

## Ultrasonie technologie - Hydrofoons - Karakteristieken en het ijken in het frequentiegebied van 15 MHz tot 40 MHz (IEC 62092:2001, IDT)

Ultrasonics - Hydrophones - Characteristics and calibration in the  
frequency range from 15 MHz to 40 MHz (IEC 62092:2001, IDT)

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ICS 17.140.50

Als Nederlandse norm is aanvaard:  
- EN 62092:2001, IDT  
- IEC 62092:2001, IDT

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Voor de in deze norm vermelde normatieve verwijzingen bestaan in Nederland de volgende equivalenten:

<u>vermelde norm</u>	<u>Nederlandse norm</u>	<u>titel</u>
IEC 60866:1987	NEN 10866:1988	De kenmerken en het ijken van hydrofoons voor gebruik in het frequentiegebied van 0,5 MHz tot 15 MHz (en,fr)
IEC 61101:1991	NEN 11101:1994	De absolute kalibratie van hydrofoons gebruik makend van de planaire aftastingstechniek in het frequentiegebied van 0,5 MHz tot 15 MHz (en,fr)
IEC 61102:1991	NEN 11102:1994	Meting en karakterisering van ultrageluidvelden gebruik makend van hydrofoons in het frequentiegebied van 0,5 MHz tot 15 MHz (en,fr)
IEC 61161:1992	NEN 11161:1994	Het meten van het vermogen van ultrageluid in vloeistoffen in het frequentiegebied 0,5 MHz tot 25 MHz (en)
IEC 61828	NEN-EN-IEC 61828	Ultrasone technologie - Focusmeters - Definities en meetmethoden van zendeigenschappen (en)

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English version

**Ultrasonics - Hydrophones -  
Characteristics and calibration in  
the frequency range from 15 MHz to 40 MHz  
(IEC 62092:2001)**

Ultrasons - Hydrophones -  
Caractéristiques et étalonnage  
dans la gamme de fréquences  
de 15 MHz à 40 MHz  
(CEI 62092:2001)

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Eigenschaften und Kalibrierung  
im Frequenzbereich von  
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(IEC 62092:2001)

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European Committee for Electrotechnical Standardization  
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## Foreword

The text of document 87/203A/FDIS, future edition 1 of IEC 62092, prepared by IEC TC 87, Ultrasonics, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62092 on 2001-10-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2002-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2004-10-01

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annex ZA is normative and annexes A, B, C, D and E are informative.

Annex ZA has been added by CENELEC.

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### Endorsement notice

The text of the International Standard IEC 62092:2001 was approved by CENELEC as a European Standard without any modification.

**Annex ZA**  
(normative)

**Normative references to international publications  
with their corresponding European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60866	1987	Characteristics and calibration of hydrophones for operation in the frequency range 0,5 MHz to 15 MHz	-	-
IEC 61101	1991	The absolute calibration of hydrophones using the planar scanning technique in the frequency range 0,5 MHz to 15 MHz	EN 61101	1993
IEC 61102	1991	Measurement and characterisation of ultrasonic fields using hydrophones in the frequency range 0,5 MHz to 15 MHz	EN 61102	1993
IEC 61161	1992	Ultrasonic power measurement in liquids in the frequency range 0,5 MHz to 15 MHz	EN 61161	1994
A1	1998		A1	1998
IEC 61828	2001	Ultrasonics - Focusing transducers - Definitions and measurement methods for the transmitted fields	EN 61828	2001

# INTERNATIONAL STANDARD

# IEC 62092

First edition  
2001-08

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## Ultrasonics – Hydrophones – Characteristics and calibration in the frequency range from 15 MHz to 40 MHz

*Ultrasons – Hydrophones –  
Caractéristiques et étalonnage dans la gamme  
de fréquences de 15 MHz à 40 MHz*



Reference number  
IEC 62092:2001(E)

## Publication numbering

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# INTERNATIONAL STANDARD

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First edition  
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# INTERNATIONAL ELECTROTECHNICAL COMMISSION

## ULTRASONICS – HYDROPHONES – CHARACTERISTICS AND CALIBRATION IN THE FREQUENCY RANGE FROM 15 MHz TO 40 MHz

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International Standard IEC 62092 has been prepared by IEC technical committee 87: Ultrasonics.

The text of this standard is based on the following documents:

FDIS	Report on voting
87/203A/FDIS	87/209/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

Annexes A, B, C, D and E are for information only.

The committee has decided that the contents of this publication will remain unchanged until 2006. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

## INTRODUCTION

The spatial and temporal distribution of acoustic pressure in an ultrasonic field in a liquid medium is commonly determined using miniature ultrasonic **hydrophones**. The characteristics and calibration of these **hydrophones** have been dealt with in a number of IEC standards in the frequency range 0,5 MHz to 15 MHz. The purpose of this International Standard is to extend this frequency range up to 40 MHz. The main **hydrophone** application in this context is the measurement of ultrasonic fields emitted by medical diagnostic equipment in water. It has turned out in recent years that **hydrophone** operation in the frequency range above 15 MHz is important to characterize fully this equipment, primarily due to the increased appearance of high-frequency components in the ultrasonic signals, caused by nonlinear propagation. In addition, the number of medical ultrasonic systems which use frequencies above 15 MHz, particularly intra-operative probes, is growing.

While the term "**hydrophone**" can be used in a wider sense, it is understood here as referring to miniature piezoelectric **hydrophones**. It is this instrument type which is used today in various areas of medical ultrasonics and particularly to characterize quantitatively the field structure of medical diagnostic instruments. With regard to other pressure sensor types such as those based on fibre optics, some of the prescriptions of this International Standard are applicable to these as well but others are not. If in the future these other "**hydrophone**" types gain more importance in field measurement practice, their characteristics and calibration will have to be dealt with in a revised version of this International Standard or in a separate one.

In agreement with present measurement practice, **hydrophones** are dealt with in this International Standard as amplitude sensors and not as phase sensors. If phase measurements were to become important in the future, this standard would need revision, with more rigorous requirements being necessary for that kind of measurement.

NOTE 1 Accordingly, the **hydrophone** sensitivity is understood as a real quantity (expressing the ratio of amplitudes) throughout this International Standard.

NOTE 2 This International Standard covers the frequency range from 15 to 40 MHz. **Hydrophone** properties and **hydrophone** calibration up to 15 MHz are covered by the International Standards IEC 60866 and IEC 61101. In practice, the useful frequency range of a **hydrophone** may well extend into both frequency ranges, below and above 15 MHz. It has therefore been the aim to keep the regulations of this International Standard as far as possible similar to those of the aforementioned standards. Differences are due either to different technical needs in the respective frequency ranges or to the technical and scientific progress achieved since the publication of the aforementioned standards. At present there are maintenance activities aiming at re-structuring and merging, where possible, all existing **hydrophone** standards. It can be expected that this will lead to unified standards covering the whole field of practical **hydrophone** application.

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