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## Measurement of fluid flow in closed conduits — Ultrasonic meters for gas —

### Part 2: Meters for industrial applications

*Mesurage de débit des fluides dans les conduites fermées —  
Compteurs à ultrasons pour gaz —*

*Partie 2: Compteurs pour applications industrielles*



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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 17089-2 was prepared by Technical Committee ISO/TC 30, *Measurement of fluid flow in closed conduits*, Subcommittee SC 5, *Velocity and mass methods*.

ISO 17089 consists of the following parts, under the general title *Measurement of fluid flow in closed conduits — Ultrasonic meters for gas*:

- *Part 1: Meters for custody transfer and allocation measurement*
- *Part 2: Meters for industrial applications*

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## Introduction

Ultrasonic meters (USMs) for gas flow measurement have penetrated the market for meters rapidly since 2000 and have become one of the prime flowmeter concepts for operational use as well as custody transfer and allocation measurement. As well as offering high repeatability and high accuracy, ultrasonic technology has inherent features like: negligible pressure loss, high rangeability and the capability to handle pulsating flows.

USMs can deliver extended diagnostic information through which it may be possible to verify not only the functionality of a USM, but also several other components within the system, such as the gas chromatograph, and the pressure and temperature transmitters. Due to the extended diagnostic capabilities, this part of ISO 17089 advocates the addition and use of automated diagnostics instead of labour-intensive quality checks.

This part of ISO 17089 focuses on meters for industrial gas applications (class 3 and class 4). Meters for custody transfer and allocation measurement are the subject of ISO 17089-1.

Typical performance factors of the classification scheme are:

Class	Typical applications	Typical uncertainty 95 % confidence level (volume flow rate) <sup>a</sup>	Reference
1	Custody transfer	±0,7 %	ISO 17089-1
2	Allocation	±1,5 %	ISO 17089-1
3	Utilities and process	±1,5 % to 5 % for $q_V > q_{V,t}^b$	This part of ISO 17089
4	Flare gas and vent gas	±5 % to 10 % for $q_V > q_{V,t}$	This part of ISO 17089

<sup>a</sup>Meter performance, inclusive of total meter uncertainty, repeatability, resolution and maximum peak-to-peak error, depends upon a number of factors which include pipe inside diameter, acoustic path length, number of acoustic paths, gas composition and speed of sound, as well as meter timing repeatability.

<sup>b</sup>By specific flow conditioning or when multi-path meters are employed, lower uncertainties may be achieved.

The special application note(s) as presented in Clause 7 as well as information in parentheses are informative.