
**STS Three Phase Keypad
Prepayment Energy Meter**

USER MANUAL

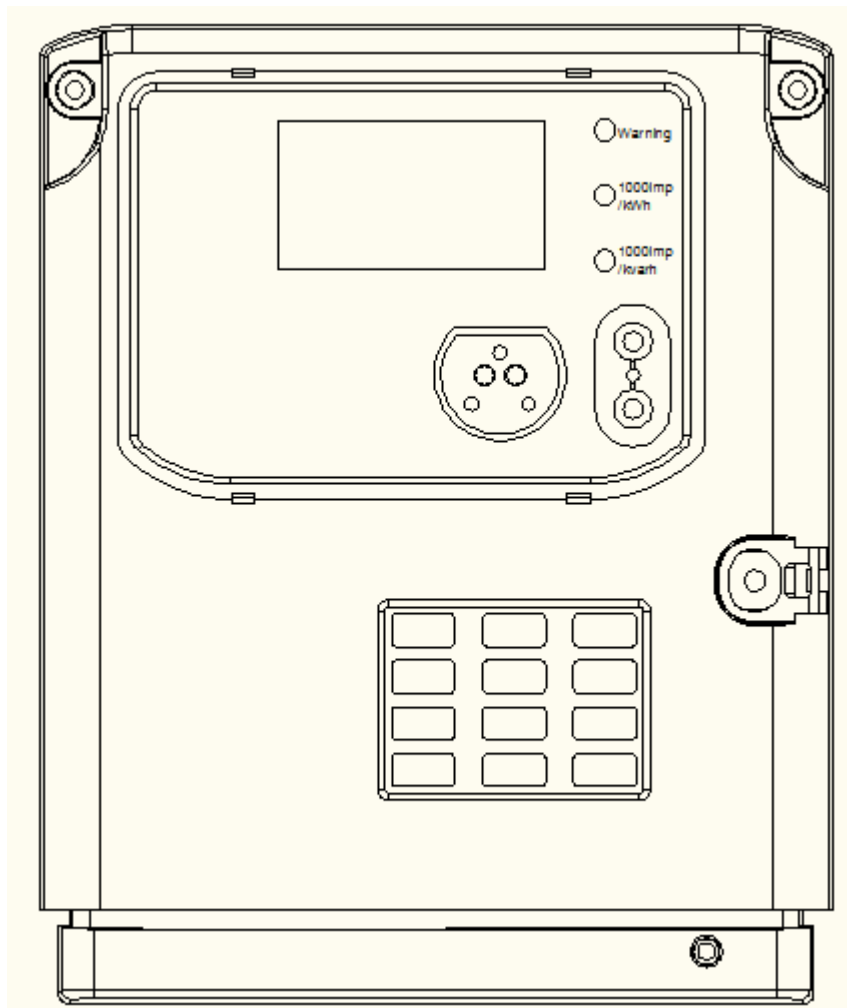
V1.0

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1 Brief Introduction

STS three phase keypad prepayment energy meter DTSY666-N is new type of prepayment meter. The meter has photoelectric communication port, according with the standard IEC62056-21. It can accurately measure total active energy consumption, remaining electricity quantity, voltage and so on. It is very easy to operate the meter, user will get a series of 20 bits code TOKEN after purchasing electricity from electricity selling department, then recharge successfully by correctly input 20-digit TOEKN code with the buttons on the meter. What's more, the meter can detect electricity theft, reverse connection, meter cover opening, terminal cover opening and etc.



2 Overview

2.1 Measurement Function Descriptions

The keypad meter can accurately measure active power, total active energy consumption = forward active energy consumption+ backward active energy consumption, measuring range is 000000.00-999999.99 kWh, display format is 6 digits integral and 2 digits decimals.

2.2 Measure Function

The meter can measure forward active energy consumption, backward active energy consumption, voltage, current, instantaneous power.

2.3 Data Storage


The meter has 64K NV EEPROM, can record total energy consumption, remaining electricity quantity, events and recharge.


2.4 LCD Display

2.4.1 Full Screen Display



Signs Descriptions:

 Balance Indication: Each bar represents 1/5 energy consumption of balance alarm value. If balance is more than balance alarm value, it will display 5 bars.

 Direction Indication: When live line and zero line are reversely connected, the meter will

detect the reversed current and shows this sign.



Theft of Electricity Indication: This sign shows during occurrence of zero line deficiency, magnetic testing, bypass and other theft of electricity.

kWhz Unit Display: energy consumption unit KWh, current unit A, voltage unit V, power unit and so on



Disconnection of Relay.

8888 Short code and TOKEN input count.



This displays meter data during keypad query, data, energy consumption, TOKEN processing information and so on.

2.4.2 Backlight

Power on or button press, it lights up and then put out after 30 seconds.

2.4.3 Screen Display

The screen can display remaining electricity quantity.

2.4.4 Short Code

Code	Description	Code	Description
00	Test all LCD display	61	Last 3 rd Credit KWH
01	Test the load switch	62	Last 4 th Credit KWH
02	Display Test – Test the buzzer as well	63	Last 5 th Credit KWH
03	Total kWh Register	64	Total Technical Token Accepted
04	Display Key Version Number & Type	65	Last Technical Token Accepted
05	Display Tariff Index	66	Last 2 nd Technical Token Accepted
06	Test the token reader device	67	Last 3 rd Technical Token Accepted
07	Display Power Limit	68	Total overload trip
08	Display Tamper Status	69	Amounts of power outage
09	Display Active Power	70	Total terminal cover open

10	Display software version	71	Total meter cover open
11	-	72	Total Electricity Theft
12	-	73	-
13	-	74	Hardware Version
14-36	RESERVED BY STS	75	Meter ID
37	Balance Credit (kWh)	76	Forecast time till the credit is over
38	Total Electricity Consumption (kWh)	77	Supply Group Code (SGC)
39	Power Factor(PF)	78	Duration of Alarm
40	Apparent Power (VA)	79	Low limit credit alarm
41	Instantaneous Voltage (V)	80	-
42	-	81	Forecast time till the credit is over
43	-	82	Last tampering
44	Live Rms Current (C)	83	Energy Consumption last month
45	Neutral. Current(C)	84	Energy Consumption last 2 nd month
46	-	85	Energy Consumption last 3 rd month
47	Instantaneous Power (W)	86	Over load trip last time (day and time)
48	-	87	Over load trip last 2 nd time
49	-	88	Last meter off (day and time)
50	-	89	Last 2 nd meter off
51	-	90	Last terminal meter open
52	-	91	Last 2 nd terminal meter open
53	Total The Number of Token Accepted	92	Last cover meter open
54	Last Credit Token Accepted	93	Maximum power this month
55	Last 2 nd Credit Token Accepted	94	Time at maximum power this month
56	Last 3 rd Credit Token Accepted	95	Current Time
57	Last 4 th Credit Token Accepted	96	Current Date
58	Last 5 th Credit Token Accepted	97	-
59	Last Credit KWH	98	-
60	Last 2 nd Credit KWH	99	Software Check+ Feature

There is no TRC in the meter, then no information between 80 and 98 , showing nihil.

2.5 Communication Function

The meter has photoelectric communication port, according with the standard IEC62056-21. User can read and set parameters of the meter through the PC software.

Reading Content: Reading mode (total energy consumption, remaining electricity quantity, voltage, live line current, zero line current, meter ID), events record, recharge record (token, recharging electric quantity)

Programmable items: meter ID, SGC, Overdraft, maximum recharge limit balance alarm value, etc

Executive Operation: Start and open cover testing function

2.6 LED indication

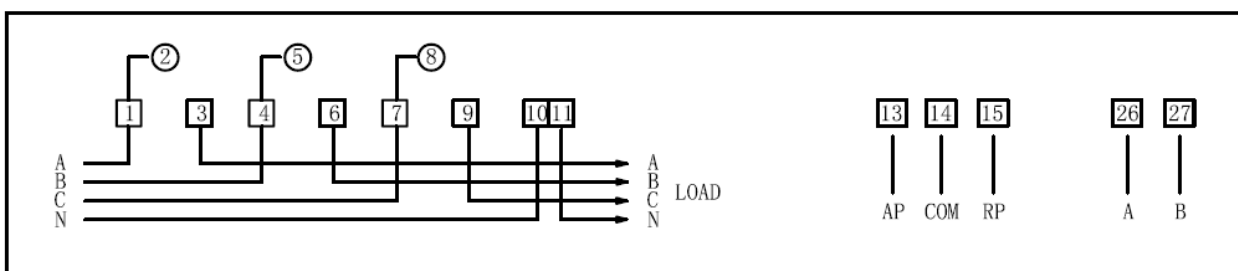
Impulse light: red impulse light, it will flash when the meter is working.

Alarming light: yellow alarming light, it will flash when the meter detects meter cover opening, terminal cover opening, reverse, bypass, zero line deficiency, magnetic testing and other theft of electricity, and the LCD will shows corresponding sign of electricity theft and PERIKSA.

Balance Indication Light: the indication light shows green when the remaining electricity is more than alarming value; the indication light shows red flash when the remaining electricity is less than alarming value, and there will be alarm from buzzer. Any button on the keypad can close the buzzer alarm. The buzzer will not open automatically within the set time, but it will alarm again if without recharge during this period.

Balance alarm value and buzzer closing time can be set up by keyboard and short code query. Input 456XX, set balance alarm value as XXkwh; input 123 XXX, set closing time for buzzer as XXXmin. Minimum balance alarm value is 5kwh, if the set value is less than 5kwh, the meter will automatically amend it to 5kwh.

2.7 Connection diagram



2.8 Overload


Overload parameter is the real-time power of the meter and the maximum power limit. When current power is more than the maximum power limit, buzzer will alarm and LCD shows DyLEBIH.

The following occurrences are overload, meter will disconnect relay, record overload event:

1. Real-time power is more than the maximum power limit and lasting 45s.
2. Within 30min, overload time lasts no more than 45s, but the total time is more than 45s.

The relay will be automatically closed after 150s disconnection and restart overload detection. If there are more than five overloads within 30min, the meter will automatically disconnect relay and close after 45min. If the cumulative time is less than 45s within 30min, then start timing again. The meter will resume overload procession if power failure and then power on.

2.9 Anti-theft

When the meter detects electricity theft, LCD will show PERIKSA and electricity theft sign and the meter will handle it accordingly. When LCD shows PERIKSA or  sign, the meter can't accept any type of token before solving the problem, including recharge and clearing event code.

2.9.1 Reverse

When live line and zero line are reversely connected, the meter will detect the reverse current, consider it as electricity theft and show electricity theft sign, and at the same time, the meter will take the absolute value of negative electricity value and then calculate the power consumption.

2.9.2 Bypass and Zero Line Deficiency

The meter measures power value of live line and zero line at the same time. When difference value between the two is more than a certain percentage value (this value can be set by upper computer, the default value is 4, that's 6.25% ($1/2^4$)), there is bypass event occurring, then the larger power value will be measured as power consumption, to prevent users from bypass electricity theft.

2.9.3 Magnetic Testing

When the meter detect more than 400mT magnetic field, LCD shows status of electricity theft and record.

2.9.4 Meter Cover Opening and Terminal Cover Testing

Under the circumstance of power on, if the meter detect meter cover opening and terminal over opening, it will immediately disconnect relay and record electricity theft event, cut off power supply to prevent electricity theft, and LCD shows electricity theft sign.

Under the circumstance of power failure, if the meter detect meter cover opening and terminal over opening, it will record electricity theft event and immediately disconnect relay when power on next time to prevent electricity theft

2.10 Event Record

The meter can detect and record overvoltage, undervoltage, reverse, meter cover opening, terminal cover opening, magnetic detection, bypass, reset, power failure, programming, overload and other events, and handle them accordingly. Threshold values for overvoltage and undervoltage and delay time for event detection (same time for entry and exit) can be set by PC software.

The first type event: overvoltage, undervoltage, reverse, and bypass. Record total occurrence times of event.

overvoltage, undervoltage, reverse, and bypass: 3-minute delay for entry and exit.

overvoltage : entry and exit voltage threshold value $110\%U_n$.

undervoltage : entry and exit voltage threshold value $90\%U_n$.

The second type event: meter cover opening, terminal cover opening, magnetic testing. Record total occurrence times of event.

meter cover opening, terminal cover opening, magnetic testing: entry and exit default 1s.

The third type event: programming. Record total occurrence times of event.

The fourth type event: relay operation. Record total occurrence times of event.

The fifth type event: overload. Record total occurrence times of event.

The sixth type event: power failure and reset. Record total occurrence times of event.

Special record: Recharge: Record total occurrence times of event. The latest 50 times of recharge amount and recharge TOKEN.

2.11 Prepaid Function

2.11.1 Recharge

User will get a series of 20 bits code TOKEN after purchasing electricity from electricity selling department of Electricity Bureau. This TOKEN is generated after encryption by STS, composed by recharge quantity, date, and secret key. User can recharge successfully by correctly input 20-digit TOEKN code with the buttons on the meter.

2.11.2 Management

General Management Code: this function is mainly provided by STS, used to test meter performance and query meter parameters. This kind of management TOKEN is not encrypted by STS, and any prepaid energy meter following STS protocol can be operated. Main functions are as following: relay test, LCD test, displaying the remaining electricity quantity, displaying version number of secret key, displaying rate index, displaying maximum power, showing energy meter status, show total electricity and meter version number.

Special Management Code: this kind of management TOKEN is not encrypted by STS, including time and corresponding management information, can only operate on the meter that share the same secret key. Main functions are as following: setting maximum power, removing remaining electricity quantity, modifying secret key, removing event status.

If token is refused by the meter, and it displays GAGAL and corresponding identification number:

GAGAL – 1. TOKEN parse error

GAGAL – 2. recharge overrun

GAGAL – 3. TOKEN type error

GAGAL – 4. TOKEN old

GAGAL – 5. TOKEN is refused when it's in status of electricity theft

GAGAL – 6. It's unsuccessful during testing photoelectric communication port

GAGAL –7. It cannot be recharged during the circumstance of meter cover opening and terminal cover opening

2.12 Meter Failure

When there is a failure in meter, such as data storage error, the meter will automatically prompt error and immediately disconnect relay, and LCD displays ERR---

3 Performance specification

GENERAL DESCRIPTION		PARAMETERS
Work Place		Outdoor Meter
Wire		Three Phase Four Wire
Connection way		Direct Connection
Rated voltage Un		3×240/415V
Rated current In		5A
Max current I _{max}		100A
Frequency FN		50Hz
Pulse Constant C		1000imp/kWh
Environment	Specified operating range	-10°C ~ +45°C (Indoor)
	Ultimate operating range	-25°C ~ +55°C (Indoor)
	Storage temperature	-25°C ~ +85°C