Operating Manual

RISH PQM

Three Phase (3W/4W)

Three Phase Touch Screen Power Quality Monitor with TOD

Installation & Operating Instructions

Section Contents

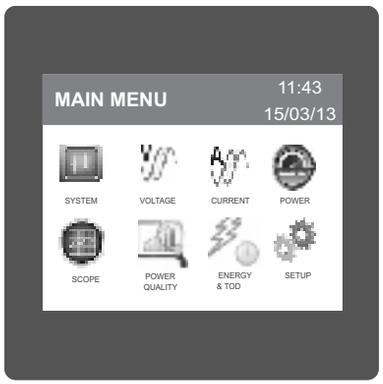
1. Introduction

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 56th 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), 3 phase 3W or 3phase 4W system , Time Of Day metering, Power Quality Parameter.

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 8 submenus. Every submenu contains list of options. By touching the icons on the main menu , submenus can be accessed. System , Voltage , Current & Power submenu contains measurement of basic electrical parameters. Scope submenu contains waveforms & phasor diagram. Power Quality submenus can be used to access harmonic, sag , swell & over current data. Energy & TOD option gives total energies and all TOD energies & costs. Setup option can be used for complete meter settings.

TABLE 1:

Measured Parameters	Units of Measurement
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	Volts
Voltage VL2-L3	Volts
Voltage VL3-L1	Volts
Current L1	Amps
Current L2	Amps
Current L3	Amps
Neutral Current (4 wire only)	Amps
Frequency	Hz
Active Power (System / Phase (4 wire only))	KW
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 (up to 14 Digit resolution)	kWh
Active Export Energy (up to 14 Digit resolution)	kWh
Reactive Import Energy (up to 14 Digit resolution)	kVArh
Reactive Export Energy (up to 14 Digit resolution)	kVArh
Apparent Energy (up to 14 Digit resolution)	kVAh

TABLE 1(continued):

Measured Parameters	Units of Measurement
Current Demand	Amps
KVA Demand	KVA
KW Import Demand	KW
KW Export Demand	KW
Max Current Demand	Amps
Max kVA Demand	KVA
Max KW Import Demand	KW
Max KW Export Demand	KW
Run Hour	Hours
On Hour	Hours
Number of Interruptions	Counts
Phase Reversal Indication (4 wire only)	——
V1 THD*	%
V2 THD*	%
V3 THD*	%
I1 THD	%
I2 THD	%
I3 THD	%
System Voltage THD	%
System Current THD	%
True representation of Phasor Diagram (4 wire only)	——
True representation of Voltage Waveform	——
True representation of Current Waveform	——

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

TABLE 1(continued):

Measured Parameters	Units of Measurement
Fundamental Voltage V1, V2, V3	Volts
THD V1, V2, V3	%
Fundamental Current I1, I2, I3 *	Amps
THD I1, I2, I3 *	%
Fundamental Active Power L1, L2, L3 (4wire only)	KW
Fundamental Reactive Power L1, L2, L3 (4wire only)	KVAr
Fundamental Apparent Power L1, L2, L3 (4wire only)	KVA
Fundamental Power Factor L1, L2, L3 (4wire only)	——
RMS Voltage of Harmonic N of phase L1, L2, L3	Volts
Voltage Harmonic Distortion of Harmonic N of L1, L2, L3	%
RMS current of Harmonic N of L1, L2, L3 *	Amps
Current Harmonic Distortion of Harmonic N of L1, L2, L3 *	%
Harmonic N Active Power L1, L2, L3 (4wire only)	KW
Harmonic N Reactive Power L1, L2, L3 (4wire only)	KVAr
Harmonic N Apparent Power L1, L2, L3 (4wire only)	KVA
Harmonic N Power Factor L1, L2, L3 (4wire only)	——
Active energy import per zone of current date	Kwh
Active energy import cost per zone of current date	——
Active energy export per zone of current date	Kwh
Active energy export cost per zone of current date	——
Reactive energy import per zone of current date	KVArh
Reactive energy import cost per zone of current date	——
Reactive energy export per zone of current date	KVArh

NOTE:

N is the harmonic no of selected harmonic.

*** These parameters are not measured for L2 in 3 phase 3 wire network.**

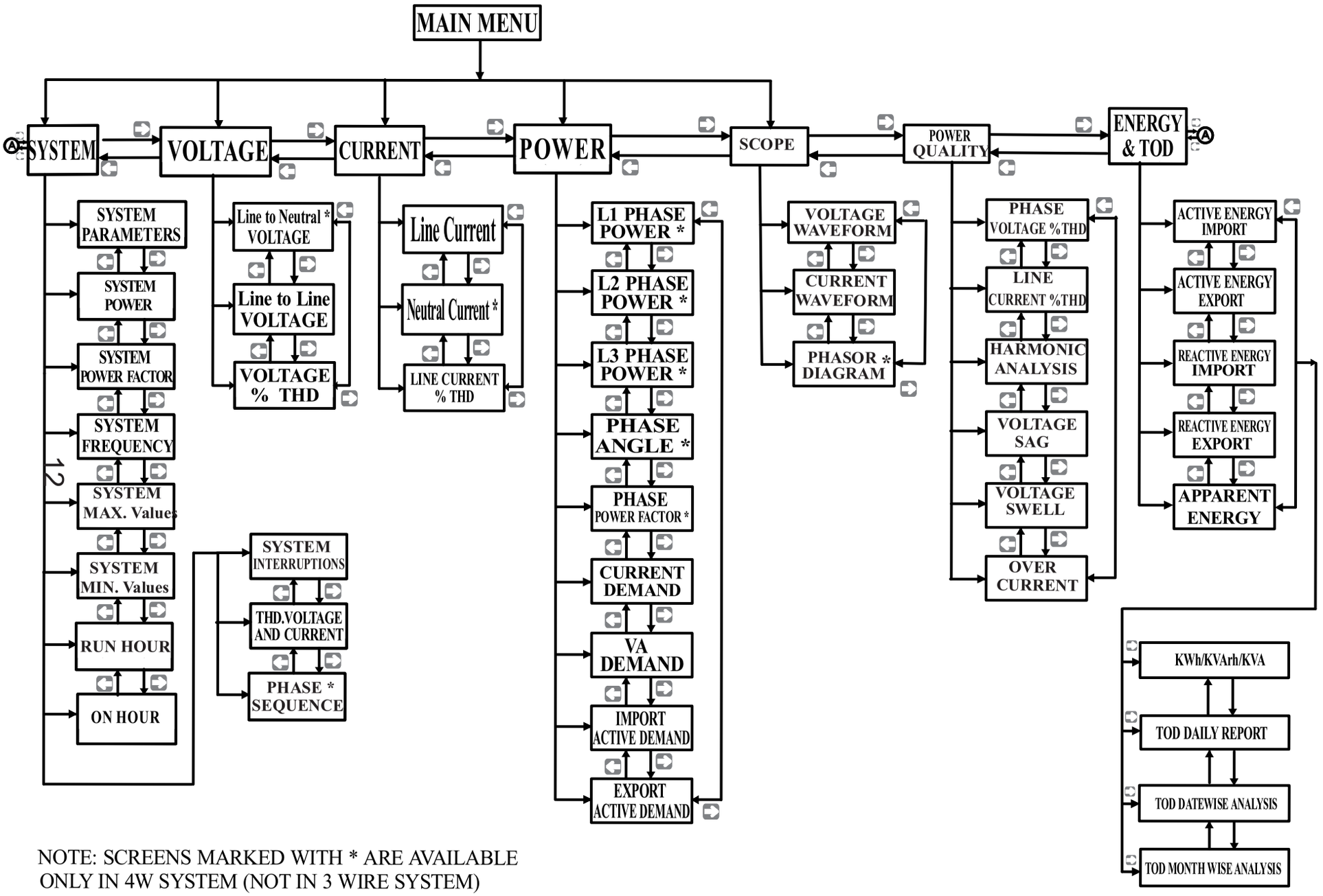
TABLE 1(continued):

Measured Parameters	Units of Measurement
Reactive energy export cost per zone of current date	——
Apparent energy per zone of current date	KVAh
Apparent energy cost per zone of current date	——
Active energy import per date up to last 31 days	Kwh
Active energy import cost per date up to last 31 days	——
Active energy export per date up to last 31 days	Kwh
Active energy export cost per date up to last 31 days	——
Reactive energy import per date up to last 31 days	KVArh
Reactive energy import cost per date up to last 31 days	——
Reactive energy export per date up to last 31 days	KVArh
Reactive energy export cost per date up to last 31 days	——
Apparent energy per date up to last 31 days	KVAh
Apparent energy cost per date up to last 31 days	——
Active energy import per month up to last 12 months	Kwh
Active energy import cost per month up to last 12 months	——
Active energy export per month up to last 12 months	Kwh
Active energy export cost per month up to last 12 months	——
Reactive energy import per month up to last 12 months	KVArh
Reactive energy import cost per month up to last 12 months	——
Reactive energy export per month up to last 12 months	KVArh
Reactive energy export cost per month up to last 12 months	——
Apparent energy per month up to last 12 months	KVAh
Apparent energy cost per month up to last 12 months	——

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.

MeasurementParameter Screens



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

Harmonic Analysis : When this option is selected from Power Quality menu, meter shows the graphical analysis of the harmonics selected in Setup -> Power Quality Setup -> Harmonic Setup L1/L2/L3. Harmonics are plotted considering fundamental as 100 %. When particular bar is touched, further details of that particular harmonic / fundamental are shown. User can view RMS values of voltage and current , voltage & current harmonic distortion % , kW / kVAR / k VA / PF (in 3p 4w only) of that selected harmonic by using side arrow keys.

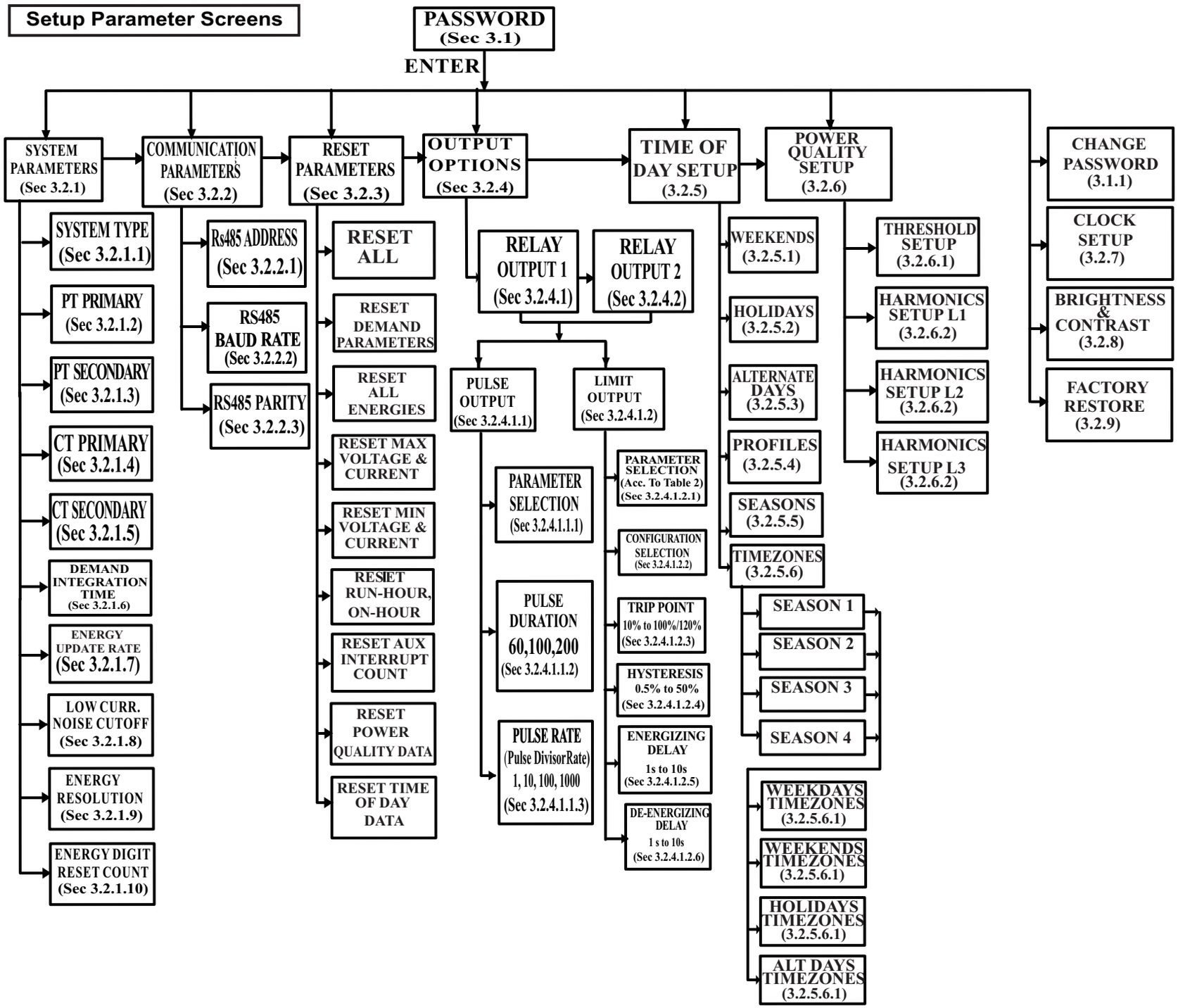
Sag / Swell / Over Current : These screens show the nos of sag / swell / over current that instrument has detected with the timestamp of arrival of events. Instrument stores the log of up to 30 events on FIFO basis.

Energy and TOD :

Daily report: This screens shows the zone wise energy , its applicable tariff rate & cost of that zone in table format. The total energy accumulated for current day and related cost is also shown.

Date wise Analysis : This screen shows the graphical trend of per date energy. Up to last 30 days data is shown. By touching on the bar , energy and cost of that date can be seen.

Month wise Analysis : This screen shows the graphical trend of per month energy. Up to last 12 months data is shown. By touching on the bar in graph, energy and cost of that month can be seen.


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)
TIME OF DAY SETUP (3.2.5)
POWER QUALITY SETUP (3.2.6)
CHANGE PASSWORD (3.1.1)
CLOCK SETUP (3.2.7)
BRIGHTNESS & CONTRAST (3.2.8)
FACTORY RESTORE (3.2.9)
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)
DEMAND INTEGRATION TIME (Sec 3.2.1.6)
ENERGY UPDATE RATE (Sec 3.2.1.7)
LOW CURR. NOISE CUTOFF (Sec 3.2.1.8)
ENERGY RESOLUTION (Sec 3.2.1.9)
ENERGY DIGIT RESET COUNT (Sec 3.2.1.10)
Rs485 ADDRESS (Sec 3.2.2.1)
RS485 BAUD RATE (Sec 3.2.2.2)
RS485 PARITY (Sec 3.2.2.3)
RESET ALL
RESET DEMAND PARAMETERS
RESET ALL ENERGIES
RESET MAX VOLTAGE & CURRENT
RESET MIN VOLTAGE & CURRENT
RESIET RUN-HOUR, ON-HOUR
RESET AUX INTERRUPT COUNT
RESET POWER QUALITY DATA
RESET TIME OF DAY DATA
RELAY OUTPUT 1 (Sec 3.2.4.1)
RELAY OUTPUT 2 (Sec 3.2.4.2)
PULSE OUTPUT (Sec 3.2.4.1.1)
LIMIT OUTPUT (Sec 3.2.4.1.2)
PARAMETER SELECTION (Sec 3.2.4.1.1.1)
PULSE DURATION 60,100,200 (Sec 3.2.4.1.1.2)
PULSE RATE (Pulse Divisor Rate) 1, 10, 100, 1000 (Sec 3.2.4.1.1.3)
PARAMETER SELECTION (Acc. To Table 2) (Sec 3.2.4.1.2.1)
CONFIGURATION SELECTION (Sec 3.2.4.1.2.2)
TRIP POINT 10% to 100%/120% (Sec 3.2.4.1.2.3)
HYSTERESIS 0.5% to 50% (Sec 3.2.4.1.2.4)
ENERGIZING DELAY 1s to 10s (Sec 3.2.4.1.2.5)
DE-ENERGIZING DELAY 1 s to 10s (Sec 3.2.4.1.2.6)
WEEKENDS (3.2.5.1)
HOLIDAYS (3.2.5.2)
ALTERNATE DAYS (3.2.5.3)
PROFILES (3.2.5.4)
SEASONS (3.2.5.5)
TIMEZONES (3.2.5.6)
SEASON 1
SEASON 2
SEASON 3
SEASON 4
WEEKDAYS TIMEZONES (3.2.5.6.1)
WEEKENDS TIMEZONES (3.2.5.6.1)
HOLIDAYS TIMEZONES (3.2.5.6.1)
ALT DAYS TIMEZONES (3.2.5.6.1)
THRESHOLD SETUP (3.2.6.1)
HARMONICS SETUP L1 (3.2.6.2)
HARMONICS SETUP L2 (3.2.6.2)
HARMONICS SETUP L3 (3.2.6.2)

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.

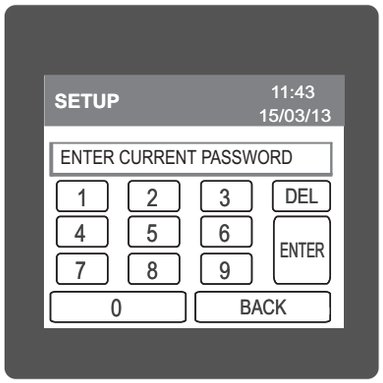
If Entered password is correct then “Password Accepted” is displayed & user will enter into setup menu.

Password Incorrect.

If Entered password is wrong then “Password Rejected” is displayed & 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 7th option in list of “SETUP” submenu, so can be accessed by a simple touch anywhere in “ Change Password” row.
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 8 - 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 TIME OF DAY SETUP
3.2.6 POWER QUALITY SETUP
3.2.7 CLOCK SETUP
3.2.8 BRIGHTNESS & CONTRAST
3.2.9 FACTORY RESTORE

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(L-L)
3.2.1.3 PT SECONDARY(L-L)
3.2.1.4 CT PRIMARY
3.2.1.5 CT SECONDARY
3.2.1.6 DEMAND INTEGRATION TIME
3.2.1.7 ENERGY UPDATE RATE
3.2.1.8 LOW CURRENT NOISE CUTOFF
3.2.1.9 ENERGY RESOLUTION
3.2.1.10 ENERGY DIGIT RESET COUNT

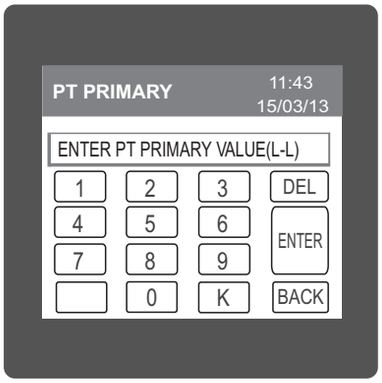
3.2.1.1 System Type

This screen is used to set the system type .Two types: 3 phase 3 wire & 3 phase 4 wire system are displayed on screen. 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 from 3 phase 4 wire to 3 phase 3 wire , relay parameter selection will be set to NONE.

3.2.1.2 Potential Transformer Primary Value

The nominal full scale voltage will be displayed as Line to Line Voltages for all system types.



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 from **100 VL-L to 692.8 KVL-L.** If value outside the range is entered, It will display "INVALID VALUE" followed by correct range of parameter.

Note : Setting PT primary value will reset all TOD data & all energies.

While setting PT primary value if auxiliary supply gets off, reset TOD data after auxiliary supply gets on from reset parameter menu. Same is applicable for CT primary value also.

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".

Valid range of PT secondary setting value is from 100 to 500.0 VL-L. If value outside the range is entered, It will display "INVALID VALUE" followed by correct range of parameter.

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 represent the Current in Amps.

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 : Setting CT primary value will reset all TOD data & all energies.

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.

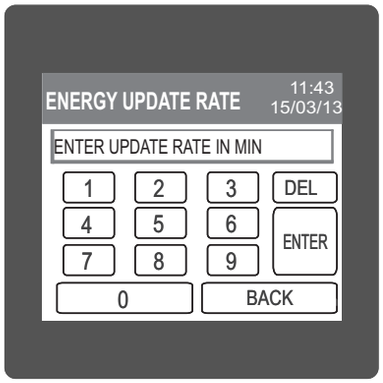
Touch on " OK key" will confirm the setting. Touching the " BACK key" will keep the old selected setting and will return to previous menu.

3.2.1.6 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.

3.2.1.7 Energy update rate



This screen allows user to enter energy update rate in min.

After entering particular value in min. the energy will be updated on modbus location from 30145 to 30153 of 3X register as per value that user has entered.

User can set value from 1 min to 60 min. If user enters value more than 60 min. then “INVALID VALUE” will be displayed and valid band will be shown.

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

For example user has entered 2 min as energy update rate. then after every 2 min, energy counts will be updated on modbus.

3.2.1.8 Low Current noise cutoff.

This screen allows the user to set Low noise current cutoff in mA.

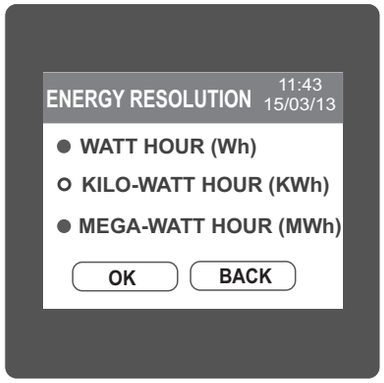
Two options, 0 MILLI-AMPERE & 30 MILLI-AMPERE are displayed on screen. Touching radio button in front of particular option will select that option.

Touch on “ OK key” will confirm the setting.

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

3.2.1.9 ENERGY RESOLUTION:

This screen enable user to set energy resolution in terms of Wh / kWh / MWh depending as per the user's requirement .This setting is applicable for all types of energy.

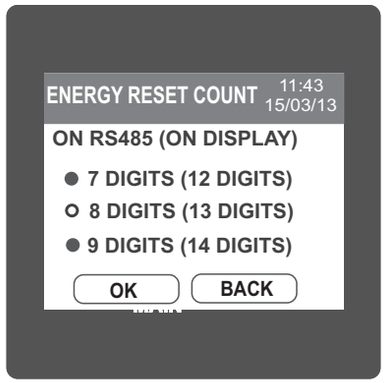


Three options: WATT HOUR, KILO-WATT HOUR & MEGA-WATT HOUR are displayed on screen. Touching radio button in front of particular option will select that option. If (PT primary * CT primary * Root3) > 30000 KW then two options: KILO-WATT HOUR & MEGA-WATT HOUR are displayed on screen.

Note : Default value is set to 'WATT HOUR' i.e. Energy resolution will be in terms of Wh / VArh / Vah respectively .

3.2.1.10 ENERGY DIGIT RESET COUNT (ROLLOVER COUNT):

This screen enables the user to for setting maximum energy count after which energy will roll over to zero. This setting is applicable for all types of energy. Counts outside brackets shows the no. of digits after which energy in 3X register on MODBUS will roll over to zero. The roll over count for overflow count in 3X register on MODBUS is 5 digits. The values inside the brackets show rollover count for energy on display.



3.2.2 Communication Parameter Selection :

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

3.2.2.1 RS485 ADDRESS
3.2.2.2 Rs485 BAUD RATE
3.2.2.3 Rs485 PARITY

3.2.2.1 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.

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.

3.2.2.2 RS 485 Baud Rate

This screen allows the user to set Baud Rate of RS 485 port. Four options: 4800, 9600, 19200, 38400 Bauds are displayed on screen. Touching radio button in front of particular option will select that option.

3.2.2.3 RS 485 Parity & Stop bit Selection

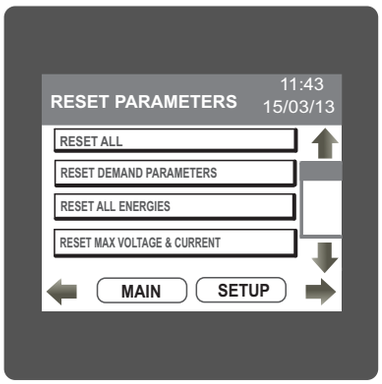
This screen allows the user to set Parity & number of stop bits. Four options: ODD PARITY WITH ONE STOP BIT, NO PARITY WITH ONE STOP BIT, NO PARITY WITH TWO STOP BITS, EVEN PARITY WITH ONE STOP BIT are displayed on screen. Touching radio button in front of particular option will select that option.

3.2.3 Reset Parameter Selection

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

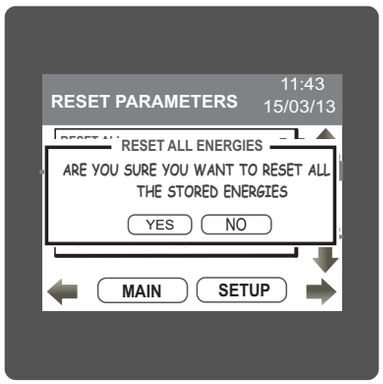
RESET ALL
RESET DEMAND PARAMETERS
RESET ALL ENERGIES
RESET MAX VOLTAGE AND CURRENT
RESET MIN VOLTAGE AND CURRENT
RESET RUN-HOUR, ON-HOUR
RESET AUX INTERRUPT COUNT
RESET POWER QUALITY DATA
RESET TIME OF DAY DATA

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, Power Quality Data, TOD Data.Touching " down" key scrolls list in upward direction.

For resetting specific parameter user can touch on that parameter.



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. Resetting Power Quality Data will reset all events in sag, swell and overcurrent log.

While resetting any parameter if auxiliary supply gets off, reset that parameter agian after auxiliary supply gets on.

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

3.2.4.1 Relay1 output Selection menu

This screen applies to the Relay1 Output option Selection .

Two options : PULSE OUTPUT & LIMIT OUTPUT displayed on screen. Touching any option will open screens of parameters related to that option.

Touch on “ OUTPUT OPTION 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:-

Apparent Energy — Import Energy (Active)
Export Energy (Active) — Import Energy (Reactive)
Export Energy (Reactive)

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.

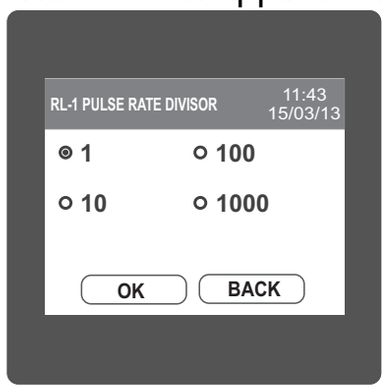
This screen allows the user to set Relay energisation time in milliseconds. Three options: 60, 100, 200 ms are displayed on screen. Touching radio button in front of particular option will select that option.

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 Resolution 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 Limit output" for assignment.

Now after assignment of any parameter, list of following setting parameters will be displayed:-

3.2.4.1.2.1 PARAMETER

3.2.4.1.2.2 CONFIGURATION

3.2.4.1.2.3 TRIP POINT

3.2.4.1.2.4 HYSTERESIS POINT

3.2.4.1.2.5 ENERGIZING DELAY

3.2.4.1.2.6 DE-ENERGIZING DELAY

3.2.4.1.2.1 Limit Parameter selection

This option allows the user to set Relay\-1 limit to corresponding measured parameter. A simple touch on "PARAMETER" row will open screen having list of parameters. (Refer Table 2 "Parameters for 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 Limit1 Configuration select

This screen is used to set the Limit1 Configuration, four different types of configuration can be selected

HIGH ALARM & ENERGIZED RELAY
HIGH ALARM & DE-ENERGIZED RELAY
LOW ALARM & ENERGIZED RELAY
LOW ALARM & DE-ENERGIZED RELAY

(For detail refer to section 9.2)

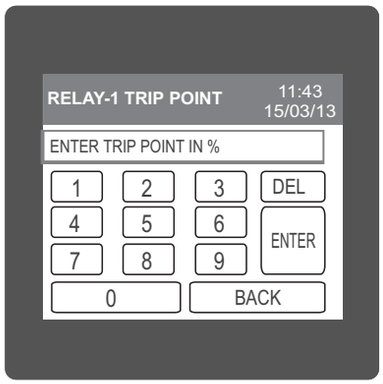
Touching radio button in front of particular type will select that type.

Touch on "OK key" will confirm the setting.

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

3.2.4.1.2.3 Trip point selection

This screen applies to the Trip point selection.



This screen allows the user to set Trip point for instrument in %.
This screen can be accessed only from Limit Output settings list menu.
Here a 0 to 9 digit input keypad is provided to set value of Trip Point, & user can confirm this value with a simple touch on " ENTER key."

" BACK key" is used to go back to Limit Output list menu.

The allowable range is from 10% to 120% for High Alarm & is from 10% to 100% for Low Alarm. For detail refer table 2.
If value outside this range is entered, it will display "INVALID VALUE" followed by correct range of parameter.

3.2.4.1.2.4 Hysteresis selection

This screen applies to the Hysteresis selection.

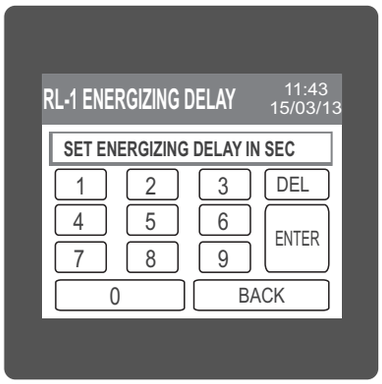
This screen allows the user to set Hysteresis in % for relay1.
This screen can be accessed only from Limit Output settings list menu.
Here a 0 to 9 digit input keypad is provided to set value of Hysteresis, & user can confirm this value with a simple touch on " ENTER key".

" BACK key" is used to go back to Limit Output list menu.

The allowable range is 0.5% to 50 % of Trip point .
If value outside this range is entered, it will display “INVALID VALUE” followed by correct range of parameter.

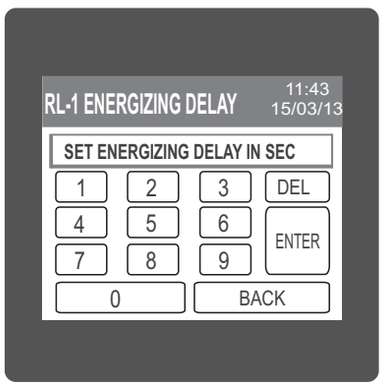
3.2.4.1.2.5 Energizing Delay time.

This screen allows the user to set Energizing Delay time for Relay 1 Limit Assigned Parameters .



This screen can be accessed only from Limit Output settings list menu.
Here a 0 to 9 digit input keypad is provided to set value of Delay, & user can confirm this value with a simple touch on “ ENTER key.”

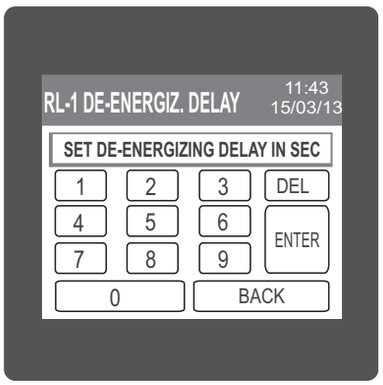
“ BACK key” is used to go back to Limit Output list menu.



The allowable range is from 1 to 10 sec.
If value outside this range is entered, it will display “INVALID VALUE” followed by correct range of parameter.

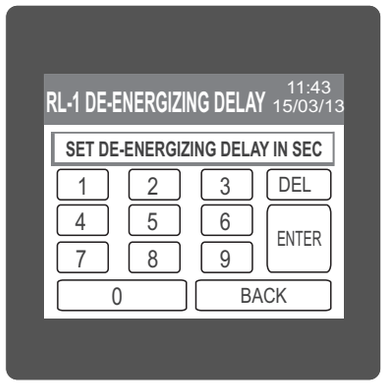
3.2.4.1.2.6 De-Energizing Delay time

This screen allows the user to set De-Energizing Delay time for Relay 1 Limit Assigned Parameters .



This screen can be accessed only from Limit Output settings list menu.
Here a 0 to 9 digit input keypad is provided to set value of Delay, & user can confirm this value with a simple touch on " ENTER key."

" BACK key" is used to go back to Limit Output list menu.

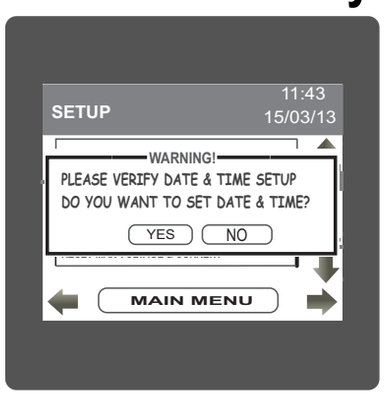


The allowable range is from 1 to 10 sec.
If value outside this range is entered, It will display "INVALID VALUE" followed by correct range of parameter.

3.2.4.2 Relay 2 Output Selection

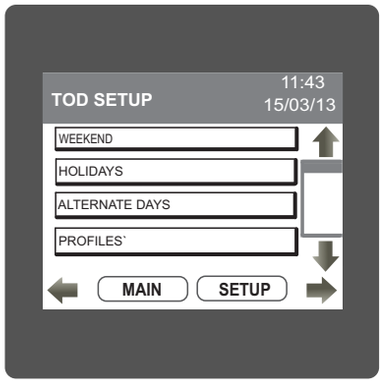
Configuration of Relay 2 for Pulse or Limit Output is same as Relay 1. If you Select the Pulse output option for Relay 1 same setting will be applicable for Relay 2 except assignment of energy to Pulse output (i.e. Energy assignment of both relay can be different.)

3.2.5 Time Of Day Setup



Time Of Day Setup options allows easy configuration of TOD module Every time when this option is selected it will pop up a message to ask user to verify date & time. It will ask user if he wants to set date & time. When pressed yes user will be directed to clock setup. Pressing no will continue to Time Of Day setup.

Time Of Day :



Time-of-day metering is a rate option that is offered by many utilities. When elected by the customer, a meter that records time, and energy usage is installed in place of the existing electrical meter. The metering option benefits utility companies by decreasing the required capacity and customers by providing reduced demand and usage rates during off-peak times, which gives customers a chance to reduce their utility bill. The meter offers a flexible tariff structure. This feature provides a useful way of following different tariff structures during different times of the day for different seasons.

The Time of Use module compares the meter's internal clock with the season, day, and time of day settings in these registers,and determines the applicable rate.

Seasons , Profiles,Timezones,Type of day

Seasons :

A year can be programmed for a max. of 4 seasons. Each day of a season can be assigned diffemet profiles. Start date of the season is to be enterd. This is will be active until the next season starts.

Profiles :

Daily profile contains the tariff rates for a particular time zones.
A max. of 4 tariff can be programmed.

Time Zones:

A day can be divided into max 6 time zones as per tariff rate .
The number and timings of these TOD time Zones are Programmable.

Type of Day: It defines the day types used in the module.
Types are weekdays, weekends, holidays, alternate days.

Weekdays:

This register defines the days of the week for all seasons. The rates in the Season (1, 2, 3, 4) Weekday time zone setup registers are used on these days.

Weekends:

This register defines the weekend days for all seasons. The rates in the Season (1,2, 3, 4) Weekend time zone setup registers are used on these days.

Holidays :

Holidays have higher priority than other day types . A max. of 30 holidays can be selected. The rates defined in the Season (1, 2, 3, 4) Holiday Time zone setup registers are used on these days.

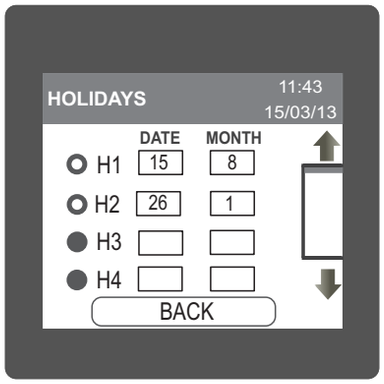
Alternate days :

These days generally have different rates from weekdays, weekends, holidays. Alternate days can be assigned a separate profile. A max. of 30 alternate days can be selected.

3.2.5.1 Weekends selection

Select weekend by selecting the radio button(dark circle) in front of the day. These days will be considered as weekends for all seasons

3.2.5.2 Holidays selection

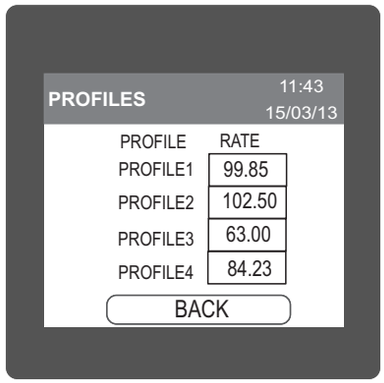


Any day can be assigned as a holiday. Holidays can have separate profile structure than other type of days. Maximum 30 holidays can be selected. To select holiday first activate holiday by touching radio button. Then touch on box to enter date and month.

3.5.2.3 Alternate days selection

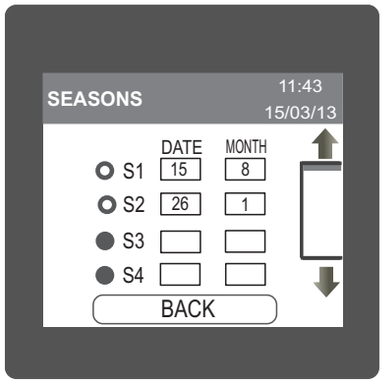
Any day can be assigned as a Alternate day. Alternate days can have separate profile structure than other type of days. Maximum 30 Alternate days can be selected.

3.2.5.4 Profiles



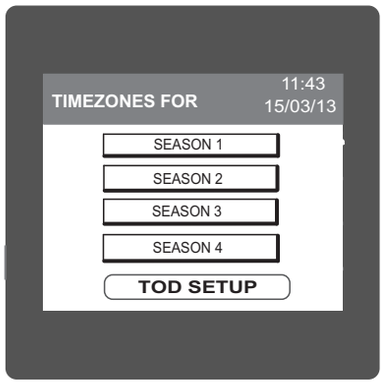
Profile contain a tariff rate that can be assign to particular timezone. Max 4 profile rate can be assign. User can assign profile rate for P1, P2, P3 & P4 between 0.001 to 299.0.

3.2.5.5 Seasons



In seasons, user can define maximum 4 season for 12 months. By selecting radio button and entering valid date and month, seasons can be define. All the seasons must be in sequential order. Start date of the season is to be entered. This is will be active until the next season starts. At least 1 season must be selected for proper functioning of TOD module.

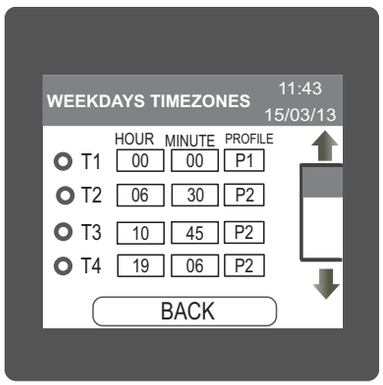
3.2.5.6 Timezones



Time zone window shows the seasons which are selected. In time zone user can assign a time zone period at which different tariff profile are applicable.

3.2.5.6.1 Weekdays / Weekends / Holidays / Alternate days Timezones

User can assign different timezone,tariff profile rate for different day types in each season. User can enter time zones for 4 types of day
Weekdays
Weekends
Holidays
Alternate days

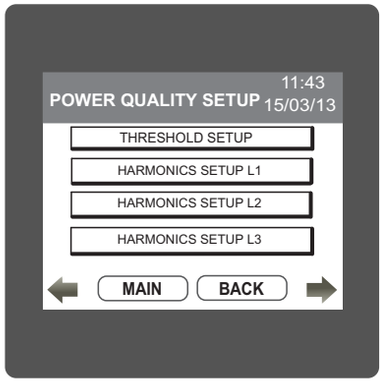


User should ensure that time zones and profile rate are assigned to all selected seasons and day types. The timezones for the day must be in sequential order and must not overlap. Minium 1 and maximum 6 time zones can be configured. For timezone1 the default time is assigned as 00:00. User has to select a profile rate for it.

Note: When using TOD module it is recommended to set energy resolution in KWh.

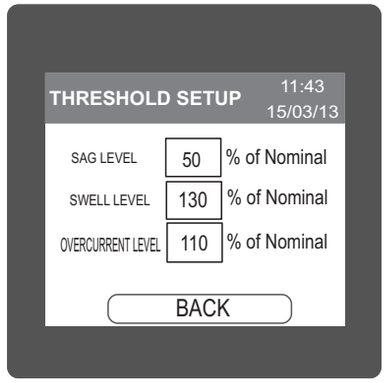
3.2.6 Power Quality Setup

3.2.6.1 Threshold Setup

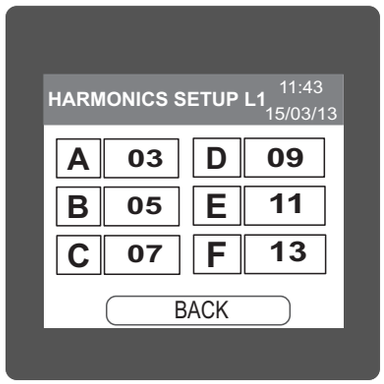


In power quality setup, user can set threshold levels for sag, swell and overcurrent detection. Also user can enter the harmonic no which user want to observe.

For threshold setup click on threshold setup menu. For sag level, touch the sag level menu and enter the value. The valid threshold level for sag is from 10 % to 90 % of nominal.If user enters wrong value then it will display “INVALID VALUE” and will display the valid range. Similarly threshold value for swell and overcurrent can be configured. The valid range for swell and overcurrent is 110 % to 150 % of nominal value. PT Secondary is considered as nominal value.

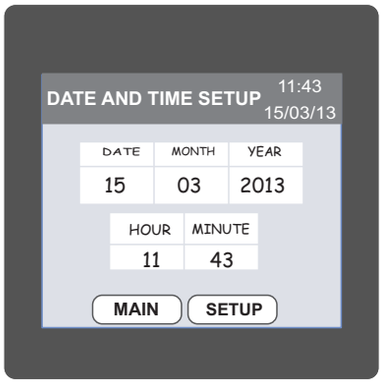


3.2.6.2 Harmonics Setup



In harmonic setup, user can define the order of harmonics that user want to observe for each phase. Maximum 6 different harmonics number can be configured at a time. For setting of harmonic, touch on the rectangle and enter the number. Valid range for harmonic no is from 2 to 56. Entering wrong value will display “INVALID VALUE” and will show the valid range.

3.2.7 Clock Setup



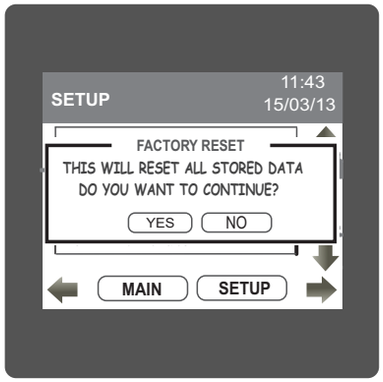
User can set the date and time through this window. By touching the on date, month, year, hour and minute, keypad will pop up and user can enter the date and time through it. Changing hour, date, month, year TOD data will get reset for that period.

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 Factory Reset

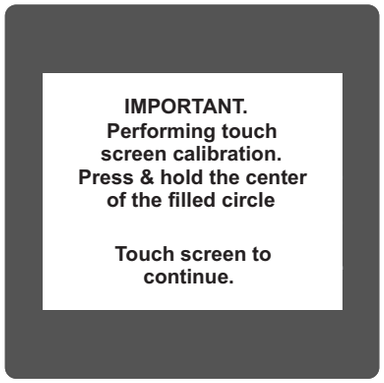


Factory reset option resets all the stored data to its default value. After factory reset meter will restart automatically with default setup values.

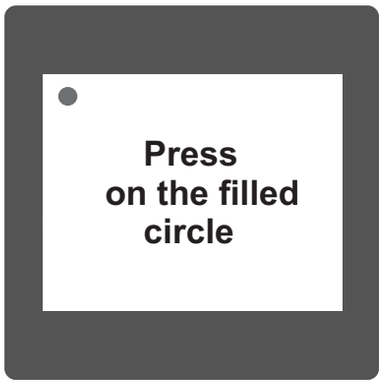
Note: Do not interrupt auxiliary supply while factory reset is in process. If auxiliary supply gets interrupted when factory reset is in process, do the factory reset again when auxiliary supply gets ON.

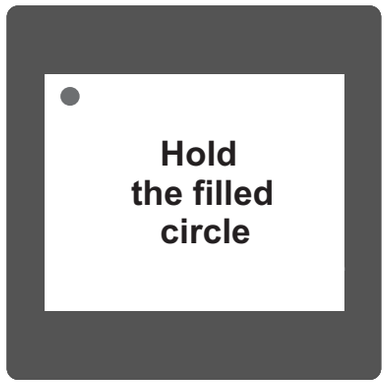
4 Touch screen calibration

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.

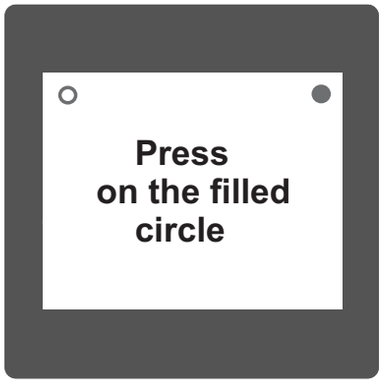


For starting touch screen calibration, touch the screen any where for 1 sec at system reset. After that touch screen calibration will start & the message shown besides will be displayed. Touch the screen to continue.

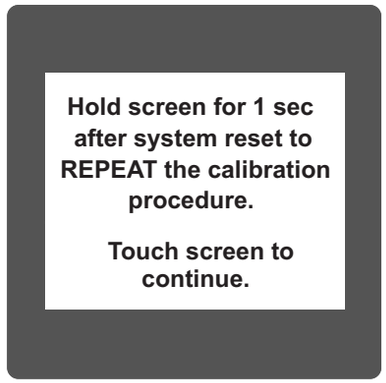




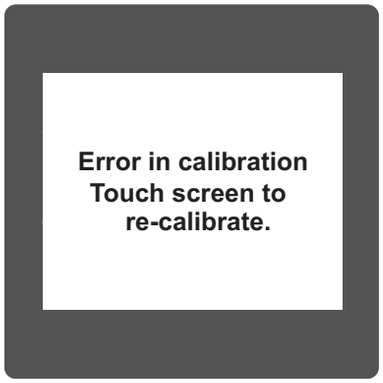
Follow the instructions displayed. Press & hold the center of the filled red circle for at least 2 seconds. Release when message for release is being displayed. For accurate results try to touch the center of the filled circle.



Repeat the same procedure for the remaining 3 corner circles.

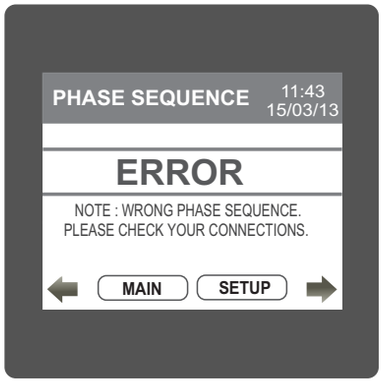


After successful calibration, the message shown besides would be displayed. Touch the screen to continue.

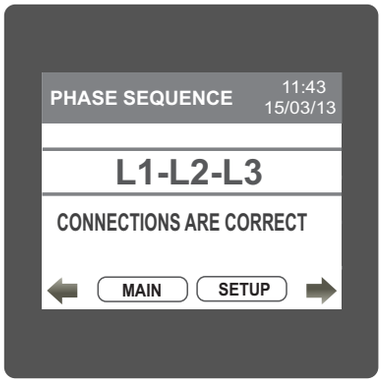


If the touch screen was not calibrated properly, “Error in calibration”message would be shown & the user will be asked to recalibrate the touch screen. In such case the meter will retain the previously stored touch - screen calibration values unless a successful calibration is being performed.

5. Phase Rotation Error screen

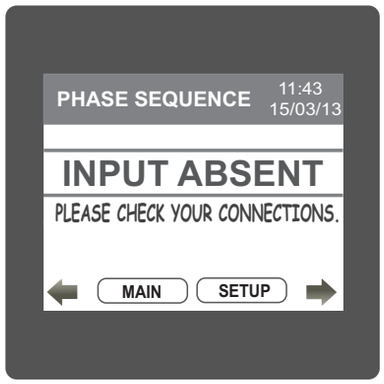


Meter shows phase rotation error if the phase sequence R-Y-B (L1-L2-L3) is not maintained This screen indicates that Phase sequence is incorrect. User must check this screen in order to get correct readings When meter is connected.



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.

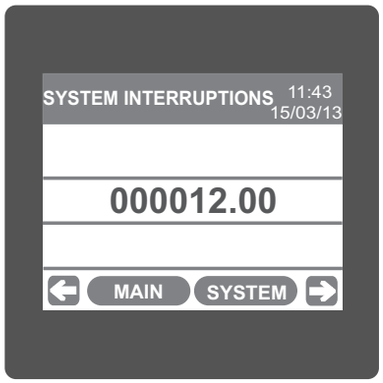
6. Run Hour

This Screen shows the total no. of hours the load is connected
Even if the Auxiliary supply is interrupted 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

7. 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
5 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

8. 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

TABLE 2 : Parameter for Limit output

Parameter No.	Parameter	3P 4W	3P 3W	Range Limit Output
0	None	✓	✓	–
1	INPUT VOLTAGE L1	✓	✓	10 - 120 %
2	INPUT VOLTAGE L2	✓	✓	10 - 120 %
3	INPUT VOLTAGE L3	✓	✓	10 - 120 %
4	INPUT CURRENT IL1	✓	✓	10 - 120 %
5	INPUT CURRENT IL2	✓	✓	10 - 120 %
6	INPUT CURRENT IL3	✓	✓	10 - 120 %
7	ACTIVE POWER L1	✓	✗	10 - 120 %

Parameter No.	Parameter	3P 4W	3P 3W	Range
				Limit Output
8	ACTIVE POWER L2	✓	✗	10 - 120 %
9	ACTIVE POWER L3	✓	✗	10 - 120 %
10	APPARENT POWER L1	✓	✗	10 - 120 %
11	APPARENT POWER L2	✓	✗	10 - 120 %
12	APPARENT POWER L3	✓	✗	10 - 120 %
13	REACTIVE POWER L1	✓	✗	10 - 120 %
14	REACTIVE POWER L2	✓	✗	10 - 120 %
15	REACTIVE POWER L3	✓	✗	10 - 120 %
16	POWER FACTOR L1	✓	✗	10 - 90 % (3)
17	POWER FACTOR L2	✓	✗	10 - 90 % (3)
18	POWER FACTOR L3	✓	✗	10 - 90 % (3)
19	PHASE ANGLE L1	✓	✗	10 - 90 % (2)
20	PHASE ANGLE L2	✓	✗	10 - 90 % (2)
21	PHASE ANGLE L3	✓	✗	10 - 90 % (2)
22	VOLTAGE AVG	✓	✓	10 - 120 %
24	CURRENT AVG	✓	✓	10 - 120 %
27	ACTIVE POWER SUM	✓	✓	10 - 120 %
29	APPARENT POWER SUM	✓	✓	10 - 120 %
31	REACTIVE POWER SUM	✓	✓	10 - 120 %
32	POWER FACTOR AVG	✓	✓	10 - 90 % (3)
34	PHASE ANGLE AVG	✓	✓	10 - 90 % (2)
36	FREQUENCY	✓	✓	10 - 90% (1)
43	WATT DEMAND IMPORT	✓	✓	10 - 120 %
44	WATT MAX DEMAND IMP.	✓	✓	10 - 120 %
45	WATT DEMAND EXPORT	✓	✓	10 - 120 %
46	WATT MAX DEMAND EXP.	✓	✓	10 - 120 %

Parameter No.	Parameter	3P 4W	3P 3W	Range
				Limit Output
51	VA DEMAND	✓	✓	10 - 120 %
52	VA MAX DEMAND	✓	✓	10 - 120 %
53	CURRENT DEMAND	✓	✓	10 - 120 %
54	CURRENT MAX DEMAND	✓	✓	10 - 120 %
101	INPUT VOLTAGE L12	✓	✗	10 - 120 %
102	INPUT VOLTAGE L23	✓	✗	10 - 120 %
103	INPUT VOLTAGE L31	✓	✗	10 - 120 %
113	NEUTRAL CURRENT	✓	✗	10 - 120 %

Note : Parameters 1,2,3 are L-N Voltage for 3P 4W & L-L Voltage for 3P 3W .

(1) For Frequency 0% corresponds to 45 Hz & 100% corresponds to 66 Hz.

(2) For Phase Angle 0% corresponds to 0^0& 100% corresponds to 360^0.

(3) For Power Factor 0% corresponds to -1 & 100% corresponds to +1.

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 3 : 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 3600kW
	1per MWh	Above 3600kW

3. For Energy Output in MWh

	Pulse rate
Divisor	Pulse
1	1 per MWh

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

9.2 Limit Switch :

Limit switch can be used to monitor the measured parameter (Ref.Table:2)in relation with 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.

Trip point:

Trip point can be set in the range of 10% to 120 % 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.

Energizing Delay:

The energizing delay can be set in the range from1 to 10 sec.

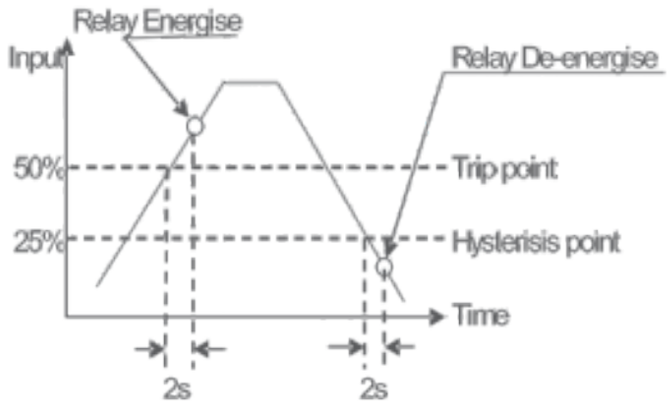
De-Energizing Delay:

The De-energizing delay can be set in the range from1 to 10 sec.

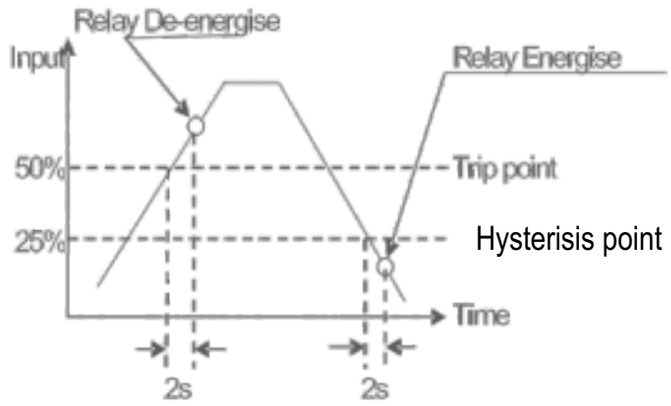
Note : In case of lo alarm if trip point is set at 100% then maximum 20% Hysterisis can be set..

Example of different configuration.
Parameter No: 4 (Current 1)
Trip Point = 50%
Hysteresis = 50% of trip point
Energising Delay: 2s
De-energising Delay: 2s

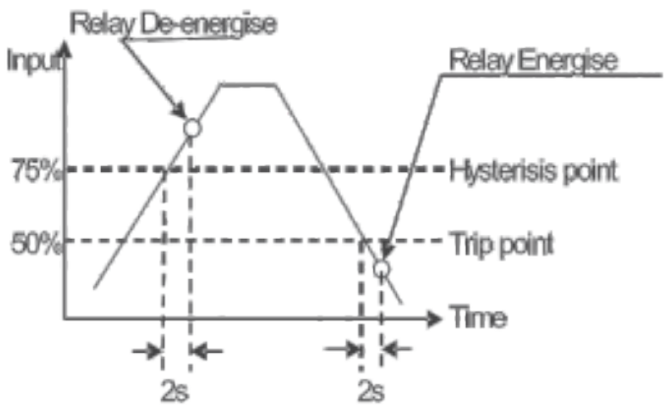
1) Hi alarm & Energised relay



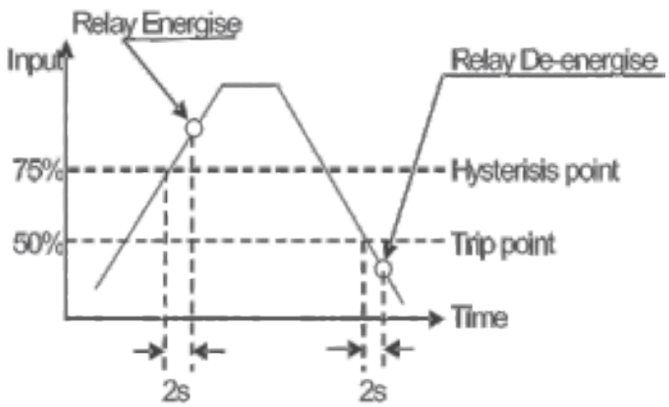
2) Hi alarm & De-energised relay



3) Lo alarm & Energised relay



4) Lo alarm & De-energised relay



10. RS 485 (ModBus) Output :

This instrument supports MODBUS (RS485) RTU protocol(2-wire) .

Connection should be made using twisted pair shielded cable. All "A" and "B" connections are daisy chained together. The screens should also be connected to the “Gnd” terminal. To avoid the possibility of loop currents, an Earth connection should be made at one point on the network.Loop (ring) topology does not require any termination load. Line topology may or may not require terminating loads depending on the type and length of cable used. The impedance of the termination load should match the impedance of the cable and be at bothends of the line. The cable should be terminated at each end with a 120 ohm (1/4 Watt min.) resistor.

RS 485 network supports maximum length of 1.2km. Including the Master, a maximum of 32 instruments can be connected in Rs485 network.The permissible address range for the instrument is between 1 and 247 for 32 instruments. Broadcast Mode (address 0) is not allowed.

The maximum latency time for the instrument is 50ms i.e. this is the amount of time that can pass before the first response character is output.

After sending any query through software (of the Master) , it must allow 50ms of time to elapse before assuming that the instrument is not going to respond. If slave does not respond within 50 ms, Master can ignore the previous query and can issue fresh query to the slave.

The each byte in RTU mode has following format:

	8-bit binary, hexadecimal 0-9, A-F 2 hexadecimal characters contained in each 8-bit field of the message
Format of Data Bytes	4 bytes (32 bits) per parameter. Floating point format (to IEEE 754) Most significant byte first (Alternative least significant byte first)
Error Checking Bytes	2 byte Cyclical Redundancy Check (CRC)
Byte format	1 start bit, 8 data bits, least significant bit sent first 1 bit for even/odd parity 1 stop bit if parity is used; 1 or 2 bits if no parity

Communication Baud Rate is user selectable from the front panel between 4800, 9600, 19200, 38400 bps.

Function code :

03	Read Holding Registers	Read content of read /write location (4X)
04	Read input Registers	Read content of read only location (3X)
16	Presets Multiple Registers	Set the content of read / write locations (4X)

Exception Cases : An exception code will be generated when the instrument receives ModBus query with valid parity & error check but which contains some other error (e.g. Attempt to set floating point variable to an invalid value) The response generated will be “Function code” Ored with HEX (80H). The exception codes are listed below

01	Illegal function	This function code is not supported by the instrument.
02	Illegal Data Address	Attempt to access an invalid address or an attempt to read or write part of a floating point value
03	Illegal Data Value	Attempt to set a floating point variable to an invalid value
04	Slave Device Failure	An error occurred so that slave device has failed to communicate.
06	Slave Device Busy	The slave is engaged in processing a long-duration program command. the master should retransmit the message when the slave is free.

Accessing 3 X register for reading measured values:

Two consecutive 16 bit registers represent one parameter. Refer table 4 for the addresses of 3X registers (Parameters measured by the instruments).

Each parameter is held in the 3X registers. Modbus Code 04 is used to access all parameters.

Example :

To read parameter ,

Volts 3 : Start address= 04 (Hex) Number of registers = 02

Note : Number of registers = Number of parameters x 2

Each Query for reading the data must be restricted to 20 parameters or less. Exceeding the 20 parameter limit will cause a ModBus exception code to be returned.

Query :

01 (Hex)	04 (Hex)	00 (Hex)	04(Hex)	00 (Hex)	02(Hex)	30 (Hex)	0A (Hex)
Device Address	Function Code	Start Address High	Start Address Low	Number of Registers Hi	Number of Registers Lo	CRC Low	CRC High

Start Address High : Most significant 8 bits of starting address of the parameter requested.

Start Address low :Least significant 8 bits of starting address of the parameter requested.

Number of register Hi : Most significant 8 bits of Number of registers requested.

Number of register Lo : Least significant 8 bits of Number of registers requested.

(Note : Two consecutive 16 bit register represent one parameter.)

Response: Volt3 (219.25V)

01 (Hex)	04 (Hex)	04 (Hex)	43 (Hex)	5B (Hex)	41 (Hex)	21 (Hex)	6F (Hex)	9B (Hex)
Device Address	Function Code	Byte Count	Data Register1 High Byte	Data Register1 Low Byte	Data Register2 High Byte	Data Register2 Low Byte	CRC Low	CRC High

Byte Count : Total number of data bytes received.

Data register 1 High Byte : Most significant 8 bits of Data register 1 of the parameter requested.

Data register 1 Low Byte : Least significant 8 bits of Data register 1 of the parameter requested.

Data register 2 High Byte : Most significant 8 bits of Data register 2 of the parameter requested.

Data register 2 Low Byte : Least significant 8 bits of Data register 2 of the parameter requested.

(Note : Two consecutive 16 bit register represent one parameter.)

Table 4 : 3 X register addresses (measured parameters)

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P4W	3P3W
			High Byte	Low Byte		
30001	1	Volts 1	00	0	✓	✓
30003	2	Volts 2	00	2	✓	✓
30005	3	Volts 3	00	4	✓	✓
30007	4	Current 1	00	6	✓	✓
30009	5	Current 2	00	8	✓	✓
30011	6	Current 3	00	A	✓	✓

Note : Parameters 1,2,3 are L-N Voltage for 3P 4W & L-L Voltage for 3P 3W .

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P4W	3P3W
			High Byte	Low Byte		
30013	7	W1	00	C	✓	x
30015	8	W2	00	E	✓	x
30017	9	W3	00	10	✓	x
30019	10	VA1	00	12	✓	x
30021	11	VA2	00	14	✓	x
30023	12	VA3	00	16	✓	x
30025	13	VAR1	00	18	✓	x
30027	14	VAR2	00	1A	✓	x
30029	15	VAR3	00	1C	✓	x
30031	16	PF1	00	1E	✓	x
30033	17	PF2	00	20	✓	x
30035	18	PF3	00	22	✓	x
30037	19	Phase Angle1	00	24	✓	x
30039	20	Phase Angle2	00	26	✓	x
30041	21	Phase Angle3	00	28	✓	x
30043	22	Volts Avg	00	2A	✓	✓
30045	23	Volts Sum	00	2C	✓	✓
30047	24	Current Avg	00	2E	✓	✓
30049	25	Current Sum	00	30	✓	✓
30051	26	Watt Avg	00	32	✓	✓
30053	27	Watt Sum	00	34	✓	✓
30055	28	VA Avg	00	36	✓	✓
30057	29	VA Sum	00	38	✓	✓
30059	30	VAR Avg	00	3A	✓	✓
30061	31	VAR Sum	00	3C	✓	✓
30063	32	PF Avg	00	3E	✓	✓

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P4W	3P3W
			High Byte	Low Byte		
30065	33	PF Sum	00	40	✓	x
30067	34	Phase Angle Avg	00	42	✓	✓
30069	35	Phase Angle Sum	00	44	✓	x
30071	36	Freq	00	46	✓	✓
30073	37	Wh import	00	48	✓	✓
30075	38	Wh export	00	4A	✓	✓
30077	39	VARh import	00	4C	✓	✓
30079	40	VARh export	00	4E	✓	✓
30081		VAh	00	50	✓	✓
30083	42	-	-	-	-	-
30085	43	W Demand (Import)	00	54	✓	✓
30087	44	W Max Demand (Import)	00	56	✓	✓
30089	45	W Demand (Export)	00	58	✓	✓
30091	46	W Max Demand (Export)	00	5A	✓	✓
30101	51	VA Demand	00	64	✓	✓
30103	52	VA Max Demand	00	66	✓	✓
30105	53	A Demand	00	68	✓	✓
30107	54	A Max Demand	00	6A	✓	✓
30109	55	Wh Import (no of overflows in register 30073 / 30111)	00	6C	✓	✓
30111	56	Wh Import	00	6E	✓	✓

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P4W	3P3W
			High Byte	Low Byte		
30113	57	Wh Export (no of overflows in register 30075 / 30115)	00	70	✓	✓
30115	58	Wh export	00	72	✓	✓
30117	59	VARh Import (no of overflows in register 30077 / 30119)	00	74	✓	✓
30119	60	VARh import	00	76	✓	✓
30121	61	VARh Export (no of overflows in register 30079 / 30123)	00	78	✓	✓
30123	62	VARh export	00	7A	✓	✓
30125	63	VAh (no of overflows in register 30081 / 30127)	00	7C	✓	✓
30127	64	Vah	00	7E	✓	✓
30133	67	System Max Voltage	00	84	✓	✓
30135	68	System Min Voltage	00	86	✓	✓
30141	71	System Max Currrent	00	8C	✓	✓
30143	72	System Min Current	00	8E	✓	✓
30145	73	Wh import depending on update rate	00	90	✓	✓
30147	74	Wh export depending on update rate	00	92	✓	✓

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P4W	3P3W
			High Byte	Low Byte		
30149	75	VArh import depending on update rate	00	94	✓	✓
30151	76	VArh export depending on update rate	00	96	✓	✓
30153	77	VAh depending on update rate	00	98	✓	✓
30163	82	Running Season no	00	A2	✓	✓
30165	83	Running Day type	00	A4	✓	✓
30167	84	Running Zone no.	00	A6	✓	✓
30169	85	Running tariff rate	00	A8	✓	✓
30171	86	RTC Minute	00	AA	✓	✓
30173	87	RTC Hour	00	AC	✓	✓
30175	88	RTC Date	00	AE	✓	✓
30177	89	RTC Month	00	B0	✓	✓
30179	90	RTC Year	00	B2	✓	✓
30181	91	Running zone Active Import Energy	00	B4	✓	✓
30183	92	Running zone Active Import Cost	00	B6	✓	✓
30185	93	Running zone Active Export Energy	00	B8	✓	✓
30187	94	Running zone Active Export Cost	00	BA	✓	✓
30189	95	Running zone Reactive Import Energy	00	BC	✓	✓
30191	96	Running zone Reactive Import Cost	00	BE	✓	✓

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P4W	3P3W
			High Byte	Low Byte		
30193	97	Running zone Reactive Export Energy	00	C0	✓	✓
30195	98	Running zone Reactive Export Cost	00	C2	✓	✓
30197	99	Running zone Apparent Energy	00	C4	✓	✓
30199	100	Running zone Apparent Cost	00	C6	✓	✓
30201	101	V1 - 2 (Calculated)	00	C8	✓	x
30203	102	V2 - 3 (Calculated)	00	CA	✓	x
30205	103	V3- 1 (Calculated)	00	CC	✓	x
30207	104	V1 THD (%)	00	CE	✓	✓
30209	105	V2 THD (%)	00	D0	✓	✓
30211	106	V3 THD (%)	00	D2	✓	✓
30213	107	I1 THD (%)	00	D4	✓	✓
30215	108	I2 THD (%)	00	D6	✓	✓
30217	109	I3 THD (%)	00	D8	✓	✓
30219	110	System Voltage THD (%)	00	DA	✓	✓
30221	111	System Current THD (%)	00	DC	✓	✓
30225	113	I Neutral	00	E0	✓	x
30227	114	Run Hour	00	E2	✓	✓
30229	115	On Hour	00	E4	✓	✓

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P4W	3P3W
			High Byte	Low Byte		
30231	116	No. of interrupts	00	E6	✓	✓
30233	117	VRMS Fundamental L1	00	E8	✓	✓
30235	118	IRMS Fundamental L1	00	EA	✓	✓
30237	119	Watt Fundamental L1	00	EC	✓	x
30239	120	VAR Fundamental L1	00	EE	✓	x
30241	121	VA Fundamental L1	00	F0	✓	x
30243	122	PF Fundamental L1	00	F2	✓	x
30245	123	VTHD L1 (%)	00	F4	✓	✓
30247	124	ITHD L1 (%)	00	F6	✓	✓
30249	125	VRMS Harmonic A L1	00	F8	✓	✓
30251	126	IRMS Harmonic A L1	00	FA	✓	✓
30253	127	Watt Harmonic A L1	00	FC	✓	x
30255	128	VAR Harmonic A L1	00	FE	✓	x
30257	129	VA Harmonic A L1	01	0	✓	x
30259	130	PF Harmonic A L1	01	2	✓	x
30261	131	Voltage HD Harmonic A L1	01	4	✓	✓
30263	132	Current HD Harmonic A L1	01	6	✓	✓
30265	133	VRMS Harmonic B L1	01	8	✓	✓
30267	134	IRMS Harmonic B L1	01	A	✓	✓
30269	135	Watt Harmonic B L1	01	C	✓	x
30271	136	VAR Harmonic B L1	01	E	✓	x
30273	137	VA Harmonic B L1	01	10	✓	x
30275	138	PF Harmonic B L1	01	12	✓	x

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P4W	3P3W
			High Byte	Low Byte		
30277	139	Voltage HD Harmonic B L1	01	14	✓	✓
30279	140	Current HD Harmonic B L1	01	16	✓	✓
30281	141	VRMS Harmonic C L1	01	18	✓	✓
30283	142	IRMS Harmonic C L1	01	1A	✓	✓
30285	143	Watt Harmonic C L1	01	1C	✓	x
30287	144	VAR Harmonic C L1	01	1E	✓	x
30289	145	VA Harmonic C L1	01	20	✓	x
30291	146	PF Harmonic C L1	01	22	✓	x
30293	147	Voltage HD Harmonic C L1	01	24	✓	✓
30295	148	Current HD Harmonic C L1	01	26	✓	✓
30297	149	VRMS Harmonic D L1	01	28	✓	✓
30299	150	IRMS Harmonic D L1	01	2A	✓	✓
30301	151	Watt Harmonic D L1	01	2C	✓	x
30303	152	VAR Harmonic D L1	01	2E	✓	x
30305	153	VA Harmonic D L1	01	30	✓	x
30307	154	PF Harmonic D L1	01	32	✓	x
30309	155	Voltage HD Harmonic D L1	01	34	✓	✓
30311	156	Current HD Harmonic D L1	01	36	✓	✓
30313	157	VRMS Harmonic E L1	01	38	✓	✓
30315	158	IRMS Harmonic E L1	01	3A	✓	✓
30317	159	Watt Harmonic E L1	01	3C	✓	x

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P4W	3P3W
			High Byte	Low Byte		
30319	160	VAR Harmonic E L1	01	3E	✓	x
30321	161	VA Harmonic E L1	01	40	✓	x
30323	162	PF Harmonic E L1	01	42	✓	x
30325	163	Voltage HD Harmonic E L1	01	44	✓	✓
30327	164	Current HD Harmonic E L1	01	46	✓	✓
30329	165	VRMS Harmonic F L1	01	48	✓	✓
30331	166	IRMS Harmonic F L1	01	4A	✓	✓
30333	167	Watt Harmonic F L1	01	4C	✓	x
30335	168	VAR Harmonic F L1	01	4E	✓	x
30337	169	VA Harmonic F L1	01	50	✓	x
30339	170	PF Harmonic F L1	01	52	✓	x
30341	171	Voltage HD Harmonic F L1	01	54	✓	✓
30343	172	Current HD Harmonic F L1	01	56	✓	✓
30345	173	VRMS Fundamental L2	01	58	✓	✓
30347	174	IRMS Fundamental L2	01	5A	✓	✓
30349	175	Watt Fundamental L2	01	5C	✓	x
30351	176	VAR Fundamental L2	01	5E	✓	x
30353	177	VA Fundamental L2	01	60	✓	x
30355	178	PF Fundamental L2	01	62	✓	x
30357	179	VTHD L2 (%)	01	64	✓	✓
30359	180	ITHD L2 (%)	01	66	✓	✓
30361	181	VRMS Harmonic A L2	01	68	✓	✓
30363	182	IRMS Harmonic A L2	01	6A	✓	✓
30365	183	Watt Harmonic A L2	01	6C	✓	x
30367	184	VAR Harmonic A L2	01	6E	✓	x

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P4W	3P3W
			High Byte	Low Byte		
30369	185	VA Harmonic A L2	01	70	✓	x
30371	186	PF Harmonic A L2	01	72	✓	x
30373	187	Voltage HD Harmonic A L2	01	74	✓	✓
30375	188	Current HD Harmonic A L2	01	76	✓	✓
30377	189	VRMS Harmonic B L2	01	78	✓	✓
30379	190	IRMS Harmonic B L2	01	7A	✓	✓
30381	191	Watt Harmonic B L2	01	7C	✓	x
30383	192	VAR Harmonic B L2	01	7E	✓	x
30385	193	VA Harmonic B L2	01	80	✓	x
30387	194	PF Harmonic B L2	01	82	✓	x
30389	195	Voltage HD Harmonic B L2	01	84	✓	✓
30391	196	Current HD Harmonic B L2	01	86	✓	✓
30393	197	VRMS Harmonic C L2	01	88	✓	✓
30395	198	IRMS Harmonic C L2	01	8A	✓	✓
30397	199	Watt Harmonic C L2	01	8C	✓	x
30399	200	VAR Harmonic C L2	01	8E	✓	x
30401	201	VA Harmonic C L2	01	90	✓	x
30403	202	PF Harmonic C L2	01	92	✓	x
30405	203	Voltage HD Harmonic C L2	01	94	✓	✓
30407	204	Current HD Harmonic C L2	01	96	✓	✓
30409	205	VRMS Harmonic D L2	01	98	✓	✓
30411	206	IRMS Harmonic D L2	01	9A	✓	✓
30413	207	Watt Harmonic D L2	01	9C	✓	x
30415	208	VAR Harmonic D L2	01	9E	✓	x
30417	209	VA Harmonic D L2	01	A0	✓	x
30419	210	PF Harmonic D L2	01	A2	✓	x

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P4W	3P3W
			High Byte	Low Byte		
30421	211	Voltage HD Harmonic D L2	01	A4	✓	✓
30423	212	Current HD Harmonic D L2	01	A6	✓	✓
30425	213	VRMS Harmonic E L2	01	A8	✓	✓
30427	214	IRMS Harmonic E L2	01	AA	✓	✓
30429	215	Watt Harmonic E L2	01	AC	✓	x
30431	216	VAR Harmonic E L2	01	AE	✓	x
30433	217	VA Harmonic E L2	01	B0	✓	x
30435	218	PF Harmonic E L2	01	B2	✓	x
30437	219	Voltage HD Harmonic E L2	01	B4	✓	✓
30439	220	Current HD Harmonic E L2	01	B6	✓	✓
30441	221	VRMS Harmonic F L2	01	B8	✓	✓
30443	222	IRMS Harmonic F L2	01	BA	✓	✓
30445	223	Watt Harmonic F L2	01	BC	✓	x
30447	224	VAR Harmonic F L2	01	BE	✓	x
30449	225	VA Harmonic F L2	01	C0	✓	x
30451	226	PF Harmonic F L2	01	C2	✓	x
30453	227	Voltage HD Harmonic F L2	01	C4	✓	✓
30455	228	Current HD Harmonic F L2	01	C6	✓	✓
30457	229	VRMS Fundamental L3	01	C8	✓	✓
30459	230	IRMS Fundamental L3	01	CA	✓	✓
30461	231	Watt Fundamental L3	01	CC	✓	x
30463	232	VAR Fundamental L3	01	CE	✓	x
30465	233	VA Fundamental L3	01	D0	✓	x
30467	234	PF Fundamental L3	01	D2	✓	x
30469	235	VTHD L3 (%)	01	D4	✓	✓
30471	236	ITHD L3 (%)	01	D6	✓	✓

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P4W	3P3W
			High Byte	Low Byte		
30473	237	VRMS Harmonic A L3	01	D8	✓	✓
30475	238	IRMS Harmonic A L3	01	DA	✓	✓
30477	239	Watt Harmonic A L3	01	DC	✓	x
30479	240	VAR Harmonic A L3	01	DE	✓	x
30481	241	VA Harmonic A L3	01	E0	✓	x
30483	242	PF Harmonic A L3	01	E2	✓	x
30485	243	Voltage HD Harmonic A L3	01	E4	✓	✓
30487	244	Current HD Harmonic A L3	01	E6	✓	✓
30489	245	VRMS Harmonic B L3	01	E8	✓	✓
30491	246	IRMS Harmonic B L3	01	EA	✓	✓
30493	247	Watt Harmonic B L3	01	EC	✓	x
30495	248	VAR Harmonic B L3	01	EE	✓	x
30497	249	VA Harmonic B L3	01	F0	✓	x
30499	250	PF Harmonic B L3	01	F2	✓	x
30501	251	Voltage HD Harmonic B L3	01	F4	✓	✓
30503	252	Current HD Harmonic B L3	01	F6	✓	✓
30505	253	VRMS Harmonic C L3	01	F8	✓	✓
30507	254	IRMS Harmonic C L3	01	FA	✓	✓
30509	255	Watt Harmonic C L3	01	FC	✓	x
30511	256	VAR Harmonic C L3	01	FE	✓	x
30513	257	VA Harmonic C L3	02	0	✓	x
30515	258	PF Harmonic C L3	02	2	✓	x
30517	259	Voltage HD Harmonic C L3	02	4	✓	✓
30519	260	Current HD Harmonic C L3	02	6	✓	✓
30521	261	VRMS Harmonic D L3	02	8	✓	✓
30523	262	IRMS Harmonic D L3	02	A	✓	✓

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P4W	3P3W
			High Byte	Low Byte		
30525	263	Watt Harmonic D L3	02	C	✓	x
30527	264	VAR Harmonic D L3	02	E	✓	x
30529	265	VA Harmonic D L3	02	10	✓	x
30531	266	PF Harmonic D L3	02	12	✓	x
30533	267	Voltage HD Harmonic D L3	02	14	✓	✓
30535	268	Current HD Harmonic D L3	02	16	✓	✓
30537	269	VRMS Harmonic E L3	02	18	✓	✓
30539	270	IRMS Harmonic E L3	02	1A	✓	✓
30541	271	Watt Harmonic E L3	02	1C	✓	x
30543	272	VAR Harmonic E L3	02	1E	✓	x
30545	273	VA Harmonic E L3	02	20	✓	x
30547	274	PF Harmonic E L3	02	22	✓	x
30549	275	Voltage HD Harmonic E L3	02	24	✓	✓
30551	276	Current HD Harmonic E L3	02	26	✓	✓
30553	277	VRMS Harmonic F L3	02	28	✓	✓
30555	278	IRMS Harmonic F L3	02	2A	✓	✓
30557	279	Watt Harmonic F L3	02	2C	✓	x
30559	280	VAR Harmonic F L3	02	2E	✓	x
30561	281	VA Harmonic F L3	02	30	✓	x
30563	282	PF Harmonic F L3	02	32	✓	x
30565	283	Voltage HD Harmonic F L3	02	34	✓	✓
30567	284	Current HD Harmonic F L3	02	36	✓	✓

PF : Power Factor HD : Harmonic Distortion

For 3 phase 3 wire L1: V12 / I1, L2 : V23 / I2, L3 : V31 / I3

Harmonic A/B/C/D/E/F denotes harmonic no entered in Power Quality Setup - Harmonic setup L1/L2/L3

Accessing Sag, Swell, Over Current data through MODBUS :

The Sag, Swell, Over Current time stamping data can be accessed from the addresses shown in table 5. In this case Hour & Minute parameters are combined on one location and Date, Month & year parameters are combined on the next location.

For example: Suppose after reading register 30581, data read is 1051 in decimal. And reading register 30583, data read is 150313. Here in 1051, first two digits stand for hour i.e 10Hours and the next two digits stand for minute i.e 51 minutes. Also in 150313, first two digit denotes date i.e 15, next two denotes month i.e 3 and last to gives year when added to 2000.

So, For address 30581 10:51 is time for SAG 1.

For address 30583 15 / 03 / 2013 is date for SAG 1.

Sag, Swell, Over Current data is applicable in both 3P3W & 3P 4W.

Table 5 : 3 X register (Sag, Swell, Over Current data)

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30581	291	Sag1 minute /Sag1 hour	02	44
30583	292	Sag1 date/ Sag1 month/ Sag1 year	02	46
30585	293	Sag2 minute /Sag2 hour	02	48
30587	294	Sag2 date/ Sag2 month/ Sag2 year	02	4A
30589	295	Sag3 minute /Sag3 hour	02	4C
30591	296	Sag3 date/ Sag3 month/ Sag3 year	02	4E
30593	297	Sag4 minute /Sag4 hour	02	50
30595	298	Sag4 date/ Sag4 month/ Sag4 year	02	52

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30597	299	Sag5 minute /Sag5 hour	02	54
30599	300	Sag5 date/ Sag5 month/ Sag5 year	02	56
30601	301	Sag6 minute /Sag6 hour	02	58
30603	302	Sag6 date/ Sag6 month/ Sag6 year	02	5A
30605	303	Sag7 minute /Sag7 hour	02	5C
30607	304	Sag7 date/ Sag7 month/ Sag7 year	02	5E
30609	305	Sag8 minute /Sag8 hour	02	60
30611	306	Sag8 date/ Sag8 month/ Sag8 year	02	62
30613	307	Sag9 minute /Sag9 hour	02	64
30615	308	Sag9 date/ Sag9 month/ Sag9 year	02	66
30617	309	Sag10 minute /Sag10 hour	02	68
30619	310	Sag10 date/ Sag10 month/ Sag10 year	02	6A
30621	311	Sag11 minute /Sag11 hour	02	6C
30623	312	Sag11 date/ Sag11 month/ Sag11 year	02	6E
30625	313	Sag12 minute /Sag12 hour	02	70
30627	314	Sag12 date/ Sag12 month/ Sag12 year	02	72
30629	315	Sag13 minute /Sag13 hour	02	74
30631	316	Sag13 date/ Sag13 month/ Sag13 year	02	76
30633	317	Sag14 minute /Sag14 hour	02	78
30635	318	Sag14 date/ Sag14 month/ Sag14 year	02	7A
30637	319	Sag15 minute /Sag15 hour	02	7C
30639	320	Sag15 date/ Sag15 month/ Sag15 year	02	7E
30641	321	Sag16 minute /Sag16 hour	02	80
30643	322	Sag16 date/ Sag16 month/ Sag16 year	02	82
30645	323	Sag17 minute /Sag17 hour	02	84
30647	324	Sag17 date/ Sag17 month/ Sag17 year	02	86

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30649	325	Sag18 minute /Sag18 hour	02	88
30651	326	Sag18 date/ Sag18 month/ Sag18 year	02	8A
30653	327	Sag19 minute /Sag19 hour	02	8C
30655	328	Sag19 date/ Sag19 month/ Sag19 year	02	8E
30657	329	Sag20 minute /Sag20 hour	02	90
30659	330	Sag20 date/ Sag20 month/ Sag20 year	02	92
30661	331	Sag21 minute /Sag21 hour	02	94
30663	332	Sag21 date/ Sag21 month/ Sag21 year	02	96
30665	333	Sag22 minute /Sag22 hour	02	98
30667	334	Sag22 date/ Sag22 month/ Sag22 year	02	9A
30669	335	Sag23 minute /Sag23 hour	02	9C
30671	336	Sag23 date/ Sag23 month/ Sag23 year	02	9E
30673	337	Sag24 minute /Sag24 hour	02	A0
30675	338	Sag24 date/ Sag24 month/ Sag24 year	02	A2
30677	339	Sag25 minute /Sag25 hour	02	A4
30679	340	Sag25 date/ Sag25 month/ Sag25 year	02	A6
30681	341	Sag26 minute /Sag26 hour	02	A8
30683	342	Sag26 date/ Sag26 month/ Sag26 year	02	AA
30685	343	Sag27 minute /Sag27 hour	02	AC
30687	344	Sag27 date/ Sag27 month/ Sag27 year	02	AE
30689	345	Sag28 minute /Sag28 hour	02	B0
30691	346	Sag28 date/ Sag28 month/ Sag28 year	02	B2
30693	347	Sag29 minute /Sag29 hour	02	B4
30695	348	Sag29 date/ Sag29 month/ Sag29 year	02	B6
30697	349	Sag30 minute /Sag30 hour	02	B8
30699	350	Sag30 date/ Sag30 month/ Sag30 year	02	BA

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30701	351	Swell1 minute /Swell1 hour	02	BC
30703	352	Swell1 date/ Swell1 month/ Swell1 year	02	BE
30705	353	Swell2 minute /Swell2 hour	02	C0
30707	354	Swell2 date/ Swell2 month/ Swell2 year	02	C2
30709	355	Swell3 minute /Swell3 hour	02	C4
30711	356	Swell3 date/ Swell3 month/ Swell3 year	02	C6
30713	357	Swell4 minute /Swell4 hour	02	C8
30715	358	Swell4 date/ Swell4 month/ Swell4 year	02	CA
30717	359	Swell5 minute /Swell5 hour	02	CC
30719	360	Swell5 date/ Swell5 month/ Swell5 year	02	CE
30721	361	Swell6 minute /Swell6 hour	02	D0
30723	362	Swell6 date/ Swell6 month/ Swell6 year	02	D2
30725	363	Swell7 minute /Swell7 hour	02	D4
30727	364	Swell7 date/ Swell7 month/ Swell7 year	02	D6
30729	365	Swell8 minute /Swell8 hour	02	D8
30731	366	Swell8 date/ Swell8 month/ Swell8 year	02	DA
30733	367	Swell9 minute /Swell9 hour	02	DD
30735	368	Swell9 date/ Swell9 month/ Swell9 year	02	DE
30737	369	Swell10 minute /Swell10 hour	02	E0
30739	370	Swell10 date/ Swell10 month/ Swell10 year	02	E2
30741	371	Swell11 minute /Swell11 hour	02	E4
30743	372	Swell11 date/ Swell11 month/ Swell11 year	02	E6
30745	373	Swell12 minute /Swell12 hour	02	E8
30747	374	Swell12 date/ Swell12 month/ Swell12 year	02	EA
30749	375	Swell13 minute /Swell13 hour	02	EC
30751	376	Swell13 date/ Swell13 month/ Swell13 year	02	EE

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30753	377	Swell14 minute /Swell14 hour	02	F0
30755	378	Swell14 date/ Swell14 month/ Swell14 year	02	F2
30757	379	Swell15 minute /Swell15 hour	02	F4
30759	380	Swell15 date/ Swell15 month/ Swell15 year	02	F6
30761	381	Swell16 minute /Swell16 hour	02	F8
30763	382	Swell16 date/ Swell16 month/ Swell16 year	02	FA
30765	383	Swell17 minute /Swell17 hour	02	FC
30767	384	Swell17 date/ Swell17 month/ Swell17 year	02	FE
30769	385	Swell18 minute /Swell18 hour	03	0
30771	386	Swell18 date/ Swell18 month/ Swell18 year	03	2
30773	387	Swell19 minute /Swell19 hour	03	4
30775	388	Swell19 date/ Swell19 month/ Swell19 year	03	6
30777	389	Swell20 minute /Swell20 hour	03	8
30779	390	Swell20 date/ Swell20 month/ Swell20 year	03	A
30781	391	Swell21 minute /Swell21 hour	03	C
30783	392	Swell21 date/ Swell21 month/ Swell21 year	03	E
30785	393	Swell22 minute /Swell22 hour	03	10
30787	394	Swell22 date/ Swell22 month/ Swell22 year	03	12
30789	395	Swell23 minute /Swell23 hour	03	14
30791	396	Swell23 date/ Swell23 month/ Swell23 year	03	16
30793	397	Swell24 minute /Swell24 hour	03	18
30795	398	Swell24 date/ Swell24 month/ Swell24 year	03	1A
30797	399	Swell25 minute /Swell25 hour	03	1C
30799	400	Swell25 date/ Swell25 month/ Swell25 year	03	1E
30801	401	Swell26 minute /Swell26 hour	03	20
30803	402	Swell26 date/ Swell26 month/ Swell26 year	03	22

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30805	403	Swell27 minute /Swell27 hour	03	24
30807	404	Swell27 date/ Swell27 month/ Swell27 year	03	26
30809	405	Swell28 minute /Swell28 hour	03	28
30811	406	Swell28 date/ Swell28 month/ Swell28 year	03	2A
30813	407	Swell29 minute /Swell29 hour	03	2C
30815	408	Swell29 date/ Swell29 month/ Swell29 year	03	2E
30817	409	Swell30 minute /Swell30 hour	03	30
30819	410	Swell30 date/ Swell30 month/ Swell30 year	03	32
30821	411	Over Current1 minute /Over Current1 hour	03	34
30823	412	Over Current1 date/ Over Current1 month/ Over Current1 year	03	36
30825	413	Over Current2 minute /Over Current2 hour	03	38
30827	414	Over Current2 date/ Over Current2 month/ Over Current2 year	03	3A
30829	415	Over Current3 minute /Over Current3 hour	03	3C
30831	416	Over Current3 date/ Over Current3 month/ Over Current3 year	03	3E
30833	417	Over Current4 minute /Over Current4 hour	03	40
30835	418	Over Current4 date/ Over Current4 month/ Over Current4 year	03	42
30837	419	Over Current5 minute /Over Current5 hour	03	44
30839	420	Over Current5 date/ Over Current5 month/ Over Current5 year	03	46
30841	421	Over Current6 minute /Over Current6 hour	03	48

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30843	422	Over Current6 date/ Over Current6 month/ Over Current6 year	03	4A
30845	423	Over Current7 minute /Over Current7 hour	03	4C
30847	424	Over Current7 date/ Over Current7 month/ Over Current7 year	03	4E
30849	425	Over Current8 minute /Over Current8 hour	03	50
30851	426	Over Current8 date/ Over Current8 month/ Over Current8 year	03	52
30853	427	Over Current9 minute /Over Current9 hour	03	54
30855	428	Over Current9 date/ Over Current9 month/ Over Current9 year	03	56
30857	429	Over Current10 minute /Over Current10 hour	03	58
30859	430	Over Current10 date/ Over Current10 month/ Over Current10 year	03	5A
30861	431	Over Current11 minute /Over Current11 hour	03	5C
30863	432	Over Current11 date/ Over Current11 month/ Over Current11 year	03	5E
30865	433	Over Current12 minute /Over Current12 hour	03	60
30867	434	Over Current12 date/ Over Current12 month/ Over Current12 year	03	62
30869	435	Over Current13 minute /Over Current13 hour	03	64
30871	436	Over Current13 date/ Over Current13 month/ Over Current13 year	03	66
30873	437	Over Current14 minute /Over Current14 hour	03	68

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30875	438	Over Current14 date/ Over Current14 month/ Over Current14 year	03	6A
30877	439	Over Current15 minute /Over Current15 hour	03	6C
30879	440	Over Current15 date/ Over Current15 month/ Over Current15 year	03	6E
30881	441	Over Current16 minute /Over Current16 hour	03	70
30883	442	Over Current16 date/ Over Current16 month/ Over Current16 year	03	72
30885	443	Over Current17 minute /Over Current17 hour	03	74
30887	444	Over Current17 date/ Over Current17 month/ Over Current17 year	03	76
30889	445	Over Current18 minute /Over Current18 hour	03	78
30891	446	Over Current18 date/ Over Current18 month/ Over Current18 year	03	7A
30893	447	Over Current19 minute /Over Current19 hour	03	7C
30895	448	Over Current19 date/ Over Current19 month/ Over Current19 year	03	7E
30897	449	Over Current20 minute /Over Current20 hour	03	80
30899	450	Over Current20 date/ Over Current20 month/ Over Current20 year	03	82
30901	451	Over Current21 minute /Over Current21 hour	03	84
30903	452	Over Current21 date/ Over Current21 month/ Over Current21 year	03	86
30905	453	Over Current22 minute /Over Current22 hour	03	88

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30907	454	Over Current22 date/ Over Current22 month/ Over Current22 year	03	8A
30909	455	Over Current23 minute /Over Current23 hour	03	8C
30911	456	Over Current23 date/ Over Current23 month/ Over Current23 year	03	8E
30913	457	Over Current24 minute /Over Current24 hour	03	90
30915	458	Over Current24 date/ Over Current24 month/ Over Current24 year	03	92
30917	459	Over Current25 minute /Over Current25 hour	03	94
30919	460	Over Current25 date/ Over Current25 month/ Over Current25 year	03	96
30921	461	Over Current26 minute /Over Current26 hour	03	98
30923	462	Over Current26 date/ Over Current26 month/ Over Current26 year	03	9A
30925	463	Over Current27 minute /Over Current27 hour	03	9C
30927	464	Over Current27 date/ Over Current27 month/ Over Current27 year	03	9E
30929	465	Over Current28 minute /Over Current28 hour	03	A0
30931	466	Over Current28 date/ Over Current28 month/ Over Current28 year	03	A2
30933	467	Over Current29 minute /Over Current29 hour	03	A4
30935	468	Over Current29 date/ Over Current29 month/ Over Current29 year	03	A6

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30937	469	Over Current30 minute /Over Current30 hour	03	A8
30939	470	Over Current30 date/ Over Current30 month/ Over Current30 year	03	AA

Accessing 3 X for reading Time Of Day data :

Time Of Day data can be read from 3 X register only after setting the 4 X register address 40083 (parameter No. 41 in 4 X register). For different values in 40083 different TOD data can be read. Settings for 40083 address are mentioned in table 6.

Table 6 : TOD Data Configuration

Value in 40083	Type of data in 3 X register	Reference Table
0	Normal measurement data & Sag, Swell, Over Current Timestamps	Table 4 & Table 5
1	TOD Summury data (per date total energy & cost up to last 31 days & per month total energy & cost up to last 12 months	Table 7
2	TOD zonewise active import energy & cost per date up to last 31 days	Table 8
3	TOD zonewise active export energy & cost per date up to last 31 days	
4	TOD zonewise reactive import energy & cost per date up to last 31 days	
5	TOD zonewise reactive export energy & cost per date up to last 31 days	
6	TOD zonewise apparent energy & cost per date up to last 31 days	

If value at 40083 is configured from 1 to 6 , the corresponding data in 3 X register can be read for maximum 5 minutes. After that 40083 will automatically be configured as 0 , and normal measured parameter will be held in 3 X register.

For Time Of Day data the units for energy and cost multiplier are decided on the settings of Pt primary value and CT primary value. Following table shows the unit of energy and cost multiplier for the different ranges of CT primary and PT primary.

CTPR*PTPR(VLL)*ROOT3 (KW)	Per month Energy Unit	Per month Cost Multiplier	Per day & Per Zone Energy Unit	Per day & Per Zone Cost Multiplier
0 to <=900	kWh	1	kWh	1
>900 to <=90000	kWh	1000	kWh	1
>90000	MWh	1000	kWh	1000

For example, Suppose PT primary value is set as 500 and CT primary value is set as 5, then 5 * 500 * 1.732051 = 4330.127. This is less than 900 KW.

So the per month energy , per day energy & per zone energy will be in KW. Also cost multiplier for all cost will be 1.

In other case, if PT primary value is set as 692800 and CT primary value is set as 1157, then 1157 * 692800 * 1.732051 = 1388359273. This is greater than 90000 KW. So the per month energy , per day energy & per zone energy will be in KW. Also cost multiplier for all cost will be 1000 i.e. if get value of cost as 5 , cost should be

Table 7 : TOD Summary Data

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30003	1	Current date timezone1 kWh import energy	00	2
30005	2	Current date timezone2 kWh import energy	00	4
30007	3	Current date timezone3 kWh import energy	00	6
30009	4	Current date timezone4 kWh import energy	00	8
30011	5	Current date timezone5 kWh import energy	00	A
30013	6	Current date timezone6 kWh import energy	00	C
30015	7	Current date timezone1 kWh export energy	00	E
30017	8	Current date timezone2 kWh export energy	00	10
30019	9	Current date timezone3 kWh export energy	00	12
30021	10	Current date timezone4 kWh export energy	00	14
30023	11	Current date timezone5 kWh export energy	00	16
30025	12	Current date timezone6 kWh export energy	00	18
30027	13	Current date timezone1 kVARh import energy	00	1A
30029	14	Current date timezone2 kVARh import energy	00	1C
30031	15	Current date timezone3 kVARh import energy	00	1E
30033	16	Current date timezone4 kVARh import energy	00	20

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30035	17	Current date timezone5 kVARh import energy	00	22
30037	18	Current date timezone6 kVARh import energy	00	24
30039	19	Current date timezone1 kVARh export energy	00	26
30041	20	Current date timezone2 kVARh export energy	00	28
30043	21	Current date timezone3 kVARh export energy	00	2A
30045	22	Current date timezone4 kVARh export energy	00	2C
30047	23	Current date timezone5 kVARh export energy	00	2E
30049	24	Current date timezone6 kVARh export energy	00	30
30051	25	Current date timezone1 kVAh energy	00	32
30053	26	Current date timezone2 kVAh energy	00	34
30055	27	Current date timezone3 kVAh energy	00	36
30057	28	Current date timezone4 kVAh energy	00	38
30059	29	Current date timezone5 kVAh energy	00	3A
30061	30	Current date timezone6 kVAh energy	00	3C
30063	31	Date 1 kWh import energy	00	3E
30065	32	Date 2 kWh import energy	00	40
30067	33	Date 3 kWh import energy	00	42

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30069	34	Date 4 kWh import energy	00	44
30071	35	Date 5 kWh import energy	00	46
30073	36	Date 6 kWh import energy	00	48
30075	37	Date 7 kWh import energy	00	4A
30077	38	Date 8 kWh import energy	00	4C
30079	39	Date 9 kWh import energy	00	4E
30081	40	Date 10 kWh import energy	00	50
30083	41	Date 11 kWh import energy	00	52
30085	42	Date 12 kWh import energy	00	54
30087	43	Date 13 kWh import energy	00	56
30089	44	Date 14 kWh import energy	00	58
30091	45	Date 15 kWh import energy	00	5A
30093	46	Date 16 kWh import energy	00	5C
30095	47	Date 17 kWh import energy	00	5E
30097	48	Date 18 kWh import energy	00	60
30099	49	Date 19 kWh import energy	00	62
30101	50	Date 20 kWh import energy	00	64

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30103	51	Date 21 kWh import energy	00	66
30105	52	Date 22 kWh import energy	00	68
30107	53	Date 23 kWh import energy	00	6A
30109	54	Date 24 kWh import energy	00	6C
30111	55	Date 25 kWh import energy	00	6E
30113	56	Date 26 kWh import energy	00	70
30115	57	Date 27 kWh import energy	00	72
30117	58	Date 28 kWh import energy	00	74
30119	59	Date 29 kWh import energy	00	76
30121	60	Date 30 kWh import energy	00	78
30123	61	Date 31 kWh import energy	00	7A
30125	62	Date 1 kWh export energy	00	7C
30127	63	Date 2 kWh export energy	00	7E
30129	64	Date 3 kWh export energy	00	80
30131	65	Date 4 kWh export energy	00	82
30133	66	Date 5 kWh export energy	00	84
30135	67	Date 6 kWh export energy	00	86

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30137	68	Date 7 kWh export energy	00	88
30139	69	Date 8 kWh export energy	00	8A
30141	70	Date 9 kWh export energy	00	8C
30143	71	Date 10 kWh export energy	00	8E
30145	72	Date 11 kWh export energy	00	90
30147	73	Date 12 kWh export energy	00	92
30149	74	Date 13 kWh export energy	00	94
30151	75	Date 14 kWh export energy	00	96
30153	76	Date 15 kWh export energy	00	98
30155	77	Date 16 kWh export energy	00	9A
30157	78	Date 17 kWh export energy	00	9C
30159	79	Date 18 kWh export energy	00	9E
30161	80	Date 19 kWh export energy	00	A0
30163	81	Date 20 kWh export energy	00	A2
30165	82	Date 21 kWh export energy	00	A4
30167	83	Date 22 kWh export energy	00	A6
30169	84	Date 23 kWh export energy	00	A8

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30171	85	Date 24 kWh export energy	00	AA
30173	86	Date 25 kWh export energy	00	AC
30175	87	Date 26 kWh export energy	00	AE
30177	88	Date 27 kWh export energy	00	B0
30179	89	Date 28 kWh export energy	00	B2
30181	90	Date 29 kWh export energy	00	B4
30183	91	Date 30 kWh export energy	00	B6
30185	92	Date 31 kWh export energy	00	B8
30187	93	Date 1 kVARh import energy	00	BA
30189	94	Date 2 kVARh import energy	00	BC
30191	95	Date 3 kVARh import energy	00	BE
30193	96	Date 4 kVARh import energy	00	C0
30195	97	Date 5 kVARh import energy	00	C2
30197	98	Date 6 kVARh import energy	00	C4
30199	99	Date 7 kVARh import energy	00	C6
30201	100	Date 8 kVARh import energy	00	C8
30203	101	Date 9 kVARh import energy	00	CA

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30205	102	Date 10 kVARh import energy	00	CC
30207	103	Date 11 kVARh import energy	00	CE
30209	104	Date 12 kVARh import energy	00	D0
30211	105	Date 13 kVARh import energy	00	D2
30213	106	Date 14 kVARh import energy	00	D4
30215	107	Date 15 kVARh import energy	00	D6
30217	108	Date 16 kVARh import energy	00	D8
30219	109	Date 17 kVARh import energy	00	DA
30221	110	Date 18 kVARh import energy	00	DC
30223	111	Date 19 kVARh import energy	00	DE
30225	112	Date 20 kVARh import energy	00	E0
30227	113	Date 21 kVARh import energy	00	E2
30229	114	Date 22 kVARh import energy	00	E4
30231	115	Date 23 kVARh import energy	00	E6
30233	116	Date 24 kVARh import energy	00	E8
30235	117	Date 25 kVARh import energy	00	EA
30237	118	Date 26 kVARh import energy	00	EC

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30239	119	Date 27 kVARh import energy	00	EE
30241	120	Date 28 kVARh import energy	00	F0
30243	121	Date 29 kVARh import energy	00	F2
30245	122	Date 30 kVARh import energy	00	F4
30247	123	Date 31 kVARh import energy	00	F6
30249	124	Date 1 kVARh export energy	00	F8
30251	125	Date 2 kVARh export energy	00	FA
30253	126	Date 3 kVARh export energy	00	FC
30255	127	Date 4 kVARh export energy	00	FE
30257	128	Date 5 kVARh export energy	01	0
30259	129	Date 6 kVARh export energy	01	2
30261	130	Date 7 kVARh export energy	01	4
30263	131	Date 8 kVARh export energy	01	6
30265	132	Date 9 kVARh export energy	01	8
30267	133	Date 10 kVARh export energy	01	A
30269	134	Date 11 kVARh export energy	01	C
30271	135	Date 12 kVARh export energy	01	E

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30273	136	Date 13 kVARh export energy	01	10
30275	137	Date 14 kVARh export energy	01	12
30277	138	Date 15 kVARh export energy	01	14
30279	139	Date 16 kVARh export energy	01	16
30281	140	Date 17 kVARh export energy	01	18
30283	141	Date 18 kVARh export energy	01	1A
30285	142	Date 19 kVARh export energy	01	1C
30287	143	Date 20 kVARh export energy	01	1E
30289	144	Date 21 kVARh export energy	01	20
30291	145	Date 22 kVARh export energy	01	22
30293	146	Date 23 kVARh export energy	01	24
30295	147	Date 24 kVARh export energy	01	26
30297	148	Date 25 kVARh export energy	01	28
30299	149	Date 26 kVARh export energy	01	2A
30301	150	Date 27 kVARh export energy	01	2C
30303	151	Date 28 kVARh export energy	01	2E
30305	152	Date 29 kVARh export energy	01	30

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30307	153	Date 30 kVARh export energy	01	32
30309	154	Date 31 kVARh export energy	01	34
30311	155	Date 1 kVAh energy	01	36
30313	156	Date 2 kVAh energy	01	38
30315	157	Date 3 kVAh energy	01	3A
30317	158	Date 4 kVAh energy	01	3C
30319	159	Date 5 kVAh energy	01	3E
30321	160	Date 6 kVAh energy	01	40
30323	161	Date 7 kVAh energy	01	42
30325	162	Date 8 kVAh energy	01	44
30327	163	Date 9 kVAh energy	01	46
30329	164	Date 10 kVAh energy	01	48
30331	165	Date 11 kVAh energy	01	4A
30333	166	Date 12 kVAh energy	01	4C
30335	167	Date 13 kVAh energy	01	4E
30337	168	Date 14 kVAh energy	01	50
30339	169	Date 15 kVAh energy	01	52

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30341	170	Date 16 kVAh energy	01	54
30343	171	Date 17 kVAh energy	01	56
30345	172	Date 18 kVAh energy	01	58
30347	173	Date 19 kVAh energy	01	5A
30349	174	Date 20 kVAh energy	01	5C
30351	175	Date 21 kVAh energy	01	5E
30353	176	Date 22 kVAh energy	01	60
30355	177	Date 23 kVAh energy	01	62
30357	178	Date 24 kVAh energy	01	64
30359	179	Date 25 kVAh energy	01	66
30361	180	Date 26 kVAh energy	01	68
30363	181	Date 27 kVAh energy	01	6A
30365	182	Date 28 kVAh energy	01	6C
30367	183	Date 29 kVAh energy	01	6E
30369	184	Date 30 kVAh energy	01	70
30371	185	Date 31 kVAh energy	01	72
30373	186	month 1 kWh import energy	01	74

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30375	187	month 2 kWh import energy	01	76
30377	188	month 3 kWh import energy	01	78
30379	189	month 4 kWh import energy	01	7A
30381	190	month 5 kWh import energy	01	7C
30383	191	month 6 kWh import energy	01	7E
30385	192	month 7 kWh import energy	01	80
30387	193	month 8 kWh import energy	01	82
30389	194	month 9 kWh import energy	01	84
30391	195	month 10 kWh import energy	01	86
30393	196	month 11 kWh import energy	01	88
30395	197	month 12 kWh import energy	01	8A
30397	198	month 1 kWh export energy	01	8C
30399	199	month 2 kWh export energy	01	8E
30401	200	month 3 kWh export energy	01	90
30403	201	month 4 kWh export energy	01	92
30405	202	month 5 kWh export energy	01	94
30407	203	month 6 kWh export energy	01	96

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30409	204	month 7 kWh export energy	01	98
30411	205	month 8 kWh export energy	01	9A
30413	206	month 9 kWh export energy	01	9C
30415	207	month 10 kWh export energy	01	9E
30417	208	month 11 kWh export energy	01	A0
30419	209	month 12 kWh export energy	01	A2
30421	210	month 1 kVARh import energy	01	A4
30423	211	month 2 kVARh import energy	01	A6
30425	212	month 3 kVARh import energy	01	A8
30427	213	month 4 kVARh import energy	01	AA
30429	214	month 5 kVARh import energy	01	AC
30431	215	month 6 kVARh import energy	01	AE
30433	216	month 7 kVARh import energy	01	B0
30435	217	month 8 kVARh import energy	01	B2
30437	218	month 9 kVARh import energy	01	B4
30439	219	month 10 kVARh import energy	01	B6
30441	220	month 11 kVARh import energy	01	B8

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30443	221	month 12 kVARh import energy	01	BA
30445	222	month 1 kVARh export energy	01	BC
30447	223	month 2 kVARh export energy	01	BE
30449	224	month 3 kVARh export energy	01	C0
30451	225	month 4 kVARh export energy	01	C2
30453	226	month 5 kVARh export energy	01	C4
30455	227	month 6 kVARh export energy	01	C6
30457	228	month 7 kVARh export energy	01	C8
30459	229	month 8 kVARh export energy	01	CA
30461	230	month 9 kVARh export energy	01	CC
30463	231	month 10 kVARh export energy	01	CE
30465	232	month 11 kVARh export energy	01	D0
30467	233	month 12 kVARh export energy	01	D2
30469	234	month 1 kVAh energy	01	D4
30471	235	month 2 kVAh energy	01	D6
30473	236	month 3 kVAh energy	01	D8
30475	237	month 4 kVAh energy	01	DA

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30477	238	month 5 kVAh energy	01	DC
30479	239	month 6 kVAh energy	01	DE
30481	240	month 7 kVAh energy	01	E0
30483	241	month 8 kVAh energy	01	E2
30485	242	month 9 kVAh energy	01	E4
30487	243	month 10 kVAh energy	01	E6
30489	244	month 11 kVAh energy	01	E8
30491	245	month 12 kVAh energy	01	EA
30493	246	Date 1 kWh import cost	01	EC
30495	247	Date 2 kWh import cost	01	EE
30497	248	Date 3 kWh import cost	01	F0
30499	249	Date 4 kWh import cost	01	F2
30501	250	Date 5 kWh import cost	01	F4
30503	251	Date 6 kWh import cost	01	F6
30505	252	Date 7 kWh import cost	01	F8
30507	253	Date 8 kWh import cost	01	FA
30509	254	Date 9 kWh import cost	01	FC

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30511	255	Date 10 kWh import cost	01	FE
30513	256	Date 11 kWh import cost	02	0
30515	257	Date 12 kWh import cost	02	2
30517	258	Date 13 kWh import cost	02	4
30519	259	Date 14 kWh import cost	02	6
30521	260	Date 15 kWh import cost	02	8
30523	261	Date 16 kWh import cost	02	A
30525	262	Date 17 kWh import cost	02	C
30527	263	Date 18 kWh import cost	02	E
30529	264	Date 19 kWh import cost	02	10
30531	265	Date 20 kWh import cost	02	12
30533	266	Date 21 kWh import cost	02	14
30535	267	Date 22 kWh import cost	02	16
30537	268	Date 23 kWh import cost	02	18
30539	269	Date 24 kWh import cost	02	1A
30541	270	Date 25 kWh import cost	02	1C
30543	271	Date 26 kWh import cost	02	1E

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30545	272	Date 27 kWh import cost	02	20
30547	273	Date 28 kWh import cost	02	22
30549	274	Date 29 kWh import cost	02	24
30551	275	Date 30 kWh import cost	02	26
30553	276	Date 31 kWh import cost	02	28
30555	277	Date 1 kWh export cost	02	2A
30557	278	Date 2 kWh export cost	02	2C
30559	279	Date 3 kWh export cost	02	2E
30561	280	Date 4 kWh export cost	02	30
30563	281	Date 5 kWh export cost	02	32
30565	282	Date 6 kWh export cost	02	34
30567	283	Date 7 kWh export cost	02	36
30569	284	Date 8 kWh export cost	02	38
30571	285	Date 9 kWh export cost	02	3A
30573	286	Date 10 kWh export cost	02	3C
30575	287	Date 11 kWh export cost	02	3E
30577	288	Date 12 kWh export cost	02	40

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30579	289	Date 13 kWh export cost	02	42
30581	290	Date 14 kWh export cost	02	44
30583	291	Date 15 kWh export cost	02	46
30585	292	Date 16 kWh export cost	02	48
30587	293	Date 17 kWh export cost	02	4A
30589	294	Date 18 kWh export cost	02	4C
30591	295	Date 19 kWh export cost	02	4E
30593	296	Date 20 kWh export cost	02	50
30595	297	Date 21 kWh export cost	02	52
30597	298	Date 22 kWh export cost	02	54
30599	299	Date 23 kWh export cost	02	56
30601	300	Date 24 kWh export cost	02	58
30603	301	Date 25 kWh export cost	02	5A
30605	302	Date 26 kWh export cost	02	5C
30607	303	Date 27 kWh export cost	02	5E
30609	304	Date 28 kWh export cost	02	60
30611	305	Date 29 kWh export cost	02	62

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30613	306	Date 30 kWh export cost	02	64
30615	307	Date 31 kWh export cost	02	66
30617	308	Date 1 kVARh import cost	02	68
30619	309	Date 2 kVARh import cost	02	6A
30621	310	Date 3 kVARh import cost	02	6C
30623	311	Date 4 kVARh import cost	02	6E
30625	312	Date 5 kVARh import cost	02	70
30627	313	Date 6 kVARh import cost	02	72
30629	314	Date 7 kVARh import cost	02	74
30631	315	Date 8 kVARh import cost	02	76
30633	316	Date 9 kVARh import cost	02	78
30635	317	Date 10 kVARh import cost	02	7A
30637	318	Date 11 kVARh import cost	02	7C
30639	319	Date 12 kVARh import cost	02	7E
30641	320	Date 13 kVARh import cost	02	80
30643	321	Date 14 kVARh import cost	02	82
30645	322	Date 15 kVARh import cost	02	84

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30647	323	Date 16 kVARh import cost	02	86
30649	324	Date 17 kVARh import cost	02	88
30651	325	Date 18 kVARh import cost	02	8A
30653	326	Date 19 kVARh import cost	02	8C
30655	327	Date 20 kVARh import cost	02	8E
30657	328	Date 21 kVARh import cost	02	90
30659	329	Date 22 kVARh import cost	02	92
30661	330	Date 23 kVARh import cost	02	94
30663	331	Date 24 kVARh import cost	02	96
30665	332	Date 25 kVARh import cost	02	98
30667	333	Date 26 kVARh import cost	02	9A
30669	334	Date 27 kVARh import cost	02	9C
30671	335	Date 28 kVARh import cost	02	9E
30673	336	Date 29 kVARh import cost	02	A0
30675	337	Date 30 kVARh import cost	02	A2
30677	338	Date 31 kVARh import cost	02	A4
30679	339	Date 1 kVARh export cost	02	A6

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30681	340	Date 2 kVARh export cost	02	A8
30683	341	Date 3 kVARh export cost	02	AA
30685	342	Date 4 kVARh export cost	02	AC
30687	343	Date 5 kVARh export cost	02	AE
30689	344	Date 6 kVARh export cost	02	B0
30691	345	Date 7 kVARh export cost	02	B2
30693	346	Date 8 kVARh export cost	02	B4
30695	347	Date 9 kVARh export cost	02	B6
30697	348	Date 10 kVARh export cost	02	B8
30699	349	Date 11 kVARh export cost	02	BA
30701	350	Date 12 kVARh export cost	02	BC
30703	351	Date 13 kVARh export cost	02	BE
30705	352	Date 14 kVARh export cost	02	C0
30707	353	Date 15 kVARh export cost	02	C2
30709	354	Date 16 kVARh export cost	02	C4
30711	355	Date 17 kVARh export cost	02	C6
30713	356	Date 18 kVARh export cost	02	C8

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30715	357	Date 19 kVARh export cost	02	CA
30717	358	Date 20 kVARh export cost	02	CC
30719	359	Date 21 kVARh export cost	02	CE
30721	360	Date 22 kVARh export cost	02	D0
30723	361	Date 23 kVARh export cost	02	D2
30725	362	Date 24 kVARh export cost	02	D4
30727	363	Date 25 kVARh export cost	02	D6
30729	364	Date 26 kVARh export cost	02	D8
30731	365	Date 27 kVARh export cost	02	DA
30733	366	Date 28 kVARh export cost	02	DC
30735	367	Date 29 kVARh export cost	02	DE
30737	368	Date 30 kVARh export cost	02	E0
30739	369	Date 31 kVARh export cost	02	E2
30741	370	Date 1 kVAh cost	02	E4
30743	371	Date 2 kVAh cost	02	E6
30745	372	Date 3 kVAh cost	02	E8
30747	373	Date 4 kVAh cost	02	EA

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30749	374	Date 5 kVAh cost	02	EC
30751	375	Date 6 kVAh cost	02	EE
30753	376	Date 7 kVAh cost	02	F0
30755	377	Date 8 kVAh cost	02	F2
30757	378	Date 9 kVAh cost	02	F4
30759	379	Date 10 kVAh cost	02	F6
30761	380	Date 11 kVAh cost	02	F8
30763	381	Date 12 kVAh cost	02	FA
30765	382	Date 13 kVAh cost	02	FC
30767	383	Date 14 kVAh cost	02	FE
30769	384	Date 15 kVAh cost	03	0
30771	385	Date 16 kVAh cost	03	2
30773	386	Date 17 kVAh cost	03	4
30775	387	Date 18 kVAh cost	03	6
30777	388	Date 19 kVAh cost	03	8
30779	389	Date 20 kVAh cost	03	A
30781	390	Date 21 kVAh cost	03	C

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30783	391	Date 22 kVAh cost	03	E
30785	392	Date 23 kVAh cost	03	10
30787	393	Date 24 kVAh cost	03	12
30789	394	Date 25 kVAh cost	03	14
30791	395	Date 26 kVAh cost	03	16
30793	396	Date 27 kVAh cost	03	18
30795	397	Date 28 kVAh cost	03	1A
30797	398	Date 29 kVAh cost	03	1C
30799	399	Date 30 kVAh cost	03	1E
30801	400	Date 31 kVAh cost	03	20
30803	401	month 1 kWh import cost	03	22
30805	402	month 2 kWh import cost	03	24
30807	403	month 3 kWh import cost	03	26
30809	404	month 4 kWh import cost	03	28
30811	405	month 5 kWh import cost	03	2A
30813	406	month 6 kWh import cost	03	2C
30815	407	month 7 kWh import cost	03	2E

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30817	408	month 8 kWh import cost	03	30
30819	409	month 9 kWh import cost	03	32
30821	410	month 10 kWh import cost	03	34
30823	411	month 11 kWh import cost	03	36
30825	412	month 12 kWh import cost	03	38
30827	413	month 1 kWh export cost	03	3A
30829	414	month 2 kWh export cost	03	3C
30831	415	month 3 kWh export cost	03	3E
30833	416	month 4 kWh export cost	03	40
30835	417	month 5 kWh export cost	03	42
30837	418	month 6 kWh export cost	03	44
30839	419	month 7 kWh export cost	03	46
30841	420	month 8 kWh export cost	03	48
30843	421	month 9 kWh export cost	03	4A
30845	422	month 10 kWh export cost	03	4C
30847	423	month 11 kWh export cost	03	4E
30849	424	month 12 kWh export cost	03	50

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30851	425	month 1 kVARh import cost	03	52
30853	426	month 2 kVARh import cost	03	54
30855	427	month 3 kVARh import cost	03	56
30857	428	month 4 kVARh import cost	03	58
30859	429	month 5 kVARh import cost	03	5A
30861	430	month 6 kVARh import cost	03	5C
30863	431	month 7 kVARh import cost	03	5E
30865	432	month 8 kVARh import cost	03	60
30867	433	month 9 kVARh import cost	03	62
30869	434	month 10 kVARh import cost	03	64
30871	435	month 11 kVARh import cost	03	66
30873	436	month 12 kVARh import cost	03	68
30875	437	month 1 kVARh export cost	03	6A
30877	438	month 2 kVARh export cost	03	6C
30879	439	month 3 kVARh export cost	03	6E
30881	440	month 4 kVARh export cost	03	70
30883	441	month 5 kVARh export cost	03	72

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30885	442	month 6 kVARh export cost	03	74
30887	443	month 7 kVARh export cost	03	76
30889	444	month 8 kVARh export cost	03	78
30891	445	month 9 kVARh export cost	03	7A
30893	446	month 10 kVARh export cost	03	7C
30895	447	month 11 kVARh export cost	03	7E
30897	448	month 12 kVARh export cost	03	80
30899	449	month 1 kVAh cost	03	82
30901	450	month 2 kVAh cost	03	84
30903	451	month 3 kVAh cost	03	86
30905	452	month 4 kVAh cost	03	88
30907	453	month 5 kVAh cost	03	8A
30909	454	month 6 kVAh cost	03	8C
30911	455	month 7 kVAh cost	03	8E
30913	456	month 8 kVAh cost	03	90
30915	457	month 9 kVAh cost	03	92
30917	458	month 10 kVAh cost	03	94

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30919	459	month 11 kVAh cost	03	96
30921	460	month 12 kVAh cost	03	98
30923	461	Current date timezone1 kWh import cost	03	9A
30925	462	Current date timezone2 kWh import cost	03	9C
30927	463	Current date timezone3 kWh import cost	03	9E
30929	464	Current date timezone4 kWh import cost	03	A0
30931	465	Current date timezone5 kWh import cost	03	A2
30933	466	Current date timezone6 kWh import cost	03	A4
30935	467	Current date timezone1 kWh export cost	03	A6
30937	468	Current date timezone2 kWh export cost	03	A8
30939	469	Current date timezone3 kWh export cost	03	AA
30941	470	Current date timezone4 kWh export cost	03	AC
30943	471	Current date timezone5 kWh export cost	03	AE
30945	472	Current date timezone6 kWh export cost	03	B0
30947	473	Current date timezone1 kVARh import cost	03	B2
30949	474	Current date timezone2 kVARh import cost	03	B4
30951	475	Current date timezone3 kVARh import cost	03	B6

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30953	476	Current date timezone4 kVARh import cost	03	B8
30955	477	Current date timezone5 kVARh import cost	03	BA
30957	478	Current date timezone6 kVARh import cost	03	BC
30959	479	Current date timezone1 kVARh export cost	03	BE
30961	480	Current date timezone2 kVARh export cost	03	C0
30963	481	Current date timezone3 kVARh export cost	03	C2
30965	482	Current date timezone4 kVARh export cost	03	C4
30967	483	Current date timezone5 kVARh export cost	03	C6
30969	484	Current date timezone6 kVARh export cost	03	C8
30971	485	Current date timezone1 kVAh cost	03	CA
30973	486	Current date timezone2 kVAhcost	03	CC
30975	487	Current date timezone3 kVAh cost	03	CE
30977	488	Current date timezone4 kVAh cost	03	D0
30979	489	Current date timezone5 kVAh cost	03	D2
30981	490	Current date timezone6 kVAh cost	03	D4

Accessing TOD Zone wise Data of Last 31 days :

For reading zone wise data proper value should be written at location 400083 as mentioned in table 6. The zone wise TOD energy & cost are stored on the location of the particular date. For example if today is 15 march 2013 , then TOD energy & cost of today will be located at date 15 zone wise data(address 30337 to address 30359 of 3 X register). Similarly data of 25th of February will be located on date 25 zone wise data (address 30577 to address 30599 of 3 X register). Following table shows respective 3 X addresses to read

Table 8 : TOD Zonewise data (kWh (imp/exp) / kVArh (imp/exp) / kVAh)

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30001	1	timezone1 date1 Energy	00	0
30003	2	timezone2 date1 Energy	00	2
30005	3	timezone3 date1 Energy	00	4
30007	4	timezone4 date1 Energy	00	6
30009	5	timezone5 date1 Energy	00	8
30011	6	timezone6 date1 Energy	00	A
30013	7	timezone1 date1 cost	00	C
30015	8	timezone2 date1 cost	00	E
30017	9	timezone3 date1 cost	00	10
30019	10	timezone4 date1 cost	00	12
30021	11	timezone5 date1 cost	00	14
30023	12	timezone6 date1 cost	00	16
30025	13	timezone1 date2 Energy	00	18
30027	14	timezone2 date2 Energy	00	1A

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30029	15	timezone3 date2 Energy	00	1C
30031	16	timezone4 date2 Energy	00	1E
30033	17	timezone5 date2 Energy	00	20
30035	18	timezone6 date2 Energy	00	22
30037	19	timezone1 date2 cost	00	24
30039	20	timezone2 date2 cost	00	26
30041	21	timezone3 date2 cost	00	28
30043	22	timezone4 date2 cost	00	2A
30045	23	timezone5 date2 cost	00	2C
30047	24	timezone6 date2 cost	00	2E
30049	25	timezone1 date3 Energy	00	30
30051	26	timezone2 date3 Energy	00	32
30053	27	timezone3 date3 Energy	00	34
30055	28	timezone4 date3 Energy	00	36
30057	29	timezone5 date3 Energy	00	38
30059	30	timezone6 date3 Energy	00	3A
30061	31	timezone1 date3 cost	00	3C
30063	32	timezone2 date3 cost	00	3E
30065	33	timezone3 date3 cost	00	40
30067	34	timezone4 date3 cost	00	42
30069	35	timezone5 date3 cost	00	44
30071	36	timezone6 date3 cost	00	46
30073	37	timezone1 date4 Energy	00	48
30075	38	timezone2 date4 Energy	00	4A
30077	39	timezone3 date4 Energy	00	4C
30079	40	timezone4 date4 Energy	00	4E
30081	41	timezone5 date4 Energy	00	50
30083	42	timezone6 date4 Energy	00	52

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30085	43	timezone1 date4 cost	00	54
30087	44	timezone2 date4 cost	00	56
30089	45	timezone3 date4 cost	00	58
30091	46	timezone4 date4 cost	00	5A
30093	47	timezone5 date4 cost	00	5C
30095	48	timezone6 date4 cost	00	5E
30097	49	timezone1 date5 Energy	00	60
30099	50	timezone2 date5 Energy	00	62
30101	51	timezone3 date5 Energy	00	64
30103	52	timezone4 date5 Energy	00	66
30105	53	timezone5 date5 Energy	00	68
30107	54	timezone6 date5 Energy	00	6A
30109	55	timezone1 date5 cost	00	6C
30111	56	timezone2 date5 cost	00	6E
30113	57	timezone3 date5 cost	00	70
30115	58	timezone4 date5 cost	00	72
30117	59	timezone5 date5 cost	00	74
30119	60	timezone6 date5 cost	00	76
30121	61	timezone1 date6 Energy	00	78
30123	62	timezone2 date6 Energy	00	7A
30125	63	timezone3 date6 Energy	00	7C
30127	64	timezone4 date6 Energy	00	7E
30129	65	timezone5 date6 Energy	00	80
30131	66	timezone6 date6 Energy	00	82
30133	67	timezone1 date6 cost	00	84
30135	68	timezone2 date6 cost	00	86
30137	69	timezone3 date6 cost	00	88
30139	70	timezone4 date6 cost	00	8A

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30141	71	timezone5 date6 cost	00	8C
30143	72	timezone6 date6 cost	00	8E
30145	73	timezone1 date7 Energy	00	90
30147	74	timezone2 date7 Energy	00	92
30149	75	timezone3 date7 Energy	00	94
30151	76	timezone4 date7 Energy	00	96
30153	77	timezone5 date7 Energy	00	98
30155	78	timezone6 date7 Energy	00	9A
30157	79	timezone1 date7 cost	00	9C
30159	80	timezone2 date7 cost	00	9E
30161	81	timezone3 date7 cost	00	A0
30163	82	timezone4 date7 cost	00	A2
30165	83	timezone5 date7 cost	00	A4
30167	84	timezone6 date7 cost	00	A6
30169	85	timezone1 date8 Energy	00	A8
30171	86	timezone2 date8 Energy	00	AA
30173	87	timezone3 date8 Energy	00	AC
30175	88	timezone4 date8 Energy	00	AE
30177	89	timezone5 date8 Energy	00	B0
30179	90	timezone6 date8 Energy	00	B2
30181	91	timezone1 date8 cost	00	B4
30183	92	timezone2 date8 cost	00	B6
30185	93	timezone3 date8 cost	00	B8
30187	94	timezone4 date8 cost	00	BA
30189	95	timezone5 date8 cost	00	BC
30191	96	timezone6 date8 cost	00	BE
30193	97	timezone1 date9 Energy	00	C0
30195	98	timezone2 date9 Energy	00	C2

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30197	99	timezone3 date9 Energy	00	C4
30199	100	timezone4 date9 Energy	00	C6
30201	101	timezone5 date9 Energy	00	C8
30203	102	timezone6 date9 Energy	00	CA
30205	103	timezone1 date9 cost	00	CC
30207	104	timezone2 date9 cost	00	CE
30209	105	timezone3 date9 cost	00	D0
30211	106	timezone4 date9 cost	00	D2
30213	107	timezone5 date9 cost	00	D4
30215	108	timezone6 date9 cost	00	D6
30217	109	timezone1 date10 Energy	00	D8
30219	110	timezone2 date10 Energy	00	DA
30221	111	timezone3 date10 Energy	00	DC
30223	112	timezone4 date10 Energy	00	DE
30225	113	timezone5 date10 Energy	00	E0
30227	114	timezone6 date10 Energy	00	E2
30229	115	timezone1 date10 cost	00	E4
30231	116	timezone2 date10 cost	00	E6
30233	117	timezone3 date10 cost	00	E8
30235	118	timezone4 date10 cost	00	EA
30237	119	timezone5 date10 cost	00	EC
30239	120	timezone6 date10 cost	00	EE
30241	121	timezone1 date11 Energy	00	F0
30243	122	timezone2 date11 Energy	00	F2
30245	123	timezone3 date11 Energy	00	F4
30247	124	timezone4 date11 Energy	00	F6
30249	125	timezone5 date11 Energy	00	F8
30251	126	timezone6 date11 Energy	00	FA

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30253	127	timezone1 date11 cost	00	FC
30255	128	timezone2 date11 cost	00	FE
30257	129	timezone3 date11 cost	01	0
30259	130	timezone4 date11 cost	01	2
30261	131	timezone5 date11 cost	01	4
30263	132	timezone6 date11 cost	01	6
30265	133	timezone1 date12 Energy	01	8
30267	134	timezone2 date12 Energy	01	A
30269	135	timezone3 date12 Energy	01	C
30271	136	timezone4 date12 Energy	01	E
30273	137	timezone5 date12 Energy	01	10
30275	138	timezone6 date12 Energy	01	12
30277	139	timezone1 date12 cost	01	14
30279	140	timezone2 date12 cost	01	16
30281	141	timezone3 date12 cost	01	18
30283	142	timezone4 date12 cost	01	1A
30285	143	timezone5 date12 cost	01	1C
30287	144	timezone6 date12 cost	01	1E
30289	145	timezone1 date13 Energy	01	20
30291	146	timezone2 date13 Energy	01	22
30293	147	timezone3 date13 Energy	01	24
30295	148	timezone4 date13 Energy	01	26
30297	149	timezone5 date13 Energy	01	28
30299	150	timezone6 date13 Energy	01	2A
30301	151	timezone1 date13 cost	01	2C
30303	152	timezone2 date13 cost	01	2E
30305	153	timezone3 date13 cost	01	30
30307	154	timezone4 date13 cost	01	32

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30309	155	timezone5 date13 cost	01	34
30311	156	timezone6 date13 cost	01	36
30313	157	timezone1 date14 Energy	01	38
30315	158	timezone2 date14 Energy	01	3A
30317	159	timezone3 date14 Energy	01	3C
30319	160	timezone4 date14 Energy	01	3E
30321	161	timezone5 date14 Energy	01	40
30323	162	timezone6 date14 Energy	01	42
30325	163	timezone1 date14 cost	01	44
30327	164	timezone2 date14 cost	01	46
30329	165	timezone3 date14 cost	01	48
30331	166	timezone4 date14 cost	01	4A
30333	167	timezone5 date14 cost	01	4C
30335	168	timezone6 date14 cost	01	4E
30337	169	timezone1 date15 Energy	01	50
30339	170	timezone2 date15 Energy	01	52
30341	171	timezone3 date15 Energy	01	54
30343	172	timezone4 date15 Energy	01	56
30345	173	timezone5 date15 Energy	01	58
30347	174	timezone6 date15 Energy	01	5A
30349	175	timezone1 date15 cost	01	5C
30351	176	timezone2 date15 cost	01	5E
30353	177	timezone3 date15 cost	01	60
30355	178	timezone4 date15 cost	01	62
30357	179	timezone5 date15 cost	01	64
30359	180	timezone6 date15 cost	01	66
30361	181	timezone1 date16 Energy	01	68
30363	182	timezone2 date16 Energy	01	6A

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30365	183	timezone3 date16 Energy	01	6C
30367	184	timezone4 date16 Energy	01	6E
30369	185	timezone5 date16 Energy	01	70
30371	186	timezone6 date16 Energy	01	72
30373	187	timezone1 date16 cost	01	74
30375	188	timezone2 date16 cost	01	76
30377	189	timezone3 date16 cost	01	78
30379	190	timezone4 date16 cost	01	7A
30381	191	timezone5 date16 cost	01	7C
30383	192	timezone6 date16 cost	01	7E
30385	193	timezone1 date17 Energy	01	80
30387	194	timezone2 date17 Energy	01	82
30389	195	timezone3 date17 Energy	01	84
30391	196	timezone4 date17 Energy	01	86
30393	197	timezone5 date17 Energy	01	88
30395	198	timezone6 date17 Energy	01	8A
30397	199	timezone1 date17 cost	01	8C
30399	200	timezone2 date17 cost	01	8E
30401	201	timezone3 date17 cost	01	90
30403	202	timezone4 date17 cost	01	92
30405	203	timezone5 date17 cost	01	94
30407	204	timezone6 date17 cost	01	96
30409	205	timezone1 date18 Energy	01	98
30411	206	timezone2 date18 Energy	01	9A
30413	207	timezone3 date18 Energy	01	9C
30415	208	timezone4 date18 Energy	01	9E
30417	209	timezone5 date18 Energy	01	A0
30419	210	timezone6 date18 Energy	01	A2

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30421	211	timezone1 date18 cost	01	A4
30423	212	timezone2 date18 cost	01	A6
30425	213	timezone3 date18 cost	01	A8
30427	214	timezone4 date18 cost	01	AA
30429	215	timezone5 date18 cost	01	AC
30431	216	timezone6 date18 cost	01	AE
30433	217	timezone1 date19 Energy	01	B0
30435	218	timezone2 date19 Energy	01	B2
30437	219	timezone3 date19 Energy	01	B4
30439	220	timezone4 date19 Energy	01	B6
30441	221	timezone5 date19 Energy	01	B8
30443	222	timezone6 date19 Energy	01	BA
30445	223	timezone1 date19 cost	01	BC
30447	224	timezone2 date19 cost	01	BE
30449	225	timezone3 date19 cost	01	C0
30451	226	timezone4 date19 cost	01	C2
30453	227	timezone5 date19 cost	01	C4
30455	228	timezone6 date19 cost	01	C6
30457	229	timezone1 date20 Energy	01	C8
30459	230	timezone2 date20 Energy	01	CA
30461	231	timezone3 date20 Energy	01	CC
30463	232	timezone4 date20 Energy	01	CE
30465	233	timezone5 date20 Energy	01	D0
30467	234	timezone6 date20 Energy	01	D2
30469	235	timezone1 date20 cost	01	D4
30471	236	timezone2 date20 cost	01	D6
30473	237	timezone3 date20 cost	01	D8
30475	238	timezone4 date20 cost	01	DA

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30477	239	timezone5 date20 cost	01	DC
30479	240	timezone6 date20 cost	01	DE
30481	241	timezone1 date21 Energy	01	E0
30483	242	timezone2 date21 Energy	01	E2
30485	243	timezone3 date21 Energy	01	E4
30487	244	timezone4 date21 Energy	01	E6
30489	245	timezone5 date21 Energy	01	E8
30491	246	timezone6 date21 Energy	01	EA
30493	247	timezone1 date21 cost	01	EC
30495	248	timezone2 date21 cost	01	EE
30497	249	timezone3 date21 cost	01	F0
30499	250	timezone4 date21 cost	01	F2
30501	251	timezone5 date21 cost	01	F4
30503	252	timezone6 date21 cost	01	F6
30505	253	timezone1 date22 Energy	01	F8
30507	254	timezone2 date22 Energy	01	FA
30509	255	timezone3 date22 Energy	01	FC
30511	256	timezone4 date22 Energy	01	FE
30513	257	timezone5 date22 Energy	02	0
30515	258	timezone6 date22 Energy	02	2
30517	259	timezone1 date22 cost	02	4
30519	260	timezone2 date22 cost	02	6
30521	261	timezone3 date22 cost	02	8
30523	262	timezone4 date22 cost	02	A
30525	263	timezone5 date22 cost	02	C
30527	264	timezone6 date22 cost	02	E
30529	265	timezone1 date23 Energy	02	10
30531	266	timezone2 date23 Energy	02	12

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30533	267	timezone3 date23 Energy	02	14
30535	268	timezone4 date23 Energy	02	16
30537	269	timezone5 date23 Energy	02	18
30539	270	timezone6 date23 Energy	02	1A
30541	271	timezone1 date23 cost	02	1C
30543	272	timezone2 date23 cost	02	1E
30545	273	timezone3 date23 cost	02	20
30547	274	timezone4 date23 cost	02	22
30549	275	timezone5 date23 cost	02	24
30551	276	timezone6 date23 cost	02	26
30553	277	timezone1 date24 Energy	02	28
30555	278	timezone2 date24 Energy	02	2A
30557	279	timezone3 date24 Energy	02	2C
30559	280	timezone4 date24 Energy	02	2E
30561	281	timezone5 date24 Energy	02	30
30563	282	timezone6 date24 Energy	02	32
30565	283	timezone1 date24 cost	02	34
30567	284	timezone2 date24 cost	02	36
30569	285	timezone3 date24 cost	02	38
30571	286	timezone4 date24 cost	02	3A
30573	287	timezone5 date24 cost	02	3C
30575	288	timezone6 date24 cost	02	3E
30577	289	timezone1 date25 Energy	02	40
30579	290	timezone2 date25 Energy	02	42
30581	291	timezone3 date25 Energy	02	44
30583	292	timezone4 date25 Energy	02	46
30585	293	timezone5 date25 Energy	02	48
30587	294	timezone6 date25 Energy	02	4A

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30589	295	timezone1 date25 cost	02	4C
30591	296	timezone2 date25 cost	02	4E
30593	297	timezone3 date25 cost	02	50
30595	298	timezone4 date25 cost	02	52
30597	299	timezone5 date25 cost	02	54
30599	300	timezone6 date25 cost	02	56
30601	301	timezone1 date26 Energy	02	58
30603	302	timezone2 date26 Energy	02	5A
30605	303	timezone3 date26 Energy	02	5C
30607	304	timezone4 date26 Energy	02	5E
30609	305	timezone5 date26 Energy	02	60
30611	306	timezone6 date26 Energy	02	62
30613	307	timezone1 date26 cost	02	64
30615	308	timezone2 date26 cost	02	66
30617	309	timezone3 date26 cost	02	68
30619	310	timezone4 date26 cost	02	6A
30621	311	timezone5 date26 cost	02	6C
30623	312	timezone6 date26 cost	02	6E
30625	313	timezone1 date27 Energy	02	70
30627	314	timezone2 date27 Energy	02	72
30629	315	timezone3 date27 Energy	02	74
30631	316	timezone4 date27 Energy	02	76
30633	317	timezone5 date27 Energy	02	78
30635	318	timezone6 date27 Energy	02	7A
30637	319	timezone1 date27 cost	02	7C
30639	320	timezone2 date27 cost	02	7E
30641	321	timezone3 date27 cost	02	80
30643	322	timezone4 date27 cost	02	82

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30645	323	timezone5 date27 cost	02	84
30647	324	timezone6 date27 cost	02	86
30649	325	timezone1 date28 Energy	02	88
30651	326	timezone2 date28 Energy	02	8A
30653	327	timezone3 date28 Energy	02	8C
30655	328	timezone4 date28 Energy	02	8E
30657	329	timezone5 date28 Energy	02	90
30659	330	timezone6 date28 Energy	02	92
30661	331	timezone1 date28 cost	02	94
30663	332	timezone2 date28 cost	02	96
30665	333	timezone3 date28 cost	02	98
30667	334	timezone4 date28 cost	02	9A
30669	335	timezone5 date28 cost	02	9C
30671	336	timezone6 date28 cost	02	9E
30673	337	timezone1 date29 Energy	02	A0
30675	338	timezone2 date29 Energy	02	A2
30677	339	timezone3 date29 Energy	02	A4
30679	340	timezone4 date29 Energy	02	A6
30681	341	timezone5 date29 Energy	02	A8
30683	342	timezone6 date29 Energy	02	AA
30685	343	timezone1 date29 cost	02	AC
30687	344	timezone2 date29 cost	02	AE
30689	345	timezone3 date29 cost	02	B0
30691	346	timezone4 date29 cost	02	B2
30693	347	timezone5 date29 cost	02	B4
30695	348	timezone6 date29 cost	02	B6
30697	349	timezone1 date30 Energy	02	B8
30699	350	timezone2 date30 Energy	02	BA

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30701	351	timezone3 date30 Energy	02	BC
30703	352	timezone4 date30 Energy	02	BE
30705	353	timezone5 date30 Energy	02	C0
30707	354	timezone6 date30 Energy	02	C2
30709	355	timezone1 date30 cost	02	C4
30711	356	timezone2 date30 cost	02	C6
30713	357	timezone3 date30 cost	02	C8
30715	358	timezone4 date30 cost	02	CA
30717	359	timezone5 date30 cost	02	CC
30719	360	timezone6 date30 cost	02	CE
30721	361	timezone1 date31 Energy	02	D0
30723	362	timezone2 date31 Energy	02	D2
30725	363	timezone3 date31 Energy	02	D4
30727	364	timezone4 date31 Energy	02	D6
30729	365	timezone5 date31 Energy	02	D8
30731	366	timezone6 date31 Energy	02	DA
30733	367	timezone1 date31 cost	02	DC
30735	368	timezone2 date31 cost	02	DE
30737	369	timezone3 date31 cost	02	E0
30739	370	timezone4 date31 cost	02	E2
30741	371	timezone5 date31 cost	02	E4
30743	372	timezone6 date31 cost	02	E6

Accessing 4 X register for Reading & Writing :

Each setting is held in the 4X registers .ModBus code 03 is used to read the current setting and code 16 is used to write/change the setting. Refer **Table 9** for 4 X Register addresses.

Example : Reading System type

System type : Start address= 0A (Hex) Number of registers = 02

Note :Number of registers = Number of Parameters x 2

Query :

Device Address	01 (Hex)
Function Code	03 (Hex)
Start Address High	00 (Hex)
Start Address Low	0A (Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02 (Hex)
CRC Low	E4 (Hex)
CRC High	09 (Hex)

Start Address High : Most significant 8 bits of starting address of the parameter requested.

Start Address low :Least significant 8 bits of starting address of the parameter requested.

Number of register Hi : Most significant 8 bits of Number of registers requested.

Number of register Lo : Least significant 8 bits of Number of registers requested.

(Note : Two consecutive 16 bit register represent one parameter.)

Response: System Type (3phase 4 wire = 3)

Device Address	01 (Hex)
Function Code	03 (Hex)
Byte Count	04 (Hex)
Data Register1 High Byte	40 (Hex)
Data Register1Low Byte	40 (Hex)

Data Register2 High Byte	00 (Hex)
Data Register2 Low Byte	00(Hex)
CRC Low	EE (Hex)
CRC High	27 (Hex)

Byte Count : Total number of data bytes received.

Data register 1 High Byte : Most significant 8 bits of Data register 1 of the parameter requested.

Data register 1 Low Byte : Least significant 8 bits of Data register 1 of the parameter requested.

Data register 2 High Byte : Most significant 8 bits of Data register 2 of the parameter requested.

Data register 2 Low Byte : Least significant 8 bits of Data register 2 of the parameter requested.

(Note : Two consecutive 16 bit register represent one parameter.)

Example : Writing System type

System type : Start address= 0A (Hex) Number of registers = 02

Query:(Change System type to 3phase 3wire = 2)

Device Address	01 (Hex)
Function Code	10 (Hex)
Starting Address Hi	00 (Hex)
Starting Address Lo	0A(Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02(Hex)

Byte Count	04 (Hex)
Data Register-1High Byte	40 (Hex)
Data Register-1 Low Byte	00(Hex)
Data Register-2 High Byte	00(Hex)
Data Register-2 Low Byte	00(Hex)
CRC Low	66 (Hex)
CRC High	10 (Hex)

Byte Count : Total number of data bytes received.

Data register 1 High Byte : Most significant 8 bits of Data register 1 of the parameter requested.

Data register 1 Low Byte : Least significant 8 bits of Data register 1 of the parameter requested.

Data register 2 High Byte : Most significant 8 bits of Data register 2 of the parameter requested.

Data register 2 Low Byte : Least significant 8 bits of Data register 2 of the parameter requested.

(Note : Two consecutive 16 bit register represent one parameter.)

Response:

Device Address	01 (Hex)
Function Code	10 (Hex)
Start Address High	00 (Hex)
Start Address Low	0A(Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02(Hex)
CRC Low	61 (Hex)
CRC High	CA (Hex)

Start Address High : Most significant 8 bits of starting address of the parameter requested.

Start Address low :Least significant 8 bits of starting address of the parameter requested.

Number of register Hi : Most significant 8 bits of Number of registers requested.

Number of register Lo : Least significant 8 bits of Number of registers requested.

(Note : Two consecutive 16 bit register represent one parameter.)

Table 9 : 4 X register addresses

Address (Register)	Parameter No.	Parameter	Read / Write	Modbus Start Address Hex	
				High Byte	Low Byte
40003	1	Demand Period	R/Wp	00	2
40005	2	Energy Resolution	R/Wp	00	4
40007	3	System Voltage	R	00	6
40009	4	System Current	R	00	8
40011	5	System type	R/Wp	00	A
40013	6	Pulse Width	R/Wp	00	C
40015	7	Reset Parameters	Wp	00	E
40019	9	RS 485 Setup Code	R/Wp	00	12
40021	10	Node Address	R/Wp	00	14
40023	11	Pulse Divisor	R/Wp	00	16
40033	16	PT primary	R/Wp	00	20
40035	17	CT primary	R/Wp	00	22
40037	18	System Power	R	00	24
40039	19	Energy digit reset count	R/Wp	00	26
40041	20	register order/word order	R/Wp	00	28
40043	21	CT secondary	R/Wp	00	2A
40045	22	PT secondary	R/Wp	00	2C
40047	23	Relay 1 output select	R/Wp	00	2E
40049	24	Pulse 1/ Limit 1 parameter select	R/Wp	00	30

Address (Register)	Parameter No.	Parameter	Read / Write	Modbus Start Address Hex	
				High Byte	Low Byte
40051	25	Limit 1 Trip Point	R/Wp	00	32
40053	26	Hysteresis(Limit 1)	R/Wp	00	34
40055	27	Limit 1 delay (on)	R/Wp	00	36
40057	28	Limit 1 delay (off)	R/Wp	00	38
40059	29	Relay 2 output select	R/Wp	00	3A
40061	30	Pulse 2/ Limit 2 Parameter select	R/Wp	00	3C
40063	31	Limit 2 Trip point	R/Wp	00	3E
40065	32	Hysteresis(Limit 2)	R/Wp	00	40
40067	33	Limit 2 delay (on)	R/Wp	00	42
40069	34	Limit 2 delay (off)	R/Wp	00	44
40071	35	Password	R/W	00	46
40073	36	Limit 1 Configuration Select	R/Wp	00	48
40075	37	Limit 2 Configuration Select	R/Wp	00	4A
40079	39	30 mA Noise Current Elimination	R/Wp	00	4E
40081	40	Energy updation rate	R/Wp	00	50
40083	41	Tou data & Energy Type	Wp	00	52
40097	48	serial number	R	00	60
40099	49	model no	R	00	62
40101	50	modbus version no.	R	00	64
40103	51	display version no.	R	00	66
40105	52	weekend	R/Wp	00	68

Address (Register)	Parameter No.	Parameter	Read / Write	Modbus Start Address Hex	
				High Byte	Low Byte
40107	53	holiday no	R/Wp	00	6A
40109	54	holiday date	R/Wp	00	6C
40111	55	holiday month	R/Wp	00	6E
40113	56	alternate day no	R/Wp	00	70
40115	57	alternate day date	R/Wp	00	72
40117	58	alternate day month	R/Wp	00	74
40119	59	profile 1	R/Wp	00	76
40121	60	profile 2	R/Wp	00	78
40123	61	profile 3	R/Wp	00	7A
40125	62	profile 4	R/Wp	00	7C
40127	63	season no	R/Wp	00	7E
40129	64	season start date	R/Wp	00	80
40131	65	season start month	R/Wp	00	82
40133	66	day type no	R/Wp	00	84
40135	67	time zone no	R/Wp	00	86
40137	68	time zone minute	R/Wp	00	88
40139	69	time zone hour	R/Wp	00	8A
40141	70	time zone profile	R/Wp	00	8C
40143	71	Sag Threshold Set	R/Wp	00	8E
40145	72	Swell Threshold Set	R/Wp	00	90
40147	73	Over Current Threshold	R/Wp	00	92
40149	74	Phase no for Harmonic Setup	R/Wp	00	94
40151	75	Harmonic A	R/Wp	00	96
40153	76	Harmonic B	R/Wp	00	98
40155	77	Harmonic C	R/Wp	00	9A

Address (Register)	Parameter No.	Parameter	Read / Write	Modbus Start Address Hex	
				High Byte	Low Byte
40157	78	Harmonic D	R/Wp	00	9C
40159	79	Harmonic E	R/Wp	00	9E
40161	80	Harmonic F	R/Wp	00	A0
40163	81	RTC Minute	R/Wp	00	A2
40165	82	RTC Hour	R/Wp	00	A4
40167	83	RTC Date	R/Wp	00	A6
40169	84	RTC Month	R/Wp	00	A8
40171	85	RTC Year	R/Wp	00	AA
40173	86	Brightness	R/Wp	00	AC
40175	87	Contrast	R/Wp	00	AE

Explanation for 4 X register :

Address	Parameter	Description
40003	Demand Period	Demand period represents demand time in minutes. The applicable values are 8,15,20 or 30. Writing any other value will return an error.
40005	Energy Resolution	This address is used to set energy resolution in Wh, Kwh & MWh. Write one of the following value to this address. **1** = Energy in Wh. 2 = Energy in KWh. **3** = Energy in MWh. For CTPR * PTPR * 1.732051 > 30000 kW , only kWh & MWh can be set.
40007	System Voltage	This address is read only and displays System Voltage
40009	System Current	This address is read only and displays System Current

Address	Parameter	Description
40011	System Type	This address is used to set the System type. Write one of the following value to this address. **2** = 3 Phase 3 Wire **3** = 3 Phase 4 Wire. Writing any other value will return error .
40013	Pulse Width of Relay	This address is used to set **pulse width** of the Pulse output. Write one of the following values to this address: **60** : 60 ms **100** : 100 ms **200** : 200 ms Writing any other value will return error .
40015	Reset Parameters	This address is used to reset the different parameters. Write specific value to this register will reset particular data. Writing any other value will return an error. Following are the values to reset various data. 0 - Energy Reset 1 - Demand Reset 2 - System Max Values Reset 3 - System Min Values Reset 4 - Run hour & On hour Reset 5 - No of Interruptions Reset 6 - Power Quality data Reset 7 - Time Of Day data Reset 8 - Reset all data 9- Factory Reset
40019	Rs485 Set-up Code	This address is used to set the baud rate, Parity, Number of stop bits. Refer to Table 10 for details.
40021	Node Address	This register address is used to set Device address between 1 to 247 .
40023	Pulse Divisor	This address is used to set **pulse divisor** of the Pulse output. Write one of the following values to this address **for Wh**: **1** : Divisor 1 **10** : Divisor 10

Address	Parameter	Description
		100 : Divisor 100 **1000** : Divisor 1000 For Detail refer Table 3. Pulse rate divisor is set to 1, when Energy Resolution is set to kWh or MWh.
40033	PT Primary	This address allows the user to set PT Primary value. The range of value is 100 to 692.8kV L-L depends on the per phase 666.6MVA Restriction of power combined with CT primary
40035	CT Pimary	This address allows the user to set CT Primary value. The range of value is 1 to 9999 A & also depends on the per phase 666.6MVA Restriction of power combined with PT primary
40037	Sys Power	System Power (Read Only) is the Nominal system power based on the values of Nominal system volts and Nominal system current.
40039	Energy Digit Reset Count	This address allows user to set maximum energy digits count after which energy will roll over to zero. Valid values for this address are 7 , 8 , 9.These values decides the rollover count of energy in 3X register on MODBUS.
40041	Word Order	Word Order controls the order in which the instrument receives or sends floating - point numbers:- normal or reversed register order.In normal mode, the two registers that make up a floating point numbers are sent most significant bytes first. In reversed register mode , the two registers that make up a floating point numbers are sent least significant bytes first. To set the mode, write the value '2141.0' into this register- the instrument will detect the order used to send this value and set that order for all ModBus transaction involving floating point numbers.

Address	Parameter	Description
40043	CT secondary	This address is used to read and write the CT secondary value write one of the following values to this address. 1=1A CT secondary 5=5A CT secondary writing any other value will return an error.
40045	PT secondary	This address is used to read and write the PT secondary value. Valid range for PT secondary value is from 100 to 500V L-L. Writing any other value will return an error.
40047	Relay1 output select	This address is used to select the Relay 1 operation as pulse or Limit. write one of the following values to this address. 0 = Pulse output on Relay 1 128 (Decimal) = Limit output on Relay 1 writing any other value will return an error.
40049	Pulse 1 /Limit 1 parameter select	This address is used to assign the Parameter to Relay1 If Limit option is selected refer table 2 for parameter number & if Pulse option is selected then refer table 11.
40051	Limit1 Trip Point	This address is used to set the trip point in %. Any value between 10 to 100 for Lo- alarm & 10 to120 for Hi-alarm can be written to this address. Writing any other value will return an error.
40053	Hysteresis (Limit 1)	This address is used to set the hysteresis between 0.5 to 50 . Writting any other value will return an error.
40055	Limit1 Energizing Delay	This address is used to set the Energizing delay between 1 to 10 sec . Writting any other value will return an error.
40057	Limit1 de-energizing Delay	This address is used to set the De-Energizing delay between 1 to 10 sec . Writting any other value will return an error.

Address	Parameter	Description
40059	Relay 2 output select	This address is used to select the Relay 2 operation as pulse or Limit. write one of the following values to this address. 0 = Pulse output on Relay 2 128 (decimal) = Limit output on Relay 2 writing any other value will return an error.
40061	Pulse 2/Limit 2 Parameter select	This address is used to assign the Parameter to Relay2 If Limit option is selected refer table 2 for parameter number & if Pulse option is selected then refer table 11.
40063	Limit 2 Trip point	This address is used to set the trip point in %. Any value between 10 to 100 for Lo- alarm & 10 to120 for Hi-alarm can be written to this address. Writing any other value will return an error.
40065	Hysteresis (Limit 2)	This address is used to set the hysteresis between 0.5 to 50 . Writting any other value will return an error.
40067	Limit 2 Energizing delay	This address is used to set the Energizing delay between 1 to 10 sec . Writting any other value will return an error.
40069	Limit 2 De-Energizing delay	This address is used to set the De-Energizing delay between 1 to 10 sec . Writting any other value will return an error.
40071	Password	This address is used to set & reset the password. Valid Range of Password can be set is 0000 - 9999 . 1) If password lock is present & if this location is read it will return **zero**. 2) If Password lock is absent & if this location is read it will return **One**.

Address	Parameter	Description
		3) If password lock is present & to disable this lock first send valid password to this location then write “0000” to this location 4) If password lock is present & to modify 4X parameter first send valid password to this location so that 4X parameter will be accessible for modification. 5) If for in any of the above case invalid password is send then meter will return exceptional error 2.
40073	Limit1 Configuration Select	This address is used to set the Configuration for relay 1 see table 12 . Writting any other value will return an error.
40075	Limit2 Configuration Select	This address is used to set the Configuration for relay 2 see table 12 . Writting any other value will return an error.
40079	30mA Noise current Elimination	This address is used to activate or de-activatethe 30 mA noise current elimination write 0-Deactivate 30 (Decimal)-Activate Writing any other value will return an error.
40081	Energy Update Rate	This address is used to specify update rate of energy in corresponding 3X registers. The valid values for update rate are from 1 to 60 min. Writing any other value will return an error.
40083	TOD data On MODBUS	This address allows to access TOD data in 3 X register . Writing values from 0 to 6 gives different data in 3 X register. Refer table 6 for details.

<table>
<tr><th>Address</th><th>Parameter</th><th>Description</th></tr>
<tr><td>40097</td><td>Serial No</td><td>This address shows the serial no. configured at factory</td></tr>
<tr><td>40099</td><td>Model No</td><td>This address shows the model no. for identification of model. For PQM model no is 3481.</td></tr>
<tr><td>40101</td><td>Add on VER No.</td><td>This address shows the version no of add - on card.</td></tr>
<tr><td>40103</td><td>Display VER No.</td><td>This address shows the version no of display card.</td></tr>
<tr><td>40105</td><td>Weekend Select</td><td>This address allows to select days as weekends.
<table><tr><td></td><td>S</td><td>S</td><td>F</td><td>T</td><td>W</td><td>T</td><td>M</td></tr><tr><td></td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr></table>0 = DESELECT
1 = SELECT
For example if user wants to select Sunday and Monday as weekend, according to the above register user has to select the S & M as 1, and then user has to write its decimal representation on modbus location 40105 of 4x register i.e. user has to write 65 on 40105.</td></tr>
<tr><td>40107</td><td>Holiday No.</td><td>This address is used to select holiday no of which data is to be read from or written to addresses 40109 & 40111. Valid range for holiday no is 1 to 30.Writing any other value will return an error.</td></tr>
<tr><td>40109</td><td>Holiday Date</td><td>This address allows to read or write the value of date of holiday no specified in address 40107.</td></tr>
<tr><td>40111</td><td>Holiday Month</td><td>This address allows to read or write the value of month of holiday no specified in address 40107.</td></tr>
<tr><td>40113</td><td>Alternate day No.</td><td>This address is used to select Alternate day no of which data is to be read from or written to addresses 40115 & 40117. Valid range for Alternate day no is 1 to 30.Writing any other value will return an error.</td></tr>
</table>

Address	Parameter	Description
40115	Alternate day Date	This address allows to read or write the value of date of Alternate day no specified in address 40113.
40117	Alternate day Month	This address allows to read or write the value of month of Alternate day no specified in address 40113.
40119	Profile 1	This address allows to enter tariff rate for Profile 1. Valid range for tariff rate is 0.001 to 299.0.
40121	Profile 2	This address allows to enter tariff rate for Profile 2. Valid range for tariff rate is 0.001 to 299.0.
40123	Profile 3	This address allows to enter tariff rate for Profile 3. Valid range for tariff rate is 0.001 to 299.0.
40125	Profile 4	This address allows to enter tariff rate for Profile 4. Valid range for tariff rate is 0.001 to 299.0.
40127	Season No.	This address is used to select season no of which data is to be read from or written to addresses 40129 & 40131. Valid range for season no is 1 to 4.Writing any other value will return an error.
40129	Season Date	This address allows to read or write the value of date of season no specified in address 40127.
40131	Season Month	This address allows to read or write the value of month of season no specified in address 40127.
40133	Day type	This address is used to select day type of season specified in address 40127. Valid value for day type are from 1 to 4. Writing any other value will return an error. 1 - Week days 2 - Weekends 3 - Holidays 4 - Alternate days

<table>
<tr><th>Address</th><th>Parameter</th><th>Description</th></tr>
<tr><td>40135</td><td>Timezone No.</td><td>This address is used to select time zone no of season specified in address 40127 & day type specified in address 40133 . Valid range for time zone no is 1 to 6.Writing any other value will return an error. Time zones must be entered in sequential order. First time zone is default configured as 00:00</td></tr>
<tr><td>40137</td><td>Time zone Hour</td><td>This address allows to read or write the value of hour of time zone no specified in address 40135.</td></tr>
<tr><td>40139</td><td>Time zone Minute</td><td>This address allows to read or write the value of minute of time zone specified in address 40135.</td></tr>
<tr><td>40141</td><td>Time zone Profile Rate</td><td>This address allows to read or write the tariff rate no of time zone specified in address 40135.</td></tr>
<tr><td>40143</td><td>Sag Threshold Set</td><td>This address allows to enter threshold value for sag detection. Valid range for sag threshold is 10 to 90 % of nominal.</td></tr>
<tr><td>40145</td><td>Swell Threshold Set</td><td>This address allows to enter threshold value for swell detection. Valid range for swell threshold is 110 to 150 % of nominal voltage .</td></tr>
<tr><td>40147</td><td>Over Current Threshold Set</td><td>This address allows to enter threshold value for over current detection. Valid range for overcurrent threshold is 110 to 150% of nominal current.</td></tr>
<tr><td>40149</td><td>Phase No for Harmonic Setup</td><td>This address is used to select phase no of which data is to be read from or written to addresses from 40151 to 40161. Valid range for phase no is 1 to 3.
<table>
<tr><th>Phase No</th><th>3p4w</th><th>3p3w</th></tr>
<tr><td>1</td><td>L1</td><td>L12</td></tr>
<tr><td>2</td><td>L2</td><td>L23</td></tr>
<tr><td>3</td><td>L3</td><td>L13</td></tr>
</table></td></tr>
<tr><td>40151</td><td>Harmonic A</td><td>This address allows to read or write the value of harmonic A of phase no specified. Harmonic Range is 2-56.</td></tr>
</table>

Address	Parameter	Description
40153	Harmonic B	This address allows to read or write the value of harmonic B of phase no specified. Harmonic Range is 2-56.
40155	Harmonic C	This address allows to read or write the value of harmonic C of phase no specified. Harmonic Range is 2-56.
40157	Harmonic D	This address allows to read or write the value of harmonic D of phase no specified. Harmonic Range is 2-56.
40159	Harmonic E	This address allows to read or write the value of harmonic E of phase no specified. Harmonic Range is 2-56.
40161	Harmonic F	This address allows to read or write the value of harmonic F of phase no specified . Harmonic Range is 2-56.
40163	RTC Minute	This address allows to read or write the value of minute of RTC.
40165	RTC Hour	This address allows to read or write the value of Hour of RTC.
40167	RTC Date	This address allows to read or write the value of Date of RTC.
40169	RTC month	This address allow to read or write the value of month of RTC.
40171	RTC Year	This address allows to read or write the value of Year of RTC.
40173	Brightness	This address allows to read or set the value of brightness of display LCD. The valid range of values for brightness are from 2 to 102.
40175	Contrast	This address allows to read or set the value of contrast of display LCD. The valid range of values for contrast are from 6 to 28.

Table 10 : RS 485 Set-up Code

Baud Rate	Parity	Stop bit	Decimal Value
4800	NONE	1	0
4800	NONE	2	1
4800	EVEN	1	2
4800	ODD	1	3
9600	NONE	1	4
9600	NONE	2	5
9600	EVEN	1	6
9600	ODD	1	7
19200	NONE	1	8
19200	NONE	2	9
19200	EVEN	1	10
19200	ODD	1	11
38400	NONE	1	12
38400	NONE	2	13
38400	EVEN	1	14
38400	ODD	1	15

NOTE :

Codes not listed in the table above may give rise to unpredictable results including loss of communication. Excise caution when attempting to change mode via direct Modbus writes.

Table 11 : Pulse1 & Pulse2 Configuration select

Code	Configuration
0	Import Active Energy
1	Export Active Energy
2	Import Reactive Energy
3	Export Reactive Energy
4	Apparent Energy

NOTE : Configuring Pulse 1 will also configure impulse to same energy.

Table 12 :Limit1 & Limit2 Configuration select

Code	Configuration
0	Hi- alarm & Energized relay
1	Hi- alarm & De-energized relay
2	Lo- alarm & Energized relay
3	Lo- alarm & De-energized relay

10.1 User Assignable Modbus Registers:

This instrument contains the 20 user assignable registers in the address range of 0x2200 (38705) to 0x2226 (38743) (**see Table** 13).
Any of the parameter addresses (3X register addresses Table 4)) accessible in the instrument can be mapped to these 20 user assignable registers.
Parameters (3X registers addresses) that resides in different locations may be accessed by the single request by re-mapping them to adjacent address in the user assignable registers area.
The actual address of the parameters (3X registers addresses) which are to be assessed via address 0x2200 to 0x2226 are specified in 4x Register 0x2200 to 0x2213 (**see Table 14**).

Table 13 : User Assignable 3X Data Registers

Address (Register)	Parameter Number.	Assignable Register	Modbus Start Address (Hex)	
			High Byte	Low Byte
38705	4353	Assignable Reg 1	22	00
38707	4354	Assignable Reg 2	22	02
38709	4355	Assignable Reg 3	22	04
38711	4356	Assignable Reg 4	22	06
38713	4357	Assignable Reg 5	22	08
38715	4358	Assignable Reg 6	22	0A

Address (Register)	Parameter Number.	Assignable Register	Modbus Start Address (Hex)	
			High Byte	Low Byte
38717	4359	Assignable Reg 7	22	0C
38719	4360	Assignable Reg 8	22	0E
38721	4361	Assignable Reg 9	22	10
38723	4362	Assignable Reg 10	22	12
38725	4363	Assignable Reg 11	22	14
38727	4364	Assignable Reg 12	22	16
38729	4365	Assignable Reg 13	22	18
38731	4366	Assignable Reg 14	22	1A
38733	4367	Assignable Reg 15	22	1C
38735	4368	Assignable Reg 16	22	1E
38737	4369	Assignable Reg 17	22	20
38739	4370	Assignable Reg 18	22	22
38741	4371	Assignable Reg 19	22	24
38743	4372	Assignable Reg 20	22	26

Table 14 : User Assignable mapping register (4X registers)

Address (Register)	Parameter Number.	Mapping Register	Modbus Start Address (Hex)	
			High Byte	Low Byte
48705	4353	Mapped Add for register #0x2200	22	00
48706	4354	Mapped Add for register #0x2202	22	01
48707	4355	Mapped Add for register #0x2204	22	02
48708	4356	Mapped Add for register #0x2206	22	03
48709	4357	Mapped Add for register #0x2208	22	04
48710	4358	Mapped Add for register #0x220A	22	05
48711	4359	Mapped Add for register #0x220C	22	06
40712	4360	Mapped Add for register #0x220E	22	07

Address (Register)	Parameter Number.	Mapping Register	Modbus Start Address (Hex)	
			High Byte	Low Byte
48713	4361	Mapped Add for register #0x2210	22	08
48714	4362	Mapped Add for register #0x2212	22	09
48715	4363	Mapped Add for register #0x2214	22	0A
48716	4364	Mapped Add for register #0x2216	22	0B
48717	4365	Mapped Add for register #0x2218	22	0C
48718	4366	Mapped Add for register #0x221A	22	0D
48719	4367	Mapped Add for register #0x221C	22	0E
48720	4368	Mapped Add for register #0x221E	22	0F
48721	4369	Mapped Add for register #0x2220	22	10
48722	4370	Mapped Add for register #0x2222	22	11
48723	4371	Mapped Add for register #0x2224	22	12
48724	4372	Mapped Add for register #0x2226	22	13

Example :

Assigning parameter to user assignable registers

To access the voltage2 (3X address 0x0002) and Power Factor1 (3X address 0x001E) through user assignable register assign these addresses to 4x register (Table 14) 0x2200 and 0x2201 respectively .

Assigning Query:

Device Address	01 (Hex)
Function Code	10 (Hex)
Starting Address Hi	22 (Hex)
Starting Address Lo	00 (Hex)
Number of Registers Hi	00 (Hex)*
Number of Registers Lo	02(Hex)*

Byte Count	04 (Hex)
Data Register-1High Byte	00 (Hex)
Data Register-1 Low Byte	02 (Hex)
Data Register-2 High Byte	00 (Hex)
Data Register-2 Low Byte	1E (Hex)
CRC lOW	52 (Hex)
CRC High	C6 (Hex)

Voltage 2 * (3X Address 0x0002)

Power Factor 1 * (3X Address 0x001E)

Response :

Device Address	01 (Hex)
Function Code	10 (Hex)
Start Address High	22 (Hex)
Start Address Low	00 (Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02 (Hex)
CRC Low	4B (Hex)
CRC High	B0 (Hex)

Reading Parameter data through User Assignable Registers:

In assigning query Voltage2 and Power Factor1 parameters were assigned to 0x 2200 and 0x2201(Table10) which will point to user assignable 3xregisters 0x2200 and 0x2202 (table13). So to read Voltage2 and PowerFactor1 data reading query should be as below.

Query:

Device Address	01 (Hex)
Function Code	04 (Hex)
Start Address High	22 (Hex)
Start Address Low	00 (Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	04 (Hex) **
CRC Low	FB (Hex)
CRC High	B1 (Hex)

Start Address High : Most significant 8 bits of starting address of User assignable register.

Start Address low :Least significant 8 bits of starting address of User assignable register.

Number of register Hi : Most significant 8 bits of Number of registers requested.

Number of register Lo : Least significant 8 bits of Number of registers requested.

****Note : Two consecutive 16 bit register represent one parameter.**
Since two parameters are requested four registers are required

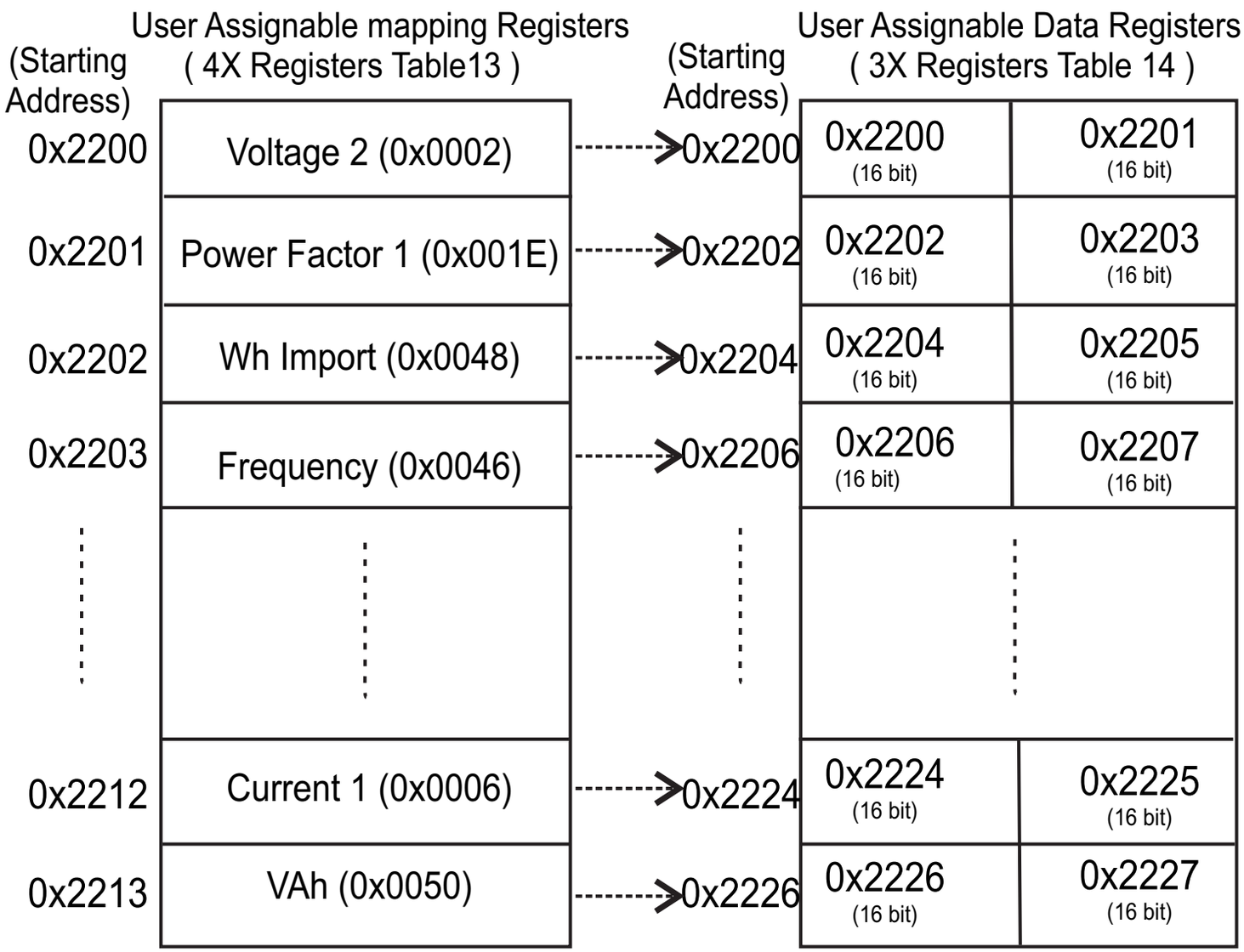
Response : (Volt2 = 219.30 / Power Factor1 = 1.0)

Device Address	01 (Hex)
Function Code	04 (Hex)
Byte count	08 (Hex)
Data Register-1High Byte	43 (Hex)
Data Register-1 Low Byte	5B (Hex)
Data Register-2 High Byte	4E (Hex)
Data Register-2 Low Byte	04 (Hex)

} **Voltage 2 Data**

Data Register-3 High Byte	3F (Hex)
Data Register-3 Low Byte	80 (Hex)
Data Register-4 High Byte	00 (Hex)
Data Register-4 Low Byte	00 (Hex)
CRC Low	79 (Hex)
CRC High	3F (Hex)

Power Factor 1Data



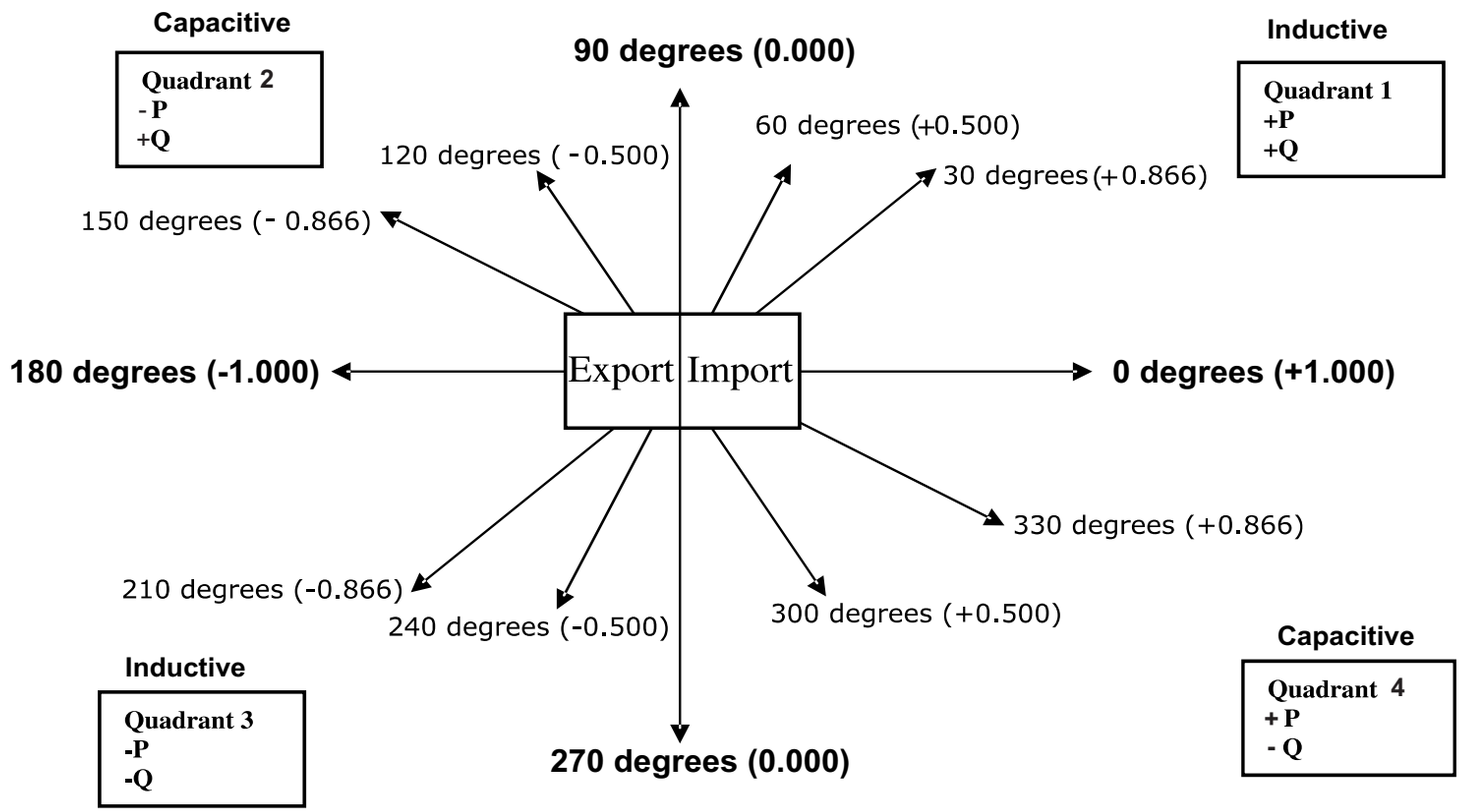
To get the data through User assignable Register use following steps:

1) Assign starting addresses(Table3) of parameters of interest to a
"User assignable mapping registers" in a sequence in which they are to be accessed
(see section "**Assigning parameter to user assignable registers"**)

2) Once the parameters are mapped data can be acquired by using
"User assignable data register " Starting address . i.e to access data of Voltage2,
Power factor1,Wh import, Frequency send query with starting address 0x200
with number of register 8 or individually parameters can be accessed
for example if current1 to be accessed use starting address 0x212.
(See section **Reading Parameter data through User Assignable Registers)**

11. Phasor Diagram :

Quadrant 1: 0° to 90° **Quadrant 3:** 180° to 270°
Quadrant 2: 90° to 180° **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

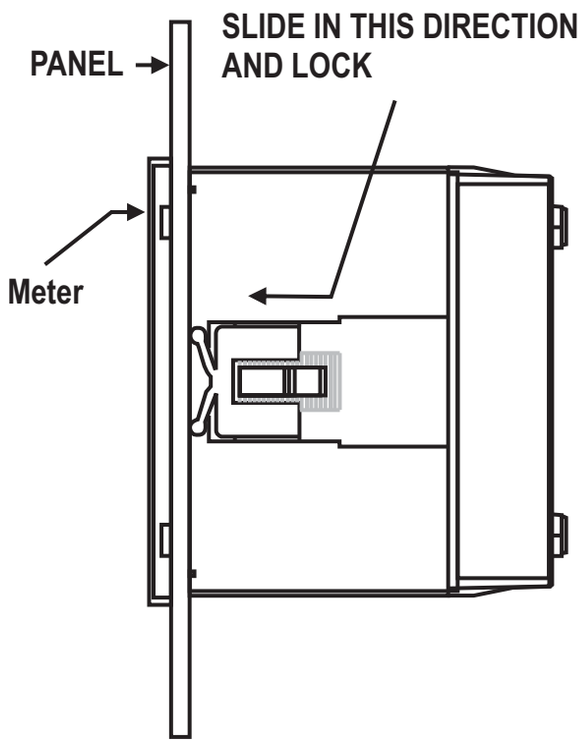
Inductive means Current lags Voltage
Capacitive means Current leads Voltage

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

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

12. 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 -10 to 55 ^{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.**

12.1 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.

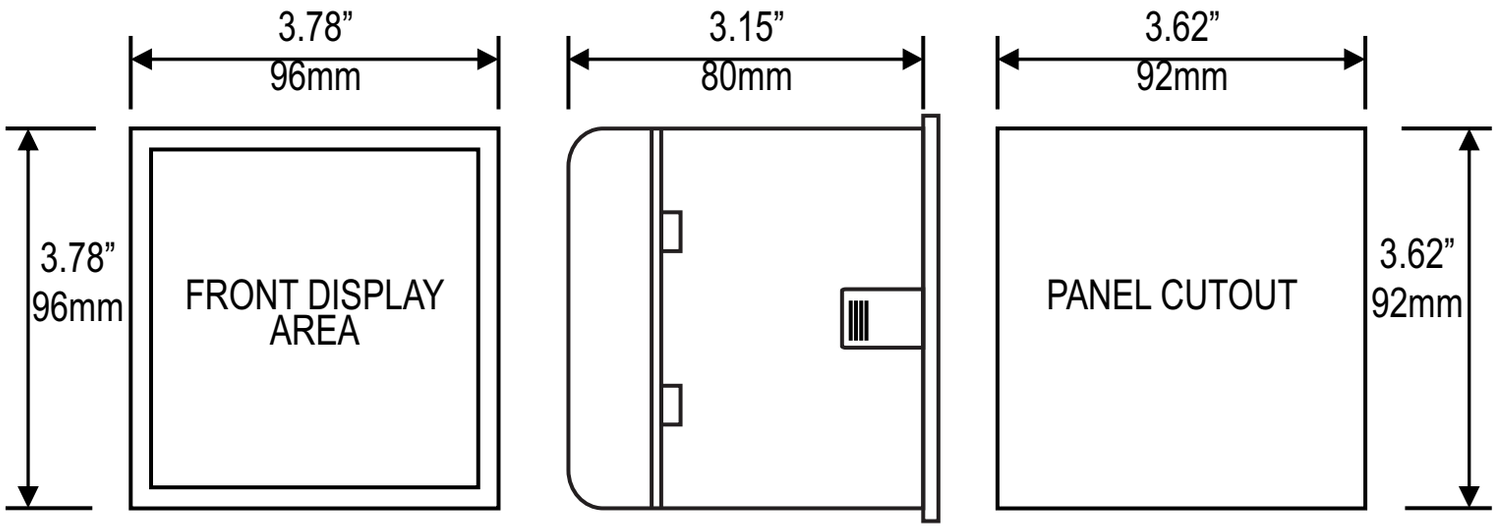
2. Avoid routing leads alongside cables and products that are, or could be, a source of interference.

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.

12.2 Case Dimension and Panel Cut Out



MAX PANEL THICKNESS 0.18”,5mm

12.3 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.

12.4 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.

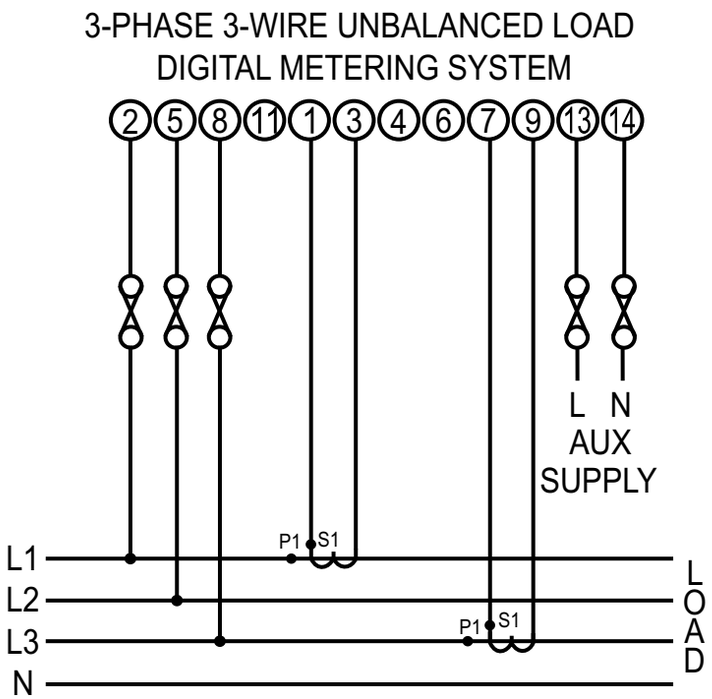
12.5 Fusing

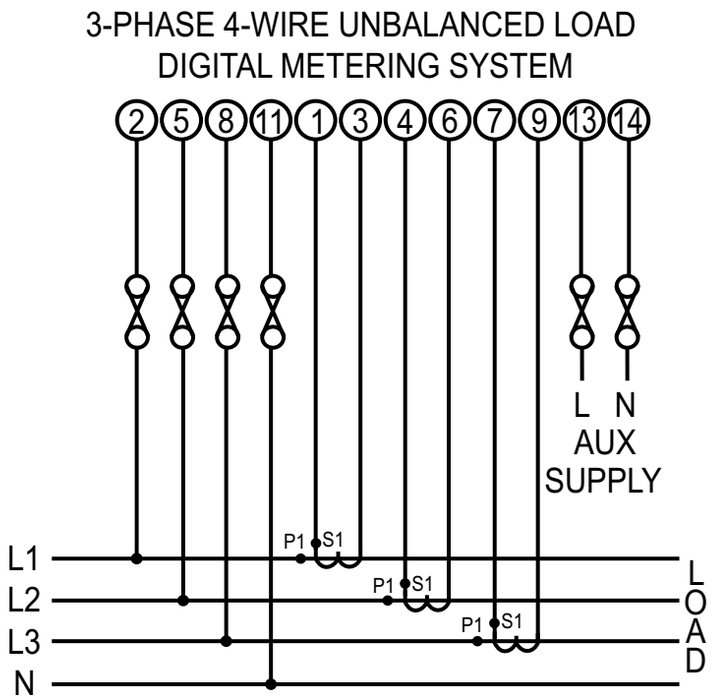
It is recommended that all voltage lines are fitted with 1 amp HRC fuses.

12.6 Earth/Ground Connections

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

13. Connection Diagrams





14. Specification :

System

3 Phase 3 Wire / 4 Wire programmable at site

Inputs

Nominal input voltage (AC RMS) (Three wire and Four wire)	Line-Neutral 57.73...288.675 V_{L-N} Line-Line 100... 500 V_{L-L}
Max continuous input voltage	347 V_{L-N}, (600 V_{L-L})
Max short duration input voltage	2 x Nominal Value (1s application repeated 10 times at 10s intervals)
Nominal input voltage burden	0.2VA approx. per phase
Nominal input current	1A / 5A AC rms
Max continuous input current	120% of Nominal Value
Nominal input current burden	0.2VA approx. per phase
Max short duration current input	20 x Nominal Value (1s application repeated 5 times at 5 min. intervals)
System CT primary values	Std. Values from 1 to 9999A (1 or 5 Amp secondary)

Auxiliary

Standard nominal Auxillary supply voltages & Frequency	60 - 300V AC- DC (45-66Hz),
a.c. supply voltage tolerance	+5 % / -5 % of Rated Value
a.c. supply frequency range	45 to 66 Hz
a.c. supply burden	<6.5VA

Operating Measuring Ranges

Voltage	5 V_{LN}.... 347 V_{LN}, 9 V_{LL}.... 600 V_{LL}.
Current	5 .. 120 % of Nominal Value
Frequency	45 .. 66 Hz

Accuracy

Voltage	± 0.2 % of Nominal value
Current	± 0.2 % of Nominal value
Frequency	0.1% of mid frequency
Active Power	± 0.2 % of Nominal value
Re- Active Power	± 0.2 % of Nominal value
Apparent Power	± 0.2 % of Nominal value
Active Energy	Class 0.5S as per IEC 62053 - 22
Apparant Energy	Class 0.5S as per IEC 62053 - 22
Re - Active Energy	Class 2 as per IEC 62053 - 23
Power Factor / Phase angle	± 2 degree
Harmonics	± 1 %
Total Harmonic Distortion	± 1 %

Reference conditions (As per IEC / EN 60688) :

Ambient 23 ^{0}C ± 1 ^{0}C

Sinusoidal (distortion factor 0.005), 50 / 60 Hz

Current Range	5... 100% of Nominal Value.
Starting Current for energy as per IEC 62053 - 22 0.5S	1 mA for 1A range 5 mA for 5A range

Display

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

Controls

User Interface	Resistive Touch screen

Real Time Clock (RTC) :

Uncertainty	+/- 2 minutes / months (23 ^{0}C $\pm$ 1 ^{0}C) (trimmable through display or MODBUS)

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	5.23 kV DC for 1 minute between all electrical circuits

Environmental

Operating temperature	-10 to 55 ^{0}C
Storage temperature	-20 to +65 ^{0}C
Relative humidity	0 .. 90 % RH
Warm up time	3 minute (minimum)
Shock	15g in 3 planes
Vibration	10 .. 150 .. 10 Hz, 0.75mm amplitude
Enclosure (front only)	IP 54 as per IEC 60529
Temperature Coefficient	0.05%/°C

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	0.600 kg Approx.

Pulse output Option (1 or 2 Relay) :

Relay	1NO + 1NC
Switching Voltage & Current	240V AC , 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 Resolution is set to kWh or MWh.

ModBus (RS 485) Option :

Protocol	ModBus (RS 485)
Baud Rate	38400, 19200 , 9600 , 4800 (Programmable)
Parity	Odd or Even, with 1 stop bit, Or None with 1 or 2 stop bits

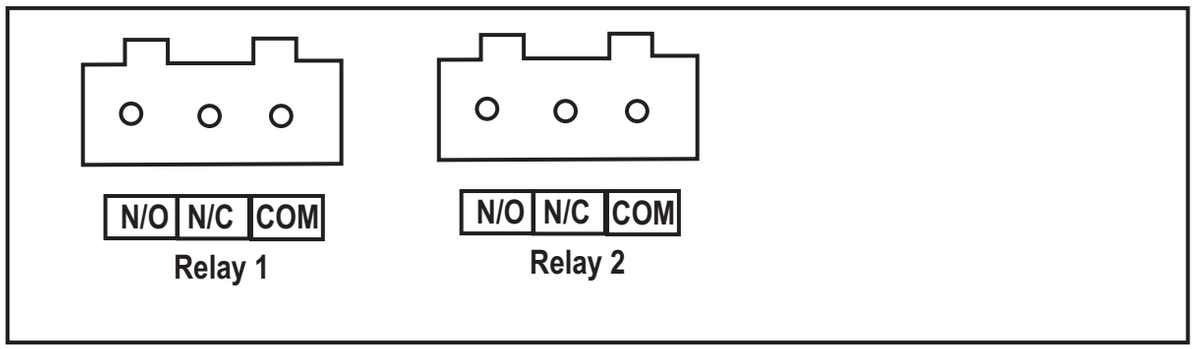
Impulse Output :

Impulse Constant	4000 impulses / KWh

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

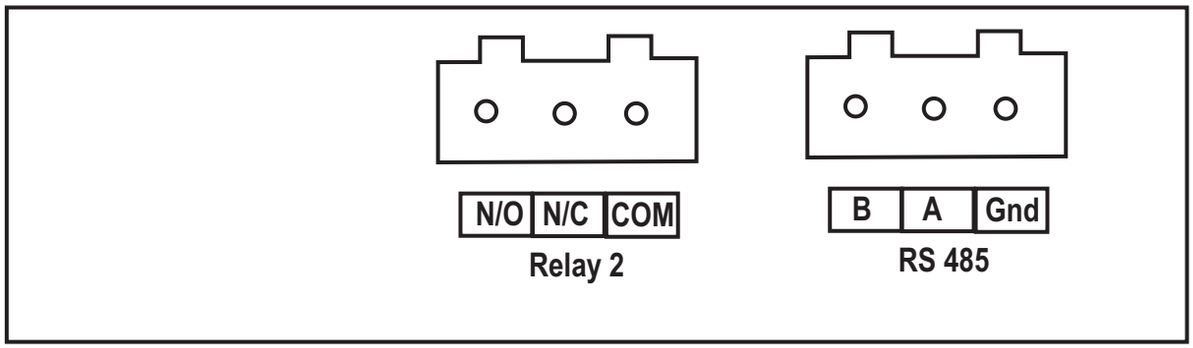
1. One Pulse Output (One Limit Output)

2. Two Pulse Output (Two Limit Output)

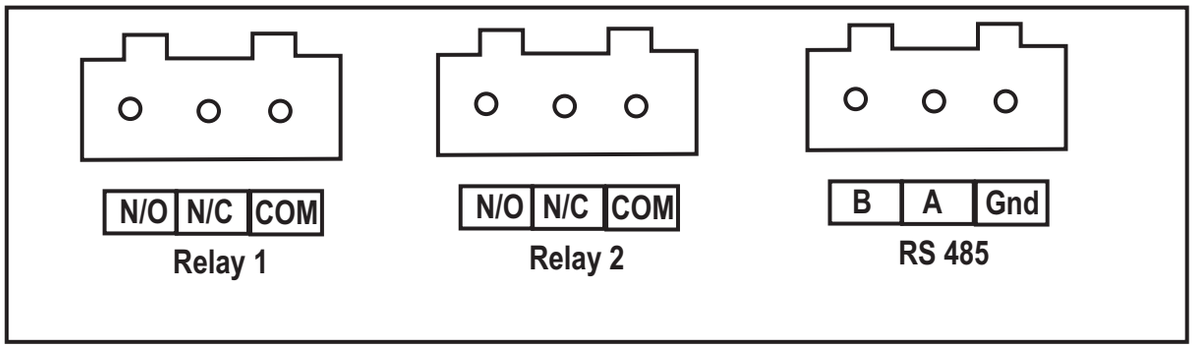


3. RS 485 Output

5. One Pulse (One Limit) + RS 485 Output



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



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.