



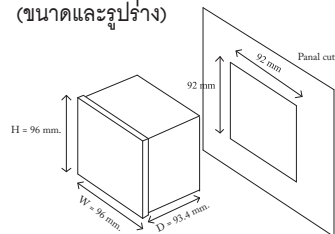
KM-07



TECHNICAL SPECIFICATION

Power Supply		230 VAC ±15 % 50-60 Hz
Power Consumption		2.5VA
Display		LCD
Input	Type	Voltage (TRUE RMS)
	Direct Phase and Neutral	10 to 290 VAC
	Direct Between Phase	10 to 500 VAC
	Voltage Primary	Up to 72000 VAC
	Voltage Secondary	60, 100, 110, 173, 190, 240 VAC
	PT Ratio	1-300
	Accuracy	± 0.2 % FS.
	Type	Current (TRUE RMS)
	Direct	20 mA to 10 A
	Current Primary	Up to 10000 A
	Current Secondary	20 mA to 5 A
	Accuracy	±0.2% FS.
	Type	Power
	Accuracy	± 0.5 % (FS)
	Type	Power Factor
	Accuracy	± 0.2 % (FS)
	Type	Frequency
	Accuracy	45 to 65 Hz ± 0.1Hz
	Active Energy Accuracy	Class 0.5
	Reactive Energy Accuracy	Class 1.0
	THD	Volt, Current
Digital Output	Speed	32 Pulse/sec
	Volt Operate	10-48 VDC
Communication	Protocol	MODBUS RTU
	Baud Rate	2400, 4800, 9600, 19200 38400 bps
	Parity	None, Even, Odd
	Stop Bits	1, 2
	Data Bits	8 Bits
	Support Device Node	128
Ambient Operation	Temperature	-10 °C to 60 °C
	Humidity	85 % RH Non-Condensing
Ambient Storage	Temperature	-20 °C to 80 °C
	Humidity	85 % RH Non-Condensing
Protection Degree	Front Protection Rating	IP52
	Case Protection Rating	IP30
Installation	Panel Mounting	
Material	ABS-V0	
Size	96 x 96 x 76.6 mm.	
Weight	465 g.	

DIMENSION (ขนาดและรูปร่าง)



DESCRIPTION

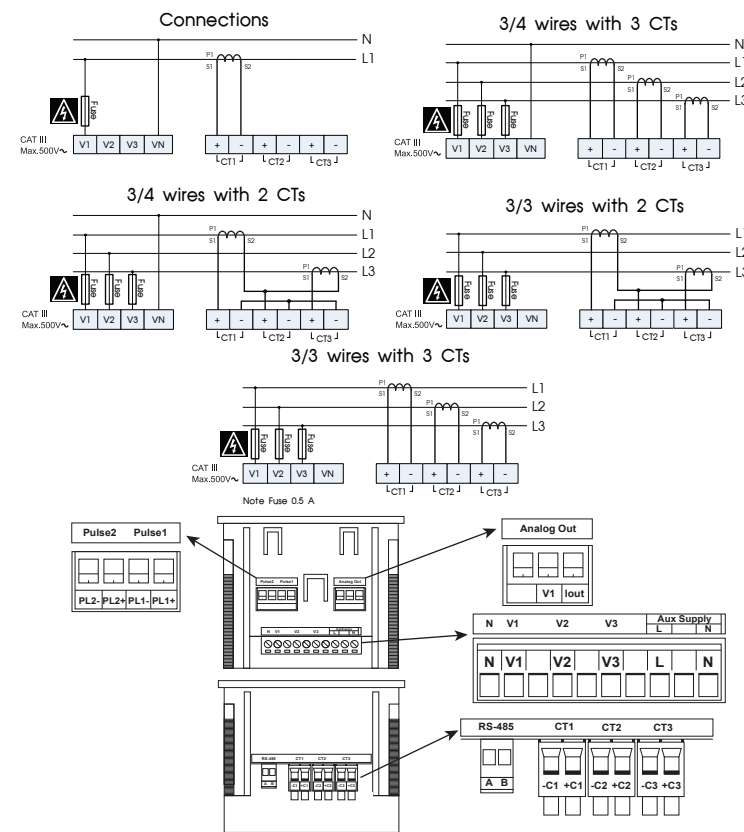
- KM-07 is a power meter. Can measure $V_{(Line)}$, $V_{(Phase)}$, $A_{(Phase)}$ kW, kVA, kVar, kWh, kVAh, kVarh, PF, Hz, kW Demand, Peak Demand, THD (Harmonic) for 1 Phase / 3 Phase
- LCD display.
- Can set Potential Transformer Ratio (PT) and Current Transformer Ratio (CT).
- Pulse, Analog 4-20 mA output.
- Can communicate via RS-485 port, MODBUS RTU PROTOCOL.

OPERATION

KM - 07 is a meter that can measure Volt, Amp, Watt, var, VA, kWh, kvarh and kVAh. It can measure the phase angle between current and voltage and THD% of Volt and Amp. RS-485 communication with MODBUS RTU PROTOCOL. And can measures kWh, kvarh and kVAh 13 digits (9,999,999,999,999).

WIRING DIAGRAM

The circuit of KM - 07 can be connected according to the diagram below. When the current transformer (CT) is removed from the KM -07 user should connect short circuit on secondary side of CT All to protect against CT damage.



Display and Key Pad Function

Measurable value display, user can be selected according to function as Key Pad Table 1 is a summary of the parameters that can be displayed by the key pad.

Table 1 Summary of selectable impressions in each keypad.

V/I	P-1Ø	P-3Ø	En
Volt Phase-neutral	Phase kWatt	Energy 14 digit	Rolling Energy
Current	Phase kVar	Demand	information display
Volt Phase-Phase	Phase kVA	Max Demand	Imp. , Exp , total kWh
kVA	Total kVA	Min Demand	Kvarh A ⁻³ kVAh
THD-I	Total kWatt	Date/Time	(Imp , Exp kWh
THD-V	Total kVar	Hours Counter	It has in model B only)
	Angle between V&I		

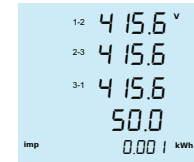
Phase (key V/I)



Volt Phase - Neutral Display

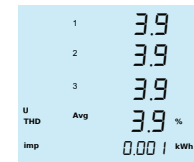
Amp Phase, kVA and PF of each phase when press the V/I keypad, the front number changes as Phase from display if Loop Page was set. The display will show loop at this page only.

Volt Between Line - Line (key V/I)



Displays Volt line to line and frequency of system. The numbers are 1-2, 2-3 and 3-1 in front.

% THD-V/ THD-I (key V/I)



When the THD-V is displayed, there are U and THD icons appear.

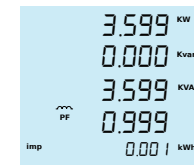
When the THD - I value is displayed, icons I and THD appear.

Power (key P-1Ø)



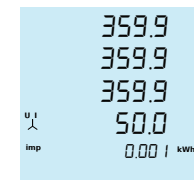
Show the kWatt, kvar, kVA and PF values of each phase. By pressing P - 1Ø, the front number changes according to the displayed phase.

Total Power (key P-1Ø)



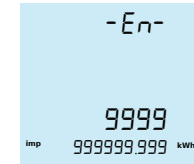
Show total kWatt, kvar, kVA, and PF total of systems. (To display total value, there will be no figure showing the front phase.)

Phase Angle Between V&I (key P-1Ø)



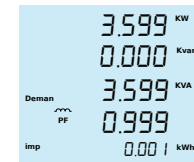
Displays the Phase Angle between Volt & Current and the Freq. value of the system

Energy (key P-3Ø & key En)



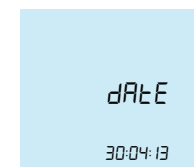
Display the Energy Value at position 10 - 13 of the energy value. And energy value position 1 - 9 of Energy By pressing the key, En shows the Energy Imp, Exp, total of kWh, kvarh, and kVAh.

Total Demand (key P-3Ø)



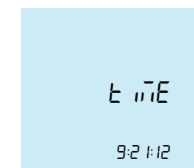
Display Demand Total kWatt, kvar, kVA, and PF of system. (In the Total display, no phase numbers are shown in the front.)

Date (key P-3Ø)



Display the date / month / year on screen

Time (key P-3Ø)



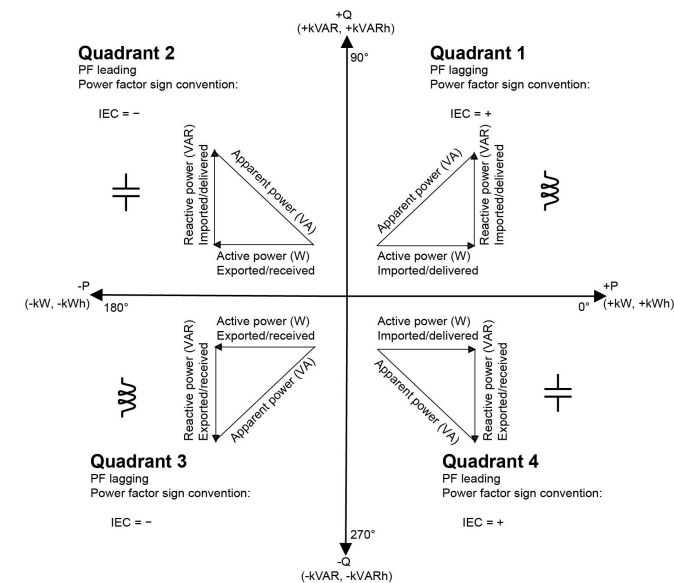
Display hours: minutes: seconds on screen

Hours Counter (key P-3Ø)



Display Meter working Hours. Unit is hour (Count only when measured at kVA>0)

PF symbols Display



Reset Energy

1. Set Parameter RES in Parameter Menu to 1.
2. Go to Page En and press P-3Ø & En at the same time for 5 seconds when the Energy value To 0, the Parameter RES becomes 0

Reset MD

1. Set Parameter RES in Parameter 1.
2. Go to Page Total Demand and press P-3Ø & En together for 5 seconds. When the Demand value is 0, the Parameter RES becomes 0

Reset Hour Counter

1. Set Parameter RES in Parameter Menu to 1.
2. Go to Page Hours and press P-3 & En together for 5 seconds. When Page Hours is 0, the Parameter RES becomes 0 too.

ORDERING CODE

KM-07- ☐ - ☐	
Metering	
A	Total kWh
B	Total, Import, Export kWh
Output	
None	Pulse Output
1	Analog Out, Pulse Output
2	RS-485, Pulse Output
3	RS-485, Analog Out,Pulse Output

Setting Parameter

Access to Menu Setting

1. Press V / I with P-10 together to enter Menu.
2. Set Password to enter Setting Parameter.

P-15-

0000

-above the PWS value. 0000 is a Cursor.

V / I keypad move Cursor

P-10 keypad increases the PWS value at the cursor position.

P-30 keypad reduces the PWS value at the cursor position.

The En keypad returns to the Meter display page.

Press V / I and P-10 together to confirm PWS.

Parameter 1 table.

List	Description	Value
rES	Enable Reset Energy Value	0 = Disable, 1 = Enable
CTr-	CT Ratio	1 to 2000
PTr-	PT Ratio	1 to 300
idPr	Demand Calculate period	1 to 60
Aut0	Display page V/I in loop as setting time in seconds unit.	0 = Disable 1 to 60 Period Display

Parameter in Table 1 uses Key Command to modify the value.

V / I keypad go to the next variable.

P-1 keypad move Cursor

P-3 keypad increase the cursor position.

The En button returns to the previous variable

Parameter 2. table

List	Description	Note
P-15-	Set new PWS	
rTc-	Set RTC timer	
comi	Communication setting	Model A2, A3, B2, B3
AnAL	Analog transfer setting	Model A1,A3,B1,B3
PULS	Set Pulse Output	Model A1,A3,B1,B3

Parameter in Table 2 uses Key Command to edit the value. Press

V / I and P-10 keypad together for entry / exit to sub menu.

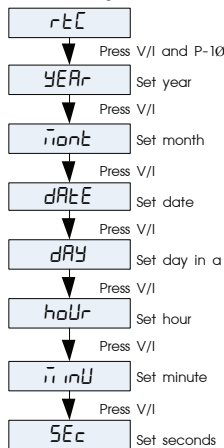
V / I keypad to the next variable.

P-10 keypad to slide Cursor (for setting RTC and Port will increase variable value)

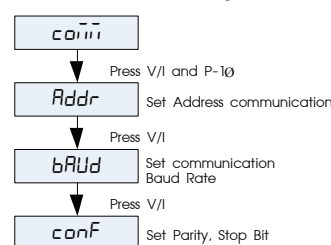
The P-30 keypad increase the cursor position (for RTC and Port settings, it decreases).

The En keypad returns to the previous variable.

RTC setting



Communication Port setting



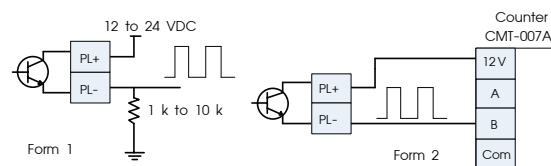
Parameter 3. table

List	Description	Value
Addr	Address of Meter	1 to 245
bAud	Communication Baud Rate	2.4, 4.8, 9.6, 19.2 and 38.4 kbps
conF	Parity , Stop Bit	n15 : None Parity 1, Stop Bit E15 : Even Parity 1, Stop Bit o15 : Odd Parity 1, Stop Bit n25 : None Parity 2, Stop Bit E25 : Even Parity 2, Stop Bit o25 : Odd Parity 2, Stop Bit

Parameter 4 Pulse Output table

List	Description	Value
PL-1	Pulse 1, Pulse / kwh	0.001 to 1 kWh
PL-2	Pulse 2, Pulse / kvarh	0.001 to 1 kvarh

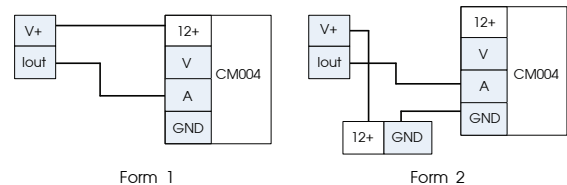
The pulse output circuit is an opto transistor, so it has a maximum voltage of 24 VDC.
The circuit to use the pulse can be connected picture.



Parameter 4 Analog Transfer Output Table

List	Description	Span	Zero
2Ero	Away Drive 4 mA		
FULL	Away Drive 20 mA		
u1	Use Volt Phase 1 calculate Output	250.0 V	50.0 V
u2	Use Volt Phase 2 calculate Output	250.0 V	50.0 V
u3	Use Volt Phase 3 calculate Output	250.0 V	50.0 V
i1	Use Current Phase 1 calculate Output	5.00 V	0 A
i2	Use Current Phase 2 calculate Output	5.00 A	0 A
i3	Use Current Phase 3 calculate Output	5.00 A	0 A
H11	Use kW Phase 1 calculate Output	1.250 kW	0 kW
H12	Use kW Phase 2 calculate Output	1.250 kW	0 kW
H13	Use kW Phase 3 calculate Output	1.250 kW	0 kW
uAr1	Use kvar Phase 1 calculate Output	1.250 kvar	0 kvar
uAr2	Use kvar Phase 2 calculate Output	1.250 kvar	0 kvar
uAr3	Use kvar Phase 3 calculate Output	1.250 kvar	0 kvar
HuA1	Use kVA Phase 1 calculate Output	1.250 kVA	0 kVA
HuA2	Use kVA Phase 2 calculate Output	1.250 kVA	0 kVA
HuA3	Use kVA Phase 3 calculate Output	1.250 kVA	0 kVA
PF1	Use PF Phase 1 calculate Output	1.000	0
PF2	Use PF Phase 2 calculate Output	1.000	0
PF3	Use PF Phase 3 calculate Output	1.000	0
H11	Use Total kW calculate Output	3.750 kW	0 kW
HuAr	Use Total kvar calculate Output	3.750 kvar	0 kvar
HuA	Use Total kVA calculate Output	3.750 kVA	0 kVA
PF	Use Total PF calculate Output	1.000	0

The circuit to use the analog can be connected picture.



Analog Transfer Calculation

The mA value to be calculated from

$$I_{out} = \left(\frac{\text{Measurement value} - \text{Zero}}{\text{Span} - \text{Zero}} \right) \times 16 + 4 \text{ mA}$$

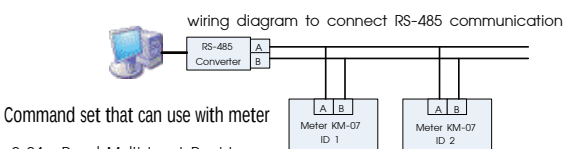
In the case of setting CT and PT ratio,

CT and PT divide the current measured value.

then calculate

Communication with MODBUS RTU

Meter KM - 07 can read parameter values measured in real time With the RS - 485 BUS system, PROTOCOL is used for communication. MODBUS RTU



Command set that can use with meter

0x04 : Read Multi Input Register

0x06 : Preset Single Register

0x10 : Preset Multi Register

Table 1 Phase PF, Hz and Signed

Offset	Address	Hex	Contents	Format	Bytes	Words	Access
0	0	0	Phase 1 PF	Signed int	2	1	Read Only
1	1	1	Phase 2 PF	Signed int	2	1	Read Only
2	2	2	Phase 3 PF	Signed int	2	1	Read Only
3	3	3	PF 3-PH	Signed int	2	1	Read Only
4	4	4	Hz 3-PH	Signed int	2	1	Read Only
5	5	5	Signed of Phase 1 Watt	Signed int	2	1	Read Only
6	6	6	Signed of Phase 2 Watt	Signed int	2	1	Read Only
7	7	7	Signed of Phase 3 Watt	Signed int	2	1	Read Only
8	8	8	Signed of Phase 2 var	Signed int	2	1	Read Only
9	9	9	Signed of Phase 3 var	Signed int	2	1	Read Only
10	10	A	Signed of Phase 3 var	Signed int	2	1	Read Only
11	11	B	Signed of Total Watt	Signed int	2	1	Read Only
12	12	C	Signed of Total var	Signed int	2	1	Read Only

$$\text{Calculating PF} \quad PF = \frac{PF_{reg}}{1000}$$

$$\text{Calculating Hz} \quad Hz = \frac{Hz_{reg}}{10}$$

If Register Signed is 1 . Show that the power value of the variable is negative.

Table 1 Phase PF, Hz and Signed

Offset	Address	Hex	Contents	Format	Bytes	Words	Access
0	256	100	Phase 1 Volts	Unsigned long	4	2	Read Only
1	257	101	Phase 2 Volts	Unsigned long	4	2	Read Only
2	258	102	Phase 3 Volts	Unsigned long	4	2	Read Only
3	259	103	Phase 3 Volts	Unsigned long	4	2	Read Only
4	260	104	Phase 3 Volts	Unsigned long	4	2	Read Only
5	261	105	Phase 3 Volts	Unsigned long	4	2	Read Only
6	262	106	Ph1-Ph2 Volts	Unsigned long	4	2	Read Only
7	263	107	Ph2-Ph3 Volts	Unsigned long	4	2	Read Only
8	264	108	Ph3-Ph1 Volts	Unsigned long	4	2	Read Only
9	265	109	Ph3-Ph1 Volts	Unsigned long	4	2	Read Only
10	266	10A	Ph3-Ph1 Volts	Unsigned long	4	2	Read Only
11	267	10B	Phase 1 Current	Unsigned long	4	2	Read Only
12	268	10C	Phase 2 Current	Unsigned long	4	2	Read Only
13	269	10D	Phase 3 Current	Unsigned long	4	2	Read Only
14	270	10E	Phase 3 Current	Unsigned long	4	2	Read Only
15	271	10F	Phase 3 Current	Unsigned long	4	2	Read Only
16	272	110	Phase 3 Current	Unsigned long	4	2	Read Only
17	273	111	Phase 3 Current	Unsigned long	4	2	Read Only
18	274	112	Per Phase Power Unit 1	Unsigned int	4	2	Read Only
19	275	113	Phase 1 kW	Signed long	4	2	Read Only
20	276	114	Phase 2 kW	Signed long	4	2	Read Only
21	277	115	Phase 3 kW	Signed long	4	2	Read Only
22	278	116	Phase 3 kW	Signed long	4	2	Read Only
23	279	117	Phase 3 kW	Signed long	4	2	Read Only
24	280	118	Phase 3 kW	Signed long	4	2	Read Only
25	281	119	Phase 3 kW	Signed long	4	2	Read Only
26	282	11A	Phase 1 kvar	Signed long	4	2	Read Only
27	283	11B	Phase 2 kvar	Signed long	4	2	Read Only
28	284	11C	Phase 3 kvar	Signed long	4	2	Read Only
29	285	11D	Phase 3 kvar	Signed long	4	2	Read Only
30	286	11E	Phase 3 kvar	Signed long	4	2	Read Only
31	287	11F	Phase 3 kvar	Signed long	4	2	Read Only
32	288	120	Phase 1 kVA	Signed long	4	2	Read Only
33	289	121	Phase 2 kVA	Signed long	4	2	Read Only
34	290	122	Phase 3 kVA	Signed long	4	2	Read Only
35	291	123	Phase 3 kVA	Signed long	4	2	Read Only
36	292	124	Phase 3 kVA	Signed long	4	2	Read Only
37	293	125	Phase 3 kVA	Signed long	4	2	Read Only
38	294	126	Per Phase Power Unit 2	Unsigned int	4	2	Read Only
39	295	127	kWatt 3-Ph	Signed long	4	2	Read Only
40	296	128	kVar 3-Ph	Signed long	4	2	Read Only
41	297	129	kVA 3-Ph	Signed long	4	2	Read Only
42	298	12A	kVar 3-Ph	Signed long	4	2	Read Only
43	299	12B	kVA 3-Ph	Signed long	4	2	Read Only
44	300	12C	kVA 3-Ph	Signed long	4	2	Read Only
45	301	12D	MD kWatt 3-Ph	Signed long	4	2	Read Only
46	302	12E	MD kWatt 3-Ph	Signed long	4	2	Read Only
47	303	12F	MD kWatt 3-Ph	Signed long	4	2	Read Only
48	304	130	MD kWatt 3-Ph	Signed long	4	2	Read Only
49	305	131	MD kWatt 3-Ph	Signed long	4	2	Read Only
50	306	132	MD kWatt 3-Ph	Signed long	4	2	Read Only
51	307	133	MD kWatt 3-Ph	Signed long	4	2	Read Only

Calculating Vrms and Irms from modbus RTU

$$V_{rms} = \frac{V_{rms} \text{ Re g}}{10} \quad \text{volt} \quad I_{rms} = \frac{I_{rms} \text{ Re g.}}{1000} \quad \text{Current}$$

Up = Per Phase Power Unit or System Power Unit

$$\text{If Up} < 3 \quad \text{Power} = \frac{\text{Pow Re g}}{10000} \quad \text{Uni in kilo}$$

$$\text{If Up} < 3 \quad \text{Power} = \frac{\text{Pow Re g}}{1000} \quad \text{Unit in Mega}$$

Table 3 Energy Value

Offset	Address	Hex	Contents	Format	Bytes	Words	Access
0	512	200	Peak Exp kWatt MD-Unit	Unsigned int	4	2	R/W
1	513	201	Peak Exp kWatt MD-Unit	Unsigned int	4	2	R/W
2	514	202	Peak Exp kWatt MD-Unit	Unsigned int	4	2	R/W
3	515	203	Peak Exp kWatt MD-Unit	Unsigned int	4	2	R/W
4	516	204	Peak Exp kWatt MD-Unit	Unsigned int	4	2	R/W
5	517	205	Peak Exp kWatt MD-Unit	Unsigned int	4	2	R/W
6	518	206	Peak Exp kWatt MD-Unit	Unsigned int	4	2	R/W
7	519	207	Peak Exp kWatt MD-Unit	Unsigned int	4	2	R/W
8	520	208	Peak Exp kWatt MD-Unit	Unsigned int	4	2	R/W
9	521	209	Peak Exp kWatt MD-Unit	Unsigned int	4	2	R/W
10	522	20A	Peak Exp kWatt MD-Unit	Unsigned int	4	2	R/W
11	523	20B	Peak Exp kWatt MD-Unit	Unsigned int	4	2	R/W
12	524	20C	Peak Exp Neg kWatt MD-Unit	Unsigned int	4	2	R/W
13	525	20D	Peak Exp Neg kWatt MD-Unit	Unsigned int	4	2	R/W
14	526	20E	Peak Exp Neg kWatt MD-Unit	Unsigned int	4	2	R/W
15	527	20F	Peak Exp Neg kWatt MD-Unit	Unsigned int	4	2	R/W
16	528	210	Peak Exp Neg kWatt MD-Unit	Unsigned int	4	2	R/W
17	529	211	Peak Exp Neg kWatt MD-Unit	Unsigned int	4	2	R/W

Table 3 Energy Value

Offset	Address	Hex	Contents	Format	Bytes	Words	Access
18	530	212	Peak Neg kWatt MD	Unsigned long	4	2	R/W
19	531	213					
20	532	214	Peak Neg kvar MD	Unsigned long	4	2	R/W
21	533	215					
22	534	216	Peak Neg kVA MD	Unsigned long	4	2	R/W
23	535	217					
24	536	218	Exp Energy-Decemal Point	Unsigned int	2	1	R/W
25	537	219	Exp Energy-Unit	Unsigned int	2	1	R/W
26	538	21A	Import kWh	Signed long	4	2	R/W
27	539	21B					
28	540	21C	Export kWh	Signed long	4	2	R/W
29	541	21D					
30	542	21E	Total kWh	Signed long	4	2	R/W
31	543	21F					
32	544	220	Import kVAh	Signed long	4	2	R/W
33	545	221					
34	546	222	Export kVAh	Signed long	4	2	R/W
35	547	223					
36	548	224	Total kVAh	Signed long	4	2	R/W
37	549	225					
38	550	226	Total kVAh	Signed long	4	2	R/W
39	551	227					
40	552	228	Exten Import kWh	Signed long	4	2	R/W
41	553	229					
42	554	22A	Exten Export kWh	Signed long	4	2	R/W
43	555	22B					
44	556	22C	Exten Total kWh	Signed long	4	2	R/W
45	557	22D					
46	558	22E	Exten Import kVAh	Signed long	4	2	R/W
47	559	22F					
48	560	230	Exten Export kVAh	Signed long	4	2	R/W
49	561	231					
50	562	232	Exten Total kVAh	Signed long	4	2	R/W
51	563	233					
52	564	234	Exten Total kVAh	Signed long	4	2	R/W
53	565	235					
54	566	236	Hour Counter	Unsigned long	4	2	R/W
55	567	237					