L&T SWITCHGEAR

SAFE & SURE

USERS' Manual

MATRIX 4.5

Protection & Control Unit for U-POWER OMEGA System of ACBs.

UW - MTX4.5

LARSEN &TOUBRO

Congratulations...

U are on the verge of being the proud user of **U-POWER** ◻ᴍᴇɢᴀ Air Circuit Breaker equipped with one of the World's most advanced Protection & Control Unit -

 UW - MTX 4.5

While U-POWER redefines Safety and User-friendliness in ACBs, UW-MTX4.5 offers the State-of-the-art in Circuit Protection & Control. Feature-by-feature, designed with USERS in mind.

Before proceeding further ...

UW-MTX4.5 offers a host of integrated features and easy navigation. Please go through section 4-1- 'Navigation Overview' to get a quick view of the unit's diverse functions.

This USERS' Manual is a generic guide to normal site installation, operation and maintenance. **U-POWER** ◻ᴍᴇɢᴀ ACBs and their accessories should only be installed, operated and maintained by competent and properly authorized personnel.
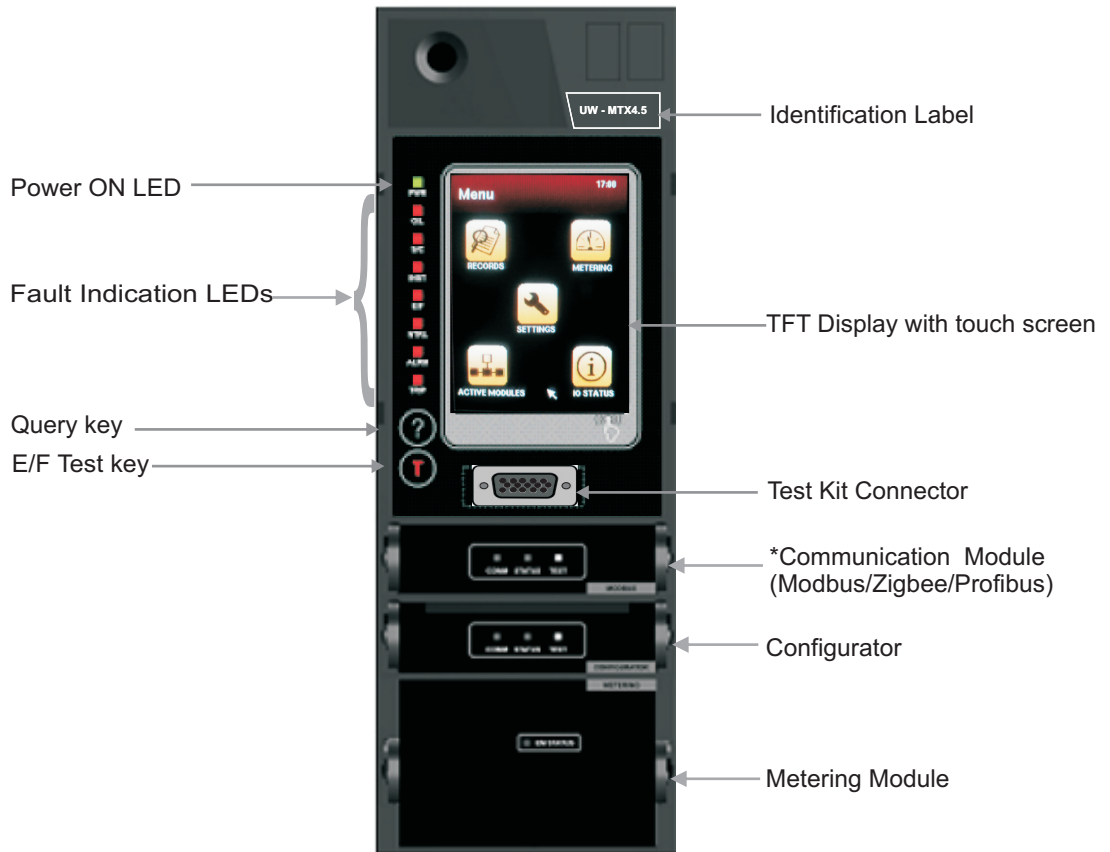
MATRIX units are pre-configured for factory settings with Set Group 1 activated. These are generic settings and provide Overload & Short Circuit protections.

Contents:

1. Identification

Identification Label

Power ON LED

Fault Indication LEDs

Query key

E/F Test key

TFT Display with touch screen

Test Kit Connector

*Communication Module
(Modbus/Zigbee/Profibus)

Configurator

Metering Module

2.Feature List

The features in built in the P&C unit

» LSIGN Current Protections
» Current Metering
» Bar graph representation of I,V*,P*
» Trending(Current ,Voltage*)
» THD/ Harmonic Metering
» THD Profiling
» Trip records
» Event records
» Additional protections
» Oscillography
» Power Saving
» Load Profiling

The optional features / module

» Power Metering Module
» Maximum Demand
» Reverse Power Protection
» Trip Circuit Supervision Module
» Earth Leakage Module
» Restricted Earth Fault Module
» Digital Input Output Module
» Analog Output Module
» Relay Module
» Zone Selective Interlock Module
» Configurator (Smart Card) Module
» Temperature Module
» Modbus Module
» Zig-bee Module
» Profi-bus Module

Metering display of UW-MTX4.5 P&C Unit

Parameter	Screen abbreviation	Details
Current	I1,I2,I3,I$_N$,Ig	Phase, Neutral and Earth
	IΔ, I$_{REF}$	Earth Leakage,Restricted EF Current
	I$_{max}$	Maximum running current per phase
	% Load	Percentage Loading per phase
	Avg.I	Average phase current
	THD current %	R, Y, B Phases
	I1, I2, I3 harmonics	Upto 28th harmonic
	Sequence Component	+ve,- ve and zero sequence Components
	Form Factor	Phase 1,Phase 2,Phase 3
	Peak Factor	Phase 1,Phase 2,Phase 3
	Crest Factor	Phase 1,Phase 2,Phase 3
Voltage[#]	V1,V2,V3	Phase-Neutral voltage
	Max V	Maximum voltage per phase
	V12,V23,V31	Ph-Ph Voltage
	Max V12,V23,V31	Maximum Ph-Ph Voltage
	Avg. Vp-p	Average Ph-Ph Voltage
	Avg Vp-n	Average Ph-N Voltage
Frequency[#]	F	System Frequency
Power Factor[#]	P.F.	System Power Factor
Power[#]	W	Active power per phase and total (kW)
	VAr	Reactive Power per phase and total (kVAr)
	VA	Apparent Power per phase and total (kVA)
Energy[#]	Wh	Active Energy per phase and total (kWh)
	VArh	Reactive Energy per phase and total (kVArh)
	VAh	Apparent Energy per phase and total (kVAh)
Max Demand[#]	Wh	Active Energy(kWh)
	VArh	Reactive Energy (kVArh)
	VAh	Apparent Energy (kVAh)
Temperature[^]	ø	Temperature per phase (˚C)

Protection Settings for UW-MTX4.5

Parameter		UW-MTX4.5	Factory Settings
Overload (Phase)	Protection: Enable/Disable	✓	Enable
	Pick-Up (Ir)=In x …for I2T, I4T, SI, LI/VI Curves	.4 to 1 In in steps of .05	1 (I2T)
	Delay (tr) in s	.5-1-2-4-6-12-18-24-30	12
	Pre-alarm	.5 to .95 in steps of .05xIr	0.5Ir
	Thermal Memory ON/OFF	✓	OFF
Overload (Neutral)	Protection: Enable/Disable	✓	Disable
	Pick-Up IN= Ir x …	.5 to 2 in steps of .5	Disable
	Pre-alarm	.5 to .95 in steps of .05xIr	-
	Delay (tr) in s	Same as Overload Phase	-
Short Circuit	Protection: Enable/Disable	✓	Enable
	Double S/C ON/OFF	✓	OFF
	I2T ON/OFF	✓	OFF
	Pick-Up Lo, Is= In x …	0.6 to 12 In in steps of 0.05	6 In
	Pick-Up Hi, Is= In x …	0.6 to 12 In in steps of 0.05	6 In
	Delay Hi (ts)	20-100-200-300-400 ms	400 ms
	Delay Lo (ts)	20-100-200-300-400 ms	400 ms
	Pre-alarm	0.5 to 0.95 in steps of 0.05xIs	0.5Is
	Cold Pick-Up: ON/OFF	✓	OFF
	Cold Delay	100 ms to 10s in steps of 100ms	1 s
Directional SC	Protection: Enable/Disable	✓	Disable
	Direction:Top / Bottom	✓	-
	I2T: ON/OFF	✓	-
	Pick- up (Is) : In x…	0.6 to 12 In in steps of .05	-
	Delay (ts)	20-100-200-300-400 ms	-
	Pre-alarm	0.5 to 0.95 in steps of .05xIs	-
	Cold Pick - Up: ON/OFF	✓	-
	Cold Delay	100 ms to 10s in steps of .05xIs	-
Instantaneous	Protection: Enable/Disable	✓	Enable
	Pick- up (Ip)=In x…	1.5 to 10 in steps of 0.1 ; 10 to 15 in steps of 1	10 In
Earth Fault	Protection: Enable/Disable	✓	Disable
	I2T: ON/OFF	✓	-
	Pick-Up (Ig)= In x…	0.2-0.3-0.4-0.5-0.6	-
	I2T OFF (tg)	100ms to 1 s in steps of 100 ms	-
	I2T ON (tg)	100-200-300-400 ms	-
	Pre-alarm	.5 to .95 in steps of .05xIg	-
	Cold Pick-Up: ON/OFF	✓	-
	Cold Delay	100ms to 5 s in steps of .1s	-
	Mode: Trip/Alarm/Both	✓	-
Under Current	Protection: Enable/Disable	✓	Disable
	Pick-Up = Ir x…	0.2 to 0.8 in steps of 0.05	-
	Delay	1 to 255 s in steps of 1 s	-
	Mode: Trip/Alarm/Both	✓	-
Current Unbalance	Protection: Enable/Disable	✓	Disable
	Pick- Up= In x…	10 to 97%in steps of 5%	-
	Delay	500 ms to 60s in steps of 0.5s	-
	Mode: Trip/Alarm/Both	✓	-
Under Voltage	Protection: Enable/Disable	✓	Disable
	Pick up (Vs) =Vn x …	0.7 to 0.95 in steps of 0.01	-
	Delay	100 ms to 5s in steps of 100 ms	-
	Vs reset	1.01 to 1.04 xVs	-
	Mode: Trip/Alarm/Both	✓	-

Parameter		UW-MTX4.5	Factory Settings
Over Voltage	Protection: Enable/Disable	✓	Disable
	Pick-Up (Vs)= Vn x…	1.05 to 1.5 Vn in steps of .01	-
	Delay	100ms to 5s in steps of 100ms	-
	Vs reset	.95 to .99 Vs in steps of 0.01	-
Voltage Unbalance	Protection: Enable/Disable	✓	Disable
	Pick-Up (Vs) = Vn x…	5 to 20% in step of 1%	-
	Delay	500ms to 60 s in steps of .5s	-
	Vs reset	.95 to 0.99 Vs in steps of 0.01	-
	Mode: Trip/Alarm/Both	✓	-
Residual Voltage	Protection: Enable/Disable	✓	Disable
	Pick-Up(Vs)=Vn x…	0.15/0.2/0.25/0.3/0.4	-
	Delay	100ms to 5s in steps of .1s	-
	Vs reset	0.95 to 0.99 Vs in steps of 0.01	-
	Mode: Trip/Alarm/Both	✓	-
Under Frequency	Protection: Enable/Disable	✓	Disable
	Pick-Up (Fn)	45-50 Hz in steps of .1Hz	-
	Delay	1-30 s in steps of 0.1s	-
	Reset Freq	1.01 to 1.05 Fn in steps of 0.01	-
	Mode: Trip/Alarm/Both	✓	-
Over Frequency	Protection: Enable/Disable	✓	Disable
	Pick-Up (Fn)	50-55 Hz in steps of 0.1 Hz	-
	Delay	1-30 s in steps of 0.1s	-
	Reset Freq	0.95 to 0.99 Fn in step of 0.01	-
	Mode: Trip/Alarm/Both	✓	-
Rev Power	Protection: Enable/Disable	✓	Disable
	Pick-Up = Pn x…	0.05 to 0.4 in steps of 0.01	-
	Delay	100ms-20s in steps of 0.1s	-
	Mode: trip/Alarm/Both	✓	-
Leading PF	Protection: Enable/Disable	✓	Disable
	Pick-Up = Pf x…	0.5 to 0.99 in steps of 0.01	-
	Delay	1/2/3/4/5 s	-
	Mode: trip/Alarm/Both	✓	-
Lagging PF	Protection: Enable/Disable	✓	Disable
	Pick-Up= Pf x…	0.5 to 0.99 in a steps of 0.01	-
	Delay	1/2/3/4/5 s	-
	Mode: trip/Alarm/Both	✓	-
MD Active	Protection: Enable/Disable	✓	Disable
	Type	Deliver/Receive	-
	Pick-Up = En x…	0.4 to 1 in steps of 0.01	-
	Mode: Trip/Alarm/Both	✓	-
MD Reactive	Protection: Enable/Disable	✓	Disable
	Type	Deliver/Receive	-
	Pick-Up= En x…	0.4 to 1 in steps of 0.01	-
	Mode: Trip/Alarm/Both	✓	-
MD Apparent	Protection: Enable/Disable	✓	Disable
	Type	Deliver/Receive	-
	Pick-Up=En x…	0.4 to 1 in steps of 0.01	-
	Mode: Trip/Alarm/Both	✓	-
Phase Sequence	Protection: Enable/Disable	✓	Disable
	Delay	100ms to 5s in steps of 100ms	-
	Mode: Trip/Alarm/Both	✓	-
Trip Records	Last 5 Records	✓	-
Display		TFT display	-
Communication Module	Modbus/Profi bus/Zig-bee Modules	*	-
Query		✓	-
Supplimentary Module	Relay,DIO,Analog,ZSI,EL,REF,TM,TCS	*	-
Time based set group		✓	-
Test kit connectivity		✓	-
AUX supply(24V DC)		✓	-

3.Protection Characteristics

Overload I^2T for MTX4.5

Protection Characteristics

Overload I^4T for for MTX4.5

Axis labels: Trip Time (s), Current Multiples (x Ir)

Curves labeled (top to bottom on right): 30 s, 24 s, 18 s, 12 s, 6 s, 4 s, 2 s, 1 s, 0.5 s
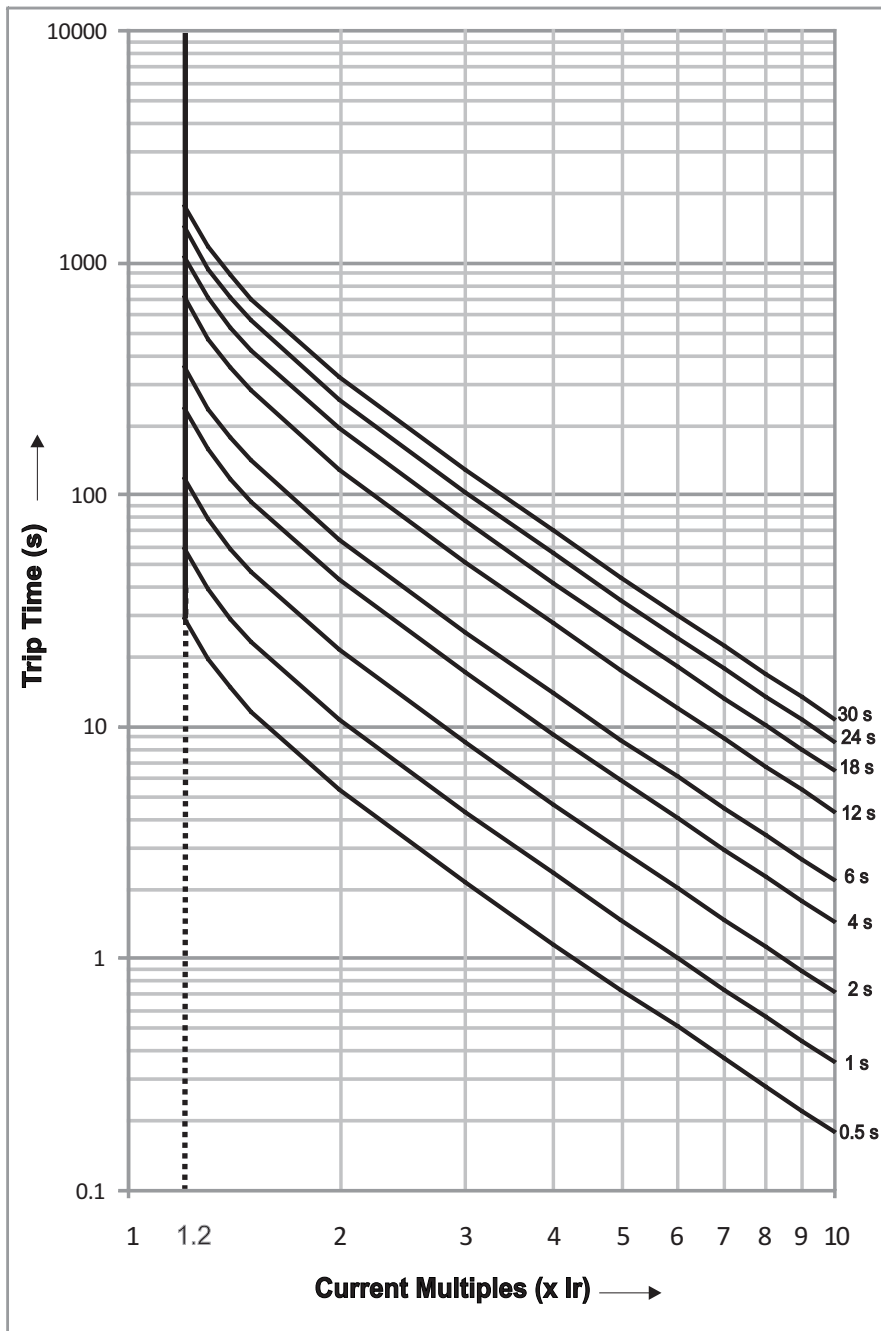
Tolerance
Trip Time: ±20%
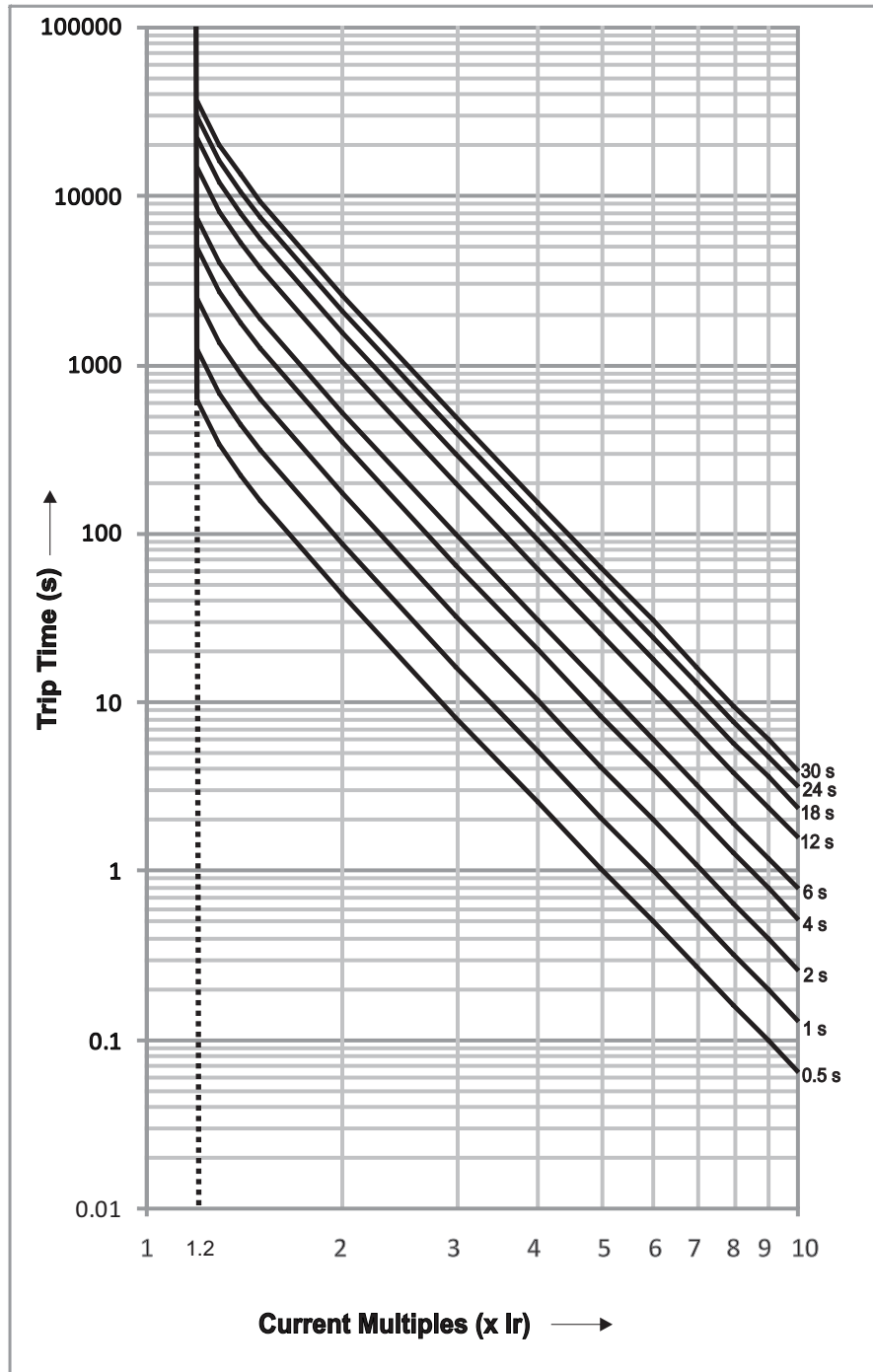
Protection Characteristics

Overload SI for MTX4.5
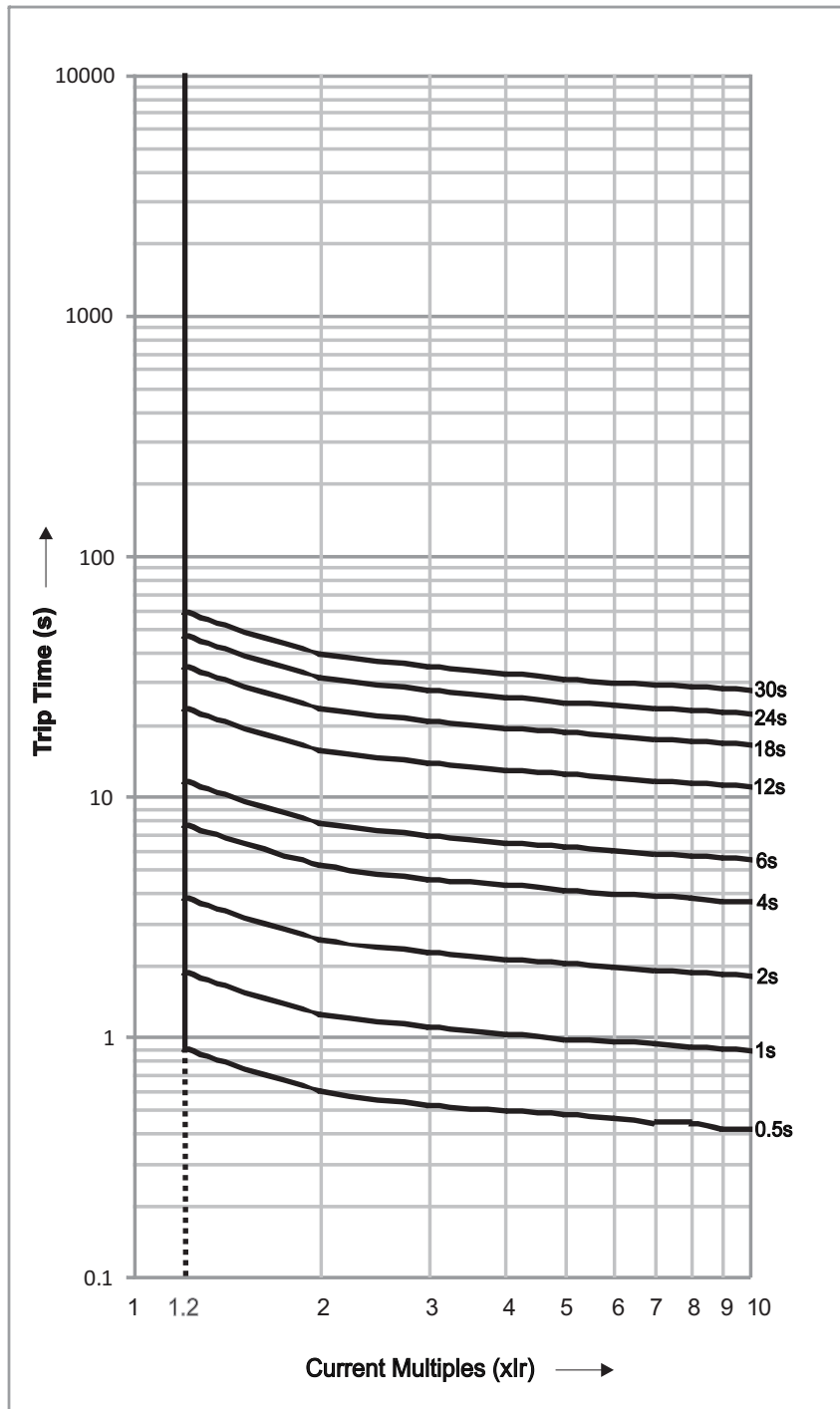
Protection Characteristics

Overload LI/VIfor MTX4.5
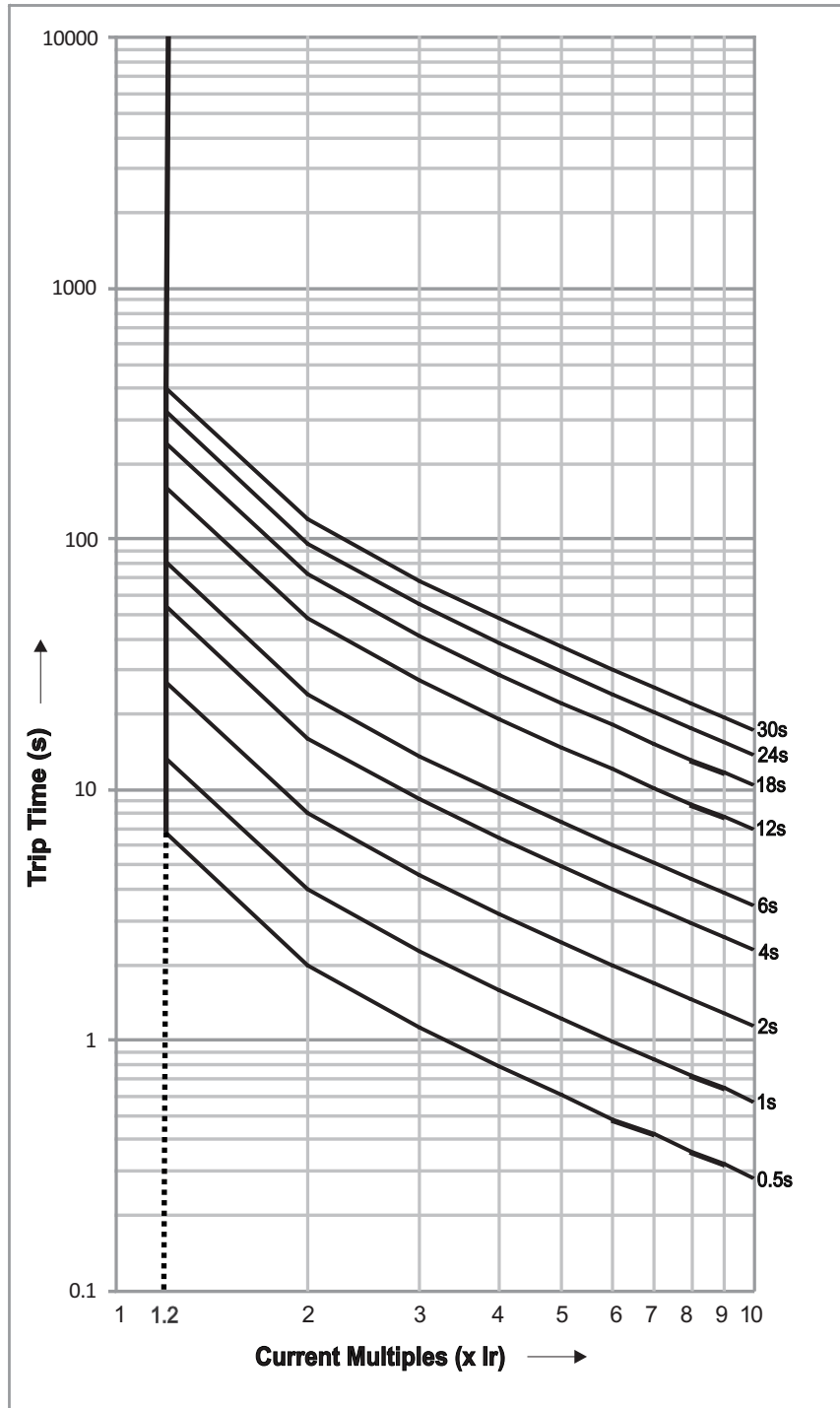
Protection Characteristics

Short Circuit I²T ON for MTX4.5

Protection Characteristics

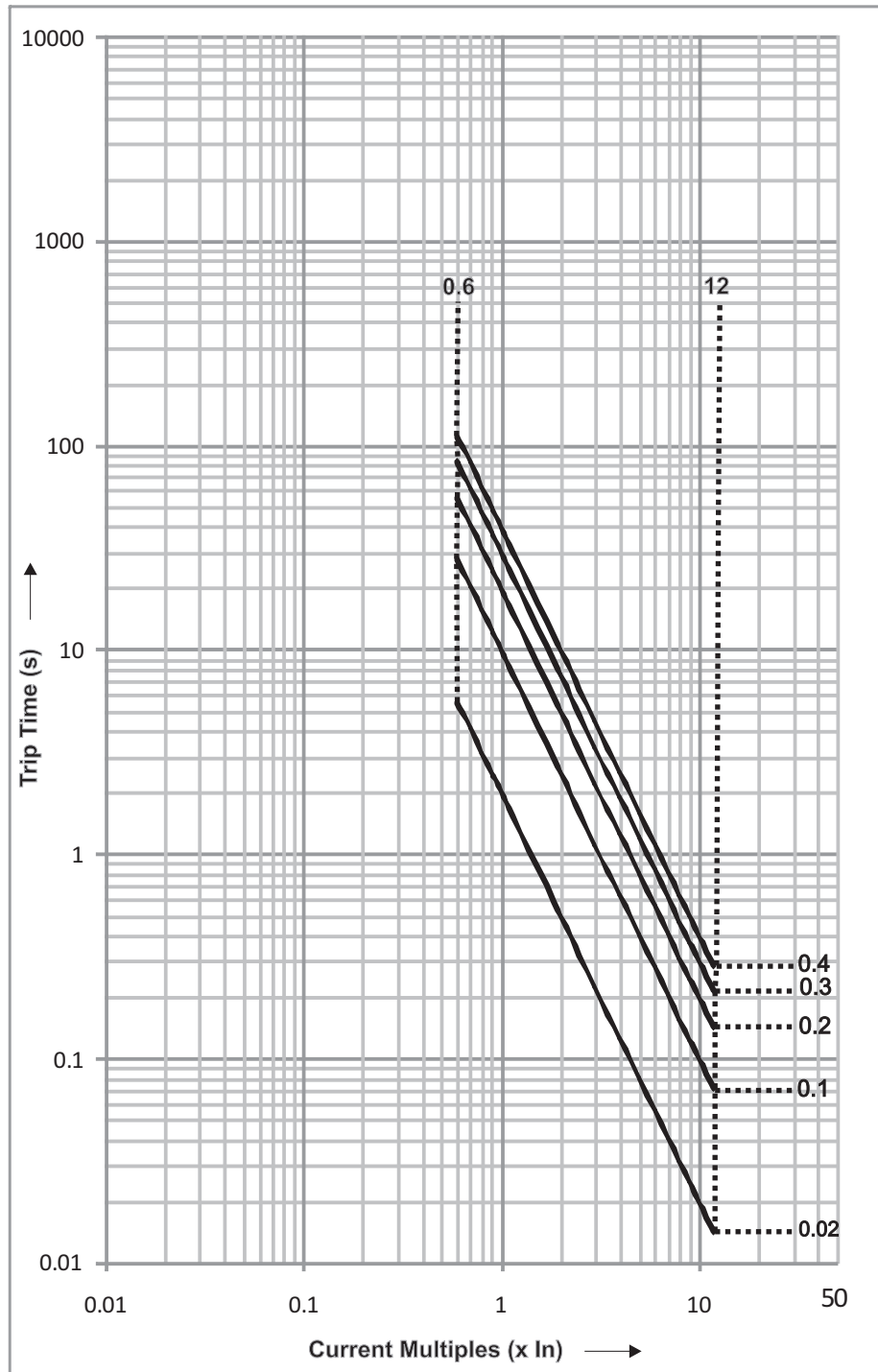## Short Circuit I²T OFF for UW-MTX4.5
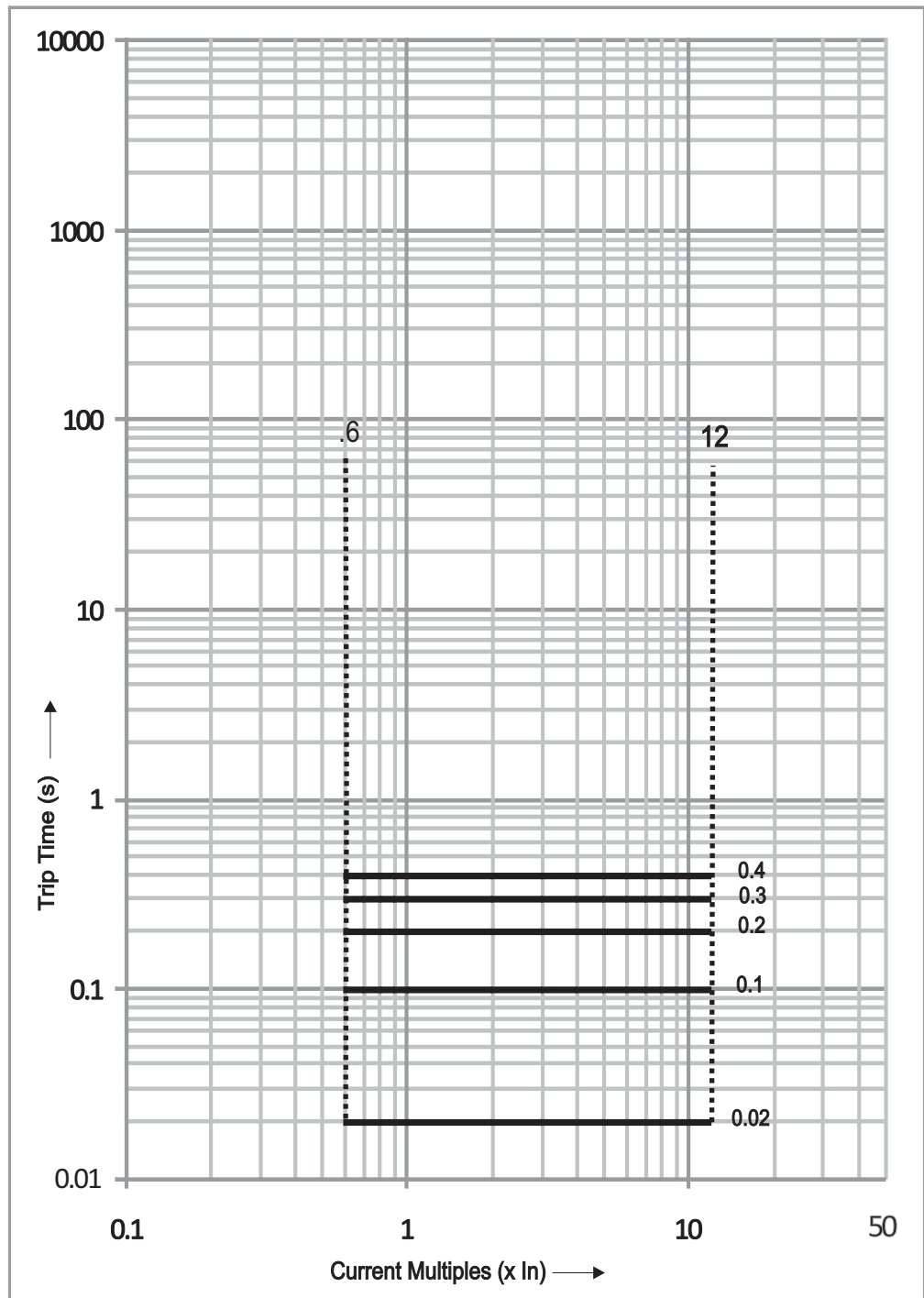
Protection Characteristics
Instantaneous for MTX4.5
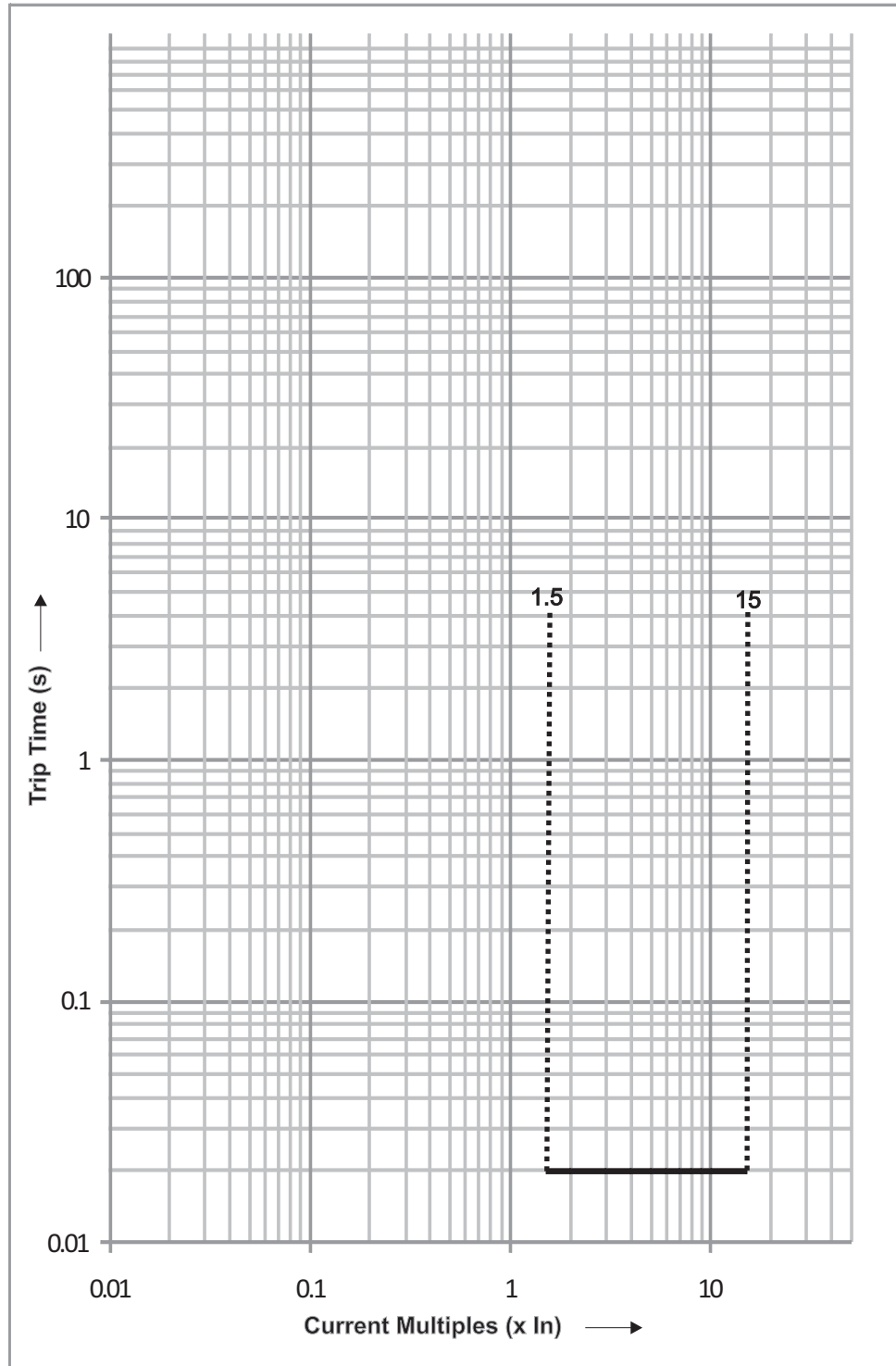
Protection Characteristics

Earth Fault I²T ON for MTX4.5
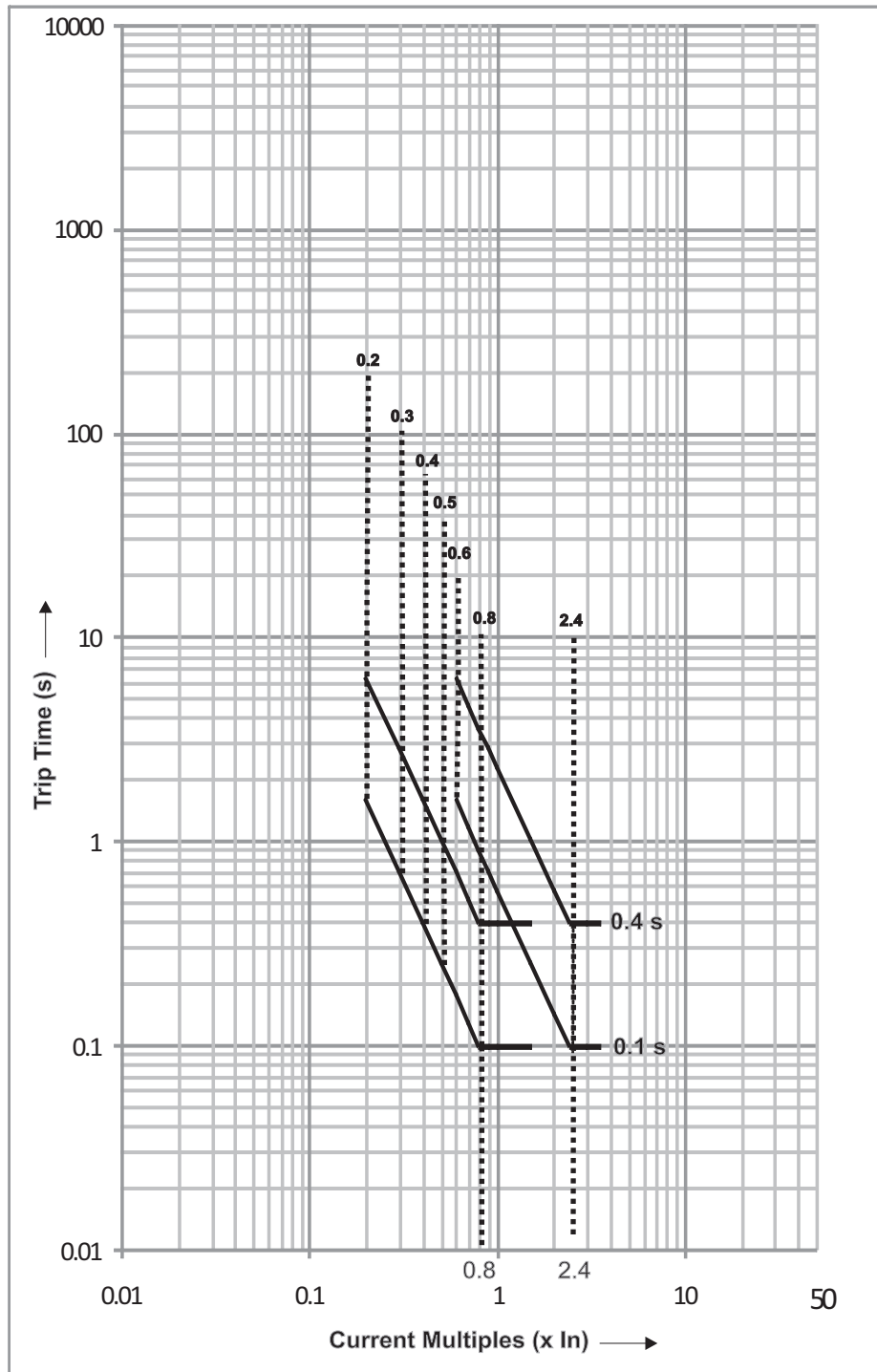
Protection Characteristics

Earth Fault I²T OFF for MTX4.5
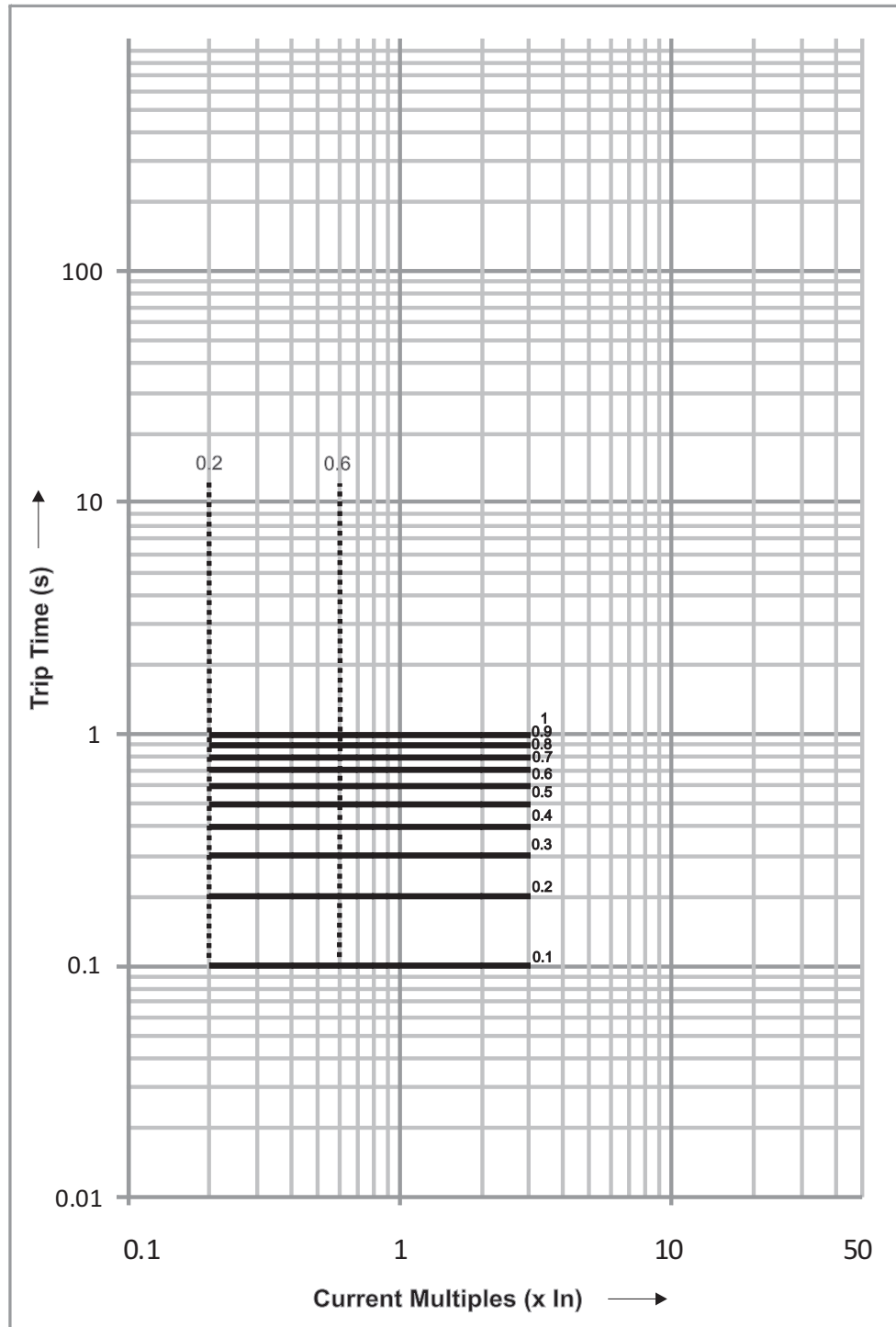
4.Overview

4.1 Menu Navigation Overview for UW-MTX4.5
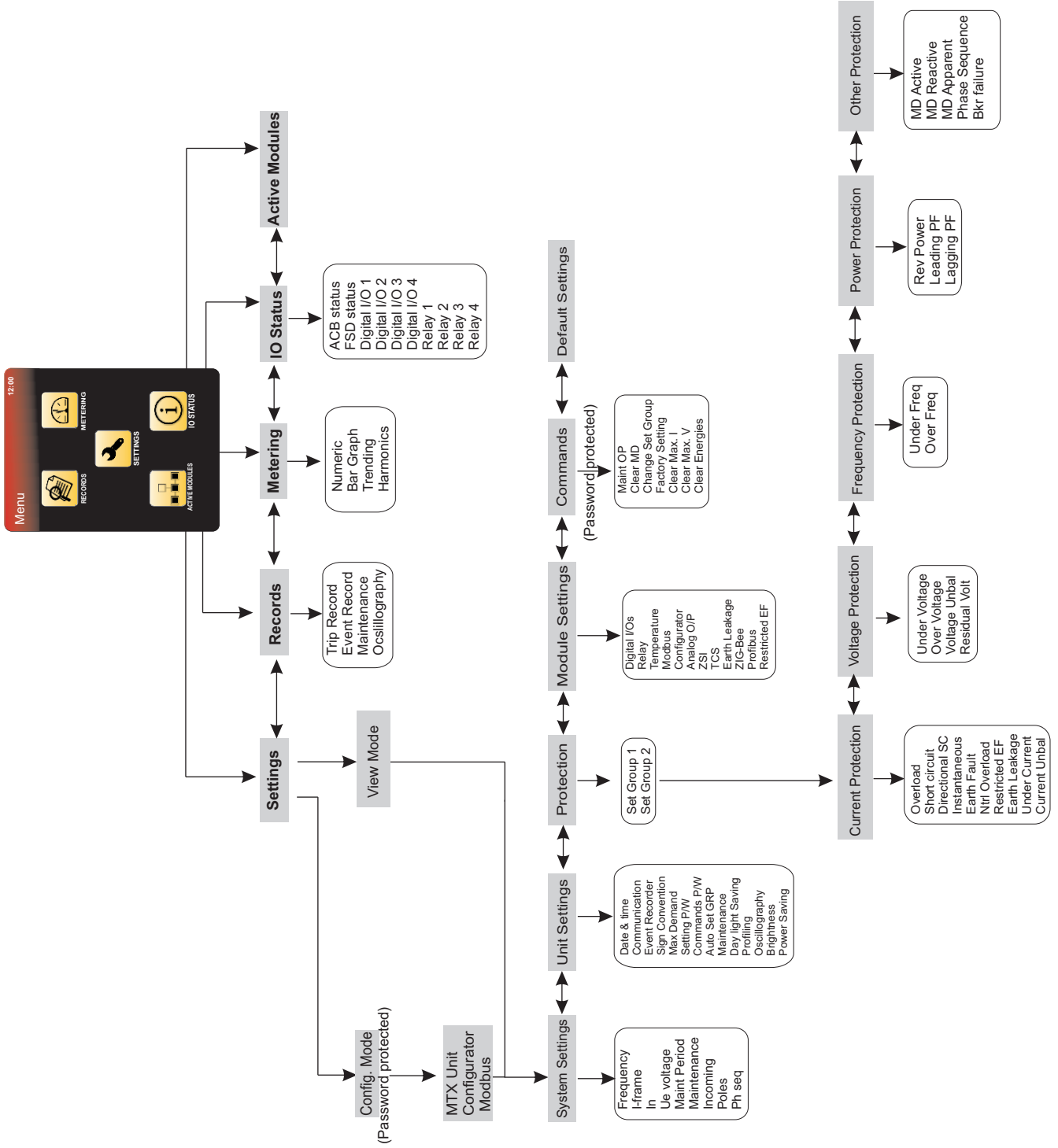
4.2 Family Overview for UW-MTX4.5

Aux supply

CAN BUS (Communication protocol for UW-MTX Family)

PS
Power Supply (24Vdc)
- 2 outputs Available
- 200mA(for UW-MTX 2.5/2.5G/3.5/3.5EC) & 650mA (for UW-MTX4.5 + modules)
- Operating voltage 85-265 Vac
- DIN rail / Base mountable module

Communication Module
Modbus/Zigbee/Profibus

Configurator Module
-for configuring the unit through smart card

Metering Module
- Provides voltage inputs for metering & protections

Digital I/O
- 4 Inputs & 4 Outputs per module
- Max. 4 modules per UW-MTX
- DIN rail / Base mountable module

Relay
- Configurable 4 Outputs per module
- Max. 4 modules per UW-MTX
- DIN rail / Base mountable module

AO
Analog Output
- 4 Configurable Output
- Analog output in range of 4-20 mA

ZSI
Zone Selective Interlock
-Provides time Discrimination for Short circuit & Earth fault

EL
Earth Leakage Protection
- Range 0.3A to 30A
- Needs specified external CTs
- DIN rail / Base mountable module

REF
Restricted Earth Fault Protection
- Detects zone of Earth fault.
-Protection ranges from .2In to .6In
- Needs specified external CTs
- DIN rail / Base mountable module

TCS
Trip Circuit Supervision
- Monitors healthiness of Shunt
- Compatible with coil voltage 24V/415 V Trip Circuit
- DIN rail / Base mountable module

TM
Temperature Protection
- Monitors terminal temperature
- 2 selectable temperature modules
- Mounted inside breaker

5. Configuration

CAUTION	- Incorrect / Inadequate Configuration can result in lack of protection and/or nuisance tripping / erroneous signaling. - Restrict the knowledge of setting passwords within authorised personnel only.

To configure UW-MTX 4.5 P&C unit, the display needs to be ON. Display switches ON when,
- the breaker is carrying 15% of rated current (In) in phases or
- 24 Vdc supply (output 2 of PS module) is connected to terminals AS+ & AS-.

Access the settings:

Tools required: Screw Driver (Tip width 3 mm)

To access the settings remove the P&C unit cover and do the changes after powering up the P&C Unit.
P&C Units type UW-MTX 4.5 are pre-configured to default factory settings (ref. page 2-2, 2-3). Default settings are common for both Set Groups 1 & 2.
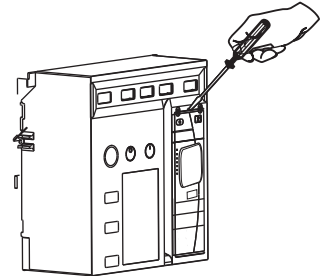
Open the P&C cover

For configuring the UW-MTX 4.5 P&C unit, enter to the configuration Mode .Configuration of the unit can be done through the touch screen display, configurator module with smart card and also through modbus module.
To access a particular menu through touch screen user interface, select the parameters by finger touch .
The menu option will be highlighted as an acknowledgment and can be accessed.

When 'Config mode' is selected, the operator is asked for password. The factory set default password is **"0000"**.After entering password press OK for confirmation.

The previous screen can be accessed by selecting button. Through button the user can anytime return to the home screen.

5.1 Unit Settings

MTX Unit	12:00
Protection Settings	
System Settings	
Unit Settings	
Module Settings	

→

Unit Settings	12:00
Date & Time	
Communication	
Event Recorder	
Sign Convention	

→

Date & Time	12:00
Date	
02/Sep/11	
Time	
10:05:14	

Date,Time can be programmed in Date & Time Menu . Select 💾 to save all the changes.

Unit Settings	12:00
Date & Time	
Communication	
Event Recorder	
Sign Convention	

→

Communication	12:00
Device ID	1

MOD/Profi bus communication parameters can be set in this menu.Select 💾 to save all the changes.

Unit Settings	12:00
Date & Time	
Communication	
Event Recorder	
Sign Convention	

→

Event Recorder	12:00
Pickup	Enable
Trip	Enable
Alarm	Enable
Module Conn	Enable
Module Rmve	Enable
Relay I/P	Enable
IO Module I/P	Enable

The Events to be captured under Event Recorder shall be made Enable here.
Select 💾 to save all the changes.

Unit Settings ...Contd.

Unit Settings	12:00
Date & Time	
Communication	
Event Recorder	
Sign Convention	

Sign Convention	12:00
Sign Convention	IEC

Sign convention presently used is IEC. This option is kept for future upgradation. Press ▭ to access the rest of the screen under unit settings.

Unit Settings	12:00
Auto Set Group	
Maintenance	
Day light Savings	
Profiling	

Auto Set Group	12:00
Mode	
S.G.1 - S.G.2	
S.G .2 - S.G.1	

SG1 - SG2	12:00
Hour	15
Min	0
Sec	0
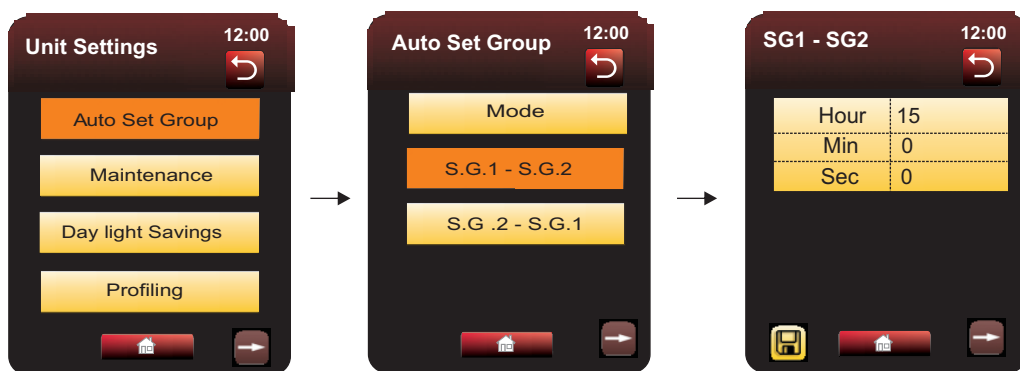
To Enable the Auto Set Group option, configure **"MODE"** as "Enable" and set the time in SG1-SG2 at which Set Group 2 becomes the active Set Group and SG2-SG1 at which Set Group 1 becomes active Set group of the unit. These Set Groups will be switched automatically in the specified timings. Select 💾 to save all the changes.

Unit Settings	12:00
Auto Set Group	
Maintenance	
Day light Savings	
Profiling	

Unit Settings	12:00
Password	

7	8	9	x
4	5	6	
1	2	3	
0	Clr	OK	
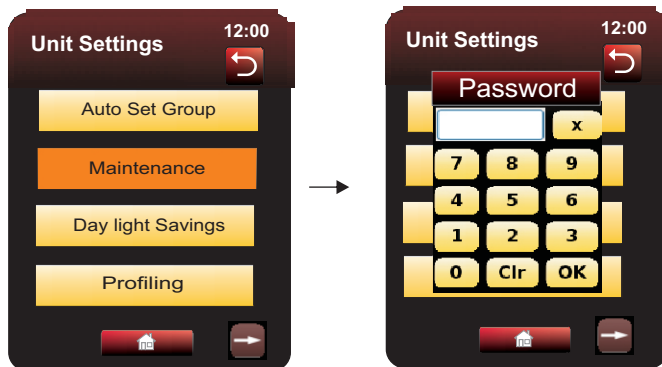
This menu will be accessible to Service Engineer through service password.Breaker installation date , Touch screen calibration and Self diagnostic test shall be carried out through this option. Select 💾 to save all the changes.

Unit Settings ...Contd.
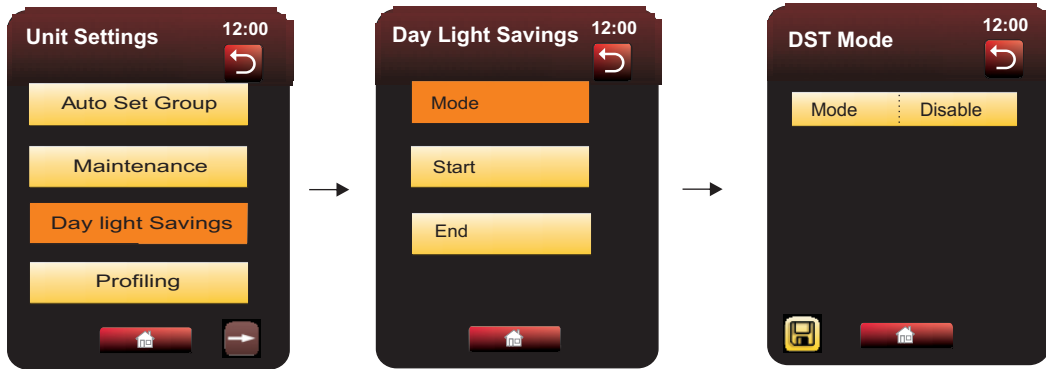
Mode and Start and End date of Day light saving and DST hours can be programmed in this menu.
Select [save icon] to save all the changes.
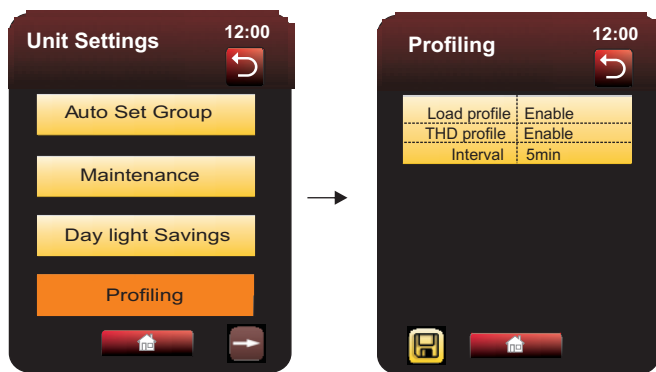
Load and THD profiling options can be activated through this menu. The profile updation interval can be also programmed from the menu options. (5,10,15 minutes). Select [save icon] to save all the changes.
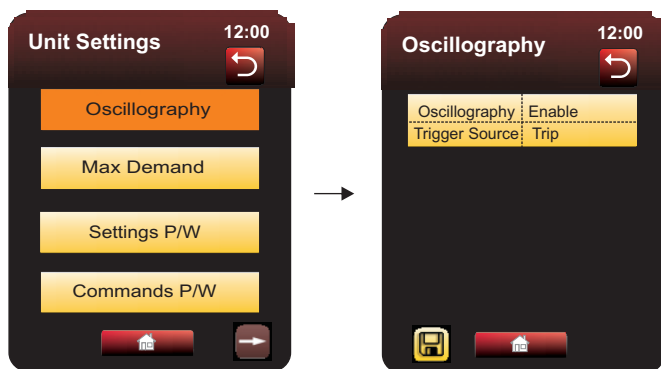
Through oscillography feature current and voltage waveforms can be captured during trip and pick up time. Waveforms 10 cycle prior to trip/pick up and 5 cycle after trip/pick up will be recorded once it is enabled. Select [save icon] to save all the changes.

Unit Settings ...Contd.
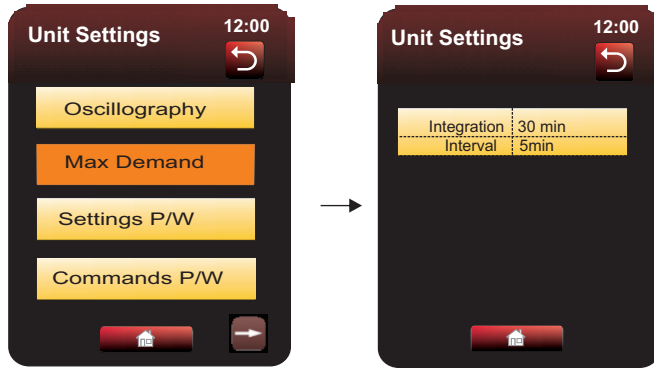
MD Integration period and interval can be programmed here. Select 💾 to save all the changes.
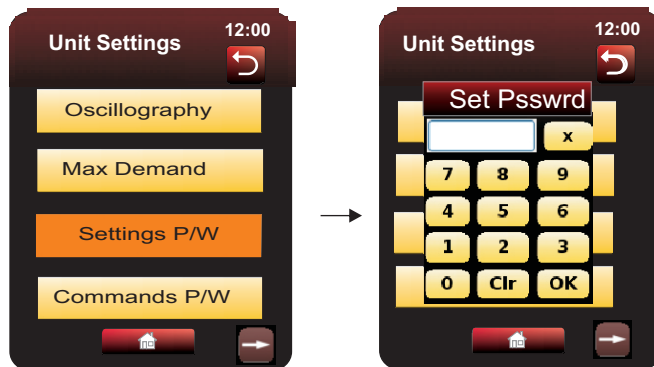
This Settings P/W shall be used for accessing Protection, Unit, System settings in Config Mode. Default settings password is "0000". Settings password can be changed to a new password with this option. Enter the new password and give OK. Select 💾 to save all the changes.
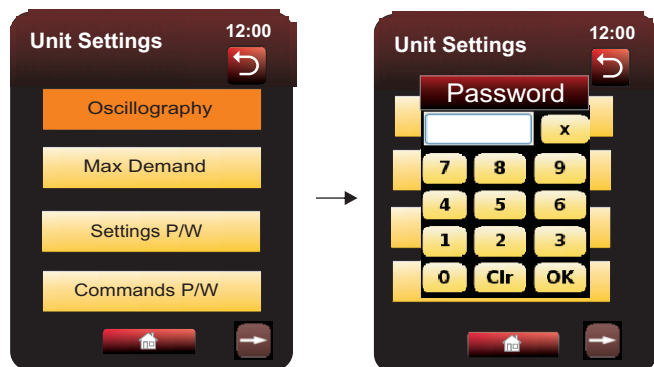
The default commands P/W is "0000". Command password is used to access menus under "Commands". Same password can be used for Earth Fault self test through the Ⓣ button in the overlay.
Select 💾 to save all the changes.

Unit Settings ...Contd.
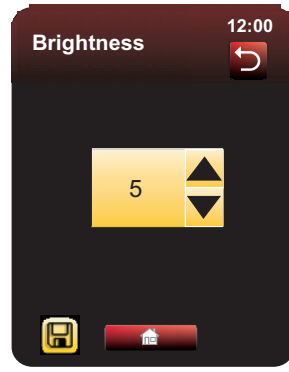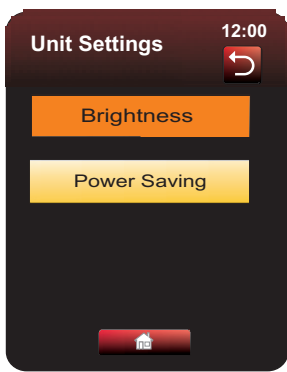
Screen brightness can be adjusted in a scale of 1 to 5 (5 being the maximum). After doing brightness adjustments press [save icon] to save the settings
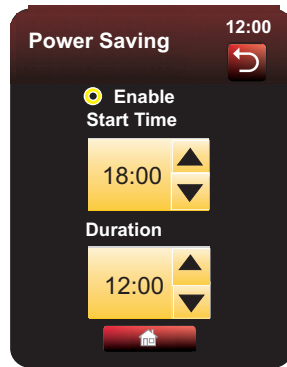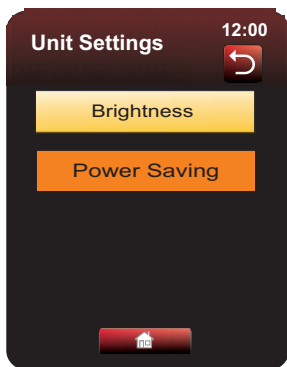
Power Saving Mode can be enabled through this feature. Once this option is enabled release display will be off for programmed duration. Press [save icon] to save all changes.

5.2 System Settings

Through System Settings the following system parameters can be programmed which are Frequency, I-Frame, In, Nominal Volt, Maint. Period, Maintenance, Incoming, Poles and Phase Seq.

System Settings

Frequency	50 Hz
I-Frame	800 A
In	400 A
Nominal Volt.	415 V
Maint. Period	6 mths
Maintenance	Disable
Incoming	Top

Frequency

- 50 Hz
- 60 Hz

Ok   Cancel
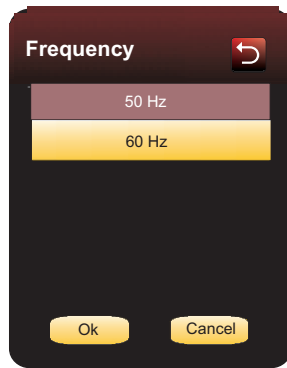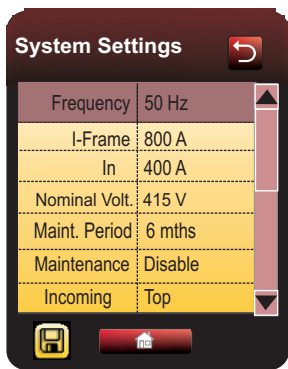
Select the appropriate system parameter and give Ok. After doing the changes, press 💾 to save all the changes.

System Settings   12:00

Frequency	50 Hz
I-Frame	800 A
In	400 A
Nominal Volt.	415 V
Maint. Period	6 mths
Maintenance	Disable
Incoming	Top

I Frame   12:00

- 800 A
- 1600 A
- 3200 A
- 4000 A
- 6300 A

Ok   Cancel
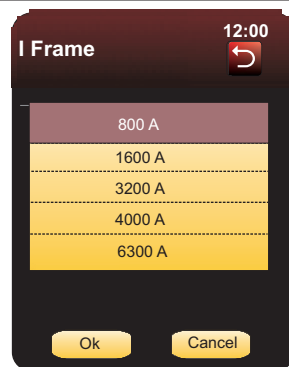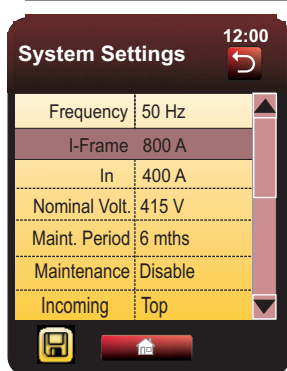
I-frame and In values shall be correctly for proper metering and protection of the P&C unit . After programming these values select 💾 to save the changes.

I-frame and In values shall be programmed as per the following look-up table for different breaker ratings .

Breaker Frame Size	Breaker rating(A)	I-Frame	In
1,2,3	400 630 800	800A	400 630 800
1,2,3	1000 1250 1600	1600	1000 1250 1600
1	2000 2500 3200	3200	2000 2500 3200
2,3	2000 2500 3200 4000	4000	2000 2500 3200 4000
3	5000 6300	6300	5000 6300

System Settings ...Contd.
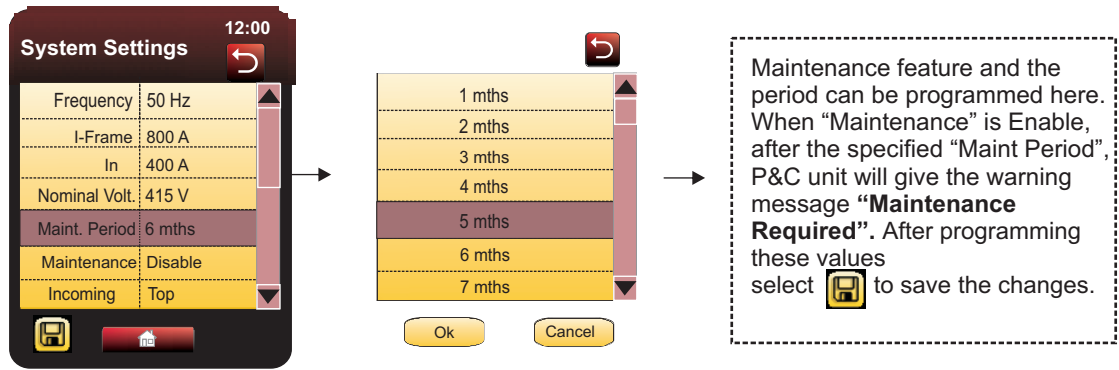
Likewise do all other settings for Incoming(Incoming direction of Current), Poles, Nominal Volt. and Phase Seq.

CAUTION	After changing System settings escape from the menu ,save the settings and reset the power of the unit once to get it applied.

5.3 Protection

Protection settings include basic and advanced protections

Basic protections:

1.Overload   2.Short circuit   3.Instantaneous   4.Earth fault 5.Neutral Overload

Advanced protections:

1.Under Current	2.Current Unbalance	3.Directional Short Circuit	4.Under-voltage
5.Over Voltage	6.Voltage Unbalance	7. Residual Voltage	8.Under-frequency
9.Over Frequency	10.Reverse Power	11.Breaker Failure	12.Phase sequence
13.Leading PF	14.Lagging PF	15.MD Active	16.MD Reactive
17.MD Apparent	18.Earth Leakage	19.Restricted Earth Fault	

Protection Settings are available in Set Group 1 and Set Group 2. By default Set Group 1 will be active. To change the Set Group manually use the command **"Change Set Group"** in **Commands**. To enable the Set Group change automatically enable "**Auto Set GRP**" option in Unit Settings.

Protection Settings

From any protection menu to come back to the home screen press [button]. Changes in settings shall be saved to before coming to the home screen
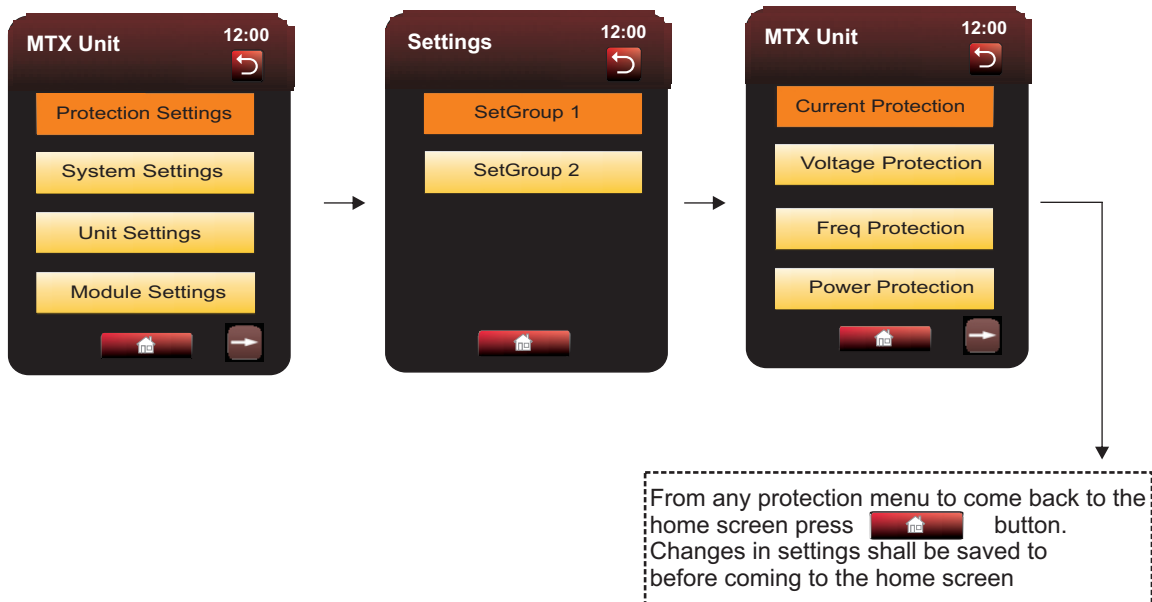
| CAUTION | It is safe to change the protection setting when the breaker is in service position. Commissioning & maintenance should be carried out by skilled technician only. Before touching the device, ensure the person operating is free of electrostatic charge |
| | Upstream protection equipment has to be set in a way, so that upstream faults are interrupted safely. |

I Protection	12:00
Overload	
Short Circuit	
Directional SC	
Instantaneous	

Overload	12:00
Protection	Enable
O/L Char	I2T
Pick up (Ir)	0.6 In
Delay	2s
Pre-alarm	0.5 Ir
Thermal Mem	Off

Pre alarm	12:00
0.55Ir	▲ ▼
Ok	Cancel
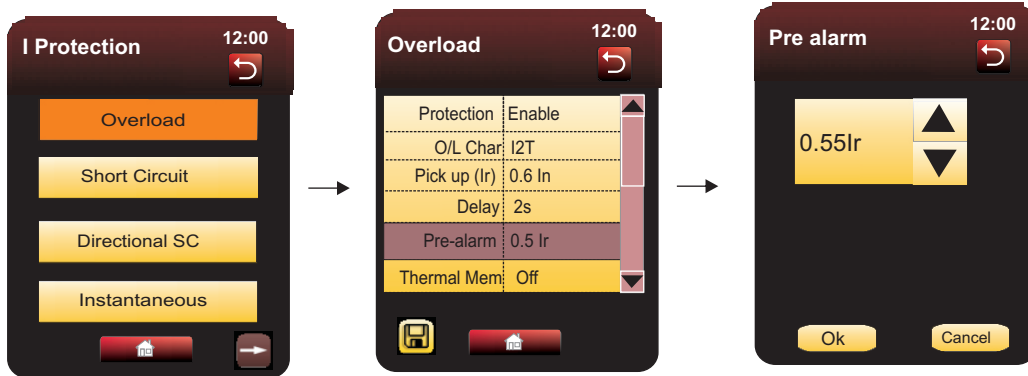
Thm-mem 'On' enables the P&C Unit to trip early if the fault reoccurs*.

I Protection	12:00
Overload	
Short Circuit	
Directional SC	
Instantaneous	

Short Circuit	12:00
Protection	Enable
Double S/C	Off
I2T	Off
Pk-up Lo(Is)	6 In
Pk-up Hi(Is)	1 In
Delay Lo	400 msec
Delay Hi	100 msec

Double Select	12:00
Off	
On	
Ok	Cancel
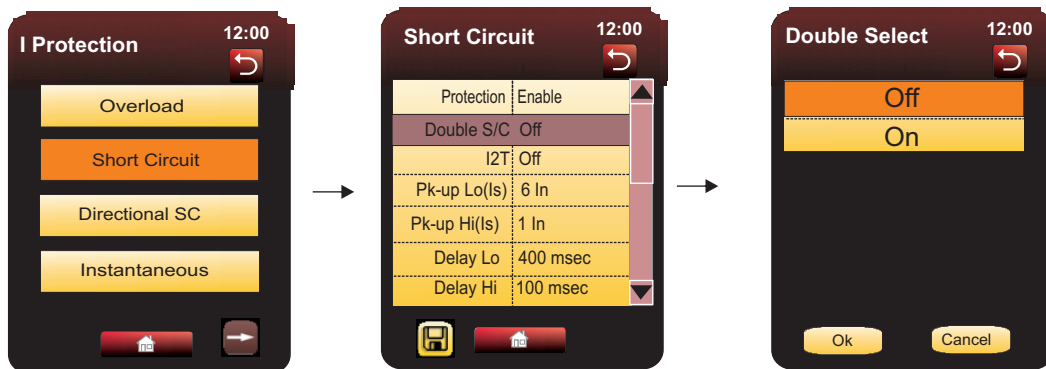
Double S/C 'ON' ,activates two different time delays corresponding to high and low pick up values. With Double S/C off, system will follow high pick up and delay for the fault. Cold pick up can be enabled to avoid false tripping of the unit against high inrush current. While Cold pick up is 'ON', P&C unit will not issue trip when fault current is less than double the pick up value till the specified cold delay elapses.

I Protection	12:00
Overload	
Short Circuit	
Directional SC	
Instantaneous	

Directional SC	12:00
Protection	Enable
Direction	Top
I2t	Off
Pick Up(Is)	6 In
Delay (ts)	100 msec
Pre-alarm	0.5 Is
Cold Pick Up	Off

Directional SC	12:00
Top	
Bottom	
Ok	Cancel

Directional SC protects system from the short Circuit in the reverse direction.

I Protection — 12:00

- Overload
- Short Circuit
- Directional SC
- **Instantaneous**

→

Instantaneous — 12:00

Protection	Disable
Pick up(Ip)	15 In

→

Instantaneous — 12:00

- Disable
- Enable

Cancel   Ok
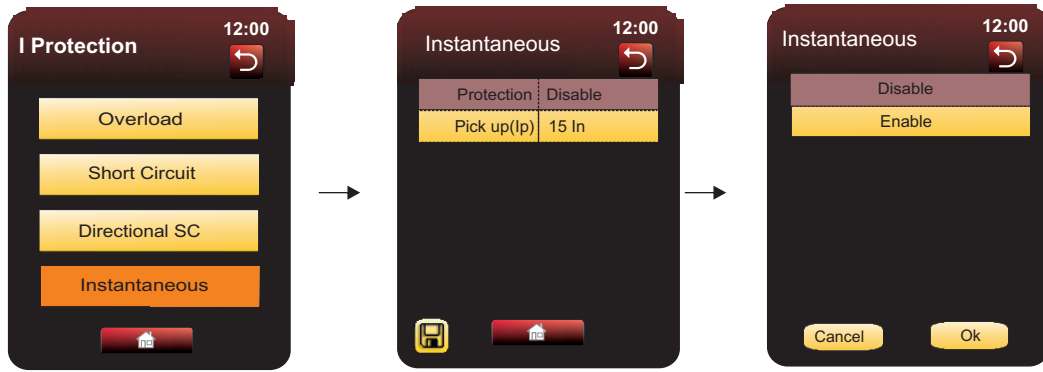
Instantaneous protection settings can be programmed in this menu.

I Protection — 12:00

- **Earth Fault**
- Ntrl Overload
- Current Unbal
- Earth Leakage

→

Earth Fault — 12:00

Protection	Disable
I2t	Off
Pick Up(Ig)	0.2 In
I2T off(tg)	100 msec
I2Ton(tg)	100 msec
Pre-alarm	0.8 Ig
Cold Pick Up	Off

→

Cold Pickup — 12:00

- Off
- On

Cancel   Ok

Cold pick up 'On' in EF enables the P&C unit not to trip for double the pick up current for the specified time delay.

I Protection — 12:00

- Earth Fault
- **Ntrl Overload**
- Current Unbal
- Earth Leakage

→

Neutral Overload — 12:00

Protection	Disable
Pick Up(IN)	1 Ir
Pre-alarm	0.8 IN

→

Protection — 12:00

- Disable
- Enable

Cancel   Ok
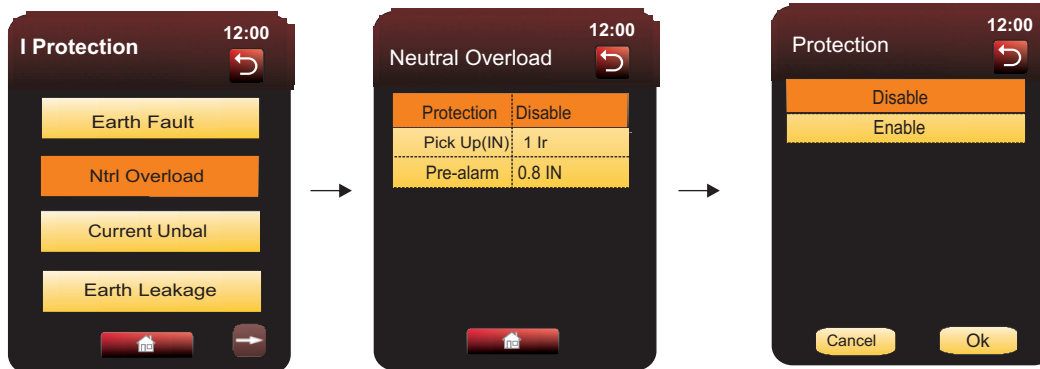
Neutral Overload Protection will protect the system from an overload condition occurring in the neutral terminal. Neutral overload protection characteristics will follow time delay and trip curve selected in Overload protection settings.

Likewise all other protection settings can be done.

Saving the Settings in P&C Unit

After doing the changes in the respective protection screens press 💾 to save all the settings.

Protection Settings will be applied immediately after confirming the changes. If any alarm or pick up is present in system 5 minutes prior to the changes "Settings not Applied" warning will be displayed, and all the settings will be applied after 5 min (if no pick up or alarm reoccurred). To apply the settings immediately , reset the unit power supply once .

5.4 Module Settings

Module	Enable
Input 1	Enable
Input 2	Enable
Input 3	Enable
Input 4	Enable
Output 1	Enable
Output 2	Enable
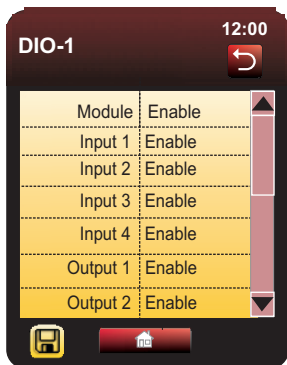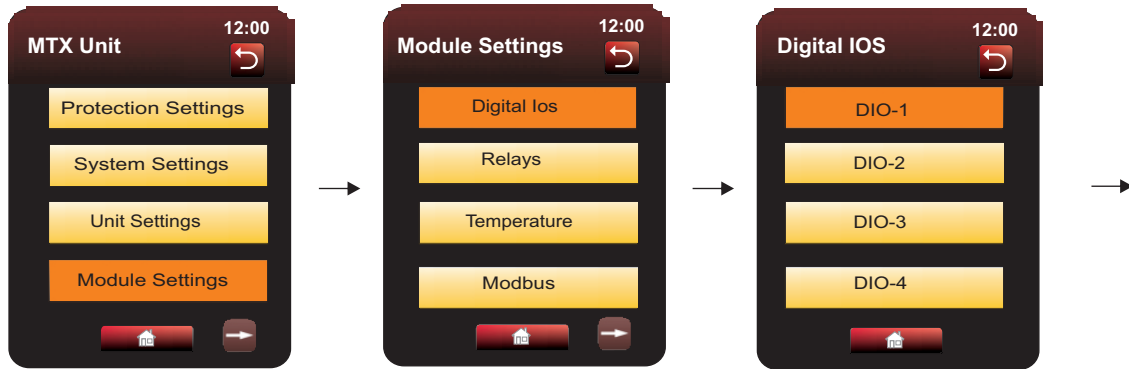
For Digital I/O and Relay Modules make the Module settings "Enable" to activate the connected Module. After doing the changes Select 💾 to save all the settings.

Module	Enable
Parity	None
Baud Rate	2.4k
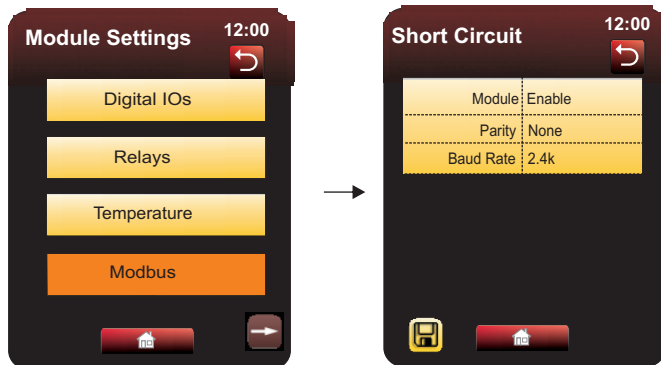
Make the Modbus settings in the menu. Baud rate and parity settings to be kept same as PC-HMI. Program rest of the module settings as explained above .

5.5 Commands

The following functions are available under "Commands"

1.Maint. Operation   2.Clear MD   3.Change SetGroup   4.Factory Setting
5.Clear Max I   6.Clear Max V   7.Clear Energies

The factory set default Command password is "0000"

5.5.1.Maintenance Operation

After doing each breaker maintenance, access "Maint.Operation" in Commands and give "Yes" command. Maintenance operation done will be recorded in Maintenance record. This also resets the "Maintenance Required" warning message which the P&C unit displays after the specified maintenance period is due.
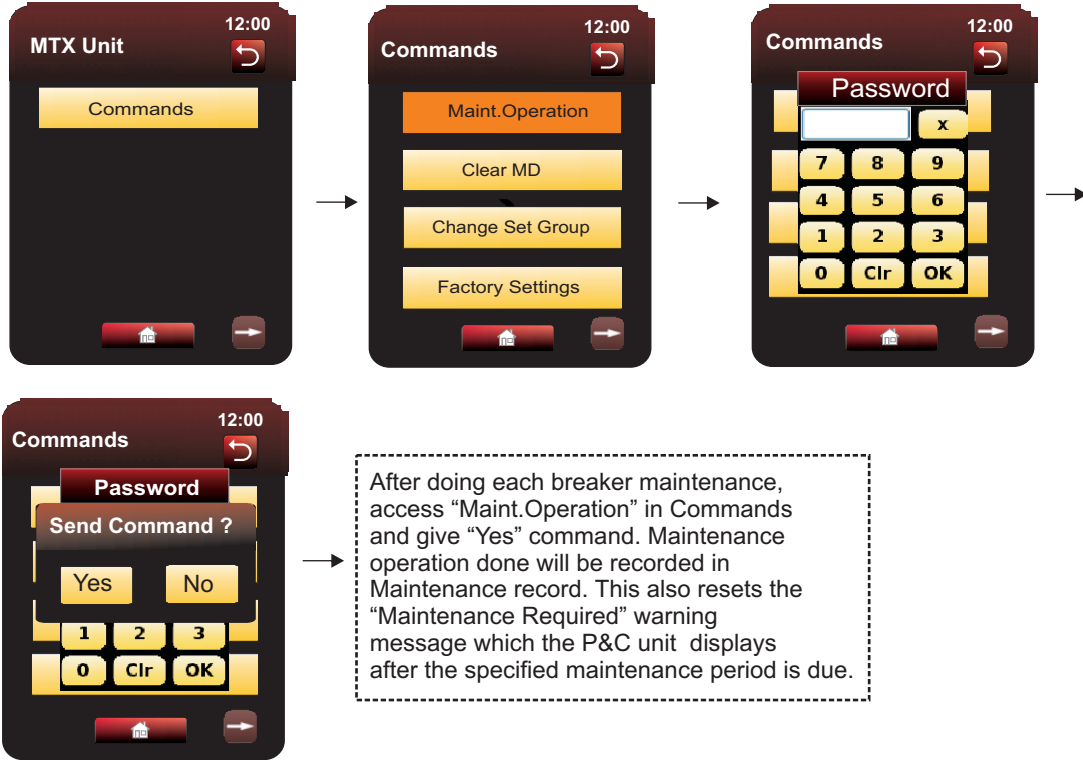
5.5.2 Clear MD, Clear Max I, Clear Max V, Clear Energies

This commands will clear the maximum values the P&C unit has captured during its operation.
Do the same for clearing Max I, Max V and Max Energies

5.5.3 Change Set Group

There are 2 Set Groups available for the Protection Settings. By default Set Group 1 will be active.
To change the Set Group the below procedure should be followed.
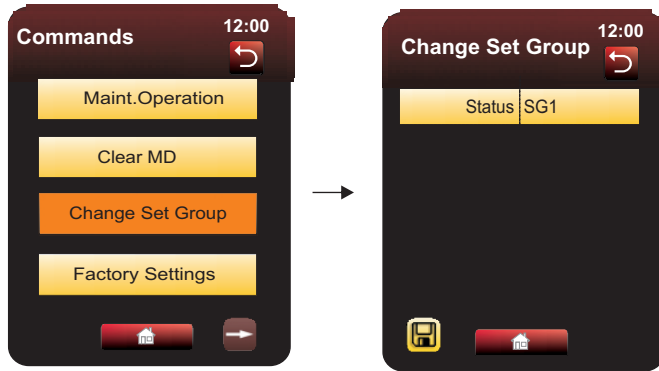
Select 🖫 to save all the settings.

5.5.4 Factory Settings

Factory Settings can be restored by this option.

After giving the command the system will be restarted.

6. Metering

6.1 Metering Values

Numeric

On selecting each of these parameters, corresponding metering values will be displayed
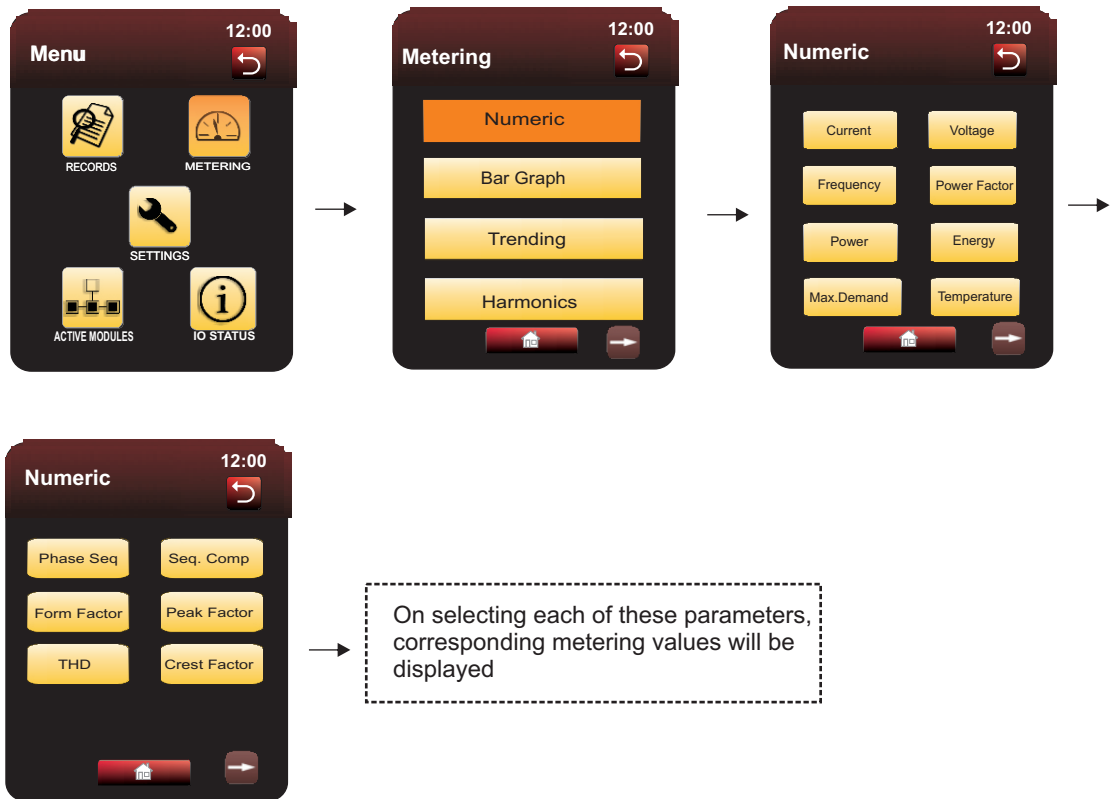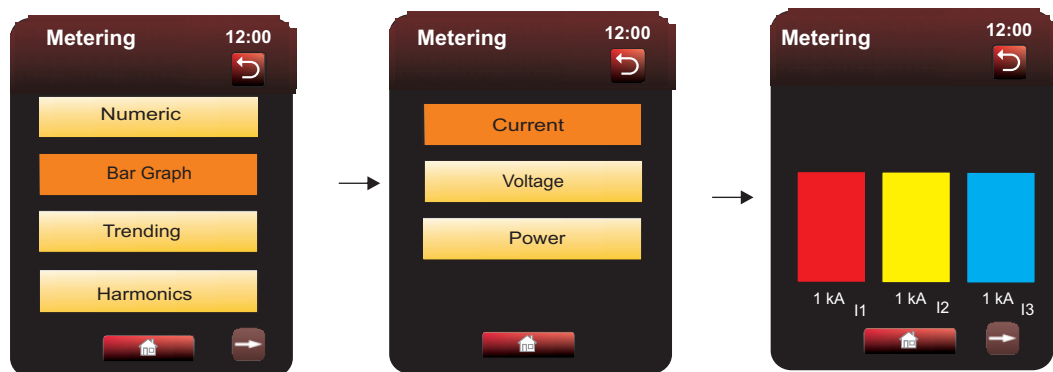
Bar Graph

Instantaneous values of Current, Voltage, Power will be displayed in bar graph format.

Metering 12:00	**Metering** 12:00
Numeric	Parameters
Bar Graph	THD Profile
Trending	Load profile
Harmonics	

Metering 12:00
Current
Voltage

Current 12:00
I1: 850   I3: 750
I2: 800   IN: 100

Amp
900
800
700
600
500
400
300
200
100
0

0 2 4 6 8 10 12 14 16 18 20   Time (s)
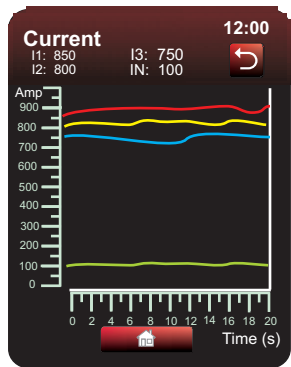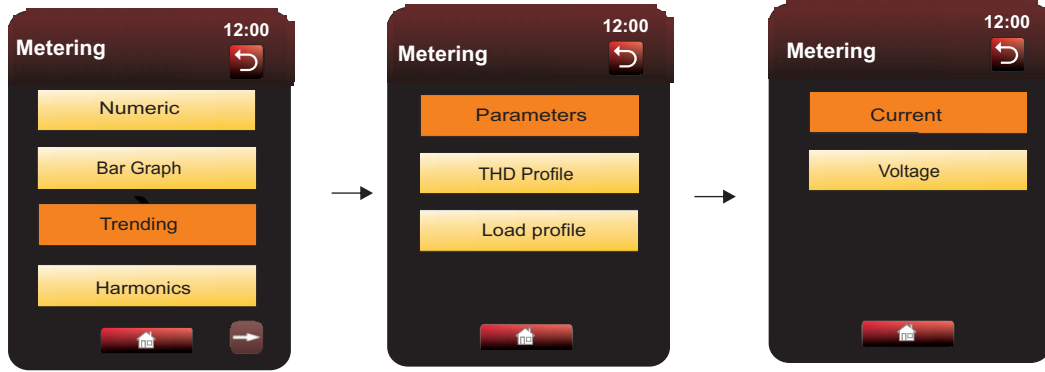
Trending feature plots the instantaneous values of Current, Voltage over a period of 60 seconds. Current trending plots I1,I2,I3,IN values and Voltage trending plots V1,V2,V3 (Phase to neutral) instantaneous values.

THD Profile

Metering 12:00
Parameters
THD Profile
Load profile

THD Profile 12:00
R-Phase
Y-Phase
B-Phase

THD Profile- R 12:00
%
100
90
80
70
60
50
40
30
20
10
0

12.00   8.00   4.00   12.00   Time
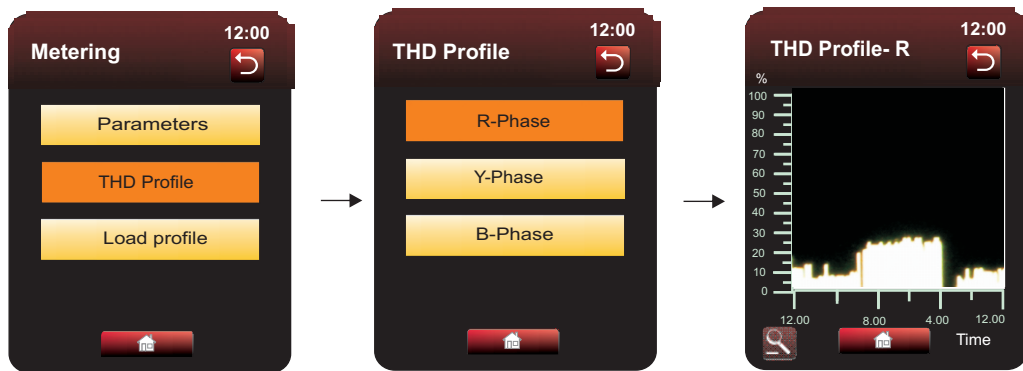
THD Profile shows the THD percentages of individual phases over the last 24 hrs.

LOAD Profile
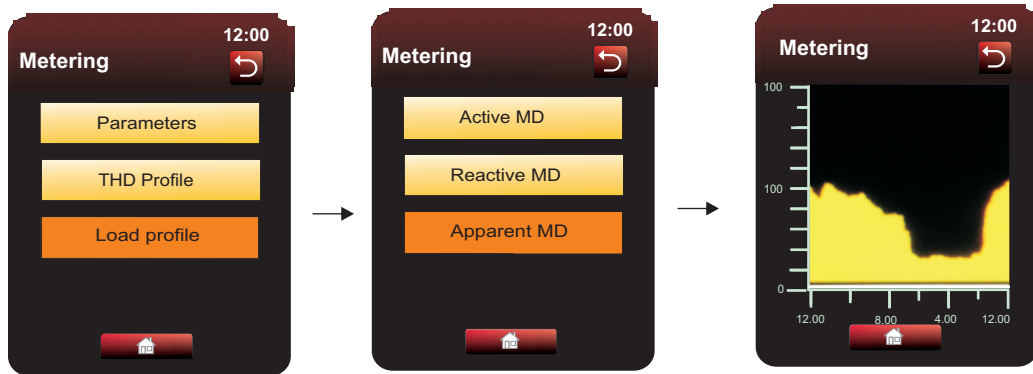
Load Profile gives the profiling of Maximum demand over a period of 24 hrs.

Harmonics
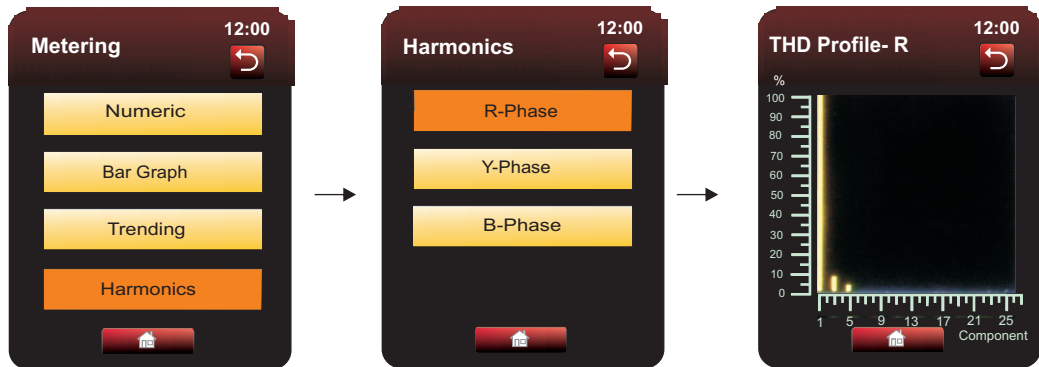
Harmonic metering of individual phases up to 28th harmonic will be displayed .

6.2 Records

Trip, Event, Maintenance Records

Trip record stores latest five trip information which include Trip Cause, Date, Time of the trip. It also records the pick up and delay values set for the particular protection. Current, Voltage, Frequency, PF values during the fault time is also recorded in the trip record.

Event records store information of the latest events. Events records has three sub division viz. Protection, Module and Other. "Protection" stores latest 10 events related to protection based events viz. alarm, pick up, trip. "Module" stores latest 5 events related to modules. "Other" stores latest 5 records of set group change and maintenance done .

Oscillography

Oscillography feature can be turned ON through Unit settings. This feature enables the P&C unit to capture Current and Voltage waveforms during pick up and trip condition.10 cycles prior to trip /pick up and 5 cycles after trip / pick up will be captured. Trigger point in the waveform indicates the starting point of the fault. The waveform can be zoomed in using finger scrolling optically upto 4 times. Use [zoom icon] button to zoom out.

6.3 IO Status

IO Status indicates the status of ACB, FSD status (open/close) and Input / Output status of Relay and DIO module.

6.4 Active Modules
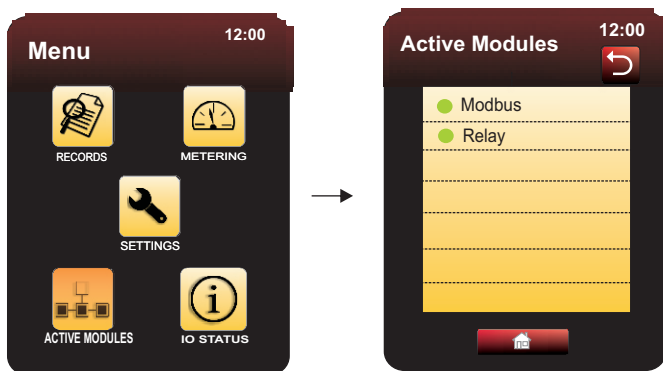
Active modules shows all the modules connected and activated with the release.

7.Supplementary Modules

Total 9 supplementary modules are available with UW-MTX4.5 series of P & C unit.

RELAY	DIGITAL INPUT/OUTPUT (DI/O)	ANALOG OUTPUT (AO)

POWER SUPPLY (PS)	ZONE SELECTIVE INTERLOCKING(ZSI)	TRIP CIRCUIT SUPERVISION (TCS)

EARTH LEAKAGE (EL)	RESTRICTED EARTH FAULT (REF)	TEMPERATURE (TM)

Supplementary Modules

UW-MTX3.5 series is supported by supplementary modules, which enhance the functionality of the P&C unit and offer a complete system solution.

Installation,configuration and operation of these modules is explained below.

Installation:

PS, AO, DI/O, RELAY, REF, EL, TCS & ZSI are suitable for base mounting and DIN rail (35mm) mounting. TM module is screw fixing.

Self Diagnostic Test:

All the modules (Except PS Module) are having self diagnostics test button provided on the front facia. Self test of the supplementary module can be performed by removing the CAN communication connection of the P&C unit with the PS module and 24V dc supply connected. (which is looped with the supplementary modules)
 After test RED led indicates module is not healthy and GREEN indicates module is healthy.
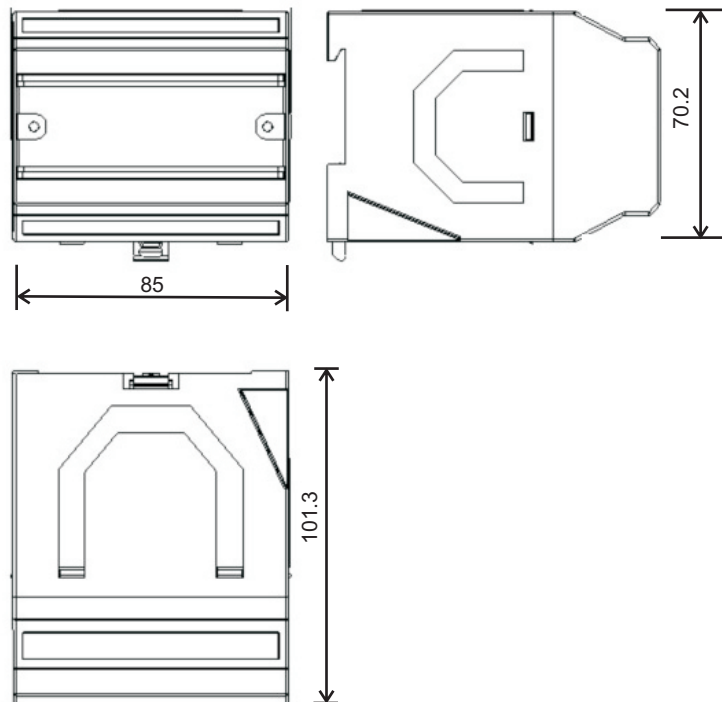
Rear view of module:

Dimensions in case of base mounting option are as mentioned.
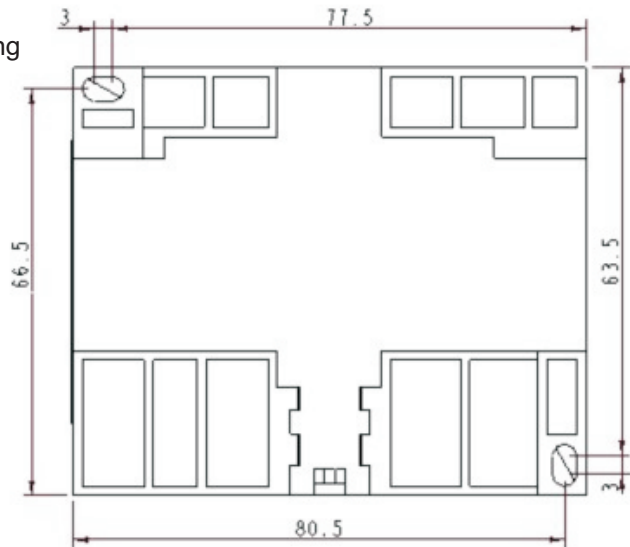
7.1 PS Module

a. For basic protections, UW-MTX works independent of external power supply.
b. For additional features like Communication and external Modules, 24 Vdc supply is required.
c. CAN (Controlled area network) communication is provided through this module. It is the internal communication bus in UW- MTX unit and rest of the supplementary modules can be looped with it.

PS provides 24Vdc auxiliary supply for Input voltage 85-265 V ac & 125V-300V dc.

Output 1: 24V dc, 200 mA: only for connecting matrix protection & control unit (UW-MTX 2.5/2.5G/3.5/3.5EC) .
Output 2: 24V dc, 650 mA: for connecting matrix unit + supplementary modules (UW-MTX4.5 should be connected to port 2 only)

Refer Section 8-1 for connection details. One PS is adequate for one unit of UW-MTX and five supplementary modules connected to it.

7.2 DI/O (Digital I/O Module)

Separate digital Input & Output contacts are provided through DI/O modules. Each DI/O offers 4 Digital Inputs and 4 Relay Outputs. UW-MTX4.5 can accept up to 4 DI/O modules for cascading the Input/Outputs as per user requirements.

To enable DI/O module ,access the Module settings in the P&C unit and set the corresponding parameters.
The module ID can be set using the DIP switches provided on the front facia of the module . DIP switch position **"UP"** means corresponding module is enabled . Also enable the same module in the MATRIX unit in Module settings.

The I/Ps & O/Ps are configurable to boolean logic equations. Total 16 combinations of these equation are possible to assign.

Contact Ratings:
Input contacts: 24 Vdc or 240 V ac
Output contacts: 24 Vdc or 240 V ac, 6A (resistive load)

For connection details, refer Section 8-1.

Configuration

Input Type: 24Vdc / 230 VAC

30-33: digital Inputs with fixed boolean logics. These inputs can be enabled.

34-37: digital outputs with fixed boolean logics. These outputs can be set as level or pulse.

Digital Input/Output configuration:

Digital I/O module	Digital Input	Relay Output
D I/O 1	30-33	34-37
D I/O 2	40-43	44-47
D I/O 3	50-53	54-57
D I/O 4	60-63	64-67

Bolean logic for Digital Inputs/Output:

For Level output:

DIGITAL I/P1 D1	DIGITAL I/P2 D2	DIGITAL I/P3 D3	DIGITAL I/P4 D4	OUTPUT 1 OP1=D1 NAND D2	OUTPUT 2 OP2=D1 NOR D2	OUTPUT 3 OP3=D3 XOR D4	OUTPUT 4 OP4=D4
0	0	0	0	1	1	0	0
0	0	0	1	1	1	1	1
0	0	1	0	1	1	1	0
0	0	1	1	1	1	0	1
0	1	0	0	1	0	0	0
0	1	0	1	1	0	1	1
0	1	1	0	1	0	1	0
0	1	1	1	1	0	0	1
1	0	0	0	1	0	0	0
1	0	0	1	1	0	1	1
1	0	1	0	1	0	1	0
1	0	1	1	1	0	0	1
1	1	0	0	0	0	0	0
1	1	0	1	0	0	1	1
1	1	1	0	0	0	1	0
1	1	1	1	0	0	0	1

Boolean logic for Digital Inputs/Output:

For Pulse output:

Note: X: Don't care

D1(Input 1)	D2(Input 2)	D3(Input 3)	D4(Input 4)	R1(Output 1) R1 = D1 NAND D2	R2(Output 2) R2 = D1 NOR D2	R3(Output 3) R3 = D3 XOR D4	R4(Output 4)
0	0	0	0	1	1	0	0
0	0	0	1	X	X	X	1
0	0	1	0	X	X	1	X
0	0	1	1	X	X	0	1
0	1	0	0	X	0	0	0
0	1	0	1	X	0	1	1
0	1	1	0	X	0	1	0
0	1	1	1	X	0	0	1
1	0	0	0	X	0	0	0
1	0	0	1	X	0	1	1
1	0	1	0	X	0	1	0
1	0	1	1	X	0	0	1
1	1	0	0	0	0	0	0
1	1	0	1	0	0	1	1
1	1	1	0	0	0	1	0
1	1	1	1	0	0	0	1

7.3 Relay module

Relay module has 4 potential free relay contacts (2 change over contacts and 2 NO) which are configurable. The ratings of the relay is 230V ac/24 dc, 6A. With the help of this, user can manouevre interlocks in the distribution system.

Configuration: Relay module can be configured through Menu section as detailed below. The module ID can be set using the DIP switches provided on the front facia of the module . DIP switch position **" UP"** means corresponding module is enabled . Enable the same module in the MATRIX unit in Module settings. . Also the output option can be set to Level or Pulse .

Contact Ratings:

Output contacts: 24 Vdc or 240 V ac, 6A (resistive load)

Similarly, change other parameters
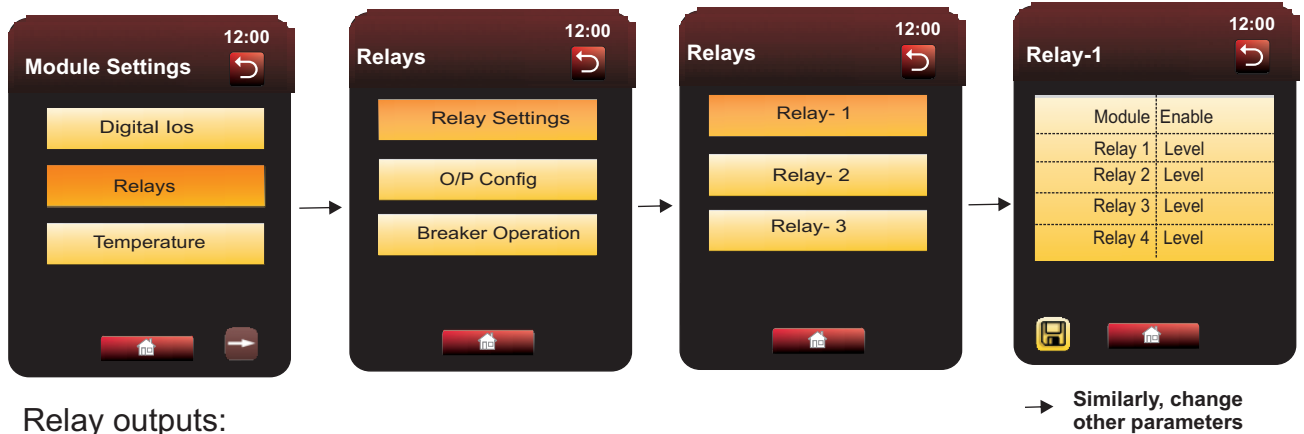
Relay outputs:

Relay module	Relay Outputs (Assigned in P&C unit)
Relay 1	70-73
Relay 2	80-83
Relay 3	90-93
Relay 4	A0-A3

Relay module o/p configuration details:

Each relay module will have 4 configurable outputs. Under o/p configuration, individual relay module output can be configured in either alarm or trip mode for different protections detailed below.

	Short form given in the P&C Unit
1. Overload	:OL_AL, OL_TR
2. Short circuit	:SC_AL, SC_TR
3. Instantaneous	:INST_TR
4. Earth fault	:EF_AL, EF_TR
5. Neutral overload	:N OL_AL, N OL_TR
6. Reverse power	:RP_AL, RP_TR
7. Phase sequence	:PhSeq_AL, PhSeq_TR
8. Under voltage	:UV_AL, UV_TR
9. Over voltage	:OV_AL, OV_TR
10. Under frequency	:UF_AL, UF_TR
11. MD (active)	:MDkw_AL, MDkw_TR
12. Breaker Operation	:BKR_OP , BKR_CL

Breaker operations (open & close) can be performed using the relay contacts.

Note: Once any of these listed configuration parameter is assigned to a relay output, that option will not be available for the remaining relay modules (output contacts).

7.4 TM (Temperature Module)

TM (Temperature Module) converts inputs from thermistors and provides breaker terminal temperature data in UW-MTX4.5 series P&C unit.
TM is located inside U-POWER ACB and senses temperature through thermistors connected on the breaker terminals. Hence, 'Temperature Rise protection' is a factory installed option. The temperature protection range is from 85 deg C to 115 deg C.

Configuration: TM module can be configured through Menu section as detailed below.
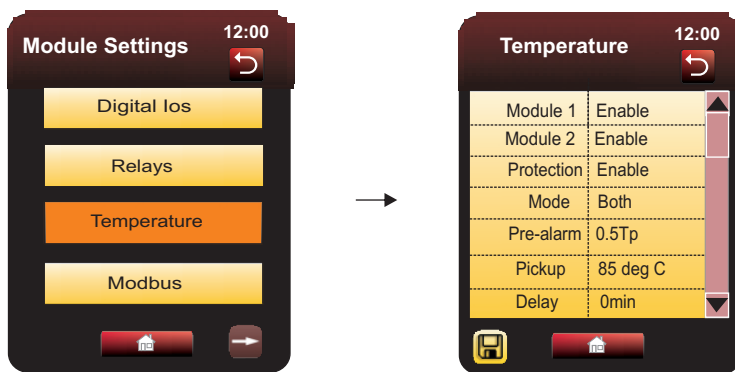
7.5 Analog output (AO) module:

Analog output module is parallel metering option for panel display meters. It gives an output of 4-20mA to which analog ammeter and voltmeter can be connected. 4 mA corresponds to zero current or voltage metering .
20 mA output corresponds to 1.5 time set I-frame value of current or 1.5 times set Vn value in Protection and Control Unit. Tolerance on Full scale deflection is 3%.

AO communicates with Matrix Protection & Control unit on internal CAN BUS protocol.

Configuration: AO module can be configured for the following parameters through Menu section as detailed below.

1. R-Phase I   2. Y-Phase I   3. B-Phase I
4. R-Phase V   5. Y-Phase V   6. B-Phase V
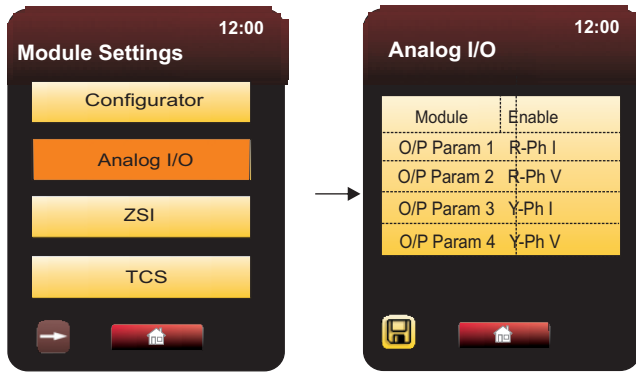
7.6 ZSI (Zone Selective Interlocking) module

ZSI module communicates with UW-MTX4.5 series on internal CAN BUS protocol. Total 20 downstream & 3 upstream breakers can be supported. It gives protection against Short circuit & Earth faults.

Refer page 8-1 for connection details.

Configuration: ZSI module can be configured through Menu section as detailed below,
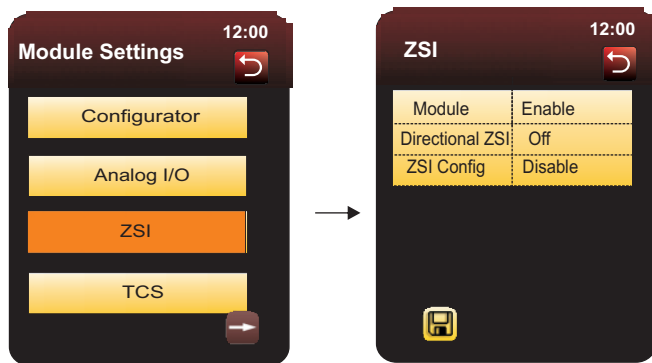
ZSI configuration "Both" will enable ZSI for ground fault and short circuit

For **ZSI** feature, P&C units are hardwired as shown and they communicate with each other through restraining signals.

In ZSI active mode , time delays in Short circuit and earth fault are set progressively higher towards the main incomer ACB. In the given diagram, ACB 1 has the highest delay of 400ms for Short Circuit. ACB 2,ACB 3 are having delays 200ms, 100ms respectively.

For fault at Y, ACB3 will send restraining signal to ACBs 1 & 2 and hence preset delays are honored.ACB 3 will trip in 100 ms and the fault will be cleared. ACB 2,ACB 3 will remain closed

For faults at intermediate locations like X, therewill be no restraining signal from feeder breakers ACB2, ACB 3 and hence ACB1 will trip in 50 ms instead of preset 400ms delay.

ACB 1
S. C. Time
Delay 400 ms

ACB 2
S. C. Time
Delay 200 ms

ACB 3
S. C. Time
Delay 100 ms
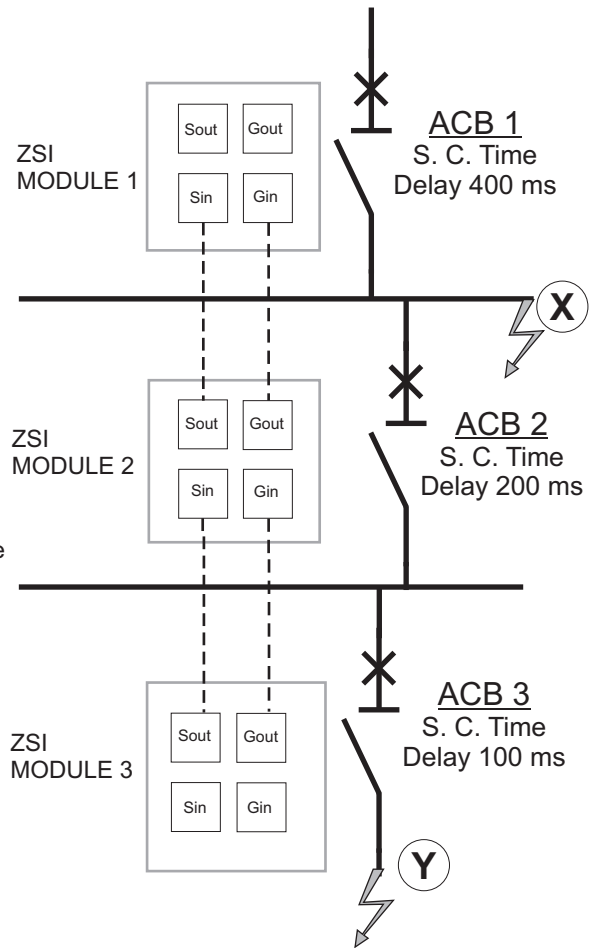
ZSI Connection details

In ZSI module Sout and Gout are the short circuit and Ground fault restraining signal outputs and Gin and Sin are the input signals to the modules. In a multilevel system all Sout signals in the lowest level shall be connected in parallel and fed to the Sin of next higher level module. Similarly the connections to be made for Gout and Gin .

Matrix P&C unit with ZSI module can support maximum 20 down stream and 3 upstream breakers .

Wire specifications:
Description   - PVC sheathed shielded twisted pair wire
Size   - 7/0.2 tinned Copper
Shield   - Braided tinned copper ID: 4.6 max
Impedance   - approx. 76 Ohm/km at 200 MHZ
No. of twists   - Approx. 11 twists / ft.

7.7 TCS (Trip Circuit Supervision)

This module continuously monitors healthiness of Shunt Trip Circuit. User can set it in alarm, trip or both mode for malfunction indication as required. Separate NO relay contact is provided which can be used by user. This module supports entire range of shunt coils from 24V-415V.
Refer pages 8-1, 8-5 & 8-6 for connection details.

Module Settings	12:00
Configurator	
Analog I/O	
ZSI	
TCS	

→

TCS	12:00
Module	Enable
Protection	Enable
Mode	Both

CONNECTION DIAGRAM:

C1	
AUX. CONTACT	TCS
SHUNT RELEASE	
C2	

T1
T2
T3
T4

TCS MODULE
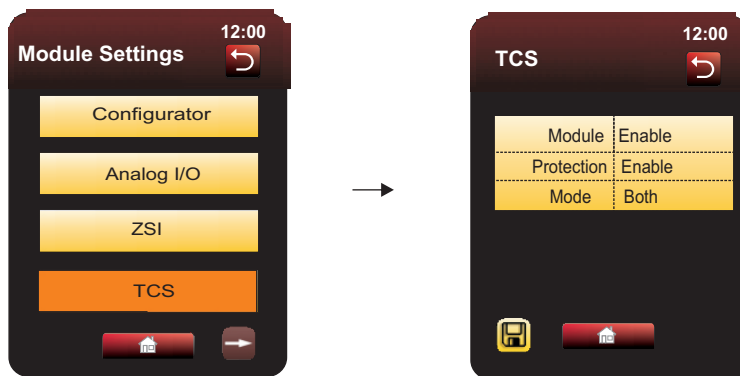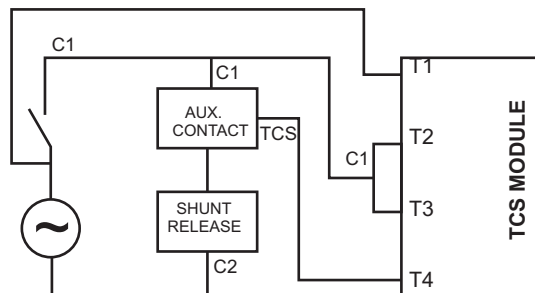
7.8 EL (Earth Leakage) module:

EL (Earth leakage protection module) monitors Earth leakages, through special Current transformers recommended by L&T.

EL communicates with UW-MTX4.5 series on internal CAN BUS protocol. For external indications, it offers NO contact 24Vdc /240Vac, 6A.
This can be used in standalone mode. DIP Switches are provided on the front facia of the module to configure the pick-up & delay settings.Refer Section 7-10 for the settings when used as a stand alone module.

Refer page 8-1 for connection details.

Module Settings	12:00
Earth Leakage	
Profibus	
ZigBee	
Restricted EF	

→

Earth Leakage	12:00
Module	Enable
Protection	Enable
Mode	Both
Pickup	1A
Delay	500 msec
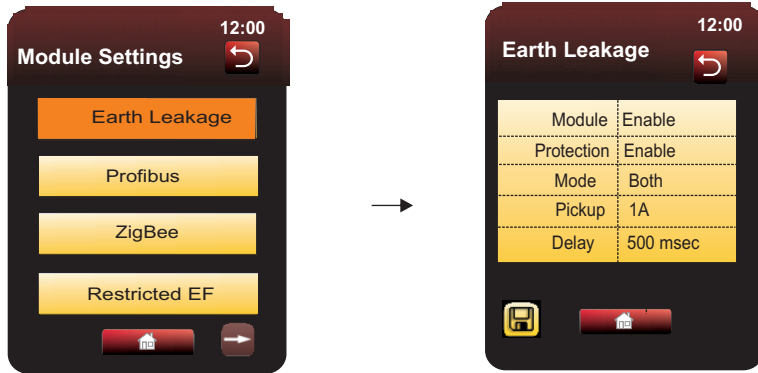
7.9 REF (Restricted earth fault) module:

REF (Restricted earth fault module) is used for Earth faults protection in restricted zone i.e. upstream of the breaker upto the transformer. It monitors the faults through a set of special CTs recommended by L&T.

REF communicates with UW-MTX4.5 series on internal CAN bus protocol. For external indications, it offers a change-over contact OP1-OP2 (24Vdc/240Vac,6A). This module can be used as standalone module. DIP switches are provided on the front facia of module to configure the pick-up & delay settings.

Module Settings	12:00
Earth Leakage	
Profibus	
ZigBee	
Restricted EF	

→

Restricted E.F.	12:00
Module	Enable
Protection	Enable
Mode	Both
Pickup	0.4In
I2T off	400 msec
I2T on	400 msec
REF Char	On
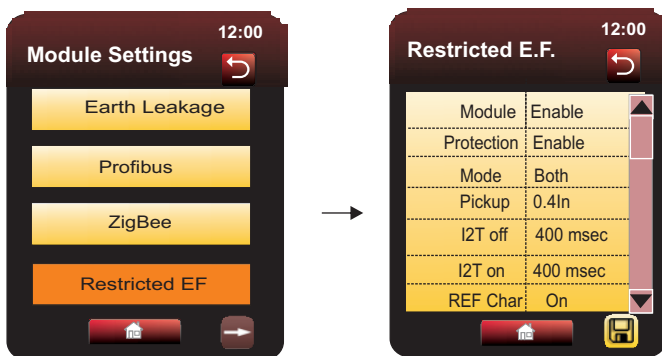
The following are dip switch settings (in the front facia) to be done for using EL,REF module as an add on module of Matrix P&C unit or a stand alone module. Also frequency of operation can be also set through the dip switch selection.

MODE	FREQUENCY	DIP setting
ADD ON	50Hz	00
ADD ON	60Hz	01
STAND ALONE	50Hz	10
STAND ALONE	60Hz	11

While using EL,REF Modules in stand alone mode the following settings to be kept for the required protection.

EL DIP SWITCH SELECTION			
Current selection(mA)	DIP setting	Delay selection(ms)	DIP setting
16.6	0000	100	0000
33.3	0001	200	0001
100	0010	300	0010
166.6	0011	400	0011
233.3	0100	500	0100
300	0101	600	0101
366.6	0110	700	0110
433.3	0111	800	0111
500	1000	900	1000
566.6	1001	1000	1001
633.3	1010	2000	1010
700	1011	2500	1011
766.6	1100	3000	1100
833.3	1101	3500	1101
900	1110	4000	1110
966.6	1111	5000	1111
REF DIP SWITCH SELECTION			
Current selection(mA)	DIP setting	Delay selection(ms)	DIP setting
200	0000	100	0000
300	0001	200	0001
400	0010	300	0010
500	0011	400	0011
600	0100	500	0100
200	0101	600	0101
200	0110	700	0110
200	0111	800	0111
200	1000	900	1000
200	1001	1000	1001
200	1010	500	1010
200	1011	500	1011
200	1100	500	1100
200	1101	500	1101
200	1110	500	1110
200	1111	500	1111

8.Control Connection

Supply

Coil

RELAY O/P

CAN Communication Bus

CT input

RELAY O/P

CT input

RELAY O/P

OP1 OP2 OP3 OP4
4 RELAY O/PS

AO1 AO2 AO3 AO4
4 ANALOG O/PS

OP1 OP2 OP3 OP4
4 DIGITAL O/PS

IP1 IP2 IP3 IP4 COM
4 DIGITAL (24V dc/230V AC) Inputs

T1 T2 T3 T4

T1-T4 connection to breaker terminals

GIN SIN SOUT GOUT

AS+ AS- CAN L CAN H

AS+ AS-

Z-L Z-H

CAN-H CAN-L AS+ AS-

RJ 45 CABLE

CAN COMMUNICATION BUS

SIC INTER CONNECTION

AS+ : AUXILIARY 24VDC
AS-   : GND
SOUT : S/C OUTPUT
SIN   : S/C INPUT
GOUT : E/F OUTPUT
GIN   : E/F INPUT

T1-T4   : THERMISTOR INPUTS
Z-L   : ZSI CAN LOW
Z-H   : ZSI CAN HIGH
CAN- H : CAN HIGH
CAN- L : CAN LOW

Note: One Power Supply module can be connected to maximum 5 modules in addition to MTX module.

8.1 SIC Terminations

For UW-MTX4.5

Terminal labels (left to right along the strip):

RR-, RR+, AS-, AS+, V0, V3, V2, V1, D-, D+, C-G, M-G, AL-, AL+, C-H, C-L, Z-H, Z-L, N2, N1, CAN, DCN, TST, CN, X2, X1, X, 104, 102, 101, TCS, C2, C1, A2, A1, D2, D1, 44, 43, 42, 41, 34, 33, 32, 31, 24, 23, 22, 21, 14, 13, 12, 11, CH2, CH1, EC2, EC1

Component labels and reference numbers:

- Protection & Control Unit — 1
- Electrical Position Indication — 8e
- For URM / SRM only one one can be used X=111/121 X1= 112/122 X2 = 114/124 — 6m
- Common Fault Indication — 1m
- Ready to Close — 1m
- Shunt Rel. # & "NO" — 6
- Closing Release # — 5
- Under Voltage Release # — 4
- Aux. Contact "NO" — 3
- Aux. Contact "NC" — 3
- Aux. Contact "NO" — 3
- Aux. Contact "NC" — 3
- Aux. Contact "NO" — 3
- Aux. Contact "NC" — 3
- Aux. Contact "NO" — 3
- Aux. Contact "NC" — 3
- Charging Indication
- Electrical Charging Device # — 2

Legend

Control circuit equipment — Ref. No.

8.4 Connection Details (UW-MTX 4.5)

Main Circuit	Protection & Control Unit	Electric Charging Device	Spring Charge Indication	Auxiliary Contacts 4NO + 4NC	U/V Release	Closing Release	Shunt Release	Ready to Close	Common Fault Indication	U/V Fault Signal /Shunt Trip Signal (only one can be used)	Electrical Position Indication	Remote Reset	Additional Electrical Position Indication
Ref. No.	1	2		3	4	5	6	7	1m	4m	8e		9
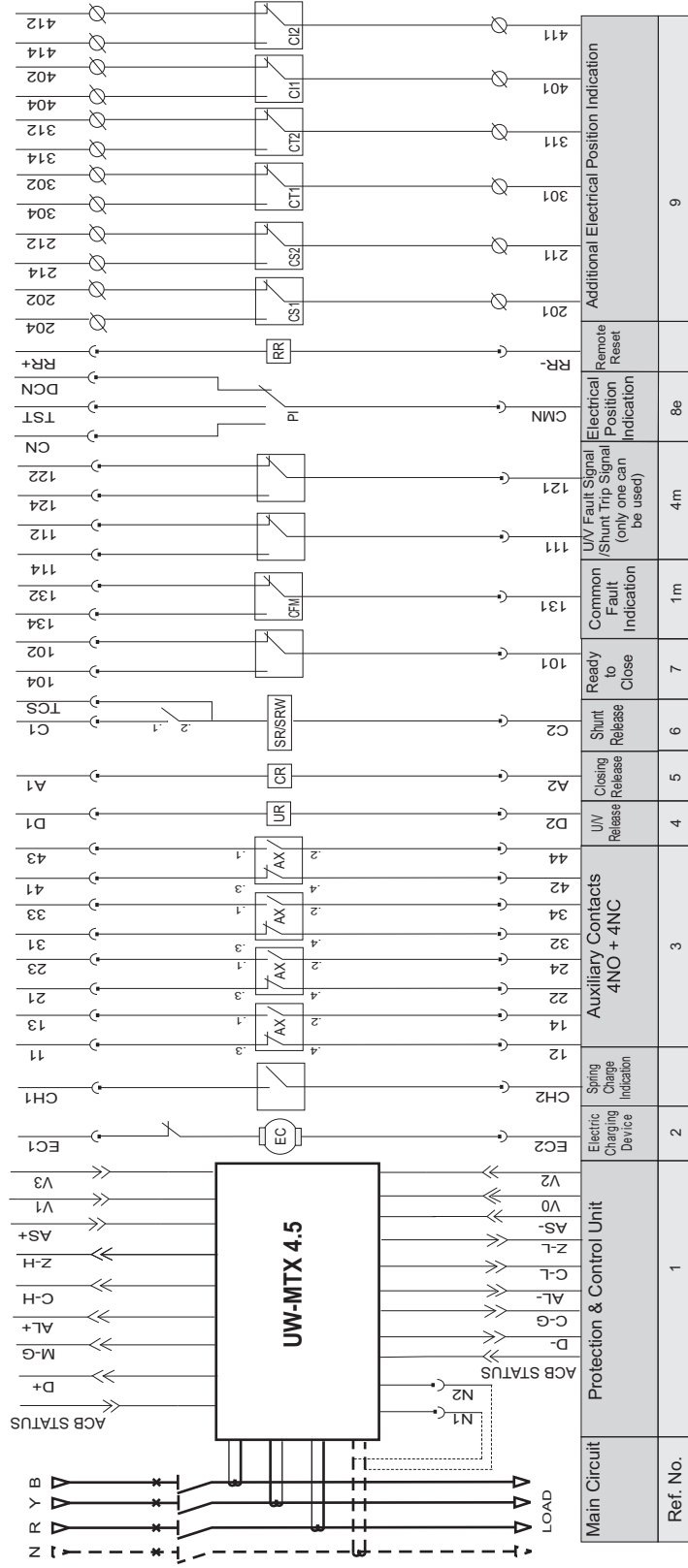
AS+, AS-   : 24V DC Power Supply
AL+   : TRIP ALARM+;TRIP ALARM-
This output can be connected to 5V-30 V dc 150 mA Relay or any other indicating device which can give alarm for Short circuit and Earth Fault trip .

D+   : MOD A
D-   : MOD B
N1   : External Neutral CT
N2   : External Neutral CT
Z-L   : ZSI CAN-Low
Z-H   : ZSI CAN-High

C-L   : CAN-Low
C-H   : CAN-High
M-G   : MOD-GND
C-G   : CAN-GND
V0,V1,V2,V3 :N ,R,Y,B, VOLTAGE I/P.

9. Add-On Modules

9.1 Metering Module
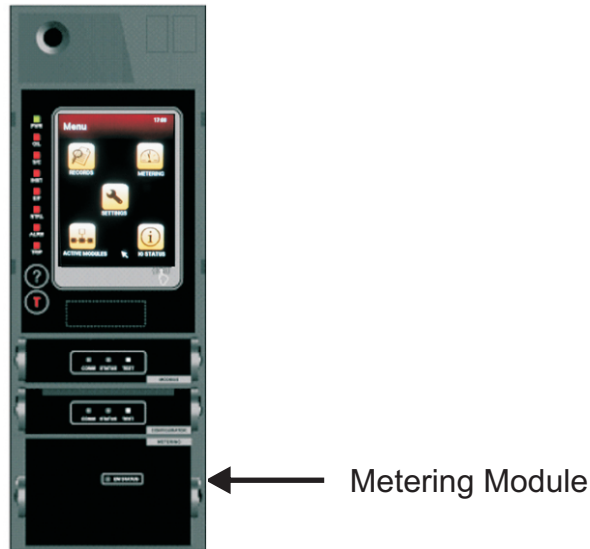
Metering Module

Matrix 4.5 P&C unit has 3 types of add-on modules.
1.Metering Module
2.Communication Module (Modbus/Zig bee/Profi bus)
3.Configurator Module

Metering Module can provide the metering of below listed parameters in an electrical distribution system.
They are Voltage, Frequency, Power, Power Factor, Energy and Maximum Demand.

Also it offers various advanced protection features viz ;

1.Over Voltage   2.Under Voltage   3.Residual Voltage
4.Voltage Unbalance   4.Over Frequency   5. Under frequency
7.Lagging P.F   8.Leading P.F   9. Reverse Power
10.MD Active   11.MD Reactive   12.MD Apparent
13.Directional SC   14.Phase Sequence

Connections: Voltage connections to be made from V1,V2,V3,V0 breaker SIC terminals to the phases (R,Y,B,N).
 If the Metering module is added later on, V1,V2,V3,V0 connections to be done with the breaker SIC and P&C unit .
But if the module is supplied along with breaker these connections will be already made.

Operating range of metering Module:
 Metering Module can be used for system voltage 220-440V (Ph-Ph). Maximum operating Ph-Ph
 voltage of this module is 440V. Minimum Voltage input for Voltage metering is 100 V ph-ph.

.

CAUTION	Before removing Metering module from the P&C unit for maintenance , make sure to remove the Voltage connection from the rear end of the unit.

9.2 Communication Modules

UW-MTX4.5 provides 3 options for communication functionality. These modules are hot - plugable and derive the supply from the release. All these modules have 2 LEDs for power status and communication indication and a self test switch

    1) MODBUS Module   - Works on Modbus RTU protocol
    2) PROFIBUS Module - Works on Profibus DP V0 protocol
    3) ZIGBEE Module   - Works on Wireless Zigbee protocol

9.2.1 MODBUS Module

Modbus Module is used for the Configuration, Monitoring and Control of Matrix P&C unit and its supplementary modules. It offers Client / Server communication in RTU mode.

Configuration function: Unit Settings
    System Settings
    Protection Settings Group 1
    Protection Settings Group 2
    Module Settings

Monitoring function : Metering Data – Voltage, Current, Power, Energy, Power Factor, Online Module Status
    Status Data – Alarm & Trip Status, Digital Input Output Module & Relay Module Status
    Record Data – Trip Records, Event Records, Maintenance Records

Control function : Commands for Set group Change, Restore Factory defaults, Clear Maximum Demand, Maximum Current value, Maximum Voltage value and Energy, Open and Close Circuit Breaker, Maintenance Acknowledgement and Earth Fault (EF) test.

Timings : Read register timings 4 sec max.
    Write register timings 10 sec max.

Settings:
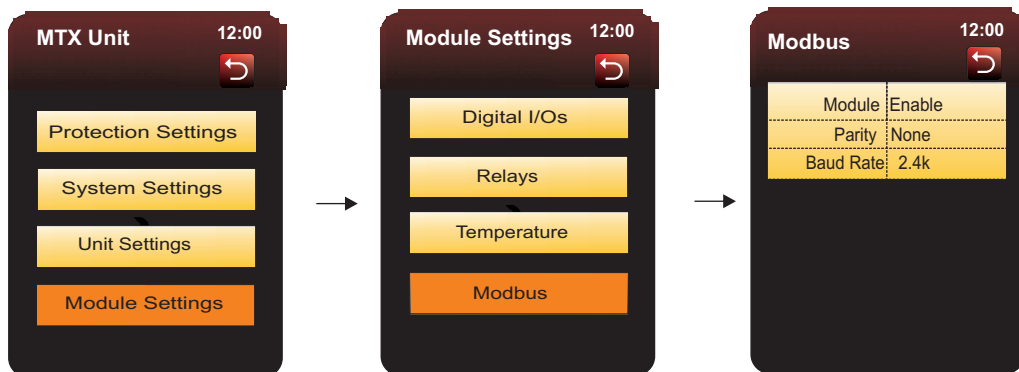
Module : Enable / Disable
Node   : 1 to 126
Parity   : None, Even or Odd

Baud Rate (kbps) : 300bps, 1.2, 2.4, 4.8, 9.6, 19.2,

SETUP:

DATA+
DATA-

RS232 to RS485
CONVERTER

SERIAL CABLE

VS +
GND

PS MODULE

SHIELD

| M-G | C-G | D+ | D- | V1 | V2 | V3 | V0 | AS+ | AS- |

SIC Termination

PC HMI

- - - -   Pre-wired Connections
          inside breaker
- · - ·   Shielded Co-axial
          2 core Cable

COMM   STATUS   TEST

MODBUS

SELF TEST SWITCH
For factory use only

STATUS LED
Blinks AMBER for 5s when Module is connected indicating
self test
Blinks GREEN continuously to indicate healthy POWER ON
GLOWS RED if unhealthy / self test fails. (Please reinsert
the module or contact L&T office if problem persists)

COMMUNICATION LED
Blinks RED during communication data transfer

9.2.2 PROFIBUS Module

Profibus Module supports PROFIBUS DP V0 slave protocol. This module communicates with PROFIBUS Class 1 and/or Class 2 Master.

GSD file should be used / loaded in PROFIBUS master for understanding the device functions. Network termination switch is provided at the rear end of the module. Thus this module can be used as end node in the network.

It communicates on baud-rates 9.6Kbps, 19.2Kbps, 45.45Kbps, 93.75Kbps, 187.5Kbps, 500Kbps, 1.5Mbps, 3Mbps, 6Mbps, 12Mbps. It automatically detects the baud-rate selected by PROFIBUS master for communication.

PROFIBUS module is used to monitor critical status parameters of Matrix P&C unit like Pick-up, Alarm and Trip status.

Settings:

SETUP:

DATA+
DATA-
PROFIBUS CABLE

SHIELD

PS MODULE

M-G C-G D+ D- V1 V2 V3 V0 AS+ AS- SIC Termination

PROFIBUS MASTER OR PLC

- - - - Pre-wired Connections inside breaker
- · - · - Shielded Co-axial 2 core Cable

COMM STATUS TEST

PROFIBUS

SELF TEST SWITCH
For factory use only

STATUS LED
Blinks AMBER for 5s when Module is connected indicating self test
Blinks GREEN continuously to indicate healthy POWER ON
GLOWS RED if unhealthy / self test fails. (Please reinsert the module or contact L&T office if problem persists)

COMMUNICATION LED
Blinks RED during communication data transfer

9.2.3 ZIGBEE Module

UW-MTX4.5 series provides Wireless Communication using ZigBee protocol formulated under IEEE 802.15.4 standard for Wireless Personal Area Network (WPANs). Zigbee operates in ISM radio bands of 2.4GHz

The Communication range is 200m Line of sight (LOS) with over the air data rates upto 250 Kbps

Zigbee module is used for Monitoring parameters of Matrix P&C unit and its supplementary modules.

Monitoring function:　　Metering Data – Voltage, Current, Power, Energy, Power Factor, Online Module Status
Status Data – Alarm & Trip Status, Digital Input Output Module & Relay Module Status
Record Data – Trip Records, Event Records, Maintenance Records

Settings:

SETUP:

ZIGBEE
CORDINATOR

POWER
LED

USB CABLE (OPTIONAL)

NETWORK
LED

PS MODULE

| M-G | C-G | D+ | D- | V1 | V2 | V3 | V0 | AS+ | AS- | SIC Termination |

PC HMI

COMM   STATUS   TEST

ZIGBEE

SELF TEST SWITCH
For factory use only

STATUS LED
Blinks AMBER for 5s when Module is connected indicating self test
Blinks GREEN continuously to indicate healthy POWER ON
GLOWS RED if unhealthy / self test fails. (Please reinsert the module or contact L&T office if problem persists)

COMMUNICATION LED
GLOW RED when not in network
Blinks RED during communication data transfer

Note:

1) It is necessary to first switch on the Coordinator module and form a network. Coordinator Module can be directly plugged in the PC USB port or USB cable can be used

2) Power LED on Coordinator Module will glow GREEN when connected to the port.
   Network LED on Coordinator module will glow GREEN when it forms a network

3) Zigbee Module should be now inserted in the Matrix P&C unit.

9.3. SMART CONFIGURATOR

UW-MTX4.5 has an optional Smart Configurator Module which is used for easy Parameterisation of the P&C unit. Smart Configurator works on the principle of RF interface at 106kbps between the module and the Smart Card.

The following operations can be performed on the Smart Card
1) Write File - Copy files from the P&C unit to the card
2) Read File - Copy files from the card to the P&C unit
3) Delete File - Delete selected file from the card
4) Format Card - Delete all the files from the card and format it

At a time maximum 2 files can be stored on the Smart Card. The files that can be written on the card are as follows

1) REQ.CFG	- Relay Equations	13) RL3.CFG	- Relay Module 3
2) DEQ.CFG	- DIO Equations	14) RL4.CFG	- Relay Module 4
3) SG1.CFG	- Set Group 1	15) AOP.CFG	- Analog Output
4) SG2.CFG	- Set Group 2	16) TM1.CFG	- Temperature Module
5) SST.CFG	- System Settings	17) ZSI.CFG	- Zone Selective Interlocking
6) UST.CFG	- Unit Settings	18) MOD.CFG	- Modbus Module
7) IO1.CFG	- IO Module 1	19) PBM.CFG	- Profibus Module
8) IO2.CFG	- IO Module 2	20) ZIG.CFG	- Zigbee Module
9) IO3.CFG	- IO Module 3	21) EL.CFG	- Earth Leakage Module
10) IO4.CFG	- IO Module 4	22) REF.CFG	- Restricted Earth Fault Module
11) RL1.CFG	- Relay Module 1	23) TCS.CFG	-Trip Circuit Supervision Module
12) RL2.CFG	- Relay Module 2	24) SMC.CFG	-Smart card configuration.

Settings:

SETUP

PS MODULE

| M-G | C-G | D+ | D- | V1 | V2 | V3 | V0 | AS+ | AS- | SIC Termination |

INSERT CARD HERE
(Card goes inside the module partially. Check the Comm LED to see whether the card is detected.)

COMM   STATUS   TEST

CONFIGURATOR

SELF TEST SWITCH
For factory use only

STATUS LED
Blinks AMBER for 5s when Module is connected indicating self test
Blinks GREEN continuously to indicate healthy POWER ON
GLOWS RED if unhealthy / self test fails. (Please reinsert the module or contact L&T office if problem persists)

COMMUNICATION LED
GLOWS RED when card is detected.
Blinks RED during communication data transfer

OPERATION

"Command Success"or "Command Fail" message is displayed on Matrix P&C unit after completion of operation.

10. SIMULATION KIT

Matrix Simulation kit is a battery operated Hand Held device used to simulate various test conditions for verifying different protections.

Key Features:

1) Simulation of 3 phase current and voltage test signals with adjustable phase angles (0 degree to 359 degree)

2) Provides sensor / CT continuity check

3) Manual and Automated test modes with test scripts generation

4) Stores test records on SD card with trip time stampings

5) Provides PC interface with USB and MODBUS

IDENTIFICATION:

OPERATION:

Insert Connector here

TEST CABLE

Insert Connector here
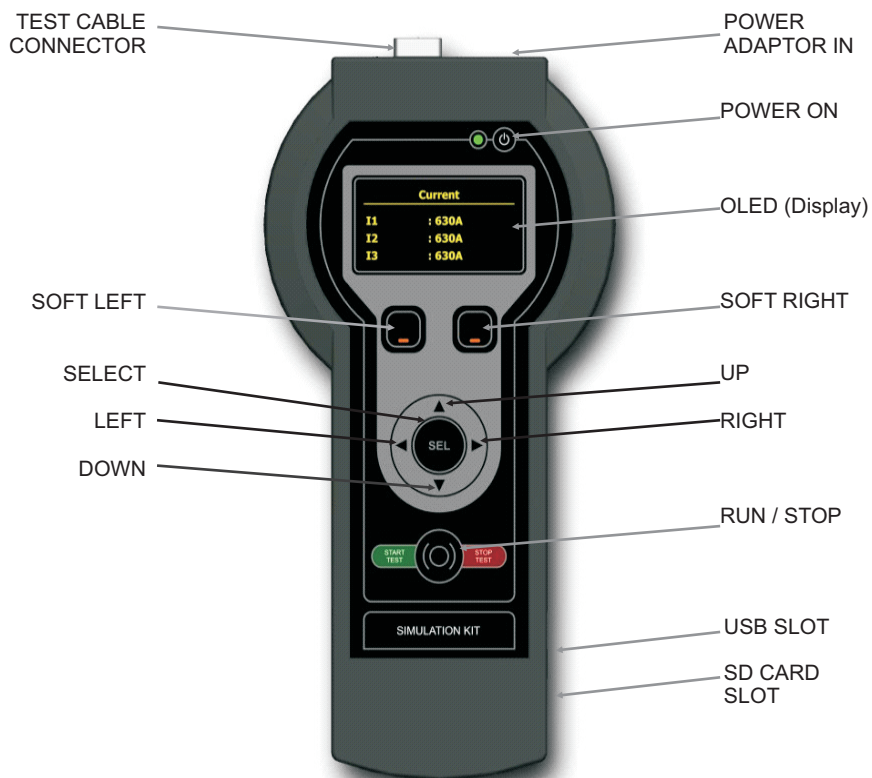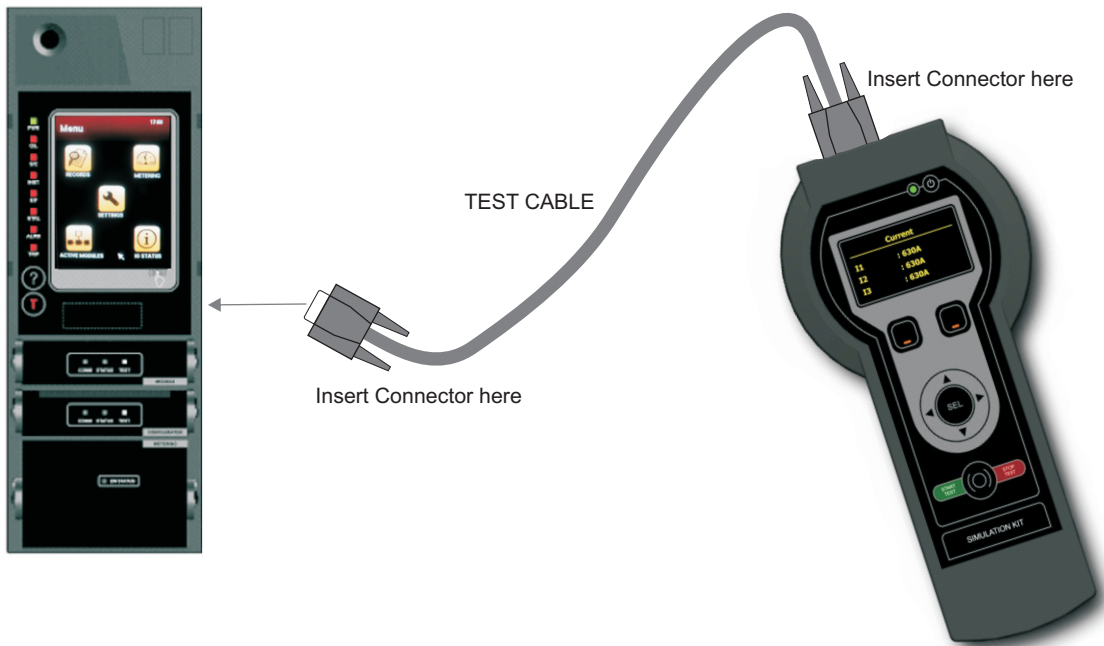
Power On the Simulation Kit and press "SEL" key / SOFT Right key to go to MENU

MENU	🔲
TEST OPTIONS	
SYSTEM SETTINGS	
DEVICE CONFIG	
DEVICE STATUS	
BACK	SELECT

→

SYSTEM SETTINGS	🔲
FRAME	16 00 A
RATED	10 00 A
NOMINAL	4 15 V
VOLT MOD	Absent
BACK	SELECT

→ Set as per Matrix release

MENU	🔲
TEST OPTIONS	
SYSTEM SETTINGS	
DEVICE CONFIG	
DEVICE STATUS	
BACK	SELECT

→

TEST OPTIONS	🔲
RELEASE TEST	
CT CNTY TEST	
BACK	SELECT

→

RELEASE TEST	🔲
NEW SCRIPT	
OPEN SCRIPT	
REL/BRK ID	
OPERATOR NAME	
BACK	SELECT

→

NEW SCRIPT	🔲
I1	00.10 In ✓
I2	00.10 In ✓
I3	00.10 In ✓
V1	00.10 Vn ✓
BACK	RUN

→

NEW SCRIPT	🔲
V2	00.10 Vn ✓
V3	00.10 Vn ✓
I1Ø	00 00 °
I2Ø	00 00 °
BACK	RUN

→

NEW SCRIPT	🔲
I3Ø	00 00 °
V1Ø	00 00 °
V2Ø	00 00 °
V3Ø	00 00 °
BACK	RUN

→

NEW SCRIPT	🔲
V1Ø	00 00 °
V2Ø	00 00 °
V3Ø	00 00 °
FREQ	50.00 Hz
BACK	RUN

→ Press RUN after setting the Test Values

* While testing with Simulation Kit, switch off the power supply module.

11. Fault Diagnosis

Fault identification:
  When P&C unit trips the breaker, a mechanical indication is provided through popping-out of the red pointer at the upper end of the unit.

  With Auto reset feature, the pointer will reset automatically.

 To identify the type of fault, open the P&C unit cover and press "?" (Query) button continuously to read the latest "Trip Info"which will be indicated by the LED indication. This local fault indication is independent of auxiliary supply or batteries and is available for repeat usage* after the fault.

 If AUX supply is present the P&C unit will indicate the fault through the fault indicating LED. For example in case of Overload trip both Overload and trip LED will glow as the fault indication.

Trip and events Records:

 Trip data can be obtained by accessing "Trip Records".It stores last 5 "Trip Records" which records the trip cause, date and time of the trip. Trip records also contains current, frequency, Voltage and System power factor values of the system while the trip has occurred.

 Events records captures the events like alarm, pick up and trip. Matrix P&C unit can store last 10 events in the event record.

12. Self Diagnostic Test

 Earth fault test can be done by pressing the "T" button. For this unit needs to be powered up in AUX mode. Enter the current command password (Default Password "0000") after pressing the "T" button in the unit .

 Once the password is entered, press Yes. The unit will issue E/F trip. E/F and Trip LED glows. To reset the LEDs ,press "T" again, enter the same password and reset the ACB status (Open to Close)

CAUTION	Do not conduct the self diagnostic test while breaker in service position or while carrying current. .

* For a definite time period only and depends on the usage

13.Memory Map

Address	Parameter	Size(in words)	UNITS	Divisor/ Multiplier	Interpretation
	Metering Parameters				
	Current				
30001	R Phase Current	2	A	1	
30003	Y Phase Current	2	A	1	
30005	B Phase Current	2	A	1	
30007	N Phase Current	2	A	1	
30009	G Phase Current	2	A	1	
30011	Earth Leakage Current	2	A	1	
30013	Restricted Earth Fault Current	2	A	1	
30015	R Phase Maximum Current	2	A	1	
30017	Y Phase Maximum Current	2	A	1	
30019	B Phase Maximum Current	2	A	1	
30021	N Phase Maximum Current	2	A	1	
30023	G Phase Maximum Current	2	A	1	
30025	Earth Leakage MaximumCurrent	2	A	1	
30027	Restricted Earth Fault Maximum Current	2	A	1	
30029	Average Current	2	A	1	
30031	R Phase % Load Current	2	%	1/10	
30033	Y Phase % Load Current	2	%	1/10	
30035	B Phase % Load Current	2	%	1/10	
	Voltage				
30037	R Phase Voltage	2	V	1	
30039	Y Phase Voltage	2	V	1	
30041	B Phase Voltage	2	V	1	
30043	R - N Phase Maximum Voltage	2	V	1	
30045	Y - N Phase Maximum Voltage	2	V	1	
30047	B - N Phase Maximum Voltage	2	V	1	
30049	P - N Average Voltage	2	V	1	
30051	R - Y Phase - Phase Voltage	2	V	1	
30053	Y - B Phase - Phase Voltage	2	V	1	
30055	B - R Phase - Phase Voltage	2	V	1	
30057	R - Y Phase - Phase Maximum Voltage	2	V	1	
30059	Y - B Phase - Phase Maximum Voltage	2	V	1	
30061	B - R Phase - Phase Maximum Voltage	2	V	1	
30063	Phase - Phase Average Voltage	2	V	1	
30065	System Frequency	2	Hz	1/100	
	Power Factor				
30067	R Phase Power Factor	2		1/100	
30069	Y Phase Power Factor	2		1/100	
30071	B Phase Power Factor	2		1/100	
30073	System Power Factor	2		1/100	
	Power				
30075	R Phase Active Power	2	KW	1	
30077	Y Phase Active Power	2	KW	1	
30079	B Phase Active Power	2	KW	1	
30081	Total Active Power	2	KW	1	
30083	R Phase Reactive Power	2	KW	1	
30085	Y Phase Reactive Power	2	KW	1	
30087	B Phase Reactive Power	2	KW	1	
30089	Total Reactive Power	2	KW	1	
30091	R Phase Apparent Power	2	KW	1	
30093	Y Phase Apparent Power	2	KW	1	
30095	B Phase Apparent Power	2	KW	1	
30097	Total Apparent Power	2	KW	1	

Address	Parameter	Size(in words)	UNITS	Divisor/ Multiplier	Interpretation
	Energy				
30099	Active Energy	2	Wh	1	
30101	Reactive Energy	2	VArh	1	
30103	Apparent Energy	2	VAh	1	
	Maximum Demand				
30105	Active Maximum Demand	2	Wh		
30107	Reactive Maximum Demand	2	VArh		
30109	Apparent Maximum Demand	2	VAh		
	Sequence Components				
30111	Positive Sequence Component 1	2		1	
30113	Positive Sequence Component 2	2		(-1)	
30115	Negative Sequence Component 1	2		1	
30117	Negative Sequence Component 2	2		(-1)	
30119	Zero Sequence Component 1	2		1	
30121	Zero Sequence Component 2	2		(-1)	
	Form Factor				
30123	R-Phase Form Factor	2		1/100	
30125	Y-Phase Form Factor	2		1/100	
30127	B-Phase Form Factor	2		1/100	
	PeakFactor				
30129	R-Phase Peak Factor	2		1/100	
30131	Y-Phase Peak Factor	2		1/100	
30133	B-Phase Peak Factor	2		1/100	
30135	Reserved	2			
30137	Reserved	2			
30139	Reserved	2			
30141	Reserved	2			
30143	Reserved	2			
30145	Reserved	2			
	Temperature				
30147	R - Phase Terminal Temperature	2	°C	1/10	
30149	Y - Phase Terminal Temperature	2	°C	1/10	
30151	B - Phase Terminal Temperature	2	°C	1/10	
30153	N - Phase Terminal Temperature	2	°C	1/10	
30155	Phase sequence	2	–		
	Total Harmonics Distortion				
30157	THD R-Phase Current	2	%	1	
30159	THD Y-Phase Current	2	%	1	
30161	THD B-Phase Current	2	%	1	
	Alarm Status				
30167	**Alarm Status0**	1			
	Instantaneous Alarm Status	:1			
	Earth Fault Alarm Status	:1			
	ShortCircuit Alarm Status	:1			
	Directional ShortCircuit Alarm Status	:1			
	OverLoad Alarm Status	:1			
	OverLoad Neutral Alarm Status	:1			
	ZSI EF Alarm Status	:1			
	ZSI SC Alarm Status	:1			0 -Alarm Off
	Phase Sequence Alarm Status	:1			1 - Alarm On
	REF Alarm Status	:1			
	Earth Leakage Alarm Status	:1			
	Current Unbalance Alarm Status	:1			
	Under Current Alarm Status	:1			
	Under Voltage Alarm Status	:1			
	Over Voltage Alarm Status	:1			
	Voltage Unbalance Alarm Status	:1			

Address	Parameter	Size(in words)	UNITS	Divisor/ Multiplier	Interpretation
30168	**Alarm Status1**	1			
	Residual Voltage Alarm Status	:1			
	Under Frequency Alarm Status	:1			
	Over Frequency Alarm Status	:1			
	Reverse Power Alarm Status	:1			
	TCS Alarm Status	:1			
	Leading PF Alarm Status	:1			
	Lagging PF Alarm Status	:1			0 -Alarm Off
	Peak Factor Alarm Status	:1			1 - Alarm On
	Form Factor Alarm Status	:1			
	MD Active Alarm Status	:1			
	MD Reactive Alarm Status	:1			
	MD Apparent Alarm Status	:1			
	THD Alarm Status	:1			
	Terminal Temperature Alarm Status	:1			
	Reserved	:1			
	Bkr Failure Alarm Status	:1			
	Pickup Status				
30169	**PickupStatus0**	1			
	Instantaneous Pickup Status	:1			
	Earth Fault Pickup Status	:1			
	ShortCircuit Pickup Status	:1			
	Directional ShortCircuit Pickup Status	:1			
	OverLoad Pickup Status	:1			
	OverLoad Neutral Pickup Status	:1			
	ZSI EF Pickup Status	:1			0 - Pickup Off
	ZSI SC Pickup Status	:1			1 -Pickup On
	Phase Sequence Pickup Status	:1			
	REF Pickup Status	:1			
	Earth Leakage Pickup Status	:1			
	Current Unbalance Pickup Status	:1			
	Under Current Pickup Status	:1			
	Under Voltage Pickup Status	:1			
	Over Voltage Pickup Status	:1			
	Voltage Unbalance Pickup Status	:1			
30170	**PickupStatus1**	1			
	Residual Voltage Pickup Status	:1			
	Under Frequency Pickup Status	:1			
	Over Frequency Pickup Status	:1			
	Reverse Power Pickup Status	:1			
	TCS Pickup Status	:1			
	Leading PF Pickup Status	:1			
	Lagging PF Pickup Status	:1			
	Peak Factor Pickup Status	:1			0 - Pickup Off
	Form Factor Pickup Status	:1			1 -Pickup On
	MD Active Pickup Status	:1			
	MD Reactive Pickup Status	:1			
	MD Apparent Pickup Status	:1			
	THD Pickup Status	:1			
	Terminal Temperature Pickup Status	:1			
	Reserved	:1			
	Reserved1	:1			
	Trip Status				
30171	**TripStatus0**	1			
	Instantaneous Trip Status	:1			
	Earth Fault Trip Status	:1			0 - Release Not Tripped
	ShortCircuit Trip Status	:1			1 - Release Tripped
	Directional ShortCircuit Trip Status	:1			
	OverLoad Trip Status	:1			

Address	Parameter	Size(in words)	UNITS	Divisor/ Multiplier	Interpretation
	OverLoad Neutral Trip Status	:1			
	ZSI EF Trip Status	:1			
	ZSI SC Trip Status	:1			
	Phase Sequence Trip Status	:1			
	REF Trip Status	:1			0 - Release Not Tripped
	Earth Leakage Trip Status	:1			1 - Release Tripped
	Current Unbalance Trip Status	:1			
	Under Current Trip Status	:1			
	Under Voltage Trip Status	:1			
	Over Voltage Trip Status	:1			
	Voltage Unbalance Trip Status	:1			
30172	**TripStatus1**	1			
	Residual Voltage Trip Status	:1			
	Under Frequency Trip Status	:1			
	Over Frequency Trip Status	:1			
	Reverse Power Trip Status	:1			
	TCS Trip Status	:1			
	Leading PF Trip Status	:1			
	Lagging PF Trip Status	:1			0 - Release Not Tripped
	Peak Factor Trip Status	:1			1 - Release Tripped
	Form Factor Trip Status	:1			
	MD Active Trip Status	:1			
	MD Reactive Trip Status	:1			
	MD Apparent Trip Status	:1			
	THD Trip Status	:1			
	Terminal Temperature Trip Status	:1			
	EF Test Button Trip Status	:1			
	Reserved	:1			
	Status Data				
30173	**Misc Status (monitor the bit status frequently)**	1			
	Maintenance Require status(Display a pop up if bit is Set)	:1			0 - Maintenance Not Required
	Online file edited in RAM	:1			0 - File not edited in RAM
	ACB Status(Display status continuously)	:1			0 - Breaker Close,1 - Breaker Open
	FSD Status (Display status continuously)	:1			0 - FSD Open,1 - FSD Close
	Flag for default setting applied(Display a pop up if bit is Set)	:1			0 - Default settings not applied
	Reserved	:1			0
	Reserved	:1			0
	Reserved	:1			0
	Reserved	:1			0
	Reserved	:1			0
	Reserved	:1			0
	Reserved	:1			0
	Reserved	:1			0
	Reserved	:1			0
	Reserved	:1			0
	Reserved	:1			0
	DIO Module Status		Each module to be accessed separably		
	DIO Module 1		All the registers within this module has to be accessed together		
30250	DIO Module 1 - Input 1 Status	1			
30251	DIO Module 1 - Input 2 Status	1			
30252	DIO Module 1 - Input 3 Status	1			Disabled - 0
30253	DIO Module 1 - Input 4 Status	1			Inactive - 1
30254	DIO Module 1 - Output 1 Status	1			Active - 3
30255	DIO Module 1 - Output 2 Status	1			Invalid Value - 2
30256	DIO Module 1 - Output 3 Status	1			
30257	DIO Module 1 - Output 4 Status	1			

Address	Parameter	Size(in words)	UNITS	Divisor/ Multiplier	Interpretation
	DIO Module 2		All the registers within this module has to be accessed together		
30258	DIO Module 2 - Input 1 Status	1			
30259	DIO Module 2 - Input 2 Status	1			Disabled - 0
30260	DIO Module 2 - Input 3 Status	1			Inactive - 1
30261	DIO Module 2 - Input 4 Status	1			Active - 3
30262	DIO Module 2 - Output 1 Status	1			Invalid Value - 2
30263	DIO Module 2 - Output 2 Status	1			
30264	DIO Module 2 - Output 3 Status	1			
30265	DIO Module 2 - Output 4 Status	1			
	DIO Module 3		All the registers within this module has to be accessed together		
30266	DIO Module 3 - Input 1 Status	1			
30267	DIO Module 3 - Input 2 Status	1			
30268	DIO Module 3 - Input 3 Status	1			Disabled - 0
30269	DIO Module 3 - Input 4 Status	1			Inactive - 1
30270	DIO Module 3 - Output 1 Status	1			Active - 3
30271	DIO Module 3 - Output 2 Status	1			Invalid Value - 2
30272	DIO Module 3 - Output 3 Status	1			
30273	DIO Module 3 - Output 4 Status	1			
	DIO Module 4		All the registers within this module has to be accessed together		
30274	DIO Module 4 - Input 1 Status	1			
30275	DIO Module 4 - Input 2 Status	1			
30276	DIO Module 4 - Input 3 Status	1			Disabled - 0
30277	DIO Module 4 - Input 4 Status	1			Inactive - 1
30278	DIO Module 4 - Output 1 Status	1			Active - 3
30279	DIO Module 4 - Output 2 Status	1			Invalid Value - 2
30280	DIO Module 4 - Output 3 Status	1			
30281	DIO Module 4 - Output 4 Status	1			
	Relay Module Status	Each module to be accessed separably			
	Relay Module 1		All the registers within this module has to be accessed together		
30282	Relay Module 1 - Output 1 Status	1			Disabled - 0
30283	Relay Module 1 - Output 2 Status	1			Inactive - 1
30284	Relay Module 1 - Output 3 Status	1			Active - 3
30285	Relay Module 1 - Output 4 Status	1			Invalid Value - 2
	Relay Module 2		All the registers within this module has to be accessed together		
30286	Relay Module 2 - Output 1 Status	1			Disabled - 0
30287	Relay Module 2 - Output 2 Status	1			Inactive - 1
30288	Relay Module 2 - Output 3 Status	1			Active - 3
30289	Relay Module 2 - Output 4 Status	1			Invalid Value - 2
	Relay Module 3		All the registers within this module has to be accessed together		
30297	Relay Module 3 - Output 1 Status	1			Disabled - 0
30291	Relay Module 3 - Output 2 Status	1			Inactive - 1
30292	Relay Module 3 - Output 3 Status	1			Active - 3
30293	Relay Module 3 - Output 4 Status	1			Invalid Value - 2
	Relay Module 4		All the registers within this module has to be accessed together		
30294	Relay Module 4 - Output 1 Status	1			Disabled - 0
30295	Relay Module 4 - Output 2 Status	1			Inactive - 1
30296	Relay Module 4 - Output 3 Status	1			Active - 3
30297	Relay Module 4 - Output 4 Status	1			Invalid Value - 2

Address	Parameter	Size(in words)	UNITS	Divisor/ Multiplier	Interpretation
	Misc. Data	Active Set Group and Total Trip both has to be accessed together.			
30298	Active Set Group	1		1	1 - Active Set Group 2
30299	Total Trip	1		1	
	Module Online Status				
30300	Module 1	1			EL Module: 0x10
30301	Module 2	1			REF Module: 0x11
30302	Module 3	1			TCS Module: 0x12
30303	Module 4	1			DISPLAY_MODULEID : 0X1A
30304	Module 5	1			ANALOG_O_MODULEID: 0x20
30305	Module 6	1			THERMISTER1_MODULEID: 0x2A
30306	Module 7	1			THERMISTER2_MODULEID: 0x2B
30307	Module 8	1			DIO1_MODULEID: 0x30
30308	Module 9	1			DIO2_MODULEID: 0x40
30309	Module 10	1			DIO3_MODULEID: 0x50
30310	Module 11	1			DIO4_MODULEID: 0x60
30311	Module 12	1			RELAY1_MODULEID: 0x70
30312	Module 13	1			RELAY2_MODULEID: 0x80
30313	Module 14	1			RELAY3_MODULEID: 0x97
30314	Module 15	1	This location indicates Status of ZSI module.ZSI Module ID = 1C		RELAY4_MODULEID: 0xA0
	MSB :NA				MODBUS_MODULEID: 0xB0
	LSB :Module ID				CONFIGURATOR_MODULEID: 0xB1
					ETHERNET/TCP IP: 0xB2
					ZIGBEE: 0xB4
					DEVICE NET: 0xB5
					GSM: 0xB6
					PROFIBUS: 0xB7
					DATA LOGGER: 0xC0

	Records	Only one record can be accessed at a time.			
	Trip Record (44Words)	Each Record should be accessed separately(one at a time).			
	Trip Cause (refer note 1on 13-24)	1			
	Trip Time - Year	1			
	Trip Time - Month	1			
	Trip Time - Date	1			
	Trip Time - Hour	1			
	Trip Time - Min	1			
	Trip Time - Sec	1			
	Trip Time - mSec	1			
	Pickup Setting String (refer note 2 on 13-25)	1			
	Pickup Setting Multiplication Factor	1			
	Pickup Setting	2			
	Delay Setting	2	mSec	1.25	
	R Phase Mean Current	2	A	1	
	Y Phase Mean Current	2	A	1	
	B Phase Mean Current	2	A	1	
	Neutral Mean Current	2	A	1	
	Earth Fault Mean Current	2	A	1	
	Restricted Earth Fault Mean Current	2	A	1	
	Earth Leakage Mean Current	2	A	1	
	R Phase Mean Voltage	2	V	1	
	YPhase Mean Voltage	2	V	1	
	B Phase Mean Voltage	2	V	1	
	Frequency	1		1/100	
	System Power Factor	1		1/100	

Address	Parameter	Size(in words)	UNITS	Divisor/ Multiplier	Interpretation
	System Frequency (0 - 50 Hz, 1- 60 Hz, 2 - 400 Hz)	1			
	I_Frame(0 - 800A, 1 -1600A, 2 -3200A, 3 -4000A, 4 -6300 A)	1			
	Rated Current (In)-(refer note 3 on 13-25)	1			
	Nominal Voltage(0-220V,1-240V, 2-400V,3-415V,4-440V)	1			
	Mainrenance Period (refer note 4 on 13-25)	1			
	Incoming(0 -Top,1 - Bottom)	1			
	Poles(0 - 3 Poles,1 - 4 Poles)	1			
	Phase Sequence(0 - RYB,1 - RBY)	1			
30324	Trip Record 1	44			
30368	Trip Record 2	44			
30412	Trip Record 3	44			
30456	Trip Record 4	44			
30500	Trip Record 5	44			
30544	Trip Record 6	44			
30588	Trip Record 7	44			
30632	Trip Record 8	44			
30676	Trip Record 9	44			
30720	Trip Record 10	44			
	Event Record (9Words)	Each Record should be accessed separately(one at a time).			
	Source (refer Note 5 on 13-25)	1			
	Event Type(String Value ALARM -1,TRIP -2,PICKUP- 3)	1			
	Event Time - Year	1			
	Event Time - Month	1			
	Event Time - Date	1			
	Event Time - Hour	1			
	Event Time - Min	1			
	Event Time - Sec	1			
	Event Time - mSec	1			
30764	Event Record 1	9			
30773	Event Record 2	9			
30782	Event Record 3	9			
30791	Event Record 4	9			
30800	Event Record 5	9			
30809	Event Record 6	9			
30818	Event Record 7	9			
30827	Event Record 8	9			
30836	Event Record 9	9			
30845	Event Record 10	9			
30854	Event Record 11	9			
30863	Event Record 12	9			
30872	Event Record 13	9			
30881	Event Record 14	9			
30897	Event Record 15	9			
30899	Event Record 16	9			
30978	Event Record 17	9			
30917	Event Record 18	9			
30926	Event Record 19	9			
30935	Event Record 20	9			
30944	Event Record 21	9			
30953	Event Record 22	9			
30962	Event Record 23	9			
30971	Event Record 24	9			
30980	Event Record 25	9			
30989	Event Record 26	9			
30998	Event Record 27	9			
31007	Event Record 28	9			
31016	Event Record 29	9			
31025	Event Record 30	9			
31034	Event Record 31	9			
31043	Event Record 32	9			
31052	Event Record 33	9			

Address	Parameter	Size(in words)	UNITS	Divisor/ Multiplier	Interpretation
31061	Event Record 34	9			
31070	Event Record 35	9			
31079	Event Record 36	9			
31088	Event Record 37	9			
31097	Event Record 38	9			
31106	Event Record 39	9			
31115	Event Record 40	9			
31124	Event Record 41	9			
31133	Event Record 42	9			
31142	Event Record 43	9			
31151	Event Record 44	9			
31160	Event Record 45	9			
31169	Event Record 46	9			
31178	Event Record 47	9			
31187	Event Record 48	9			
31196	Event Record 49	9			
31205	Event Record 50	9			
31214	Event Record 51	9			
31223	Event Record 52	9			
31232	Event Record 53	9			
31241	Event Record 54	9			
31250	Event Record 55	9			
31259	Event Record 56	9			
31268	Event Record 57	9			
31277	Event Record 58	9			
31286	Event Record 59	9			
31295	Event Record 60	9			
31304	Event Record 61	9			
31313	Event Record 62	9			
31322	Event Record 63	9			
31331	Event Record 64	9			
31340	Event Record 65	9			
31349	Event Record 66	9			
31358	Event Record 67	9			
31367	Event Record 68	9			
31376	Event Record 69	9			
31385	Event Record 70	9			
31394	Event Record 71	9			
31403	Event Record 72	9			
31412	Event Record 73	9			
31421	Event Record 74	9			
31430	Event Record 75	9			
31439	Event Record 76	9			
31448	Event Record 77	9			
31457	Event Record 78	9			
31466	Event Record 79	9			
31475	Event Record 80	9			
31484	Event Record 81	9			
31493	Event Record 82	9			
31502	Event Record 83	9			
31511	Event Record 84	9			
31520	Event Record 85	9			
31529	Event Record 86	9			
31538	Event Record 87	9			
31547	Event Record 88	9			
31556	Event Record 89	9			
31565	Event Record 97	9			
31574	Event Record 91	9			
31583	Event Record 92	9			
31592	Event Record 93	9			
31601	Event Record 94	9			
31610	Event Record 95	9			
31619	Event Record 96	9			

Address	Parameter	Size(in words)	UNITS	Divisor/ Multiplier	Interpretation
31628	Event Record 97	9			
31637	Event Record 98	9			
31646	Event Record 99	9			
31655	Event Record 100	9			
31664	Event Record 101	9			
31673	Event Record 102	9			
31682	Event Record 103	9			
31691	Event Record 104	9			
31700	Event Record 105	9			
31709	Event Record 106	9			
31718	Event Record 107	9			
31727	Event Record 108	9			
31736	Event Record 109	9			
31745	Event Record 110	9			
31754	Event Record 111	9			
31763	Event Record 112	9			
31772	Event Record 113	9			
31781	Event Record 114	9			
31797	Event Record 115	9			
31799	Event Record 116	9			
31808	Event Record 117	9			
31817	Event Record 118	9			
31826	Event Record 119	9			
31835	Event Record 120	9			
31844	Event Record 121	9			
31853	Event Record 122	9			
31862	Event Record 123	9			
31871	Event Record 124	9			
31880	Event Record 125	9			
31889	Event Record 126	9			
31898	Event Record 127	9			
31977	Event Record 128	9			
	Maintenance Record (20Words)		Each Record should be accessed separately(one at a time).		
	Year	1			
	Month	1			
	Date	1			
	Hour	1			
	Minute	1			
	Second	1			
	Millisecond	1			
	Maximum I2T Value	2			
	Phase	1			
	Period	1			
	Reserved Data	9			
31916	Maintenance Record 1	20			
31936	Maintenance Record 2	20			
31956	Maintenance Record 3	20			
31976	Maintenance Record 4	20			
31996	Maintenance Record 5	20			
32016	Running Record	20			
	Module Event Record (9Words)		Each Record should be accessed separately(one at a time).		
	Source	1	Module ID:Module ID of the corresponding module.Eg: For display module 0x1A		
	Event Type	1	Event Type Strings:0 : Offline,1 : Online		
	Event Time - Year	1			
	Event Time - Month	1			
	Event Time - Date	1			
	Event Time - Hour	1			
	Event Time - Min	1			
	Event Time - Sec	1			
	Event Time - mSec	1			

Address	Parameter	Size(in words)	UNITS	Divisor/ Multiplier	Interpretation
32036	Module Event Record 1	9			
32045	Module Event Record 2	9			
32054	Module Event Record 3	9			
32063	Module Event Record 4	9			
32072	Module Event Record 5	9			
32081	Module Event Record 6	9			
32097	Module Event Record 7	9			
32099	Module Event Record 8	9			
32108	Module Event Record 9	9			
32117	Module Event Record 10	9			
32126	Module Event Record 11	9			
32135	Module Event Record 12	9			
32144	Module Event Record 13	9			
32153	Module Event Record 14	9			
32162	Module Event Record 15	9			
32171	Module Event Record 16	9			
32180	Module Event Record 17	9			
32189	Module Event Record 18	9			
32198	Module Event Record 19	9			
32207	Module Event Record 20	9			
32216	Module Event Record 21	9			
32225	Module Event Record 22	9			
32234	Module Event Record 23	9			
32243	Module Event Record 24	9			
32252	Module Event Record 25	9			
32261	Module Event Record 26	9			
32270	Module Event Record 27	9			
32279	Module Event Record 28	9			
32288	Module Event Record 29	9			
32297	Module Event Record 30	9			
32306	Module Event Record 31	9			
32315	Module Event Record 32	9			
32324	Module Event Record 33	9			
32333	Module Event Record 34	9			
32342	Module Event Record 35	9			
32351	Module Event Record 36	9			
32360	Module Event Record 37	9			
32369	Module Event Record 38	9			
32378	Module Event Record 39	9			
32387	Module Event Record 40	9			
32396	Module Event Record 41	9			
32405	Module Event Record 42	9			
32414	Module Event Record 43	9			
32423	Module Event Record 44	9			
32432	Module Event Record 45	9			
32441	Module Event Record 46	9			
32450	Module Event Record 47	9			
32459	Module Event Record 48	9			
32468	Module Event Record 49	9			
32477	Module Event Record 50	9			
32486	Module Event Record 51	9			
32495	Module Event Record 52	9			
32504	Module Event Record 53	9			
32513	Module Event Record 54	9			
32522	Module Event Record 55	9			
32531	Module Event Record 56	9			
32540	Module Event Record 57	9			
32549	Module Event Record 58	9			
32558	Module Event Record 59	9			
32567	Module Event Record 60	9			
32576	Module Event Record 61	9			
32585	Module Event Record 62	9			
32594	Module Event Record 63	9			
32603	Module Event Record 64	9			

Address	Parameter	Size(in words)	UNITS	Divisor/ Multiplier	Interpretation
	Other Event Record (9Words)			Each Record should be accessed separately(one at a time).	
	Source(1 - SG2 To SG1, 2 - SG1 To SG2	1			
	Event Type(1 - Auto SG Change,2 - Manual SG Change)	1			
	Event Time - Year	1			
	Event Time - Month	1			
	Event Time - Date	1			
	Event Time - Hour	1			
	Event Time - Min	1			
	Event Time - Sec	1			
	Event Time - mSec	1			
32612	SetGroupChangeEvent Record 1	9			
32621	SetGroupChangeEvent Record 2	9			
32630	SetGroupChangeEvent Record 3	9			
32639	SetGroupChangeEvent Record 4	9			
32648	SetGroupChangeEvent Record 5	9			
32657	SetGroupChangeEvent Record 6	9			
32666	SetGroupChangeEvent Record 7	9			
32675	SetGroupChangeEvent Record 8	9			
32684	SetGroupChangeEvent Record 9	9			
32693	SetGroupChangeEvent Record 10	9			

Read/Write parameters								
Address	Parameter	Size(in Words)	UNITS	Divisor/ Multiplier	Min Value	Max Value	First Step Size	Further Step Size
	Set Group 1							
	Instantaneous							
40001	Protection(0: Disable,1: Enable)	1	-	1	0	1	1	1
40002	Pickup refer note 6 on pg 86	1	In (Amp)	1/100	150	1500	10	10
	Earth Fault							
40003	Protection(0: Disable,1: Enable)	1	-	1	0	1	1	1
40004	Mode(1 : Alarm, 2 : Trip, 3 : Both)	1	-	1	1	3	1	1
40005	Cold Load feature(0 : OFF, 1 : ON)	1	-	1	0	1	1	1
40006	Cold Load Delay Low Word / Cold Load Delay High Word	2	mSec	1.25	80	4000	80	80
40008	Pickup	1	In (Amp)	1/100	20	60	10	10
40009	IDMT Off Delay Low Word / IDMT Off Delay High Word	2	mSec	1.25	80	800	80	80
40011	IDMT On Delay Low Word / IDMT On Delay High Word	2	mSec	1.25	80	320	80	80
40013	E/F Characteristic (IDMT)	1	-	1	0	1	1	1
40014	Prealarm	1	Ig (Amp)	1/100	50	95	5	5
	Short Circuit Portection							
40015	Protection(0: Disable,1: Enable)	1	-	1	0	1	1	1
40016	Double Selective (0: off, 1: on)	1	-	1	0	1	1	1
40017	I2T(0: off, 1: on)	1	-	1	0	1	1	1
40018	Reserved	1	-	1	0	0	0	0
40019	Prealarm	1	Is (Amp)	1/100	50	95	5	5
40020	Cold Load feature (0: off, 1: on)	1	-	1	0	1	1	1
40021	Cold Load Delay Low Word / Cold Load DelayHigh Word	2	mSec	1.25	80	8000	80	80
40023	Pickup High (refer note 7 on pg 86)	1	In (Amp)	1/100	60	1200	5	5
40024	Pickup low (refer note 8 on pg 86)	1	In (Amp)	1/100	60	1200	5	5
40025	Delay High Low Word / Delay High HIgh Word	2	mS	1.25	16	320	64	80
40027	Delay Low Low Word / Delay Low Low Word	2	mS	1.25	16	320	64	80

Address	Parameter	Size(in Words)	UNITS	Divisor/ Multiplier	Min Value	Max Value	First Step Size	Further Step Size
	Directional Short Circuit Protection							
40029	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40030	Direction (0: Top, 1: Bottom)	1	-	1	0	1	1	1
40031	I2T (0: off, 1: on)	1	-	1	0	1	1	1
40032	Reserved	1	-	1	0	0	0	0
40033	Prealarm	1	Id (Amp)	1/100	50	95	5	5
40034	Cold Load feature (0: off, 1: on)	1	-	1	0	1	1	1
40035	Cold Load Delay Low Word	2	mSec	1.25	80	8000	80	80
	Cold Load Delay High Word							
40037	Pickup	1	In (Amp)	1/100	60	1200	5	5
40038	Delay Low Word	2	mS	1.25	16	320	64	80
	Delay High Word							
	OverLoad Protection							
40040	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40041	Thermal Memory(0:off, 1: on)	1	-	1	0	1	1	1
40042	Prealarm	1	Ir (Amp)	1/100	50	95	5	5
40043	O/L Characteristic (refer Note 9 on pg 86)	1	-	1	0	4	1	1
40044	Delay Low Word	2	mSec	1	0	8	1	1
	Delay High Word							
40046	Pickup	1	In (Amp)	1/100	40	100	5	5
	OverLoad(Neutral)							
40047	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40048	Pickup	1	Ir (Amp)	1/100	50	200	5	5
40049	Prealarm	1	Intrl (Amp)	1/100	50	95	5	5
	Restricted Earth Fault							
40050	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40051	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40052	Cold Load feature (0: off, 1: on)	1	-	1	0	1	1	1
40053	Cold Load Delay Low Word	2	mSec	1.25	48	8000	16	16
	Cold Load Delay High Word							
40055	Pickup	1	In (Amp)	1/100	10	60	10	10
40056	IDMT Off Delay Low Word	2	mSec	1.25	80	4000	80	80
	IDMT Off Delay High Word							
40058	IDMT On Delay Low Word	2	mSec	1.25	80	320	80	80
	IDMT On Delay High Word							
40060	RE/F Characteristic (0: off, 1: on)	1	-	1	0	1	1	1
40061	Prealarm	1	Iref (Amp)	1/100	50	95	5	5
	Earth Leakage							
40062	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40063	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40064	Pickup	1	Amp	1/10	3	300	1	1
40065	Delay Low Word	2	mS	1.25	80	400	80	80
	Delay High Word							
	Under Current							
40067	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40068	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40069	Pickup	1	Ir (Amp)	1/100	20	80	5	5
40070	Delay Low Word	2	mSec	1.25	800	204000	800	800
	Delay High Word							
	Curent Unbalance							
40072	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40073	Mode(1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40074	Pickup	1	%	1	10	97	5	5
40075	Delay Low Word	2	mSec	1.25	400	48000	400	400
	Delay High Word							
40077	IEC/ ANSI (0: IEC, 1: ANSI)	1	-	1	0	1	1	1
	Under Voltage							
40078	Protection (0: Disable, 1: Enable)	1	-	1	0	1	1	1
40079	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40080	Pickup	1	Vn (Volts)	1/100	70	95	1	1
40081	Delay Low Word	2	mS / Sec	1.25	80	4000	80	80
	Delay High Word							
40083	Reset Voltage	1	Vuv (Volts)	1/100	101	105	1	1
	Over Voltage							
40084	Protection (0: Disable, 1: enable)	1	-	1	0	1	1	1
40085	Mode(1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40086	Pickup	1	Vn (Volts)	1/100	105	150	1	1
40087	Delay Low Word	2	mSec	1.25	80	4000	80	80
	Delay High Word							
40089	Reset Voltage	1	Vov (Volts)	1/100	95	99	1	1

Address	Parameter	Size(in Words)	UNITS	Divisor/ Multiplier	Min Value	Max Value	First Step Size	Further Step Size
	Voltage Unbalance							
40097	Protection (0: Disable, 1: enable)	1	-	1	0	1	1	1
40091	Mode(1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40092	Pickup	1	%	1	5	20	1	1
40093	Delay Low Word	2	mSec	1.25	400	48000	400	400
	Delay High Word							
40095	Reset Voltage	1	V	1/100	95	99	1	1
	Residual Voltage							
40096	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40097	Mode(1 Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40098	Pickup	1	Vn (Volts)	1/100	5	40	5	5
40099	Delay Low Word	2	mSec	1.25	80	4000	80	80
	Delay High Word							
40101	Reset Voltage	1	Vrv (Volts)	1/100	95	99	1	1
	Under Frequency							
40102	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40103	Mode (1:Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40104	Pickup (50hz: 45-50Hz, 60Hz: 55-60Hz)	1	Hz	1/100	4500	6000	10	10
40105	Delay Low Word	2	mSec	1.25	800	24000	100	100
	Delay High Word							
40107	Reset Frequency	1	Fn	1/100	101	105	1	1
40108	Clod Load Delay Low Word	2	Sec	1.25	800	160000	800	800
	Clod Load Delay High Word							
	Over Frequency							
40110	Protection (0: disable, 1:enable)	1	-	1	0	1	1	1
40111	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40112	Pickup(50Hz: 50-55Hz, 60Hz: 60-65Hz)	1	Hz	1/100	4500	6500	10	10
40113	Delay Low Word	2	mSec	1.25	800	24000	100	100
	Delay High Word							
40115	Reset Frequency	1		1/100	95	99	1	1
40116	Clod Load Delay Low Word	2	mSec	1.25	800	160000	800	800
	Clod Load Delay High Word							
	Reverse Power							
40118	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40119	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40120	Pickup	1	Pn (kW)	1/100	5	40	1	1
40121	Delay Low Word	2	mS / Sec	1.25	80	16000	80	80
	Delay High Word							
	Leading Power Factor							
40123	Protection(0: disable, 1: enable)	1	-	1	0	1	1	1
40124	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40125	Pickup	1	PF	1/100	50	99	1	1
40126	Delay Low Word	2	mSec	1.25	800	4000	800	800
	Delay High Word							
	Lagging Power Factor							
40128	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40129	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40130	Pickup	1	PF	1/100	50	99	1	1
40131	Delay Low Word	2	mSec	1.25	800	4000	800	800
	Delay High Word							
	Peak Factor							
40133	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40134	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40135	Pickup	1	-	1/100	50	99	1	1
40136	Delay Low Word	2	Sec	1.25	800	4000	800	800
	Delay High Word							
	Form Factor							
40138	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40139	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40140	Pickup	1	-	1/100	50	99	1	1
40141	Delay Low Word	2	Sec	1.25	800	4000	800	800
	Delay High Word							
	Trip Circuit Supervision							
40143	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40144	Mode	1	-	1	1	3	1	1
	Max Demand Energy (Active)							
40145	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40146	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40147	Type (0: Deliver, 1 Receive)	1	-	1	0	1	1	1
40148	Pickup	1	KW	1/100	40	100	1	1
40149	Reserved	2	-	1	0	0	0	0

Address	Parameter	Size(in Words)	UNITS	Divisor/ Multiplier	Min Value	Max Value	First Step Size	Further Step Size
	Max Demand Energy (Reactive)							
40151	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40152	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40153	Type (0: Deliver, 1: Receive)	1	-	1	0	1	1	1
40154	Pickup	1	KW	1/100	40	100	1	1
40155	Reserved	2	-	1	0	0	0	0
	Max Demand Energy (Apparent)							
40157	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40158	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40159	Type (0: Deliver, 1: Receive)	1	-	1	0	1	1	1
40160	Pickup	1	KW	1/100	40	100	1	1
40161	Reserved	2	-	1	0	0	0	0
	Reserved							
40163	Reserved	1		0	0	0	0	0
40164	Reserved	1		0	0	0	0	0
40165	Reserved	1		0	0	0	0	0
40166	Reserved	1		0	0	0	0	0
40167	Reserved Reserved	2		0	0	0	0	0
	Phase Sequence							
40169	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40170	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40171	Delay Low Word Delay High Word	2	mSec	1.25	80	4000	20	20
	Breaker Failure							
40173	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40174	Delay Low Word Delay High Word	2	mSec	1.25	40	1600	40	40
	Total Harmonics Distortion Current							
40176	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40177	Based On (0: Fundamental, 1: RMS)	1	-	1	0	1	1	1
40178	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40179	Pickup	1		1/100	500	5000	100	100
40180	Delay Low Word Delay High Word	2	mSec	1.25	800	12000	800	800
	Total Harmonics Distortion Voltage							
40182	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40183	Based On (0: Fundamental, 1: RMS)	1	-	1	0	1	1	1
40184	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40185	Pickup	1	Vn	1	5	50	1	1
40186	Delay Low Word Delay High Word	2	mSec	1.25	800	12000	800	800
40188	Reserved	1		0	0	0	0	0
	Set Group 2							
	Instantaneous							
40201	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40202	Pickup (refer note 6 on pg 86)	1	In (Amp)	1/100	150	1500	10	10
	Earth Fault							
40203	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40204	Mode (1: Alarm, 2: Trip, 3: Both)	1	-	1	1	3	1	1
40205	Cold Load feature(0: Off, 1: On)	1	-	1	0	1	1	1
40206	Cold Load Delay Low Word Cold Load Delay High Word	2	mSec	1.25	80	4000	80	80
40208	Pickup	1	In (Amp)	1/100	20	60	10	10
40209	IDMT Off Delay Low Word IDMT Off Delay High Word	2	mSec	1.25	80	800	80	80
40211	IDMT On Delay Low Word IDMT On Delay High Word	2	mSec	1.25	80	320	80	80
40213	E/F Characteristic (IDMT)	1	-	1	0	1	1	1
40214	Prealarm	1	Ig (Amp)	1/100	50	95	5	5

Address	Parameter	Size(in Words)	UNITS	Divisor/ Multiplier	Min Value	Max Value	First Step Size	Further Step Size
	Short Circuit Portection							
40215	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40216	Double Selective (0: off, 1:on)	1	-	1	0	1	1	1
40217	I2T (0: off, 1: on)	1	-	1	0	1	1	1
40218	Reserved	1	-	1	0	0	0	0
40219	Prealarm	1	Is (Amp)	1/100	50	95	5	5
40220	Cold Load feature (0:off, 1: on)	1	-	1	0	1	1	1
40221	Cold Load Delay Low Word / Cold Load DelayHigh Word	2	mSec	1.25	80	8000	80	80
40223	Pickup High (refer note 7 on pg 86)	1	In (Amp)	1/100	60	1200	5	5
40224	Pickup low (refer note 8 on pg 86)	1	In (Amp)	1/100	60	1200	5	5
40225	Delay High Low Word / Delay High HIgh Word	2	mS	1.25	16	320	64	80
40227	Delay Low Low Word / Delay Low Low Word	2	mS	1.25	16	320	64	80
	Directional Short Circuit Protection							
40229	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40230	Direction (0: top, 1: bottom)	1	-	1	0	1	1	1
40231	I2T (0: off, 1: on)	1	-	1	0	1	1	1
40232	Reserved	1	-	0	0	0	0	0
40233	Prealarm	1	Id (Amp)	1/100	50	95	5	5
40234	Cold Load feature (0: off, 1: on)	1	-	1	0	1	1	1
40235	Cold Load Delay Low Word / Cold Load Delay High Word	2	mSec	1.25	80	8000	80	80
40237	Pickup	1	In (Amp)	1/100	60	1200	5	5
40238	Delay Low Word / Delay High Word	2	mS	1.25	16	320	64	80
	OverLoad Protection							
40240	Protection (0: disable, 1: enable)	1	-	1	0	1	1	1
40241	Thermal Memory (0: off, 1: on)	1	-	1	0	1	1	1
40242	Prealarm	1	Ir (Amp)	1/100	50	95	5	5
40243	O/L Characteristic (refer Note 9 on pg 86)	1	-	1	0	4	1	1
40244	Delay Low Word / Delay High Word	2	mSec	1	0	8	1	1
40246	Pickup	1	In (Amp)	1/100	40	100	5	5
	OverLoad(Neutral)							
40247	Protection	1	-	1	0	1	1	1
40248	Pickup	1	Ir (Amp)	1/100	50	200	5	5
40249	Prealarm	1	Intrl (Amp)	1/100	50	95	5	5
	Restricted Earth Fault							
40250	Protection	1	-	1	0	1	1	1
40251	Mode	1	-	1	1	3	1	1
40252	Cold Load feature	1	-	1	0	1	1	1
40253	Cold Load Delay Low Word / Cold Load Delay High Word	2	mSec	1.25	48	8000	16	16
40255	Pickup	1	In (Amp)	1/100	10	60	10	10
40256	IDMT Off Delay Low Word / IDMT Off Delay High Word	2	mSec	1.25	80	4000	80	80
40258	IDMT On Delay Low Word / IDMT On Delay High Word	2	mSec	1.25	80	320	80	80
40260	RE/F Characteristic	1	-	1	0	1	1	1
40261	Prealarm	1	Iref (Amp)	1/100	50	95	5	5
	Earth Leakage							
40262	Protection	1	-	1	0	1	1	1
40263	Mode	1	-	1	1	3	1	1
40264	Pickup	1	Amp	1/10	3	300	1	1
40265	Delay Low Word / Delay High Word	2	mS	1.25	80	400	80	80
	Under Current							
40267	Protection	1	-	1	0	1	1	1
40268	Mode	1	-	1	1	3	1	1
40269	Pickup	1	Ir (Amp)	1/100	20	80	5	5
40270	Delay Low Word / Delay High Word	2	mSec	1.25	800	204000	800	800
	Curent Unbalance							
40272	Protection	1	-	1	0	1	1	1
40273	Mode	1	-	1	1	3	1	1
40274	Pickup	1	%	1	10	97	5	5
40275	Delay Low Word / Delay High Word	2	mSec	1.25	400	48000	400	400
40277	IEC/ANSI	1	-	1	0	1	1	1

Address	Parameter	Size(in Words)	UNITS	Divisor/ Multiplier	Min Value	Max Value	First Step Size	Further Step Size
	Under Voltage							
40278	Protection	1	-	1	0	1	1	1
40279	Mode	1	-	1	1	3	1	1
40280	Pickup	1	Vn (Volts)	1/100	70	95	1	1
40281	Delay Low Word	2	mS / Sec	1.25	80	4000	80	80
	Delay High Word							
40283	Reset Voltage	1	Vuv (Volts)	1/100	101	105	1	1
	Over Voltage							
40284	Protection	1	-	1	0	1	1	1
40285	Mode	1	-	1	1	3	1	1
40286	Pickup	1	Vn (Volts)	1/100	105	150	1	1
40287	Delay Low Word	2	mSec	1.25	80	4000	80	80
	Delay High Word							
40289	Reset Voltage	1	Vov (Volts)	1/100	95	99	1	1
	Voltage Unbalance							
40297	Protection	1	-	1	0	1	1	1
40291	Mode	1	-	1	1	3	1	1
40292	Pickup	1	%	1	5	20	1	1
40293	Delay Low Word	2	mSec	1.25	400	48000	400	400
	Delay High Word							
40295	Reset Voltage	1	V	1/100	95	99	1	1
	Residual Voltage							
40296	Protection	1	-	1	0	1	1	1
40297	Mode	1	-	1	1	3	1	1
40298	Pickup	1	Vn (Volts)	1/100	5	40	5	5
40299	Delay Low Word	2	mS / Sec	1.25	80	4000	80	80
	Delay High Word							
40301	Reset Voltage	1	Vrv (Volts)	1/100	95	99	1	1
	Under Frequency							
40302	Protection	1	-	1	0	1	1	1
40303	Mode	1	-	1	1	3	1	1
40304	Pickup	1	Hz	1/100	4500	6000	10	10
40305	Delay Low Word	2	mSec	1.25	800	24000	100	100
	Delay High Word							
40307	Reset Frequency	1	Fn	1/100	101	105	1	1
40308	Clod Load Delay Low Word	2	Sec	1.25	800	160000	800	800
	Clod Load Delay High Word							
	Over Frequency							
40310	Protection	1	-	1	0	1	1	1
40311	Mode	1	-	1	1	3	1	1
40312	Pickup	1	Hz	1/100	4500	6500	10	10
40313	Delay Low Word	2	mSec	1.25	800	24000	100	100
	Delay High Word							
40315	Reset Frequency	1		1/100	95	99	1	1
40316	Clod Load Delay Low Word	2	mSec	1.25	800	160000	800	800
	Clod Load Delay High Word							
	Reverse Power							
40318	Protection	1	-	1	0	1	1	1
40319	Mode	1	-	1	1	3	1	1
40320	Pickup	1	Pn (kW)	1/100	5	40	1	1
40321	Delay Low Word	2	mS / Sec	1.25	80	16000	80	80
	Delay High Word							
	Leading Power Factor							
40323	Protection	1	-	1	0	1	1	1
40324	Mode	1	-	1	1	3	1	1
40325	Pickup	1	Pf	1/100	50	99	1	1
40326	Delay Low Word	2	mSec	1.25	800	4000	800	800
	Delay High Word							
	Lagging Power Factor							
40328	Protection	1	-	1	0	1	1	1
40329	Mode	1	-	1	1	3	1	1
40330	Pickup	1	Pf	1/100	50	99	1	1
40331	Delay Low Word	2	mSec	1.25	800	4000	800	800
	Delay High Word							
	Peak Factor							
40333	Protection	1	-	1	0	1	1	1
40334	Mode	1	-	1	1	3	1	1
40335	Pickup	1	-	1/100	50	99	1	1
40336	Delay Low Word	2	mSec	1.25	800	4000	800	800
	Delay High Word							

Address	Parameter	Size(in Words)	UNITS	Divisor/ Multiplier	Min Value	Max Value	First Step Size	Further Step Size
	Form Factor							
40338	Protection	1	-	1	0	1	1	1
40339	Mode	1	-	1	1	3	1	1
40340	Pickup	1	-	1/100	50	99	1	1
40341	Delay Low Word	2	mSec	1.25	800	4000	800	800
	Delay High Word							
	Trip Circuit Supervision							
40343	Protection	1	-	1	0	1	1	1
40344	Mode	1	-	1	1	3	1	1
	Max Demand Energy (Active)							
40345	Protection	1	-	1	0	1	1	1
40346	Mode	1	-	1	1	3	1	1
40347	Type	1		1	0	1	1	1
40348	Pickup	1	KW	1/100	40	100	1	1
40349	Reserved	2	-	1	0	0	0	0
	Max Demand Energy (Reactive)							
40351	Protection	1	-	1	0	1	1	1
40352	Mode	1	-	1	1	3	1	1
40353	Type	1		1	0	1	1	1
40354	Pickup	1	KW	1/100	40	100	1	1
40355	Reserved	2	-	1	0	0	0	0
	Max Demand Energy (Apparent)							
40357	Protection	1	-	1	0	1	1	1
40358	Mode	1	-	1	1	3	1	1
40359	Type	1		1	0	1	1	1
40360	Pickup	1	KW	1/100	40	100	1	1
40361	Reserved	2	-	1	0	0	0	0
	Reserved							
40363	Reserved	1		0	0	0	0	0
40364	Reserved	1		0	0	0	0	0
40365	Reserved	1		0	0	0	0	0
40366	Reserved	1		0	0	0	0	0
40367	Reserved	2		0	0	0	0	0
	Reserved							
	Phase Sequence							
40369	Protection	1	-	1	0	1	1	1
40370	Mode	1	-	1	1	3	1	1
40371	Delay Low Word	2	mSec	1.25	80	4000	20	20
	Delay High Word							
	Braker Failure							
40373	Protection	1	-	1	0	1	1	1
40374	Delay Low Word	2	mSec	1.25	40	1600	40	40
	Delay High Word							
	Total Harmonics Distortion Current							
40376	Protection	1	-	1	0	1	1	1
40377	Based On	1	-	1	0	1	1	1
40378	Mode	1	-	1	1	3	1	1
40379	Pickup	1		1/100	500	5000	100	100
40380	Delay Low Word	2	mSec	1.25	800	12000	800	800
	Delay High Word							
	Total Harmonics Distortion Voltage							
40382	Protection	1	-	1	0	1	1	1
40383	Based On	1	-	1	0	1	1	1
40384	Mode	1	-	1	1	3	1	1
40385	Pickup	1	Vn	1	5	50	1	1
40386	Delay Low Word	2	mSec	1.25	800	12000	800	800
	Delay High Word							
40388	Reserved	1		0	0	0	0	0

Address	Parameter	Size(in Words)	UNITS	Divisor/ Multiplier	Min Value	Max Value	First Step Size	Further Step Size
	System Settings							
40400	Frequency	1	Hz	Refer Comment	0	2	1	1
40401	I_Frame	1	A	Refer Comment	0	4	1	1
40402	Rated Current (In)	1	A	Refer Comment	0	14	1	1
40403	Nominal Voltage	1	V	Refer Comment	0	4	1	1
40404	Maintenance Period	1	Month(s)	Refer Comment	0	5	1	1
40405	Maintenance Enable/Disable	1	-	Refer Comment	0	1	1	1
40406	Incoming	1		Refer Comment	0	1	1	1
40407	Poles	1	Poles	Refer Comment	0	1	1	1
40408	Phase Sequence	1		Refer Comment	0	1	1	1
	Unit Settings							
	DateTime							
40415	Seconds	1		1	0	59	1	1
40416	Minutes	1		1	0	59	1	1
40417	Hour	1		1	0	23	1	1
40418	Reserved	1		1	0	0	0	0
40419	Date	1		1	1	31	1	1
40420	Month	1		1	1	12	1	1
40421	Year	1		1	0	99	1	1
40422	Reserved	1		1	0	0	0	0
40423	Reserved	1		1	0	0	0	0
	Local Communication Setting(1107 Protocol)							
40424	Device ID	1		1	1	126	1	1
40425	Reserved	1		1	0	0	0	0
40426	Reserved	1		1	0	0	0	0
40427	Reserved	1		1	0	0	0	0
	EventRecorder							
40428	EventPickup	1		1	0	1	1	1
40429	EventTrip	1		1	0	1	1	1
40430	EventAlarm	1		1	0	1	1	1
40431	ModuleConnected	1		1	0	1	1	1
40432	Module Removed	1		1	0	1	1	1
40433	RelayModuleInputs	1		1	0	1	1	1
40434	DigitalInputOutputModule	1		1	0	1	1	1
40435	Metering Sign Convention	1		1	0	2	1	1
	Oscillography Settings							
40436	Oscillography Enable/ Disable	1		1	0	1	1	1
40437	Trigger Source	1		1	0	1	1	1
	Maximum Demand							
40438	Reserved	1			0	0	0	0
40439	MD Integration Period	1	Minutes	1	0	1	1	1
40440	MD Sliding Interval	1	Minutes	1	0	2	1	1
	Load Profile							
40441	LP Active Configuration	1		1	0	3	1	1
40442	Interval	1	Minutes	1	0	2	1	1
40443	Logo Display	1		1	0	1	1	1
40444	Setting Password	1		1	0	9999	1	1
40445	Command Password	1		1	0	9999	1	1
	Display Settings							
40446	Language	1		1	0	2	1	1
40447	Contrast	1		1	13	63	1	1
40448	Reserved	1		1	0	0	0	0
40449	Reserved / Reserved	2		1	0	0	0	0
40451	Reserved / Reserved	2		1	0	0	0	0
	AutoChange SET GROUP							
40453	Enable / Disable	1		1	0	1	1	1
	SG1 To SG2							
40454	Hour	1		1	0	23		
40455	Minutes	1		1	0	59	1	1
40456	Reserved	1		1	0	0	0	0
	SG2 To SG1							
40457	Hour	1		1	0	23	1	1
40458	Minutes	1		1	0	59	1	1
40459	Reserved	1		1	0	0	0	0

Address	Parameter	Size(in Words)	UNITS	Divisor/ Multiplier	Min Value	Max Value	First Step Size	Further Step Size
	Installation Date							
40460	Year	1		1	0	99	1	1
40461	Month	1		1	1	12	1	1
40462	Date	1		1	1	31	1	1
	DayLight Saving Time(DST)							
40463	DST Enable / Disable	1		1	0	1	1	1
	Start DST Setting (4 parameters to be accessed together)	4						
40464	Start DST Month	1		1	1	12	1	1
40465	Start DST Date	1		1	1	31	1	1
40466	Start DST Hour	1		1	0	23	1	1
40467	Start DST Minute	1		1	0	59	1	1
	End DST Setting (4 parameters to be accessed together)	4						
40468	End DST Month	1		1	1	12	1	1
40469	End DST Date	1		1	1	31	1	1
40470	End DST Hour	1		1	0	23	1	1
40471	End DST Minute	1		1	0	59	1	1

Address	Parameter	Size(in Words)	UNITS	Divisor/ Multiplier	Min Value	Max Value		
	Commands							
40500	Command	2	**Argument 1**	**Argument 2**	96	106		
	Change SetGroup (interlocked with active set group)		0x60	0x00 - Active Set Group1				
	Restore Factory Defaults		0x61	0x00				
	Clear MD		0x62	0x00				
	Clear max current value		0x63	0x00				
	Clear max voltage value		0x64	0x00				
	Clear Energy		0x65	0x00				
	Open breaker (Refer note 10 on page 85)		0x66	0x00				
	Close breaker		0x67	0x00				
	Breaker maintenance done		0x68	0x00				
	EF test		0x6A	0x00				

Address	Parameter	Size(in Words)	UNITS	Divisor/ Multiplier	Min Value	Max Value	First Step Size	Further Step Size
	Module Settings							
	DIO Module1							
40600	DIO1 Enable (0-disable, 1-enable)	1		1	0	1	1	1
40601	Input 1 Enable (0-disable, 1-enable)	1		1	0	1	1	1
40602	Input 2 Enable (0-disable, 1-enable)	1		1	0	1	1	1
40603	Input 3 Enable (0-disable, 1-enable)	1		1	0	1	1	1
40604	Input 4 Enable (0-disable, 1-enable)	1		1	0	1	1	1
40605	Output 1 Enable(0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
40606	Output 2 Enable (0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
40607	Output 3 Enable(0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
40608	Output 4 Enable(0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
40609	Input Type(0-24V, 1-230V)	1		1	0	1	1	1
	DIO Module2							
40610	DIO2 Enable	1		1	0	1	1	1
40611	Input 1 Enable	1		1	0	1	1	1
40612	Input 2 Enable	1		1	0	1	1	1
40613	Input 3 Enable	1		1	0	1	1	1
40614	Input 4 Enable	1		1	0	1	1	1
40615	Output 1 Enable	1		1	0	2	1	1
40616	Output 2 Enable	1		1	0	2	1	1
40617	Output 3 Enable	1		1	0	2	1	1
40618	Output 4 Enable	1		1	0	2	1	1
40619	Input Type	1		1	0	1	1	1
	DIO Module3							
40620	DIO3 Enable	1		1	0	1	1	1
40621	Input 1 Enable	1		1	0	1	1	1
40622	Input 2 Enable	1		1	0	1	1	1
40623	Input 3 Enable	1		1	0	1	1	1
40624	Input 4 Enable	1		1	0	1	1	1
40625	Output 1 Enable	1		1	0	2	1	1
40626	Output 2 Enable	1		1	0	2	1	1
40627	Output 3 Enable	1		1	0	2	1	1
40628	Output 4 Enable	1		1	0	2	1	1
40629	Input Type	1		1	0	1	1	1
	DIO Module4							
40630	DIO4 Enable	1		1	0	1	1	1
40631	Input 1 Enable	1		1	0	1	1	1
40632	Input 2 Enable	1		1	0	1	1	1
40633	Input 3 Enable	1		1	0	1	1	1
40634	Input 4 Enable	1		1	0	1	1	1
40635	Output 1 Enable	1		1	0	2	1	1
40636	Output 2 Enable	1		1	0	2	1	1
40637	Output 3 Enable	1		1	0	2	1	1
40638	Output 4 Enable	1		1	0	2	1	1
40639	Input Type	1		1	0	1	1	1

Address	Parameter	Size(in Words)	UNITS	Divisor/ Multiplier	Min Value	Max Value	First Step Size	Further Step Size
	Relay Module 1							
40640	Relay1 Enable(0-disable, 1-enable)	1		1	0	1	1	1
40641	Output 1 Enable(0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
40642	Output 2 Enable (0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
40643	Output 3 Enable (0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
40644	Output 4 Enable (0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
	Relay Module 2							
40645	Relay2 Enable (0-disable, 1-enable)	1		1	0	1	1	1
40646	Output 1 Enable(0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
40647	Output 2 Enable (0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
40648	Output 3 Enable (0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
40649	Output 4 Enable (0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
	Relay Module 3							
40650	Relay3 Enable (0-disable, 1-enable)	1		1	0	1	1	1
40651	Output 1 Enable (0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
40652	Output 2 Enable (0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
40653	Output 3 Enable (0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
40654	Output 4 Enable (0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
	Relay Module 4							
40655	Relay4 Enable (0-disable, 1-enable)	1		1	0	1	1	1
40656	Output 1 Enable (0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
40657	Output 2 Enable (0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
40658	Output 3 Enable (0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
40659	Output 4 Enable (0-disable, 1-level, 2-pulse)	1		1	0	2	1	1
	Thermistor Module							
40660	Temp Module 1 Enable (0-disable, 1-enable)	1		1	0	1	1	1
40661	Temp Module 2 Enable (0-disable, 1-enable)	1		1	0	1	1	1
40662	Protection (0-disable, 1-enable)	1		1	0	1	1	1
40663	Mode (1-alarm, 2-trip, 3-both)	1		1	1	3	1	1
40664	Prealarm	1		1/100	50	95	5	5
40665	Pickup Temp	1		0.100	850	1150	1	1
40666	TemperatureDelay_LW / TemperatureDelay_HW	2		1	0	15	1	1
	Modbus Module							
40668	Modbus Module Enable (0-disable, 1-enable)	1		1	0	1	1	1
40669	Modbus Protocol Type (0-disable, 1-enable)	1		1	0	1	1	1
40670	Parity (0-none, 1-odd, 2-even)	1		1	0	2	1	1
40671	Stop bit	1		1	0	1	1	1
40672	Baud rate Type	1		1	0	1	1	1
40673	Baud rate (Refer note 11 on 13-25)	1	bps	1	0	8	1	1
	Configurator Module							
40674	Configurator Module Enable (0-disable, 1-enable)	1		1	0	1	1	1
	AnalogOutputModule							
40675	Analog Module Enable (0-disable, 1-enable)	1		1	0	1	1	1
40676	Output Parameter 0	1		1	0	14	1	1
40677	Output Parameter 1 (Refer note 12 on 13-25)	1		1	0	14	1	1
40678	Output Parameter 2	1		1	0	14	1	1
40679	Output Parameter 3	1		1	0	14	1	1
40680	Reserved	1		0	0	0	0	0
40681	Reserved	1		0	0	0	0	0
40682	Reserved	1		0	0	0	0	0
40683	Reserved	1		0	0	0	0	0
	ZSI Module							
40684	ZSI Module Enable (0-disable, 1-enable)	1		1	0	1	1	1
40685	Directional (0-off, 1-on)	1		1	0	1	1	1
40686	ZSI Configuration (Refer note 13 on 13-25)	1		1	0	3	1	1
40687	ZSIDelay LW / ZSIDelay HW		mSec	1.25	48	320	8	8
	Profibus Module							
#VALUE!	Profibus Module Enable (0-disable, 1-enable)	1		1	0	1	1	1
#VALUE!	Reserved	1		0	0	0	0	0

Address	Parameter	Size(in Words)	UNITS	Divisor/ Multiplier	Min Value	Max Value	First Step Size	Further Step Size
	REF Module							
40760	REF Module Enable(0-disable, 1-enable)	1		1	0	1	1	1
40761	PROTECTION (0-disable, 1-enable)	1		1	0	1	1	1
40762	MODE(1-alarm,2-trip,3-both)	1		1	1	3	1	1
40763	PICKUP	1	In	1/100	20	60	1	1
40764	I2T OFF DELAY LOW WORD(1tick=1.25ms) I2T OFF DELAY HIGH WORD	2	mSec	1.25	80	800	80	80
40766	I2T ON DELAY LOW WORD I2T ON DELAY HIGH WORD	2	mSec	1.25	80	800	80	80
40768	REF CHARACTERISTIC (0-off, 1-on)	1		1	0	1	1	1
40769	RESERVED	1		1/100	50	95	5	5
	EL Module							
40770	EL Module Enable (0-disable, 1-enable)	1		1	0	1	1	1
40771	PROTECTION (0-disable, 1-enable)	1		1	0	1	1	1
40772	MODE (1-alarm,2-trip,3-both)	1		1	1	3	1	1
40773	PICKUP	1	Amps	1/100	30	3000	20	50
40774	DELAY LW (in ticks, 1 tick = 1.25mS) DELAY HW (in ticks, 1 tick = 1.25mS)	2	mSec	1.25	80	4000	80	80
	TCS Module							
40776	TCS Module Enable (0-disable, 1-enable)	1		1	0	1	1	1
40777	PROTECTION (0-disable, 1-enable)	1		1	0	1	1	1
40778	MODE (1-alarm,2-trip,3-both)	1		1	1	3	1	1
	Zigbee Module							
40779	ZIGBEEModuleEnable (0-disable, 1-enable)	1		1	0	1	1	1
40780	Frequency Channel Select	1		1	11	26	1	1
40781	PAN ID	1		1	0	999	1	1
	RelayBoolean Equations							
	Relay 1							
40800	Relay Out 1.1.1	3		1	0	65535	1	1
40803	Relay Out 1.1.2	3		1	0	65535	1	1
40806	Relay Out 1.1.3	3		1	0	65535	1	1
40809	Relay Out 1.1.4	3		1	0	65535	1	1
40812	Relay Out 1.2.1	3		1	0	65535	1	1
40815	Relay Out 1.2.2	3		1	0	65535	1	1
40818	Relay Out 1.2.3	3		1	0	65535	1	1
40821	Relay Out 1.2.4	3		1	0	65535	1	1
40824	Relay Out 1.3.1	3		1	0	65535	1	1
40827	Relay Out 1.3.2	3		1	0	65535	1	1
40830	Relay Out 1.3.3	3		1	0	65535	1	1
40833	Relay Out 1.3.4	3		1	0	65535	1	1
40836	Relay Out 1.4.1	3		1	0	65535	1	1
40839	Relay Out 1.4.2	3		1	0	65535	1	1
40842	Relay Out 1.4.3	3		1	0	65535	1	1
40845	Relay Out 1.4.4	3		1	0	65535	1	1
	Relay 2							
40848	Relay Out 2.1.1	3		1	0	65535	1	1
40851	Relay Out 2.1.2	3		1	0	65535	1	1
40854	Relay Out 2.1.3	3		1	0	65535	1	1
40857	Relay Out 2.1.4	3		1	0	65535	1	1
40860	Relay Out 2.2.1	3		1	0	65535	1	1
40863	Relay Out 2.2.2	3		1	0	65535	1	1
40866	Relay Out 2.2.3	3		1	0	65535	1	1
40869	Relay Out 2.2.4	3		1	0	65535	1	1
40872	Relay Out 2.3.1	3		1	0	65535	1	1
40875	Relay Out 2.3.2	3		1	0	65535	1	1
40878	Relay Out 2.3.3	3		1	0	65535	1	1
40881	Relay Out 2.3.4	3		1	0	65535	1	1
40884	Relay Out 2.4.1	3		1	0	65535	1	1
40887	Relay Out 2.4.2	3		1	0	65535	1	1
40890	Relay Out 2.4.3	3		1	0	65535	1	1
40893	Relay Out 2.4.4	3		1	0	65535	1	1
	Relay 3							
40896	Relay Out 3.1.1	3		1	0	65535	1	1
40899	Relay Out 3.1.2	3		1	0	65535	1	1
40902	Relay Out 3.1.3	3		1	0	65535	1	1
40905	Relay Out 3.1.4	3		1	0	65535	1	1
40908	Relay Out 3.2.1	3		1	0	65535	1	1
40911	Relay Out 3.2.2	3		1	0	65535	1	1
40914	Relay Out 3.2.3	3		1	0	65535	1	1
40917	Relay Out 3.2.4	3		1	0	65535	1	1
40920	Relay Out 3.3.1	3		1	0	65535	1	1
40923	Relay Out 3.3.2	3		1	0	65535	1	1
40926	Relay Out 3.3.3	3		1	0	65535	1	1
40929	Relay Out 3.3.4	3		1	0	65535	1	1
40932	Relay Out 3.4.1	3		1	0	65535	1	1
40935	Relay Out 3.4.2	3		1	0	65535	1	1
40938	Relay Out 3.4.3	3		1	0	65535	1	1
40941	Relay Out 3.4.4	3		1	0	65535	1	1

Address	Parameter	Size(in Words)	UNITS	Divisor/ Multiplier	Min Value	Max Value	First Step Size	Further Step Size
	Relay 4							
40944	Relay Out 4.1.1	3		1	0	65535	1	1
40947	Relay Out 4.1.2	3		1	0	65535	1	1
40950	Relay Out 4.1.3	3		1	0	65535	1	1
40953	Relay Out 4.1.4	3		1	0	65535	1	1
40956	Relay Out 4.2.1	3		1	0	65535	1	1
40959	Relay Out 4.2.2	3		1	0	65535	1	1
40962	Relay Out 4.2.3	3		1	0	65535	1	1
40965	Relay Out 4.2.4	3		1	0	65535	1	1
40968	Relay Out 4.3.1	3		1	0	65535	1	1
40971	Relay Out 4.3.2	3		1	0	65535	1	1
40974	Relay Out 4.3.3	3		1	0	65535	1	1
40977	Relay Out 4.3.4	3		1	0	65535	1	1
40980	Relay Out 4.4.1	3		1	0	65535	1	1
40983	Relay Out 4.4.2	3		1	0	65535	1	1
40986	Relay Out 4.4.3	3		1	0	65535	1	1
40989	Relay Out 4.4.4	3		1	0	65535	1	1
	DIO Boolean Equations							
	DIO 1							
41000	DIO Out 1.1.1	3		1	0	65535	1	1
41003	DIO Out 1.1.2	3		1	0	65535	1	1
41006	DIO Out 1.1.3	3		1	0	65535	1	1
41009	DIO Out 1.1.4	3		1	0	65535	1	1
41012	DIO Out 1.2.1	3		1	0	65535	1	1
41015	DIO Out 1.2.2	3		1	0	65535	1	1
41018	DIO Out 1.2.3	3		1	0	65535	1	1
41021	DIO Out 1.2.4	3		1	0	65535	1	1
41024	DIO Out 1.3.1	3		1	0	65535	1	1
41027	DIO Out 1.3.2	3		1	0	65535	1	1
41030	DIO Out 1.3.3	3		1	0	65535	1	1
41033	DIO Out 1.3.4	3		1	0	65535	1	1
41036	DIO Out 1.4.1	3		1	0	65535	1	1
41039	DIO Out 1.4.2	3		1	0	65535	1	1
41042	DIO Out 1.4.3	3		1	0	65535	1	1
41045	DIO Out 1.4.4	3		1	0	65535	1	1
	DIO 2							
41048	DIO Out 2.1.1	3		1	0	65535	1	1
41051	DIO Out 2.1.2	3		1	0	65535	1	1
41054	DIO Out 2.1.3	3		1	0	65535	1	1
41057	DIO Out 2.1.4	3		1	0	65535	1	1
41060	DIO Out 2.2.1	3		1	0	65535	1	1
41063	DIO Out 2.2.2	3		1	0	65535	1	1
41066	DIO Out 2.2.3	3		1	0	65535	1	1
41069	DIO Out 2.2.4	3		1	0	65535	1	1
41072	DIO Out 2.3.1	3		1	0	65535	1	1
41075	DIO Out 2.3.2	3		1	0	65535	1	1
41078	DIO Out 2.3.3	3		1	0	65535	1	1
41081	DIO Out 2.3.4	3		1	0	65535	1	1
41084	DIO Out 2.4.1	3		1	0	65535	1	1
41087	DIO Out 2.4.2	3		1	0	65535	1	1
41097	DIO Out 2.4.3	3		1	0	65535	1	1
41093	DIO Out 2.4.4	3		1	0	65535	1	1
	DIO 3							
41096	DIO Out 3.1.1	3		1	0	65535	1	1
41099	DIO Out 3.1.2	3		1	0	65535	1	1
41102	DIO Out 3.1.3	3		1	0	65535	1	1
41105	DIO Out 3.1.4	3		1	0	65535	1	1
41108	DIO Out 3.2.1	3		1	0	65535	1	1
41111	DIO Out 3.2.2	3		1	0	65535	1	1
41114	DIO Out 3.2.3	3		1	0	65535	1	1
41117	DIO Out 3.2.4	3		1	0	65535	1	1
41120	DIO Out 3.3.1	3		1	0	65535	1	1
41123	DIO Out 3.3.2	3		1	0	65535	1	1
41126	DIO Out 3.3.3	3		1	0	65535	1	1
41129	DIO Out 3.3.4	3		1	0	65535	1	1
41132	DIO Out 3.4.1	3		1	0	65535	1	1
41135	DIO Out 3.4.2	3		1	0	65535	1	1
41138	DIO Out 3.4.3	3		1	0	65535	1	1
41141	DIO Out 3.4.4	3		1	0	65535	1	1
	DIO 4							
41144	DIO Out 4.1.1	3		1	0	65535	1	1
41147	DIO Out 4.1.2	3		1	0	65535	1	1
41150	DIO Out 4.1.3	3		1	0	65535	1	1
41153	DIO Out 4.1.4	3		1	0	65535	1	1
41156	DIO Out 4.2.1	3		1	0	65535	1	1
41159	DIO Out 4.2.2	3		1	0	65535	1	1
41162	DIO Out 4.2.3	3		1	0	65535	1	1
41165	DIO Out 4.2.4	3		1	0	65535	1	1
41168	DIO Out 4.3.1	3		1	0	65535	1	1
41171	DIO Out 4.3.2	3		1	0	65535	1	1
41174	DIO Out 4.3.3	3		1	0	65535	1	1
41177	DIO Out 4.3.4	3		1	0	65535	1	1
41180	DIO Out 4.4.1	3		1	0	65535	1	1
41183	DIO Out 4.4.2	3		1	0	65535	1	1
41186	DIO Out 4.4.3	3		1	0	65535	1	1
41189	DIO Out 4.4.4	3		1	0	65535	1	1

Address	Parameter	Size(in Words)	UNITS	Divisor/ Multiplier	Min Value	Max Value	First Step Size	Further Step Size
40752	Third Party S/W Login Address	2						

Queries	Query from Third Party Software.	
	For login query	**For logout query**
	Device Id :	
	Write Function Code :	0x10
	Add High:	0x02
	Add Low:	0xF0
	No of regs High:	0x00
	No of regs Low:	0x02
Login And logout query	No of bytes:	0x04
	Login ID	0x00 / 0x01	0x00 / 0x00
	Password High:	0x04	0x00
	Password Low:	0xD2	0x00
	CRC Low :	
	CRC High :	

Response to Third Party Software.	
Device Id :	
Write Function Code : 0x10	
Add High :	0x02
Add Low :	0xF0
No of regs High :	0x00
No of regs Low :	0x02
CRC Low :	
CRC High :	

Error Response to Third Party Software.	
Device Id :	
Function Code :	0x80 | 0x10
Error Code	
CRC Low :	
CRC High :	

Queries	Response From Third Party Software.
	Device Id :
	Write Function Code : 0x10
	Add High: 0x02
	Add Low: 0xF0
	No of regs High: 0x00
	No of regs Low: 0x02
Changing password	No of bytes: 0x04
	Login ID 0x00 / 0x02
	New Password High:
	New Password Low:
	CRC Low :
	CRC High :

Registers has to be accessed with in the Range for each Parameters.	
Read Only parameters (Supported Function Code - 0x04)	
Parameters	**Register Range**
Metering Parameters	30001 -30155
Status(Broadcast) Parameters	30167-30173
DIO Module Status	**(Each Modules(DIO Module1,DIO Module2,DIO Module3,DIO Module4) has to be accessed separately.)**
DIO Module 1	30250-30257 (All the registers within this module has to be accessed together)
DIO Module 2	30258-30265 (All the registers within this module has to be accessed together)
DIO Module 3	30266-30273 (All the registers within this module has to be accessed together)
DIO Module 4	30274-30281 (All the registers within this module has to be accessed together)
Relay Module Status	
Relay Module 1	30282-30285 (All the registers within this module has to be accessed together)
Relay Module 2	30286-30289 (All the registers within this module has to be accessed together)
Relay Module 3	30290-30293 (All the registers within this module has to be accessed together)
Relay Module 4	30294-30297 (All the registers within this module has to be accessed together)
Active Set Group &Total Trip	**30298-30299**
Module Online Status	**30300-30314**
Records	
Trip Record 1- Trip Record 10	30324-30720 (One record can be accessed at a time)
Event Record 1-Event Record 128	30764-31907 (One record can be accessed at a time)
Maintenance Record 1-Maintenance Record 5	31916-31996 (One record can be accessed at a time)
Running Record	32016
Module Event Record	32036-32603 (One record can be accessed at a time)
Other Event Record	32612-32693 (One record can be accessed at a time)

Read/Write parameters (Supported Function Code - 0x03/0x06/0x10)	
Parameters	**Register Range**
Set Group 1	40001- 40188
Set Group 2	40201-40388
System Settings	40400-40408
Unit Settings	
DateTime	40415-40421
Remaining Parameters	40424-40471
Commands	40500
Module Settings	
DIO Module1	40600-40609
DIO Module2	40610-40619
DIO Module3	40620-40629
DIO Module4	40630-40639
Relay Module 1	40640-40644
Relay Module 2	40645-40649
Relay Module 3	40650-40654
Relay Module 4	40655-40659
Thermistor Module	40660-40666
Modbus Module	40668-40673
Configurator Module	40674
Analog Output Module	40675-40683
ZSI Module	40684-40687
Profibus Module	40689-40690
REF Module	40760-40769
EL Module	40770-40774
TCS Module	40776-40778
Zigbee Module	40779-40781
Relay Boolean Equation	40800-40980 (Each relay has to be accessed separately for reading and configuration)
DIO Boolean Equation	41000-41180 (Each DIO has to be accessed separately for read DIO Boolean Equations are not configurable)

Note 1: Trip Cause,Event Cause

1 - Instantaneous
2 - Earth Fault
3 - Short Circuit
4 - Directional Short Circuit
5 - Overload
6 - Neutral Overload
7 - ZSI Earth Fault
8 - ZSI Short Circuit
9 - Phase Sequence
10 - Restricted Earth Fault
11 - Earth Leakage
12 - Current Unbalance
13 - Under Current
14 - Under Voltage
15 - Over Voltage
16 - Voltage Unbalance
17 - Residual Voltage
18 - Under Frequency
19 - Over Frequency
20 - Reverse Power
21 - Trip Circuit Supervision
22 - Lead Power Factor
23 - Lag Power Factor
24 - Peak Factor
25 - Form Factor
26 - MD ActIve
27 - MD Reactive
28 - MD Apparent
29 - THD
30 - Terminal Temperature
31 - Earth Fault Test

Note 2: Pickup Setting String

String	Value
BLANK	0
AMPERES	1
VOLTS	2
PERCENT	3
PS_RYB	4
PS_RBY	5
kW	6
kVAR	7
kVA	8
DEG_C	9
HERTZ	10

Note 3: Rated Current (In)

If I_FRAME = X then Rated_Current should list the following values

X	Rated_Current
800	0 - 400, 1 - 630, 2 - 800
1600	3 - 1000, 4 - 1250, 5 - 1600
3200	6 - 2000, 7 - 2500, 8 - 3200
4000	9 - 2000, 10 - 2500, 11 - 3200, 12 - 4000
6300	13 - 5000, 14 - 6300

Note 9:

EXTREMELY_INVERSE	: 0
I4t	: 1
VERY_INVERSE	: 2
LONGTIME_INVERSE	: 3
STANDARD_INVERSE	: 4

Note 4: Maintenance Period

0	-	1 Month
1	-	2 Months
2	-	3 Months
3	-	4 Months
4	-	5 Months
5	-	6 Months
6	-	7 Months
7	-	8 Months
8	-	9 Months
9	-	10 Months
10	-	11 Months
11	-	12 Months

Note 10:

Interlocked with "close breaker" command. Current breaker status can be read from " Breaker status" parameter.

Note 5:

1	-	Instantaneous
2	-	Earth Fault
3	-	Short Circuit
4	-	Directional Short Circuit
5	-	Overload
6	-	Neutral Overload
7	-	ZSI Earth Fault
8	-	ZSI Short Circuit
9	-	Phase Sequence
10	-	Restricted Earth Fault
11	-	Earth Leakage
12	-	Current Unbalance
13	-	Under Current
14	-	Under Voltage
15	-	Over Voltage
16	-	Voltage Unbalance
17	-	Residual Voltage
18	-	Under Frequency
19	-	Over Frequency
20	-	Reverse Power
21	-	Trip Circuit Supervision
22	-	Lead Power Factor
23	-	Lag Power Factor
24	-	Peak Factor
25	-	Form Factor
26	-	MD ActIve
27	-	MD Reactive
28	-	MD Apparent
29	-	THD
30	-	Terminal Temperature
31	-	Earth Fault Test

Note 11:

Data for selecting the different baudrates:

BAUDRATE_300	0
BAUDRATE_1200	1
BAUDRATE_2400	2
BAUDRATE_4800	3
BAUDRATE_9600	4
BAUDRATE_19200	5
BAUDRATE_38400	6
BAUDRATE_57600	7
BAUDRATE_115200	8

Note 6

Range is
1.5 In to 15 In.
1.5 In to 10 In (Steps of 0.1 In)
10 In to 15 In (Steps of 1 In)

Note 12:

0 : Disable
1 : R-Ph I
2 : Y-Ph I
3 : B-Ph I
4 : Neu I
5 : Gnd I
6 : R-Ph V
7 : Y-Ph V
8 ; B-Ph V

Note 13:

ZSI Configurations are
-
0 - DISABLE
1 - E/F
2 - S/C
3 - BOTH

Note 7:

Interlocked with Instantaneous Pickup in SG1 Short Circuit Pickup High setting should be less than or equal to Instantaneous pickup setting.

Note 8:

Interlocked with Instantaneous Pickup in SG1 Short Circuit Pickup low setting should be less than or equal to Instantaneous pickup setting.

14. Cat No for P&C unit variants &optional modules

Sl.No	Cat No	Description
1	CL91966OOOO	UW-MTX 1.0 RELEASE ASSEMBLY
2	CL91971OOOO	UW-MTX 1.0G RELEASE ASSEMBLY
3	CL91965OOOO	UW-MTX 1.5G RELEASE ASSEMBLY
4	CL90700OOOO	UW-MTX 3.5 EC RELEASE ASSEMBLY
5	CL90610OOOO	UW-MTX2.5G RELEASE ASSEMBLY
6	CL90611OOOO	UW-MTX4.5 RELEASE ASSEMBLY
7	CL90112OOOO	UW-MTX2.5 RELEASE ASSEMBLY
8	CL90113OOOO	UW-MTX 3.5 RELEASE ASSEMBLY
9	CL90704OOOO	MATRIX VL MODULE ASSEMBLY
10	CL90705OOOO	MATRIX SMART CARD MODULE ASSEMBLY
11	CL90709OOOO	MATRIX COMM MOD MODULE ASSEMBLY
12	CL90732OOOO	MATRIX PROFIBUS MODULE ASSEMBLY
13	CL90732OOOO	MATRIX PROFIBUS MODULE ASSEMBLY
14	CL90733OOOO	MATRIX ZIGBEE MODULE ASSEMBLY
15	CL90737OOOO	MATRIX ZIGBEE USB MODULE ASSEMBLY
16	CL90712OOOO	TM MODULE ASSEMBY, MATRIX; U-POWER
17	CL90715OOOO	DIGITAL I/O MODULE-MATRIX;U-POWER
18	CL90716OOOO	RELAY MODULE-MATRIX;U-POWER
19	CL90717OOOO	ANALOG OUTPUT MODULE-MATRIX;U-POWER
20	CL90718OOOO	ZSI MODULE-MATRIX;U-POWER
21	CL90719OOOO	TCS MODULEMATRIX;U-POWER
22	CL90720OOOO	EL MODULE-MATRIX;U-POWER
23	CL90721OOOO	REF MODULE-MATRIX;U-POWER
24	CL90722OOOO	POWER SUPPLY MODULE-MARTRIX;U-POWER
25	CL90724OOOO	SIMULATION KIT MATRIX;U-POWER
26	CL91975OOOO	UW-MTX 3.5H RELEASE ASSEMBLY;U-POWER