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## **Hydrometry — Measuring the water level in a well using automated pressure transducer methods**

*Hydrométrie — Méthodes automatisées, utilisant des transducteurs de  
pression, pour mesurer le niveau d'eau dans un puits*



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Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
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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.

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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.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

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/TR 23211 was prepared by Technical Committee ISO/TC 113, *Hydrometry*, Subcommittee SC 8, *Ground water*.

This Technical Report is based on, and much of the material is from, Freeman and others <sup>[8]</sup>. It complements ISO 4373, *Hydrometry — Water level measuring devices*.

## Introduction

Submersible pressure transducers, developed in the early 1960s, have made the collection of water-level and pressure data much more convenient than former methods. Submersible pressure transducers, when combined with electronic data recorders have made it possible to collect continuous or nearly continuous water-level or pressure data from wells, piezometers, soil-moisture tensiometers, and surface water gages. These more frequent measurements have led to an improved understanding of the hydraulic processes in streams, soils, and aquifers.

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# Hydrometry — Measuring the water level in a well using automated pressure transducer methods

## 1 Scope

This Technical Report provides information about the functional requirements of instrumentation for measuring the water level in a well using automated pressure transducer methods.

This Technical Report provides guidance for the proper selection, installation and operation of submersible pressure transducers and data loggers for the collection of hydrologic data, primarily for the collection of water-level data from wells. Basic principles, measurement needs and considerations for operating submersible pressure transducers are described and the systematic errors inherent in their use are discussed. Standard operational procedures for data collection and data processing, as well as applications of transducers for specific types of hydrologic investigations are included. Basic concepts regarding the physics of pressure and the mechanics of measuring pressure are presented, along with information on the electronics used to make and record these measurements. Guidelines for transducer calibration, proper use and quality assurance of data also are presented. Ground water field applications of pressure transducer systems are discussed, as are common problems that may corrupt data, along with suggestions for field repairs.

Annex A provides guidance on the types of pressure transducers commonly used for water-level measurement and the measurement uncertainty associated with them.

## 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 772, *Hydrometry — Vocabulary and symbols*

## 3 Terms and definitions

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

## 4 Applications of the use of pressure transducers to ground-water resource investigations

### 4.1 Ground-water monitoring

Submersible pressure transducers can be used for long-term and short-term applications. This clause discusses both applications. In addition, in 4.4, information is provided on the technique of reducing well-bore storage so that the user can apply this technique to reduce the effective diameter of wells during slug tests or aquifer tests.