

SMART ENERGY SYSTEMS
Energy Meter Manual For Three Phase Energy Meter



Quick Users Guide
Sample Meters
EC3PV 1-EM103

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Technical data

Meter Specification can be Achieve with this design.

Specification for Three Phase Meter
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FUNCTIONAL REQUIREMENTS	DETAILS
NETWORK	
No. of Phases	3
No. of Wires	4
Frequency	50 Hz or 60 Hz
Rated Voltage	3*220V /240V (other voltages on request)
MEASURED ENERGY VALUES	
ACTIVE ENERGY	Class 2 or Class 1
Maximum demand - active power	kW or kVA
Energy flow direction - active	A+ or IAI
REACTIVE ENERGY	Class 2
Maximum demand - reactive power	kVAr
LOAD PROFILE	
	Single channel, 15 minutes. 60 days
r.m.s Voltage	Each Phase
r.m.s. Current	Each Phase
Power factor	Instantaneous PF Cum and Per Phase
Frequency	Instantaneous in Hz
MEASURING SYSTEM	
Current sensor	CT
Measuring of neutral current	CT
Basic Current	5A, 10A
MCC Maximum Continuous Current	40A, 60A,
STANDARDS	
General requirements for static meters	IEC 62052-11
Meters for active energy	IEC 62053-21
Meters for reactive energy	IEC 62053-23
Real time clock	IEC 62054-21
Optical IR port	IEC 62056-21
Communication protocol	IEC 62056-21, Mode C
METER CASE	
Insulation Class	II
Grade of protection	min. IP 51 / IP54
Inflammability	UL94-V0
UV resistance	According to the Standard

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Fixing to the board	3 fixing points
METER BASE	
Material	ABS / Polycarbonate
METER COVER	
Material	ABS / Polycarbonate
Sealing	Two sealing screws provided
Integrated elements on the meter cover	Nickel plated steel plate
	Push-button 1
	Push-button 2
Detection of opening the meter cover	Provision for detection switch
TERMINAL BLOCK	
Material	ABS, Polycarbonate, Bakelite, UL94-VO
Current terminals 4 pcs.	Pasivated or Nickel plated brass
Voltage link or linkless version	Linkless
No. of fixing screws for external wire	2
Auxiliary terminals provided	7
TERMINAL COVER	
Sealing provision	2
Detection of opening the terminal cover	Provision for detection switch
Short type / Extended type	Extended type / Short Type
LCD DISPLAY	
Type of LCD display	Back-light , alpha numerical display with decimal point, icons
Size of characters	8 mm/ 10 mm, 6 integers + 2 decimal / Decimal digits can be programmable
LCD Specification	VDEW, IEC 62056-21
Display	Auto and Manual scroll will provide with list also
Auto scroll frequency	3 s / Can be Programmable
Enable meter reading when the meter is not powered from mains	Supported by Lithium battery
Indicators on LCD	Two arrows shall indicate the forward or reverse flow of energy, MD, PF, Magnetic Tamper, Top Cover Open, Units, Phase 'RYB'
Tariffs / Seasons	SS1,SS2 with t1, t2, t3, t4
LED INDICATORS	
No. of LED's	6 only 4 active 2 extra can be use as Ind.
LED function	Imp/kWh & imp/kvarh

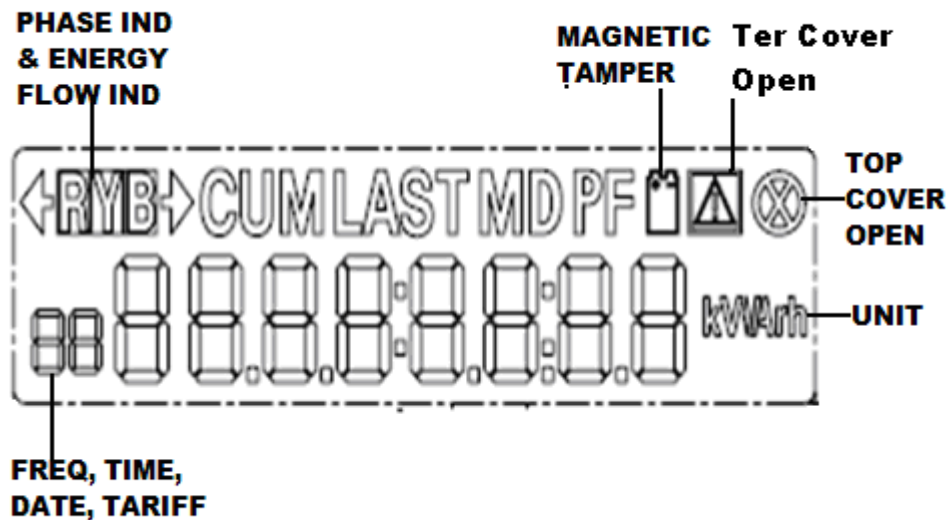
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Starting current	As per IEC
Meter Constant	1000 imp/kWh or kvarh (adjustable)
Meter test mode	All display segments to be shown
KEY PAD FUNCTIONS	
Push-Button 1-Functions of Scroll button and Battery mode	Press to scroll through manual scroll menu held pressed > 3 sec enters fast scroll
Functions of RESET button	Can be Provide.
INTERNAL CLOCK	
Clock control	32 kHz quartz
Back-up power supply	Li-battery
Guaranteed life period of battery	5 years
Trimming of quartz ability	Digital
Calendar	up to 2099 (different special days)
Date format	DD:MM:YY / Adjustable
Tariff switch on-off	Selection Provided
Maximum Demand switching period	5, 10, 15, 30 & 60 min / Can be Programmable
Billing reset	adjustable day / month / hour
Time stamps	All Tamper and Historical events
Day light saving time control	Can be provided
TARIFF CONTROL	
No. of tariffs	to be selected 1 - 4 tariffs
Time switch of tariffs	As per Selection can be set by user.
No.of Holidays	Can be as per required
No.of weekly tariffs programmes and seasons	4 Tariff and 2 seasons
Sleeping tariff programme	1 or 2
LOAD PROFILE	1 channel, 15 minutes, 60 days
OUTPUTS	
Load control	Can be provided
Pulse output SO (DIN 43864)	2
COMMUNICATION INTERFACE	
Optical IR port	IEC 62056-21 with 2 meter distance,
Communication speed	2400 Baud
RS232	Can be provided
RS485	IEC 62056-21
Communication protocol	IEC 62056-21, Mode C
EVENTS LOG BOOK WITH STAMPS	
Sag - Swell voltage (Outage)	Yes
Last change of calibration parameters	Can be provided

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Change of date & time	Can be provided
Detection of opening the meter cover	Yes
Detection of opening the terminal cover	Yes
Detection of external magnetic field	Yes
Delete data from log book	Yes
Last Billing reset	Yes
Day light saving time exchange	Can be provided
Wrong Password	Yes
CYCLIC COUNTERS	
Nos of Billing resets	00 – 255
Wrong password	00 – 255
No. of opening meter cover	00 – 10
No, of opening terminal cover	00 – 10
No of attempts of tampering by external magnetic field	00 - 10
Re-programming of parameters	00 - 10
PREVIOUS BILLING DATA	
No. of previous months	6
Energy	Yes
Maximum demand	Yes
Time stamps	(date/time)
Billing reset	
RTC	programmable reset time
Manual RESET	Keypad RESET (Sealed)
DATA SECURITY	
Passwords	1 levels can be up to 3
Password protection	Reading critical data
	Record day / time
	Record of parameters
LIFE PERIOD	
Life period of meter	5 years
TEMPERATURE CONDITIONS	
Humidity	95% vlage NC
Operational	-40°C do +70°C
LCD display	-25°C do +70°C
Store temperature	-40°C do +70°C

Display



The display has 8 digits for register display with three decimal digits. The number of decimal point can also be programmed as desired. Data format for energy: 6 + 2 / 5 + 3 decimal

Modes:

Auto Scroll mode shows only cumulative and necessary instantaneous parameters. Fast Scroll and Manual Mode shows all parameters.

Parameters:

kWh Cum, kWh Tariff 1, kWh Tariff 2, kWh Tariff 3, kWh Tariff 4, kWh R Phase, kWh Y Phase, kWh B Phase, kVArh Cum, kVArh R Phase, kVArh Y Phase, kVArh B Phase, kVAh Cum, kVAh R Phase, kVAh Y Phase, kVAh B Phase, MD Cum, MD R Phase, MD Y Phase, MD B Phase, MDr Cum, MDr R Phase, MDr Y Phase, MDr B Phase, kW Cum, kW R Phase, kW Y Phase, kW B Phase, kVAr Cum, kVAr R Phase, kVAr Y Phase, kVAr B Phase, kVA Cum, kVA R Phase,

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kVA Y Phase, kVA B Phase, Voltage R Phase, Voltage Y Phase, Voltage B Phase, Current R Phase, Current Y Phase, Current B Phase, Neutral Current, Freq, PF Cum, PF R Phase, PF Y Phase, PF B Phase, Date, Time, Dial Test, Pulse Count, Display Check, For tampers namely Magnetic Tamper, Top Cover Open, Terminal Cover open.

Possible to store Log of Energy data, not displayed on LCD; can be down-loaded via IR optical port, RS485.

Data down-loading

IR optical port 2 meter distance, RS485.

Pushbuttons

Manual scroll, Meter turn on Battery absent of power, Possible to get Data identification code as required with Historical billing data of past months via optical port as per requirement of customer.

There are Two Push buttons on the meter.

One button is for the scrolling parameters on LCD. Upon pressing this button once, the meter enters the manual scrolling mode and if not pressed again for more than 60 secs, meter gets timed out and returns to auto scrolling mode. If this button is continuously kept pressed for more than 3 secs, the meters enters fast scrolling mode from manual scroll mode and if released the meter returns to Manual scrolling mode. Also turns ON the meter on battery backup when mains power is not present to read parameters.

Second button not in use for normal meter but meter with Rs485 it is used for RS485 communications when press this button RS 485 communication starts. And back light of LCD off for the period @ 10 min form last read.

Tariff change-over

With internal RTC in compliance with a time-table given by customer

Testing and calibration Testing and calibration

Acceptance test: IEC 62056-21, IS13779-1999

Manipulations

1. Possible to Detect of terminal cover opening with indication on 'LCD'.
2. Detect of meter cover opening with indication on 'LCD'.
3. Reversed energy registered as forward energy with Indication 'LED'.
4. Detect event of external magnetic Field with indication on 'LCD'.
5. Earth Load full and partial 'LED' Indication.

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6. Phase absent Indication on 'LCD'

Other Features

1. Dial Test (Lcd)
2. Pulse Count (Lcd) on LCD and LED both available in our meter. In absence of current / load the kWh pulsing LED is always high / continuous on and it shows that there is no load on load side in meter. As soon as we enter in pulse count, it gets reset e to count the pulse as per load.
3. Isolated Pulse OutPut
4. Battery Mode
5. Meter Turn On without Neutral
6. Meter Preset Software Meter in built; Supports Settings modifications in meter

Internal RTC

RTC accuracy: 0.5 Sec/day

Temperature compensation: yes can be provided

Battery

Battery shelf-time: 5 years, Can be make 10 Years

IR Port

The EC3P V 1-EM103 IR port is designed in accordance to IEC62056-21.

To read the meter using the meterview software the following setting has to be made:

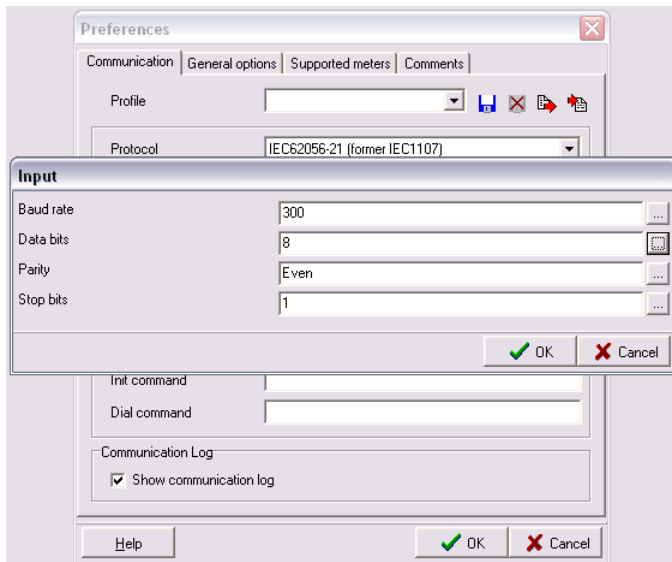
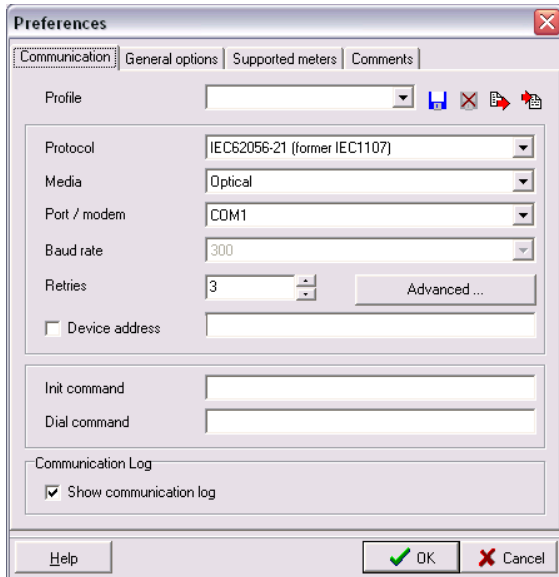
Protocol: IEC62056-21

Media: Optical

Data bits: 8

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1766 ms elapsed -> IEC1107 opening local connection
0 ms elapsed -> IEC62056-21 sending:
<NUL><NUL><NUL><NUL>
547 ms elapsed -> IEC62056-21 sending:
/?!<_CR><_LF>

2437 ms elapsed -> IEC62056-21 received:
/ 3KES103H <_CR><_LF>

203 ms elapsed -> IEC62056-21 sending:
<ACK>030<_CR><_LF>

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219 ms elapsed -> IEC62056-21 changing baudrate to 2400:
136563 ms elapsed -> IEC62056-21 received:
<STX>Sno(30001)<_CR><_LF>
Cno(30001)<_CR><_LF>
1.8.0.(140.87 KWH)<_CR><_LF>
1.8.1.(66.72 KWH T1)<_CR><_LF>
1.8.2.(45.84 KWH T2)<_CR><_LF>
1.8.3.(16.16 KWH T3)<_CR><_LF>
1.8.4.(12.14 KWH T4)<_CR><_LF>
0.0.0.(15.14 KWH A)<_CR><_LF>
0.0.0.(14.82 KWH B)<_CR><_LF>
0.0.0.(14.61 KWH C)<_CR><_LF>
0.0.0.(142.09 KVARH)<_CR><_LF>
0.0.0.(4.56 KVARH A)<_CR><_LF>
0.0.0.(4.51 KVARH B)<_CR><_LF>
0.0.0.(4.21 KVARH C)<_CR><_LF>
0.0.0.(200.08 KVAH)<_CR><_LF>
0.0.0.(15.81 KVAH A)<_CR><_LF>
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0.0.0.(00.00 MD B)<_CR><_LF>
0.0.0.(00.00 MD C)<_CR><_LF>
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0.0.0.( 081009DT 100316TI ET - 081009DT 095727TI ST )(ETH TAMP EVT. 2)<_CR><_LF>
0.0.0.( 081009DT 095723TI ET - 081009DT 095551TI ST )(ETH TAMP EVT. 3)<_CR><_LF>
0.0.0.( 081009DT 095543TI ET - 081009DT 095353TI ST )(ETH TAMP EVT. 4)<_CR><_LF>
0.0.0.( 081009DT 091624TI ET - 081009DT 091215TI ST )(ETH TAMP EVT. 5)<_CR><_LF>
0.0.0.( 081009DT 091110TI ET - 081009DT 091042TI ST )(ETH TAMP EVT. 6)<_CR><_LF>
0.0.0.( 081009DT 091020TI ET - 081009DT 090623TI ST )(ETH TAMP EVT. 7)<_CR><_LF>
0.0.0.( 081009DT 070050TI ET - 081009DT 065833TI ST )(ETH TAMP EVT. 8)<_CR><_LF>
0.0.0.( 081009DT 065831TI ET - 081009DT 065152TI ST )(ETH TAMP EVT. 9)<_CR><_LF>
0.0.0.( 081009DT 065148TI ET - 081009DT 065100TI ST )(ETH TAMP EVT. 10)<_CR><_LF>
0.0.0.( -----DT -----TI ET - 091009DT 170416TI ST )(TPC TAMP EVT. 1)<_CR><_LF>
0.0.0.( 091009DT 170416TI ET - 091009DT 164459TI ST )(TPC TAMP EVT. 2)<_CR><_LF>
0.0.0.( 091009DT 152915TI ET - 091009DT 152834TI ST )(TPC TAMP EVT. 3)<_CR><_LF>
0.0.0.( 091009DT 152833TI ET - 091009DT 152820TI ST )(TPC TAMP EVT. 4)<_CR><_LF>
0.0.0.( 091009DT 152440TI ET - 061009DT 082416TI ST )(TPC TAMP EVT. 5)<_CR><_LF>
!<_CR><_LF>
<ETX>P
```

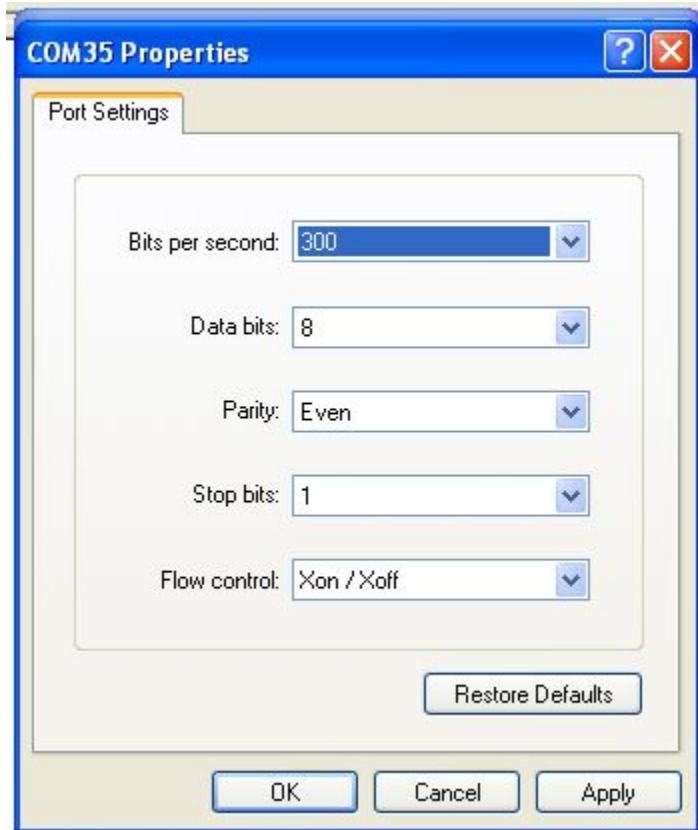
281 ms elapsed -> IEC62056-21 closing local connection

Command Line Interface for Preset of meters.

Using Command Line Interface:

- Connect the optical reader Sonda 5 for normal optical port reading and for distance reading need special optical port reader (Available with Mr. Waleed).
- Open the hyper terminal and carry out the settings as shown:-

SMART ENERGY SYSTEMS
Energy Meter Manual For Three Phase Energy Meter



- The setting is 300, 8, e,1, Xon / Xoff .

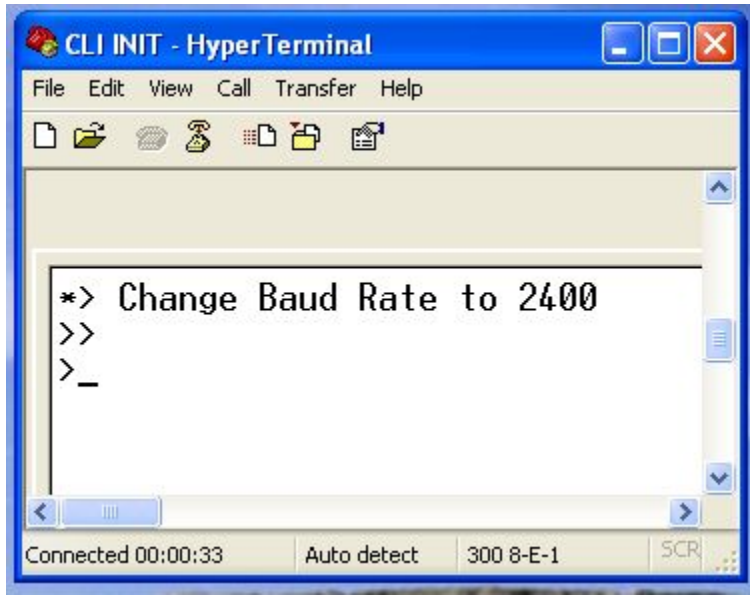
Connect Hyper Terminal

Type '*'

After command you will see below screen

SMART ENERGY SYSTEMS

Energy Meter Manual For Three Phase Energy Meter

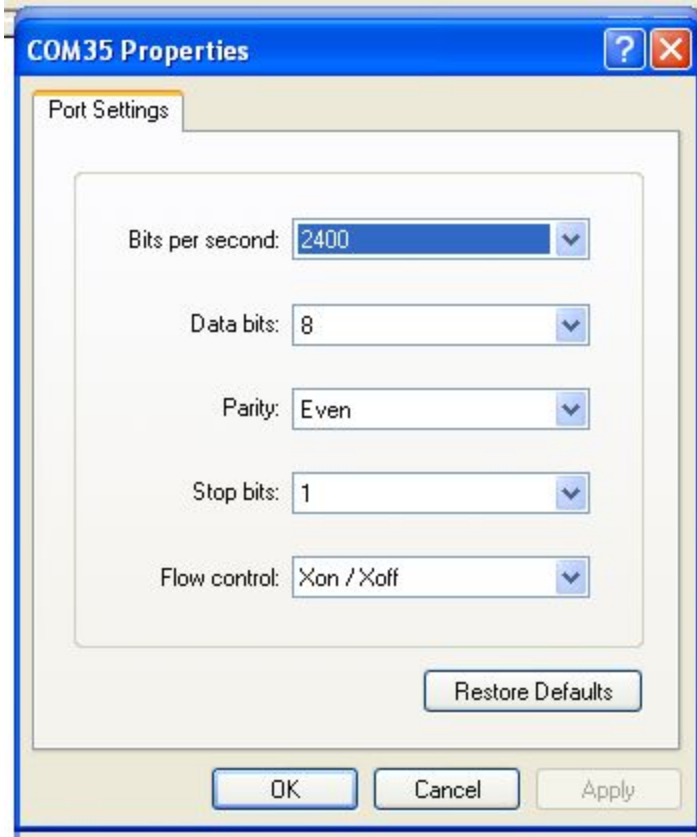


Also check the backlight is off during the communication. This will indicate that you are in command line interface mode.

Disconnect Hyper Terminal

Go to setting again and carry out the settings as shown below:-

SMART ENERGY SYSTEMS
Energy Meter Manual For Three Phase Energy Meter



- The setting is 2400, 8, e,1, Xon / Xoff . After setting connect the hyper terminal.
- Start with typing cli then press enter.
- Then the meter responds and interacts as follows

/******

Sample of Command Line interface Interaction

*****/

cli

>PWD (ASKING FOR PASSWORD)

>*** (ENTER PASSWORD GIVEN BY AUTHORISED PERSON)

CMD?

>tst (ENTER 'tst' FOR TIME AND DATE SET INTIALISATION)

DATE?

>130509

TIME?

>144900

CMD?

>usn

ENTER METER C.NO

>040001

CMD?

>msn

ENTER METER S.NO

SMART ENERGY SYSTEMS
Energy Meter Manual For Three Phase Energy Meter

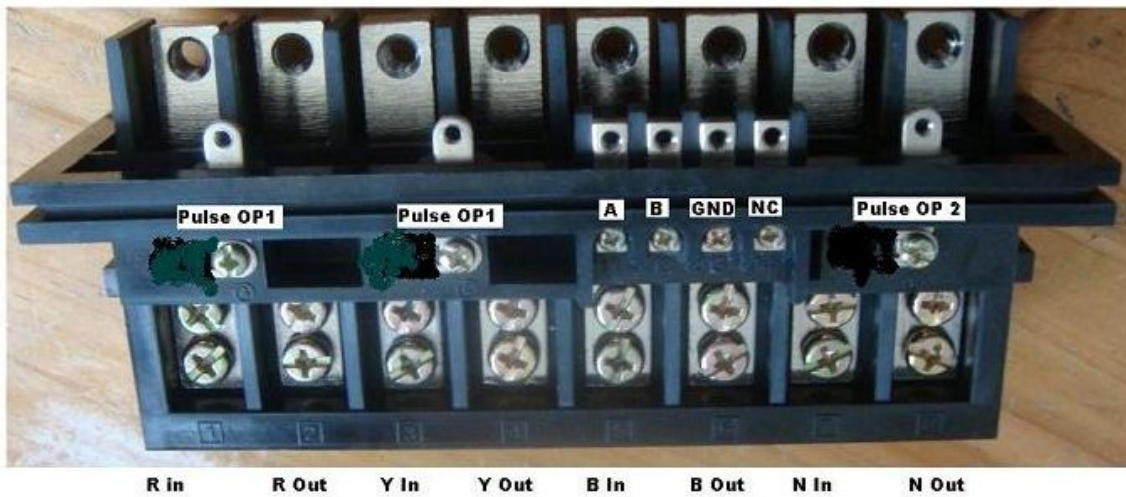
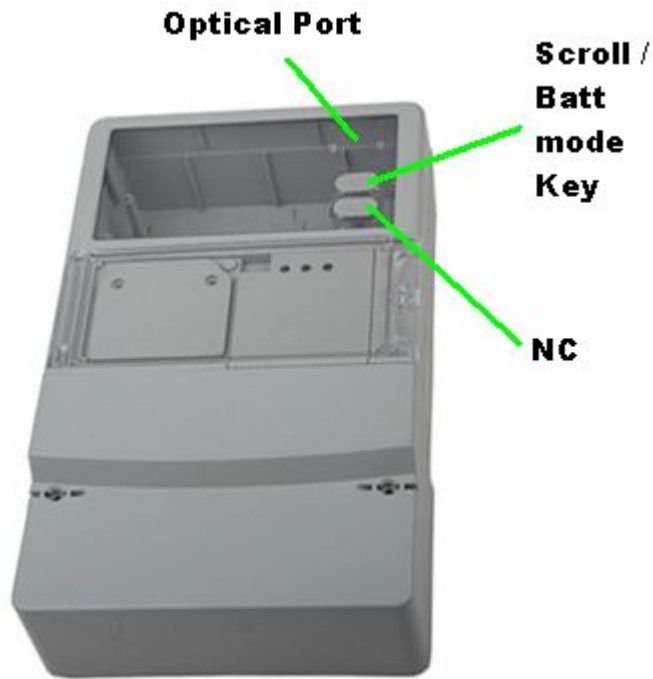
```
>040001
CMD?
>2sn (ENTER '2sn' for season setting)
ENTER SSN1 DATE
>0101
ENTER SSN2 DATE
>0107
CMD?
>4tz (ENTER '4tz' for TOD setting)
ENTER SSN1 TOD1
>0000
ENTER SSN1 TOD2
>0600
ENTER SSN1 TOD3
>1200
ENTER SSN1 TOD4
>1800
ENTER SSN2 TOD1
>1800
ENTER SSN2 TOD2
>0000
ENTER SSN2 TOD3
>0600
ENTER SSN2 TOD4
>1200
RESTART METER
>
CMD?
>ext (ENTER 'ext' for EXITING PROGRAM)
EXIT PROGRAM
```

/*After 'ext' Command, check Backlight, it will return to normal mode*/

/******

Sample of Command Line interface Interaction

SMART ENERGY SYSTEMS
Energy Meter Manual For Three Phase Energy Meter



SMART ENERGY SYSTEMS

Energy Meter Manual For Three Phase Energy Meter

Test Report of Samples.

Testing KES103H 5-60A, 10/8/2009 12:51:59 PM

Protocol of good meters:

Iskraemeco (M) Sdn. Bhd.
Pengkalan Gate Tamb. 2, 31500 Lahat, Ipoh, Perak

Tested by: Mohd Adib Order: Customer: A - Stock Temperature: 23 °C
Att. Measurer: Calibration group: Device: CATS-3PH-2 Additional processing: 0

TEST NO:
HUMIDITY : %

Type: KES103H 240V 5-60A 1000imp Un: 240 V In: 5-60 A Frequency: 50 Hz
Meter constant: 1000,00 imp/kWh
Active energy meter Three system Start-up: 0.5 % In Running with no load: 80-110 % Un
Meter class: 2 High voltage test 2,0 kV
KES103H 240V 5-60A 1000imp

MP No.		1	2	3	4	5	6	7	8	9	10	11	
Title													
Load (%)		10	100	100	100	100	100	100	100	100	1200	1200	
PF		1,0	1,0	1,0	1,0	1,0	0,5	0,5	0,5	0,5	1,0	0,5	
Phases		RSTO	RO	SO	TO	RSTO	RO	SO	TO	RSTO	RSTO	RSTO	
Load type							L	L	L	L		L	
Tariff													
Rev.-Pul.		1	1	1	1	1	1	1	1	1	5	5	
LL %		-9,0	-9,0	-9,0	-9,0	-9,0	-9,0	-9,0	-9,0	-9,0	-9,0	-9,0	
UL %		9,0	9,0	9,0	9,0	9,0	9,0	9,0	9,0	9,0	9,0	9,0	
Rev. Dir.		Right	Right	Right	Right	Right	Right	Right	Right	Right	Right	Right	
Pos. No.	Factory no.	St. no.	RF	RF	RF	RF	RF	RF	RF	RF	RF	RF	VF
1	30001		0,04	0,01	0,03	0,01	0,01	0,20	0,11	0,18	0,08	0,09	0,27 OK
2	30002		0,00	0,01	0,00	0,01	0,09	0,20	0,06	0,10	0,10	0,12	0,16 OK
3	40001		0,08	0,03	0,11	-0,01	0,12	0,36	0,25	0,08	0,18	0,09	0,48 OK
4	40002		-0,02	-0,05	0,00	0,05	-0,01	0,12	0,27	0,13	0,11	0,03	0,49 OK
Mvalue			0,03	-0,00	0,04	0,02	0,05	0,22	0,17	0,12	0,12	0,08	0,35
Range			0,10	0,08	0,11	0,06	0,13	0,24	0,21	0,11	0,10	0,09	0,33
St-Dev			0,04	0,03	0,05	0,02	0,06	0,10	0,10	0,05	0,04	0,04	0,16

Number of good meters: 4

Tested by: _____ Verified by: _____