Calibration of fibre-optic power meters

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 61315:2019 sisaldab Euroopa standardi EN IEC 61315:2019 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 61315:2019 consists of the English text of the European standard EN IEC 61315:2019.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 17.05.2019.	Date of Availability of the European standard is 17.05.2019.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 33.140, 33.180.10

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 61315

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ICS 33.140; 33.180.10

Supersedes EN 61315:2006

English Version

Calibration of fibre-optic power meters (IEC 61315:2019)

Étalonnage de wattmètres pour dispositifs à fibres optiques (IEC 61315:2019)

Kalibrierung von Lichtwellenleiter-Leistungsmessgeräten (IEC 61315:2019)

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

The text of document 86/533/CDV, future edition 3 of IEC 61315, prepared by IEC/TC 86 "Fibre optics" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61315:2019.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2020-02-03
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-05-03

This document supersedes EN 61315:2006.

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

Endorsement notice

The text of the International Standard IEC 61315:2019 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61040:1990	NOTE	Harmonized as EN 61040:1992 (not modified)
IEC 60793-1-1	NOTE	Harmonized as EN 60793-1-1
IEC 60793-1-43:2015	NOTE	Harmonized as EN 60793-1-43:2015 (not modified)
IEC 60825-1	NOTE	Harmonized as EN 60825-1
IEC 60825-2	NOTE	Harmonized as EN 60825-2
IEC 61280-4-1	NOTE	Harmonized as EN 61280-4-1
IEC 61300-3-2:2009	NOTE	Harmonized as EN 61300-3-2:2009 (not modified)
IEC 60359:2001	NOTE	Harmonized as EN 60359:2002 (not modified)
ISO/IEC 17025	NOTE	Harmonized as EN ISO/IEC 17025

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60793-2	-	Optical fibres - Part 2: Product specifications - General	EN 60793-2	-
IEC/TR 61931	1998	Fibre optic - Terminology	-	-
ISO/IEC Guide 98-3	2008	Uncertainty of measurement - Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)	-	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

CALIBRATION OF FIBRE-OPTIC POWER METERS

FOREWORD

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International Standard IEC 61315 has been prepared by IEC technical committee 86: Fibre optics.

This third edition cancels and replaces the second edition published in 2005. It constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) update of terms and definitions;
b) update of 5.1, including Table 1 (new type of source);
c) update of Annex A;
d) addition of Annex B on dB conversion.

The text of this International Standard is based on the following documents:

CDV	Report on voting
86/533/CDV	86/540A/RVC

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

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

In this document, the following print types are used:

– *terms defined in the document: in italic type.*

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Fibre-optic power meters are designed to measure optical power from fibre-optic sources as accurately as possible. This capability depends largely on the quality of the *calibration* process. In contrast to other types of measuring equipment, the *measurement results* of *fibre-optic power meters* usually depend on many conditions of measurement. The conditions of measurement during the *calibration* process are called *calibration conditions*. Their precise description is therefore an integral part of the *calibration*.

This document defines all of the steps involved in the *calibration* process: establishing the *calibration conditions*, carrying out the *calibration*, calculating the uncertainty, and reporting the uncertainty, the *calibration conditions* and the *traceability*.

The absolute power *calibration* describes how to determine the ratio between the value of the input power and the power meter's result. This ratio is called *correction factor*. The measurement uncertainty of the *correction factor* is combined following Annex A from uncertainty contributions from the *reference meter*, the *test meter*, the setup and the procedure.

The calculations go through detailed characterizations of individual uncertainties. It is important to know that

a) some uncertainties are type B estimations, experience-based,

b) a detailed uncertainty analysis is usually only done once for each power meter type under test, and all subsequent *calibrations* are usually based on this one-time analysis, using the appropriate type A measurement contributions evaluated at the time of the *calibration*, and

c) some of the individual uncertainties are simply considered to be part of a checklist, with an actual value which can be neglected.

Clause 5 defines absolute power *calibration*, which is mandatory for *calibration* reports referring to this document.

Clause 6 describes the evaluation of the measurement uncertainty of a calibrated power meter operated within *reference conditions* or within *operating conditions*. It depends on the *calibration* uncertainty of the power meter as calculated in 5.4, the conditions and its dependence on the conditions. It is usually performed by manufacturers in order to establish specifications and is not mandatory for reports referring to this document. One of these dependences, the *nonlinearity*, is determined in a separate *calibration* (Clause 7).