

Translated English of Chinese Standard: CJ/T188-2004

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

Sales@ChineseStandard.net

CJ

URBAN-RURAL CONSTRUCTION INDUSTRY STANDARD
OF THE PEOPLE'S REPUBLIC OF CHINA

CJ/T 188-2004

Technical requirements of utility meters data transmission

户用计量仪表数据传输技术条件

Abolished

Issued on: February 12, 2004

Implemented on: June 01, 2004

Issued by: Ministry of Construction of PRC

Table of Contents

Foreword.....	3
1 Scope	4
2 Normative references.....	4
3 Terminology	5
4 Basic requirements for data transmission	6
5 Physical layer.....	7
6 Data-link layer	7
7 Data security.....	11
8 Application layer	12
Appendix A (Normative) The composition and requirements of the automatic reading system.....	22
Appendix B (Informative) M-BUS interface	25
Appendix C (Informative) RS-485 standard serial electrical interface	27
Appendix D (Informative) Wireless transceiver interface	28
Appendix E (Informative) Photoelectric transceiver interface.....	29

Technical requirements of utility meters data transmission

1 Scope

This standard specifies the requirements for the basic principles, interface form, physical performance, data link, data identification, data security, data expression format of data transmission of household metering instruments (hereinafter referred to as meters), including water meters, gas meters, heat meters.

This standard is applicable to the automatic meter reading system for data exchange, between the master station and the slave station, one master and one slave, OR one master and multiple slaves.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For the dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard; however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 778.1-1996 Measurement of water flow in closed conduits - Meters for cold potable water - Part 1: Specifications

GB 4706.1 Safety of household and similar electrical appliances - Part 1: General requirements

GB/T 6968-1997 Diaphragm gas meters

GB/T 17626.2 Electromagnetic compatibility - Testing and measurement techniques - Electrostatic discharge immunity test

GB/T 17626.3 Electromagnetic compatibility - Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test

GB/T 15277 Information processing - Modes of operation for a 64-bit block cipher algorithm

GB/T 17901.1 Information technology - Security techniques. Key management - Part 1: Framework

CJ 128-2000 Heat meters

CJ/T 133-2000 IC card cold water meter

DL/T 698 Data acquisition and management system for electrical energy

3 Terminology

3.1

Automatic meter reading system

The system, by which the data of multiple household meters is read centrally by the master station, through the transmission medium, referred to as the automatic meter reading (AMR). The system is mainly composed of slave stations, physical channels, master stations, etc.

3.2

Master station

A device that selects one, a group or all of the slave stations AND initiates an information exchange with the slave stations. It can be a handheld device, computer or other data terminal.

3.3

Slave station

A device, that has a unique identification address in the entire network, receives information from the master station, exchanges information with the master station. In this standard, it refers to household instruments.

3.4

Bus

A physical connection method of the system, that connects the master station AND communicates with multiple slave stations in parallel.

3.5

Physical layer

It specifies the physical interface between the master station and the slave station, as well as the physical and electrical characteristics of the interface. It is responsible for the reception and transmission of information, on the physical medium.

3.6

Data-link layer

It specifies the composition of the information exchange frame, between the master station and the slave station, the flow control of the information exchange, the network protocol layer of error control, which is based on the physical layer.

3.7

Hand-held device

Portable device that can exchange data with data terminal device or household meters.

4 Basic requirements for data transmission

4.1 General requirements

4.1.1 The automatic reading system shall have the ability to identify different types of household instruments and two-way communication, in the same transmission medium.

4.1.2 The instruments, that constitute the slave station of the automatic reading system, shall have a communication interface. The interface shall meet the requirements of the relevant clauses of this standard.

4.1.3 The instruments, that constitute the slave station of the automatic reading system, shall use a built-in battery. The normal service life of the battery shall be not less than 5 years, for the heat meter, OR not less than 6 years for the water meter and the gas meter.

4.1.4 The household instrument shall have the output parameters of battery voltage status and valve status (only for instruments, which have valve control function).

4.1.5 See Appendix A for the composition and requirements of the automatic reading system.

4.2 Requirements for water meters

4.2.1 The accuracy of the water meter shall comply with the provisions of Chapter 5 of GB/T 778.1-1996.

4.2.2 The output parameters of the water meter shall include the real-time time, the accumulated volume on the settlement date, the accumulated volume on the current date.

4.2.3 The unit displayed by the water meter shall comply with the provisions of Clause 4.2.1.2 of GB/T 778.1-1996.

A.2.1.2 It shall be able to set initial parameters, such as time, key, etc.; there shall be measures to prevent unauthorized personnel from operating.

A.2.1.3 It shall be able to realize system timing.

A.2.1.4 It shall be able to protect the recorded data, when the power is off; the data shall not be lost after the power is restored.

A.2.1.5 It shall reserve the corresponding interface for uploading data.

A.2.2 The slave station only specifies functions, which are related to meter reading; for other requirements, refer to relevant standards.

A.2.2.1 After receiving the reading information from the master station, it shall be able to send the data, according to the transmission protocol, which is set in this standard.

A.2.2.2 It shall be able to receive the initial parameters, which are made by the master station, such as the setting of time, key, etc.

A.2.2.3 It shall be able to output status parameters, such as battery status and other parameters.

A.3 Technical requirements

A.3.1 The reliability of data transmission shall meet the following requirements.

- 1) One-time reading success rate: Calculate the one-time reading success rate, under the test conditions, according to the following formula:

$$\text{One-time reading success rate} = \frac{\text{The number of one-time successful readings}}{\text{Total number of successful readings}} \times 100\%$$

- 2) Under the test conditions, the index of one-time reading success rate is in accordance with the provisions of Table A.1:
- 3) The reading of all data shall be accurate.

A.3.2 Electrical parameters shall meet the following requirements.

- 1) The electrical parameters of water meters and gas meters shall meet the requirements in Table 2 of CJ/T 133-2000.
- 2) The electrical parameters of the heat meter shall meet the requirements of Clause

5.3.7 of CJ 128-2000.

A.3.3 The safety performance shall meet the following requirements.

- 1) The electrical safety requirements for water meters, gas meters, heat meters shall comply with the provisions of GB 4706.1.
- 2) For the lightning resistance performance of the communication interface, it shall, after subjected to 4000 V, 10/700 μ s surge impact, be free from damage, after 5 positive and negative tests.

A.3.4 Electromagnetic compatibility shall meet the following requirements.

- 1) The radio frequency electromagnetic field's radiation immunity shall be in accordance with the provisions of GB/T 17626.3.
- 2) Electrostatic discharge immunity is in accordance with the provisions of GB/T 17626.2.

A.4 Test method

A.4.1 The test method of data transmission reliability shall be implemented, according to the relevant clauses, which are specified in the standard DL/T 698.

A.4.2 The electrical parameter test of water meter and gas meter shall be carried out, according to the relevant clauses, which are specified in the standard CJ/T 133.

A.4.3 The electrical safety performance test shall be carried out, in accordance with the relevant clauses, which are specified in the standard GB 4706.1.

For the anti-shock performance, it shall, under the conditions required by the item 2 of A.3.3 of this specification, carry out 5 positive and negative tests.

A.4.4 The radio frequency electromagnetic field's radiation immunity test shall be carried out, in accordance with the relevant clauses, which are specified in the standard GB/T 17626.3.

Electrostatic discharge immunity test is carried out, according to the relevant clauses, which are specified in the standard GB/T 17626.2.

Appendix B

(Informative)

M-BUS interface

B.1 The electrical interface shall meet the following requirements.

B.1.1 M-BUS shall be able to realize one master-slave or one-master-multiple-slave communication, in the system.

B.1.2 The driving capacity shall be such that when the slave stations are powered by the master station, each slave station obtains a current of not more than 2 mA. The driving capacity of the master station shall not be less than 64 slave stations.

B.1.3 The connection method of the line has nothing to do with the topology.

B.1.4 The connection method of the line shall be non-polar.

B.2 The communication method adopts half-duplex protocol.

B.3 The transmission baud rate is 300 bps ~ 9600 bps.

B.4 The data transmission status of the M-BUS interface.

B.4.1 The schematic diagram of data transmission, from the master station to the slave station, is as shown in Figure B.1.

B.4.1.1 Only one master station is allowed to be connected to the bus; the master station must supply power to the bus, when it is working.

B.4.1.2 The master station shall transmit bit information, by means of level change.

B.4.1.3 The level of the slave terminal shall meet the following requirements.

- 1) In case of marking (the logic level is "1"): The bus voltage shall be 10 V greater than bus voltage in case of marking; the bus voltage is less than or equal to 42 V.
- 2) In case of space (the logic level is "0"): The bus voltage shall be greater than 12 V.

B.4.2 The schematic diagram of data transmission, from the slave station to the master station, is as shown in Figure B.2.

B.4.2.1 The slave station shall transmit information, through the change of current magnitude.

Appendix C

(Informative)

RS-485 standard serial electrical interface

C.1 The RS-485 standard uses data transceiver of balanced transmission and differential reception, to drive the bus.

C.2 Level requirements

C.2.1 Electrostatic discharge resistance (ESD) ± 15 kV (human body model) at the driver and receiver end.

C.2.2 Common mode input voltage: $-7\text{ V} \sim +12\text{ V}$.

C.2.3 Differential mode input voltage: Greater than 0.2 V .

C.2.4 Drive output voltage: At the load impedance of $54\ \Omega$, the maximum is 5 V , the minimum is 1.5 V .

C.3 Other requirements

C.3.1 Three-state output mode.

C.3.2 Half-duplex communication method.

C.3.3 The driving capacity shall not be less than 32 similar interfaces.

C.3.4 Under the condition that the transmission rate is not more than 100 kbps, the effective transmission distance is not less than 1200 m.

C.3.5 The bus is passive AND is powered by the slave station or handheld device.

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 -----