



SLOVENSKI STANDARD
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Plinomeri - Korektorji - 2. del: Energijska korekcija

Gas meters - Conversion devices - Part 2: Energy conversion

Gaszähler - Umwerter - Teil 2: Energieumwertung

Compteurs à gaz - Dispositifs de conversion - Partie 2 : Conversion en énergie

Ta slovenski standard je istoveten z: prEN 12405-2

ICS:

91.140.40 Sistemi za oskrbo s plinom Gas supply systems

oSIST prEN 12405-2:2026

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EUROPEAN STANDARD
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DRAFT
prEN 12405-2

March 2026

ICS 91.140.40

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Gas meters - Conversion devices - Part 2: Energy conversion

Compteurs à gaz - Dispositifs de conversion - Partie 2 :
Conversion en énergie

Gaszähler - Umwerter - Teil 2: Energieumwertung

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 237.

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European foreword

This document (prEN 12405-2:2026) has been prepared by Technical Committee CEN/TC 237 “Gas meters”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN enquiry.

This document will supersede EN 12405-2:2012.

EN 12405 consists of the following parts:

- Part 1: Volume conversion EN 12405-1:2021 to allow the harmonization of the standard with the Measuring Instruments Directive 2004/22/EC);
- Part 2: Energy conversion (this document);
- Part 3: Flow computers used as gas meter conversion

In the preparation of this document, the content of OIML Publication, “Recommendation 140 — measuring systems for gaseous fuel”, has been taken into account.

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Introduction

This introduction presents important concepts used in this document.

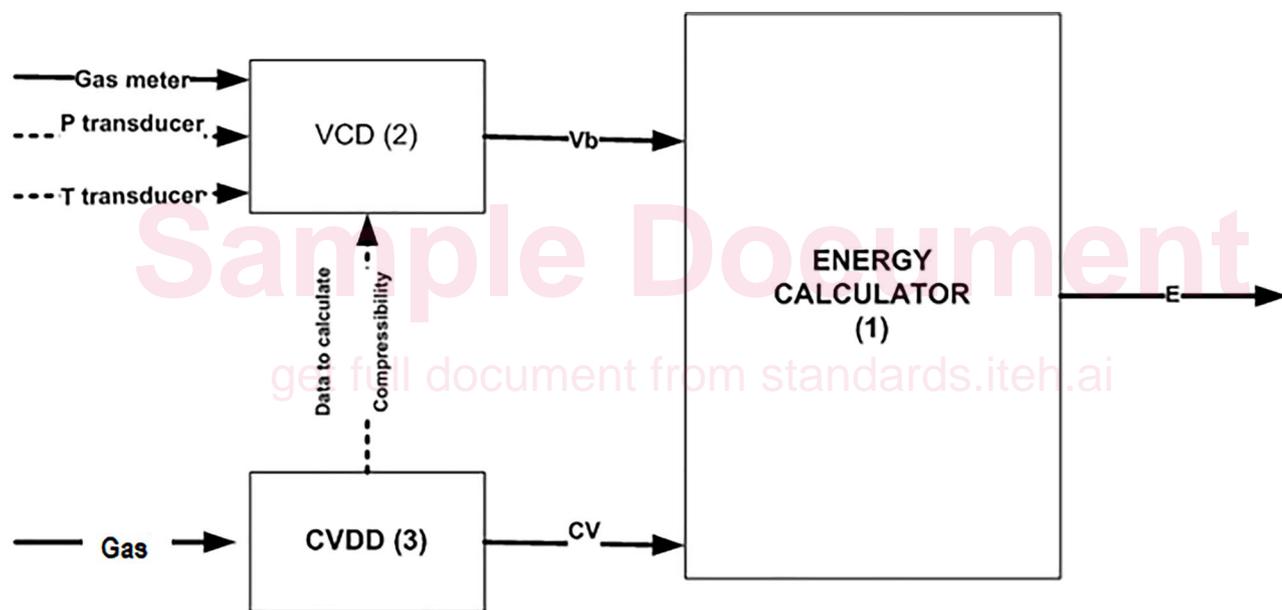
Energy conversion systems

As an energy conversion device (ECD) comprises a number of different components and functions, for the purpose of this document, two different systems are considered:

System 1, where

- the calorific value determination device (CVDD) is locally installed and is considered as being fully part of the ECD, and
- the energy calculator (EC) will have the ability to utilize a signal generated by this locally installed CVDD for determining energy.

Figure 1 shows the various components of ECD system 1.



- (1) Standardised in EN12405-2
 (2) Standardised in EN12405-1 or EN 12405-3 for class 0.5
 (3) Standardised in EN 12405-2

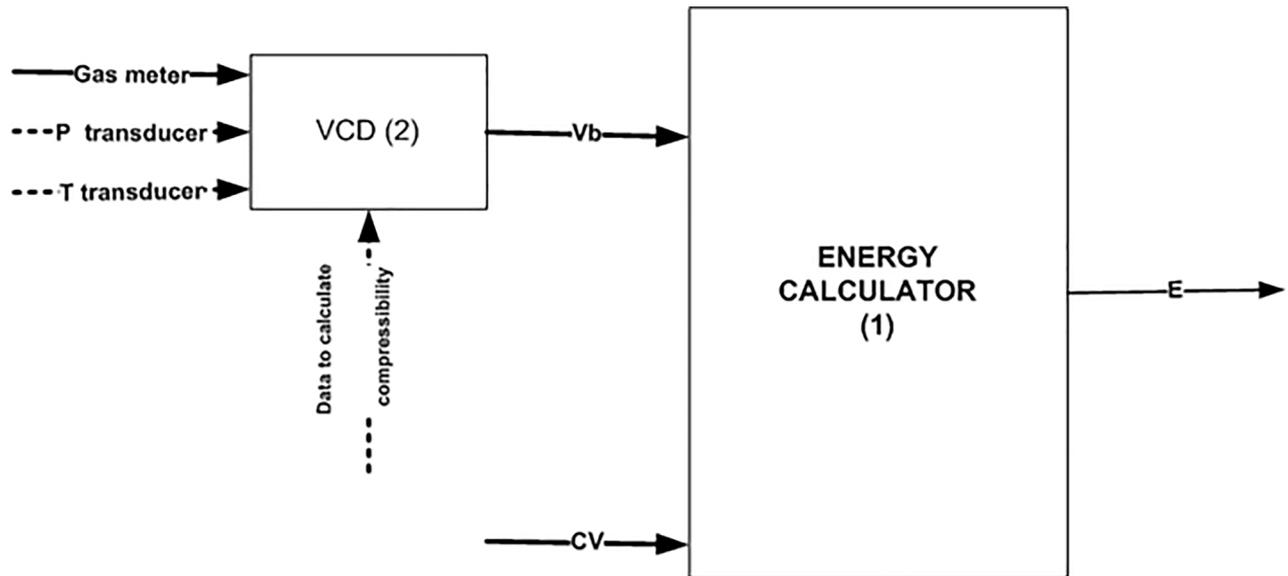
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Figure 1 — Description of ECD system 1

System 2, where

- the CVDD may not be locally installed and is considered as an external transducer of the system, and
- the calculator will have the ability to accept fixed or periodically updated signals for the calorific value for determining energy.

Figure 2 shows the various components of ECD system 2.



(1) Standardised in EN12405-2

(2) Standardised in EN12405-1 or EN 12405-3 (for class 0;5%)

Dotted line = optional

Figure 2 — Description of ECD system 2

NOTE The various components of the ECD need to be supplied as a matched, ready-for-use, set of devices; this applies to System 1 and System 2, and mechanically integrated or separated devices (see modular and global approaches below).

Modular and global approaches

In the modular approach, the ECD is an assembly of separate associated measuring instruments (VCD and CVDD) and an energy calculator (EC), which are verified separately. Each instrument is verified according to its testing procedure, using the indication available on the energy calculator or on the associated measuring instrument itself. In this case, the indication shall correspond to the one which is directly processed in energy conversion. The verification of calculation consists in verifying the calculation concerning each characteristic quantity of the gas and/or the calculation for the energy conversion.

The associated measuring instruments are approved for a type or some types of conversion device(s) in order to ensure the compatibility of the association. If the associated measuring instruments deliver a digital signal, they may be considered as interchangeable, provided the type examination certificate provides all the necessary conditions of compatibility with the calculator of the conversion device.

In the global approach, the ECD is tested as a package, performing tests of the following functions: energy calculation, volume conversion and CV determination.

The testing procedures are given in Clause 9.

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For the purpose of this document, the following configurations of devices are accepted:

Table 1 — Description of systems 1 and 2

	Global approach	modular approach
System 1	VCD/CVDD/EC	VCD + CVDD/EC
		VCD/EC + CVDD
		VCD + EC + CVDD
System 2	VCD/EC (signal CV)	VCD + EC (signal CV)
VCD: volume conversion device CVDD: calorific value determination device EC: energy calculator X/Y: devices X and Y integrated, able to perform their functions separately X+Y: devices X and Y exchanging signals between them, verified separately		

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1 Scope

This document specifies the requirements and tests for the construction, performance, safety and conformity of conversion devices used to determine the energy of fuel gases described in the Table 1, including those of the 1st and 2nd families according to EN 437.

It is also applicable for treated non-conventional combustible gases complying with EN 437 and for which a detailed technical evaluation of the functional requirements (such as injected biomethane) is performed ensuring there are no other constituents or properties of the gases that can affect the metrological and physical integrity of the measuring systems.

This document mentions technical topics to consider when hydrogen and natural gas / hydrogen blends flow through the measuring systems.

This document can also be used as a guideline for measuring systems for other gases e.g. gaseous CO₂ for CCUS.

This document is not applicable for raw or sour gases.

This document is not applicable for gas measurement in CNG filling stations.

The energy conversion device (ECD) considered in this document consists of an energy calculator (EC) and is associated with the following devices and/or functions:

- a volume conversion device (VCD) or a flow computer used as gas meter conversion, either conforming to EN 12405-1:2021, or to EN 12405-3:2015, for high accuracy measurements;
- a calorific value determination device (CVDD).

Requirements for type approval tests of the devices, not included in the above-mentioned standards are described in appropriate annexes specified in Table 6.

For the purpose of this document, the term “volume conversion devices” (VCDs) includes flow computers (FCs).

A single calculator may undertake the volume conversion functions for different metering lines.

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 437:2021, *Test gases - Test pressures - Appliance categories*

EN 12405-1:2021, *Gas meters - Conversion devices - Part 1: Volume conversion*

EN 12405-3:2015, *Gas meters - Conversion devices - Part 3: Flow computer*

EN 55011:2016, *Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement*

EN 60068-2-1:2007, *Environmental testing - Part 2-1: Tests - Test A: Cold*

EN 60068-2-2:2007, *Environmental testing - Part 2-2: Tests - Test B: Dry heat*

EN IEC 60068-2-30:2025, *Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

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EN 60068-2-31:2008, *Environmental testing - Part 2-31: Tests - Test Ec: Rough handling shocks, primarily for equipment-type specimens*

EN 60068-2-47:2005, *Environmental testing - Part 2-47: Tests - Mounting of specimens for vibration, impact and similar dynamic tests*

EN 60068-2-64:2008, *Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance*

EN 60068-2-78:2013, *Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state*

EN IEC 60068-3-1:2023, *Environmental testing - Part 3-1: Supporting documentation and guidance - Cold and dry heat tests*

EN IEC 60068-3-4:2023, *Environmental testing - Part 3-4: Supporting documentation and guidance - Damp heat tests*

EN 60068-3-8:2003, *Environmental testing - Part 3-8: Supporting documentation and guidance - Selecting amongst vibration tests*

EN 60079 (all parts), *Explosive atmospheres*

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code)*

EN 60654-2:1997, *Operating conditions for industrial-process measurement and control equipment - Part 2: Power*

EN IEC 60730-1:2024, *Automatic electrical controls - Part 1: General requirements (IEC 60730-1:2022)*

EN 61000-1-2, *Electromagnetic compatibility (EMC) Part 1-2: General - Methodology for the achievement of functional safety of electrical and electronic systems including equipment with regard to electromagnetic phenomena*

EN 61000-2-2:2002, *Electromagnetic compatibility (EMC) - Part 2-2: Environment - Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems*

EN 61000-4-2:2009, *Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test*

EN IEC 61000-4-3:2020, *Electromagnetic compatibility (EMC) - Part 4-3 : Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3:2020)*

EN 61000-4-4:2012, *Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test*

EN 61000-4-5:2014, *Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test*

EN IEC 61000-4-6:2023, *Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields*

EN 61000-4-8:2010, *Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test*

EN IEC 61000-4-11:2020, *Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase (IEC 61000-4-11:2020)*

EN 61000-4-29:2000, *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 IEC 61000-6-1:2019, *Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity standard for residential, commercial and light-industrial environments (IEC 61000-6-1:2016)*

EN IEC 61000-6-2, *Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments*

EN 62054-21, *Electricity metering (a.c.) - Tariff and load control - Part 21: Particular requirements for time switches*

EN IEC 62368-1, *Audio/video, information and communication technology equipment - Part 1: Safety requirements*

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)*

EN ISO 13443:2005, *Natural gas - Standard reference conditions (ISO 13443:1996 including Corrigendum 1:1997)*

EN ISO 6976:2016, *Natural gas - Calculation of calorific values, density, relative density and Wobbe indices from composition (ISO 6976:2016)*

ISO 6141:2015, *Gas analysis — Contents of certificates for calibration gas mixtures*

ISO 6142 (all parts), *Gas analysis — Preparation of calibration gas mixtures — Gravimetric method*

ISO 6143:2025, *Gas analysis — Comparison methods for determining and checking the composition of calibration gas mixtures*

ISO/TR 29922:2017, *Natural gas — Supporting information on the calculation of physical properties according to ISO 6976*

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 terminology databases for use in standardization at the following addresses:

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

3.1.1

adjustment interval

time interval or number of measurements between two necessary adjustments of a calorific value determining device

3.1.2

associated measuring instruments

instruments for measuring certain quantities which are characteristic of the gas (temperature, pressure, calorific value etc.), whose indications are used by the calculator with a view to making a correction and/or a conversion

Note 1 to entry: For the purpose of this document, when dealing with the ECD in modular approach, the VCD and CVDD are considered as associated measuring instruments.

3.1.3

base conditions

fixed conditions used to express the volume of gas independently of the metering conditions and the superior calorific value

Note 1 to entry: The pressure base for both volumetric metering and combustion is always 101,325 kPa. The temperature needs to be specified

EXAMPLE 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.

3.1.4

calorific value determining device

CVDD

measuring instrument for obtaining the calorific value of gas. The CVDD can comprise multiple devices

3.1.5

compression factor

parameter which indicates the deviation from the ideal gas

Note 1 to entry: The compression factor calculation needs to be carried out according to ISO 12213 part 2 or 3.

3.1.6

display

element or assembly of elements of the indicating device on which the results of measurement and memorised values are displayed

3.1.7

disturbance

influence quantity having a value within the limits specified but outside the specified rated operating conditions of the measuring instrument

Note 1 to entry: An influence quantity is a disturbance if the rated operating conditions for that influence quantity are not specified.

3.1.8

energy conversion device

ECD

device which calculates, integrates and displays energy using volume at base conditions and the calorific value or the gas composition

3.1.9

global approach

approach through which the performances of the energy conversion device (ECD) are verified and approved with a completely integrated package, including the energy calculation, the associated measuring instruments and other functions

3.1.10

influence factor

influence quantity having a value within the specified rated operating conditions of the measuring instrument

3.1.11

influence quantity

quantity that is not a measurand but that affects the result of the measurement

EXAMPLE Ambient temperature.

3.1.12

maximum permissible error

extreme value of the **measurement error**, with respect to a known **reference quantity value**, permitted by specifications or regulations for a given **measurement, measuring instrument or measuring system**

Note 1 to entry: Generally, the two extreme values are taken together and are termed “maximum permissible errors” or “limit of error”.

3.1.13

measurand

particular quantity subject to measurement

3.1.14

measurement repeatability

repeatability

measurement precision under a set of repeatable conditions of measurement

3.1.15

metering conditions

conditions of the gas at which the volume is measured at the point of measurement

Note 1 to entry: Metering conditions include the temperature and pressure of the measured gas.