

Interface Definition

RISH DMC*i*



CONTENT

Touch Screen Demand Controller with TOD Installation & Operating Instructions

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1. Introduction

This Instrument is a panel mounted 96 x 96mm DIN Quadratic Demand controller. 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 TFT LCD display.

This Instrument provides controlling action for 6 types of demands measured, It controls the power demanded by a System (or part of it) by disconnecting non-priority loads before the Demand exceeds Contracted Demand Limit. This prevents the consumption of excess power or peaks, which generally result in high penalties. This instrument provides detailed Demand Control Status of the system which explains the loads Shedding and relay actions. It also provides the simulation feature which allows user to enter the load values and verify the system conditions prior to installation.

This instrument can be configured and programmed at site for the following: PTP Primary, PT Secondary, CTP Primary, CT Secondary (5A or 1A), 3 phase 3W or 3 phase 4W system, Time Of Day metering, Demand controlling parameter.

An operation via standard RS 485 is possible. Through this optional interface all the above mentioned parameters can be configured and programmed. For bus service it is essential that device address, baud rate, parity should be configured properly.

This document specifies only the interface between a master device and instrument for electrical variable through MODBUS over RS 485.

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 Selection 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 :

THE DEMAND CONTROLLER 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.)

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 (Import)	00	48	✓	✓	✓
30075	38	Wh (Export)	00	4A	✓	✓	✓
30077	39	VARh(Import)	00	4C	✓	✓	✓
30079	40	VARh(Export)	00	4E	✓	✓	✓
30081	41	VAh	00	50	✓	✓	✓
30083	42	Ah	00	52	✓	✓	✓
30085	43	kW Demand (Import)	00	54	✓	✓	✓
30087	44	kW Max Demand (Import)	00	56	✓	✓	✓
30089	45	W Demand (Export)	00	58	✓	✓	✓
30091	46	W Max Demand (Export)	00	5A	✓	✓	✓
30093	47	kVAr Demand(Import)	00	5C	✓	✓	✓
30095	48	kVAr Max Demand(Import)	00	5E	✓	✓	✓
30097	49	kVAr Demand(Export)	00	60	✓	✓	✓
30099	50	kVAr Max Demand (Export)	00	62	✓	✓	✓
30101	51	VA Demand	00	64	✓	✓	✓
30103	52	VA Max Demand	00	66	✓	✓	✓
30105	53	A Demand	00	68	✓	✓	✓
30107	54	A Max Demand	00	6A	✓	✓	✓
30109	55	Wh Import Overflow count	00	6C	✓	✓	✓
30111	56	Wh Import	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 Export Overflow count	00	70	✓	✓	✓
30115	58	Wh Export	00	72	✓	✓	✓
30117	59	VARh Import Overflow count	00	74	✓	✓	✓
30119	60	VARh Import	00	76	✓	✓	✓
30121	61	VARh Export Overflow count	00	78	✓	✓	✓
30123	62	VARh Export	00	7A	✓	✓	✓
30125	63	VAh Overflow count	00	7C	✓	✓	✓
30127	64	VAh	00	7E	✓	✓	✓
30129	65	Predictive Demand	00	80	✓	✓	✓
30131	66	Time remaining	00	82	✓	✓	✓
30133	67	Max system Voltage	00	84	✓	✓	✓
30135	68	Min system Voltage	00	86	✓	✓	✓
30137	69	-	-	-			
30139	70	-	-	-			
30141	71	Max System Current	00	8C	✓	✓	✓
30143	72	Min System Current	00	8E	✓	✓	✓
30145	73	Wh Import depending on update rate	00	90	✓	✓	✓
30147	74	Wh Export depending on update rate	00	92	✓	✓	✓
30149	75	VARh Import depending on update rate	00	94	✓	✓	✓
30151	76	VARh Export depending on update rate	00	96	✓	✓	✓
30153	77	VAh depending on update rate	00	98	✓	✓	✓
30155	78	-	-	-			
30157	79	-	-	-			
30159	80	Relay Trip Indication	00	9E	✓	✓	✓
30161	81	Demand Profile number	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 Import energy	00	B4	✓	✓	✓
30183	92	current zone active Import cost	00	B6	✓	✓	✓
30185	93	current zone active Export energy	00	B8	✓	✓	✓
30187	94	current zone active Export cost	00	BA	✓	✓	✓
30189	95	current zone reactive Import energy	00	BC	✓	✓	✓
30191	96	current zone reactive import cost	00	BE	✓	✓	✓
30193	97	current zone reactive Export energy	00	C0	✓	✓	✓
30195	98	current zone reactive Export cost	00	C2	✓	✓	✓
30197	99	current zone apparent energy	00	C4	✓	✓	✓
30199	100	current zone apparent cost	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	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	00	E4	✓	✓	✓
30231	116	No. of interruption	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	✓	✓	✗
30573	287	maximum active Import demand date	02	3C	✓	✓	✓
30575	288	maximum active Import demand time	02	3E	✓	✓	✓
30577	289	maximum active Import demand	02	40	✓	✓	✓
30579	290	maximum active export demand date	02	42	✓	✓	✓

TABLE 1 : Continued...

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

PF : Power Factor

HD : Harmonic Distortion

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

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

3.2 Accessing 3 X for reading Time of day data

Time of Day data can be read from 3X 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 2.

TABLE 2 :TOD Data configuration

Value in 40083	Type Of data in 3X register	Reference Table
0	Normal measurement data	Table 1
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 3
2	TOD zonewise active import energy and cost per date up to last 31 days	Table 4
3	TOD zonewise active export energy and cost per date up to last 31 days	
4	TOD zonewise reactive import energy and cost per date up to last 31 days	
5	TOD zonewise reactive export energy and cost per date up to last 31 days	
6	TOD zonewise Apparent energy and cost per date up to last 31 days	
8	TOD summary data(Demand)	Table 5
9	TOD zonewise active import demand per date up to last 31 days	Table 6
10	TOD Zonewise active export demand per date up to last 31 days	
11	TOD Zonewise reactive import demand per date up to last 31 days	
12	TOD Zonewise reactive export demand per date up to last 31 days	
13	TOD Zonewise apparent demand per date up to last 31 days	
14	TOD Zonewise current demand per date up to last 31 days	

If value at 40083 is configured according to table 2, 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 as 1157,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 3 :TOD Summary Data

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

TABLE 3 :Continued..

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

TABLE 3 :Continued..

Address (Register)	Parameter No.	Parameter	Modbus Start Address	
			Hex	
			High Byte	Low Byte
30067	33	Date 3 kWh import energy	00	42
...
30119	59	Date 29 kWh import energy	00	76
30121	60	Date 30 kWh import energy	00	78
30123	61	Date 31 kWh import energy	00	7A
30125	62	Date 1 kWh export energy	00	7C
30127	63	Date 2 kWh export energy	00	7E
30129	64	Date 3 kWh export energy	00	80
...
30183	91	Date 30 kWh export energy	00	B6
30185	92	Date 31 kWh export energy	00	B8
30187	93	Date 1 kVARh import energy	00	BA
30189	94	Date 2 kVARh import energy	00	BC
30191	95	Date 3 kVARh import energy	00	BE
...
30243	121	Date 29 kVARh import energy	00	F2
30245	122	Date 30 kVARh import energy	00	F4

TABLE 3 :Continued..

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30247	123	Date 31 kVARh import energy	00	F6
30249	124	Date 1 kVARh export energy	00	F8
30251	125	Date 2 kVARh export energy	00	FA
...
30307	153	Date 30 kVARh export energy	01	32
30309	154	Date 31 kVARh export energy	01	34
30311	155	Date 1 kVAh energy	01	36
30313	156	Date 2 kVAh energy	01	38
...
30369	184	Date 30 kVAh energy	01	70
30371	185	Date 31 kVAh energy	01	72
30373	186	month 1 kWh import energy	01	74
30375	187	month 2 kWh import energy	01	76
...
30393	196	month 11 kWh import energy	01	88
30395	197	month 12 kWh import energy	01	8A
30397	198	month 1 kWh export energy	01	8C

TABLE 3 :Continued..

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30399	199	month 2 kWh export energy	01	8E
...
30417	208	month 11 kWh export energy	01	A0
30419	209	month 12 kWh export energy	01	A2
30421	210	month 1 kVARh import energy	01	A4
30423	211	month 2 kVARh import energy	01	A6
...
30441	220	month 11 kVARh import energy	01	B8
30443	221	month 12 kVARh import energy	01	BA
30445	222	month 1 kVARh export energy	01	BC
30447	223	month 2 kVARh export energy	01	BE
...
30465	232	month 11 kVARh export energy	01	D0
30467	233	month 12 kVARh export energy	01	D2
30469	234	month 1 kVAh energy	01	D4
30471	235	month 2 kVAh energy	01	D6
...

TABLE 3 :Continued..

Address (Register)	Parameter No.	Parameter	Modbus Start Address	
			Hex	
			High Byte	Low Byte
30489	244	month 11 kVAh energy	01	E8
30491	245	month 12 kVAh energy	01	EA
30493	246	Date 1 kWh import cost	01	EC
30495	247	Date 2 kWh import cost	01	EE
...
30551	275	Date 30 kWh import cost	02	26
30553	276	Date 31 kWh import cost	02	28
30555	277	Date 1 kWh export cost	02	2A
30557	278	Date 2 kWh export cost	02	2C
...
30613	306	Date 30 kWh export cost	02	64
30615	307	Date 31 kWh export cost	02	66
30617	308	Date 1 kVARh import cost	02	68
30619	309	Date 2 kVARh import cost	02	6A
...
30675	337	Date 30 kVARh import cost	02	A2
30677	338	Date 31 kVARh import cost	02	A4

TABLE 3 :Continued..

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30679	339	Date 1 kVARh export cost	02	A6
30681	340	Date 2 kVARh export cost	02	A8
...
30737	368	Date 30 kVARh export cost	02	E0
30739	369	Date 31 kVARh export cost	02	E2
30741	370	Date 1 kVAh cost	02	E4
30743	371	Date 2 kVAh cost	02	E6
...
30799	399	Date 30 kVAh cost	03	1E
30801	400	Date 31 kVAh cost	03	20
30803	401	month 1 kWh import cost	03	22
30805	402	month 2 kWh import cost	03	24
...
30823	411	month 11 kWh import cost	03	36
30825	412	month 12 kWh import cost	03	38
30827	413	month 1 kWh export cost	03	3A
30829	414	month 2 kWh export cost	03	3C

TABLE 3 :Continued..

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
...
30847	423	month 11 kWh export cost	03	4E
30849	424	month 12 kWh export cost	03	50
30851	425	month 1 kVARh import cost	03	52
30853	426	month 2 kVARh import cost	03	54
...
30871	435	month 11 kVARh import cost	03	66
30873	436	month 12 kVARh import cost	03	68
30875	437	month 1 kVARh export cost	03	6A
30877	438	month 2 kVARh export cost	03	6C
...
30895	447	month 11 kVARh export cost	03	7E
30897	448	month 12 kVARh export cost	03	80
30899	449	month 1 kVAh cost	03	82
30901	450	month 2 kVAh cost	03	84
...
30919	459	month 11 kVAh cost	03	96

TABLE 3 :Continued..

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30921	460	month 12 kVAh cost	03	98
30923	461	Current date timezone1 kWh import cost	03	9A
30925	462	Current date timezone2 kWh import cost	03	9C
30927	463	Current date timezone3 kWh import cost	03	9E
30929	464	Current date timezone4 kWh import cost	03	A0
30931	465	Current date timezone5 kWh import cost	03	A2
30933	466	Current date timezone6 kWh import cost	03	A4
30935	467	Current date timezone1 kWh export cost	03	A6
30937	468	Current date timezone2 kWh export cost	03	A8
30939	469	Current date timezone3 kWh export cost	03	AA
30941	470	Current date timezone4 kWh export cost	03	AC
30943	471	Current date timezone5 kWh export cost	03	AE
30945	472	Current date timezone6 kWh export cost	03	B0
30947	473	Current date timezone1 kVARh import cost	03	B2
30949	474	Current date timezone2 kVARh import cost	03	B4
30951	475	Current date timezone3 kVARh import cost	03	B6
30953	476	Current date timezone4 kVARh import cost	03	B8

TABLE 3 :Continued..

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

3.3 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 2.

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 4 : TOD Zonewise data (kWh(imp/exp)/kVAh(imp/exp)/kVAh)

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30001	1	timezone1 date 1 Energy	00	0
30003	2	timezone2 date 1 Energy	00	2
30005	3	timezone3 date 1 Energy	00	4
30007	4	timezone4 date 1 Energy	00	6
30009	5	timezone5 date 1 Energy	00	8
30011	6	timezone6 date 1 Energy	00	A
30013	7	timezone1 date 1 cost	00	C
30015	8	timezone2 date 1 cost	00	E
30017	9	timezone3 date 1 cost	00	10
30019	10	timezone4 date 1 cost	00	12

TABLE 4 :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 4 :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 4 :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 5 : DEMAND Summary Data

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30003	1	Current date timezone 1kW import Demand	00	02
30005	2	Current date timezone 2 kW import Demand	00	04
30007	3	Current date timezone 3 kW import Demand	00	06
30009	4	Current date timezone 4 kW import Demand	00	08
30011	5	Current date timezone 5 kW import Demand	00	0A
30013	6	Current date timezone 6 kW import Demand	00	0C
30015	7	Current date timezone1 kW export Demand	00	0E
30017	8	Current date timezone 2 kW export Demand	00	10
30019	9	Current date timezone 3 kW export Demand	00	12
30021	10	Current date timezone 4 kW export Demand	00	14
30023	11	Current date timezone 5 kW export Demand	00	18
30025	12	Current date timezone 6 kW export Demand	00	1A
30027	13	Current date timezone 1kVAR import Demand	00	1C
30029	14	Current date timezone 2 kVAR import Demand	00	1E
30031	15	Current date timezone 3 kVAR import Demand	00	20
30033	16	Current date timezone 4 kVAR import Demand	00	22
30035	17	Current date timezone 5 kVAR import Demand	00	24
30037	18	Current date timezone 6 kVAR import Demand	00	26
30039	19	Current date timezone 1kVAR export Demand	00	28
30041	20	Current date timezone 2kVAR export Demand	00	2A
30043	21	Current date timezone 3 kVAR export Demand	00	2C
30045	22	Current date timezone 4 kVAR export Demand	00	2E
30047	23	Current date timezone 5 kVAR export Demand	00	30
30049	24	Current date timezone 6 kVAR export Demand	00	32
30051	25	Current date timezone 1 kVA Demand	00	34

TABLE 5 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30053	26	Current date timezone 2 kVA Demand	00	34
30055	27	Current date timezone 3 kVA Demand	00	36
30057	28	Current date timezone 4 kVA Demand	00	38
30059	29	Current date timezone 5 kVA Demand	00	3A
30061	30	Current date timezone 6 kVA Demand	00	3C
30063	31	Current date timezone 1 kA Demand	00	3E
30065	32	Current date timezone 2 kA Demand	00	40
30067	33	Current date timezone 3 kA Demand	00	42
30069	34	Current date timezone 4 kA Demand	00	44
30071	35	Current date timezone 5 kA Demand	00	46
30073	36	Current date timezone 6 kA Demand	00	48
30075	49	Date 1 kW import Demand	00	4A
30077	50	Date 2 kW import Demand	00	4C
30079	51	Date 3 kW import Demand	00	4E
.....	--	--
30133	66	Date 30 kW import Demand	00	84
30135	67	Date 31 kW import Demand	00	86
30137	68	Date 1 kW export Demand	00	8C
30139	69	Date 2 kW export Demand	00	8E
30141	70	Date 3 kW export Demand	00	90
.....	--	--
30195	97	Date 30 kW export Demand	00	C2
30197	98	Date 31 kW export Demand	00	C4
30199	99	Date 1 kVAR import Demand	00	C6
30201	100	Date 2 kVAR import Demand	00	C8

TABLE 5 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30203	101	Date 3 kVAR Import Demand	00	CA
.....
30257	128	Date 30 kVAR import Demand	01	0
30259	129	Date 31 kVAR import Demand	01	2
30261	130	Date 1 kVAR export Demand	01	4
30263	131	Date 2 kVAR export Demand	01	6
.....
30319	159	Date 30 kVAR export Demand	01	3E
30321	160	Date 31 kVAR export Demand	01	40
30323	161	Date 1 kVA Demand	01	42
30325	162	Date 2 kVA Demand	01	44
30327	163	Date 3 kVA Demand	01	46
.....
30381	190	Date 30 kVA Demand	01	7C
30383	191	Date 31 kVA Demand	01	7E
30385	192	Date 1 kA Demand	01	80
30387	193	Date 2 kA Demand	01	82
30389	194	Date 3 kA Demand	01	84
.....
30443	221	Date 30 kA Demand	01	BA
30445	222	Date 31 kA Demand	01	BC
30447	223	month 1kW import Demand	01	BE
30449	224	month 2 kW import Demand	01	C0
.....
30467	233	month 11 kW import Demand	01	D2

TABLE 5 : Continued...

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30469	234	month 12 kW import Demand	01	D4
30471	235	month 1kW export Demand	01	D6
30473	236	month 2 kW export Demand	01	D8
.....
30491	245	month 11kW export Demand	01	EA
30493	246	month 12 kW export Demand	01	EC
30495	247	month 1 kVAR import Demand	01	EE
30497	248	month 2 kVAR import Demand	01	F0
.....
30515	257	month 11 kVAR import Demand	02	2
30517	258	month 12 kVAR import Demand	02	4
30519	259	month 1 kVAR export Demand	02	6
30521	260	month 2 kVAR export Demand	02	8
.....
30539	269	month 11 kVAR export Demand	02	1A
30541	270	month 12 kVAR export Demand	02	1C
30543	271	month 1 kVA Demand	02	1E
30545	272	month 2 kVA Demand	02	20
.....
30563	281	month 11 kVA Demand	02	32
30565	282	month 12 kVA Demand	02	34
30567	283	month 1 kA Demand	02	36
30569	284	month 2 kA Demand	02	38
.....
30589	294	month 12 kA Demand	02	4C

TABLE 6: 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 6 : 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	timezone 1 date 7 Demand	00	48
30075	38	timezone 2 date 7 Demand	00	4A
.....
30083	42	timezone6 date 7Demand	00	52
30085	43	timezone 1 date 8 Demand	00	54
30087	44	timezone2 date 8 Demand	00	56
.....
30095	48	timezone6 date 8 Demand	00	5E
30097	49	timezone 1 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	timezone 1 date 11 Demand	00	78
.....
30131	66	timezone6 date 11 Demand	00	82
30133	67	timezone 1 date 12 Demand	00	84

TABLE 6 : 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 6 : 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 6 : 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 7** 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.)

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.)

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)

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.)

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-1 High 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)

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:

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 7 : 4 X register addresses

Address (Register)	Parameter No.	Parameter	Read / Write	Modbus Start Address Hex		Default Value
				High Byte	Low Byte	
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
40015	7	Reset Parameters	Wp	00	0E	0
40019	9	RS 485 Set-up Code	R/Wp	00	12	5
40021	10	Node Address	R/Wp	00	14	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
40071	35	Password	R/W	00	46	1
40079	39	Low Current Noise 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	3482
40101	50	Modbus Version Number	R	00	64	-#
40103	51	Display version number	R	00	66	-#

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

***Note: As per latest version.**

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

TABLE 7 : continued...

Address (Register)	Parameter No.	Parameter	Read / Write	Modbus Start Address Hex		Default Value
				High Byte	Low Byte	
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	1
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	0
40131	65	Season start month	R/Wp	00	82	0
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
40143	71	Timezone demand profile	R/Wp	00	8E	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

***Note: for 1 phase 2 wire Harmonic set up values are not present, default value will be 0.**

TABLE 7 : continued...

Address (Register)	Parameter No.	Parameter	Read / Write	Modbus Start Address Hex		Default Value
				High Byte	Low Byte	
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
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
40221	110	Demand window type	R/Wp	00	DC	2
40223	111	Demand Integration period	R/Wp	00	DE	15
40227	113	Demand Control parameter	R/Wp	00	E2	1
40229	114	Predictive Demand interval	R/Wp	00	E4	60
40231	115	Contract Demand	R/Wp	00	E6	4330.254
40237	118	Demand Trip limit 1	R/Wp	00	EC	90
40239	119	Demand Trip limit 2	R/Wp	00	EE	80
40241	120	Demand Reset limit	R/Wp	00	F0	60
40245	122	Relay 1 configuration	R/Wp	00	F4	0

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

TABLE 7 : continued...

Address (Register)	Parameter No.	Parameter	Read / Write	Modbus Start Address Hex		Default Value
				High Byte	Low Byte	
40247	123	Relay 2 configuration	R/Wp	00	F6	0
40249	124	Relay 3 configuration	R/Wp	00	F8	0
40251	125	Relay 4 configuration	R/Wp	00	FA	1
40253	126	DM control	R/Wp	00	FC	1
40255	127	Relay 1 function	R/Wp	00	FE	1
40257	128	Relay 2 function	R/Wp	01	0	2
40259	129	Relay 3 function	R/Wp	01	2	2
40261	130	Relay 4 function	R/Wp	01	4	3
40263	131	Relay 1 limit	R/Wp	01	6	100
40265	132	Relay 2 limit	R/Wp	01	8	100
40267	133	Relay 3 limit	R/Wp	01	A	80
40269	134	Relay 4 limit	R/Wp	01	C	60
40279	139	Demand profile 1 Trip limit 1	R	01	16	90
40281	140	Demand profile 1 Trip limit 2	R	01	18	80
40283	141	Demand profile 1 Reset limit	R	01	1A	60
40285	142	Demand profile 2 Trip limit 1	R/Wp	01	1C	90
40287	143	Demand profile 2 Trip limit 2	R/Wp	01	1E	80
40289	144	Demand profile 2 Reset limit	R/Wp	01	20	60
40291	145	Demand profile 3 Trip limit 1	R/Wp	01	22	90
40293	146	Demand profile 3 Trip limit 2	R/Wp	01	24	80
40295	147	Demand profile 3 Reset limit	R/Wp	01	26	60
40297	148	Demand profile 4 Trip limit 1	R/Wp	01	28	90
40299	149	Demand profile 4 Trip limit 2	R/Wp	01	2A	80
40301	150	Demand profile 4 Reset limit	R/Wp	01	2C	60
40303	151	Demand profile 5 Trip limit 1	R/Wp	01	2E	90
40305	152	Demand profile 5 Trip limit 2	R/Wp	01	30	80

TABLE 7 : continued...

Address (Register)	Parameter No.	Parameter	Read / Write	Modbus Start Address Hex		Default Value
				High Byte	Low Byte	
40307	153	Demand profile 5 reset limit	R/Wp	01	32	60
40309	154	Demand profile 6 Trip limit 1	R/Wp	01	34	90
40311	155	Demand profile 6 Trip limit 2	R/Wp	01	36	80
40313	156	Demand profile 6 Reset limit	R/Wp	01	38	60
40315	157	Demand profile 7 Trip limit 1	R/Wp	01	3A	90
40317	158	Demand profile 7 Trip limit 2	R/Wp	01	3C	80
40319	159	Demand profile 7 Reset limit	R/Wp	01	3E	60
40321	160	Demand profile 8 Trip limit 1	R/Wp	01	40	90
40323	161	Demand profile 8 Trip limit 2	R/Wp	01	42	80
40325	162	Demand profile 8 Reset limit	R/Wp	01	44	60
40333	166	Auto Reset no.	R/Wp	01	4C	0
40335	167	Auto Reset Date	R/Wp	01	4E	0
40337	168	Auto Reset Month	R/Wp	01	50	0
40339	169	Demand Synchronization	R/Wp	01	52	0

Explanation for 4 X register :

Address	Parameter	Description
40033	PT Primary	This address allows the user to set PT Primary value. The range of value is 100 to 692.8kV L-L depends on the per phase 666.6MVA Restriction of power combined with CT primary
40035	CT Primary	This address allows the user to set CT Primary value. The range of value is 1 to 9999 A & also depends on the per phase 666.6MVA Restriction of power combined with PT primary
40037	Sys Power	System Power (Read Only) is the Nominal system power based on the values of Nominal system volts and Nominal system current.
40039	Energy Digit Reset Count	This address allows user to set maximum energy digits count after which energy will roll over to zero. Valid values for this address are 7 , 8 , 9. These values decides the rollover count of energy in 3X register on MODBUS.
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.

Explanation for 4 X register :

Address	Parameter	Description
40043	CT secondary	This address is used to read and write the CT secondary value write one of the following values to this address. 1=1A CT secondary 5=5A CT secondary writing any other value will return an error.
40045	PT secondary	This address is used to read and write the PT secondary value. Valid range for PT secondary value is from 100 to 500V L-L. Writing any other value will return an error.
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.
40079	Low Noise Current Cut Off	This address is used to activate or de-activate the 30 mA noise current elimination write 0-Deactivate 30 (Decimal)-Activate Writing any other value will return an error.

Explanation for 4 X register :

Address	Parameter	Description																
40081	Energy Update Rate	This address is used to specify update rate of energy in corresponding 3X registers. The valid values for update rate are from 1 to 60 min. Writing any other value will return an error.																
40083	TOD data On MODBUS	This address allows to access TOD data in 3 X register. Refer table 3 for details.																
40097	Serial No	This address shows the serial no. configured at factory																
40099	Model No	This address shows the model no. for identification of model model no. is 3490.																
40101	Add on VER No.	This address shows the version no of add - on card.																
40103	Display VER No.	This address shows the version no of display card.																
40105	Weekend Select	<p>This address allows to select days as weekends.</p> <table border="1" style="display: inline-table; margin-right: 10px;"> <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> <p>0 = DESELECT 1 = SELECT</p> <p>For example if user wants to select Sunday and Monday as weekend, according to the above register user has to select the S & M as 1, and then user has to write its decimal representation on modbus location 40105 of 4x register i.e. user has to write 65 on 40105.</p>		S	S	F	T	W	T	M		1	0	0	0	0	0	1
	S	S	F	T	W	T	M											
	1	0	0	0	0	0	1											
40107	Holiday No.	This address is used to select holiday no of which data is to be read from or written to addresses 40109 & 40111. Valid range for holiday no is 1 to 30. Writing any other value will return an error.																
40109	Holiday Date	This address allows to read or write the value of date of holiday no specified in address 40107.																

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.
40143	Time zone Demand profile	This address allows to read or write the demand profile no. of timezone specified in 40135.

Explanation for 4 X register :

Address	Parameter	Description																
40149	Phase No for Harmonic Setup	<p>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.</p> <table border="1"> <thead> <tr> <th>Phase no.</th> <th>3P4W</th> <th>3P3W</th> <th>1P2W</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>L1</td> <td>L12</td> <td>L1</td> </tr> <tr> <td>2</td> <td>L2</td> <td>L23</td> <td>-</td> </tr> <tr> <td>3</td> <td>L3</td> <td>L31</td> <td>-</td> </tr> </tbody> </table>	Phase no.	3P4W	3P3W	1P2W	1	L1	L12	L1	2	L2	L23	-	3	L3	L31	-
Phase no.	3P4W	3P3W	1P2W															
1	L1	L12	L1															
2	L2	L23	-															
3	L3	L31	-															
40151	Harmonic A	This address allows to read or write the value of harmonic A of phase no specified. Harmonic Range is 2-56.																
40153	Harmonic B	This address allows to read or write the value of harmonic B of phase no specified. Harmonic Range is 2-56.																
40155	Harmonic C	This address allows to read or write the value of harmonic C of phase no specified. Harmonic Range is 2-56.																
40157	Harmonic D	This address allows to read or write the value of harmonic D of phase no specified. Harmonic Range is 2-56.																
40159	Harmonic E	This address allows to read or write the value of harmonic E of phase no specified. Harmonic Range is 2-56.																
40161	Harmonic F	This address allows to read or write the value of harmonic F of phase no specified . Harmonic Range is 2-56.																
40163	RTC Minute	This address allows to read or write the value of minute of RTC.																
40165	RTC Hour	This address allows to read or write the value of Hour of RTC.																
40167	RTC Date	This address allows to read or write the value of Date of RTC.																
40169	RTC month	This address allow to read or write the value of month of RTC.																

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
40221	Demand Window Type	This address is used to set Demand window type,Write one of the following values to this address: 1: Fixed 2:Sliding Writing any other value will return error .
40223	Demand Integration Period	This address is used to set Demand integration period between 1 to 60 minutes. Writing any other value will return an error.
40227	Demand Control Parameter	This address is used to set the demand control parameter, Write one of the following Values to this address. 1:Import kW Demand 2:Export kW Demand 3:Import kVAr Demand 4:Export kVAr Demand 5:VA Demand 6:A Demand Writing any other value will return an error.
40229	Predictive Demand Interval	This address is used to set the Predictive demand interval between 15 sec.to 50% of demand integration period specified in address 40223. It should be in seconds.
40231	Contract Demand	This register address is used to configure contract demand,Any Value between 5 to 120% of full scale can be set ,writing any other value will return an error.
40237	Demand Trip Limit 1	This address is used to set Demand Trip limit1 in % of contract demand .Any value between 10 to 100 can be written to this address. writing any other value will return an error.
40239	Demand Trip Limit 2	This address is used to set Demand Trip limit 2 in % of Trip limit 1,Any value between 50 to 99 can be written to this address. writing any other value will return an error.
40241	Demand Reset Limit	This address is used to set Demand reset limit in % of Trip limit 2,Any value between 10 to 99 can be written to this address. writing any other value will return an error.

Explanation for 4 X register :

Address	Parameter	Description
40279	Demand Profile1 Trip limit 1	This address is used to read Demand Profile1 Trip limit1 in % of contract demand .
40281	Demand Profile1 Trip limit 2	This address is used to read Demand Profile1 Trip limit 2 in % of Trip limit 1.
40283	Demand Profile1 Reset limit	This address is used to read Demand Profile1 Reset limit in % of Trip limit 2.
40285,40291, 40297,40303, 40309,40315, 40321	Demand Profile 2,3 4,5,6,7,8 Trip limit 1	This address is used to set Demand Profile Trip limit1 in % of contract demand. Any value between 10 to 100 can be written to this address. writing any other value will return an error.
40287,40293, 40299,40305 40311,40317, 40323	Demand Profile 2,3 4,5,6,7,8 Trip limit 2	This address is used to set Demand Profile Trip limit 2 in % of Trip limit 1,Any value between 50 to 99 can be written to this address. writing any other value will return an error.
40289,40295 40301,40307 40313,40319 40325	Demand Profile 2,3 4,5,6,7,8 Reset limit	This address is used to set Demand Profile reset limit in % of Trip limit 2,Any value between 10 to 99 can be written to this address. writing any other value will return an error.
40333	Auto reset no.	This address is used to select auto reset no. of which data is to be read from or written to addresses 40335 & 40337.
40335	Auto reset Date	This address is used to read or write the value of date of the Auto reset no. specified in address 40333.

Explanation for 4 X register :

Address	Parameter	Description
40337	Auto reset Month	This address is used to read or write the value of month of the Auto reset no. specified in address 40333.
40339	Demand Synchronization	This address is used to Sync. the Demand integration period with Utility, To synchronize demand enter 1.Demand synchronization is available only in Fixed window.

TABLE 8 : RS 485 set -up Code

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

NOTE :

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

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 9**).

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 10**)

TABLE 9: 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 9 : 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 10: 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 10 : 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 10) 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 10) which will point to user assignable 3x registers 0x2200 and 0x2202 (TABLE 9). So to read Voltage2 and Power Factor1 data reading query should be as shown on next page.

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 : (

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

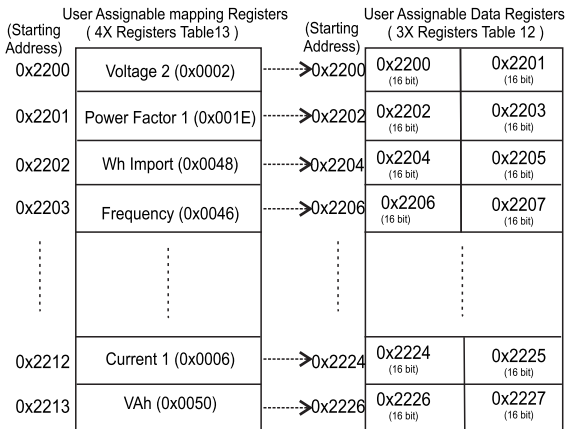
Device Address	01 (Hex)
Function Code	04 (Hex)
Byte count	08 (Hex)
Data Register-1High Byte	43 (Hex)
Data Register-1 Low Byte	5B (Hex)
Data Register-2 High Byte	4E (Hex)
Data Register-2 Low Byte	04 (Hex)

} Voltage 2 Data

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

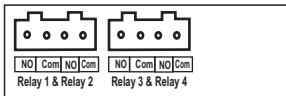


To get the data through User assignable Register use following steps:

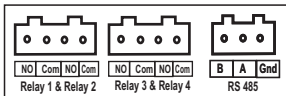
- 1) Assign starting addresses(Table3) of parameters of interest to a "User assignable mapping registers" in a sequence in which they are to be accessed (see section "**Assigning parameter to user assignable registers**")
- 2) Once the parameters are mapped data can be acquired by using "User assignable 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 Relay and Optional Rs485 Output (rear view of instrument):

1. Relay1& Relay 2 Output and Relay 3 & Relay 4 Output



2. Relay1& Relay 2 Output and Relay 3 & Relay 4 Output+RS485 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.

NOTES

RISH DMC*i*



Demand Controller