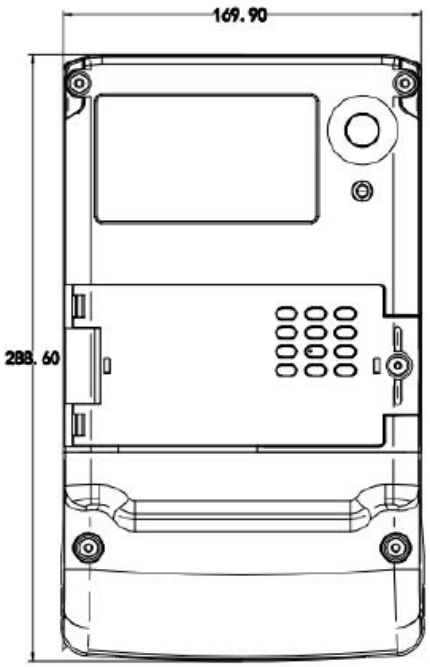
# VC3000

**BSOM01-CIP**

## THREE PHASE STS KEYPAD PREPAYMENT METER

**User Manual**



# 1. Product Introduction

## 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 power 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 power, the meter will alarm when the remaining power 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 (30.00kWh，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 the set value.
- LED pulse light output.
- Pulse output energy
- 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):3* 230/400V
Rated Current: 5(100) A
Pulse: 1000imp/kWh
Frequency: 50Hz
Staring current: ≤0.004Ib

Weight: 1.7kg

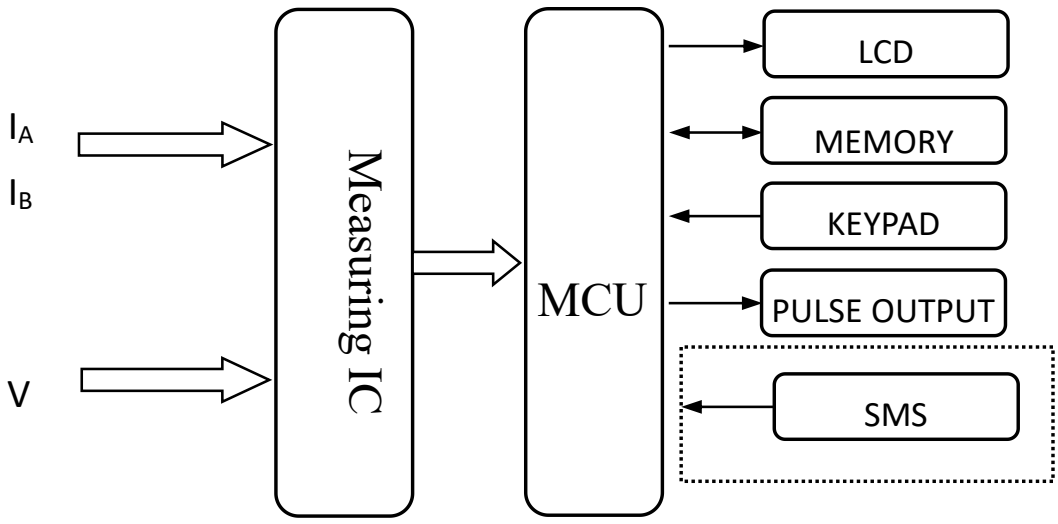
**Electric parameter**

| | |
|---|---|
| Normal working voltage | 0.55Un～1.15Un |
| Limited working voltage | 0.45Un～1.25Un |
| Voltage circuit energy consumption | ≤ 1.2W and 5VA |
| Current circuit energy consumption | ＜1VA |

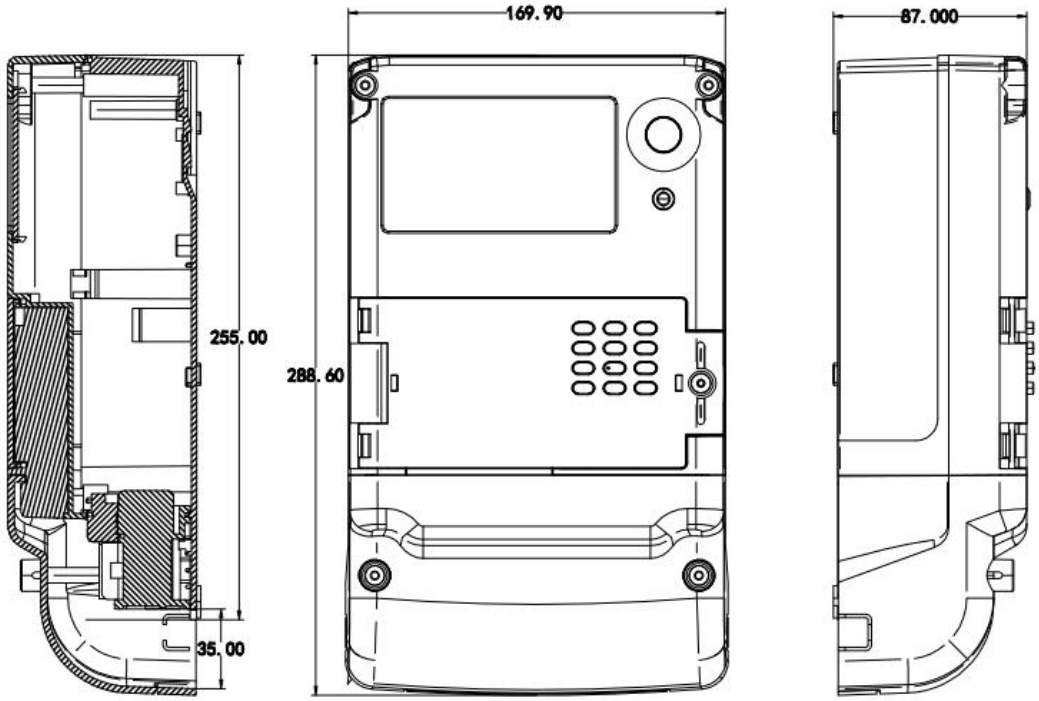
**Climate condition**

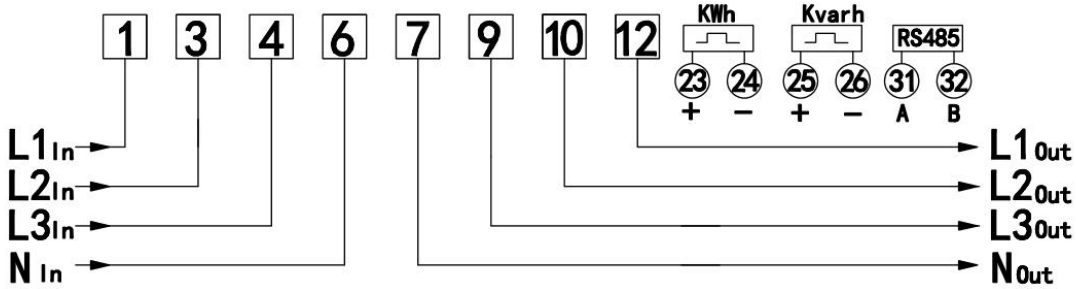
| | |
|---|---|
| Normal working temperature | -20℃～+55℃ |
| Limited working temperature | -30℃～+55℃ |
| Store and transportation temperature | -40℃～+70℃ |
| Store and working humidity | ≤ 85% |

## 1.3. Working Principle



## 1.4. Outline and installation




## 1.5. Communication interface

1、 Near infrared:
Default baud rate: 4800bps
Data bits: 7+1 (mode C)）or 8+1 （mode E）
Parity: Even parity
Protocol： IEC62056-21 mode C and mode E，DLMS/COSEM

2、 RS485:
Default baud rate: 9600bps
Data bits: 8+1
Parity: Even parity
Protocol：DLMS/COSEM and DLT645-2007

3、 PLC/4G/GPRS:Support module replacement

Default baud rate:9600bps

Data bits： 8+1

Parity: Even parity

Protocol： DLMS/COSEM and DLT645-2007

4、 Display unit (optional): using PLC/wireless (optional)

5、 SCSSCAAA9 Physical data Communication：

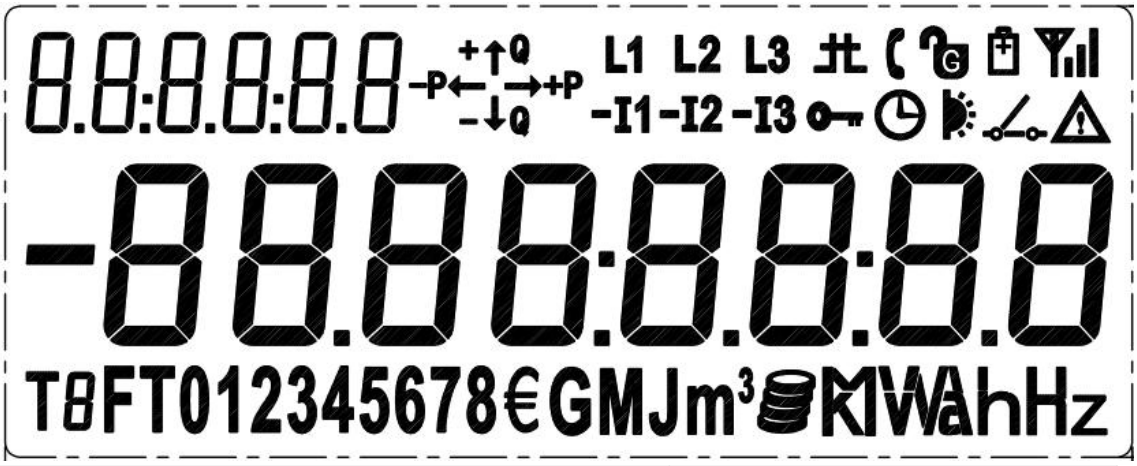
Default baud rate： 4800bps

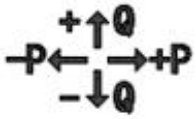
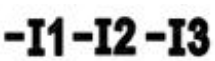
Data bits： 7+1（mode C）or 8+1 （mode E）

Parity: Even parity

Protocol： IEC62056-21 mode C and mode E， DLMS/COSEM

## 2. LCD display




| Symbol | Content |
|---|---|
|  | Numerical display area |
|  | Display item code indication |
|  | Quadrant indication |
|  | Three-phase voltage indication |
|  | External battery is discharged |
|  | Infrared communication indication |
|  | Reserve |
|  | Battery symbol, flashes when battery is low |
|  | The level of the remaining energy |
|  | Three-phase current indication, Current symbol, with "-" sign when reversed |
|  | Flashes when programming is opened |

| | |
|---|---|
|  | The LCD currently displays the date and time and is always on |
|  | Reserve |
|  | Relay status |
|  | Clock error |
|  | T1、2、3、4 The present tariff |
|  | Current Tamper status:<br>0.Exist uncleared power tamper<br>1.Magnetic<br>2.Cover open<br>3.Reserve<br>4.Unbalanced<br>5.Over voltage<br>6.Reverse<br>7.Opening cover<br>8.Low voltage |
|  | Display: Prepaid<br>Not Display: postpaid |
|  | Display: Prepaid<br>Not Display: postpaid |
|  | Display: amount mode<br>Not Display: power mode |
|  | Unit indication |
|  | unit |

| 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 | TAMPER | Tampering |
| 8 | EMPTY | No tamper |
| 9 | V-Err | Over Voltage or low Voltage |
| 10 | 1ST KCT | The first Token to change the key |
| 11 | 2nd KCT | The second Token to change the key |
| 12 | 3 rd KCT | The third Token to change the key |
| 13 | NULL | Null |

## 2.1. Automatic display

When there is no input to the meter, the meter will display Remaining energy in prepaid mode, and it will display follow items in postpaid mode.

| | |
|---|---|
| 15.8.0 | Current total active energy |
| 15.8.1 | Current active energy of tariff 1 |
| 15.8.2 | Current active energy of tariff 2 |
| 15.8.3 | Current active energy of tariff 3 |
| 15.8.4 | Current active energy of tariff 3 |
| 0.9.1 | Current time |
| 0.9.2 | Current date |
| 32.7.0 | Voltage |
| 31.7.0 | Phase current |
| 51.7.0 | Neutral current |
| 21.7.0 | Phase power |
| 41.7.0 | Neutral power |
| 14.7.0 | Frequency |
| 33.7.0 | Phase power factor |
| 53.7.0 | Neutral power factor |
| 1.6.0 | Current maximum demand |
| 1.6.0 | Current maximum demand occurrence date |
| 1.6.0 | Current maximum demand occurrence Time |

## 2.2. Short code display（Prepaid）

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 5.2.

| | |
|---|---|
| 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 |
| 09 | Show present active power |

### 2.3. Key display

When press key, it will display follow items

| | |
|---|---|
| 15.8.0 | Current total active energy |
| 15.8.1 | Current active energy of tariff 1 |
| 15.8.2 | Current active energy of tariff 2 |
| 15.8.3 | Current active energy of tariff 3 |
| 15.8.4 | Current active energy of tariff 3 |
| 0.9.1 | Current time |
| 0.9.2 | Current date |
| 32.7.0 | Voltage |
| 31.7.0 | Phase current |
| 51.7.0 | Neutral current |
| 21.7.0 | Phase power |
| 41.7.0 | Neutral power |
| 14.7.0 | Frequency |
| 33.7.0 | Phase power factor |
| 53.7.0 | Neutral power factor |
| 1.6.0 | Current maximum demand |
| 1.6.0 | Current maximum demand occurrence date |
| 1.6.0 | Current maximum demand occurrence Time |

# 3. Function

## 3.1 Commissioning Token

1158_4869_9058_0086_3778

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

- Measure the current total active , forward, reverse electric energy and 4-tariff electric energy
- Measure the current total reactive forward, reverse electric energy and 4-tariff electric energy
- Measure the current apparent total electric energy and 4-tariff electric energy
- Record the total power consumption data in the last 12 months
- Record the total active power consumption data in the last 12 months
- Record daily frozen power data for the last 31 days
- Record hourly frozen power data for 24 hours
- In prepaid mode: the meter will automatically deduct fees, and the reverse metering data will also be deducted. When the remaining amount is 0, the meter will automatically turn off. In the overdraft state, there will be a negative charge, which will be deducted the next time of recharge.
- Overdraft function: The factory default is 0. If necessary, please set the limit on the host computer; when the credit is 0, the relay is disconnected and press any key on the keyboard to activate the overdraft limit.

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.

## 3.3 Charge energy

1) 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”.

2) 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 energy (the remaining energy plus the charge energy) less that the limited value.

3) 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”.

4) 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”

## 3.4 Anti-tamper alarm

Anti-tamper:

1) 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.

2) 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.

3) 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<br>Record data | tamper |  | Active | Token |
| open upper cover and terminal cover when meter power off | Relay open<br>Record data | Tamper |  | - | Token |
| reversed wire | Meter measure normally<br>Record data | Tamper | F6 | Active | Reparation |
| Magnetic | Meter measure normally<br>Record data | Tamper | F1 | Active | Reparation |
| Unbalance | Meter measure normally<br>Record data | Tamper | F4 | Active | Reparation |
| Overload | Relay open<br>Record data | Tamper | Overload | Active | Reparation |
| OverVoltage | Relay open<br>Record data | Tamper | V-Err | Active | Reparation |

| | | | | | |
|---|---|---|---|---|---|
| UnderVoltage | Relay open<br>Record data | Tamper | V-Err | Active | Reparation |

## 3.5 Demand

1) The electric meter measures the current active , reactive, apparent maximum demand and the corresponding 4-tariff maximum demand
2) Record the maximum demand for the last 12 mouths
3) Record the daily frozen maximum demand data on the 31st
4) The demand measurement mode can set the interval and slip mode, and the default is slip mode.
5) The demand cycle and slip time can be set. The default is a demand cycle of 15 minutes and a slip time of 1 minute.

## 3.6 Meter parameter measurement

Measure voltage, current, active power, reactive power, apparent power, power factor, grid frequency and other parameters.

## 3.7 Event records

1） Record the time of last 50 power outage
2） Record the last 50 meter clearing
3） Record the time of last 50 opening the terminal cover
4） Record the time of last 50 event clearing
5） Record the time of last 50 demand clearing
6） Record the time of last 50 opening the upper cover
7） Record the time of last 50 magnetic field
8） Record the time of last 50 load imbalance
9） Record the last 50 recharge power TOKEN
10） Record the last 50 recharge power
11） Record the time of last 50 overload
12） Record the last 50 technical Token
13） Record the time of last 50 reverse
14） Record the time of last 50 tamper
15） Record the time of last 10 battery failure
16） Record the last 50 time setting
17） Record the last 50 recharge amounts Token
18） Record the last 50 recharge amounts
19） Record the time of last 50 recharge amounts
20） Record the time of last 50 recharge electricity
21） Record the time of last 10 over voltage
22） Record the time of last 10 low voltage

23）Record the time of last 50 switch off
24） Record the time of last 50 switch on
25）Record the time of last 10 overload threshold setting
26）Record the time of last 10 relay errors
27）Record the last 10 prepaid mode switch

### 3.8 Load curve

Default load curve time: 15 minutes, recording channels include:
1） Time
2） Total active forward electric energy
3） Active forward tariff 1 electric energy
4） Active forward tariff 2 electric energy
5） Active forward tariff 3 electric energy
6） Active forward tariff 4 electric energy
7） Total active reverse electric energy
8） Active reverse tariff 1 electric energy
9） Active reverse tariff 2 electric energy
10） Active reverse tariff 3 electric energy
11） Active reverse tariff 4 electric energy

### 3.9 Upgrade function

Supports local upgrade, and the meter firmware can be upgraded through the host computer software.

### 3.10 Switching between prepaid and postpaid modes

Prepaid and postpaid modes can be switched through the host computer/system/token.

## 4. Meter check

We can use two ways to check.

1) Through STS test command to check the data.

- Test 1: Switch on/off
  TOKEN: 0115 2921 5090 3605 4672
  It 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)

- Test2 : Full screen
  TOKEN: 0115 2921 5133 3104 2448
  It is used to display the full screen one time and then back to the original status.

- Test3: Display the total active energy
  TOKEN: 0115 2921 5219 2095 2465
  It is used to display the total consuming energy and back to the original status.

- Test4: KRN/KT
  TOKEN: 0115 2921 5391 0083 8034
  It is used to display the KRN value and back to the original status.

- Test5: TI
  TOKEN: 0115 2921 5734 6054 3637
  It will display the TI value.

- Test6: Tamper status
  TOKEN: 0115 2922 0544 9688 0824
  It will display the tamper status.

- Test7: Power Consumption
  TOKEN: 0115 2922 6042 5269 4700
  It will display the power value.

- Test8: Software Version
  TOKEN: 0115 2923 7037 6432 2536

- Test9: Display EA Number
  TOKEN: 0115 2956 6891 1315 4192

- Test10: Display No. of KCT Supported
  TOKEN: 0115 2991 8734 8524 9680

- Test11: Display SGC
  TOKEN: 0115 3062 2422 2942 8368

- Test12: Display KEN
  TOKEN: 0115 3202 9797 1778 8816

- Test13: Display KRN
  TOKEN: 0115 3484 4546 9451 4832

- Test all

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

2) Through input the short code refer to 4.6.

## 4.1 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 41 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.

## 4.2 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)

## 4.3 Clear the energy

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.

## 4.4 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] |

## 4.5 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.

## 4.6 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 |
| 04 | KRN KT |
| 05 | TI |
| 07 | Maximum power threshold |
| 08 | Tamper Status:<br>1. Magnetic<br>2. Cover open<br>3. Reserve<br>4. Imbalance<br>5. Reserve<br>6. reverse |

| | |
|---|---|
| | 7. Terminal Cover open when power off<br>8. Terminal Cover open when power on |
| 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 |
| 529 | Overdraft credit |
| 37 | Number of recharge Tokens |
| 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<br>Single phase meter:<br>A represents the current current,<br>BC represents phase and neutral current |
| 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 reverse |
| 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 SV |
| 92 | The meter ID |
| 93 | Constant of meter |
| 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 time |
| 130~139 | The last 10 reverse time |
| 140~149 | The last 10 magnetic field time |
| 150~159 | The last 10 opening cover time |
| 160~169 | The last 10 opening terminal cover time |
| 170~179 | The last 10 overload time |
| 180~189 | The last 10 power failures 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 |
| 350~399 | The last 50 technical tokens |
| 431~442 | Total Energy of last 12 months |
| 537 | Switch between prepaid and postpaid models |