Interface Definition

RISH EM 3490DS*i*

CONTENT

Touch Screen Dual Source Energy Meter with TOD

Installation & Operating Instructions

DMAN-00IM-0575 REV A 09/16

1. Introduction

This Instrument is a panel mounted 96 x 96mm DIN Quadratic Dual source energy meter. It measures important electrical parameters like AC voltage, AC Current, Frequency, Power,Phase Angle, Power Factor, Demand and 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 TFTLCD display.

This Instrument provides Run hour , On Hour , No of Interruptions, Energy(Active / Reactive / Apparent) in different registers for Utility (Normal mode) & Generator (in power back up) in three phase/ single phase network.The switch over from utility to generator or vice versa is sensed through the sensing Voltage applied at Generator sense terminal at the rear side of the instrument. If voltage is present at sensing terminal the instrument will measure Generator parameters and if absent then it will measure utility parameters.On Modbus important electrical parameters like AC voltage,AC Current, Frequency,Power,Phase Angle,Power Factor are provided in seperate registers for Utility and Generator.

This instrument can be configured and programmed at site for the following:PTPrimary, PTSecondary, CTPrimary, CTSecondary (5Aor1A), 3 phase 3W or 3phase 4W system , Time Of Day metering, Power Quality Parameter , Billing metering.

measurement readings & configration can be also accessed via Modbus Interface and front panel touch screen.

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

This document specifies only the interface between master device and instrument 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 RS 485 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 option 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 option 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 :

DUAL SOURCE ENERGY METER 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 Meter is between 1 and 247 for 32 instruments. Broadcast Mode (address 0) is not allowed.

The maximum latency time of an Meter is 200ms 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 200ms of time to elapse before assuming that the Meter is not going to respond. If slave does not respond within 200 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 Meter 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	The function code is not supported by Meter
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 DataValue	Attempt to set a floating point variable to an invalid value

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.)

Note: Utility(UTL) & generator(GEN) basic parameters (Voltage, Current ,Power(W/VA/VAr),PF,Phase Angle, Frequency)are at different location on modbus. starting address of Utility parameter is 30001 and starting address of Generator parameter is 30903.

TABLE 1 : 3 X register addresses (measured parameters)

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30001	1	Volts 1	00	00	✓	✓	✓
30003	2	Volts 2	00	02	✓	✓	✗
30005	3	Volts 3	00	04	✓	✓	✗
30007	4	Current 1	00	06	✓	✓	✓
30009	5	Current 2	00	08	✓	✓	✗
30011	6	Current 3	00	0A	✓	✓	✗
30013	7	W1	00	0C	✓	✗	✓
30015	8	W2	00	0E	✓	✗	✗
30017	9	W3	00	10	✓	✗	✗
30019	10	VA 1	00	12	✓	✗	✓
30021	11	VA 2	00	14	✓	✗	✗
30023	12	VA 3	00	16	✓	✗	✗
30025	13	VAr 1	00	18	✓	✗	✓
30027	14	VAr 2	00	1A	✓	✗	✗
30029	15	VAr 3	00	1C	✓	✗	✗
30031	16	PF 1	00	1E	✓	✗	✓
30033	17	PF 2	00	20	✓	✗	✗
30035	18	PF 3	00	22	✓	✗	✗
30037	19	Phase Angle 1	00	24	✓	✗	✓
30039	20	Phase Angle 2	00	26	✓	✗	✗
30041	21	Phase Angle 3	00	28	✓	✗	✗
30043	22	Volts Avg	00	2A	✓	✓	✓
30045	23	Volts Sum	00	2C	✓	✓	✓
30047	24	Current Avg	00	2E	✓	✓	✓
30049	25	Current Sum	00	30	✓	✓	✓

TABLE 1 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
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	✓	✓	✓
30065	33	PF sum	00	40	✓	✗	✓
30067	34	Phase angle Avg	00	42	✓	✓	✓
30069	35	Phase angle sum	00	44	✓	✗	✓
30071	36	Frequency	00	46	✓	✓	✓
30073	37	Wh (UTL)	00	48	✓	✓	✓
30075	38	Wh (GEN)	00	4A	✓	✓	✓
30077	39	VArh(UTL)	00	4C	✓	✓	✓
30079	40	VArh(GEN)	00	4E	✓	✓	✓
30081	41	VAh (UTL)	00	50	✓	✓	✓
30083	42	VAh (GEN)	00	52	✓	✓	✓
30085	43	kW Demand (UTL/GEN)	00	54	✓	✓	✓
30087	44	kW Max Demand (UTL)	00	56	✓	✓	✓
30089	45	Reserved	00	58			
30091	46	kW Max Demand (GEN)	00	5A	✓	✓	✓
30093	47	Reserved	00	5C			
30095	48	Reserved	00	5E			
30097	49	Current max demand(GEN)	00	60	✓	✓	✓
30099	50	VA Max Demand(GEN)	00	62	✓	✓	✓
30101	51	VA Demand (UTL/GEN)	00	64	✓	✓	✓
30103	52	VA Max Demand (UTL)	00	66	✓	✓	✓
30105	53	Current Demand (UTL/GEN)	00	68	✓	✓	✓
30107	54	Current Max Demand (UTL)	00	6A	✓	✓	✓
30109	55	Wh Overflow count(UTL)	00	6C	✓	✓	✓
30111	56	Wh (UTL)	00	6E	✓	✓	✓

TABLE 1 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30113	57	Wh Overflow count(GEN)	00	70	✓	✓	✓
30115	58	Wh (GEN)	00	72	✓	✓	✓
30117	59	VArh Overflow count(UTL)	00	74	✓	✓	✓
30119	60	VArh (UTL)	00	76	✓	✓	✓
30121	61	VArh Overflow count(GEN)	00	78	✓	✓	✓
30123	62	VArh(GEN)	00	7A	✓	✓	✓
30125	63	VAhOverflow count(UTL)	00	7C	✓	✓	✓
30127	64	VAh(UTL)	00	7E	✓	✓	✓
30129	65	VAh Overflow count(GEN)	00	80	✓	✓	✓
30131	66	VAh(GEN)	00	82	✓	✓	✓
30133	67	Reserved	00	84			
30135	68	Reserved	00	86			
30137	69	RPM	00	88	✓	✓	✓
30139	70	generator status(1-present)	00	8A	✓	✓	✓
30141	71	Reserved	00	8C			
30143	72	Reserved	00	8E			
30145	73	Wh depending on update rate(UTL)	00	90	✓	✓	✓
30147	74	Wh depending on update rate(GEN)	00	92	✓	✓	✓
30149	75	VArh depending on update rate(UTL)	00	94	✓	✓	✓
30151	76	VArh depending on update rate(GEN)	00	96	✓	✓	✓
30153	77	VAh depending on update rate(UTL)	00	98	✓	✓	✓
30155	78	VAh depending on update rate(GEN)	00	9A	✓	✓	✓
30157	79	-	-	-			
30159	80	Reserved	00	9E			
30161	81	Reserved	00	A0			
30163	82	season number	00	A2	✓	✓	✓
30165	83	Day type	00	A4	✓	✓	✓
30167	84	zone number	00	A6	✓	✓	✓

TABLE 1 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30169	85	Profile 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	current zone active energy(UTL)	00	B4	✓	✓	✓
30183	92	current zone active cost(UTL)	00	B6	✓	✓	✓
30185	93	Reserved	00	B8			
30187	94	Reserved	00	BA			
30189	95	current zone reactive energy(UTL)	00	BC	✓	✓	✓
30191	96	current zone reactive cost(UTL)	00	BE	✓	✓	✓
30193	97	Reserved	00	C0			
30195	98	Reserved	00	C2			
30197	99	current zone apparent energy(UTL)	00	C4	✓	✓	✓
30199	100	current zone apparent cost(UTL)	00	C6	✓	✓	✓
30201	101	VL 1-2(Calculated)	00	C8	✓	✗	✗
30203	102	VL 2-3(Calculated)	00	CA	✓	✗	✗
30205	103	VL 3-1(Calculated)	00	CC	✓	✗	✗
30207	104	V1 THD(%)	00	CE	✓	✓	✓
30209	105	V2 THD(%)	00	D0	✓	✓	✗
30211	106	V3 THD(%)	00	D2	✓	✓	✗
30213	107	I1 THD(%)	00	D4	✓	✓	✓
30215	108	I2 THD(%)	00	D6	✓	✓	✗
30217	109	I3 THD(%)	00	D8	✓	✓	✗
30219	110	System Voltage THD(%)	00	DA	✓	✓	✓
30221	111	System Current THD(%)	00	DC	✓	✓	✓
30223	112	Reserved	00	DE			
30225	113	I Neutral	00	E0	✓	✗	✗
30227	114	Run Hour (UTL)	00	E2	✓	✓	✓

TABLE 1 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30229	115	On Hour(UTL)	00	E4	✓	✓	✓
30231	116	No. of interruption(UTL)	00	E6	✓	✓	✓
30233	117	VRMS fundamental L1	00	E8	✓	✓	✓
30235	118	IRMS fundamental L1	00	EA	✓	✓	✓
30237	119	Watt fundamental L1	00	EC	✓	✗	✓
30239	120	VAr fundamental L1	00	EE	✓	✗	✓
30241	121	VA fundamental L1	00	F0	✓	✗	✓
30243	122	PF fundamental L1	00	F2	✓	✗	✓
30245	123	VTHD L1(%)	00	F4	✓	✓	✓
30247	124	ITHD L1(%)	00	F6	✓	✓	✓
30249	125	VRMS harmonics A L1	00	F8	✓	✓	✓
30251	126	IRMS harmonics A L1	00	FA	✓	✓	✓
30253	127	watt harmonics A L1	00	FC	✓	✗	✓
30255	128	VAr harmonics A L1	00	FE	✓	✗	✓
30257	129	VA harmonics A L1	01	00	✓	✗	✓
30259	130	PF harmonics A L1	01	02	✓	✗	✓
30261	131	Voltage HD harmonic A L1	01	04	✓	✓	✓
30263	132	Current HD harmonic A L1	01	06	✓	✓	✓
30265	133	VRMS harmonics B L1	01	08	✓	✓	✓
30267	134	IRMS harmonic B L1	01	0A	✓	✓	✓
30269	135	Watt harmonics B L1	01	0C	✓	✗	✓
30271	136	VAr harmonics B L1	01	0E	✓	✗	✓
30273	137	VA harmonics B L1	01	10	✓	✗	✓
30275	138	PF harmonics B L1	01	12	✓	✗	✓
30277	139	Voltage HD harmonics B L1	01	14	✓	✓	✓
30279	140	Current HD harmonics B L1	01	16	✓	✓	✓
30281	141	VRMS harmonics C L1	01	18	✓	✓	✓
30283	142	IRMS harmonics C L1	01	1A	✓	✓	✓
30285	143	Watt harmonics C L1	01	1C	✓	✗	✓

TABLE 1 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30287	144	VAr harmonics C L1	01	1E	✓	✗	✓
30289	145	VA harmonics C L1	01	20	✓	✗	✓
30291	146	PF harmonics C L1	01	22	✓	✗	✓
30293	147	Voltage HD harmonics C L1	01	24	✓	✓	✓
30295	148	Current HD harmonics 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	✓	✗	✓
30303	152	VAr harmonic D L1	01	2E	✓	✗	✓
30305	153	VA harmonic D L1	01	30	✓	✗	✓
30307	154	PF harmonics D L1	01	32	✓	✗	✓
30309	155	Voltage HD harmonic D L1	01	34	✓	✓	✓
30311	156	Current HD harmonic D L1	01	36	✓	✓	✓
30313	157	VRMS harmonics E L1	01	38	✓	✓	✓
30315	158	IRMS harmonics E L1	01	3A	✓	✓	✓
30317	159	watt harmonics E L1	01	3C	✓	✗	✓
30319	160	VAr harmonics E L1	01	3E	✓	✗	✓
30321	161	VA harmonics E L1	01	40	✓	✗	✓
30323	162	PF harmonics E L1	01	42	✓	✗	✓
30325	163	Voltage HD harmonics E L1	01	44	✓	✓	✓
30327	164	Current HD harmonics E L1	01	46	✓	✓	✓
30329	165	VRMS harmonics F L1	01	48	✓	✓	✓
30331	166	IRMS harmonics F L1	01	4A	✓	✓	✓
30333	167	Watt harmonics F L1	01	4C	✓	✗	✓
30335	168	VAr harmonics F L1	01	4E	✓	✗	✓
30337	169	VA harmonics F L1	01	50	✓	✗	✓
30339	170	PF harmonics F L1	01	52	✓	✗	✓
30341	171	Voltage HD harmonics F L1	01	54	✓	✓	✓
30343	172	Current HD harmonics F L1	01	56	✓	✓	✓
30345	173	VRMS fundamental L2	01	58	✓	✓	✗

TABLE 1 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30347	174	IRMS fundamental L2	01	5A	✓	✓	✗
30349	175	Watt fundamental L2	01	5C	✓	✗	✗
30351	176	VAr fundamental L2	01	5E	✓	✗	✗
30353	177	VA fundamental L2	01	60	✓	✗	✗
30355	178	PF fundamental L2	01	62	✓	✗	✗
30357	179	VTHD L2(%)	01	64	✓	✓	✗
30359	180	ITHD L2(%)	01	66	✓	✓	✗
30361	181	VRMS harmonic A L2	01	68	✓	✓	✗
30363	182	IRMS harmonic A L2	01	6A	✓	✓	✗
30365	183	Watt harmonic A L2	01	6C	✓	✗	✗
30367	184	VAr harmonic A L2	01	6E	✓	✗	✗
30369	185	VA harmonic A L2	01	70	✓	✗	✗
30371	186	PF harmonic A L2	01	72	✓	✗	✗
30373	187	Voltage HD harmonic A L2	01	74	✓	✓	✗
30375	188	Current HD harmonic A L2	01	76	✓	✓	✗
30377	189	VRMS harmonic B L2	01	78	✓	✓	✗
30379	190	IRMS harmonic B L2	01	7A	✓	✓	✗
30381	191	Watt harmonic B L2	01	7C	✓	✗	✗
30383	192	VAr harmonic B L2	01	7E	✓	✗	✗
30385	193	VA harmonic B L2	01	80	✓	✗	✗
30387	194	PF harmonic B L2	01	82	✓	✗	✗
30389	195	Voltage HD harmonic B L2	01	84	✓	✓	✗
30391	196	Current HD harmonic B L2	01	86	✓	✓	✗
30393	197	VRMS harmonic C L2	01	88	✓	✓	✗
30395	198	IRMS harmonic C L2	01	8A	✓	✓	✗
30397	199	Watt harmonic C L2	01	8C	✓	✗	✗
30399	200	VAr harmonic C L2	01	8E	✓	✗	✗
30401	201	VA harmonic C L2	01	90	✓	✗	✗
30403	202	PF harmonic C L2	01	92	✓	✗	✗
30405	203	Voltage HD harmonic C L2	01	94	✓	✓	✗

TABLE 1 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30407	204	Current HD harmonic C L2	01	96	✓	✓	✗
30409	205	VRMS harmonic D L2	01	98	✓	✓	✗
30411	206	IRMS harmonic D L2	01	9A	✓	✓	✗
30413	207	Watt harmonic D L2	01	9C	✓	✗	✗
30415	208	VAr harmonic D L2	01	9E	✓	✗	✗
30417	209	VA harmonic D L2	01	A0	✓	✗	✗
30419	210	PF harmonic D L2	01	A2	✓	✗	✗
30421	211	Voltage HD harmonic D L2	01	A4	✓	✓	✗
30423	212	Current HD harmonic D L2	01	A6	✓	✓	✗
30425	213	VRMS harmonic E L2	01	A8	✓	✓	✗
30427	214	IRMS harmonic E L2	01	AA	✓	✓	✗
30429	215	Watt harmonic E L2	01	AC	✓	✗	✗
30431	216	VAr harmonic E L2	01	AE	✓	✗	✗
30433	217	VA harmonic E L2	01	B0	✓	✗	✗
30435	218	PF harmonic E L2	01	B2	✓	✗	✗
30437	219	Voltage HD harmonic E L2	01	B4	✓	✓	✗
30439	220	Current HD harmonic E L2	01	B6	✓	✓	✗
30441	221	VRMS harmonic F L2	01	B8	✓	✓	✗
30443	222	IRMS harmonic F L2	01	BA	✓	✓	✗
30445	223	Watt harmonic F L2	01	BC	✓	✗	✗
30447	224	VAr harmonic F L2	01	BE	✓	✗	✗
30449	225	VA harmonic F L2	01	C0	✓	✗	✗
30451	226	PF harmonic F L2	01	C2	✓	✗	✗
30453	227	Voltage HD harmonic F L2	01	C4	✓	✓	✗
30455	228	Current HD harmonic F L2	01	C6	✓	✓	✗
30457	229	VRMS fundamental L3	01	C8	✓	✓	✗
30459	230	IRMS fundamental L3	01	CA	✓	✓	✗
30461	231	Watt fundamental L3	01	CC	✓	✗	✗
30463	232	VAr fundamental L3	01	CE	✓	✗	✗

TABLE 1 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30465	233	VA fundamental L3	01	D0	✓	✗	✗
30467	234	PF fundamental L3	01	D2	✓	✗	✗
30469	235	VTHD L3(%)	01	D4	✓	✓	✗
30471	236	ITHD L3(%)	01	D6	✓	✓	✗
30473	237	VRMS harmonic A L3	01	D8	✓	✓	✗
30475	238	IRMS harmonic A L3	01	DA	✓	✓	✗
30477	239	Watt harmonic A L3	01	DC	✓	✗	✗
30479	240	VAr harmonic A L3	01	DE	✓	✗	✗
30481	241	VA harmonic A L3	01	E0	✓	✗	✗
30483	242	PF harmonic A L3	01	E2	✓	✗	✗
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	✓	✗	✗
30495	248	VAr harmonic B L3	01	EE	✓	✗	✗
30497	249	VA harmonic B L3	01	F0	✓	✗	✗
30499	250	PF harmonic B L3	01	F2	✓	✗	✗
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	✓	✗	✗
30511	256	VAR harmonic C L3	01	FE	✓	✗	✗
30513	257	VA harmonic C L3	02	0	✓	✗	✗
30515	258	PF harmonic C L3	02	2	✓	✗	✗
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	✓	✓	✗

TABLE 1 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30525	263	Watt harmonic D L3	02	0C	✓	×	×
30527	264	VAr harmonic D L3	02	0E	✓	×	×
30529	265	VA harmonic D L3	02	10	✓	×	×
30531	266	PF harmonic D L3	02	12	✓	×	×
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	✓	×	×
30543	272	VAr harmonic E L3	02	1E	✓	×	×
30545	273	VA harmonic E L3	02	20	✓	×	×
30547	274	PF harmonic E L3	02	22	✓	×	×
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	✓	×	×
30559	280	VAr harmonic F L3	02	2E	✓	×	×
30561	281	VA harmonic F L3	02	30	✓	×	×
30563	282	PF harmonic F L3	02	32	✓	×	×
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

TABLE 1 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30573	287	maximum active demand date (UTL)	02	3C	✓	✓	✓
30575	288	maximum active demand time (UTL)	02	3E	✓	✓	✓
30577	289	maximum active demand date (GEN)	02	40	✓	✓	✓
30579	290	maximum active demand time (GEN)	02	42	✓	✓	✓
30581	291	maximum reactive demand date (UTL)	02	44	✓	✓	✓
30583	292	maximum reactive demand time(UTL)	02	46	✓	✓	✓
30585	293	maximum reactive demand date (GEN)	02	48	✓	✓	✓
30587	294	maximum reactive demand time (GEN)	02	4A	✓	✓	✓
30589	295	maximum apparent demand date (UTL)	02	4C	✓	✓	✓
30591	296	maximum apparent demand time (UTL)	02	4E	✓	✓	✓
30593	297	maximum apparent demand date (GEN)	02	50	✓	✓	✓
30595	298	maximum apparent demand time(GEN)	02	52	✓	✓	✓
30597	299	maximum current demand date (UTL)	02	54	✓	✓	✓
30599	300	maximum current demand time(UTL)	02	56	✓	✓	✓
30601	301	maximum current demand date (GEN)	02	58	✓	✓	✓
30603	302	maximum current demand time (GEN)	02	5A	✓	✓	✓
30605	303	maximum active demand old (UTL)	02	5C	✓	✓	✓
30607	304	maximum active demand old (GEN)	02	5E	✓	✓	✓
30609	305	maximum reactive demand old (UTL)	02	60	✓	✓	✓
30611	306	maximum reactive demand old (GEN)	02	62	✓	✓	✓
30613	307	maximum apparent demand old (UTL)	02	64	✓	✓	✓
30615	308	maximum apparent demand old (GEN)	02	66	✓	✓	✓
30617	309	maximum current demand old (UTL)	02	68	✓	✓	✓
30619	310	maximum current demand old (GEN)	02	6A	✓	✓	✓

TABLE 1 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30621	311	Wh update rate Overflow Count (UTL)	02	6C	✓	✓	✓
30623	312	Wh update rate(UTL)	02	6E	✓	✓	✓
30625	313	Wh update rate Overflow Count(GEN)	02	70	✓	✓	✓
30627	314	Wh update rate(GEN)	02	72	✓	✓	✓
30629	315	VArh update rate Overflow Count(UTL)	02	74	✓	✓	✓
30631	316	VArh update rate(UTL)	02	76	✓	✓	✓
30633	317	VArh update rate Overflow Count(GEN)	02	78	✓	✓	✓
30635	318	VArh update rate(GEN)	02	7A	✓	✓	✓
30637	319	VAh update rate Overflow Count(UTL)	02	7C	✓	✓	✓
30639	320	VAh update rate(UTL)	02	7E	✓	✓	✓
30641	321	VAh update rate Overflow Count(GEN)	02	80	✓	✓	✓
30643	322	VAh update rate(GEN)	02	82	✓	✓	✓
30645	323	Run hour (GEN)	02	84	✓	✓	✓
30647	324	On hour (GEN)	02	86	✓	✓	✓
30649	325	No. of interruption (GEN)	02	88	✓	✓	✓
30651	326	Total run hour	02	8A	✓	✓	✓
30653	327	Total on hour	02	8C	✓	✓	✓
30655	328	kVAr Demand(UTL/GEN)	02	8E	✓	✓	✓
30657	329	kVAr max Demand(UTL)	02	90	✓	✓	✓
30659	330	Reserved	02	92			
30661	331	kVAr max Demand(GEN)	02	94	✓	✓	✓
30663	332	Old Wh Overflow Count (UTL)	02	96	✓	✓	✓
30665	333	Old Wh (UTL)	02	98	✓	✓	✓
30667	334	Old Wh Overflow Count (GEN)	02	9A	✓	✓	✓
30669	335	Old Wh (GEN)	02	9C	✓	✓	✓
30671	336	Old VArh Overflow Count(UTL)	02	9E	✓	✓	✓

TABLE 1 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30673	337	Old VArh(UTL)	02	A0	✓	✓	✓
30675	338	Old VArh Overflow Count(GEN)	02	A2	✓	✓	✓
30677	339	Old VArh(GEN)	02	A4	✓	✓	✓
30679	340	Old VAh Overflow Count(UTL)	02	A6	✓	✓	✓
30681	341	Old VAh(UTL)	02	A8	✓	✓	✓
30683	342	Old VAh Overflow Count(GEN)	02	AA	✓	✓	✓
30685	343	Old VAh(GEN)	02	AC	✓	✓	✓
30687	344	Old Run Hour(UTL)	02	AE	✓	✓	✓
30689	345	Old Run hour (GEN)	02	B0	✓	✓	✓
30691	346	Old On hour (UTL)	02	B2	✓	✓	✓
30693	347	Old On Hour (GEN)	02	B4	✓	✓	✓
30695	348	Old Total Run Hour	02	B6	✓	✓	✓
30697	349	Old Total on hour	02	B8	✓	✓	✓
30699	350	Old Number Of interrupts(UTL)	02	BA	✓	✓	✓
30701	351	Old Number Of interrupts(GEN)	02	BC	✓	✓	✓
30703	352	Relay 1 status	02	BE	✓	✓	✓
30705	353	Relay 2 status	02	C0	✓	✓	✓
30707	354	Reserved	02	C2			
30903	452	V1(GEN)	03	86	✓	✓	✓
30905	453	V2(GEN)	03	88	✓	✓	✗
30907	454	V3(GEN)	03	8A	✓	✓	✗
30909	455	I1(GEN)	03	8C	✓	✓	✓
30911	456	I2(GEN)	03	8E	✓	✓	✗
30913	457	I3(GEN)	03	90	✓	✓	✗
30915	458	W1(GEN)	03	92	✓	✓	✓
30917	459	W2(GEN)	03	94	✓	✓	✗
30919	460	W3(GEN)	03	96	✓	✓	✗
30921	461	VA1(GEN)	03	98	✓	✓	✓

TABLE 1 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30923	462	VA2(GEN)	03	9A	✓	✓	✗
30925	463	VA3(GEN)	03	9C	✓	✓	✗
30927	464	VAr1(GEN)	03	9E	✓	✓	✓
30929	465	VAr2(GEN)	03	A0	✓	✓	✗
30931	466	VAr3(GEN)	03	A1	✓	✓	✗
30933	467	PF1(GEN)	03	A4	✓	✓	✓
30935	468	PF2(GEN)	03	A6	✓	✓	✗
30937	469	PF3(GEN)	03	A8	✓	✓	✗
30939	470	Angle1(GEN)	03	AA	✓	✓	✓
30941	471	Angle2(GEN)	03	AC	✓	✓	✗
30943	472	Angle3(GEN)	03	AE	✓	✓	✗
30945	473	Volt avg(GEN)	03	B0	✓	✓	✓
30947	474	Voltage sum(GEN)	03	B2	✓	✓	✓
30949	475	Current avg.(GEN)	03	B4	✓	✓	✓
30951	476	Current sum(GEN)	03	B6	✓	✓	✓
30953	477	Watt avg(GEN)	03	B8	✓	✓	✓
30955	478	Watt sum(GEN)	03	BA	✓	✓	✓
30957	479	VA avg.(GEN)	03	BC	✓	✓	✓
30959	480	VA sum(GEN)	03	BE	✓	✓	✓
30961	481	VAr avg.(GEN)	03	C0	✓	✓	✓
30963	482	VAr sum(GEN)	03	C2	✓	✓	✓
30965	483	PF avg (GEN)	03	C4	✓	✓	✓
30967	484	PF sum(GEN)	03	C6	✓	✗	✓
30969	485	Phase angle avg.(GEN)	03	C8	✓	✓	✓
30971	486	Phase angle sum(GEN)	03	CA	✓	✗	✓
30973	487	Frequency(GEN)	03	CC	✓	✓	✓

3.2 Accessing Generator log data through MODBUS

The Generator log time stamping data can be accessed from 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 another location.

For example: Suppose after reading register 30739,data read is 1.0,also after reading register 30743,data read is 270716.0,similarly after reading register 30745,data read is 1051.0,reading 30747,data read is 1055.0,And reading register 30749,data read is 4.000.

Here 1 denotes generator current log number,in 270716 ,first two digit denotes date i.e.27,next two digits stand for month i.e. 7 and last two digits gives year when added to 2000.

Also in case of 1051,1055 & 4.000 first two digits stand for hour i.e.10hours and next two digits stand for minute i.e.51minutes. similarly in case of 1055,10 denotes hour and 55 denotes minutes & in case of 4.000 denotes 04 minutes.

So, For address 30739 1 is the current generator log number.

For address 30743 27/07/2016 is date for LOG1.

For address 30745 10:51 is start time for LOG1.

For address 30747 10:55 is stop time for LOG1.

For address 30749 00:04 is duration for LOG 1.

Note: If 9999 is displayed in any start time or stop time address then it denotes that generator is already running or generator is not stopped respectively. In case of 00 hour, value of minutes are directly displayed on the Modbus.Hours will not be displayed.

TABLE 2 : 3 X Register (generator event logging data)

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30739	370	Generator current log number	02	E2	✓	✓	✓
30743	372	Generator log1 date	02	E6	✓	✓	✓
30745	373	Generator log1 start time	02	E8	✓	✓	✓
30747	374	Generator log1 stop time	02	EA	✓	✓	✓
30749	375	Generator log1 duration	02	EC	✓	✓	✓
30751	376	Generator log 2 date	02	EE	✓	✓	✓

TABLE 2 : Continued..

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30753	377	Generator log 2 start time	02	F0	✓	✓	✓
30755	378	Generator log 2 stop time	02	F2	✓	✓	✓
30757	379	Generator log 2 duration	02	F4	✓	✓	✓
30759	380	Generator log 3 date	02	F6	✓	✓	✓
30761	381	Generator log 3 start time	02	F8	✓	✓	✓
30763	382	Generator log 3 stop time	02	FA	✓	✓	✓
30765	383	Generator log 3 duration	02	FC	✓	✓	✓
30767	384	Generator log 4 date	02	FE	✓	✓	✓
30769	385	Generator log 4 start time	03	0	✓	✓	✓
30771	386	Generator log 4 stop time	03	2	✓	✓	✓
30773	387	Generator log 4 duration	03	4	✓	✓	✓
30775	388	Generator log 5 date	03	6	✓	✓	✓
30777	389	Generator log 5 start time	03	8	✓	✓	✓
30779	390	Generator log 5 stop time	03	A	✓	✓	✓
30781	391	Generator log 5 duration	03	C	✓	✓	✓
30783	392	Generator log 6 date	03	E	✓	✓	✓
30785	393	Generator log 6 start time	03	10	✓	✓	✓
30787	394	Generator log 6 stop time	03	12	✓	✓	✓
30789	395	Generator log 6 duration	03	18	✓	✓	✓
30791	396	Generator log 7 date	03	1A	✓	✓	✓
30793	397	Generator log 7 start time	03	1C	✓	✓	✓
30795	398	Generator log 7 stop time	03	1E	✓	✓	✓
30797	399	Generator log 7 duration	03	20	✓	✓	✓
30799	400	Generator log 8 date	03	22	✓	✓	✓
30801	401	Generator log 8 start time	03	24	✓	✓	✓
30803	402	Generator log 8 stop time	03	24	✓	✓	✓
30805	403	Generator log 8 duration	03	24	✓	✓	✓

TABLE 2 : Continued..

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30807	404	Generator log 9 date	03	26	✓	✓	✓
30809	405	Generator log 9 start time	03	28	✓	✓	✓
30811	406	Generator log 9 stop time	03	2A	✓	✓	✓
30813	407	Generator log 9 duration	03	2C	✓	✓	✓
30815	408	Generator log 10 date	03	2E	✓	✓	✓
30817	409	Generator log 10 start time	03	30	✓	✓	✓
30819	410	Generator log 10 stop time	03	32	✓	✓	✓
30821	411	Generator log 10 duration	03	34	✓	✓	✓
30823	412	Generator log 11 date	03	36	✓	✓	✓
30825	413	Generator log 11start time	03	38	✓	✓	✓
30827	414	Generator log 11 stop time	03	3A	✓	✓	✓
30829	415	Generator log 11 duration	03	3C	✓	✓	✓
30831	416	Generator log 12 date	03	3E	✓	✓	✓
30833	417	Generator log 12 start time	03	40	✓	✓	✓
30835	418	Generator log 12 stop time	03	42	✓	✓	✓
30837	419	Generator log 12 duration	03	44	✓	✓	✓
30839	420	Generator log 13 date	03	46	✓	✓	✓
30841	421	Generator log 13 start time	03	48	✓	✓	✓
30843	422	Generator log 13 stop time	03	4A	✓	✓	✓
30845	423	Generator log 13 duration	03	4C	✓	✓	✓
30847	424	Generator log 14 date	03	4E	✓	✓	✓
30849	425	Generator log 14 start time	03	50	✓	✓	✓
30851	426	Generator log 14 stop time	03	52	✓	✓	✓
30853	427	Generator log 14 duration	03	54	✓	✓	✓
30855	428	Generator log 15 date	03	56	✓	✓	✓
30857	429	Generator log 15 start time	03	58	✓	✓	✓
30859	430	Generator log 15 stop time	03	5A	✓	✓	✓

TABLE 2 : Continued..

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P 4W	3P 3W	1P 2W
			High Byte	Low Byte			
30861	431	Generator log 15 duration	03	5C	✓	✓	✓
30863	432	Generator log 16 date	03	5E	✓	✓	✓
30865	433	Generator log 16 start time	03	60	✓	✓	✓
30867	434	Generator log 16 stop time	03	62	✓	✓	✓
30869	435	Generator log 16 duration	03	64	✓	✓	✓
30871	436	Generator log 17 date	03	66	✓	✓	✓
30873	437	Generator log 17 start time	03	68	✓	✓	✓
30875	438	Generator log 17 stop time	03	6A	✓	✓	✓
30877	439	Generator log 17 duration	03	6C	✓	✓	✓
30879	440	Generator log 18 date	03	6E	✓	✓	✓
30881	441	Generator log 18 start time	03	70	✓	✓	✓
30883	442	Generator log 18 stop time	03	72	✓	✓	✓
30885	443	Generator log 18 duration	03	74	✓	✓	✓
30887	444	Generator log 19 date	03	76	✓	✓	✓
30889	445	Generator log 19 start time	03	78	✓	✓	✓
30891	446	Generator log 19 stop time	03	7A	✓	✓	✓
30893	447	Generator log 19 duration	03	7C	✓	✓	✓
30895	448	Generator log 20 date	03	80	✓	✓	✓
30897	449	Generator log 20 start time	03	82	✓	✓	✓
30899	450	Generator log 20 stop time	03	84	✓	✓	✓
30901	451	Generator log 20 duration	03	86	✓	✓	✓

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 4X register address 40083(parameter no.41 in 4X register).For different values in 40083 different TOD data can be read. setting for 40083 address are mentioned in table 3.

TABLE 3 :TOD Data configuration

Value in 40083	Type Of data in 3X register	Reference Table
0	Normal measurement data & Generator event logging data	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 utility energy and cost per date up to last 31 days	Table 5
4	TOD zonewise reactive utility energy and cost per date up to last 31 days	
6	TOD zonewise apparent energy utility and cost per date up to last 31 days	
8	TOD summary data(Demand)	Table 6
9	TOD zonewise active utility demand per date up to last 31 days	Table 7
11	TOD Zonewise reactive utility demand per date up to last 31 days	
13	TOD Zonewise apparent utility demand per date up to last 31 days	

If value at 40083 is configured according to table 3, corresponding to data in 3X 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 3X register.

For TOD data the units for energy and cost multiplier are decided on the setting of PT primary value and Ct primary value.
following table shows the units of energy and cost multiplier for the different range 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 Energy Unit
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 900KW,So per month energy ,per day energy & per zone energy will be in KWh.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 as1157,then 1157 *692800*1.732051=13888359273. This is greater than 90000 kW.So per day and per zone energy will be in KWh & month energy will be in MWh.also cost multiplier for month energy is 1000 i.e. if get value of cost as 5,cost should be 5000.

TABLE 4 : TOD Summary Data

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30003	1	Current date timezone 1kWh Utility energy	00	02
30005	2	Current date timezone 2 kWh Utility energy	00	04
30007	3	Current date timezone 3 kWh Utility energy	00	06
30009	4	Current date timezone 4 kWh Utility energy	00	08
30011	5	Current date timezone 5 kWh Utility energy	00	0A
30013	6	Current date timezone 6 kWh Utility energy	00	0C
30015	7	Reserved	00	0E
30017	8	Reserved	00	10
30019	9	Reserved	00	12
30021	10	Reserved	00	14
30023	11	Reserved	00	18
30025	12	Reserved	00	1A
30027	13	Current date timezone 1kVArh Utility energy	00	1C
30029	14	Current date timezone 2 kVArh Utility energy	00	1E
30031	15	Current date timezone 3 kVArh Utility energy	00	20
30033	16	Current date timezone 4 kVArh Utility energy	00	22
30035	17	Current date timezone 5 kVArh Utility energy	00	24
30037	18	Current date timezone 6 kVArh Utility energy	00	26
30039	19	Reserved	00	28
30041	20	Reserved	00	2A
30043	21	Reserved	00	2C
30045	22	Reserved	00	2E
30047	23	Reserved	00	30
30049	24	Reserved	00	32
30051	25	Current date timezone 1 kVAh Utility energy	00	34

TABLE 4: Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30053	26	Current date timezone 2 kVAh Utility energy	00	34
30055	27	Current date timezone 3 kVAh Utility energy	00	36
30057	28	Current date timezone 4 kVAh Utility energy	00	38
30059	29	Current date timezone 5 kVAh Utility energy	00	3A
30061	30	Current date timezone 6 kVAh Utility energy	00	3C
30063	31	Reserved	00	3E
30065	32	Reserved	00	40
30067	33	Reserved	00	42
30069	34	Reserved	00	44
30071	35	Reserved	00	46
30073	36	Reserved	00	48
30075	37	Date 1 kWh Utility energy	00	4A
30077	38	Date 2 kWh Utility energy	00	4C
30079	39	Date 3 kWh Utility energy	00	4E
.....	..	.....	..	..
30133	66	Date 30 kWh Utility energy	00	84
30135	67	Date 31 kWh Utility energy	00	86
30137	68	Date 1 kWh Gen energy	00	88
30139	69	Date 2 kWh Gen energy	00	8A
30141	70	Date 3 kWh Gen energy	00	8C
.....	..	.....	..	..
30195	97	Date 30 kWh Gen energy	00	C2
30197	98	Date 31 kWh Gen energy	00	C4
30199	99	Date 1 kVArh Utility energy	00	C6
30201	100	Date 2 kVArh Utility energy	00	C8

TABLE 4 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30203	101	Date 3 kVArh Utility energy	00	CA
.....	..	.....	..	..
30257	128	Date 30 kVArh Utility energy	01	00
30259	129	Date 31 kVArh Utility energy	01	02
30261	130	Date 1 kVArh Gen energy	01	04
30263	131	Date 2 kVArh Gen energy	01	06
.....	..	.....	..	..
30319	159	Date 30 kVArh Gen energy	01	3E
30321	160	Date 31 kVArh Gen energy	01	40
30323	161	Date 1 kVAh Utility energy	01	41
30325	162	Date 2 kVAh Utility energy	01	43
30327	163	Date 3 kVAh Utility energy	01	44
.....	..	.....	..	..
30381	190	Date 30 kVAh Utility energy	01	7C
30383	191	Date 31 kVAh Utility energy	01	7E
30385	192	Date 1 kVAh Gen energy	01	80
30387	193	Date 2 kVAh Gen energy	01	82
30389	194	Date 3 kVAh Gen energy	01	84
.....	..	.....	..	..
30443	221	Date 30 kVAh Gen energy	01	BA
30445	222	Date 31 kVAh Gen energy	01	BC
30447	223	month 1kWh Utility energy	01	BE
30449	224	month 2 kWh Utility energy	01	C0
.....	..	.....	..	..
30467	233	month 11 kWh Utility energy	01	D2

TABLE 4 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30469	233	month 12 kWh Utility energy	01	D4
30471	235	month 1kWh Gen energy	01	D6
30473	237	month 2 kWh Gen energy	01	D8
.....	..	.....	..	..
30491	245	month 11kWh Gen energy	01	EA
30493	246	month 12 kWh Gen energy	01	EC
30495	247	month 1 kVArh Utility energy	01	EE
30497	248	month 2 kVArh Utility energy	01	F0
.....	..	.....	..	..
30515	257	month 11 kVArh Utility energy	02	02
30517	258	month 12 kVArh Utility energy	02	04
30519	259	month 1 kVArh Gen energy	02	06
30521	260	month 2 kVArh Gen energy	02	08
.....	..	.....	..	..
30539	269	month 11 kVArh Gen energy	02	1A
30541	270	month 12 kVArh Gen energy	02	1C
30543	271	month 1 kVAh Utility energy	02	1E
30545	272	month 2 kVAh Utility energy	02	20
.....	..	.....	..	..
30563	281	month 11 kVAh Utility energy	02	32
30565	282	month 12 kVAh Utility energy	02	34
30567	283	month 1 kVAh Gen energy	02	36
30569	284	month 2 kVAh Gen energy	02	38
.....	..	.....	..	..
30589	294	month 12 kVAh Gen energy	02	4C

TABLE 4 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30591	295	Date 1 kWh Utility cost	02	4E
30593	296	Date 2 kWh Utility cost	02	50
30595	297	Date 3 kWh Utility cost	02	52
.....	..	.....	..	..
30649	324	Date 30 kWh Utility cost	02	88
30651	325	Date 31 kWh Utility cost	02	8A
30653	247	Date 1 kWh Gen cost	02	8C
30655	248	Date 2 kWh Gen cost	02	8E
.....	..	.....	..	..
30699	349	Date 30 kWh Gen cost	02	BA
30701	350	Date 31 kWh Gen cost	02	BC
30703	351	Date 1 kVArh Utility cost	02	BE
30705	352	Date 2 kVArh Utility cost	02	C0
.....	..	.....	..	..
30773	386	Date 30 kVArh Utility cost	03	04
30775	387	Date 31 kVArh Utility cost	03	06
30777	388	Date 1 kVArh Gen cost	03	08
30779	389	Date 2 kVArh Gen cost	03	0A
.....	..	.....	..	..
30835	417	Date 30 kVArh Gen cost	03	42
30837	418	Date 31 kVArh Gen cost	03	44
30839	419	Date 1 kVAh Utility cost	03	46
30841	420	Date 2 kVAh Utility cost	03	48
.....	..	.....	..	..
30899	449	Date 31 kVAh Utility cost	03	82

TABLE 4 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30901	450	Date 1 kVAh Gen cost	03	84
30903	451	Date 2 kVAh Gen cost	03	86
30905	452	Date 3 kVAh Gen cost	03	88
.....	..	.....	..	..
30959	479	Date 30 kVAh Gen cost	03	BE
30961	480	Date 31 kVAh Gen cost	03	C0
30963	481	month 1 kWh Utility cost	03	C2
30965	482	month 2 kWh Utility cost	03	C4
.....	..	.....	..	..
30983	491	month 11 kWh Utility cost	03	D6
30985	492	month 12 kWh Utility cost	03	D8
30987	493	month 1 kWh Gen cost	03	DA
30989	494	month 2 kWh Gen cost	03	DC
.....	..	.....	..	..
31007	503	month 11 kWh Gen cost	03	EE
31009	504	month 12 kWh Gen cost	03	F0
31011	505	month 1 kVArh Utility cost	03	F2
31013	506	month 2 kVArh Utility cost	03	F4
.....	..	.....	..	..
31031	515	month 11 kVArh Utility cost	04	06
31033	516	month 12 kVArh Utility cost	04	08
31035	517	month 1 kVArh Gen cost	04	0A
31037	518	month 2 kVArh Gen cost	04	0C
.....	..	.....	..	..
31057	528	month 12 kVArh Gen cost	04	20

TABLE 4 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
31059	529	month 1 kVAh Utility cost	04	22
31061	530	month 2 kVAh Utility cost	04	24
31063	531	month 3 kVAh Utility cost	04	26
.....	..	.....	..	..
31079	539	month 11 kVAh Utility cost	04	36
31081	540	month 12 kVAh Utility cost	04	38
31083	541	month 1 kVAh Gen cost	04	3A
31085	542	month 2 kVAh Gen cost	04	3C
.....	..	.....	..	..
31103	551	month 11 kVAh Gen cost	04	4E
31105	552	month 12 kVAh Gen cost	04	50
31107	553	Current date timezone 1kWh utility cost	04	52
31109	554	Current date timezone 2 kWh utility cost	04	54
31111	555	Current date timezone 3 kWh utility cost	04	56
31113	556	Current date timezone 4 kWh utility cost	04	58
31115	557	Current date timezone 5 kWh utility cost	04	5A
31117	558	Current date timezone 6 kWh utility cost	04	5C
31119	559	Reserved	04	5E
31121	560	Reserved	04	60
31123	561	Reserved	04	62
31125	562	Reserved	04	64
31127	563	Reserved	04	66
31129	564	Reserved	04	68
31131	565	Current date timezone 1 kVArh utility cost	04	6A
31133	566	Current date timezone 2 kVArh utility cost	04	6C

TABLE4: Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
31135	567	Current date timezone 3 kVArh utility cost	04	6E
31137	568	Current date timezone 4 kVArh utility cost	04	70
31139	569	Current date timezone 5 kVArh utility cost	04	72
31141	570	Current date timezone 6 kVArh utility cost	04	74
31143	571	Reserved	04	76
31145	572	Reserved	04	78
31147	573	Reserved	04	7A
31149	574	Reserved	04	7C
31151	575	Reserved	04	7E
31153	576	Reserved	04	80
31155	577	Current date timezone 1 kVAh utility cost	04	82
31157	578	Current date timezone 2 kVAh utility cost	04	84
31159	579	Current date timezone 3 kVAh utility cost	04	86
31161	580	Current date timezone 4 kVAh utility cost	04	88
31163	581	Current date timezone 5 kVAh utility cost	04	8A
31165	582	Current date timezone 6 kVAh utility cost	04	8C
31167	583	Reserved	04	8E
31169	584	Reserved	04	90
31171	585	Reserved	04	92
31173	586	Reserved	04	94
31175	587	Reserved	04	96
31177	588	Reserved	04	98

3.4 Accessing TOD Zonewise Data of last 31 days

For reading zone wise data proper value should be written at location 40083 as mentioned in Table 3.

The Zonewise TOD Energy and Cost are stored on the location of particular date. For example if today is 15 march 2016 then TOD energy & cost of today will be located at date 15 zone wise data (address 30337 to address 30359 of 3X register).Similarly data of 25 th February will be located on date 25 zonewise data (address 30577 to address 30599 of 3X register).following table shows respective 3X addresses to read

TABLE 5 : TOD Zonewise data (kWh,kVArh,kVA (UTL))

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

TABLE 5 : Continued..

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
...	...	....	...	...

TABLE 5 : Continued..

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

TABLE 5 : Continued..

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

TABLE 6 : DEMAND Summary Data

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30003	1	Current date timezone 1 kW Utility Demand	00	02
30005	2	Current date timezone2 kW Utility Demand	00	04
30007	3	Current date timezone3 kW Utility Demand	00	06
30009	4	Current date timezone 4 kW Utility Demand	00	08
30011	5	Current date timezone 5 kW UtilityDemand	00	0A
30013	6	Current date timezone 6 kW Utility Demand	00	0C
30015	7	Reserved	00	0E
30017	8	Reserved	00	10
30019	9	Reserved	00	12
30021	10	Reserved	00	14
30023	11	Reserved	00	18
30025	12	Reserved	00	1A
30027	13	Current date timezone 1kVAr Utility Demand	00	1C
30029	14	Current date timezone 2 kVAr Utility Demand	00	1E
30031	15	Current date timezone 3 kVAr Utility Demand	00	20
30033	16	Current date timezone 4 kVAr Utility Demand	00	22
30035	17	Current date timezone 5 kVAr Utility Demand	00	24
30037	18	Current date timezone 6 kVAr Utility Demand	00	26
30039	19	Reserved	00	28
30041	20	Reserved	00	2A
30043	21	Reserved	00	2C
30045	22	Reserved	00	2E
30047	23	Reserved	00	30
30049	24	Reserved	00	32
30051	25	Current date timezone 1 kVA Utility Demand	00	34

TABLE 6 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30053	26	Current date timezone 2 kVA Utility Demand	00	34
30055	27	Current date timezone 3 kVA Utility Demand	00	36
30057	28	Current date timezone 4 kVA Utility Demand	00	38
30059	29	Current date timezone 5 kVA Utility Demand	00	3A
30061	30	Current date timezone 6 kVA Utility Demand	00	3C
30063	31	Reserved	00	3E
30065	32	Reserved	00	40
30067	33	Reserved	00	42
30069	34	Reserved	00	44
30071	35	Reserved	00	46
30073	36	Reserved	00	48
30099	49	Date 1 kW Utility Demand	00	62
30101	50	Date 2 kW Utility Demand	00	64
30103	51	Date 3 kW Utility Demand	00	66
.....	..	.....	..	..
30157	78	Date 30 kW Utility Demand	00	9C
30159	79	Date 31 kW Utility Demand	00	9E
30161	80	Date 1 kW Gen Demand	00	A0
30163	81	Date 2 kW Gen Demand	00	A2
30165	82	Date 3 kW Gen Demand	00	A4
.....	..	.....	..	..
30219	109	Date 30 kW Gen Demand	00	DA
30221	110	Date 31 kW Gen Demand	00	DC
30223	111	Date 1 kVAr Utility Demand	00	DE
30225	112	Date 2 kVAr Utility Demand	00	E0

TABLE 6 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30227	113	Date 3 kVAr Utility Demand	00	E2
.....	..	.....	..	..
30281	140	Date 30 kVAr Utility Demand	01	18
30283	141	Date 31 kVAr Utility Demand	01	1A
30285	142	Date 1 kVAr Gen Demand	01	1C
30287	143	Date 2 kVAr Gen Demand	01	1E
.....	..	.....	..	..
30343	171	Date 30 kVAr Gen Demand	01	56
30345	172	Date 31 kVAr Gen Demand	01	58
30347	173	Date 1 kVA Utility Demand	01	5A
30349	174	Date 2 kVA Utility Demand	01	5C
30351	175	Date 3 kVA Utility Demand	01	5E
.....	..	.....	..	..
30405	202	Date 30 kVA Utility Demand	01	94
30407	203	Date 31 kVA Utility Demand	01	96
30409	204	Date 1 kVA Gen Demand	01	98
30411	205	Date 2 kVA Gen Demand	01	9A
30413	206	Date 3 kVA Gen Demand	01	9C
.....	..	.....	..	..
30467	233	Date 30 kVA Gen Demand	01	D2
30469	234	Date 31 kVA Gen Demand	01	D4
30595	297	month 1kW Utility Demand	02	52
30597	298	month 2 kW Utility Demand	02	54
.....	..	.....	..	..
30615	307	month 11 kW Utility Demand	02	66

TABLE 6 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30617	308	month 12 kW Utility Demand	02	68
30619	309	month 1kW Gen Demand	02	6A
30621	310	month 2 kW Gen Demand	02	6C
.....	..	.....	..	..
30639	319	month 11kW Gen Demand	02	7E
30641	320	month 12 kW Gen Demand	02	80
30643	321	month 1 kVAr Utility Demand	02	82
30645	322	month 2 kVAr Utility Demand	02	84
.....	..	.....	..	..
30663	331	month 11 kVAr Utility Demand	02	96
30665	332	month 12 kVAr Utility Demand	02	98
30667	333	month 1 kVAr Gen Demand	02	9A
30669	334	month 2 kVAr Gen Demand	02	9C
.....	..	.....	..	..
30687	335	month 11 kVAr Gen Demand	02	AE
30689	336	month 12 kVAr Gen Demand	02	B0
30691	337	month 1 kVA Utility Demand	02	B2
30693	338	month 2 kVA Utility Demand	02	B4
.....	..	.....	..	..
30711	355	month 11 kVA Utility Demand	02	C6
30713	356	month 12 kVA Utility Demand	02	C8
30715	357	month 1 kVA Gen Demand	02	CA
30717	358	month 2 kVA Gen Demand	02	CC
.....	..	.....	..	..
30737	368	month 12 kVA Gen Demand	02	E0

TABLE 7 : Demand Daily data

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30001	1	timezone1 date 1 Demand	00	00
30003	2	timezone2 date 1 Demand	00	02
30005	3	timezone3 date 1 Demand	00	04
30007	4	timezone4 date 1 Demand	00	06
30009	5	timezone5 date 1 Demand	00	08
30011	6	timezone6 date 1 Demand	00	0A
30013	7	timezone1 date 2 Demand	00	0C
30015	8	timezone 2 date 2 Demand	00	0E
30017	9	timezone3 date 2 Demand	00	10
30019	10	timezone4 date 2 Demand	00	12
30021	11	timezone5 date 2 Demand	00	14
30023	12	timezone6 date 2 Demand	00	16
30025	13	timezone1 date 3 Demand	00	18
30027	14	timezone2 date 3 Demand	00	1A
.....	..	.....	..	..
30033	17	timezone5 date 3 Demand	00	20
30035	18	timezone6 date 3 Demand	00	22
30037	19	timezone1 date 4 Demand	00	24
30039	20	timezone2 date 4 Demand	00	26
.....	..	.....	..	..
30045	23	timezone5 date 4 Demand	00	2C
30047	24	timezone6 date 4 Demand	00	2E
30049	25	timezone1 date 5 Demand	00	30
30051	26	timezone2 date 5 Demand	00	32
.....	..	.....	..	..

TABLE 7 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30057	29	timezone 5 date 5 Demand	00	38
30059	30	timezone 6 date 5 Demand	00	3A
30061	31	timezone1 date 6 Demand	00	3C
30063	32	timezone2 date 6 Demand	00	3E
.....	..	.....	..	..
30071	36	timezone6 date 6 Demand	00	46
30073	37	timezone1 date 7 Demand	00	48
30075	38	timezone 2 date 7 Demand	00	4A
.....	..	.....	..	..
30083	42	timezone6 date 7Demand	00	52
30085	43	timezone1 date 8 Demand	00	54
30087	44	timezone2 date 8 Demand	00	56
.....	..	.....	..	..
30095	48	timezone6 date 8 Demand	00	5E
30097	49	timezone1 date 9 Demand	00	60
30099	50	timezone2 date 9 Demand	00	62
.....	..	.....	..	..
30107	54	timezone6 date 9 Demand	00	6A
30109	55	timezone1 date 10 Demand	00	6C
.....	..	.....	..	..
30119	60	timezone6 date 10 Demand	00	76
30121	61	timezone1 date 11 Demand	00	78
.....	..	.....	..	..
30131	66	timezone6 date 11 Demand	00	82
30133	67	timezone1 date 12 Demand	00	84

TABLE 7 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
.....	..	.....	..	..
30143	72	timezone6 date 12 Demand	00	8E
30145	73	timezone1 date 13 Demand	00	90
.....	..	.....	..	..
30155	78	timezone6 date 13 Demand	00	9A
30157	79	timezone1 date 14 Demand	00	9C
.....	..	.....	..	..
30167	84	timezone6 date 14 Demand	00	A6
30169	85	timezone1 date 15 Demand	00	A8
.....	..	.....	..	..
30179	90	timezone6 date 15 Demand	00	B2
30181	91	timezone1 date 16 Demand	00	B4
.....	..	.....	..	..
30191	96	timezone6 date 16 Demand	00	BE
30193	97	timezone1 date 17 Demand	00	C0
.....	..	.....	..	..
30203	102	timezone6 date 17 Demand	00	CA
30205	103	timezone1 date 18 Demand	00	CC
.....	..	.....	..	..
30215	108	timezone6 date 18 Demand	00	D6
30217	109	timezone1 date 19 Demand	00	D8
.....	..	.....	..	..
30227	114	timezone6 date 19 Demand	00	E0
30229	115	timezone1 date 20 Demand	00	E2
.....	..	.....	..	..

TABLE 7 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30239	120	timezone6 date 20 Demand	00	EC
30241	121	timezone1 date 21 Demand	00	EE
30243	122	timezone2 date 21 Demand	00	F0
.....	..	.....	..	..
30251	126	timezone6 date 21 Demand	00	F8
30253	127	timezone1 date 22 Demand	00	FA
.....	..	.....	..	..
30263	132	timezone6 date 22 Demand	01	4
30265	133	timezone1 date 23 Demand	01	6
.....	..	.....	..	..
30275	138	timezone6 date 23 Demand	01	10
30277	139	timezone1 date 24 Demand	01	12
.....	..	.....	..	..
30287	144	timezone6 date 24 Demand	01	1C
30289	145	timezone1 date 25 Demand	01	1E
.....	..	.....	..	..
30299	150	timezone6 date 25 Demand	01	28
30301	151	timezone1 date 26 Demand	01	3A
.....	..	.....	..	..
30311	156	timezone6 date 26 Demand	01	36
30313	157	timezone1 date 27 Demand	01	38
.....	..	.....	..	..
30323	162	timezone6 date 27 Demand	01	42
30325	163	timezone1 date 28 Demand	01	44
.....	..	.....	..	..

TABLE 7 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30335	168	timezone6 date 28 Demand	01	4E
30337	169	timezone1 date 29 Demand	01	50
30339	170	timezone2 date 29 Demand	01	52
30341	171	timezone3 date 29 Demand	01	54
30343	172	timezone4 date 29 Demand	01	56
30345	173	timezone5 date 29 Demand	01	58
30347	174	timezone6 date 29 Demand	01	5A
30349	175	timezone1 date 30 Demand	01	5C
30351	176	timezone2 date 30 Demand	01	5E
30353	177	timezone3 date 30 Demand	01	60
30355	178	timezone4 date 30 Demand	01	62
30357	179	timezone5 date 30 Demand	01	64
30359	180	timezone6 date 30 Demand	01	66
30361	181	timezone1 date 31 Demand	01	68
30363	182	timezone2 date 31 Demand	01	6A
30365	183	timezone3 date 31 Demand	01	6C
30367	184	timezone4 date 31 Demand	01	6E
30369	185	timezone5 date 31 Demand	01	70
30371	186	timezone6 date 31 Demand	01	72

3.5 Accessing 4 X register for Reading & Writing Settings:

Each setting is held in the 4X registers. ModBus code 03 is used to read the current setting & code 16 is used to write/change the setting. Refer **TABLE 8** for 4X 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

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.)

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)

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: 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)

Example : Writing System type

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

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.)

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.)

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)

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)

TABLE 8 : 4 X register addresses

Address (Register)	Parameter No.	Parameter	Read / Write	Modbus Start Address Hex		Default Value
				High Byte	Low Byte	
40003	1	Demand Integration Time	R/Wp	00	02	15
40005	2	Energy Resolution	R/Wp	00	04	1
40007	3	System Voltage	R	00	06	288.675
40009	4	System Current	R	00	08	5
40011	5	System Type*	R/Wp	00	0A	3
40013	6	Pulse Duration	R/Wp	00	0C	100
40015	7	Reset Parameters	Wp	00	0E	0
40019	9	RS 485 Set-up Code	R/Wp	00	12	5
40021	10	RS 485 Address	R/Wp	00	14	1
40023	11	Pulse Rate	R/Wp	00	16	1
40033	16	PT Primary	R/Wp	00	20	500
40035	17	CT Primary	R/Wp	00	22	5
40037	18	System Power	R	00	24	4330.125
40039	19	Energy Digit Reset Count	R/Wp	00	26	7
40041	20	Register Order/Word Order	R/Wp	00	28	0
40043	21	CT Secondary	R/Wp	00	2A	5
40045	22	PT Secondary	R/Wp	00	2C	500
40047	23	Relay 1 output select	R/Wp	00	2E	0
40049	24	Pulse1/ Limit1/ACCL Parameter select	R/Wp	00	30	0
40051	25	Limit 1/ACCL Trip point	R/Wp	00	32	100
40053	26	Limit 1 Hysteresis	R/Wp	00	34	0.5
40055	27	Limit 1 Delay (On)	R/Wp	00	36	1
40057	28	Limit 1 Delay (Off)	R/Wp	00	38	1

***Note: for 1 phase 2 wire system type is read only & value is 1**

TABLE 8 : continued...

Address (Register)	Parameter No.	Parameter	Read / Write	Modbus Start Address Hex		Default Value
				High Byte	Low Byte	
40059	29	Relay 2 output	R/Wp	00	3A	0
40061	30	Pulse 2/ limit 2 Parameter select	R/Wp	00	3C	0
40063	31	Limit 2 Trip point	R/Wp	00	3E	100
40065	32	Limit 2 Hysteresis	R/Wp	00	40	0.5
40067	33	Limit 2 delay(ON)	R/Wp	00	42	1
40069	34	Limit 2 delay(OFF)	R/Wp	00	30	1
40071	35	Password	R/W	00	46	0
40073	36	Limit 1 Configuration select	R/Wp	00	48	0
40075	37	Limit 2 Configuration select	R/Wp	00	4C	0
40079	39	Low Noise Current Cut Off	R/Wp	00	4E	0
40081	40	Energy Update Rate	R/Wp	00	50	1
40083	41	TOU data& energy type	Wp	00	52	0
40097	48	Serial Number	R	00	60	–#
40099	49	Model Number	R	00	62	3490
40101	50	Modbus Version Number	R	00	64	–*
40103	51	Display version number	R	00	66	–*
40105	52	Weekend	R/Wp	00	68	0
40107	53	Holiday no.	R/Wp	00	6A	1
40109	54	Holiday date	R/Wp	00	6C	0
40111	55	Holiday month	R/Wp	00	6E	0
40113	56	Alternate day no.	R/Wp	00	70	1
40115	57	Alternate day date	R/Wp	00	72	0
40117	58	Alternate day month	R/Wp	00	74	0
40119	59	Profile 1	R/Wp	00	76	0

***Note:** As per latest version

#**Note:** As per printed on sticker

TABLE 8 : continued...

Address (Register)	Parameter No.	Parameter	Read / Write	Modbus Start Address Hex		Default Value
				High Byte	Low Byte	
40121	60	Profile 2	R/Wp	00	78	1
40123	61	Profile 3	R/Wp	00	7A	1
40125	62	Profile 4	R/Wp	00	7C	1
40127	63	Season no.	R/Wp	00	7E	1
40129	64	Season start date	R/Wp	00	80	1
40131	65	Season start month	R/Wp	00	82	1
40133	66	Day type no.	R/Wp	00	84	1
40135	67	Time zone no.	R/Wp	00	86	1
40137	68	Timezone minute	R/Wp	00	88	0
40139	69	Timezone hour	R/W	00	8A	0
40141	70	Timezone profile no.	R/Wp	00	8C	0
40149	74	Phase no. for harmonic setup*	R/Wp	00	94	1
40151	75	Harmonic A	R/Wp	00	96	3
40153	76	Harmonic B	R/Wp	00	98	5
40155	77	Harmonic C	R/Wp	00	9A	7
40157	78	Harmonic D	R/Wp	00	9C	9
40159	79	Harmonic E	R/Wp	00	9E	11
40161	80	Harmonic F	R/Wp	00	A0	13
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	42
40175	87	Contrast	R/Wp	00	AE	9

***Note: for 1 phase 2 wire phase no. for harmonic set up is read only & value is 1**

TABLE 8 : continued...

Address (Register)	Parameter No.	Parameter	Read / Write	Modbus Start Address Hex		Default Value
				High Byte	Low Byte	
40203	101	Red colour code of phase 1*	R/Wp	00	CA	160
40205	102	Green colour code of phase 1*	R/Wp	00	CC	82
40207	103	Blue colour code of phase 1*	R/Wp	00	CE	45
40209	104	Red colour code of phase 2*	R/Wp	00	D0	0
40211	105	Green colour code of phase 2*	R/Wp	00	D2	0
40213	106	Blue colour code of phase 2*	R/Wp	00	D4	0
40215	107	Red colour code of phase 3*	R/Wp	00	D6	128
40217	108	Green colour code of phase 3*	R/Wp	00	D8	128
40219	109	Blue colour code of phase 3*	R/Wp	00	DA	128
40223	111	ACCL no. of attempts	R/Wp	00	DE	5
40225	112	No. of poles	R/Wp	00	E0	2
40233	116	Billing date	R/Wp	00	E8	1
40239	119	Generator tarriff rate	R/Wp	00	EE	0

***Note: for 1 phase 2 wire R,G,B values are not present, default value will be 0.**

Explanation for 4 X register :

Address	Parameter	Description
40003	Demand Integration Time	This represents demand time in minutes.the applicable values are 8,15,20,30.Writing any other value will return an error.

Explanation for 4 X register :

Address	Parameter	Description
40005	Energy Resolution	This address is used to set energy resolution in Wh, Kwh & MWh. Write one of the following value to this address. **1** = Energy in Wh. 2 = Energy in KWh. **3** = Energy in MWh. For CT Primary * PT Primary * 1.732051 > 30000 kW , only kWh & MWh can be set.
40007	System Voltage	This address is read only and displays System Voltage
40009	System Current	This address is read only and displays System Current
40011	System Type	This address is used to set the System type. Write one of the following value to this address **2**: 3 Phase 3 Wire **3**: 3 Phase 4 Wire**.** Writing any other value will return error . **For 1 phase 2 wire this address is read only and displays value 1.**
40013	Pulse Duration	This address is used to set **pulse width** of the Pulse output. Write one of the following values to this address: **60** : 60 ms **100** : 100 ms **200** : 200 ms Writing any other value will return error .
40015	Reset Parameters	This address is used to reset different parameters. Write specific value to this register to reset the corresponding parameter. Writing any other value will return an error. Following are the values to reset various data. **0:** Energy Reset **1:** Demand Reset **4:** Run hour & On hour Reset **5:** No of Interruptions Reset **6:** Generator log Reset **7**:Time of Day data reset **8**: Reset all data **9**:Factory Reset

Explanation for 4 X register :

Address	Parameter	Description
40019	RS 485 Set up Code	This address is used to set the baud rate, Parity, Number of stop bits. Refer to **TABLE 9** for details.
40021	RS 485 Address	This register address is used to set Device address between 1 to 247 .
40023	Pulse Rate	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 Pimary	This address allows the user to set CT Primary value. The range of value is 1 to 9999 A & also depends on the per phase 666.6MVA Restriction of power combined with PT primary
40037	Sys Power	System Power (Read Only) is the Nominal system power based on the values of Nominal system volts and Nominal system current.
40039	Energy Digit Reset Count	This address allows user to set maximum energy digits count after which energy will roll over to zero. Valid values for this address are 7 , 8 , 9.These values decides the rollover count of energy in 3X register on MODBUS.

Explanation for 4 X register :

Address	Parameter	Description
40041	Word Order	Word Order controls the order in which the instrument receives or sends floating - point numbers:- normal or reversed register order.In normal mode, the two registers that make up a floating point numbers are sent most significant bytes first. In reversed register mode , the two registers that make up a floating point numbers are sent least significant bytes first. To set the mode, write the value '2141.0' into this register- the instrument will detect the order used to send this value and set that order for all ModBus transaction involving floating point numbers.
40043	CT secondary	This address is used to read and write the CT secondary value write one of the following values to this address. 1=1A CT secondary 5=5A CT secondary writing any other value will return an error.
40045	PT secondary	This address is used to read and write the PT secondary value. Valid range for PT secondary value is from 100 to 500V L-L. Writing any other value will return an error.
40047	Relay 1 output select	This address is used to select the relay 1 operation as pulse or limit orACCL. write one of the following values to this address. 0= pulse output on relay1 10(decimal)=ACCL output relay 1 128(decimal)=Limit output on relay 1 writing any other value will return an error.
40049	Pulse 1 / Limit 1/ ACCL parameter select	This address is used to assign the Parameter to Relay1 If Limit option is selected refer **TABLE 13** for parameter number & if Pulse option is selected then refer **TABLE 10** and for ACCLrefer **TABLE 14**

Explanation for 4 X register :

Address	Parameter	Description
40051	Limit 1/ACCL 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 &10 to120 for ACCL can be written to this address. Writing any other value will return an error.
40053	Limit 1 Hysterisis	This address is used to set the hysteresis between 0.5 to 50 . Writting any other value will return an error.
40055	Limit1 Energizing Delay	This address is used to set the Energizing delay between 1 to 10 sec . Writting any other value will return an error.
40057	Limit1 de-energizing Delay	This address is used to set the De-Energizing delay between 1 to 10 sec . Writting any other value will return an error.
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 Relay 2 If limit option is selected refer table 13 for parameter number & if pulse option is selected then refer table 10.
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	Limit 2 Hysterisis	This address is used to set the hysteresis between 0.5 to 50 . Writting any other value will return an error.
40067	Limit 2 Energizing delay	This address is used to set the Energizing delay between 1 to 10 sec . Writting any other value will return an error.

Explanation for 4 X register :

Address	Parameter	Description
40069	Limit 2 De-Energizing delay	This address is used to set the De-Energizing delay between 1 to 10 sec . Writting any other value will return an error.
40071	Password	This address is used to set & reset the password. Valid Range of Password can be set is 0000 - 9999 . 1) If password lock is present & if this location is read it will return **zero**. 2) If Password lock is absent & if this location is read it will return **One**. 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 . Writting any other value will return an error.
40075	Limit2 Configuration Select	This address is used to set the Configuration for relay 2 see table 10 . Writting any other value will return an error.
40079	Low Noise Current Cut Off	This address is used to activate or de-activatethe 30 mA noise current elimination write 0-Deactivate 30 (Decimal)-Activate Writing any other value will return an error.

Explanation for 4 X register :

<table>
<tr><th>Address</th><th>Parameter</th><th>Description</th></tr>
<tr><td>40081</td><td>Energy Update Rate</td><td>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.</td></tr>
<tr><td>40083</td><td>TOD data On MODBUS</td><td>This address allows to access TOD data in 3 X register. Refer table 3 for details.</td></tr>
<tr><td>40097</td><td>Serial No</td><td>This address shows the serial no. configured at factory</td></tr>
<tr><td>40099</td><td>Model No</td><td>This address shows the model no. for identification of model model no. is 3490.</td></tr>
<tr><td>40101</td><td>Add on VER No.</td><td>This address shows the version no of add - on card.</td></tr>
<tr><td>40103</td><td>Display VER No.</td><td>This address shows the version no of display card.</td></tr>
<tr><td>40105</td><td>Weekend Select</td><td>This address allows to select days as weekends.
<table>
<tr><td></td><td>S</td><td>S</td><td>F</td><td>T</td><td>W</td><td>T</td><td>M</td></tr>
<tr><td></td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
</table>
0 = DESELECT
1 = SELECT
For example if user wants to select Sunday and Monday as weekend, according to the above register user has to select the S & M as 1, and then user has to write its decimal representation on modbus location 40105 of 4x register i.e. user has to write 65 on 40105.</td></tr>
<tr><td>40107</td><td>Holiday No.</td><td>This address is used to select holiday no of which data is to be read from or written to addresses 40109 & 40111. Valid range for holiday no is 1 to 30.Writing any other value will return an error.</td></tr>
<tr><td>40109</td><td>Holiday Date</td><td>This address allows to read or write the value of date of holiday no specified in address 40107.</td></tr>
</table>

Explanation for 4 X register :

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.

Explanation for 4 X register :

Address	Parameter	Description
40133	Day type	This address is used to select day type of season specified in address 40127. Valid value for day type are from 1 to 4. Writing any other value will return an error. 1 - Week days 2 - Weekends 3 - Holidays 4 - Alternate days
40135	Timezone No.	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
40137	Time zone Minute	This address allows to read or write the value of minute of time zone specified in address 40135.
40139	Time zone Hour	This address allows to read or write the value of hour of time zone no specified in address 40135.
40141	Time zone Profile no.	This address allows to read or write the tariff rate no of time zone specified in address 40135. before setting timezone hour and minute profile rate must be specified.

Explanation for 4 X register :

<table>
<tr><th>Address</th><th>Parameter</th><th>Description</th></tr>
<tr><td>40149</td><td>Phase No for Harmonic Setup</td><td>This address is used to select phase no of which data is to be read from or written to addresses from 40151 to 40161.
Valid range for phase no is 1 to 3.
<table>
<tr><th>Phase no.</th><th>3P4W</th><th>3P3W</th><th>1P2W</th></tr>
<tr><td>1</td><td>L 1</td><td>L 12</td><td>L 1</td></tr>
<tr><td>2</td><td>L 2</td><td>L 23</td><td>-</td></tr>
<tr><td>3</td><td>L 3</td><td>L 31</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>40151</td><td>Harmonic A</td><td>This address allows to read or write the value of harmonic A of phase no specified. Harmonic Range is 2-56.</td></tr>
<tr><td>40153</td><td>Harmonic B</td><td>This address allows to read or write the value of harmonic B of phase no specified. Harmonic Range is 2-56.</td></tr>
<tr><td>40155</td><td>Harmonic C</td><td>This address allows to read or write the value of harmonic C of phase no specified. Harmonic Range is 2-56.</td></tr>
<tr><td>40157</td><td>Harmonic D</td><td>This address allows to read or write the value of harmonic D of phase no specified. Harmonic Range is 2-56.</td></tr>
<tr><td>40159</td><td>Harmonic E</td><td>This address allows to read or write the value of harmonic E of phase no specified. Harmonic Range is 2-56.</td></tr>
<tr><td>40161</td><td>Harmonic F</td><td>This address allows to read or write the value of harmonic F of phase no specified . Harmonic Range is 2-56.</td></tr>
<tr><td>40163</td><td>RTC Minute</td><td>This address allows to read or write the value of minute of RTC.</td></tr>
<tr><td>40165</td><td>RTC Hour</td><td>This address allows to read or write the value of Hour of RTC.</td></tr>
<tr><td>40167</td><td>RTC Date</td><td>This address allows to read or write the value of Date of RTC.</td></tr>
<tr><td>40169</td><td>RTC month</td><td>This address allow to read or write the value of month of RTC.</td></tr>
</table>

Explanation for 4 X register :

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.

Explanation for 4 X register :

Address	Parameter	Description
40223	ACCL No. Of Attempts	ACCL Cycle represents no.of attempts, The applicable values are 1to10. Writing any other value will return an error.
40225	No.of poles	This address is used to set the no. of poles of generator of which RPM is to be measured. user can select no. of poles 2,4,6,8,.....38,40.
40233	Billing date	This address is used to configure the billing date for TOD.
40239	Generator tarriff rate	This address is used to set the tarriff rate for the generator energy. generator energy cost is calculated using tariff rate.

TABLE 9 : RS485 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 10 : Pulse Configuration select

Code	Configuration
0	Active Energy Utility
1	Active Energy Gen
2	Utility Reactive Energy
3	Gen Reactive Energy
4	Apparent Energy Utility
5	Apparent Energy Gen

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

TABLE 11 : Energy pulse rate divisor

1.For Energy Output in Wh

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

2. For Energy Output in KWh

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

3. For Energy Output in MWh

	Pulse rate
Divisor	Pulse
1	1 per MWh

Above options are also applicable for Apparent and Reactive Energy.

* System power = 3 x CT(Primary) x $PT(Primary)_{L-N}$ for 3 Phase 4 Wire
System power = Root3 x CT(Primary) x $PT(Primary)_{L-L}$ for 3 Phase 3 Wire
System power =CT(Primary)x $PT(Primary)_{L-N}$ For 1Phase 2 Wire

TABLE 12:Limit 1 and Limit 2 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 13 : Parameters for Limit output

Para-meter No.	Parameter	3P 4W	3P 3W	1P 2W	Trip Point Set Range	100% Value
0	None	✓	✓	✓	NA	NA
1	Volts 1	✓	✓	✓	10 - 120 %	Vnom (L-N)
2	Volts 2	✓	✓	✗	10 - 120 %	Vnom (L-N)
3	Volts 3	✓	✓	✗	10 - 120 %	Vnom (L-N)
4	IL1	✓	✓	✓	10 - 120 %	Inom
5	IL2	✓	✓	✗	10 - 120 %	Inom
6	IL3	✓	✓	✗	10 - 120 %	Inom
7	W1	✓	✗	✓	10 - 120 %	Nom (3)
8	W2	✓	✗	✗	10 - 120 %	Nom (3)
9	W3	✓	✗	✗	10 - 120 %	Nom (3)
10	VA1	✓	✗	✓	10 - 120 %	Nom (3)
11	VA2	✓	✗	✗	10 - 120 %	Nom (3)
12	VA3	✓	✗	✗	10 - 120 %	Nom (3)
13	VAr1	✓	✗	✓	10 - 120 %	Nom (3)
14	VAr2	✓	✗	✗	10 - 120 %	Nom (3)
15	VAr3	✓	✗	✗	10 - 120 %	Nom (3)
16	PF1	✓	✗	✓	10 - 90 %	90°(7)
17	PF2	✓	✗	✗	10 - 90 %	90°(7)
18	PF3	✓	✗	✗	10 - 90 %	90°(7)
19	Pa1	✓	✗	✓	10 - 90 %	360°(6)
20	Pa2	✓	✗	✗	10 - 90 %	360°(6)
21	Pa3	✓	✗	✗	10 - 90 %	360°(6)

TABLE 13 : Continued..

Para-meter No.	Parameter	3P 4W	3P 3W	1P 2W	Trip Point Set Range	100% Value
22	Volts Ave.	✓	✓	✗	10 - 120 %	Vnom (2)
24	Current Ave.	✓	✓	✗	10 - 120 %	Inom
27	Watts sum	✓	✓	✗	10 - 120 %	Nom (3)
29	VA sum	✓	✓	✗	10 - 120 %	Nom (3)
31	VAr sum	✓	✓	✗	10 - 120 %	Nom (3)
32	PF Ave.	✓	✓	✗	10 - 90 %	90°
34	PA Ave.	✓	✓	✗	10 - 90 %	360°
36	Freq.	✓	✓	✓	10 - 90 %	66 Hz (1)
43	Watt Demand Utility	✓	✓	✓	10 - 120 %	Nom (3)
44	Watt Max Demand Utility	✓	✓	✓	10 - 120 %	Nom (3)
46	Watt Demand Max Gen	✓	✓	✓	10 - 120 %	Nom (3)
51	VA Demand	✓	✓	✓	10 - 120 %	Nom (3)
52	VA Max Demand utility	✓	✓	✓	10 - 120 %	Nom (3)
50	VA Max Demand Gen	✓	✓	✓	10 - 120 %	Nom (3)
53	Current Demand.	✓	✓	✓	10 - 120 %	Inom
54	Current Max Demand.	✓	✓	✓	10 - 120 %	Inom
49	Current max Demand Gen.	✓	✓	✓	10 - 120 %	Inom
55	Relay manual off oper.	✓	✓	✓	NA	NA
56	Relay manual on oper.	✓	✓	✓	NA	NA
101	VL1-L2	✓	✗	✗	10 - 120 %	Vnom (L-L)
102	VL2-L3	✓	✗	✗	10 - 120 %	Vnom (L-L)

TABLE 13 : Continued..

Para-meter No.	Parameter	3P 4W	3P 3W	1P 2W	Trip Point Set Range	100% Value
103	VL3-L1	✓	✗	✗	10 - 120 %	Vnom (L-L)
104	VL1 THD(%)	✓	✓	✓	5 - 100%	
105	VL2 THD(%)	✓	✓	✗	5 - 100%	
106	VL3 THD(%)	✓	✓	✗	5 - 100%	
107	IL1 THD(%)	✓	✓	✓	5 - 100%	
108	IL2 THD(%)	✓	✓	✗	5 - 100%	
109	IL3 THD(%)	✓	✓	✗	5 - 100%	
110	System voltage THD(%)	✓	✓	✗	5 - 100%	
111	System current THD(%)	✓	✓	✗	5 - 100%	
113	I Neutral	✓	✗	✗	5 - 100%	Inom
328	VAr demand	✓	✓	✓	10 - 120 %	Nom (3)
329	VAr max demand utility	✓	✓	✓	10 - 120 %	Nom (3)
331	VAr Max demand Gen	✓	✓	✓	10 - 120 %	Nom (3)

Note : (1) For Frequency 0% corresponds to 45 Hz and 100% corresponds to 66 Hz.
(2) For 3P 4W and 1Ph the nominal value is V_{L-N} and that for 3P 3W is V_{L-L}.
(3) Nominal Value for power is calculated from Nominal Voltage and current values.
(4) Nominal Value is to be considered with set CT/ PT Primary values.
(5) For single phase L1 Phase values are to be considered as System values.
(6) For Phase angle 0% corresponds to 0^0 &100% corresponds to 360^0
(7) For Power factor 0% corresponds to 0^0 &100% corresponds to 360^0

NA : Not Applicable

TABLE 14 : Parameters For ACCL output

Para-meter No.	Parameter	3P 4W	3P 3W	1P 2W	Trip Point Set Range
0	None	✓	✓	✓	NA
4	Input current IL1	✓	✓	✓	10-120%
5	Input current IL2	✓	✓	✗	10-120%
6	Input current IL3	✓	✓	✗	10-120%
10	Apparent power L1	✓	✗	✓	10-120%
11	Apparent power L2	✓	✗	✗	10-120%
12	Apparent power L3	✓	✗	✗	10-120%
24	Current Avg.	✓	✓	✗	10-120%
29	Apparent power sum	✓	✓	✗	10-120%

3.6 User Assignable Modbus Registers

This instrument contains 20 user assignable registers in the address range of 0x2200 (38705) to 0x2226 (38743) for 3X registers (**see TABLE 15**).

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 reside 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 accessed via address 0x2200 to 0x2226 are specified in 4X Register 0x2200 to 0x2213. (**see TABLE 16**)

TABLE 15: 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
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

TABLE 15 : Continued..

Address (Register)	Parameter Number.	Assignable Register	Modbus Start Address (Hex)	
			High Byte	Low Byte
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 16: 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

TABLE 16 : Continued..

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 16**) 0x02200 and 0x02201 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)*

Assigning Query(continued..)

Byte Count	04 (Hex)
Data Register-1High Byte	00 (Hex)
Data Register-1 Low Byte	02 (Hex)
Data Register-2 High Byte	00 (Hex)
Data Register-2 Low Byte	1E (Hex)
CRC 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 Voltage 2 & Power Factor 1 parameters were assigned to 0x 2200 &0x2201(**TABLE 16**) which will point to user assignable 3x registers 0x2200 and 0x2202 (**TABLE 15**). So to read Voltage2 and Power Factor1 data reading query should be as below.

Query:

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

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

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

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

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

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

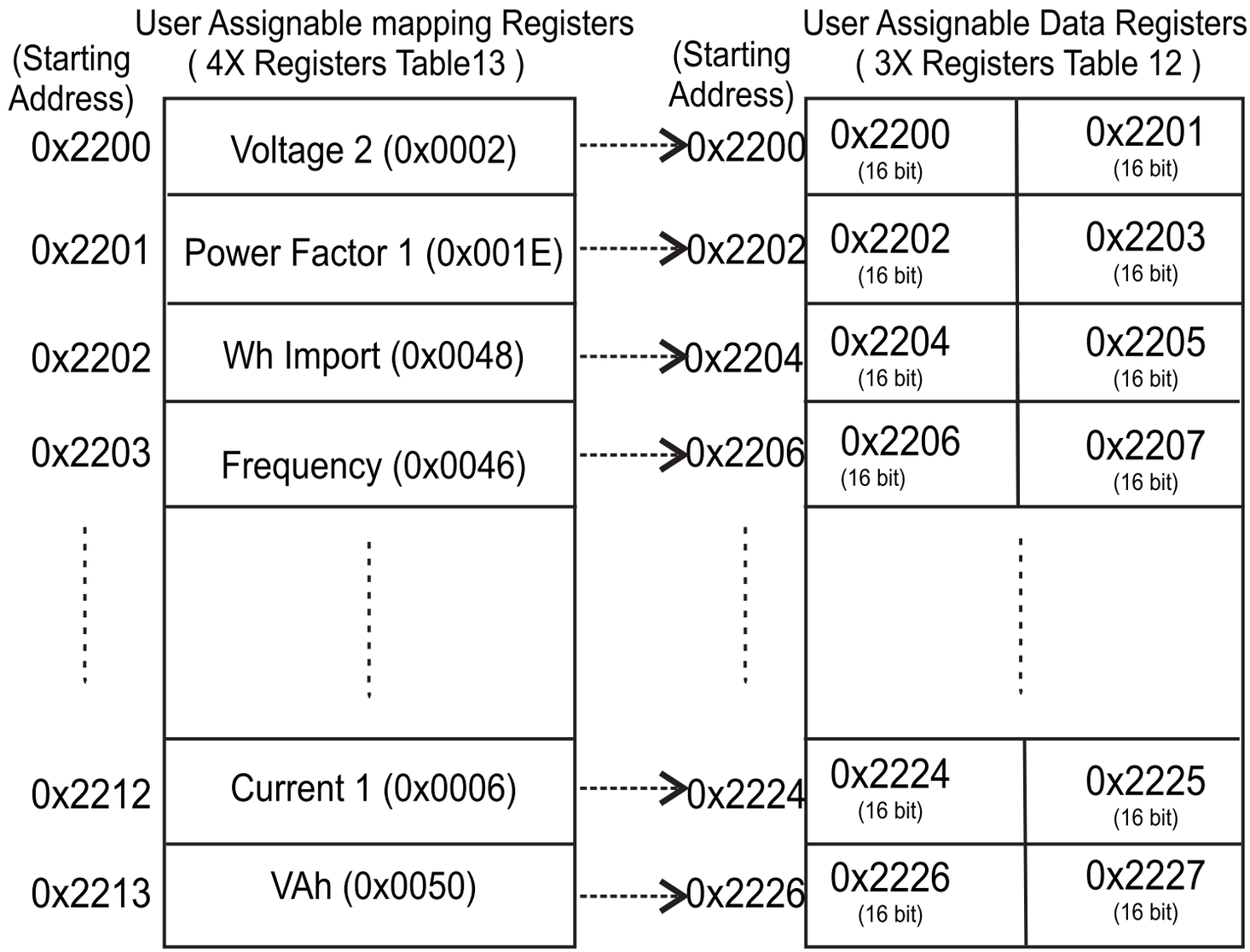
Response: (Volt2=219.30/Power Factor1=1.0)

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

Response(Continued..)

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

} **Power Factor 1Data**



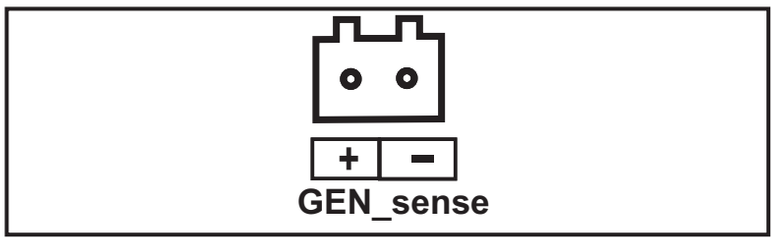
To get the data through User assignable Register use following steps:

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

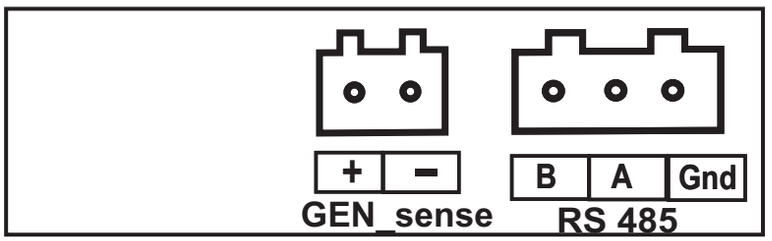
2) Once the parameters are mapped data can be acquired by using
"User assignable data register " Starting address . i.e to access data of Voltage2,
Power factor1,Wh import, Frequency send query with starting address 0x200
with number of register 8 or individually parameters can be accessed
for example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

4. Connection for Generator sense and Optional Pulse Output / RS 485 (rear view of instrument):

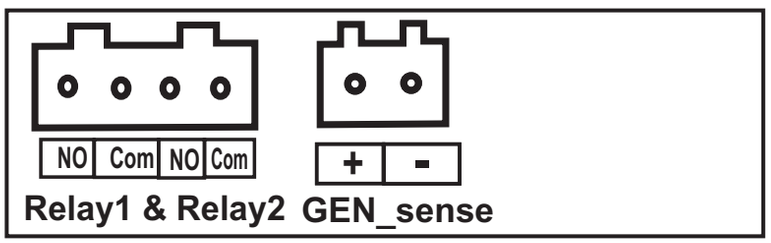
1. Generator sense



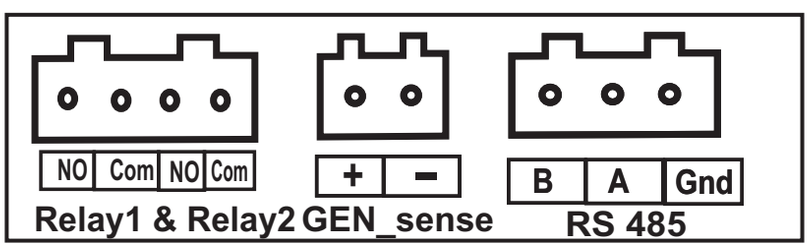
2. Generator sense+RS 485 Output



3. Generator sense+Relay1& Relay2 Output



4. Generator sense+Relay 1 & Relay2 output +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.

RISH EM 3490DSi

Dual Source Energy Meter