SLOVENSKI STANDARD
SIST EN IEC 61869-9:2019/oprA1:2026

01-maj-2026

Instrumentni transformatorji - 9. del: Digitalni vmesnik za instrumentne transformatorje - Dopolnilo A1

Amendment 1 - Instrument transformers - Part 9: Digital interface for instrument transformers

Messwandler - Teil 9: Digitale Schnittstelle für Messwandler

Amendement 1 - Transformateurs de mesure - Partie 9: Interface numérique des transformateurs de mesure

Ta slovenski standard je istoveten z: **EN IEC 61869-9:2019/prA1:2026**

ICS:

17.220.20	Merjenje električnih in magnetnih veličin	Measurement of electrical and magnetic quantities

SIST EN IEC 61869-9:2019/oprA1:2026 **en**

38/847/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 61869-9/AMD1 ED1**	
DATE OF CIRCULATION: **2026-03-13**	CLOSING DATE FOR VOTING: **2026-06-05**
SUPERSEDES DOCUMENTS: **38/715/CD, 38/720A/CC**	

IEC TC 38 : INSTRUMENT TRANSFORMERS	
SECRETARIAT: Italy	SECRETARY: Mr Filippo Frugoni
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 13,SC 17C,TC 57,TC 85,TC 95,TC 115	HORIZONTAL FUNCTION(S):
ASPECTS CONCERNED: Digital content,Electricity transmission and distribution	
☒ SUBMITTED FOR CENELEC PARALLEL VOTING	☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

Attention IEC-CENELEC parallel voting

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.

The CENELEC members are invited to vote through the CENELEC online voting system.

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Recipients of this document are invited to submit, with their comments, notification of any relevant “In Some Countries” clauses to be included should this proposal proceed. Recipients are reminded that the CDV stage is the final stage for submitting ISC clauses. (SEE AC/22/2007 OR NEW GUIDANCE DOC).

TITLE:

Amendment 1 - Instrument transformers - Part 9: Digital interface for instrument transformers

PROPOSED STABILITY DATE: 2029

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INSTRUMENT TRANSFORMERS

Part 9: Digital interface for instrument transformers

This amendment has been prepared by IEC technical committee 38: INSTRUMENT TRANSFORMERS. It is the amendment 1 to International Standard IEC 61869:2016.

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

a) Alignment to IEC 61850-9-2:2011+AMD1:2020 introducing the SynchSrcID information in the SV stream indicating the active time synchronisation source of the MU

b) Addition of a slew based synchronisation mechanism with associated requirements

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

Draft	Report on voting
XX/XX/FDIS	XX/XX/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 amendment 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.

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.

INTRODUCTION

In the enumeration introduced by "The IEC 61869-9 standard:" add a dash

– amendment 1 adds the optional SynchSrcID information in the SV stream indicating the active time synchronisation source of the MU in order to align to IEC 61850 series edition 2.1 and IEC 61850-9-2:2011+AMD1:2020.

– amendment 1 updates and clarifies the step-based synchronization mechanism.

– amendment 1 also adds a slew-based synchronisation mechanism with associated requirements.

INSTRUMENT TRANSFORMERS

Part 9: Digital interface for instrument transformers

2 Normative references

Replace the text of the whole clause by the following:

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 61869-6:2016 is applicable with the following additions:

IEC 61588:2021, *Precision clock synchronization protocol for networked measurement and control systems*

IEC 61850-6:2009+AMD1:2018+AMD2:2024, *Communication networks and systems for power utility automation – Part 6: Configuration description language for communication in electrical substation related to IEDs*

IEC 61850-7-1:2011+AMD1:2020, *Communication networks and systems for power utility automation – Part 7-1: Basic communication structure – Principles and models*

IEC 61850-7-2:2010+AMD1:2020, *Communication networks and systems for power utility automation – Part 7-2: Basic information and communication structure – Abstract communication service interface (ACSI)*

IEC 61850-7-3:2010+AMD1:2020, *Communication networks and systems for power utility automation – Part 7-3: Basic communication structure – Common data classes*

IEC 61850-7-4:2010+AMD1:2020, *Communication networks and systems for power utility automation – Part 7-4: Basic communication structure – Compatible logical node classes and data object classes*

IEC 61850-8-1:2011+AMD1:2020, *Communication networks and systems for power utility automation – Part 8-1: Specific communication service mapping (SCSM) – Mappings to MMS* (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3

IEC 61850-9-2:2011+AMD1:2020, *Communication networks and systems for power utility automation – Part 9-2: Specific communication service mapping (SCSM) – Sampled values over ISO/IEC 8802-3*

IEC 61850-10:2012, *Communication networks and systems for power utility automation – Part 10: Conformance testing*

IEC 61869-6:2016, *Instrument transformers – Part 6: additional general requirements for low power instrument transformers*

IEC 61850-9-3:2016, *Communication networks and systems for power utility automation – Part 9-3: Precision time protocol profile for power utility automation*

3 Terms and definitions

List of terms and definitions is extended with

3.5.905

Clipping
a form of limiting in which all the instantaneous values of a signal exceeding a predetermined threshold value are reduced to values close to that of the threshold, all other instantaneous values of the signal being preserved.

Source: IEV 702-04-33

3.6 Index of abbreviations

Index of abbreviations is extended with

PTP Precision time protocol specified in IEC 61588

5.901 Performance requirements

Replace the text of the fifth paragraph with

For example, when powering up, an optical current transformer may need to activate thermoelectric coolers, perform carefully controlled laser start-up, and wait until the system has stabilized to allow operation within stated accuracy. During this process, merging unit (digital) output should be disabled. If data output is enabled, quality and validity attributes associated with all affected data values shall be tagged as ‘invalid’ in accordance with 6.903.9. The same requirement applies during power-down (loss of power) and self-diagnostic system activation (i.e. DSP subsystem failure). The merging unit should guarantee no un-flagged bad sampled value data is sent out.

6.903 Specification of the communications profile

6.903.1 General

In the second sentence replace “IEC 61850-9-2:2011” *by* “IEC 61850-9-2”

6.903.2 Variants

Replace the text in the whole subclause with

To facilitate interoperability, only a limited variability is permitted for naming, message structure, sample rate, analogue signal content and scaling. The permitted variants are described in the device nameplate using the following notation, introduced here as an easy way to describe merging unit capabilities in a human readable text format:

$$\mathrm{F}\,f\,\mathrm{S}\,s\,\mathrm{I}\,i\,\mathrm{U}\,u$$

where

f is the digital output sample rate expressed in samples per second

s is the number of ASDUs (samples) contained in a sampled value message

i is the number of current quantities contained in each ASDU

u is the number of voltage quantities contained in each ASDU.

Device nameplate documents device capability (range of supported variants) with active configuration separately specified in the merging unit configuration file (Annex 9C).

Variant notation examples:

F4000S1I4U4 describes the 9-2LE MSVCB01 sampled values with 50 Hz nominal system frequency.

F12800S8I4U4 describes the 9-2LE MSVCB02 sampled values with 50 Hz nominal system frequency.

F4800S2I8U0 describes sampled values with 4800 samples per second, two ASDU (samples) per message, 8 currents, and no voltages.

Instrument transformers / MU claiming compliance to this standard shall be configurable to implement at least one of the preferred rates defined in Table 902 and at least one of the following backward compatible configurations:

F4000S1I4U4

F4800S1I4U4

F5760S1I4U4

The backward compatibility requirement does not apply to merging units for DC applications, UCA 9-2LE Power Quality applications, and merging units intended for special purpose applications.

Merging units may also implement variants with other number of currents and voltages. The minimum number of current plus voltage quantities allowed is 1. It is recommended that the maximum number of quantities allowed on a 100 Mbit/s network be limited to:

for general measuring and protection: 24 quantities

for quality metering: 8 quantities

for DC control applications: 24 quantities.

The maximum limitations are introduced to ensure fair network access and prevent blocking caused by excessively long Ethernet frames. No specific limits are defined for 1 Gbit/s and faster networks or applications where the MU is directly connected (point-to-point) to a higher speed backbone bridge. DC instrument transformer outputs may require point to point connection and Gigabit Ethernet links.

6.903.4 Logical Devices

Replace the text in the whole subclause by the following

The merging unit shall implement one or more logical devices. Logical devices shall be as specified in IEC 61850-7-2.

Each logical device product-related name (LDName), hosting a 9-2LE multicast sampled value control block (MSVCB01 or MSVCB02) and dataset (PhsMeas1) shall be preconfigured as follows:

*xxxx*MU*nn*

where

xxxx is the configurable IED name of the merging unit per IEC 61850-6.

MU*nn* is the logical device instance name, the attribute “inst” of the element LDdevice in the IED section of the ICD file. *nn* shall be a decimal number that makes the instance identifier of the logical device unique within the physical device.

NOTE 902 The combination of the IED name and the LD instance number makes the logical device unique within the system.

6.903.7 Logical nodes TCTR

Replace the text of the whole subclause by the following:

TCTR logical nodes shall be as specified in IEC 61850-7-4, except that the TCTR logical nodes shall be extended by the addition of the nameplate data objects defined in Table 905 and in Table 903. The value of TCTR.NamPlt.InNs shall be “IEC 61869-9:2016”. The values of the data attributes of these extended data objects shall be read-only.

Each TCTR name (LNName) shall be formatted during engineering phase according to:

I *nn p* TCTR *n*

where

nn is the instance number of the current measurement point (01-99) that makes the current measurement identification (Inn) unique within the bay. This value is part of the substation section of the SCL description and is defined during the engineering process.

p is the phase identification of the primary current, either A, B, C, or N for a.c. instrument transformers. For d.c. instrument transformers, pending support for d.c. systems in the IEC 61850 series of standards, use A for the pole 1, B for the pole 2, and N for earth return. This value should correspond to the SubEquipment phase attribute in the substation section of the SCL description if any.

n is the attribute “inst” of the element LN in the substation and IED sections of the ICD file. It binds the TCTR described in the substation section to the TCTR described in the IED section. *“n”* shall be a decimal number (0 through 99).

TCTR name shall be unique within the logical device and is in general configurable or fixed by the manufacturer.

As an example, a TCTR name might be:

I02ATCTR4

The above name is for current measurement point number 02, phase A, with current transformer core connected to TCTR instance 4 as illustrated in Figure 908. This is only one example illustrating substation modelling defined in IEC 61850-7-1 and substation configuration language rules defined in IEC 61850-6.

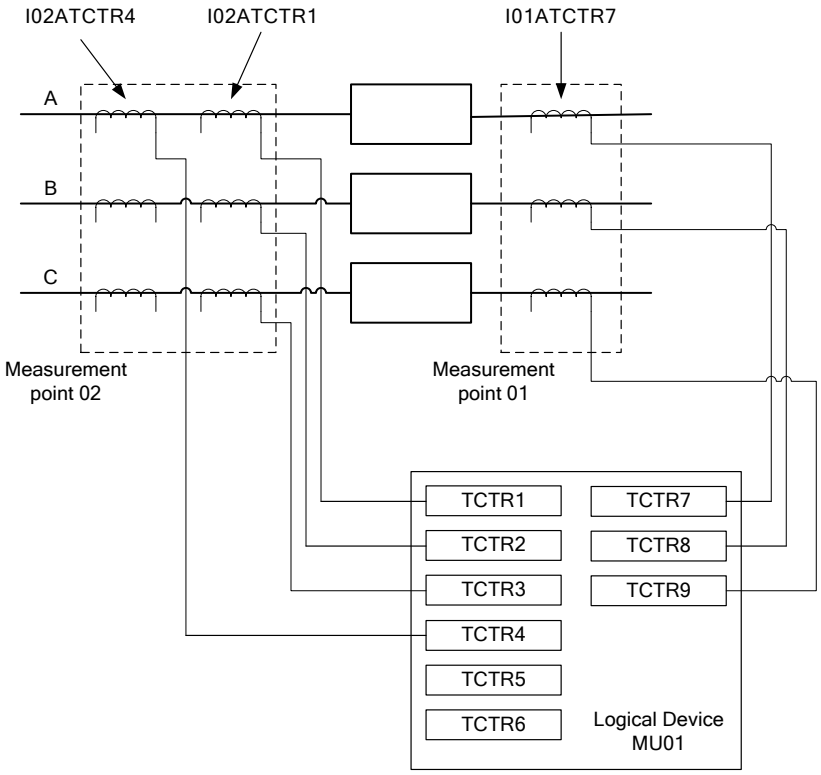

Figure 908 – TCTR naming example

It is recommended to map the TCTR logical node in the substation section (Equipment (instrument transformer) / SubEquipment (Phase)) to define and identify the measuring point in accordance with IEC 61850-6.

The TCTR data object NamPlt shall conform to the LPL common data class definition in IEC 61850-7-3.

When user is allowed to edit the prefix, prefix shall retain the deployed phase information.

The TCTR data object AmpSv shall conform to the SAV common data class definition in IEC 61850-7-3. The attributes AmpSv.instMag.i, AmpSv.sVC.scaleFactor, AmpSv.sVC.offset, AmpSv.units.multiplier and AmpSv.units.SIUnit shall be mandatory and read-only with values specified in Table 904:

Table 904 – AmpSv object attribute values

Attribute	Value
AmpSv.units.SIUnit	5 (code for ampere)
AmpSv.units.multiplier	0
AmpSv.sVC.offset	0
AmpSv.sVC.scaleFactor	0,001
AmpSv.instMag.i	count (of milliampere)

All current measurements are scaled to reflect primary current values and are transmitted using signed 32 bit integer format.

Neutral current can be measured directly. If a direct measurement of this value is not available, it is acceptable to substitute an estimate computed by creating an algebraic sum of currents flowing through all live conductors in accordance with IEC 61850-7-3. This quantity shall use the same scaling as defined in Table 904. The derived bit defined in 9-2 LE guideline is not used.

$$IN = IA + IB + IC$$

This equation does not necessarily apply for distribution networks with impedance grounded neutral point and distributed neutral. Equation used in that case needs to be user defined. See IEC 61850-7-3:2010+AMD1:2020, Figure 16.

Available options for publication of the neutral current and its accuracy shall be described in the product documentation.

Table 905 – Extensions to the TCTR class

TCTR class extensions with nameplate information				
Data object name	**Common data class**	**Explanation**	**T**	**M/O/C**
NamAccRtg	VSD	the accuracy class rating in the format described in clause 5.6, e.g. “0,5S/5P20”		M
NamARtg	VSD	a semicolon separated list of the rated primary currents (I_{Pr}) in amperes, e.g. “200;400;800”		M
NamClipRtg	VSD	the ratio of the clipping limit of the instantaneous current to the rated primary current multiplied with a square root of two, e.g. “20”		M
Key M = Mandatory O = Optional C = Conditional				

6.903.8 Logical nodes TVTR

Replace the text of the whole subclause by the following:

TVTR logical nodes shall be as specified in IEC 61850-7-4, except that the TVTR logical nodes shall be extended by the addition of the nameplate data objects defined in Table 907. The value of TVTR.NamPlt.InNs shall be “IEC 61869-9:2016”. The values of the data attributes of these extended data objects shall be read-only.

Each TVTR name (LNName) shall be formatted during engineering phase according to:

$$U\ nn\ pTVTR\ n$$

where

nn is the instance number of the voltage measurement point (01-99) that makes the voltage measurement identification (Unn) unique within the bay. This value is part of the substation section of the SCL description.

p is the phase identification, either A, B, C, AB, BC, CA or N for a.c. instrument transformers. For d.c. instrument transformers, pending support for d.c. systems in the IEC 61850 series, use A for the pole 1, B for the pole 2, and N for earth return. This value should correspond to the SubEquipment phase attribute in the substation section of the SCL description if any.

n is the attribute “inst” of the element LN in the substation and IED sections of the ICD file. It binds the TVTR described in the substation section to the TVTR described in the IED section. *"n"* shall be a decimal number (0 through 99).

TVTR name shall be unique within the logical device and is in general configurable or fixed by the manufacturer.

As an example, a TVTR name might be:

U01ATVTR1

It is recommended to map the TVTR logical node in the substation section (Equipment (instrument transformer) / SubEquipment (Phase)) to define and identify the measuring point in accordance with IEC 61850-6.

The TVTR attribute NamPlt shall conform to the LPL common data class definition in IEC 61850-7-3.

When user is allowed to edit the prefix, prefix shall retain the deployed phase information.

The TVTR data object VolSv shall conform to the SAV common data class definition in IEC 61850-7-3, except that attributes VolSv.instMag.i, VolSv.sVC.scaleFactor, VolSv.sVC.offset, VolSv.units.multiplier and VolSv.units.SIUnit are mandatory and read-only with values specified in Table 906:

Table 906 – VolSv object attribute values

Attribute	Value
VolSv.units.SIUnit	29 (code for volt)
VolSv.units.multiplier	0
VolSv.sVC.offset	0
VolSv.sVC.scaleFactor	0,01
VolSv.instMag.i	count (of centivolt)

All voltage measurements are scaled to represent primary voltage values and are transmitted using signed 32 bit integer format.

Neutral voltage can be measured directly or derived based on individual phase to ground measurements. When derived, VN shall be equal to a simple arithmetic sum of the phase to ground voltages and shall use the same scaling as defined in Table 906. Derived bit defined in 9-2 LE guideline is deprecated.

$$VN = VA + VB + VC$$

Available options for publication of the neutral voltage and its accuracy shall be described in the product documentation.

Table 907 – Extensions to the TVTR class

TVTR class extensions with nameplate information				
Data object name	**Common data class**	**Explanation**	**T**	**M/O/C**
NamAccRtg	VSD	the accuracy class rating in the format described in clause 5.6, e.g. “0.5/3P”		M
NamVRtg	VSD	the rated primary voltage (U_{Pr}) in volts, e.g. for rating of 300000/sqrt(3) we will have “173000”		M
NamClipRtg	VSD	the ratio of the clipping limit of the instantaneous voltage to the rated primary voltage multiplied with a square root of two, e.g. “2”		M
Key M = Mandatory O = Optional				

TVTR class extensions with nameplate information				
Data object name	Common data class	Explanation	T	M/O/C
C = Conditional				

6.903.9 Quality

Replace the text of the third paragraph with

The quality of each sampled value (TCTR.AmpSv.q, TVTR.VolSv.q) in each ASDU shall be as represented by its quality value in that ASDU. For example, if a channel having previously been accurate becomes inaccurate, the first inaccurate value shall have in the same ASDU its validity attribute set to questionable and detail quality attribute inaccurate set to true.

Replace the text of the fifth paragraph with

The validity attribute shall be set to questionable and the outOfRange quality data attribute shall be true (q.validity = questionable and q.detailQual.outofRange = true) for samples affected by clipping. outOfRange attribute shall not be set for situations other than clipping.

Replace the text of the eighth paragraph with

The inaccurate quality data attribute (q.validity = questionable and q.detailQual.inaccurate = true) shall be true when an instrument transformer supervision function has detected an error condition indicating that the sampled value output does not meet the nameplate measuring accuracy class but may be useable for other applications. Simultaneously setting the inaccurate attribute to true for all analogue data values is used to indicate time synchronization event as specified in section 6.904 while tagged as inaccurate, measurement error should not exceed two times the stated protection accuracy class or 2% at rated input level in case protection accuracy class is not defined.

Table 907.1 – Quality attribute summary

State	q.validity	q.detailQual	Remarks
Normal operation	good	Default (FALSE)	Data meets all stated accuracy specifications
Clipping	questionable	outOfRange	True on the affected channel Data may be used for protection
Data does not meet the stated measuring accuracy specification	questionable	inaccurate	True on the affected channel Data may be used for protection
Time synchronization in progress	questionable	inaccurate	Simultaneously set true on all valid channels. Data may be used for protection
Quantity not present or logical node is OFF	invalid	Default (FALSE)	True on the affected channel Mode / behaviour support
Diagnostic failure	invalid	failure	Data is unusable

6.903.10 Dataset(s)

Replace the text of the whole subclause by the following:

The datasets shall be as specified in IEC 61850-7-2, and as further constrained by this subclause 6.903.10.

Dataset members shall consist of AmpSv.instMag.i (current sampled value) or VolSv.instMag.i (voltage sampled value) attributes, each followed immediately by the corresponding AmpSv.q or VolSv.q (quality) data attribute. The number of current sampled values and the number of voltage sampled values shall match the number of each specified by the variant code for the dataset.

All AmpSv members (current sampled values) shall precede any VolSv members (voltage sampled values).

Each dataset name (DSName) declared to be 9-2LE backward compatible configuration shall be configured according to:

PhsMeas1

The dataset name PhsMeas1 shall only be used for a 9-2LE datasets whose members in order are:

InnATCTR1.AmpSv.instMag.i
InnATCTR1.AmpSv.q
InnBTCTR2.AmpSv.instMag.i
InnBTCTR2.AmpSv.q
InnCTCTR3.AmpSv.instMag.i
InnCTCTR3.AmpSv.q
InnNTCTR4.AmpSv.instMag.i
InnNTCTR4.AmpSv.q
UnnATVTR1.VolSv.instMag.i
UnnATVTR1.VolSv.q
UnnBTVTR2.VolSv.instMag.i
UnnBTVTR2.VolSv.q
UnnCTVTR3.VolSv.instMag.i
UnnCTVTR3.VolSv.q
UnnNTVTR4.VolSv.instMag.i
UnnNTVTR4.VolSv.q

6.903.11 Multicast sampled value control block

Replace the text of the whole subclause by the following:

The multicast sampled value control blocks shall be as specified in IEC 61850-7-2, and as further constrained by this subclause. The value of attribute MsvID shall be unique within the substation. It is recommended that this field be short to preserve communications bandwidth (recommend making it equal to hexadecimal character representation of APPID: 4000 to 7FFF).

NOTE 903 Some legacy devices restrict the length of this field to be between 10 and 34 characters.

In the context of IEC 61850-9-2 the APPID value of 0x4000 mandated by the UCA 9-2LE Guideline indicates the lack of configuration. IEC 61850-9-2 strongly recommends having a unique, source orientated SV APPID within a system, to enable a filter on the link layer.

The SmpMod attribute shall have a value of “1” (samples per second). The SmpRate attribute shall have a value matching the sample rate in the variant code for the control block with the exception of d.c. control block for 96 kHz where the value is 9600. Use of 9600 samples per nominal period (smpMod = 0), implying a nominal frequency of 10 Hz, is a workaround to the