
Komunikacijska omrežja in sistemi za avtomatizacijo porabe električne energije - 7-440. del: Osnovna komunikacijska struktura - Združljivi logični vozliščni in podatkovni razredi - Merjenje kakovosti električne energije

Communication networks and systems for power utility automation - Part 7-440: Basic communication structure - Compatible logical node classes and data object classes - Power quality metering

Sample Document

Réseaux et systèmes de communication pour l'automatisation des systèmes électriques - Partie 7-440: Structure de communication de base - Classes de noeuds logiques et classes d'objets de données compatibles - Mesure de la qualité de l'énergie

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33.200	Daljinsko krmiljenje, daljinske meritve (telemetrija)	Telecontrol. Telemetry

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57/2876/CDV

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SECRETARIAT: Germany	SECRETARY: Mr Heiko Englert
OF INTEREST TO THE FOLLOWING COMMITTEES:	HORIZONTAL FUNCTION(S):
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TITLE: Communication networks and systems for power utility automation – Part 7-440: Basic communication structure – Compatible logical node classes and data object classes – Power quality metering

PROPOSED STABILITY DATE: 2027

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CONTENTS

FOREWORD	4
INTRODUCTION	7
1 Scope	8
1.1 General	8
1.2 Published versions of the standard and related namespace names	10
1.3 Identification of the code component	11
1.4 Code Component distribution	11
2 Normative references	12
3 Terms and definitions	12
4 Abbreviated terms	13
4.1 General purpose abbreviated terms	13
4.2 Abbreviated terms used in data object names	13
5 Logical node preliminaries	14
5.1 Logical node groups	14
5.2 Derived logical nodes and associated presence conditions nds/ds	14
5.3 Interpretation of logical node tables	16
5.4 Relationship between this standard and IEC 61850-5	17
6 Logical node classes (LogicalNodes-7-440)	20
6.1 General	20
6.2 Abstract logical nodes (AbstractLNs-7-440)	20
6.2.1 General	20
6.2.2 Abstract GroupM logical nodes (AbstractLNsGroupM-7-440)	21
6.2.3 Abstract GroupQ logical nodes (AbstractLNsGroupQ-7-440)	23
6.3 Logical nodes for metering and measurement (LNGroupM-7-440)	24
6.3.1 General	24
6.3.2 LN: Flicker measurement Name: MFLK	26
6.3.3 LN: Harmonics or interharmonics Name: MHAI	28
6.3.4 LN: Non-phase-related AC harmonics and interharmonics Name: MHAN	32
6.3.5 LN: Metering single phase Name: MMTN	35
6.3.6 LN: Metering 3 phase Name: MMTR	36
6.4 Logical nodes for power quality events (LNGroupQ-7-440)	38
6.4.1 General	38
6.4.2 LN: Frequency variation Name: QFVR	39
6.4.3 LN: Current transient Name: QITR	41
6.4.4 LN: Current unbalance variation Name: QIUB	43
6.4.5 LN: Voltage transient Name: QVTR	45
6.4.6 LN: Voltage unbalance variation Name: QVUB	47
6.4.7 LN: Voltage variation Name: QVVR	49
7 Data object name semantics and enumerations	51
7.1 Data semantics	51
7.2 Enumerated data attribute types	55
7.2.1 General	55
7.2.2 Affected phases (AffectedPhasesKind enumeration)	55
7.2.3 Unbalance detection method (UnbalanceDetectionKind enumeration)	56

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7.2.4 Voltage interrupt detection (VoltInterruptDetectionKind enumeration)	56
Annex A (informative) Deprecated logical node classes	57
Annex B (informative) Conditions for element presence	58
Annex C (normative) Compatibility of the different revisions of the standard	60
C.1 General.....	60
C.2 List of the modifications to consider for backward / forward compatibility	60
C.3 List of modifications requiring specific treatment	63
Bibliography.....	64
Figure 1 – Overview of this standard and relation of 7-4, 7-4n and 7-4nn series	9
Figure 2 – Overview of the annexes in 7-4, 7-4n and 7-4nn series	10
Figure 3 – Class diagram LogicalNodes-7-440::LogicalNodesGroups.....	20
Figure 4 – Class diagram AbstractLNs-7-440::AbstractLNs-7-440	21
Figure 5 – Class diagram AbstractLNsGroupM-7-440::AbstractLNsGroupM	21
Figure 6 – Class diagram AbstractLNsGroupQ-7-440::AbstractLNsGroupQ	23
Figure 7 – Class diagram LNGroupM-7-440::LNGroupM1-7-440	25
Figure 8 – Class diagram LNGroupM-7-440::LNGroupM2-7-440	26
Figure 9 – Class diagram LNGroupQ-7-440::LNGroupQ-7-440.....	39
Table 1 – Tracking information of IEC 61850-7-440:2025A namespace building-up.....	6
Table 2 - Published version	10
Table 3 – Attributes of IEC 61850-7-440:2025A namespace	11
Table 4 – List of logical node groups.....	14
Table 5 – Interpretation of logical node tables.....	16
Table 6 – Logical nodes mappings	17
Table 7 – Data objects of EnergyLN.....	22
Table 8 – Data objects of HarmonicsLN	22
Table 9 – Data objects of PowerQualityLN	24
Table 10 – Data objects of UnbalanceDetectionLN	24
Table 11 – Data objects of MFLK	26
Table 12 – Data objects of MHAI.....	29
Table 13 – Data objects of MHAN	32
Table 14 – Data objects of MMTN	35
Table 15 – Data objects of MMTR	37
Table 16 – Data objects of QFVR.....	39
Table 17 – Data objects of QITR.....	41
Table 18 – Data objects of QIUB.....	43
Table 19 – Data objects of QVTR.....	45
Table 20 – Data objects of QVUB	47
Table 21 – Data objects of QVVR	49
Table 22 – Name and description of data objects defined in classes of LogicalNodes-7-440 package	51
Table 23 – Literals of AffectedPhasesKind.....	55

Table 24 – Literals of UnbalanceDetectionKind	56
Table 25 – Literals of VoltInterruptDetectionKind	56
Table 26 – Conditions for presence of elements within a context	58

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**COMMUNICATION NETWORKS AND
SYSTEMS FOR POWER UTILITY AUTOMATION –****Part 7-440: Basic communication structure –
Compatible logical node classes and data object classes –
Power quality and metering**

FOREWORD

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International Standard IEC 61850-7-440 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

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The IEC 61850-7-4 Edition 2.1 is re-organized into the following parts of “Basic communication structure – Compatible logical node classes and data object classes”, each hereinafter referred to by the specialized title indicated below:

- IEC 61850-7-4:2025 Edition 3 – Core part
- IEC 61850-7-40:2025 Edition 1 – Common part
- IEC 61850-7-43:2025 Edition 1 – Primary equipment
- IEC 61850-7-44:2025 Edition 1 – Instrument transformers
- IEC 61850-7-400:2025 Edition 1 – Substation automation
- IEC 61850-7-401:2025 Edition 1 – Protection
- IEC 61850-7-440:2025 Edition 1 – Power quality and metering (– this document)

Further in this document these are referenced as 7-4, 7-4n and 7-4nn.

This structure of IEC 61850-7-4 Edition 2.1 has been changed into several parts (7-4, 7-4n and 7-4nn) which allows to update individual parts without requiring a new edition to the core part. This enables the standard to meet time to market requirements more quickly.

As a consequence, the annexes of former IEC 61850-7-4 Edition 2.1 are now distributed according to their purpose. This document includes the following Annexes:

- Annex A - Deprecated logical nodes classes in regard to this document. All deprecated logical node classes from IEC 61850-7-4 Edition 2.1 are found in 7-4 – Core part.
- Annex B - Conditions for element presence
- Annex C - Compatibility of the different revisions of the standard

IEC 61850-7-4 Edition 2.1 will not be subject to any further improvements with this series being published.

The new series cancels and replaces IEC 61850-7-4 Edition 2.1 which was last published in 2020 as a consolidated version.

Clauses 4 through 7 and their subclauses (except for 5.1, 5.2, and 5.3) are automatically generated from the UML model.

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

FDIS	Report on voting

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Table 1 shows all tracking information of IEC 61850-7-440:2025A namespace building-up

Table 1 – Tracking information of IEC 61850-7-440:2025A namespace building-up

Attribute	Content
Namespace IEC specific information	
Version of the UML model used for generating the document (informative)	WG10built18
Date of the UML model used for generating the document (informative)	2025-12-12
Autogeneration software name and version(informative)	j61850DocBuilder 02.05b based on jCleanCim beta9.4 (derived from jCleanCim 02-02)

A list of all parts of the IEC 61850 series under the general title *Communication networks and systems for power utility automation*, can be found on the IEC website.

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site under "http://web-store.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.

A bilingual version of this publication may be issued at a later date.

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.

1

INTRODUCTION

2 This part of IEC 61850 is part of a set of standards, the IEC 61850 series. IEC 61850 defines
3 communication networks and systems for power utility automation, and more specifically the
4 communication architecture for subsystems such as substation automation systems. The sum
5 of all subsystems can result also in the description of the communication architecture for the
6 overall power system management. The defined architecture provided in specific parts of
7 IEC 61850-7-n gives both a power utility specific data model and a substation domain specific
8 data model with abstract definitions of data objects classes and services independently from
9 the specific protocol stacks, implementations, and operating systems. The mapping of these
10 abstract classes and services to communication stacks is outside the scope of IEC 61850-7-n
11 and can be found in IEC 61850-8-n and in IEC 61850-9-n.

12 IEC 61850-7-1 gives an overview of the basic communication architecture to be used for all
13 applications in the power system domain. IEC 61850-7-3 defines common attribute types and
14 common data classes related to all applications in the power system domain. The attributes of
15 the common data classes can be accessed using services defined in IEC 61850-7-2. These
16 common data classes are used in this part to define the compatible data object classes.

17 To reach interoperability, all data objects in the data model need a strong definition with regard
18 to syntax and semantics. The semantics of the data objects is mainly provided by names as-
19 signed to common logical nodes defined in this part and the data objects they contain, as de-
20 fined in this basic part, and dedicated logical nodes defined in domain specific parts such as
21 for hydro power control systems. Interoperability is easiest if as many as possible of the data
22 objects are defined as mandatory. Because of different approaches and technical features,
23 some data objects, especially settings, were declared as optional in IEC 61850-7-4:2010 and
24 its following editions. There are also data objects which were declared as conditional, i.e. they
25 will become mandatory under some well-defined conditions. After some experience has been
26 gained with this standard, this decision can be reviewed in the next edition of this part of
27 IEC 61850-7.

28 It is noted that data objects with full semantics are only one of the elements required to achieve
29 interoperability. The standardized access to the data objects is defined in compatible, power
30 utility and domain specific services (see IEC 61850-7-2). Since data objects and services are
31 hosted by devices (IED), a proper device model is also needed. To describe both the device
32 capabilities and the interaction of the devices in the related system, a configuration language
33 is also needed, as defined in IEC 61850-6 by the substation configuration description language
34 (SCL).

35 The compatible logical node name and data object name definitions found in this part and the
36 associated semantics are fixed. The syntax of the type definitions of all data objects classes is
37 governed by abstract definitions provided in IEC 61850-7-2 and IEC 61850-7-3. Not all features
38 of logical nodes are listed in this part; for example, data sets and logs are covered in
39 IEC 61850-7-2.

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COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 7-440: Basic communication structure – Compatible logical node classes and data object classes – Power quality and metering part

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1 Scope

1.1 General

This part of IEC 61850 specifies the information model of devices and functions generally related to common use regarding applications in systems for power utility automation. In particular, it specifies the compatible logical node names and data object names for communication between intelligent electronic devices (IED). This includes the relationship between logical nodes and data objects.

The logical node names and data object names defined in this document are part of the class model introduced in IEC 61850-7-1 and defined in IEC 61850-7-2. These names are used to build the hierarchical object references applied for communicating with IEDs in systems for power utility automation and, especially, with IEDs in substations and on distribution feeders. The naming conventions of IEC 61850-7-2 are applied in this part.

To avoid private, incompatible extensions, this part specifies normative naming rules for multiple instances and private, compatible extensions of logical node (LN) classes and data object names. Any definition is based on IEC 61850 or on referenced well identified public documents.

This section does not include tutorial material. It provides content that assumes prior knowledge of IEC 61850-5 and IEC 61850-7-1, together with IEC 61850-7-3 and IEC 61850-7-2.

This standard and its direct counterparts (7-4, 7-4n and 7-4nn) are applicable to describe device models and functions for:

- substation and feeder equipment,
- substation-to-substation information exchange,
- substation-to-control centre information exchange,
- power plant-to-control centre information exchange,
- information exchange for distributed generation,
- information exchange for distributed energy resources,
- information exchange for metering,
- information exchanged for hydro power plants, or
- information exchange for wind generation plants.

Figure 1 provides a general overview of this standard, the groups of logical nodes and the new structure after the split. For convenience, the logical nodes are defined below in alphabetical order within its part.

Figure 2 gives an overview of the annexes used in the series of 7-4, 7-4n and 7-4nn.

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Figure 1 – Overview of this standard and relation of 7-4, 7-4n and 7-4nn series

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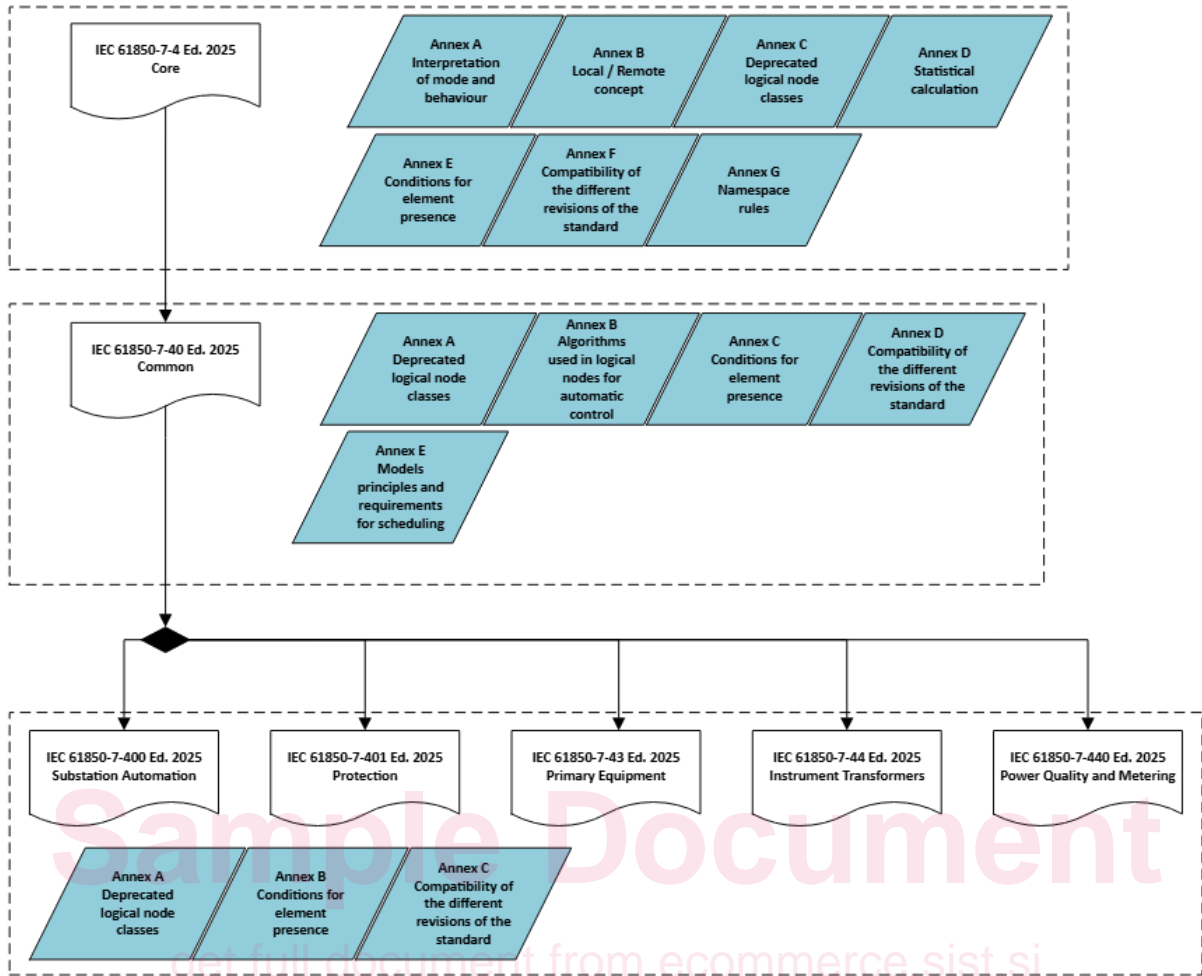


Figure 2 – Overview of the annexes in 7-4, 7-4n and 7-4nn series

1.2 Published versions of the standard and related namespace names

Table 2 provides a reference between all published editions, amendments or corrigenda of this document and the full name of the namespace.

Table 2 - Published version

Edition	Publication date	Webstore	Namespace
Edition 1.0	20nn-nn	IEC 61850-7-440:20nn	IEC 61850-7-440:2025A3

91 1.3 Identification of the code component

92

93 Table 3 shows all attributes of IEC 61850-7-440:2025A namespace.

94 **Table 3 – Attributes of IEC 61850-7-440:2025A namespace**

Attribute	Content
Namespace nameplate	
Namespace Identifier	IEC 61850-7-440
Version	2025
Revision	A
Release	3
Full Namespace Name	IEC 61850-7-440:2025A
Full Code Component Name	IEC_61850-7-440.NSD.2025A.Full
Light Code Component Name	IEC_61850-7-440.NSD.2025A.Light
Namespace Type	domain
Namespace dependencies	
includes	IEC 61850-7-40:2025A version :2025 revision :A

95

96 1.4 Code Component distribution

97 Each Code Component is a ZIP package containing the electronic representation of the Code
98 Component itself, with a file describing the content of the package (IECManifest.xml).

99 The life cycle of a code component is not restricted to the life cycle of the related publication.
100 The publication life cycle goes through two stages, Version (corresponding to an edition) and
101 Revision (corresponding to an amendment). A third publication stage (Release) allows publica-
102 tion of Code Component in case of urgent fixes of InterOp Tissues, thus without need to publish
103 an amendment.

104 Consequently, new releases of the Code Component might be released, which supersedes the
105 previous release, and will be distributed through the IEC TC57 web site at:

106 <https://www.iec.ch/tc57/supportdocuments>

107 The code component associated to this document is a nsd file. It is available as a full version
108 and a light version. The light version is freely accessible on the IEC website for download at
109 <https://www.iec.ch/tc57/supportdocuments>, but the usage remains under the licensing condi-
110 tions.

111 The latest version/release of the code component will be found by selecting the file for the code
112 component with the highest value for VersionStateInfo, e.g. *IEC_61850-6-*
113 *100.XSD.{VersionStateInfo}.full.zip*

114 In case of any differences between the downloadable code component and the IEC pdf pub-
115 lished content, the downloadable code component is the valid one; it might be subject to up-
116 dates. See included history files.

117

118

119 2 Normative references

120 The following documents are referred to in the text in such a way that some or all of their content
121 constitutes requirements of this document. For dated references, only the edition cited applies.
122 For undated references, the latest edition of the referenced document (including any amend-
123 ments) applies.

124 IEC 61000-4-7:2002, *Electromagnetic compatibility (EMC) - Part 4-7: Testing and measurement*
125 *techniques - General guide on harmonics and interharmonics measurements and instrumenta-*
126 *tion, for power supply systems and equipment connected thereto*

127 IEC 61000-4-15, *Electromagnetic compatibility (EMC) - Part 4-15: Testing and measurement*
128 *techniques - Flickermeter - Functional and design specifications*

129 IEC TS 61850-2, *Communication networks and systems for power utility automation - Part 2:*
130 *Glossary*

131 IEC 61850-5, *Communication networks and systems for power utility automation - Part 5: Com-*
132 *munication requirements for functions and device models*

133 IEC 61850-7-1:2020, *Communication networks and systems for power utility automation - Part*
134 *7-1: Basic communication structure - Principles and models*

135 IEC 61850-7-2:2020, *Communication networks and systems for power utility automation - Part*
136 *7-2: Basic information and communication structure - Abstract communication service interface*
137 *(ACSI)*

138 IEC 61850-7-3:2020, *Communication networks and systems for power utility automation - Part*
139 *7-3: Basic communication structure - Common data classes*

140 IEC 61850-7-4:2025, *Basic communication structure - Compatible logical node classes and data*
141 *object classes – Core part*

142 IEC 61850-7-40:2025, *Basic communication structure - Compatible logical node classes and*
143 *data object classes – Common part*

144 IEEE 519:2022, *IEEE Recommended Practises and Requirements for Harmonic Control in Elec-*
145 *trical Power Systems*

146 IEEE C37.2:2022, *Electrical Power System Device Function Numbers and Contact Designation*

147 IEEE 1459:2025, *IEEE Trial-Use Standard Definitions for the Measurement of Electric Power*
148 *Quantities Under Sinusoidal, Nonsinusoidal, Balanced, or Unbalanced Conditions*

149 3 Terms and definitions

150 For the purposes of this document, the terms and definitions given in IEC 61850-2:2019,
151 IEC 61850-7-2:2020 and IEC 61850-7-4:2020, as well as the following, apply.

152 ISO and IEC maintain terminological databases for use in standardization at the following ad-
153 dresses:

- 154 • IEC Electropedia: available at <http://www.electropedia.org/>
- 155 • ISO Online browsing platform: available at <http://www.iso.org/obp>

156 3.1 <<abstract>> logical node class

157 abstract logical node class which is never instantiated, used to group common data objects into
158 a semantically meaningful entity and reuse them in a logical node class through inheritance

159 3.2 <<admin>> logical node class

160 abstract logical node class with one special rule for changing the presence condition of some
161 of its data objects when they are inherited in the derived statistics (“ds”) context: in a logical