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MAHU TEISENDUS

Gas meters - Conversion devices - Part 1: Volume  
conversion

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

|                                                                                                                     |                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
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| Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas                                                   | This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation. |
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EUROPEAN STANDARD

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English Version

## Gas meters - Conversion devices - Part 1: Volume conversion

Compteurs de gaz - Dispositifs de conversion - Partie 1:  
Conversion de volume

Gaszähler - Umwerter - Teil 1: Volumenumwertung

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COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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## European foreword

This document (EN 12405-1:2018) has been prepared by Technical Committee CEN/TC 237 “Gas meters”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by April 2019, and conflicting national standards shall be withdrawn at the latest by April 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12405-1:2005+A2:2010.

This document has been prepared under the mandate M/541 given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2014/32/EU Measuring Instruments Directive (MID).

For relationship with EU Directive 2014/32/EU, see informative Annex ZA, which is an integral part of this document.

EN 12405 consists of the following parts:

- Part 1: Volume conversion (this European Standard),
- Part 2: Energy conversion,
- Part 3: Flow computer.

In the preparation of this European Standard, the content of OIML Publication, “International Document 11”, and “International Recommendations 140” and the content of member bodies' national standards on gas-volume electronic conversion devices have been taken into account.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## 1 Scope

This European Standard specifies the requirements and tests for the construction, performance, safety and conformity of gas-volume electronic conversion devices associated to gas meters, used to measure volumes of fuel gases of the 1st and 2nd families according to EN 437.

This European Standard is intended for type testing, the detailed relevant provisions of which are given in Annex A.

Only three kinds of conversion are treated in this European Standard:

- conversion as a function of temperature only (called T conversion);
- conversion as a function of the pressure and of the temperature with constant compression factor (called PT conversion);
- conversion as a function of the pressure, the temperature and taking into account the compression factor (called PTZ conversion).

This document is not relevant to temperature conversion integrated into gas meters which only indicate the converted volume.

EN 12405-2 applies for energy conversion.

Gas-volume conversion devices consist of a calculator and a temperature transducer or a calculator, a temperature transducer and a pressure transducer locally installed.

For application of this European Standard, a conversion device may be, as a choice of the manufacturer, considered as a complete instrument (Type 1) or made of separate elements (Type 2), according to the definitions given in 3.1.18.1 and 3.1.18.2.

In this last case, the provisions concerning pressure transducers, temperature sensors and temperature transducers are given in Annexes B, C and D respectively.

Any conversion device can provide an error curve correction for a gas meter.

NOTE When rendering an account to an end user the readings from the conversion device can be used in conjunction with the readings from a gas meter conforming to EN 1359, EN 12480, or EN 12261, as appropriate, or to any other appropriate and relevant international or national standard for gas meters, without prejudice of national regulations.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 437, *Test gases — Test pressures — Appliance categories*

EN 1776, *Gas infrastructure - Gas measuring systems - Functional requirements*

EN 55011, *Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement (CISPR 11)*

EN 60068-2-1, *Environmental testing - Part 2-1: Tests - Test A: Cold*

EN 60068-2-2, *Environmental testing - Part 2-2: Tests - Test B: Dry heat*

- EN 60068-2-30, *Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)*
- EN 60068-2-31, *Environmental testing - Part 2-31: Tests - Test Ec: Rough handling shocks, primarily for equipment-type specimens*
- EN 60068-2-64, *Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance*
- EN 60068-2-78, *Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state*
- EN 60068-3-1, *Environmental testing - Part 3-1: Supporting documentation and guidance - Cold and dry heat tests*
- EN 60079-0, *Explosive atmospheres - Part 0: Equipment - General requirements*
- EN 60079-1, *Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"*
- EN 60079-2, *Explosive atmospheres - Part 2: Equipment protection by pressurized enclosure "p" (IEC 60079-2)*
- EN 60079-5, *Explosive atmospheres - Part 5: Equipment protection by powder filling "q" (IEC 60079-5)*
- EN 60079-6, *Explosive atmospheres - Part 6: Equipment protection by liquid immersion "o" (IEC 60079-6)*
- EN 60079-7, *Explosive atmospheres - Part 7: Equipment protection by increased safety "e" (IEC 60079-7)*
- EN 60079-11, *Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i" (IEC 60079-11)*
- EN 60079-25, *Explosive atmospheres - Part 25: Intrinsically safe electrical systems*
- EN 60529, *Degrees of protection provided by enclosures (IP Code)*
- EN 60730-1:2016, *Automatic electrical controls for household and similar use — Part 1: General requirements (IEC 60730-1:2013)*
- EN 60751, *Industrial platinum resistance thermometers and platinum temperature sensors*
- EN 60950-1, *Information technology equipment - Safety - Part 1: General requirements*
- EN 61000-4-2, *Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test*
- EN 61000-4-3, *Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test*
- EN 61000-4-4, *Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test*
- EN 61000-4-5, *Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test*
- EN 61000-4-6, *Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields*
- EN 61000-4-8, *Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test*

EN 61000-4-11, *Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests*

EN 61000-4-29, *Electromagnetic compatibility (EMC) - Part 4-29: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests*

EN ISO 12213-2:2009, *Natural gas - Calculation of compression factor - Part 2: Calculation using molar-composition analysis (ISO 12213-2:2006)*

EN ISO 12213-3:2009, *Natural gas - Calculation of compression factor - Part 3: Calculation using physical properties (ISO 12213-3:2006)*

### 3 Terms, definitions, symbols and classification

#### 3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

##### 3.1.1

##### **absolute static pressure**

value of the static pressure of the gas relative to vacuum

##### 3.1.2

##### **base conditions**

specified conditions to which the measured quantity of gas is converted

EXAMPLES Temperature of 273,15 K and absolute pressure of 1,013 25 bar or temperature of 288,15 K and absolute pressure of 1,013 25 bar.

##### 3.1.3

##### **calculator**

electronic device that receives the output signals from the associated gas meter and transducers and processes them

##### 3.1.4

##### **conversion factor**

factor equal to the volume at base conditions divided by the corrected volume, or if there is no gas meter correction, equal to the volume at base conditions divided by the volume at measurement conditions

##### 3.1.5

##### **conventional true value (of a quantity)**

value attributed to a particular quantity and accepted, sometimes by convention, as having an uncertainty appropriate for a given purpose

##### 3.1.6

##### **corrected volume**

volume at measurement conditions corrected for the error curve of the gas meter