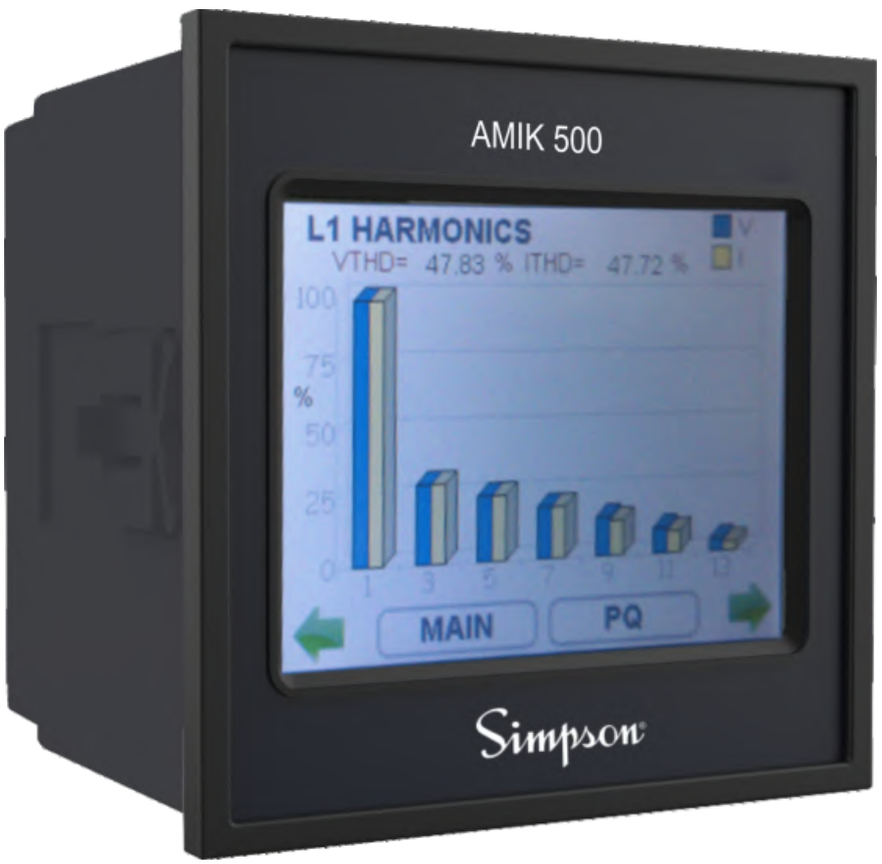
Simpson®
USA SINCE 1936 RELIABILITY BEYOND MEASURE

Interface Definition

AMIK 500



Three Phase (3W/4W)

Three Phase Touch Screen Power Quality Monitor with TOD

Interface Definition

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1. Introduction

This instrument is a panel mounted 96 x 96mm DIN Quadratic Digital metering system for the measurement of important electrical parameters like AC voltage, AC Current, Frequency, Power, Energy(Active / Reactive / Apparent) . The instrument integrates accurate measurement of technology (All Voltage & Current measurements are True RMS upto 56th Harmonic) with 320x240 Pixels touch screen TFT LCD display.

This instrument can be configured and programmed at site for the following:

PT Primary, PT Secondary, CT Primary, CT Secondary (5A or1A), 3 phase 3W or 3phase 4W system , Time Of Day metering, Power Quality Parameter.

The front panel has a 3.5" Touch Screen through which the user can move across the available measurement readings, reset the energy,Min/Max (System Voltage and System Current) and configure the product settings.

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

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

2. Communication Parameter Selection :

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

2.1 RS485 ADDRESS
2.2 Rs485 BAUD RATE
2.3 Rs485 PARITY

2.1 Rs485 Address Setting



This screen applies to the RS 485 output only. This screen allows the user to set RS485 address parameter for the instrument. This screen can be accessed only from Communication Parameters List menu.

The range of allowable address is 1 to 247.

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

2.2 RS 485 Baud Rate

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

2.3 RS 485 Parity & Stop bit Selection

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

3. RS 485 (ModBus) Output :

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

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

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

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

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

The each byte in RTU mode has following format:

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

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

Function code :

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

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

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

3.1 Accessing 3 X register for reading measured values:

Two consecutive 16 bit registers represent one parameter. Refer table 1 for the addresses of 3X registers (Parameters measured by the instruments).
Each parameter is held in the 3X registers. Modbus Code 04 is used to access all parameters.

Example :

To read parameter ,
Volts 3 : Start address= 04 (Hex) Number of registers = 02

Note : Number of registers = Number of parameters x 2

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

Query :

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

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

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

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

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

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

Response: Volt3 (219.25V)

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

Byte Count : Total number of data bytes received.

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

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

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

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

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

Table 1 : 3 X register addresses (measured parameters)

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

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

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

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		3P4W	3P3W
			High Byte	Low Byte		
30065	33	PF Sum	00	40	✓	x
30067	34	Phase Angle Avg	00	42	✓	✓
30069	35	Phase Angle Sum	00	44	✓	x
30071	36	Freq	00	46	✓	✓
30073	37	Wh import	00	48	✓	✓
30075	38	Wh export	00	4A	✓	✓
30077	39	VARh import	00	4C	✓	✓
30079	40	VARh export	00	4E	✓	✓
30081	41	VAh	00	50	✓	✓
30083	42	-	-	-	-	-
30085	43	W Demand (Import)	00	54	✓	✓
30087	44	W Max Demand (Import)	00	56	✓	✓
30089	45	W Demand (Export)	00	58	✓	✓
30091	46	W Max Demand (Export)	00	5A	✓	✓
30101	51	VA Demand	00	64	✓	✓
30103	52	VA Max Demand	00	66	✓	✓
30105	53	A Demand	00	68	✓	✓
30107	54	A Max Demand	00	6A	✓	✓
30109	55	Wh Import (no of overflows in register 30073 / 30111)	00	6C	✓	✓
30111	56	Wh Import	00	6E	✓	✓

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

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

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

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

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

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

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

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

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

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

PF : Power Factor HD : Harmonic Distortion

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

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

3.2 Accessing Sag, Swell, Over Current data through MODBUS :

The Sag, Swell, Over Current time stamping data can be accessed from the addresses shown in table 2. In this case Hour & Minute parameters are combined on one location and Date, Month & year parameters are combined on the next location.

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

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

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

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

Table 2 : 3 X register (Sag, Swell, Over Current data)

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

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

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

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

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

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

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

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

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

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

3.3 Accessing 3 X for reading Time Of Day data :

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

Table 3 : TOD Data Configuration

Value in 40083	Type of data in 3 X register	Reference Table
0	Normal measurement data & Sag, Swell, Over Current Timestamps	Table 1 & Table 2
1	TOD Summury data (per date total energy & cost up to last 30 days & per month total energy & cost up to last 12 months)	Table 4
2	TOD zonewise active import energy & cost per date up to last 31 days	Table 5
3	TOD zonewise active export energy & cost per date up to last 31 days	
4	TOD zonewise reactive import energy & cost per date up to last 31 days	
5	TOD zonewise reactive export energy & cost per date up to last 31 days	
6	TOD zonewise apparent energy & cost per date up to last 31 days	

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

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

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

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

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

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

Table 4 : TOD Summary Data

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

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

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

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

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

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

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

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

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30921	460	month 12 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

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

3.4 Accessing TOD Zone wise Data of Last 31 days :

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

Table 5 : TOD Zonewise data (kWh (imp/exp) / kVArh (imp/exp) / kVAh)

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

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

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

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

3.5 Accessing 4 X register for Reading & Writing :

Each setting is held in the 4X registers .ModBus code 03 is used to read the current setting and code 16 is used to write/change the setting. Refer **Table** 6 for 4 X Register addresses.

Example : Reading System type

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

Note :Number of registers = Number of Parameters x 2

Query :

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

Start Address High : Most significant 8 bits of starting address of the parameter requested.
Start Address low :Least significant 8 bits of starting address of the parameter requested.
Number of register Hi : Most significant 8 bits of Number of registers requested.
Number of register Lo : Least significant 8 bits of Number of registers requested.
(Note : Two consecutive 16 bit register represent one parameter.)

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

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

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

Byte Count : Total number of data bytes received.

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

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

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

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

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

Example : Writing System type

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

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

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

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

Byte Count : Total number of data bytes received.

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

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

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

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

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

Response:

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

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

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

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

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

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

Table 6 : 4 X register addresses

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

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

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

Address (Register)	Parameter No.	Parameter	Read / Write	Modbus Start Address Hex	
				High Byte	Low Byte
40157	78	Harmonic D	R/Wp	00	9C
40159	79	Harmonic E	R/Wp	00	9E
40161	80	Harmonic F	R/Wp	00	A0
40163	81	RTC Minute	R/Wp	00	A2
40165	82	RTC Hour	R/Wp	00	A4
40167	83	RTC Date	R/Wp	00	A6
40169	84	RTC Month	R/Wp	00	A8
40171	85	RTC Year	R/Wp	00	AA
40173	86	Brightness	R/Wp	00	AC
40175	87	Contrast	R/Wp	00	AE
40203	101	Red color code of phase1	R/Wp	00	CA
40205	102	Green color code of phase1	R/Wp	00	CC
40207	103	Blue color code of phase1	R/Wp	00	CE
40209	104	Red color code of phase2	R/Wp	00	D0
40211	105	Green color code of phase2	R/Wp	00	D2
40213	106	Blue color code of phase2	R/Wp	00	D4
40215	107	Red color code of phase3	R/Wp	00	D6
40217	108	Green color code of phase3	R/Wp	00	D8
40219	109	Blue color code of phase3	R/Wp	00	DA

Explanation for 4 X register :

Address	Parameter	Description
40003	Demand Period	Demand period represents demand time in minutes. The applicable values are 8,15,20 or 30. Writing any other value will return an error.

Address	Parameter	Description
40005	Energy Resolution	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 .
40013	Pulse Width of Relay	This address is used to set **pulse width** of the Pulse output. Write one of the following values to this address: **60** : 60 ms **100** : 100 ms **200** : 200 ms Writing any other value will return error .
40015	Reset Parameters	This address is used to reset the different parameters. Write specific value to this register will reset particular data. Writing any other value will return an error. Following are the values to reset various data. 0 - Energy Reset 1 - Demand Reset 2 - System Max Values Reset 3 - System Min Values Reset 4 - Run hour & On hour Reset 5 - No of Interruptions Reset 6 - Power Quality data Reset 7 - Time Of Day data Reset 8 - Reset all data 9- Factory Reset

Address	Parameter	Description
40019	Rs485 Set-up Code	This address is used to set the baud rate, Parity, Number of stop bits. Refer to Table 7 for details.
40021	Node Address	This register address is used to set Device address between 1 to 247 .
40023	Pulse Divisor	This address is used to set **pulse divisor** of the Pulse output. Write one of the following values to this address **for Wh**: **1** : Divisor 1 **10** : Divisor 10 **100** : Divisor 100 **1000** : Divisor 1000 For Detail refer Table 9. Pulse rate divisor is set to 1, when Energy Resolution is set to kWh or MWh.
40033	PT Primary	This address allows the user to set PT Primary value. The range of value is 100 to 692.8kV L-L depends on the per phase 666.6MVA Restriction of power combined with CT primary
40035	CT 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.

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	Relay1 output select	This address is used to select the Relay 1 operation as pulse or Limit. write one of the following values to this address. 0 = Pulse output on Relay 1 128 (Decimal) = Limit output on Relay 1 writing any other value will return an error.
40049	Pulse 1 /Limit 1 parameter select	This address is used to assign the Parameter to Relay1 If Limit option is selected refer table 11 for parameter number & if Pulse option is selected then refer table 8.

Address	Parameter	Description
40051	Limit1 Trip Point	This address is used to set the trip point in %. Any value between 10 to 100 for Lo- alarm & 10 to120 for Hi-alarm can be written to this address. Writing any other value will return an error.
40053	Hysteresis (Limit 1)	This address is used to set the hysteresis between 0.5 to 50 . 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 Relay2 If Limit option is selected refer table 11 for parameter number & if Pulse option is selected then refer table 8.
40063	Limit 2 Trip point	This address is used to set the trip point in %. Any value between 10 to 100 for Lo- alarm & 10 to120 for Hi-alarm can be written to this address. Writing any other value will return an error.
40065	Hysteresis (Limit 2)	This address is used to set the hysteresis between 0.5 to 50 . 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.

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	30mA Noise current Elimination	This address is used to activate or de-activatethe 30 mA noise current elimination write 0-Deactivate 30 (Decimal)-Activate Writing any other value will return an error.

<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 . Writing values from 0 to 6 gives different 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.
For Amik 500</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>

Address	Parameter	Description
40111	Holiday Month	This address allows to read or write the value of month of holiday no specified in address 40107.
40113	Alternate day No.	This address is used to select Alternate day no of which data is to be read from or written to addresses 40115 & 40117. Valid range for Alternate day no is 1 to 30.Writing any other value will return an error.
40115	Alternate day Date	This address allows to read or write the value of date of Alternate day no specified in address 40113.
40117	Alternate day Month	This address allows to read or write the value of month of Alternate day no specified in address 40113.
40119	Profile 1	This address allows to enter tariff rate for Profile 1. Valid range for tariff rate is 0.001 to 299.0.
40121	Profile 2	This address allows to enter tariff rate for Profile 2. Valid range for tariff rate is 0.001 to 299.0.
40123	Profile 3	This address allows to enter tariff rate for Profile 3. Valid range for tariff rate is 0.001 to 299.0.
40125	Profile 4	This address allows to enter tariff rate for Profile 4. Valid range for tariff rate is 0.001 to 299.0.
40127	Season No.	This address is used to select season no of which data is to be read from or written to addresses 40129 & 40131. Valid range for season no is 1 to 4.Writing any other value will return an error.
40129	Season Date	This address allows to read or write the value of date of season no specified in address 40127.
40131	Season Month	This address allows to read or write the value of month of season no specified in address 40127.

Address	Parameter	Description
40133	Day type	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 Hour	This address allows to read or write the value of hour of time zone no specified in address 40135.
40139	Time zone Minute	This address allows to read or write the value of minute of time zone specified in address 40135.
40141	Time zone Profile Rate	This address allows to read or write the tariff rate no of time zone specified in address 40135.
40143	Sag Threshold Set	This address allows to enter threshold value for sag detection. Valid range for sag threshold is 10 to 90 % of nominal.
40145	Swell Threshold Set	This address allows to enter threshold value for swell detection. Valid range for swell threshold is 110 to 150 % of nominal voltage .
40147	Over Current Threshold Set	This address allows to enter threshold value for over current detection. Valid range for overcurrent threshold is 110 to 150% of nominal current.

<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></tr>
<tr><td>1</td><td>L1</td><td>L12</td></tr>
<tr><td>2</td><td>L2</td><td>L23</td></tr>
<tr><td>3</td><td>L3</td><td>L13</td></tr>
</table></td></tr>
<tr><td>40151</td><td>Harmonic A</td><td>This address allows to read or write the value of harmonic A of phase no specified. Harmonic Range is 2-56.</td></tr>
<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>

Address	Parameter	Description
40171	RTC Year	This address allows to read or write the value of Year of RTC.
40173	Brightness	This address allows to read or set the value of brightness of display LCD. The valid range of values for brightness are from 2 to 102.
40175	Contrast	This address allows to read or set the value of contrast of display LCD. The valid range of values for contrast are from 6 to 28.
40203	Red Color Code for L1	This address allows to read or set the value of Red component of color used to display phase 1 parameters. The valid range is 0 to 255.
40205	Green Color Code for L1	This address allows to read or set the value of Green component of color used to display phase 1 parameters. The valid range is 0 to 255.
40207	Blue Color Code for L1	This address allows to read or set the value of Blue component of color used to display phase 1 parameters. The valid range is 0 to 255.
40209	Red Color Code for L2	This address allows to read or set the value of Red component of color used to display phase 2 parameters. The valid range is 0 to 255.
40211	Green Color Code for L2	This address allows to read or set the value of Green component of color used to display phase 2 parameters. The valid range is 0 to 255.
40213	Blue Color Code for L2	This address allows to read or set the value of Blue component of color used to display phase 2 parameters. The valid range is 0 to 255.
40215	Red Color Code for L3	This address allows to read or set the value of Red component of color used to display phase 3 parameters. The valid range is 0 to 255.
40217	Green Color Code for L3	This address allows to read or set the value of Green component of color used to display phase 3 parameters. The valid range is 0 to 255.
40219	Blue Color Code for L3	This address allows to read or set the value of Blue component of color used to display phase 3 parameters. The valid range is 0 to 255.

Table 7 : RS 485 Set-up Code

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

NOTE :

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

Table 8 : Pulse1 & Pulse2 Configuration select

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

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

TABLE 9 : Energy Pulse Rate Divisor

1.For Energy Output in Wh

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

2. For Energy Output in KWh

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

3. For Energy Output in MWh

	Pulse rate
Divisor	Pulse
1	1 per MWh

Above options are also applicable for Apparent and Reactive Energy.

* System power = 3 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

Table 10 :Limit1 & Limit2 Configuration select

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

TABLE 11 : Parameter for Limit output

Parameter No.	Parameter	3P 4W	3P 3W	Range Limit Output
0	None	✓	✓	–
1	INPUT VOLTAGE L1	✓	✓	10 - 120 %
2	INPUT VOLTAGE L2	✓	✓	10 - 120 %
3	INPUT VOLTAGE L3	✓	✓	10 - 120 %
4	INPUT CURRENT IL1	✓	✓	10 - 120 %
5	INPUT CURRENT IL2	✓	✓	10 - 120 %
6	INPUT CURRENT IL3	✓	✓	10 - 120 %
7	ACTIVE POWER L1	✓	×	10 - 120 %
8	ACTIVE POWER L2	✓	×	10 - 120 %
9	ACTIVE POWER L3	✓	×	10 - 120 %
10	APPARENT POWER L1	✓	×	10 - 120 %
11	APPARENT POWER L2	✓	×	10 - 120 %
12	APPARENT POWER L3	✓	×	10 - 120 %
13	REACTIVE POWER L1	✓	×	10 - 120 %
14	REACTIVE POWER L2	✓	×	10 - 120 %

Parameter No.	Parameter	3P 4W	3P 3W	Range Limit Output
15	REACTIVE POWER L3	✓	✗	10 - 120 %
16	POWER FACTOR L1	✓	✗	10 - 90 % (3)
17	POWER FACTOR L2	✓	✗	10 - 90 % (3)
18	POWER FACTOR L3	✓	✗	10 - 90 % (3)
19	PHASE ANGLE L1	✓	✗	10 - 90 % (2)
20	PHASE ANGLE L2	✓	✗	10 - 90 % (2)
21	PHASE ANGLE L3	✓	✗	10 - 90 % (2)
22	VOLTAGE AVG	✓	✓	10 - 120 %
24	CURRENT AVG	✓	✓	10 - 120 %
27	ACTIVE POWER SUM	✓	✓	10 - 120 %
29	APPARENT POWER SUM	✓	✓	10 - 120 %
31	REACTIVE POWER SUM	✓	✓	10 - 120 %
32	POWER FACTOR AVG	✓	✓	10 - 90 % (3)
34	PHASE ANGLE AVG	✓	✓	10 - 90 % (2)
36	FREQUENCY	✓	✓	10 - 90% (1)
43	WATT DEMAND IMPORT	✓	✓	10 - 120 %
44	WATT MAX DEMAND IMP.	✓	✓	10 - 120 %
45	WATT DEMAND EXPORT	✓	✓	10 - 120 %
46	WATT MAX DEMAND EXP.	✓	✓	10 - 120 %
51	VA DEMAND	✓	✓	10 - 120 %
52	VA MAX DEMAND	✓	✓	10 - 120 %
53	CURRENT DEMAND	✓	✓	10 - 120 %
54	CURRENT MAX DEMAND	✓	✓	10 - 120 %
55	Relay Manual OFF Operation	✓	✓	NA
56	Relay Manual ON Operation	✓	✓	NA

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

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

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

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

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

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

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

NA : Not Applicable

3.6 User Assignable Modbus Registers:

This instrument contains the 20 user assignable registers in the address range of 0x2200 (38705) to 0x2226 (38743) (**see Table** 12).
Any of the parameter addresses (3X register addresses Table 1)) accessible in the instrument can be mapped to these 20 user assignable registers.
Parameters (3X registers addresses) that resides in different locations may be accessed by the single request by re-mapping them to adjacent address in the user assignable registers area.
The actual address of the parameters (3X registers addresses) which are to be assessed via address 0x2200 to 0x2226 are specified in 4x Register 0x2200 to 0x2213 (**see Table 13**).

Table 12 : User Assignable 3X Data Registers

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

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

Table 13 : User Assignable mapping register (4X registers)

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

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

Example :

Assigning parameter to user assignable registers

To access the voltage2 (3X address 0x0002) and Power Factor1 (3X address 0x001E) through user assignable register assign these addresses to 4x register (Table 13) 0x2200 and 0x2201 respectively .

Assigning Query:

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

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

Voltage 2 * (3X Address 0x0002)

Power Factor 1 * (3X Address 0x001E)

Response :

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

Reading Parameter data through User Assignable Registers:

In assigning query Voltage2 and Power Factor1 parameters were assigned to 0x 2200 and 0x2201(Table13) which will point to user assignable 3xregisters 0x2200 and 0x2202 (table12). So to read Voltage2 and PowerFactor1 data reading query should be as below.

Query:

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

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

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

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

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

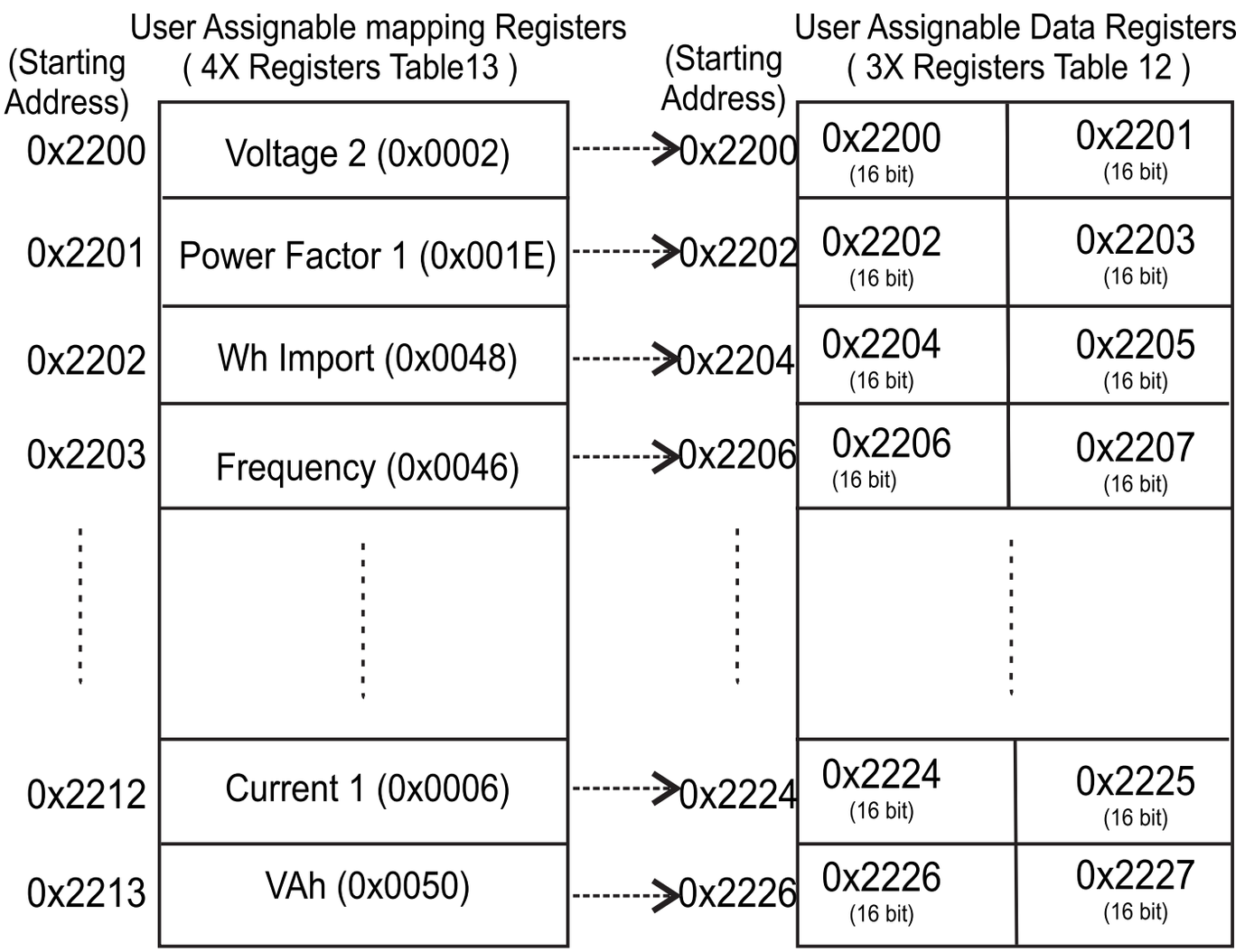
****Note : Two consecutive 16 bit register represent one parameter.**
Since two parameters are requested four registers are required

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

Device Address	01 (Hex)	
Function Code	04 (Hex)	
Byte count	08 (Hex)	
Data Register-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)	

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)**

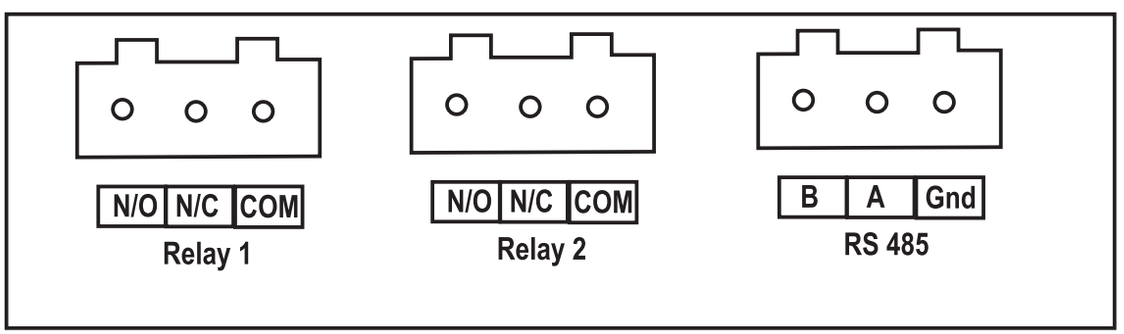
4. Connection for Optional RS 485 Output

(rear view of the instrument) :

1. RS 485 Output



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



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

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

Simpson

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