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Interested committees:

Title: BS EN IEC 61869-7 Instrument transformers

Part 7: Specific requirements for electronic Voltage Transformers

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

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SECRETARIAT:

Italy

SECRETARY:

Mr Filippo Frugoni

OF INTEREST TO THE FOLLOWING COMMITTEES:

TC 13, TC 57, TC 85, TC 95

HORIZONTAL FUNCTION(S):

ASPECTS CONCERNED:

Electromagnetic Compatibility

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TITLE:

Instrument transformers - Part 7: Specific requirements for electronic Voltage Transformers

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INSTRUMENT TRANSFORMERS –

**Part 7: Specific requirements
for low power voltage transformers**

FOREWORD

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International Standard IEC 61869-7 has been prepared by IEC technical committee 38: Instrument transformers.

This first edition of IEC 61869-7 cancels and replaces the IEC 60044-7, published in 2002¹, and IEC 61869-11 for low power voltage transformer part. IEC 61859-11 continues to be active for all voltage sensors (with secondary signal non proportional to primary current).

¹ IEC 60044-7 and IEC 60044-8 will eventually be replaced by the IEC 61869 series, but until all the relevant parts will be published, these two standards are still in force.

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

FDIS	Report on voting
38/XXX/FDIS	38/XXX/RVD

408
409 Full information on the voting for the approval of this standard can be found in the report on
410 voting indicated in the above table.

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

412 A list of all parts in the IEC 61869 series, published under the general title *Instrument*
413 *transformers*, can be found on the IEC website.

414 This Part 7 is to be read in conjunction with, and is based on, IEC 61869-1:2023, *Part 1: General*
415 *Requirements*.

416 This Part 7 follows the structure of IEC 61869-1:2023 and supplements or modifies its
417 corresponding clauses.

418 When a particular clause/subclause of Part 1 is not mentioned in this Part 7, that
419 clause/subclause applies. When this standard states “addition”, “modification” or “replacement”,
420 the relevant text in Part 1 is to be adapted accordingly.

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

- 423 – clauses, subclauses, tables, figures and notes that are numbered starting from 701 are
424 additional to those in Part 1;
- 425 – additional annexes are lettered 7A, 7B, etc.

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

Product family standard	Product standard	Title
61869-1 General requirements	61869-2	Specific requirements for current transformers
	61869-3	Specific requirements for inductive voltage transformers
	61869-4	Specific requirements for combined transformers
	61869-5	Specific requirements for capacitive voltage transformers
	61869-7	Specific requirements for low-power voltage transformers
	61869-8	Specific requirements for low-power current transformers
	61869-9	Digital interface for instrument transformers
	61869-10	Current sensors
	61869-11	Voltage sensors
	61869-12	Specific requirements for combined low-power instrument 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
	61869-16	TEDS (Transducer Electronic Data Sheet) for instrument transformers
	61869-99	Instrument transformers: Glossary

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

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

A bilingual version of this publication may be issued at a later date.

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

This document covers all kind of LPVT (low power voltage transformers), which includes both EVTs (electronic voltage transformers) and passive voltage dividers with, according to Clause 3.1.1 of IEC 61869-99, secondary voltage proportional to instantaneous primary voltage. All requirements, ratings and test procedures for passive low power voltage transformers, formerly present in IEC 61860-11, have been transferred into this publication without major modifications but with minor modifications where deemed necessary. IEC 61869-11 Ed.2 will cover only voltage sensors.

Figures 701 to 703 are showing different use cases with different applicability of the present publication. They refer to the analog output, but the same principle is applicable to devices with digital output.

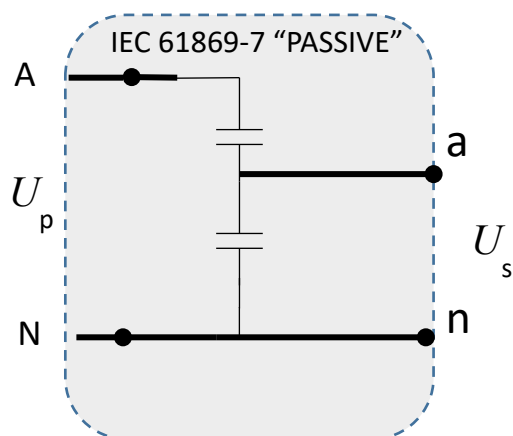


Figure 701 – Example of LPVT : “passive” voltage divider

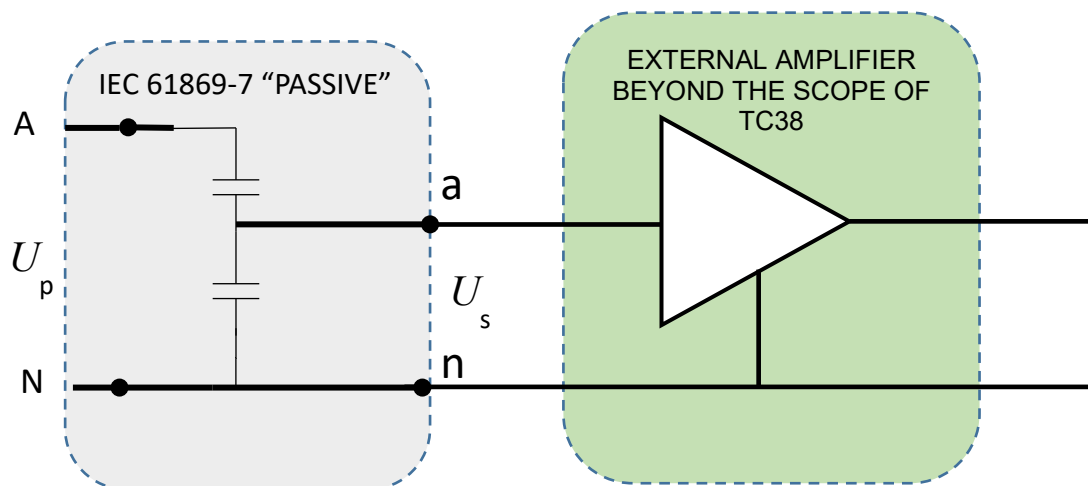


Figure 702 – Example of LPVT : “passive” voltage divider with external amplifier

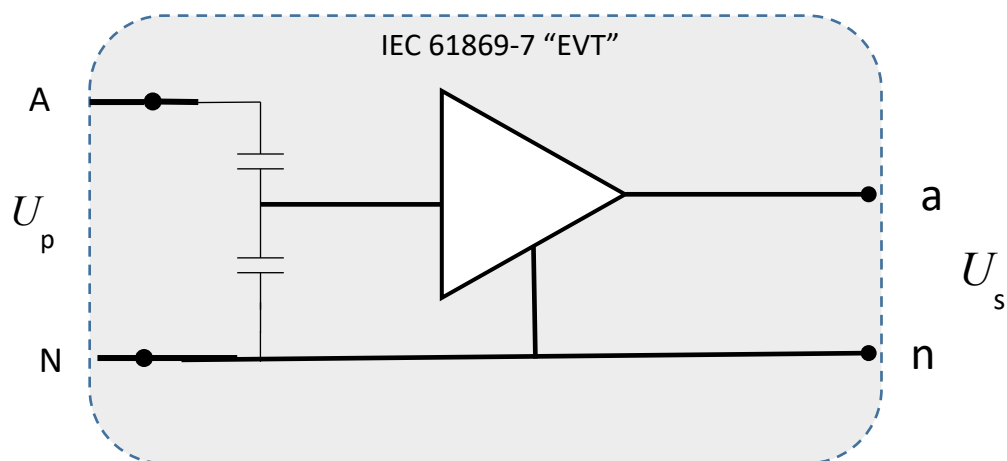


Figure 703 – Example of LPVT: EVT (electronic voltage transformer)

An Informative Annex (Annex 7B) is dedicated to procedures for correction of transformation ratio and phase of LPVT (according to Clauses 3.5.63 and 3.5.67 of IEC 61869-99) as well as for correction of instantaneous secondary voltage to improve the accuracy class of the LPVT.

INSTRUMENT TRANSFORMERS –

Part 7: Specific requirements for low power voltage transformers

1 Scope

This part of IEC 61869 is a product standard and covers additional requirements for low power voltage transformers (LPVT), with both passive and active technologies (EVT), used for AC applications having rated frequencies from 15 Hz to 400 Hz and nominal voltage above 1 kV.

An LPVT may include any arrangement of electrical, electronic, optical, magnetic or other technologies.

For analogue secondary signal, this standard specifies rated secondary voltage.

For digital secondary signal, this standard refers to IEC 61869-9.

2 Normative reference

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61869-1:2023, *Instrument transformers – Part 1: General requirements*

IEC 61869-3:2012, *Instrument Transformers - Part 3: Additional requirements for inductive voltage transformers*

IEC 61869-9:2016, *Instrument transformers – Part 9: Digital interface for instrument transformers*

IEC 61869-99:2022, *Instrument transformers - Part 99: Glossary*

IEC 60060-1:2010, *High-Voltage Test Techniques - Part 1: General definitions and test requirements*

IEC 61000-4-17:1999+AMD1:2001+AMD2:2008, *Electromagnetic Compatibility (EMC) - Part 4-17: Testing and measurement techniques - ripple on d.c. Input power port immunity test*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions from IEC 61869-99:2022 apply.

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

- IEC Electropedia: available at <https://www.electropedia.org/>;
- ISO Online browsing platform: available at <https://www.iso.org/obp>.

3.2 Index of abbreviations

The subclause 3.2 of IEC 61869-1:2023 applies with the following additions:

MTTF	Mean operating Time To Failure
U_{ar}	rated auxiliary power supply voltage

4 Normal and special environmental conditions

4.1 General

The subclause 4.1 of IEC 61869-1:2023 applies.

4.2 Normal environmental conditions

4.2.1 Ambient air temperature

The subclause 4.2.1 of IEC 61869-1:2023 applies.

4.2.2 Altitude

The subclause 4.2.2 of IEC 61869-1:2023 applies.

4.2.3 Vibrations or earth tremors

The subclause 4.2.3 of IEC 61869-1:2023 applies.

4.2.4 Exposure to pollution

The subclause 4.2.4 of IEC 61869-1:2023 applies.

4.2.5 Other environmental conditions for indoor instrument transformers

The subclause 4.2.5 of IEC 61869-1:2023 applies.

4.2.6 Other environmental conditions for outdoor instrument transformers

The subclause 4.2.6 of IEC 61869-1:2023 applies.

4.2.7 IT with outdoor parts

The subclause 4.2.7 of IEC 61869-1:2023 applies.

4.3 Special environmental conditions

4.3.1 General

The subclause 4.3.1 of IEC 61869-1:2023 applies.

4.3.2 Altitude

4.3.2.1 Influence of altitude on external insulation

The subclause 4.3.2.1 of IEC 61869-1:2023 applies.

4.3.2.2 Influence of altitude on temperature rise

The subclause 4.3.2.2 of IEC 61869-1:2023 applies.

4.3.3 Ambient temperature

The subclause 4.3.3 of IEC 61869-1:2023 applies.

4.3.4 Vibrations or earth tremors

The subclause 4.3.4 of IEC 61869-1:2023 applies.

4.3.5 Earthquakes

The subclause 4.3.5 of IEC 61869-1:2023 applies.

5 Ratings**5.1 General**

The subclause 5.1 of IEC 61869-1:2023 applies.

5.2 Voltage ratings**5.2.1 Highest voltage for equipment (U_m)**

The subclause 5.2.1 of IEC 61869-1:2023 applies.

5.2.2 Power system earthing

The subclause 5.2.2 of IEC 61869-1:2023 applies.

5.2.3 Standard values for rated primary voltage (U_{pr})

The standard values of rated primary voltage of an LPVT connected between one line of a three-phase system and earth shall be $1/\sqrt{3}$ times the values of the rated system voltage.

Preferred values are given in Table 701 and are based on IEC 60038.

Table 701 – Rated primary voltage (U_{pr}) levels for instrument transformers for AC applications

Highest voltage for equipment U_m (RMS) kV	Rated primary voltage U_{pr} phase to ground (RMS) kV
3,6	$3,3/\sqrt{3}$
7,2	$6,6/\sqrt{3}$
12	$11/\sqrt{3}$
17,5	$15/\sqrt{3}$
24	$22/\sqrt{3}$
36	$33/\sqrt{3}$
52	$45/\sqrt{3}$
72,5	$66/\sqrt{3}$ $69/\sqrt{3}$
100	$95/\sqrt{3}$
123	$110/\sqrt{3}$

	$115/\sqrt{3}$
145	$132/\sqrt{3}$ $138/\sqrt{3}$
170	$154/\sqrt{3}$
245	$220/\sqrt{3}$ $230/\sqrt{3}$
300	$275/\sqrt{3}$ $285/\sqrt{3}$
362	$345/\sqrt{3}$
420	$380/\sqrt{3}$ $400/\sqrt{3}$
550	$525/\sqrt{3}$
800	$765/\sqrt{3}$
1 100	$1\,050/\sqrt{3}$
1 200	$1\,140/\sqrt{3}$

547

548 The standard values for rated primary voltage U_{pr} given in Table 701 cover the individual
 549 country-dependent values with a tolerance of $\pm 10\%$ limited to U_m value. Within the range of
 550 $\pm 10\%$ limited to U_m value all country-dependent primary voltage levels are allowed to use.

551 NOTE The performance of an LPVT as a measuring or protection transformer is based on the rated primary voltage
 552 U_{pr} whereas the rated insulation level is based on one of the highest voltages for equipment U_m of IEC 60071-1.

553 5.2.4 Standard values for rated secondary voltage (U_{sr})

554 The rated secondary voltage shall be chosen according to the practice at the location where
 555 the transformer is to be used. The standard values of rated secondary signal, U_{sr} , for LPVT
 556 intended to be used phase-to-earth in three-phase systems are

$$557 \quad 3.25/\sqrt{3} \text{ V} - 100/\sqrt{3} \text{ V}$$

558 For LPVT used for a range of rated primary voltages, the rated secondary signal shall apply to
 559 one of the rated primary voltages, or alternatively a rated transformation ratio (e.g. 10'000/1).

560 5.2.5 Rated auxiliary power supply voltage (U_{ar})

561 5.2.5.1 General

562 The subclause 5.2.5.1 of IEC 61869-1:2023 applies.

563 5.2.5.2 Rated AC auxiliary voltage

564 The subclause 5.2.5.2 of IEC 61869-1:2023 applies.

565 5.2.5.3 Rated DC auxiliary voltage

566 The subclause 5.2.5.3 of IEC 61869-1:2023 applies.

5.2.5.4 Insulation requirements for power supply terminals

The subclause 5.2.5.4 of IEC 61869-1:2023 applies.

5.3 Current Ratings**5.3.1 Standard values for rated primary current (I_{pr})**

The subclause 5.3.1 of IEC 61869-1:2023 does not apply.

5.3.2 Standard values of rated secondary current (I_{sr})

The subclause 5.3.2 of IEC 61869-1:2023 does not apply.

5.3.3 Standard value of rated continuous thermal current (I_{cth})

The subclause 5.3.3 of IEC 61869-1:2023 does not apply.

5.3.4 Short time current ratings**5.3.4.1 Rated short-time thermal current (I_{th})**

The subclause 5.3.4.1 of IEC 61869-1:2023 does not apply.

5.3.4.2 Rated dynamic current (I_{dyn})

The subclause 5.3.4.2 of IEC 61869-1:2023 does not apply.

5.3.4.3 Rated internal arc fault current (I_{arc})

The subclause 5.3.4.3 of IEC 61869-1:2023 does not apply.

5.4 Dielectric ratings**5.4.1 General**

The subclause 5.4.1 of IEC 61869-1:2023 applies.

5.4.2 Rated primary terminal insulation level

Subclause 5.4.2 of IEC 61869-1:2023 applies.

5.4.3 Other requirements for primary terminal insulation**5.4.3.1 Partial discharges**

Subclause 5.4.3.1 of IEC 61869-1:2023 applies.

5.4.3.2 Chopped lightning impulse

Subclause 5.4.3.2 of IEC 61869-1:2023 applies.

5.4.3.3 Capacitance and dielectric dissipation factor ($\tan\delta$)

Subclause 5.4.3.3 of IEC 61869-1:2023 applies.

5.4.4 Between-section insulation requirements

Subclause 5.4.4 of IEC 61869-1:2023 applies.