masibus®

Quick User Guide
PM 2160-A
Multifunctional Meter

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INTRODUCTION

PRODUCT OVERVIEW

The 2160-A MULTIFUNCTION METER is a solid state Multifunction Meter Which accurately measures all quantities of the supply including all types of energies. The 2160-A Multifunction Meter is based on Microcontroller, with a high degree of programmability. The meter meets the Accuracy requirements of IS14697 & IEC62053-22
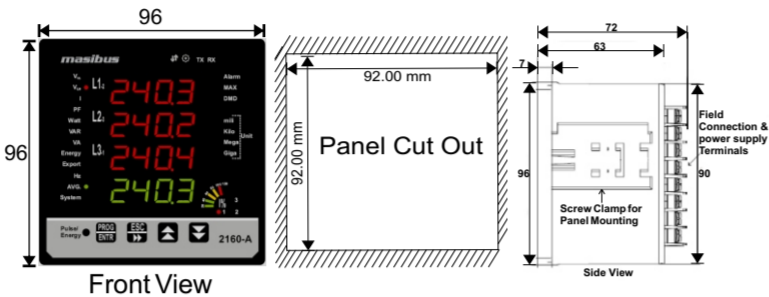
The Meter has been programmed to operate as an intelligent front end measuring and storing device and to communicate continuously to a Master, all the data relevant for the purpose of SCADA, through isolated RS-485 port using MODBUS-RTU protocol.

The Meter is normally supplied readily pre-programmed for operation and can be directly installed in the usual manner. The Meter can be read manually or through a Master using MODBUS-RTU Protocol.

Ordering code

Model		Accuracy		Communication		Max. Demand		THD		Output		Display Type
2160-A	X		X		X		X		X		X		X
	S	Class 1.0	N	None	N	None	N	None	N	None	LED	7 seg LED [4×4]
	5	Class 0.5s	1	RS485 Modbus	R	Required	R	Required	1	Pulse Output	LCP	LCD Panel
	2	Class 0.2s		Ethernet*								

Sr. No.	Description of accessory	Quantity
1	Panel mount clamps	2
2	User manual	1

MECHANICAL GUIDELINE

96
96
92.00 mm
92.00 mm

Panel Cut Out

Front View

72
63

Field Connection & power supply Terminals

Screw Clamp for Panel Mounting

Side View

FRONT PANEL PICTURE

PGM/ENT
RUN mode: Key press is used to enter into PGM mode
PGM mode: On key press - If in view mode goes into edit mode.
   If in edit mode goes into view mode.

ESC/SHIFT
RUN mode: Key press is used to move from one frame to the other Horizontally.
Continuously 4 Second key press is used to move in First page (Vrms) from any page in page matrix.
PROG mode: On key press - When in view mode this key press is used to exit from PGM mode to RUN mode.
   - If in edit mode used to shift to the next digit.

INC/UP
RUN mode: Key press is used to move from one frame to the other vertically up.
PROG mode: Increment value in edit mode.
   Move UP to next configuration parameter in view mode.

DEC/DOWN
RUN mode: Key press is used to move from one frame to the other Vertically Down.
PROG mode: Decrement value in edit mode.
   Move Down to next configuration parameter in view mode

REAR PANEL PICTURE

TERMINAL CONNECTION

1- TA+ = RS - 485 Positive Terminal
2- TB- = RS - 485 Negative Terminal

3- IB+ = Input terminal for B phase current connection
4- IB- = Output terminal for B phase current connection
5- IY+ = Input terminal for Y phase current connection
6- IY- = Output terminal for Y phase current connection
7- IR+ = Input terminal for R phase current connection
8- IR- = Output terminal for R phase current connection

9- L = AUX Supply Positive
10- N = AUX Supply Negative
11- OP+ = Pulse output Positive
12- OP- = Pulse output Negative

13- N = Neutral point for three phase four wire system
14- VB = B phase voltage connection
15- VY = Y phase voltage connection
16- VR = R phase voltage connection

SPECIFICATION

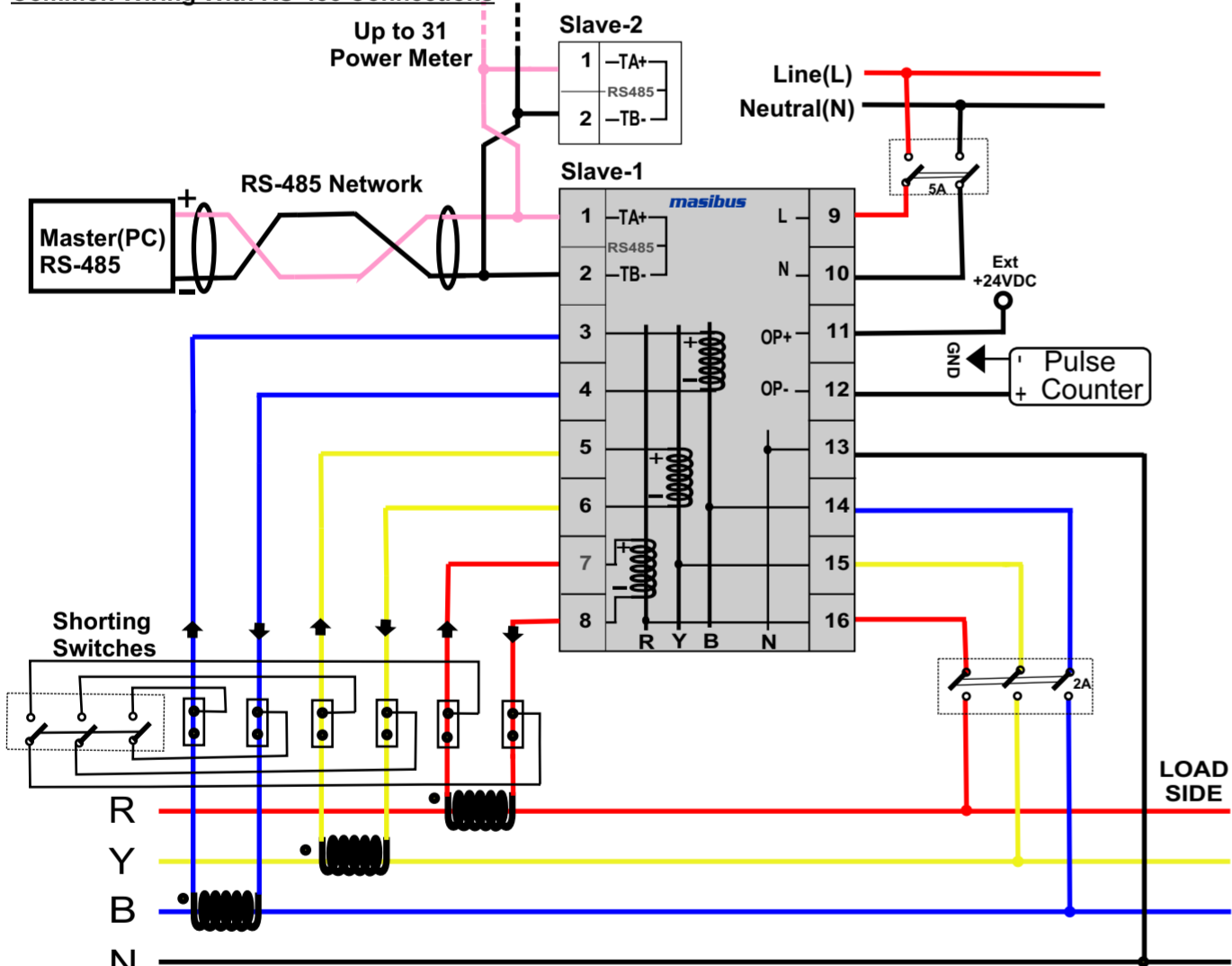|	
Meter Type	3Ph4W/ 3Ph3W (Site selectable)
Voltage Input	
Direct Voltage	20V to 350V (L-N) or 34V to 620V (L-L) @ 240V Nominal Voltage
PT Secondary (Nominal Voltage)	64V L-N, 110V L-N, 120 V L-N or 240V L-N (Site-selectable)Configurable for 3Ph3W or 3Ph4W system
Measurement Method	True RMS
Burden	<0.2VA per phase
Wire gauge	16 AWG
PT Ratio	1 to 9999.999 Programmable
Overload	1.2 x Nominal Voltage (Continuous)
Current Input	
Secondary Current	1 to 5A (Site selectable)
Measurement Method	True RMS
Burden	<0.2VA per phase
Wire gauge	16 AWG
CT Ratio	1 to 9999.999 Programmable
Overload	For 5A CT: 8A Continuous/ 20A for 1sec; For 1A CT: 2A Continuous/ 20A for 1sec
Starting Current	0.1% of Nominal Current (class 0.5)
Frequency	45 to 65 Hz
Display	
LED	4 line 4 digit' [10mm] 7-segment Display
LCD Panel	3 lines of 7 digits Height: 9.1 x Width: 5.15 mm; last line of 9 digits Height: 7 x Width: 3.97 mm
Measured Parameters	
Voltage	L1-L2,L2-L3,L1-L3 and Avarage (3Ph3W & 3Ph4W); L1-N,L2-N,L3-N & average (1Ph & 3Ph4W)
Current	All phase currents & their average (mA, A, KA)
Frequency	System Frequency
Power Factor	Phase wise PF & Average PF
Power (Phase & Total)	Active Power, Reactive Power and Apparent Power
Energy (Phase wise & Total)	Active Energy for Import & Export (Separate); Reactive Energy for Import & Export (Separate); Apparent Energy

Demand	Maximum Demand on KW/KVA (Block/Sliding for 15/30 minutes window)
Power Quality	Harmonics for each Voltage and Current (3rd to 15th odd); THD for Voltage & Current (Phase wise)
Real time clock & date	
	ON hour ,LOAD hour (up to 65000 hours Recording); Power Interruption count (up to 65000) with (Last Power OFF & Latest Power ON)Time & Date

Accuracy Table

	Class 0.2 (O)	Class 0.5 (O)	Class 1.0 (S)
Voltage		±0.25% of reading	
Current	±0.5% of reading	±0.5% of reading	±0.5% of reading
Frequency		±0.01Hz	
Power Factor	±0.2% of FS	±0.25% of FS	±0.5% of FS
Active Power* (≥0.02 of Ib)	0.2% of reading +/- 0.01% of FS	0.3% of reading +/- 0.01% of FS	1.0% of reading + 0.01% of FS
Reactive Power* (≥0.02 of Ib)	0.2% of reading +/- 0.02% of FS	0.5% of reading +/- 0.02% of FS	1.0% of reading + 0.02% of FS
Apparent Power* (≥0.02 of Ib)	0.2% of reading +/- 0.02% of FS	0.5% of reading +/- 0.02% of FS	1.0% of reading + 0.02% of FS
Active Energy*	Class 0.2s as per Is14697/ IEC 62053-22	Class 0.5s as per Is14697/ IEC 62053-22	Class 1.0 as per Is13779/ IEC 62053-21
Reactive Energy*	Class 0.2s as per Is14697	Class 0.5s as per Is14697	Class 1.0s as per Is13779
Apparent Energy*	Class 0.2s	Class 0.5s	Class 1.0

(*PF 0.5 Lag-1.0 - 0.8 Lead Applicable for Power & Energy Parameter)
Isolation (Withstanding voltage)
Between primary terminals* and secondary terminals:**
At least 2000 V AC for 1 minute
Between primary terminals*:
At least 2000 V AC for 1 minute
Between secondary terminals:**
At least 2000 V AC for 1 minute
* Primary terminals indicate Aux power terminals, Voltage i/p terminals and ct terminals.
** Secondary terminals indicate pulse o/p and Communication O/P.
Insulation resistance: 20MΩ or more at 500 V DC between power terminals and grounding terminal

Auxiliary Power Supply	
Power Supply	85-265VAC, 50/60Hz or 100-300VDC
Burden	Less than 4VA [LED]; Less than 3VA [LCD Panel with Backlight], Less than 2VA [LCD Panel w/o Backlight through Configuration]
Energy Update Rate	500 mSec
Communication Output RS485(Optional)	
Interface	RS485
Baud Rate	9600, 19200, 38400 (Selectable)
Start bit, Stop bit	1, 1
Protocol	Modbus-RTU
Pulse Output (Optional in lieu of relay o/p)	
Type	WH/ VARh/ Vah
AC/DC Ratings	200VAC / 300VDC,100mA AC/150mA DC
Pulse rate	Programmable from 100 to 60000 pulses per KWh[I]/KWh[E]/KVARh[I] /KVARh[E] /KVAh/ MWh[I]/MWh[E]/MVARh[I] /MVARh[E] /MVAhof total.
Pulse duration	40 mSec ± 10%
Output Type	Open collector [External Excitation Required]
Environmental	
Working temperature	0 to 55 °C
Storage temperature	-10 to 70°C
Relative Humidity	30 to 95% RH non-condensing
Warm up time	5 minutes
Physical	
Mounting Type	Panel mount
Size (in mm)	96 x 96 x 64 mm
Front Bezel (in mm)	96 x 96 mm
Panel cutout (in mm)	92 x 92 mm
Depth behind panel	64 mm
Material	ABS
Accessory	2 Panel mount clamps
Weight	0.3 Kg
Enclosure Protection	IP50 front fascia; Overall IP20
Terminal & Cable Size	Barrier Type terminal, Cable Size [3 mm²]

WIRING DIAGRAMS

Common Wiring With RS-485 Connections

Up to 31 Power Meter

Slave-2
1 –TA+ RS485
2 –TB-

Line(L)
Neutral(N)

RS-485 Network

Slave-1
1 –TA+ RS485
2 –TB-

Master(PC) RS-485

Shorting Switches

R Y B N

LOAD SIDE

Ext +24VDC
Pulse Counter

Safety Precautions

Dangerous voltages capable of causing death are sometimes present in this instrument. Before installation or beginning of any troubleshooting procedures the power to all equipment must be switched off and isolated. Units suspected of being faulty must be disconnected and removed first and brought to a properly equipped workshop for testing and repair. Component replacement and interval adjustments must be made by a company person only.

Read the instructions in this manual before performing installation and take note of the following precautions:
All wiring must confirm to appropriate standards of good practice and local codes and regulations. Wiring must be suitable for voltage, current, and temperature rating of the system.

Ensure that all incoming AC power and other power sources are turned OFF before performing any work on the instrument. Protect the measurement AC Inputs voltage (V1, V2, V3) with 2A external over current protection device and the power supply source inputs with 5A external over current protection device, located close to the equipment.

Before connecting the instrument to the power source, check the labels on the instrument to ensure that your instrument is equipped with the appropriate power supply voltage, input voltages and currents. Failure to do so may result in serious or even fatal injury and/or equipment damage.

Under no circumstances don't connect instrument a power source if it is damaged.
To prevent potential fire or shock hazard, do not expose the instrument to rain or moisture.

The secondary of an external current transformer must never be allowed to be open circuit when the primary is energized. An open circuit can cause high voltages, possibly resulting in equipment damage, fire and even serious or fatal injury. Ensure that the current transformer wiring is secured using an external strain relief to reduce mechanical strain on the screw terminals, if necessary.

Only qualified personnel familiar with the instrument and its associated electrical equipment must perform setup procedures.
Beware not to over-tighten the instrument terminals.

Read this manual thoroughly before connecting the device to the current carrying circuits. During operation of the device, hazardous voltages are present on input terminals. Failure to observe precautions can result in serious or even fatal injury or damage to equipment.

Upon receipt of the shipment remove the unit from the carton and inspect the unit for shipping damage. If any damage due to transit, report and claim with the carrier. Write down the model number and serial number for future reference when corresponding with our Customer Support Division.

Do not use this instrument in areas such as excessive shock, vibration, dirt, moisture, corrosive gases or rain. The ambient temperature of the areas should not exceed the maximum rating specified.

Note: -For Single Phase Two Wire, system should be 3P4W and Do not consider Average Voltage, Average Current & Average PF on the display or MODBUS. Also Do not consider Y- Phase and B- Phase parameters.

1) Single Phase Two Wire System

Earth
Earth
LOAD SIDE
P
N
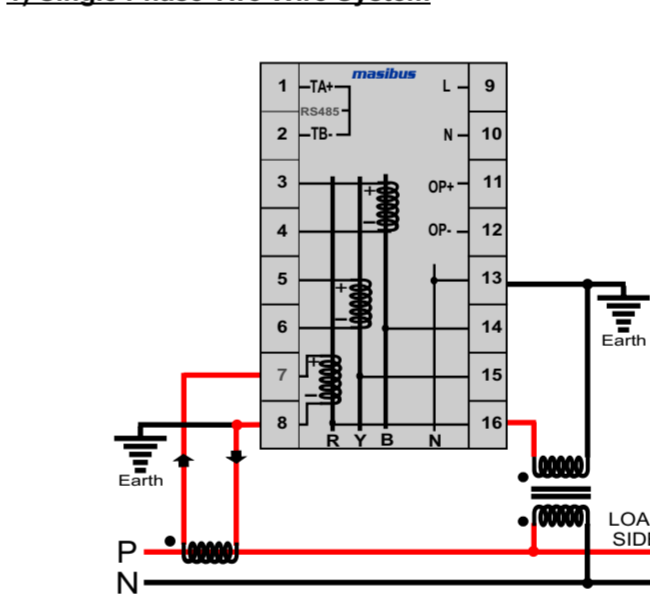
2) Three Phase Three Wire System

2A) 3-Wire 2- Element Open Delta Connection Using 2PTs, 2CTs

Earth
Earth
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R Y B
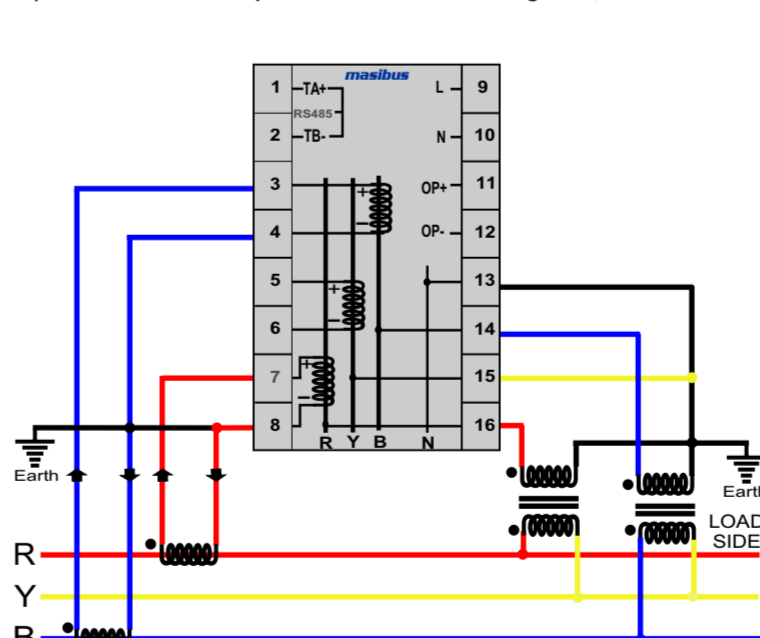
2B) 3-Wire 2- Element Direct Connection Using 2CTs

Earth
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R Y B
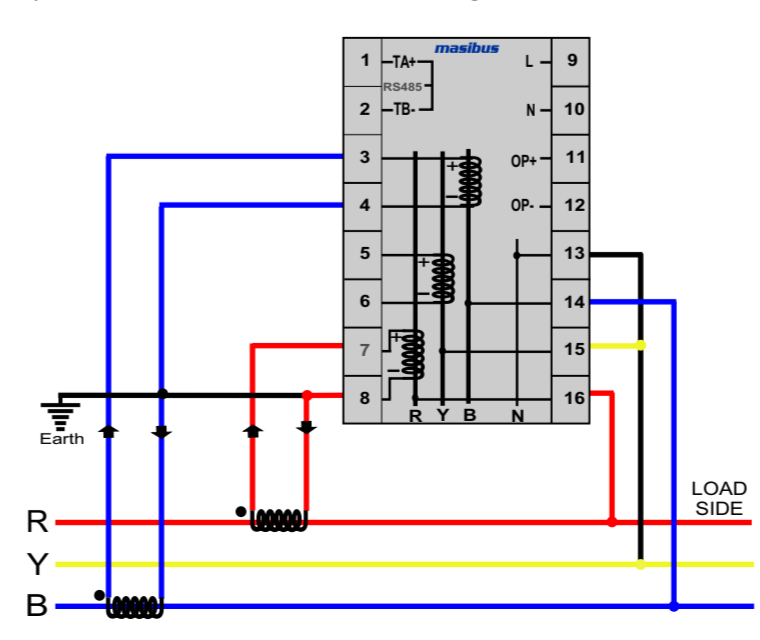
3) Three Phase Four Wire System

3A) 4-Wire Wye-3 Element Connection Using 3PTs, 3CTs

Earth
Earth
LOAD SIDE
R Y B N
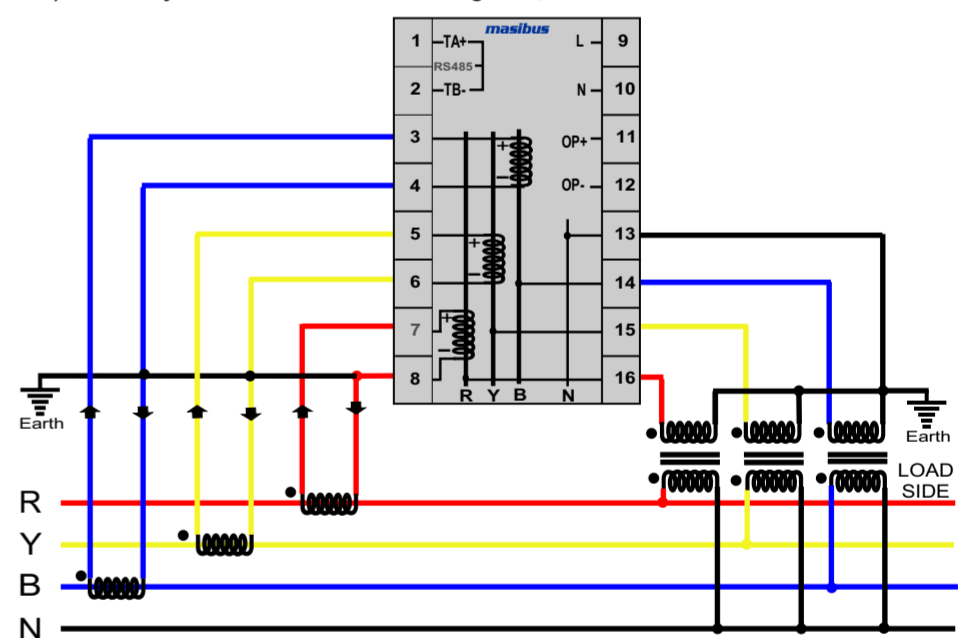
3B) 4-Wire Wye-3 Element Direct Connection Using 3CTs

Earth
LOAD SIDE
R Y B N
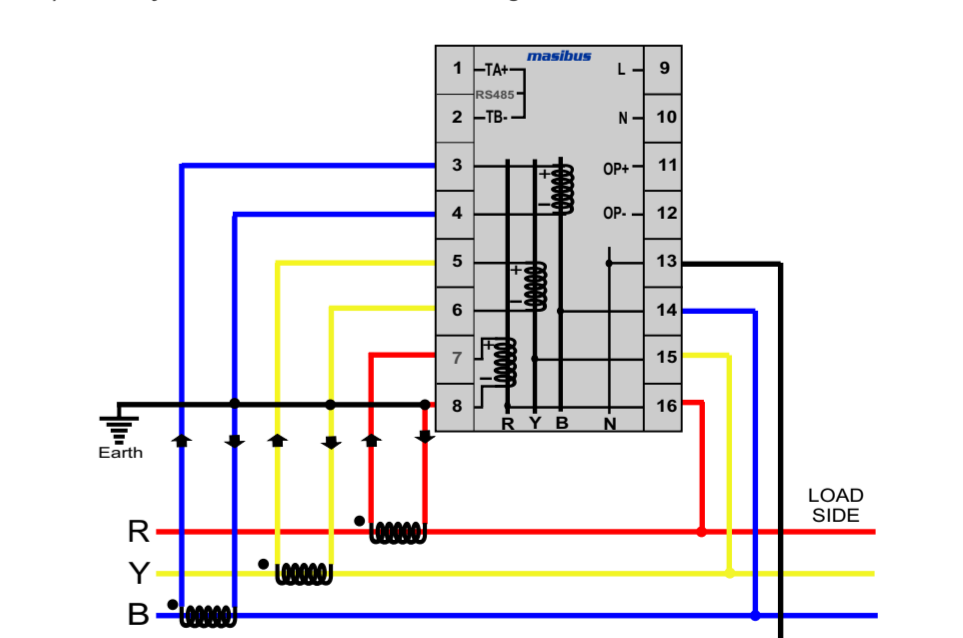
3C) 4-Wire Direct Connection

LOAD SIDE
R Y B N
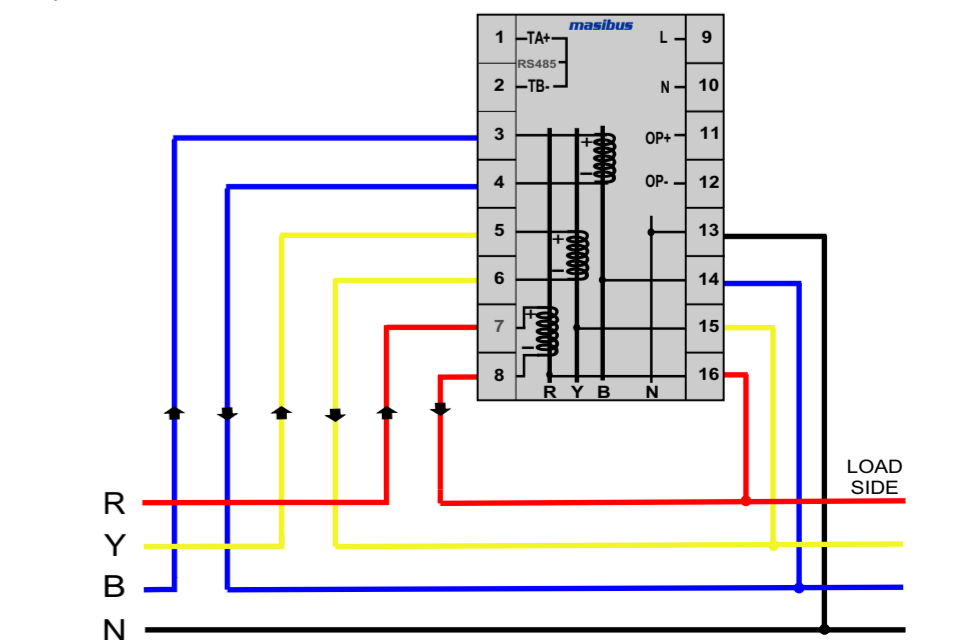
Modbus Register Map for 3P4W AND 3P3W parameters

Data read Query = [0 x Slave Id], [0 x Fun. Code], [0 x ADD. High], [0 x ADD. Low], [0 x No. of data word, High], [0 x No. of data word. Low] [0 x CRC Low] [0 x CRC High]
Function Code = 0X04
Address between 30001 to 30121
No. of data word ≤ 122 & in multiple of 2 as all data are of 4 Bytes [Long & Real].
Enter only Even value (data word length).
Response = [0 x Slave Id], [0 x Fun. Code], [Byte count], [Data High], [Data Low] ...... [Data. High], [Data. Low] [0 x CRC Low] [0 x CRC High]
[Data Format: Long & Real]

Sr. No.	Address	Measured parameter		W	M.F.
		3P4W	3P3W		
1	30001	Frequency	Frequency	2	0.01
2	30003	1. PF	1_2. PF	2	0.001
3	30005	2. PF	Reserved	2	0.001
4	30007	3. PF	3_2. PF	2	0.001
5	30009	A. PF	A. PF	2	0.001
6	30011	1. Vrms	Vrms 1*2	2	0.1
7	30013	2. Vrms	Vrms 3*1	2	0.1
8	30015	3. Vrms	Vrms 2*3	2	0.1
9	30017	A. Vrms	A. Vrms	2	0.1
10	30019	Vrms 1*2	Reserved	2	0.1
11	30021	Vrms 2*3	Reserved	2	0.1
12	30023	Vrms 3*1	Reserved	2	0.1
13	30025	1. Irms	1. Irms	2	0.001
14	30027	2. Irms	Reserved	2	0.001
15	30029	3. Irms	3. Irms	2	0.001
16	30031	A. Irms	A. Irms	2	0.001
17	30033	Reserved	Reserved	-	-
18	30035	1. Watt	1_2. Watt	2	1
19	30037	2. Watt	Reserved	2	1
20	30039	3. Watt	3_2. Watt	2	1
21	30041	S. Watt	S. Watt	2	1
22	30043	1. Var	1_2. Var	2	1
23	30045	2. Var	Reserved	2	1
24	30047	3. Var	3_2. Var	2	1
25	30049	S. Var	S. Var	2	1
26	30051	1. VA	1_2. VA	2	1
27	30053	2. VA	Reserved	2	1
28	30055	3. VA	3_2. VA	2	1
29	30057	S. VA	S. VA	2	1
30	30059	1. Wh-Import	1_2. Wh-Import	2	0.1
31	30061	2. Wh-Import	Reserved	2	0.1
32	30063	3. Wh-Import	3_2. Wh-Import	2	0.1
33	30065	T. Wh-Import	T. Wh-Import	2	0.1
34	30067	1. Wh-Export	1_2. Wh-Export	2	0.1
35	30069	2. Wh-Export	Reserved	2	0.1
36	30071	3. Wh-Export	3_2. Wh-Export	2	0.1
37	30073	T. Wh-Export	T. Wh-Export	2	0.1
38	30075	1. Varh-Import	1_2. Varh-Import	2	0.1
39	30077	2. Varh-Import	Reserved	2	0.1
40	30079	3. Varh-Import	3_2. Varh-Import	2	0.1
41	30081	T. Varh-Import	T. Varh-Import	2	0.1
42	30083	1. Varh-Export	1_2. Varh-Export	2	0.1
43	30085	2. Varh-Export	Reserved	2	0.1
44	30087	3. Varh-Export	3_2. Varh-Export	2	0.1
45	30089	T. Varh-Export	T. Varh-Export	2	0.1
46	30091	1. Vah	1_2. Vah	2	0.1
47	30093	2. Vah	Reserved	2	0.1
48	30095	3. Vah	3_2. Vah	2	0.1
49	30097	T. Vah	T. Vah	2	0.1
50	30099	Rising Demand	Rising Demand	2	1
51	30101	Real Date	Real Date	2	-
52	30103	Real Time	Real Time	2	-
53	30105	Max. Demand	Max. Demand	2	0.1
54	30107	MD Date	MD Date	2	-
55	30109	MD Time	MD Time	2	-
56	30111	1. Phase Angle	1_2. Phase Angle	2	0.01
57	30113	2. Phase Angle	Reserved	2	0.01
58	30115	3. Phase Angle	3_2. Phase Angle	2	0.01
59	30117	V. Unbalance	V. Unbalance	2	0.01
60	30119	I. Unbalance	I. Unbalance	2	0.01
61	30121	Reserved	Reserved	2	0.01

Note: For all table,
(1) W= words
(2) M.F.= Multiplication Factor(If data type is long)

Energy Overflow Count:

Function Code = 0X04
Address between 30150 to 30154
No. of data word ≤ 5 & in multiple of 1 as all data are of 2 Bytes [Decimal].
[Data Format: Only in Decimal]

Sr. No.	Address	Measured parameter	W	M.F.
1	30150	Wh I-ovcnt	1	-
2	30151	Wh E-ovcnt	1	-
3	30152	VARh I-ovcnt	1	-
4	30153	VARh E-ovcnt	1	-
5	30154	VAh -ovcnt	1	-

ON Hour / LOAD Hour / Power Interruption Count:

Function Code = 0X04
Address between 30301 to 30311
No. of data word ≤ 11 & in multiple of 1 as all data are of 2 Bytes [Decimal].
[Data Format: Only in Decimal]

Sr. No.	Address	Measured Parameter	W	M.F.
1	30301	On Hour	1	-
2	30302	On Min	1	-
3	30303	Load Hour	1	-
4	30304	Load Min	1	-
5	30305	Idle Hour	1	-
6	30306	Idle Min	1	-
7	30307	PWR Intr. Count	1	-
8	30308	Import Run Hour	1	-
9	30309	Import Run Min	1	-
10	30310	Export Run Hour	1	-
11	30311	Export Run Min	1	-

Power ON/OFF Date & Time:

Function Code = 0X04
Address between 30350 to 30356
No. of data word ≤ 8 & in multiple of 2 as all data are of 4 Bytes [Long & Real].
[Data Format: long & Real]

Sr. No.	Address	Measured Parameter	W	M.F.
1	30350	Power Off Date	2	-
2	30352	Power Off Time	2	-
3	30354	Power On Date	2	-
4	30356	Power On Time	2	-

Note: If data type is long in multifunction meter then set Swapped long in Modbus master. If data type is Real in Multifunction meter then set Swapped Float in Modbus master.
Note: Energy will be in Kilo for Real data type and for Long data type multiply with constant stated to get energy in Kilo unit.
Note: Ignore address which are not mentioned in the memory map as they are useful in 3P4W mode.
Note: For Time & Date
Real Date & MD Date: DDMMYY(e.g. If it is 250112 then Date: 25/01/12)
Real Time : HHMMSS (e.g. If it is 135015 than Time: 13:50:15)
MD Time : HHMM (e.g. If it is 1350 than Time: 13:50)
Note: Rising Demand and Max Demand will be in Kilo for float & Long value.
Note: Ignore value for Reserved in Modbus Memory Map.

Modbus map for 3P4W & 3P3W:

Function Code = 0X04
Address between 32001 to 32033
No. of data word ≤ 34 & in multiple of 2 as all data are of 4 Bytes [Long & Real].
[Data Format: long & Real]

Sr. No.	Address	Measured Parameter		W	M.F.
		3P4W	3P3W		
1	32001	Frequency	Frequency	2	0.01
2	32003	1. Vrms	Vrms 1*2	2	0.1
3	32005	2. Vrms	Vrms 3*1	2	0.1
4	32007	3. Vrms	Vrms 2*3	2	0.1
5	32009	A. Vrms	A. Vrms	2	0.1
6	32011	1. Irms	1. Irms	2	0.001
7	32013	2. Irms	Reserved	2	0.001
8	32015	3. Irms	3. Irms	2	0.001
9	32017	A. Irms	A. Irms	2	0.001
10	32019	S. Watt	S. Watt	2	1
11	32021	S. Var	S. Var	2	1
12	32023	S. VA	S. VA	2	1
13	32025	T. Wh-Import	T. Wh-Import	2	0.1
14	32027	T. Wh-Export	T. Wh-Export	2	0.1
15	32029	T. Varh-Import	T. Varh-Import	2	0.1
16	32031	T. Varh-Export	T. Varh-Export	2	0.1
17	32033	T. Vah	T. Vah	2	0.1

Harmonics:

Function Code = 0X04
Address between 30200 to 30294
No. of data word ≤ 96 & in multiple of 2 as all data are of 4 Bytes [Long & Real].
Enter only Even value (data word length).
[Data Format: long & Real]

Sr. No.	Address	Measured parameter		W	M.F.
		3P4W	3P3W		
1	30200	3rd VrHar	3rd VrHar	2	0.01
2	30202	5th VrHar	5th VrHar	2	0.01
3	30204	7th VrHar	7th VrHar	2	0.01
4	30206	9th VrHar	9th VrHar	2	0.01
5	30208	11th VrHar	11th VrHar	2	0.01
6	30210	13th VrHar	13th VrHar	2	0.01
7	30212	15th VrHar	15th VrHar	2	0.01
8	30214	Total Vrthd	Total Vrthd	2	0.01
9	30216	3rd VyHar	Reserved	2	0.01
10	30218	5th VyHar	Reserved	2	0.01
11	30220	7th VyHar	Reserved	2	0.01
12	30222	9th VyHar	Reserved	2	0.01
13	30224	11th VyHar	Reserved	2	0.01
14	30226	13th VyHar	Reserved	2	0.01
15	30228	15th VyHar	Reserved	2	0.01
16	30230	Total Vythd	Reserved	2	0.01
17	30232	3rd VbHar	3rd VbHar	2	0.01
18	30234	5th VbHar	5th VbHar	2	0.01
19	30236	7th VbHar	7th VbHar	2	0.01
20	30238	9th VbHar	9th VbHar	2	0.01
21	30240	11th VbHar	11th VbHar	2	0.01
22	30242	13th VbHar	13th VbHar	2	0.01
23	30244	15th VbHar	15th VbHar	2	0.01
24	30246	Total Vbthd	Total Vbthd	2	0.01
25	30248	3rd IrHar	3rd IrHar	2	0.01
26	30250	5th IrHar	5th IrHar	2	0.01
27	30252	7th IrHar	7th IrHar	2	0.01
28	30254	9th IrHar	9th IrHar	2	0.01
29	30256	11th IrHar	11th IrHar	2	0.01
30	30258	13th IrHar	13th IrHar	2	0.01
31	30260	15th IrHar	15th IrHar	2	0.01
32	30262	Total Irthd	Total Irthd	2	0.01
33	30264	3rd IyHar	Reserved	2	0.01
34	30266	5th IyHar	Reserved	2	0.01
35	30268	7th IyHar	Reserved	2	0.01
36	30270	9th IyHar	Reserved	2	0.01
37	30272	11th IyHar	Reserved	2	0.01
38	30274	13th IyHar	Reserved	2	0.01
39	30276	15th IyHar	Reserved	2	0.01
40	30278	Total Iythd	Reserved	2	0.01
41	30280	3rd IbHar	3rd IbHar	2	0.01
42	30282	5th IbHar	5th IbHar	2	0.01
43	30284	7th IbHar	7th IbHar	2	0.01
44	30286	9th IbHar	9th IbHar	2	0.01
45	30288	11th IbHar	11th IbHar	2	0.01
46	30290	13th IbHar	13th IbHar	2	0.01
47	30292	15th IbHar	15th IbHar	2	0.01
48	30294	Total Ibthd	Total Ibthd	2	0.01

Exception Responses:

CODE	NAME	MEANING
01	Illegal Function	The message function received is not an allowable action for slave.
02	Illegal Data Address	The address referenced in the data field is not an allowable address for the addressed slave location.
03	Illegal Data Value	The value referenced in the data field is not allowable in the addressed slave location.
06	Slave Device Busy	The slave is engaged in processing a program command. The master should retransmit the message later when slave is free.

Note 1: If data type is long in Energy meter then set Swapped long in Modbus master. If data type is Real in Energy meter then set Swapped Float in Modbus master.
Note 2: Energy will be in Kilo for Real data type and for Long data type multiply with constant stated to get energy in Kilo unit.
Note 3: Ignore address which are not mentioned in the memory map as they are useful in 3P4W Mode.
Note 4: Ignore value for Reserved in Modbus Memory Map.
Note 5: As per standard condition, negative sign of PF indicates lead and positive sign of PF indicates Lag on Modbus.

Modbus Register Map for configuration parameters

(A)Read Holding Register
Data read Query = [0 x Slave Id], [0 x Fun. Code], [0 x ADD. High], [0 x ADD. Low], [0 x No. of data word, High], [0 x No. of data word. Low] [0 x CRC Low] [0 x CRC High]
Function Code = 0X03
Address between 40101 to 40130
No. of data word ≤ 41 & in multiple of 1 as all data are of 2 Bytes [Decimal].
Response = [0 x Slave Id], [0 x Fun. Code], [Byte count], [Data High], [Data Low] ...... [Data. High], [Data. Low] [0 x CRC Low] [0 x CRC High]

(B)Preset Single Holding Register
Data write Query = [0 x Slave Id], [0 x Fun. Code], [0 x ADD. High], [0 x ADD. Low], [0 x Data High], [0 x Data Low], [0 x CRC High]
Function Code = 0X06
Address Any Single Register between 40101 to 40130
Data = Data of 1 word, as all data are of 2 Bytes [Decimal].
Response = [0 x Slave Id], [0 x Fun. Code], [0 x ADD. High], [0 x ADD. Low], [0 x Data High], [0 x Data Low], [0 x CRC Low] [0 x CRC High]

[Data Format: only in Decimal]

Sr. No.	Address	Measured parameter	W	Min. value	Max. value
1	40101	Password	1	1	9999
2	40102	Slave address	1	1	247
3	40103	Baud rate (9600, 19200, 38400)	1	9600	38400
4	40104	*Energy type	1	0	9
5	40105	System type (0 – 3P4W, 1 – 3P3W)	1	0	1
6	40106	PF1 type (read only value)	1	0	2
7	40107	PF2 type (read only value) (3P4W only)	1	0	2
8	40108	PF3 type (read only value)	1	0	2
9	40109	Total PF type(read only value)	1	0	2
10	40110	*CT Ratio – High byte	1		
11	40111	*CT Ratio – low byte	1		
12	40112	*PT Ratio – high byte	1		
13	40113	*PT Ratio – low byte	1		
14	40114	Rated Voltage (6,410,120,240)	1	64	240
15	40115	Rated Current (1,5)	1	1	5
16	40116	Pulse constant (KWH)*	1	100	60000
17	40121	Data type (0-Real,1-Long)	1	0	1
18	40122	Demand Type (0-KW, 1-KVA)	1	0	1
19	40123	Demand Method (0-BLOCK,1-SLIDE)	1	0	1
20	40124	Interval Time	1	15	30
21	40125	Sub Interval Time*	1	5	10
22	40126	Real Sec& Min [SSMM]	1	0	5959
23	40127	Real Hour & Date [HHDD]	1	1	2331
24	40128	Real Month & Year[MMYY]	1	100	1299
25	40129	Reset Individual Reg.** (Write only)	1	77	84
26	40130	Reset all (Write only) **	1	85	85

*1) Energy type has ten options
  0 KWH Import
  1 KWH Export
  2 KVARH Import
  3 KVARH Export
  4 KVAH
  5 MWH Import
  6 MWH Export
  7 MVARH Import
  8 MVARH Export
  9 MVAH

*2) Maximum CT & PT Ratio value is 9999999 i.e. maximum value is 9999.999 & minimum value is 1000 i.e. 1.000
*3) Energy Pulse output must be in multiple of 100
*4) Sub interval Time It is applicable for Sliding window only For 15 minute Interval time it is limited to 1, 3 or 5 For 30 minute Interval time it is limited to 1, 2,3,5,6 or 10
*5) RESET INDIVIDUAL REG.
  77 - Wh-Import
  78 - Wh-Export
  79 - Varh-Import
  80 - Varh-Export
  81 - Reset All Energy
  82 - Hours
  83 - Power Interruption Count Reset
  84 - Maximum Demand Reset
*6) To reset all the parameters write 85 to address 40130.

Example:
For entering CTR value 1234.567, convert 1234567 in to hexadecimal i.e. 2D687.
Now enter lower four byte (D687) at 40111 and higher four byte (0012) at 40110 addresses respectively.

PF type has three options: 0 Unity
  1 Lag
  2 Lead

NOTE:-
MODBUS Time out 4 Sec or more.

General Setting & Condition for CT, PT ratio

Confirm the connection configuration
Confirm that all energy parameters, Hour parameters, MD parameters & Power Interruption counter are going to start from zero, if not, make them zero by All Regs Rst
Vrated and Irated should be set equal to PT secondary P-N Voltage and CT secondary Current Respectively.
Apply proper CT PT Ratio as per requirement, which must pass the below mathematical conditions for 3P3W and 3P4W.
For 3P4W
  3x1.2xVratedx1.2xIratedx CT Ratio x PT Ratio < 2,000,000,000
For 3P3W
  2x1.2x√3xVratedx1.2xIratedx CT Ratio x PT Ratio < 2,000,000,000
Select Energy type for LED Blinking as per your requirement.
Confirm that Meter is calibrated.
For Serial communication, MODBUS-RTU, RS485, you will get real/long data from measurement.
Factory set Password to access the Program mode is 0001.
Some parameters in configuration are only for factory purposes so please don't disturb these parameters like V rated, I rated & System.
For 3p3w system, Display Menu will be changed and for modbus communication, follow the address map for 3p3w.Program mode will be same.

Energy Overflow Time Calculation

When data type selected for modbus is FLOAT, Total apparent Energy will overflow from 400GVAhr then auto reset Apparent Energy, but when the ov.count of this energy (VA Ov.count > 99) then meter will auto reset all energy parameter. This includes Active import and export energy, Reactive Import and Export energy and apparent energy. Such condition of overflow occurrence is depending on CT ratio and PT ratio.
Example:
For 110V V rated, and 1 A I rated multifunction meter is set for 100A and 66KV line with CT Ratio of 100 and PT Ratio of 600.
PT Primary = 66KV, **PT Secondary** = 110V
Therefore select Vrated = 110V.
PTR = 66KV/110V=600 select.
CT Primary=100A, CT Secondary=1A
Therefore select Irated = 1A.
CTR = 100A/1A=100 select in meter.
Energy consumed per hour = 66kV X 100Amps
  = 6600KVAHr.
Time to overflow in Hr. = 400GVAhr / 6600KvaHr = 60606 Hr
Days = 60606 /24 = 2525 Days
Years = 2525 / 365 = 6.91 Years / Total of Three Phase.
But our Apparent Energy Overflow Count Range are 1 to 99, therefore
Total Time to overflow in Years = 6.91*99 = 684.09 Years / Total of Three Phase.
User has to manually reset All Regs Rst, when installing the meter first time.
As above for 100A and 66KV line, PT Primary = 66KV, PT Secondary = 110V Therefore Vrated = 110V select. PTR = 66KV/110V=600 select.
CT Primary=100A, CT Secondary=1A Therefore Irated = 1A select. CTR = 100A/1A=100 select in meter.

Energy Calculation

Below formula used for finding the Total Active Energy Import.
Total Active Energy = [Running Active Energy (Import) + (WH-I Ov.count * 400G)]
(Import)
Example:
Let's WH-I Ov.count = 5, Active[Im] = 20.3268 GWh then,
  Actually measured Total Active Energy (Import) = [20.3268 G + (5 * 400G)] = 2020.3268 GWh
Above calculation is same for other energy (Active Export, Reactive Import, Reactive Export, and Apparent Energy) can be find out using respective Ov.count and running energy.

Energy Pulse O/P Constant Setting

For Front Blinking LED, select energy type (i.e.- import/KWH-export/KVARh-Import/KVARh-Export/KVAh/MWh-Import/MWh-Export/MVARh-Import/MVARh -Export/MVAh) as per your requirement using Program mode, from OUTPUT and set the value of constant. But here you can get maximum output pulse frequency (& LED Blinking rate) up to 50 msec. so whenever you are using this feature; you should set value of Meter-Constant such a way so it will not cross the limit of 50 ms pulse frequency.
As pulse frequency is 50 msec, i.e. in one second maximum 20 pulses can be obtained, hence in one hour maximum 72000 pulses can be obtained.
Total no of impulses/second can be calculated as below
(Vrate * Irate * CTR * PTR * Pulse Constant in Wh)/3600 <= 20.
Example: Meter specification
V rated = 240V, I rated = 5A, CT ratio = 40 and PT ratio = 100,
Above meter can consume maximum of 4.8MWatt.
I.e. For 3600 pulses/KWh [3.6 pulses/Wh], it will generate 4800 pulses/sec as per above equation, [240*5*40*100*3.6/3600 = 4800] so it will not work for the meter as it is more than 20 pulses/sec
I.e. For 2000 pulses/MWh [0.002 pulses/Wh], it will generate 2.666 pulses/sec as per above equation, [240*5*40*100*0.002/3600 = 2.66] so it will work for the meter as it is less than 20 pulses/sec
This is for single phase only, in case of three phases, energy will be multiplied by three in 3p4w and hence pulses should be calculated for three phase energy.

Energy Resolution on Modbus

Resolution of the energy parameter on the Modbus when data is transmitted in LONG format is 100VAhr/Whr/VARhr rather than 1VAhr/Whr/VARhr, which is possible when FLOAT data type is used. Because of the limitation of the Long data type and to avoid frequent reset, Data is transmitted in with above-mentioned resolution.
Due to this resolution on display of the Meter will not be same as ON ModBus data, when data is transmitted in LONG format. Multiplication factor given on master side is 0.0001.
Example:
Lets say on modbus data transmitted is 20098798 then on the master side it will be,

20098798 * 0.0001 = 2009.8798 MWhr/MVAhr/MVARhr

Which gives the resolution of the 0.1KWhr/KVAhr/KVARhr as described above.

ON Hour, LOAD Hour, IDLE Hour& Power Interruption Count

ON Hour: The period for which the meter (supply) is ON
LOAD Hour: Indicates the period the Load is ON and has run. This counter accumulates as long as the load is greater than the starting current (0.1% of the Irate) set.
IDLE Hour: Indicates the period of difference between ON Hour and LOAD Hour.
(ON, LOAD, IDLE Display two quantity Hours and Minute.
Power Interruption Count: Number of Supply Outages, means the number of Auxiliary Supply interruptions. If the meter Auxiliary Supply is from a UPS then the INTR (number of interruptions) will be zero (as long as the UPS stays ON), even if the Voltage Signals did die out from time to time.
It shows last Power OFF & Power ON time. [Available with RTC option only]

Potential Problem	Possible Cause	Possible Solution
The display is OFF after applying control Power to the Energy Meter.	The Energy meter may not be Receiving the necessary Power.	Verify that the Energy meter line (L) and neutral (N) terminals are Receiving the necessary power.
The data being displayed is inaccurate Or not what you expect.	Incorrect setup values.	Check that the correct values have been entered for Energy meter setup parameters (CT and PT ratings, System Type).
	Incorrect voltage inputs.	Check Energy meter voltage input terminals to verify that adequate voltage is present.
Cannot communicate with Energy meter from A remote personal computer.	Energy meter address is incorrect.	Check to see that the Energy meter is correctly addressed.
	Energy meter baud rate (parity, stop bit) is incorrect.	Verify that the baud rate (parity, stop bit) of the Energy meter matches the baud rate (parity, stop bit) of all other devices on its communications link.
	Communications lines are improperly connected.	Verify the Energy meter communications connections interchange [A+] & [B-] lines
EB/DG ENERGY LOGGING	Improper DG connection	Connect properly as per diagram (COMMON WIRING WITH RS-485/ EB-DG CONNECTIONS)