

ICS 17.120.10

CCS N12



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 18659-2023

**Measurement of fluid flow in closed conduits - Guidance for the
use of electromagnetic flowmeters**

封闭管道中流体流量的测量 电磁流量计使用指南

Issued on: August 6, 2023

Implemented on: March 1, 2024

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

Table of Contents

1 Scope	1
2 Normative reference documents	1
3 Terms and Definitions 1 4 symbols	3
5 Theory and Basic Formulas	4
6 Structure and working principle	4
6.1 Overview	4
6.2 Sensor	5
6.3 Transmitter	6
6.4 Flow meter/transmitter output	8
7 Equipment Mark	8
7.1 Recommended information	8
8.1 Sensor	9
8.3 Operation Precautions	14
9.1 Calibration of flow meter (manufacturer's specification)	14
9.2 Verification of flow meter (on-site electronic verification)	14
21 Reference	24

Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1. Structure and Drafting Rules of Standardization Documents" Drafting. This document replaces GB/T 18660-2002 "Method of use of electromagnetic flowmeter for measuring conductive liquid flow in closed pipelines", GB/T 18659-2002 "Performance Evaluation Method of Electromagnetic Flowmeters for Measuring Conductive Liquid Flow in Closed Pipes", GB/T 20729- 2006 "Total length of flange-mounted electromagnetic flowmeter for measuring conductive liquid flow in closed pipelines". This document is based on GB/T 18660- It mainly contains the content of 2002 and integrates the content of GB/T 18659-2002 and GB/T 20729-2006. With GB/T 18660-2002 In comparison, in addition to structural adjustments and editorial changes, the main technical changes are as follows:

- Some symbols have been changed (see Chapter 4, Chapter 4 of GB/T 18660-2002);
- Changed the functions implemented by the transmitter (see 6.3.1,

6.3 of GB/T 18660-2002);

---Changed the output form of the flow meter/transmitter (see 6.4,

6.4 of GB/T 18660-2002);

---Added the installation conditions for sensors buried underground and sensors submerged in water (see 8.1.2.6, 8.1.2.7);

---Changed the recommended maximum cone angle for small-angle tapered pipes (see 8.1.5.4,

7.1.3.3 of GB/T 18660-2002);

---Deleted the power factor (see

7.1.4.2 of GB/T 18660-2002);

---Deleted the content about sensor cleaning and maintenance (see

7.1.5 of GB/T 18660-2002);

1 Scope

GB/T 18659-2023 gives guidance on using electromagnetic flowmeters in closed conduits. The magmeter has no moving parts and no obstruction and is the default choice for water, slurry and any conductive liquid, but it fails in ways that give a plausible reading rather than none: an incompletely filled pipe, a coating on the electrodes, stray currents from cathodic protection, or an installation too close to a bend. The standard explains the theory and basic equations, the construction and working principle of the sensor and transmitter and their outputs, the marking of the equipment, the installation and commissioning, and the in-service verification including on-site electronic verification, with informative annexes on the sensor construction materials, the practical differences between AC and DC excitation systems, and cathodic protection. It replaces GB/T 18659-2002 and GB/T 18660-2002 and took effect on 1 March 2024.

This document applies to industrial electromagnetic flowmeters that measure conductive liquid flow in closed full pipes. This document covers the adoption of AC (AC) and Electromagnetic flow meters with two excitation forms of pulsed direct current (DC) and electromagnetic flow meters powered by main power supply, battery power or other power sources Quantity meter. This document does not apply to insertion electromagnetic flowmeters, electromagnetic flowmeters used in open channels or partially filled pipes, nor to the measurement of ferromagnetic slurries. Or electromagnetic flowmeter for liquid metal. This document does not specify safety requirements for the use of electromagnetic flowmeters in hazardous environments.

2 Normative reference documents

This document has no normative references.

3 Terms and definitions

The following terms and definitions apply to this document. ISO and IEC maintain standardized terminology databases at.

3.1 Generate a magnetic field perpendicular to the flow direction, and use the induced voltage U_v generated by the conductive fluid flowing in the magnetic field to derive the flow rate of flow meter.

Note. The electromagnetic flowmeter consists of a sensor (3.2) and a transmitter (3.3).

3.2 sensor sensor Devices including at least the following units.

---A section of electrically insulated measuring tube through which the conductive liquid to be measured flows;

---A pair of electrodes that measure the signal generated by the flow of conductive liquid;

---An electromagnet that generates a magnetic field in the measuring tube (3.4). Note

1. The sensor produces a signal proportional to the flow rate and sometimes a reference signal (3.9), see 6.2. Note

2. The terms primary device or flow measuring tube have previously been used to refer to sensors. Note

3. In some cases, other electrodes are also used, such as ground electrodes and full pipe detection electrodes (empty pipe detection), see 3.5.

3.3 transmittertransmitter Contains circuitry to drive the excitation coil and extract the flow signal.