

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Instrument transformers –  
Part 1: General requirements**

**Transformateurs de mesure –  
Partie 1: Exigences générales**



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Part 1: General requirements**

**Transformateurs de mesure –  
Partie 1: Exigences générales**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**INSTRUMENT TRANSFORMERS –****Part 1: General requirements****FOREWORD**

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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.

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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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://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

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## 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.

# INSTRUMENT TRANSFORMERS –

## Part 1: General requirements

### 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 ≤ 1,5 kV DC) are covered by IEC 61869-201.

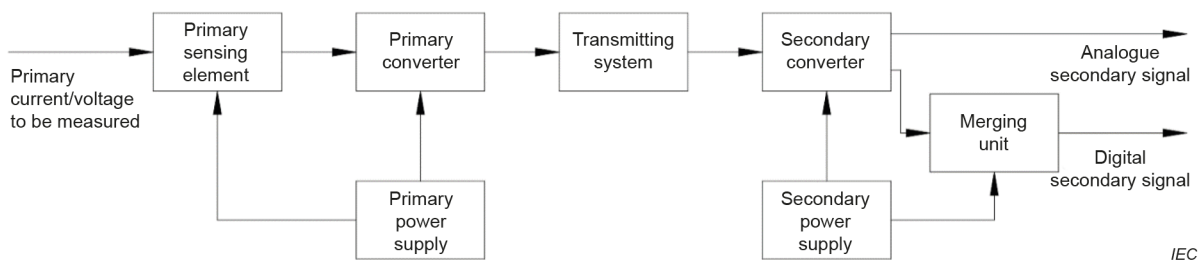
This part of IEC 61869 is a product family standard and covers general requirements only. For each type of instrument transformer, the product standard is composed of this document and the relevant specific product standard.

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.