Operating Manual

RISH Master 3440*i*/3440*iDL* 0.2S

as per IEC62053-22

INDEX

Touch Screen Digital Multi-Function Meter
Installation & Operating Instructions

Section **Contents**

1. Introduction

This instrument is a panel mounted 96 x 96mm DIN Quadratic Digital metering system for the measurement of important electrical parameters like AC voltage, AC Current, Frequency, Power, Energy(Active / Reactive / Apparent) . The instrument integrates accurate measurement of technology (All Voltage & Current measurements are True RMS upto 15th Harmonic) with 320x240 Pixels touch screen TFT LCD display.

This instrument can be configured and programmed at site for the following: PT Primary, PT Secondary, CT Primary, CT Secondary (5A or1A) and 3 phase 3W or 3 Phase 4W system. The front panel has a 3.5” Touch Screen through which the user can move across the available measurement readings, reset the energy, Min/Max (System Voltage and System Current) and configure the product settings.

Main menu is divided into 6 submenus. Each submenu contains a list of options. By touching the icons on main menu, submenus can be accessed. System submenu can be used to access RTC, harmonics, Power Quality events and other system parameters like system power, min, max voltage and current, THD, run hour, on hour and number of interruptions. Voltage, current and power submenu contain measurement of basic elecrical parameters. Energy submenu gives the total energy and Setup submenu can be used for complete meter settings.

TABLE 1:Measurement Parameters for both models

Measured Parameters	Units of Measurement	RM3440i	RM3440iDL
System Voltage	Volts	✓	✓
System Current	Amps	✓	✓
Voltage VL1-N(4wire only)	Volts	✓	✓
Voltage VL2-N(4wire only)	Volts	✓	✓
Voltage VL3-N(4wire only)	Volts	✓	✓
Voltage VL1-L2 (for 3 / 4 wire)	Volts	✓	✓
Voltage VL2-L3 (for 3 / 4 wire)	Volts	✓	✓
Voltage VL3-L1 (for 3 / 4 wire)	Volts	✓	✓
Current L1(for 3 / 4 wire)	Amps	✓	✓
Current L2(for 3 / 4 wire)	Amps	✓	✓
Current L3(for 3 / 4 wire)	Amps	✓	✓
Neutral Current (4 wire only)	Amps	✓	✓
Frequency	Hz	✓	✓
Active Power (System / Phase (4 wire only))	Kwatts	✓	✓
Reactive Power (System / Phase (4 wire only))	KVAr	✓	✓
Apparent Power (System / Phase (4 wire only))	KVA	✓	✓
Power Factor (System / Phase (4 wire only))	——	✓	✓
Phase Angle (Phase(4 wire only))	Degree	✓	✓
Active Import Energy (8 Digit resolution)	kWh	✓	✓
Active Export Energy (8 Digit resolution)	kWh	✓	✓
Inductive Reactive Energy (8 Digit resolution)	kVArh	✓	✓
Capacitive Reactive Energy (8 Digit resolution)	kVArh	✓	✓
Apparent Energy (8 Digit resolution)	kVAh	✓	✓
RTC	Date,Time	✗	✓
Individual Harmonics V	%	✗	✓
Individual Harmonics I	%	✗	✓
Sag, Swell & Overcurrent Events	-	✗	✓

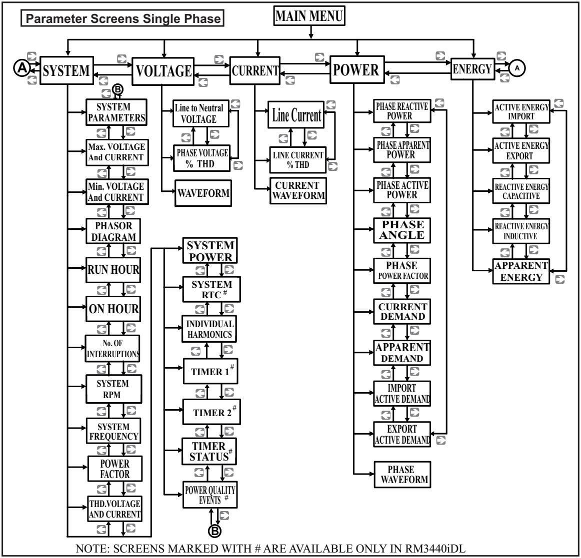
TABLE 1:Continued...

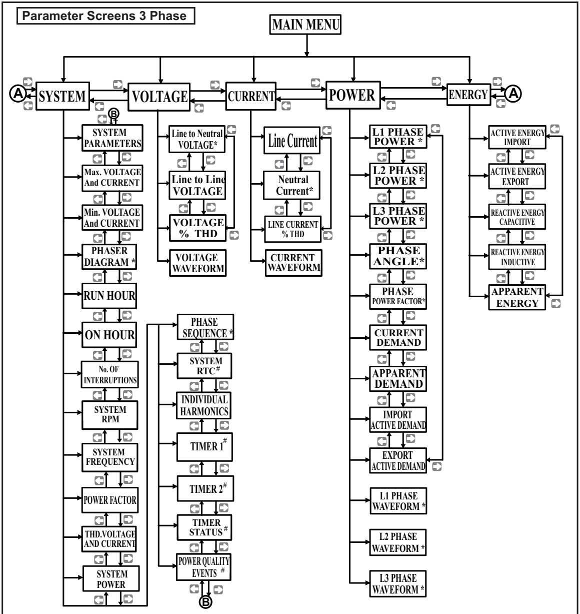
Measured Parameters	Units of Measurement	RM3440i	RM3440iDL
Timer1 No. of Cycles, ON, OFF delay	count,sec,sec	✗	✓
Timer2 No. of Cycles, ON, OFF delay	count,sec,sec	✗	✓
Current Demand	Amps	✓	✓
KVA Demand	KVA	✓	✓
KW Import Demand	KW	✓	✓
KW Export Demand	KW	✓	✓
KVAr Cap. Demand	KW	✓	✓
KVAr Ind. Demand	KW	✓	✓
Max Current Demand	Amps	✓	✓
Max kVA Demand	KVA	✓	✓
Max KW Import Demand	KW	✓	✓
Max KW Export Demand	KW	✓	✓
Max KVAr Ind. Demand	KW	✓	✓
Max KVAr Cap. Demand	KW	✓	✓
Run Hour	Hours	✓	✓
On Hour	Hours	✓	✓
Number of Interruptions	Counts	✓	✓
Phase Reversal Indication (4 wire only)	——	✓	✓
V1 THD* (for 3 / 4 wire)	%	✓	✓
V2 THD* (for 3 / 4 wire)	%	✓	✓
V3 THD* (for 3 / 4 wire)	%	✓	✓
I1 THD (for 3 / 4 wire)	%	✓	✓
I2 THD (for 3 / 4 wire)	%	✓	✓
I3 THD (for 3 / 4 wire)	%	✓	✓
System Voltage THD	%	✓	✓
System Current THD	%	✓	✓

***Note : THD Parameters are L-N in case of 3P 4W & L-L in case of 3P 3W .**

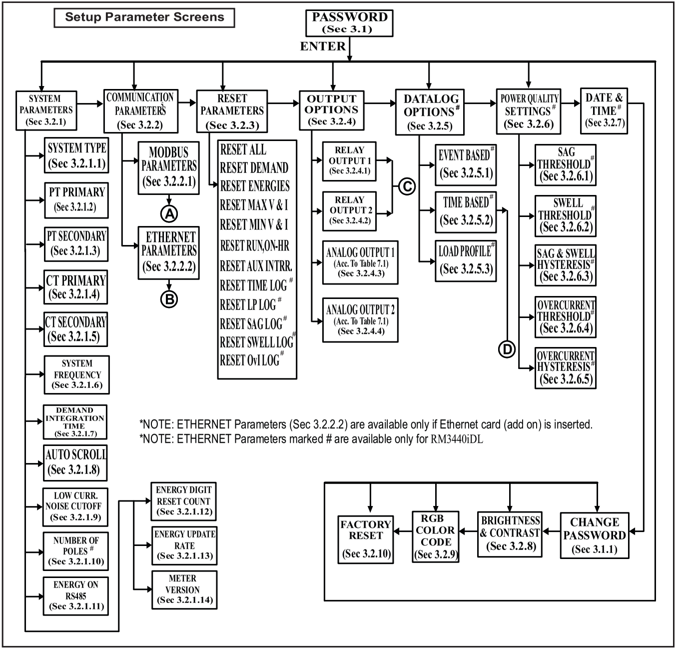
2. Measurement Reading Screens

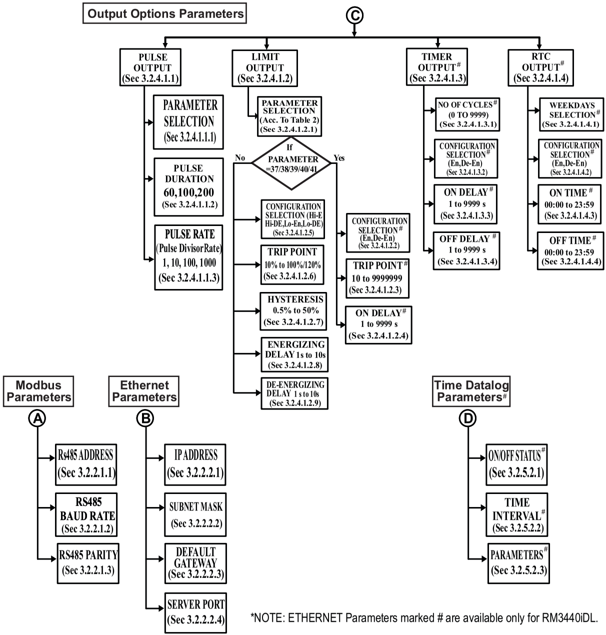
In normal operation the user is presented with one of the measurement reading screens out of several screens. These screens from particular submenu may be scrolled through one at a time in incremental order by touching the " ➡ key" and in decremental order by touching " ⬅ key" on that screen.





NOTE 1: SCREENS MARKED WITH * ARE AVAILABLE ONLY IN 4W SYSTEM (NOT IN 3 WIRE SYSTEM)
NOTE 2: SCREENS MARKED WITH # ARE AVAILABLE ONLY IN RM3440iDL


Setup Parameter Screens
PASSWORD (Sec 3.1)
ENTER
SYSTEM PARAMETERS (Sec 3.2.1)
COMMUNICATION PARAMETERS (Sec 3.2.2)
RESET PARAMETERS (Sec 3.2.3)
OUTPUT OPTIONS (Sec 3.2.4)
DATALOG OPTIONS# (Sec 3.2.5)
POWER QUALITY SETTINGS# (Sec 3.2.6)
DATE & TIME# (Sec 3.2.7)
SYSTEM TYPE (Sec 3.2.1.1)
PT PRIMARY (Sec 3.2.1.2)
PT SECONDARY (Sec 3.2.1.3)
CT PRIMARY (Sec 3.2.1.4)
CT SECONDARY (Sec 3.2.1.5)
SYSTEM FREQUENCY (Sec 3.2.1.6)
DEMAND INTEGRATION TIME (Sec 3.2.1.7)
AUTO SCROLL (Sec 3.2.1.8)
LOW CURR. NOISE CUTOFF (Sec 3.2.1.9)
NUMBER OF POLES # (Sec 3.2.1.10)
ENERGY ON RS485 (Sec 3.2.1.11)
ENERGY DIGIT RESET COUNT (Sec 3.2.1.12)
ENERGY UPDATE RATE (Sec 3.2.1.13)
METER VERSION (Sec 3.2.1.14)
MODBUS PARAMETERS (Sec 3.2.2.1)
A
ETHERNET PARAMETERS (Sec 3.2.2.2)
B
RESET ALL
RESET DEMAND
RESET ENERGIES
RESET MAX V & I
RESET MIN V & I
RESET RUN,ON-HR
RESET AUX INTRR.
RESET TIME LOG #
RESET LP LOG #
RESET SAG LOG #
RESET SWELL LOG #
RESET OvI LOG #
RELAY OUTPUT 1 (Sec 3.2.4.1)
RELAY OUTPUT 2 (Sec 3.2.4.2)
C
ANALOG OUTPUT 1 (Acc. To Table 7.1) (Sec 3.2.4.3)
ANALOG OUTPUT 2 (Acc. To Table 7.1) (Sec 3.2.4.4)
EVENT BASED# (Sec 3.2.5.1)
TIME BASED# (Sec 3.2.5.2)
D
LOAD PROFILE# (Sec 3.2.5.3)
SAG THRESHOLD# (Sec 3.2.6.1)
SWELL THRESHOLD# (Sec 3.2.6.2)
SAG & SWELL HYSTERESIS# (Sec 3.2.6.3)
OVERCURRENT THRESHOLD# (Sec 3.2.6.4)
OVERCURRENT HYSTERESIS# (Sec 3.2.6.5)
*NOTE: ETHERNET Parameters (Sec 3.2.2.2) are available only if Ethernet card (add on) is inserted.
*NOTE: ETHERNET Parameters marked # are available only for RM3440iDL
FACTORY RESET (Sec 3.2.10)
RGB COLOR CODE (Sec 3.2.9)
BRIGHTNESS & CONTRAST (Sec 3.2.8)
CHANGE PASSWORD (Sec 3.1.1)



*NOTE: ETHERNET Parameters marked # are available only for RM3440iDL.

3. Programming

The following sections comprise step by step procedures for configuring the instrument for individual user requirements. To access the set-up screens touch on the " SETUP " icon in Main Menu. This will take the User into the Password Protection Entry Stage(Section 3.1).

3.1. Password Protection

Password protection can be enabled to prevent unauthorised access to set-up screens, by default password is "0000".
Password protection is enabled by selecting any four digit number.

After touching " SETUP" icon Password protection screen is displayed. Screen consists of 0 to 9 digit input keypad for entering the password very similar to any calculator in touchscreen mobile."Enter Password" is displayed on screen at start so that user can enter password using displayed keypad.
Touching " 1 key" will display 1 in display area, similarly user can enter remaining 3 digits.

For deleting any digit while entering password, user can touch " DEL key".
After entering the complete password user needs to confirm password by touching " ENTER key''.

Password confirmed.
If Entered password is correct then "Password Accepted" is displayed on screen & user will on screen & user will enter into setup menu.

Password Incorrect.
If Entered password is wrong then "Password Rejected" is displayed on screen & user need to re-enter the password After wrong password is entered, user needs to touch " ENTER key " for trying another password.

3.1.1 Change Password

Change Password Option is the second last option in list of “SETUP” submenu, so can be accessed by a simple touch on “ Change Password” button.
In this screen user first needs to enter the current password.

After input of correct password,“PASSWORD ACCEPTED”is displayed & now user can enter the new 4 digit password.

New Password confirmed.
After entering new password user needs to touch “ ENTER key” to confirm.
After confirming “PASSWORD CHANGED” is displayed on screen, which ensures successful changing of the password.

3.2 Menu selection.

After entering in the SUBMENU 6 - SETUP, user will be asked to enter password & after input of correct password list of following parameters will be displayed on screen :-

3.2.1 SYSTEM PARAMETERS
3.2.2 COMMUNICATION PARAMETERS
3.2.3 RESET PARAMETERS
3.2.4 OUTPUT OPTIONS
3.2.5 DATALOGGING OPTIONS
3.2.6 POWER QUALITY SETTINGS
3.2.7 DATE & TIME SETTINGS
3.2.8 BRIGHTNESS & CONTRAST
3.2.9 RGB COLOR CODE
3.2.10 FACTORY RESET

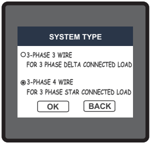
Touching on SYSTEM PARAMETER will open the system parameters list screen.Then these screens from particular parameter may be scrolled through one at a time in incremental order by touching the " ➡ key" and in decremental order by touching " ⬅ key" on given touch screen.

3.2.1 System Parameters Selection

After entering in the "SYSTEM PARAMETERS", List of following parameters will be displayed :-

3.2.1.1 SYSTEM TYPE
3.2.1.2 PT PRIMARY
3.2.1.3 PT SECONDARY
3.2.1.4 CT PRIMARY
3.2.1.5 CT SECONDARY
3.2.1.6 SYSTEM FREQUENCY
3.2.1.7 DEMAND INTEGRATION TIME
3.2.1.8 AUTO SCROLL
3.2.1.9 LOW CURRENT NOISE CUTOFF
3.2.1.10 NUMBER OF POLES
3.2.1.11 ENERGY RESOLUTION
3.2.1.12 ENERGY DIGIT RESET COUNT
3.2.1.13 ENERGY UPDATE RATE
3.2.1.14 METER VERSION

3.2.1.1 System Type

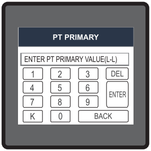


This screen is used to set the system type.
Two types: 3 phase 3 wire & 3 phase 4 wire system are displayed on screen (for RM3440i). Touching radio button in front of particular type will select that type.
Touch on " OK key" will confirm the system type.
Touching the " BACK key" will keep the old selected setting and will return to previous menu.

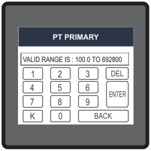
Note : If system type is changed, relay parameter selection & analog output selection will be set to NONE and all the PQ event data (sag/ swell/ overcurrent) would be erased.

3.2.1.2 Potential Transformer Primary Value

The nominal full scale voltage will be displayed as Line to Line Voltages for 3 Phase 3 wire and 3 Phase 4 wire and 1 Phase 2 wire for Single Phase.



This screen can be accessed only from system parameters list menu. Here again 0 to 9 digit input keypad is provided to set value of PT Primary, & user can confirm this value with a simple touch " ENTER key".
" K key" is used to multiply value by 1000.
In case presently displayed Potential Transformer Primary value together with the Current Transformer Primary value, previously set, would result in a maximum power of greater than 666.6 MVA per phase,"Invalid value" will be displayed. Then the valid range will be displayed.

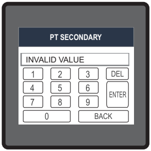


Valid range of PT primary setting value is
100V L-L to 692.8KV L-L.
If value outside the range is entered, It will display "**INVALID VALUE**" followed by correct range of parameter.

Note : Changing PT Primary would erase the Sag and Swell data of PQ events.

3.2.1.3 Potential Transformer secondary Value

The value must be set to the nominal full scale secondary voltage which will be obtained from the the Transformer when the potential transformer(PT)primary is supplied with the voltage defined in 3.2.1.2 potential transformer primary voltage. The ratio of full scale primary to full scale secondary is defined as the transformer ratio.
This screen can be accessed only from system parameters list menu. Here again 0 to 9 digit input keypad is provided to set value of PT Secondary, & user can confirm this value with a simple touch on " ENTER key".

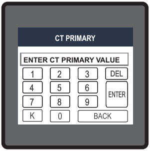


The Valid range of instrument is from 100 to 600V.
If value outside the range is entered, It will display "INVALID VALUE" followed by correct range of parameter.

Note : Changing PT Secondary would erase the Sag and Swell data of PQ events.

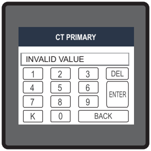
3.2.1.4 Current Transformer Primary Value

The nominal Full Scale Current that will be displayed as the Line currents. This screen enables the user to display the Line currents inclusive of any transformer ratios, the values displayed representthe Current in Amps.



This screen can be accessed only from system parameters list menu. Here again 0 to 9 digit input keypad is provided to set value of CT Primary & user can confirm this value with a simple touch on "ENTER key" and " K key" is used to multiply value by 1000. In case presently displayed Current Transformer Primary Value together with the Potential Transformer Primary Value results in a maximum power of greater than 666.6 MVA, "invalid value" will be displayed. Example: If primary value of PT is set as 692.8kV L-L (max value) then primary value of Current is restricted to 1157A.

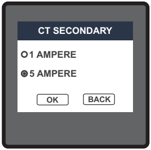
The “Maximum Power” restriction of 666.6 MVA refers to 120% of nominal current and 120% of nominal voltage, i.e, 462.96 MVA nominal power per phase.



Valid range of CT primary setting value is from 1 to 9999. If value outside the range is entered, It will display “INVALID VALUE” followed by correct range of parameter.

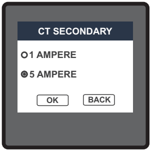
Note : Changing CT Primary would erase the Overcurrent data of PQ events.

3.2.1.5 Current Transformer Secondary Value



This screen is used to set the secondary value for Current Transformer. Two options: 1 AMPERE & 5 AMPERE are displayed on screen. Touching radio button in front of particular option will select that option.
Touch on “ OK key” will confirm the setting. Touching the “ BACK key” will keep the old selected setting and will return to previous menu.
Note : Changing CT Secondary would erase the Overcurrent data of PQ events.

3.2.1.6 System Frequency

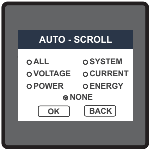


This screen is used to set the frequency of the input.
Two options : **50** & **60** Hz are displayed on screen.
Touching radio button in front of particular option will select that option.
Touch on “ OK key” will confirm the setting. Touching the “ BACK key” will keep the old selected setting and will return to previous screen.

3.2.1.7 Demand Integration Time

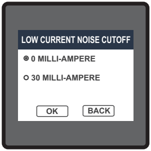
This screen is used to set the period over which current and power readings are to be integrated.
Four options: 8, 15, 20, 30 Minutes are displayed on screen.
Touching radio button in front of particular option will select that option.
Touch on " OK key" will confirm the setting.
Touching the " BACK key" will keep the old selected setting and will return to previous menu.

3.2.1.8 Auto Scrolling



This screen allows user to enable screen scrolling. Seven options : ALL, SYSTEM, VOLTAGE, CURRENT, POWER, ENERGY & NONE are displayed on screen. Touching radio button in front of particular option will select that option. Selecting particular option means, only screens which are under that submenu will be scrolled automatically. Selecting NONE will disable Auto-Scroll.
Touch on " OK key" will confirm the setting.
Touching the " BACK key" will keep the old selected setting and will return to previous menu.
While in Auto-scrolling mode, touch sense for entire screen will be disabled except for the top right most corner where "A" symbol would be displayed stating that meter is in Auto-scroll mode. Touching on "A" will show two options "ON" and "OFF". Touching on "ON" will continue auto scrolling & touching on "OFF" will stop auto-scrolling & return to normal mode.

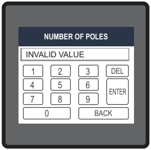
3.2.1.9 Low Current noise cutoff



This screen allows the user to set Low noise current cutoff in mA.
Two options, 0 MILLI-AMPERE & 30 MILLI-AMPERE are displayed on screen. Touching radio button in front of particular option will select that option.
Touch on " OK key" will confirm the setting.
Touching the " BACK key" will keep the old selected setting and will return to previous menu.

3.2.1.10 Number of Poles

This screen enables to set No. of poles of a Generator of which RPM is to be measured and to which the instrument is connected to monitor its parameters.

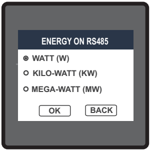


The valid range of number of poles is from **2 to 40**.

If an odd value or a value outside the range is entered, It will display "INVALID VALUE" followed by the correct range of parameter.
Touch on " OK key" will confirm the setting and will return to previous menu. Touching the " BACK key" will keep the old selected setting.

3.2.1.11 Energy Resolution

This screen enable user to set energy in terms of Wh / kWh / MWh on Rs485 Output

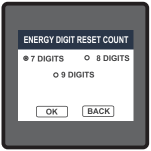


depending as per the user's requirement.
This setting is applicable for all types of energy.
Three options: WATT, KILO-WATT & MEGA-WATT are displayed on screen. Touching radio button in front of particular option will select that option.
Touch on " OK key" will confirm the setting.
Touching the " BACK key" will keep the old selected setting and will return to previous menu.

Note : Default value is set to 'WATT' i.e. Energy on Modbus will be in terms of Wh/VArh/VAh respectively.

3.2.1.12 Energy Digit Reset Count (Rollover Count)

This screen enables the user for setting maximum energy count after which energy will rollover to zero. This rollover count values are 7, 8 and 9 Digits.



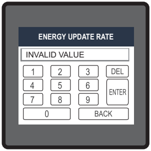
Touching radio button in front of particular option will select that option.
Touch on " OK key" will confirm the setting.
Touching the " BACK key" will keep the old selected setting and will return to previous menu.

Note :-

1) If Energy Resolution is set to MW & energy digit reset count is set to 9, Energy screen on display will show "-------" i.e energy overflow when energy crosses the 8 digit count.

3.2.1.13 Energy Update Rate

This screen allows user to enter energy update rate in minutes. After entering particular value in minutes, the energy will be updated on modbus location from 30145 to 30165 of 3X register and 40145 to 40165 of 4X register as per value that user has entered.



The valid range of number of poles is from **1 to 60** minutes.

If a value outside the range is entered, It will display "INVALID VALUE" followed by the correct range of parameter.
Touch on " OK key" will confirm the setting and will return to previous menu. Touching the " BACK key" will keep the old selected setting.

If Energy Rate is set to 2 then energy will get stored after 2 minutes on the modbus.

3.2.1.14 Meter Version

The meter version is available on the SYSTEM PARAMETERS screen as read only.

3.2.2 Communication Parameter Selection :

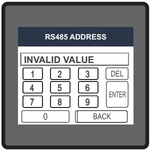
After entering in the “COMMUNICATION PARAMETERS” list of following parameters will be displayed

- 3.2.2.1 MODBUS PARAMETERS
  - 3.2.2.1.1 RS485 ADDRESS
  - 3.2.2.1.2 RS485 BAUD RATE
  - 3.2.2.1.3 RS485 PARITY
- 3.2.2.2 ETHERNET PARAMETERS
  - 3.2.2.2.1 IP ADDRESS
  - 3.2.2.2.2 SUBNET MASK
  - 3.2.2.2.3 DEFAULT GATEWAY
  - 3.2.2.2.4 SERVER PORT

3.2.2.1 Modbus Parameters Setting

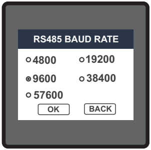
3.2.2.1.1 RS485 Address Setting

This screen applies to the RS 485 output only. This screen allows the user to set RS485 address parameter for the instrument. This screen can be accessed only from Communication Parameters List menu. Here again 0 to 9 digit input keypad is provided to set RS485 address & user can confirm this value with a simple touch on “ ENTER key”.



The range of allowable address is 1 to 247.
If value outside the range is entered, it will display “INVALID VALUE” followed by the correct range of parameter.

3.2.2.1.2 RS 485 Baud Rate



This screen allows the user to set Baud Rate of RS 485 port.
Five options: 2400, 4800, 9600, 19200, 57600 Bauds are displayed on screen. Touching radio button in front of particular option will select that option.
Touch on " OK key" will confirm the setting.
Touching the " BACK key" will keep the old selected setting and will Return to previous menu.

3.2.2.1.3 RS 485 Parity & Stop bit Selection

This screen allows the user to set Parity & number of stop bits.
Four options: ODD PARITY WITH ONE STOP BIT, NO PARITY WITH ONE STOP BIT, NO PARITY WITH TWO STOP BITS, EVEN PARITY WITH ONE STOP BIT are displayed on screen.
Touching radio buttion in front of particular option will select that option.
Touch on " OK key" will confirm the setting.
Touching the " BACK key" will keep the old selected setting and will return to previous menu.

3.2.2.2 Ethernet Parameters Setting

These settings are available only when the addon Ehernet card is connected to the instrument.

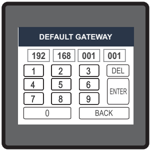
3.2.2.2.1 IP Address Setting

The user can enter a valid IP Address value for each octet, i.e. **0 to 255**.
Any value other than these would be indicated red and the previous value will get restored.
The user can confirm the address by touching the " ENTER key" and cancel the change by touching the " BACK key".

3.2.2.2.2 Subnet Mask Setting

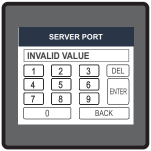
The user can enter a valid Subnet Mask value for each octet, i.e. **0 to 255**.
Any value other than these would be indicated red and the previous value will get restored.
The user can confirm the setting by touching the " ENTER key" and cancel the change by touching the " BACK key".

3.2.2.2.3 Default Gateway Setting



The user can enter a valid Default Gateway value for each octet, i.e. **0 to 255**.
Any value other than these would be indicated red and the previous value will get restored.
The user can confirm the setting by touching the " ENTER key" and cancel the change by touching the " BACK key".

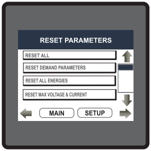
3.2.2.2.4 Server Port Setting



This screen allows the user to enter the server port for the IP settings.
The allowable range for server port value is **0 to 9999**.
If value outside the range is entered, it will display "INVALID VALUE" followed by the correct range of parameter.
The user can confirm the value by touching the " ENTER key" and cancel the change by touching the " BACK key".

3.2.3 Reset Parameter Selection:-

3.2.3.1 Resetting Parameter



These screens allow the users to reset all the parameters eg:- Energy, Min, Max, Demand, Run hour, On hour, No. of Interrupts, Sag Data, Swell Data, Overcurrent Data.
Touching " down" key scrolls list in upward direction. This screen is displayed after repeatedly touching " down" key.
Touching " Up" key scrolls list in downward direction.
User needs to touch on the specific parameter to be reset.

Touching on any parameter will display the confirmation dialog, now a touch on "YES key" will confirm the resetting of that particular Parameter.
Touching on "NO key" will move back to Reset parameters menu.
For example resetting All Energies will display a confirmation dialog as shown in the screen beside. User can reset other parameters in similar manner

3.2.4. Output Option selection menu

After entering in the “OUTPUT OPTIONS”, List of following parameters will be displayed :-

3.2.4.1 RELAY-1
3.2.4.2 RELAY-2
3.2.4.3 ANALOG-1
3.2.4.4 ANALOG-2

3.2.4.1 Relay1 output Selection menu

This screen applies to the Relay1 Output option Selection . Four options : PULSE OUTPUT, LIMIT OUTPUT, TIMER & RTC RELAY displayed on screen.
Touching any option will open screens of parameters related to that option.
Touch on “ OUTPUT OPTIONS key” will take back to Output Options screen.

3.2.4.1.1 Pulse output

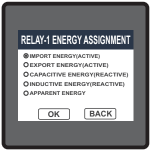
After entering in the “PULSE OUTPUT”, List of following parameters will be displayed :-

3.2.4.1.1.1 ENERGY
3.2.4.1.1.2 PULSE DURATION
3.2.4.1.1.3 PULSE RATE

These settings are used to assign Relay1 in Pulse output mode.

3.2.4.1.1.1 Assignment of Energy to pulse output (Relay 1) :

This screen allows the user to assign energy to pulse output (for Relay 1)



Following six options are displayed:-

Import Energy (Active) Export Energy (Active)
Capacitive Energy (Reactive) Inductive Energy (Reactive)
Apparent Energy

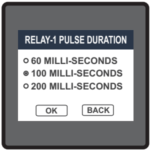
Touching radio button in front of any particular option will select that option.

Touch on " OK key" will confirm the setting.

Touching the " BACK key" will keep the old selected setting and will return to previous menu.

3.2.4.1.1.2 Pulse Duration Selection:

This screen applies only to the Pulsed output mode of both the relays.



This screen allows the user to set Relay energisation time in milliseconds.

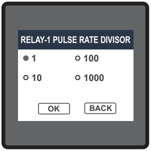
Three options: 60, 100, 200 ms are displayed on screen. Touching radio button in front of particular option will select that option.

Touch on " OK key" will confirm the setting.

Touching the " BACK key" will keep the old selected setting and will return to previous menu.

3.2.4.1.1.3 Pulse Rate

This screen applies only to the Pulsed output mode of both the relays.



The screen allows user to set the energy pulse rate divisor.

Divisor values can be selected through 1,10, 100,1000.Touching radio button in front of particular value will select that value.

Touch on " OK key" will confirm the setting.

Touching the " BACK key" will keep the old selected setting and will return to previous menu.

Pulse rate divisor is set to 1, when Energy on Rs485 is set to kWh or MWh.

3.2.4.1.2 Limit output

This screen is for Limit output mode selection. It allows the user to set Limit output corresponding measured value. After entering in Limit Output first time(was disabled previously), only “PARAMETER:” is displayed on screen. Now a simple touch on “PARAMETER:” will open list of parameters, Refer TABLE 2 “Parameter for Analog & Limit output” for assignment. Now after assignment of any parameter, list of following setting parameters will be displayed:-

3.2.4.1.2.1 LIMIT OUTPUT PARAMETER
3.2.4.1.2.2 ENERGY COUNT CONFIG
3.2.4.1.2.3 ENERGY TRIP POINT
3.2.4.1.2.4 ENERGY COUNT ON DELAY
3.2.4.1.2.5 PARAMETER CONFIG
3.2.4.1.2.6 TRIP POINT
3.2.4.1.2.7 HYSTERESIS
3.2.4.1.2.8 ENERGIZING DELAY
3.2.4.1.2.9 DE-ENERGIZING DELAY

3.2.4.1.2.1 Limit Parameter selection

This option allows the user to set Relay1 limit to corresponding measured parameter. A simple touch on “PARAMETER” row will open screen having list of parameters. (Refer TABLE 2 “Parameters for Analog & Limit output”)

Touch on “ OK key” will confirm the setting.

Touching the “ BACK key” will keep the old selected setting and will return to previous menu.

3.2.4.1.2.2 Energy Count Configuration

This screen is used to set the Limit Configuration for Energy Count.

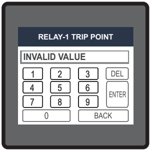
Selecting Active Import/ Active Export/ Capacitive/ Inductive/ Apparent Energy as Limit Output Parameter (see Section 3.2.4.1.2.1) allows the user select one of the following configurations:
ENERGIZED RELAY (To Energize the Relay)
DE-ENERGIZED RELAY (To De-Energized the Relay)

Touch on " OK key" will confirm the setting and take back to the previous screen.
Touch on " BACK key" will take back to the previous screen.

3.2.4.1.2.3 Energy Trip Point

This screen is used to trip the relay using the energy count. The relay trips after the lapse of "ON Delay" time (see Section 3.2.4.1.2.4) from the moment the energy count reaches the value of Energy Trip Point set by the user in addition to its value at the moment the Energy Trip Point is set.

Example: if the value set for Energy Trip Point is 888 and the value of the corresponding parameter at the moment this value is set is 1077, then the relay will trip after x sec of the moment the value of the parameter becomes 1965 (= 1077 + 888), where x is the ON Delay (see Section 3.2.4.1.2.4).



Here 0 to 9 digit input keypad is provided to set the Energy Trip Point & user can confirm this value with a simple touch on " ENTER key". and cancel the change by touching the " BACK key".

The valid range is 10 to 9999999.

If value outside this range is entered, it will display "INVALID VALUE" followed by correct range of parameter.

Caution:Once the relay has tripped, then to reactivate the Energy Tripping function, the user has to either reset the energy or re-enter the energy count.

3.2.4.1.2.4 Energy Count ON Delay

This screen allows the user to set ON Delay time in **seconds** for Relay Limit Assigned Parameter. Refer Section 3.2.4.1.2.3 for details.

Here 0 to 9 digit input keypad is provided to set the Energy Count On Delay & user can confirm this value with a simple touch on " ENTER key". and cancel the change by touching the " BACK key".

The valid range is 1 to 9999 seconds.

If value outside this range is entered, it will display "INVALID VALUE" followed by correct range of parameter.

3.2.4.1.2.5 Parameter Configuration

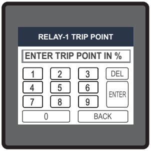
Selecting Limit Output Parameter (see Section 3.2.4.1.2.1) other than Active Import/ Active Export/ Capacitive/ Inductive/ Apparent Energy allows the user select one of the following configurations:

High Alarm & Energized Relay
High Alarm & De-Energized Relay
Low Alarm & Energized Relay
Low Alarm & De-Energized Relay

Touch on " OK key" will confirm the setting and take back to the previous screen.
Touch on " BACK key" will take back to the previous screen.
(For details refer to section 9.2)

3.2.4.1.2.6 Trip Point

This screen applies to the Trip point selection for parameters other than Active Import/ Active Export/ Capacitive/ Inductive/ Apparent Energy selected in Section 3.2.4.1.2.1. It allows the user to set Trip point for instruments.



The allowable range is **10% to 120% for High Alarm**, **10% to 100% for Low Alarm** (refer **TABLE 2**).

Here 0 to 9 digit input keypad is provided to set the Trip Point & user can confirm this value with a simple touch on " ENTER key". and cancel the change by touching the " BACK key".

If value outside the range is entered, it will display "INVALID VALUE" followed by correct range of parameter.

3.2.4.1.2.7 Hysteresis

This screen applies to the Hysteresis selection. This screen allows the user to set Hysteresis for relay output.

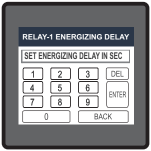
Here 0 to 9 digit input keypad is provided to set the Hysteresis & user can confirm this value with a simple touch on " ENTER key". and cancel the change by touching the " BACK key".

The allowable range is **0.5% to 50.0 %** of Trip point.

If value outside the range is entered, it will display "INVALID VALUE" followed by correct range of parameter.
(For details refer to section 9.2)

3.2.4.1.2.8 Energizing Delay

This screen allows the user to set Energizing Delay time in **seconds** for Relay Limit Assigned Parameters.



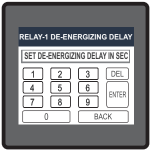
Here 0 to 9 digit input keypad is provided to set the Energizing Delay & user can confirm this value with a simple touch on " ENTER key". and cancel the change by touching the " BACK key".

The allowable range is **0 to 9999 seconds**.

If value outside the range is entered, it will display "INVALID VALUE" followed by correct range of parameter.
(For details refer to section 9.2)

3.2.4.1.2.9 De-Energizing Delay

This screen allows the user to set De-Energizing Delay time in **seconds** for Relay Limit Assigned Parameters.



Here 0 to 9 digit input keypad is provided to set the De-Energizing delay & user can confirm this value with a simple touch on " ENTER key". and cancel the change by touching the " BACK key".

The allowable range is **0 to 9999 seconds**.

If value outside the range is entered, it will display "INVALID VALUE" followed by correct range of parameter.
(For details refer to section 9.2)

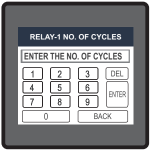
3.2.4.1.3 Timer Output

After entering in the "TIMER OUTPUT", List of following parameters will be displayed :-

3.2.4.1.3.1 NUMBER OF CYCLES
3.2.4.1.3.2 TIMER CONFIGURATION
3.2.4.1.3.3 ON DELAY
3.2.4.1.3.4 OFF DELAY

These settings are used to assign Relay1 in Timer output mode.

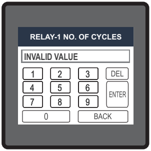
3.2.4.1.3.1 Number of Cycles



The value decides how many times the timer will repeat the switching after it has been started in the **timer based relay output option**.

Here 0 to 9 digit input keypad is provided to set the No. of Cycles & user can confirm this value with a simple touch on " ENTER key". and cancel the change by touching the " BACK key".

The value for this parameter can range from **0000 to 9999.**



If value outside this range is entered, it will display “INVALID VALUE” followed by correct range of parameter.

If the value is set as 0000, the timer will keep repeating the cycles until 9999 cycles are complete or the timer is stopped by the user. **Refer Section 9.3 for more details.**

Note: 1) To turn ON the relay in timer mode, visit “TIMER STATUS” submenu of SYSTEM submenu in measurement screens.
2) The live status of No. of Cycles, ON & OFF delay is aslo available to the user in “TIMER 1” and “TIMER 2” submenu of SYSTEM submenu in measurement screens for relay 1 and relay 2, respectively.

3.2.4.1.3.2 Timer Configuration

The option decides the relay configuration for timer output. Two options are available:
1. **ENERGIZED RELAY**: Energize on start
2. **DE-ENERGIZED RELAY** : De-energize on start.

Touch on “ OK key” will confirm the setting and take back to the previous screen.
Touch on “ BACK key” will take back to the previous screen.

3.2.4.1.3.3 On Delay

The value decides the time in seconds taken by the relay in timer configuration before tripping after it is started.

Here 0 to 9 digit input keypad is provided to set the On Delay & user can confirm this value with a simple touch on “ ENTER key”. and cancel the change by touching the “ BACK key”.

The valid range is 1 to 9999 seconds.

If value outside this range is entered, it will display “INVALID VALUE” followed by correct range of parameter.

3.2.4.1.3.4 Off Delay

The value decides the time in seconds taken by the relay in timer configuration before coming out of the trip state after it has tripped.

Here 0 to 9 digit input keypad is provided to set the Off Delay & user can confirm this value with a simple touch on " ENTER key". and cancel the change by touching the " BACK key".

The valid range is 1 to 9999 seconds.

If value outside this range is entered, it will display "INVALID VALUE" followed by correct range of parameter.

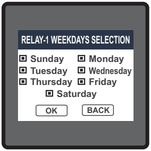
3.2.4.1.4 RTC Output

After entering in the "RTC OUTPUT", List of following parameters will be displayed :-

3.2.4.1.4.1 WEEKDAYS SELECTION
3.2.4.1.4.2 RELAY CONFIGURATION
3.2.4.1.4.3 ON TIME
3.2.4.1.4.4 OFF TIME

These settings are used to assign Relay1 in RTC output mode.

3.2.4.1.4.1 Weekdays Selection



This screen allows user to select the days of the week on which the relay behaves as configured for RTC Relay settings.

Touch on " OK key" will confirm the setting and take back to the previous screen.
Touch on " BACK key" will take back to the previous screen.

3.2.4.1.4.2 Relay Configuration

The option decides the relay configuration for RTC output. Two options are available:
1. **ENERGIZED RELAY**: Energize on start
2. **DE-ENERGIZED RELAY** : De-energize on start.

Touch on " OK key" will confirm the setting and take back to the previous screen.
Touch on " BACK key" will take back to the previous screen.

3.2.4.1.4.3 On Time

On Time is the time on which the relay becomes active.

Here hour and minute settings can be done separately by touching the corresponding value which will open the keypad.
The 0 to 9 digit input keypad is provided to set the On Time & user can confirm this value with a simple touch on " ENTER key". and cancel the change by touching the " BACK key".

The valid range for hour is 0 to 23 and that for minute is 0 to 59.

If value outside this range is entered, it will display "INVALID VALUE" followed by correct range of parameter.

3.2.4.1.4.4 Off Time

Off Time is the time on which the relay deactivates.

Here hour and minute settings can be done separately by touching the corresponding value which will open the keypad.
The 0 to 9 digit input keypad is provided to set the Off Time & user can confirm this value with a simple touch on " ENTER key". and cancel the change by touching the " BACK key".

The valid range for hour is 0 to 23 and that for minute is 0 to 59.

If value outside this range is entered, it will display "INVALID VALUE" followed by correct range of parameter.

3.2.4.2 Relay 2 Output Selection

Configuration of Relay 2 for Pulse/ Limit/ Timer/ RTC Output is same as Relay 1. If you Select the Pulse output option for Relay 1 same setting will be applicable for Relay 2.

3.2.4.3 Parameter setting for Analog Output 1 (Optional)

This option allows the user to set analog output 1 to corresponding measured parameter. A simple touch on “ANALOG-1”row will open screen having list of parameters.(Refer TABLE 2 “ Parameter for Analog & Limit output ”)

Touch on “ OK key” will confirm the setting.

Touching the “ BACK key” will keep the old selected setting and will return to previous menu.

3.2.4.4 Parameter setting for Analog Output 2 (Optional)

This option allows the user to set analog output 2 to corresponding measured parameter. A simple touch on “ANALOG-2”row will open screen having list of parameters.(Refer TABLE 2 “ Parameter for Analog & Limit output ”)

Touch on “ OK key” will confirm the setting.

Touching the “ BACK key” will keep the old selected setting and will return to previous menu.

3.2.5 Datalog Option Selection

After entering in the “DATALOGGING OPTIONS”, List of following options will be displayed :-
3.2.5.1 EVENT BASED DATALOG
3.2.5.2 TIME BASED DATALOG
3.2.5.3 LOAD PROFILE DATALOG
Any of these can be selected for logging of data.

3.2.5.1 Event Based Datalog Setup

Touching the “EVENT BASED DATALOG” option of Section 3.2.5 will provide a confirmation dialog.

If logging is turned off, then touching “ YES ” will turn on the Event Based Datalogging while touching “ NO ” will make no change.

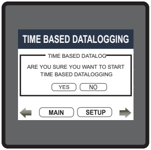
If it is turned on, then touching “ YES ” will turn off the Event Based Datalogging while touching “ NO ” will make no change.

3.2.5.2 Time Based Datalog Setup

Following Time based datalog parameters can be set by touching the “TIME BASED DATALOG” option of Section 3.2.5:

3.2.5.2.1. STATUS SELECTION
3.2.5.2.2. TIME INTERVAL
3.2.5.2.3. PARAMETER SELECTION

3.2.5.2.1 Time Based Datalog Status Selection



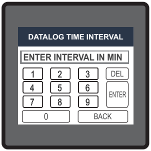
Touching the “STATUS” option of Section 3.2.5.2 will provide a confirmation dialog.

If logging is turned off, then touching “ YES ” will turn on the Time Based Datalogging while touching “ NO ” will make no change.

If it is turned on, then touching “ YES ” will turn off the Time Based Datalogging while touching “ NO ” will make no change.

Caution: The settings for time based logging (see Section 3.2.5.2.2 & Section 3.2.5.2.3) are not editable if time based datalog selection is turned ON (see Section 3.2.5.2.1).

3.2.5.2.2 Time Interval Selection



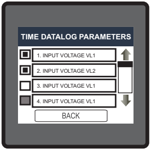
The value decides the time interval between two successive time datalog entries.

Here 0 to 9 digit input keypad is provided to set the Time Interval & user can confirm this value with a simple touch on “ ENTER key”. and cancel the change by touching the “ BACK key”.

The valid range is 1 to 60 minutes.

If value outside this range is entered, it will display “INVALID VALUE” followed by correct range of parameter.

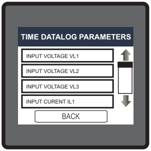
3.2.5.2.3 Parameter Selection



The parameter for time based datalogging can be selected out of the available options by first touching the checkbox infront of it to enable the selection and then touching the corresponding button to get the available parameters.

Maximum 30 and minimum 1 parameter(s) can be chosen.

The list of available parameters is given in TABLE 3.



When the button (for which the checkbox is selected) is touched, the list of available parameters (Table) appear. The user can scroll for the required parameter and select the same by touching it.

The number of parameters selected for datalogging appears on the "TIME BASED DATALOGGING" screen (Section 3.2.5.2) for PARAMETERS setting option.

Only these selected parameters will get logged.

3.2.5.3 Load Profile Datalog Setup

Touching the "LOAD PROFILE DATALOG" option of Section 3.2.5 will provide a confirmation dialog.

If logging is turned off, then touching " **YES** " will turn on the Load Profile Datalogging while touching " **NO** " will make no change.

If it is turned on, then touching " **YES** " will turn off the Load Profile Datalogging while touching " **NO** " will make no change.

3.2.6 PQ Event Settings

After entering in the "PQ EVENT SETTINGS", List of following options will be displayed :-

3.2.6.1 SAG THREHOLD
3.2.6.2 SWELL THRESHOLD
3.2.6.3 SAG & SWELL HYSTERESIS
3.2.6.4 OVERCURRENT THRESHOLD
3.2.6.5 OVERCURRENT HYSTERESIS

3.2.6.1 Sag Threshold Setting

The value decides the threshold for sag detection.**(Refer section 8 for details)**

Here 0 to 9 digit input keypad is provided to set the Sag Threshold & user can confirm this value with a simple touch on " ENTER key" and cancel the change by touching the " BACK key".

The valid range is **10 to 90 % of nominal voltage**.

If value outside this range is entered, it will display "INVALID VALUE" followed by correct range of parameter.

Note : Changing Sag Threshold would erase the Sag data of PQ events.

3.2.6.2 Swell Threshold Setting

The value decides the threshold for swell detection.**(Refer section 8 for details)**

Here 0 to 9 digit input keypad is provided to set the Swell Threshold & user can confirm this value with a simple touch on " ENTER key" and cancel the change by touching the " BACK key".

The valid range is **110 to 150 % of nominal voltage**.

If value outside this range is entered, it will display "INVALID VALUE" followed by correct range of parameter.

Note : Changing Swell Threshold would erase the Swell data of PQ events.

3.2.6.3 Sag & Swell Hysteresis Setting

The value decides the common hysteresis for sag & swell detection. Hysteresis is the difference in magnitude between the start and end threshold.**(Refer section 8 for details)**

Here 0 to 9 digit input keypad is provided to set the Sag & Swell Hysteresis & user can confirm this value with a simple touch on " ENTER key" and cancel the change by touching the " BACK key".

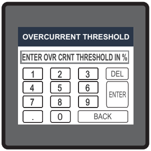
The valid range is **1 to 20 % of nominal value**.

If value outside this range is entered, it will display "INVALID VALUE" followed by correct range of parameter.

Note : Changing Sag & Swell Hysteresis would erase the Sag & Swell data of PQ events.

3.2.6.4 Overcurrent Threshold Setting

The value decides the threshold for overcurrent detection.**(Refer section 8 for details)**



Here 0 to 9 digit input keypad is provided to set the Overcurrent Threshold & user can confirm this value with a simple touch on " ENTER key" and cancel the change by touching the " BACK key".

The valid range is **110 to 150 % of nominal current**.

If value outside this range is entered, it will display "INVALID VALUE" followed by correct range of parameter.

Note : Changing Overcurrent Threshold would erase the Overcurrent data of PQ events.

3.2.6.5 Overcurrent Hysteresis Setting

The value decides the hysteresis for overcurrent detection.Hysteresis is the difference in magnitude between the start and end threshold.**(Refer section 8 for details)**

Here 0 to 9 digit input keypad is provided to set the Overcurrent Hysteresis & user can confirm this value with a simple touch on "ENTER key" and cancel the change by touching the " BACK key".

The valid range is **1 to 20 % of nominal current**.

If value outside this range is entered, it will display "INVALID VALUE" followed by correct range of parameter.

Note : Changing Overcurrent Hysteresis would erase the Overcurrent data of PQ events.

3.2.7 Date & Time Settings

After entering in the "DATE AND TIME SETUP", the user will be able to change the DATE, MONTH, YEAR, HOUR & MINUTE individually by touching the corresponding option.

The range for date is **10-10-2000 to 31-12-2099** and that for time is **00:00 to 23:59**.

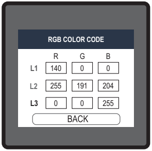
Touching an option gives 0 to 9 digit input keypad to set the corresponding value & user can confirm this value with a simple touch on "ENTER key" and cancel the change by touching the " BACK key".

If invalid value is entered, it will display "INVALID VALUE" followed by correct range of the parameter.

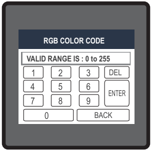
3.2.8 Brightness & Contrast

The brightness & contrast of the TFT LCD screen can be varied by the user by sliding the sliders. Touching the " OK key" will confirm the current brightness contrast setting.
Touching the DEFAULT key will set brightness and contrast as per factory settings. Touching the BACK key will move back to the setup menu without making any changes.

3.2.9 RGB Color Code (only for 3 Phase 3 Wire / 4 Wire)



This screen allows user to set the values of Red, Green and Blue components of colors used to display the parameters of all three phases.
Different colors can be assigned to each phase using combination of Red, Green and Blue component values. L1,L2,L3 will be set to the assigned color.



To set these values, touch the corresponding rectangular section, 0 to 9 digit input keypad will appear. After entering the value using this keypad,user can confirm this value with a simple touch on " ENTER key".
" BACK key" is used to go back to previous screen.

The allowable range for these values is 0 to 255. If a value outside this range is entered, it will display " VALID RANGE IS : 0 TO 255".
NOTE : Colors similar to background are not recommended.

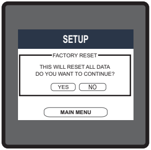
Standard color combinations

COLOR	R	G	B
Black	0	0	0
Blue	0	0	255
Brass	181	166	66
Bronze	204	128	51
Brown	166	41	41
Copper	184	115	51
Dark Blue	0	0	140
Dark Brown	102	66	33
Dark Green	0	51	33

COLOR	R	G	B
Dark Pink	232	84	128
Dark Purple	48	26	51
Dark Red	140	0	0
Dark Violet	148	0	212
Dark Yellow	156	135	13
Gold	212	176	56
Gray	128	128	128
Green	0	255	0
Indigo	74	0	130

COLOR	R	G	B
Light Blue	173	217	230
Maroon	176	48	97
Pink	255	191	204
Purple	161	33	240
Red	255	0	0
Silver	191	191	191
Violet	143	0	255
White	255	255	255
Yellow	255	255	0

3.2.10 Factory Reset



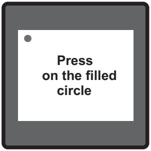
Touching the “FACTORY RESET” option of Section 3.2 will provide a confirmation dialog.

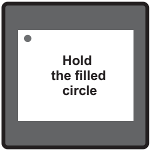
Touching “ YES ” allows the user to erase all data from the meter and set all setup parameters to their default values while touching “ NO ” will make no change.

4 Touch screen calibration

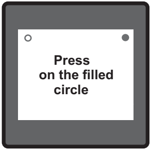
This instrument is able to perform calibration to ensure the proper operation of the units touch screen functionalities. The calibration procedure will correct the problem of out of tolerance touch screen malfunction. Note that errors corrected by this calibration procedure are specific only to touch screen operation.

For starting touch screen calibration, touch the screen any where for 1 sec at system reset. After that touch screen calibration will start & the message shown besides will be displayed. Touch the screen to continue.

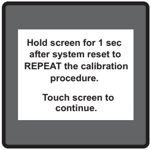




Follow the instructions displayed. Press & hold the center of the filled red circle for at least 2 seconds. Release when message for release is being displayed. For accurate results try to touch the center of the filled circle.



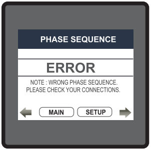
Repeat the same procedure for the remaining 3 corner circles.



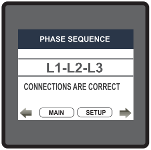
After successful calibration, the message shown besides would be displayed. Touch the screen to continue.

If the touch screen was not calibrated properly, “Error in calibration”message would be shown & the user will be asked to recalibrate the touch screen. In such case the meter will retain the previously stored touch - screen calibration values unless a successful calibration is being performed.

5. Phase Rotation Error screen(Only for 3P3W/4W)

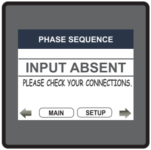


Meter shows phase rotation error if the phase sequence R-Y-B (L1-L2-L3) is not maintained This screen indicates that Phase sequence is incorrect. User must check this screen in order to get correct readings When meter is connected.



Correct Phase sequence

This Screen indicates the phase sequence connected to meter is correct. If phase sequence is wrong this screen is useful to get correct phase sequence by interchanging connection & verifying it with screen.



This Screen indicates that either of the phases or all three phases (Voltages) are absent.

6. Run Hr, On Hr & No. of Interruptions

6.1. Run Hour

This Screen shows the total no. of hours the load is connected. Even if the Auxiliary supply is interrupted, the count of Run hour will be maintained in internal memory & displayed in the format "hours. min". For example if Displayed count is 000001.19 hrs it indicates 1 hours & 19 minutes.

After 999999.59 run hours display will restart from zero.

To reset run hour manually see section Resetting Parameter 3.2.3.1

6.2. On Hour

This Screen shows the total no. of hours the Axillary Supply is ON. Even if the Auxiliary supply is interrupted count of On hour will be maintained in internal memory & displayed in the format "hours. min".

For example if Displayed count is 000005.18 hrs it indicates 15 hours & 18 minutes.

After 999999.59 On hours display will restart from zero.

To reset On hour manually see section Resetting Parameter 3.2.3.1

6.3. Number of Interruption

This Screen Displays the total no. of times the Axillary Supply was Interrupted. Even if the Auxiliary supply is interrupted count will be maintained in internal memory.

To reset No of Interruption manually see section Resetting Parameter 3.2.3.1

7. Analog Output (optional) :

This module provides two d.c. isolated outputs :

Two 4 - 20mA outputs , internally powered .

The output signals are present on pins A1(Analog Output 1) & A2 (Analog Output 2)
These outputs can be individually assigned to represent any one of the measured and displayed Parameters.
All settings are user configurable via the user interface screen. See Analog o/p selection (section 3.2.4.3 & section 3.2.4.4) for details .

*** Note : Refer diagram 1**

Diagram 1 : (4 -20 mA)

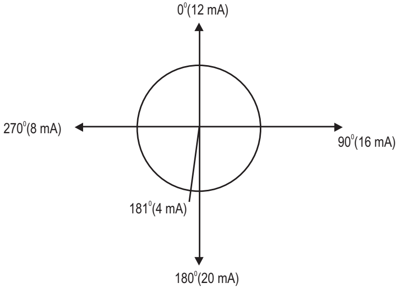


TABLE 2 : Parameter for Analog & Limit Output

Parameter No.	Parameter	3P 4W	3P 3W	1P 2W	Trip Point Set Range	100% Value
0	None	✓	✓	✓	-	-
1	Volts 1	✓	✓	✓	10 - 120 %	Vnom (L-N)
2	Volts 2	✓	✓	✗	10 - 120 %	Vnom (L-N)
3	Volts 3	✓	✓	✗	10 - 120 %	Vnom (L-N)
4	IL1	✓	✓	✓	10 - 120 %	Inom
5	IL2	✓	✓	✗	10 - 120 %	Inom
6	IL3	✓	✓	✗	10 - 120 %	Inom
7	W1	✓	✗	✓	10 - 120 %	Nom [3]
8	W2	✓	✗	✗	10 - 120 %	Nom [3]
9	W3	✓	✗	✗	10 - 120 %	Nom [3]
10	Va1	✓	✗	✓	10 - 120 %	Nom [3]
11	Va2	✓	✗	✗	10 - 120 %	Nom [3]
12	Va3	✓	✗	✗	10 - 120 %	Nom [3]
13	Var1	✓	✗	✓	10 - 120 %	Nom [3]
14	Var2	✓	✗	✗	10 - 120 %	Nom [3]
15	VAr3	✓	✗	✗	10 - 120 %	Nom [3]
16	PF1 #	✓	✗	✓	10 - 90 %	90°
17	PF2 #	✓	✗	✗	10 - 90 %	90°
18	PF3 #	✓	✗	✗	10 - 90 %	90°
19	PA1 #	✓	✗	✓	10 - 90 %	360°
20	PA2 #	✓	✗	✗	10 - 90 %	360°
21	PA3 #	✓	✗	✗	10 - 90 %	360°
22	Volts Ave	✓	✓	✗	10 - 120 %	Vnom [2]
24	Current Ave	✓	✓	✗	10 - 120 %	Inom
27	Watts sum	✓	✓	✗	10 - 120 %	Nom [3]
29	VA sum	✓	✓	✗	10 - 120 %	Nom [3]
31	VAr sum	✓	✓	✗	10 - 120 %	Nom [3]
32	PF Ave. #	✓	✓	✗	10 - 90 %	90°
34	PA Ave. #	✓	✓	✗	10 - 90 %	360°
36	Freq. #	✓	✓	✓	10 - 90 %	66 Hz [1]
37	Wh Import*	✓	✓	✓	10 - 9999999	Nom [3]

TABLE 2 : Continued...

Parameter No.	Parameter	3P 4W	3P 3W	1P 2W	Trip Point Set Range	100% Value
38	Wh Export*	✓	✓	✓	10 - 9999999	Nom (3)
39	VAr Capacitive*	✓	✓	✓	10 - 9999999	Nom (3)
40	VAr Inductive *	✓	✓	✓	10 - 9999999	Nom (3)
41	VA*	✓	✓	✓	10 - 9999999	Nom (3)
43	Watt Demand Imp.	✓	✓	✓	10 - 120 %	Nom (3)
44	Watt Max Demand Imp.	✓	✓	✓	10 - 120 %	Nom (3)
45	Watt Demand Exp.	✓	✓	✓	10 - 120 %	Nom (3)
46	Watt Demand Max Exp.	✓	✓	✓	10 - 120 %	Nom (3)
47	VAr Demand Cap.	✓	✓	✓	10 - 120 %	Nom (3)
48	VAr Max Demand Cap.	✓	✓	✓	10 - 120 %	Nom (3)
49	VAr Demand Ind.	✓	✓	✓	10 - 120 %	Nom (3)
50	VAr Demand Max Ind.	✓	✓	✓	10 - 120 %	Nom (3)
51	VA Demand	✓	✓	✓	10 - 120 %	Nom (3)
52	VA Max Demand	✓	✓	✓	10 - 120 %	Nom (3)
53	Current Demand	✓	✓	✓	10 - 120 %	Inom
54	Current Max Demand	✓	✓	✓	10 - 120 %	Inom
101	VL1-L2	✓	✗	✗	10 - 120 %	Vnom (L-L)
102	VL2-L3	✓	✗	✗	10 - 120 %	Vnom (L-L)
103	VL3-L1	✓	✗	✗	10 - 120 %	Vnom (L-L)
113	I Neutral	✓	✗	✗	10 - 120 %	Inom
114	Relay Manual OFF*	✓	✓	✓	1	-
115	Relay Manual ON*	✓	✓	✓	1	-

Note : Parameters 1,2,3 are L-N Voltage for 3P 4W & L-L Voltage for 3P 3W.
***Note : Parameters marked are not applicable for RM3440i and Analog output.**
#Note : Refer #Note of Section 5.2 for details.

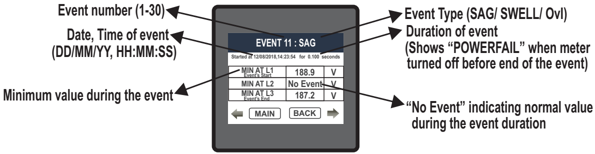
(1) For Frequency 0% corresponds to 45 Hz and 100% corresponds to 66 Hz.
(2) For 3P 4W and 1P2W the nominal value is VLN and that for 3P 3W is VLL.
(3) Nominal Value for power is calculated from Nominal Voltage and current values.
(4) Nominal Value is to be considered with set CT/ PT Primary values.
(5) For single phase L1 Phase values are to be considered as System values.

8. Power Quality Measurement:

The instrument measures the three power quality events, namely voltage sag, voltage swell and overcurrent.

These events get stored in tabular form giving the corresponding date & time of event start and its duration. The minimum event duration that can be recorded is 100mseconds.

Maximum of 30 such events get stored in the table one by one in the first in first out manner i.e., the 31st event replaces 1st event and so on.
Touching a particular event in the table gives the detailed information about the corresponding event. Consider an example for SAG detection:



"Ëvent's Start" indicates the phase which had the minimum value during the Event's start and "Ëvent's End" indicates the phase which had the minimum value during the Event's end.

In case of swell/ overcurrent event, MAX would appear in place of MIN and respective phase readings would be taken considering the maximum values (instead of minimum values taken in case of sag).

The Threshold and Hysteresis settings (Section 3.2.6) done in % by the user results in the following values: (Consider Figure 9.1)

$$\text{Threshold Value} = \frac{(\%\text{Threshold}) \times \text{Nominal Value}}{100}$$

$$\text{Hysteresis Value} = \frac{(\%\text{Hysteresis}) \times \text{Nominal Value}}{100}$$

Example for sag:
Nominal voltage = 100V
Threshold = 80% = 80V
Hysteresis = 2% = 2V

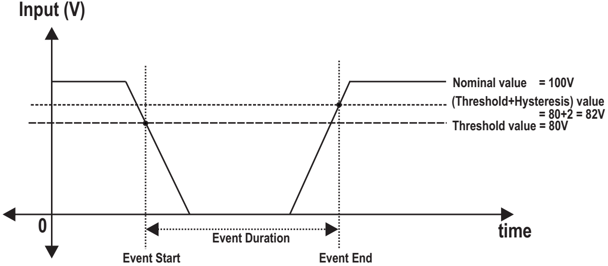


Figure 9.1: Waveform of SAG detection for 1P2W system

Note:

(1) For the events to be detected, it is recommended to bring the system voltage and current for all channels to their corresponding nominal values.

(2) The nominal voltage is the L-L PT Primary value in case of 3P3W system and L-N PT Primary value in case of 3P4W and 1P2W system.

(3) The nominal current is taken to be CT Primary value.

(4) In case of polyphase systems, sag begins when the voltage of one or more channels falls below the threshold and ends when the voltage on all measured channels is above the threshold plus the hysteresis voltage (Figure 9.1). Similarly, the Swell/ Overcurrent event is shown in Figure 9.2.

Example for swell/ overcurrent:

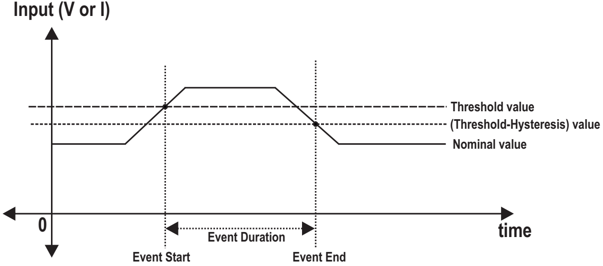


Figure 9.2: Waveform of SWELL/ OVERCURRENT detection for 1P2W system

9. Relay output (Optional) :

This instrument is provided with either 1 or 2 relay for pulse output as well as for limit switch

9.1 Pulse Output :

Pulse output is the potential free, very fast acting relay contact which can be used to drive an external mechanical counter for energy measurement.

This instrument's pulse output can be configured to any of the following parameter through setup parameter screen

1) Active Energy (Import) 2) Active Energy (Export)
3)Reactive Energy (Import) 4)Reactive Energy (Export)
5)Apparent Energy

TABLE 9.1.1 : Energy Pulse Rate Divisor

1.For Energy Output in Wh

	Pulse rate	
Divisor	Pulse	System Power*
1	1per Wh	Up to 3600W
	1per kWh	Up to 3600kW
	1per Mwh	Above 3600kW
10	1per 10Wh	Up to 3600W
	1per 10kWh	Up to 3600kW
	1per 10MWh	Above 3600kW
100	1per 100Wh	Up to 3600W
	1per 100kWh	Up to 3600kW
	1per 100MWh	Above 3600kW
1000	1 per 1000Wh	Up to 3600W
	1 per 1000kWh	Up to 3600kW
	1per 1000MWh	Above 3600kW
Pulse Duration 60 ms,100 ms or 200 ms		

2. For Energy Output in kWh

	Pulse rate	
Divisor	Pulse	System Power*
1	1 per kWh	Up to 3600W
	1 per 1000kWh	Up to 3600kW
	1 per 1000MWh	Above 3600kW

3. For Energy Output in MWh

	Pulse rate	
Divisor	Pulse	System Power*
1	1 per MWh	Up to 3600W
	1 per 1000MWh	Up to 3600kW
	1 per 1000GWh	Above 3600kW

Above options are also applicable for Apparent and Reactive Energy.

* System power = 3 x CT(Primary) x PT(Primary)L-N for 3 Phase 4 Wire
System power = Root3 x CT(Primary) x PT(Primary)L-L for 3 Phase 3 Wire

Ampere Hour: Divisor 1(Default)
CT secondary = 1A Max pulse rate 3600 pulses per Ah **
CT secondary = 5A Max pulse rate 720 pulses per Ah **

Divisors 10
CT secondary = 1A Max pulse rate 3600 pulses per 10Ah **
CT secondary = 5A Max pulse rate 720 pulses per 10Ah **

Divisors 100
CT secondary = 1A Max pulse rate 3600 pulses per 100Ah **
CT secondary = 5A Max pulse rate 720 pulses per 100Ah **

Divisors 1000
CT secondary = 1A Max pulse rate 3600 pulses per 1000Ah **
CT secondary = 5A Max pulse rate 720 pulses per 1000Ah **

Pulse duration 60 ms, 100 ms or 200 ms
**No. of Pulses per Ampere hour = Maximum Pulses / CT Ratio Where, CT Ratio = (CT primary/ CT Secondary)

9.2 Limit Switch :

Limit switch can be used to monitor the measured parameter (refer TABLE 2) in relation to a set limit.
The limit switch can be configured in one of the four mode given below:-
1) Hi alarm & Relay Energized Relay.
2) Hi alarm & De-Energized Relay.
3) Lo alarm & Energized Relay.
4) Lo alarm & De-Energized Relay.
Limit switch has user selectable Trip point, Hysteresis, Energizing Delay & De-Energizing delay.

Hi Alarm:

If Hi-Alarm Energized or Hi Alarm De-Energized option is selected then relay will get energized or De-energized, if selected parameter is greater than or equal to trip point.

Lo Alarm:

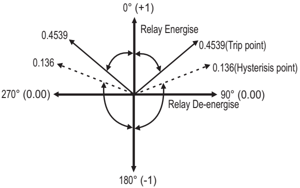
If Lo-Alarm Energized or Lo Alarm De-Energized option is selected then relay will get energized or De-energized, if selected parameter is less than or equal to trip point.

 # Note: For Lo-Alarm configuration, set the values of trip point & hysteresis such that % trip point + % hysteresis should be less than 100% Value.

Example for Phase angle:
If trip point is set 70% then maximum applicable hysteresis is 42.8%. i.e Trip point 70% (252°) + Hysteresis 42.8% (107.8°) = 359.8° If total value is greater than the 100% i.e. 360° then relay will not release.

Example for PF:
For Hi-Alarm Energized, if trip point is 70% & hysterisis is 30%, then trip value = 0.7x90° = 63°. Tripping PF = cos(63)=0.4539 & hysterisis = 0.3 x 0.4539 = 0.136.
Hence, the relay will energize above 0.4539 and de-energize below 0.3179.

Note: This function will work irrespective of +/- sign. It depends only on value.



Trip point:

Trip point can be set in the range as specified in **TABLE 3** of nominal value for Hi-Alarm & 10% to 100 % of nominal value for Lo-Alarm.

Hysteresis:

Hysteresis can be set in the range of 0.5% to 50 % of set trip point. If Hi-alarm Energized or Hi-alarm De-energized is selected then relay will get De-energized or Energized respectively, if set parameter value is less than Hysteresis. Similarly if Lo-alarm Energized or Lo-alarm De-Energized.

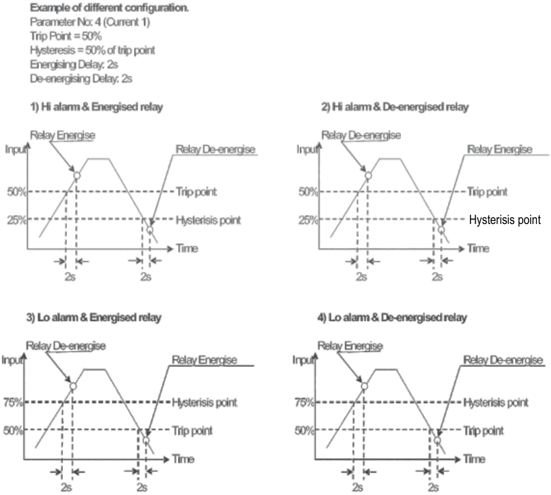
Note : In case of lo alarm if trip point is set greater than 80% then the maximum hysteresis can be set such that the total Trip point+ Hysteresis(% of trip point value) will not exceed 120% of range.
For example :If trip point is set at 90%, then maximum 33.3% hysteresis should be set such that, [90 + 29.99 (33.3% of 90)] = 120.

Energizing Delay:

The energizing delay can be set in the range from 1 to 9999 seconds.

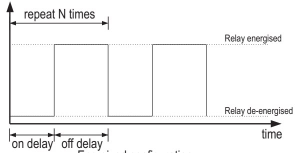
De-Energizing Delay:

The De-energizing delay can be set in the range from 1 to 9999 seconds.

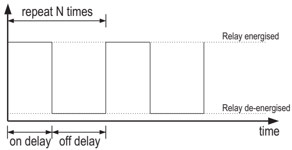


9.3 Timer Output

Timer output can be used to operate the Relay in a cyclic manner. The user can define the ON period and OFF period and also the number of times this cycle is to be repeated. The number of Cycles (N) can be indefinite or 1 to 9999. The counting is shown on a measurement screen as explained before.



Energized configuration



De-energized configuration

TABLE 3 : Datalogging Parameters List

Para. No.	Parameter	3P 4W	3P 3W	1P 2W
0	V1	✓	✓	✓
1	V2	✓	✓	✗
2	V3	✓	✓	✗
3	I1	✓	✓	✓
4	I2	✓	✓	✗
5	I3	✓	✓	✗
6	W1	✓	✗	✓
7	W2	✓	✗	✗
8	W3	✓	✗	✗
9	VA1	✓	✗	✓
10	VA2	✓	✗	✗
11	VA3	✓	✗	✗
12	VAR1	✓	✗	✓
13	VAR2	✓	✗	✗
14	VAR3	✓	✗	✗
15	PF1	✓	✗	✓
16	PF2	✓	✗	✗

TABLE 3: Continued...

Para. No.	Parameter	3P 4W	3P 3W	1P 2W
17	PF3	✓	✗	✗
18	Angle1	✓	✗	✓
19	Angle2	✓	✗	✗
20	Angle3	✓	✗	✗
21	Volt Avg	✓	✓	✗
22	Volt Sum	✓	✓	✗
23	Current Avg	✓	✓	✗
24	Current Sum	✓	✓	✗
25	Watt Avg	✓	✓	✗
26	Watt Sum	✓	✓	✗
27	VA Avg	✓	✓	✗
28	VA Sum	✓	✓	✗
29	VAR Avg	✓	✓	✗
30	VAR Sum	✓	✓	✗
31	PF Avg	✓	✓	✗
32	PF Sum	✓	✗	✗
33	Phase Angle Avg	✓	✓	✗
34	Phase Angle Sum	✓	✓	✗
35	Freq	✓	✓	✓
36	Wh import	✓	✓	✓
37	Wh export	✓	✓	✓
38	VARh Capacitive	✓	✓	✓
39	VARh Inductive	✓	✓	✓
40	VAh	✓	✓	✓
42	kw imp demand	✓	✓	✓
43	max kW imp demand	✓	✓	✓
44	kW exp demand	✓	✓	✓
45	max kW exp demand	✓	✓	✓
46	kVAr Cap. demand	✓	✓	✓

TABLE 3: Continued...

Para. No.	Parameter	3P 4W	3P 3W	1P 2W
47	max kVAr Cap. demand	✓	✓	✓
48	kVAr Ind. demand	✓	✓	✓
49	max kVAr Ind. demand	✓	✓	✓
50	KVA demand	✓	✓	✓
51	max KVA demand	✓	✓	✓
52	current demand	✓	✓	✓
53	max current demand	✓	✓	✓
54	Wh Import Overflow Count	✓	✓	✓
56	Wh Export Overflow Count	✓	✓	✓
58	VARh Capacitive OF Count	✓	✓	✓
60	VARh Inductive OF Count	✓	✓	✓
62	Vah Overflow Count	✓	✓	✓
66	system voltage max	✓	✓	✓
67	system voltage min	✓	✓	✓
68	RPM	✓	✓	✓
70	system current max	✓	✓	✓
71	system current min	✓	✓	✓
100	V12	✓	✗	✗
101	V23	✓	✗	✗
102	V31	✓	✗	✗
103	V THD-L1	✓	✓	✓
104	V THD-L2	✓	✓	✗
105	V THD-L3	✓	✓	✗
106	I THD-L1	✓	✓	✓
107	I THD-L2	✓	✓	✗
108	I THD-L3	✓	✓	✗
109	System V-THD	✓	✓	✓
110	System I-THD	✓	✓	✓
112	Neutral Current	✓	✗	✗

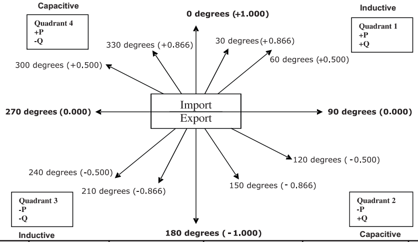
TABLE 3: Continued...

Para. No.	Parameter	3P 4W	3P 3W	1P 2W
113	Run hour	✓	✓	✓
114	On Hour	✓	✓	✓
115	No. of interrupts	✓	✓	✓
166	Phase indicate	✓	✓	✗

10. Phasor Diagram :

Quadrant 1: 0° to 90° **Quadrant 2:** 90° to 180°

Quadrant 3: 180° to 270° **Quadrant 4:** 270° to 360°



Connections	Quadrant	Sign of Active Power (P)	Sign of Reactive Power (Q)	Sign of Power Factor (PF)	Inductive / Capacitive
Import	1	+ P	+ Q	+	L
Import	4	+ P	- Q	+	C
Export	2	- P	+ Q	-	C
Export	3	- P	- Q	-	L

Inductive means Current lags Voltage

When Multifunction Meter displays Active power (P) with " + " (positive sign), the connection is "**Import** ".

Capacitive means Current leads Voltage

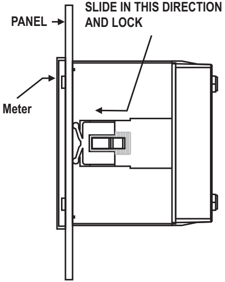
When Multifunction Meter displays Active power (P) with " - " (negative sign), the connection is "**Export** ".

11. Installation

Mounting is by four side clamps, slide the side clamps through side slot till side clamp gets firmly locked in a groove (Refer fig.) Consideration should be given to the space required behind the instrument to allow for bends in the connection cables. As the front of the enclosure conforms to IP54 it is protected from water spray from all directions, additional protection to the panel may be obtained by the use of an optional panel gasket.

The terminals at the rear of the product should be protected from liquids.

The instrument should be mounted in a reasonably stable ambient temperature and where the operating temperature is within the range -20 to 70^{0}C.



Vibration should be kept to a minimum and the product should not be mounted where it will be subjected to excessive direct sunlight.

Caution

1. **In the interest of safety and functionality this product must be installed by a qualified engineer, abiding by any local regulations.**
2. **Voltages dangerous to human life are present at some of the terminal connections of this unit. Ensure that all supplies are de-energised before attempting any connection or disconnection.**
3. **These products do not have internal fuses therefore external fuses must be used to ensure safety under fault conditions.**

11.1 EMC Installation Requirements

This product has been designed to meet the certification of the EU directives when installed to a good code of practice for EMC in industrial environments, e.g.

1. Screened output and low signal input leads or have provision for fitting RF suppression components, such as ferrite absorbers, line filters etc., in the event that RF fields cause problems.

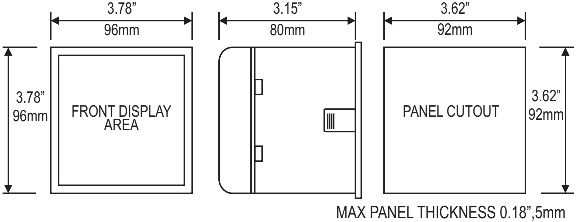
Note: It is good practice to install sensitive electronic instruments that are performing critical functions, in EMC enclosures that protect against electrical interference which could cause a disturbance in function.

2. Avoid routing leads alongside cables and products that are, or could be, a source of interference.

3. To protect the product against permanent damage, surge transients must be limited to 2kV pk. It is good EMC practice to suppress differential surges to 2kV at the source. The unit has been designed to automatically recover in the event of a high level of transients. In extreme circumstances it may be necessary to temporarily disconnect the auxiliary supply for a period of greater than 5 seconds to restore correct operation. The Current inputs of these products are designed for connection in to systems via Current Transformers only, where one side is grounded.

4. ESD precautions must be taken at all times when handling this product.

11.2 Case Dimension and Panel Cut Out



11.3 Wiring

Input connections are made directly to screw-type terminals with indirect wire pressure. Numbering is clearly marked in the plastic moulding. Choice of cable should meet local regulations. Terminal for both Current and Voltage inputs will accept upto 3mm^{2}x 2 diameter cables.

Note : It is recommended to use wire with lug for connection with meter.

11.4 Auxiliary Supply

The instrument should ideally be powered from a dedicated supply, however it may be powered from the signal source, provided the source remains within the limits of the chosen auxiliary voltage.

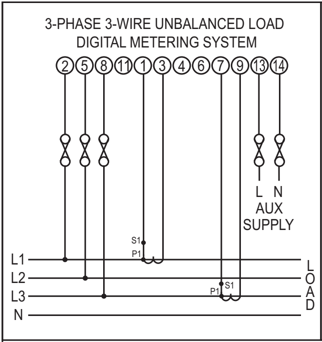
11.5 Fusing

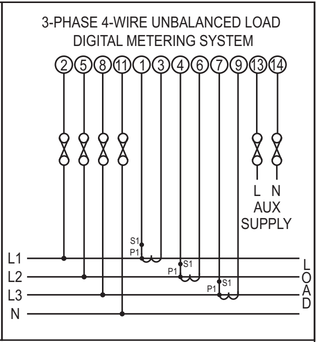
It is recommended that all voltage lines are fitted with 1 amp HRC fuses.

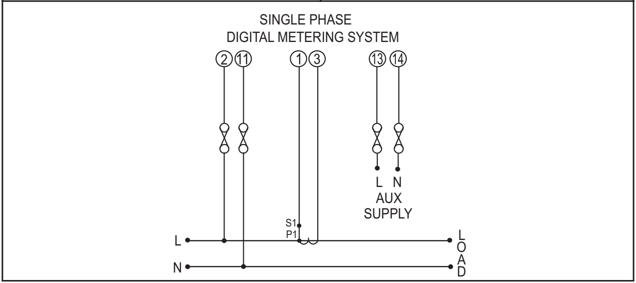
11.6 Earth/Ground Connections

For safety reasons, CT secondary connections should be grounded in accordance with local regulations.

12. Connection Diagrams







13. Specification

System

RM3440i (as per order) : 3 Phase 3 Wire / 3 phase 4 Wire programmable at site
1 Phase 2 Wire

RM3440iDL : 3 Phase 3 Wire / 3 phase 4 Wire /1 Phase 2 Wire programmable at site

Display

TFT LCD	3.5" Graphical LCD, resolution 320x240 pixels
Update	Approx. 1 seconds

Controls

User Interface	Resistive Touch Screen

Inputs

Nominal Input Voltage (AC RMS)	100VLL to 600VLL programmable on site. (57.7VLN to 346.4VLN)
System PT Primary Values	100VLL to 1200 kVLL, programmable on site
System PT Secondary Values	100VLL to 600VLL programmable on site. (57.7VLN to 346.4VLN)
Max continuous input voltage	120% of Nominal Value
Nominal input voltage burden	<0.3 VA approx. per Phase (at nominal 240V)
Nominal Input Current	1A/5A
max continuous input current	120% of Nominal value
Nominal input current burden (Inbuilt CT)	<0.3 VA approx. per phase
System CT primary values	Std. Values 1 to 9999A (1 or 5 Amp secondary)
System CT secondary values	1A / 5A, programmable on site
Overload Indication	“-OL-” >121% of Nominal value (for voltage and current)
Overload withstand	
Voltage input	2 x Rated Value (1s application at 10s intervals) repeated 10 times
Current input	2 x nominal Value (1s application at 5min intervals) repeated 5 times

Auxiliary Supply

External Higher Aux.	100V to 550V AC/DC
External Higher Aux. Nominal Value	230V AC/DC 50/60 Hz for AC Aux
External Lower Aux.	12V to 60V AC/DC
External Lower Aux. Nominal Value	24V AC/ 48V DC 50/60 Hz for AC Aux
Aux Frequency Range	45 to 65 Hz
VA Burden With Addon card	< 8 VA approx. (at nominal)
VA Burden With Ethernet card	< 9 VA approx. (at nominal)

Operating Measuring Ranges

Voltage	20 ... 120 % of nominal Value
Current	1....120% of nominal value
Starting Current	as per IEC 62053-22 (0.2S)
Frequency	45 to 65 Hz
Power Factor	0.5 Lag ... 1 ... 0.8 Lead
Total Harmonic Distortion	50% upto 15th harmonic 10% upto 31st harmonic

Accuracy

Voltage	± 0.2 % of range
Current	± 0.2 % of range
Frequency	0.15% of mid frequency
Active Power	± 0.2 % of range
Re- Active Power	± 0.4 % of range
Apparent Power	± 0.2 % of range
Active Energy	as per IEC 62053-22 (0.2S)
Re - Active Energy	Class 2 as per IEC 62053-23
Apparant Energy	± 0.2 % of range
Power Factor	± 1 % of Unity
Angle	± 1 % of range
Analog Output	± 1 % of Output end value
Total Harmonic Distortion	± 3 %
Neutral Current	± 4 % of range

Reference conditions for Accuracy :

Reference temperature	23 ^{0}C $\pm$ 2 ^{0}C
Input frequency	50 or 60Hz $\pm$ 2%
Input waveform	Sinusoidal (distortion factor 0.005)
Auxiliary supply voltage	Rated Value $\pm$ 1 %
Auxiliary supply frequency	Rated Value $\pm$ 1 %
Voltage Range	50... 100% of Nominal Value. 60... 100% of Nominal Value for THD.
Current Range	10... 100% of Nominal Value. 20... 100% of Nominal Value for THD.
Power	cosØ / sinØ = 1 For Active / Reactive Power & Energy 10... 100% of Nominal Current & 50... 100% of Nominal Voltage.
Power Factor / Phase Angle	40... 100% of Nominal Current & 50... 100% of Nominal Voltage.

Nominal range of use of influence quantities for measurands

Voltage	50 .. 120 % of Rated Value
Current	10 .. 120 % of Rated Value
Input frequency	Rated Value $\pm$ 10 %
Temperature	0 to 50 ^{0}C
Auxiliary supply voltage	Rated Value $\pm$ 10 %
Auxiliary supply frequency	Rated Value $\pm$ 10 %
Temperature Coefficient (For Rated value range of use 0... 50^{0}C)	0.025% / ^{0}C for Voltage (50..120% of Rated Value) 0.05% / ^{0}C for Current (10..120% of Rated Value)
Error change due to variation of an influence quantity	2 * Error allowed for the reference condition applied in the test.

Standards

EMC Immunity	IEC 61326 10V/m min-Level 3 industrial low level electromagnetic radiation environment IEC 61000-4-3.
Safety	IEC 61010-1 , Year 2001
IP for water & dust	IEC 60529

Isolation

Dielectric voltage withstand test between circuits and accessible surfaces	2.2 kV RMS 50 Hz for 1 minute between all electrical circuits

Environmental

Operating temperature	-20 to +70^{0} C
Storage temperature	-25 to +75^{0} C
Relative humidity	0 .. 90 % RH
Warm up time	3 minute (minimum)
Shock	15g in 3 planes
Vibration	10 .. 55 Hz, 0.15mm amplitude
Enclosure (front only)	IP 54 as per IEC 60529

Enclosure

Style	96mm x 96mm DIN Quadratic
Material	Polycarbonate Housing , Self extinguish & non dripping as per UL 94 V-0
Terminals	Screw-type terminals
Depth	< 80 mm
Weight	0.620 kg Approx.

Pulse output Option (1 or 2 Relay) :

Relay	1NO + 1NC
Switching Voltage & Current	240VDC , 5Amp.
Default Pulse rate Divisor	1 per Wh (up to 3600W), 1 per kWh (up to 3600kW), 1 per MWh (above 3600 kW)
Pulse rate Divisors	Programmable on site
10	1 per 10Wh (up to 3600W), 1 per 10kWh (up to 3600kW), 1 per 10MWh (above 3600 kW)
100	1 per 100Wh (up to 3600W), 1 per 100kWh (up to 3600kW), 1 per 100MWh (above 3600 kW)
1000	1 per 1000Wh (up to 3600W), 1 per 1000kWh (up to 3600kW), 1 per 1000MWh (above 3600 kW)
Pulse Duration	60ms , 100ms or 200ms

Note : Above conditions are also applicable for Reactive & Apparent Energy .
Note : Pulse rate divisor is set to 1, when Energy on Rs485 is set to kWh or MWh.

ModBus (RS 485) Option :

Protocol	ModBus (RS 485)
Baud Rate	4.8k, 9.6k, 19.2k, 38.4k, 57.6k (Programmable)
Parity	Odd or Even, with 1 stop bit, Or None with 1 or 2 stop bits

Analog Output Option :

Linear	4 ... 20mA dc into 0 - 500 ohm Uni-directional, internally powered.

Ethernet	Ethernet access on Modbus TCP/IP Protocol

Impulse Output :

Impulse LED For Energy testing

Impulse Constant

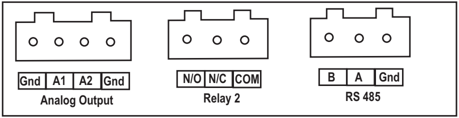
Depending on nominal system nominal power, the number of impulses are created to measure the energy.The number of impulses for particular nominal power is set which indicates 1kWh energy. Energy can be Watt,VA or Var. Following table shows impulses corresponding to nominal system energy.

Note: For External CT option consider Nominal current as 5A.

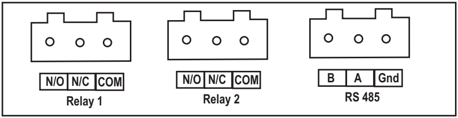
System nominal power	Impulse constant
<=400	16000
<=800	8000
<=1600	4000
<=3200	2000
>3200	1000

14. Connection for Optional Pulse Output / RS 485/ Analog Output / Ethernet (rear view of the instrument) :

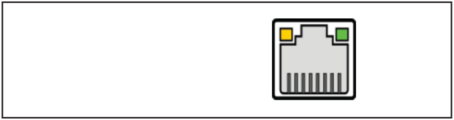
1. RS 485 Output + One Pulse (One Limit) + Two Analog Output



2. Two Pulse (Two Limit) + RS 485 Output



3. Ethernet



NOTE

The Information contained in these installation instructions is for use only by installers trained to make electrical power installations and is intended to describe the correct method of installation for this product.

It is the user's responsibility to determine the suitability of the installation method in the user's field conditions.

RISH Master 3440i/3440iDL

Multi Function Device