

AS 61869.1:2024
IEC 61869-1:2023



STANDARDS
Australia



Instrument transformers

Part 1: General requirements (IEC 61869-1:2023 (ED 2.0) MOD)

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AS 61869.1:2024

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Instrument transformers

Part 1: General requirements (IEC 61869-1:2023 (ED 2.0) MOD)

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Preface

This Standard was prepared by the Australian members of Standards Australia Committee EL-013, Measurement And Protection Transformers to supersede AS 61869.1:2021.

The objective of this document is to provide general requirements for newly manufactured instrument transformers intended for applications where the nominal voltage is higher than 1 kV AC or 1,5 kV DC, with an analogue or a digital secondary signal for measuring, protection and control purposes, with rated frequencies from 15 Hz to 400 Hz, or for DC applications.

NOTE 1 A bushing type current transformer, although having no primary insulation level for itself is often placed on a system with a nominal voltage > 1 kV AC or > 1,5 kV DC and therefore falls within the scope of this document. Example: CT placed around an HV bushing or a cable.

This document is identical with national modifications, and has been reproduced from, IEC 61869-1:2023, *Instrument transformers — Part 1: General requirements*.

The modifications are additional requirements and are set out in [Appendix ZZ](#), which has been added at the end of the source text.

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- (a) In the source text “this part of IEC 61869” should read “this document”
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The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

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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.
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IEC 61869-1 has been prepared by IEC technical committee 38: Instrument transformers. It is an International Standard.

This second edition cancels and replaces the first edition published in 2007 and IEC 61869-6:2016. This edition constitutes a technical revision.

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

- a) merger with IEC 61869-6:2016;
- b) new scope: equipment for HV applications with a nominal voltage > 1 kV AC or 1,5 kV DC;
- c) new classification of some special tests as type tests or routine test;

- d) additional type tests, additional special tests and new clause for commissioning tests;
- e) new [annexes E, F, G](#) and [I](#).

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

Draft	Report on voting
38/718/FDIS	38/722/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 61869 series, published under the general title *Instrument transformers*, can be found on the IEC website. An overview of the planned or existing 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: <https://www.iec.ch>

Product family standard	Product standard	Title
61869-1 General requirements	61869-2	Additional requirements for current transformers
	61869-3	Additional requirements for inductive voltage transformers
	61869-4	Additional requirements for combined transformers
	61869-5	Additional requirements for capacitor voltage transformers
	61869-7	Additional requirements for low-power voltage transformers
	61869-8	Additional requirements for low-power current transformers
	61869-9	Digital interface for instrument transformers
	61869-10	Additional requirements for current sensors
	61869-11	Additional requirements for voltage sensors
	61869-12	Additional requirements for combined low-power instrument transformers
	61869-13	Stand-alone merging unit (SAMU)
	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	Glossary

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under 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 document 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 is the first revision of IEC 61869-1, defining common requirements for instrument transformers, applicable to all types or technologies.

Furthermore, the document is the result of a merger of IEC 61869-1:2007 (*General requirements*) and IEC 61869-6:2016 (*Additional general requirements for low-power instrument transformers*) with the aim of having one single document and simplify the comprehension for the reader of [LPIT](#) product-specific standards.

The main modifications of this revision are listed below:

- new scope: equipment for HV applications with a nominal voltage > 1 kV AC or 1,5 kV DC;
- transfer of the definitions to the TC 38 Glossary IEC 61869-99;
- ratings:
 - addition of HV insulation levels above 800 kV;
 - new DC insulation resistance requirements for secondary terminals;
 - additional accuracy class extensions for harmonics;
- design and construction:
 - additional mechanical requirements for EHV applications;
 - clarification of the altitude correction for external insulation and dielectric tests;
 - multiple chopped impulse test: definition of maximum gas-in-oil level before test;
 - internal arc fault protection: simplification of the acceptance criteria;
 - new requirements for storage climatic conditions withstand capability for [LPIT](#);
- type tests:
 - temperature rise test: more accurate definition of the test duration;
 - lightning impulse test: new test procedure (15 impulses) for gas-insulated and resin-insulated instrument transformers, for $U_m \geq 300$ kV;
 - switching impulse test: to be performed in both polarities in case of gas-insulated instrument transformers;
 - chopped wave impulse test: moved from special test to type test;
 - test for accuracy: to be performed with regard to the temperature range and frequency;
 - mechanical test: moved from special test to type test;
 - new specification for storage climatic environmental tests;
- routine tests:
 - partial discharge measurement: addition of record of [PD](#) inception voltage and extinction voltage;

- measurement of capacitance and $\tan\delta$: moved from special test to routine test;
- special tests:
 - transmitted overvoltage test: improved test procedure;
 - internal arc fault test: clarified test procedure;
 - new insulation resistance measurement on secondary terminals;
 - new test for resin insulated instrument transformers operating at low temperature;
 - vibration test: improvement and addition of a shock test for parts mechanically coupled to a circuit-breaker;
 - optional tests for accuracy versus harmonics and for anti-aliasing;
- commissioning tests (new clause):
 - new installation inspection;
 - gas dew point test moved from special test to commissioning tests;
 - new recommended insulation test on LV connection up to the LV cubicle;
- rules for transport, storage, erection, operation and maintenance:
 - new mandatory rules for user and manufacturer;
 - new conditions for transportation and storage;
- new annexes:
 - [Annex E](#) (informative): technique used in temperature rise test of transformers to determine the thermal time constant by an experimental estimation;
 - [Annex F](#) (informative): guidance for the extension of validity of type tests and special tests;
 - [Annex G](#) (informative): guidance for the calculation of equivalent diameter in case of irregular shape of insulating part;
 - [Annex I](#) (normative): seismic qualification of instrument transformers.

NOTES

Australian Standard®

Instrument transformers

Part 1: General requirements (IEC 61869-1:2023 (ED 2.0) MOD)

1 Scope

This part of IEC 61869 is applicable to newly manufactured instrument transformers intended for applications where the nominal voltage is higher than 1 kV AC or 1,5 kV DC, with an analogue or a digital secondary signal for measuring, protection and control purposes, with rated frequencies from 15 Hz to 400 Hz, or for DC applications.

NOTE 1 A bushing type current transformer, although having no primary insulation level for itself is often placed on a system with a nominal voltage > 1 kV AC or $> 1,5$ kV DC and therefore falls within the scope of this document. Example: [CT](#) placed around an HV bushing or a cable.

The general requirements for instrument transformers for applications in LV systems (nominal voltage ≤ 1 kV AC or $\leq 1,5$ kV DC) are covered by IEC 61869-201.

This part of IEC 61869 is a product family standard and covers general requirements only. For each type of instrument transformer, the product standard is composed of this document and the relevant specific product standard.

This part of IEC 61869 contains the requirements for the limits of the errors both for analogue and digital secondary signals. The other characteristics of a digital interface for instrument transformer are standardised in IEC 61869-9 as an application of the IEC 61850 horizontal standard series, covering communication networks and systems for power utility automation.

This part of IEC 61869 considers bandwidth requirements. The accuracy requirements on harmonics and requirements for the anti-aliasing filter are specified in [5.7](#).

In the case of an [LPIT](#), the general block diagram of single-phase devices is given in [Figure 1](#).

According to the technology, it is not always necessary that all parts described in [Figure 1](#) be included in the instrument transformer.

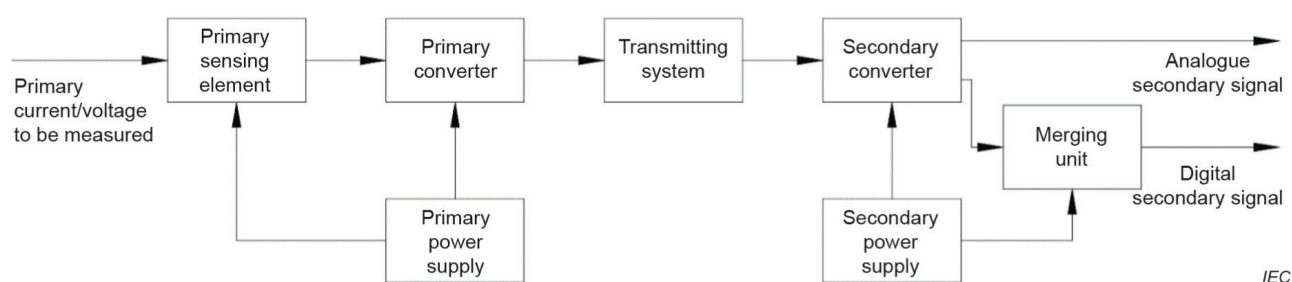


Figure 1 — General block diagram of single-phase LPITs

NOTE 2 A secondary power supply can be combined with a primary power supply or with a power supply of other instrument transformers.

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 60060-1, *High-voltage test techniques - Part 1: General definitions and test requirements*