

Oscillation-type density meters —

Part 2: Process instruments for homogenous liquids

ICS 17.060

National foreword

This British Standard is the UK implemenation of EN ISO 15212-2:2002. It is identical with ISO15212-2:2002, incorporating corrigendum December 2008.

The start and finish of text introduced or altered by corrigendum is indicated in the text by tags. Text altered by ISO corrigendum December 2008 is indicated in the text by AC₁ AC₁.

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A list of organizations represented on this subcommittee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Dichtemessgeräte nach dem Schwingerprinzip - Teil 2: Prozessgeräte für homogene Flüssigkeiten (ISO 15212-2:2002)

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Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document (ISO 15212-2:2002) has been prepared by Technical Committee ISO/TC 48 "Laboratory glassware and related apparatus" in collaboration with Technical Committee CEN/TC 332 "Laboratory equipment", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2002, and conflicting national standards shall be withdrawn at the latest by September 2002.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 15212-2:2002 has been approved by CEN as a European Standard without any modifications.

NOTE Normative references to International Standards are listed in annex ZA (normative).

Contents

	Page
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Principle and functional units	2
4.1 Measuring principle	2
4.2 Functional units	2
5 Density sensor	4
5.1 Sensor material	4
5.2 Sensor design	4
6 Requirements and tests	4
6.1 General	4
6.2 Density measuring transducer	4
6.3 Liquid temperature measurement	6
6.4 Display and output of results	7
6.5 Auxiliary units and data transfer	7
6.6 Safety requirements	8
6.7 Electromagnetic compatibility	8
7 Preadjustment and adjustment	8
7.1 Preadjustment of process density meters	8
7.2 Preadjustment of density measuring transducers	8
7.3 Adjustment of installed density measuring transducers	8
7.4 Adjustment of processing units	8
8 Calibration	9
8.1 Laboratory calibration	9
8.2 In-situ calibration	11
9 Process density meter accuracy	13
9.1 Accuracy requirements	13
9.2 Laboratory conformity test	13
9.3 In-situ tests	14
9.4 Test procedure and conformity assessment	14
10 Installation	15
11 Operating manual	15
12 Marking	16

Introduction

Density values of pure water at different temperatures and information on how to calculate the density values at different pressures can be found in ISO 15212-1:1998, annex A.

Oscillation-type density meters —

Part 2:

Process instruments for homogeneous liquids

1 Scope

This part of ISO 15212 specifies metrological requirements, among others, for oscillation-type density meters as well as for functional units (see 4.2) of oscillation-type density meters, which are used in process for all kinds of homogeneous liquids. This includes liquified gases. Instructions and methods for installation, preadjustment, adjustment and calibration of process instruments are also given. The instruments are either integral systems or functional units, which can be combined into an integral measuring system.

This part of ISO 15212 does not describe the method of use of process density meters for particular applications or products, e.g. petroleum products or beverages. Such methods of use can be defined by relevant institutions such as ISO or responsible Government agencies.

This part of ISO 15212 does not define an instrument specification for any particular application. For this information reference should be made to the relevant standard covering the method of use.

This part of ISO 15212 is addressed to manufacturers of density meters and to bodies, testing and certifying the conformity of density meters. This part of ISO 15212 also gives recommendations for adjustment and calibration of process density meters.

Oscillation-type density meters used in laboratories are addressed in ISO 15212-1.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 15212. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 15212 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 15212-1:1998, *Oscillation-type density meters — Part 1: Laboratory instruments*

IEC 61010-1, *Safety requirements for electrical equipment for measurement, control and laboratory use — Part 1: General requirements*

AC1 IEC 61326-1, *Electrical equipment for measurement, control and laboratory use — EMC requirements — Part 1: General requirements*

ISO/IEC Guide 98-3, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)* AC1

3 Terms and definitions

For the purposes of this part of ISO 15212, the terms and definitions given in ISO 15212-1 and the following apply.

3.1

preadjustment

⟨process density meter⟩ adjustment performed in a laboratory environment before installation

NOTE Adjustment, see 3.1 of ISO 15212-1:1998.

3.2

laboratory calibration

⟨process density meter⟩ calibration for the intended entire working range of the instrument performed in a laboratory environment before installation

NOTE Calibration, see 3.2 of ISO 15212-1:1998.

3.3

***in-situ* calibration**

⟨process density meter⟩ calibration of the installed instrument for its actual working conditions in a process environment

4 Principle and functional units

4.1 Measuring principle

The sensors used in density meters are electrically or mechanically induced oscillating systems, whose oscillation frequencies or periods are a function of the liquid density. Depending on the sensor design, the liquid can either flow through the sensor or the sensor can be immersed in the liquid. Instrument constants of the adjusted density meter are used to calculate the sample density from the oscillation frequency or oscillation period and from associated measurements, e.g. temperature or pressure.

4.2 Functional units

Oscillation-type process density meters shall consist of the following functional units:

- a) a density sensor through which the liquid flows or which is immersed in the liquid;
- b) a device to determine the density sensor temperature;
- c) a device to condition and/or preamplify the density sensor signal;
- d) a device to condition and/or preamplify the temperature sensor signal;
- e) a unit for signal processing, output of results and functional monitoring.

Optional functional units of process density meters may be:

- f) a temperature transducer to measure the liquid temperature (see item 6 in Figure 1);
- g) a pressure transducer to measure the liquid pressure (see item 7 in Figure 1).

The functional units a) to d) are often referred to as density measuring transducer (see item 8 in Figure 1). The unit e) can be referred to as processing or indicating unit (see item 5 in Figure 1) and may accept additional signals or process parameters, e.g. from a flow meter.

The functional units, items 5 and 8 in Figure 1, can be integrated into a single instrument or can be separate units.