SLOVENSKI STANDARD
SIST EN IEC 61757-4-3:2020

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Optični senzorji - 4-3. del: Merjenje električnega toka - Polarimetrijska metoda (IEC 61757-4-3:2020)

Fibre optic sensors - Part 4-3: Electric current measurement - Polarimetric method (IEC 61757-4-3:2020)

Lichtwellenleitersensoren - Teil 4-3: Strommessung - Polarimetrisches Verfahren (IEC 61757-4-3:2020)

Capteurs fibroniques - Partie 4-3: Mesure du courant électrique - Méthode polarimétrique (IEC 61757-4-3:2020)

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ICS:

33.180.99	Druga oprema za optična vlakna	Other fibre optic equipment

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Fibre optic sensors - Part 4-3: Electric current measurement - Polarimetric method (IEC 61757-4-3:2020)

Capteurs fibroniques - Partie 4-3: Mesure du courant électrique - Méthode polarimétrique (IEC 61757-4-3:2020)

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

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European foreword

The text of document 86C/1578/CDV, future edition 1 of IEC 61757-4-3, prepared by SC 86C "Fibre optic systems and active devices" of IEC/TC 86 "Fibre optics" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61757-4-3:2020.

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) 2021-06-03
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-09-03

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Endorsement notice

The text of the International Standard IEC 61757-4-3:2020 was approved by CENELEC as a European Standard without any modification.

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 61757	-	Fibre optic sensors - Generic specification	EN IEC 61757	-

IEC 61757-4-3

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fibre optic sensors –
Part 4-3: Electric current measurement – Polarimetric method

Capteurs fibroniques –
Partie 4-3: Mesure du courant électrique – Méthode polarimétrique

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FIBRE OPTIC SENSORS –

Part 4-3: Electric current measurement – Polarimetric method

FOREWORD

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International Standard IEC 61757-4-3 has been prepared by subcommittee SC 86C: Fibre optic systems and active devices, of IEC technical committee TC 86: Fibre optics.

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

CDV	Report on voting
86C/1578/CDV	86C/1611/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.

A list of all parts in the IEC 61757 series, published under the general title *Fibre optic sensors*, can be found on the IEC website.

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.

INTRODUCTION

Current measuring techniques are essential for controlling and diagnosing apparatus that support industry and society. As current measuring devices, optical current sensors based on magneto-optic effect have been developed. As these sensors enable advanced current measurement free from the issues related to conventional current sensors based on electromagnetic induction, they have been applied in various fields including power systems.

Given the expectations for the potential of this sensing technology, various kinds of optical current sensors for various applications have been proposed by manufacturers. With this background, there are many kinds (target current for measurement, configuration of sensor, signal processing method, installation method) of optical current sensors for various applications. When developing a new optical current sensor, the evaluation and design of performance and characteristics are carried out in each case.

For promoting the dissemination of optical current sensors, it is important to define the terms representing performance and functionality of the optical current sensor, which is manufactured on the basis of sensing technology. It is also important to make clear how to evaluate such terms. This makes it possible to design the sensor efficiently and properly and to transfer the sensor smoothly from a supplier to a user by settling these issues. Under these circumstances, a set of methods is summarized in this document for evaluating the performance and characteristics of optical current sensors. As the required performance for a sensor depends on its application, the performance is not defined quantitatively in this document. However, with the help of this document, the quantitative measures of sensor performance will be defined in designing the sensor itself in anticipation of its practical application.

This document is based on standard OITDA FS 01 published by the Optoelectronics Industry and Technology Development Association (OITDA).

FIBRE OPTIC SENSORS –

Part 4-3: Electric current measurement – Polarimetric method

1 Scope

This part of IEC 61757 defines terminology, structure, and a characteristic test method of an optical current sensor using the polarimetric method. It addresses the current sensing element only and not the additional devices that are unique to each application. Generic specifications for fibre optic sensors are defined in IEC 61757.

As the specifications of optical polarimetric fibre current sensors required by each user vary depending on the application, this document does not define the required performance values. The required performance values are defined when designing a sensor according to the specific application.

2 Normative references

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.

IEC 61757, *Fibre optic sensors – Generic specification*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61757 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
current conducting coil
air-core coil made of lead wires that applies electric current, which is used to apply the equal magnetic field generated by the current to be measured to an optical fibre or a bulk-form Faraday element when conducting a characteristic test of optical current sensor

3.2
external magnetic field
magnetic field generated from anywhere other than the conductor where the current to be measured is passing in an optical current sensor

3.3
Faraday effect
circular birefringence that is generated when an external magnetic field is imposed on a substance

Note 1 to entry: The Faraday effect is a kind of magneto-optical effect. "Magneto-optical effect" is a general term that means the effect of a magnetic field on the optical characteristics of particles or crystal. In addition to the Faraday effect, there are other magneto-optical effects such as the Zeeman effect, magnetic birefringence, magnetic circular dichroism, the magnetic Kerr effect, and magneto-oscillatory absorption.

3.4
Faraday element
optical element for detecting Faraday effect

3.5
Faraday mirror
reflecting mirror that rotates the polarization angle by the Faraday effect

3.6
intensity modulation method
method of converting the rotation of a polarization plane to light intensity and generating an optical signal that corresponds to the current to be measured by passing light, first through a sensing element and then through a polarization separation element, in an optical current sensor

3.7
interferometric method
method of generating an optical signal that corresponds to the current to be measured by an optical current sensor by converting the left-handed and right-handed circularly polarized light that passed through the Faraday element to the same polarization, then interfering with each other to convert the polarized light to the light intensity

3.8
maximum measurable current
maximum measurable value of the current to be measured by an optical current sensor

3.9
maximum measurable frequency
maximum measurable frequency of the current to be measured by an optical current sensor

3.10
minimum measurable frequency
minimum measurable frequency of the current to be measured by an optical current sensor

3.11
operating temperature range
range of temperatures within which an optical current sensor satisfies the defined performances

3.12
optical current sensor
part, module, sub-assembly, assembly, or equipment that measures the electric current using fibre optic technology

Note 1 to entry: Optical current sensors are commonly used with power supplies, user interface, and electromagnetic shields, as shown in Figure 1. The output signal is arranged in a signal form required by the output interface, and a signal is sent to an application system such as an oscilloscope or a control system. An optical current sensor using the polarimetric method consists of the sensor part, optical transmission part, and signal processing part (see Clause 4).