



**NSAI**  
Standards

Irish Standard  
I.S. EN 12405-2:2012

# Gas meters - Conversion devices - Part 2: Energy conversion

## I.S. EN 12405-2:2012

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

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**NSAI**  
1 Swift Square,  
Northwood, Santry  
Dublin 9

T +353 1 807 3800  
F +353 1 807 3838  
E standards@nsai.ie  
W NSAI.ie

**Sales:**  
T +353 1 857 6730  
F +353 1 857 6729  
W standards.ie

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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 European Standard was approved by CEN on 9 June 2012.

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## **Foreword**

This document (EN 12405-2:2012) 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of an identical text or by endorsement, at the latest by January 2013, and conflicting national standards shall be withdrawn at the latest by January 2013.

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

EN 12405 consists of the following parts:

- Part 1: Volume conversion (and its amendments EN12405-1/A1 and EN 12405-1+A2 to allow the harmonisation of the standard with the Measuring Instruments Directive 2004/22/EC);
- Part 2: Energy conversion (this European Standard);
- Part 3: Flow computers used as gas meter conversion (in preparation).

In the preparation of this European Standard, the content of OIML Publication, “Recommendation 140 — measuring systems for gaseous fuel”, has 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## Introduction

This introduction presents important concepts used in this standard.

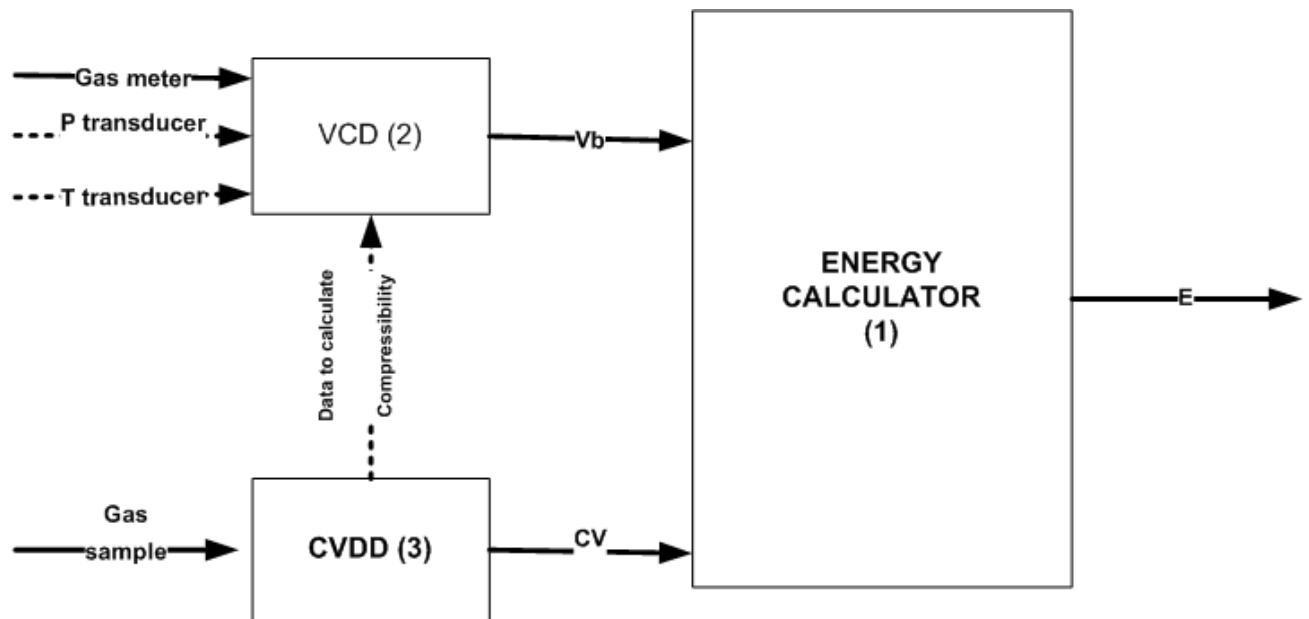
### Energy conversion systems

As an energy conversion device (ECD) comprises a number of different components and functions, for the purpose of this Standard, 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 utilise 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

Dotted line = optional

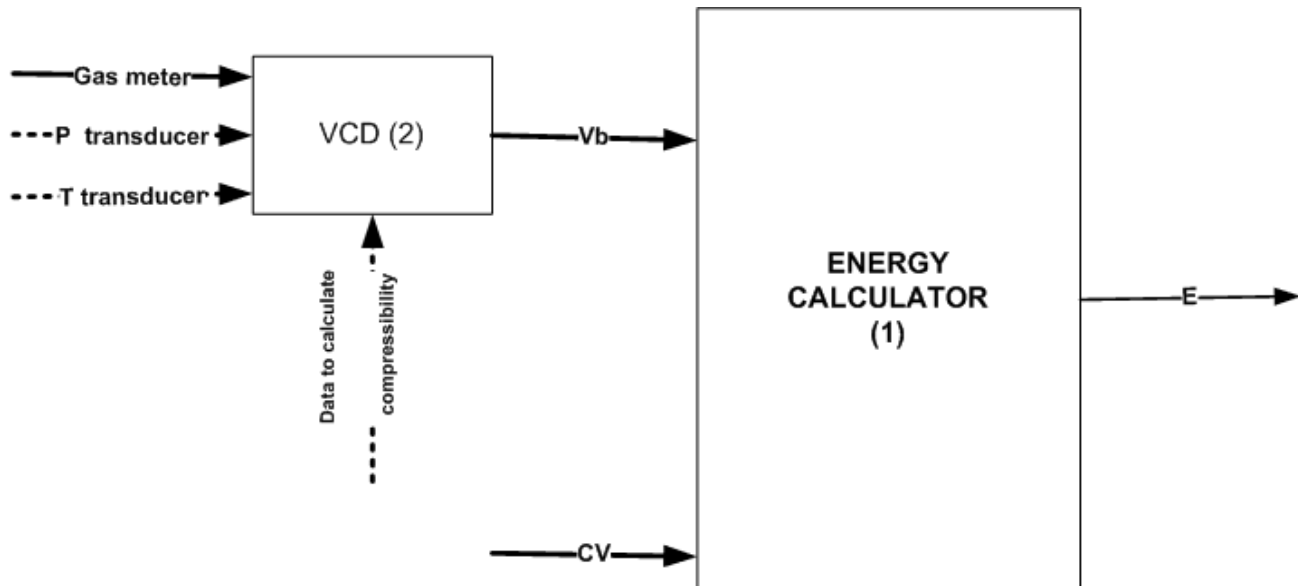
Figure 1 — Description of ECD system 1

## EN 12405-2:2012 (E)

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.



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

**Table 1 — Description of systems 1 and 2**

	<b>Global approach</b>	<b>modular approach</b>
<b>System 1</b>	VCD/CVDD/EC	VCD + CVDD/EC
		VCD/EC + CVDD
		VCD + EC + CVDD
<b>System 2</b>	VCD/EC (signal CV)	VCD + EC (signal CV)

Key: VCD: volume conversion device  
 CVDD: calorific value determination device  
 EC: energy calculator  
 X/Y: devices X and Y mechanically integrated, able to perform their functions separately  
 X+Y: devices X and Y exchanging signals between them, verified separately

## 1 Scope

This European Standard 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.

The energy conversion device (ECD) considered in this standard 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 12405-1:2005+A2:2010, or to prEN 12405-3, 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 European Standard, 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, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 12405-1:2005+A2:2010, *Gas meters — Conversion devices — Part 1: Volume conversion*

prEN 12405-3, *Gas meters — Conversion devices — Part 3: Flow computers*<sup>1)</sup>

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

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

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

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1) In preparation.

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