KKP METERING ELECTRICITY AND WATER

"YOU ONLY PAY FOR WHAT YOU USE"

VC1000

Single Phase STS Keypad Prepayment Meter



1.1. General description

The meter is with advanced measuring chip with high reliable CPU, and manufactured with advanced SMT Process. The main features are:

- Bidirectional active energy measurement, reverse energy accumulated to positive energy.
- Measuring the total accumulative and remaining energy.
- The meter will automatically switch off when the remaining energy was used out.
- Using the STS encryption techniques and protocol to generate 20 digits cryptograph which can be used to charge energy, set key, clear tampering sign and so on.
- Multi-level remaining energy, the meter will alarm when the remaining energy is low.
- Credit overflow limit: If the credit amount transferred plus remaining credit more than credit stock limit, then the credit amount transferred will be refused, but the Credit amount transfer token is still valid.
- Alarm: When remaining credit crosses the minimum credit (30kWh，20kWh, 10kWh), the warning LED glitter，LCD also indicates the warning symbol to remind user to purchase credit. Buzzer buzzes should customize.
- Open upper cover and terminal cover detection whether the meter is power on or off.
- Switch off when the power is over or under the set value.
- LED pulse light output.
- Design the meter according to IEC62052-11，IEC62053-21/31， 62055-41， and IEC 62055-51.
- High reliability and accuracy, easy to use.

1.2. Technical specification

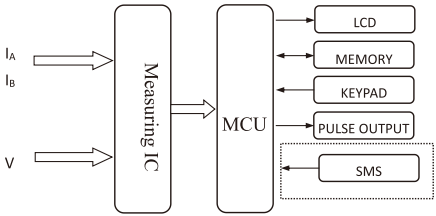
Accuracy: 1.0
Rated voltage (Un): 230V
Rated Current: 5(80) A
Pulse: 1000imp/kWh
Frequency: 50Hz
Staring current: 0.004In
Weight: 0.45kg

Electric parameter

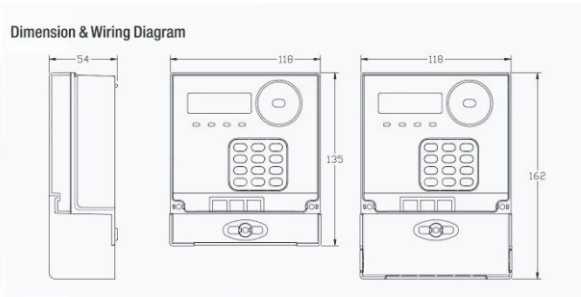
Normal working voltage	0.8Un～1.1Un
Limited working voltage	0.7Un～1.2Un
Voltage circuit energy consumption	≤ 1.2W and 5VA
Current circuit energy consumption	＜1VA

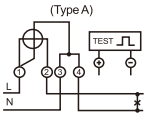
Normal working temperature	-20℃～+50℃
Limited working temperature	-30℃～+60℃
Store and transportation temperature	-40℃～+70℃
Store and working humidity	≤ 85%

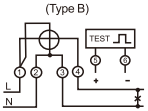
1.3. Working Principle



1.4. Outline and installation







Terminal	Note(Type B)
1	Inlet phase line
4	Outgoing phase line
2	Inlet neutral lire
3	Outgoing neutral line
+ and -	Port of pulse output passive

2. LCD display



Symbol	Content
	Number text display
	The level of the remaining energy
	The direction of reverse current
	Tamper status
	unit
	Relay status

No	Display content	Meaning
1	ACCEPT	Accept
2	REJECT	Refuse
3	USED	Used
4	OLD	Obsolete
5	OUE_LOAD	Excessive power
6	OUELOAD5	Excessive power as many as 5 times
7	TEMPER	Tampering
8	EMPTY	Empty data
9	V-Err	Over Voltage or low Voltage

2.1. Automatic display

When there is no input to the meter, the meter will displayed in two ways:

- Prepaid model: the meter will display remaining energy
- Postpaid model: the meter will display item is like the following:

1	Current Total active energy
2	Current active energy rate1
3	Current active energy rate2
4	Current active energy rate3
5	Current active energy rate4
6	Current time
7	Current date
8	Voltage
9	Phase current
10	Neutral current
11	Phase active power
12	Neutral active power
13	Frequency
14	Phase power factor
15	Neutral power factor
16	Current active total max demand

2.2. Alternate display

Input the following number +enter key, the meter will show the related data or related test. can get more detail of short code list from 4.9.

00	Show Remain energy
01	Relay test
02	Full display
03	Show the total active energy
04	Show KRN and KT
05	Show TI value
07	Show the over power value
08	Show tampering status

3.1 Commissioning Token

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1. The commissioning token should only be entered once the installation is complete i.e. confirm the wire connection is right and the terminal cover is closed.
2. The Meter's Relay is off in factory default.
3. When you enter the commissioning token, the meter will active the tamper function.
4. If there is no tamper the meter relay will close to connect the load.

3.2 Energy Measure

The meter can record the remaining energy and accumulative energy. The operator can check the present accumulative energy. The relay will switch off automatically when the remaining energy is less than 0. Only when the remaining energy is more than 0, the relay will be switch on automatically.

- Prepaid model：The meter will automatically deduct the charge, the reverse metering data will also be deducted, and when the remaining amount is 0, the meter will automatically pull the switch. Overdraft state will go negative electricity, the next recharge will be deducted。
- Overdraft function： Factory default is 0, if necessary, please set the limit in the host computer; When the remain energy is 0, the relay will disconnect and press any key on the keyboard to start the overdraft limit。

3.3 Charge energy

The operator can use the STS encryption techniques and key to input 20digits cryptograph to recharge deposit Energy to remaining energy. The meter will display "ACCEPT".

If the recharge energy amount plus remaining energy more than limited value (999,999.99kWh), then the recharge energy will be refused, the meter will display "FULL". but the energy amount token is still valid and the token can be used when total remain energy (the remaining energy plus the charge energy) less that the limited value.

The meter will check whether the time mark of token is already used or not. One meter can only generate one charge token in one minute. The meter will refuse the TOKEN that generated at the same minute and will show "USED".

The meter can check the generated time of the token and record the token used time of the last 50 times. If the generated time of the token is early than the last 50 times, the token will refuse the token and show "OLD"

Anti-tamper:

The electronic energy meter will alarm when the tampering happened (for example: reverse wiring, open cover). When the upper cover and terminal cover are opened, the alarm will keep on until inputting command of clearing the tampering status even if the cover is closed. Other tampering status will disappear, when the tampering is end.

In the reparation, “Token” means only when input the reparation token we can clean the tampering status. “Repair” means when the tampering is end the tampering status will end.

Following is the tampering detection and meter reaction.

Type of abuse	Meter reaction	Display		Tamper LED	Normalization code
		Text	Symbol		
open upper cover and terminal cover	Relay open Record data	tamper		Active	Token
open upper cover and terminal cover when meter power off	Relay open Record data	Tamper		Active	Token
reversed wire	Meter measure normally Record data	Tamper		Active	Reparation
current circuit shortly connected	Meter measure normally	Tamper		Active	Reparation
Bypass	Meter measure normally	Tamper		Active	Reparation
External magnetic field induction of 400mT (4000 Gauss)	Meter measure normally	Tamper		Active	Reparation

The pre-pay and post-pay mode can be switched by the host computer/system /token

3.6 Meter check

We can use two ways to check.

1. Through STS test command to check the data.

- Switch on/off

TOKEN: 0115 2921 5090 3605 4672 is used to test the relay. The relay operate two times (switch on and switch off) and back to the original status when the meter received the command. (If the meter with zero energy, the meter will show that the relay has on operation)

- Full screen

TOKEN: 0115 2921 5133 3104 2448 is used to display the full screen one time and then back to the original status.

- Display the total active energy

TOKEN: 0115 2921 5219 2095 2465 is used to display the total consuming energy and back to the original status.

- KRN/KT

TOKEN: 0115 2921 5391 0083 8034 is used to display the KRN value and back to the original status.

- TI

TOKEN: 0115 2921 5734 6054 3637 will display the TI value.

- Software Version

TOKEN: 0115 2923 7037 6432 2536 will display the Software Version.

- EA Number

TOKEN: 0115 2956 6891 1315 4192 will display the EA Number.

- KCN

TOKEN: 0115 2991 8734 8524 9680 will display the KCN

- SGC

TOKEN: 0115 3062 2422 2942 8368 will display the SGC.

- KEN

TOKEN: 0115 3202 9797 1778 8816 will display the KEN.

TOKEN: 0115 3484 4546 9451 4832 will display the Meter ID

- Test all above function.

TOKEN: 0230 5843 0050 5295 1967 will test the whole above test one time and back to the original status.

2. Through input the short code refer to 4.2.

3.7 Over power alarm

The meter will come into over-power status when the power is larger than the value that we set. The meter will show “OUE_LOAD”. The over power symbol will lose only when the power less than the set value. Using keypad input 09+enter key to show the present power, input 07+enter key to show the over power value.
The meter also has the following function.

- When the meter is over power for 3 seconds, the meter will show over power status.
- The over power status is last more than 45 seconds; the meter will switch off and switch on 300 seconds later.
- If the meter switches off more than 5 times in 30 minutes because of over power, the meter will switch off for 120 minutes before switch on again.

3.8 Low credit alarm

1） Credit≥30kWh,Green
2） 20≤Credit＜30,Red
3） 10≤Credit＜20,Red blinking
4） 0＜Credit＜10, Red blinking and Buzzer
5） Credit=0,Disconnect

Set parameters that related to the lower energy value:

- 123xxx: Set time to make the buzzer ring again. After setting, put any key to close the buzzer, then the buzzer will ring again automatically after xxx minutes.
- 456xx: Set the lower energy value. After setting, the meter will alarm when the remaining energy is lower than xx.
- 567xx: Set how long the buzzer will ring. After the meter ringing xx minutes, the buzzer will ring XX minutes. (the same as we set)

The operator can use STS command to clear the remaining energy. The meter will display “Accept” when the meter accepts the command. Then the energy will be 0 and the relay will be switch off.

3.10 Change the Key

The customer can change the key through the STS command which complies with IEC 62055-41.
Refer to the following column to check whether the different level key can change each other.

Child key	Permitted usage			
	Parent key			
	$DITK_0$	$DDTK_1$	$DUTK_2$	$DCTK_3$
$DITK_0$	Yes	No	No	No
$DDTK_1$	Yes	Yes	Yes	Yes[a]
$DUTK_2$	Yes	Yes	Yes	Yes[a]
$DCTK_3$	Yes[a]	Yes[a]	No	Yes[a]

4. Input operation guide

4.1 Input 20 digits standard STS command

Input the 20 digits STS command from left to right. LCD will show the last 7 digits and the digits that have been input will show on the right corner. After input the 20 digits command please put ↵, then the meter will carry out the related command.

4.2 Short code

Using short code to show the command, for example, when we input short code “01” then ↵, the meter will show the full screen, following is the short code meaning.

Code	Description
00	Remain Credit
01	Relay test
02	Test LCD
03	Total Energy

05	TI
07	Maximum power threshold
08	Tamper Status: 8- Terminal Cover open when power on 7- Terminal Cover open when power off 6- reverse 5- L Current short 4- imbalance 3- N Current short 2-cover open 1- Magnetic
11~22	Total Energy consumption of last 12 months
23	Alarm time
24	Repeat alarm time (no longer alarm after pressing the button)
28	Apparent power
29~31	Apparent power A B C
32	Power factor
33~35	Power factor A B C
36	Current power overdraft
38	number of Tokens
39	Number of technical tokens
40	Total active power
41~43	Voltage A B C
44~46	Current A B C
47~49	Active power A B C
50~59	Recharge token of last ten times
60~69	Technical tokens of the last ten times
70~79	Recharge Energy of last ten times
80	EA
81	KEN
82	KCN
83	Number of magnetic field
84	Number of load imbalance
85	Number of current reversal
86	Number of overload
87	Number of power failures
88	Number of terminal cover open
89	Number of cover open
90	Number of tamper
91	The version number
92	The meter ID

94	SGC
96	Low power alarm threshold
97	Available time of remaining Energy
98	The current time
99	The current date
100~112	Current demand and last 12 months demand
120~129	The last 10 imbalanced recording time
130~139	The last 10 reverse records time
140~149	The last 10 magnetic field records time
150~159	The last 10 opening cover time
160~169	The last 10 opening terminal cover time
170~179	The last 10 overload records time
180~189	The last 10 power failures records time
190~199	The last 10 tamper time
200~249	The last 50 recharge time
250~299	The last 50 recharge tokens
300~349	The last 50 recharge energy
431~442	Total Energy of last 12 months
529	Overdraft credit
530	Warn currency
533	Current time zone
534	Current periods
536	Payment model
537	Switch between prepaid and postpaid models
801~812	Total Energy of last 12 months