

BS 7965:2013



BSI Standards Publication

**Guide to the selection,
installation, operation and
calibration of diagonal path
transit time ultrasonic
flowmeters for industrial
gas applications**

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Published by BSI Standards Limited 2013

ISBN 978 0 580 80061 0

ICS 17.120.10

The following BSI references relate to the work on this document:

Committee reference CPI/30/5

Draft for comment 13/30268440 DC

Publication history

First published April 2000

Second edition, October 2009

Third (present) edition, October 2013

Amendments issued since publication

Date	Text affected
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Contents

Foreword *ii*

1	Scope	1
2	Normative references	1
3	Symbols and abbreviations	2
4	Selection	3
5	Installation recommendations	14
6	Operational considerations	22
7	Ultrasonic flowmeter verification and calibration	35
8	Condition-based maintenance (CBM)	53

Annexes

Annex A (informative)	Application of flow calibration results	56
Annex B (informative)	Methods for correcting a USM's flow measurement error at flow calibration	59
Annex C (informative)	Thermowell installations in bi-directional flow installations incorporating flow-conditioners	66
	Bibliography	67

List of figures

Figure 1	– General ray geometry for transit time velocity measurement	4
Figure 2	– Transducer designs	7
Figure 3	– Variations in path configuration	8
Figure 4	– Some typical cross-sectional acoustic path configurations	11
Figure 5	– Performance specification summary for Class 1 meters	23
Figure 6	– Performance specification summary for Class 2 meters	24
Figure 7	– Performance specification summary for Class 3 meters	25
Figure 8	– Performance specification summary for Class 4 meters	26
Figure B.1	– Un-corrected and FWME-corrected flow calibration	62
Figure C.1	– Bi-directional flow installation employing two USMs	66
Figure C.2	– Bi-directional flow installation employing one USM	66

List of tables

Table 1	– Symbols and abbreviations	2
Table 2	– Class performance criteria – Meter requirements	12
Table 3	– System uncertainties and applications – System requirements	13
Table 4	– Common thermal expansion coefficients in the 0 to 100 °C range	27
Table 5	– Calibration options and applications	36
Table 6	– Internal diameter tolerance	36
Table 7	– Tolerance for beam path length	37
Table 8	– Minimum nominal test flow rates	43
Table 9	– Spread or repeatability (max. error minus min. error) versus number of test points for a specified uncertainty in the mean	45
Table 10	– Effects of number of readings	45
Table A.1	– Sequential flow calibration results	58
Table B.1	– Example flow calibration data table for 200 mm diameter USM	60
Table B.2	– Flow weighted mean error calculation	61
Table B.3	– FWME-corrected flow calibration data summary	61
Table B.4	– Example results from a typical flow calibration	63
Table B.5	– Example calibration results	64
Table B.6	– Calculation of percentage flowrate	65

Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 68, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 October 2013. It was prepared by Subcommittee CPI/30/5, *Velocity based methods*, under the authority of Technical Committee CPI/30, *Measurement of fluid flow in closed conduits*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 7965:2009, which is withdrawn.

Information about this document

This is a full revision of the standard, and introduces the following principal changes:

- further division of meter sizes into large, medium and small to incorporate meter sizes with a nominal bore <4 inches;
- meters that are not standard in line meters, such as cartridge type meters;
- where appropriate, the standard is aligned with revisions made to other USM documents such as AGA Report No. 9 [1] and BS ISO 17089-1, taking account of results from research and development projects and end-user experience;
- updated in the light of research and user experience since 2009;
- includes a new section covering condition-based maintenance.

Hazard warnings

CAUTION: High gas velocities can cause flow-induced thermowell vibration, which could result in catastrophic metal fatigue failure of the thermowell.

CAUTION: The use of extractor tools to extract ultrasonic transducers without depressurization should only be undertaken by competent personnel.

Use of this document

As a guide, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification or a code of practice and claims of compliance cannot be made to it.

Presentational conventions

The guidance in this standard is presented in roman (i.e. upright) type. Any recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

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

Compliance with a British Standard cannot confer immunity from legal obligations.

1 Scope

This British Standard gives recommendations and guidance on the selection, installation, operation and calibration of transit time ultrasonic flowmeters (USMs) for industrial gas applications (including flare gas).

It is applicable only to those devices in which the entire gas stream flows through the body of the USM and the transducers (wetted or invasive type), or a wetted interface, are in contact with the fluid. This includes full-bore/reduced-bore and insertion type meters employing direct or reflective paths. It is also applicable to "dirty gases", i.e. those contaminated with solids and/or liquids in sufficiently small quantities, depending upon the application.

It is not applicable to clamp-on/externally mounted, domestic or stack/chimney (combustion exhaust) meters.

As an aid to selection, this standard incorporates an uncertainty classification for USMs. This takes into account the components of uncertainty relating to the meter plus those additional uncertainties associated with installation and operation effects. There are four classifications offered. These range from high accuracy applications (Class 1) to process flow indication and control applications (Class 4).

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.

Standards publications

BS 7834, *Specification for turbine meters used for the measurement of gas flow in closed conduits*

BS EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

BS ISO 20765-1:2005, *Natural gas – Calculation of thermodynamic properties – Part 1: Gas phase properties for transmission and distribution applications*

BS ISO/TR 12765:1998, *Measurement of fluid flow in closed circuits – Methods using transit-time ultrasonic flowmeters*

Other publications

[N1] AMERICAN SOCIETY FOR TESTING AND MATERIALS. *ASTM E1002-11, Standard practice for leaks using ultrasonics, Book of Standard Volume 03.03.* ¹⁾

¹⁾ Available from <<http://www.astm.org/Standard/index.shtml>> [last viewed 14 October 2013].