

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Instrument transformers –**  
**Part 6: Additional general requirements for low-power instrument transformers**

**Transformateurs de mesure –**  
**Partie 6: Exigences générales supplémentaires concernant les transformateurs de mesure de faible puissance**

STANDARD PREVIEW  
(standards.iteh.ai)

IEC 61869-6:2016

https://standards.iteh.ai/catalog/standards/sis/88797566-9546-4066-

70aa82e2778/iec-61869-6-2016





## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2016 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

#### IEC Catalogue - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

#### IEC publications search - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms, containing 20 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

#### IEC Glossary - [std.iec.ch/glossary](http://std.iec.ch/glossary)

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [csc@iec.ch](mailto:csc@iec.ch).

### A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

### A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

#### Catalogue IEC - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

#### Recherche de publications IEC - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

#### Glossaire IEC - [std.iec.ch/glossary](http://std.iec.ch/glossary)

65 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

#### Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [csc@iec.ch](mailto:csc@iec.ch).

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Instrument transformers –**  
**Part 6: Additional general requirements for low-power instrument transformers**

**Transformateurs de mesure –**  
**Partie 6: Exigences générales supplémentaires concernant les transformateurs**  
**de mesure de faible puissance**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 17.220.20

ISBN 978-2-8322-4534-7

**Warning! Make sure that you obtained this publication from an authorized distributor.**  
**Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	6
1 Scope.....	10
2 Normative reference.....	10
3 Terms and definitions.....	13
3.1 General terms and definitions.....	13
3.2 Terms and definitions related to dielectric ratings and voltages.....	17
3.3 Terms and definitions related to current ratings.....	17
3.4 Terms and definitions related to accuracy.....	21
3.5 Terms and definitions related to other ratings.....	26
3.7 Index of abbreviations and symbols.....	26
4 Normal and special service conditions.....	28
4.2 Normal service conditions.....	28
4.2.3 Vibrations or earth tremors.....	28
4.2.601 Partially outdoor LPIT.....	28
5 Ratings.....	28
5.3 Rated insulation levels and voltages.....	28
5.3.5 Insulation requirements for secondary terminals.....	28
5.3.601 Rated auxiliary power supply voltage ( $U_{ar}$ ).....	28
5.4 Rated frequency.....	29
5.5 Rated output.....	29
5.5.601 Rated burden ( $R_{br}$ ).....	29
5.5.602 Standard values for the rated delay time ( $t_{dr}$ ).....	29
5.6 Rated accuracy class.....	30
6 Design and construction.....	30
6.7 Mechanical requirements.....	30
6.11 Electromagnetic compatibility (EMC).....	30
6.11.3 Requirements for immunity.....	30
6.11.4 Requirement for transmitted overvoltages.....	32
6.11.601 Emission requirements.....	32
6.13 Markings.....	33
6.601 Requirements for optical transmitting system and optical output link.....	33
6.601.1 General.....	33
6.601.2 Optical connectors.....	33
6.601.3 Fibre optic terminal box.....	33
6.601.4 Total cable length.....	33
6.602 Requirements for electrical transmitting system and electrical wires for output link.....	33
6.602.1 Connectors.....	33
6.602.2 Earthing of the output cable.....	34
6.603 Signal-to-noise ratio.....	34
6.604 Failure detection and maintenance announcement.....	35
6.605 Operability.....	35
6.606 Reliability and dependability.....	35
6.607 Vibrations.....	35
7 Tests.....	36
7.1 General.....	36

7.1.2	List of tests .....	36
7.2	Type tests .....	37
7.2.1	General .....	37
7.2.2	Temperature-rise test .....	37
7.2.3	Impulse voltage withstand test on primary terminals .....	37
7.2.5	Electromagnetic compatibility (EMC) tests .....	37
7.2.6	Test for accuracy .....	41
7.2.601	Low-voltage component voltage withstand test .....	43
7.3	Routine tests .....	44
7.3.1	Power-frequency voltage withstand tests on primary terminals .....	44
7.3.4	Power-frequency voltage withstand tests on secondary terminals .....	45
7.3.5	Test for accuracy .....	45
7.3.601	Power-frequency voltage withstand test for low-voltage components .....	45
7.4	Special tests .....	45
7.4.601	Vibration tests .....	45
601	Information to be given with enquiries, tenders and orders .....	46
601.1	Designation .....	46
601.2	Dependability .....	46
Annex 6A (normative) LPIT frequency response and accuracy requirements for harmonics .....		47
6A.1	General .....	47
6A.2	Requirements for noise and distortion .....	47
6A.3	Anti-aliasing filter requirements for LPIT using digital data processing .....	47
6A.4	LPIT accuracy requirements for harmonics and low frequencies .....	49
6A.4.1	General .....	49
6A.4.2	Measuring accuracy classes .....	49
6A.4.3	Accuracy class extension for quality metering and low bandwidth d.c. applications .....	50
6A.4.4	Protective accuracy classes .....	51
6A.4.5	Special high bandwidth protection accuracy class .....	51
6A.4.6	Special accuracy classes for d.c. coupled low-power voltage transformers .....	52
6A.5	Tests for accuracy versus harmonics and low frequencies .....	52
6A.6	Test arrangement and test circuit .....	53
6A.6.1	Test for accuracy for harmonics and low frequencies .....	53
6A.6.2	Type test for proper anti-aliasing .....	53
Annex 6B (informative) Transient performances of low-power current transformers .....		55
6B.1	General .....	55
6B.2	Short-circuit currents in power systems .....	55
6B.3	Conventional current transformer equivalent circuit .....	58
6B.4	Types of current transformers .....	60
6B.4.1	Types of conventional CTs .....	60
6B.4.2	Types of low-power current transformers .....	61
6B.5	Transient performance of current transformers .....	62
6B.5.1	Transient performance of conventional current transformers .....	62
6B.5.2	Transient performance of low-power current transformers .....	63
6B.6	Summary .....	64
Annex 6C (informative) Transient performances of low-power voltage transformers .....		65
6C.1	Overview .....	65

6C.2	General.....	65
6C.2.1	Defining primary and secondary voltages.....	65
6C.2.2	Normal service conditions of the network.....	65
6C.2.3	Abnormal service conditions of the network.....	66
6C.2.4	Rated secondary voltages.....	66
6C.2.5	Steady-state conditions.....	66
6C.3	Transient conditions.....	66
6C.3.1	Theoretical considerations.....	66
6C.3.2	Definition of transient error.....	73
6C.3.3	Test of transient performance.....	73
Annex 6D	(informative) Test circuits.....	78
6D.1	Test circuits for accuracy measurements in steady state for low-power current transformers.....	78
6D.2	Test circuits for accuracy measurements in steady state for low-power voltage transformers.....	81
Annex 6E	(informative) Graph explaining the accuracy requirements for multi-purpose low-power current transformer.....	84
Bibliography	.....	85
Figure 601	– General block diagram of a single-phase LPIT.....	10
Figure 602	– Primary time constant $T_p$ .....	19
Figure 603	– Duty cycles, single energization.....	20
Figure 604	– Duty cycles, double energization.....	21
Figure 605	– Examples of subassembly subjected to EMC tests – Usual structure used in HV AIS applications.....	38
Figure 606	– Examples of subassembly subjected to EMC tests – Usual structure used in MV applications.....	39
Figure 607	– Examples of subassembly subjected to EMC tests – Usual structure used in HV GIS applications.....	39
Figure 608	– Temperature cycle accuracy test.....	42
Figure 6A.1	– Digital data acquisition system example.....	48
Figure 6A.2	– Frequency response mask for metering accuracy class 1 ( $f_r = 60$ Hz, $f_s = 4\ 800$ Hz).....	49
Figure 6B.1	– Illustration of a fault in a power system.....	56
Figure 6B.2	– Short-circuit current a.c. and d.c. components.....	56
Figure 6B.3	– Symmetric fault current.....	57
Figure 6B.4	– Asymmetric fault current.....	57
Figure 6B.5	– Equivalent electrical circuit of a conventional CT.....	58
Figure 6B.6	– Flux-current characteristic for a conventional CT without remanence representation.....	59
Figure 6B.7	– Representation of hysteresis and remanent flux for a conventional CT.....	60
Figure 6B.8	– Comparison of flux-current characteristics for gapped and gapless CTs.....	62
Figure 6B.9	– Secondary current distorted due to the CT saturation.....	63
Figure 6B.10	– AC component for non-saturated and saturated CT.....	63
Figure 6C.1	– Schematic diagram explaining the trapped charge phenomena.....	69
Figure 6C.2	– Voltages during trapped charges phenomena.....	70
Figure 6C.3	– Modelization example of a simplified low-power voltage transformer.....	72

Figure 6C.4 – Testing arrangement for short time constant .....	76
Figure 6C.5 – Testing arrangement for long time constant .....	77
Figure 6C.6 – Typical waveform of $e(t)$ during test .....	77
Figure 6D.1 – Test circuit for analogue accuracy measurements in steady state .....	78
Figure 6D.2 – Test circuit for analogue accuracy measurements in steady state (alternative solution) .....	79
Figure 6D.3 – Test circuit for digital accuracy measurements in steady state .....	80
Figure 6D.4 – Test circuit for analogue accuracy measurements in steady state .....	81
Figure 6D.5 – Test circuit for analogue accuracy measurements in steady state (alternative solution) .....	82
Figure 6D.6 – Test circuit for digital accuracy measurements in steady state .....	83
Figure 6E.1 – Accuracy limits of a multi-purpose low-power current transformer .....	84
Table 601 – Secondary terminal and low voltage component withstand capability .....	28
Table 602 – Immunity requirements and tests .....	30
Table 603 – Connectors .....	34
Table 10 – List of tests .....	36
Table 6A.1 – Anti-aliasing filter .....	48
Table 6A.2 – Measuring accuracy classes .....	50
Table 6A.3 – Accuracy classes extension for quality metering and low bandwidth d.c. applications .....	50
Table 6A.4 – Accuracy classes extension for high bandwidth d.c. applications .....	51
Table 6A.5 – Protective accuracy classes .....	51
Table 6A.6 – Accuracy classes for special high bandwidth protection .....	52
Table 6A.7 – Accuracy classes for special d.c. coupled low-power voltage transformers .....	52
Table 6A.8 – Accuracy classes for harmonics .....	53
Table 6B.1 – Protective CTs .....	61
Table 6C.1 – Primary short circuit .....	71
Table 6C.2 – Trapped charges .....	71
Table 6C.3 – Limits of instantaneous voltage error for protective electronic voltage transformers in case of trapped charges reclose .....	71

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

---

**INSTRUMENT TRANSFORMERS –****Part 6: Additional general requirements  
for low-power instrument transformers****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 61869-6 has been prepared by IEC technical committee 38: Instrument transformers.

This first edition of IEC 61869-6 cancels and replaces the relevant parts of IEC 60044-7, published in 1999, and of IEC 60044-8, published in 2002<sup>1</sup>.

This bilingual version (2017-07) corresponds to the English version, published in 2016-04.

---

<sup>1</sup> 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.



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

FDIS	Report on voting
38/501/FDIS	38/507/RVD

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

The French version of this standard has not been voted upon.

This publication 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 6 is to be read in conjunction with, and is based on, IEC 61869-1:2007, *General Requirements* – however, the reader is encouraged to use its most recent edition.

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

When a particular clause/subclause of Part 1 is not mentioned in this Part 6, that clause/subclause applies. When this standard states “addition”, “modification” or “replacement”, the relevant text in Part 1 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 601 are additional to those in Part 1;
- additional annexes are lettered 6A, 6B, 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](http://www.iec.ch).

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

iTeh STANDARD REVIEW  
(standards.itih.nl)

<https://standards.itih.nl/catalog/standards/sstd/887973bb-9326-40bb-9ef5-d170aa82e2778/iec-61869-6-2016>

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.

**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.**

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[IEC 61869-6:2016](#)

<https://standards.iteh.ai/catalog/standards/sist/887973bb-9346-40bb-9e5d-170aa82e2778/iec-61869-6-2016>

# INSTRUMENT TRANSFORMERS –

## Part 6: Additional general requirements for low-power instrument transformers

### 1 Scope

This part of IEC 61869 is a product family standard and covers only additional general requirements for low-power instrument transformers (LPIT) used for a.c. applications having rated frequencies from 15 Hz to 100 Hz covering MV, HV and EHV or used for d.c. applications. This product standard is based on IEC 61869-1:2007, in addition to the relevant product specific standard.

This part of IEC 61869 does not cover the specification for the digital output format of instrument transformers.

This part of IEC 61869 defines the errors in case of analogue or digital output. The other characteristics of the digital interface for instrument transformers are standardised in IEC 61869-9 as an application of the standards, the IEC 61850 series, which details layered substation communication architecture.

**ITeH STANDARD PREVIEW**

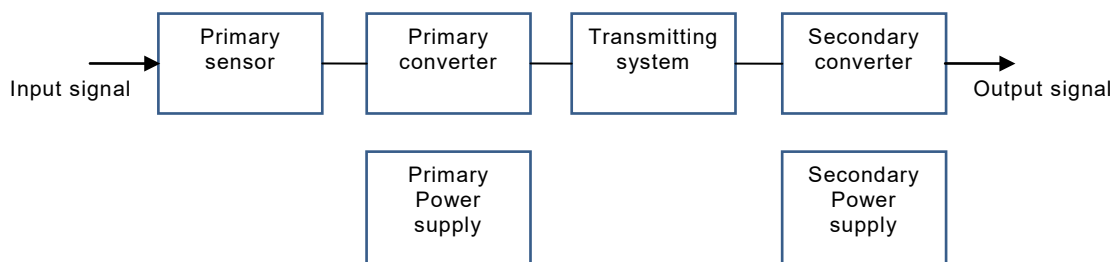
This part of IEC 61869 considers additional requirements concerning bandwidth. The accuracy requirements on harmonics and requirements for the anti-aliasing filter are given in the normative Annex 6A.4.

IEC 61869-6:2016

The general block diagram of single-phase LPITs is given in Figure 601.

According to the technology, it is not absolutely necessary that all parts described in Figure 601 are included in the instrument transformer.

As an example, for low-power passive transformers (LPITs without active electronic components) the blocks are composed only with passive components and there is no power supply.



IEC

Figure 601 – General block diagram of a single-phase LPIT

### 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.

Clause 2 of IEC 61869-1:2007 is applicable with the following additions:

IEC 60068-2-6:2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60255-27:2013, *Measuring relays and protection equipment – Part 27: Product safety requirements*

IEC 60603-7-1:2011, *Connectors for electronic equipment – Part 7-1: Detail specification for 8-way, shielded, free and fixed connectors*

IEC 60794-2:2002, *Optical fibre cables – Part 2: Indoor cables – Sectional specification*

IEC 60794-3:2014, *Optical fibre cables – Part 3: Outdoor cables – Sectional specification*

IEC 60812:2006, *Analysis techniques for system reliability – Procedure for failure mode and effects analysis (FMEA)*

IEC 61000-4-1:2006, *Electromagnetic compatibility (EMC) – Part 4-1: Testing and measurement techniques – Overview of IEC 61000-4 series*

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*  
IEC 61000-4-3:2006/AMD1:2007

IEC 61000-4-3:2006/AMD2:2010

[IEC 61869-6:2016](https://standards.iteh.ai/catalog/standards/sist/887973bb-9346-40bb-9e5d-170aa82e2778/iec-61869-6-2016)

[https://standards.iteh.ai/catalog/standards/sist/887973bb-9346-40bb-](https://standards.iteh.ai/catalog/standards/sist/887973bb-9346-40bb-9e5d-170aa82e2778/iec-61869-6-2016)

IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6:2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-7:2002, *Electromagnetic compatibility (EMC) – Part 4-7: Testing and measurement techniques – General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto*  
IEC 61000-4-7:2002/AMD1:2008

IEC 61000-4-8:2009, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

IEC 61000-4-9:1993, *Electromagnetic compatibility (EMC) – Part 4-9: Testing and measurement techniques – Section 9: Pulse magnetic field immunity test*  
IEC 61000-4-9:1993/AMD1:2000

IEC 61000-4-10:1993, *Electromagnetic compatibility (EMC) – Part 4-10: Testing and measurement techniques – Section 10: Damped oscillatory magnetic field immunity test. Basic EMC Publication*  
IEC 61000-4-10:1993/AMD1:2000

IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

IEC 61000-4-13:2002, *Electromagnetic compatibility (EMC) – Part 4-13: Testing and measurement techniques – Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests*  
IEC 61000-4-13:2002/AMD1:2009

IEC 61000-4-16:1998, *Electromagnetic compatibility (EMC) – Part 4-16: Testing and measurement techniques – Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz*  
IEC 61000-4-16:1998/AMD1:2001  
IEC 61000-4-16:1998/AMD2:2009

IEC 61000-4-18:2006, *Electromagnetic compatibility (EMC) – Part 4-18: Testing and measurement techniques – Damped oscillatory wave immunity test*  
IEC 61000-4-18:2006/AMD1:2010

IEC 61000-4-29:2000, *Electromagnetic compatibility (EMC) – Part 4-29: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests*

IEC 61025:2006, *Fault tree analysis (FTA)*

IEC 61076-2-101:2012, *Connectors for electronic equipment – Product requirements – Part 2-101: Circular connectors – Detail specification for M12 connectors with screw-locking*

IEC TS 61850-2:2003, *Communication networks and systems in substations – Part 2: Glossary*

IEC 61850-7-4:2010, *Communication networks and systems for power utility automation – Part 7-4: Basic communication structure – Compatible logical node classes and data object classes*

IEC 61869-1:2007, *Instrument transformers – Part 1: General requirements*

IEC 61869-2:2012, *Instrument transformers – Part 2: Additional requirements for current transformers*

IEC 61869-3:2011, *Instrument transformers – Part 3: Additional requirements for inductive voltage transformers*

IEC TR 61869-103:2012, *Instrument transformers – Part 103: The use of instrument transformers for power quality measurement*

IEC 62271-100:2008, *High-voltage switchgear and controlgear – Part 100: Alternating current circuit-breakers*  
IEC 62271-100:2008/AMD1:2012

CISPR 11:2015, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*

ISO/IEC/IEEE 21451-4:2010, *Information technology – Smart transducer interface for sensors and actuators – Part 4: Mixed-mode communication protocols and Transducer Electronic Data Sheet (TEDS) formats*

EN 50160:2010, *Voltage characteristics of electricity supplied by public distribution systems*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions in IEC 61869-1:2007 apply, with the following modifications and additions.

#### 3.1 General terms and definitions

##### 3.1.601

##### **low-power instrument transformer**

##### **LPIT**

arrangement, consisting of one or more current or voltage transformer(s) which may be connected to transmitting systems and secondary converters, all intended to transmit a low-power analogue or digital output signal to measuring instruments, meters and protective or control devices or similar apparatus

EXAMPLE An arrangement consisting of three current sensors, three voltage sensors connected to one merging unit delivering one digital output is considered an LPIT.

Note 1 to entry: LPITs are commonly called non-conventional instrument transformers (NCIT).

Note 2 to entry: The output power produced by these devices is typically lower or equal to 1 VA.

Note 3 to entry: This note applies to the French language only.

##### 3.1.602

##### **low-power current transformer**

##### **LPCT**

low-power instrument transformer for current measurement

Note 1 to entry: This note applies to the French language only.

##### 3.1.603

##### **low-power voltage transformer**

##### **LPVT**

low-power instrument transformer for voltage measurement

Note 1 to entry: This note applies to the French language only.

##### 3.1.604

##### **measuring LPIT**

LPIT intended to transmit an output signal to measuring instruments and meters

##### 3.1.605

##### **protective LPIT**

LPIT intended to transmit an output signal to protective and control devices

##### 3.1.606

##### **multipurpose LPIT**

LPIT intended for both measurement and protection applications

##### 3.1.607

##### **electronic LPIT**

LPIT that includes active components

##### 3.1.608

##### **passive LPIT**

LPIT that includes only passive components