SINGLE PHASE STS PREPAID METER

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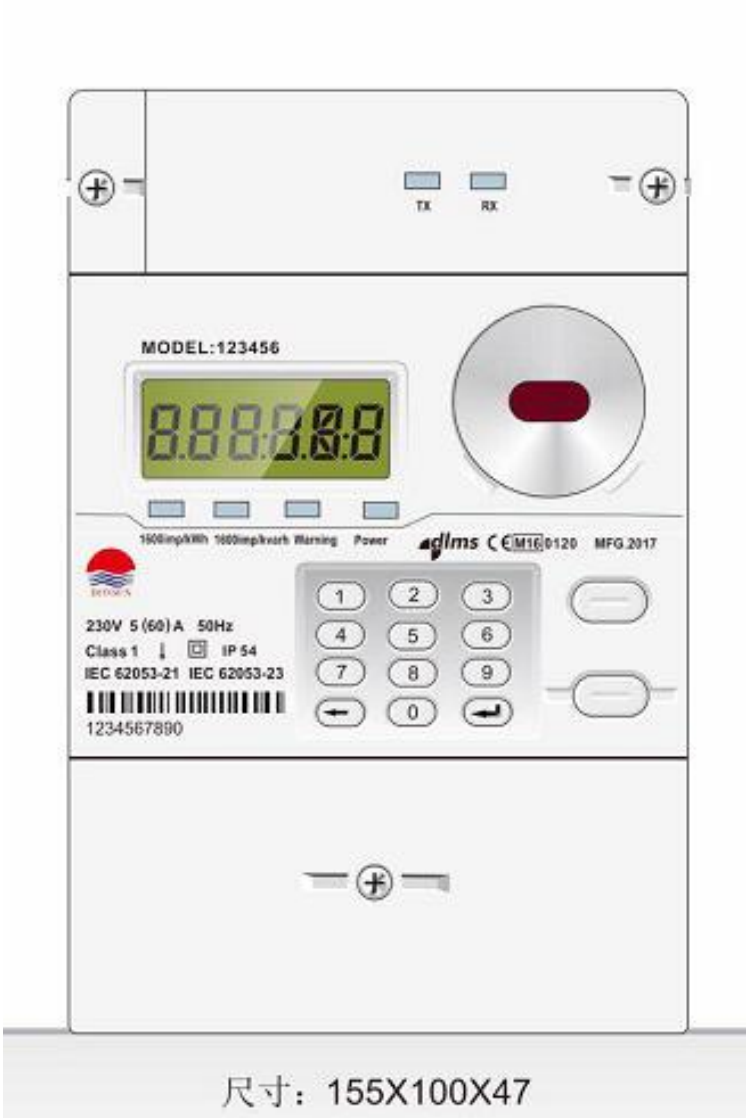
1 INTRODUCTION

The single-phase 2 wires STS prepaid Keypad active electronic electricity meter can realize the functions of active energy measuring and pre-payment control.

The meter communicates with the master station system via TOKEN to realize the functions of active power measuring and pre-payment control. The meter includes measurement unit, real-time clock unit, infrared communication, RS485, plug-and-play communication module (PLC, RF, GPRS), load switch and other auxiliary modules.

The prepaid security algorithm is STS certified and so keep advantage of being interoperable with any STS vending system.



2 STANDARDS REFERENCES

- IEC62052-11 Electricity metering equipment (A.C)-General requirements tests and test conditions- Part11: Metering equipment.
- IEC62053-21 Electricity metering equipment (A.C)-Particular requirements-Part21: Static meters for active energy (classes 1 and 2).
- IEC62055-31 Electricity metering -Payment systems-Part31: Particular requirements Static payment meters for active energy (class 1 and 2).
- IEC62055-41 Electricity metering-Payment systems-Part 41: Standard transfer specification (STS) - Application layer protocol for one - way token carrier systems.
- IEC62055-51 Electricity metering-Payment systems-Part51: Standard transfer specification (STS)-Physical layer protocol for one-way numeric and magnetic card token carriers.
- ISO 9001
- SANS 1524-1 (electricity payment system)

3 TECHNICAL PARAMETERS

3.1 Meter operating voltage

The nominal voltage is 230V.

The maximum operating voltage is 230V +20% (276 VAC) and the minimum operating Voltage is 230V -30% (161VAC).

The meter is able to withstand 415VAC for 48 hours.

3.2 Meter current parameters

The starting current is 20mA, the basic current is 5A and the maximum current Imax is 60A.

3.3 Meter frequency parameters

The supply frequency is 50HZ +/-5%.

3.4 Self- power consumption of meter

Power consumption of voltage circuit	<1 W 10 VA
Power consumption of current circuit	<4 VA

3.5 Accuracy

The measurement accuracy is conforms to IEC62053-21 Class 1.

3.6 Meter Pulse Constant

The pulse constant is 1000 imp/kWh these pulses are emitted with a Led on the front of the meter and on the CIU part if CIU is required.

3.7 Meter serial communication interface

The Meter is equipped with three communication interfaces:

- Interface 1: Optical communication according to IEC 62056-21.
- Interface 2: RS485 compliant with DLMS/COSEM
- Interface 3: Plug-and-play modules complaint with DLMS/COSEM

3.8 Surge arrestor

The meter is equipped with 5KA/5KV MOV Varistor as a surge arrestor.

4 PHYSICAL DESIGN

4.1 Meter Protective Class

In accordance with IEC60529-4, the protective Class of the meter is IP 54.

4.2 Resistance to Heat and Fire

Resistance to heat and fire class: V0 (all the plastics materials are made of heat-resistant and fire-retardant materials).

5 FUNCTIONS

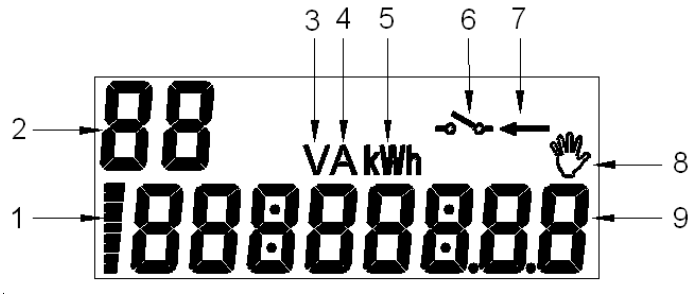
5.1 Metering Function

CL710K11 Single-phase Keypad Energy Meter can measure reverse power in the same way of measuring forward power and the energy can be accumulated in active energy registers.

$|A| = |-A| + |+A|$

5.2 Data Item Display Function

LCD in full screen is as follows：



1	Credit balance bar	2	Data item code	3	Voltage tag
4	Current tag	5	Unit tag	6	Relay trip indication
7	Reverse tag	8	Tamper tag	9	Data item content

Data indication: 8 digits of integer and 0 digit of decimal. Power unit is kWh; Active power unit is kW.

Display code: With 2 digits code to indicate respective data item.

The meter can display negative credit.

Display content includes consumption data, configuration data, and history data and so on.

For data item length over 8 digits (e.g. date & time and meter No., etc.), meter will display in two pages. For credit balance, the data item can be used to indicate the specific value; meanwhile Credit balance bar can be displayed on LCD screen.

LCD Energy bar displayed on CIU is as:

Credit balance in meter< 30 kWh, no bar displays;

30 kWh ≤credit balance< 60 kWh, the first bar displays;

60 kWh ≤credit balance< 90 kWh, the first 2 bars display;

90 kWh ≤credit balance<120 kWh, the first 3 bars display;

270 kWh ≤credit balance, all 9 bars display.

In a similar way, when the credit balance decreases, the corresponding bar will turn off.

Shorts codes:

Shorts codes are used to display object or to test some function using the keypad of the CIU.

The short code objects are:

- Keypad test/Display test
- Total user consumption to date
- Total energy purchased
- Power limit Level
- User consumption history (last 24 hours, Last 30 days)
- Meter serial number
- Supply Group Code
- Tariff index
- Key revision number
- Last 20 digit token information
- Available credit
- Voltage
- Current
- Active power
- Frequency
- Low credit amount alert threshold
- Events (tamper, overload, reverse, power off).
- Time and date

5.3 PROMPT MESSAGE

Item	Introduction
	Power purchase token is correct and accepted and "accept" is displayed.
	Power purchase token is wrong and rejected and "reject" is displayed.
	When "Old" is displayed, it means token is expired.
	When "Used" is displayed, it means the token is a used one.
	Overload consumption—When consumption load is over the load threshold specified, "over po" will be displayed and the power will be cut off within specified time.

Other LCD message prompt:

- OK: Successful operation
- ERROR 01: Error in manufacturer code
- ERROR 02: Key expiration error
- ERROR 03: DDTK error
- ERROR 04: Overflow Error
- ERROR 05: Key type Error
- ERROR 06: Data format Error
- ERROR 07: Token type error
- ERROR 08: Appointed function Error
- NULL: Reserved

5.4 LED Indicator Status

- Indicator status on MCU:

Impulse indicator: red, blinks during consumption.

Alert indicator: Yellow, blinks during alert event (reverse energy, overload, and low credit); keeps lighting when relay trips.

Tamper indicator: Red and Green color, displays in green when there is no tamper. Display in red when tamper is present.

- Indicator status on CIU:

Impulse indicator: red, blinks during consumption.

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5.5 Load Control Function

The meter can be programmed for load control threshold (0A to 60A). In case of over load the alert LED will blink and if the overload goes for more than 30 seconds (value can be modified using optical port) the meter will cut off user load and the relay shall auto close after 120 seconds (value can be modified using optical port) If overload trip times > 4 (value can be modified using optical port) within half an hour, the relay shall auto close after 30 minutes (value can be modified using optical port).

During the overload the CIU displays overload and Led alarm is active with buzzer audible sound. If the overload event occurs, the CIU buzzer will alarm. Press any button to stop the alarm.

5.6 Pre-warning Consumption Function

The meter have the function of user pre-warning on low credit level. When the available energy amount value is below pre-warning threshold, the LCD of CIU will display low credit message and audio alert accompanied. Press any button to stop the audible alarm.

5.7 Event Recording Function

- Meter cover and terminal cover open event

When meter is open, the meter will send out power off signal to have load switch cut off automatically, the tamper tag is displayed, the relay open tag is displayed also, and the tamper LED is active. It will add 1 to total count of terminal cover open times. The terminal cover open times and last 5 terminal cover open time records can be recorded. At the trip, the relay will not get closed even if put terminal cover in place, unless the dedicated TOKEN rather than other tokens is input by Utility after the terminal cover is closed.

- Overload trip event

If overload occur the LCD display the overload event screen. The alarm LED is active and an audible sound is active. To prevent user to lower its consumption.

After overload alert duration reaches specified time, meter will send out power off signal to have load switch cut off automatically, meter will add 1 to count of overload trip times. The overload trip times and last 5 overload trip time and date can be recorded.

- Power off event

When meter powers off, it can add 1 to power off times. The meter can record the power off times and the last 5 power off time and date.

- Reverse tampering event

When energy is reversed, the reverse tag ← shall keep lighting and the tamper tag  is displayed. The alarm LED is active and an audible sound is active. Meanwhile, the meter will add 1 to count up of reversing times. The meter record reverse times and the last 5 reverse time and date.

5.8 HISTORY READOUT

Via communication interface, it is available to read data items in meter, including current consumption data, credit balance, meter clock, previous 12 months consumption data, events, all kinds of meter data items and log data.

5.9 Over/under-voltage Trip Function (available on customer request)

When meter voltage gets lower than 150 V for 10 sec, the meter will trip. When voltage goes back to be higher than 160 V for 10 sec, the relay can get closed by inputting “0” “0” and pressing Enter key on CIU or let relay auto close after 5 min. If the voltage is below 100 V, the meter will not get tripped until the voltage rises.

When meter voltage gets higher than 260 V for 10 sec, the meter will trip. When voltage is lower than 250 V for 10 sec, the relay can get closed by inputting “0” “0” and pressing Enter key on CIU or let relay auto close after 5 min.

This function is set in order to protect the customer equipment and it is optional and makes available on customer request.

6 TECHNICAL TABLE:

Object	Value
type	Single-phase 2 wires STS prepaid Keypad active electronic electricity meter.
Standards reference	IEC62052-11, IEC62053-21, IEC62055-31, IEC62055-41 IEC62055-51, ISO 9001, SANS 1524-1
Operating voltage	230V (-30% to +20%)
Frequency	50HZ +/- 5%
Basic current	5A
Maximum current	60A
Starting current	20mA
Installation type	BS
Accuracy	CL.1
Energy pulses	1000 pulse/KWh
IP protection	IP54
Internal consumption	<1W
Isolation	Class II
Local communication	Optical (IEC 62056-21) + RS485
Display	LCD (8 digits and icons) unit of energy Kwh with Back light
Keypad	12 button with audible feedback
Operating temperature	-25°C à +70°C
Max operating temperature	-40°C à +70°C
Humidity	95%
Surge protection	5KA/5KV surge arrestor
Tamper detection	Sealable screws and electronic terminals and meter cover opening detector.
Display language	English
Plastic materials	ABS flame proof.
Life span	15 years
ID card	NRS 009-4:1995
User manual	In English language