

ND25 POWER NETWORK METER



USER'S MANUAL FOR INTERFACE

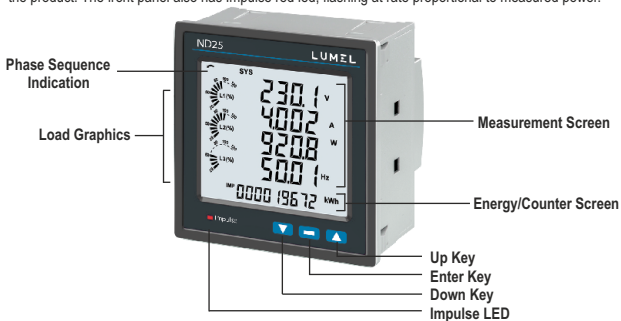
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1. Introduction

The Multifunction Energy Meter is a panel mounted 96 x 96mm DIN Quadratic Digital Panel Meter, which measures important electrical parameters in 3 ph 4 wire / 3 wire / 1ph Network and replaces the multiple analog panel meters. It measures electrical parameters like AC voltage, Current, Frequency, Power, Energy (Active / Reactive / Apparent), phase angle, power factor, individual harmonics & many more. The instrument integrates accurate measurement technology (All Voltages & current measurements are True RMS upto 31st Harmonic) with LCD display with backlit.

It can be configured & Programmed at site for the following :PT Primary, PT Secondary, CT Primary, CT Secondary , 3 Phase 3W, 3 Phase 4W, 1 Phase 2W system.

The front panel has three push buttons using which the user can scroll through different screens & configure the product. The front panel also has Impulse red led, flashing at rate proportional to measured power.



Operation via standard RS485 is also possible. Through this optional interface all the above mentioned parameters can be configured and programmed. For modbus 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 Meter for electrical variable through MODBUS over RS485.

2. Communication Parameter Selection Screen

While using USB port communication the Configuration must be :

Device address: 001

Baud rate : 57600

Parity : None

Stop bit: 1

2.1 Address Setting



This screen applies to the RS 485 output only. This screen allows the user to set RS 485 address for the meter.

The allowable range of addresses is 1 to 247.

Press "▲" key to advance to "RS 485 Baud Rate" screen (see Section 2.2) or press the "▼" key to advance to the "Quit Communication Parameters" screen (see Section 2.4).

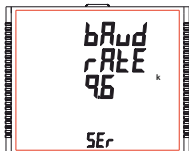


Press "■" to enter into edit mode, prompt for first digit. (Flashing digit indicates cursor position).

Press the "▲" and "▼" keys to scroll the value of the first digit. Press the "■" key to advance to next digit.

Similarly, enter second and third digits of address. After entering third digit, pressing "■" key confirms the selection and shows "Address Setting" screen (see Section 3.2.2.1).

2.2 RS 485 Baud Rate



This screen allows the user to set Baud Rate of RS 485 port. The values displayed on screen are in kbaud.

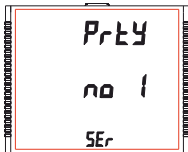
Pressing "▲" key accepts the present value and advance to the "RS 485 Parity Selection" screen (see Section 2.3) and pressing the "▼" key accepts the present value and advance to the "Address Setting" screen (see Section 2.1).

Pressing the "■" key advances to the "Baud Rate Edit" mode and "▲" & "▼" keys scrolls the value through **4.8, 9.6, 19.2, 38.4 and 57.6** kbaud.

Pressing the "■" key sets the value and shows the "RS 485 Baud Rate" screen (see Section 2.2).

2.3 RS 485 Parity

This screen allows the user to set Parity & number of stop bits of RS 485 port.

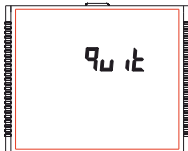


Pressing "▲" key accepts the present value and advances to "Quit Communication Parameters" screen (see section 2.4). Similarly, pressing "▼" key accepts the present value and advances to "RS 485 Baud Rate" screen (see section 2.2).

Pressing the "■" key advances to the "Parity & Stop bit Edit" mode & keys "▲" and "▼" scrolls the value through:
no 1 : no parity with one stop bit **no 2** : no parity with two stop bit
E : even parity with one stop bit **odd** : odd parity with one stop bit

Pressing "■" key sets the value and advances to "RS 485 Parity Selection" screen (see Section 2.3).

2.4 Quit Communication Parameters



This screen allows user to exit from system "Communication Parameter Selection" setup.

Pressing the "▲" key advances to "Communication Parameter Selection" screen (see Section 2.1).

Similarly, pressing the "▼" key advances to "RS 485 Parity" screen (see Section 2.3).

Pressing the "■" key advances to "Communication Parameter Selection" screen (see Section 2).

3. RS 485 (ModBus) Output :

THE MULTIFUNCTION INSTRUMENT supports MODBUS (RS485) RTU protocol (2-wire) .

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

RS 485 network supports maximum length of 1.2km. Including the Master, a maximum of 32 instruments can be connected in RS485 network. The permissible address range for The Meter is between 1 and 247 for 32 instruments. Broadcast Mode (address 0) is not allowed.

The maximum latency time of a Meter is 300 ms 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 300ms of time to elapse before assuming that the Meter is not going to respond. If slave does not respond within 300 ms, Master can ignore the previous query and can issue fresh query to the slave.

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 4800,9600,19200,38400,57600 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 3X and 4X register for reading measured values:

Two consecutive 16 bit registers represent one parameter. Refer **TABLE 1** for the addresses of 3X and 4X registers used for parameters measured by the instrument. Each parameter is held in the 3X as well as 4X registers. Modbus Code 04 and 03 are used to access all parameters in 3X and 4X registers respectively.

Example :

To read parameter,

Voltage2 from 3X:

Start address = 00 02

Number of registers = 02

Watt2 from 4X:

Start address = 00 0E

Number of registers = 02

Note : Number of registers = Number of parameters x 2

Each Query for reading the data must be restricted to 40 parameters or less. Exceeding the 40 parameter limit will cause a ModBus exception code to be returned.

Query for 3X read:

01 (Hex)	04 (Hex)	00 (Hex)	02(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

3X Response: Voltage 2 (219.254V)

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.

Query for 4X read:

01 (Hex)	03 (Hex)	00 (Hex)	0E(Hex)	00 (Hex)	02(Hex)	E0 (Hex)	C9 (Hex)
Device Address	Function Code	Start Address High	Start Address Low	Number of Registers Hi	Number of Registers Lo	CRC Low	CRC High

4X Response: Watt2 (2000 W)

01 (Hex)	03 (Hex)	04 (Hex)	44 (Hex)	FA (Hex)	00 (Hex)	00 (Hex)	CE (Hex)	F2 (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 : No. of Bytes Demanded by user in query.

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.

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 and 4 X register addresses for measured parameters

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30001	40001	1	V1	00	00	00	00
30003	40003	2	V2	00	02	00	02
30005	40005	3	V3	00	04	00	04
30007	40007	4	I1	00	06	00	06
30009	40009	5	I2	00	08	00	08
30011	40011	6	I3	00	0A	00	0A
30013	40013	7	W1	00	0C	00	0C
30015	40015	8	W2	00	0E	00	0E
30017	40017	9	W3	00	10	00	10
30019	40019	10	VA1	00	12	00	12
30021	40021	11	VA2	00	14	00	14
30023	40023	12	VA3	00	16	00	16
30025	40025	13	VAR1	00	18	00	18
30027	40027	14	VAR2	00	1A	00	1A
30029	40029	15	VAR3	00	1C	00	1C
30031	40031	16	PF1	00	1E	00	1E
30033	40033	17	PF2	00	20	00	20
30035	40035	18	PF3	00	22	00	22
30037	40037	19	Angle1	00	24	00	24
30039	40039	20	Angle2	00	26	00	26
30041	40041	21	Angle3	00	28	00	28
30043	40043	22	Volt Avg	00	2A	00	2A
30045	40045	23	Volt Sum	00	2C	00	2C
30047	40047	24	Current Avg	00	2E	00	2E
30049	40049	25	Current Sum	00	30	00	30
30051	40051	26	Watt Avg	00	32	00	32
30053	40053	27	Watt Sum	00	34	00	34
30055	40055	28	VA Avg	00	36	00	36
30057	40057	29	VA Sum	00	38	00	38
30059	40059	30	VAr Avg	00	3A	00	3A

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30061	40061	31	VAr Sum	00	3C	00	3C
30063	40063	32	PF Avg	00	3E	00	3E
30065	40065	33	PF Sum	00	40	00	40
30067	40067	34	Phase Angle Avg	00	42	00	42
30069	40069	35	Phase Angle Sum	00	44	00	44
30071	40071	36	Freq	00	46	00	46
30073	40073	37	Wh import	00	48	00	48
30075	40075	38	Wh export	00	4A	00	4A
30077	40077	39	VArh Capacitive	00	4C	00	4C
30079	40079	40	VArh Inductive	00	4E	00	4E
30081	40081	41	VAh	00	50	00	50
30085	40085	43	kW imp demand	00	54	00	54
30087	40087	44	max kW imp demand	00	56	00	56
30089	40089	45	kW exp demand	00	58	00	58
30091	40091	46	max kW exp demand	00	5A	00	5A
30093	40093	47	kVAr Cap. demand	00	5C	00	5C
30095	40095	48	max kVAr Cap. demand	00	5E	00	5E
30097	40097	49	kVAr Ind. demand	00	60	00	60
30099	40099	50	max kVAr Ind. demand	00	62	00	62
30101	40101	51	KVA demand	00	64	00	64
30103	40103	52	max KVA demand	00	66	00	66
30105	40105	53	current demand	00	68	00	68
30107	40107	54	max current demand	00	6A	00	6A
30109	40109	55	Wh import Overflow count	00	6C	00	6C
30111	40111	56	Wh Import	00	6E	00	6E
30113	40113	57	Wh export Overflow count	00	70	00	70
30115	40115	58	Wh export	00	72	00	72
30117	40117	59	VArh Cap. Overflow count	00	74	00	74
30119	40119	60	VArh Capacitive	00	76	00	76
30121	40121	61	VArh Ind. Overflow count	00	78	00	78

TABLE 1 : Continued...

Address (3X)	Address (4X)	Para. No.	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30123	40123	62	VARh Inductive	00	7A	00	7A
30125	40125	63	VAh Overflow count	00	7C	00	7C
30127	40127	64	VAh	00	7E	00	7E
30133	40133	67	System Voltage Max	00	84	00	84
30135	40135	68	System Voltage Min	00	86	00	86
30137	40137	69	RPM	00	88	00	88
30139	40139	70	Impulse Rate	00	8A	00	8A
30141	40141	71	System Current Max	00	8C	00	8C
30143	40143	72	System Current Min	00	8E	00	8E
30145	40145	73	Wh imp. depending on update rate*	00	90	00	90
30147	40147	74	Wh exp. depending on update rate*	00	92	00	92
30149	40149	75	VARh cap. depending on update rate*	00	94	00	94
30151	40151	76	VARh ind. depending on update rate*	00	96	00	96
30153	40153	77	VAh depending on update rate*	00	98	00	98
30157	40157	79	Wh imp OFC depending on update rate*	00	9C	00	9C
30159	40159	80	Wh exp OFC depending on update rate*	00	9E	00	9E
30161	40161	81	VARh Cap. OFC depending on update rate *	00	A0	00	A0
30163	40163	82	VARh Ind. OFC depending on update rate *	00	A2	00	A2
30165	40165	83	VAh OFC depending on update rate*	00	A4	00	A4
30169	40169	85	Old Wh imp OFC	00	A8	00	A8
30171	40171	86	Old Wh imp	00	AA	00	AA
30173	40173	87	Old Wh exp OFC	00	AC	00	AC
30175	40175	88	Old Wh exp	00	AE	00	AE
30177	40177	89	Old VARh Cap. OFC	00	B0	00	B0
30179	40179	90	Old VARh Cap.	00	B2	00	B2
30181	40181	91	Old VARh Ind.OFC	00	B4	00	B4
30183	40183	92	Old VARh Ind.	00	B6	00	B6
30185	40185	93	Old VAh OFC	00	B8	00	B8
30187	40187	94	Old VAh	00	BA	00	BA

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30201	40201	101	V12	00	C8	00	C8
30203	40203	102	V23	00	CA	00	CA
30205	40205	103	V31	00	CC	00	CC
30207	40207	104	VTHD-R	00	CE	00	CE
30209	40209	105	VTHD-Y	00	D0	00	D0
30211	40211	106	VTHD-B	00	D2	00	D2
30213	40213	107	ITHD-R	00	D4	00	D4
30215	40215	108	ITHD-Y	00	D6	00	D6
30217	40217	109	ITHD-B	00	D8	00	D8
30219	40219	110	System V-THD	00	DA	00	DA
30221	40221	111	System I-THD	00	DC	00	DC
30225	40225	113	Neutral Current	00	E0	00	E0
30227	40227	114	Run hour	00	E2	00	E2
30229	40229	115	On Hour	00	E4	00	E4
30231	40231	116	No. of interrupts	00	E6	00	E6
30251	40251	126	Old run hour	00	FA	00	FA
30255	40255	128	Old on hour	00	FE	00	FE
30263	40263	132	Old No. of int.	01	06	01	06
30267	40267	134	Relay 1 status	01	0A	01	0A
30269	40269	135	Relay 2 status	01	0C	01	0C
30271	40271	136	old max imp W demand	01	0E	01	0E
30273	40273	137	old max exp W demand	01	10	01	10
30275	40275	138	old max Cap. VARh demand	01	12	01	12
30277	40277	139	old max Ind. VARh demand	01	14	01	14
30279	40279	140	old max VA demand	01	16	01	16
30281	40281	141	old max A demand	01	18	01	18

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30293	40293	147	RTC Minute	01	24	01	24
30295	40295	148	RTC Hour	01	26	01	26
30297	40297	149	RTC Day	01	28	01	28
30299	40299	150	RTC Date	01	2A	01	2A
30301	40301	151	RTC Month	01	2C	01	2C
30303	40303	152	RTC Year	01	2E	01	2E
30305	40305	153	RTC Complete date	01	30	01	30
30307	40307	154	RTC Complete time	01	32	01	32
30333	40333	167	Phase indicate	01	4C	01	4C
30337	40337	169	Temperature	01	50	01	50
30345	40345	173	Power Down RTC Minute	01	58	01	58
30347	40347	174	Power Down RTC Hour	01	5A	01	5A
30349	40349	175	Power Down RTC Day	01	5C	01	5C
30351	40351	176	Power Down RTC Date	01	5E	01	5E
30353	40353	177	Power Down RTC Month	01	60	01	60
30355	40355	178	Power Down RTC Year	01	62	01	62
30357	40357	179	Timer 1 On delay	01	64	01	64
30359	40359	180	Timer 2 On delay	01	66	01	66
30361	40361	181	Timer 1 Off delay	01	68	01	68
30363	40363	182	Timer 2 Off delay	01	6A	01	6A
30365	40365	183	Timer 1 No. of Cycles	01	6C	01	6C
30367	40367	184	Timer 2 No. of Cycles	01	6E	01	6E
30401	40401	201	VR Harmonic-1	01	90	01	90
30403	40403	202	IR Harmonic-1	01	92	01	92
30405	40405	203	VR Harmonic-2	01	94	01	94

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30407	40407	204	IR Harmonic-2	01	96	01	96
30409	40409	205	VR Harmonic-3	01	98	01	98
30411	40411	206	IR Harmonic-3	01	9A	01	9A
30413	40413	207	VR Harmonic-4	01	9C	01	9C
30415	40415	208	IR Harmonic-4	01	9E	01	9E
30417	40417	209	VR Harmonic-5	01	A0	01	A0
30419	40419	210	IR Harmonic-5	01	A2	01	A2
30421	40421	211	VR Harmonic-6	01	A4	01	A4
30423	40423	212	IR Harmonic-6	01	A6	01	A6
30425	40425	213	VR Harmonic-7	01	A8	01	A8
30427	40427	214	IR Harmonic-7	01	AA	01	AA
30429	40429	215	VR Harmonic-8	01	AC	01	AC
30431	40431	216	IR Harmonic-8	01	AE	01	AE
30433	40433	217	VR Harmonic-9	01	B0	01	B0
30435	40435	218	IR Harmonic-9	01	B2	01	B2
30437	40437	219	VR Harmonic-10	01	B4	01	B4
30439	40439	220	IR Harmonic-10	01	B6	01	B6
30441	40441	221	VR Harmonic-11	01	B8	01	B8
30443	40443	222	IR Harmonic-11	01	BA	01	BA
30445	40445	223	VR Harmonic-12	01	BC	01	BC
30447	40447	224	IR Harmonic-12	01	BE	01	BE
30449	40449	225	VR Harmonic-13	01	C0	01	C0
30451	40451	226	IR Harmonic-13	01	C2	01	C2
30453	40453	227	VR Harmonic-14	01	C4	01	C4
30455	40455	228	IR Harmonic-14	01	C6	01	C6
30457	40457	229	VR Harmonic-15	01	C8	01	C8
30459	40459	230	IR Harmonic-15	01	CA	01	CA
30461	40461	231	VR Harmonic-16	01	CC	01	CC
30463	40463	232	IR Harmonic-16	01	CE	01	CE
30465	40465	233	VR Harmonic-17	01	D0	01	D0

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30467	40467	234	IR Harmonic-17	01	D2	01	D2
30469	40469	235	VR Harmonic-18	01	D4	01	D4
30471	40471	236	IR Harmonic-18	01	D6	01	D6
30473	40473	237	VR Harmonic-19	01	D8	01	D8
30475	40475	238	IR Harmonic-19	01	DA	01	DA
30477	40477	239	VR Harmonic-20	01	DC	01	DC
30479	40479	240	IR Harmonic-20	01	DE	01	DE
30481	40481	241	VR Harmonic-21	01	E0	01	E0
30483	40483	242	IR Harmonic-21	01	E2	01	E2
30485	40485	243	VR Harmonic-22	01	E4	01	E4
30487	40487	244	IR Harmonic-22	01	E6	01	E6
30489	40489	245	VR Harmonic-23	01	E8	01	E8
30491	40491	246	IR Harmonic-23	01	EA	01	EA
30493	40493	247	VR Harmonic-24	01	EC	01	EC
30495	40495	248	IR Harmonic-24	01	EE	01	EE
30497	40497	249	VR Harmonic-25	01	F0	01	F0
30499	40499	250	IR Harmonic-25	01	F2	01	F2
30501	40501	251	VR Harmonic-26	01	F4	01	F4
30503	40503	252	IR Harmonic-26	01	F6	01	F6
30505	40505	253	VR Harmonic-27	01	F8	01	F8
30507	40507	254	IR Harmonic-27	01	FA	01	FA
30509	40509	255	VR Harmonic-28	01	FC	01	FC
30511	40511	256	IR Harmonic-28	01	FE	01	FE
30513	40513	257	VR Harmonic-29	02	00	02	00
30515	40515	258	IR Harmonic-29	02	02	02	02
30517	40517	259	VR Harmonic-30	02	04	02	04
30519	40519	260	IR Harmonic-30	02	06	02	06
30521	40521	261	VR Harmonic-31	02	08	02	08
30523	40523	262	IR Harmonic-31	02	0A	02	0A
30525	40525	263	VR Harmonic-32	02	0C	02	0C

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30527	40527	264	IR Harmonic-32	02	0E	02	0E
30529	40529	265	VY Harmonic-1	02	10	02	10
30531	40531	266	IY Harmonic-1	02	12	02	12
30533	40533	267	VY Harmonic-2	02	14	02	14
30535	40535	268	IY Harmonic-2	02	16	02	16
30537	40537	269	VY Harmonic-3	02	18	02	18
30539	40539	270	IY Harmonic-3	02	1A	02	1A
30541	40541	271	VY Harmonic-4	02	1C	02	1C
30543	40543	272	IY Harmonic-4	02	1E	02	1E
30545	40545	273	VY Harmonic-5	02	20	02	20
30547	40547	274	IY Harmonic-5	02	22	02	22
30549	40549	275	VY Harmonic-6	02	24	02	24
30551	40551	276	IY Harmonic-6	02	26	02	26
30553	40553	277	VY Harmonic-7	02	28	02	28
30555	40555	278	IY Harmonic-7	02	2A	02	2A
30557	40557	279	VY Harmonic-8	02	2C	02	2C
30559	40559	280	IY Harmonic-8	02	2E	02	2E
30561	40561	281	VY Harmonic-9	02	30	02	30
30563	40563	282	IY Harmonic-9	02	32	02	32
30565	40565	283	VY Harmonic-10	02	34	02	34
30567	40567	284	IY Harmonic-10	02	36	02	36
30569	40569	285	VY Harmonic-11	02	38	02	38
30571	40571	286	IY Harmonic-11	02	3A	02	3A
30573	40573	287	VY Harmonic-12	02	3C	02	3C
30575	40575	288	IY Harmonic-12	02	3E	02	3E
30577	40577	289	VY Harmonic-13	02	40	02	40
30579	40579	290	IY Harmonic-13	02	42	02	42
30581	40581	291	VY Harmonic-14	02	44	02	44
30583	40583	292	IY Harmonic-14	02	46	02	46
30585	40585	293	VY Harmonic-15	02	48	02	48

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30587	40587	294	IY Harmonic-15	02	4A	02	4A
30589	40589	295	VY Harmonic-16	02	4C	02	4C
30591	40591	296	IY Harmonic-16	02	4E	02	4E
30593	40593	297	VY Harmonic-17	02	50	02	50
30595	40595	298	IY Harmonic-17	02	52	02	52
30597	40597	299	VY Harmonic-18	02	54	02	54
30599	40599	300	IY Harmonic-18	02	56	02	56
30601	40601	301	VY Harmonic-19	02	58	02	58
30603	40603	302	IY Harmonic-19	02	5A	02	5A
30605	40605	303	VY Harmonic-20	02	5C	02	5C
30607	40607	304	IY Harmonic-20	02	5E	02	5E
30609	40609	305	VY Harmonic-21	02	60	02	60
30611	40611	306	IY Harmonic-21	02	62	02	62
30613	40613	307	VY Harmonic-22	02	64	02	64
30615	40615	308	IY Harmonic-22	02	66	02	66
30617	40617	309	VY Harmonic-23	02	68	02	68
30619	40619	310	IY Harmonic-23	02	6A	02	6A
30621	40621	311	VY Harmonic-24	02	6C	02	6C
30623	40623	312	IY Harmonic-24	02	6E	02	6E
30625	40625	313	VY Harmonic-25	02	70	02	70
30627	40627	314	IY Harmonic-25	02	72	02	72
30629	40629	315	VY Harmonic-26	02	74	02	74
30631	40631	316	IY Harmonic-26	02	76	02	76
30633	40633	317	VY Harmonic-27	02	78	02	78
30635	40635	318	IY Harmonic-27	02	7A	02	7A
30637	40637	319	VY Harmonic-28	02	7C	02	7C
30639	40639	320	IY Harmonic-28	02	7E	02	7E
30641	40641	321	VY Harmonic-29	02	80	02	80
30643	40643	322	IY Harmonic-29	02	82	02	82
30645	40645	323	VY Harmonic-30	02	84	02	84

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30647	40647	324	IY Harmonic-30	02	86	02	86
30649	40649	325	VY Harmonic-31	02	88	02	88
30651	40651	326	IY Harmonic-31	02	8A	02	8A
30653	40653	327	VY Harmonic-32	02	8C	02	8C
30655	40655	328	IY Harmonic-32	02	8E	02	8E
30657	40657	329	VB Harmonic-1	02	90	02	90
30659	40659	330	IB Harmonic-1	02	92	02	92
30661	40661	331	VB Harmonic-2	02	94	02	94
30663	40663	332	IB Harmonic-2	02	96	02	96
30665	40665	333	VB Harmonic-3	02	98	02	98
30667	40667	334	IB Harmonic-3	02	9A	02	9A
30669	40669	335	VB Harmonic-4	02	9C	02	9C
30671	40671	336	IB Harmonic-4	02	9E	02	9E
30673	40673	337	VB Harmonic-5	02	A0	02	A0
30675	40675	338	IB Harmonic-5	02	A2	02	A2
30677	40677	339	VB Harmonic-6	02	A4	02	A4
30679	40679	340	IB Harmonic-6	02	A6	02	A6
30681	40681	341	VB Harmonic-7	02	A8	02	A8
30683	40683	342	IB Harmonic-7	02	AA	02	AA
30685	40685	343	VB Harmonic-8	02	AC	02	AC
30687	40687	344	IB Harmonic-8	02	AE	02	AE
30689	40689	345	VB Harmonic-9	02	B0	02	B0
30691	40691	346	IB Harmonic-9	02	B2	02	B2
30693	40693	347	VB Harmonic-10	02	B4	02	B4
30695	40695	348	IB Harmonic-10	02	B6	02	B6
30697	40697	349	VB Harmonic-11	02	B8	02	B8
30699	40699	350	IB Harmonic-11	02	BA	02	BA
30701	40701	351	VB Harmonic-12	02	BC	02	BC
30703	40703	352	IB Harmonic-12	02	BE	02	BE
30705	40705	353	VB Harmonic-13	02	C0	02	C0

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30707	40707	354	IB Harmonic-13	02	C2	02	C2
30709	40709	355	VB Harmonic-14	02	C4	02	C4
30711	40711	356	IB Harmonic-14	02	C6	02	C6
30713	40713	357	VB Harmonic-15	02	C8	02	C8
30715	40715	358	IB Harmonic-15	02	CA	02	CA
30717	40717	359	VB Harmonic-16	02	CC	02	CC
30719	40719	360	IB Harmonic-16	02	CE	02	CE
30721	40721	361	VB Harmonic-17	02	D0	02	D0
30723	40723	362	IB Harmonic-17	02	D2	02	D2
30725	40725	363	VB Harmonic-18	02	D4	02	D4
30727	40727	364	IB Harmonic-18	02	D6	02	D6
30729	40729	365	VB Harmonic-19	02	D8	02	D8
30731	40731	366	IB Harmonic-19	02	DA	02	DA
30733	40733	367	VB Harmonic-20	02	DC	02	DC
30735	40735	368	IB Harmonic-20	02	DE	02	DE
30737	40737	369	VB Harmonic-21	02	E0	02	E0
30739	40739	370	IB Harmonic-21	02	E2	02	E2
30741	40741	371	VB Harmonic-22	02	E4	02	E4
30743	40743	372	IB Harmonic-22	02	E6	02	E6
30745	40745	373	VB Harmonic-23	02	E8	02	E8
30747	40747	374	IB Harmonic-23	02	EA	02	EA
30749	40749	375	VB Harmonic-24	02	EC	02	EC
30751	40751	376	IB Harmonic-24	02	EE	02	EE
30753	40753	377	VB Harmonic-25	02	F0	02	F0
30755	40755	378	IB Harmonic-25	02	F2	02	F2
30757	40757	379	VB Harmonic-26	02	F4	02	F4
30759	40759	380	IB Harmonic-26	02	F6	02	F6
30761	40761	381	VB Harmonic-27	02	F8	02	F8
30763	40763	382	IB Harmonic-27	02	FA	02	FA
30765	40765	383	VB Harmonic-28	02	FC	02	FC

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30767	40767	384	IB Harmonic-28	02	FE	02	FE
30769	40769	385	VB Harmonic-29	03	00	03	00
30771	40771	386	IB Harmonic-29	03	02	03	02
30773	40773	387	VB Harmonic-30	03	04	03	04
30775	40775	388	IB Harmonic-30	03	06	03	06
30777	40777	389	VB Harmonic-31	03	08	03	08
30779	40779	390	IB Harmonic-31	03	0A	03	0A
30781	40781	391	VB Harmonic-32	03	0C	03	0C
30783	40783	392	IB Harmonic-32	03	0E	03	0E

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

2. Relay Output 1/ 2 Status shows whether relay is Energized or De-energized.

1 :- Relay Energized

0:- Relay De-energized

TABLE 2 : 3X and 4X register addresses for 32-bit Integer Energy

Address (3X)	Address (4X)	Parameter	Start Address Hex 3X		Start Address Hex	
			Hi Byte	Lo Byte	Hi Byte	Lo Byte
30801	40801	Active Energy Import	03	20	03	20
30803	40803	Active Energy Export	03	22	03	22
30805	40805	Reactive Energy Capacitive	03	24	03	24
30807	40807	Reactive Energy Inductive	03	26	03	26
30809	40809	Apparent Energy	03	28	03	28
30813	40813	Active Energy Import Overflow Count	03	2C	03	2C
30815	40815	Active Energy Export Overflow Count	03	2E	03	2E
30817	40817	Reactive Energy Cap. Overflow Count	03	30	03	30
30819	40819	Reactive Energy Ind. Overflow Count	03	32	03	32
30821	40821	Apparent Energy Overflow Count	03	34	03	34
30825	40825	Active Energy Import on time*	03	38	03	38
30827	40827	Active Energy Export on time*	03	3A	03	3A
30829	40829	Reactive Energy Cap. on time*	03	3C	03	3C

TABLE 2 : 3X and 4X register addresses for 32-bit Integer Energy

Address (3X)	Address (4X)	Parameter	Start Address Hex 3X		Start Address Hex	
			Hi Byte	Lo Byte	Hi Byte	Lo Byte
30831	40831	Reactive Energy Imp. on time*	03	3E	03	3E
30833	40833	Apparent Energy on time*	03	40	03	40
30837	40837	Active Energy Imp Overflow Count on time*	03	44	03	44
30839	40839	Active Energy Exp Overflow Count on time*	03	46	03	46
30841	40841	Reac. Energy Cap. Overflow Count on time*	03	48	03	48
30843	40843	Reac. Energy Ind. Overflow Count on time*	03	4A	03	4A
30845	40845	Apparent Energy Overflow Count on time*	03	4C	03	4C
30849	40849	Old Active Energy Import Overflow Count	03	50	03	50
30851	40851	Old Active Energy Import	03	52	03	52
30853	40853	Old Active Energy Export Overflow Count	03	54	03	54
30855	40855	Old Active Energy Export	03	56	03	56
30857	40857	Old Reactive Energy Cap. Overflow Count	03	58	03	58
30859	40859	Old Reactive Energy Cap.	03	5A	03	5A
30861	40861	Old Reac. Energy Ind. Overflow Count	03	5C	03	5C
30863	40863	Old Reac. Energy Inductive	03	5E	03	5E
30865	40865	Old Apparent Energy Overflow Count	03	60	03	60
30867	40867	Old Apparent Energy	03	62	03	62

***Note:**

1. The values are updated depending on update rate which is settable by user.

For example, if user set update rate 15 min, then the values on these registers (marked with *) will get updated on every 15 min.

3.2 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 3** for 4X Register addresses.

Example: Reading System type

System type: Start address = 177A (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	17 (Hex)
Start Address Low	7A (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 = 177A (Hex)

Number of registers = 02

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

Device Address	01 (Hex)
Function Code	10 (Hex)
Starting Address Hi	17 (Hex)
Starting Address Lo	7A(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	17 (Hex)
Start Address Low	7A(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 3 : 4 X register addresses

Address (Register)	Parameter No.	Parameter	Read/ Write	Modbus Start Addr. Hex		Default Value
				High Byte	Low Byte	
46003	1	Demand integration time	R/Wp	17	72	8
46005	2	Energy Resolution / unit	R/Wp	17	74	2
46007	3	System nominal Voltage	R	17	76	415
46009	4	System nominal Current	R	17	78	5
46011	5	System type	R/Wp	17	7A	3
46013	6	Pulse width	R/Wp	17	7C	100
46015	7	Reset parameters	R/Wp	17	7E	0
46017	8	No. of poles	R/Wp	17	80	2
46019	9	RS485 setup code	R/Wp	17	82	4
46021	10	Node address	R/Wp	17	84	1
46023	11	Pulse divisor	R/Wp	17	86	1
46033	16	PT primary	R/Wp	17	90	415
46035	17	CT primary	R/Wp	17	92	5
46037	18	System Power	R	17	94	2075
46039	19	Energy digit reset count	R/Wp	17	96	8
46041	20	Register Order/Word Order	R/Wp	17	98	0
46043	21	CTSecondary	R/Wp	17	9A	5
46045	22	PTSecondary	R/Wp	17	9C	415
46047	23	Relay1 output select	R/Wp	17	9E	0
46049	24	Pulse1/Limit1 Parameter select	R/Wp	17	A0	0
46051	25	Limit1 Trip point	R/Wp	17	A2	100
46053	26	Hysteresis(Limit1)	R/Wp	17	A4	0.5
46055	27	Limit1 delay(On)	R/Wp	17	A6	1
46057	28	Limit1 delay(Off)	R/Wp	17	A8	1
46059	29	Relay2 output select	R/Wp	17	AA	0
46061	30	Pulse2/Limit2 Parameter select	R/Wp	17	AC	0
46063	31	Limit2 Trip point	R/Wp	17	AE	100
46065	32	Hysteresis(Limit2)	R/Wp	17	B0	0.5

TABLE 3 : continued...

Address (Register)	Parameter No.	Parameter	Read/ Write	Modbus Start Addr. Hex		Default Value
				High Byte	Low Byte	
46067	33	Limit2 delay(On)	R/Wp	17	B2	1
46069	34	Limit2 delay(Off)	R/Wp	17	B4	1
46071	35	Password	R/Wp	17	B6	0000
46073	36	Limit1 Configuration select	R/Wp	17	B8	0
46075	37	Limit2 Configuration select	R/Wp	17	BA	0
46077	38	Auto scroll	R/Wp	17	BC	0
46079	39	30mA Noise cutoff	R/Wp	17	BE	0
46081	40	Update rate on MODBUS	R/Wp	17	C0	15
46083	41	Factory Reset Mode	R/Wp	17	C2	0
46087	43	System Frequency selection	R/Wp	17	C6	50
46089	44	Impulse on Energy Selection	R/Wp	17	C8	1
46091	45	EnergyPara Select	R/Wp	17	CA	0
46093	46	Enter Energy Start Count	R/Wp	17	CC	0
46095	47	Timer 1 Start stop	R/Wp	17	CE	0
46097	48	Timer 2 Start stop	R/Wp	17	D0	0
46127	63	RTC Complete Date	R/Wp	17	EE	-
46129	64	RTC Complete Time	R/Wp	17	F0	-
46131	65	RTC Day of week	R	17	F2	0
46133	66	Backlite ON/OFF	R/Wp	17	F4	1
46135	67	Contrast	R/Wp	17	F6	3
46137	68	User screen enable	R/Wp	17	F8	0
46139	69	User screen1	R/Wp	17	FA	1
46141	70	User screen2	R/Wp	17	FC	2
46143	71	User screen3	R/Wp	17	FE	3
46145	72	User screen4	R/Wp	18	00	4
46147	73	User screen5	R/Wp	18	02	5
46149	74	User screen6	R/Wp	18	04	6
46151	75	User screen7	R/Wp	18	06	7
46153	76	User screen8	R/Wp	18	08	8

TABLE 3 : continued...

Address (Register)	Parameter No.	Parameter	Read/ Write	Modbus Start Addr. Hex		Default Value
				High Byte	Low Byte	
46155	77	User screen9	R/Wp	18	0A	9
46157	78	User screen10	R/Wp	18	0C	10
46177	88	Serial number	R	18	0E	-
46179	89	Model No	R	18	22	-
46181	90	Version no.	R	18	24	-
46183	91	Restart / Reboot Meter	R/Wp	18	26	0
46185	92	Event-based Datalog Select	R/Wp	18	28	0
46187	93	Time-based Datalog Select	R/Wp	18	2A	0
46189	94	Time-based Datalog Interval Selection	R/Wp	18	2C	1
46191	95	Logging Parameter Count	R/Wp	18	2E	1
46193	96	Datalog Parameter 1	R/Wp	18	30	0
46195	97	Datalog Parameter 2	R/Wp	18	32	0
46197	98	Datalog Parameter 3	R/Wp	18	34	0
46199	99	Datalog Parameter 4	R/Wp	18	36	0
46201	100	Datalog Parameter 5	R/Wp	18	38	0
46203	101	Datalog Parameter 6	R/Wp	18	3A	0
46205	102	Datalog Parameter 7	R/Wp	18	3C	0
46207	103	Datalog Parameter 8	R/Wp	18	3E	0
46209	104	Datalog Parameter 9	R/Wp	18	40	0
46211	105	Datalog Parameter 10	R/Wp	18	42	0
46213	106	Datalog Parameter 11	R/Wp	18	44	0
46215	107	Datalog Parameter 12	R/Wp	18	46	0
46217	108	Datalog Parameter 13	R/Wp	18	48	0
46219	109	Datalog Parameter 14	R/Wp	18	4A	0
46221	110	Datalog Parameter 15	R/Wp	18	4C	0
46223	111	Datalog Parameter 16	R/Wp	18	4E	0
46225	112	Datalog Parameter 17	R/Wp	18	50	0
46227	113	Datalog Parameter 18	R/Wp	18	52	0
46229	114	Datalog Parameter 19	R/Wp	18	54	0
46231	115	Datalog Parameter 20	R/Wp	18	56	0

TABLE 3 : continued...

Address (Register)	Parameter No.	Parameter	Read/ Write	Modbus Start Addr. Hex		Default Value
				High Byte	Low Byte	
46233	116	Datalog Parameter 21	R/Wp	18	58	0
46235	117	Datalog Parameter 22	R/Wp	18	5A	0
46237	118	Datalog Parameter 23	R/Wp	18	5C	0
46239	119	Datalog Parameter 24	R/Wp	18	5E	0
46241	120	Datalog Parameter 25	R/Wp	18	60	0
46243	121	Datalog Parameter 26	R/Wp	18	62	0
46245	122	Datalog Parameter 27	R/Wp	18	64	0
46247	123	Datalog Parameter 28	R/Wp	18	66	0
46249	124	Datalog Parameter 29	R/Wp	18	68	0
46251	125	Datalog Parameter 30	R/Wp	18	6A	0
46253	126	Load Profile Datalog Select	R/Wp	18	6C	0
46255	127	Start Date of Load Profile Datalog	R	18	6E	0
46265	132	Old Parameters Enable disable	R/Wp	18	78	0

NOTE: Wp - Write protected , R - Read only , R/Wp - Read & Write protected

Explanation for 4 X register :

NOTE: Writing any invalid values (non-applicable values) to any of the following locations will result in modbus error.

Address	Parameter	Description
46003	Demand Integration Time	Demand period represents demand time in minutes. The applicable values are 8,15,20 or 30.
46005	Energy Output	This address is used to set energy output 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.
46007	System Voltage	This address is read only and displays System Nominal Voltage
46009	System Current	This address is read only and displays System Nominal Current
46011	System Type	This address is used to set the System type. Write one of the following value to this address. 1: 1 Phase 2 Wire 2: 3 Phase 3 Wire 3: 3 Phase 4 Wire.

Address	Parameter	Description
46013	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
46015	Reset Parameters	This address is used to reset different parameters. Write specific value to this register to reset the corresponding parameter. Following are the values to reset various data. 1 : Energy Reset 2 : Demand Reset 3 : System Min Values Reset 4 : System Max Values Reset 5 : Run hour & On hour Reset 6 : No of Interruptions Reset 7 : Reset All data 8 : Time Datalog 9 : Load Profile Datalog
46017	Number of Poles	This address is used to set the no. of poles of generator of which RPM is to be measured. The value must be between 2 to 40 and a multiple of 2.
46019	Rs485 Set-up Code	This address is used to set the baud rate, Parity and Number of stop bits. Refer to TABLE 4 for details.
46021	Node Address	This register address is used to set Device address between 1 and 247 .
46023	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 & In kWh or MWh divisor will be 1 default .
46033	PT Primary	This address allows the user to set PT Primary value (in terms of VL-L). The settable range is 100 VL-L to 1200 kVL-L for all system types & also depends on the per phase 1000 MVA Restriction of power combined with CT primary.
46035	CT Primary	This address allows the user to set CT Primary value. The settable range is 1 to 9999. It also depends on the per phase 1000 MVA Restriction of power combined with PT primary.
46037	Sys Power	System Power (Read Only) is the Nominal system power based on the values of Nominal system volts and Nominal system current.

Address	Parameter	Description
46039	Energy Digit Reset Count	This address is used to set Energy Digit Reset Count value. Energy count can be configured to reset in between 7 to 9.
46041	Word Order	Word Order controls the order in which Multifunction Meter 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.
46043	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
46045	PT secondary	This address is used to read and write the PT secondary value. The settable range is 100-600VLL.
46047	Relay 1 output select	This address is used to select the Relay operation as Pulse/Timer/RTC Relay/Limit. Write one of the following values to this address. 0: Pulse output on Relay 10 (Decimal): Timer mode for Relay 40 (Decimal): RTC mode for Relay. 128 (Decimal): Limit output on Relay.
46049	Relay 1 Para select/ No. of Cycles/ Weekly repeat	This address is used to assign the Parameter to Relay. Pulse relay: Refer TABLE 5 Timer relay: Refer TABLE 6 RTC relay: Refer TABLE 7 Limit relay: Refer TABLE 8
46051	Limit 1 Trip Point	This address is used to set the trip point in %. Any value between 10 to 100 for Lo- alarm & 10 to 120 for Hi-alarm can be written to this address. For energy parameters, the valid range id 10-9999999. (refer TABLE 8).
46053	Limit 1 Hysteresis	This address is used to set the hysteresis between 0.5 to 50.0%.
46055	Relay 1 On (Energize) Delay/ On Time	This address is used to set the Energizing delay or On delay in seconds in range of 1 to 9999. For RTC Relay this range is 00.00 to 23.59.

Address	Parameter	Description
46057	Relay 1 Off (De-Energize) Delay/ Off Time	This address is used to set the De-energizing delay or Off delay in seconds in range of 1 to 9999. For RTC Relay this range is 00.00 to 23.59.
46059	Relay 2 output select	Same as Relay 1.
46061	Relay 2 Para select/ No. of Cycles/ Weekly repeat	
46063	Limit 2 Trip Point	
46065	Limit 2 Hysteresis	
46067	Relay 2 On (Energize) Delay/ On Time	
46069	Relay 2 Off (De-Energize) Delay/ Off Time	
46071	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.
46073	Relay 1 Configuration Select	This address is used to set the Configuration for Relay 1 Refer TABLE 9 .
46075	Limit 2 Configuration Select	This address is used to set the Configuration for Relay 2 Refer TABLE 9 .

Address	Parameter	Description
46077	Auto scroll	This address is used to activate or de-activate the auto scrolling. Write 0 : Deactivate 1 : Activate
46079	30mA Noise current Elimination	This address is used to activate or de-activate the 30 mA noise current elimination write 0 : Deactivate 30 (Decimal): Activate
46081	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.
46083	Factory Reset	This address allows the user to reset the instrument to factory settings. Refer the Default Values in TABLE 3 for factory settings. Write 5555 at this address to reset the instrument.
46087	System Frequency Selection	This address is used to set the frequency of the input. Write 50 : For 50 Hz input 60 : For 60Hz input
46089	Impulse Selection	This address is used to select the energy to which impulse is to be assigned. Writing any other value will return an error. 0 : None 1 : Active Energy 2 : Reactive Energy 3 : Apparent Energy
46091	Energy Parameter Selection	This address is used to select the parameter whose start count (initial value) is to be set. Refer TABLE 10 .
46093	Energy Start Count	This address is used to set the start count of the parameter selected in address 46091. The start count of the parameter should be in the range specified in TABLE 10 .
46095	Timer 1 Start/ Stop	This address is used to start/stop the timer for Relay 1 in timer mode with following options: 0 : Stop 1 : Start
46097	Timer 2 Start/ Stop	This address is used to start/stop the timer for Relay 2 in timer mode with following options: 0 : Stop 1 : Start

Address	Parameter	Description
46127	RTC Complete Date	This address is used to read and write full date in "ddmmyy" format from RTC.
46129	RTC Complete Time	This address is used to read and write complete time in "hh.mm" format from RTC.
46131	RTC Day of week.	This address is used to read the day of the week for the present date with following values: 1:Sunday 2:Monday 3:Tuesday 4:Wednesday 5:Thursday 6:Friday 7:Saturday
46133	Backlit ON/OFF	This address is used to turn On or turn Off the backlit. 1: Backlit On 0: Backlit Off
46135	Contrast	This address is used to change the contrast of the display. The options available are 1 to 4 , in increasing order of contrast.
46137	User Assignable Screen On/Off	This address is used to activate or deactivate the User Assignable Screen feature. 0: Deactivate 1 to 10: Corresponding number of user assignable screens.
46139 to 46157	User Screens 1 to 10	These addresses are used to assign the screen numbers to user screens 1 to 10 respectively. Refer to TABLE 11 and 12 for screen numbers.
46177	Serial Number	This address is read only and displays the serial number of the meter.
46179	Model Number	This address is read only and displays the model number of the meter.
46181	Version Number	This address is read only and displays the version number of the meter.
46183	Restart Meter	This register can be used to restart the meter by writing 1.
46185	Event Based Datalog Select	This register is used to enable or disable event based datalogging. 0: Disabled 1: Enabled
46187	Time Based Datalog Select	This register is used to enable or disable time based datalogging. 0: Disabled 1: Enabled

Address	Parameter	Description
46189	Time Based Datalog Interval Selection	This address is used to read and write the interval between consecutive time log entries in minutes. Valid value range 1-60
46191	Logging Parameter Count	This value decides the number of parameters to be logged in time based datalogging. The value ranges from 1 to 30 .
46193-46251	Datalog Parameter 1 to 30	These addresses are used to read and write the parameters to be logged in time based logging. For valid values, refer TABLE 13 .
46253	Load Profile Datalog Select	The address is used to start/stop Load Profile Datalogging. 0 : Start Load Profile datalogging 1 : Stop Load Profile datalogging
46255	Start Date of Load Profile Datalog	This value show the starting date for Load Profile datalog. This address are read only.
46265	Old Parameters Enable/Disable	The address is used to enable/disable the showing of Old Parameter Screens. Refer TABLE 11 (or TABLE 12) for Old parameter screens.

NOTE:

Changing system type, PT/CT ratio, Energy Output, Energy Digit Reset Count will reset the energy.

TABLE 4 : RS 485 Set-up Code

Baud Rate	Parity	Stop Bit	Decimal value
4800	NONE	01	0
4800	NONE	02	1
4800	EVEN	01	2
4800	ODD	01	3
9600	NONE	01	4
9600	NONE	02	5
9600	EVEN	01	6
9600	ODD	01	7
19200	NONE	01	8
19200	NONE	02	9
19200	EVEN	01	10
19200	ODD	01	11
38400	NONE	01	12
38400	NONE	02	13
38400	EVEN	01	14
38400	ODD	01	15
57600	NONE	01	16
57600	NONE	02	17
57600	EVEN	01	18
57600	ODD	01	19

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

TABLE 5 : Pulse Configuration select

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

TABLE 6: Number of Cycles for Timer Relay

Code	Description
0	Unlimited
1 to 9999	Fixed Cycles

TABLE 7: Weekly Repeat for RTC Relay

Code	Description
1XXXXXXX	Eg 11010000 means relay will operate only on Sun & Tue
	1 = Sunday, 7 = Saturday

TABLE 8 : Parameters for Limit output

Parameter No.	Parameter	3P 4W	3P 3W	1P 2W	Trip Point Set Range	100% Value
0	None	✓	✓	✓	-	-
1	Volts 1	✓	✓	✓	10 - 120 %	Vnom (L-N)
2	Volts 2	✓	✓	✗	10 - 120 %	Vnom (L-N)
3	Volts 3	✓	✓	✗	10 - 120 %	Vnom (L-N)
4	IL1	✓	✓	✓	10 - 120 %	Inom
5	IL2	✓	✓	✗	10 - 120 %	Inom
6	IL3	✓	✓	✗	10 - 120 %	Inom
7	W1	✓	✗	✓	10 - 120 %	Nom ⁽³⁾
8	W2	✓	✗	✗	10 - 120 %	Nom ⁽³⁾
9	W3	✓	✗	✗	10 - 120 %	Nom ⁽³⁾
10	Va1	✓	✗	✓	10 - 120 %	Nom ⁽³⁾
11	Va2	✓	✗	✗	10 - 120 %	Nom ⁽³⁾
12	Va3	✓	✗	✗	10 - 120 %	Nom ⁽³⁾
13	Var1	✓	✗	✓	10 - 120 %	Nom ⁽³⁾
14	Var2	✓	✗	✗	10 - 120 %	Nom ⁽³⁾
15	VAr3	✓	✗	✗	10 - 120 %	Nom ⁽³⁾
16	PF1 *	✓	✗	✓	10 - 90 %	90°
17	PF2 *	✓	✗	✗	10 - 90 %	90°
18	PF3 *	✓	✗	✗	10 - 90 %	90°
19	PA1 *	✓	✗	✓	10 - 90 %	360°
20	PA2 *	✓	✗	✗	10 - 90 %	360°
21	PA3 *	✓	✗	✗	10 - 90 %	360°
22	Volts Ave.	✓	✓	✗	10 - 120 %	Vnom ⁽²⁾
24	Current Ave.	✓	✓	✗	10 - 120 %	Inom
27	Watts sum	✓	✓	✗	10 - 120 %	Nom ⁽³⁾
29	VA sum	✓	✓	✗	10 - 120 %	Nom ⁽³⁾
31	VAr sum	✓	✓	✗	10 - 120 %	Nom ⁽³⁾
32	PF Ave.	✓	✓	✗	10 - 90 %	90°
34	PA Ave.	✓	✓	✗	10 - 90 %	360°
36	Freq.	✓	✓	✓	10 - 90 %	66 Hz ⁽¹⁾
37	Wh Import	✓	✓	✓	10 - 9999999	-

TABLE 8: Continued...

Parameter No.	Parameter	3P 4W	3P 3W	1P 2W	Trip Point Set Range	100% Value
38	Wh Export	✓	✓	✓	10 - 9999999	-
39	VAr Capacitive	✓	✓	✓	10 - 9999999	-
40	VAr Inductive	✓	✓	✓	10 - 9999999	-
41	VA	✓	✓	✓	10 - 9999999	-
43	Watt Demand Imp.*	✓	✓	✓	10 - 120 %	Nom ⁽³⁾
44	Watt Max Demand Imp.*	✓	✓	✓	10 - 120 %	Nom ⁽³⁾
45	Watt Demand Exp.*	✓	✓	✓	10 - 120 %	Nom ⁽³⁾
46	Watt Demand Max Exp.*	✓	✓	✓	10 - 120 %	Nom ⁽³⁾
47	VAr Demand Cap.*	✓	✓	✓	10 - 120 %	Nom ⁽³⁾
48	VAr Max Demand Cap.*	✓	✓	✓	10 - 120 %	Nom ⁽³⁾
49	VAr Demand Ind.*	✓	✓	✓	10 - 120 %	Nom ⁽³⁾
50	VAr Demand Max Ind.*	✓	✓	✓	10 - 120 %	Nom ⁽³⁾
51	VA Demand*	✓	✓	✓	10 - 120 %	Nom ⁽³⁾
52	VA Max Demand*	✓	✓	✓	10 - 120 %	Nom ⁽³⁾
53	Current Demand*	✓	✓	✓	10 - 120 %	Inom
54	Current Max Demand*	✓	✓	✓	10 - 120 %	Inom
101	VL1-L2	✓	✗	✗	10 - 120 %	Vnom (L-L)
102	VL2-L3	✓	✗	✗	10 - 120 %	Vnom (L-L)
103	VL3-L1	✓	✗	✗	10 - 120 %	Vnom (L-L)
113	I Neutral	✓	✗	✗	10 - 120 %	Inom
114	Relay Manual OFF	✓	✓	✓	1	-
115	Relay Manual ON	✓	✓	✓	1	-

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

***Note :** Parameters marked are not applicable for the Lower Model.

- (1) For Frequency 0% corresponds to 45 Hz and 100% corresponds to 66 Hz.
- (2) For 3P 4W and 1P2W the nominal value is VLN and that for 3P 3W is VLL.
- (3) Nominal Value for power is calculated from Nominal Voltage and current values.
- (4) Nominal Value is to be considered with set CT/ PT Primary values.
- (5) For single phase L1 Phase values are to be considered as System values.

TABLE 9: Relay Configuration

For Limit Relay

Code	Configuration
0	Hi - alarm & energised Relay
1	Hi - alarm & De-energised Relay
2	Lo - alarm & Energised Relay
3	Lo - alarm & De-energised Relay

For Timer or RTC relay

Code	Configuration
0	Energize when triggered
1	De-energize when triggered

TABLE 10: Energy Parameter Selection and Start Count

Parameter Number	Parameter	Range
1	Imp Active Energy Start Count	0 to 999999999
2	Exp Active Energy Start Count	0 to 999999999
3	Capacitive Reactive Energy Start Count	0 to 999999999
4	Inductive Reactive Energy Start Count	0 to 999999999
5	Apparent Energy Start Count	0 to 999999999
7	Imp Active Energy Overflow Start Count	0 to 999999
8	Exp Active Energy Overflow Start Count	0 to 999999
9	Capacitive Reactive Energy Overflow Start Count	0 to 999999
10	Inductive Reactive Energy Overflow Start Count	0 to 999999
11	Apparant Energy Overflow Start Count	0 to 999999

**TABLE 11 :
Measurement & Energy/Counter Screens for Advanced version of ND25**

Screen No.	Parameters	On Display			On Modbus		
		3P 4W	3P 3W	1P 2W	3P 4W	3P 3W	1P 2W
1	System Voltage/ Current/ Power/ Frequency	✓	✓	✓	✓	✓	✓
2	L-N Voltage	✓	✗	✗	✓	✗	✗
3	L-L Voltage	✓	✓	✗	✓	✓	✗
4	Current ,Neutral Current	✓	✓*	✗	✓	✓*	✗
5	Phase Voltage THD	✓	✓	✗	✓	✓	✗
6	Phase Current THD	✓	✓	✗	✓	✓	✗
7	L1 phase VA/VAr/W/PF	✓	✗	✗	✓	✗	✗
8	L2 phase VA/VAr/W/PF	✓	✗	✗	✓	✗	✗
9	L3 phase VA/VAr/W/PF	✓	✗	✗	✓	✗	✗
10	Phase Angle	✓	✗	✗	✓	✗	✗
11	VA/A demand	✓	✓	✓	✓	✓	✓
12	Capacitive, Inductive VAr demand	✓	✓	✓	✓	✓	✓
13	W IMP demand	✓	✓	✓	✓	✓	✓
14	W EXP demand	✓	✓	✓	✓	✓	✓
15	Max VA/A demand	✓	✓	✓	✓	✓	✓
16	Max Capacitive, Inductive VAr demand	✓	✓	✓	✓	✓	✓
17	Max W IMP demand	✓	✓	✓	✓	✓	✓
18	Max W EXP demand	✓	✓	✓	✓	✓	✓
19	Old Max VA/A demand	✓	✓	✓	✓	✓	✓
20	Old Max Capacitive, Inductive VAr demand	✓	✓	✓	✓	✓	✓
21	Old Max W IMP demand	✓	✓	✓	✓	✓	✓
22	Old Max W EXP demand	✓	✓	✓	✓	✓	✓
23	Sys RPM/Frequency	✓	✓	✓	✓	✓	✓
24	Sys Active/Reactive/Apparent power/Temperature	✓	✓	✓	✓	✓	✓
25	Sys Apparent, Reactive (Power), Phase angle, PF	✓	✓	✓	✓	✓	✓
26	Min Sys Voltage / Current	✓	✓	✓	✓	✓	✓
27	Max Sys Voltage / Current	✓	✓	✓	✓	✓	✓
28	Sys %THD Voltage /Current	✓	✓	✓	✓	✓	✓
29	Current Reversal	✓	✗	✓	✓	✗	✓
30	Phase rotation error	✓	✗	✗	✓	✗	✗
31	Phase absent indication	✓	✗	✗	✗	✗	✗
32	RTC	✓	✓	✓	✓	✓	✓

*Note: In 3P3W system, Neutral Current is not shown, only line currents are shown.

TABLE 11 : Continued...

Screen No.	Parameters	On Display			On Modbus		
		3P 4W	3P 3W	1P 2W	3P 4W	3P 3W	1P 2W
33	Individual harmonics V	✓	✓	✓	✓	✓	✓
34	Individual harmonics A	✓	✓	✓	✓	✓	✓
35	Timer1 No. of Cycles, ON, OFF delay	✓	✓	✓	✓	✓	✓
36	Timer2 No. of Cycles, ON, OFF delay	✓	✓	✓	✓	✓	✓
37	Active Energy Import(Over ow)	✓	✓	✓	✓	✓	✓
38	Active Energy Import	✓	✓	✓	✓	✓	✓
39	Active Energy Export(Over ow)	✓	✓	✓	✓	✓	✓
40	Active Energy Export	✓	✓	✓	✓	✓	✓
41	Reactive Capacitive energy (Over ow)	✓	✓	✓	✓	✓	✓
42	Reactive Capacitive energy	✓	✓	✓	✓	✓	✓
43	Reactive Inductive energy (Over ow)	✓	✓	✓	✓	✓	✓
44	Reactive Inductive energy	✓	✓	✓	✓	✓	✓
45	Apparent energy(Over ow)	✓	✓	✓	✓	✓	✓
46	Apparent energy	✓	✓	✓	✓	✓	✓
47	Run hour	✓	✓	✓	✓	✓	✓
48	On hour	✓	✓	✓	✓	✓	✓
49	No. of interrupts	✓	✓	✓	✓	✓	✓
50	Old Active energy Import(Over ow)	✓	✓	✓	✓	✓	✓
51	Old Active energy Import	✓	✓	✓	✓	✓	✓
52	Old Active energy Export(Over ow)	✓	✓	✓	✓	✓	✓
53	Old Active energy Export	✓	✓	✓	✓	✓	✓
54	Old Reactive Capacitive energy (Over ow)	✓	✓	✓	✓	✓	✓
55	Old Reactive Capacitive energy	✓	✓	✓	✓	✓	✓
56	Old Reactive Inductive energy (Over ow)	✓	✓	✓	✓	✓	✓
57	Old Reactive Inductive energy	✓	✓	✓	✓	✓	✓
58	Old Apparent energy(Over ow)	✓	✓	✓	✓	✓	✓
59	Old Apparent energy	✓	✓	✓	✓	✓	✓
60	Old Run hour	✓	✓	✓	✓	✓	✓
61	Old On hour	✓	✓	✓	✓	✓	✓
62	Old no. of interrupts	✓	✓	✓	✓	✓	✓

Note: (1) Only screens (with screen number) 1 to 32 are available for selectable Userscreens.

(2) For 'Overflow' energy screens, refer Section 3.2.1.12.

TABLE 12 :**Measurement & Energy/Counter Screens for Basic version of ND25**

Screen No.	Parameters	On Display			On Modbus		
		3P 4W	3P 3W	1P 2W	3P 4W	3P 3W	1P 2W
1	System Voltage/ Current/ Power/ Frequency	✓	✓	✓	✓	✓	✓
2	L-N Voltage	✓	✗	✗	✓	✗	✗
3	L-L Voltage	✓	✓	✗	✓	✓	✗
4	Current ,Neutral Current	✓	✓*	✗	✓	✓*	✗
5	Phase Voltage THD	✗	✗	✗	✗	✗	✗
6	Phase Current THD	✗	✗	✗	✗	✗	✗
7	L1 phase VA/VAr/W/PF	✓#	✗	✗	✓	✗	✗
8	L2 phase VA/VAr/W/PF	✓#	✗	✗	✓	✗	✗
9	L3 phase VA/VAr/W/PF	✓#	✗	✗	✓	✗	✗
10	Phase Angle	✗	✗	✗	✗	✗	✗
11	VA/A demand	✗	✗	✗	✗	✗	✗
12	Capacitive, Inductive VAr demand	✗	✗	✗	✗	✗	✗
13	W IMP demand	✗	✗	✗	✗	✗	✗
14	W EXP demand	✗	✗	✗	✗	✗	✗
15	Max VA/A demand	✗	✗	✗	✗	✗	✗
16	Max Capacitive, Inductive VAr demand	✗	✗	✗	✗	✗	✗
17	Max W IMP demand	✗	✗	✗	✗	✗	✗
18	Max W EXP demand	✗	✗	✗	✗	✗	✗
19	Old Max VA/A demand	✗	✗	✗	✗	✗	✗
20	Old Max Capacitive, Inductive VAr demand	✗	✗	✗	✗	✗	✗
21	Old Max W IMP demand	✗	✗	✗	✗	✗	✗
22	Old Max W EXP demand	✗	✗	✗	✗	✗	✗
23	Sys RPM/Frequency	✓	✓	✓	✓	✓	✓
24	Sys Active/Reactive/Apparent power/Temperature	✓	✓	✓	✓	✓	✓
25	Sys Apparent, Reactive (Power), Phase angle, PF	✓	✓	✓	✓	✓	✓
26	Min Sys Voltage / Current	✓	✓	✓	✓	✓	✓
27	Max Sys Voltage / Current	✓	✓	✓	✓	✓	✓
28	Sys %THD Voltage /Current	✓	✓	✓	✓	✓	✓
29	Current Reversal	✓	✗	✓	✓	✗	✓
30	Phase rotation error	✓	✗	✗	✓	✗	✗
31	Phase absent indication	✓	✗	✗	✗	✗	✗
32	RTC	✓	✓	✓	✓	✓	✓

*Note: In 3P3W system, Neutral Current is not shown, only line currents are shown.

#Note: In 3P4W system, Per Phase PF is not shown.

TABLE 12 : Continued...

Screen No.	Parameters	On Display			On Modbus		
		3P 4W	3P 3W	1P 2W	3P 4W	3P 3W	1P 2W
33	Individual harmonics V	✗	✗	✗	✗	✗	✗
34	Individual harmonics A	✗	✗	✗	✗	✗	✗
35	Timer1 No. of Cycles, ON, OFF delay	✓	✓	✓	✓	✓	✓
36	Timer2 No. of Cycles, ON, OFF delay	✓	✓	✓	✓	✓	✓
37	Active Energy Import(Over ow)	✓	✓	✓	✓	✓	✓
38	Active Energy Import	✓	✓	✓	✓	✓	✓
39	Active Energy Export(Over ow)	✓	✓	✓	✓	✓	✓
40	Active Energy Export	✓	✓	✓	✓	✓	✓
41	Reactive Capacitive energy (Over ow)	✓	✓	✓	✓	✓	✓
42	Reactive Capacitive energy	✓	✓	✓	✓	✓	✓
43	Reactive Inductive energy (Over ow)	✓	✓	✓	✓	✓	✓
44	Reactive Inductive energy	✓	✓	✓	✓	✓	✓
45	Apparent energy(Over ow)	✓	✓	✓	✓	✓	✓
46	Apparent energy	✓	✓	✓	✓	✓	✓
47	Run hour	✓	✓	✓	✓	✓	✓
48	On hour	✓	✓	✓	✓	✓	✓
49	No. of interrupts	✓	✓	✓	✓	✓	✓
50	Old Active energy Import(Over ow)	✗	✗	✗	✗	✗	✗
51	Old Active energy Import	✗	✗	✗	✗	✗	✗
52	Old Active energy Export(Over ow)	✗	✗	✗	✗	✗	✗
53	Old Active energy Export	✗	✗	✗	✗	✗	✗
54	Old Reactive Capacitive energy (Over ow)	✗	✗	✗	✗	✗	✗
55	Old Reactive Capacitive energy	✗	✗	✗	✗	✗	✗
56	Old Reactive Inductive energy (Over ow)	✗	✗	✗	✗	✗	✗
57	Old Reactive Inductive energy	✗	✗	✗	✗	✗	✗
58	Old Apparent energy(Over ow)	✗	✗	✗	✗	✗	✗
59	Old Apparent energy	✗	✗	✗	✗	✗	✗
60	Old Run hour	✗	✗	✗	✗	✗	✗
61	Old On hour	✗	✗	✗	✗	✗	✗
62	Old no. of interrupts	✗	✗	✗	✗	✗	✗

Note: (1) Only screens (with screen number) 1 to 32 are available for selectable Userscreens.
 (2) For 'Overflow' energy screens, refer Section 3.2.1.12.

TABLE 13 : Datalogging Parameters List

Para. No.	Parameter	Higher Model			Lower Model		
		3P 4W	3P 3W	1P 2W	3P 4W	3P 3W	1P 2W
0	V1	✓	✓	✓	✓	✓	✓
1	V2	✓	✓	✗	✓	✓	✗
2	V3	✓	✓	✗	✓	✓	✗
3	I1	✓	✓	✓	✓	✓	✓
4	I2	✓	✓	✗	✓	✓	✗
5	I3	✓	✓	✗	✓	✓	✗
6	W1	✓	✗	✓	✓	✗	✓
7	W2	✓	✗	✗	✓	✗	✗
8	W3	✓	✗	✗	✓	✗	✗
9	VA1	✓	✗	✓	✓	✗	✓
10	VA2	✓	✗	✗	✓	✗	✗
11	VA3	✓	✗	✗	✓	✗	✗
12	VAR1	✓	✗	✓	✓	✗	✓
13	VAR2	✓	✗	✗	✓	✗	✗
14	VAR3	✓	✗	✗	✓	✗	✗
15	PF1	✓	✗	✓	✗	✗	✗
16	PF2	✓	✗	✗	✗	✗	✗
17	PF3	✓	✗	✗	✗	✗	✗
18	Angle1	✓	✗	✓	✗	✗	✗
19	Angle2	✓	✗	✗	✗	✗	✗
20	Angle3	✓	✗	✗	✗	✗	✗
21	Volt Avg	✓	✓	✗	✓	✓	✗
22	Volt Sum	✓	✓	✗	✓	✓	✗
23	Current Avg	✓	✓	✗	✓	✓	✗
24	Current Sum	✓	✓	✗	✓	✓	✗
25	Watt Avg	✓	✓	✗	✓	✓	✗
26	Watt Sum	✓	✓	✗	✓	✓	✗
27	VA Avg	✓	✓	✗	✓	✓	✗
28	VA Sum	✓	✓	✗	✓	✓	✗

TABLE 13 : Continued...

Para. No.	Parameter	Advanced version of ND25			Basic version of ND25		
		3P 4W	3P 3W	1P 2W	3P 4W	3P 3W	1P 2W
29	VAR Avg	✓	✓	✗	✓	✓	✗
30	VAR Sum	✓	✓	✗	✓	✓	✗
31	PF Avg	✓	✓	✗	✓	✓	✗
32	PF Sum	✓	✓	✗	✓	✓	✗
33	Phase Angle Avg	✓	✓	✗	✓	✓	✗
34	Phase Angle Sum	✓	✓	✗	✓	✓	✗
35	Freq	✓	✓	✓	✓	✓	✓
36	Wh import	✓	✓	✓	✓	✓	✓
37	Wh export	✓	✓	✓	✓	✓	✓
38	VARh Capacitive	✓	✓	✓	✓	✓	✓
39	VARh Inductive	✓	✓	✓	✓	✓	✓
40	VAh	✓	✓	✓	✓	✓	✓
42	kw imp demand	✓	✓	✓	✗	✗	✗
43	max kW imp demand	✓	✓	✓	✗	✗	✗
44	kW exp demand	✓	✓	✓	✗	✗	✗
45	max kW exp demand	✓	✓	✓	✗	✗	✗
46	kVAr Cap. demand	✓	✓	✓	✗	✗	✗
47	max kVAr Cap. demand	✓	✓	✓	✗	✗	✗
48	kVAr Ind. demand	✓	✓	✓	✗	✗	✗
49	max kVAr Ind. demand	✓	✓	✓	✗	✗	✗
50	KVA demand	✓	✓	✓	✗	✗	✗
51	max KVA demand	✓	✓	✓	✗	✗	✗
52	current demand	✓	✓	✓	✗	✗	✗
53	max current demand	✓	✓	✓	✗	✗	✗
66	system voltage max	✓	✓	✓	✓	✓	✓
67	system voltage min	✓	✓	✓	✓	✓	✓
68	RPM	✓	✓	✓	✓	✓	✓
70	system current max	✓	✓	✓	✓	✓	✓
71	system current min	✓	✓	✓	✓	✓	✓

TABLE 13: Continued...

Para. No.	Parameter	Advanced version of ND25			Basic version of ND25		
		3P 4W	3P 3W	1P 2W	3P 4W	3P 3W	1P 2W
100	V12	✓	✗	✗	✓	✗	✗
101	V23	✓	✗	✗	✓	✗	✗
102	V31	✓	✗	✗	✓	✗	✗
103	V THD-L1	✓	✓	✓	✗	✗	✗
104	V THD-L2	✓	✓	✗	✗	✗	✗
105	V THD-L3	✓	✓	✗	✗	✗	✗
106	I THD-L1	✓	✓	✓	✗	✗	✗
107	I THD-L2	✓	✓	✗	✗	✗	✗
108	I THD-L3	✓	✓	✗	✗	✗	✗
109	System V-THD	✓	✓	✓	✓	✓	✓
110	System I-THD	✓	✓	✓	✓	✓	✓
112	Neutral Current	✓	✗	✗	✓	✗	✗
113	Run hour	✓	✓	✓	✓	✓	✓
114	On Hour	✓	✓	✓	✓	✓	✓
115	No. of interrupts	✓	✓	✓	✓	✓	✓
166	Phase indicate	✓	✗	✗	✓	✗	✗
168	Temperature	✓	✓	✓	✓	✓	✓

3.3 User Assignable Modbus Registers:

The Multifunction Instrument contains 20 user assignable registers in the address range of 0x400 (31025) to 0x426 (31065) for 3X registers (see TABLE 14) and address range of 0x400 (41025) to 0x426 (41065) for 4X registers (see TABLE 14).

Any of the parameter addresses (3X register addresses and 4X register addresses TABLE 1) accessible in the instrument can be mapped to these 20 user assignable registers.

Parameters (3X and 4X 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 and 4X registers addresses) which are to be accessed via address 0x400 to 0x426 are specified in 4X Register 0x251C to 0x252F (see TABLE 15).

TABLE 14 : User Assignable 3X Data Registers

Address (3X)	Address (4X)	Assignable Register	Modbus Start Address (Hex)	
			High Byte	Low Byte
31025	41025	Assignable Reg 1	04	00
31027	41027	Assignable Reg 2	04	02
31029	41029	Assignable Reg 3	04	04
31031	41031	Assignable Reg 4	04	06
31033	41033	Assignable Reg 5	04	08
31035	41035	Assignable Reg 6	04	0A
31037	41037	Assignable Reg 7	04	0C
31039	41039	Assignable Reg 8	04	0E
31041	41041	Assignable Reg 9	04	10
31043	41043	Assignable Reg 10	04	12
31045	41045	Assignable Reg 11	04	14
31047	41047	Assignable Reg 12	04	16
31049	41049	Assignable Reg 13	04	18
31051	41051	Assignable Reg 14	04	1A
31053	41053	Assignable Reg 15	04	1C
31055	41055	Assignable Reg 16	04	1E
31057	41057	Assignable Reg 17	04	20
31059	41059	Assignable Reg 18	04	22
31061	41061	Assignable Reg 19	04	24
31063	41063	Assignable Reg 20	04	26

TABLE 15 : User Assignable mapping register (4X registers)

Address (4X)	Assignable Register	Modbus Start Address (Hex)	
		High Byte	Low Byte
49501	Mapped Add for register #0x0400	25	1C
49502	Mapped Add for register #0x0402	25	1D
49503	Mapped Add for register #0x0404	25	1E
49504	Mapped Add for register #0x0406	25	1F
49505	Mapped Add for register #0x0408	25	20
49506	Mapped Add for register #0x040A	25	21
49507	Mapped Add for register #0x040C	25	22
49508	Mapped Add for register #0x040E	25	23
49509	Mapped Add for register #0x0410	25	24

TABLE 15 : Continued...

Address (4X)	Assignable Register	Modbus Start Address (Hex)	
		High Byte	Low Byte
49510	Mapped Add for register #0x0412	25	25
49511	Mapped Add for register #0x0414	25	26
49512	Mapped Add for register #0x0416	25	27
49513	Mapped Add for register #0x0418	25	28
49514	Mapped Add for register #0x041A	25	29
49515	Mapped Add for register #0x041C	25	2A
49516	Mapped Add for register #0x041E	25	2B
49517	Mapped Add for register #0x0420	25	2C
49518	Mapped Add for register #0x0422	25	2D
49519	Mapped Add for register #0x0424	25	2E
49520	Mapped Add for register #0x0426	25	2F

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 15**) 0x251C and 0x251D respectively.

Assigning Query:

Device Address	01 (Hex)
Function Code	10 (Hex)
Starting Address Hi	25 (Hex)
Starting Address Lo	1C (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	CB (Hex)
CRC High	07 (Hex)

} Voltage 2 *
 (3X Address
 0x0002)
 } Power Factor
 1 *(3X Address
 0x001E)

Response :

Device Address	01 (Hex)
Function Code	10 (Hex)
Start Address High	25 (Hex)
Start Address Low	1C (Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02 (Hex)
CRC Low	40 (Hex)
CRC High	70 (Hex)

* Note : Parameters should be assigned in Multiple of two i.e. 2,4,6,8.....20.

Reading Parameter data through User Assignable Registers:

In assigning query Voltage 2 & Power Factor 1 parameters were assigned to 0x251C & 0x251D (TABLE 15) which will point to user assignable 3x registers 0x400 and 0x402 (TABLE 14). So to read Voltage2 and Power Factor1 data reading query should be as below.

Query:

Device Address	01 (Hex)
Function Code	04 (Hex)
Start Address High	04(Hex)
Start Address Low	00 (Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	04 (Hex)**
CRC Low	F0 (Hex)
CRC High	71 (Hex)

Start Address High : Most significant 8 bits of starting address of Userassignable 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)	Voltage 2 Data
Function Code	04 (Hex)	
Byte count	08 (Hex)	
Data Register-1High Byte	43 (Hex)	
Data Register-1 Low Byte	5B (Hex)	Power Factor 1 Data
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)	

User Assignable mapping Registers (Starting Address) (4X Registers TABLE 14)		User Assignable Data Registers (Starting Address) (3X Registers TABLE 13)		
0x251C	Voltage 2 (0x0004)	-----> 0x400	0x400 (16 bit)	0x401 (16 bit)
0x251D	Power Factor 1 (0x0020)	-----> 0x402	0x402 (16 bit)	0x403 (16 bit)
0x251E	Wh Import (0x004A)	-----> 0x404	0x404 (16 bit)	0x405 (16 bit)
0x251F	Frequency (0x0048)	-----> 0x406	0x406 (16 bit)	0x407 (16 bit)
⋮	⋮	⋮	⋮	⋮
0x252E	Current 1 (0x0008)	-----> 0x424	0x424 (16 bit)	0x425 (16 bit)
0x252F	Vah (0x0052)	-----> 0x426	0x426 (16 bit)	0x427 (16 bit)

To get the data through User Assignable Register go through the following steps:

- 1) Assign starting addresses(**TABLE 1**) of parameters of interest to "User assignable mapping registers" in a sequence in which they are to be accessed (see Section "**Assigning Parameter to User Assignable Registers**" of Section 3.3).
- 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 0x0400 with number of register 8 or individually parameters can be accessed. For example, if current1 is to be accessed use starting address 0x0424. (see Section **Reading Parameter data through User Assignable Registers** of Section 3.3).

4. Datalogging

Datalogging is a feature that allows the meter to store measured parameters based on time or on occurrence of a certain event. The user can retrieve the data later for further application.

This meter offers three types of datalogging

1) Event based

2) Time based

3) Load profile

4.1 Event Based Datalogging

This type of datalogging stores data when certain event is observed. This data is time stamped and last five occurrences of each type of event are stored based on first in first out queue. This meter offers event based logging for 10 parameters. This data can be observed on the modbus on the address table shown below. These registers can be accessed by the query explained in section 3.1 The user can turn this logging on and off through display as well as modbus by using address 46185.

Changing any setup parameter related to the logged parameters will reset the log.

Note: Below addresses are available for 3X and for 4X.

for example 312289 for 3X and 412289 for 4X.

Table 16: Addresses for event based datalog

Address	Logged Parameter	Log Details	Mod Start Address Hex	
			High Byte	Low Byte
312289	Max Voltage	Date 1	30	00
312291		Time 1	30	02
312293		Value 1	30	04
312295		Date 2	30	06
312297		Time 2	30	08
312299		Value 2	30	0A
312301		Date 3	30	0C
312303		Time 3	30	0E
312305		Value 3	30	10
312307		Date 4	30	12
312309	Min Voltage	Time 4	30	14
312311		Value 4	30	16
312313		Date 5	30	18
312315		Time 5	30	1A
312317		Value 5	30	1C
312319		Date 1	30	1E
312321		Time 1	30	20
312323		Value 1	30	22
312325		Date 2	30	24
312327		Time 2	30	26
312329		Value 2	30	28
312331		Date 3	30	2A
312333		Time 3	30	2C
312335		Value 3	30	2E
312337		Date 4	30	30
312339		Time 4	30	32
312341		Value 4	30	34
312343		Date 5	30	36
312345		Time 5	30	38
312347		Value 5	30	3A

Table 16: Continued...

312349	Max Current	Date 1	30	3C	312409	Max W Import Demand	Date 1	30	78
312351		Time 1	30	3E	312411		Time 1	30	7A
312353		Value 1	30	40	312413		Value 1	30	7C
312355		Date 2	30	42	312415		Date 2	30	7E
312357		Time 2	30	44	312417		Time 2	30	80
312359		Value 2	30	46	312419		Value 2	30	82
312361		Date 3	30	48	312421		Date 3	30	84
312363		Time 3	30	4A	312423		Time 3	30	86
312365		Value 3	30	4C	312425		Value 3	30	88
312367		Date 4	30	4E	312427		Date 4	30	8A
312369	Min Current	Time 4	30	50	312429	Max W Export Demand	Time 4	30	8C
312371		Value 4	30	52	312431		Value 4	30	8E
312373		Date 5	30	54	312433		Date 5	30	90
312375		Time 5	30	56	312435		Time 5	30	92
312377		Value 5	30	58	312437		Value 5	30	94
312379		Date 1	30	5A	312439		Date 1	30	96
312381		Time 1	30	5C	312441		Time 1	30	98
312383		Value 1	30	5E	312443		Value 1	30	9A
312385		Date 2	30	60	312445		Date 2	30	9C
312387		Time 2	30	62	312447		Time 2	30	9E
312389	Min Current	Value 2	30	64	312449	Max W Export Demand	Value 2	30	A0
312391		Date 3	30	66	312451		Date 3	30	A2
312393		Time 3	30	68	312453		Time 3	30	A4
312395		Value 3	30	6A	312455		Value 3	30	A6
312397		Date 4	30	6C	312457		Date 4	30	A8
312399		Time 4	30	6E	312459		Time 4	30	AA
312401		Value 4	30	70	312461		Value 4	30	AC
312403		Date 5	30	72	312463		Date 5	30	AE
312405		Time 5	30	74	312465		Time 5	30	B0
312407		Value 5	30	76	312467		Value 5	30	B2

Table 16: Continued...

312469	Max VAr Capacitive Demand	Date 1	30	B4	312529	Max VA Demand	Date 1	30	F0
312471		Time 1	30	B6	312531		Time 1	30	F2
312473		Value 1	30	B8	312533		Value 1	30	F4
312475		Date 2	30	BA	312535		Date 2	30	F6
312477		Time 2	30	BC	312537		Time 2	30	F8
312479		Value 2	30	BE	312539		Value 2	30	FA
312481		Date 3	30	C0	312541		Date 3	30	FC
312483		Time 3	30	C2	312543		Time 3	30	FE
312485		Value 3	30	C4	312545		Value 3	31	0
312487		Date 4	30	C6	312547		Date 4	31	2
312489	Max VAr Inductive Demand	Time 4	30	C8	312549	Max A Demand	Time 4	31	4
312491		Value 4	30	CA	312551		Value 4	31	6
312493		Date 5	30	CC	312553		Date 5	31	8
312495		Time 5	30	CE	312555		Time 5	31	0A
312497		Value 5	30	D0	312557		Value 5	31	0C
312499		Date 1	30	D2	312559		Date 1	31	0E
312501		Time 1	30	D4	312561		Time 1	31	10
312503		Value 1	30	D6	312563		Value 1	31	12
312505		Date 2	30	D8	312565		Date 2	31	14
312507		Time 2	30	DA	312567		Time 2	31	16
312509	Max VAr Inductive Demand	Value 2	30	DC	312569		Value 2	31	18
312511		Date 3	30	DE	312571		Date 3	31	1A
312513		Time 3	30	E0	312573		Time 3	31	1C
312515		Value 3	30	E2	312575		Value 3	31	1E
312517		Date 4	30	E4	312577		Date 4	31	20
312519		Time 4	30	E6	312579		Time 4	31	22
312521		Value 4	30	E8	312581		Value 4	31	24
312523		Date 5	30	EA	312583		Date 5	31	26
312525		Time 5	30	EC	312585		Time 5	31	28
312527		Value 5	30	EE	312587		Value 5	31	2A

4.2 Time Based Datalogging

This type of datalogging stores data with a timestamp at a preset time interval. This can be used to take a snapshot of the system at regular time intervals. This data can be used to do in-depth analysis of the system. The number of parameters to be logged and which parameters to store can also be configured by the user through display as well as modbus. Various configuration registers can be found on addresses 46187 to 46251.

The number of entries stored varies according to the number of parameters logged i.e. more entries can be stored if less number of parameters are being logged. User can configure the meter to store 1 to 30 parameters. And the time interval can vary from 1 to 60 minutes. Editing of these parameters is not allowed while the logging is on.

Each entry consists of number of parameters selected by the user in addition to date and time of the entry log.

Max Memory Locations = 273030

Actual parameter stored in Each log = Date +time+Number of parameter selected by user

for ex. Number of parameter selected by user = 1.

Actual parameter stored in Each log = 1(Date) +1(time)+ 1 = 3

Maximum log that can be stored = Max Memory Location/Actual parameter stored in Each log
 $= 273030/3 = 91010$

Timelog Interval setting = 15 minutes

Log in one day = (60 /Timelog Interval setting) * 24
 $= (60/15)*24 = 96$

Max Days = Maximum log that can be stored / log in one day
 $= 91010 / 96 = 948.20$ days

After all memory allocated locations are filled with logging data, the meter will start shifting data by first in first out queue i.e. at any time after all the locations are used once, the user will have access to the latest logged maximum number of entries.

Query Format for Downloading the Time based datalog

The query format for downloading an entry of a time datalog is given below. Maximum number of register the user can access in 1 query are limited by 64 and corresponding to it maximum byte count is 128. The byte count should be logging parameter count multiplied by 4 and added to 8, where 8 is the byte count for date and time (4 bytes x 2 parameters).

(logging parameter count x 4) + (2 x 4)

e.g.

if logging parameter count is 10

byte count = (10 x 4) + 8 = 48 (4 bytes per parameter)

number of registers = (10 x 2) + (2 x 2) = 24 (2 registers per parameter)

Starting address will be 01,CA for time datalog.

The entry number of the desired log need to be converted to IEEE format and sent as 4 bytes.

Query example:

Description	Decimal Value	Hex Value
Dev Addr	3	03
Func Code	16	10
Start Addr Hi		01
Start Addr Lo		CA
No of Reg Hi	00	00
No of Reg Lo	14	0E
Log Download Bytes	28	1C
Entry No Reg 1 Hi	25	41
Entry No Reg 1 Lo		C8
Entry No Reg 2 Hi		00
Entry No Reg 2 Lo		00
CRC Lo		CC
CRC Hi		A4

If a user wants to download 5 parameters logged at entry number 25, the query will be as following (Assuming device address 3). All the data in query is represented in hexadecimal float.

03,10, 01, CA,00,0E,1C,41,C8,00,00,CC,A4

03 is device address;

10 is function code;

01 CA is the address that lets the user access the time datalog;

00 0E is number of registers to be accessed (actual parameter count x 2+4);

1C is number of bytes to be accessed;

41 C8 00 00 is entry number converted to hex;

CC A4 is CRC calculated on query.

Response:

Description	Hex Value	Decimal Value
Dev Addr	03	03
Func Code	10	16
No of bytes	1C	28
Date	46,24,28,00	010506(May 1st 2006)
Time	40,CC,CC,CD	6.40 (06:40 am)
Parameter 1	41,78,1F,68	15.50
Parameter 2	46,AB,5A,12	21933.0
Parameter 3	46,AC,57,6A	22059.7
Parameter 4	46,AB,3C,58	21918.2
Parameter 5	46,A9,AD,9D	21718.8
CRC	BE,7C	

The response to time datalog query contains data in following structure.

First two bytes are device address and function code, followed by number of bytes data of 1 byte and then date and a time data of 4 bytes each.

Then requested parameters are received in order that is specified in timelog parameters settings, each of 4 bytes. The response ends with 2 bytes of CRC.

4.3 Load Profile Datalogging

This type of datalogging stores data on each day at time 00:00. The parameters stored in this log include all energies and maximum demands. This log stores data daily as well as monthly interval. Hence, daily and monthly energy consumption can be logged. Furthermore, maximum power demand and maximum current demand during each day and each month is also logged. This data can be used to study load behaviour over a period of time. The daily data available to the user is maximum of one year interval and the monthly data for 14 years interval assuming the log requested is after the starting date (requesting data before the starting date will result in modbus exception message). 1 year after the starting date, the oldest logs of daily data are constantly replaced with latest logs. 14 years after the starting date, all the load profile logs for that channel are cleared and logging is started again.

This log can be selected or de-selected using memory location 46253, if it is selected, then energy, maximum demand will be logged. The starting date of this datalog is stored in read only memory location 46255.

The user can access different parameters in this log by sending queries using following addresses.

Note: Changing the meter date resets the load profile log.

TABLE 17: Addresses for Load Profile datalog access

Parameter	Modbus Start Address Hex	
	High Byte	Low Byte
Daily Energy Datalog Download Addr	01	CC
Daily Maximum Demand Datalog Download Addr	01	CE
Monthly Energy Datalog Download Addr	01	D0
Monthly Maximum Demand Datalog Download Addr	01	D2

TABLE 18: Parameter number for Energy datalog Load Profile

Parameter number	Description
01	Imp watt energy
02	Exp watt energy
03	Capacitive VAr energy
04	Inductive VAr energy
05	Apparent energy

TABLE 19: Parameter number for max. Power Demand datalog Load Profile

Parameter number	Description
01	Imp watt Max demand
02	Exp watt Max demand
03	Capacitive VAr Max demand
04	Inductive VAr Max demand
05	Apparent Max demand
06	Current Max demand

Query Format for Downloading the Load Profile Datalog

The query format for downloading an entry of a daily load profile log is given below. Maximum number of register the user can access in 1 query are limited by 40.

Query example:

Description	Decimal Value	Hex Value
Dev Addr	03	03
Func Code	16	10
Start Addr Hi		01
Start Addr Lo		CC
No of Reg Hi	00	00
No of Reg Lo	20	14
Log Download Bytes	40	28
Parameter no	03	03
Date	04	04
Month	11	0B
Year	17	11
CRC Lo		AD
CRC Hi		C3

Example: If a user wants to access daily energy load profile log of Capacitive VAr Energy for 10 days from 4 November 2017 to 13 November 2017, the query for this will be as following.

03,10,01,CC,00,14,28,03,04,0B,11,AD,C3

03 is device address;

10 is function code;

01 CC is the starting address for accessing the daily energy load profile log. (refer **TABLE 17**)

00 14 is the number of registers to be accessed. This value will be double of the number of parameters requested.

28 is the number of bytes requested in this query. This value will be 4 times the number of parameters requested.

03 is the parameter number for Capacitive VAr energy import data. (refer **TABLE 18**)

04 0B 11 is the starting date of the log to be accessed.

AD C3 is the CRC added at the end.

The load profile datalog access query consists of device address and function code followed by the starting address which is different for different parameters and mentioned in **TABLE 17**. Number of registers can vary in multiple of 2, but can not exceed 40 and corresponding to it, number of bytes can not exceed 80.

Parameter number decides the parameter within the log (eg. Capacitive VAr energy from the daily energy log.) Refer **TABLE 18** and **TABLE 19**.

Date, month and year decides the date from which the data is to be downloaded.

All data in the query is represented in hexadecimal format.

At the end 2 byte CRC is calculated.

Response:

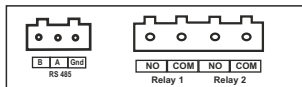
Description	Hex	Decimal
Dev Addr	03	03
Func Code	10	16
Number of bytes	28	40
Value 1 (Nov 4)	48,6A,B4,80	240338
Value 2 (Nov 5)	48,6A,AD,40	240309
Value 3 (Nov 6)	48,6A,AA,C0	240299
Value 4 (Nov 7)	48,6A,B6,40	240345
Value 5 (Nov 8)	48,6A,B1,40	240325
Value 6 (Nov 9)	48,6A,B4,80	240338
Value 7 (Nov 10)	48,6A,B7,40	240349
Value 8 (Nov 11)	48,6A,AF,C0	240319
Value 9 (Nov 12)	48,6A,B3,40	240333
Value 10 (Nov 13)	48,6A,BD,C0	240375
CRC	A9,2A	

The response to the load profile query contains device address, function code and number of bytes data each of 1 byte, and then the requested parameters of 4 bytes each. Each parameter represents data over a period of a day when daily log is accessed and represents data over a period of a month when monthly log is accessed. The response ends with 2 byte CRC.

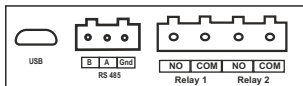
Note: If a user tries to access the data which is out of the range of the datalog i.e. more than 1 year before the present date for daily log and more than 14 years before the present date for monthly log, it will result in a modbus exception. The same will occur if a user tries to access the data before the starting date of the corresponding log or a future date.

5. Connection for Optional Pulse Output / RS 485 (rear view of Multifunction Meter):

1. RS 485 Output with Relay1 & Relay2



2. USB and RS 485 Output with Relay1 & Relay2



5. Specifications of BACNET Protocol

Under the BACNET implementation we have implemented Data link layer option - BACNET IP, (Annex J), with BACNET protocol version 12, with 2 BACNET objects: a) Device and b) Analog Input.

The Change of value (COV Subscriptions) service of Analog Input object type is not supported.

1. Under the device object we have properties:

- a) Device Instance number (Editable and stored in eeprom, Editing procedure of this parameter through Modbus TCP registers is mentioned in detail below)
- b) Device name(Editable and stored in eeprom)
- c) Device location(Editable and stored in eeprom)
- d) Device description(Editable and stored in eeprom)
- e) Vendor name
- f) Vendor ID
- g) Firmware version
- h) Database revision
- i) APDU length max
- j) APDU timeout time
- k) List of objects
- l) List of Services
- m) Meter model name
- n) Current date and time

2. Under the Analog input object type we have all important measurement parameters listed in table1, each of these have following properties:

- a) Present value
- b) Description
- c) Instance number
- d) Units
- e) Out of service setting(Editable)
- f) Reliability status

Editing of Device Instance number through Modbus TCP:

The Device Instance number for BACNET can be edited through Modbus TCP register number 0x18C2, the value must be written in 4 bytes for 2 registers.

The value can be from 1 to 0x3FFFFFFF.

The default values of important BACNET parameters are:

Device Instance number - 99999

Device Name - ND25BACnet

Device Location - Zielona Gora, PL

Device Description - Power network meter

Below Table Showing the measurement parameters under Analog Input Object:

Sr No	Instance Number	Measurement Parameter
1	Analog Input,0	L1 Phase Voltage
2	Analog Input,1	L2 Phase Voltage
3	Analog Input,2	L3 Phase Voltage
4	Analog Input,3	L1 Phase Current
5	Analog Input,4	L2 Phase Current
6	Analog Input,5	L3 Phase Current
7	Analog Input,6	L1 Phase Active Power
8	Analog Input,7	L2 Phase Active Power
9	Analog Input,8	L3 Phase Active Power
10	Analog Input,9	L1 Phase Apparent Power
11	Analog Input,10	L2 Phase Apparent Power
12	Analog Input,11	L3 Phase Apparent Power
13	Analog Input,12	L1 Phase Reactive Power
14	Analog Input,13	L2 Phase Reactive Power
15	Analog Input,14	L3 Phase Reactive Power
16	Analog Input,15	L1 Phase Power Factor
17	Analog Input,16	L2 Phase Power Factor
18	Analog Input,17	L3 Phase Power Factor
19	Analog Input,18	L1 Phase Angle

Sr No	Instance Number	Measurement Parameter
20	Analog Input,19	L2 Phase Angle
21	Analog Input,20	L3 Phase Angle
22	Analog Input,21	Voltage Average
23	Analog Input,22	Voltage Sum
24	Analog Input,23	Current Average
25	Analog Input,24	Current Sum
26	Analog Input,25	Active Power Average
27	Analog Input,26	Active Power Sum
28	Analog Input,27	Apparent Power Average
29	Analog Input,28	Apparent Power Sum
30	Analog Input,29	Reactive Power Average
31	Analog Input,30	Reactive Power Sum
32	Analog Input,31	Power Factor Average
33	Analog Input,32	Power Factor Sum
34	Analog Input,33	Phase Angle Average
35	Analog Input,34	Phase Angle Sum
36	Analog Input,35	Frequency
37	Analog Input,36	Active Import Demand
38	Analog Input,37	Active Import Demand max
39	Analog Input,38	Active Export Demand
40	Analog Input,39	Active Export Demand max

Sr No	Instance Number	Measurement Parameter
41	Analog Input,40	Reactive Capacitive Demand
42	Analog Input,41	Reactive Capacitive Demand
43	Analog Input,42	Reactive Inductive Demand
44	Analog Input,43	Reactive Inductive Demand max
45	Analog Input,44	Apparent Demand
46	Analog Input,45	Apparent Demand max
47	Analog Input,46	Current Demand
48	Analog Input,47	Current Demand max
49	Analog Input,48	Active import Energy Overflow count
50	Analog Input,49	Active import Energy
51	Analog Input,50	Active export Energy Overflow count
52	Analog Input,51	Active export Energy
53	Analog Input,52	Reactive Capacitive Energy Overflow count
54	Analog Input,53	Reactive Capacitive Energy
55	Analog Input,54	Reactive Inductive Energy Overflow count
56	Analog Input,55	Reactive Inductive Energy
57	Analog Input,56	Apparent Energy Overflow count
58	Analog Input,57	Apparent Energy
59	Analog Input,58	System Voltage Max
60	Analog Input,59	System Voltage Min
61	Analog Input,60	Rotations Per Minute
62	Analog Input,61	Impulse per unit of Energy

Sr No	Instance Number	Measurement Parameter
63	Analog Input,62	System Current Max
64	Analog Input,63	System Current Min
65	Analog Input,64	L12 Voltage
66	Analog Input,65	L23 Voltage
67	Analog Input,66	L31 Voltage
68	Analog Input,67	Voltage THD L1
69	Analog Input,68	Voltage THD L2
70	Analog Input,69	Voltage THD L3
71	Analog Input,70	Current THD L1
72	Analog Input,71	Current THD L2
73	Analog Input,72	Current THD L3
74	Analog Input,73	System Voltage THD
75	Analog Input,74	System Current THD
76	Analog Input,75	Neutral Current



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