC curve)

<div style="border: 2px solid black; padding: 5px; width: 100px; margin: 0 auto;">Overcurrent</div>	<p>By using the (+ / ▲) or (- / ►) key, select the Over Current setting menu in Group 1.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: 100px; margin: 0 auto;">I>1 Function IEC S Inverse</div>	<p>Press the Edit Key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, I>1 Function (Curve Selection) can be set i.e. Disable / US ST Inverse / US Inverse / IEEE E Inverse / IEEE V Inverse / IEEE M Inverse / UK LT Inverse / IEC E Inverse / IEC V Inverse / S Inverse (1.3 Sec) / IEC S Inverse and DT.#</p> <p>After selecting the desired I>1 Function, press the Edit key. The text will stop blinking.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: 100px; margin: 0 auto;">I>1 Current Set 1.00 A</div>	<p>Press the Edit Key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, I>1 Current Set can be set. The setting range is from 0.20 to 2.50 in steps of 0.01.</p> <p>After editing the I>1 Current Set setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: 100px; margin: 0 auto;">I>1 TMS 1.00</div>	<p>Press the Edit Key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, I>1 TMS can be set. The setting range is from 0.025 to 1.200 in steps of 0.005.</p> <p>After editing the desired I>1 TMS, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>I>1 tRESET</p> <p>1.00 S</p> </div>	<p>Press the Edit Key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, I>1 tRESET can be set. The setting range is from 0 to 100s in steps of 0.01s.</p> <p>After editing the I>1 tReset setting, press the Edit key. The number will stop blinking.**</p> <p>Press the (- / ▸) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>I>1 2H Blocking</p> <p>Enabled</p> </div>	<p>Press the Edit Key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, I>1 2H Blocking function can be set i.e. Enabled / Disabled.</p> <p>After selecting the desired I>1 2H Blocking setting, press the Edit key. The text will stop blinking.**</p> <p>Press the (◀) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>I>1 Current Set</p> <p>1.00 A</p> </div>	<p>The window displays the first setting of the Overcurrent menu.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>SET For Save</p> <p>RESET For Cancel</p> </div>	<p>Press the SET / (◀) key to SAVE the changes.</p> <p>Press the RESET key to CANCEL the changes.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>OK</p> </div>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the Main Menu.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>GROUP 1</p> </div>	

Note:

#. If the function is set as enable then the relay will allow editing the settings of respective sub menus. If the function is set as disable then the relay will not allow editing the settings of sub menus and will bypass the protection function.

* The User can scroll the previous settings by using the (+ / ▲) key.

** After Editing any sub menus of the Over Current setting, If the SET/ (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.

2.3.12.3 Edit settings (if I>1Function is selected for IEEE curve)

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>Overcurrent</p> </div>	<p>By using the (+ / ▲) or (- / ►) key, select the Over Current setting menu in Group 1.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>I>1 Function</p> <p>US ST Inverse</p> </div>	<p>Press the Edit Key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, I>1 Function (Curve Selection) can be set i.e. Disable / US ST Inverse / US Inverse / IEEE E Inverse / IEEE V Inverse / IEEE M Inverse / UK LT Inverse / IEC E Inverse / IEC V Inverse / S Inverse (1.3 Sec) / IEC S Inverse and DT.#</p> <p>After selecting the desired I>1 Function, press the Edit key. The text will stop blinking.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>I>1 Current Set</p> <p>1.00 A</p> </div>	<p>Press the Edit Key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, I>1 Current Set can be set. The setting range is from 0.20 to 2.50 in steps of 0.01.</p> <p>After editing the I>1 Current Set Setting, press the Edit key. The number will stop blinking.**</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>I>1 Time Dial</p> <p>1.00</p> </div>	<p>Press the Edit Key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, I>1 Time Dial can be set. The setting range is from 0.01 to 100 in steps of 0.01.</p> <p>After editing the I>1 Time Dial setting, press the Edit key. The number will stop blinking.**</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>I>1 tRESET</p> <p>1.00 S</p> </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, I>1 tRESET can be set. The setting range is from 0 to 100s in steps of 0.01s.</p> <p>After editing the I>1 tReset setting, press the Edit key. The number will stop blinking.**</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>I>1 2H Blocking</p> <p>Enabled</p> </div>	<p>Press the Edit key, the text value will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, I>1 2H Blocking function can be set i.e. Enabled / Disabled.</p> <p>After selecting the I>1 2H Blocking setting, press the Edit key. The text will stop blinking.**</p> <p>Press the (◀) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>I>1 Current Set</p> <p>1.00 A</p> </div>	<p>The window displays the first setting of the Over Current menu.</p> <p>Press the (◀) key to move to the next option. *</p>

<p style="text-align: center;">SET For Save</p> <p style="text-align: center;">RESET For Cancel</p>	<p>Press the SET / (◀) key to SAVE the changes. Press the RESET key to CANCEL the changes.</p>
<p style="text-align: center;">OK</p>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the Main Menu.</p>
<p style="text-align: center;">GROUP 1</p>	

Note:

If the function is set as enable then the relay will allow editing the settings of respective sub menus. If the function is set as disable then the relay will not allow editing the settings of sub menus and will bypass the protection function.

* *The User can scroll the previous settings by using the (+ / ▲) key.*

** *After Editing any sub menus of the Over Current setting, If the SET/ (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.*

2.3.12.4 Edit settings (if I>1Function is selected for DT i.e. Definite Time)

<p style="text-align: center;">Overcurrent</p>	<p>By using the (+ / ▲) or (- / ▶) key, select the Over Current setting menu in Group 1. Press the (◀) key to move to the next option.</p>
<p style="text-align: center;">I>1 Function</p> <p style="text-align: center;">DT</p>	<p>Press the Edit key, the text will start blinking. By using the (+ / ▲) or (- / ▶) key, I>1 Function (Curve Selection) can be set i.e. Disable / US ST Inverse / US Inverse / IEEE E Inverse / IEEE V Inverse / IEEE M Inverse / UK LT Inverse / IEC E Inverse / IEC V Inverse / S Inverse (1.3 Sec) / IEC S Inverse and DT. # After selecting the desired I>1 Function setting, press the Edit key. The text will stop blinking. Press the (◀) key to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>I>1 Current Set</p> <p>1.00 A</p> </div>	<p>Press the Edit Key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, I>1 Current Set can be set.</p> <p>The DT setting range for I>1 Current setting & I>2 Current setting is from 0.20 to 35.00 in steps of 0.01 and the DT setting for I>3 Current setting is from 01.00 to 35.00 in steps of 0.01</p> <p>After editing the I>1 Current Set Setting, press the Edit key. The number will stop blinking.**</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>I>1 Time Delay</p> <p>1.00 S</p> </div>	<p>Press the Edit Key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, I>1 Time Delay can be set. The setting range is from 0 to 100s in steps of 0.01s.</p> <p>After editing the I>1 Time Delay setting, press the Edit key. The number will stop blinking.**</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>I>1 tRESET</p> <p>1.00 S</p> </div>	<p>Press the Edit Key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, I>1 tRESET can be set. The setting range is from 0 to 100s in steps of 0.01s.</p> <p>After editing the I>1 tReset setting, press the Edit key. The number will stop blinking.**</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>I>1 2H Blocking</p> <p>Enable</p> </div>	<p>Press the Edit Key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, I>1 2H Blocking function can be set i.e. Enable / Disable.</p> <p>After selecting the I>1 2H Blocking setting, press the Edit key. The text will stop blinking.**</p> <p>Press the (◀) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>I>1 Current Set</p> <p>1.00 A</p> </div>	<p>The window displays the first setting of the Over Current menu.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>SET For Save</p> <p>RESET For Cancel</p> </div>	<p>Press the SET / (◀) key to SAVE the changes.</p> <p>Press the RESET key to CANCEL the changes.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>OK</p> </div>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the Main Menu.</p>

GROUP 1	
----------------	--

Note:

#. *If the function is set as enable then the relay will allow editing the settings of respective sub menus. If the function is set as disable then the relay will not allow editing the settings of sub menus and will bypass the protection function.*

* *The User can scroll the previous settings by using the (+ / ▲) key.*

** *After Editing any sub menus of the Over Current setting, If the SET/ (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes. .*

Note: The settings of I>2 Function and I>3 Function to be set in similar manner as that of I>1 Function.

2.3.13 GROUP 1 EARTH FAULT submenu

2.3.13.1 Edit settings (if IN>1Function is disabled)

Earth Fault	By using the (+ / ▲) or (- / ▶) key, select the Earth Fault setting menu in Group 1. Press the (◀) key to move to the next option.
IN>1Function Disabled	Press the Edit Key, the text will start blinking. By using the (/▲) or (-/▶) key, IN>1 Function (Curve Selection) can be set i.e. Disable / US ST Inverse / US Inverse / IEEE E Inverse / IEEE V Inverse / IEEE M Inverse / UK LT Inverse / IEC E Inverse / IEC V Inverse / S Inverse (1.3 Sec) / IEC S Inverse and DT. # After selecting the desired IN>1 Function, press the Edit key. The text will stop blinking. Press the (◀) key to move to the next option.
SET For Save RESET For Cancel	Press the SET / (◀) key to SAVE the changes. Press the RESET key to CANCEL the changes.
OK	When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the Main Menu.

GROUP 1	
----------------	--

Note: #. If the function is set as enable then the relay will allow editing the settings of respective sub menus. If the function is set as disable then the relay will not allow editing the settings of sub menus and will bypass the protection function.

2.3.13.2 Edit settings (if IN>1Function is selected for IEC curve)

Earth Fault	<p>By using the (+ / ▲) or (- / ►) key, select the Earth Fault setting menu in Group 1.</p> <p>Press the (◀) key to move to the next option.</p>
IN>1Function IEC S Inverse	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, IN>1 Function (Curve Selection) can be set i.e. Disabled / US ST Inverse / IEEE E Inverse / IEEE V Inverse / IEEE M Inverse / UK LT Inverse / IEC E Inverse / IEC V Inverse / S Inverse (1.3 Sec) / IEC S Inverse 1 and DT. #</p> <p>After selecting the desired IN>1 Function, press the Edit key. The text will stop blinking. **</p> <p>Press the (◀) key to move to the next option.</p>
IN>1Current Set 0.20 A	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, IN>1 Current Setting can be set. The setting range is from 0.10 to 2.50 in steps of 0.01.</p> <p>After editing the IN>1 Current Set Setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ►) to move to the next option. *</p>
IN>1 TMS 1.000	<p>Press the Edit key the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, IN>1 TMS can be set. The setting range is from 0.025 to 1.2 in steps of 0.005.</p> <p>After editing the IN>1 TMS setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
IN>1 tRESET 1.00 S	<p>Press the Edit key the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, IN>1tRESET can be set. The setting range is from 0 to 100s in steps of 0.01s.</p> <p>After editing the IN>1 tRESET setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>

<p>IN>1 2H Blocking</p> <p>Enabled</p>	<p>Press the Edit key, the text value will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, IN>1 2H Blocking function can be set i.e. Enabled / Disabled.</p> <p>After selecting the desired IN>1 Blocking setting, press the Edit key. The text will stop blinking.**</p> <p>Press the (- / ▸) key to move to the next option. *</p>
<p>IN>1Current Set</p> <p>0.20 A</p>	<p>The window displays the first setting of the Earth Fault setting menu.</p> <p>Press the (◀) key to move to the next option.</p>
<p>SET For Save</p> <p>RESET For Cancel</p>	<p>Press the SET / (◀) key to SAVE the changes.</p> <p>Press the RESET key to CANCEL the changes.</p>
<p>OK</p>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the Main Menu.</p>
<p>GROUP 1</p>	

Note:

#. *If the function is set as enable then the relay will allow editing the settings of respective sub menus. If the function is set as disable then the relay will not allow editing the settings of sub menus and will bypass the protection function.*

* *The User can scroll the previous settings by using the (+ / ▲) key.*

** *After Editing any sub menus of the Earth Fault setting, If the SET/ (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.*

2.3.13.3 Edit settings (if IN>1Function is selected for IEEE curve)

<p>Earth Fault</p>	<p>By using the (+ / ▲) or (- / ▸) key, select the Earth Fault setting menu in Group 1.</p> <p>Press the (◀) key to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>IN>1Function</p> <p>US ST Inverse</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, IN>1 Function (Curve Selection) can be set i.e. Disabled / US ST Inverse / US Inverse / IEEE E Inverse / IEEE V Inverse / IEEE M Inverse / UK LT Inverse / IEC E Inverse / IEC V Inverse / S Inverse (1.3 Sec) / IEC S Inverse and DT. #</p> <p>After selecting the desired IN>1 Function, press the Edit key. The text will stop blinking.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>IN>1Current Set</p> <p>0.20 A</p> </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, IN>1 Current Setting can be set. The setting range is from 0.10 to 2.50 in steps of 0.01.</p> <p>After editing the IN>1Current Set setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>IN>1 Time Dial</p> <p>1.00</p> </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, IN>1 Time Dial can be set. The setting range is from 0.01 to 100 in steps of 0.01.</p> <p>After editing the IN>1 Time Dial setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>IN>1 tRESET</p> <p>1.00 S</p> </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, IN>1 tRESET can be set. The setting range is from 0 to 100s in steps of 0.01s.</p> <p>After editing the IN>1 tReset setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>IN>1 2H Blocking</p> <p>Enabled</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, IN>1 2H Blocking function can be set i.e. Enabled / Disabled.</p> <p>After selecting the desired IN>1 2H Blocking setting, press the Edit Key. The text will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>IN>1Current Set</p> <p>0.20 A</p> </div>	<p>The window displays the first setting of the Earth Fault setting menu.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>SET For Save</p> <p>RESET For Cancel</p> </div>	<p>Press the SET / (◀) key to SAVE the changes.</p> <p>Press the RESET key to CANCEL the changes.</p>

OK	When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the Main Menu.
GROUP 1	

Note:

#. If the function is set as enable then the relay will allow editing the settings of respective sub menus. If the function is set as disable then the relay will not allow editing the settings of sub menus and will bypass the protection function.

* The User can scroll the previous settings by using the (+ / ▲) key.

** After Editing any sub menus of the Earth Fault setting, If the SET/ (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.

2.3.13.4 Edit settings (if IN>1Function is selected for DT i.e. Definite Time)

Earth Fault	By using the (+ / ▲) or (- / ▶) key, select the Earth Fault setting menu in Group 1. Press the (◀) key to move to the next option.
IN>1Function DT	Press the Edit key, the text will start blinking. By using the (+ / ▲) or (- / ▶) key, IN>1 Function (Curve Selection) can be set i.e. Disabled / US ST Inverse / US Inverse / IEEE E Inverse / IEEE V Inverse / IEEE M Inverse / UK LT Inverse / IEC E Inverse / IEC V Inverse / S Inverse (1.3 Sec) / IEC S Inverse and DT. # After selecting the desired IN>1 Function, press the Edit key. The text will stop blinking. Press the (◀) key to move to the next option.
IN>1Current Set 0.20 A	Press the Edit key, the number will start blinking. By using the (+ / ▲) or (- / ▶) key, IN>1 Current Setting can be set. The DT setting range for IN>1 Current setting & IN>2 Current setting is from 0.10 to 35.00 in steps of 0.01 and the DT setting for I>3 Current setting is from 01.00 to 35.00 in steps of 0.01 After editing the IN>1 Current Set setting, press the Edit key. The number will stop blinking. ** Press the (- / ▶) key to move to the next option. *

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>IN>1 Time Delay</p> <p>1.00 S</p> </div>	<p>Press the Edit key the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, IN>1 Time Delay can be set. The setting range is from 0 to 200s in steps of 0.01s.</p> <p>After editing the IN>1 Time Delay setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>IN>1 tRESET</p> <p>1.00 S</p> </div>	<p>Press the Edit key the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, IN>1tReset can be set. The setting range is from 0 to 100s in steps of 0.01s.</p> <p>After editing the IN>1 tRESET setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>IN>1 2H Blocking</p> <p>Enabled</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, IN>1 2H Blocking function can be set i.e. Enabled / Disabled.</p> <p>After selecting the desired IN>1 2H Blocking setting, press the Edit key. The text will stop blinking. **</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>IN>1Current Set</p> <p>0.20 A</p> </div>	<p>The window displays the first setting of the Earth Fault setting menu.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>SET For Save</p> <p>RESET For Cancel</p> </div>	<p>Press the SET / (◀) key to SAVE the changes.</p> <p>Press the RESET key to CANCEL the changes.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>OK</p> </div>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the Main Menu.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>GROUP 1</p> </div>	

Note:

#. If the function is set as enable then the relay will allow editing the settings of respective sub menus. If the function is set as disable then the relay will not allow editing the settings of sub menus and will bypass the protection function.

* The User can scroll the previous settings by using the (+ / ▲) key.

** After Editing any sub menus of the Earth Fault setting, If the SET/ (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.

Note: The settings of IN>2 Function and IN>3 Function to be set in similar manner as that of IN>1 Function.

2.3.14 GROUP 1-THERMAL OVERLOAD submenu

2.3.14.1 Edit settings (if Thermal Overload Characteristic is disabled)

<p>Thermal Overload</p>	<p>By using the (+ / ▲) or (- / ▶) key, select the Thermal Overload setting menu in Group 1. Press the (◀) key to move to the next option.</p>
<p>Characteristic Disabled</p>	<p>Press the Edit key, the text will start blinking. By using the (+ / ▲) or (- / ▶) key, the desired Characteristic can be set i.e. Single / Disabled. # After selecting the desired Characteristic, press the Edit key. The text will stop blinking. Press the (◀) key to move to the next option. *</p>
<p>SET For Save RESET For Cancel</p>	<p>Press the SET / (◀) key to SAVE the changes. Press the RESET key to CANCEL the changes.</p>
<p>OK</p>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the Main Menu.</p>
<p>GROUP 1</p>	

Note:

#. *If the function is set as enable then the relay will allow editing the settings of respective sub menus. If the function is set as disable then the relay will not allow editing the settings of sub menus and will bypass the protection function.*

* *The User can scroll the previous settings by using the (+ / ▲) key.*

** *After editing any sub menus of the Thermal Overload setting. If the SET/ (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.*

2.3.14.2 Edit settings (if Thermal Overload Characteristic is set as Single)

<p>Thermal Overload</p>	<p>By using the (+ / ▲) or (- / ▶) key, select the Thermal Overload setting menu in Group 1.</p> <p>Press the (◀) key to move to the next option.</p>
<p>Characteristic</p> <p>Single</p>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▶) key, the desired Characteristic can be set i.e. Single / Disable. #</p> <p>After selecting the desired Characteristic, press the Edit key. The text will stop blinking.</p> <p>Press the (◀) key to move to the next option. *</p>
<p>Thermal Trip</p> <p>1.00 A</p>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▶) key, Thermal Trip can be set. The setting range is from 0.10 to 4 in steps of 0.01.</p> <p>After editing the Thermal Trip setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ▶) key to move to the next option. *</p>
<p>Thermal Alarm</p> <p>70%</p>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▶) key, Thermal Alarm can be set. The setting range is from 50% to 100% in steps of 1%.</p> <p>After editing the Thermal Alarm setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ▶) key to move to the next option. *</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"> Time Constant 1 10 </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, Time Constant 1 can be set. The setting range is from 1 to 200 in steps of 1.</p> <p>After editing the Time constant 1 setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> K 1.05 </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, K constant can be set. The setting range is from 1 to 1.5 in steps of 0.01.</p> <p>After editing the K constant setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> Thermal Trip 1.00 A </div>	<p>The window displays the first setting of the thermal overload menu.</p> <p>Press the (◀) key the relay show as follows</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> SET For Save RESET For Cancel </div>	<p>Press the SET / (◀) key to SAVE the changes.</p> <p>Press the RESET key to CANCEL the changes.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> OK </div>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the Main Menu.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> GROUP 1 </div>	

Note:

#. *If the function is set as enabled then the relay will allow editing the settings of respective sub menus. If the function is set as disabled then the relay will not allow editing the settings of sub menus and will bypass the protection function.*

* *The User can scroll the previous settings by using the (+ / ▲) key.*

** *After editing any sub menus of the Thermal Overload setting. If the SET / (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.*

2.3.15 GROUP 1 - COLD LOAD PICKUP submenu

2.3.15.1 Edit settings (Protection menu)

<div style="border: 2px solid black; padding: 5px; text-align: center;"> Cold Load Pickup </div>	<p>By using the (+ / ▲) or (- / ►) key, select the Cold Load Pickups setting menu in Group 1.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> tcold Time Delay 07200 </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, tcold Time Delay can be set. The setting range is from 0 to 14400 in steps of 1.</p> <p>After editing the tcold Time Delay setting, press the Edit key. The number will stop blinking.</p> <p>Press the (- / ►) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> tclp Time Delay 07200 </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, tclp Time Delay can be set. The setting range is from 0 to 14400 in steps of 1.</p> <p>After editing the tclp Time Delay setting, press the Edit key. The number will stop blinking.</p> <p>Press the (- / ►) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> l>1 Status Enabled </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, l>1 Status can be set i.e. Enabled / Blocked. #</p> <p>After selecting the desired l>1 Status setting, press the Edit key. The text will stop blinking.</p> <p>Press the (- / ►) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> l>2 Status Enabled </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, l>2 Status can be set i.e. Enabled / Blocked. #</p> <p>After selecting the desired l>2 Status setting, press the Edit key. The text will stop blinking.</p> <p>Press the (- / ►) key to move to the next option.</p>

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>I>3 Status</p> <p>Enabled</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, I>3 Status can be set i.e. Enabled / Blocked. #</p> <p>After selecting the desired I>3 Status setting, press the Edit key. The text will stop blinking.</p> <p>Press the (- / ▸) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>IN>1 Status</p> <p>Enabled</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, IN>1 Status can be set i.e. Enabled / Blocked. #</p> <p>After selecting the desired IN>1 Status setting, press the Edit key. The text will stop blinking.</p> <p>Press the (- / ▸) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>IN>2 Status</p> <p>Enabled</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, IN>2 Status can be set i.e. Enabled / Blocked. #</p> <p>After selecting the desired IN>2 Status setting, press the Edit key. The text will stop blinking.</p> <p>Press the (- / ▸) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>IN>3 Status</p> <p>Enabled</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, IN>3 Status can be set i.e. Enabled / Blocked. #</p> <p>After selecting the desired IN>3 Status setting, press the Edit key. The text will stop blinking.</p> <p>Press the (- / ▸) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>SET For Save</p> <p>RESET For Cancel</p> </div>	<p>Press the SET / (◀) key to SAVE the changes.</p> <p>Press the RESET key to CANCEL the changes.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>OK</p> </div>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the main menu.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>GROUP 1</p> </div>	

Note:

#. If the function is set as **enabled** then the relay will allow editing the settings of respective sub menus. If the function is set as **disabled** then the relay will not allow editing the settings of sub menus and will bypass the protection function.

* The User can scroll the previous settings by using the (+ / ▲) key.

** After Editing any sub menus of the Cold Load Pickup setting, If the SET/ (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.

Note: The settings (I>1, I>2, I>3, IN>1, IN>2 and IN>3) which are to be enabled in OVERCURRENT and EARTH FAULT function of Group setting, only those settings are visible in COLD LOAD PICKUP.

2.3.15.2 Edit settings (for I>1Function, IEC or IEEE curve is selected)

<p>Cold Load Pickup</p>	<p>By using the (+ / ▲) or (- / ▶) key, select the Cold Load Pickup setting menu in Group 1.</p> <p>Press the (◀) key to move to the next option.</p>
<p>tcold Time Delay</p> <p>07200</p>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▶) key, tcold Time Delay can be set. The setting range is from 0 to 14400 in steps of 1.</p> <p>After editing the tcold Time Delay setting, press the Edit key. The number will stop blinking.</p> <p>Press the (- / ▶) key to move to the next option.</p>
<p>tclp Time Delay</p> <p>07200</p>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▶) key, tclp Time Delay can be set. The setting range is from 0 to 14400 in steps of 1.</p> <p>After editing the tclp Time Delay setting, press the Edit key. The number will stop blinking.</p> <p>Press the (- / ▶) key to move to the next option.</p>
<p>I>1 Status</p> <p>Enabled</p>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ▶) key, I>1 Status can be set i.e. Enabled / Blocked. #</p> <p>After selecting the desired I>1 Status setting, press the Edit Key. The selectable text will stop blinking.</p> <p>Press the (◀) key to move to the next option.</p>

<p>I>1 Current Set</p> <p>1.50 A</p>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, I>1 Current Set can be set. The setting range is from 0.20 to 4 in steps of 0.01.</p> <p>After editing the I>1 Current Set setting, press the Edit Key. The number will stop blinking**.</p> <p>Press the (- / ▸) to move to the next option. *</p>
<p>I>1 TMS</p> <p>1.00</p>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, I>1 TMS can be set. The setting range is from 0.025 to 1.2 in steps of 0.005</p> <p>After editing the I>1 TMS setting, press the Edit key. The number will stop blinking.**</p> <p>Press the (- / ▸) key to move to the next option. *</p>
<p>I>1 Current Set</p> <p>1.50 A</p>	<p>The window displays the first setting of I>1 Current Set of the Cold Load Pickup setting.</p> <p>Press the (◀) key to move to the next option.</p>
<p>SET For Save</p> <p>RESET For Cancel</p>	<p>Press the SET / (◀) key to SAVE the changes.</p> <p>Press the RESET key to CANCEL the changes.</p>
<p>OK</p>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the main menu.</p>
<p>GROUP 1</p>	

Note:

#. If the function is set as enabled then the relay will allow editing the settings of respective sub menus. If the function is set as disabled then the relay will not allow editing the settings of sub menus and will bypass the protection function.

* The User can scroll the previous settings by using the (+ / ▲) key.

** After Editing any sub menus of the Cold Load Pickup setting, If the SET / (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.

2.3.15.3 Edit settings (for I>1Function, DT i.e. Definite Time is selected)

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>Cold Load Pickup</p> </div>	<p>By using the (+ / ▲) or (- / ►) key, select the Cold Load Pickup setting menu in Group 1.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>tcold Time Delay</p> <p>07200</p> </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, tcold Time Delay can be set. The setting range is from 0 to 14400 in steps of 1.</p> <p>After editing the tcold Time Delay setting, press the Edit key. The number will stop blinking.</p> <p>Press the (- / ►) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>tclp Time Delay</p> <p>07200</p> </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, tclp Time Delay can be set. The setting range is from 0 to 14400 in steps of 1.</p> <p>After editing the tclp Time Delay setting, press the Edit key. The number will stop blinking.</p> <p>Press the (- / ►) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>I>1 Status</p> <p>Enabled</p> </div>	<p>Press the Edit key, the text will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, I>1 Status can be set i.e. Enabled / Blocked. #</p> <p>After selecting the I>1 Status setting, press the Edit Key. The text will stop blinking.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>I>1 Current Set</p> <p>1.50 A</p> </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, I>1 Current Set can be set. The setting range is from 0.20 to 4 in steps of 0.01.</p> <p>After editing the I>1 Current Set setting, press the Edit key. The number will stop blinking**.</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>I>1 Time Delay</p> <p>1.00 S</p> </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ►) key, I>1 Time Delay can be set. The setting range is from 0 to 100s in steps of 0.01s.</p> <p>After editing the I>1 Time Delay setting, press the Edit key. The number will stop blinking.**</p> <p>Press the (- / ►) key to move to the next option. *</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>I>1 Current Set</p> <p>1.50 A</p> </div>	<p>The window displays the first setting of the I>1 Current Set of the Cold Load Pickup setting.</p> <p>Press the (◀) key to move to the next option.</p>

<p style="text-align: center;">SET For Save</p> <p style="text-align: center;">RESET For Cancel</p>	<p>Press the SET / (◀) key to SAVE the changes. Press the RESET key to CANCEL the changes.</p>
<p style="text-align: center;">OK</p>	<p>When the SET / (◀) key is pressed the relay will SAVE the changes and this window will flash for moment. The control will return to the main menu.</p>
<p style="text-align: center;">GROUP 1</p>	

Note:

#. *If the function is set as enabled then the relay will allow editing the settings of respective sub menus. If the function is set as disabled then the relay will not allow editing the settings of sub menus and will bypass the protection function.*

* *The User can scroll the previous settings by using the (+ / ▲) key.*

** *After Editing any sub menus of the Cold Load Pickup setting, If the SET/ (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.*

Note :

The settings of I>2 Function, I>3 Function, IN>1 Function, IN>2 Function and IN>3 Function to be set in similar manner as that of I>1 Function.

2.3.16 GROUP 1 - Under Current Protection submenu**2.3.16.1 Edit settings (if I< Status is set as Disabled)**

<p style="text-align: center;">UnderCurr Prot</p>	<p>By using the (+ / ▲) or (- / ▶) key, select the Under Current Protection setting menu in Group 1. Press the (◀) key to move to the next option.</p>
--	--

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>I< Status Disabled</p> </div>	<p>Press the Edit key, the text will start blinking. By using the (+ / ▲) or (- / ►) key, I< Status can be set i.e. Enabled / Disabled # After selecting the I< Status setting, press the Edit key. The text will stop blinking. Press the (◀) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>SET For Save RESET For Cancel</p> </div>	<p>Press the SET / (◀) key to SAVE the changes. Press the RESET key to CANCEL the changes.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>OK</p> </div>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the Main Menu</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>GROUP 1</p> </div>	

Note:

#. If the function is set as **enable** then the relay will allow editing the settings of respective sub menus. If the function is set as **disable** then the relay will not allow editing the settings.

* The User can scroll the previous settings by using the (+ / ▲) key.

** After Editing any sub menus of the Under Current protection setting, If the SET/ (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.

2.3.16.2 Edit Settings (if I< Status is set as Enabled)

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>UnderCurr Prot</p> </div>	<p>By using the (+ / ▲) or (- / ►) key, select the Under Current Protection setting menu in Group 1. Press the (◀) to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p>I< Status Enabled</p> </div>	<p>Press the Edit key, the text will start blinking. By using the (+ / ▲) or (- / ►) key, the desired I< Status can be set i.e. Enabled / Disabled # After selecting the desired I< Status setting, press the Edit key. The text will stop blinking. Press the (◀) key to move to the next option.</p>

<div style="border: 1px solid black; padding: 5px; width: fit-content;"> I< 1.00 A </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, I< settings can be set. The setting range is from 0.10 to 1 in steps of 0.01.</p> <p>After editing the I< setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option. *</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> t I< 1.00 S </div>	<p>Press the Edit key, the number will start blinking.</p> <p>By using the (+ / ▲) or (- / ▸) key, t I< setting can be set. The setting range is from 0.2 to 100s in steps of 0.01s.</p> <p>After editing the t I< setting, press the Edit key. The number will stop blinking. **</p> <p>Press the (- / ▸) key to move to the next option. *</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> I< 1.00 A </div>	<p>The window displays the first setting of the under current Protection menu.</p> <p>Press the (◀) key to move to the next option.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> SET For Save RESET For Cancel </div>	<p>Press the SET / (◀) key to SAVE the changes.</p> <p>Press the RESET key to CANCEL the changes.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> OK </div>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the Main Menu</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> GROUP 1 </div>	

Note:

#. If the function is set as enable then the relay will allow editing the settings of respective sub menus. If the function is set as disable then the relay will not allow editing the settings.

* The User can scroll the previous settings by using the (+ / ▲) key.

** After Editing any sub menus of the Under Current protection setting, If the SET / (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes.

2.3.17 GROUP 2 menu

2.3.17.1 Edit settings

<div style="border: 2px solid black; padding: 5px; text-align: center;">GROUP 2</div>	<p>Password protected window for "GROUP 2" settings i.e. System Configuration, Over Current, Earth Fault, Thermal Overload, Cold Load Pickup and Under Current Protection.</p> <p>Press the (◀) key the relay will display as follows.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;">Password = 0000</div>	<p>Press the Edit Key, the number will start blinking.</p> <p>Enter the previously set password by using the (+ / ▲) or (- / ▶) key. The Password setting range is 0000 to 9999. The default Password is "0000"</p> <p>After editing the Password, press the Edit key. The settable number will stop blinking.</p> <p>Press the (◀) key to move to the next option.</p> <p>By using the (+ / ▲) or (- / ▶) key, the Protection function setting menu can be scrolled and will display as below.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;">SYSTEM CONFIG</div>	<p>Password protected window for "SYSTEM CONFIGURATION" settings</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;">OVERCURRENT</div>	<p>Password protected window for "OVERCURRENT" Protection settings</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;">EARTH FAULT</div>	<p>Password protected window for "EARTH FAULT" Protection settings</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;">THERMAL OVER LOAD</div>	<p>Password protected window for "THERMAL OVERLOAD" Protection settings</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;">COLD LOAD PICKUP</div>	<p>Password protected window for "COLD LOAD PICKUP" Protection settings</p>

UNDERCURREN PROT	Password protected window for "UNDERCURRENT" Protection settings
-------------------------	--

Note: The Group 2 Function for the setting System Configuration, over Current, Earth Fault, Thermal Overload, Cold Load Pkp and under Current Protection is similar to Group 1.

2.3.18 SYSTEM DATA menu

2.3.18.1 Edit settings

SYSTEM DATA	By using the (+ / ▲) or (- / ▸) key, select the System Data setting menu. Press the (◀) to move to the next option.
Frequency 50Hz	Press the Edit key, the text will start blinking. By using the (+ / ▲) or (- / ▸) key, system Frequency can be set i.e. 50Hz / 60Hz After selecting the desired Frequency, press the Edit key. The text will stop blinking. ** Press the (- / ▸) key to move to the next option. *
Password = 0000	Press the Edit key, the number will start blinking. Enter the New password by using the (+ / ▲) or (- / ▸). The Password setting range is 0000 to 9999. The default Password is "0000" After editing the New Password, press the Edit key. The settable number will stop blinking. ** Press the (- / ▸) key to move to the next option. *
Com Port USB	Press the Edit key the text will start blinking. By using the (+ / ▲) or (- / ▸) key, Com Port can be set i.e. USB / RP After selecting the desired Com Port, press the Edit key. The text will stop blinking. ** Press the (- / ▸) key to move to the next option. *
Frequency 50Hz	The window displays the first setting of the System Data menu. Press the (◀) key to move to the next option.

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>SET For Save</p> <p>RESET For Cancel</p> </div>	<p>Press the SET / (◀) key to SAVE the changes. Press the RESET key to CANCEL the changes.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>OK</p> </div>	<p>When the SET / (◀) key is pressed, the relay will SAVE the changes and this window will flash for moment. The control will return to the Main Menu</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>SYSTEM DATA</p> </div>	

Note:

#. If the function is set as **enable** then the relay will allow editing the settings of respective sub menus. If the function is set as **disable** then the relay will not allow editing the settings.

* The User can scroll the previous settings by using the (+ / ▲) key.

** After Editing any sub menus of the SYSTEM DATA setting, If the SET/ (◀) key is pressed, the Relay displays SET to SAVE the changes or RESET to CANCEL the changes. .

2.3.18.2 View settings

<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>SYSTEM DATA</p> </div>	<p>By using the (+ / ▲) or (- / ▶) key, select the System Data setting menu. Press the (- / ▶) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>Language</p> <p>English</p> </div>	<p>This window shows the user interface Language. Press the (+ / ▲) key to move to the next option. ***</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>Description</p> <p>P50 Agile P15D</p> </div>	<p>This window shows Description of the relay. Press the (+ / ▲) key to move to the next option. ***</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>Model Number</p> <p>P15D211A1A0010A</p> </div>	<p>This window shows the Model Number of the relay. Press the (+ / ▲) key to move to the next option. ***</p>

<p>Serial Number</p> <p>14EP15D0001</p>	<p>This window shows the Serial number of the relay. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Software Version</p> <p>P15D_1_____V1.05</p>	<p>This window shows the software version of the relay. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Frequency</p> <p>50Hz</p>	<p>This window shows the System Frequency setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Com Port</p> <p>USB</p>	<p>This window shows the Com Port setting done previously. Press the (+ / ▲) key to move to the next option. ***</p>
<p>USB Address</p> <p>001</p>	<p>This window shows the USB Address setting of the relay. Press the (+ / ▲) key to move to the next option. ***</p>
<p>USB Parity</p> <p>None</p>	<p>This window shows the USB Parity setting of the relay. Press the (+ / ▲) key to move to the next option. ***</p>
<p>USB Baudrate</p> <p>57600 BPS</p>	<p>This window shows the USB Baudrate setting of the relay. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Active Group</p> <p>Group 1</p>	<p>This window shows the Active Group setting of the relay. Press the (+ / ▲) key to move to the next option. ***</p>
<p>OptoInput 4321</p> <p>Status 0000</p>	<p>This window shows status of Digital inputs. Press the (+ / ▲) key to move to the next option. ***</p>

<div style="border: 2px solid black; padding: 5px; text-align: center;"> RLY O/P STATUS LATCH RLY = OFF </div>	<p>This window shows latch relay status. Press the (+ / ▲) key to move to the next option. ***</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> Language English </div>	<p>The window displays the first setting of System Data. Press the (◀) or (▶) key to return to the Main Menu.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> SYSTEM DATA </div>	

*Note: *** By using the (◀) or (▶) key the relay will return to Main Menu.*

2.3.19 VIEW RECORDS menu

2.3.19.1 View contents

<div style="border: 2px solid black; padding: 5px; text-align: center;"> VIEW RECORDS </div>	<p>By using the (+ / ▲) or (- / ▶) key, select the View Records setting menu. Press the (- / ▶) key to move to the next option.</p>				
<div style="border: 2px solid black; padding: 5px; text-align: center;"> Fault Record </div>	<p>This window shows the Fault Record Press the (- / ▶) key to move to the next option.</p>				
<div style="border: 2px solid black; padding: 5px; text-align: center;"> Fault Num=01 </div>	<p>This window shows the Fault Number of latest fault. Press the (+ / ▲) key, the relay will scroll between Fault Numbers 01 to 05. After selecting desired fault number, Press the (- / ▶) key, the relay will display the Fault record value as below.</p>				
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;"> >1:</td> <td style="width: 50%; text-align: center;"> >2:</td> </tr> <tr> <td style="text-align: center;"> >3:</td> <td style="text-align: center;">SF</td> </tr> </table> </div>	>1:	>2:	>3:	SF	<p>This window will show trip flag of O/C, E/F or status flag. Press the (+ / ▲) key to move to the next option. ***</p>
>1:	>2:				
>3:	SF				

<p>Undercurr Flt</p> <p>I<:</p>	<p>This window will show trip flag of under current operated. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Trip Counter</p> <p>t:0000</p>	<p>This window will show Trip Counter. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Fa =0.000 b =0.000</p> <p>c =0.000 n =0.000</p>	<p>This window will show secondary fault current values. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Trip Timing (Sec)</p> <p>00000.000</p>	<p>This window will show Trip Timings. Press the (+ / ▲) key to move to the next option. ***</p>
<p>Thermal State</p> <p>0000%</p>	<p>This window will show Thermal State. Press the (+ / ▲) key to move to the next option. ***</p>
<p>21/02/14</p> <p>16:15:30.225</p>	<p>This window will show Date & Time of fault. Press the (+ / ▲) key to move to the next option. ***</p>
<p>I>1: I>2:</p> <p>I>3: SF:</p>	<p>The window displays the first setting of the Fault Number of View record menu. Press the (◀) or (▶) key to return to the Main Menu.</p>
<p>VIEW RECORDS</p>	

*Note: *** By using the (◀) or (▶) key the relay will return to Main Menu.*

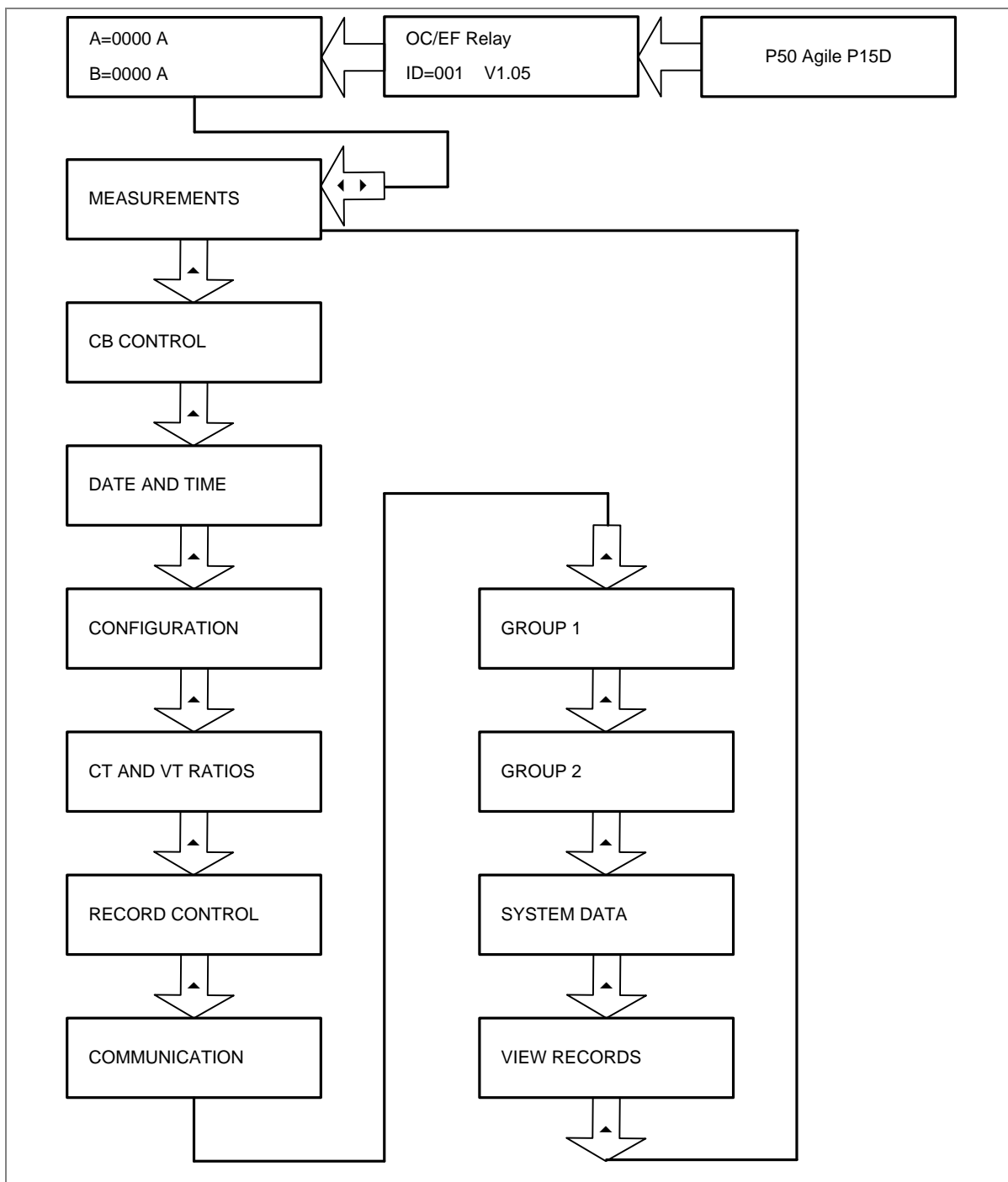
2.3.19.2 View Error Log

<div style="border: 2px solid black; padding: 5px; text-align: center;">VIEW RECORDS</div>	<p>By using the (+ / ▲) or (- / ►) key, select the View Records setting menu. Press the (- / ►) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;">Fault Record</div>	<p>This window shows the Fault Record Press the (+ / ▲) key to move to the next option.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;">Error Log: 0000</div>	<p>This window will show Error Log 0000 detected by self supervision function of Relay Press the (◀) or (▶) key to return to the Main Menu.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;">VIEW RECORDS</div>	

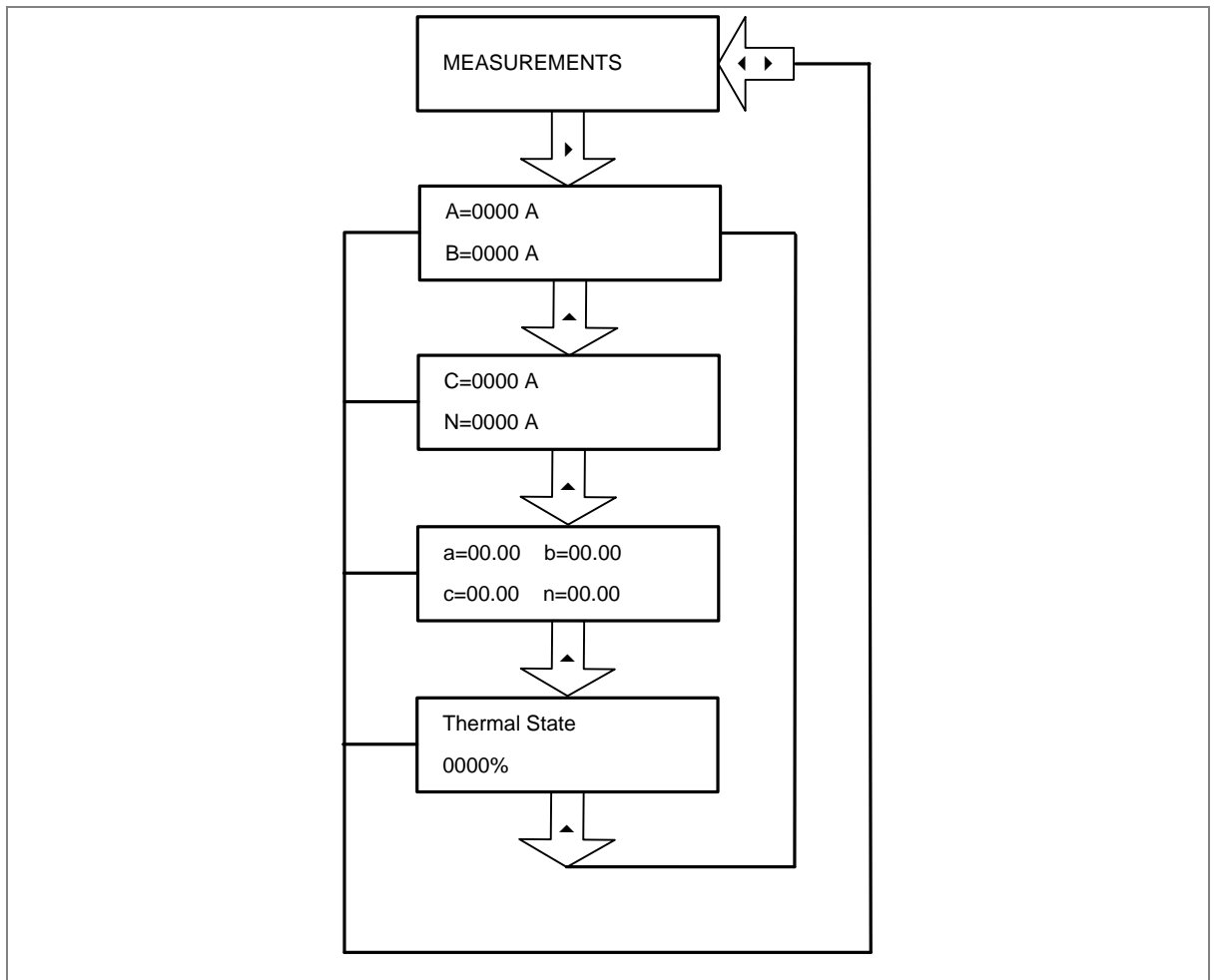
2.4 Configuration flowcharts

2.4.1 Main Menu

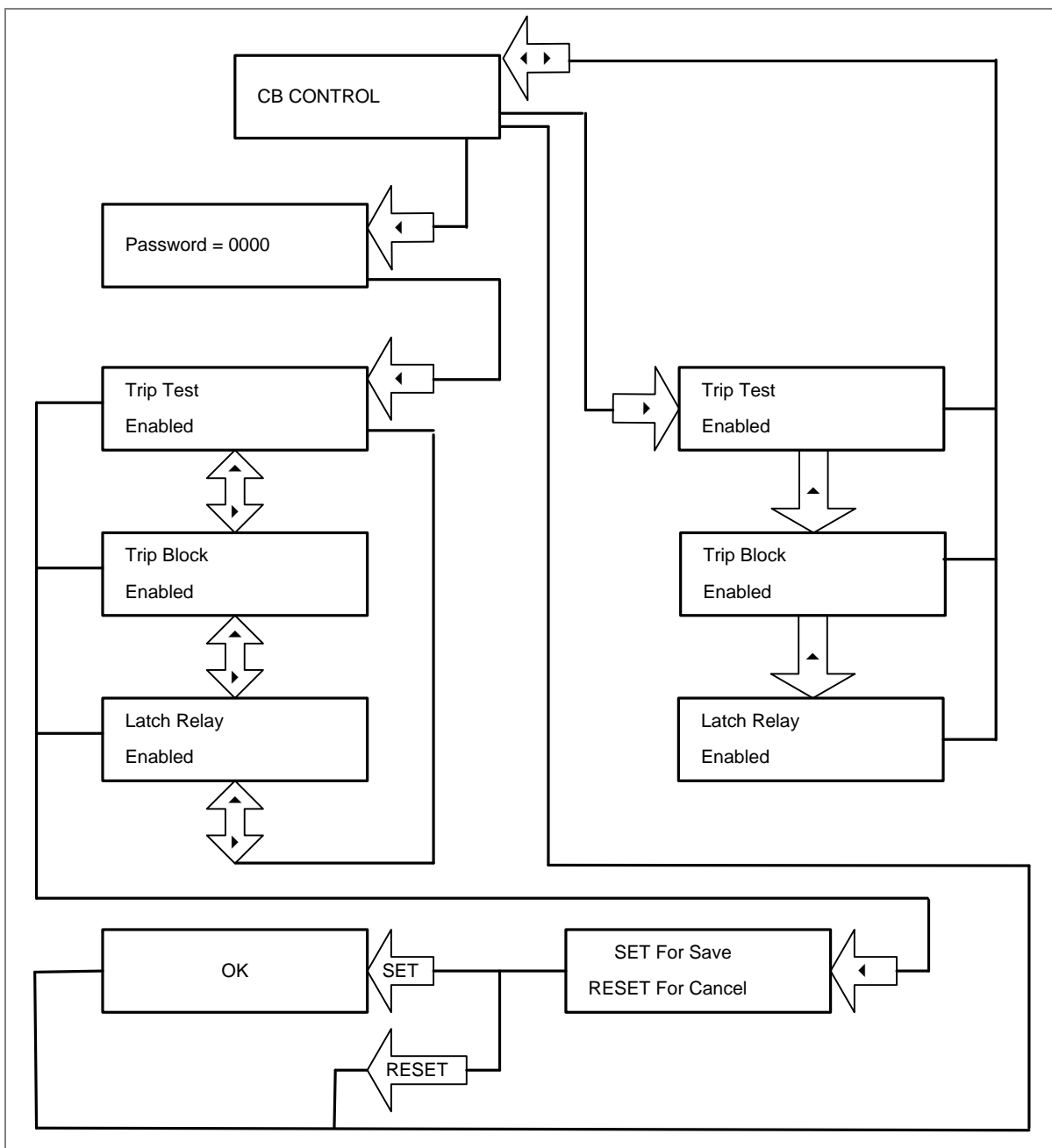
After the Power ON or when the relay is reset the following windows will be displayed, and the user can scroll through the main menu as below.



2.4.2 View Measurement menu

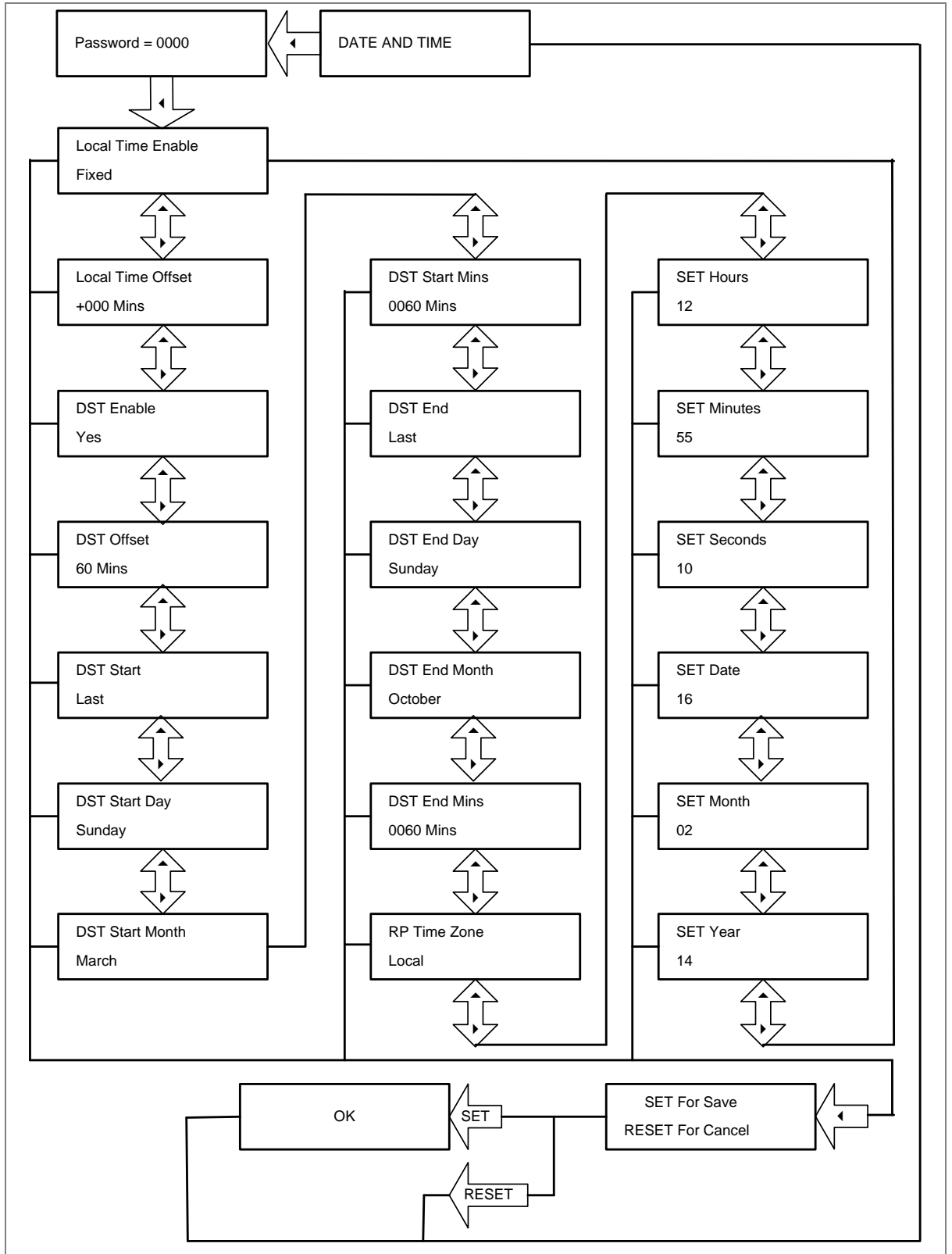


2.4.3 Edit/View CB Control menu settings

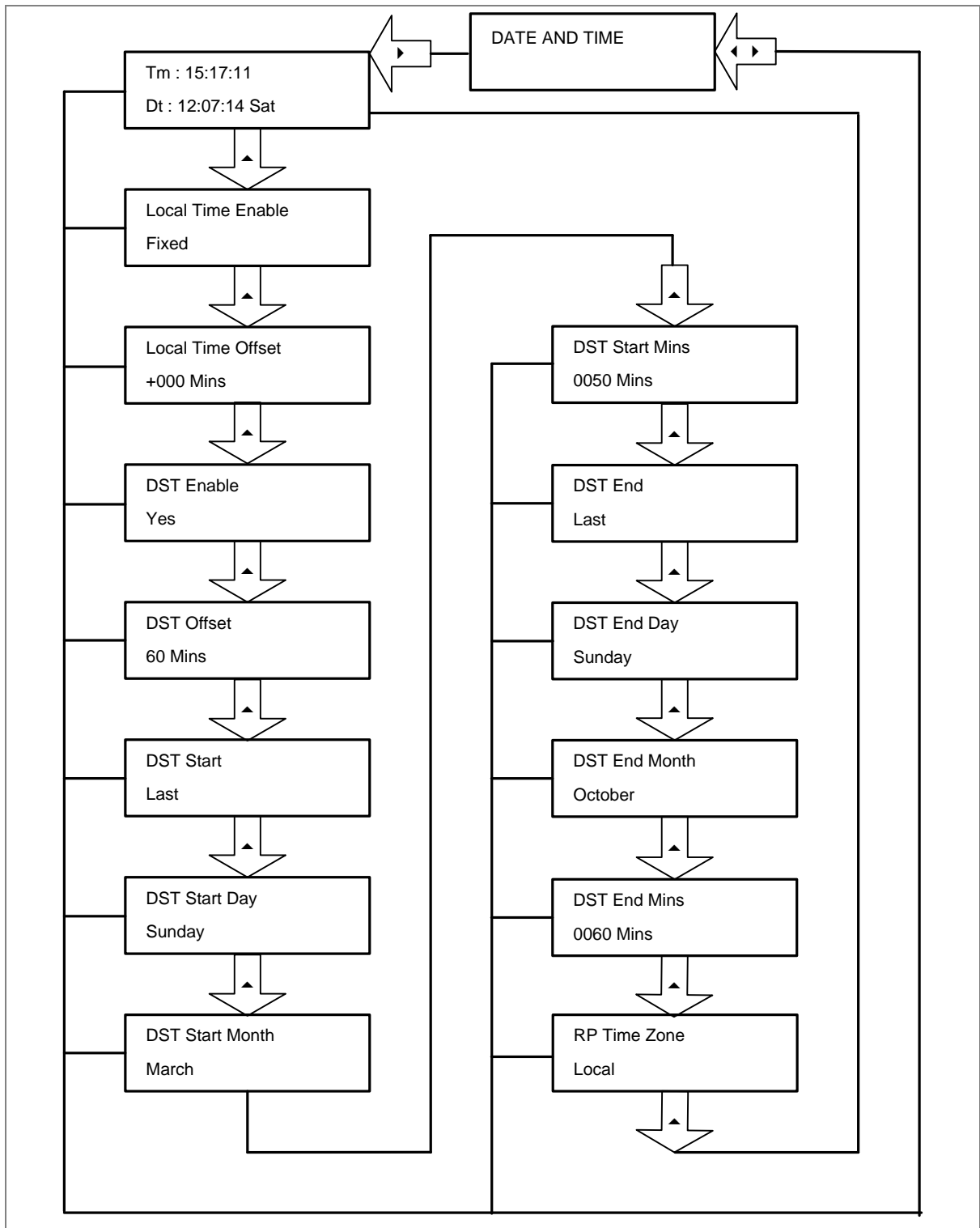


2.4.4 Edit/View Date and Time menu settings

2.4.4.1 Edit settings

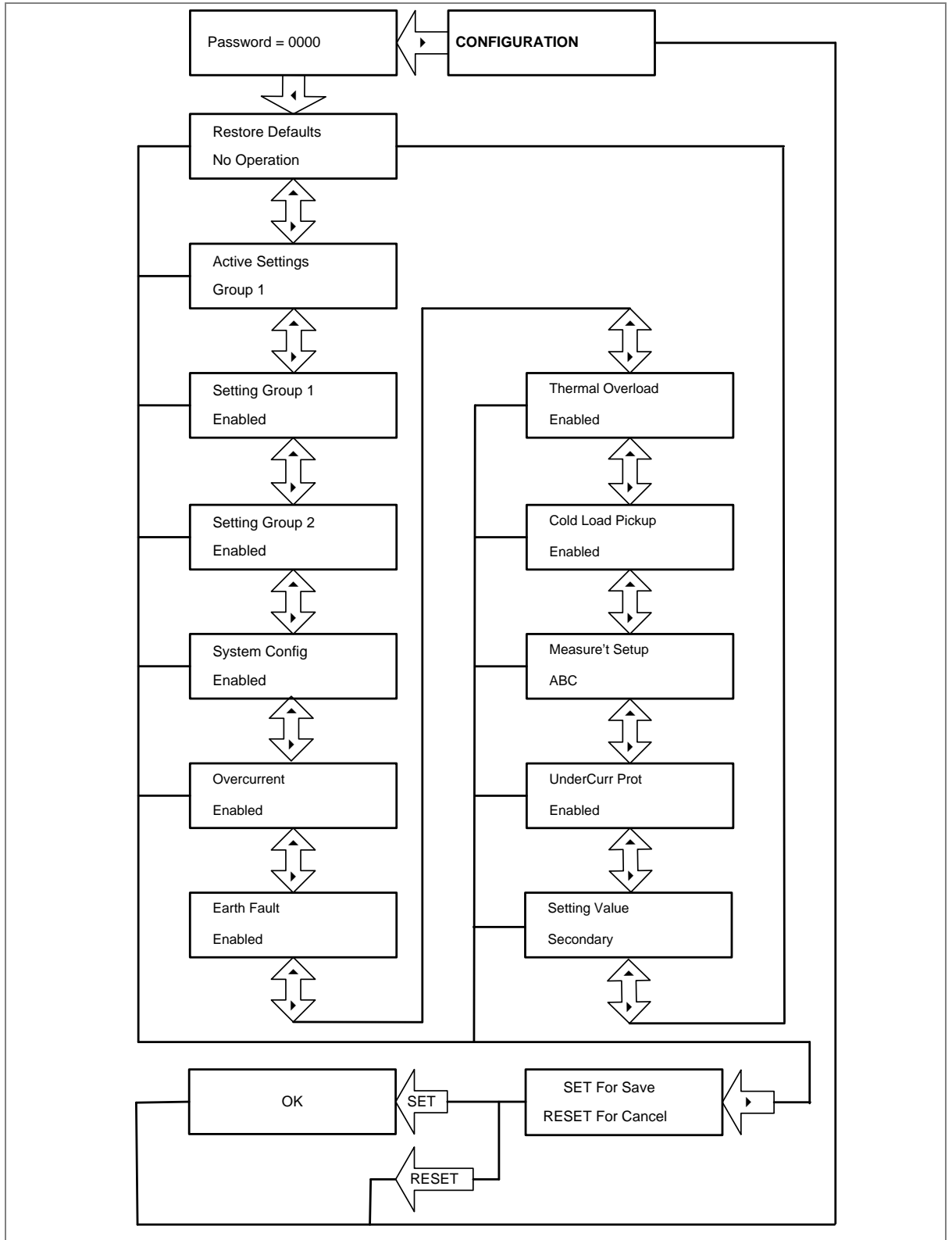


2.4.4.2 View settings

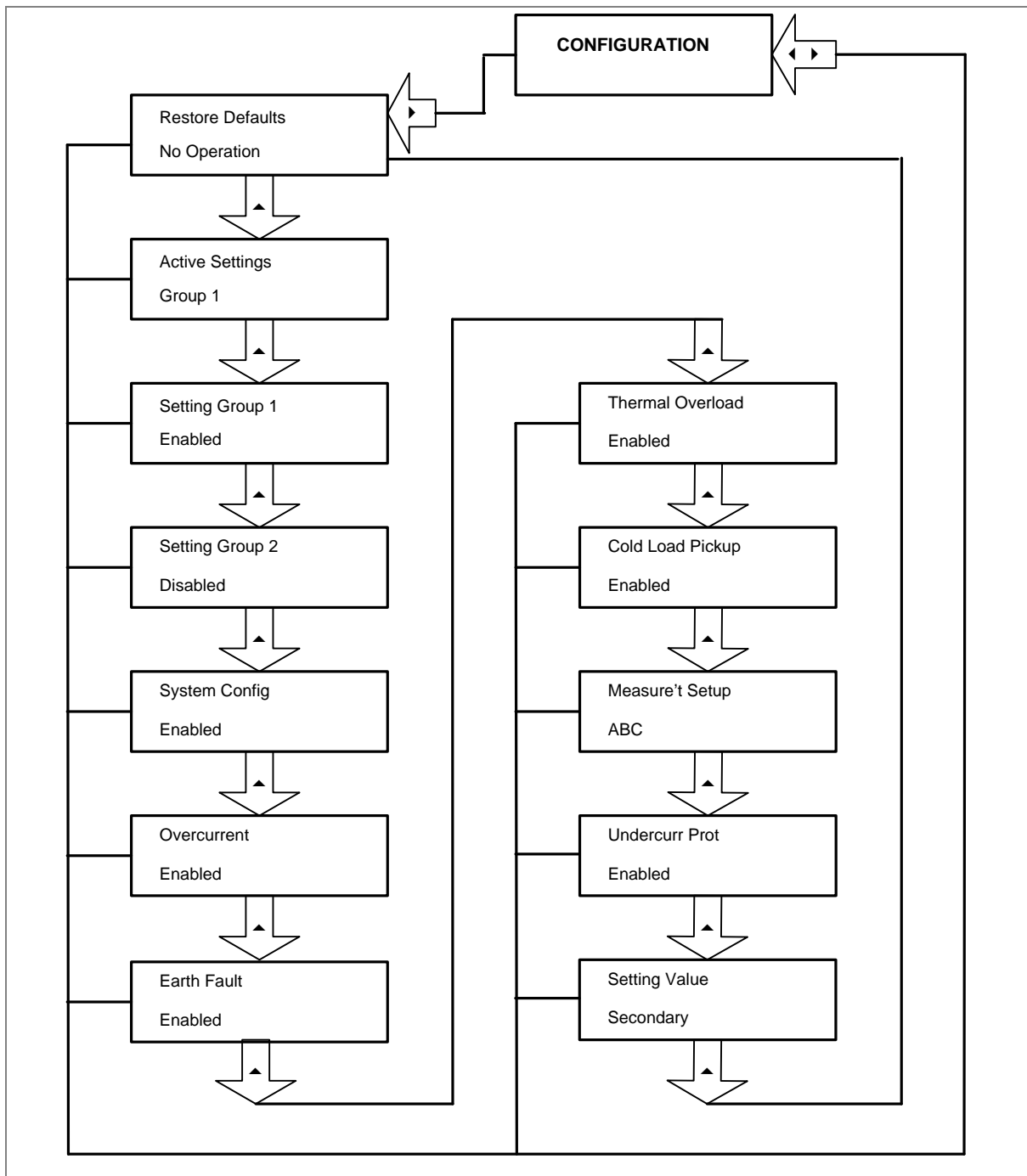


2.4.5 Edit/View Configuration menu settings

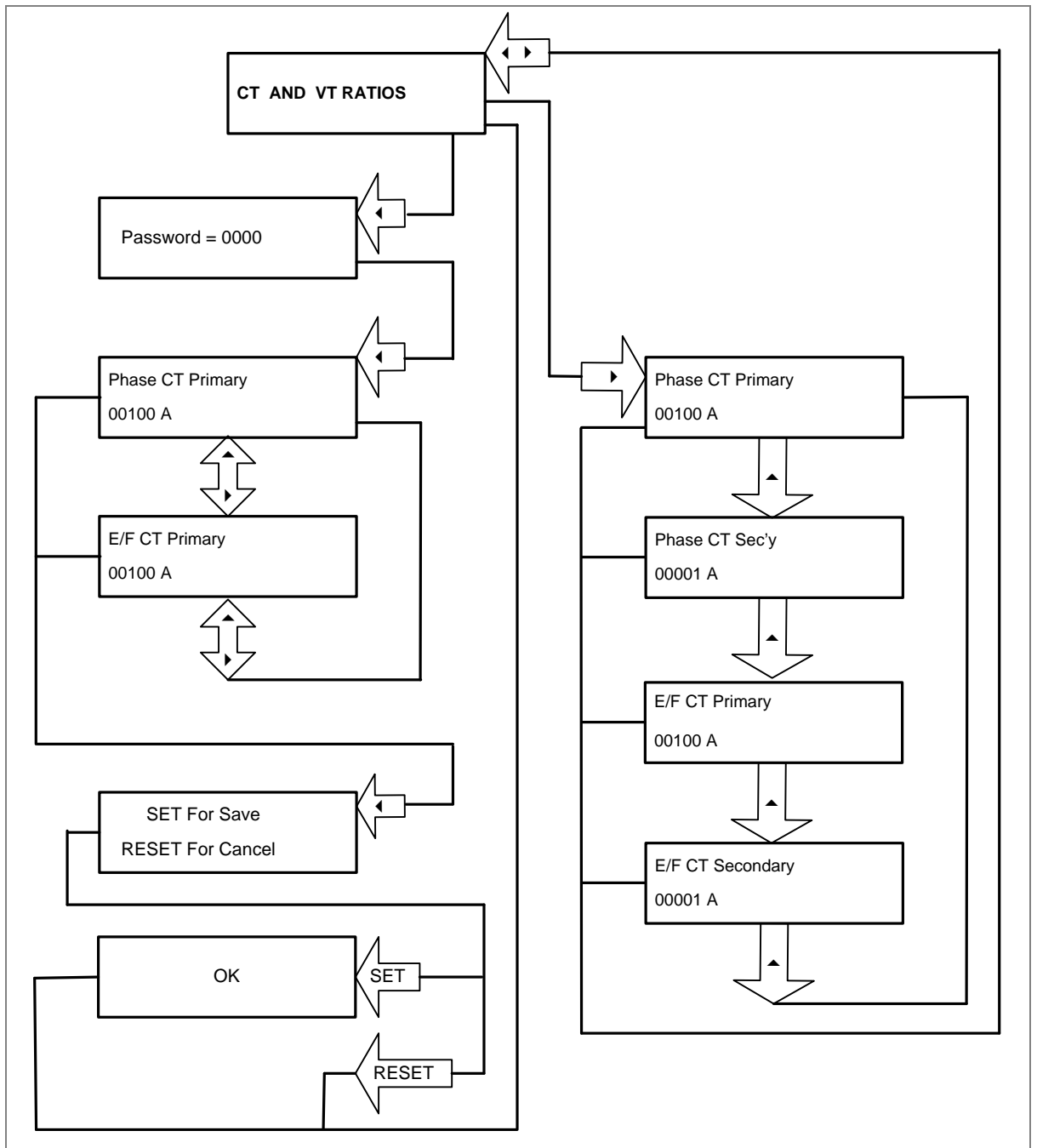
2.4.5.1 Edit settings



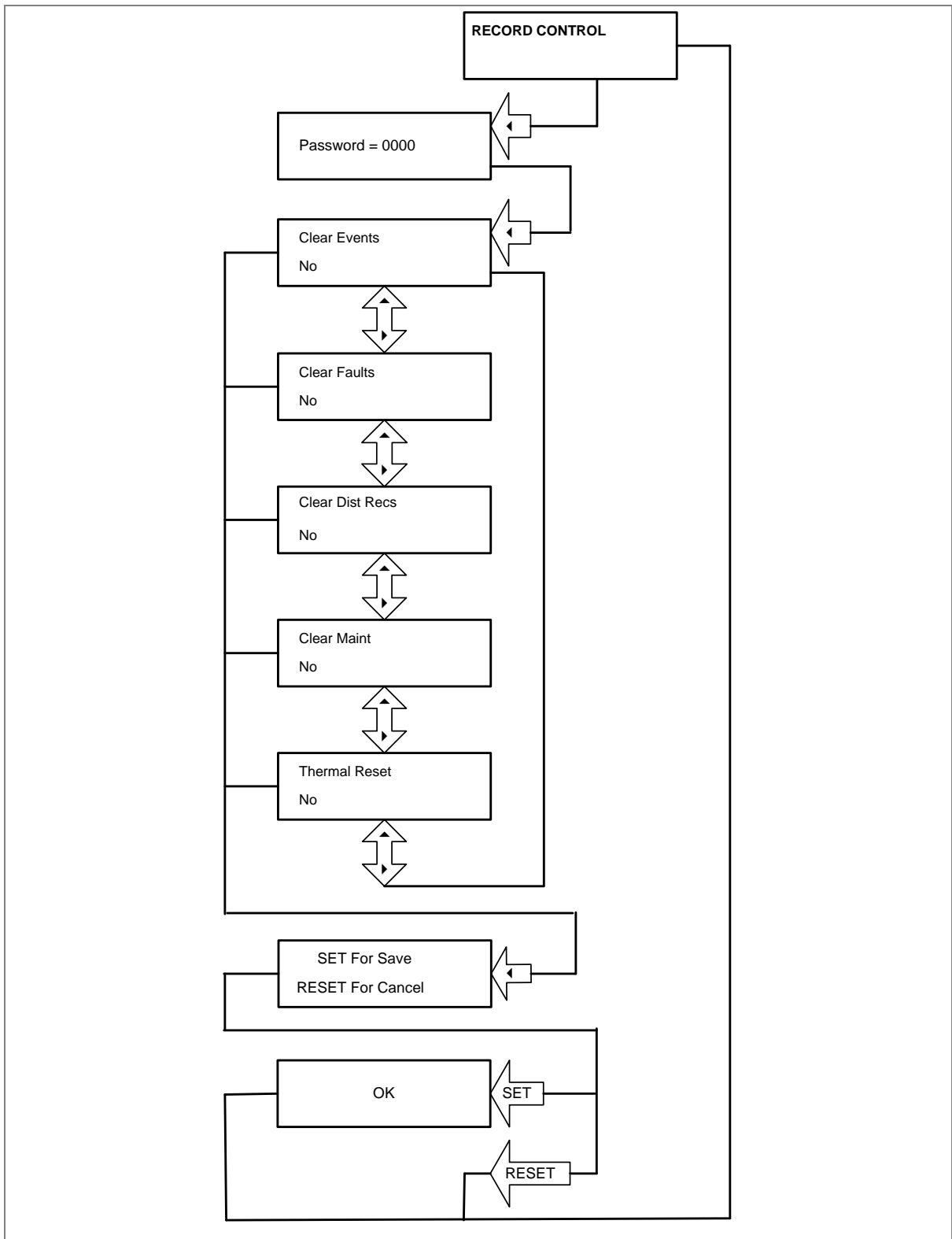
2.4.5.2 View settings



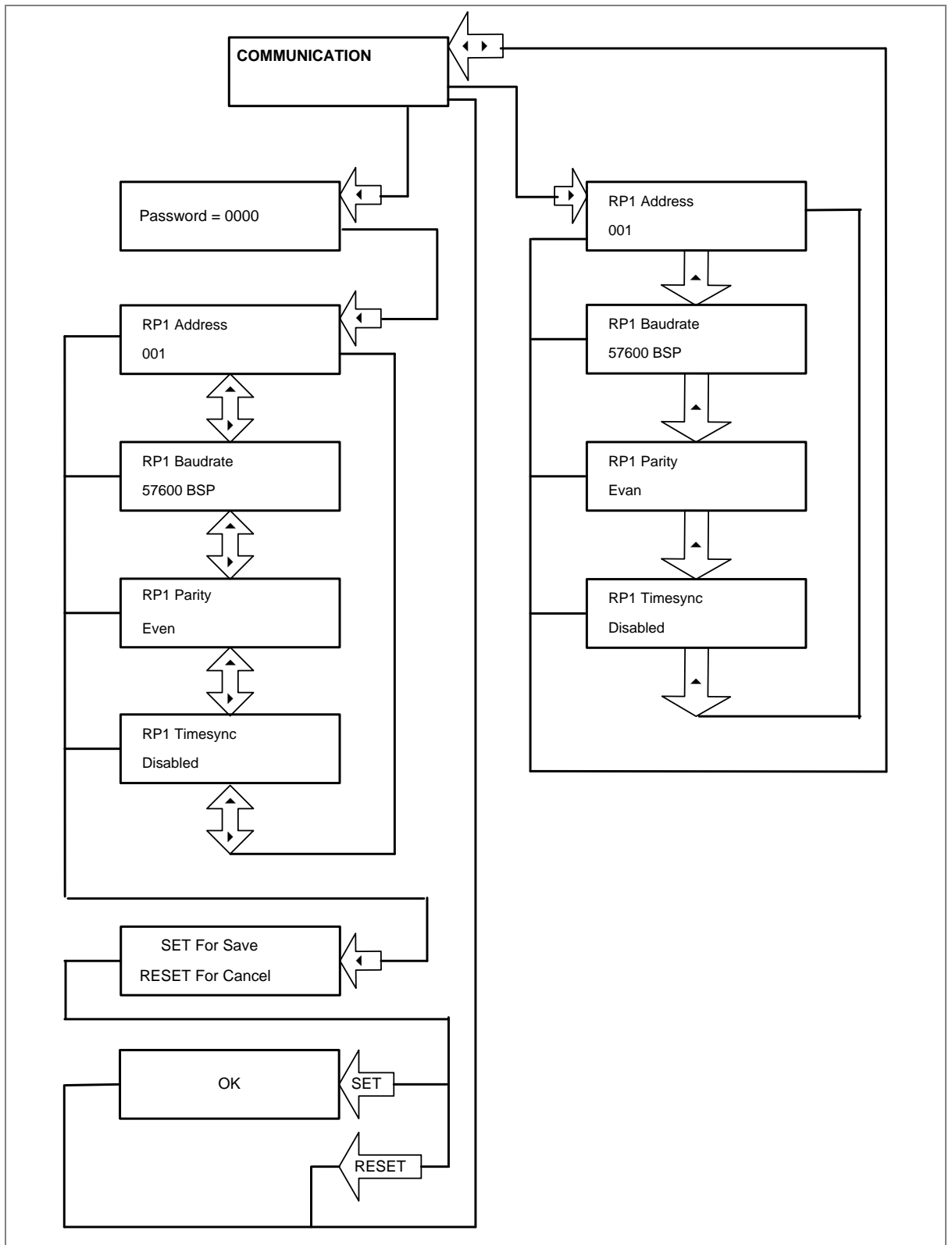
2.4.6 Edit/View CT and VT Ratios menu settings



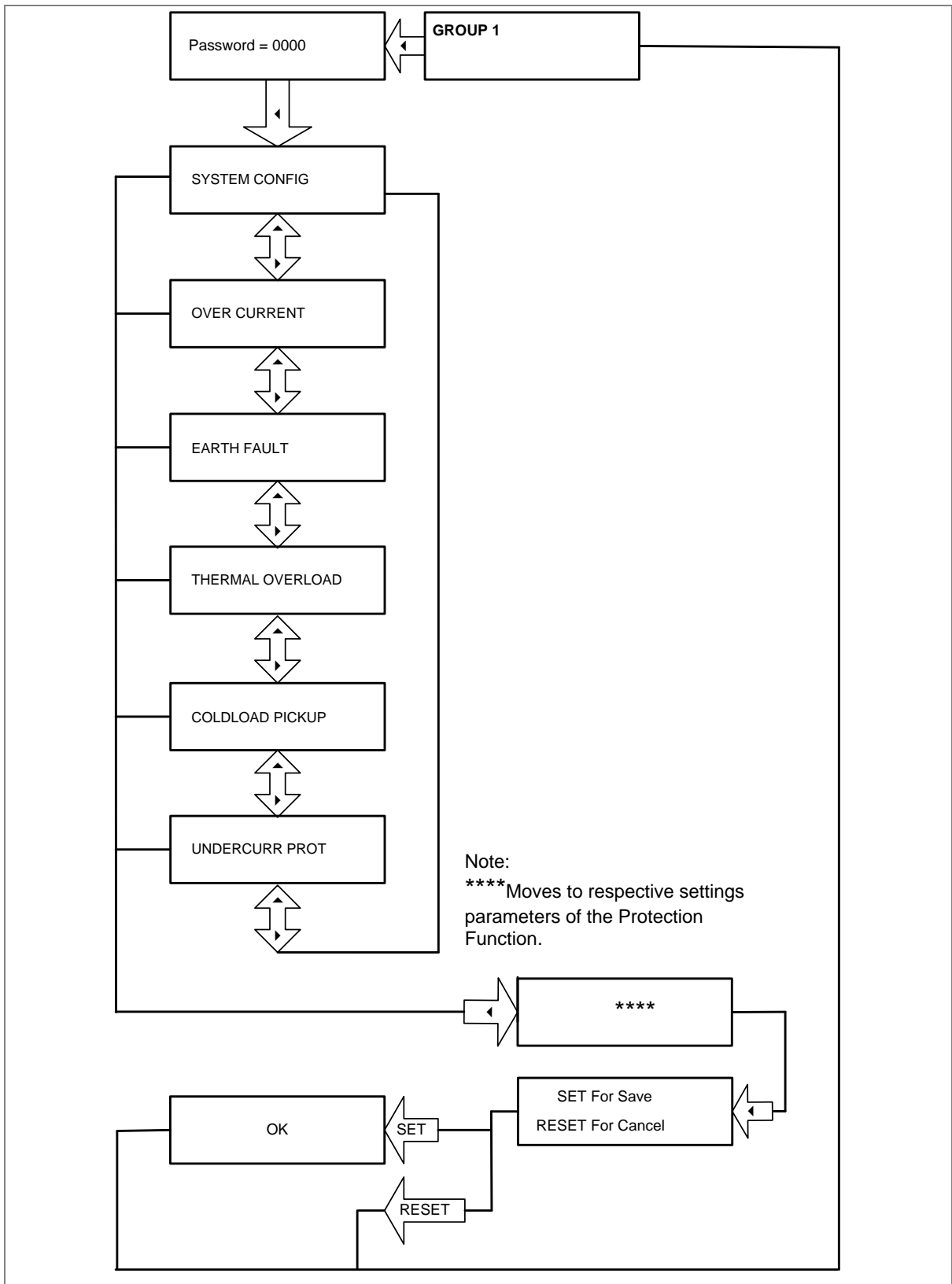
2.4.7 Edit/View Record Control menu settings



2.4.8 Edit/View Communication menu settings

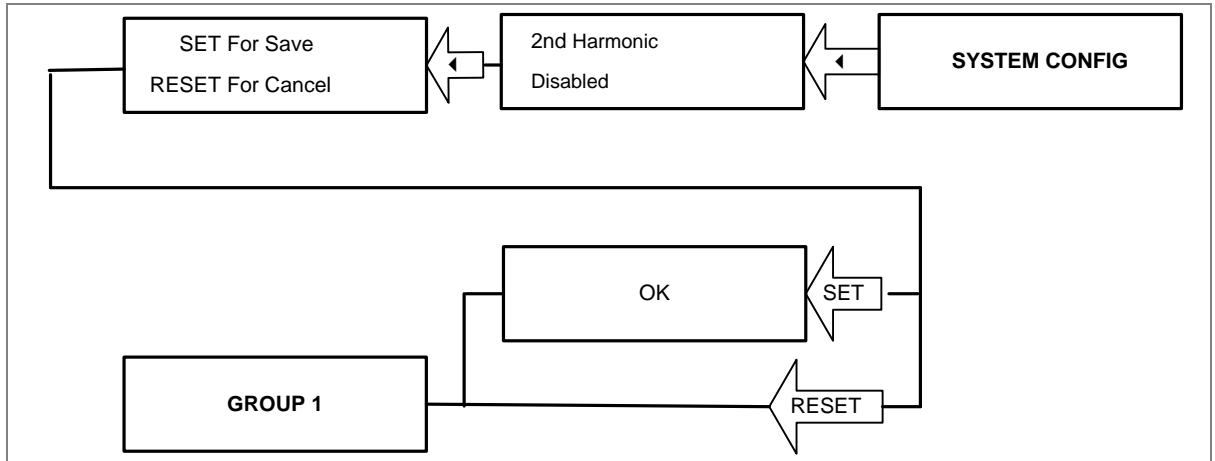


2.4.9 Edit/View Group 1 menu settings

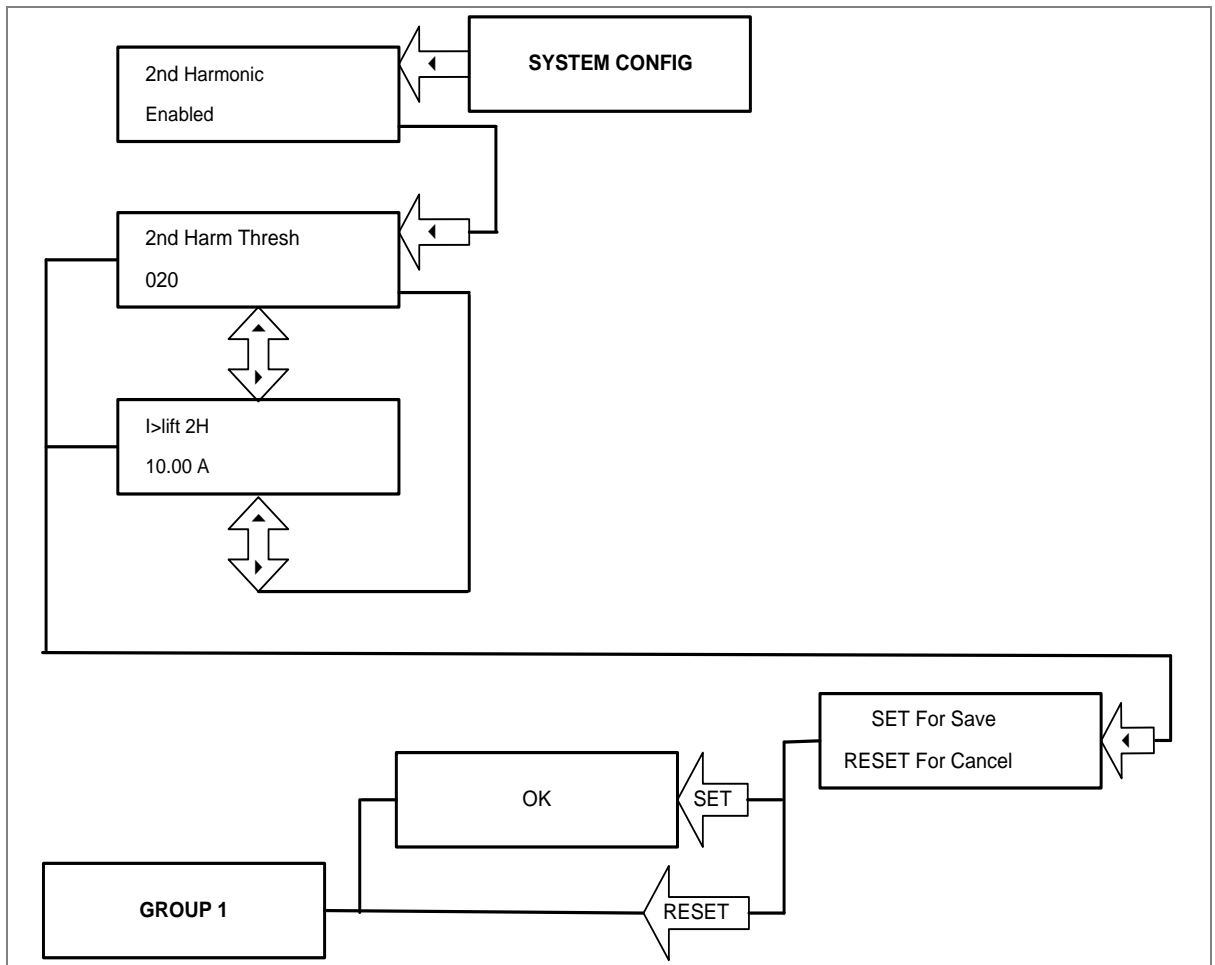


2.4.10 Edit/View GROUP 1- SYSTEM CONFIG sub menu settings

2.4.10.1 If 2nd Harmonic is Disabled

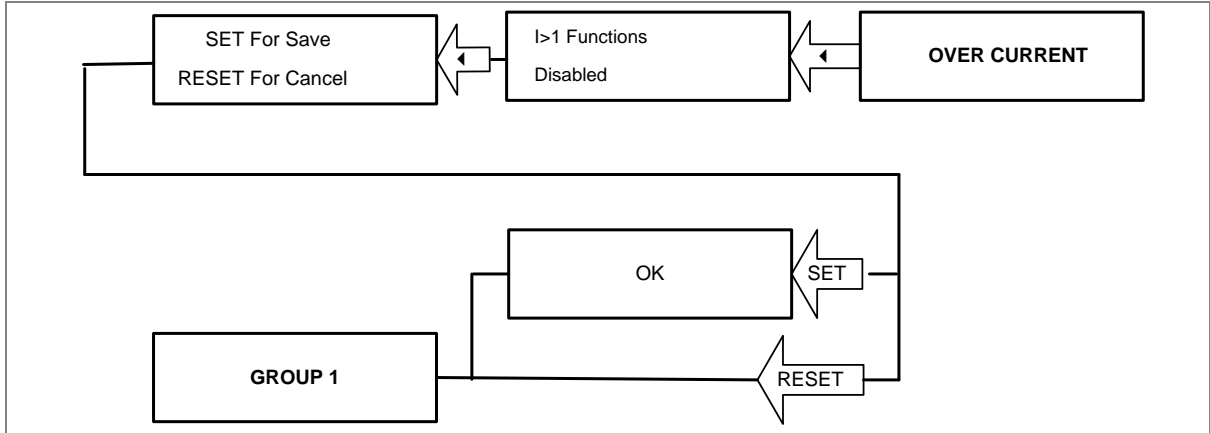


2.4.10.2 If 2nd Harmonic is Enabled

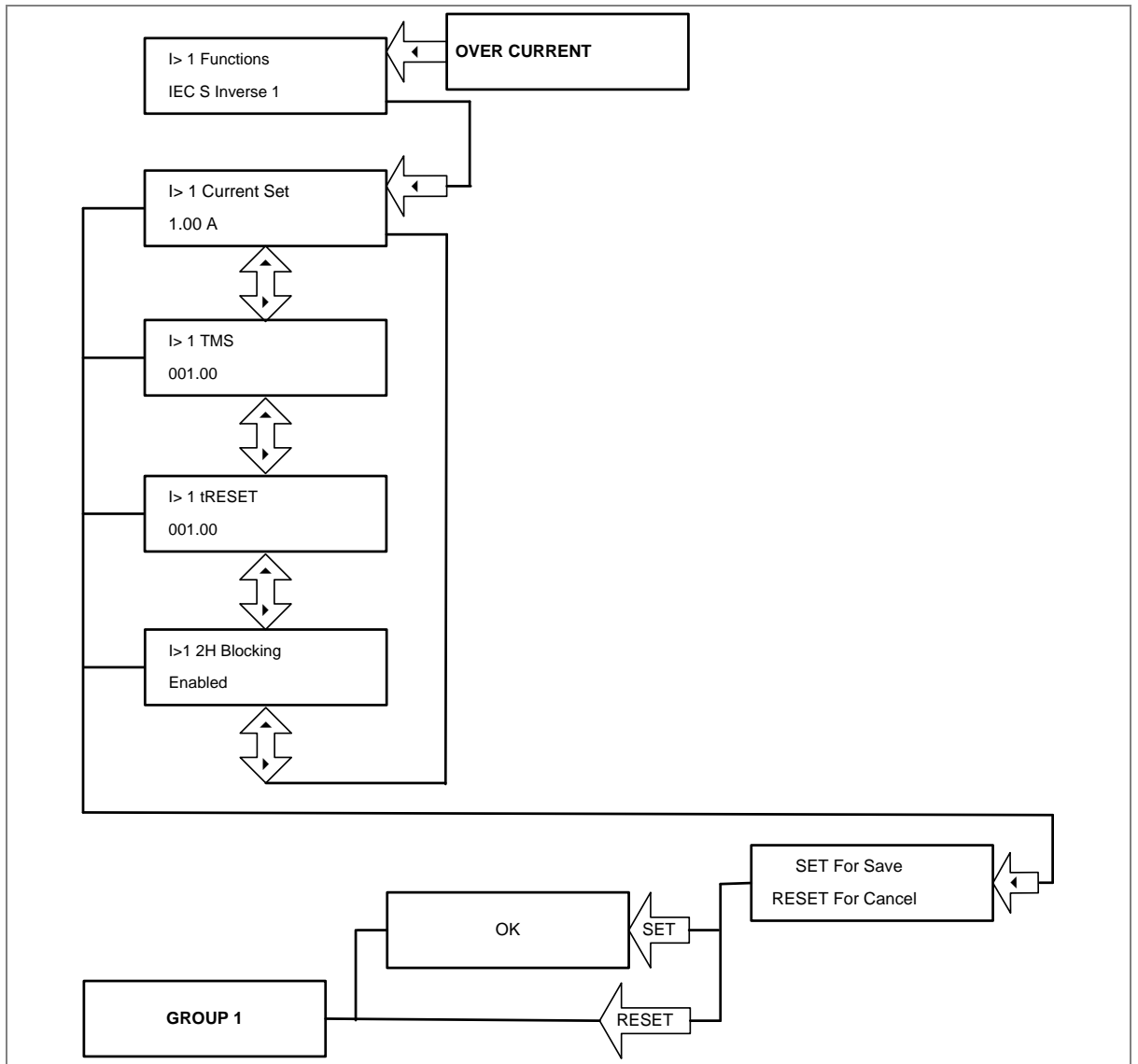


2.4.11 Edit/View Group 1- Overcurrent sub menu settings

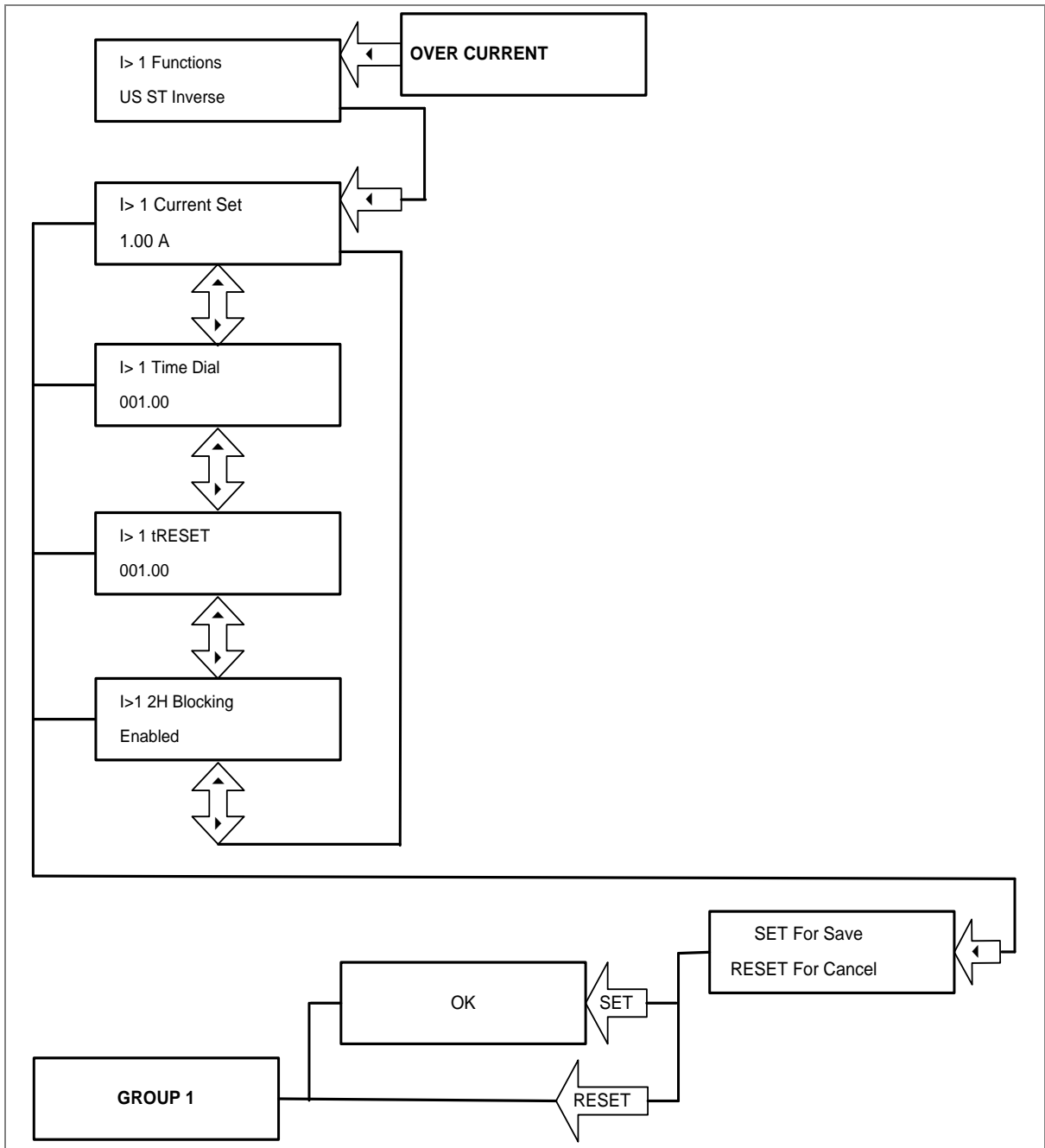
2.4.11.1 If I>1 Function is Disabled



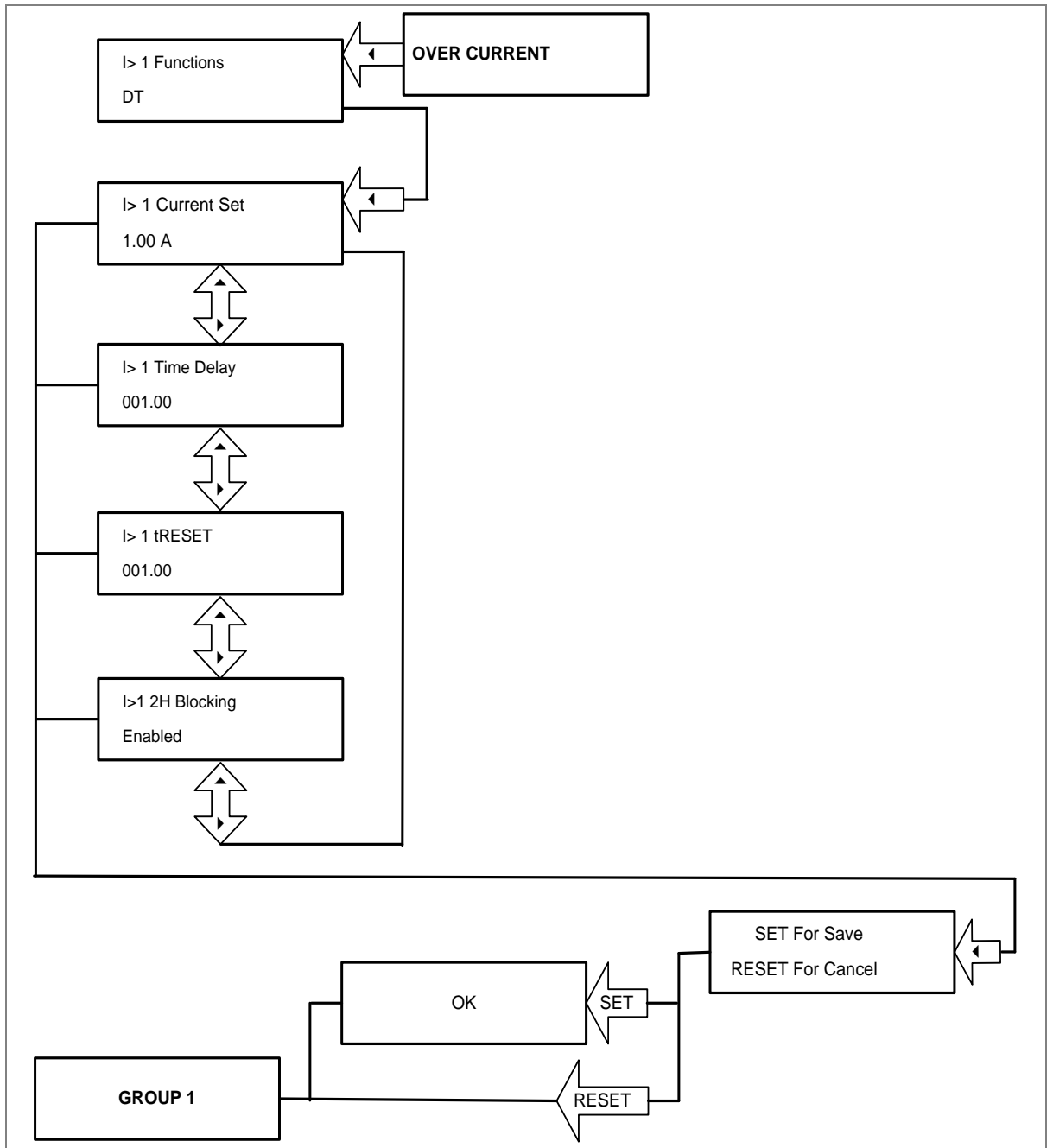
2.4.11.2 For I>1 Function set for IEC curve



2.4.11.3 If I>1 Function set for IEEE curve

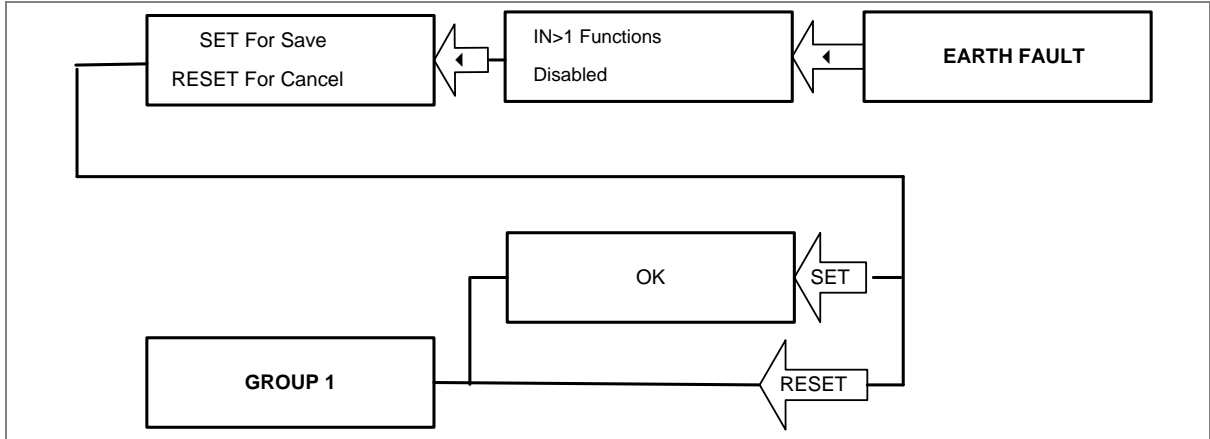


2.4.11.4 If I>1 Function set for Definite Time

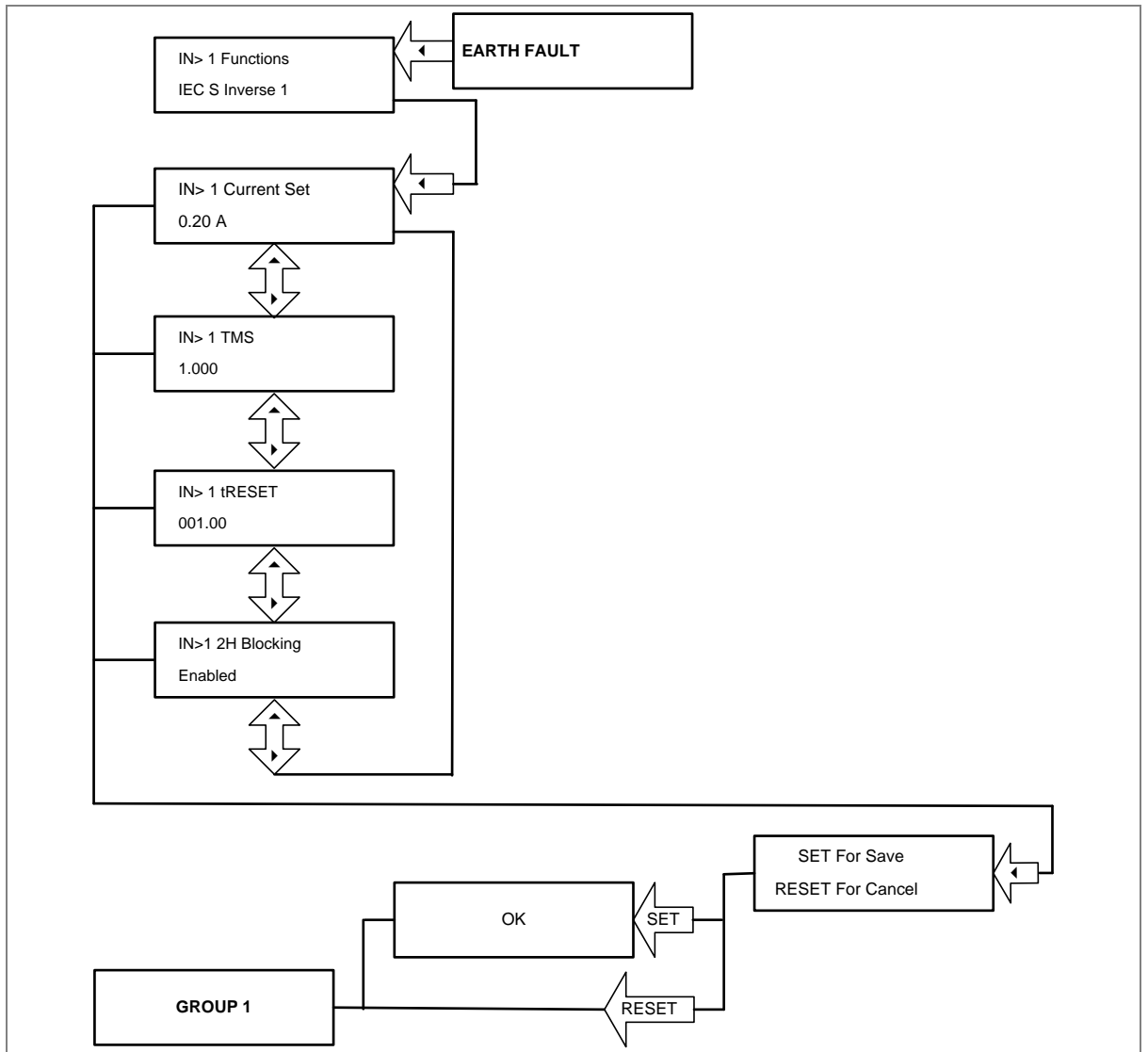


2.4.12 Edit/View Group 1- Earth Fault sub menu settings

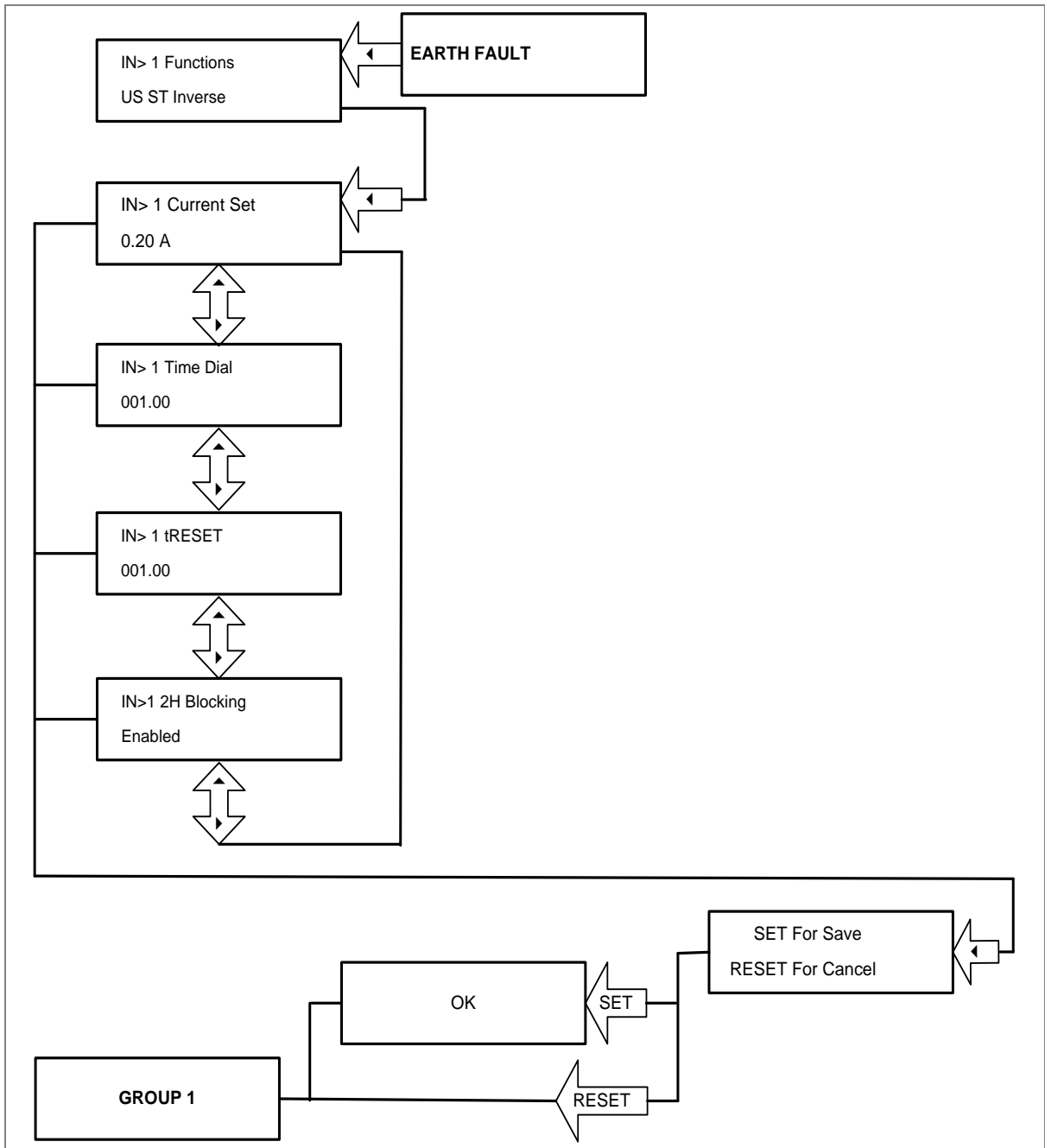
2.4.12.1 If IN>1 Function is Disabled



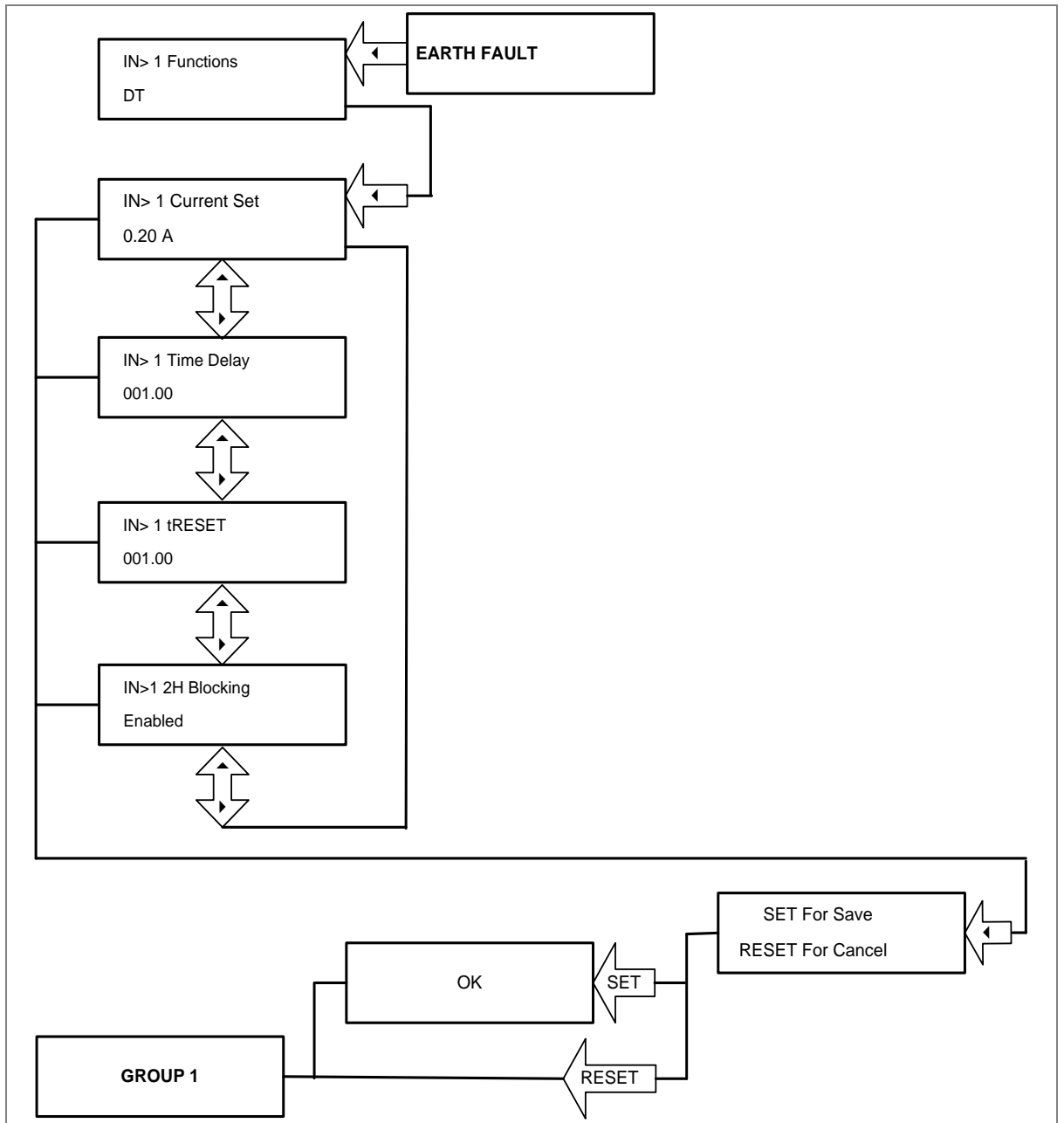
2.4.12.2 If IN>1 Function is set for IEC curve



2.4.12.3 If IN>1 Function is set for IEEE curve

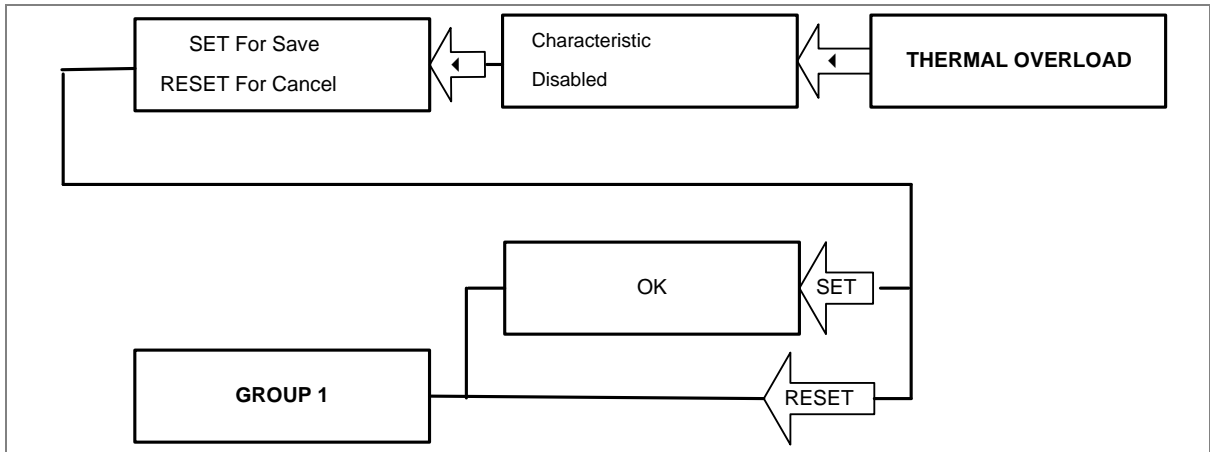


2.4.12.4 If IN>1 Function is set for Definite Time

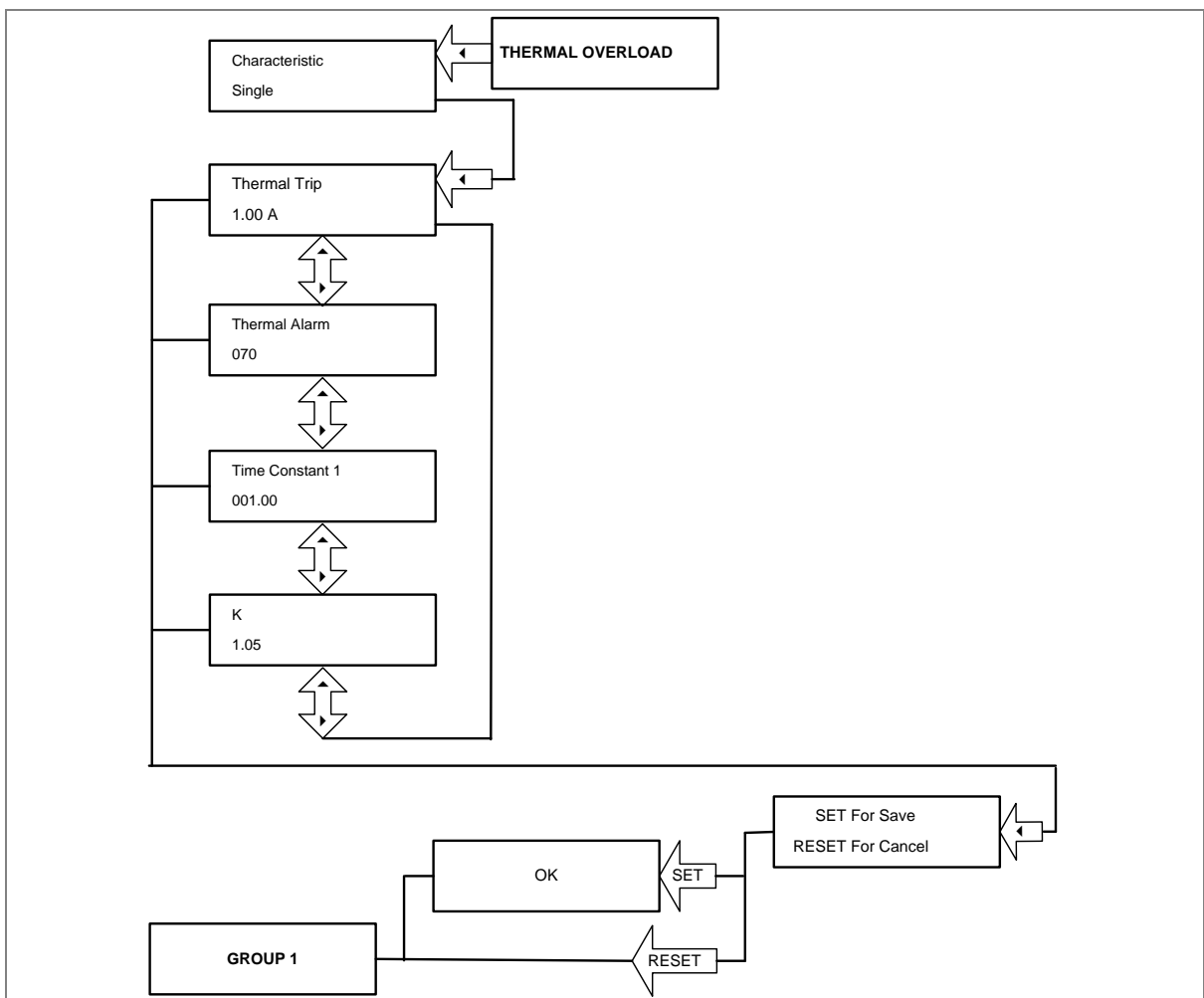


2.4.13 Edit/View Group 1-Thermal Overload sub menu setting

2.4.13.1 If the Characteristic is set to Disabled

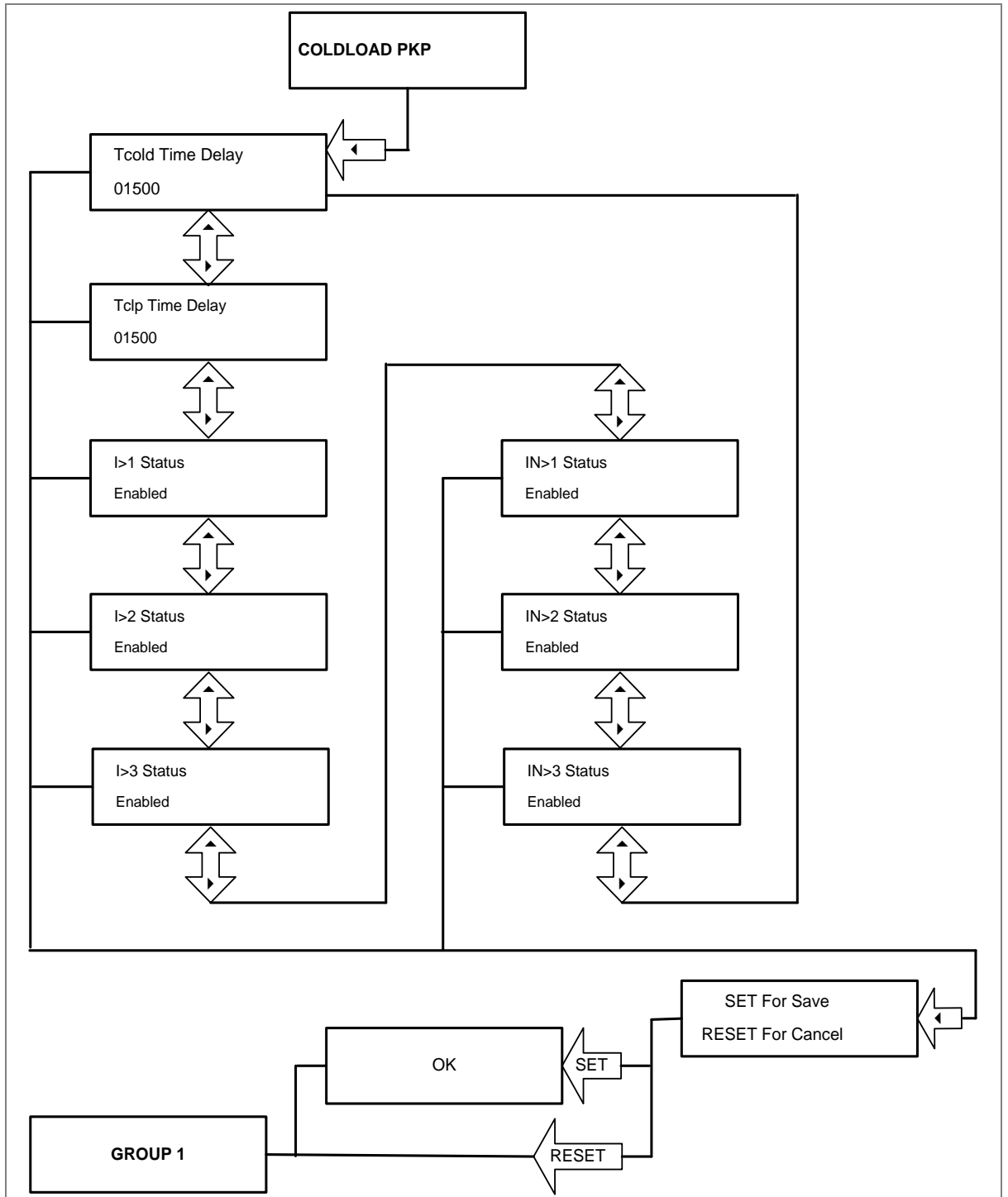


2.4.13.2 If the Characteristic is set to Single

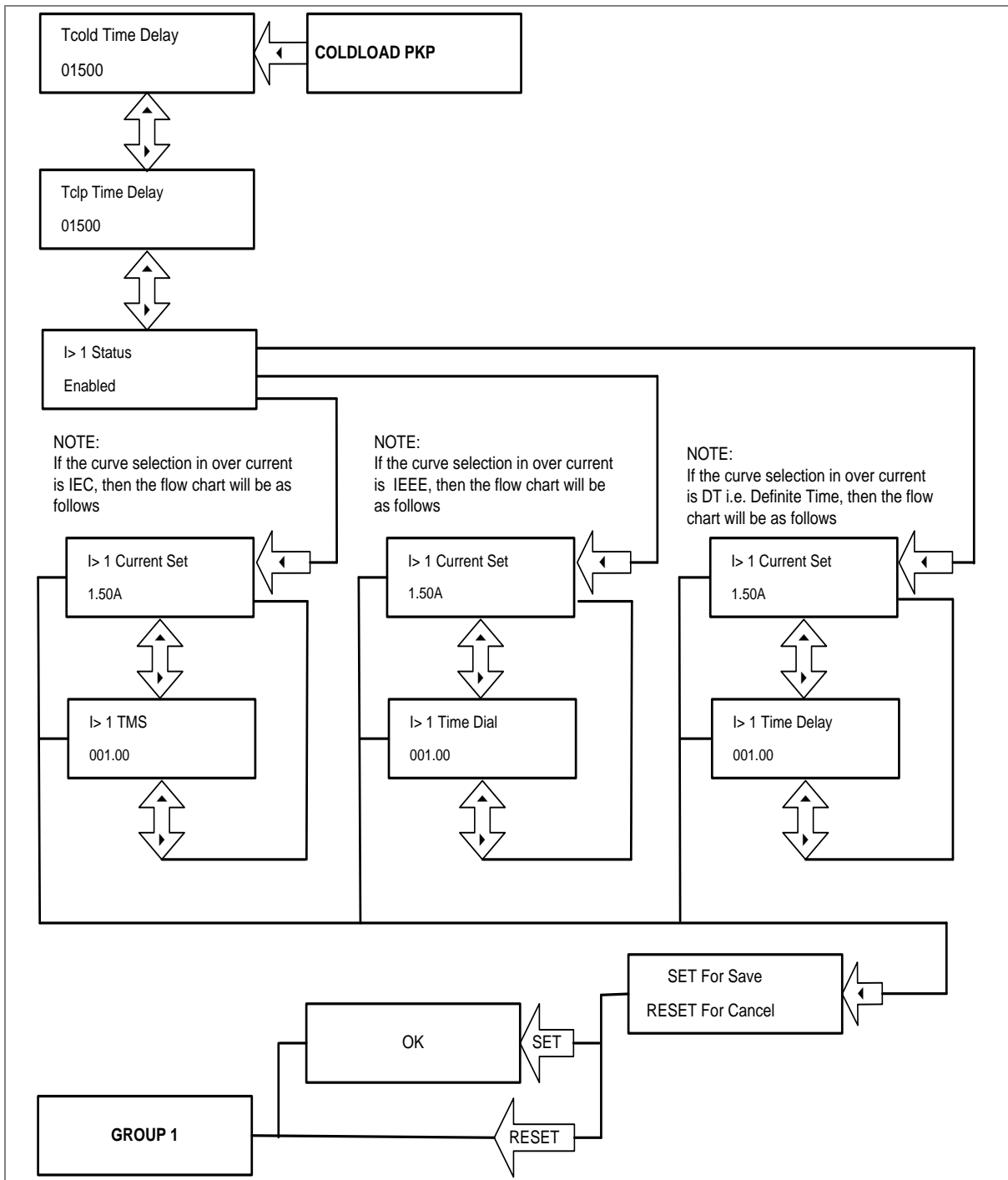


2.4.14 Edit/View Group 1-Cold Load Pickup sub menu settings

2.4.14.1 Edit/View Cold Load Pickup Protection menu settings



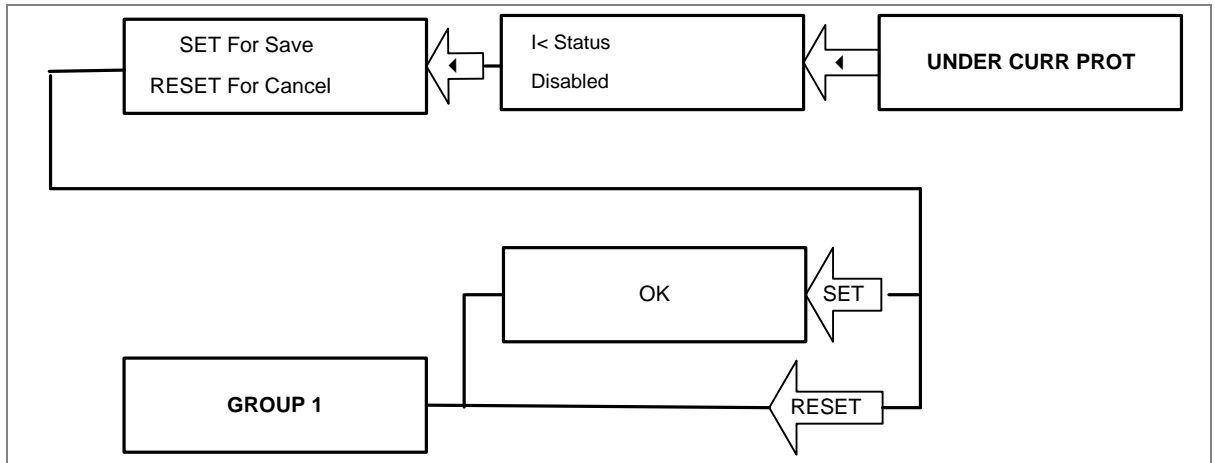
2.4.14.2 Edit/View Cold Load Pickup - I>1 sub menu settings



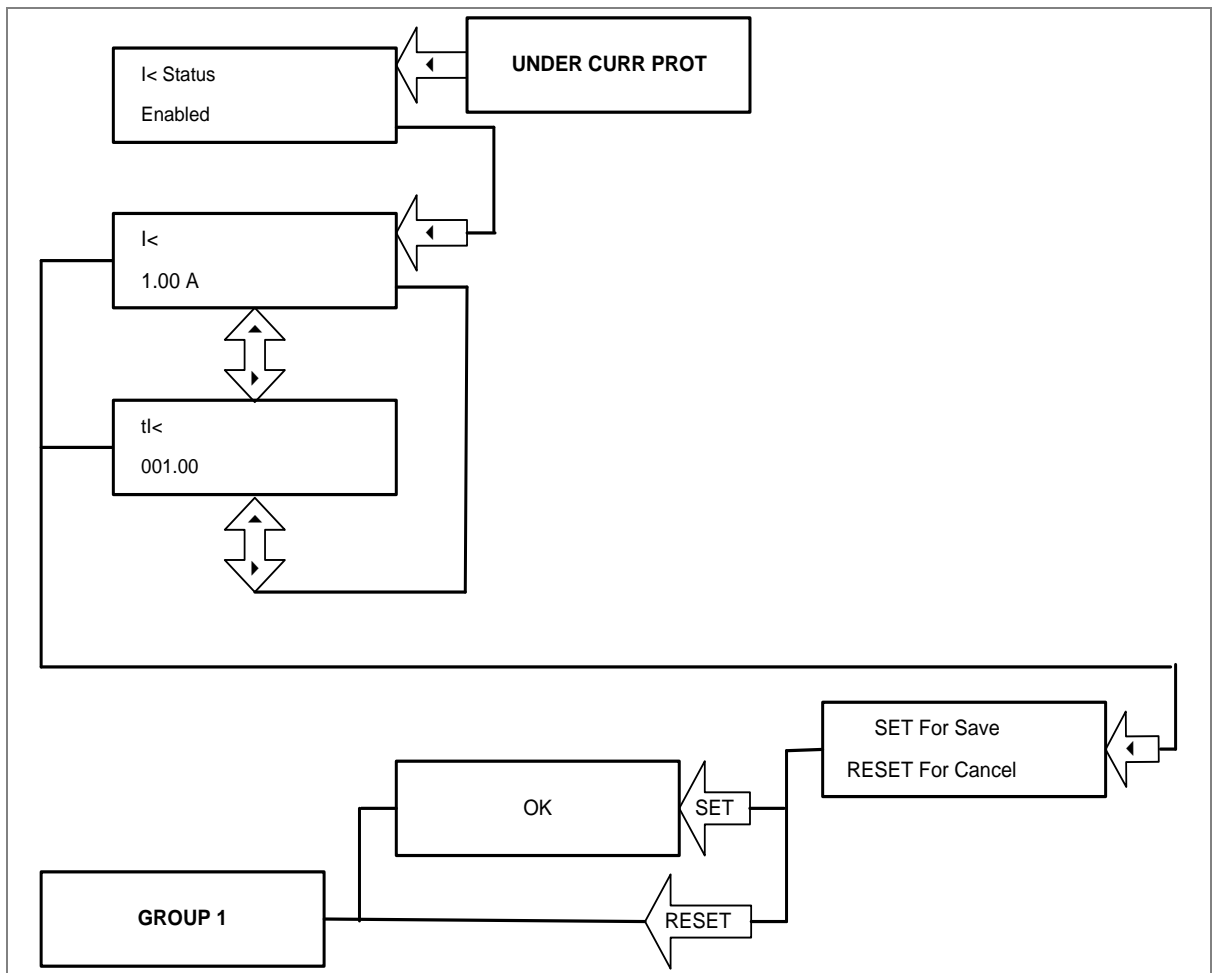
Note: Flow chart for COLD LOAD PICKUP for I>2, I>3, IN>1, IN>2 and IN>3 is same as above.

2.4.15 Edit/View Group 1-Undercurr Prot. Sub menu settings

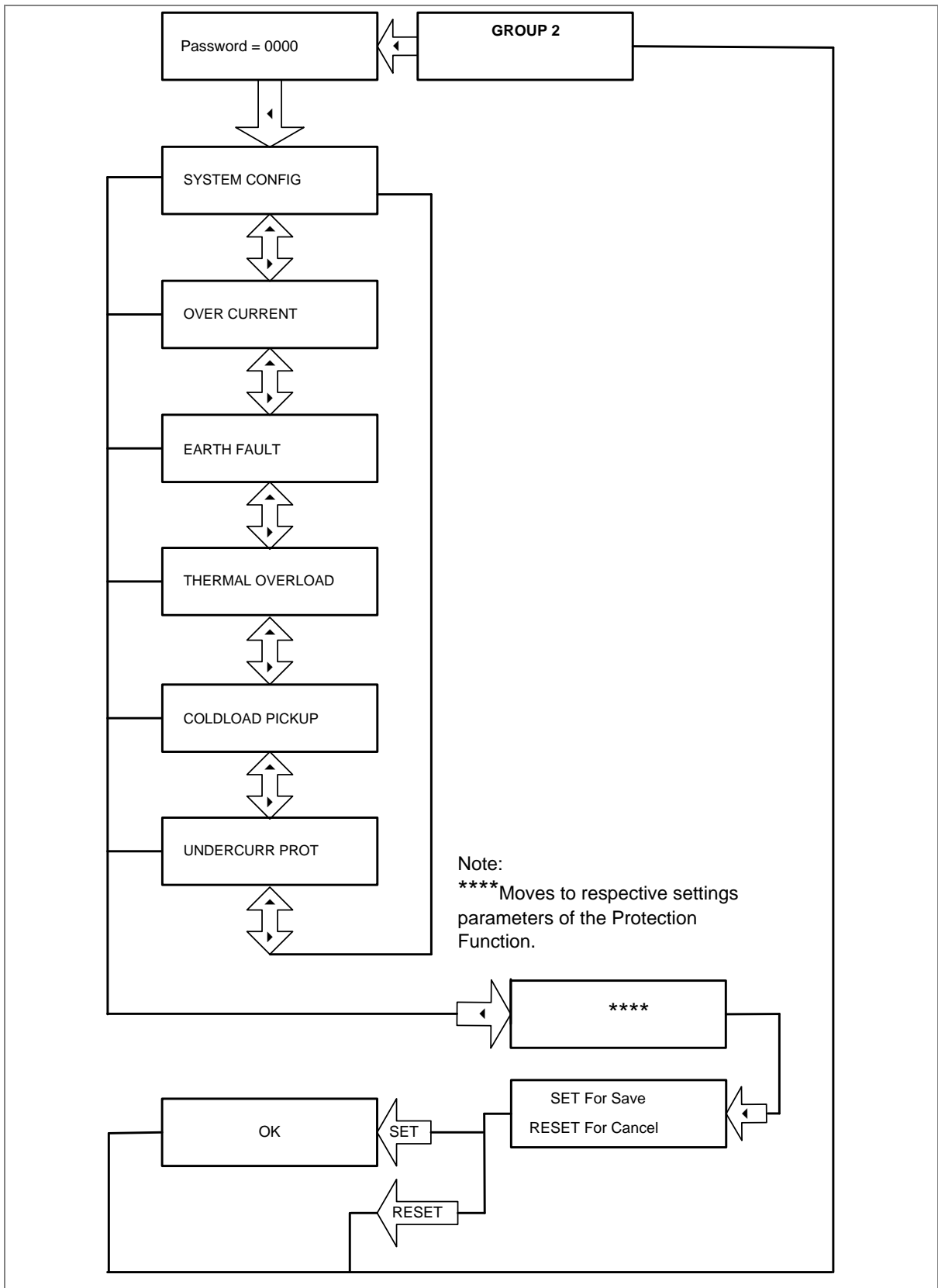
2.4.15.1 If I< Status is set to Disabled



2.4.15.2 If I< Status is set to Enabled



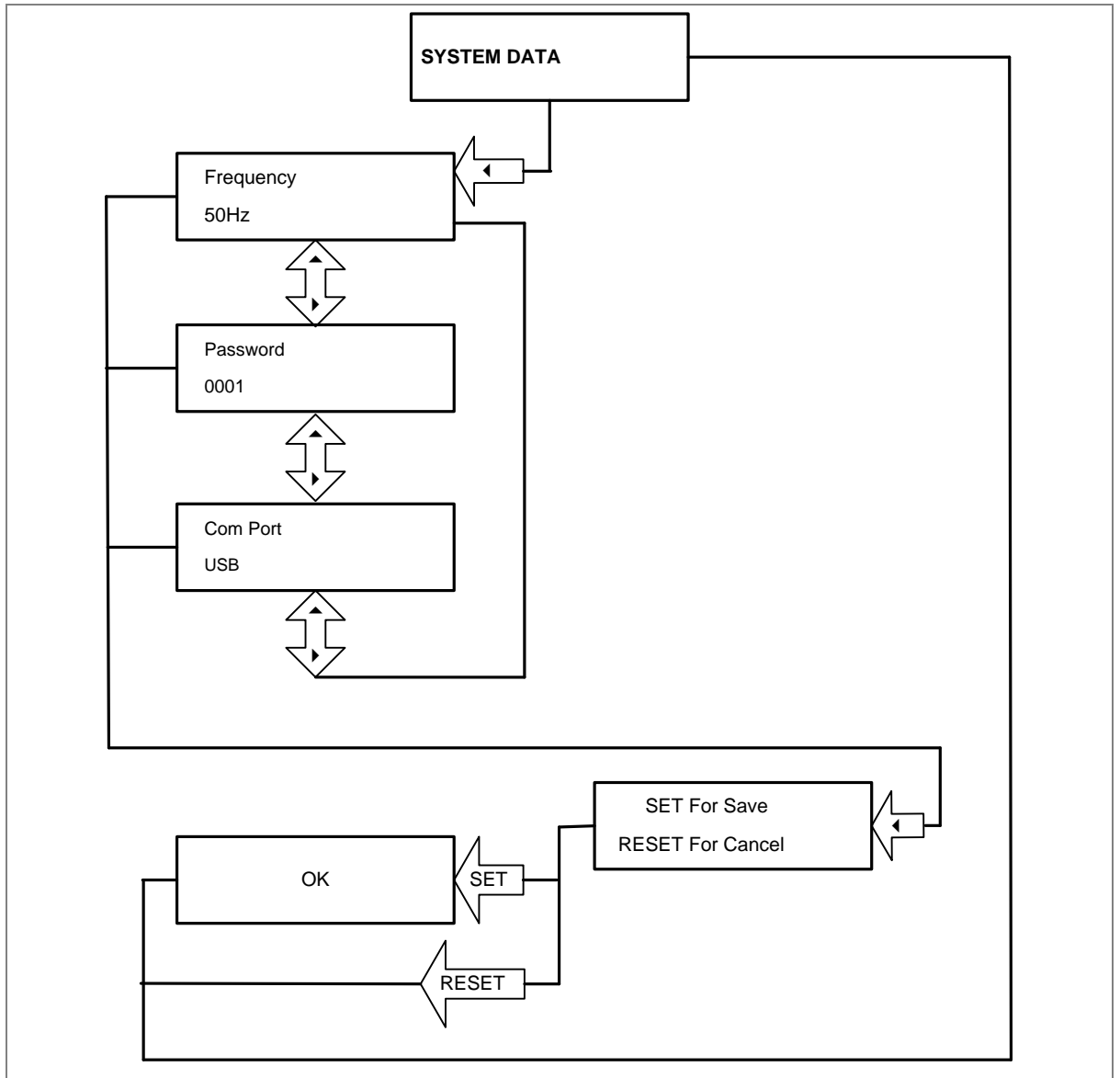
2.4.16 Edit/View Group 2 menu settings



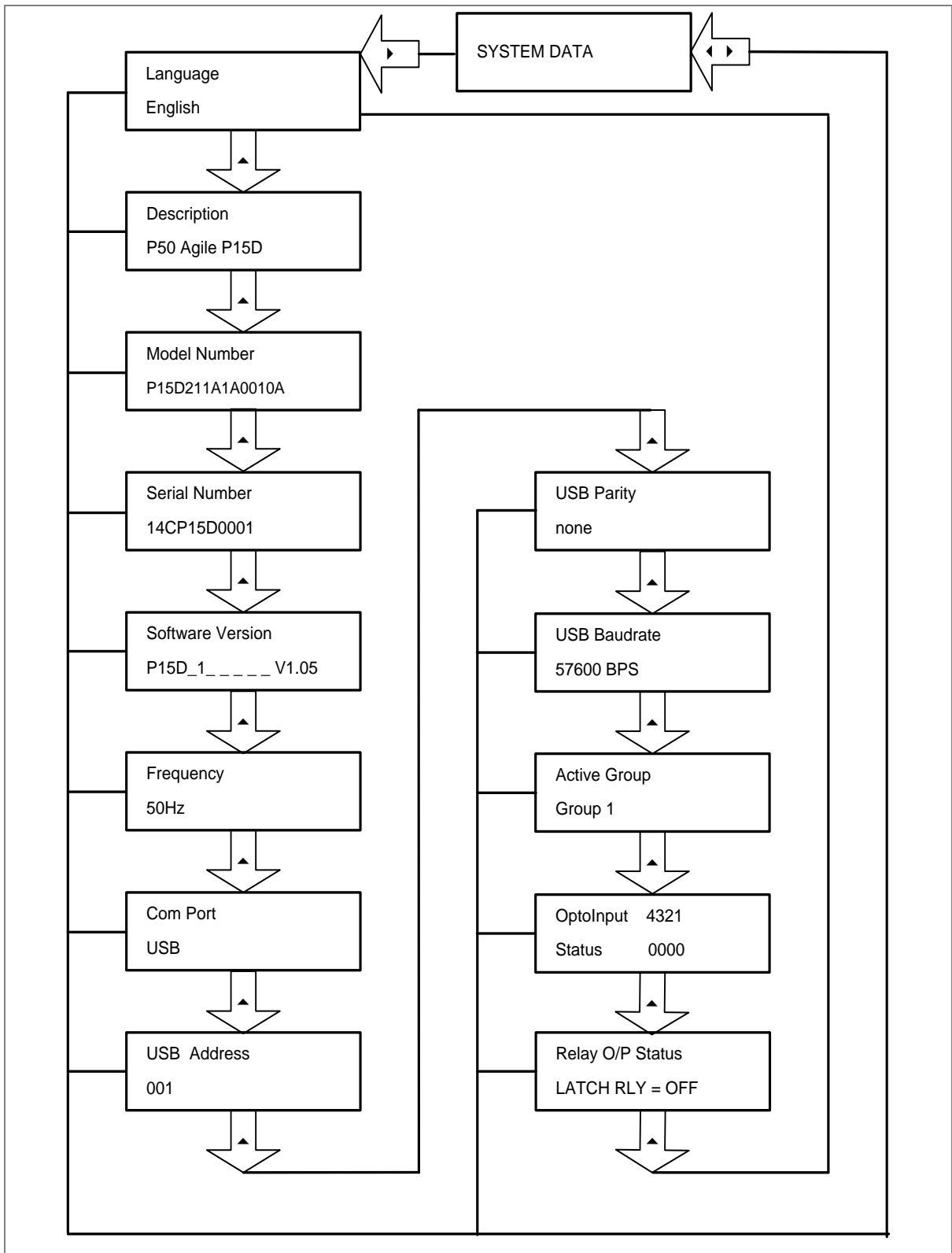
Note: The Flow chart for Protection function settings in Group 2 is identical to Group 1.

2.4.17 Edit/View System Data menu settings

2.4.17.1 Edit settings

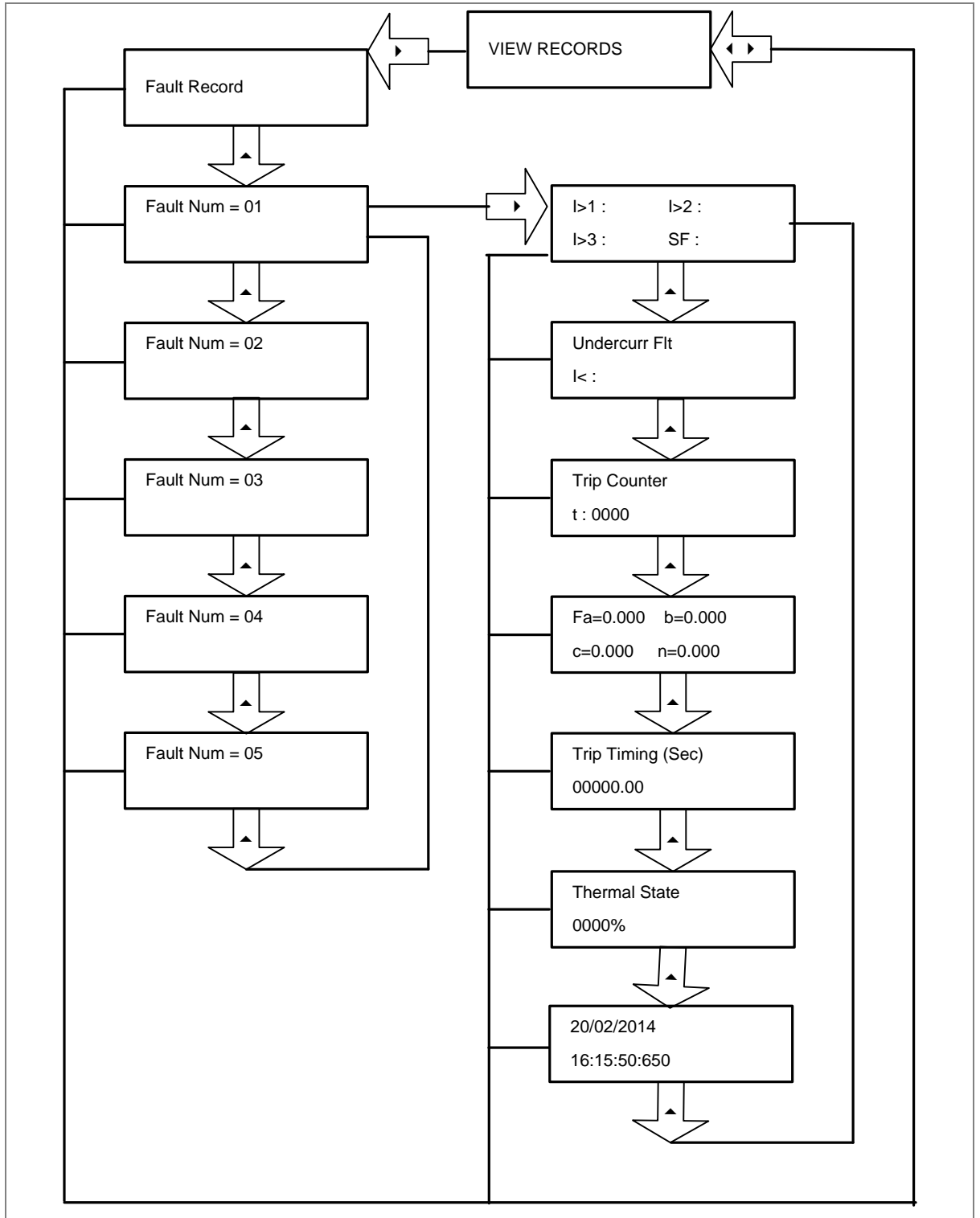


2.4.17.2 View settings



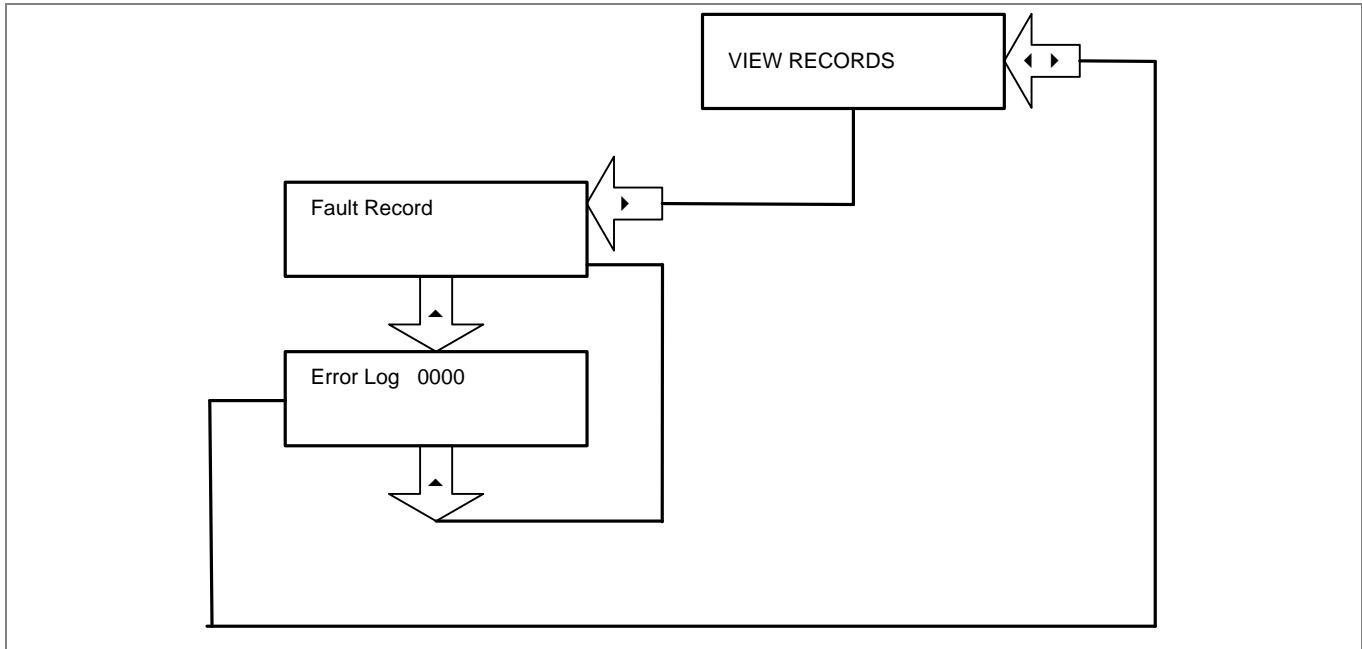
2.4.18 Edit/View Records menu

2.4.18.1 View Fault Record



Note: The flow chart to view fault 2, fault 3, fault 4 & fault 5 is identical to fault 1.

2.4.18.2 View Error Logs



PROTECTION FUNCTIONS

CHAPTER 6

1 CHAPTER OVERVIEW

This chapter consists of the following sections:

- 1 Chapter overview**
- 2 Protection functions**
 - 2.1 Overcurrent/Earth Fault function
 - 2.1.1 IDMT Characteristics
 - 2.1.2 Principle of Protection Function Implementation
 - 2.1.3 Timer Hold Facility/Reset Characteristics
 - 2.2 Thermal Overload Function
 - 2.2.1 Thermal Overload protection implementation
 - 2.3 Undercurrent protection function
 - 2.4 Cold Load Pickup function
 - 2.4.1 Cold Load Pickup logic
 - 2.4.2 Cold Load Pickup for SWITCH ONTO FAULT condition
 - 2.5 Inrush Current Blocking function (2ND Harm Blocking)
 - 2.5.1 Second Harmonic Blocking Implementation

2 PROTECTION FUNCTIONS

2.1 Overcurrent/Earth Fault function

Most power system faults result in an overcurrent of some kind. It is the job of protection devices, formerly known as relays but now known as Intelligent Electronic Devices (IEDs), to protect the power system from such faults. The general principle is to isolate the faults as quickly as possible to limit the danger and prevent unwanted fault currents flowing through systems, which can cause severe damage to equipment and systems. At the same time, we wish to switch off only the parts of the grid that are absolutely necessary, to prevent unnecessary blackouts. The protection devices that control the tripping of the grid's circuit breakers are highly sophisticated electronic units, providing an array of functionality to cover the different fault scenarios for a multitude of applications.

The described products offer a range of overcurrent protection functions including:

- Phase Overcurrent protection
- Earth Fault Overcurrent protection

To ensure that only the necessary circuit breakers are tripped and that these are tripped with the smallest possible delay, the IEDs in the protection scheme need to co-ordinate with each other. Various methods are available to achieve correct co-ordination between IEDs in a system.

These are:

- By means of time alone
- By means of current alone
- By means of a combination of both time and current.

Grading by means of current is only possible where there is an appreciable difference in fault level between the two locations where the devices are situated. Grading by time is used by some utilities but can often lead to excessive fault clearance times at or near source substations where the fault level is highest. For these reasons the most commonly applied characteristic in co-ordinating overcurrent devices is the IDMT (Inverse Definite Minimum Time) type.

The relay is designed for three stages programmable OC and EF functions. All three stages of overcurrent and earth fault protection function are programmable as Inverse Definite Minimum Time (IDMT) or Definite Time (DT) delay.

2.1.1 IDMT Characteristics

All three stages of OC and EF functions are programmable as per IDMT characteristic based on IEC and IEEE 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

Is: Current threshold setting

α : Constant (see the table)

L: ANSI/IEEE constant (zero for IEC curve)

T: Time multiplier setting (TMS) for IEC curves

T: Time dial setting (TD) for IEEE curves

Description	Standard	K	α	L
Define Time	DT	-	-	0
Standard Inverse	IEC	0.14	0.02	0
Standard Inverse 1.3 Sec	---	0.06	0.02	0
Very Inverse	IEC	13.5	1	0
Extremely inverse	IEC	80	2	0
Long Time Inverse	UK	120	1	0
Moderate Inverse	IEEE	0.0515	0.02	0.114
Very Inverse	IEEE	19.61	2	0.491
Extremely Inverse	IEEE	28.2	2	0.1217
US Inverse	CO8	5.95	2	0.18
US Short Time Inverse	CO2	0.0239	0.02	0.0169

2.1.2 Principle of Protection Function Implementation

An energising quantity is a current input from a system current transformer or another quantity derived from the current input. The energising quantities are extracted from the power system and presented to the IED in the form of analogue signals. These analogue signals are then converted to digital quantities where they can be processed by the IEDs internal processor.

In general, an energising quantity is compared with a threshold value, which may be settable or hard-coded depending on the function. If the quantity exceeds (for overvalues) or falls short of (for undervalues) the threshold, a signal is produced, which when gated with the various inhibit and blocking functions becomes the Start signal for that protection function. This Start signal is generally made available to Fixed Scheme logic for further processing. It is also passed through a timer function to produce the Trip signal. The timer function may be an IDMT curve, or a Definite Time delay, depending on the function. The timer can be configured by a range of settings to define such parameters as the type of curve, The Time Multiplier Setting, the IDMT constants and Definite Time delay.

In P15D there are several independent stages for each of the functions. Typically in P15D stages 1 and 2 use an DT/IDMT timer function, whilst stage 3 uses a Definite Time timer function. If the DT time delay is set to '0', then the function is known to be "instantaneous". In many instances the term "instantaneous protection" is used loosely to describe Definite Time protection stages even when the stage may not theoretically be instantaneous.

2.1.3 Timer Hold Facility/Reset Characteristics

This feature may be useful in certain applications, such as when grading with upstream electromechanical overcurrent relays, which have inherent reset time delays. If you set the hold timer to a value other than zero, the resetting of the protection element timers will be delayed for this period. This allows the element to behave in a similar way to an electromechanical relay. If you set the hold

timer to zero, the overcurrent timer for that stage will reset instantaneously as soon as the current falls below a specified percentage of the current setting (typically 95%).

Another possible situation where the timer hold facility may be used to reduce fault clearance times is for intermittent faults. An example of this may occur in a plastic insulated cable. In this application it is possible for the fault energy to melt and reseal the cable insulation, thereby extinguishing the fault. This process repeats to give a succession of fault current pulses, each of increasing duration with reducing intervals between the pulses, until the fault becomes permanent.

When the reset time is instantaneous, the device will repeatedly reset and not be able to trip until the fault becomes permanent. By using the Timer Hold facility the device will integrate the fault current pulses, thereby reducing fault clearance time.

The timer hold facility is available to all three stages of OC and EF functions.

The Definite Time Reset characteristic is applicable for IEC curves / DT.

The value of the Reset Timer depends on the type of the timer associated to the pick-up phase (Earth) threshold.

Type of timer associated with phase (earth) threshold	Reset Timer
Self-Powered	
- For DT time delay	DT
- For IDMT time delay	DT
Aux. Powered	
- For DT time delay	DT
- For IDMT time delay	DT

The range of DT time setting is 0 – 100 sec in steps of 0.01 sec.

Note: For aux. powered P15D relay, if load current reduces below minimum value required to keep relay energised, then the HOLD/RESET timer will reset to zero.

2.2 Thermal Overload Function

The heat generated within an item of plant, such as a cable or a transformer, is the resistive loss (I^2Rt). The thermal time characteristic is therefore based on the square of the current integrated over time. The device automatically uses the largest phase current for input to the thermal model.

The equipment is designed to operate continuously at a temperature corresponding to its full load rating, where the heat generated is balanced with heat dissipated. Over-temperature conditions occur when currents in excess of their maximum rating are allowed to flow for a period of time. It is known that temperature changes during heating follow exponential time constants.

The device provides single time constant characteristic which is used to protect cables, dry type transformers (e.g. type AN), and capacitor banks.

Thermal overload protection is designed to prevent the electrical equipment when operating temperature is exceeded the maximum designed temperature. The fundamental currents are measured and analysed to monitor the thermal state. In case of thermal overload function the calculation of the Time to Trip is given by:

$$t = \tau \ln \left(\frac{(K^2 - A)}{(K^2 - Th. Trip)} \right)$$

Where:

t: Time to trip (in seconds)

τ : Thermal time constant (T_e , in seconds) of the equipment to be protected

K: Thermal overload equal to $(I_{eq} / k \cdot IFL)$

Where:

I_{eq} : Equivalent current corresponding to the largest phase current

IFL: Full load current rating (settable)

k : Settable (1 to 1.5 step 0.01)

A: Initial thermal state. If the initial thermal state is 30% then $A = 0.3$

Th. Trip: Trip thermal state. If the trip thermal state is set at 100%, then Th. Trip is 1

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

$$\hat{E}_{i+1} = (I_{eq} / k \cdot IFL)^2 \cdot [1 - \exp(-t/T_e)] + \hat{E}_i \cdot \exp(-t/T_e)$$

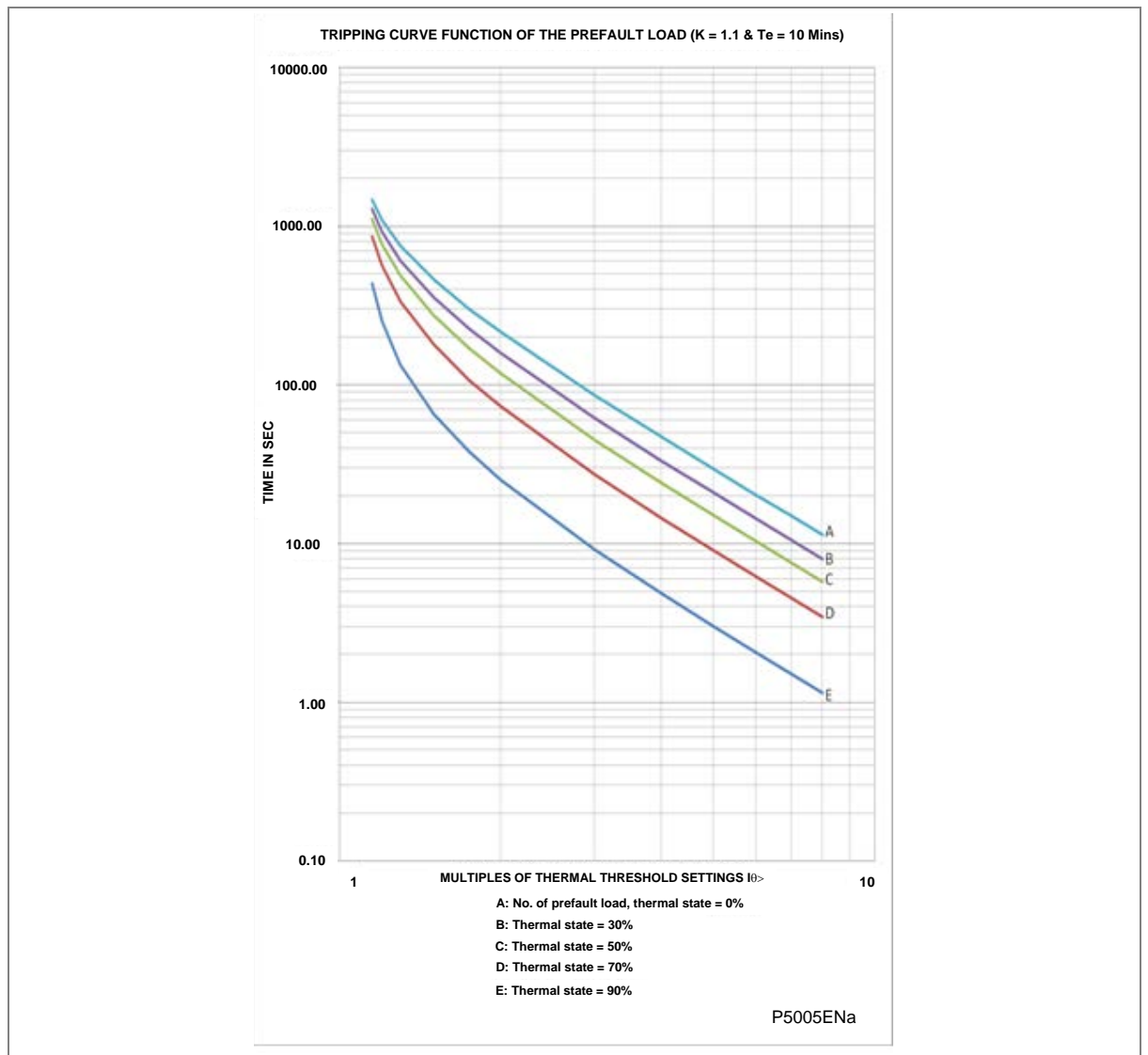


Figure 1: Thermal Overload curve

2.2.1 Thermal Overload protection implementation

The device incorporates a current-based thermal characteristic, using fundamental load current to model heating and cooling of the protected plant. The element can be set with both alarm and trip stages.

Thermal Overload protection is implemented in the THERMAL OVERLOAD column of the relevant settings group. The magnitudes of the three phase input currents are compared and the largest magnitude is taken as the input to the thermal overload function.

Thermal over load function supports setting for alarm and trip stages. If the thermal overload function is enabled and thermal state of the protected equipment exceeds the alarm threshold setting, the alarm is issued and indicated by illuminated **START** LED on the relay front panel.

If the thermal overload function is enabled and thermal state of the protected equipment exceeds the Trip threshold setting, a trip command is issued resulting in operation of output contacts and generation of low energy pulse output. Trip condition is indicated by illuminated **TRIP** LED.

The thermal state measurement is made available in the MEASUREMENTS menu.

The thermal state can be reset from the HMI panel by pressing front panel Touch key **RESET / EDIT + PROT. RESET**

2.3 Undercurrent protection function

The relay includes undercurrent elements that can be used to provide additional functions to prevent damage to the power system. This function allows typical applications such as loss of load. The undercurrent protection function is available only if the auxiliary contact of the CB status is connected to the relay, for example, when NO contact of CB is high.

Note: For proper operation of this function the relay should have auxiliary power supply.

2.4 Cold Load Pickup function

When a feeder circuit breaker is closed in order to energise a load, the current levels that flow for a period of time following energisation may be far greater than the normal load levels. Consequently, overcurrent settings that have been applied to provide overcurrent protection may not be suitable during this period of energisation (cold load), as they may initiate undesired tripping of the circuit breaker. This scenario can be prevented with Cold Load Pickup (CLP) functionality.

The Cold Load Pickup (CLP) logic works by either:

- Inhibiting one or more stages of the overcurrent protection for a set duration
- Raising the overcurrent settings of selected stages, for the cold loading period.

The CLP logic therefore provides stability, whilst maintaining protection during the start-up.

Cold Load Pickup Protection is implemented in the COLD LOAD PICKUP column of the relevant settings group.

This function acts on the following protection functions:

- All overcurrent stages
- All Earth Fault stages

The principle of operation is identical for the 3-phase overcurrent protection and Earth Fault overcurrent protection.

CLP operation occurs when the circuit breaker remains open for a time greater than **tcold** and is subsequently closed. CLP operation is applied after **tcold** and remains for a set time delay of **tclp** following closure of the circuit breaker. The status of the circuit breaker is provided by means of the CB auxiliary contacts. Whilst CLP operation is in force, the CLP settings are enabled. After the time delay **tclp** has elapsed, the normal overcurrent settings are applied and the CLP settings are disabled.

If desired, instead of applying different current setting thresholds for the cold load time, it is also possible to completely block the overcurrent operation during this time, for any of the overcurrent stages.

2.4.1 Cold Load Pickup logic

The CLP logic is in operation when CLP is enabled AND CLP is initiated from a CB open condition after the **tcold** period has elapsed. The CLP logic becomes inactive when CLP is disabled or when there is a CB closed condition. **tcold** and **tclp** are initiated using the CB status signal produced by connecting CB NO auxiliary contact from the circuit breaker. The CLP logic gets driven from a single breaker contact.

2.4.2 Cold Load Pickup for SWITCH ONTO FAULT condition

In some feeder applications, fast tripping may be required if a fault is already present on the feeder when it is energized. Such faults may be due to a fault condition not having been removed from the feeder, or due to earthing clamps having been left on following maintenance. In either case, it is desirable to clear the fault condition quickly, rather than waiting for the time delay imposed by IDMT overcurrent protection. The CLP logic can cater for this situation. Selected overcurrent/earth fault stages could be set to instantaneous operation for a defined period following circuit breaker closure (typically 200 ms). Therefore, instantaneous fault clearance would be achieved for a switch onto fault (SOTF) condition

2.5 Inrush Current Blocking function (2ND Harm Blocking)

When a transformer is initially connected to a source of AC voltage, there may be a substantial surge of current through the primary winding called inrush current. This is analogous to the inrush current exhibited by an electric motor that is started up by sudden connection to a power source, although transformer inrush is caused by a different phenomenon.

In an ideal transformer, the magnetizing current would rise to approximately twice its normal peak value as well, generating the necessary MMF to create this higher-than-normal flux. However, most transformers are not designed with enough of a margin between normal flux peaks and the saturation limits to avoid saturating in a condition like this, and so the core will almost certainly saturate during this first half-cycle of voltage. During saturation, disproportionate amounts of MMF are needed to generate magnetic flux. This means that winding current, which creates the MMF to cause flux in the core, could rise to a value way in excess of its steady state peak value. Furthermore, if the transformer happens to have some residual magnetism in its core at the moment of connection to the source, the problem could be further exacerbated.

We can see that inrush current is a regularly occurring phenomenon and should not be considered a fault, as we do not wish the protection device to issue a trip command whenever a transformer or machine is switched on. This presents a problem to the protection device, because it should always trip on an internal fault. The problem is that typical internal transformer faults may produce overcurrents which are not necessarily greater than the inrush current. Furthermore faults tend to manifest themselves on switch on, due to the high inrush currents. For this reason, we need to find a mechanism that can distinguish between fault current and inrush current. Fortunately this is possible due to the different natures of the respective currents. An inrush current waveform is rich in harmonics, whereas an internal fault current consists only of the fundamental. We can thus develop a restraining method based on the harmonic content of the inrush current. The mechanism by which this is achieved is called second harmonic blocking.

2.5.1 Second Harmonic Blocking Implementation

Second harmonic blocking can be applied to the following overcurrent protection types:

- Phase Overcurrent protection
- Earth Fault protection

Second harmonic blocking is implemented in the GROUP (n) SYSTEM CONFIG column, where (n) is the number of the setting group.

Second harmonic blocking is applicable to all stages of each of the elements.

The function works by identifying and measuring the inrush currents present at switch on. It does this by comparing the value of the second harmonic current components to the value of the fundamental component. If this ratio exceeds the set thresholds, then the blocking signal is generated. The threshold is defined by the **2ndHarm Thresh** setting.

We only want the function to block the protection if the fundamental current component is within the normal range. If this exceeds the normal range, then this is indicative of a fault, which must be protected. For this reason there is another settable trigger **I> lift 2H**, which when exceeded, stops the 2nd harmonic blocking function.

Each overcurrent protection element has a **I>Blocking** setting with which the type of blocking is defined.

PROTECTION PARAMETER SETTINGS

CHAPTER 7

1 CHAPTER OVERVIEW

This chapter consists of the following sections:

- 1 Chapter overview**
- 2 Protection Parametre Settings**
 - 2.1 System Data
 - 2.2 CB Control settings
 - 2.3 Date and Time settings
 - 2.4 Configuration settings
 - 2.5 CT and VT Ratio settings
 - 2.6 Record Control settings
 - 2.7 Communication settings
 - 2.8 Group settings
 - 2.8.1 System Config settings
 - 2.8.2 Overcurrent settings
 - 2.8.2.1 I>1 Function
 - 2.8.2.2 I>2 Function
 - 2.8.2.3 I>3 Function
 - 2.8.3 EARTH FAULT (Measured)
 - 2.8.3.1 IN>1 Function
 - 2.8.3.2 IN>2 Function
 - 2.8.3.3 IN>3 Function
 - 2.8.4 Thermal Overload
 - 2.8.5 Undercurrent
 - 2.8.6 Cold Load Pickup

2 PROTECTION PARAMETRE SETTINGS

2.1 System Data

Parameter	Default setting	Setting Range
Language	English	Not Editable
Description	P50 Agile P15D	Not Editable
Model Number	P15DxxxAxAxxxxA	Not Editable
Serial Number	xxxP15Dxxxx	Not Editable
Software Version	P15D_x____Vx.xx	Not Editable
Frequency	50Hz	50Hz / 60Hz
This cell sets the frequency to either 50 Hz or 60 Hz.		
Com Port	USB	USB /RP
This setting allows you to select the front port (USB) or rear port (RS485) for communication.		
Password	0000	0000-9999
This cell allows you to set new password.		
USB Address	1	Not editable
This cell displays the address for the front USB port of the relay.		
USB Parity	None	Not editable
This cell displays the parity format used in the data frames.		
USB Baud rate	57600	Not editable
This cell sets the communication speed between relay and configuration tool.		
Active Group	Group 1	Group 1/Group 2
This setting displays the active setting group as selected in CONFIGURATION menu.		

2.2 CB Control settings

Sr. No	Parameter	Default Setting	Setting Range
1	Password	0000	0000 to 9999
This setting specifies to enter the set password.			
2	Trip Test	Disabled	Enabled/Disabled
This setting enables or disables Trip Test function. When the function is enabled and the Trip Test key is pressed, the relay immediately provides trip command. This trip command is also extended to breaker coil, so the entire trip operation from relay to circuit breaker can be checked.			
3	Latch Relay	Disabled	Enabled/Disabled
This setting activates or deactivates the Latch Relay function.			
4	Trip Block	Disabled	Enabled/Disabled
This setting enables or disables the Trip Block function. By enabling this function, the user can block the trip command.			

2.3 Date and Time settings

Sr. No	Parameter	Default setting	Setting Range
1.	Password	0000	0000 to 9999
This setting specifies to enter the set password.			
2.	Local Time Enable	Fixed	Fixed / Flexible / Disabled

Sr. No	Parameter	Default setting	Setting Range
This setting is used 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 mins step 15 mins
Setting to specify an offset for local time zone from -12 to +12 hrs in 15 minute intervals. This adjustment is applied to the time based on UTC/GMT master clock.			
4.	DST Enable	Yes	Yes / No
This setting is used to turn on/off daylight saving time adjustment to local time.			
5.	DST Offset	60 Mins	From 30 - 60 mins step 30 mins
Setting to specify daylight saving offset used for the local time adjustment.			
6.	DST Start	Last	First / Second / Third / Fourth / Last
This setting is used 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
This setting is used 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
This setting is used to specify the month in which daylight saving time adjustment starts.			
9.	DST Start Mins	60 Mins	0 to 1425 mins step 15 mins
This setting is used 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
This setting is used 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
This setting is used 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
This setting is used to specify the month in which daylight saving time adjustment ends.			
13.	DST End Mins	60 Mins	0 to 1425 mins step 15 mins
This setting is used 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	UTC	Local / UTC
Setting for the rear port 1 interface to specify if time synchronization received will be local or universal time co-ordinated.			
15.	SET Hours	15*	00 to 23 hrs step 1
The Hour setting is needed when the relay is not connected to SCADA system.			
16.	SET Minutes	59*	00 to 59 mins step 1
The Minutes setting is needed when the relay is not connected to SCADA system.			
17.	SET Seconds	55*	00 to 59 step 1
The Seconds setting is needed when the relay is not connected to SCADA system.			
18.	SET Date	25*	1 to 31 days step 1
The Date setting is needed when the relay is not connected to SCADA system.			
19.	SET Month	03*	1 to 12 months step 1
The Month setting is needed when the relay is not connected to SCADA system.			

Sr. No	Parameter	Default setting	Setting Range
20.	SET Year	14*	00 to 99 years step 1
The Year setting is needed when the relay is not connected to SCADA system.			

*Note: * The relay displays the current Date/Time set in the relay.*

2.4 Configuration settings

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	Password	0000	0000 to 9999
This setting specifies to enter the set password.			
2.	Restore Defaults	No Operation	No Operation / All Settings / Setting Group 1 / Setting Group 2
<p>This setting restores the chosen setting groups to factory default values.</p> <p>To restore the default values to any Group, 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.</p> <p>While editing the relay settings through UI, the new updated value is kept in a temporary memory. After editing all settings in a respective function, there is an option to save setting by pressing SET key or cancel changes by selecting RESET key. If SET key is pressed, relay saves the setting from temporary memory to actual setting file. If RESET key is pressed, relay discards the temporary memory.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><i>Note: If the key pad is left untouched for 100 sec, any changes made are aborted and the relay returns to the Main Menu.</i></p> <p><i>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.</i></p> </div>			
3.	Active Settings	Group 1	Group 1 / Group 2
This setting selects the active settings group.			
4.	Setting Group 1	Enabled	Enabled
This setting enables or disables settings 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. If the Setting Group1 is disabled from the configuration, then all associated settings and signals are hidden, with the exception of this setting.			
5.	Setting Group 2	Disabled	Enabled / Disabled
This setting enables or disables settings 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. If the Setting Group 2 is disabled from the configuration, then all associated settings and signals are hidden, with the exception of this setting.			
6.	System Config	Disabled	Enabled / Disabled
This setting hides or unhides the System Config menu. Inside the 2nd Harmonic blocking related parameters are present			
7.	Overcurrent	Enabled	Enabled / Disabled
This setting is used to enable or disable the Phase Overcurrent Protection function. If it is disabled, then all associated settings and signals are hidden, with the exception of this setting.			
8.	Earth Fault	Enabled	Enabled / Disabled
This setting is used to enable or disable the Earth Fault Protection function.			
9.	Thermal Overload	Disabled	Enabled / Disabled
This setting is used to enable or disable the Thermal Overload function.			
10.	Cold Load Pickup	Disabled	Enabled / Disabled
This setting is used to enable or disable the Cold Load Pickup function.			

Sr. No	Parameter	Defaults setting	Setting / Ranges
11.	Measure't Setup	ABC	ABC /RYB
This setting determines the representation of Phases. Based on this setting, the representation in measurements, records etc. will change. No change is expected for the stored records, if any.			
12.	Under Current Protection	Disabled	Enabled / Disabled
This setting is used to enable or disable the Under Current Protection.			
13.	Under Current Protection	Disabled	Enabled / Disabled
This setting is used to enable or disable the Under Current Protection.			
14.	Setting Value	Secondary	Not editable
This setting determines the reference for all settings dependent on the transformer ratios; either referenced to the primary or the secondary.			

2.5 CT and VT Ratio settings

Sr. No	Parameter	Defaults setting	Setting / Ranges
1.	Password	0000	0000 to 9999
This setting specifies to enter the set password.			
2.	Phase CT Primary	00100	00001 to 30000A in step 1A
This setting determines the phase current transformer input primary current rating.			
3.	E/F CT Primary	00100	00001 to 30000A in step 1A
This setting determines the earth current transformer input primary current rating.			

2.6 Record Control settings

Sr. No	Parameter	Default setting	Setting Range
1.	Password	0000	0000 to 9999
This setting specifies to enter the set password.			
2.	Clear Events	No	Yes / No
Selecting "Yes" will erase the existing events stored in the relay.			
3.	Clear Faults	No	Yes / No
Selecting "Yes" will erase the existing fault records from the relay.			
4.	Clear Dist Recs	No	Yes / No
Selecting "Yes" will erase the existing disturbance records from the relay.			
5.	Clear Maint	No	Yes / No
Selecting "Yes" will erase the existing maintenance records from the relay.			
6.	Thermal Reset	No	Yes / No
Selecting "Yes" will reset the existing thermal state to zero.			

2.7 Communication settings

Sr. No	Parameter	Default setting	Setting Range
1.	Password	0000	0000 to 9999
This setting specifies to enter the set password.			
2.	RP1 Address	001	1 to 247 step 1
This setting sets the address of RP1.			
3.	RP1 Baud rate	57600 BPS	9600 / 14400 / 19200 / 28800 / 38400 / 57600 BPS
This setting sets the communication speed between relay and master station. It is important that both relay and master station are set at the same speed setting.			

Sr. No	Parameter	Default setting	Setting Range
4.	RP1 Parity	Even	Even / Odd / None
This setting sets 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.	RP1 Time sync	Disabled	Enabled / Disabled
This setting enables or disables time synchronization with the master clock.			

2.8 Group settings

The following settings are common to Group 1 and 2.

2.8.1 System Config settings

Sr. No	Parameter	Default setting	Setting Range
1.	2nd Harmonic	Disabled	Enabled / Disabled
This setting is used to enable or disable the 2nd Harmonic blocking of the overcurrent protection.			
2.	2ndHarm Thresh	20%	5 % to 70% step 1%
This setting is used to specify the 2 nd Harm Threshold value. If the level of 2nd harmonic/fundamental in any phase current or neutral current exceeds the setting, the overcurrent protection will be blocked as selected.			
3.	I>lift 2H	10.00*In	4 to 32*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.			

2.8.2 Overcurrent settings

2.8.2.1 I>1 Function

Sr. No	Parameter	Default setting	Setting Range
1.	I>1 Function	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 overcurrent element.			
2.	I>1 Current Set	1*In	If DT 0.20 to 35.00*In step 0.01*In If IDMT 0.20 to 2.50*In step 0.01*In
This setting determines the pick-up setting for first stage overcurrent element.			
3.	I>1 Time Delay	1 S	0 to 100s step 0.01s
This setting determines the time-delay for the definite time setting if selected for first stage overcurrent element.			
4.	I>1 TMS	1	0.025 to 1.2 step 0.005
This time multiplier setting is used to adjust the operating time of the IEC IDMT characteristic.			
5.	I>1 Time Dial	1	0.01 to 100 step 0.01s
This time multiplier setting is used to adjust the operating time of the IEEE IDMT curves.			
6.	I>1 tRESET	0.01 S	0 to 100s step 0.01s
This setting determines the type of reset/release time for all type of curves.			
7.	I>1 2H Blocking	Disabled	Enabled / Disabled
This setting determines the enabling/disabling of blocking first stage overcurrent element due to presence of inrush current. If I>1 Blocking and 2nd Harmonic both setting are enabled, then (I>1) trip command will be blocked in case 2nd harmonics content in any phase is above the 2ndHarm Thresh. and fundamental current is below I> lift 2H setting . (Set in SYSTEM CONFIG Menu.)			

2.8.2.2 I>2 Function

Sr. No	Parameter	Default setting	Setting Range
1.	I>2 Function	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 second overcurrent element.			
2.	I>2 Current Set	1*In	If DT 0.20 to 35.00*In step 0.01*In If IDMT 0.20 to 2.50*In step 0.01*In
This setting determines Pick-up setting for second stage overcurrent element.			
3.	I>2 Time Delay	1 S	0 to 100s step 0.01s
This setting determines the time-delay for the definite time setting if selected for second stage overcurrent element.			
4.	I>2 TMS	1	0.025 to 1.2 step 0.005
This setting determines the time multiplier setting used to adjust the operating time of the IEC IDMT characteristic.			
5.	I>2Time Dial	1	0.01 to 100 step 0.01
This setting determines the new time multiplier setting to adjust the operating time of the IEEE IDMT curves.			
6.	I>2 tRESET	0.01 S	0 to 100s step 0.01s
This setting determines the reset/release time for all types of curve.			
7.	I>2 2H Blocking	Disabled	Enabled / Disabled
This setting determines the enabling/disabling of blocking second stage overcurrent element due to presence of inrush current. If I>2 Blocking and 2nd Harmonic both setting are enabled, then (I>2) trip command will be blocked in case 2nd harmonics content in any phase is above the 2ndHarm Thresh. and fundamental current is below I> lift 2H setting . (Set in SYSTEM CONFIG Menu.)			

2.8.2.3 I>3 Function

Sr. No	Parameter	Default setting	Setting Range
1.	I>3 Function	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 third overcurrent element.			
2.	I>3 Current Set	1*In	If DT 1.0 to 35.00* In step 0.01*In If IDMT 0.20 to 2.50*In step 0.01*In
This setting determines Pick-up setting for second stage overcurrent element.			
3.	I>3 Time Delay	1 S	0 to 100s step 0.01s
This setting determines the time-delay for the definite time setting if selected for second stage overcurrent element.			
4.	I>3 TMS	1	0.025 to 1.2 step 0.005
This setting determines the time multiplier setting used to adjust the operating time of the IEC IDMT characteristic.			
5.	I>3Time Dial	1	0.01 to 100 step 0.01
This setting determines the new time multiplier setting to adjust the operating time of the IEEE IDMT curves.			
6.	I>3 tRESET	0.01 S	0 to 100s step 0.01s
This setting determines the reset/release time for all types of curve.			
7.	I>3 2H Blocking	I>3 2H Blocking	I>3 2H Blocking
This setting determines the enabling/disabling of blocking second stage overcurrent element due to presence of inrush current. If I>2 Blocking and 2nd Harmonic both setting are enabled, then (I>2) trip command will be blocked in case 2nd harmonics content in any phase is above the 2ndHarm Thresh and fundamental current is below I> lift 2H setting . (Set in SYSTEM CONFIG Menu.)			

2.8.3 EARTH FAULT (Measured)

2.8.3.1 IN>1 Function

Sr. No	Parameter	Default setting	Setting Range
1.	IN>1 Function	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 earth fault element.			
2.	IN >1 Current Set	1*In	If DT 0.10 to 35.00*In step 0.01*In If IDMT 0.10 to 2.50*In step 0.01*In
This setting determines Pick-up setting for first stage earth fault element.			
3.	IN >1 Time Delay	1 S	0 to 200s step 0.01s
This setting determines the time-delay for the definite time setting, if selected for first stage earth fault element.			
4.	IN >1 TMS	1	0.025 to 1.2 step 0.005
This setting determines the new time multiplier setting to adjust the operating time of the IEC IDMT characteristic.			
5.	IN >1 Time Dial	1	0.01 to 100 step 0.01
This setting determines the time multiplier setting to adjust the operating time of the IEEE IDMT curves.			
6.	IN >1 tRESET	0.01 S	0 to 100s step 0.01s
This setting determines the reset/release time for all type of curves.			
7.	IN >1 2H Blocking	Disabled	Enabled / Disabled
This setting determines the enabling/disabling of blocking first stage of Earth fault element due to presence of inrush current. If IN>1 Blocking and 2nd Harmonic both setting are enabled, then (IN>1) trip command will be blocked in case 2nd harmonics content in any phase is above the 2ndHarm Thresh and fundamental current is below I> lift 2H setting . (Set in SYSTEM CONFIG Menu.)			

2.8.3.2 IN>2 Function

Sr. No	Parameter	Default setting	Setting Range
1.	IN>2 Function	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 second stage earth fault element.			
2.	IN >2 Current Set	1*In	If DT 0.10 to 35.00*In step 0.01*In If IDMT 0.10 to 2.50*In step 0.01*In
This setting determines pick-up setting for second stage earth fault element.			
3.	IN >2 Time Delay	1 S	0 to 200s step 0.01s
This setting determines the time-delay for the definite time setting, if selected for second stage earth fault element.			
4.	IN >2 TMS	1	0.025 to 1.2 step 0.005
This setting determines the time multiplier setting to adjust the operating time of the IEC IDMT characteristic.			
5.	IN >2 Time Dial	1	0.01 to 100 step 0.01
This setting determines the time multiplier setting to adjust the operating time of the IEEE IDMT curves.			
6.	IN >2 tRESET	0.01 S	0 to 100s step 0.01s
This setting determines the reset/release time for definite time reset characteristic.			
7.	IN >2 2H Blocking	Disabled	Enabled / Disabled
This setting determines the enabling/disabling of blocking second stage of Earth fault element due to presence of inrush current. If IN>2 Blocking and 2nd Harmonic both setting are enabled, then (IN>2) trip command will be blocked in case 2nd harmonics content in any phase is above the 2ndHarm Thresh. and fundamental current is below I> lift 2H setting . (Set in SYSTEM CONFIG Menu.)			

2.8.3.3 IN>3 Function

Sr. No	Parameter	Default setting	Setting Range
1.	IN>3 Function	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 third stage earth fault current element.			
2.	IN>3 Current Set	1*In	If DT 1.0 to 35.00* In step 0.01*In If IDMT 0.10 to 2.50* In step 0.01*In
This setting determines the pick-up setting for third stage earth fault current element.			
3.	IN>3 Time Delay	1 S	0 to 200s step 0.01s
This setting determines the time-delay for the definite time setting, if selected for third stage earth fault element.			
4.	IN>3 TMS	1	0.025 to 1.2 step 0.005
This setting determines the time multiplier setting to adjust the operating time of the IEC IDMT characteristic.			
5.	IN>3Time Dial	1	0.01 to 100 step 0.01
This setting determines the time multiplier setting to adjust the operating time of the IEEE IDMT curves.			
6.	IN>3 tRESET	0.01 S	0 to 100s step 0.01s
This setting determines the reset/release time for all types of curves.			
7.	IN>3 2H Blocking	Disabled	Enabled / Disabled
This setting determines the enabling/disabling of blocking third stage of Earth fault element due to presence of inrush current. If IN>3 Blocking and 2nd Harmonic both setting are enabled, then (IN>3) trip command will be blocked in case 2nd harmonics content in any phase is above the 2ndHarm Thresh. and fundamental current is below I> lift 2H setting . (Set in SYSTEM CONFIG Menu.)			

2.8.4 Thermal Overload

Sr. No	Parameter	Default setting	Setting Range
1.	Characteristic	Single	Disabled/ Single
This setting determines the operating characteristic of the thermal overload element.			
2.	Thermal Trip	1*In	0.10 to 4.00* In step 0.01 In
This setting sets the pick-up threshold of the thermal characteristic. This would normally be the maximum full load current.			
3.	Thermal Alarm	70	50 to 100% step 1%
This setting sets the thermal state threshold at which an alarm will be generated. This corresponds to a percentage of the trip threshold.			
4.	Time constant 1	10	1 to 200 min step 1min
This setting determines the thermal time constant for a single time constant characteristic.			
5.	K factor	1.05	1 to 1.5 step 0.01
This setting specify the k constant of thermal over load function			

2.8.5 Undercurrent

Sr. No	Parameter	Default setting	Setting Range
1.	I< Status	Enabled	Enabled / Disabled
This setting is used to enable or disable the Undercurrent protection.			
2.	I<	1*In	0.1In to 1.00*In step 0.01*In
This setting determines pick-up setting for undercurrent element.			
3.	tI<	1	0.20s to 100s step 0.01s
This setting determines the time-delay for tripping.			

2.8.6 Cold Load Pickup

Sr. No	Parameter	Default setting	Setting Range
1.	tcold Time Delay	7200	0 to 14400s step 1s
This setting determines the time the load needs to be de-energized (dead time) before the new settings are applied.			
2.	tclp Time Delay	7200	0 to 14400s step 1s
This setting controls the period of time for which the relevant overcurrent and earth fault settings are altered or inhibited following circuit breaker closure.			
3.	I>1 Status	Enabled	Blocked / Enabled
The I>1 status cells have two setting options, "Enabled" and "Blocked". Selecting "Enabled" for a particular stage means that the current and time settings programmed in the following cells will be adopted during the "tclp" time. Selecting "Blocked" simply blocks the relevant protection stage during the "tclp" time. It also removes the following current and time settings for that stage from the menu.			
4.	I>1 Current Set	1.5*In	0.20 to 4.00*In step 0.01*In
This setting determines the new pick-up setting for first stage overcurrent element during the tclp time delay.			
5.	I>1 Time Delay	0.01 S	0 to 100s step 0.01s
This setting determines the new operating time delay for the first stage definite time overcurrent element during the tclp time.			
6.	I>1 TMS	0.1	0.025 to 1.2 in step 0.005
This setting determines the new time multiplier setting for the first stage element to adjust the operating time of the IEC IDMT characteristic during the tclp time.			
7.	I>1 Time Dial	0.1	0.01 to 100 in step 0.01s
This setting determines the new time multiplier setting for the first stage element to adjust the operating time of the IEEE / US IDMT characteristic during the tclp time.			
8.	I>2 Status	Enabled	Blocked / Enabled
The I>2 status cells have two setting options, "Enabled" and "Blocked". Selecting "Enabled" for a particular stage means that the current and time settings programmed in the following cells will be adopted during the "tclp" time. Selecting "Blocked" simply blocks the relevant protection stage during the "tclp" time. It also removes the following current and time settings for that stage from the menu.			
9.	I>2 Current Set	1.5*In	0.20 to 4.00*In step 0.01*In
This setting determines the new pick-up setting for second stage overcurrent element during the tclp time delay.			
10.	I>2 Time Delay	0.01 S	0 to 100s in step 0.01s
This setting determines the new operating time delay for the second stage definite time overcurrent element during the tclp time.			
11.	I>2 TMS	0.1	0.025 to 1.2 in step 0.005
This setting determines the new time multiplier setting for the second stage element to adjust the operating time of the IEC IDMT characteristic during the tclp time.			
12.	I>2 Time Dial	0.1	0.01 to 100 in step 0.01s
This setting determines the new time multiplier setting for the second stage element to adjust the operating time of the IEEE / US IDMT characteristic during the tclp time.			
13.	I>3 Status	Enabled	Blocked / Enabled
The I>3 status cells have two setting options, "Enabled" and "Blocked". Selecting "Enabled" for a particular stage means that the current and time settings programmed in the following cells will be adopted during the "tclp" time. Selecting "Blocked" simply blocks the relevant protection stage during the "tclp" time. It also removes the following current and time settings for that stage from the menu.			
14.	I>3 Current Set	1.5*In	0.20 to 4.00*In step 0.01*In
This setting determines the new pick-up setting for third stage overcurrent element during the tclp time delay.			
15.	I>3 Time Delay	0.01 S	0 to 100s step 0.01s
This setting determines the new operating time delay for the third stage definite time overcurrent element during the tclp time.			
16.	I>3 TMS	0.1	0.025 to 1.2 in step 0.005
This setting determines the new time multiplier setting for the third stage element to adjust the operating time of the IEC IDMT characteristic during the tclp time.			
17.	I>3 Time Dial	0.1	0.01 to 100 in step 0.01s
This setting determines the new time multiplier setting for the third stage element to adjust the operating time of the IEEE / US IDMT characteristic during the tclp time.			

Sr. No	Parameter	Default setting	Setting Range
18.	IN>1 Status	Enabled	Blocked / Enabled
The IN>1 status cells have two setting options, "Enabled" and "Blocked". Selecting "Enabled" for a particular stage means that the current and time settings programmed in the following cells will be adopted during the "tclp" time. Selecting "Blocked" simply blocks the relevant protection stage during the "tclp" time. It also removes the following current and time settings for that stage from the menu.			
19.	IN>1 Current Set	$0.2 \cdot I_n$	0.20 to 4.00 step $0.01 \cdot I_n$
This setting determines the new pick-up setting for first stage earth fault element during the tclp time delay.			
20.	IN>1 Time Delay	0.01 S	0 to 200s step 0.01s
This setting determines the new operating time delay for the first stage definite time element during the tclp time.			
21.	IN>1 TMS	0.1	0.025 to 1.2 step 0.005
This setting determines the new time multiplier setting to adjust the operating time of the IEC IDMT characteristic during the tclp time.			
22.	IN>1 Time Dial	0.1	0.01 to 100 in step 0.01s
This setting determines the new time multiplier setting for the first stage element to adjust the operating time of the IEEE / US IDMT characteristic during the tclp time.			
23.	IN>2 Status	Enabled	Blocked / Enabled
The IN>2 status cells have two setting options, "Enabled" and "Blocked". Selecting "Enabled" for a particular stage means that the current and time settings programmed in the following cells will be adopted during the "tclp" time. Selecting "Blocked" simply blocks the relevant protection stage during the "tclp" time. It also removes the following current and time settings for that stage from the menu.			
24.	IN>2 Current Set	$0.2 \cdot I_n$	0.20 to $4.00 \cdot I_n$ step $0.01 \cdot I_n$
This setting determines the new pick-up setting for second stage earth fault element during the tclp time delay.			
25.	IN>2 Time Delay	0.01 S	0 to 200s step 0.01s
This setting determines the new operating time delay for the second stage definite time element during the tclp time.			
26.	IN>2 TMS	0.1	0.025 to 1.2 step 0.005
This setting determines the new time multiplier setting to adjust the operating time of the IEC IDMT characteristic during the tclp time.			
27.	IN>2 Time Dial	0.1	0.01 to 100 in step 0.01s
This setting determines the new time multiplier setting for the second stage element to adjust the operating time of the IEEE / US IDMT characteristic during the tclp time.			
28.	IN>3 Status	Enabled	Blocked / Enabled
The IN>3 status cells have two setting options, "Enabled" and "Blocked". Selecting "Enabled" for a particular stage means that the current and time settings programmed in the following cells will be adopted during the "tclp" time. Selecting "Blocked" simply blocks the relevant protection stage during the "tclp" time. It also removes the following current and time settings for that stage from the menu.			
29.	IN>3 Current Set	$0.2 \cdot I_n$	0.20 to $4.00 \cdot I_n$ step $0.01 \cdot I_n$
This setting determines the new pick-up setting for third stage earth fault element during the tclp time delay.			
30.	IN>3 Time Delay	0.01 S	0 to 200s step 0.01s
This setting determines the new operating time delay for the third stage definite time element during the tclp time.			
31.	IN>3 TMS	0.1	0.025 to 1.2 step 0.005
This setting determines the new time multiplier setting to adjust the operating time of the IEC IDMT characteristic during the tclp time.			
32.	IN>3 Time Dial	0.1	0.01 to 100 in step 0.01s
This setting determines the new time multiplier setting for the third stage element to adjust the operating time of the IEEE / US IDMT characteristic during the tclp time.			

MONITORING & CONTROL

CHAPTER 8

1 CHAPTER OVERVIEW

This chapter consists of the following sections:

- 1 **Chapter overview**
- 2 **Monitoring & Control**
 - 2.1 Monitoring Functions (Event, Fault, Disturbance Record)
 - 2.1.1 Event Records
 - 2.1.2 Fault Record
 - 2.1.3 Disturbance Record
 - 2.2 Display of Measuring Parameters
 - 2.3 Self-Diagnostic features
 - 2.4 Interface with SCADA
 - 2.5 Binary output relay
 - 2.6 Remote trip

2 MONITORING & CONTROL

2.1 Monitoring Functions (Event, Fault, Disturbance Record)

The IED logs three different types of record. These are Event, Fault and Disturbance records, which are stored in the IEDs non-volatile memory. It is important to log records because this allows you to establish the sequence of events that occurred, for example following a particular power system condition.

The device is capable of storing up to:

- 100 event records
- 5 Fault records
- 5 Disturbance records

When the available space is exhausted, the oldest record is automatically overwritten by the new one. The IEDs internal clock provides a time tag for each event, to a resolution of 1 ms.

The VIEW RECORDS column contains details of these Event and Fault records, which can be displayed on the IEDs front panel, although it is easier to view them using the settings application software.

The device supports IEC 60870-5-103 and Modbus protocol. It auto-detects IEC-60870-5-103 and MODBUS command and responds in respective language. There is no any specific setting which defines the protocol.

Note: The MODBUS by design does not support event functionality.

2.1.1 Event Records

Event records are generated when certain events happen. A change in any digital input signal or protection element output signal causes an event record to be created. These events are generated by the protection software and immediately time stamped. They are then transferred to non-volatile memory for storage.

The device continuously monitors logical and physical status. There are three physical Binary inputs provided, marked as S1, S2 and S3. The S1 is designed to monitor breaker status and also use this status for Cold load operation, while S2 and S3 are general purpose. Any physical or logical change is recorded as event. These events are stored in internal, non-volatile memory along with a time stamp. Some of the events recorded include: Protection pickup, Relay Reset and CB Trip. A complete list can be found in protocol document. Up to 100 such events can be stored and downloaded for detailed analysis. Details of event data are as follows:

Capacity: 100 events

Time-tag: 1 millisecond

Triggers: Any selected protection alarm and threshold, Logic input change of state, Self-test events and setting changes.

The user can view the event records either using the front panel interface, the USB port or remotely using the rear EIA(RS)485 port.

2.1.2 Fault Record

A fault record is triggered by any protection signal which trips the circuit breaker. If there are any fault records, these will appear automatically in the VIEW RECORDS column. You can select the fault record in the VIEW RECORDS column. A value of '01' corresponds to the latest fault record.

Information about the fault follows in the subsequent cells. The time stamp assigned to the fault record itself is more accurate than the corresponding stamp of the event record, because the event is logged after the actual fault record is generated. The fault measurements in the fault record are given at the time of the protection Start.

After every fault relay latched fault data which can be viewed for detailed analysis. The following are details of this fault data.

Capacity: 5 faults

Time-tag: 1 millisecond

Triggers: Any selected protection threshold.

Data: Fault number, Type of fault (stage / Phase / EF etc), Trip counter, Fault current magnitude in Secondary, Trip Timing, Thermal state, Fault date and Fault time.

2.1.3 Disturbance Record

The disturbance recorder can record the waveforms of the calibrated analogue channels, as well as the values of the digital signals. The disturbance recorder is supplied with data once per cycle, and collates the received data into a disturbance record. The disturbance records can be extracted using application software or the SCADA system, which can also store the data in COMTRADE format, allowing the use of other packages to view the recorded data.

The integral disturbance recorder has an area of memory specifically set aside for storing disturbance records. The number of records that can be stored is dependent on the recording duration. Up to 5 such waveforms can be recorded; the duration of each disturbance record is 1sec. The maximum total recording time is 5 seconds.

When the available memory is exhausted, the oldest records are overwritten by the newest ones. The disturbance recorder stores the samples that are taken at a rate of 12 samples per cycle.

Each disturbance record consists of 4 analogue data channels and 16 digital data channels. The relevant CT ratio for the analogue channels is also extracted to enable scaling to primary quantities.

The relay records the waveform of the current along with all digital and logical status during a fault. The disturbance record can be triggered from trip operation of relay. This waveform can be downloaded via the communication port for further analysis.

The details of the disturbance record are as follows:

Capacity: 5 records of 1 sec each (0.9 sec for pre fault and 0.1 sec for post fault)

Sampling Rate: 12 samples / cycles

Triggers: Trip signal

Data: 4 analogue channels and 16 digital channels (physical and logical status).

2.2 Display of Measuring Parameters

The device directly measures and calculates a number of system quantities, which are updated at regular intervals. These values can be viewed in the MEASUREMENTS menu on the LCD screen using the navigation keys on the front panel or using the P50 Agile configurator tool.

In normal conditions the relay displays Primary and Secondary current value of phases A, B, C and earth current N as per phase/earth CT ratio within $\pm 1\%$ 1% accuracy and Thermal state in %.

The device measures and displays the following quantities:

Parameter	Unit	Description
A	Amp	Primary current in phase A
B	Amp	Primary current in phase B
C	Amp	Primary current in phase C
N	Amp	Primary current in phase N
a	Amp	Secondary current in phase A
b	Amp	Secondary current in phase B
c	Amp	Secondary current in phase C
n	Amp	Secondary current in phase N
Thermal State	%	Thermal state

In the event of a fault, the type of the fault and fault current are displayed on LCD. The IED measures the fault current and stores it in the non-volatile memory.

2.3 Self-Diagnostic features

The P15D relay includes self-monitoring function to check the operation of its hardware and software while in service. If there is a problem with the hardware or software, it is able to detect and report the problem.

The relay continuously monitors the hardware and in the event detects any hardware fault/error, corresponding error code is displayed on the LCD. These faults errors are stored in the error log file and can be viewed from "Error Log" menu. Error log is stored as 16 bit integer. Some example of error codes are given below:

Setting error: 0000 0000 0000 0001

RTC error: 0000 0000 0000 0100

If more than one error bits are set: the error code displayed on the LCD is the combination of these error bits.

As an example if RTC error and Setting error occur simultaneously, then error code/error log will be as under:

Setting Error Bit	RTC Error Bit	Error code	Error log on LCD
0000 0000 0000 0001	0000 0000 0000 0100	0000 0000 0000 0101	0005

If the error is cleared during the self-diagnostic procedure the corresponding error bit will be cleared. In case of errors related to 'Setting' and 'ADC', P15D goes in to OUT OF SERVICE mode (Protection function will be blocked) and the **ON** LED on the front facia of the relay will start blinking at 1 sec interval. For more details, refer to the Troubleshooting section.

2.4 Interface with SCADA

Communication port RS-485 can be configured for networking with remote SCADA. The additional binary inputs S2 & S3 are provided and can be used to monitor any additional contact, such as CB or any other relay contact, remotely.

2.5 Binary output relay

The relay supports two output contacts: 1x self-reset and 1x latching type. The self-reset trip contact remains closed until the fault persists and opens after fault current become less than reset value. The

latching type contact will close when a fault occurs and the relay provides trip command. This contact will remain closed even if there is no power supplied to relay. The contact can be reset by pressing RESET key after normalization of the relay power supply.

2.6 Remote trip

A dedicated binary input is provided marked as remote trip. After applying auxiliary voltage to this terminal, the relay will provide an instant trip. This can be used for initiating trip from remote signal as well for safety functions such transformer door monitoring.

EXTERNAL BATTERY BACKUP

CHAPTER 9

1 CHAPTER OVERVIEW

This chapter consists of the following sections:

- 1 Chapter overview**
- 2 Front panel external battery backup**

2 FRONT PANEL EXTERNAL BATTERY BACKUP

A non-chargeable external battery backup is provided to view parameters whenever there is loss of source power supply. Press the “BAT ON” key to view the relay parameters on the LCD.

The battery is located in the battery box on the front panel and can be easily replaced by opening the cover. The unit uses three AA size batteries with capacity of 1.5 V each.

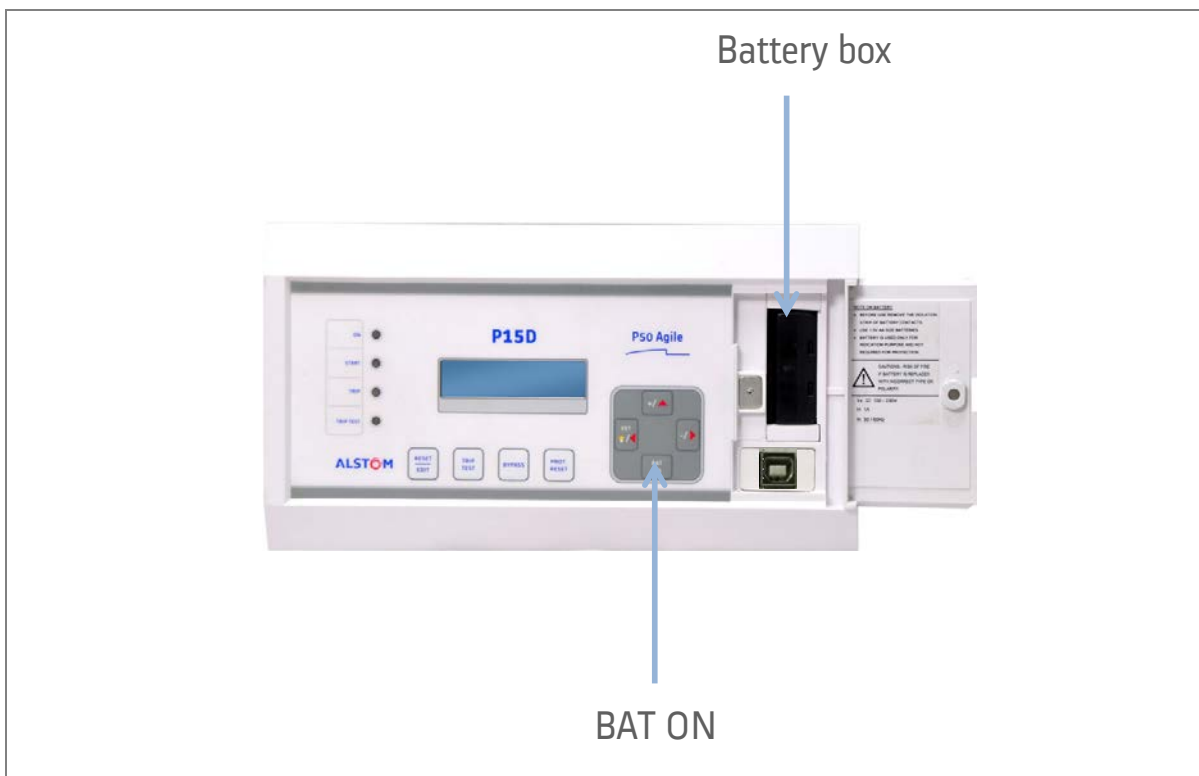


Figure 1: Battery ON key

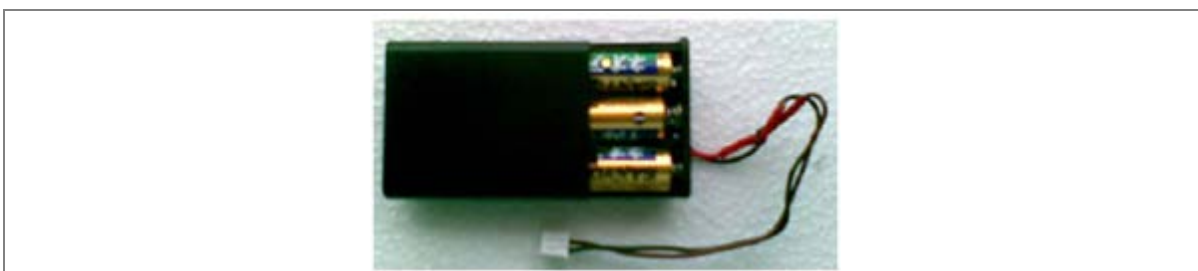


Figure 2: Battery box



Caution Risk of fire if batteries are replaced with incorrect type or polarity.

IMPULSE OUTPUT FOR TRIPPING COIL

CHAPTER 10

1 CHAPTER OVERVIEW

This chapter consists of the following sections:

- 1 Chapter overview**
- 2 Impulse Output for Tripping Coil**

2 IMPULSE OUTPUT FOR TRIPPING COIL

The Low Energy tripping coil of the circuit breaker (CB) can be interfaced on relay terminal block. The trip energy (12 V-24 V DC \leq 0.1J) is provided by a capacitor in the relay. The capacitors are charged by a current input or the auxiliary voltage. The length of the trip impulse is 50 ms (if the output is not burdened). The pause between the individual pulses depends on the impedance of the tripping coil and the current level. The pulse lasts as long as the activation threshold is exceeded. The voltage level of the energy output depends on the discharging time.

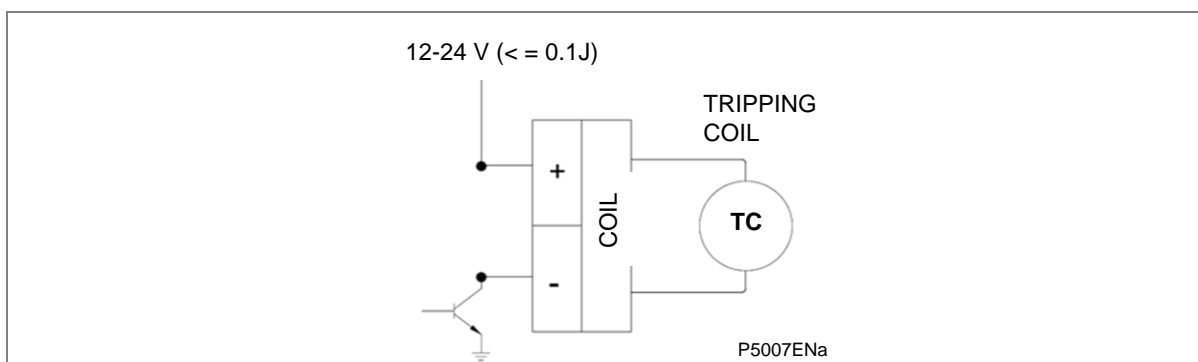


Figure 1: Impulse output connection to Trip coil of CB

IMPULSE FOR FLAG INDICATOR

CHAPTER 11

1 CHAPTER OVERVIEW

This chapter consists of the following sections:

- 1 Chapter overview**
- 2 Impulse for Flag Indicator**

2 IMPULSE FOR FLAG INDICATOR

The trip energy (12 V-24 V DC, ≤ 0.03 J) for the flag indicator is stored by a capacitor built into the protection relay. The capacitors are charged by a current input or the auxiliary voltage. The duration of the trip pulse is 50 ms (if output is not burden). The pause between the individual pulses depends on the impedance of the flag indicator and on the current level. The pulse lasts as long as the activation threshold is exceeded. The impulse output for flag indicator and trip coil drive energy from same source. The flag indicator output uses additional capacitor to store additional required energy. If more energy is taken from flag output than specified, then it will affect energy output of trip coil.

SCADA COMMUNICATIONS

CHAPTER 12

1 CHAPTER OVERVIEW

This chapter consists of the following sections:

- 1 Chapter overview**
- 2 SCADA communications**
 - 2.1 Modbus
 - 2.1.1 Overview
 - 2.1.2 Protocol Mapping
 - 2.2 IEC60-870-5-103
 - 2.2.1 Overview
 - 2.2.2 Physical Connection and Link Layer
 - 2.2.3 Initialisation
 - 2.2.4 Time Synchronisation
 - 2.2.5 Spontaneous Events
 - 2.2.6 General Interrogation (GI)
 - 2.2.7 Cyclic Measurements
 - 2.2.8 Commands
 - 2.2.9 Test Mode
 - 2.2.10 Disturbance Records
 - 2.2.11 Configuration
 - 2.2.12 Protocol Mapping

2 SCADA COMMUNICATIONS

2.1 Modbus

This section describes how the MODBUS standard is applied to the Px50 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).

2.1.1 Overview

Physical Connection and Link Layer

Only one option is available for connecting MODBUS.

- 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 starts bit, 8 data bits, 1 parity bit with 1 stop bit, or 2 stop bits (a total of 11 bits per character). One stop bit when parity even or odd, 2 stop bits when parity none.

MODBUS Functions

2.1.2 Protocol Mapping

The following MODBUS function codes are 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

- 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, then 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 on 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

Sr. No.		Function Code	Register	No. of Regs	Format	Reg. Type	Address Map
2	Time Synchronization (Unicast/Broadcast)	03/16					
			Year	1	16 bit	R/W	4x02049
			Month- Day	1	16 bit	R/W	4x02050
			Hour, Min	1	16 bit	R/W	4x02051
			Milliseconds	1	16 bit	R/W	4x02052

<p>For Alstom P50 Agile IEDs on Modbus, time synchronization is possible via a broadcast command to 800H (4x02049 through 4x02052) .The format is inverted IEC 870-5-4 CP56Time2a</p>																	
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	SU 0 0				Hours				Iv 0				Minutes				0..23 0..59
4	Milliseconds Hi								Milliseconds Lo								0..59999 (seconds + milliseconds)
Su	(=0 Standard , =1 Summer Time)																
iv	(=0 valid , =1 non valid or non synchronised system case)																
	First day of week is Monday																

Sr.No.		Function Code	Register	No. of Regs	Format	Reg. Type	Address Map
3	Status and Logical Status	02					
			General Strt	1	1 bit	R	1x32769
			Strt R	1	1 bit	R	1x32770
			Strt Y	1	1 bit	R	1x32771
			Strt B	1	1 bit	R	1x32772
			Strt I>1	1	1 bit	R	1x32773
			Strt I>2	1	1 bit	R	1x32774
			Strt I>3	1	1 bit	R	1x32775
			Strt IN>1	1	1 bit	R	1x32776
			Strt IN>2	1	1 bit	R	1x32777
			Strt IN>3	1	1 bit	R	1x32778
			CLP in Progress	1	1 bit	R	1x32779
			Strt I<	1	1 bit	R	1x32780
			TH Alarm	1	1 bit	R	1x32781
			Gen Trip	1	1 bit	R	1x32782
			Trip L1	1	1 bit	R	1x32783
			Trip L2	1	1 bit	R	1x32784
			Trip L3	1	1 bit	R	1x32785
			Trip I>1	1	1 bit	R	1x32786
			Trip I>2	1	1 bit	R	1x32787
			Trip I>3	1	1 bit	R	1x32788
			Trip IN>1	1	1 bit	R	1x32789
			Trip IN>2	1	1 bit	R	1x32790
			Trip IN>3	1	1 bit	R	1x32791
			Trip CLP	1	1 bit	R	1x32792
			I< Trip	1	1 bit	R	1x32793
			Test Trip	1	1 bit	R	1x32794
			Status-1	1	1 bit	R	1x32801
			Status-2	1	1 bit	R	1x32802
			Status-3	1	1 bit	R	1x32803
			Status-4	1	1 bit	R	1x32804
			Trip LED	1	1 bit	R	1x32805
			Latch Trip	1	1 bit	R	1x32806
			Protection active	1	1 bit	R	1x32807
			Relay Error	1	1 bit	R	1x32808

Sr.No.		Function Code	Register	No. of Regs	Format	Reg. Type	Address Map
4	Outputs	05					
			Trip	1	16 bit	W	0x33025
			LED Reset	1	16 bit	W	0x33026

Sr. No.		Function Code	Register	No. of Regs	Format	Reg. Type	Address Map
5	Parameters	04					
			IL1	2	32 bit Float	R	3x33281 – 3x33282
			IL2	2	32 bit Float	R	3x33283 – 3x33284
			IL3	2	32 bit Float	R	3x33285 – 3x33286
			IN	2	32 bit Float	R	3x33287 – 3x33288
			Th State	2	32 bit Float	R	3x33289 – 3x33290

2.2 IEC60-870-5-103

2.2.1 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 P15D 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

2.2.2 Physical Connection and Link Layer

There is just one option for IEC 60870-5-103:

- Rear serial port 1- for permanent SCADA connection via RS485

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

2.2.3 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.

2.2.4 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. 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.

2.2.5 Spontaneous Events

Events are categorized using the following information:

- Function type
- Information Number

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

2.2.6 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.

2.2.7 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.

2.2.8 Commands

The list of commands supported P15D relay is given in table below.

2.2.9 Test Mode

It is possible to enable test mode in the relay using either the front panel menu or with P50 Agile configurator. 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'.

2.2.10 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.

2.2.11 Configuration

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

2.2.12 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					
	18	Protection active	X	1	1,7,9	160
	19	Trip LED	X	1	1,7,9,11,12,20,21	160
	21	Test Trip	X	1	9,11	127
	22	Local parameter setting	X	1	9,11,12	160
	27	Opto I/P-1	X	1	1,7,9,11	160
	28	Opto I/P-2	X	1	1,7,9,11	160
	29	Opto I/P-3	X	1	1,7,9,11	160
	30	Opto I/P-4	X	1	1,7,9,11	160

Sr. No.	INF	Description	GI	TYP	COT	FUN
3	Semantics of INFORMATION NUMBER : Fault indications in monitor direction					
	84	Gen Strt	X	2	1,7,9	160
	64	Strt L1	X	2	1,7,9	160
	65	Strt L2	X	2	1,7,9	160
	66	Strt L3	X	2	1,7,9	160
	117	Strt l>1	X	2	1,7,9	126
	103	Strt l>2	X	2	1,7,9	126
	105	Strt l>3	X	2	1,7,9	126
	143	Strt IN>1	X	2	1,7,9	126
	144	Strt IN>2	X	2	1,7,9	126
	145	Strt IN>3	X	2	1,7,9	126
	200	THOL Alm	-	2	1,7	126
	21	Strt CLP	-	2	1,7	124
	178	Strt l<	X	2	1,7,9	126
	22	Test Mode	-	2	1,7	124
	68	Gen Trip	-	2	1,7	160
	69	Trip L1	-	2	1,7	160
	70	Trip L2	-	2	1,7	160
	71	Trip L3	-	2	1,7	160
	90	Trip l>1	-	2	1,7	160
	91	Trip l>2	-	2	1,7	160
	104	Trip l>3	-	2	1,7	126
	123	Trip IN>1	-	2	1,7	126
	124	Trip IN>2	-	2	1,7	126
	125	Trip IN>3	-	2	1,7	126
	202	THOL Trip	-	2	1,7	126
	225	CLP	-	2	1,7	126
	177	Trip l<	-	2	1,7	126
	145	Rly Error	-	2	1,7	127

Sr. No.	INF	Description	GI	TYP	COT	FUN
5	Semantics of INFORMATION NUMBER : Measurands in monitor direction					
	147	Measurand I _n	-	3	2,7	160
	148	Measurand I _{L 1,2,3}	-	9	2,7	160
	155	Th State	-	9	2,7	160

Note: The measurands transmitted by the relay are sent as a proportion of 2.4 times of the rated value of the analogue value.

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

Sr. No.	INF	Description
7		Semantics of Actual Channel : Used for DR Transmission
	ACC	Description
	1	IL1 - Primary
	2	IL2
	3	IL3
	74	IN (Measuredl)

Sr. No.	INF	Description	GI	TYP	COT	FUN
8		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
9		Semantics of INFORMATION NUMBER : General commands in control direction				
	19	LED Reset	ON	20	20	160
	124	Trip	ON/OFF	20	20	127

INSTALLATION

CHAPTER 13

1 CHAPTER OVERVIEW

This chapter consists of the following sections:

- 1 Chapter overview**
- 2 Installation**
 - 2.1 Handling the goods
 - 2.1.1 Cables and Connectors
 - 2.1.2 Case dimensions
 - 2.2 Commissioning
 - 2.2.1 Commissioning Test and equipment required
 - 2.2.2 External circuitry check
 - 2.2.2.1 Earthing
 - 2.2.2.2 CT Polarity
 - 2.2.3 Check relay settings
 - 2.2.4 Final check
 - 2.2.5 Relay testing
 - 2.2.5.1 Relay calibration
 - 2.2.5.2 Pickup, Trip and Binary Output Test:
 - 2.2.6 Testing of Binary Input Contact:
 - 2.2.7 Testing for optional auxiliary power supply
 - 2.2.8 Testing for trip coil
 - 2.2.9 Testing for flag coil
 - 2.2.10 Functional test
 - 2.2.10.1 Testing of Overcurrent Protection
 - 2.2.10.2 Testing of Earth Fault Protection
 - 2.3 Maintenance
 - 2.4 Troubleshooting

2 INSTALLATION

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 you should be familiar with the Safety Information chapter of this manual.

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.

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.

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° to $+65^{\circ}\text{C}$.

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.

Mounting the device

The products are available for flush panel mounting only

Flush Panel Mounting

P15D 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

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

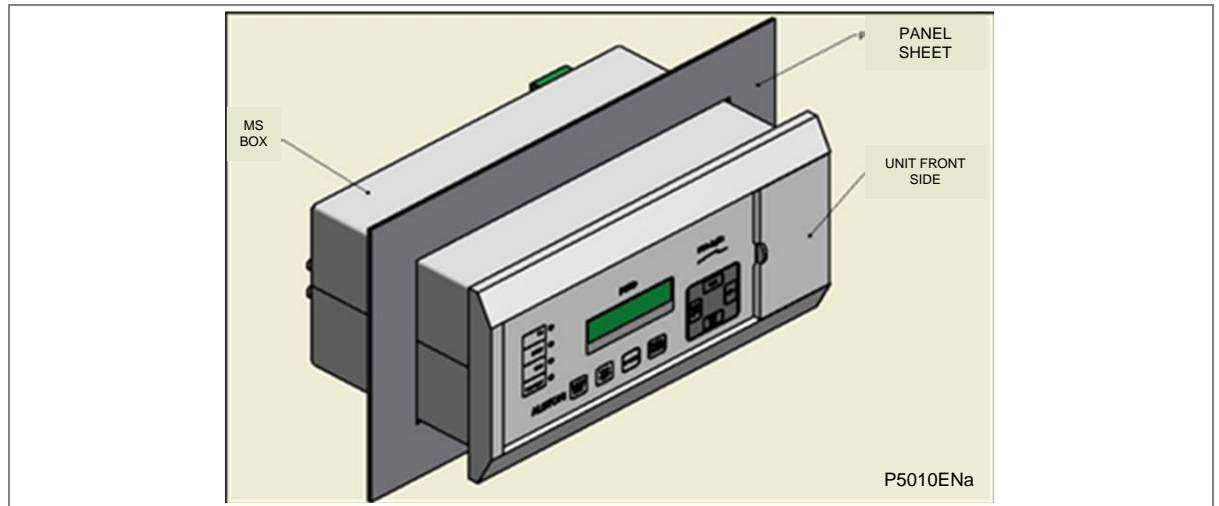


Figure 1: Inserting relay in to the panel cutout

2. 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.

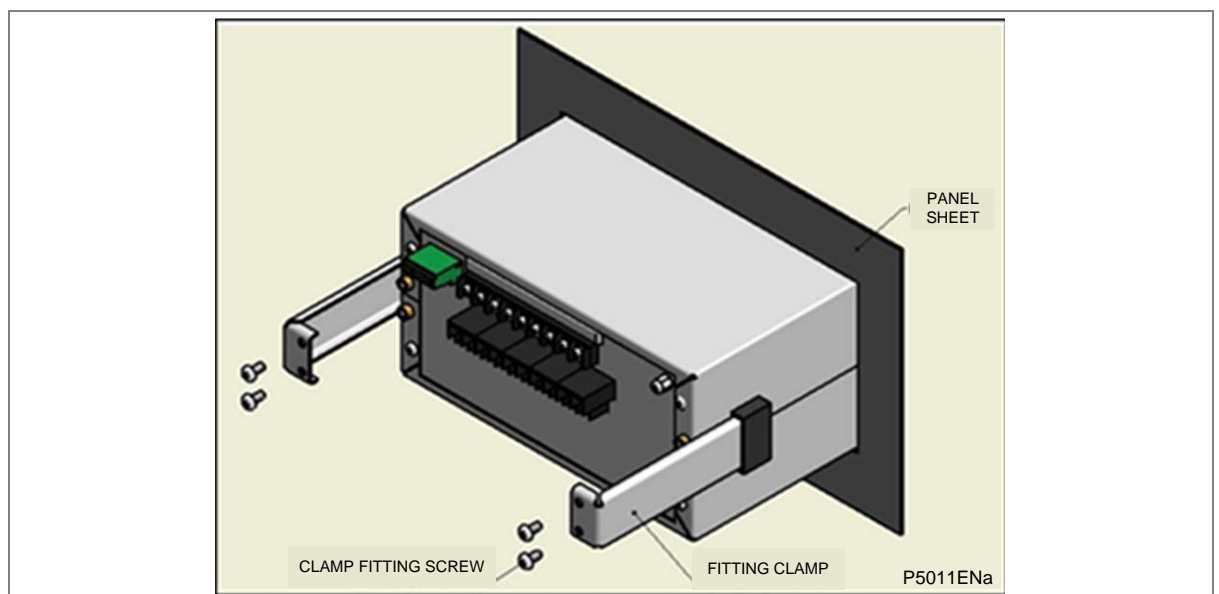


Figure 2: Tightening Fitting clamps



Caution: All screws of fitting clamps 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.

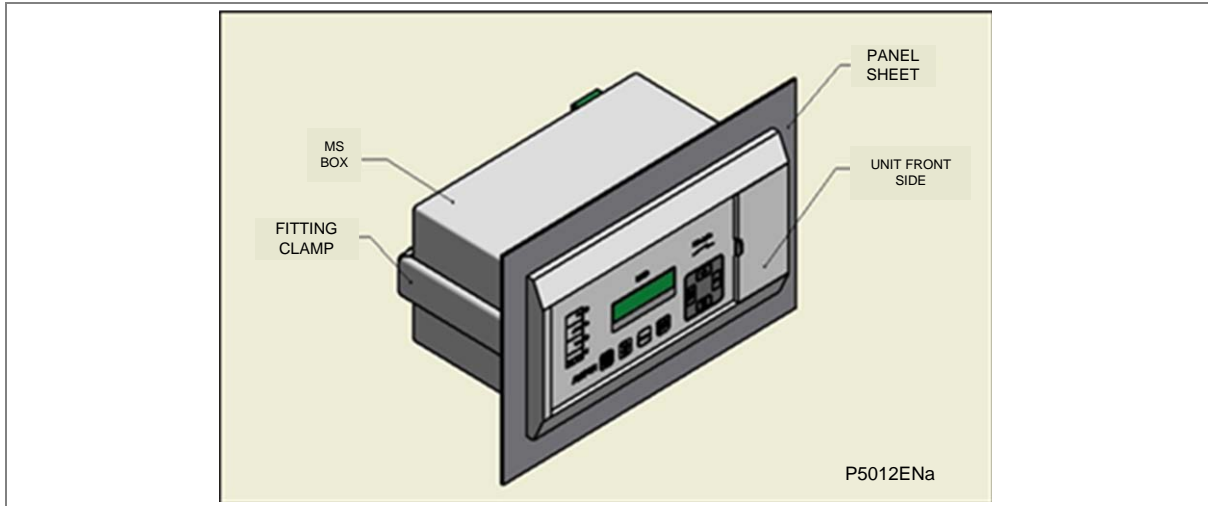


Figure 3: Relay mounted on the panel-front view

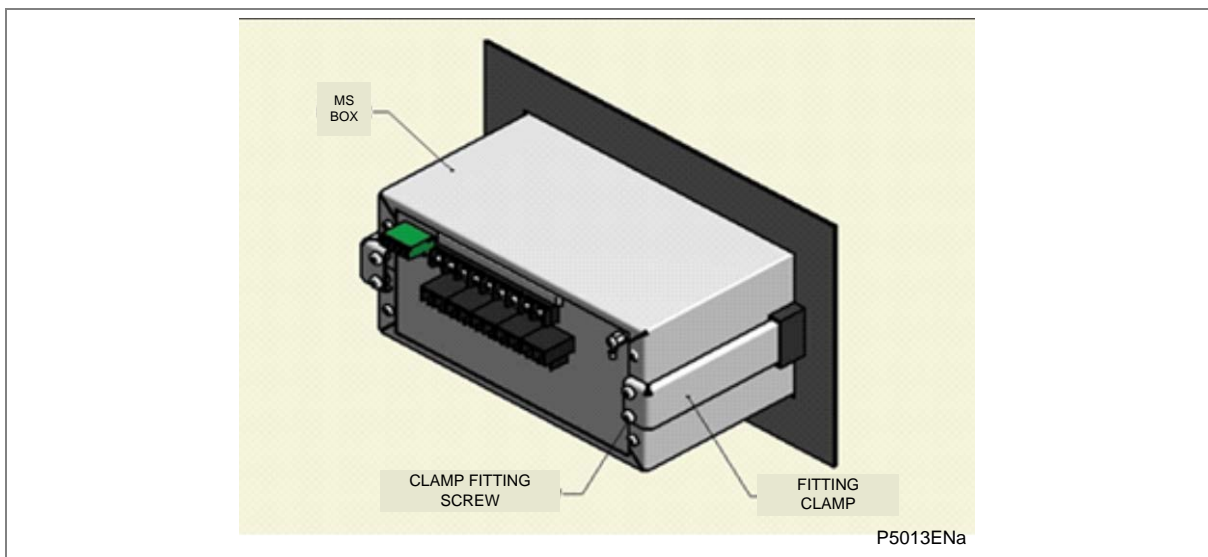


Figure 4: Relay mounted on the panel-rear view

Relay Connection

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.

Before Energizing following should be checked

1. Voltage rating and polarity.
2. CT circuit rating and integrity of connection.
3. Protective fuse rating.
4. Integrity of the earthing connection.
5. Voltage and current rating of external wiring, applicable as per application.

Relay Operating Condition

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

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.

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.

2.1.1 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 you should be familiar with the Safety Section and the ratings on the equipment’s rating label.

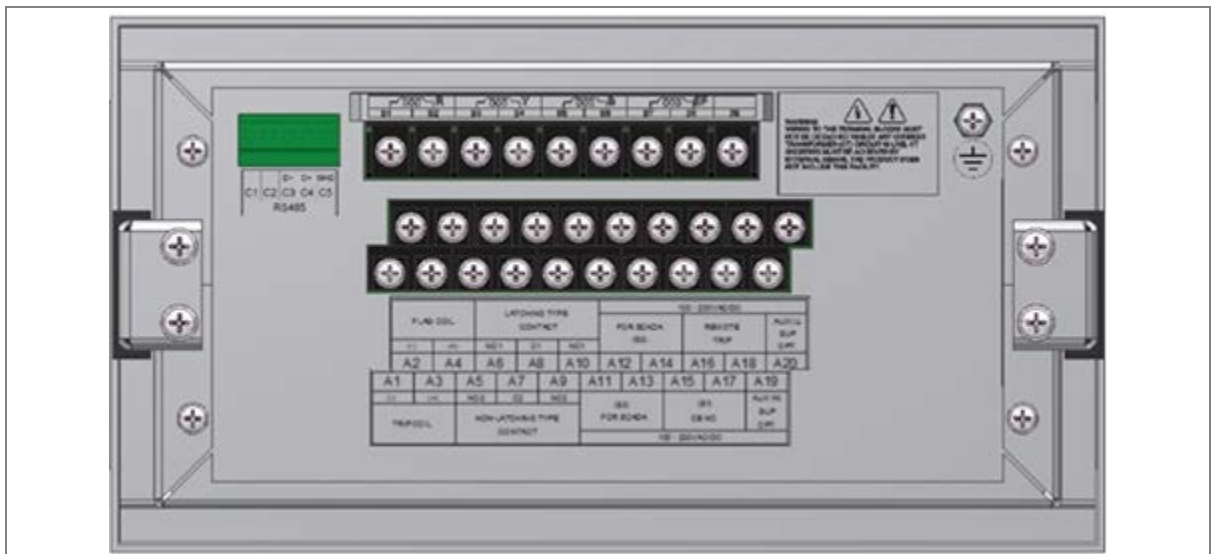


Figure 5: P15D Rear view-Terminal Connection

Terminal Blocks

CT/Auxiliary power/Input/ Output connections

The P50 Agile devices 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.

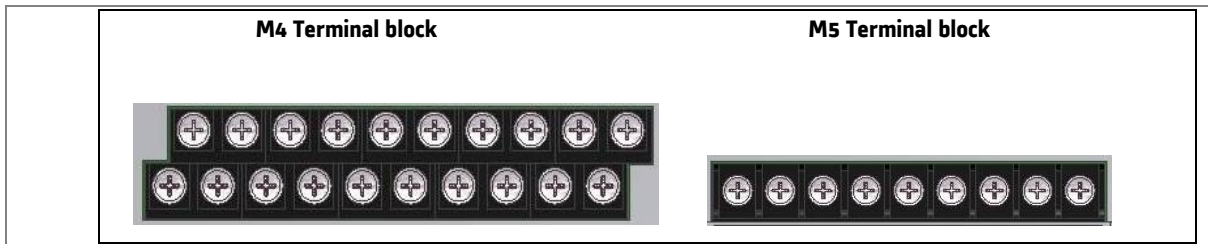


Figure 6: Terminal blocks



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

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.

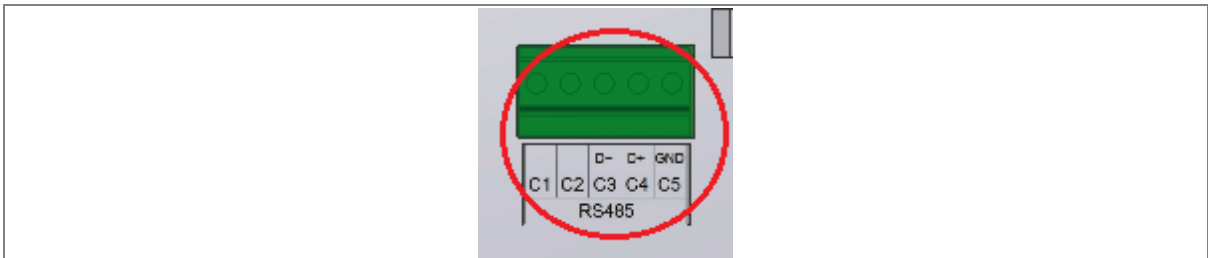


Figure 7: Rear Serial port terminal block

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.

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 mm² or as per industries standard practice. The protective conductor (earth) connection must be of low-inductance and as short as possible.

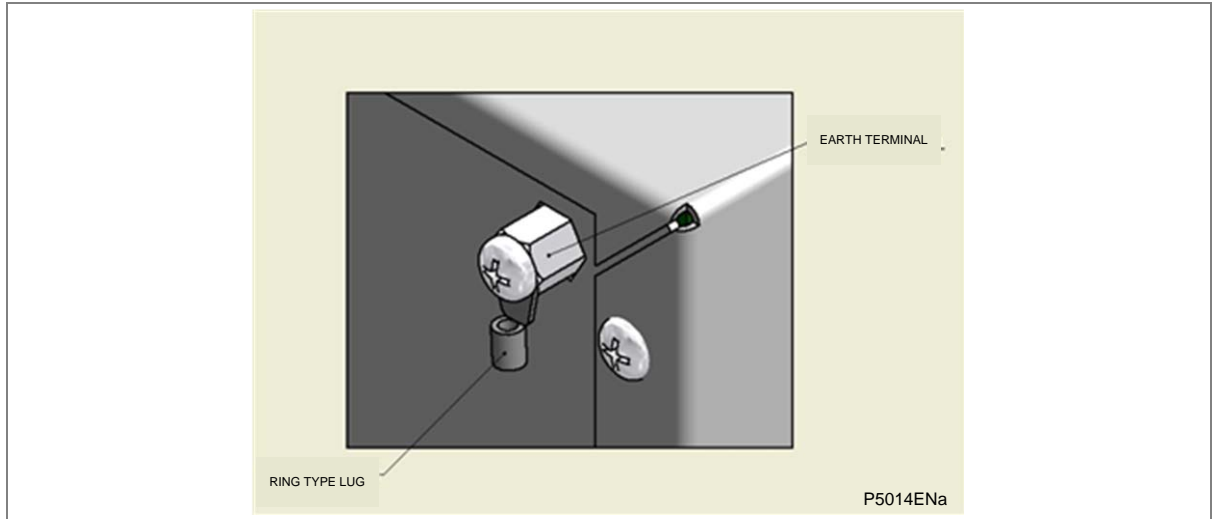


Figure 8: Earthing terminal on the rear side of the relay

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.

Current Transformers

Current transformers would generally be wired with 2.5 mm² 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 mm² using ring terminals.

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



Caution: Current transformer circuits must never be fused.

Note 1: 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 mm² PVC insulated multi-stranded copper wire.

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 mm² copper conductors, PVC insulated
- Nominal conductor area: 0.5 mm² 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.

Output Relay Connections

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

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.

2.1.2 Case dimensions

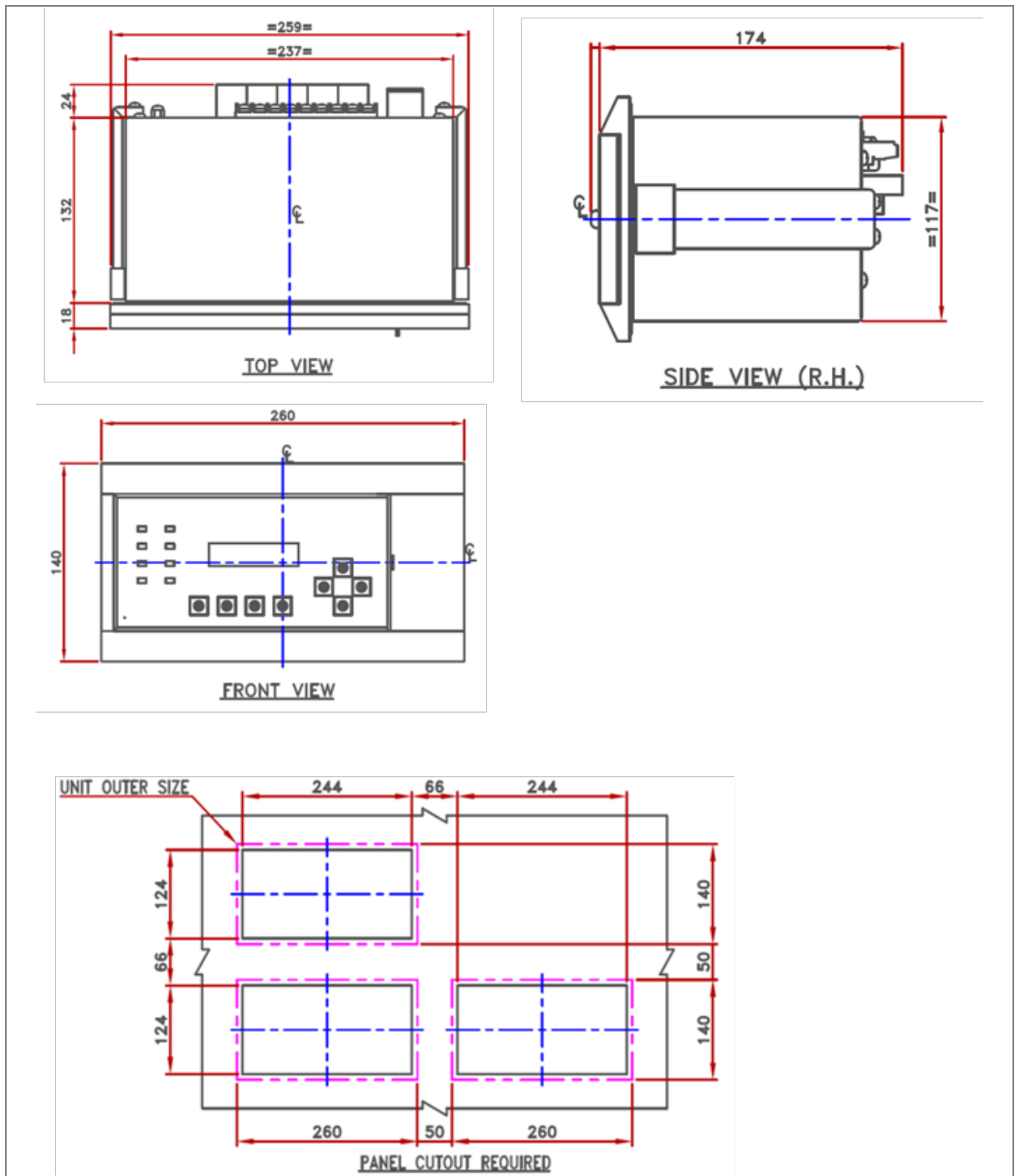


Figure 9: Case dimensions

Note: All dimensions in mm.

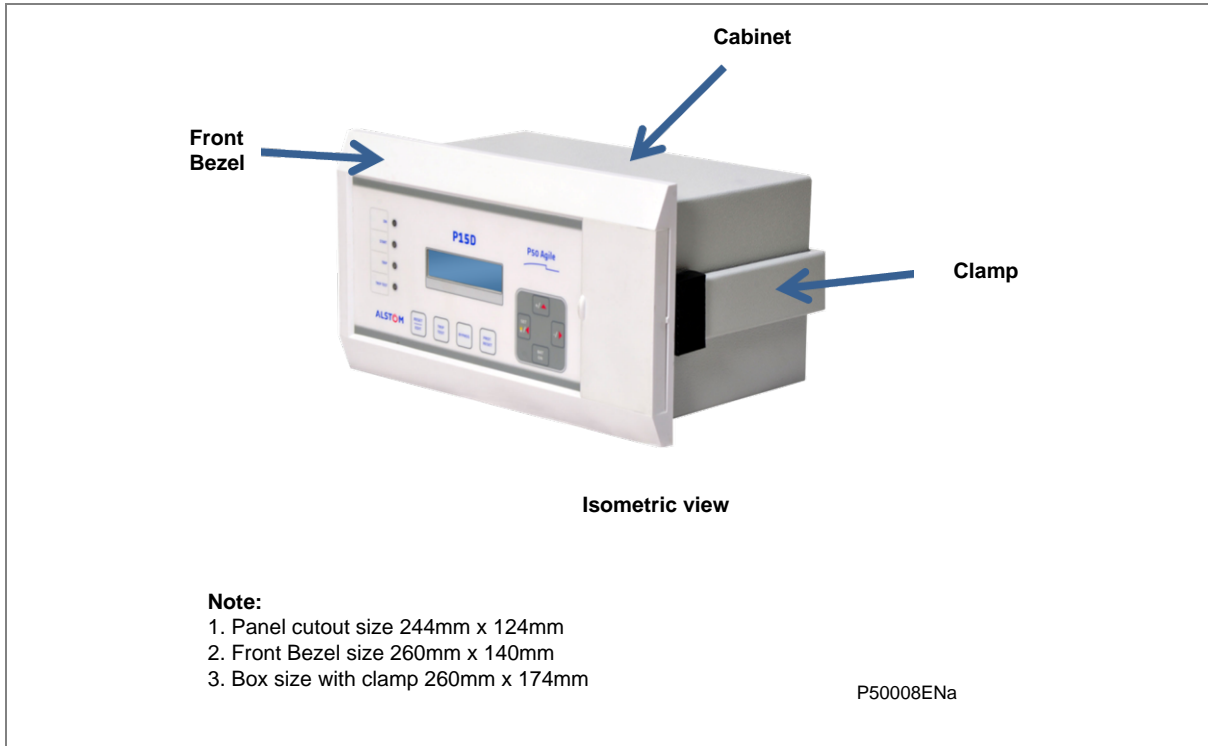


Figure 10: Case dimensions

2.2 Commissioning

2.2.1 Commissioning Test and equipment required

The P15D is fully numerical in its design - it has self-supervision function which continuously keeps track of its internal hardware, and it will display a message on the LCD screen if it detects the failure of any component. This is why the commissioning tests are less extensive than those for non-numeric electronic devices or electromechanical relays.

At the time of commissioning the P15D, the following test equipment is required as a minimum:

- Current injection test kit
- Multimeter with suitable AC current range and DC voltage range.
- Timer with precision 1 ms.
- Required auxiliary supply.
- Connecting wire, as per required length extension board etc.
- A portable PC, installed with appropriate software (P50 Agile Configurator)

2.2.2 External circuitry check

Check the relay wiring on back terminal of relay against the appropriate wiring diagram:

- CT Secondary must be connected to the relay 1A or 5A. All CT wiring screws should be properly tightened.



Warning: An open circuit of the CT secondary wiring can cause high voltage which may be lethal and could damage insulation.

- Optionally external supply can be wired to the relay aux. supply terminals with proper polarity marking as mentioned on the Terminal sticker at the back of the relay. The supply range is also mentioned on this sticker. Confirm that the auxiliary supply is in range before energizing the relay.
- Trip Coil contact connection should be as per the given schematic diagram.
- Latching type annunciation contact connection as per requirement of site.

2.2.2.1 Earthing

An earthing terminal is provided at the back of the relay. Ensure that the case earthing connections (Top right-hand corner at the rear of the IED case) are used to connect the IED to a local earth bar using an adequate conductor.

With several relays present, make sure that the copper earth bar is properly installed for solidity connecting to the earthing terminal of each relay.

2.2.2.2 CT Polarity

Ensure proper CTs are connected as per required maximum load current and their polarity. When all CTs are connected with proper polarity, unbalance current flowing through earth fault element will be approximately zero. Otherwise the relay will trip on earth fault when the CB is energized.

2.2.3 Check relay settings

The relay setting check ensures that all of the application-specific settings for the particular installation have been correctly applied to the relay. Enter all settings manually via the front panel interface or using P50 Agile configurator tool.

Following points to be checked:

- Ensure overcurrent and earth fault trip setting.
- Ensure TMS setting of overcurrent and earth fault are entered correctly as per required time grading between feeder and incomer.
- Ensure instantaneous setting is correct and its definite time delay is applied properly as per required time grading between feeder and incomer.
- Ensure selection of latching type annunciation duty contact is as per required function.
- Ensure that the current measurement in the relay is same as the applied current .

2.2.4 Final check

After completion of all relay functionality testing and relay setting check, remove all test equipment and shorting leads and then restore all the original wiring from the relay. While restoring wiring, it should be ensured that the CT connections are restored in accordance with the relevant external connection or schemes diagram. Ensure all fault and annunciation contacts, and trip contacts have been reset before leaving relay.

If the P15D is newly installed or the CB has just been maintained, the trip counter of Relay should be zero. This counter can be reset by enabling Clear Faults function in the RECORD CONTROL menu.

Note: This will also clear all fault memory and the set password.

2.2.5 Relay testing

2.2.5.1 Relay calibration

Before conducting a test, confirm the relay calibration using the following method.

1. Connect P15D relay to current injector and timer.

The following table shows the terminal numbers for CT connections.

Phase	Terminal
R	B1,B2
Y	B3,B4
B	B5,B6
N	B7,B8

2. Connect the CT terminals using the above table.
3. Adjust rated CT secondary current 1A or 5 A (based on the P15D variant under test). Observe the current value from the **Measurement** menu. The actual current should match the relay display.

Phase	Applied Current (Amp.)	Measured Current (Amp.)	Error (%)
R			
Y			
B			
N			

2.2.5.2 Pickup, Trip and Binary Output Test:

1. Connect current source 1A or 5 A (based on the P15D variant under test) to the current input terminal.
2. Set current setting value to 100% of rated current, TMS at Minimum (x0.02) value.
3. Start current injector to & increase current value till relay pick up and trip. The operating value should be within 1 to 1.1 times of set pickup value.
4. After tripping of relay, check continuity in between NO and C output contact terminal.

Binary Output Contact	Terminal		
	NO	C	NC
Latching Type	A6	A8	A10
Non Latching Type	A5	A7	A9

5. After reducing the current to reset value, only non-latching type relay contact (terminal A5 & A7) should open.
6. Press RESET Key and latching type contact (terminal A6 & A8) should be open.

2.2.6 Testing of Binary Input Contact:

1. The Binary inputs shall be tested by applying rated voltage to respective binary input terminals.

2. Binary inputs terminal details are as under :-

Binary Inputs	Terminal	
S1	A15	A17
S2	A12	A14
S3	A11	A13
Remote Trip (S4)	A16	A18

3. Observed binary input (S1,S2,S3) status in system data menu on LCD display
4. For Testing Remote trip input, apply rated voltage at A16 and A18 terminal. Relay will immediately go in to tripping mode.

2.2.7 Testing for optional auxiliary power supply

The P15D is a dual power relay and can function with or without an external Auxiliary power supply.

To test this function apply rated auxiliary supply at relay terminal A (19 & 20) with proper polarity and complete function of the relay can be tested.

It is suggested to use Numerical test kit while testing relay P15D. For timing measurements use the optional auxiliary supply to power ON the relay.

2.2.8 Testing for trip coil

The Impulse output for Circuit Breaker Tripping coil with trip energy (12 to 24 VDC, <= 0.1 J) is provided by a capacitor in the protection relay. The length of the pulse is 50 ms (if output is not burdened).The pause between the individual pulses depends upon the impedance of trip coil (C.B.) and the current level. Pulses are continued until the CB operates and fault current becomes zero. Testing can be performed at trip coil terminal - A1 (-ve) & A3 (+ve).The trip coil output function can be also operated by using TEST key on the relay front panel.

2.2.9 Testing for flag coil

The Impulse output for external Flag indicator with a trip energy of (12 to 24 VDC, <= 0.03 J) is provided by a capacitor in the protection relay. The length of the pulse is 50 ms (if output is not burdened).The pause between the individual pulses depends upon the impedance of flag indicator and on the current level. Testing can be performed at Flag coil terminal – A2 (-ve) & A4 (+ve).

2.2.10 Functional test

2.2.10.1 Testing of Overcurrent Protection

1. **Overcurrent I>1 function:** Pickup test

I>1 Setting	R Phase		Y Phase		B Phase		Limit value (amp)			
	1A	5A	1A	5A	1A	5A	1A		5A	
							Min	Max	Min	Max
100%										

2. **Overcurrent I>1 function: Operating time test (IDMT /DT curve)**

For IDMT curve testing : Set I>1 = 100% TMS = 1.0

For DT curve testing : Set I>1 = 100% Time delay =1.0 sec

Note: You can use only one CT input and operating curves which is relevant to your requirement.

	Injected current			Operating Time				
		For 1A relay	For 5A relay	IEC E Inverse	IEC V Inverse	IEC S Inverse1	IEC S Inverse2	DT
R Phase	5 In	5A	25A					
Y Phase	5 In	5A	25A					
B Phase	5 In	5A	25A					

For IDMT curve testing : Set I>1 = 100% TMS = 0.1

For DT curve testing : Set I>1 = 100% Time delay =0.05 sec

Note: IDMT operating time should be 1/10 of above observed timing.

	Injected current			Operating Time				
		For 1A relay	For 5A relay	IEC E Inverse	IEC V Inverse	IEC S Inverse1	IEC S Inverse2	DT
R Phase	5 In	5A	25A					
Y Phase	5 In	5A	25A					
B Phase	5 In	5A	25A					

2.2.10.2 **Testing of Earth Fault Protection**

1. **Earth fault IN>1 function: Pickup test**

I>1 Setting	EF input		Limit value (amp)			
	1A	5A	1A		5A	
20%			Min	Max	Min	Max

2. **Earth Fault IN >1 function: Operating time test (IDMT /DT curve)**

For IDMT curve testing : Set IN >1 = 20%, TMS = 1.0
 For DT curve testing : Set IN>1 = 20% Time delay =1 sec

Note: You can use only one CT input and Operating curves which is relevant to your requirement.

	Injected current			Operating Time				
		For 1A relay	For 5A relay	IEC E Inverse	IEC V Inverse	IEC S Inverse1	IEC S Inverse2	DT
EF	5 In	1.0A	5.0A					
	5 In	5A	25A					

For IDMT curve testing : Set IN >1 = 20%, TMS = 0.1
 For DT curve testing : Set IN>1 = 20% Time delay =0.05 sec

Note: IDMT operating time should be 1/10 of above observed timing.

	Injected current			Operating Time				
		For 1A	For 5A	IEC E	IEC V	IEC S	IEC S	DT
EF	5 In	1.0A	5.0A					

Note: The test results need to be compared with the technical claims stated in the manual.

2.3 Maintenance

Maintenance checks

In view of the critical nature of the application, Alstom Grid products should be checked at regular intervals to confirm they are operating correctly.

The devices are self-supervising and so require less maintenance than earlier designs of protection devices. Most problems will result in an alarm, indicating that remedial action should be taken. However, some periodic tests should be carried out to ensure that they are functioning correctly and that the external wiring is intact. It is the responsibility of the customer to define the interval between maintenance periods. If your organisation has a Preventative Maintenance Policy, the recommended product checks should be included in the regular program. Maintenance periods depend on many factors, such as:

- The operating environment
- The accessibility of the site
- The amount of available manpower
- The importance of the installation in the power system
- The consequences of failure

Although some functionality checks can be performed from a remote location, these are predominantly restricted to checking that the unit is measuring the applied currents and voltages accurately, and

checking the circuit breaker maintenance counters. For this reason, maintenance checks should also be performed locally at the substation.



Caution: Before carrying out any work on the equipment you should be familiar with the contents of the Safety Section or the Safety Guide Pxxx-SG-4LM-1 and the ratings on the equipment's rating label.

Opto-Isolators

Check the opto-inputs by repeating the commissioning test detailed in the Commissioning chapter.

Output relays

Check the output relays by repeating the commissioning test detailed in the Commissioning chapter.

Measurement accuracy

If the power system is energised, the measured values can be compared with known system values to check that they are in the expected range. If they are within a set range, this indicates that the A/D conversion and the calculations are being performed correctly. Suitable test methods can be found in Commissioning chapter.

Alternatively, the measured values can be checked against known values injected into the device using the test block, (if fitted) or injected directly into the IED's terminals. These tests will prove the calibration accuracy is being maintained.

Replacing the unit

If your product should develop a fault while in service, depending on the nature of the fault, the error codes will be generated which can be viewed on the relay HMI. First step is to take actions as suggested in the Troubleshooting section of this manual. In the unlikely event that the problem persist or lies with the wiring and/or terminals, then you must replace the complete device, rewire and re-commission the device.

Once the unit has been reinstalled, it should be re-commissioned.



Caution: If the repair is not performed by an approved service centre, the warranty will be invalidated.



Caution: Before carrying out any work on the equipment, you should be familiar with the contents of the Safety Information section of this guide or the Safety Guide Pxxx-SG-4LM-1 as well as the ratings on the equipment's rating label. This should ensure that no damage is caused by incorrect handling of the electronic components.



Warning: Before working at the rear of the unit, isolate all voltage and current supplying it.

Note: P15D does not support automatic current transformer shorting. Hence for safety reasons, CT terminals to be shorted when the terminal block is removed.

Cleaning



Warning: Before cleaning the IED, ensure that all AC and DC supplies and transformer connections are isolated to prevent any chance of an electric shock while cleaning.

Only clean the equipment with a lint-free cloth dampened with clean water. Do not use detergents, solvents or abrasive cleaners as they may damage the product's surfaces and leave a conductive residue.

2.4 Troubleshooting

The relay continuously monitors the hardware and detects any hardware fault/error. In case of hardware failure relay displays the corresponding error code on the LCD. These faults errors are stored in the error log file and can be viewed from "Error Log" menu. Error log is stored in 16 bit integer. The bit definition applicable to P15D is as under:

Bit 12 – Bit 15	Bit 10 & Bit 11	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Unused	Firmware Mismatch error	Unused	FRAM 3 Error	Unused	FRAM 2 Error	FRAM 1 Error	ADC Error	Unused	RTC Error	Unused	Setting Error

Error code descriptions are given below:

Sr. No	Error Log Display	Error Data Bitwise	Description	Causes	Action taken MCU	Proposed action
1	0001	0000 0000 0000 0001	SETTING ERROR	1. Setting corrupted 2. Change in address of setting in memory	ON LED blinks with 1 sec interval indicating IED is OUT OF SERVICE	Go to CONFIGURATION menu and restore default settings and then save settings. Press (RESET + PROT. RESET).
2	0004	0000 0000 0000 0100	RTC ERROR	1. I2C Bus Error 2. Damaged RTC 3. Battery backup not functioning	Error is checked periodically after 1 minute interval.	Set correct values for Date and Time and Press (RESET + PROT. RESET).
3	0010	0000 0000 0001 0000	ADC ERROR	1. ADC device not working. 2. SPI bus error	ON LED blinks with 1 sec interval indicating IED is OUT OF SERVICE	Press (RESET + PROT. RESET)
4	0020	0000 0000 0010 0000	FRAM 1 Error	1. SPI bus error 2. FRAM not working	Error is checked periodically after 1 minute interval.	Press (RESET + PROT. RESET)
5	0040	0000 0000 0100 0000	FRAM 2 Error	1. SPI bus error 2. FRAM not working	Error is checked periodically after 1 minute interval.	Press (RESET + PROT. RESET)
6	0100	0000 0001 0000 0000	FRAM 3 Error	1. SPI bus error 2. FRAM not working	Error is checked periodically after 1 minute interval.	Press (RESET + PROT. RESET)
7	0C00	0000 1100 0000 0000	Incompatible Firmware error	Firmware flashed in to the relay is not compatible with the relay hardware (eg mismatch	ON LED blinks with 1 sec interval indicating IED is OUT OF SERVICE	Flash correct Firmware as per the cortec information on the relay.

Sr. No	Error Log Display	Error Data Bitwise	Description	Causes	Action taken MCU	Proposed action
				in Relay name/ model number/ CT selection etc)		

TECHNICAL SPECIFICATIONS

CHAPTER 14

1 CHAPTER OVERVIEW

This chapter consists of the following sections:

- 1 **Chapter overview**
- 2 **Technical specification**
 - 2.1.1 Standards compliance

2 TECHNICAL SPECIFICATION

Current Input		
I.	CT secondary	1 A or 5 A (ordering option)
II.	Nominal burden at rated current (without tripping condition)	O/C CT < 4.2 VA (@ In = 1 A) O/C CT < 4.5 VA (@ In = 5 A) E/F CT < 0.10 VA (@ In= 1A) E/F CT < 0.10 VA (@ In= 5A)
III.	Thermal withstand capacity	50 x rated current (In) for 1s 30 x rated current (In) for 3s 2 x rated current (In) continuous
IV.	Operating range	For O/C : 0.2 – 35 In For E/F : 0.1 – 35 In
V.	Measurement accuracy	Typical $\pm 2\%$ at In for Phase and E/F CTs
VI.	Nominal frequency range for current Inputs	50/60 Hz (selectable in P15D Menu)
VII.	Minimum current required to energize the relay	$1\emptyset \geq 20\% I_n$, $2\emptyset \geq 15\% I_n$ and $3\emptyset \geq 12\% I_n$.
VIII.	Frequency measurement range	45 Hz – 65 Hz
Auxiliary Supply		
I.	Nominal auxiliary voltage	24-50 V DC or 100 – 230 V DC /AC (50 Hz / 60 Hz) (ordering option)
II.	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 100 – 230 V auxiliary power supply	100-230 VAC <10 VA (no output or LED energized) <12VA (status S1, S2 & S3 energised)
		100-230 VDC <4W (no output or LED energized) <4W (status S1, S2 & S3 energised)
IV.	Nominal burden on 24 - 50 VDC auxiliary power supply	<3 W (no output or LED energized) <4 W (status S1, S2 & S3 energised)
V.	Tolerable ac ripple	Up to 15% of highest dc supply, as per IEC 60255-11: 2008
VI.	Relay power up time with auxiliary supply	<50 ms
VII.	Auxiliary Power Supply Voltage Interruption (without powering by CT)	As per IEC 60255-11, within auxiliary supply range 100 – 230 V DC, the relay will withstand a 50 ms; 100 – 230 V DC, the relay will withstand a 50 ms; 24-50 V DC, the relay will withstand a 20 ms;
Opto Isolated Input		
I.	Nominal voltage range	Same as Auxiliary supply range 24 - 50 VDC or 100 – 230V DC /AC (50Hz / 60Hz)
II.	VA burden of Status Inputs (S1, S2 & S3)	For 100 to 230V AC nominal voltage range: < 0.8 VA For 100 to 230V DC nominal voltage range: < 0.8 W For 24V to 50V DC nominal voltage range: < 0.5 W

III.	VA burden of Status S4 (Remote Trip)	For 100 to 230 V AC nominal voltage range: < 12 VA For 100 to 230 V DC nominal voltage range: < 4 W For 24 V to 50 V DC nominal voltage range: < 4 W Note: Relay draws power from Remote Trip input to power its electronics and provide tripping output to circuit breaker even if P15D is not supplied from auxiliary supply and current is below the minimum current required to power ON the relay.	
IV.	Operating voltage range	80% of lower nominal range and 120% of upper nominal range for DC 80% of lower nominal range and 110% of upper nominal range for AC	
V.	Pick up voltage range	For 100 to 230 V auxiliary supply : 60 – 80V For 24 to 50 V auxiliary supply : 15 – 19V	
VI.	Drop off voltage range	For 100 to 230 V auxiliary supply : 30 – 60V For 24 to 50 V auxiliary supply : 7 – 15V	
VII.	Filtering Time	< 40 ms for S1 ,S2,S3	
VIII.	Logic input recognition time	For S1,S2,S3 : filtering time + 5ms ± 5 ms For S4 (Remote Trip) : 3.5 sec ± 5%	
Output Contact			
I.	Latching contact (Signalling contact)	Making capacity	Making capacity – 2A /250 V AC
		Breaking capacity	Breaking capacity - 60 W / 62.5 VA
II.	Non Latching contact	Continuous	Continuous 5A/250 V AC
		Make & carry	30A for 3sec AC/DC
		Short time withstand capacity	50A for 1sec AC/DC
		Breaking capacity	AC- 1250 VA max. 5A or 300 V (PF= 0.4)
			DC- 100 W resistive max. 5A or 300 V -50 W Inductive (L/R =45 ms) max. 5A or 300 V
		Operating Time	<10 msec
Minimum no. of operations	10,000 operation loaded condition & unloaded 100,000 operations		
III.	Impulse output for tripping coil	Impulse output for the tripping coil	12 V - 24 VDC (Energy <= 0.1 J)
Note: The trip energy for the trip coil is stored by a capacitor built into the protection relay. The capacitor is charged by a current input or the auxiliary voltage. The duration of the trip pulse is 50 ms (if output is not burden). The pause between the individual pulses depends on the impedance of the trip coil and on the current level. The pulse lasts as long as the activation threshold is exceeded. The voltage level of the energy output depends on the discharging time			
IV.	Impulse output for Flag Indicator or Auxiliary Relay	Impulse output for Flag Indicator or auxiliary Relay	12 V - 24 VDC (Energy <= 0.03 J)
Note: The trip energy for the flag indicator is stored by a capacitor built into the protection relay. The capacitor is charged by a current input or the auxiliary voltage. The duration of the trip pulse is 50 ms (if output is not burden). The pause between the individual pulses depends on the impedance of the flag indicator and on the current level. The pulse lasts as long as the activation threshold is exceeded The impulse output for flag indicator and trip coil drive energy from same source. The flag out use additional capacitor to store required energy. If more energy is take from flag output than specified, then it will affect energy output of trip coil			
Accuracy of protection function			
Overcurrent & Earth Fault function			
I.	Operating value	Pick-up	Setting +10% / - 5%
		Minimum trip level of IDMT	1.05 x Settings ± 5%
		Drop –off	0.95 x Setting ± 5% (for setting >=20%) 0.90 x Setting ± 10% (for setting < 20%)

	Operating time	IDMT characteristic shape with Relay Power ON condition	as per class5 of 60255-151 cl.5.2 or ± 60 ms whichever is greater*
		DT operation with Relay Power ON condition	$\pm 5\%$ or ± 60 ms whichever is greater**
		IDMT characteristic shape with Relay Power OFF condition	as per class5 of 60255-151 cl.5.2 or ± 90 ms whichever is greater*
		DT operation with Relay Power OFF condition	$\pm 5\%$ or ± 90 ms whichever is greater **
		*Reference condition	TMS=1, I>setting of 1A, Operating range 2-20 In
		** Reference condition	Fault current 2 times above set value
II.	Under current function (For proper operation, relay must be Powered ON by external auxiliary supply)		
	Operating value	Pick-up	Below 0.20 In : 0.95 x settings $\pm 7.50\%$
			Above 0.20 In : 0.95 x settings $\pm 5\%$
		Drop -off	Below 0.20 In : 1.05 x settings $\pm 7.50\%$
			Above 0.20 In : 1.05 x settings $\pm 5\%$
	Operating time	DT operation	$\pm 5\%$ or ± 60 ms whichever is greater
III.	Thermal Overload function		
	Operating time	Thermal Trip operation	$\pm 10\%$ of calculated time
IV.	Cold Load Pickup function		
	Operating time	tcold	Setting $\pm 10\%$
		tclp	Setting $\pm 10\%$
	Operating value	Pick-up	Setting +10% / - 5%
		Minimum trip level of IDMT	1.05 x Settings $\pm 5\%$
		Drop -off	0.95 x settings $\pm 5\%$

	Operating time	IDMT characteristic shape with Relay Power ON condition	as per class5 of 60255-151 cl.5.2 or ± 60 ms whichever is greater*
		DT operation with Relay Power ON condition	$\pm 5\%$ or ± 60 ms whichever is greater**
		IDMT characteristic shape with Relay Power OFF condition	as per class5 of 60255-151 cl.5.2 or ± 90 ms whichever is greater*
		DT operation with Relay Power OFF condition	$\pm 5\%$ or ± 90 ms whichever is greater**
		*Reference condition	TMS=1, I>setting of 1xIn ,Operating range 2-20 In
		** Reference condition	Fault current 2 times above set value
2nd Harmonic blocking function			
	Operating value	2 nd Harm Thresh	Setting $\pm 15\%$
		I>lift 2H	Setting $\pm 15\%$

Operating conditions		
I.	Relative Humidity	Humidity (RH) 95% maximum
II.	Operating temperature range	-25 °C to +65 °C (without battery)
III.	Storage temperature range	-25 °C to +65 °C (without battery)
Battery Details		
I.	Battery	AA type ,1.5volts, non rechargeable batteries For capacity 4.5 volts, use 1.5V x 3 nos. <i>Note: Batteries not supplied with the relay. We recommend Lithium batteries (Make – ENERGISER L91 Ultimate Lithium)</i>
II.	Backlit ON time	<ul style="list-style-type: none"> 60 sec when switched on by "Bat. ON" key (CT current is less than minimum operating value and there is no auxiliary supply) 10 sec after Trip.
Terminals specification		
I.	AC current Input Terminals	M5 threaded terminals for ring lug connection. Suitable up to 4 mm ²
II.	Auxiliary & Input/output Terminals	M4 threaded terminal connection. Suitable up to 2.5 mm ²
III.	Rear Communication Terminal	For two wire connection. Suitable up to 2.5 mm ²
Mechanical & Environmental specification		
I.	Design	Flush mounting case
II.	Weight	3.50 Kg approximate
III.	Pollution Degree	II

2.1.1 Standards compliance

SR. NO.	TYPE TEST	STANDARD	TEST SPECIFICATION/METHOD	
1.	Impulse, Dielectric and Insulation tests			
1.1	Impulse voltage test	IEC 60255-27:2005 (incl. corrigendum 2007)	Test voltage	5kv, 1.2/50 μ V
			Energy	0.5 J
			Polarity	+ve and -ve
			No. of impulses	3 on each polarity
			Duration between impulses	5sec.
			EUT condition	Non energised
1.2	Dielectric voltage withstand test	IEC 60255-27:2005 (incl. corrigendum 2007)	Product shall withstand for 1 minute between 1) 2kV all terminals connected together with case earth. 2) 2kV independent circuit with case earth. 3) 1.5kV across tripping Relay contact. 4) 1kV across non tripping relay contact.	
1.3	Insulation resistance test	IEC 60255-27:2005 (incl. corrigendum 2007)	Product shall have minimum insulation resistance of 100 M Ω	

2.	Auxiliary Supply tests			
2.1	DC voltage dips	IEC 60255-11, IEC 60255-5, IEC60255-26	DC auxiliary supply dip 1) At 40% for 200ms. 2) At 70% for 500ms. No loss of protection	
2.2	DC voltage interruption	IEC 60255-11, IEC 60255-5, IEC60255-26	1) DC auxiliary supply interruptions for 10, 20ms with no loss of protection. 2) DC auxiliary supply interruptions for 30ms, 50ms, 100ms, 200ms, 300ms, 0.5s, 1s, 5s with temporary loss of protection.	
2.3	AC voltage dips	IEC60255-26(ed3.0)-2013	AC auxiliary supply dip 1) At 40% for 200ms. 2) At 70% for 500ms 3) At 80% for 5s. No loss of protection	
2.4	AC voltage interruption	IEC60255-26(ed3.0)-2013	1) AC auxiliary supply interruptions for 10, 20ms with no loss of protection. 2) AC auxiliary supply interruptions for 50ms, 100ms, 200ms, 0.5s, 5s Temporary loss of protection.	
2.5	AC (ripple) in DC supply	IEC 60255-11, IEC60255-26	AC 100Hz ripple superimposed on DC max. (120% HRV) and min. (80% LRV) auxiliary supply at 15% of highest rated DC.	
2.6	Gradual shut down/ start-up Test	IEC 60255-11, IEC 60255-5, IEC60255-26	The unit must power down and up correctly with no mal operation.	
			Shut down time	60 sec.
			Power off time	5 min.
			Start-up time	60 sec.
2.7	Reversal of DC power supply polarity test	IEC 60255-11, IEC 60255-5, IEC60255-26	Product shall withstand for 1 minute with Reverse polarity of power supply inputs.	

3.		Emission tests		
3.1	Radiated emission test	IEC60255-26(ed3.0)-2013	The EUT shall satisfy the requirement of this specification. Radiation measured at a distance of 10 meter.	
			Frequency range	Limits
			30 MHz – 230 MHz	40 dB (µV/m)
			230 MHz – 1000 MHz	47 dB (µV/m)
			EUT condition	Energised
3.2	Conducted emission test	IEC60255-26(ed3.0)-2013	The EUT shall satisfy the requirement of this specification.	
			Frequency range	Limits
			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)
EUT condition	Energised			
4.		Immunity tests		
4.1	High frequency disturbance test	IEC60255-26(ed3.0)-2013	1) 2.5 kV Common mode a) Between independent circuit and case earth. b) Independent circuit.	
			2) 1 kV Differential mode a) Independent circuit. EUT condition: Energised	
4.2	Electrostatic discharge	IEC60255-26(ed3.0)-2013	1) 15kV air discharge 2) 8kV contact discharge 3) 15kV indirect discharge EUT condition Energized	
4.3	Surge immunity test	EN61000-4-5. IEC60255-26(ed3.0)-2013	1) 4KV: Power supply common mode 2) 2KV Power supply differential mode 3) 4KV CT/VT/ input / output ports common mode 4) 2KV CT/VT/ input / output ports differential mode 5) 2KV RS485 communications common mode EUT condition : Energised	
4.4	Fast transient	EN 61000-4-4:2004, IEEE C37.90.1, IEC60255-26(ed3.0)-2013	1) 4kV 5 kHz, power supply and earth ports. 2) 2kV 5 kHz, all other circuits (excluding power supply and earth ports). 3) 4kV 5 kHz and 100 kHz, applied to all circuits excluding communication ports 4)2kV 5 kHz and 100 kHz, applied to communication ports EUT condition: Energized	
4.5	Radiated radio frequency electromagnetic field	EN 61000-4-3: 2006+A1:2008 Level 4, IEEE C37.90.2, IEC60255-26(ed3.0)-2013	1) Voltage level :10 V/m	
			Frequency range :80 - 1000 MHz , 1.4 – 2.7 GHz	
			2) Voltage level :30 V/m	
			Frequency range :800 – 960 MHz , 1.4 – 2 GHz	
			Modulation :80% AM @ 1 KHz	
Spot Frequency : 80, 160, 380, 450, 900,1850 & 2150MHz				

4.6	Conducted disturbance induced by radio frequency field	IEC60255-26(ed3.0)-2013	Voltage level	10 V
			Frequency range	0.15 – 80 MHz
			Modulation	80% AM @ 1 KHz
			Dwell time	2.85 Sec.
			EUT condition	Energized
			Spot frequency	27, 68 MHz
4.7	Power frequency magnetic field immunity	IEC60255-26(ed3.0)-2013	<p>1) Class 5: 100A/m field applied continuously in all planes for the EUT in a quiescent and tripping state</p> <p>2) Class 5: 1000A/m field applied for 3s in all planes for the EUT in a quiescent and tripping state</p> <p>EUT condition : Energized</p>	
4.8	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	
4.9	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.	
4.10	Damped oscillatory test	EN 61000-4-18: 2007 + A1:2010,Level 3	<p>1) 100kHz and 1MHz slow damped oscillatory applied in common mode at 2.5 KV</p> <p>2) 3MHz, 10MHz, 30MHz fast damped oscillatory applied in differential mode at 1 KV</p>	
5. Mechanical tests				
5.1	Vibration response test	EN 60255-21-1:1996 Class 2	Frequency range	10 Hz to 150 Hz
			Crossover frequency	58 to 60 Hz
			Peak displacement before crossover	0.075mm
			Peak acceleration after crossover	1 gn
			No. of sweep cycles per axis	1
			EUT condition	Energised
5.2	Vibration endurance test	EN 60255-21-1:1996 Class 2	Frequency range	10 to 250Hz
			Peak acceleration	2 gn
			No. of sweep cycles per axis	20
			EUT condition	Non energised
5.3	Shock response test	EN 60255-21-2:1996 Class 2	Peak acceleration	10 gn
			Pulse duration	11 ms
			No. of pulses in each direction	5
			EUT condition	Energised

5.4	Shock withstand test	EN 60255-21-2:1996 Class 2	Peak acceleration	30 gn
			Pulse duration	11 ms
			No. of pulses in each direction	3
			EUT condition	Non Energised
5.5	Bump test	EN 60255-21-2:1996 Class 2	Peak acceleration	20 gn
			Pulse duration	16 ms
			No. of pulses in each direction	1000
			EUT condition	Non energized
5.6	Seismic test	EN 60255-21-3:1995 (Class 2 - 2g peak)	Frequency range	1 to 35 Hz
			Crossover frequency	8 Hz
			Peak displacement before crossover X	7.5 mm
			Peak displacement before crossover Y	3.5 mm
			Peak acceleration after crossover X	2 gn
			Peak acceleration after crossover Y	1 gn
			No. of sweep cycles per axis	1
EUT condition	Energised			
6.	Environmental tests			
6.1	Dry heat test	IEC 60255-1, 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 temperature claim +65°C (EUT energised at highest rated voltage)	Operate for 96 hours at highest rated voltage (HRV)
			High temperature claim +70°C (EUT not energised)	Storage for 96 hours
			Hot start +65°C (EUT energised at highest rated voltage)	Operate for 2 hours at highest rated voltage (HRV)
			Last test +20°C (EUT energised)	Functional verification tests for 2 hours
6.2	Cold test	IEC 60255-1, 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 temperature -25°C (EUT energised)	Functional verification tests for 96 hours
			Low temperature -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
6.3	Change of Temperature Test	IEC 60255-1, EN 60068-2-14:2009 Nb	Lower temperature	-25°C
			Higher temperature	+55°C
			Rate of change of temperature	1°C/min
			Duration of exposure	5 cycle
			Duration of cycle	3 + 3 hrs.

			EUT condition	Energised
6.4	Damp heat steady state test	EN 60068-2-78, EN60068-2-30	Operating temperature	+40°C
			Humidity	93%
			Duration of exposure	10 days
			EUT condition	Energised
6.5	Damp heat cyclic test	EN60068-2-30, EN 60068-2-78	Lower temperature	C
			Humidity	97%
			Higher temperature	+55°C
			Humidity	93%
			Duration of exposure	6 cycle
			Duration of cycle	12 + 12 hrs.
			EUT condition	Energised
6.6	Enclosure protection	EN 60529:2000	IP52	For Front
			IP20	For Rear
			EUT condition	Non energised

WIRING DIAGRAMS

CHAPTER 15

1 CHAPTER OVERVIEW

This chapter consists of the following sections:

- 1 Chapter overview**
- 2 Wiring diagrams**

2 WIRING DIAGRAMS

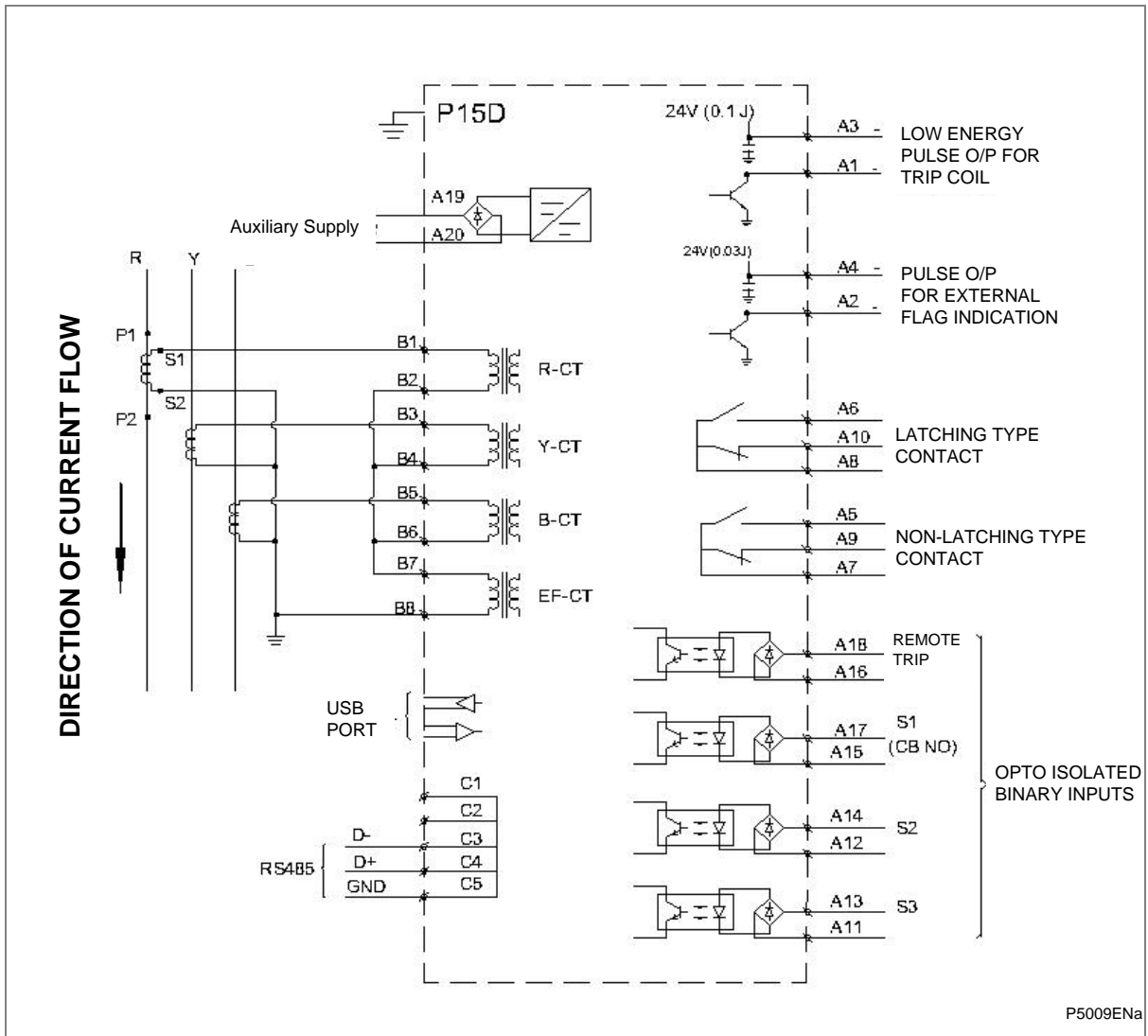


Figure 1: P15D wiring diagram

Alstom Grid

© - ALSTOM 2015. All rights reserved.
Information contained in this document is indicative only. No representation or warranty is given or should be relied on that it is complete or correct or will apply to any particular project. This will depend on the technical and commercial circumstances. It is provided without liability and is subject to change without notice. Reproduction, use or disclosure to third parties, without express written authority, is strictly prohibited.

Alstom Grid Worldwide Contact Centre

www.alstom.com/grid/contactcentre/

Tel: +44 (0) 1785 250 070

www.alstom.com

The ALSTOM logo is located at the bottom right of the page. It consists of the word "ALSTOM" in a bold, blue, sans-serif font. The letter "O" is replaced by a red circle with a white outline, which is a stylized representation of a power plug or a similar symbol.