
**Measurement of total discharge in open
channels — Electromagnetic method
using a full-channel-width coil**

*Mesurage du débit total dans les canaux découverts — Méthode
électromagnétique à l'aide d'une bobine d'induction couvrant toute la
largeur du chenal*



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

This document is a preview generated by EVS

© ISO 2004

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

	Page
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principles of operation and practice	1
5 Applications	5
6 Selection of site	6
7 Design and construction	6
8 Uncertainties in flow measurement	12
9 Gauge calibration and verification	13
Annex A (informative) Site survey for electrical interference	14
Annex B (informative) Design aspects of the electromagnetic coil	15
Annex C (informative) Numerical example of the calculation of uncertainty	16
Annex D (normative) Gauge calibration procedure	17
Bibliography	19

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 9213 was prepared by Technical Committee ISO/TC 113, *Hydrometry*, Subcommittee SC 1, *Velocity area methods*.

This second edition cancels and replaces the first edition (ISO 9213:1992), which has been technically revised.

Measurement of total discharge in open channels — Electromagnetic method using a full-channel-width coil

1 Scope

This International Standard specifies procedures for the establishment and operation of a gauging station, equipped with an electromagnetic flow meter, in an open channel or a closed conduit with a free water surface.

This International Standard is applicable to configurations where an artificial magnetic field is generated through which the entire body of water flows. The induced voltage is sensed in such a way that all elements of the moving water contribute. The equipment described normally requires an electrical mains power supply.

This International Standard is not applicable to devices sampling only part of the flowing body of water (e.g. velocity meters) or to flow meters which operate by using the Earth's magnetic field.

2 Normative references

The following referenced documents are indispensable for the application 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.

ISO 748, *Measurement of liquid flow in open channels — Velocity-area methods*

ISO 772, *Hydrometric determinations — Vocabulary and symbols*

ISO 1100-2, *Measurement of liquid flow in open channels — Part 2: Determination of the stage-discharge relation*

ISO 5168:—¹⁾, *Measurement of fluid flow — Evaluation of uncertainties*

ISO/TR 7066-1, *Assessment of uncertainty in calibration and use of flow measurement devices — Part 1: Linear calibration relationships*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 772 apply.

4 Principles of operation and practice

4.1 This is a velocity-area method of discharge determination. The electromagnetic gauge operates on Faraday's principle of electromagnetic induction. If a length of conductor moves through a magnetic field, a voltage is generated between the ends of the conductor. In the electromagnetic gauge, a vertical magnetic field is generated by means of an insulated coil which is located either above or beneath the channel. The conductor is formed by the water which moves through the magnetic field; the ends of the conductor are represented by the channel walls or riverbanks. The voltage generated is sensed by electrodes on the channel extremities and these are connected to the input of a sensitive voltage-measuring device. The faster the velocity of the water, the greater is the voltage which is generated.

1) To be published. (Revision of ISO/TR 5168:1998)