

Translated English of Chinese Standard: GB/T15284-2022

www.ChineseStandard.net → Buy True-PDF → Auto-delivery.

Sales@ChineseStandard.net

GB

NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA

ICS 17.220.20

CCS N 22

GB/T 15284-2022

Replacing GB/T 15284-2002

Multi-rate electricity meters - Particular requirements

多费率电能表 特殊要求

Issued on: April 15, 2022

Implemented on: November 01, 2022

Issued by: State Administration for Market Regulation;

Standardization Administration of the People's Republic of China.

Table of Contents

Foreword.....	3
1 Scope	6
2 Normative references.....	6
3 Terms and definitions.....	7
4 Classification	9
4.1 According to the way of access to the circuit and the type of electricity measured	9
4.2 According to the level of accuracy of measuring electricity	9
4.3 According to where the rate plan is set	10
4.4 According to with or without the function of bidirectional measurement of electricity	10
5 Standard power value	10
5.1 Voltage	10
5.2 Current	10
5.3 Frequency	10
5.4 Power consumption	10
6 Technical requirements	11
6.1 Functional requirements	11
6.2 Mechanical and structural requirements	12
6.3 Climatic conditions	14
6.4 External effect.....	14
6.5 Metrological performance protection requirements	14
6.6 Electrical requirements	14
6.7 Metrological performance requirements.....	16
7 Test methods.....	18
7.1 Function inspection.....	18
7.2 Mechanical and structural tests.....	18
7.3 Climate impact test	19
7.4 External effect test	19
7.5 Metrological performance protection test.....	19
7.6 Electrical test	19
7.7 Metrological performance test.....	21
8 Inspection rules	21
9 Meter identification and documentation.....	22
10 Packaging and storage.....	22
Annex A (normative) Test items for multi-rate electricity meters	23

Multi-rate electricity meters - Particular requirements

1 Scope

This Standard specifies the terms and definitions, technical requirements, test methods, inspection rules, identification and documentation, packaging and storage for multi-rate electricity meters hereinafter referred to as "the meters".

This Standard applies to newly manufactured meters for measuring and controlling electricity in a 50Hz or 60Hz grid with a voltage not exceeding 600V. This Standard is only applicable to the meters whose time switch is digital display and use battery or capacitor as working reserve.

This Standard does not apply to meters whose time switch is an analog dial, nor does it apply to electromechanical meters.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 2423.5-2019, *Environmental testing - Part 2: Test methods - Test Ea and guidance: Shock*

GB/T 2423.43-2008, *Environmental testing for electric and electronic products - Part 2: Test methods - Mounting of specimens for vibration, impact and similar dynamic tests*

GB/T 2423.56-2018, *Environmental testing - Part 2: Test methods - Test Fh: Vibration, broadband random and guidance*

GB/T 2900.77-2008, *Electrotechnical terminology - Electrical and electronic measurements and measuring instruments - Part 1: General terms relating to measurements*

GB/T 13384-2008, *General specifications for packing of mechanical and electrical product*

GB/T 16935.1-2008, *Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests*

GB/T 17215.211-2021, *Electricity metering equipment (AC) - General requirements,*

tests and test conditions - Part 11: Metering equipment

GB/T 17215.321-2021, *Electricity metering equipment (AC) - Particular requirements - Part 21: Static meters for active electricity (classes A, B, C, D and E)*

GB/T 17215.323-2008, *Electricity metering equipment (a.c.) - Particular requirements - Part 23: Static meters for reactive electricity (classes 2 and 3)*

GB/T 17215.324-2017, *Electricity metering equipment (a.c.) - Particular requirements - Part 24: Static meters for reactive electricity at fundamental frequency (classes 0.5S, 1S and 1)*

JJF 1245.2-2019, *Program of Pattern Evaluation of Fixed AC Electricity Meters - Software Requirements*

DL/T 1490-2015, *Functional specification for smart electricity meters*

IEC 62052-31:2015, *Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 31: Product safety requirements and tests*

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 17215.211-2021, GB/T 2900.77-2008, DL/T 1490-2015 as well as the followings apply.

3.1 multi-rate electricity meter

A meter that has one or more electricity registers and the rate plan is set in the local meter or on the remote billing system side.

NOTE: The rate plan is set in the meter or in the remote billing system. It works on time or consumption baselines, or via external control signals.

[Source: GB/T 17215.211-2021, 3.1.7, with modifications]

3.2 static multi-rate electricity meter

A meter that the measurement unit produces an output proportional to the electricity by applying current and voltage to a solid-state (electronic) device, and its rate electricity metering function is realized by electronic circuit or remote billing system.

3.3 local static multi-rate electricity meter

A meter that the rate plan is set in the meter, the meter records the electricity data of each rate according to the rate plan and stores it in the corresponding register.

3.3 local static multi-rate electricity meter

- According to the accuracy of reactive electricity: 0.5S, 1S, 1, 2 and 3.

4.3 According to where the rate plan is set

According to where the rate plan is set, it is divided into:

- Local static multi-rate electricity meter;
- Remote static multi-rate electricity meter.

4.4 According to with or without the function of bidirectional measurement of electricity

According to with or without the function of bidirectional measurement of electricity, it is divided into:

- Bidirectional multi-rate electricity meter;
- One-way multi-rate electricity meter.

5 Standard power value

5.1 Voltage

The nominal voltage and voltage range shall comply with the provisions of 4.1 in GB/T 17215.211-2021.

5.2 Current

For active meters, the current shall comply with the provisions of 4.2 in GB/T 17215.321-2021. For reactive meters, the current shall comply with the provisions of Chapter 4 in GB/T 17215.323-2008 and Chapter 4 in GB/T 17215.324-2017.

5.3 Frequency

It shall comply with the provisions of 4.3 in GB/T 17215.211-2021.

5.4 Power consumption

It shall comply with the provisions of 4.4 in GB/T 17215.211-2021.

6 Technical requirements

6.1 Functional requirements

6.1.1 Basic functions

Unless otherwise specified, under normal operating conditions, the design of the meter shall meet the following requirements:

- The clock has calendar, timing, leap year automatic conversion function;
- It has the function of time being calibrated;
- The date and time are set with security measures to prevent operations by unauthorized persons;
- If the power outage time misses the freezing time, it has a supplementary freezing mechanism when the power is turned on;
- It supports the setting of rates and time intervals for holidays and special days;
- It records the date of the last 10 programming and the total number of programming;
- It records the tiered electricity for different electricity price tiers.

6.1.2 Local meter functions

Unless otherwise specified, under normal operating conditions, local meters shall be designed to meet the following requirements:

- At least 14 time intervals can be set arbitrarily within 24h (minimum interval is 5min). Time interval can be set across zero;
- At least 4 rate registers are supported. Each register records power data at a specified time corresponding to different rates;
- Store at least the last two months or the last two billing cycles of total electricity and electricity data of each rate. It can be read out through the data communication interface. The data storage boundary time is the end of the month or other (1st to 28th) designated days;
- Record the total electricity and the number of times each rate register is cleared and the data before clearing;
- It can process the rate parameter form or other electricity price contract parameters remotely issued by the master station. Locally realize rate management and electricity price contract update.

6.2.4 Seal regulations

It shall comply with the provisions of 5.4 in GB/T 17215.211-2021.

6.2.5 Display of measured values

It shall comply with the provisions of 5.5 in GB/T 17215.211-2021.

For local meters, the indicating display shall show the current effective rate. The measured value indication of each rate register shall be read locally, and each rate register clearly identified.

For remote meters, the indicating display shall support the display of electricity data recorded at predetermined time intervals.

6.2.6 Storage of measured values

It shall comply with the provisions of 5.6 in GB/T 17215.211-2021.

6.2.7 Output

It shall comply with the provisions of 5.7.1, 5.7.2.1, 5.7.2.2, 5.7.3.1 in GB/T 17215.211-2021.

6.2.8 Electrical pulse input

It shall comply with the provisions of 5.8.1 in GB/T 17215.211-2021.

6.2.9 Work indicator

It shall comply with the provisions of 5.9 in GB/T 17215.211-2021.

6.2.10 Protection against mechanical hazards

The meter shall not present a mechanical hazard under normal operating conditions. The protection test against mechanical hazards shall be carried out according to 7.2 of IEC 62052-31:2015.

6.2.11 Measures to protect the connection

The requirements for the protective earth terminal shall comply with the provisions of 6.5.2.3 in IEC 62052-31:2015. The protective connection impedance requirements of permanently connected equipment shall comply with the provisions in 6.5.2.4 of IEC 62052-31:2015.

NOTE: Class I protective equipment requires a protective earth terminal.

6.2.12 Flame spread prevention

It shall comply with the provisions of 9.3.2.1 in IEC 62052-31:2015.

6.2.13 Instrument temperature limits and heat resistance

6.2.13.1 Surface temperature limits to prevent burns

When the ambient temperature is 40°C, the temperature of the easy-to-contact surface of the meter shall not exceed the value given in 1) in Table 31 of IEC 62052-31:2015 under normal conditions.

When the ambient temperature exceeds 40°C, the temperature of the easy-to-contact surface of the meter is allowed to exceed the value given in 1) in Table 31 of IEC 62052-31:2015. However, the excess value is not greater than the difference between the ambient temperature and 40°C.

The surface of the terminal box covered by the terminal cover, or the surface of the board-mounted instrument protected by the fence, is not regarded as an accessible surface.

6.2.13.2 Temperature limits for terminals

When the ambient temperature is 40°C, the temperature of the terminal shall not exceed the value given in Table 32 of IEC 62052-31:2015 under normal conditions.

When the ambient temperature exceeds 40°C, the temperature of the terminal is allowed to exceed the value given in Table 32 of IEC 62052-31:2015. However, the excess value is not greater than the difference between the ambient temperature and 40°C.

6.3 Climatic conditions

It shall comply with the provisions of 8.1, 8.2 and 8.3 in Chapter 8 of GB/T 17215.211-2021.

6.4 External effect

It shall comply with the provisions of 9.1, 9.2, 9.3.1 and 9.4.1 in Chapter 9 of GB/T 17215.211-2021.

6.5 Metrological performance protection requirements

It shall comply with the provisions of Chapter 10 of GB/T 17215.211-2021.

6.6 Electrical requirements

6.6.1 Clearance and creepage distances

meter shall not exhibit flashover, destructive discharge or breakdown. After the test, the meter shall be free from mechanical damage and work correctly.

NOTE: U_{nom} is the nominal voltage between line and neutral.

6.6.3 Dielectric strength

6.6.3.1 Pulse voltage

Apply the pulse voltage specified in 6.10.2.3 of IEC 62052-31:2015. The meter shall not exhibit flashover, destructive discharge or breakdown. After the test, the meter shall be free from mechanical damage and work correctly.

6.6.3.2 AC power frequency voltage

Apply the AC power frequency voltage specified in 6.10.2.5 of IEC 62052-31:2015. The meter shall not exhibit flashover, destructive discharge or breakdown. After the test, the meter shall be free from mechanical damage and work correctly.

6.6.4 Voltage interruption effects

6.6.4.1 Effect of voltage interruption on the meter

6.6.4.1.1 Voltage interruption effects of local meters

During the period when the power supply voltage interruption does not exceed the working reserve, when the power supply is restored, the meter shall correctly store the data (if any) at the end of the month or the specified day.

6.6.4.1.2 Voltage interruption effects of remote meters

During the period when the power supply voltage interruption does not exceed the working reserve, when the power supply is restored, the meter shall be able to refreeze the data of the next freezing point at the time of power-off and the data of the previous freezing point at the time of power-on.

6.6.4.2 Effect of voltage interruption on clock

During the period when the power supply voltage interruption does not exceed the working reserve, the meter clock shall maintain the specified accuracy when power is restored. When power is restored to the meter, the meter's clock and calendar shall not be confused.

6.7 Metrological performance requirements

6.7.1 Meter constants

The relationship between the test output and the indicated value of the indicating

display shall conform to the constant value of the meter.

6.7.2 No-load condition (creeping)

Current circuit opens. Voltage circuit applies $1.1U_{\text{nom}}$ voltage. Within the specified test time limit, the test output of the meter shall not generate more than one pulse.

6.7.3 Startup

The meter shall startup at the startup current of I_{st} (polyphase meter with balanced load) specified in relevant standards such as GB/T 17215.321-2021, GB/T 17215.323-2008, GB/T 17215.324-2017 and when the power factor (or $\sin\phi$) is 1. Continuously record electricity.

6.7.4 Basic maximum allowable error (initial inherent error)

It shall comply with the provisions of 7.6 in GB/T 17215.321-2021, 8.1 in GB/T 17215.323-2008 and 8.2 in GB/T 17215.324-2017.

6.7.5 Repeatability

The same measured signal under the same measurement conditions shall produce nearly consistent continuous measurement results.

6.7.6 Variation requirements

The absolute value of the maximum error change between adjacent test results shall comply with the provisions of GB/T 17215.321-2021 for the meters of various accuracy levels.

6.7.7 Load current rise and fall

The basic error of the meter is tested twice in the order of load current from small to large, and then from large to small. The absolute value of the error change of the same sample at the same load point shall comply with the provisions of GB/T 17215.321-2021.

6.7.8 Error consistency

The deviation between the test error of the meter under test and the average value of the error at the same test point shall comply with the provisions of GB/T 17215.321-2021 for the meters of various accuracy levels.

6.7.9 Electricity indication error

Only a single rate register (other than the total register) is valid for a local meter at any time. The sum of the recorded values in each multi-rate register shall equal the recorded value of the total register. It is not appropriate to calculate the recorded value of the total register by arithmetically adding the recorded value of each rate register. If the

The surface temperature limit of the meter to prevent burns and the temperature limit test of the meter terminals shall be carried out in accordance with the provisions of 10.4 in IEC 62052-31:2015.

7.2.2 Output test

The functional test of the optical test output shall be carried out in accordance with the provisions of 5.7.2.3 in GB/T 17215.211-2021. The functional test of electric pulse output shall be carried out in accordance with the provisions of 5.7.4.2 in GB/T 17215.211-2021.

7.2.3 Electrical pulse input test

The functional test of electric pulse input shall be carried out in accordance with the provisions of 5.8.2 in GB/T 17215.211-2021.

7.3 Climate impact test

It shall be carried out in accordance with the provisions of Chapter 8 of GB/T 17215.211-2021.

7.4 External effect test

It shall be carried out in accordance with the provisions of Chapter 9 of GB/T 17215.211-2021.

7.5 Metrological performance protection test

Check the identification and documentation of meter legal related software. Adopt document analysis and software feature function test device. Carry out in accordance with the provisions of Chapter 9 of JJF 1245.2-2019.

7.6 Electrical test

7.6.1 Power consumption test

The power consumption shall be under the reference conditions given in 7.1 of GB/T 17215.211-2021. The reference voltage and reference current shall be applied to the voltage loop and the electricity meter. Turn the meter backlight off. Measure active and apparent power consumption of voltage lines. Apply reference voltage and reference current to the current loop and electricity meter. Turn the meter backlight off. Measure the apparent power consumption of each current line.

7.6.2 Measurement of clearance and creepage distances

It shall be carried out in accordance with the provisions of 6.2 in GB/T 16935.1-2008.

7.6.3 Electrical test procedures

The electrical test procedures related to safety shall be carried out in accordance with the provisions of 11.2 in GB/T 17215.321-2021.

7.6.4 Withstand long-term overvoltage test

Carry out in accordance with the provisions of 6.10.3.2 in IEC 62052-31:2015.

7.6.5 Dielectric strength test

7.6.5.1 Humidity pretreatment

It shall be carried out in accordance with 6.10.4.2 of IEC 62052-31:2015.

7.6.5.2 Test method and test equipment preparation

The dielectric strength test shall be carried out in accordance with the provisions of 6.10.4.3.1 in IEC 62052-31:2015. The test equipment preparation shall meet the requirements of 6.10.4.3.2 in IEC 62052-31:2015.

7.6.5.3 Impulse voltage test

It shall be carried out in accordance with the provisions of 6.10.4.3.3 in IEC 62052-31:2015. The test voltage meets the requirements of Table 7 in IEC 62052-31:2015.

7.6.5.4 AC power frequency voltage test

It shall be carried out in accordance with the provisions of 6.10.4.3.4 in IEC 62052-31:2015. The test voltage meets the requirements of Table 11 in IEC 62052-31:2015.

7.6.6 Voltage interruption effect test

7.6.6.1 Effect test of voltage interruption on meter

7.6.6.1.1 Voltage interruption effects of local meters

The test is carried out under the following conditions:

- Nominal voltage;
- The clock and calendar of the meter are set at 23:50 at the end of the month (or the day before the specified day);
- After reading the current value and stored value of the meter, interrupt the supply voltage;
- After 30min, restore the power supply. Immediately read the current value and

This is an excerpt of the PDF (Some pages are marked off intentionally)

Full-copy PDF can be purchased from 1 of 2 websites:

1. <https://www.ChineseStandard.us>

- SEARCH the standard ID, such as GB 4943.1-2022.
- Select your country (currency), for example: USA (USD); Germany (Euro).
- Full-copy of PDF (text-editable, true-PDF) can be downloaded in 9 seconds.
- Tax invoice can be downloaded in 9 seconds.
- Receiving emails in 9 seconds (with download links).

2. <https://www.ChineseStandard.net>

- SEARCH the standard ID, such as GB 4943.1-2022.
- Add to cart. Only accept USD (other currencies - <https://www.ChineseStandard.us>).
- Full-copy of PDF (text-editable, true-PDF) can be downloaded in 9 seconds.
- Receiving emails in 9 seconds (with PDFs attached, invoice and download links).

Translated by: Field Test Asia Pte. Ltd. (Incorporated & taxed in Singapore. Tax ID: 201302277C)

About Us (Goodwill, Policies, Fair Trading...): <https://www.chinesestandard.net/AboutUs.aspx>

Contact: Wayne Zheng, Sales@ChineseStandard.net

Linkin: <https://www.linkedin.com/in/waynezhengwenrui/>

----- The End -----