

SPEM
Series

SPARK



Model: SPEM1
USER MANUAL

Spark Energy Management Solutions
Private Limited



SPARK
“SPEM1” Single Phase Meter Manual

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Meter Configuration List

SPEM		Electronic single-phase meter
1		Multi-rate meter with maximum demand , LCD and RTC
D		Terminal block for direct connecting the meter
1		Terminal block for I _{max} = 30A
2		Terminal block for I _{max} = 60A
3		Terminal block for I _{max} = 85A
4		Terminal block for I _{max} customer specific
A		Active energy
1		Accuracy class 1 in accordance with IEC 62053-21
2		Accuracy class 2 in accordance with IEC 62053-21
U		Energy measurement in one direction
B		Energy measurement in two directions
A		Absolute energy measurement
R		Reactive energy
2		kvarh-meter class 2
3		kvarh-meter class 3
1		One energy flow direction (Q+=Q1+Q2)
2		two energy flow direction(Q+=Q1+Q2) and (Q-=Q3+Q4)
T		Tariff
1		1 tariff
2		2 tariff
3		3 tariff
4		4 tariff
IO1		1 impulse S0 output (option)
IO2		2 impulse S0 outputs (option)
OR1		1 relay output (option)
M		Internal time-switch (RTC)
L		RTC back-up supply – Lithium battery
C		Communication interface
O		Infrared optical port (IEC 62056-21)
R		RS485 interface (option)
M		M-bus (option)
P		Load profile (option)

Features

1. Technical data

- 1.1. Energy measure: Active Energy.
- 1.2. Current range: 5(85) A
- 1.3. Reference voltage: 240 V
- 1.4. Reference frequency: 50 Hz
- 1.5. Accuracy class: Better than class 1,
- 1.6. Meter constant: 1000 imp/kWh
- 1.7. LCD with cyclical data display
- 1.8. Meter billing reset as per requirement.
- 1.9. Communication Channel: Optical port by IEC 62056-21
- 1.10. Communication Protocol: IEC 62056-21 Mode C

2. Meter case

- 2.1. Meter mounting on the table: in 3 points without removing of top cover
- 2.2. Meter Top cover cannot be removed permanently sealed
- 2.3. Insulation class II
- 2.4. Case protection class as per IP51
- 2.5. Terminal box and terminals
- 2.6. Without Voltage link
- 2.7. Terminal box material as per ISO 75-2 (method A)
- 2.8. Terminals material prevent corrosion
- 2.9. Numbers of screws / terminal are each 2 – 6MM Slot in the screws flat heads
Posi - drive Connection diagram inner side of terminal cover

3. Data on the name plate

- 3.1. Meter type approval mark, customer Logo, As per customer requirement.

4. Climatic conditions

- 1.1. Operating temperature range: -25°C to 70°C
- 1.2. Storage / transport: -25°C to 70°C

Utilization

A. Data downloading

- a) Logging of Energy data
- b) Tamper data,
- c) Load Survey (Load Profile),
- d) Meter Outage, with Data identification code: IEC 62056-61 / IEC1107
Historical billing data of kWh and MD of past 6 months or as per requirement of customer via optical reader port

B. Testing and calibration

- a) Acceptance test: IEC 62056-21

C. Tamper Detection

- a) Terminal cover opening Detection.
- b) Meter cover opening Detection.
- c) Reversed energy flow - Energy registered positively with Reversed energy flow by LED and LCD Indication.
- d) External magnetic field - Registration of event of external magnetic field.
- e) Earth Load / Neutral Tamper - Full and partial earth load event registration and Indication by LCD.

D. Internal RTC

- a) Standard: IEC 62054-21 RTC control: 32 kHz quartz crystal RTC accuracy: 0.5 s/day

E. Temperature compensation:

- a) Internal temperature compensation.

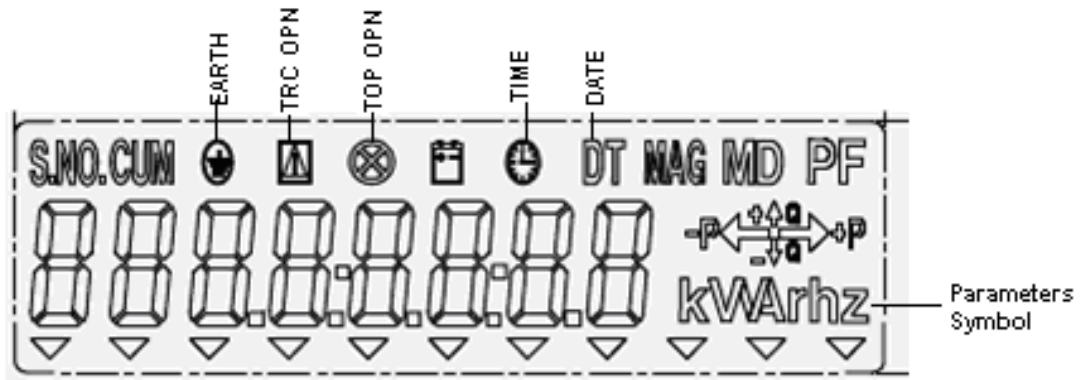
F. Battery

- a) Lithium Battery – Life : 5 years

G. HMI

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H. Display



- LCD display with 8 digits for registers which shows energy with two decimal digits.
- Data format for energy is 5 + 2 decimal.
- In above fig given indication for Unit
 - ✓ Serial No.
 - ✓ Energy's,
 - ✓ Maximum Demand,
 - ✓ Power Factor,
 - ✓ Date and Time.
- For tampers indications:
 - ✓ Magnetic Tamper,
 - ✓ Top Cover Open,
 - ✓ Terminal Cover open,
 - ✓ Reverse and forward energy ,
 - ✓ Earth Load
- Specifies the four quadrant alignment of the meter.

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Display Parameters

Display Icon	Definition
CUM KWH	Absolute cumulative kWh indicator
P kWh	Positive / Forward kWh indicator
r kWh	Negative / Reverse kWh indicator
kVArH	Cumulative reactive energy indicator
MD	Absolute average maximum demand (kW) indicator
KW	Instantaneous absolute active energy indicator
kVA	Instantaneous absolute apparent energy indicator
V	Applied voltage indicator
A	Applied current indicator
n A	Applied neutral current indicator
Hz	Operating frequency indicator
PF	Power factor indicator
DT	Date DD MM YY indicator
	Time HR MIN SEC indicator
	Top cover open indicator
	Terminal cover indicator
	Earth load indicator
MAG	Magnetic tamper indicator
	Energy status indicator
S.NO.	Meter serial number indicator

Display Mode:

Two buttons

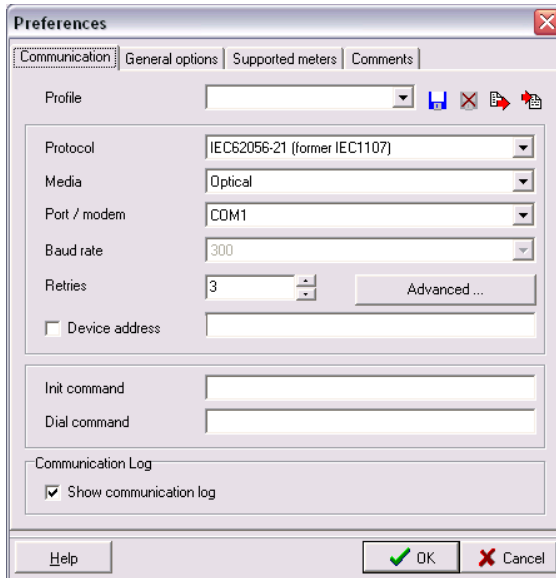
- Press once for Turn the meter “ON” in battery-backup mode
- Press the button once then the meter enters **Manual Scrolling Mode** and if not pressed within 60 Sec again, meter gets timed out and returns to **Auto Scrolling Mode**.
- If this button is continuously kept pressed for 3 sec, the meters enters **Fast scrolling mode**
- When button released then the meter returns to **Manual Scrolling Mode** again.

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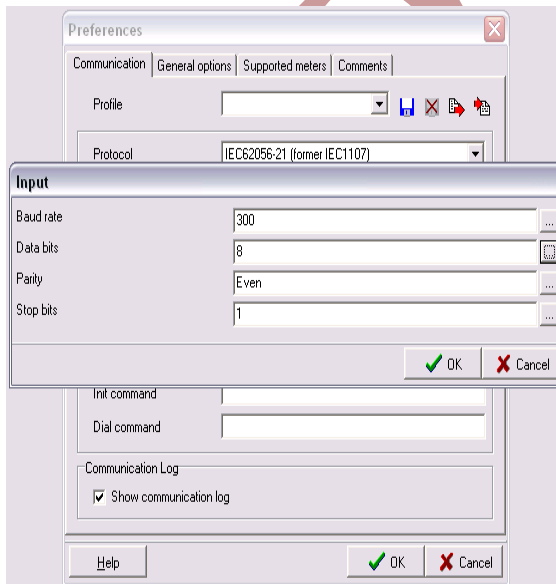
Meter Reading

- **IR Port**

- Use Meter software Version 1 for reading meter.
- The ‘Single Phase “SPEM1” Meter’ IR port is designed in accordance to IEC62056-21.
- To read the meter using the meterview software the follow setting below:



Go to communication then select Protocol/ IEC62056-21 former IEC110. Media Optical. Port as per connected, Retries 5,



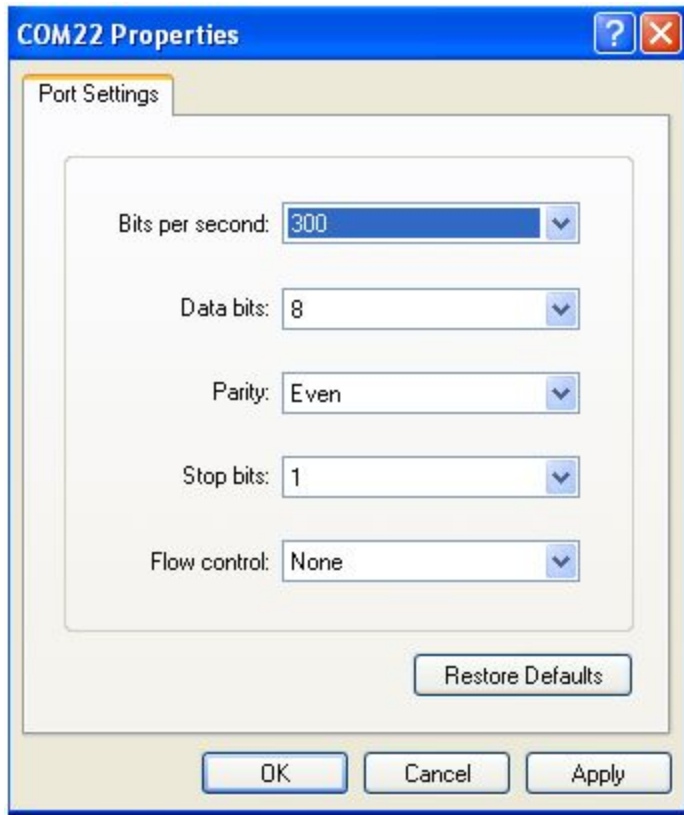
Go to Advance Tab and in Input screen Baud Rate 300, Data bits8, Parity Even, Stop Bits 1

❖ *Pl refer to annexure ‘A’ for sample readout:*

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- **Meter Preset Software Using Command Line Interface:**

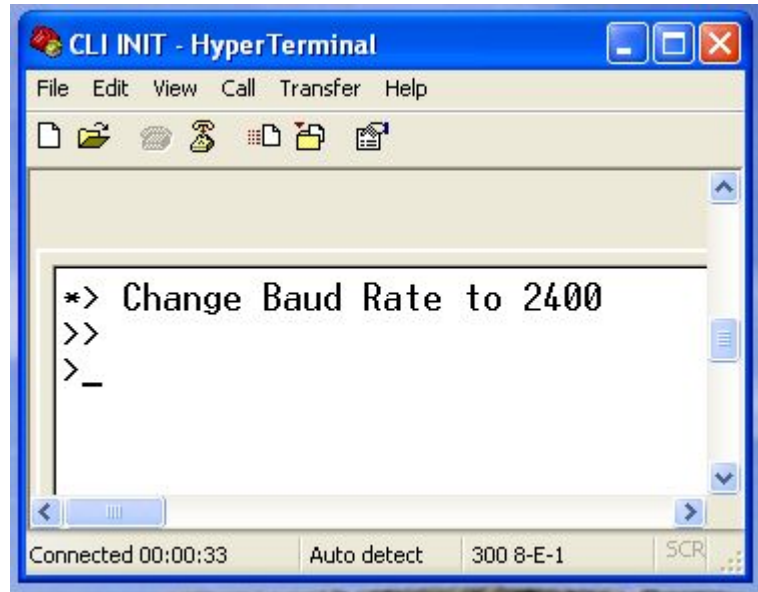
- Connect the optical reader to the meter and DB9 (9 pin connector) to the RS232 port of the computer.
- Open the hyper terminal and carry out the settings as shown:-



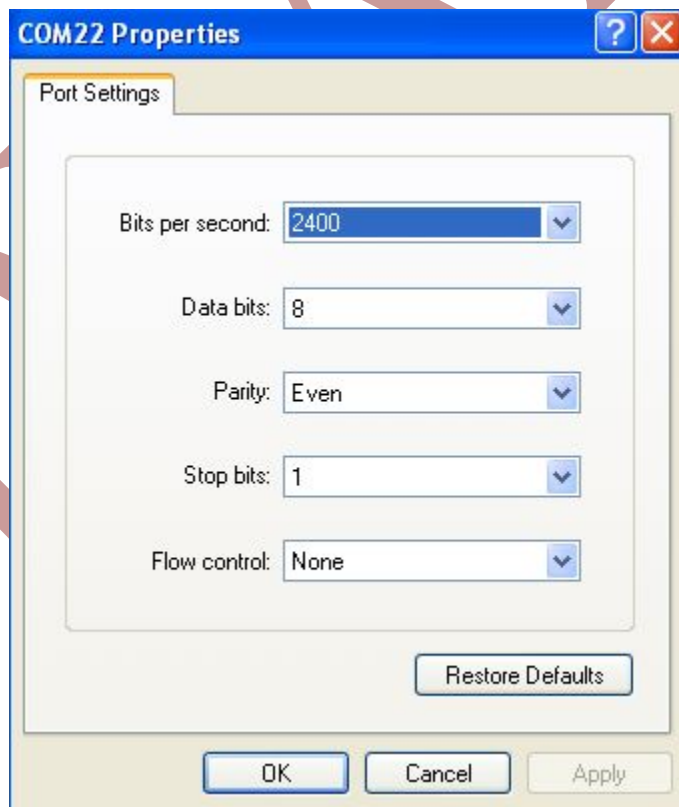
The setting is 300, 8, n

- Connect Hyper Terminal
- Type '*' (Two times) In the Hyper terminal (Software Entry Mode, Security level one,
- Asking for password)
- After command you will see below screen

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- The backlight of LCD goes off this will indicate that communication mode.
- Disconnect Hyper Terminal
- Go to setting again and carry out the settings as shown below:-



- **S**etting is 2400, 8,n. After setting connect the hyper terminal.

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- Start with typing cli then press enter.
- Then the meter responds and interaction as follows.
- Sample of Command Line interface Interaction

```
>cli
>WELCOME TO SESCO UTILITY METER PRESET SOFTWARE
>ENTER PASSWORD
>*****
(ENTER PASSWORD GIVEN BY AUTHORISED PERSON, THREE LEVEL
PASSWORD)
>ENTER COMMAND
>help
>help = HELP MENU
>tset = SET DATE AND TIME
>sldv = SHOW METER SET DATA
>extp = EXITS THE PROGRAM
>
>ENTER COMMAND
>tset
>ENTER DATE
>+120110 /* 12th JAN 2010*/
>ENTER TIME
>+144525 /*24 Hr time format*/
>ext
EXIT PROGRAM*

/*After 'ext' Cmd, check LCD, it will return to normal mode*/
/*****
Sample of Command Line interface Interaction
*****/
```

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Annexure ‘A’

Illustration of Data read out of the meter:

Example Data	Explanation
C.1.0 (5S002001 S.NO)<_CR><_LF>	/*Meter serial no.*/ /
C.1.1 (5S002001 C.NO)<_CR><_LF>	/*Customer serial no.*/ /
15.8.0 (09.12 KWH A)<_CR><_LF>	/*Absolute Cumulative Active Energy*/ /
1.8.0 (09.01 KWH P)<_CR><_LF>	/* Positive Cumulative Active Energy */ /
2.8.0 (00.11 KWH R)<_CR><_LF>	/* Negative Cumulative Active Energy */ /
3.8.0 (04.01 KVARH)<_CR><_LF>	/* Absolute Cumulative Reactive Energy */ /
2.6.0 (00.00 MD)<_CR><_LF>	/* Absolute Maximum Demand */ /
1.6.0 (00.00 KW)<_CR><_LF>	/* Absolute Instantaneous Active Energy */ /
33.8.0 (00.00 KVA)<_CR><_LF>	/* Absolute Instantaneous Apparent Energy */ /
32.7.0 (248.59 VOLTS)<_CR><_LF>	/* Phase Voltage */ /
31.7.0 (00.00 CRT)<_CR><_LF>	/* Phase Current */ /
51.7.0 (00.00 N_CRT)<_CR><_LF>	/* Neutral Current */ /
14.7.0 (50.12 FREQ)<_CR><_LF>	/* frequency */ /
33.7.0 (00.00 PF)<_CR><_LF>	/* power factor */ /
0.9.2 (12 JAN 2010 DATE)<_CR><_LF>	/*Date*/ /
0.9.1 (14:49:06 TIME)<_CR><_LF>	/*Time*/ /
(=====START KWH LOGS=====)<_CR><_LF>	
15.8.0*01(00.00 KWH)<_CR><_LF>	/*kWh logs last six months*/ /
15.8.0*02(00.00 KWH)<_CR><_LF>	
15.8.0*03(00.00 KWH)<_CR><_LF>	
15.8.0*04(00.00 KWH)<_CR><_LF>	
15.8.0*05(00.00 KWH)<_CR><_LF>	
15.8.0*06(00.00 KWH)<_CR><_LF>	
(=====END KWH LOGS=====)<_CR><_LF>	
(=====START MD LOGS=====)<_CR><_LF>	
2.6.0*01(00.00 MD)<_CR><_LF>	/*MD logs last six months*/ /
2.6.0*02(00.00 MD)<_CR><_LF>	
2.6.0*03(00.00 MD)<_CR><_LF>	
2.6.0*04(00.00 MD)<_CR><_LF>	
2.6.0*05(00.00 MD)<_CR><_LF>	
2.6.0*06(00.00 MD)<_CR><_LF>	
(=====END MD LOGS=====)<_CR><_LF>	
(=====START LD PRFL LOGS=====)<_CR><_LF>	
1.6.0*01(00.00 LD PRF)<_CR><_LF>	/*Load Profile last 60 days*/ /
1.6.0*02(00.00 LD PRF)<_CR><_LF>	
1.6.0*03(00.00 LD PRF)<_CR><_LF>	
1.6.0*04(00.00 LD PRF)<_CR><_LF>	
1.6.0*05(00.00 LD PRF)<_CR><_LF>	
1.6.0*06(00.00 LD PRF)<_CR><_LF>	
1.6.0*07(00.00 LD PRF)<_CR><_LF>	
1.6.0*08(00.00 LD PRF)<_CR><_LF>	
1.6.0*09(00.00 LD PRF)<_CR><_LF>	
1.6.0*10(00.00 LD PRF)<_CR><_LF>	
1.6.0*11(00.00 LD PRF)<_CR><_LF>	

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1.6.0*12(00.00 LD PRF)<_CR><_LF>
1.6.0*13(00.00 LD PRF)<_CR><_LF>
1.6.0*14(00.00 LD PRF)<_CR><_LF>
1.6.0*15(00.00 LD PRF)<_CR><_LF>
1.6.0*16(00.00 LD PRF)<_CR><_LF>
1.6.0*17(00.00 LD PRF)<_CR><_LF>
1.6.0*18(00.00 LD PRF)<_CR><_LF>
1.6.0*19(00.00 LD PRF)<_CR><_LF>
1.6.0*20(00.00 LD PRF)<_CR><_LF>
1.6.0*21(00.00 LD PRF)<_CR><_LF>
1.6.0*22(00.00 LD PRF)<_CR><_LF>
1.6.0*23(00.00 LD PRF)<_CR><_LF>
1.6.0*24(00.00 LD PRF)<_CR><_LF>
1.6.0*25(00.00 LD PRF)<_CR><_LF>
1.6.0*26(00.00 LD PRF)<_CR><_LF>
1.6.0*27(00.00 LD PRF)<_CR><_LF>
1.6.0*28(00.00 LD PRF)<_CR><_LF>
1.6.0*29(00.00 LD PRF)<_CR><_LF>
1.6.0*30(00.00 LD PRF)<_CR><_LF>
1.6.0*31(00.00 LD PRF)<_CR><_LF>
1.6.0*32(00.00 LD PRF)<_CR><_LF>
1.6.0*33(00.00 LD PRF)<_CR><_LF>
1.6.0*34(00.00 LD PRF)<_CR><_LF>
1.6.0*35(00.00 LD PRF)<_CR><_LF>
1.6.0*36(00.00 LD PRF)<_CR><_LF>
1.6.0*37(00.00 LD PRF)<_CR><_LF>
1.6.0*38(00.00 LD PRF)<_CR><_LF>
1.6.0*39(00.00 LD PRF)<_CR><_LF>
1.6.0*40(00.00 LD PRF)<_CR><_LF>
1.6.0*41(00.00 LD PRF)<_CR><_LF>
1.6.0*42(00.00 LD PRF)<_CR><_LF>
1.6.0*43(00.00 LD PRF)<_CR><_LF>
1.6.0*44(00.00 LD PRF)<_CR><_LF>
1.6.0*45(00.00 LD PRF)<_CR><_LF>
1.6.0*46(00.00 LD PRF)<_CR><_LF>
1.6.0*47(00.00 LD PRF)<_CR><_LF>
1.6.0*48(00.00 LD PRF)<_CR><_LF>
1.6.0*49(00.00 LD PRF)<_CR><_LF>
1.6.0*50(00.00 LD PRF)<_CR><_LF>
1.6.0*51(00.00 LD PRF)<_CR><_LF>
1.6.0*52(00.00 LD PRF)<_CR><_LF>
1.6.0*53(00.00 LD PRF)<_CR><_LF>
1.6.0*54(00.00 LD PRF)<_CR><_LF>
1.6.0*55(00.00 LD PRF)<_CR><_LF>
1.6.0*56(00.00 LD PRF)<_CR><_LF>
1.6.0*57(00.00 LD PRF)<_CR><_LF>
1.6.0*58(00.00 LD PRF)<_CR><_LF>
1.6.0*59(00.00 LD PRF)<_CR><_LF>
1.6.0*60(00.00 LD PRF)<_CR><_LF>
(=====END LD PRFL LOGS=====)<_CR><_LF>

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```
(          =====START MAGNETIC TAMPER=====)<_CR><_LF>
(LOGS NOT PRESENT)<_CR><_LF>
(          =====END MAGNETIC TAMPER=====)<_CR><_LF>
(          =====START METER OUTAGE=====)<_CR><_LF>
LB.E000(DATE: 12 JAN 2010 TIME: 14:46:51 OTG START EVENT NO. 1)<_CR><_LF>
LB.E001(DATE: 12 JAN 2010 TIME: 14:46:58 OTG END EVENT NO. 1)<_CR><_LF>
(          =====END METER OUTAGE=====)<_CR><_LF>
(          =====START EARTH LOAD TAMPER=====)<_CR><_LF>
(LOGS NOT PRESENT)<_CR><_LF>
(          =====END EARTH LOAD TAMPER=====)<_CR><_LF>
(          =====START REVERSE ENERGY TAMPER=====)<_CR><_LF>
(LOGS NOT PRESENT)<_CR><_LF>
(          =====END REVERSE ENERGY TAMPER=====)<_CR><_LF>
(          =====START TERMINAL COVER TAMPER=====)<_CR><_LF>
(LOGS NOT PRESENT)<_CR><_LF>
(          =====END TERMINAL COVER TAMPER=====)<_CR><_LF>
(          =====START MAIN COVER TAMPER=====)<_CR><_LF>
LB.811D(DATE: 12 JAN 2010 TIME: 14:46:58 TPC START EVENT NO. 1)<_CR><_LF>
LB.811E(DATE: 12 JAN 2010 TIME: 14:48:25 TPC END EVENT NO. 1)<_CR><_LF>
(          =====END MAIN COVER TAMPER=====)<_CR><_LF>
!<_CR><_LF>
<ETX>=
```