MÕÕTETRAFOD. OSA 14: ERINÕUDED ALALISVOOLU VOOLUTRAFODELE

Instrument transformers - Part 14: Additional requirements for current transformers for DC applications

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 61869-14:2019 sisaldab Euroopa standardi EN IEC 61869-14:2019 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 61869-14:2019 consists of the English text of the European standard EN IEC 61869-14:2019.
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 05.07.2019.	Date of Availability of the European standard is 05.07.2019.
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 17.200.20

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 61869-14

July 2019

ICS 17.200.20

English Version

Instrument transformers - Part 14: Additional requirements for current transformers for DC applications (IEC 61869-14:2018)

Transformateurs de mesure - Partie 14: Exigences supplémentaires concernant les transformateurs de courant pour application en courant continu (IEC 61869-14:2018)

Messwandler - Teil 14: Besondere Anforderungen für Gleichstromwandler (IEC 61869-14:2018)

This European Standard was approved by CENELEC on 2018-08-21. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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

Ref. No. EN IEC 61869-14:2019 E

European foreword

The text of document 38/560/FDIS, future edition 1 of IEC 61869-14, prepared by IEC/TC 38 "Instrument transformers" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61869-14:2019.

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) 2020-01-05
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-07-05

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.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

Endorsement notice

The text of the International Standard IEC 61869-14:2018 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.

Clause 2 of IEC 61869-6:2016 is applicable, with the following additions and modifications:

Publication	Year	Title	EN/HD	Year
IEC/TS 60815-4	2019	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 4: Insulators for d.c. systems	-	-
IEC/TS 61245:2015	2015	Artificial pollution tests on high-voltage ceramic and glass insulators to be used on d.c. systems	-	-
IEC 61869-6	2016	Instrument transformers - Part 6: Additional general requirements for low-power instrument transformers	EN 61869-6	2016
IEC 61869-9	2016	Instrument transformers - Part 9: Digital interface for instrument transformers	EN IEC 61869-9	2019

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

INSTRUMENT TRANSFORMERS –

Part 14: Additional requirements for current transformers for DC applications

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61869-14 has been prepared by IEC technical committee 38: Instrument transformers.

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

FDIS	Report on voting
38/560/FDIS	38/565/RVD

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 61869 series, published under the general title *Instrument transformers*, can be found on the IEC website.

This Part 14 is to be used in conjunction with, and is based on, IEC 61869-1:2007, *General requirements*, and IEC 61869-6:2016, *Additional general requirements for low-power instrument transformers* – however the reader is encouraged to use the most recent editions.

This Part 14 follows the structure of IEC 61869-1:2007 and IEC 61869-6:2016 and supplements or modifies their corresponding clauses.

When a subclause of Part 1 or Part 6 is not mentioned in this Part 14, that subclause applies. When this standard states “addition”, “modification” or “replacement”, the relevant text in Part 1 or Part 6 is to be adapted accordingly.

For additional clauses, subclauses, figures, tables, annexes or notes, the following numbering system is used:

- clauses, subclauses, tables, figures and notes that are numbered starting from 1401 are additional to those in Part 1 and Part 6;
- additional annexes are lettered 14A, 14B, etc.

An overview of the planned set of standards at the date of publication of this document is given below. The updated list of standards issued by IEC TC 38 is available at the website: www.iec.ch

PRODUCT FAMILY STANDARDS		PRODUCT STANDARD	PRODUCTS	OLD STANDARD
61869-1 GENERAL REQUIREMENTS		61869-2	ADDITIONAL REQUIREMENTS FOR CURRENT TRANSFORMERS	60044-1 60044-6
		61869-3	ADDITIONAL REQUIREMENTS FOR INDUCTIVE VOLTAGE TRANSFORMERS	60044-2
		61869-4	ADDITIONAL REQUIREMENTS FOR COMBINED TRANSFORMERS	60044-3
		61869-5	ADDITIONAL REQUIREMENTS FOR CAPACITIVE VOLTAGE TRANSFORMERS	60044-5
	61869-6 ADDITIONAL GENERAL REQUIREMENTS FOR LOW-POWER INSTRUMENT TRANSFORMERS	61869-7	ADDITIONAL REQUIREMENTS FOR ELECTRONIC VOLTAGE TRANSFORMERS	60044-7
		61869-8	ADDITIONAL REQUIREMENTS FOR ELECTRONIC CURRENT TRANSFORMERS	60044-8
		61869-9	DIGITAL INTERFACE FOR INSTRUMENT TRANSFORMERS	
		61869-10	ADDITIONAL REQUIREMENTS FOR LOW-POWER PASSIVE CURRENT TRANSFORMERS	
		61869-11	ADDITIONAL REQUIREMENTS FOR LOW-POWER PASSIVE VOLTAGE TRANSFORMERS	60044-7
		61869-12	ADDITIONAL REQUIREMENTS FOR COMBINED ELECTRONIC INSTRUMENT TRANSFORMER OR COMBINED LOW-POWER PASSIVE TRANSFORMERS	
		61869-13	STAND ALONE MERGING UNIT	
		61869-14	ADDITIONAL REQUIREMENTS FOR CURRENT TRANSFORMERS FOR DC APPLICATIONS	
		61869-15	ADDITIONAL REQUIREMENTS FOR VOLTAGE TRANSFORMERS FOR DC APPLICATIONS	

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

General

This document applies to current transformers intended to be used in DC applications with at least one of the following functions:

- measure DC current (with significant harmonics);
- withstand DC voltage.

Depending on the position of the current transformer on the DC system, different kinds of application exist, which are briefly described below, together with the approximate voltage or current wave shape.

Line-commutated converters (LCC)

Line-commutated converters (LCC) are based on thyristor converters (see Figure 1401). They are characterized by a single direction of current flow, and a voltage polarity reversal possibility. Significant voltage and current harmonics exist up to frequencies of about 3 kHz to 4 kHz.

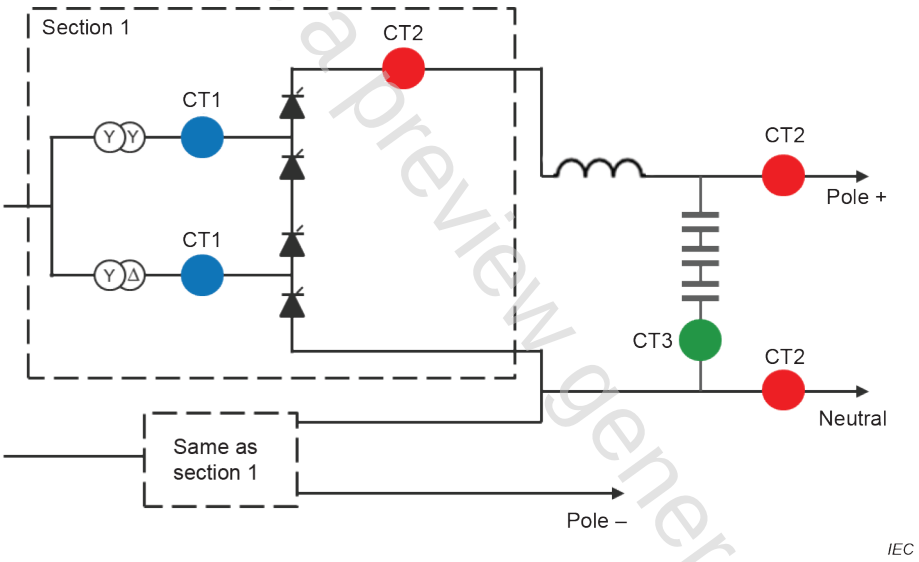


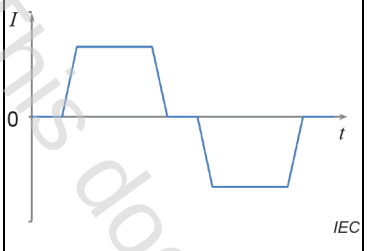
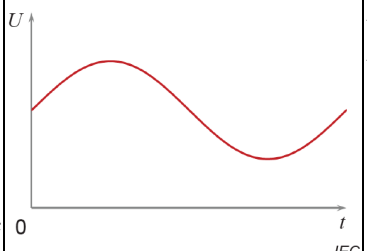
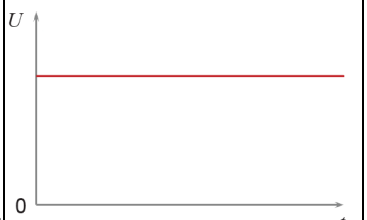
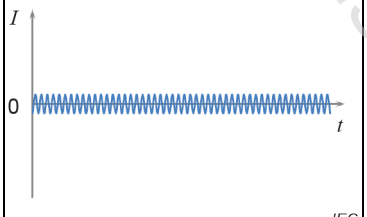
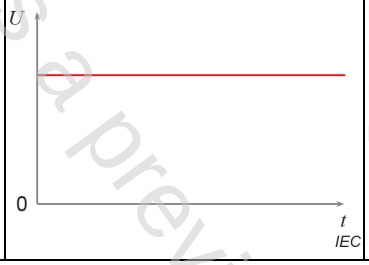
Figure 1401 – Example of LCC scheme

We distinguish three different current-measurement functions:

- CT1: measurement of the current at the AC side of the converter;
- CT2: measurement of the current at the DC side of the converter;
- CT3: measurement of the current in the DC filter.

Table 1401 gives an overview of the current and voltage waveshapes as well as the main characteristics of the different applications of the CT.

Table 1401 – Current and voltage in current transformers for LCC application

	Current	Voltage	Characteristics
CT1			AC current AC + DC voltage Large amount of current harmonics Mainly for protection purposes
CT2			Pure DC application High-accuracy measurement Harmonics measurement Metering, control and protection purposes
CT3			DC voltage stress with harmonics DC current = 0 Harmonics measurement Mainly for protection purposes

Voltage-source converters (VSC)

Voltage-source converters (VSC) are based on transistor converters. They are characterized by a bi-directional current flow and a single voltage polarity. Voltage and current harmonics exist up to frequencies of about 20 kHz.

Two variants of VSC schemes exist: symmetrical monopoles (using one single converter) and asymmetrical monopole or bipole (with one converter for each polarity).

Both schemes are shown in Figure 1402 and Figure 1403.

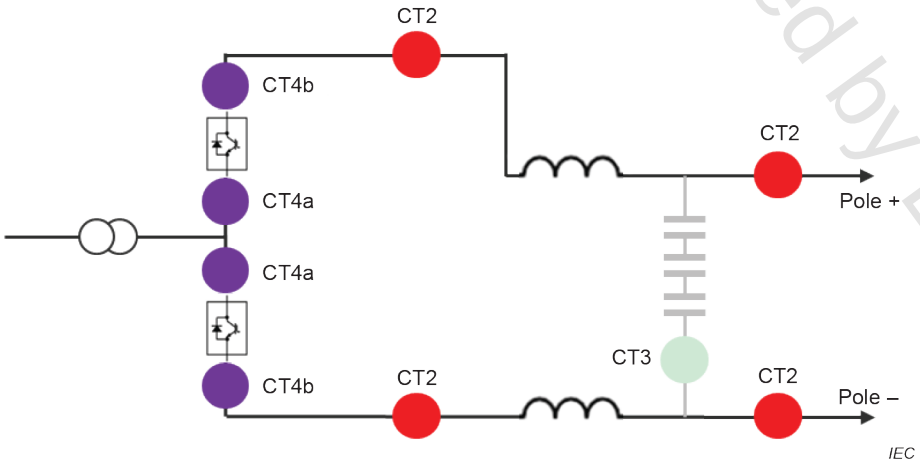


Figure 1402 – Typical scheme for VSC – symmetrical monopole

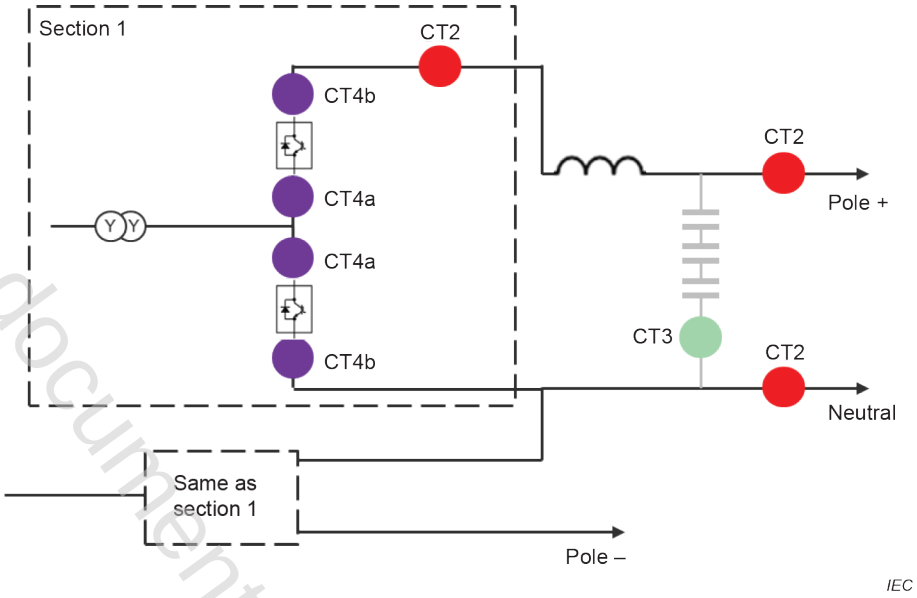


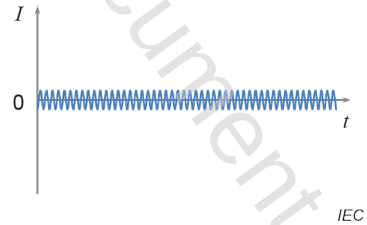
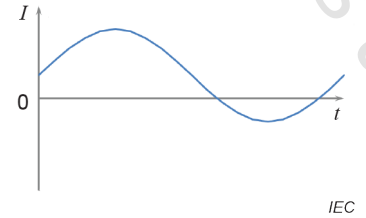
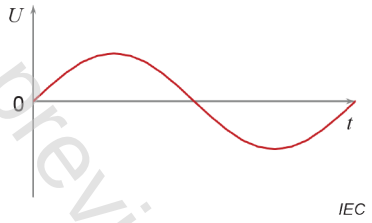
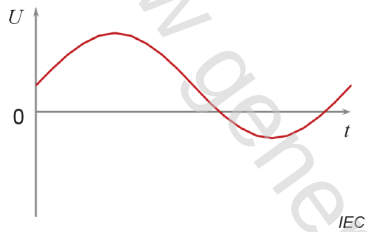
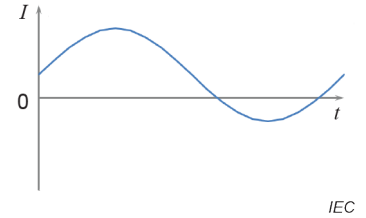
Figure 1403 – Typical scheme for VSC – asymmetrical monopole or bipole

We distinguish three different current-measurement functions:

- CT4: measurement of the current in the transistor branches of the converter.
  The CT can be placed before (CT4a) or after the transistor branch (CT4b);
- CT2: measurement of the current at the DC side of the converter;
- CT3: measurement of the current in the DC filter (not always present in this scheme).

Table 1402 gives an overview of the current and voltage waveshapes as well as the main characteristics of the different applications of the CT.

Table 1402 – Current and voltage in current transformers for VSC application

	Current	Voltage	Characteristics
CT2			Pure DC application High accuracy measurement Harmonics measurement Metering, control and protection purposes Short step response time
CT3			DC voltage stress DC current = 0 Harmonics measurement Mainly for protection purposes
CT4a		Symmetrical monopole:  Asymmetrical monopoles / bipoles: 	Pure AC voltage or DC + AC voltage DC + AC current High-accuracy measurement Short step response time
CT4b			DC voltage stress DC + AC current High-accuracy measurement Short step response time