

Interface Definition

RISH PQM Power Quality Monitor



Three Phase (3W/4W)

Three Phase Touch Screen Power Quality Monitor with TOD

Interface Definition

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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.

An operation via standard Rs485 is possible. Through this optional interface all the above mentioned parameters can be configured and programmed. For bus service it is essential that device address, baud rate and parity should be configured properly.

This document specifies only the interface between a master device and power quality monitor for electrical variable through MODBUS over Rs485.

2. Communication Parameter Selection :

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

- 2.1 RS485 ADDRESS
- 2.2 Rs485 BAUD RATE
- 2.3 Rs485 PARITY

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.

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.

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. 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 both ends 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. |

3.1 Accessing 3 X register for reading measured values:

Two consecutive 16 bit registers represent one parameter. Refer table 1 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 1 : 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 | | 3P4W | 3P3W |
|-----------------------|------------------|--------------|----------------------|----------|------|------|
| | | | Hex | | | |
| | | | 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 | 41 | 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 Current | 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 | ✓ | x |
| 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 | | 3P4W | 3P3W |
|-----------------------|------------------|--------------------------|----------------------|----------|------|------|
| | | | Hex | | | |
| | | | 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 | ✓ | x |
| 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 | ✓ | x |
| 30361 | 181 | VRMS Harmonic A L2 | 01 | 68 | ✓ | ✓ |
| 30363 | 182 | IRMS Harmonic A L2 | 01 | 6A | ✓ | x |
| 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 | ✓ | x |
| 30377 | 189 | VRMS Harmonic B L2 | 01 | 78 | ✓ | ✓ |
| 30379 | 190 | IRMS Harmonic B L2 | 01 | 7A | ✓ | x |
| 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 | ✓ | x |
| 30393 | 197 | VRMS Harmonic C L2 | 01 | 88 | ✓ | ✓ |
| 30395 | 198 | IRMS Harmonic C L2 | 01 | 8A | ✓ | x |
| 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 | ✓ | x |
| 30409 | 205 | VRMS Harmonic D L2 | 01 | 98 | ✓ | ✓ |
| 30411 | 206 | IRMS Harmonic D L2 | 01 | 9A | ✓ | x |
| 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 | | 3P4W | 3P3W |
|-----------------------|------------------|--------------------------|----------------------|----------|------|------|
| | | | Hex | | | |
| | | | High Byte | Low Byte | | |
| 30421 | 211 | Voltage HD Harmonic D L2 | 01 | A4 | ✓ | ✓ |
| 30423 | 212 | Current HD Harmonic D L2 | 01 | A6 | ✓ | x |
| 30425 | 213 | VRMS Harmonic E L2 | 01 | A8 | ✓ | ✓ |
| 30427 | 214 | IRMS Harmonic E L2 | 01 | AA | ✓ | x |
| 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 | ✓ | x |
| 30441 | 221 | VRMS Harmonic F L2 | 01 | B8 | ✓ | ✓ |
| 30443 | 222 | IRMS Harmonic F L2 | 01 | BA | ✓ | x |
| 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 | ✓ | x |
| 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 | | 3P4W | 3P3W |
|-----------------------|------------------|--------------------------|----------------------|----------|------|------|
| | | | Hex | | | |
| | | | 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

3.2 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 2. 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 2 : 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 |
| 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 |

3.3 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 3.

Table 3 : 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 1 & Table 2 |
| 1 | TOD Summary data (per date total energy & cost up to last 30 days & per month total energy & cost up to last 12 months) | Table 4 |
| 2 | TOD zonewise active import energy & cost per date up to last 31 days | Table 5 |
| 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 4 : 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 |

| Address (Register) | Parameter No. | Parameter | Modbus Start Address Hex | |
|-----------------------|------------------|-----------------------------|-----------------------------|-------------|
| | | | High Byte | Low Byte |
| 30067 | 33 | Date 3 kWh import energy | 00 | 42 |
| ... | ... | | ... | ... |
| 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 |
| ... | ... | | ... | ... |
| 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 |
| ... | ... | | ... | ... |
| 30243 | 121 | Date 29 kVARh import energy | 00 | F2 |
| 30245 | 122 | Date 30 kVARh import energy | 00 | F4 |

| Address (Register) | Parameter No. | Parameter | Modbus Start Address Hex | |
|-----------------------|------------------|-----------------------------|-----------------------------|-------------|
| | | | High Byte | Low Byte |
| 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 |
| ... | ... | | ... | ... |
| 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 |
| ... | ... | | ... | ... |
| 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 |
| 30375 | 187 | month 2 kWh import energy | 01 | 76 |
| ... | ... | | ... | ... |
| 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 |

| Address (Register) | Parameter No. | Parameter | Modbus Start Address Hex | |
|-----------------------|------------------|------------------------------|-----------------------------|-------------|
| | | | High Byte | Low Byte |
| 30399 | 199 | month 2 kWh export energy | 01 | 8E |
| ... | ... | | ... | ... |
| 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 |
| ... | ... | | ... | ... |
| 30441 | 220 | month 11 kVARh import energy | 01 | B8 |
| 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 |
| ... | ... | | ... | ... |
| 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 |
| ... | ... | | ... | ... |

| Address (Register) | Parameter No. | Parameter | Modbus Start Address | |
|-----------------------|------------------|---------------------------|----------------------|-------------|
| | | | Hex | |
| | | | High Byte | Low Byte |
| 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 |
| ... | ... | | ... | ... |
| 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 |
| ... | ... | | ... | ... |
| 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 |
| ... | ... | | ... | ... |
| 30675 | 337 | Date 30 kVARh import cost | 02 | A2 |
| 30677 | 338 | Date 31 kVARh import cost | 02 | A4 |

| Address (Register) | Parameter No. | Parameter | Modbus Start Address Hex | |
|-----------------------|------------------|---------------------------|-----------------------------|-------------|
| | | | High Byte | Low Byte |
| 30679 | 339 | Date 1 kVARh export cost | 02 | A6 |
| 30681 | 340 | Date 2 kVARh export cost | 02 | A8 |
| ... | ... | | ... | ... |
| 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 |
| ... | ... | | ... | ... |
| 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 |
| ... | ... | | ... | ... |
| 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 |

| Address (Register) | Parameter No. | Parameter | Modbus Start Address Hex | |
|-----------------------|------------------|----------------------------|-----------------------------|-------------|
| | | | High Byte | Low Byte |
| ... | ... | | ... | ... |
| 30847 | 423 | month 11 kWh export cost | 03 | 4E |
| 30849 | 424 | month 12 kWh export cost | 03 | 50 |
| 30851 | 425 | month 1 kVARh import cost | 03 | 52 |
| 30853 | 426 | month 2 kVARh import cost | 03 | 54 |
| ... | ... | | ... | ... |
| 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 |
| ... | ... | | ... | ... |
| 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 |
| ... | ... | | ... | ... |
| 30919 | 459 | month 11 kVAh cost | 03 | 96 |

| Address (Register) | Parameter No. | Parameter | Modbus Start Address Hex | |
|-----------------------|------------------|--|-----------------------------|-------------|
| | | | High Byte | Low Byte |
| 30921 | 460 | month 12 kWh 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 |
| 30953 | 476 | Current date timezone4 kVARh import cost | 03 | B8 |

| Address (Register) | Parameter No. | Parameter | Modbus Start Address Hex | |
|-----------------------|------------------|--|-----------------------------|-------------|
| | | | High Byte | Low Byte |
| 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 kVAh cost | 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 |

3.4 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 3. 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 5 : 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 date 1 Energy | 00 | 0 |
| 30003 | 2 | timezone2 date 1 Energy | 00 | 2 |
| 30005 | 3 | timezone3 date 1 Energy | 00 | 4 |
| 30007 | 4 | timezone4 date 1 Energy | 00 | 6 |
| 30009 | 5 | timezone5 date 1 Energy | 00 | 8 |
| 30011 | 6 | timezone6 date 1 Energy | 00 | A |
| 30013 | 7 | timezone1 date 1 cost | 00 | C |
| 30015 | 8 | timezone2 date 1 cost | 00 | E |
| 30017 | 9 | timezone3 date 1 cost | 00 | 10 |
| 30019 | 10 | timezone4 date 1 cost | 00 | 12 |

| Address (Register) | Parameter No. | Parameter | Modbus Start Address Hex | |
|-----------------------|------------------|--------------------------|-----------------------------|-------------|
| | | | High Byte | Low Byte |
| 30021 | 11 | timezone5 date 1 cost | 00 | 14 |
| 30023 | 12 | timezone6 date 1 cost | 00 | 16 |
| 30025 | 13 | timezone1 date 2 Energy | 00 | 18 |
| ... | ... | | ... | ... |
| 30035 | 18 | timezone6 date 2 Energy | 00 | 22 |
| 30037 | 19 | timezone1 date 2 cost | 00 | 24 |
| ... | ... | | ... | ... |
| 30047 | 24 | timezone6 date 2 cost | 00 | 2E |
| 30049 | 25 | timezone1 date 3 Energy | 00 | 30 |
| ... | ... | | ... | ... |
| 30059 | 30 | timezone6 date 3 Energy | 00 | 3A |
| 30061 | 31 | timezone1 date 3 cost | 00 | 3C |
| ... | ... | | ... | ... |
| 30071 | 36 | timezone6 date 3 cost | 00 | 46 |
| ... | ... | | ... | ... |
| ... | ... | | ... | ... |
| 30337 | 169 | timezone1 date 15 Energy | 01 | 50 |
| ... | ... | | ... | ... |

| Address (Register) | Parameter No. | Parameter | Modbus Start Address Hex | |
|-----------------------|------------------|--------------------------|-----------------------------|-------------|
| | | | High Byte | Low Byte |
| 30347 | 174 | timezone6 date 15 Energy | 01 | 5A |
| 30349 | 175 | timezone1 date 15 cost | 01 | 5C |
| ... | ... | | ... | ... |
| 30359 | 180 | timezone6 date 15 cost | 01 | 66 |
| ... | ... | | ... | ... |
| ... | ... | | ... | ... |
| 30673 | 337 | timezone1 date 29 Energy | 02 | A0 |
| ... | ... | | ... | ... |
| 30683 | 342 | timezone6 date 29 Energy | 02 | AA |
| 30685 | 343 | timezone1 date 29 cost | 02 | AC |
| ... | ... | | ... | ... |
| 30695 | 348 | timezone6 date 29 cost | 02 | B6 |
| 30697 | 349 | timezone1 date 30 Energy | 02 | B8 |
| ... | ... | | ... | ... |
| 30707 | 354 | timezone6 date 30 Energy | 02 | C2 |
| 30709 | 355 | timezone1 date 30 cost | 02 | C4 |
| ... | ... | | ... | ... |
| 30719 | 360 | timezone6 date 30 cost | 02 | CE |

| Address (Register) | Parameter No. | Parameter | Modbus Start Address Hex | |
|-----------------------|------------------|--------------------------|-----------------------------|-------------|
| | | | High Byte | Low Byte |
| 30721 | 361 | timezone1 date 31 Energy | 02 | D0 |
| 30723 | 362 | timezone2 date 31 Energy | 02 | D2 |
| 30725 | 363 | timezone3 date 31 Energy | 02 | D4 |
| 30727 | 364 | timezone4 date 31 Energy | 02 | D6 |
| 30729 | 365 | timezone5 date 31 Energy | 02 | D8 |
| 30731 | 366 | timezone6 date 31 Energy | 02 | DA |
| 30733 | 367 | timezone1 date 31 cost | 02 | DC |
| 30735 | 368 | timezone2 date 31 cost | 02 | DE |
| 30737 | 369 | timezone3 date 31 cost | 02 | E0 |
| 30739 | 370 | timezone4 date 31 cost | 02 | E2 |
| 30741 | 371 | timezone5 date 31 cost | 02 | E4 |
| 30743 | 372 | timezone6 date 31 cost | 02 | E6 |

3.5 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 6 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 6 : 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/ Limil 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 |
| 40203 | 101 | Red color code of phase1 | R/Wp | 00 | CA |
| 40205 | 102 | Green color code of phase1 | R/Wp | 00 | CC |
| 40207 | 103 | Blue color code of phase1 | R/Wp | 00 | CE |
| 40209 | 104 | Red color code of phase2 | R/Wp | 00 | D0 |
| 40211 | 105 | Green color code of phase2 | R/Wp | 00 | D2 |
| 40213 | 106 | Blue color code of phase2 | R/Wp | 00 | D4 |
| 40215 | 107 | Red color code of phase3 | R/Wp | 00 | D6 |
| 40217 | 108 | Green color code of phase3 | R/Wp | 00 | D8 |
| 40219 | 109 | Blue color code of phase3 | R/Wp | 00 | DA |

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. |

| Address | Parameter | Description | | | | | | | | | | |
|------------------------------|-------------------------------|---|------------------|------------------|-----------------------------|-----------------------------|------------------------------|-------------------------------|------------------------------|----------------------------|--------------------|-------------------|
| 40005 | Energy Resolution | <p>This address is used to set energy resolution in Wh, Kwh & MWh. Write one of the following value to this address.</p> <p>1 = Energy in Wh. 2 = Energy in KWh. 3 = Energy in MWh.</p> <p>For CT Primary * PT Primary * 1.732051 > 30000 kW , only kWh & MWh can be set.</p> | | | | | | | | | | |
| 40007 | System Voltage | This address is read only and displays System Voltage | | | | | | | | | | |
| 40009 | System Current | This address is read only and displays System Current | | | | | | | | | | |
| 40011 | System Type | <p>This address is used to set the System type. Write one of the following value to this address.</p> <p>2 = 3 Phase 3 Wire 3 = 3 Phase 4 Wire.</p> <p>Writing any other value will return error .</p> | | | | | | | | | | |
| 40013 | Pulse Width of Relay | <p>This address is used to set pulse width of the Pulse output. Write one of the following values to this address:</p> <p>60 : 60 ms 100 : 100 ms 200 : 200 ms</p> <p>Writing any other value will return error .</p> | | | | | | | | | | |
| 40015 | Reset Parameters | <p>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.</p> <table border="0" data-bbox="363 827 909 967"> <tr> <td>0 - Energy Reset</td> <td>1 - Demand Reset</td> </tr> <tr> <td>2 - System Max Values Reset</td> <td>3 - System Min Values Reset</td> </tr> <tr> <td>4 - Run hour & On hour Reset</td> <td>5 - No of Interruptions Reset</td> </tr> <tr> <td>6 - Power Quality data Reset</td> <td>7 - Time Of Day data Reset</td> </tr> <tr> <td>8 - Reset all data</td> <td>9 - Factory Reset</td> </tr> </table> | 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 |
| 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 | | | | | | | | | | | |

| Address | Parameter | Description |
|---------|--------------------------|--|
| 40019 | Rs485 Set-up Code | This address is used to set the baud rate, Parity, Number of stop bits. Refer to Table 7 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 10 100 : Divisor 100 1000 : Divisor 1000 For Detail refer Table 9. 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 Primary | 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. |

| Address | Parameter | Description |
|---------|-----------------------------------|--|
| 40041 | Word Order | <p>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.</p> <p>In reversed register mode , the two registers that make up a floating point numbers are sent least significant bytes first.</p> <p>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.</p> |
| 40043 | CT secondary | <p>This address is used to read and write the CT secondary value write one of the following values to this address.</p> <p>1=1A CT secondary 5=5A CT secondary writing any other value will return an error.</p> |
| 40045 | PT secondary | <p>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.</p> |
| 40047 | Relay1 output select | <p>This address is used to select the Relay 1 operation as pulse or Limit.</p> <p>write one of the following values to this address.</p> <p>0 = Pulse output on Relay 1 128 (Decimal) = Limit output on Relay 1 writing any other value will return an error.</p> |
| 40049 | Pulse 1 /Limit 1 parameter select | <p>This address is used to assign the Parameter to Relay1</p> <p>If Limit option is selected refer table 11 for parameter number & if Pulse option is selected then refer table 8.</p> |

| Address | Parameter | Description |
|---------|--|--|
| 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 . Writing 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 . Writing 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 . Writing any other value will return an error. |
| 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 11 for parameter number & if Pulse option is selected then refer table 8. |
| 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 . Writing 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 . Writing any other value will return an error. |

| Address | Parameter | Description |
|---------|--------------------------------------|---|
| 40069 | Limit 2 De-Energizing delay | This address is used to set the De-Energizing delay between 1 to 10 sec . Writing any other value will return an error. |
| 40071 | Password | <p>This address is used to set & reset the password. Valid Range of Password can be set is 0000 - 9999 .</p> <ol style="list-style-type: none"> 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. 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 10 . Writing any other value will return an error. |
| 40075 | Limit2 Configuration Select | This address is used to set the Configuration for relay 2 see table 10 . Writing any other value will return an error. |
| 40079 | 30mA Noise current Elimination | <p>This address is used to activate or de-activate the 30 mA noise current elimination write</p> <p>0-Deactivate 30 (Decimal)-Activate</p> <p>Writing any other value will return an error.</p> |

| Address | Parameter | Description | | | | | | | | | | | | | | | | | | |
|---------|--------------------|--|---|---|---|---|---|---|---|---|--|--|---|---|---|---|---|---|---|--|
| 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 3 for details. | | | | | | | | | | | | | | | | | | |
| 40097 | Serial No | This address shows the serial no. configured at factory | | | | | | | | | | | | | | | | | | |
| 40099 | Model No | This address shows the model no. for identification of model. For PQM model no is 3481. | | | | | | | | | | | | | | | | | | |
| 40101 | Add on VER No. | This address shows the version no of add - on card. | | | | | | | | | | | | | | | | | | |
| 40103 | Display VER No. | This address shows the version no of display card. | | | | | | | | | | | | | | | | | | |
| 40105 | Weekend Select | <p>This address allows to select days as weekends.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>S</td> <td>S</td> <td>F</td> <td>T</td> <td>W</td> <td>T</td> <td>M</td> <td></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> <td></td> </tr> </table> <p>0 = DESELECT 1 = SELECT</p> <p>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.</p> | | S | S | F | T | W | T | M | | | 1 | 0 | 0 | 0 | 0 | 0 | 1 | |
| | S | S | F | T | W | T | M | | | | | | | | | | | | | |
| | 1 | 0 | 0 | 0 | 0 | 0 | 1 | | | | | | | | | | | | | |
| 40107 | Holiday No. | 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. | | | | | | | | | | | | | | | | | | |
| 40109 | Holiday Date | This address allows to read or write the value of date of holiday no specified in address 40107. | | | | | | | | | | | | | | | | | | |

| Address | Parameter | Description |
|----------------|---------------------|--|
| 40111 | Holiday Month | This address allows to read or write the value of month of holiday no specified in address 40107. |
| 40113 | Alternate day No. | 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. |
| 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. |

| Address | Parameter | Description |
|---------|----------------------------|--|
| 40133 | Day type | <p>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.</p> <p>1 - Week days 2 - Weekends 3 - Holidays 4 - Alternate days</p> |
| 40135 | Timezone No. | <p>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</p> |
| 40137 | Time zone Hour | <p>This address allows to read or write the value of hour of time zone no specified in address 40135.</p> |
| 40139 | Time zone Minute | <p>This address allows to read or write the value of minute of time zone specified in address 40135.</p> |
| 40141 | Time zone Profile Rate | <p>This address allows to read or write the tariff rate no of time zone specified in address 40135.</p> |
| 40143 | Sag Threshold Set | <p>This address allows to enter threshold value for sag detection. Valid range for sag threshold is 10 to 90 % of nominal.</p> |
| 40145 | Swell Threshold Set | <p>This address allows to enter threshold value for swell detection. Valid range for swell threshold is 110 to 150 % of nominal voltage .</p> |
| 40147 | Over Current Threshold Set | <p>This address allows to enter threshold value for over current detection. Valid range for overcurrent threshold is 110 to 150% of nominal current.</p> |

| Address | Parameter | Description | | | | | | | | | | | | |
|----------|-----------------------------|--|----------|------|------|---|----|-----|---|----|-----|---|----|-----|
| 40149 | Phase No for Harmonic Setup | 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 border="1" data-bbox="446 221 702 293"> <thead> <tr> <th>Phase No</th> <th>3p4w</th> <th>3p8w</th> </tr> </thead> <tbody> <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> </tbody> </table> | Phase No | 3p4w | 3p8w | 1 | L1 | L12 | 2 | L2 | L23 | 3 | L3 | L13 |
| Phase No | 3p4w | 3p8w | | | | | | | | | | | | |
| 1 | L1 | L12 | | | | | | | | | | | | |
| 2 | L2 | L23 | | | | | | | | | | | | |
| 3 | L3 | L13 | | | | | | | | | | | | |
| 40151 | Harmonic A | This address allows to read or write the value of harmonic A of phase no specified. Harmonic Range is 2-56. | | | | | | | | | | | | |
| 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. | | | | | | | | | | | | |

| Address | Parameter | Description |
|---------|-------------------------|---|
| 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. |
| 40203 | Red Color Code for L1 | This address allows to read or set the value of Red component of color used to display phase 1 parameters. The valid range is 0 to 255. |
| 40205 | Green Color Code for L1 | This address allows to read or set the value of Green component of color used to display phase 1 parameters. The valid range is 0 to 255. |
| 40207 | Blue Color Code for L1 | This address allows to read or set the value of Blue component of color used to display phase 1 parameters. The valid range is 0 to 255. |
| 40209 | Red Color Code for L2 | This address allows to read or set the value of Red component of color used to display phase 2 parameters. The valid range is 0 to 255. |
| 40211 | Green Color Code for L2 | This address allows to read or set the value of Green component of color used to display phase 2 parameters. The valid range is 0 to 255. |
| 40213 | Blue Color Code for L2 | This address allows to read or set the value of Blue component of color used to display phase 2 parameters. The valid range is 0 to 255. |
| 40215 | Red Color Code for L3 | This address allows to read or set the value of Red component of color used to display phase 3 parameters. The valid range is 0 to 255. |
| 40217 | Green Color Code for L3 | This address allows to read or set the value of Green component of color used to display phase 3 parameters. The valid range is 0 to 255. |
| 40219 | Blue Color Code for L3 | This address allows to read or set the value of Blue component of color used to display phase 3 parameters. The valid range is 0 to 255. |

Table 7 : 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 8 : 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 9 : 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 = $3 \times CT(\text{Primary}) \times PT(\text{Primary})_{L-N}$ for 3 Phase 4 Wire

System power = $\text{Root}3 \times CT(\text{Primary}) \times PT(\text{Primary})_{L-L}$ for 3 Phase 3 Wire

Table 10 :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 |

TABLE 11 : 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 % |
| 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 % |

| Parameter No. | Parameter | 3P 4W | 3P 3W | Range |
|---------------|----------------------------|-------|-------|--------------------------|
| | | | | Limit Output |
| 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 % |
| 51 | VA DEMAND | ✓ | ✓ | 10 - 120 % |
| 52 | VA MAX DEMAND | ✓ | ✓ | 10 - 120 % |
| 53 | CURRENT DEMAND | ✓ | ✓ | 10 - 120 % |
| 54 | CURRENT MAX DEMAND | ✓ | ✓ | 10 - 120 % |
| 55 | Relay Manual OFF Operation | ✓ | ✓ | NA |
| 56 | Relay Manual ON Operation | ✓ | ✓ | NA |

| Parameter No. | Parameter | 3P 4W | 3P 3W | Range |
|---------------|--------------------------|-------|-------|--------------|
| | | | | Limit Output |
| 101 | INPUT VOLTAGE L12 | ✓ | ✘ | 10 - 120 % |
| 102 | INPUT VOLTAGE L23 | ✓ | ✘ | 10 - 120 % |
| 103 | INPUT VOLTAGE L31 | ✓ | ✘ | 10 - 120 % |
| 104 | V1 THD (%) | ✓ | ✓ | 5 - 100 % |
| 105 | V2 THD (%) | ✓ | ✓ | 5 - 100 % |
| 106 | V3 THD (%) | ✓ | ✓ | 5 - 100 % |
| 107 | I1 THD (%) | ✓ | ✓ | 5 - 100 % |
| 108 | I2 THD (%) | ✓ | ✘ | 5 - 100 % |
| 109 | I3 THD (%) | ✓ | ✓ | 5 - 100 % |
| 110 | System Voltage THD (%) | ✓ | ✓ | 5 - 100 % |
| 111 | System Current THD (%) | ✓ | ✓ | 5 - 100 % |
| 113 | NEUTRAL CURRENT | ✓ | ✘ | 5 - 100 % |
| 123 | VTHD L1 (%) | ✓ | ✓ | 5 - 100 % |
| 124 | ITHD L1 (%) | ✓ | ✓ | 5 - 100 % |
| 131 | Voltage HD Harmonic A L1 | ✓ | ✓ | 5 - 100 % |
| 132 | Current HD Harmonic A L1 | ✓ | ✓ | 5 - 100 % |
| 139 | Voltage HD Harmonic B L1 | ✓ | ✓ | 5 - 100 % |
| 140 | Current HD Harmonic B L1 | ✓ | ✓ | 5 - 100 % |
| 147 | Voltage HD Harmonic C L1 | ✓ | ✓ | 5 - 100 % |
| 148 | Current HD Harmonic C L1 | ✓ | ✓ | 5 - 100 % |
| 155 | Voltage HD Harmonic D L1 | ✓ | ✓ | 5 - 100 % |
| 156 | Current HD Harmonic D L1 | ✓ | ✓ | 5 - 100 % |
| 163 | Voltage HD Harmonic E L1 | ✓ | ✓ | 5 - 100 % |
| 164 | Current HD Harmonic E L1 | ✓ | ✓ | 5 - 100 % |
| 171 | Voltage HD Harmonic F L1 | ✓ | ✓ | 5 - 100 % |
| 172 | Current HD Harmonic F L1 | ✓ | ✓ | 5 - 100 % |

| Parameter No. | Parameter | 3P 4W | 3P 3W | Range |
|---------------|--------------------------|-------|-------|--------------|
| | | | | Limit Output |
| 179 | VTHD L2 (%) | ✓ | ✓ | 5 - 100 % |
| 180 | ITHD L2 (%) | ✓ | ✗ | 5 - 100 % |
| 187 | Voltage HD Harmonic A L2 | ✓ | ✓ | 5 - 100 % |
| 188 | Current HD Harmonic A L2 | ✓ | ✗ | 5 - 100 % |
| 195 | Voltage HD Harmonic B L2 | ✓ | ✓ | 5 - 100 % |
| 196 | Current HD Harmonic B L2 | ✓ | ✗ | 5 - 100 % |
| 203 | Voltage HD Harmonic C L2 | ✓ | ✓ | 5 - 100 % |
| 204 | Current HD Harmonic C L2 | ✓ | ✗ | 5 - 100 % |
| 211 | Voltage HD Harmonic D L2 | ✓ | ✓ | 5 - 100 % |
| 212 | Current HD Harmonic D L2 | ✓ | ✗ | 5 - 100 % |
| 219 | Voltage HD Harmonic E L2 | ✓ | ✓ | 5 - 100 % |
| 220 | Current HD Harmonic E L2 | ✓ | ✗ | 5 - 100 % |
| 227 | Voltage HD Harmonic F L2 | ✓ | ✓ | 5 - 100 % |
| 228 | Current HD Harmonic F L2 | ✓ | ✗ | 5 - 100 % |
| 235 | VTHD L3 (%) | ✓ | ✓ | 5 - 100 % |
| 236 | ITHD L3 (%) | ✓ | ✓ | 5 - 100 % |
| 243 | Voltage HD Harmonic A L3 | ✓ | ✓ | 5 - 100 % |
| 244 | Current HD Harmonic A L3 | ✓ | ✓ | 5 - 100 % |
| 251 | Voltage HD Harmonic B L3 | ✓ | ✓ | 5 - 100 % |
| 252 | Current HD Harmonic B L3 | ✓ | ✓ | 5 - 100 % |
| 259 | Voltage HD Harmonic C L3 | ✓ | ✓ | 5 - 100 % |
| 260 | Current HD Harmonic C L3 | ✓ | ✓ | 5 - 100 % |
| 267 | Voltage HD Harmonic D L3 | ✓ | ✓ | 5 - 100 % |
| 268 | Current HD Harmonic D L3 | ✓ | ✓ | 5 - 100 % |
| 275 | Voltage HD Harmonic E L3 | ✓ | ✓ | 5 - 100 % |
| 276 | Current HD Harmonic E L3 | ✓ | ✓ | 5 - 100 % |

| Parameter No. | Parameter | 3P 4W | 3P 3W | Range |
|---------------|--------------------------|-------|-------|--------------|
| | | | | Limit Output |
| 283 | Voltage HD Harmonic F L3 | ✓ | ✓ | 5 - 100 % |
| 284 | Current HD Harmonic F L3 | ✓ | ✓ | 5 - 100 % |

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° & 100% corresponds to 360°.

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

NA : Not Applicable

3.6 User Assignable Modbus Registers:

This instrument contains the 20 user assignable registers in the address range of 0x2200 (38705) to 0x2226 (38743) (see Table 12).

Any of the parameter addresses (3X register addresses Table 1)) 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 13).

Table 12 : 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 13 : 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 13) 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-1 High 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 IOW | 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 0x2200 and 0x2201 (Table13) which will point to user assignable 3x registers 0x2200 and 0x2202 (table12). 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

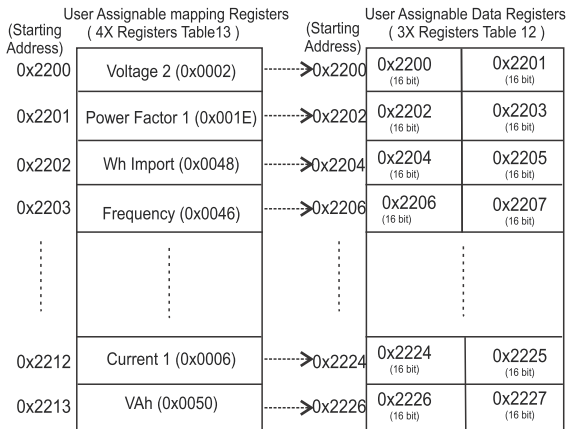
Response : (Volt2 = 219.30 / Power Factor1 = 1.0)

| | |
|---------------------------|----------|
| Device Address | 01 (Hex) |
| Function Code | 04 (Hex) |
| Byte count | 08 (Hex) |
| Data Register-1 High 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 (Table 3) 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**)

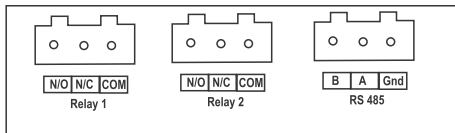
4. Connection for Optional RS 485 Output

(rear view of the instrument) :

1. RS 485 Output



2. 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.

