

Svenska Elektriska Kommissionen, SEK

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## Mättransformatorer – Del 8: Elektroniska strömtransformatorer

*Instrument transformers –  
Part 8: Electronic current transformers*

Som svensk standard gäller europastandarden EN 60044-8:2002. Den svenska standarden innehåller den officiella engelska språkversionen av EN 60044-8:2002.

### Nationellt förord

Europastandarden EN 60044-8:2002

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 60044-8, First edition, 2002 - Instrument transformers -  
Part 8: Electronic current transformers**

utarbetad inom International Electrotechnical Commission, IEC.

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ICS 17.22.20

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Denna standard är fastställd av Svenska Elektriska Kommissionen, SEK, som också kan lämna upplysningar om **sakinnehållet** i standarden.  
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EUROPEAN STANDARD

**EN 60044-8**

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 2002

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ICS 17.220.20

English version

**Instrument transformers**  
**Part 8: Electronic current transformers**  
(IEC 60044-8:2002)

Transformateurs de mesure  
Partie 8: Transformateurs de courant  
électroniques  
(CEI 60044-8:2002)

Messwandler  
Teil 8: Elektronische Stromwandler  
(IEC 60044-8:2002)

This European Standard was approved by CENELEC on 2002-09-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

**CENELEC**

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

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## Foreword

The text of document 38/280/FDIS, future edition 1 of IEC 60044-8, prepared by IEC TC 38, Instrument transformers, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60044-8 on 2002-09-01.

The following dates were fixed:

- latest date by which the EN has to be implemented  
at national level by publication of an identical  
national standard or by endorsement (dop) 2003-06-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2005-09-01

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annexes D and ZA are normative and annexes A, B, C and E are informative.

Annex ZA has been added by CENELEC.

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## Endorsement notice

The text of the International Standard IEC 60044-8:2002 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

|                    |      |                                                          |
|--------------------|------|----------------------------------------------------------|
| IEC 60038          | NOTE | Harmonized as HD 472 S1:1989 (modified).                 |
| IEC 60068-2 Series | NOTE | Harmonized in EN 60068-2/HD 323.2 Series (not modified). |
| IEC 60071-2        | NOTE | Harmonized as EN 60071-2:1997 (not modified).            |
| IEC 60255-24       | NOTE | Harmonized as EN 60255-24:2001 (not modified).           |
| IEC 60270          | NOTE | Harmonized as EN 60270:2001 (not modified).              |
| IEC 60437          | NOTE | Harmonized as EN 60437:1997 (not modified).              |
| IEC 60567          | NOTE | Harmonized as EN 60567:1992 (not modified).              |
| IEC 60599          | NOTE | EN 60599:1999 is based on IEC 60599:1999 (not modified). |
| IEC 60721-2-2      | NOTE | Harmonized as HD 478.2.2 S1:1990 (not modified).         |
| IEC 60721-2-4      | NOTE | Harmonized as HD 478.2.4 S1:1989 (not modified).         |
| IEC 61508-1        | NOTE | Harmonized as EN 61508-1:2001 (not modified).            |
| IEC 61508-3        | NOTE | Harmonized as EN 61508-3:2001 (not modified).            |
| IEC 61754-1        | NOTE | Harmonized as EN 61754-1:1997 (not modified).            |
| IEC 61754-15       | NOTE | Harmonized as EN 61754-15:2001 (not modified).           |

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## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| <u>Publication</u>           | <u>Year</u>     | <u>Title</u>                                                                                  | <u>EN/HD</u> | <u>Year</u>        |
|------------------------------|-----------------|-----------------------------------------------------------------------------------------------|--------------|--------------------|
| IEC 60028                    | 1925            | International standard of resistance for copper                                               | -            | -                  |
| IEC 60044-1                  | - <sup>1)</sup> | Instrument transformers<br>Part 1: Current transformers                                       | EN 60044-1   | 1999 <sup>2)</sup> |
| IEC 60044-6                  | - <sup>1)</sup> | Part 6: Requirements for protective current transformers for transient performance            | EN 60044-6   | 1999 <sup>2)</sup> |
| IEC 60044-7                  | - <sup>1)</sup> | Part 7: Electronic voltage transformers                                                       | EN 60044-7   | 2000 <sup>2)</sup> |
| IEC 60050-161                | 1990            | International Electrotechnical Vocabulary (IEV)<br>Chapter 161: Electromagnetic compatibility | -            | -                  |
| IEC 60050-321                | 1986            | International electrotechnical vocabulary<br>Chapter 321: Instrument transformers             | -            | -                  |
| IEC 60050-601                | 1985            | Chapter 601: Generation, transmission and distribution of electricity - General               | -            | -                  |
| IEC 60050-604                | 1987            | Chapter 604: Generation, transmission and distribution of electricity - Operation             | -            | -                  |
| IEC 60056                    | - <sup>1)</sup> | High-voltage alternating-current circuit-breakers                                             | HD 348 S7    | 1998 <sup>3)</sup> |
| IEC 60060-1<br>+ corr. March | 1989<br>1990    | High-voltage test techniques<br>Part 1: General definitions and test requirements             | HD 588.1 S1  | 1991               |

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<sup>1)</sup> Undated reference.

<sup>2)</sup> Valid edition at date of issue.

<sup>3)</sup> HD 348 S7:1998 is superseded by EN 62271-100:2001, which is based on IEC 62271-100:2001.

| <u>Publication</u>             | <u>Year</u>     | <u>Title</u>                                                                                                                               | <u>EN/HD</u>                    | <u>Year</u>                |
|--------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|----------------------------|
| IEC 60068-2-6<br>+ corr. March | 1995<br>1995    | Environmental testing<br>Part 2: Tests - Test Fc: Vibration<br>(sinusoidal)                                                                | EN 60068-2-6                    | 1995                       |
| IEC 60068-2-17                 | - <sup>1)</sup> | Part 2: Tests - Test Q: Sealing                                                                                                            | EN 60068-2-17                   | 1994 <sup>2)</sup>         |
| IEC 60068-2-75                 | - <sup>1)</sup> | Part 2-75: Tests - Test Eh: Hammer<br>tests                                                                                                | EN 60068-2-75                   | 1997 <sup>2)</sup>         |
| IEC 60071-1                    | 1993            | Insulation co-ordination<br>Part 1: Definitions, principles and rules                                                                      | EN 60071-1                      | 1995                       |
| IEC 60085                      | 1984            | Thermal evaluation and classification of<br>electrical insulation                                                                          | HD 566 S1                       | 1990                       |
| IEC 60121                      | - <sup>1)</sup> | Recommendation for commercial<br>annealed aluminium electrical conductor<br>wire                                                           | -                               | -                          |
| IEC 60255-5                    | 2000            | Electrical relays<br>Part 5: Insulation coordination for<br>measuring relays and protection<br>equipment - Requirements and tests          | EN 60255-5                      | 2001                       |
| IEC 60255-22-1                 | 1988            | Part 22: Electrical disturbance tests for<br>measuring relays and protection<br>equipment -<br>Section 1: 1 MHz burst disturbance<br>tests | -                               | -                          |
| IEC 60296                      | 1982            | Specification for unused mineral<br>insulating oils for transformers and<br>switchgear                                                     | -                               | -                          |
| IEC 60304                      | 1982            | Standard colours for insulation for low-<br>frequency cables and wires                                                                     | HD 402 S2                       | 1984                       |
| IEC 60376                      | 1971            | Specification and acceptance of new<br>sulphur hexafluoride                                                                                | -                               | -                          |
| IEC 60376B                     | 1974            | Second supplement: Clause 26                                                                                                               | -                               | -                          |
| IEC 60417                      | Series          | Graphical symbols for use on equipment                                                                                                     | EN 60417                        | Series                     |
| IEC 60480                      | 1974            | Guide to the checking of sulphur<br>hexafluoride (SF <sub>6</sub> ) taken from electrical<br>equipment                                     | -                               | -                          |
| IEC 60529                      | - <sup>1)</sup> | Degrees of protection provided by<br>enclosures (IP Code)                                                                                  | EN 60529<br>+ corr. May         | 1991 <sup>2)</sup><br>1993 |
| IEC 60664-1<br>(mod)           | 1992            | Insulation coordination for equipment<br>within low-voltage systems<br>Part 1: Principles, requirements and<br>tests                       | HD 625.1 S1<br>+ corr. November | 1996<br>1996               |

| <u>Publication</u> | <u>Year</u>     | <u>Title</u>                                                                                                                                                                                 | <u>EN/HD</u>            | <u>Year</u>        |
|--------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------|
| IEC 60694          | 1996            | Common specifications for high-voltage switchgear and controlgear standards                                                                                                                  | EN 60694<br>+ corr. May | 1996<br>1999       |
| IEC 60707          | 1999            | Flammability of solid non-metallic materials when exposed to flame sources - List of test methods                                                                                            | EN 60707                | 1999               |
| IEC 60721-3-3      | 1994            | Classification of environmental conditions<br>Part 3: Classification of groups of environmental parameters and their severities -<br>Section 3: Stationary use at weatherprotected locations | EN 60721-3-3            | 1995               |
| IEC 60721-3-4      | 1995            | Section 4: Stationary use at non-weatherprotected locations                                                                                                                                  | EN 60721-3-4            | 1995               |
| IEC 60794          | Series          | Optical fibre cables                                                                                                                                                                         | EN 60794                | Series             |
| IEC 60812          | 1985            | Analysis techniques for system reliability - Procedure for failure mode and effects analysis (FMEA)                                                                                          | HD 485 S1               | 1987               |
| IEC 60815          | 1986            | Guide for the selection of insulators in respect of polluted conditions                                                                                                                      | -                       | -                  |
| IEC 60870-5-1      | 1990            | Telecontrol equipment and systems<br>Part 5: Transmission protocols -<br>Section 1: Transmission frame formats                                                                               | EN 60870-5-1            | 1993               |
| IEC 61000-4-1      | 2000            | Electromagnetic compatibility (EMC)<br>Part 4-1: Testing and measurement techniques - Overview of IEC 61000-4 series                                                                         | EN 61000-4-1            | 2000               |
| IEC 61000-4-2      | - <sup>1)</sup> | Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test                                                                                                         | EN 61000-4-2            | 1995 <sup>2)</sup> |
| IEC 61000-4-3      | - <sup>1)</sup> | Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test                                                                                | EN 61000-4-3            | 2002 <sup>2)</sup> |
| IEC 61000-4-4      | 1995            | Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test                                                                                                 | EN 61000-4-4            | 1995               |
| IEC 61000-4-5      | - <sup>1)</sup> | Part 4-5: Testing and measurement techniques - Surge immunity test                                                                                                                           | EN 61000-4-5            | 1995 <sup>2)</sup> |
| IEC 61000-4-7      | 1991            | Part 4-7: Testing and measurement techniques - General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto      | EN 61000-4-7            | 1993               |

| <u>Publication</u> | <u>Year</u>     | <u>Title</u>                                                                                                                                                            | <u>EN/HD</u>  | <u>Year</u>        |
|--------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------|
| IEC 61000-4-8      | - <sup>1)</sup> | Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test                                                                             | EN 61000-4-8  | 1993 <sup>2)</sup> |
| IEC 61000-4-9      | - <sup>1)</sup> | Part 4-9: Testing and measurement techniques - Pulse magnetic field immunity test                                                                                       | EN 61000-4-9  | 1993 <sup>2)</sup> |
| IEC 61000-4-10     | - <sup>1)</sup> | Part 4-10: Testing and measurement techniques - Damped oscillatory magnetic field immunity test                                                                         | EN 61000-4-10 | 1993 <sup>2)</sup> |
| IEC 61000-4-11     | - <sup>1)</sup> | Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests                                                 | EN 61000-4-11 | 1994 <sup>2)</sup> |
| IEC 61000-4-12     | - <sup>1)</sup> | Part 4-12: Testing and measurement techniques - Oscillatory waves immunity test                                                                                         | EN 61000-4-12 | 1995 <sup>2)</sup> |
| IEC 61000-4-13     | - <sup>1)</sup> | Part 4-13: Testing and measurement techniques - Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests                | EN 61000-4-13 | 2002 <sup>2)</sup> |
| IEC 61000-4-29     | 2000            | Part 4-29: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests                        | EN 61000-4-29 | 2000               |
| IEC 61025          | 1990            | Fault tree analysis (FTA)                                                                                                                                               | HD 617 S1     | 1992               |
| IEC 61166          | 1993            | High-voltage alternating current circuit-breakers - Guide for seismic qualification of high-voltage alternating current circuit-breakers                                | EN 61166      | 1993               |
| IEC/TS 61462       | 1998            | Composite insulators - Hollow insulators for use in outdoor and indoor electrical equipment - Definitions, test methods, acceptance criteria and design recommendations | -             | -                  |
| IEC 61850-3        | - <sup>1)</sup> | Communication networks and systems in substations<br>Part 3: General requirements                                                                                       | EN 61850-3    | 2002 <sup>2)</sup> |
| IEC 61850-9-1      | - <sup>4)</sup> | Part 9-1: Specific communication system mappings (SCSM) - Serial unidirectional multidrop point to point link                                                           | -             | -                  |

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<sup>4)</sup> To be published.



| <u>Publication</u> | <u>Year</u>     | <u>Title</u>                                                                                                                                        | <u>EN/HD</u> | <u>Year</u> |
|--------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------|
| CISPR 11<br>(mod)  | 1997            | Industrial, scientific and medical (ISM)<br>radio-frequency equipment - Radio<br>disturbance characteristics - Limits and<br>methods of measurement | EN 55011     | 1998        |
| A1                 | 1999            |                                                                                                                                                     | A1           | 1999        |
| EIA RS-485         | - <sup>1)</sup> | Standard for electrical characteristics of<br>generators and receivers for use in<br>balanced digital multipoint systems                            | -            | -           |
| -                  | -               | Voltage characteristics of electricity<br>supplied by public distribution systems                                                                   | EN 50160     | 1999        |



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## INSTRUMENT TRANSFORMERS –

### Part 8: Electronic current transformers

#### 1 Scope

##### 1.1 General

This part of IEC 60044 applies to newly manufactured electronic current transformers having an analogue voltage output or a digital output, for use with electrical measuring instruments and electrical protective devices at nominal frequencies from 15 Hz to 100 Hz.

NOTE Additional requirements due to the bandwidth are considered. The accuracy requirements on harmonics are given in annex D.

Clause 12 covers the accuracy requirements that are necessary for electronic current transformers for use with electrical measuring instruments.

Clause 13 covers the accuracy requirements that are necessary for electronic current transformers for use with electrical protective relays, and particularly for forms of protection in which the prime requirement is to maintain the accuracy up to several times the rated current. If required, the transient accuracy of an electronic current transformer during fault is also given in this clause.

Electronic current transformers intended for both measurement and protection should comply with all the clauses of this standard and are called multipurpose electronic current transformers.

The transformer technology can be based on optical arrangements equipped with electrical components, on air-core coils (with or without a built-in integrator), or on iron-core coils with integrated shunt used as a current-to-voltage converter, alone or equipped with electronic components.

For analogue output, the electronic current transformer may include the secondary signal cable. Examples of electronic current transformer technologies using air-core coils and iron-core coils with integrated shunt are given in annex C.

For digital output, this standard takes into account a point-to-point connection from the electronic transformer to electrical measuring instruments and electrical devices (see annex B).

Some information has been added in order to ensure the compatibility of this point-to-point link with the overall system of communication in the substation, thus allowing data exchange between all kinds of substation devices. This information builds what is called the mapping of the link layer of the point-to-point serial link. Processbus communication is under consideration.

This mapping allows interoperability between devices from different manufacturers.

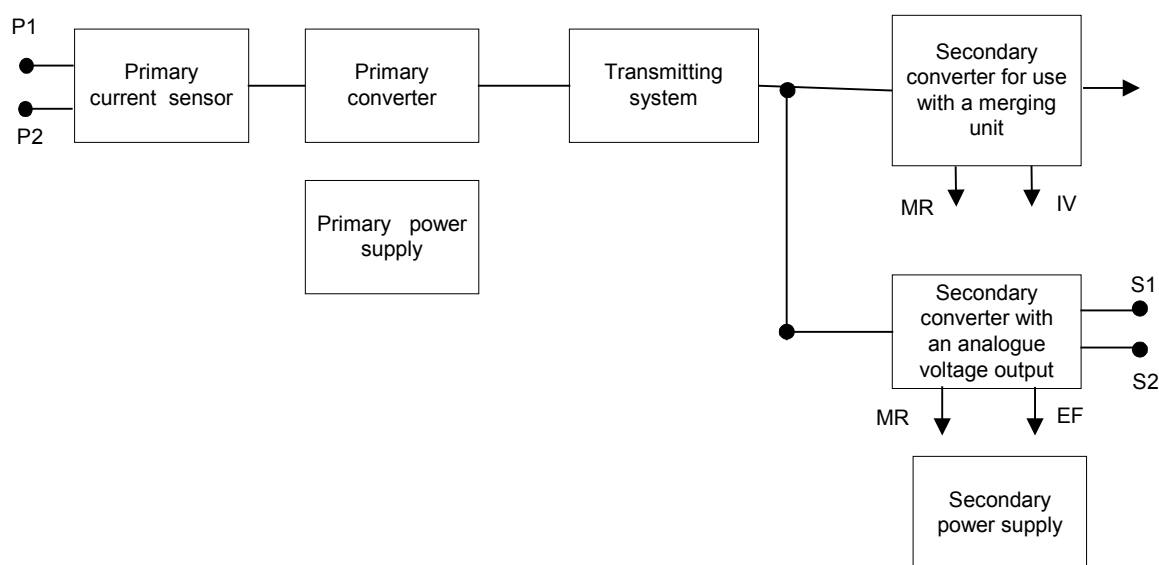
This standard does not specify individual implementations or products, nor does it constrain the implementation of entities and interfaces within a computer system. This standard specifies the externally visible functionality of implementations together with conformance requirements for such functionalities.

NOTE 1 Translation of the analogue requirements on CT and VT into digital parameters, such as the number of bits and the sampling speed, has been carried out as far as was reasonable, since the requirements on the conventional CT and VT are expressed according to the actual technologies used and their shortcomings, rather than on needs from the equipment using the information on current and voltage.

NOTE 2 The approach chosen is to concentrate on what is needed by the secondary equipment and how the performance can be calibrated. The concept is compatible with a processbus.

## 1.2 General block diagram of electronic current transformers

The applied technology decides which parts are necessary for the realization of an electronic current transformer, i.e. it is not absolutely necessary that all the parts described in figures 1 and 2 be included in the transformer.



IEC 1732/02

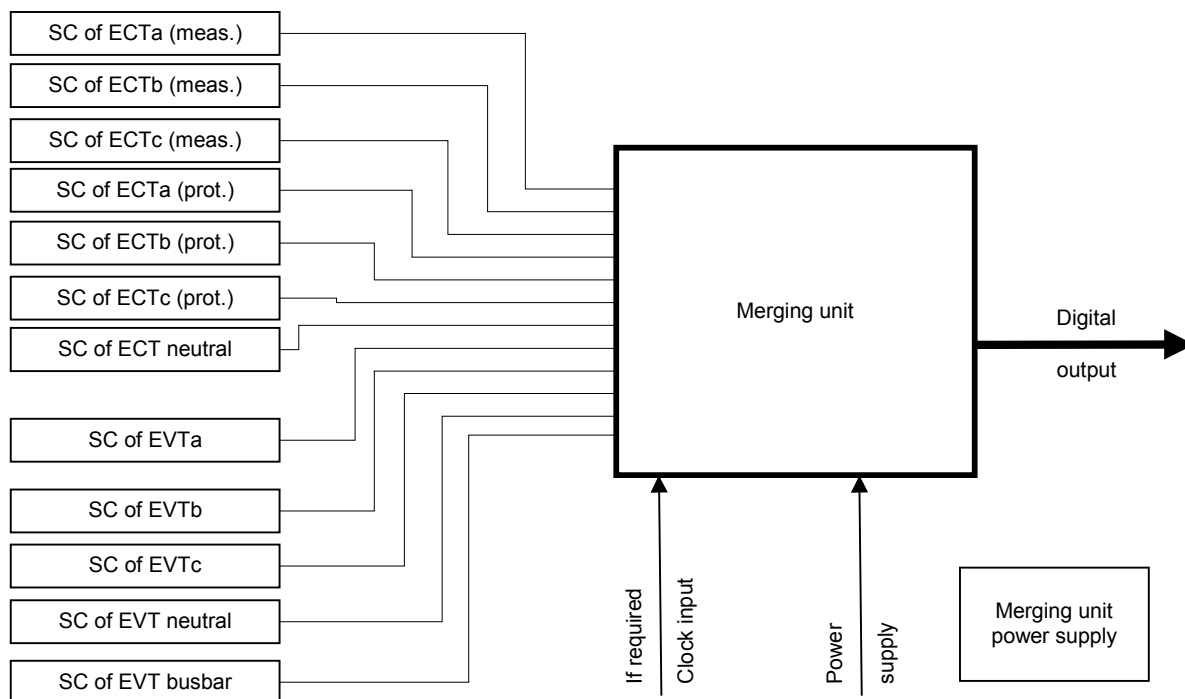
### Key

- IV Output invalid
- EF Equipment failure
- MR Maintenance request

**Figure 1 – General block diagram of a single-phase electronic current transformer**



### 1.3 General block diagram of electronic transformers with a digital output



IEC 1733/02

NOTE SC of EVTa is the secondary converter of the electronic voltage transformer of phase a (see IEC 60044-7). SC of ECTa is the secondary converter of the electronic current transformer of phase a. Other data channel mappings are possible (see 6.2.3).

**Figure 2 – Example of digital interface block diagram**

Up to 12 secondary converter data channels are grouped together (merged) using a merging unit (MU). A data channel carries a single stream of sampled measurement values from an electronic current transformer or an electronic voltage transformer (see figure 2). Several data channels may be transmitted via one physical interface from the secondary converter to the merging unit in case of multiphase or combined units. The merging unit supplies the secondary equipment with a time-coherent set of current and voltage samples. A secondary converter can be used also for the acquisition of signals coming from conventional voltage instrument transformers or current instrument transformers and may be integrated into the merging unit.

## 2 Normative references

The following referenced documents are indispensable for the application 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.

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<sup>1</sup> To be published.