



User Manual

Smart Card Based Three Phase Pre-paid Energy Meter

Model No. : TSS-PPM10100TP

Supplied by: TSS Digital Meter Plant, TSS.

Partner: Shenzhen Kaifa Technology (Chengdu) Co., Ltd.

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Document Map

The following documents are supplied for the pre-paid system installation, operation and maintenance.

TSS-PPM560SP User Manual

The TSS-PP560SP User Manual gives an introduction of Smartcard Based Single phase Prepaid Energy Meter, include functions operation guide and product specification.

TSS-PPMKP560SP User Manual

The TSS-PPMKP560SP User Manual gives an introduction of Keypad Based Single phase Prepaid Energy Meter, include functions operation guide and product specification.

TSS-PPM10100TP User Manual

The TSS-PPM10100TP User Manual gives an introduction of Smartcard Based Poly phase Prepaid Energy Meter and GPRS communication module, include functions operation guide and product specification.

TSS-PPMKP10100TP User Manual

The TSS-PPMKP10100TP User Manual gives an introduction of Keypad Based Poly phase Prepaid Energy meter and GPRS communication module, include functions operation guide and product specification.

Smartset User Manual

Smartset User Manual gives an operation guide to set meter by tool software.

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Safety Instructions



Read all safety information and operating instructions before using TSS-PPM10100TP to avoid personal injury.

Transport and Storage

Before you transport and storage the meter and communication module, read and observe the clause 7 titled "Transport and storage" in this document.

Installation

Power must be cut off before install or remove TSS-PPM10100TP.

Before you install or remove the meter and communication module, find and read the "Product Installation Guide" first.

Operation

1. Do not break the seal and remove terminal cover without authorized operator.
2. Do not break the seal and remove communication module without authorized operator.
3. Never remove the meter cover or communication module cover while the meter is in operation.
Doing so will expose circuits and components and can lead to injuries, fire or damage to the meter.
4. Meter working voltage must less than 130% nominal voltage (130%Un), load current must be lesser than 120% maximum current (120% I_{max}). Long time over voltage and over load can lead to fire or damage to the meter.
5. Before you install or change external battery, read and observe the section 3.4 titled "external battery" in this document first. Incorrect operation may cause electrical shock!
6. Do not operate the meter with wet hands.

For service and technical support information, please contact:

Supplied by:

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Gazipur – 1710, Bangladesh
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1 Product introduction

TSS-PPM10100TP is a smart card based Poly phase pre-paid energy meter for measuring and monitoring energy parameters, such as total active/reactive/apparent energy in both directions, reactive energy in 4 quadrants, instantaneous voltage and current, PF, Vrms, Irms, active and reactive power in three-phase four-wire network. Meter adopts advanced SLE4428 IC card with dynamic encryption technology, it keeps meter in a high level security performance. At the same time, SLE4428 can be used as the data exchange media and it can transfer meter data to POS (point of sale), so utility can get relevant meter information and have regular time meter usage supervision.

As a part of Kaifa smart pre-paid solution, this meter provides optical port and RS485 port communication for local and remote meter reading/setting and integrated smart metering functions as described in section 1.4., this meter can work as a sub meter or main meter, sub meter can connect to main meter through RS485 cable. Kaifa HES can collect sub meter data through GPRS main meter, and it is possible to send recharge token by remote and reach over air recharge function by SMS or APPs in smart mobile phone.

What is more, the remote GPRS communication module which can integrate and communicate with utility's AMI system is modular designed with its own box and embedded into the meter casing box. This make it is flexible to support different type of communication modules.

1.1 Front view and Rear view

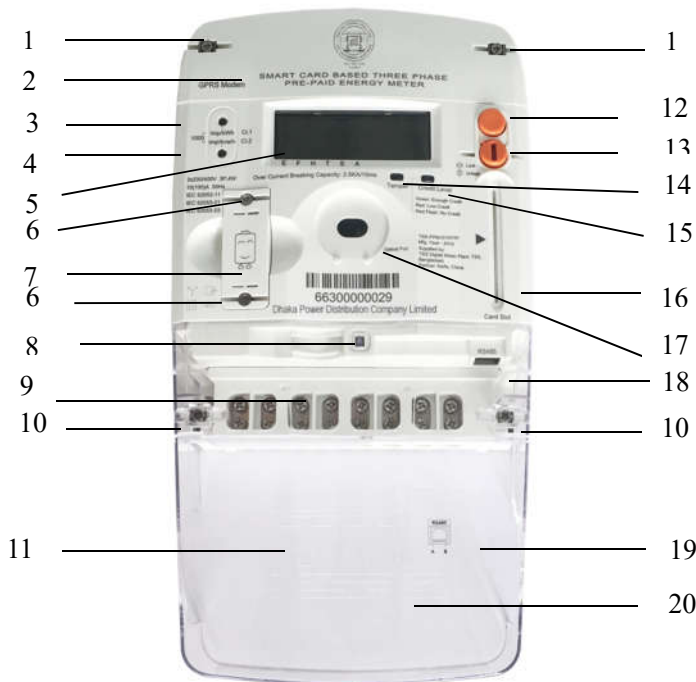


Figure 1 Front view

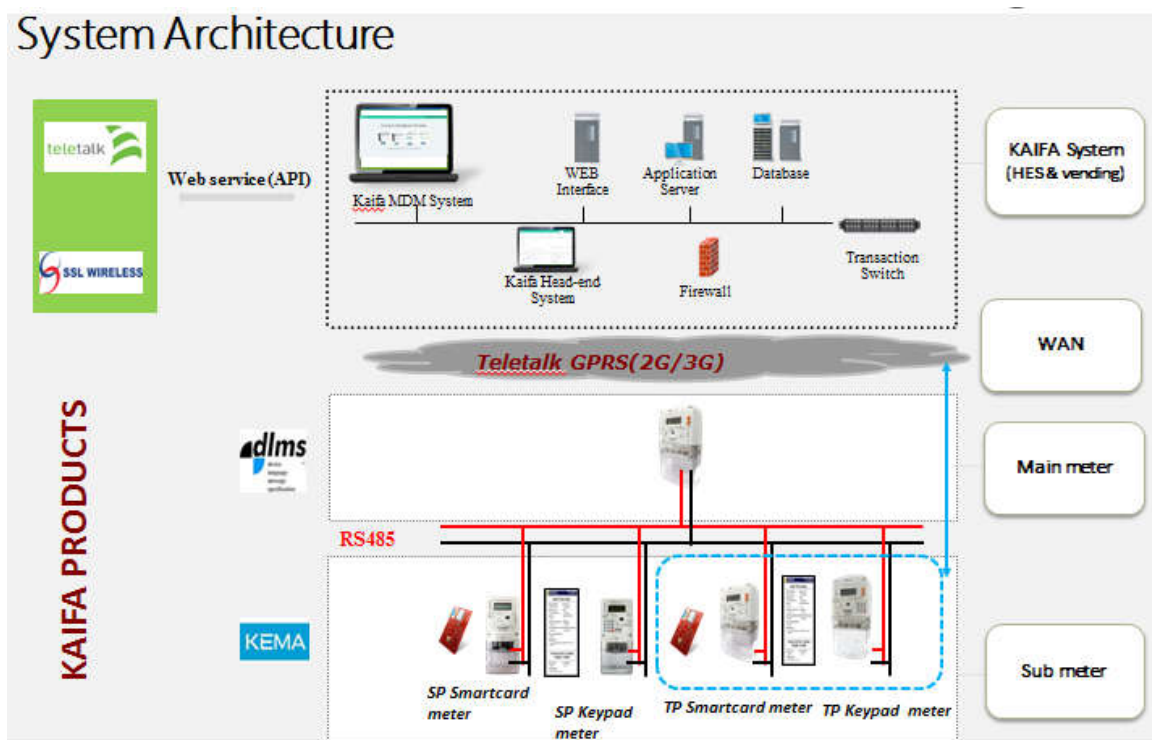


Figure 2 Rear view

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1. GPRS modem cover sealing screws	13. Reserved button
2. GPRS communication modem	14. Alarm LED
3. Active pulse LED	15. Credit level LED
4. Reactive pulse LED	16. Card slot
5. LCD window	17. Optical communication port
6. External battery sealing screws	18. RS485 communication port
7. External battery house	19. RS485 diagram
8. Terminal Cover open detect switch	20. Connection diagram
9. Terminal Block	21. Hook
10. Terminal Cover sealing screws	22. Fix hole
11. Terminal Cover	23. Cable entry slot
12. Display button	

1.2 Smart Prepaid Meter System Architecture



1.3 Features List

Accuracy	Active: Class1.0, Reactive: Class 2.0
Connection	Three Phase four Wire
Nominal Voltage(Un)	3x230V/400V
Voltage range	0.7-1.3Un
Current	Ib=10A, I _{max} =100 A

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Starting current	0.4%Ib
Frequency	50 Hz (± 5%)
Meter constant	1000imp/kWh
Power Consumption	Voltage circuit: ≤5W/10VA Current circuit: ≤2.5VA
Degree of Protection	IP51
Communication protocol	DLMS/COSEM
LCD	Segment type LCD Power off display for meter reading
Backlight	White LED backlight
Buttons	Display scroll button Reserved button----No use
Communication interface	Optical port RS485 GPRS/GSM(2G)
Connect/disconnect relay	Latching relay Max. Contact voltage: 230VAC Max. contact current:120A Contact resistance: 0.5mΩ max Operate time:≤ 20 ms; Release time: e20 ms Mechanical life:100000 times Electrical endurance:10000 times
RTC	Comply with IEC62054-21
Data retention	10 years (minimum) in case of power failure.
Battery	Replaceable 3.6V/1200mAh lithium battery
Mechanical	Weight:1.85kgm Ingress protection rate: IP51 Dimension:340.0mm×169.8mm×89.6mm
Environmental	Operation temperature range: -25℃~ +55℃ Storage and transport temperature range: -25℃~ +70℃ Relative Humidity: Up to 95% non-condensing

1.4 Function characteristics

Energy Parameters	Current month active energy Cumulative active energy Cumulative active energy with tariff Cumulative reactive energy with tariff
MD (Maximum demand)	Active MD Reactive MD The maximum demand period is 30 minutes(fixed value)

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<p>Instantaneous Parameters</p>	<p>Instantaneous R Ph voltage Instantaneous Y Ph voltage Instantaneous B Ph voltage Instantaneous R Ph current Instantaneous Y Ph current Instantaneous B Ph current Neutral current Instantaneous R Ph power factor Instantaneous Y Ph power factor Instantaneous B Ph power factor Active power of three phase Total active power</p>
<p>Daily Billing</p>	<p>Last 93 days daily billing data 1.Clock 2.Energy Cumulative +A total 3.Energy Cumulative +R total 4.Current Month Consumption amount 5.Active Energy Cumulative rate 1 6.Active Energy Cumulative rate 2 7.Reactive Energy Cumulative rate 1 8.Reactive Energy Cumulative rate 2 9.Current Month Consumption Amount rate 1 10.Current Month Consumption Amount rate 2 11.The remaining balance 12.Running status</p>

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Monthly billing	<p>Previous 13 months historic data</p> <ol style="list-style-type: none"> 1. Billing date and time 2. Cumulative active energy 3. Cumulative reactive energy 4. Current month consumption active energy 5. Current month consumption reactive energy 6. The remaining balance 7. Current month recharged credit 8. Current month consumption credit 9. Active MD 10. Reactive MD 11. Cumulative active energy T1 12. Cumulative active energy T2 13. Cumulative reactive energy T1 14. Cumulative reactive energy T2 15. Current month Consumption amount T1 16. Current month Consumption amount T2 17. Cumulative Power off counts 18. Cumulative Sanctioned Load Exceeded counts 19. Month Average power factor 20. PFC
Billing Mode	<p>Automatic billing at 00:00 on the first day of every month</p> <p>Automatic billing at 00:00 in every day</p>
Load Profile	<p>90days ,30minutes load profile interval</p> <p>Cumulative active energy</p> <p>Cumulative reactive energy</p> <p>Active energy(increment value)</p> <p>Reactive energy(increment value)</p> <p>Clock</p> <p>Status</p>
Tariff	<p>Support 3 types programmable tariff structure</p> <p>Single tariff</p> <p>TOU tariff (maximum support 4 TOU)</p> <p>Step tariff (maximum support 11 step)</p>
Tamper Detection	<p>Top cover open detection</p> <p>Terminal cover open detection</p> <p>Current bypass</p> <p>Current reverse</p> <p>External magnetic disturbance</p>

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Event Log	Last 4 times top cover open Last 4 times terminal cover open Last 4 times current bypass Last 4 times sanctioned load exceeded Last 4 times current reverse Power off count Last 4 times tariff program transaction record
Event Push	Terminal cover open Top cover open Overload disconnect Low credit No credit Emergency mode No credit disconnect
Disconnection Facility	<ul style="list-style-type: none"> ■ On credit expiry ■ Decommissioning state ■ Exceed power threshold ■ When tampered: <ul style="list-style-type: none"> a) Top cover open b) Terminal cover open
Prepaid Features	Charge credit Friendly hours Weekend Public holiday, support maximum 30 holidays Emergency credit limit programmable Maximum balance limit programmable

2 Meter Installation

TSS-PPM10100TP should be installed at a dry and well-ventilated place. The installation board should be fixed on a solid, fire-resistant and sturdy wall. The suggested installation height is about 1.2 meters.

Install environment temperature must not exceed meter operation temperature range (-25°C~+55°C); Working voltage must in the range of 160Vac~300Vac, 50±5%Hz. Load current must not over 100A.

2.1 What should prepared

To install TSS-PPM10100TP, you should prepare:

- Screw driver: PH2 screw driver for main terminal screw and terminal cover.
- Fixing screw and Hook screw: M5 slotted countersunk (flat) head tapping screw.

2.2 Meter Installation

Step 1: Inspect meter before install.

Before install, please make sure there is no damage, broken or other defect on meter.

If defect is found, please don't install the meter.

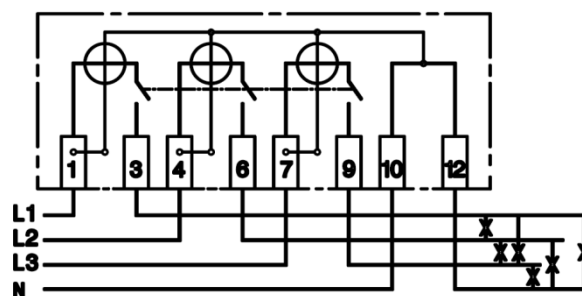
Step 2: Fixing

TSS-PPM10100TP is a 3 point mounting meter, fixed by 1 hook and 2 fixing hole.

To fix TSS-PPM10100TP, hang the meter by hook then fasten with two fixing screws.

Step 3: Connect power line

Connect power line according to the wiring diagram which marked on the terminal cover.



NOTICE

To insure the reliable connection, install torque must be higher than 2 N • m

Step 4:

- **Power on inspection**

After correct connection, close the terminal cover, and turn on the power.

- **Display inspection:**

After power on, Inspect display according to 3.2.2, if some abnormal display found, contact utility technical member.

- **Account open**

New meter leave factory status is as follows:

No.	Item	Description	Default factory setting
1	Tariff	TOU	T1: 17:00-23:00 - 11.98 Tk./kWh T2: 23:00-17:00 - 8.45 Tk/kWh
2	Low credit alarm threshold	/	40 taka
3	EMC credit limit	/	500 taka
4	Available credit of meter(Pre-loaded credit)	/	0 taka
5	Sanctioned Load Exceeded, two periods (Maximum 18kw)	Power limit 1	55.6kw
		Power limit 2	55.6kw

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6	Friendly hour and weekend	Default friendly hours	Enable	
		Weekend	Friday, Saturday	
		Friendly times	1	
7	Holiday	For Recursive Holiday:		
		No.	Holiday Name	Date
		01	Language Martyrs' Day	21-02-2019
		02	Sheikh Mujibur Rahman's birthday	17-03-2019
		03	Independence Day	26-03-2019
		04	Bengali New Year	14-04-2019
		05	May day/ Labor Day	01-05-2019
		06	National Mourning Day	15-08-2019
		07	Victory Day	16-12-2019
		08	Christmas Day	25-12-2019
		For General Holiday:		
		No.	Holiday Name	Date
		01	Shab-e-Barat	21-04-2019
		02	Shab-e-Bara	22-04-2019
		03	Buddha Purnima	19-05-2019
		04	Shab-e-Qadr	02-06-2019
		05	Shab-e-Qadr	03-06-2019
		06	Eidul-fitr day1	04-06-2019
		07	Eidul-fitr day2	05-06-2019
08	Eidul-fitr day3	06-06-2019		
09	Eidul-Adha day1	11-08-2019		
		Enabled		

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		10	Eidul-Adha day2	12-08-2019	
		11	Eidul-Adha day3	13-08-2019	
		12	Eidul-Adha day4	14-08-2019	
		13	Ashura	10-09-2019	
		14	Ashura	11-09-2019	
		15	Durga Puja	08-10-2019	
		16	Eid e-Milad un Nabi	10-11-2019	
		17	Eid e-Milad un Nabi	11-11-2019	
8	PFC Function				Disabled
9	Relay status		/		Disconnect due to no credit
10	Tamper disconnect feature		Terminal cover open, top cover open, neutral missing occur, meter will disconnect		Enabled

Before meter send to consumer house, utility need to customize parameters for all meter and charge, or else meter cannot work.

The first token is needed to send account open token, after then, meter will accept the another token, such as recharge token, tariff solution management toke , clear tamper token and so on.

- **Measurement inspection:**

Inspect measurement by impulse LED. If there is no current, the impulse LED will always off after power on.

3 Meter Reading and Operation

3.1 Meter card operation

TSS-PPM10100TP can read and write data to the SLE4428 smartcard, it can be managed by the token,

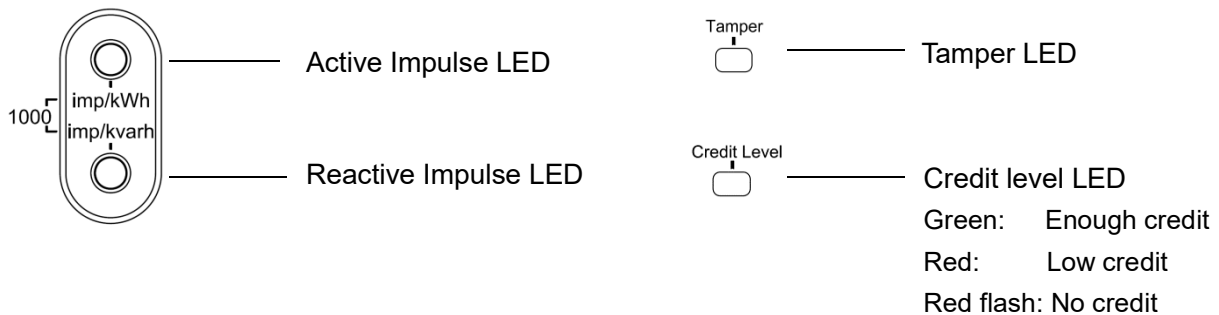
Operation	LCD display	Buzzer	Credit LED
Insert invalid card	"Invalid card"	Buzzer discontinuously sound if not remove the card	Red LED is lighted on
Insert valid card	Reading: "Read card"		Reading: Yellow LED flash

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	Read success: "Success"	Success: sound continuously 3 seconds	Success: green LED is lighted on
	Invalid Token: "Invalid token" Duplicate Token: "Duplicate token" Credit overflow: "Credit overflow" Key expired: "Key expired" Read failure: "Read failure" Used card : "Used card"	Fail: sound discontinuously	Fail: Yellow LED is lighted on
Remove card	"Remove card"	/	/

3.2 Meter reading

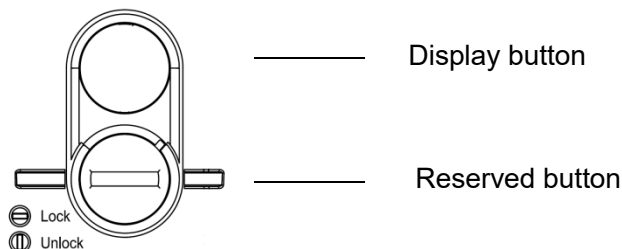
3.2.1 LED indicate



3.2.2 Push Button

The meter provides two buttons:

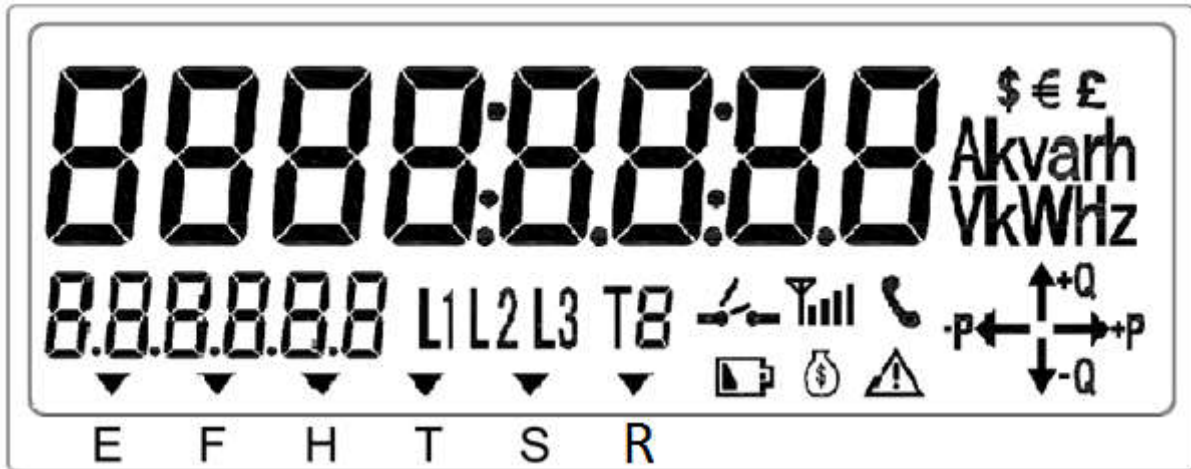
- 1) The display button is used to alternate the display parameters manually.
- 2) The meter with a reserved button which can used to extend functions in the future. This button is sealable. Breaking the seal and turn to the "unlock" position, it can be pressed. After operation, please turn back to the "lock" position, and seal the button again.



3.2.3 Display control









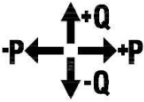
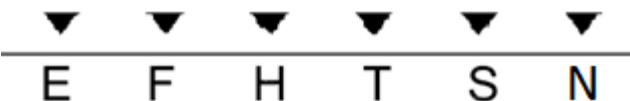
3.2.3.1 LCD Display

LCD shown as following picture:



Number/Symbol	Description
(first row)	Display main information of meter
(left of second row)	Display label
\$ € £	Currency unit(don't in use currently)
Akvarh V kWhz	The units include: A, V, kWh, kvarh, kvah, kW, kvar, kva, Hz, h, W, var, va, Wh, varh, vah.
L1 L2 L3	Phase indicators On: Normal voltage Off: Missing phase Blink: Current reversal
T8	Tariff indicator. TOU Tariff: it means the current TOU Step Tariff: it means the current step
	Main relay status Display symbol Connect On Disconnect blink
	Communication indicator of the base meter(don't in use currently): On: There is communication through any communication ports of meter. Off: No any communication to the meter.
	Displays the strength of GPRS signal that is categorized into four levels The signal strength is categorized as

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	<p>following:</p>  RSSI < -111 dBm  -111 dBm <= RSSI < -97 dBm  -97 dBm <= RSSI < -81 dBm  -81 dBm <= RSSI < -65 dBm  RSSI >= -65 dBm
	<p>Low battery Blink: Battery is low. External battery should be installed or replaced. Off: Battery is normal.</p>
	<p>Critical error alarm Blink: Internal error happens (Refer to: Annexure II Meter State Word F.F.0). Off: No critical error.</p>
	<p>On: Meter balance is enough in prepayment mode Blink: Meter balance is low in prepayment mode OFF: Postpaid mode</p>
	<p>Indicate quadrant of power</p>
	<p>Six small triangles to indicate six status/modes are activated or not. The status/modes are label printed on the meter top cover. The status/mode is activated when the above relative triangle is lighted “E”: EMC, emergency in use “F”: Friendly hours and weekend in use “H”: Holidays in use “T”: TOU tariff in use “S”: Step tariff in use “N”: GPRS network register status</p>

3.2.3.2 Display mode

TSS-PPM10100TP has six kinds of display mode for field meter reading.

- Auto Scroll Mode

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- Prepaid mode
- Postpaid mode
- Push button mode
- Prepaid mode
- Postpaid mode
- Power off mode
- Test mode
- Alarm mode
- Smartcard insertion mode

- Auto Scroll Mode

Auto Scroll Mode is default display mode. Items are displayed automatically and circularly with 5 sec interval time.

Meter support two types auto scroll display mode as per the prepaid mode and postpaid mode.

The default auto scroll display list and examples are as follows:

Prepaid mode display:

NO.	Parameter	Format	Display time
-	f/w version	VXXXX	3S
-	Display test	All segments on	3S
Auto Display			
1	Prepaid mode	Prepaid	5S
2	Meter Account status	OFF-Crdt/Emc-Use/Frid-Use/ Holy-Use/Crdt-use	5S
3	Left seven number of meter ID	XXXXXXXX-	5S
3	Right five number of meter ID	XXXXX	5S
4	Tariff index ¹	XX	5S
5	The Remaining Credit	XXXXXX.XX	5S
6	The Total Consumption, kWh to date	XXXXXX.XX	5S
7	The Total Consumption, kVarh to date	XXXXXX.XX	5S
8	Taka used for the current billing period	XXXXXX.XX	5S
9	kWh for the current billing period	XXXXXX.XX	5S
10	Taka used for the last billing period	XXXXXX.XX	5S
11	kWh for the last billing period	XXXXXX.XX	5S
12	The power limit 1	P1 XXX.X	5S
13	The power limit 2	P2 XXX.X	5S
14	The current Tariff	Single /Step x/TOU x	5S
15	Current electricity rate	XX.XX	5S
16	Date	DD-MM-YYYY	5S
17	Time	HH:MM:SS	5S
18	Active power of L1	L1 XX.XXX KW	5S

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19	Active power of L2	L2 XX.XXX KW	5S
20	Active power of L3	L3 XX.XXX KW	5S
21	Voltage of L1	L1 XXX.X V	5S
22	Voltage of L2	L2 XXX.X V	5S
23	Voltage of L3	L3 XXX.X V	5S
24	Current of L1	L1 XXX.XX A	5S
25	Current of L2	L2 XXX.XX A	5S
26	Current of L3	L3 XXX.XX A	5S
27	Current of N	N XXX.XX A	5S
28	Power factor of L1	L1 X.XXX	5S
29	Power factor of L2	L2 X.XXX	5S
30	Power factor of L3	L3 X.XXX	5S
31	Total power factor	PF X.XXX	5S
32	Token acceptance count	XXXXX	5S
33	Token rejection count	XXXXX	5S
34	Emergency credit limit	XXXXXX.XX	5S
35	Meter constant	1000	5S
36	Current token Seq. No in the meter	XXX	5S

NOTICE

1. *Tariff index is tariff structure number which is programmed by unified system.*

When System create new Tariff, the tariff index will get increased; the Numbers, such 01,02,03,04, ... 99, is the sequence of tariff index.

Postpaid mode display:

No.	Parameter	Format	Display time
-	Meter f/w version	VXXXX	3S
-	Display test	All segments on	3S
Auto Display			
1	Postpaid mode	Postpaid	5S
2	Left seven number of meter ID	XXXXXXXX-	5S
2	Right five number of meter ID	XXXXX	5S
3	The Total Consumption, kWh to date	XXXXXX.XX	5S
4	The Total Consumption, kVARh to date	XXXXXX.XX	5S
5	Date	DD-MM-YYYY	5S
6	Time	HH:MM:SS	5S
7	Active power of L1	L1 XX.XXX kW	5S

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8	Active power of L2	L2 XX.XXX kW	5S
9	Active power of L3	L3 XX.XXX kW	5S
10	Voltage of L1	L1 XXX.X V	5S
11	Voltage of L2	L2 XXX.X V	5S
12	Voltage of L3	L3 XXX.X V	5S
13	Current of L1	L1 XXX.X A	5S
14	Current of L2	L2 XXX.X A	5S
15	Current of L3	L3 XXX.X A	5S
16	Current of N	N XXX.X A	5S
17	Power factor of L1	L1 X.XXX	5S
18	Power factor of L2	L2 X.XXX	5S
19	Power factor of L3	L3 X.XXX	5S
20	Total power factor	PF X.XXX	5S
21	Meter constant	XXXX	5S
22	Current token Seq. No in the meter	XXX	5S

- **Push button mode**

In auto scroll mode, user can press the display button to enter into the alternate mode. The display content is same with auto scroll mode; user can switch the display content by pressing the display button.

If no display button is pressed for 10 seconds, meter will switch back to auto scroll mode.

NO.	Parameter	Format	Display time
-	f/w version	VXXXX	3S
-	Display test	All segments on	3S
Auto Display			
1	Prepaid mode	Prepaid	5S
2	Meter Account status	OFF-Crdt/Emc-Use/Frid-Use/ Holy-Use/Crdt-use	5S
3	Left seven number of meter ID	XXXXXXXX-	5S
3	Right five number of meter ID	XXXXX	5S
4	Tariff index ¹	XX	5S
5	The Remaining Credit	XXXXXX.XX	5S
6	The Total Consumption, kWh to date	XXXXXX.XX	5S
7	The Total Consumption, kVarh to date	XXXXXX.XX	5S
8	Taka used for the current billing period	XXXXXX.XX	5S
9	kWh for the current billing period	XXXXXX.XX	5S
10	Taka used for the last billing period	XXXXXX.XX	5S
11	kWh for the last billing period	XXXXXX.XX	5S

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12	The power limit 1	P1 XXX.X	5S
13	The power limit 2	P2 XXX.X	5S
14	The current Tariff	Single /Step x/TOU x	5S
15	Current electricity rate	XX.XX	5S
16	Date	DD-MM-YYYY	5S
17	Time	HH:MM:SS	5S
18	Active power of L1	L1 XX.XXX KW	5S
19	Active power of L2	L2 XX.XXX KW	5S
20	Active power of L3	L3 XX.XXX KW	5S
21	Voltage of L1	L1 XXX.X V	5S
22	Voltage of L2	L2 XXX.X V	5S
23	Voltage of L3	L3 XXX.X V	5S
24	Current of L1	L1 XXX.XX A	5S
25	Current of L2	L2 XXX.XX A	5S
26	Current of L3	L3 XXX.XX A	5S
27	Current of N	N XXX.XX A	5S
28	Power factor of L1	L1 X.XXX	5S
29	Power factor of L2	L2 X.XXX	5S
30	Power factor of L3	L3 X.XXX	5S
31	Total power factor	PF X.XXX	5S
32	Token acceptance count	XXXXX	5S
33	Token rejection count	XXXXX	5S
34	Emergency credit limit	XXXXXX.XX	5S
35	Meter constant	1000	5S
36	Current token Seq. No in the meter	XXX	5S
37	Total friendly allowable times	XXX	5S
38	The used friendly allowable times	XXX	5S

● Power off display

When meter is power off, the LCD will enter the power off display mode automatically. User can check the item through push the upper button or see the LCD automatically scroll.

The power off display list for prepaid mode is as follows:

NO.	Parameter	Format	Display time
1	The Remaining Credit	XXXXXX.XX	5S
2	The Total Consumption, kWh to date	XXXXXX.XX	5S
3	Taka used for the current billing period	XXXXXX.XX	5S
4	kWh for the current billing period	XXXXXX.XX	5S
5	Emergency Credit Limit	XXXXXX.XX	5S

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The power off display list for postpaid mode is as follows:

NO.	Parameter	Format	Display time
1	The Total Consumption, kWh to date	XXXXXX.XX	5S

- **Test Mode**

When insert the test card, meter will enter test mode, LCD will display “Test” at first, and then display the following parameters one by one as per the test token definition.

Bit No.	Description	Display format	Display time
0	test all the contents		
1	test relay ¹	RL Open RL Close	15S
2	test LCD display	All segments on	15S
3	test total energy	XXXXXX.XX kWh	15S
4	test max power limit	P1 XXX.X kW	15S
		P2 XXX.X kW	
5	display current meter status	XXXXXXXXXXXXXXXXXX	15S
6	display current power	XX.XXX kW	15S
7	display meter software version	XX.XX	15S
8	display current tariff unit price	XX.XX Tk / kWh	15S
9	display overcurrent threshold	I1 XXX.XX A	15S
		I2 XXX.XX A	
10	display recharge times	XXXXX	15S
11	display token sequence No.	XXX	15S
12	display relay-off times	XXXXX	15S
13	accuracy test	XXXXXX.XXXX kWh	1min
14-36	Reserved		

Meter will keep in the test mode until user removes the test card.

NOTICE

1. Test relay. Meter will connect & disconnect three times.

- **Status/Alarm Mode**

When meter occur the following event, LCD will display the event reason and stop auto scroll display until the event remove. If user wants to check the auto scroll display, they can insert and remove the user card to enter auto scroll display mode.

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Event	LCD Display	Buzzer	Credit LED	Tamper LED
Overload disconnect	OFF-Load	/	/	/
Cover open/terminal cover open disconnect	OFF-COV	/	/	Light on
No credit disconnect	OFF-Cdt	/	Red LED blinking	/
Decommission disconnect	DI-com	/	/	/
Other tamper (current bypass, current reversal, magnetic disturbance)	Tampered	/	/	Light on
Low credit alarm	L-Credit	Sound continuously 30 seconds in 5 minutes periods and user can silent the alarm through insert user card	Red LED light on	/
Emergency activated	EMC-Act	/	Red LED light on	/
Emergency in use	EMC-USE	/	Red LED blinking	/
Current friendly hours, Weekend	Frid-USE	/	Red LED blinking	/
Holidays	Holy-USE	/	Red LED blinking	/
Relay failure	RL Fail	Sound continuously 30 seconds in 5 minutes periods and user can silent the alarm through insert user card	/	Light on
EEPROM error	EE Error	Same as the above	/	Light on
Metering IC fault	Emm error	Same as the above	/	Light on
Low battery	L-BATY	Same as the above	/	Light on
RTC error	RTC Error	Same as the above	/	Light on

- **Smartcard inserting Mode**

If there is a smartcard inserting, the meter will stop current display mode and go into smartcard inserting mode until the card remove. For the smartcard inserting display list, please refer 3.2.4.

3.2.4 Smartcard inserting operation

Once insert the smartcard, meter LCD will give some friendly, readable display for user.

One smartcard can include the multi- token; meter will display the token result according to the token group. If there are multi-result need to display, then the display will every items one by one, every item display 3 seconds.

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Card operation		LCD Display		Buzzer	Credit status LED	
		Main area	Auxiliary area			
Insert the invalid card		Invalid	Card	sound at all time and stop until remove card	Red LED is on at all time and off until remove card	
Insert valid user card	Reading	Read	Card	/	Yellow LED flash	
	Read end	Read	Card			
	Result	Success	pls see the success result list		All token success: sound for 3 seconds	All token success: green LED is on and off when remove card
		Failure	pls see the failure result list		Sound at all time and stop until remove card	Yellow LED is on and off when remove card
	No token	No	Token	/	/	
Remove card		Remove	Card	/	/	

Token success result display list:

Token type	LCD Display	
	Main area	Auxiliary area
Key change	Key-Chg	Succ
Recharge	Vending	Succ
	xxxxx.xx	Vend
	xxxxx.xx	Bal
Clear balance	Clr-Bal	Succ
	xxxxxx.xx	Bal
Configure friendly hour and weekend	Friend	Succ
Configure holiday	Holiday	Succ
Switch meter mode	Sw-Mode	Succ
	"Postpaid" or "Prepaid"	Mode
Configure single tariff	Single	Succ
	xxx.xx	TK
Configure TOU tariff	TOU	Succ
	xxxxx.xx	TOU 1
	xxxxx.xx	TOU 2

Configure emergency credit limit	EMC-Cr	Succ

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	xxxxxx.xx	TK
Configure the maximum balance limit	Max-Cr	Succ
	xxxxxx.xx	TK
Configure the low credit alarm limit	Low-Cr	Succ
	xxxxxx.xx	TK
Configure maximum sanction load limit	Max-PI	Succ
	xxxxx.x kW	P1
	xx:xx	Time 1
	xxxxx.x kW	P2
	xx:xx	Time 2
Clear event status	Clr-Evt	Succ
Reset token	Reset	Succ
Test token	Test	

Token failure result display list:

Token type	LCD Display	
	Main area	Auxiliary area
Invalid token	Invalid	xx
Duplicate token	Dup	xx
Credit overflow	Cr Exces	xx
Meter key expired	Expired	Key
Read card failure	Fail	Read
Used card	Used	Card

Notes:

XX means how many token are sent to meter.

3.2.5 Software tools reading

Meter data and information include billing data, instantaneous data, tamper event, tariff, basic information, status words, and events etc. can be read from optical port by SMARTSET.

Detailed information will be given in relevant SMARTSET user manuals.

3.3 External battery

External changeable battery can provide backup energy for meter power on condition. If user found “Low battery” alarm on LCD or found low battery status word from smartcard, please contact the utility member for removing the battery as soon as possible, or else meter will shut down after one month.

Only authorize utility member can remove the battery, it is not allowable to remove battery for consumer..

The recommended battery size is ER 14250; please see the detailed dimension as following:

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Figure 4 Dimensions of the battery

- 1) Power off the meter, remove the sealing and screws, open the battery cover, change the battery, then sealing the cover.
- 2) If the battery voltage is lowers continuously for 1 month, the meter will shut down automatically and disconnect the relay, and consumer cannot use the electricity.

3.4 GPRS module

- Features

Remote communication uses GPRS, and bases on DLMS/COSEM TCP/IP profile. The key features of GPRS are listed in below table:

General Function	Performance & Availability	Class 10 GPRS communication slot. Support reconnection behavior after detecting an unexpected interrupted communication session.
	Last Gasp	GPRS is supported by super capacitors which allow reporting of power down without support of mains supply to the back end system.
	Roaming	Support national roaming between GPRS networks of different national telecom providers. Support SIM cards with multiple IMSI.
	SIM	Support 2FF SIM card. Support IMEI lock of the USIM card.
	Indications of GPRS signal strength	Indicate GPRS signal strength in a minimum of 4 separate levels. Refer to LCD display. RSSI value is readable.
	Antenna	Support both internal antenna and external antenna. Exchange the antenna without de-energizing the meter.
Access and connection	Always online	Support fully qualified domain names. Receive and store the IP address of the primary and secondary address when establishing a PDP context based on the DHCP protocol. Support data pushing.
	Authentication and security	Changeable APN/password Support RADIUS authentication using PAP or CHAP. Network access information is not saved on the SIM cards Communication settings to be remotely configurable
	Assign IP address	GPRS module support dynamic IP address assignment

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The GPRS communication parameters are generally programmed in the factory. It is also possible to change the communication parameter remotely or locally.

- SIM card install

This step may be skipped if the SIM card is installed in the meter manufacture stage.

The modules support SIM Cards with the form factor 2FF (Standard SIM). Install the SIM card into the GPRS communication module as following figure.



Plug the communication module, and sealing the seals.

4 Anti-Tamper

- Current bypass
- Meter top cover open and terminal cover detect
- Current reverse
- Magnetic detect

5 Event record

When the event occurred, meter can record it with date and time stamp, and the event can be transfer to the pre-paid system through smart card or optical port, it contains:

1. **Cover open:** when top cover is opened, the tamper LED will be lighted immediately, cover open status word will also be set. Meter can record last 4 times cover open event with date and time stamp.
2. **Terminal cover open:** when the meter terminal cover is opened, the tamper LED will be lighted immediately, and the terminal cover open status word will also be set. Meter can record last 4 times terminal cover open event with date and time stamp.
3. **Current bypass:** If the difference between the vector sum of three phase current and neutral current is bigger than 2.5A after 3minutes, meter will record current bypass event. Current bypass status word will also be set. The tamper LED will be lighted after 15 seconds. Meter can record last 4 times current reverse event with the snapshot, such as counts, date and time stamp.
4. **Overload:** if the overload is occurred, meter can record last 4 times over load event with snapshot, such as counts, date and time stamp.

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If the overcurrent condition is over 1 minute, meter will disconnect, after 3 minutes reconnect the load automatically. The meter shall reconnect the load up to 5 times at 30 seconds intervals. If the over current still exist, the meter will wait a period of 30 minutes before attempting to reconnect the load.

5. **Power off:** when power off, meter can record the event with date and time stamp immediately

Magnetic disturbance: When meter detect the continuous magnetic attack for 60 seconds, the tamper LED will be lighted on, and meter will record the event.

6 Event Push

Meter can push the part of event to HES for instantaneous status alarm. Sub meter can push the event through RS 485 network to main meter. Main meter will transfer event to HES.

The push event type is as follows:

- a. Terminal cover open
- b. Top cover open
- c. Overload disconnect
- d. Low credit
- e. No credit
- f. Emergency mode
- g. No credit disconnect

The events push logic in the meter is as below:

- All event which can support push feature will be pushed to HES when 1st time occurrence.
- For terminal cover open, top cover open, overload disconnect event, if occur many times within 15 minutes, meter will only push to HES at one time.
- If meter enter emergency mode, meter will only push emergency mode event and no negative credit event push.
- If meter enter holiday and friendly hour, meter will push negative credit to HES.
- If meter disconnect due to no credit, meter will only push no credit disconnect event.
- If meter enter low credit, negative credit, emergency mode, no credit disconnect in a continuous time, meter will push to HES at two times in every day. The first time is at 07:00 – 09:00 in random, and the second time is at 14:00 -16:00 in random.

7 Tariff

The meter support single tariff structures as well as time-of-use tariff and stepped tariff, each tariff can be configured by the token.

- a. Each tariff uniquely identified using the tariff code.
- b. Each tariff has an activation date, being the date on which the tariff becomes effective.

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- c. Step tariff has up to eleven steps (in kWh) for different levels of energy pricing.
- d. The rate describes the cost per kWh for energy consumption in that step.
- e. TOU tariff support maximum 4 TOU for different zone and price.

7.1 Tariff management in the meter

Tariffs entered into the meter via the two-way token or optical port. When the meter tariff is active, the current tariff cannot be overwritten.

When the tariff is loaded into meter, the time and date will be stamped.

In general, when a tariff has expired in the meter, the tariff is automatically deleted by the meter.

7.2 Tariff security and verification

The meter shall write the active tariff code to the token on each insertion.

7.3 Tariff switchover

When the meter detects that a new tariff is applicable (using the tariff activation date), the meter can execute the following steps:

- a. The meter begins the billing against the new tariff.
- b. The current tariff code is updated to reflect the new tariff code.
- c. The old tariff is deleted.
- d. New tariffs are activated at 00:00 on the first day of a month only.

7.4 Default tariff

The meter default tariff is as the below:

Start Time	Tariff	Unit price(TK/kWh)
17:00	T1	11.98
23:00	T2	8.45

8 Billing

The default billing time is at 00:00 of the first day of each calendar month, and it cannot be programmed, if at the billing point the meter is power off, when power on meter, meter will automatic billing.

The billing contains last 6 months data:

- a. Billing date and time
- b. The cumulative active energy
- c. Current month recharged credit
- d. Current month used credit
- e. MD of kW
- f. MD of kVAR
- g. Cumulative active energy of T1
- h. Cumulative active energy of T2
- i. Cumulative reactive energy of T1
- j. Cumulative reactive energy of T2

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- k. Current month used credit of T1
- l. Current month used credit of T2
- m. Power off counts
- n. Sanction load exceed counts
- o. Monthly average power factor

9 Pre-payment

The meter support two modes of operation: prepayment mode and postpaid mode, it can be switched by the token.

9.1 Postpaid mode

In this mode meter will calculate the cumulative consumption energy and don't record the credit related parameters. Utility will use smartcard as the data transfer media for billing data.

9.2 Prepayment mode

9.2.1 Consumption

Meter can deduct the credit by each 0.01 unit consumption based on the tariff.

9.2.2 Credit

The credit can be written to the meter through token, meter can receive the max credit amount is 999999.99.

9.2.3 Emergency mode

Emergency credit facility will allow consumer to draw on an emergency credit, the basic feature are as follows:

- When the credit register value reaches a programmable Emergency Credit Threshold, the meter would buzz an alarm, user can insert the user card to active the emergency mode. In this mode, the power will not be disconnected.
- If all the available credit in the credit register is expired and power disconnected, user can insert the user card to activate the emergency credit.
- If emergency credit has been previously consumed, then the value of emergency credit used would be deducted from the next token inserted into the meter.
- This function can be activated only once before each time after recharging meter by positive credit.
- The emergency credit limit can be programmed through token.

9.2.4 Friendly hours, weekend, holidays

The meter accommodates the "Friendly hours", "Weekend" and "Holidays" features. These are time periods during which the meter shall not cut-off power to consumer even if the credit becomes negative. It can be programmed through token, and this function can be enabled or disabled through token.

Meter support maximum 30 holidays program through token

- For friendly hours and weekend, there is no any credit limit to use electricity for user, but there are times limit to user. The utility technician can configure this allowable times through token in unified

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system. Once the allowable times are finished, meter will start to deduct the emergency credit, if the emergency credit is also finished, meter will disconnect and user will have to recharge and pay for the debt.

- For holiday, there is no any credit and times limit to use electricity for user. Meter can deduct money and become negative energy value.
- The condition of meter for entering friendly hour and weekend are as follows:
 - a. Meter is low credit or have some available emergency credit
 - b. Meter is connected status

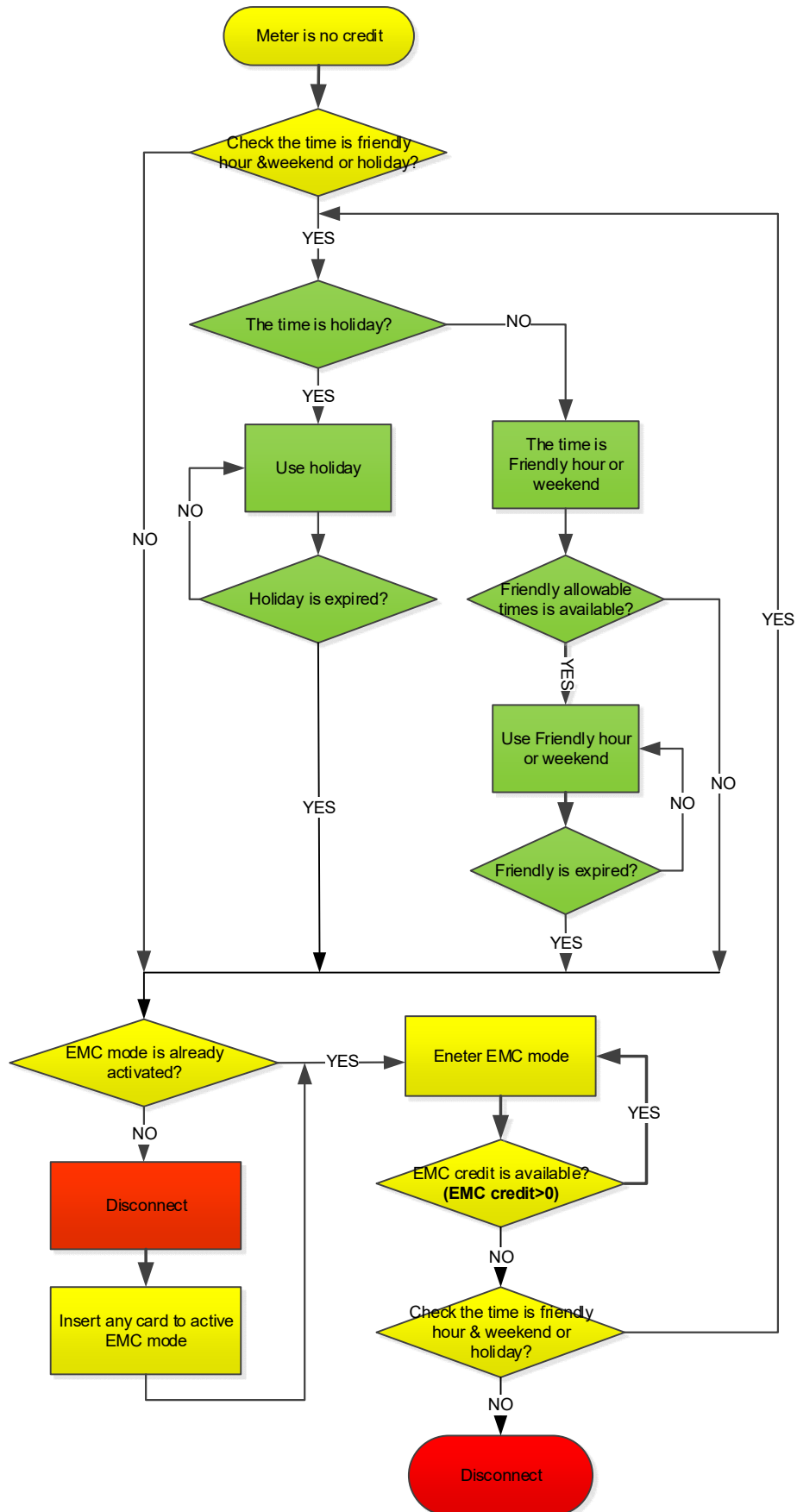
Once the meter is disconnected because of no credit or emergency credit is finished, meter cannot reconnect automatically even if the meter time is friendly hour, weekend or holiday. User has to recharge and pay for the debt.

9.2.5 Priority Process

There are three overdraw way for meter, emergency mode, friendly hour and weekend, holiday.

The priority level is as follows:

Item	Credit limit(YES or NO)	Times limit(YES or NO)	Priority
Emergency mode	YES	YES, only 1time	3
Friendly hours and weekend	NO	YES, the allowable times can be configured through token	2
Holiday	NO	NO	1



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Deduction Rules:

1. In holiday mode, emergency credit will not be deducted.
2. In friendly hours and weekend mode, emergency credit will not be deducted.
3. After finish friendly hour meter should use EMC credit again before recharge.
4. When emergency credit is expired, and at the same time meter isn't in friendly hour and weekend and holiday, meter will disconnect automatically.
5. All overdraw credit must be paid and exceed the minimum balance limit, meter will connect and provide power supply for consumer.
6. EMC credit limit is master switch to control disconnect and connect action.
7. If cannot have enough EMC credit then meter will not enter into friendly hour again.
8. Friendly hour and weekend are together, the allowable times limitation can be used for friendly hour and weekend.
9. Meter will calculate the successively friendly hour and weekend days as one time friendly allowable.

9.2.6 PFC(Power factor charge) Deduction

As per the PFC formula which is released by Bangladesh Energy Regulatory Commission (BERC), the three phase meter TSS-PPM10100TP can support PFC deduction in every month billing date and time. PFC charge will be deducted from meter balance when customer's monthly average power factor is below 0.95.

The calculation method is be done as below:

Calculation Method:

- $PFC\ Charge = 0.75(0.95 - APF) * C$, When $0.75 < PF < 0.95$
- $PFC\ Charge = 0.75(0.95 - APF) * C$, When $PF \leq 0.75$
- $C =$ Monthly consumed Tk

And user can configure PFC Deduction is enabled or disabled by remote from MDMS system or Smartset or by local through optical port by PC software (Smartset).

10. Load Control Management

To protect user's load, load control management function can disconnect the relay automatically when the load is over the threshold for 1 minute. The meter would attempt to reconnect the load up to 5 times at 3 minutes intervals. If the over-current condition still exists the meter shall wait a period of 30 minutes before attempting to reconnect the load.

Our mete can support 2 power limit configure with 2 validation time through token.

For example:

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Power limit 1:08:00 3kw

Power limit 2:15:00 5kw

It means meter will use 3kw as an overload threshold from 08:00-15:00, and use 5kw as overload threshold from 15:00-23:59 and 00:00-08:00.

Default setting:

The meter Default overload threshold is 0, user can use the token to set this value and time period.

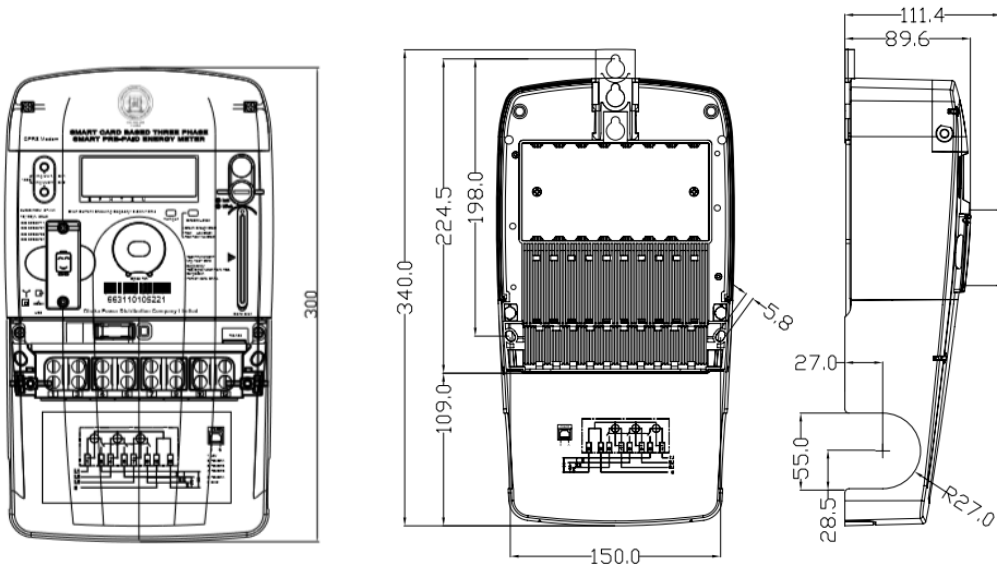
10 Transport and Storage

The meters should be placed on kickstands and the height should not exceed 5 layers. The storage condition should be clean, with an environmental temperature of between -25°C and +70°C, relative humidity of less than 95% and with an absence of rusty matter in the air.

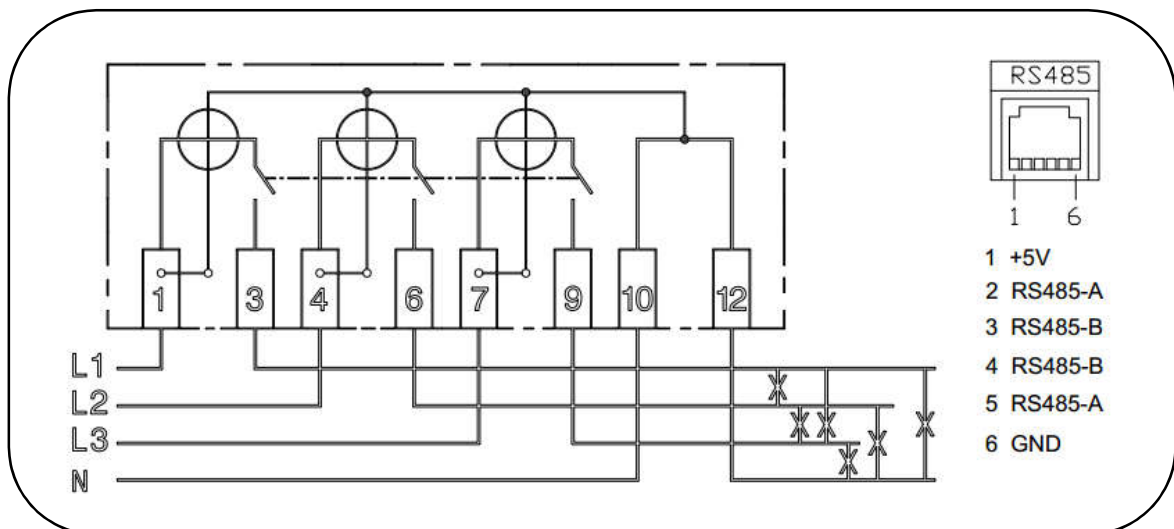
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Annexure I Weight and Dimension

The meter weighs 1850g and is shaped in a box with a dimension of 340.0mm x 169.8mm x 89.6mm.



Wire diagram and RJ12 type RS485 connector diagram



Annexure II Meter status word

Bit. No.	Description
0	clock has been set
1	low battery
2	open cover event
3	open terminal cover event
4	bypass
5	reverse energy
6	magnetic disturbance

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7	relay status
8	relay failure
9	overdraw has been used
10-11	tariff type of current month
	0: single tariff;
	1: TOU tariff;
	2: step tariff.
12	Credit is negative value
13-16	Reserved
17	Low credit
18	Over power
19	EMC activated
20	EMC available
21	Friendly hours
22	Holidays
23	No credit
24	Card on
25	Prepay mode
26- 31	Reserved

Annexure III Referenced documents

IEC 514	Acceptance inspection of Class 1 alternating current watt-hour meters.
IEC 735	Testing equipment for electrical energy meters.
IEC 62052-11	Electricity metering equipment (AC)- General requirements, tests and test Conditions- Part 11: Metering equipment
IEC 62055-21	Part 21: Framework for standardization
IEC 62055-31	Part 31: Particular requirements- Static payment meters for active energy (classes 1).
IEC 62056-21	Electricity metering – data exchange for meter reading, tariff and load control – Part 21 Direct local data exchange
IEC 62056-46	Electricity metering – Data exchange for meter reading, tariff and load control - Part 46: Data link layer using HDLC protocol
IEC 62056-53	Electricity metering - Data exchange for meter reading, tariff and load control - Part 53 Part: COSEM Application layer
IEC 62056-61	Electricity metering - Data exchange for meter reading, tariff and load control - Part 61 Part: Object identification system (OBIS)
IEC 62056-62	Electricity metering - Data exchange for meter reading, tariff and load control - Part 62: Interface classes
IEC 62053-21	Electricity metering equipment (a.c.) - particular requirements - part 21 static meters for active energy (class 1 and 2)

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IEC 62053-23	Electricity metering equipment (a.c.) - particular requirements -Parte 23 static meters for reactive energy (class 2 and 3)
IEC 1036	Alternating current static watt-hour meters (classes 1)
IEC 1038	Time switches for tariff and load control
IEC 1107	Data exchange for meter reading, tariff and load control and direct local data exchange
IEC 58	Shock and vibration, humidity, solar radiation and salt mist etc.
ISO 9001	Code of practice for quality systems part 1: Model for quality assurance in design/development, production, installation and servicing.
IEC 62054	Real Time Clock (RTC)
Others	All other relevant IEC specifications for metering equipment

Annexure IV Enclosure

- The enclosure conforms to the requirements of BS 7856.
- The case is double insulated to protective class II.
- The case provides an ingress protection rating of IP51.
- The terminal cover provides the side entry groove for PVC pipe enter.
- The terminal cover can be sealed for limit access to the main meter connections.
- The terminal cover is transparent and will be laser printing the connection diagram.
- The main cover is molded with gray color, polycarbonate.
- The metal ring of the optical port is fixed under the main cover.
- Name plate of the meter will be laser printing.
- Micro switches for face cover and terminal cover opening detection.

*****End of Document *****

