



INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

IEC TC38 - Instrument Transformers

IT4PQ Final Meeting
June 2023

A decorative graphic on the left side of the slide, featuring a blue background with a complex pattern of white, overlapping curved lines and a grid of small white squares.

Volker Leitloff (FR)
Chair

volker.leitloff@rte-france.com



IEC TC 38 Officers and Working Bodies

Secretary: Filippo Frugoni (IT)
Chair: Volker Leitloff (FR) Term 2017-08 – 2026-07
Vice-chair Olga Petrova (RU) - terminology

IEC Officer: Miroslav Siket

Members: 47 Members (27 P + 20 O)
• Saudia Arabia added as P-member (june 22)

Active WG/MT/PT

- CAG
- 3 MT, 10 WG (including 3 JWG),
- 5 PT (including 4 in WG37)

Liaison: 15 IEC, 3 Type A, 3 WG level

Participation in ACTAD



IEC TC 38 – Plenary Meetings

Nov 2009	Madrid	(ES)
Dec 2011	Prague	(CZ)
April 2013	Houston	(US)
Nov 2014	Tokyo	(JP)
Nov 2016	Milano	(IT)
Nov 2018	Frankfurt	(DE)

Plenary 2020 planned in Bucharest cancelled due to COVID-19 crisis

Sept 21	web	
Oct 23	Bucharest	(RU)

<http://www.iec.ch/>

<http://collaborate.iec.ch>

TC 38 - Scope

Standardisation in the field of AC and/or DC current and/or voltage instrument transformers, including their subparts like (but not limited to) sensing devices, signal treatment, data conversion and analog or digital interfacing.

Motivation for TC38 scope update in 2009:

- **cover all the emerging technologies**
- **new scenarios for equipment with integrated functions**
- **tighter coordination with TC13, TC57, TC85 and TC95**



Overview of TC 38 Standards

IEC 61869

- **Parts 1-99: General parts and parts related to HV applications**
- **Parts 100-199: Technical Reports**
- **Parts 200-299: LV Instrument Transformers**
[<1kV ac and <1,5kV dc]




IEC 62689

- **Fault Passage Indicators (FPI)**


IEC 63253

- **Station Service Voltage Transformers (SSVT)**

IEC 61869 Parts 1-5 “Conventional” IT

Reference	Title	Comment
61869-1	General Requirements	IS: 2007 MT48 Ed2 merge with IS 06-2023 
61869-2	Additional Requirements for CT	IS: 2012 Ed2 MT 58 
61869-3	Additional Requirements for Inductive VT	IS: 2012 Ed2 MT 58
61869-4	Additional Requirements for Combined IT	IS: 2013
61869-5	Additional Requirements for Capacitive VT	IS: 2012 Ed2 MT 58 
61869-99	Glossary	WG 39 IS 2022 Base for update of IEC 321

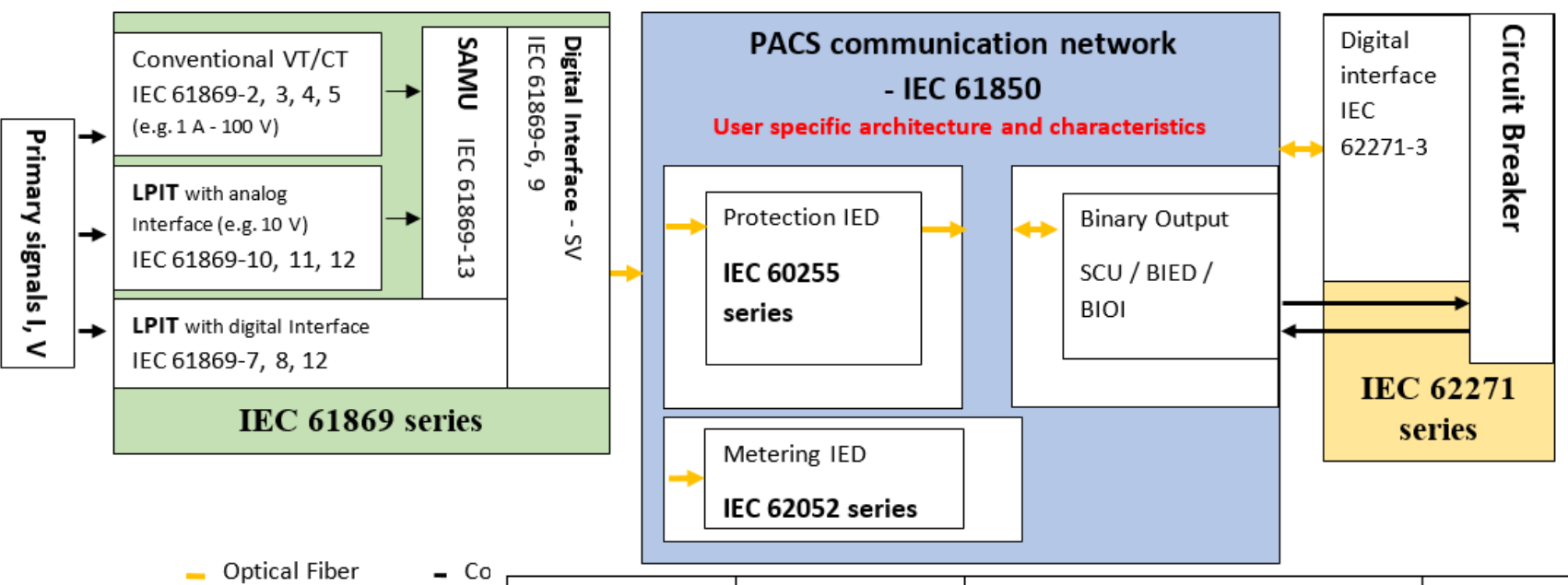
IEC 61869 Parts 6-13 Low Power IT

Reference	Title	Out	Comment
61869-6	Additional General Requirements for LPIT		IS: 2016 Ed2: merge -1
61869-7	Additional Requirements for Electronic VT	A/D	WG37 PT7/8 NP 02/20
61869-8	Additional Requirements for Electronic CT	A/D	WG37 PT7/8 CD1 06/21
61869-9	Digital Interface for IT	D	IS: 2016 WG37: AMD1 
61869-10	Additional Requirements for LP Passive CT	A	IS: 2018
61869-11	Additional Requirements for LP Passive VT	A	IS: 2018 ISH Sept 21
61869-12	Add. Req. for Combined Electronic IT / LPIT	A	after 7, -8
61869-13	SAMU (Stand Alone Merging Unit)	D	IS: 2021

Notes: Parts -1, -and 16 also apply to LPIT
 Part -9: update required for consistency with IEC 61850 ed 2.1



Functional Protection Chain



— Optical Fiber - Co

Use Case	Error of primary IT	Error of analog acquisition	Error due to numeric processing in the protection function
	End-to-End error of the acquisition chain		
	End-to-End Error of the functional chain		
Conventional IT – IED with analog input	Covered by IEC 61869-2	Covered by IEC 60255-1xx series	
Conventional IT – SAMU – IED with digital input	IEC 61869- 3, -5	Covered by IEC 61869-6 IEC 61869-13	Presently covered by IED specification.
LPIT - IED with digital input	Covered by IEC 61869-6, and future IEC 61869-7 and -8		Will be covered by relevant standards (IEC 60255-1xx) associated to protection functions.



TC 38 - Overview of Standards

IEC 61869 Parts 14 /15 DC

Reference	Title	Comment
61869-14	Add. Req. for CT for DC Applications	IS: 2018 Ed2 MT 59
61869-15	Add. Req. for VT for DC Applications	IS: 2018 Ed2 MT 59



IEC 61869 Parts 16- ?? IT Companion Standards

Reference	Title	Comment
61869-16	TEDS (Transducer Electronic Data Sheet) for IT	WG 37 PT16
61869-20	Product Safety Req. for IT above 1kV	WG 57
61869-21	Uncertainty evaluation in the calibration of Instrument Transformers	JWG 55 TR-> IS NP 03/23
61869-22	IT integrated with other functions	WG 54



IEC 61869 Parts 2xx LV applications

Reference	Title	Comment
61869-201	General Req. for IT used in LV Applications	WG 49 CD1 11/2020
61869-202	Additional Requirements for inductive CT for LV applications	WG 49 CD1 11/2020
61869-210	Additional Requirements for LPCT for LV applications	WG 49 Split from part 202 proposed in 2020 CD1 11/2020
61869-220	Product Safety Requirements for IT used in LV Applications	JWG 52 CD1 CD1 02/2019

IEC 61869 Parts 100-199 Technical Reports

Reference	Title	Comment
61869-100	Guidance for application of CT in power system protection	TR:2017
61869-101	Standard Mathematical Models for Instrument Transformers	WG45
61869-102	Ferroresonance oscillations in substations with inductive VT	TR:2014
61869-103	Use of IT for power quality measurement	TR:2012
61869-104	Evolution of Instrument Transformers <i>ratings</i> for the modern market	WG47
61869-106	Selection and interfacing of Instrument Transformers for wide bandwidth applications	PT 106

IEC 62689 Fault Passage Indicators

Reference	Title	Comment
62689-1	Current and voltage sensors or detectors for FPI- Part 1: General principles and requirements	IS:2016
62689-2	Current and voltage sensors or detectors for FPI- Part 2: System aspects	IS:2016
62689-3	Communication	WG Disbanded in TC38 Plenary 2018
62689-4	Conformance Testing	

IEC 63253 SSVT

Reference	Title	Comment
63253	Station Service Voltage Transformers (SSVT)	JWG 56 FDIS Double Logo



Issues and Events since last TC 38 Plenary relevant for IT4PQ

Metrology - EMPIR

- **IT4PQ: TC38 is main stakeholder.**
 - Kick-off meeting in September 2020, Stakeholder WS Feb21, Feb22, Nov 22
 - Several presentations in different TC38 working bodies
- **ADMIT: TC38 is main stakeholder**
 - **1st Stakeholder WS June 2023**

CIGRE SC A3

- **Discussion about possibilities of collaboration and synergies**
- **List of subjects of common interest dressed**
 - PMU and synchrophasor application
 - Protection applications
 - On-site accuracy tests
 - Impact of aging on IT
 - Travelling Waves



Collaboration IEC TC38 - CENELEC TC38

Standard	Subject	EMC	LV	CLC 38 WG
61869-13	SAMU	x	x	3
61869-16	TEDS	x		
61869-1	Common	x	x	1/2
61869-2	CT	-	?	
61869-3	VT	-	x	
61869-7	LPVT	x		1/2
61869-8	LPCT	x		1/2
61869-201	Common-LV	x	x	1/2
61869-202	LV CT		?	1/2
61869-210	LV LPCT	x	?	1/2
61869-220	LV Safety		x	1/2
63253	SSVT		x (?)	

CLC 38

Secretary: P. Mazza (IT)
Chair: V. Leitloff (FR)

WG

Aim: harmonization of IEC standards

- WG1 LV
- WG2 EMC
- WG3 EN 61869-13

Close collaboration between CENELEC TC38 and IEC TC38 to be implemented

Harmonisation of TC38 standards in cooperation with CLC38

[LPIT, part 1, part 13, LV IT]

- **Move forward planned TC38 standards and reports**
 - **LPIT**
 - LV IT
 - Uncertainty and influence quantities
 - TC Models
 - Use of IT for power quality measurements
 - TEDS
 - Safety
 - Interfacing of Instrument Transformers for
 - wide bandwidth applications (converters)
 - Travelling Waves
- **Revision of some standards of IEC 61869 series**
 - **parts 2 - 5** after publication of IEC 61869-1 ed2
 - **part 9** amendment after publication of IEC 61850 ed. 2.1 ed2 after thus
 - **Part 14-15** DC

- **Work items under evaluation by WG47**

- Accuracy versus Influencing Quantities
- Travelling Waves
- Use of Instrument Transformers for Power Quality measurement
- Phasor Measuring Unit (PMU) - Synchrophasor applications
- Questionnaire about Instrument Transformer Ratings

Development of Technical Reports before introduction in IEC 61869 series

- **Implication in several EURAMET projects**

- Metrology UHV – finalised in 2019, results of traceability of TOV used for part-1 ed2
- IT4PQ [TC 38 is main stakeholder] : launched in 2020, close collaboration
- ADMIT [TC 38 is main stakeholder] : launched in 2023

Transfer of results to WGs and implementation in IS and TR

- **Green Deal : Include requirements and criteria in European Product Standards**
 - Net Zero Industry Act (NZIA)
 - Critical Raw Materials Act (CRMA)
 - Ecodesign for Sustainable Product Regulation (ESPR)
- **Deployment of converter based energy sources: impact on IT standards ?**
 - Bandwidth
 - Environment (offshore)
- **New Protection functions : impact on IT standards ?**
 - DC: VSC, meshed grids, LV DC, offshore
 - Travelling Wave
- **ACEA : Life Cycle Assessment for Instrument Transformers**



Expected Benefits from IT4PQ

- **IT Product Standards: Recommendations for requirements and test for Instrument Transformers intended to be used for Power Quality applications**
 - Extended functional requirements for PQ
 - Definition of accuracy and uncertainty as basis for the extension of IT accuracy classes for PQ
 - Associated test requirements and methods, including multiple influence factors
 - Calibration
- **Reference systems for the Current and Voltage Transformer calibration for (PQ) phenomena**
 - Basis for traceability
- **Explicit mapping of use cases and applications to requirements and test**