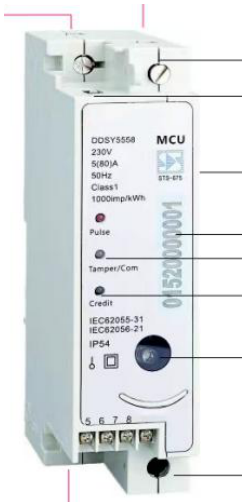
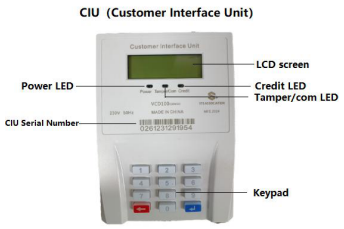
VC1100

DINM22-CIP SINGLE PHASE PREPAID ENERGY METER

Technical Manual

METER & CUSTOMER INTERFACE UNIT





Technical content retained from the supplied VC1100 manufacturer 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
- Dual channel metering
- Overdraft function
- 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: 0.5kg

Electric parameter

Normal working voltage	0.7Un～1.2Un
Limited working voltage	0.7Un～1.2Un

Voltage circuit energy consumption	≤ 1.2W and 5VA
Current circuit energy consumption	＜1VA

Climate condition

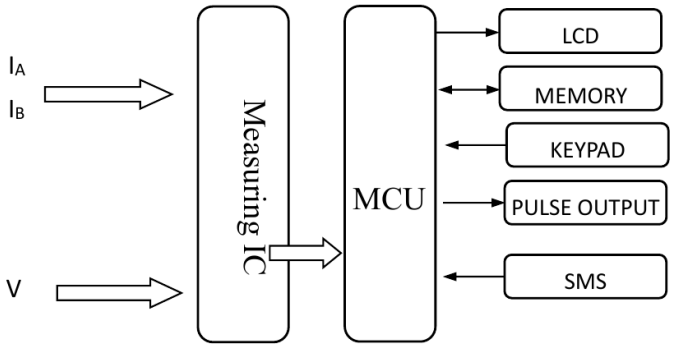
Normal working temperature	-20℃～+50℃
Limited working temperature	-30℃～+60℃
Store and transportation temperature	-40℃～+70℃
Store and working humidity	≤ 85%

1.3. Communication Port

1) Near infrared
Default baud rate：4800bps
Data bis：7+1（mode C）
Parity: Even parity
Protocol： IEC62056-21 mode C

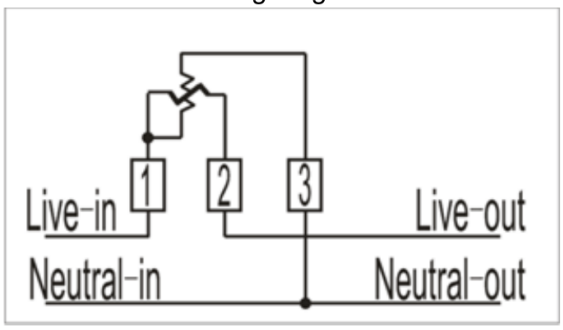
2) RS485:
Default baud rate:：9600bps
Data bis：8+1
Parity: Even parity
Protocol： IEC62056-21 mode C

1.4. Working Principle

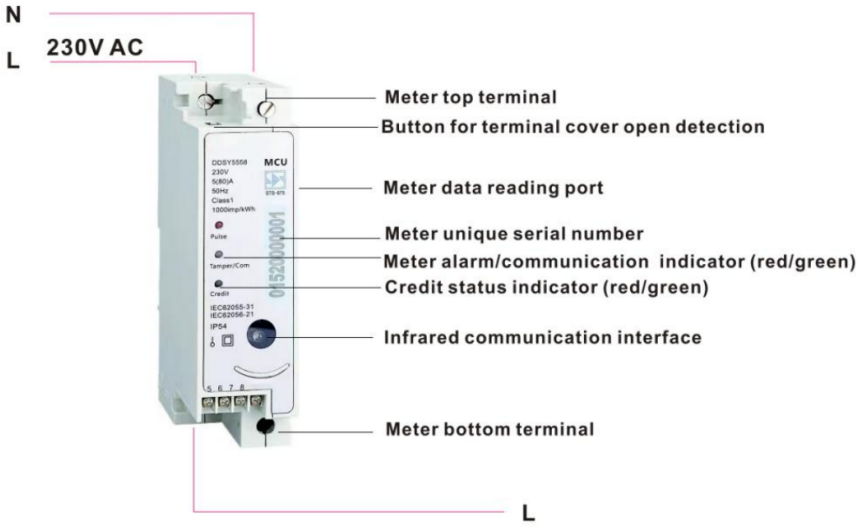


1.5. Meter Description

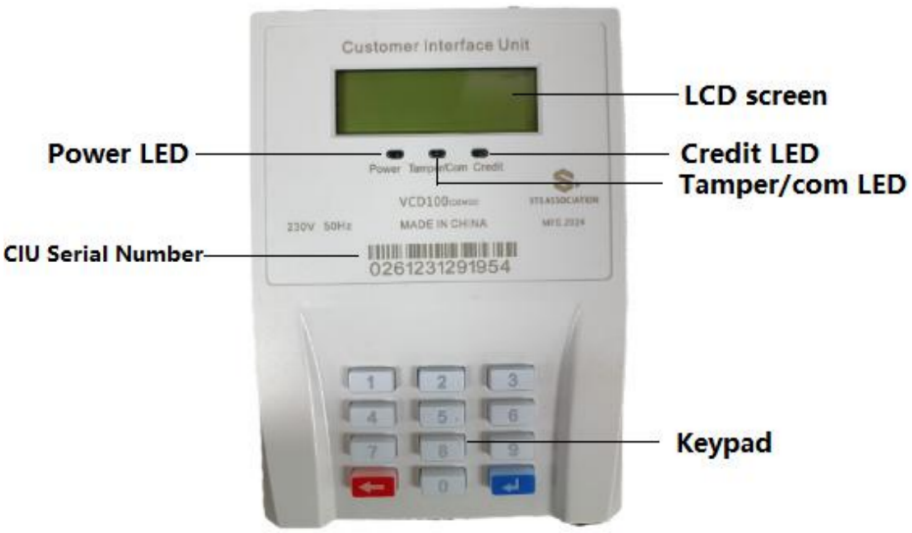
Wiring diagram



MCU (Measurement and Control Unit)



CIU (Customer Interface Unit)



1.6. How to pair CIU with meter:

Step 1: Keep the CIU Energized;

Step 2: Input by keypad: " 12032--- meter number---↵ " ; After successful configuration, the meter number will be displayed in two separate digital display;

Step 3 : Then, CIU will automatically communicate with meter(the indicator light is on). When communicating, ⚠ will flicker, but will be off after communication success. If ⚠ remains on, it means communication fails.

Step 4: Input by keypad: "92---↵" , check if the input meter number is right. If something wrong with the number, please repeat the above Step 2.

2. Function

2.1. 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.

2.2. Energy Measure

1) Bidirectional active energy measurement, reverse energy accumulated to positive energy. Pulse led and pulse terminal output.
2) 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.

a) Measure the current total active power, forward, reverse electric energy and 4-tariff electric energy
b) Measure the current total reactive power, forward, reverse electric energy and 4-tariff electric energy
c) Measure the current apparent total, forward, reverse electric energy and 4-tariff electric energy
d) Record the total power data of the previous 12 months
e) Record the total active power consumption data in the last 12 months
f) Record the daily frozen power data of the last 31 days
g) Record the hourly frozen power data for the last 24 hours
h) 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 you recharge.
i) Overdraft function: The factory default is 0. If necessary, please set the limit on the host computer; when the power is 0, the relay is disconnected. Press any key on the CIU to communicate with the meter to activate the overdraft limit. When the overdraft limit is exhausted, the relay disconnect.

2.3. Charge energy

1) The operator can use the STS encryption techniques and key to input 20digits

cryptograph to recharge deposit Energy to remaining energy.

2) If the recharge energy amount plus remaining energy more than limited value (999,999.99kWh), then the recharge energy will be refused, 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.

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

2.4. 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（optional）		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		-	Token
reversed wire	Meter measure normally Record data	-		Active	Reparation

External magnetic field induction of 400mT (4000 Gauss)	Meter measure normally	Tamper	M	Active	-

3. Meter check

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.

3.1. Over power alarm

The meter will come into over-power status when the power is larger than the value that we set.

1) When the meter is over power for 3 seconds, the meter will in over power status.
2) The over power status is last more than 45 seconds; the meter will switch off and switch on 300 seconds later.
3) 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.

3.2. Low credit alarm

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

3.3. Change the Key

1) The customer can change the key through the STS command which complies with IEC 62055-41.
2) 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]

3.4. Switching between prepaid and postpaid modes

1) Factory default: prepaid mode;

2) Switch the mode through the IEC host computer software: The default value of Prepaid mode is "00", which means prepaid, and "01" which means postpaid; you can also switch the mode through the system/Token code;

3) Postpaid mode:

a) In the closed state: the Credit light is used as the power indicator light and is always green;

b) When executing the switch-on command: the Tamper light is used as a relay status indicator light, and the red light is always on when the switch is switched on;

4) Prepaid mode:

a) Under normal conditions, refer to 3.2 for the battery indicator light;

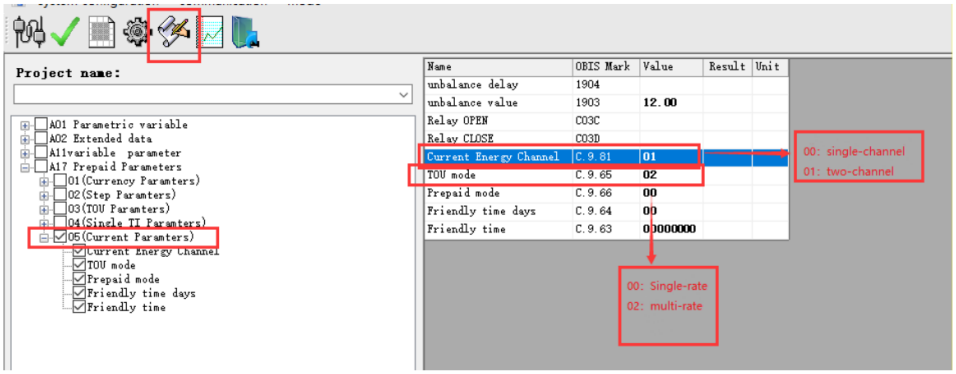
b) When a magnetic field occurs or the cover is opened, the red light of the power theft light is always on and the relay is disconnected.

3.5. Single tariff and multi-tariff mode switching, dual channel function switching

1) Factory default: first channel;

2）Set the second channel through the IEC host computer software, as shown in the figure below: Current Enerhy Channel, the default is "00", indicating the first channel, set to "01", which is the second channel, the demand and power of the two channels All are individually

measured and stored;



3) The maximum demand freeze in the last 12 months, the electric energy data freeze in the last 12 months, the 31-day frozen electric energy data, and the 24-hour electric energy frozen data all have dual-channel functions, which can be frozen separately and measured separately. When the first channel is frozen, the data of the second channel is frozen at the same time, and the data is 0. When the second channel is used, the data of the first channel is frozen at the same time, and the data is 0. If both channels have data generated, they are measured separately.

4. 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	DISPLAY
00	Remain Credit
01	Test relay
02	Test LCD
03	Total Eenergy
04	KRN KT
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
09	Battery voltage
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	Phase A Apparent power
30	Phase B Apparent power
31	Phase C Apparent power
32	Power factor
33	Phase A Power factor
34	Phase B Power factor
35	Phase C Power factor
36	Negative Energy
38	number of Tokens
39	number of Technical tokens
40	Active power
41	Phase A Voltage
42	Phase B Voltage
43	Phase C Voltage
44	current
45	L current
46	N current
47	Phase A Active power
48	Phase B Active power
49	Phase C Active power
50~59	Recharge token of last 10 times
60~69	Technical tokens of the last 10 times
70~79	Recharge Energy of last 10 times
80	EA (default is 07)
81	KEN (default 255)
82	KCN (default 3),The new version is 3, the old version is 2
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
93	Constant of meter
94	SGC
95	Total Recharge Energy
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 cover records time
170~179	The last 10 overload records time
180~189	The last 10 power failures records time
190~199	The last 10 electricity theft records 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