Keypad Meter Prepayment Vending Software

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China

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Content

1.   Keypad Meter Prepayment Vending System

1.1 System Introduction

Keypad Prepayment Vending System meets the STS standard. It follows IEC 62055-41 communication protocol, adopts 20 digit Encrypted number for data carrier to transfer purchase information to meters. It has diverse ways to purchase electricity: Vending station, Mobile vending, Internet online vending, SMS, ATM, etc.

1.2 System Characteristic

- Storage management.

- Customer information management.

- Power vending.

- Refund management.

- System parameters management (Price, tax rate).

- Vending station credit limit.

- History arrear management.

- Data interface for other billing system.

- Setting for report format.

- Meter reading management.

- Token management.

- Security module management.

- Security files management.

- Operator management.

- Many kinds of language support (Independent language files).

1.3 System Framework

Keypad Prepayment Vending System has two different versions: C/S (Client/Server) framework vending system and B/S (Browser/Server) framework vending system.

- For C/S framework vending system, it does not need high-level hardware and network service. As to data transfer from Client vending station to database server, it supports via USB flash or E-mail. This solution is the economic way at first stage.

- For B/S framework vending system, it needs high-level hardware, stable network service and devices for safety. The cost for B/S is higher than C/S at the first stage, but offers advantages to maintenance.

Customer can choose different system upon demand.

## 1.4 System (B/S framework) Structure
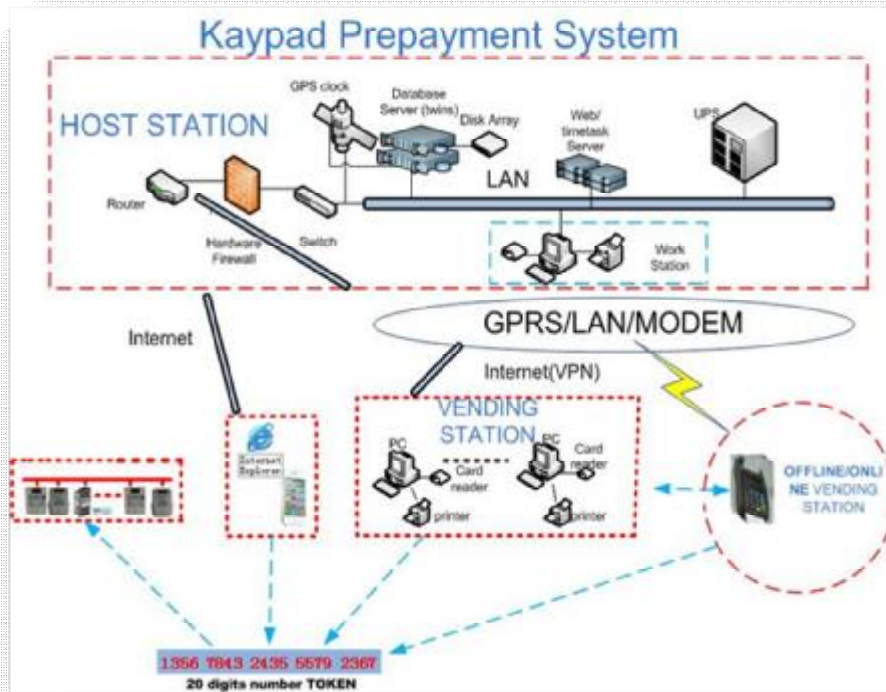
Servers Applicable:

• Database Server: used for storage of business data;

• Web/Time task Server: used for providing HTTP service to connect vending points of utility company, and connection for bank payment collection, internet power vending, vending agency, etc;

• Vending station: customer purchase energy server point.

• Offline / online vending station: Mobile vending device.

Notice: Above‐mentioned server application can be grouped according to customer demand and development condition; all service function operated in one server is supported as well.
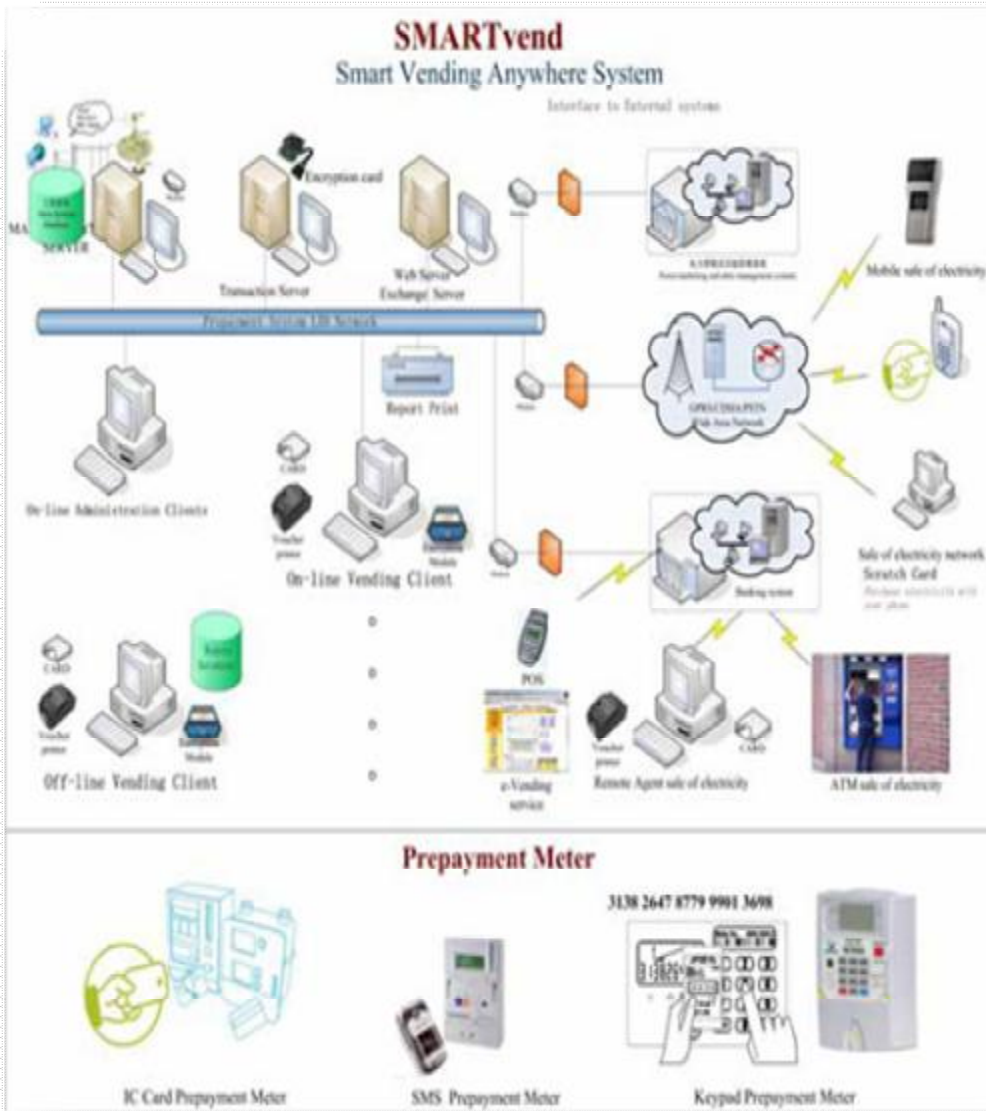
1.5 System (C/S framework) Structure
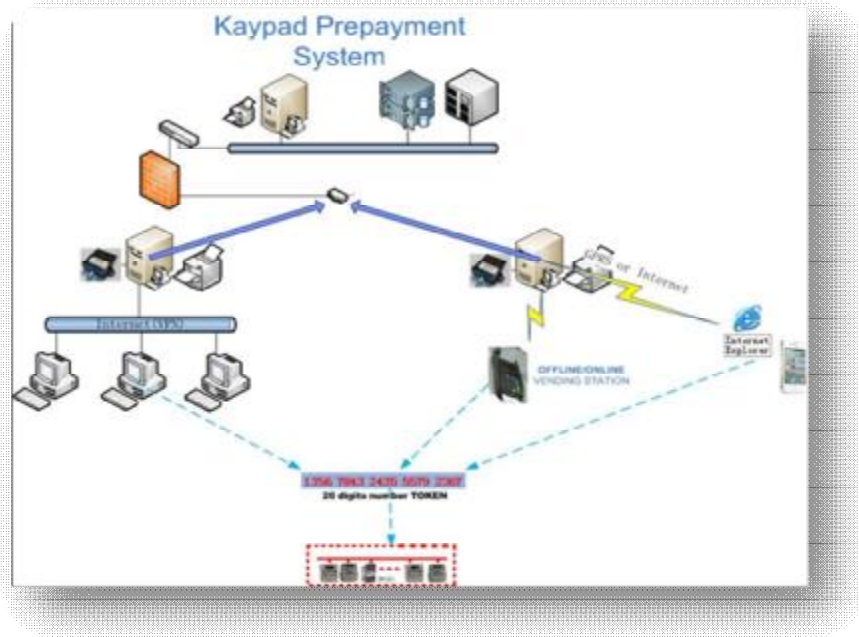
Other Systems:

Power marketing and its business system;

Telecommunication port: payment collection port provided by bank for ATM automatic and internet power vending;

Other System port: payment collection through agents like Network Company, Telecommunication Company or scratch card.

1.6 System Compatibility and Scalability

Keypad Prepayment Vending System adopts unified power vending and revenue collection method, compatible with various IC prepayment energy meters, STS keypad prepayment energy meter, SMS prepayment energy meter researched by GST Electronics, as well as STS keypad energy meter made by different manufacturers. Meanwhile, it makes compatible with prepayment energy meter with different type and different protocol, prepayment water meter, prepayment hot water meter and gas meter by system' third party extended interface base.

1.7 Diversified Power Vending Module

Keypad Prepayment Vending System provides various vending modes in order to bring convenience and efficiency to users and reduce workload of vending personnel.

- **ATM**

Users purchase electricity from ATM self-help equipment. Recharge will be made by connecting with bank system after safety certificate. ATM will read the card and print digit code.

- **PC recharge**

Users enter online network vending website to purchase electricity(IC card reader is needed for operation for IC prepayment energy meter). After paying and confirming the payment on internet, vending management center will make safety authentication and give vending instruction for printing digit code.

- **POS, PDA recharge**

Users enter network vending website by internet with handhold computer for recharge (It cannot recharge for IC prepayment energy meter).

- **Agent vending**

Banks or other agent vendors authorized by the utility provide vending business for users.

- **Recharge hall**

Integrated petty charges recharge hall provide electricity vending business.

- **Vending hall**

Power supply system provides internal vending network.

- **Scratch card**

Telecom companies use their value added service to transfer the recharge payment and give recharge instruction (It cannot recharge for IC prepayment energy meter).

- **SMS**

Telecom companies use their value added service to transfer the recharge payment, and after successful recharge transferring, recharge can be made by SMS. It is applicable for SMS prepayment energy meter and STS keypad prepayment energy meter (It cannot recharge for IC card prepayment energy meter).

1.8 System Main Functions

Keypad Prepayment Vending System has three versions: standard version, professional version and enterprise version. Different version system contains different functions and supports different meter type. Customers can choose according to their actual business requirement.

has following function modules:

· **Daily business processing module**

Customer data maintenance, power consumption contact signing and canceling, petty charge collection, power vending, meter exchange, card complement, card data maintenance, and complementally bill printing.

· **Power vending network management module**

Contact signing or canceling of vending network, vending terminal management, vending network reconciliation, vending network permission, commission payment, etc

· **Tempering module**

Customer power off/power recovery, tempering charge collection, handling charge collection of power off made by customers, etc

· **Charge collection module**

Petty charge collection, capacitance increase charge collection, meter freezing charge collection

· **Reports outputting module**

Account opening integrated report, vending integrated report, consumption integrated report, tempering integrated report, vending network integrated report, charges integrated report, etc daily report outputting, consumption and vending and other analyses report outputting.

· **System management module**

Company information management, department management, role permission management, user management, electricity price management, system operation data management, data management, data maintenance, data exchange management, etc,

· **Assistance module:**

Online assistance display.

2 Keypad Prepayment Meter

2.1 Executive Summary

The system consists of two parts: The prepayment Electricity Vending Management System and Prepayment meters.

Prepayment meter is a kind of meter which requires the consumer to pay for the electricity they are to use in advance. The consumers are required to charge the electricity they have purchased into the meter through some intermediary, and the meter shall identify and process the data and then supply electricity to the consumer accordingly. When the credit in the meter is small (equal or below the warning amount), then the meter will send out a warning signal to the consumer to remind them for charging; when the credit in the meter is zero already, the power supply shall be cut off, realizing the principle of "Prepayment".

The application of the prepayment meter can successfully solve such practical problems as inaccurate meter manual reading and difficult in collection of the electricity fee which the Electricity Management Authority are faced with nowadays. Following are the prepayment meter products developed and manufactured by Shenzhen GST Co., Ltd.
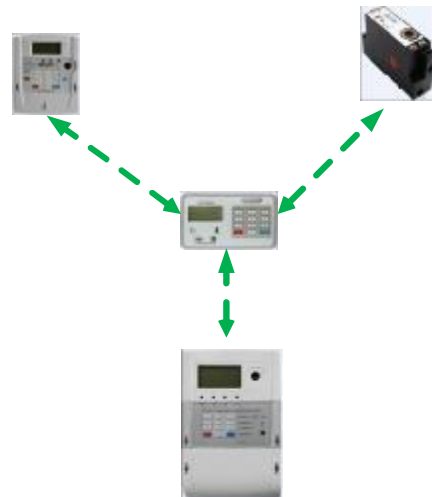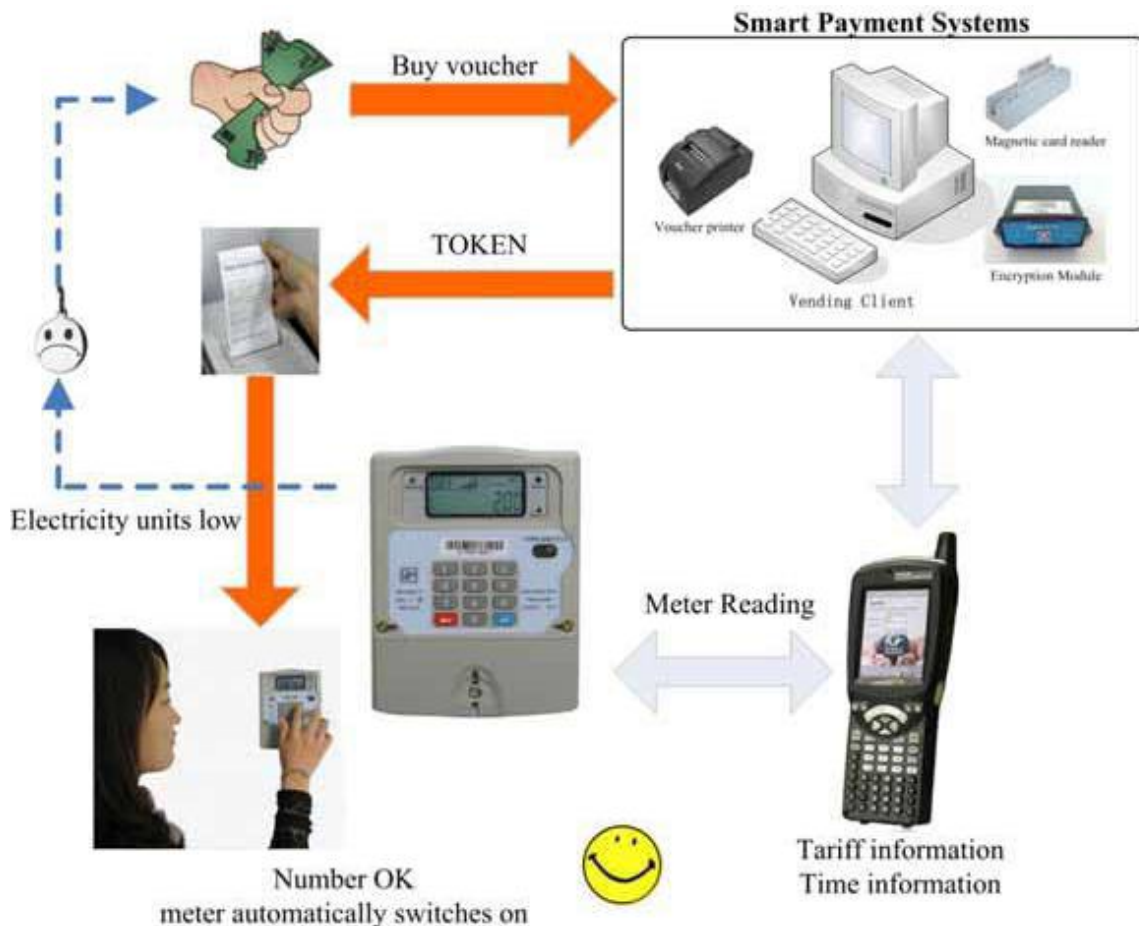

Keypad Prepayment Meter

2.2 Keypad Prepayment Energy Meter

Keypad Prepayment Energy Meter is a prepayment meter using virtual intermediary, i.e. token, as data exchange media.

Token means a code consists of 20 digits, such as 2837 5872 3731 6854 3423. After the consumer makes the payment of the electricity, a unique token shall be generated by the Vending Management System. Then the consumer is required to input the token into the meter through the keypad on the meter to realize the credit transfer. (The meter shall decode the token according to the communication protocol).

Prepayment Vending Procedure

2.3 Applicable Standards on Keypad Prepayment Meter

The only international standards available for the prepayment metering system is IEC62055, which was drafted by Standard Transfer Specification Association (STSA) established in 1997 in South Africa and recognized as an international standard, i.e. IEC62055 in 2005.

IEC62055 series of standards covers payment collection management system, CIS customer information system, vending management system, data transfer carrier, data exchange standard, prepayment meter, interface standard and other related contents, all of which establishes a complete system frame work for Prepayment Metering System.

IEC62055 series of standard consist of:

EC62055－21 Standardization structure

IEC62055－31 Prepayment meters for Active Energy (Class 1 and 2)

IEC62055 － 41 STS standard data transferring protocol － Application layer data transferring protocol

IEC62055－51 STS standard data transferring protocol—physical layer data exchange carrier (numeric and magnetic card carrier)

EC62055－ 52 STS standard data transferring protocol—physical layer data exchange carrier (communication virtual carrier)

As all the keypad prepayment meter follows the same standard, certified for their compatibility with STS standard, and adopts standardized security module encryption algorithm), all prepayment meters and vending system manufactured by different manufacturers are compatible with each other.

As STS (Standard Transfer Standard) has been the only open prepayment metering system standard all over the world, and only with the authorization by STSA can the technology be used, the safety and security of the Electricity Utilities are assured in the use of the STS system.

As to obtain the compatibility, the keypad prepayment meter products of Shenzhen GST

Co., Ltd. are all STS certified and the manufacturer's code is "54".

Apart from the STS standard, GST's keypad prepayment metering products also comply with the Following standards:

IEC 62052-11 2003 General requirement for Electricity measurement equipment (AC) test and test conditions, part 11, measuring equipment.

IEC 62053-21 2003 Special requirement on Electricity measurement equipment（AC）, Part 21, special requirement on static active electricity meters (class 1 and 2)

SANS 1524-1 2005 National Standard of South Africa for prepayment meters (SABS certification)

ESKOM SCSSCAAA9 Prepayment meter technical requirement of ESKOM, South Africa

ESKOM TRMSCAAP2 Prepayment meter technical requirement of ESKOM, South Africa

BS 5685 British Standard type of wire connection

DIN 43857 Deutsch Standard type of wire Connection

IEC60529 2001 Meter casing protection class

2.5.1 MCU

MCU (Measurement and control unit) is the main body of the meter: single/three phase integrated/split keypad Prepayment energy meter. It is installed outdoors and the installation complies with meter installation requirement and supports RS485/M-bus communication, infrared communication, Power Line Carrier Wave Communication (PLC) and RF (Radio Frequency) communication.

MCU can adopt LCD display to display all measured data such as accumulative kWh reading, history monthly kWh consumption, credit charged, credit balance, load profile, warning/alarms.

Through different communication means, MCU can also be programmed for it operation parameters or switching tariffs under stepped multi-tariff arrangement.

2.5.2 UIU

UIU is User Interface Unit used for single phase, three-phase split keypad prepaid energy meter. It is installed indoor, which is convenient for the user to learn the meter operation parameters and load the pre-purchased energy (credit).

2.4 Technical Features

The main reason for the wide acceptance of STS keypad prepayment meters lies at the salient technical features of the virtual token data transferring system.

2.6.1 Features of STS

- STS is a prepayment technology for data exchange and communication transferring based on virtual token which fits the development trend of the future communication technology.

- STS data transfer standard is used to define the process of transferring available credit to electricity meter; it can also be adopted in water meter, gas meter and other utility meters;

- STS is a secure communication system which is used for the data exchange between vending point and meter;

- STS is an open and secured worldwide transferring standard. It adopts IEC 62055-41 as the only international standard for prepayment system;

- Encryption key technology is provided (provide leveled encryption keys which are managed by Utility themselves);

- Every TOKEN, meter, vending point and prepayment metering system are protected by different levels of security control;

- The encryption system is reliable and technically reduces the possibility of being attacked;

- Multi-system structure ensures its timely technical updating;

- Products in the standard system have to obtain the STS certification;

- Transferring process of charging token in the system is secure and reliable. Even in case of repeated transferring, meter will accept the data only once; and the information is only for valid for the assigned meter for it contains the information of the meter.

- More than 20 million STS prepayment meters have already been installed and used by hundreds of Utilities all over the world;

- The use of STS ensures the compatibility between meters manufactured by different manufacturers; Utility can purchase products from any STS certified manufacturer or vending system supplier freely without any concern with the security of the system.

2.6.2 Features of keypad meter

- STS certification

- 20 digits of virtual token

- Support TOU (Time of use) and Stepped tariff function;

- Multiple credit balance alarm (local warning, Short message service and email);

- Overload disconnection/load control;

- Emergency overdraft function and friendly non-disconnection function

- Anti-stocking of credit function;

- Build-in RS485 or PLC communication module, support remote charging;

- Once remote charge fails, also support local keypad charging and infrared communication;

- Meter is installed in meter box, consumer cannot and need not to touch meter;

- Build-in reliable relay, support relay failure detection and warning;

- Anti-tamper function;

- Consumer consumption history information inquiry;

- Easy to adopt split type design.

2.6.3 Flexible Credit Purchase Means

- SMS self serviced credit purchase;

- Credit purchase via internet;

- Vending station purchase;

- Scratch card purchase;

- Credit charging via Convenient store POS machine;

- Credit purchase via purchase of charging card;

- Self-serviced credit purchase via internet banking;

- Credit purchase via Call center/special service telephone number;

- Credit purchase via ATM

2.5 Categories of GST Keypad Prepayment Meter

Based on phases of consumer：

- Single phase keypad prepayment meter
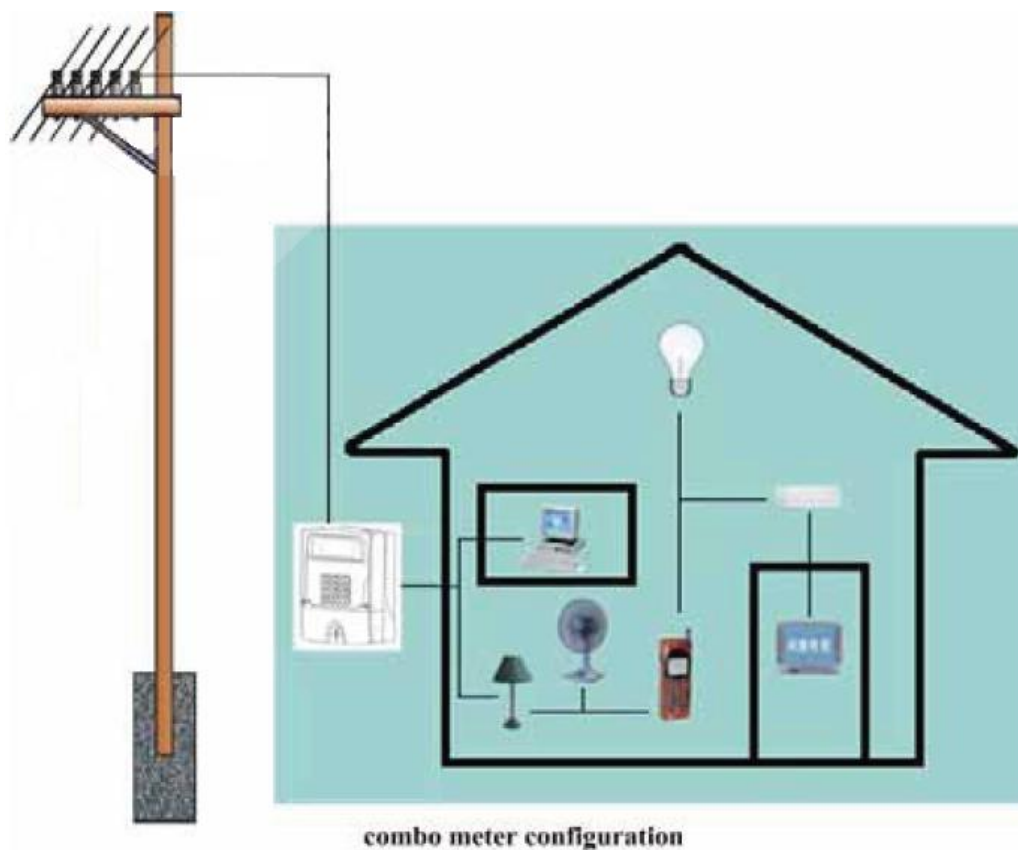
- Three phase keypad prepayment meter

Based on installation method：

- Single phase integrated type prepayment meter;

- Single phase Split type prepayment meter;

- Three phase integrated type prepayment meter;

- Three phase Split type prepayment meter;

Based on the standards the meter comply with：

- IEC standard complied, BS5685 wiring or DIN43857 wiring single phase integrated type prepayment meter, single phase split type prepayment meter, three phase integrated type prepayment meter and three phase split type prepayment meter;

Installation diagram of integrated type keypad prepayment meter:

combo meter configuration

Installation diagram of split type keypad prepayment meter：

Split meter configuration
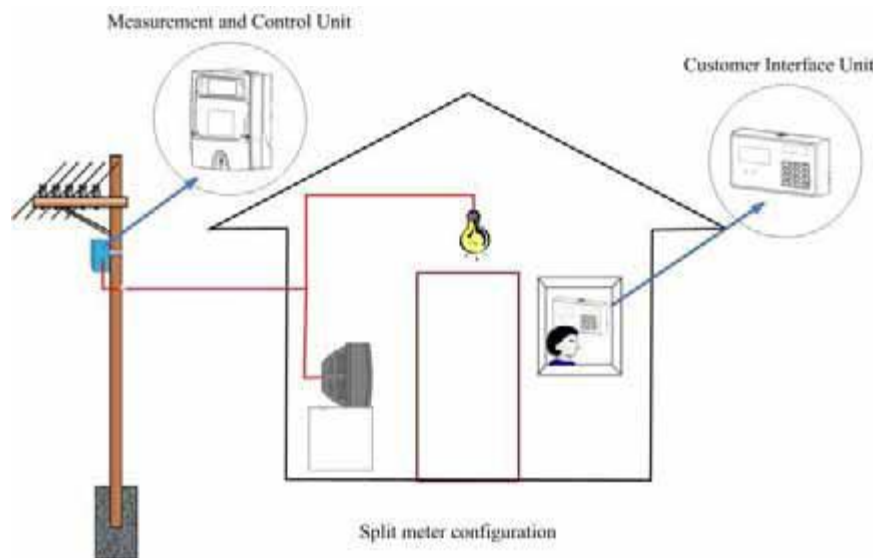
2.6 Basic Function of Products

Keypad prepayment meter products series of GST adopt advanced technology of measurement, control and communication. They can provide not only accurate measurement of energy, but also reliable control on the collection of electricity charges. GST's keypad prepayment meter products (including single and three phase keypad prepayment meter, MCU & UIU etc.) have the following basic functions:

- 20 digits TOKEN comply with STS specification;

- Measurement, calculation and storage of active energy, Reactive energy (for three phase meter), apparent energy and related parameters (voltage, current, frequency, demand, power);

- TOU (time of usage) function: support programmable tariff scheme;

- History data storage function: can store data of the last 12 months;

- Event record function：can record event such as terminal cover open, meter cover open, power loss, phase loss, tariff change, meter date/time calibration, MD reset, battery replacement and external magnetic influence;

- Anti-tamper function：can detect and record tamper behaviors such as reverse current

and circuit bypass;

- Load control function: for different types of consumers, different load control threshold can be programmed to control their consumption;

- Visible/audible Low credit balance (in energy units/in monetary units) warning signal.

- Overdraft electricity switch;

- Minimum charity electricity consumption (basic electricity use) function;

- Disconnection disable function at night (or predefined periods), in holidays and weekends

- Peak hour load control facility;

- IP54 protection provided for outdoor-use MCU and IP51 protection provided for indoor-use UIU;

- Large size, wide visible angle, wide working temperature range LCD screen with backlight

- Display items programmable

- Braille characters and key stroke tone provided on keypad

- Load threshold programmable

- 15 years life

- STSA certified