

INTERNATIONAL STANDARD

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Wind turbines –

**Part 25-2: Communications for monitoring and control of wind power plants –
Information models**

Eoliennes –

**Partie 25-2: Communications pour la surveillance et la commande des centrales
éoliennes – Modèles d'information**



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INTERNATIONAL STANDARD

NORME INTERNATIONALE



Wind turbines –

Part 25-2: Communications for monitoring and control of wind power plants – Information models

Eoliennes –

Partie 25-2: Communications pour la surveillance et la commande des centrales éoliennes – Modèles d'information

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CONTENTS

FOREWORD.....	6
INTRODUCTION.....	8
1 Scope.....	9
2 Normative references.....	10
3 Terms and definitions	12
4 Abbreviated terms	12
5 General.....	15
5.1 Overview of logical node classes	15
5.2 Use of logical node classes	17
5.3 Extensions of the information model	18
6 Wind power plant logical node classes	18
6.1 System specific logical nodes	18
6.1.1 Wind power plant common logical node class	18
6.1.2 LN: Logical node zero Name: LLN0	20
6.1.3 LN: Physical device information Name: LPHD	20
6.2 Wind power plant specific logical nodes	21
6.2.1 LN: Wind power plant general information Name: WPPD	21
6.2.2 LN: Wind turbine general information Name: WTUR	22
6.2.3 LN: Wind turbine rotor information Name: WROT	22
6.2.4 LN: Wind turbine transmission information Name: WTRM	23
6.2.5 LN: Wind turbine generator information Name: WGEN	24
6.2.6 LN: Wind turbine converter information Name: WCNV	25
6.2.7 LN: Wind turbine transformer information Name: WTRF	26
6.2.8 LN: Wind turbine nacelle information Name: WNAC	27
6.2.9 LN: Wind turbine yawing information Name: WYAW	28
6.2.10 LN: Wind turbine tower information Name: WTOW	29
6.2.11 LN: Wind power plant meteorological information Name: WMET	30
6.2.12 LN: Wind power plant alarm information Name: WALM	31
6.2.13 LN: Wind turbine availability information Name: WAVL	31
6.2.14 LN: Wind power plant active power control Name: WAPC	32
6.2.15 LN: Wind power plant reactive power control Name: WRPC	33
6.3 Data name semantic.....	34
7 Common data classes.....	47
7.1 Basic concepts for common data classes (CDC)	47
7.1.1 Categories of common data classes	47
7.1.2 Structure of common data classes	48
7.2 Type definitions.....	50
7.2.1 General	50
7.2.2 BasicTypes	50
7.2.3 CommonACSITypes	50
7.2.4 ConstructedAttributeClasses	51
7.2.5 Originator	54
7.3 Wind power plant specific common data classes (CDC).....	55
7.3.1 General	55
7.3.2 Setpoint value (SPV).....	56
7.3.3 Status Value (STV)	58

7.3.4	Alarm (ALM)	58
7.3.5	Command (CMD)	60
7.3.6	Event counting (CTE)	61
7.3.7	State timing (TMS)	63
7.3.8	Alarm Set Status (AST)	65
7.4	Common data classes inherited from IEC 61850-7-3	65
7.4.1	CDCs from IEC 61850-7-3 (unchanged)	65
7.4.2	CDCs from IEC 61850-7-3 (specialised)	66
7.5	Common data class attribute semantics	68
Annex A (informative) Information model for statistical data and historical statistical data		73
A.1	General	73
A.2	Model for statistical and historical statistical data	73
A.3	Logical node extension for statistical data	76
A.3.1	Data for calculation method for analogue and statistical analogue values	76
A.3.2	Data name semantics	76
A.4	Common data class for statistical data	78
A.4.1	Object reference setting group common data class (ORG)	78
Annex B (normative) Value range for units and multiplier		80
Annex C (normative) Logical nodes for state log, analogue log and report information		83
C.1	LN: Wind turbine state log information Name: WSLG	83
C.2	LN: Wind turbine analogue log information Name: WALG	85
C.3	LN: Wind turbine report information Name: WREP	88
Annex D (informative) Wind power plant controller		90
D.1	General	90
D.2	Active power control functions	91
D.3	Reactive power control functions	94
Annex E (informative) List of mandatory logical nodes and data		97
E.1	General	97
Annex F (informative) Control authority management		99
F.1	General	99
F.2	Functional description	99
F.2.1	Local mode	99
F.2.2	Local mode at station level	99
F.3	Logical Node representation	100
F.3.1	Local mode	100
F.3.2	Diagram description	100
F.4	Local mode at station level	101
F.4.1	General	101
F.4.2	Diagram description	101
Figure 1 – Conceptual communication model of the IEC 61400-25 series		10
Figure 2 – Relationship of logical nodes		15
Figure 3 – Use of instances of logical nodes		18
Figure A.1 – Conceptual model of statistical and historical statistical data (1)		74
Figure A.2 – Conceptual model of statistical and historical statistical data (2)		75

Figure D.1 – Conceptual structure of the wind power plant control functions.....	90
Figure D.2 – Schematic illustration of the active power limitation control function	91
Figure D.3 – Schematic illustration of the gradient power control function	92
Figure D.4 – Schematic illustration of the delta power control function	92
Figure D.5 – Schematic illustration of a combined control – including gradient, delta and active power limitation control	93
Figure D.6 – Schematic illustration of the apparent power control function	93
Figure D.7 – Schematic illustration of the reactive power control function.....	94
Figure D.8 – Schematic illustration of the power factor control function	95
Figure D.9 – Schematic illustration of the voltage control function using reactive power control.....	96
Figure F.1 – Local mode	100
Figure F.2 – Local mode at station level	101
Table 1 – System specific logical nodes	15
Table 2 – Wind power plant general logical nodes	16
Table 3 – Logical nodes for modelling a wind turbine	16
Table 4 – Logical nodes for modelling a non-turbine device	17
Table 5 – Wind power plant common logical node class.....	19
Table 6 – Logical node zero class	20
Table 7 – Physical device information class.....	21
Table 8 – LN: Wind power plant general information (WPPD).....	21
Table 9 – LN: Wind turbine general information (WTUR).....	22
Table 10 – LN: Wind turbine rotor information (WROT)	23
Table 11 – LN: Wind turbine transmission information (WTRM).....	24
Table 12 – LN: Wind turbine generator information (WGEN).....	25
Table 13 – LN: Wind turbine converter information (WCNV).....	26
Table 14 – LN: Wind turbine transformer information (WTRF)	27
Table 15 – LN: Wind turbine nacelle information (WNAC)	28
Table 16 – LN: Wind turbine yawing information (WYAW).....	29
Table 17 – LN: Wind turbine tower information (WTOW)	29
Table 18 – LN: Wind power plant meteorological information (WMET).....	30
Table 19 – LN: Wind power plant alarm information (WALM).....	31
Table 20 – LN: Wind turbine availability (WAVL).....	32
Table 21 – LN: Wind power plant active power control information (WAPC).....	33
Table 22 – LN: Wind power plant reactive power control information (WRPC).....	34
Table 23 – Data name semantic	35
Table 24 – General table structure of a common data class (CDC).....	48
Table 25 – Common data class attributes	49
Table 26 – Conditions for the presence of an attribute	49
Table 27 – Basic types.....	50
Table 28 – AnalogueValue	51
Table 29 – TimeStamp type	52
Table 30 – TimeQuality definition	53

Table 31 – TimeAccuracy.....	53
Table 32 – Quality	54
Table 33 – Unit	54
Table 34 – Originator	55
Table 35 – Values for orCat	55
Table 36 – Wind power plant specific common data classes.....	56
Table 37 – CDC: Setpoint value (SPV)	57
Table 38 – CDC: Status Value (STV).....	58
Table 39 – CDC: Alarm (ALM).....	59
Table 40 – CDC: Command (CMD).....	61
Table 41 – CDC: Event counting (CTE)	62
Table 42 – CDC: State timing (TMS)	64
Table 43 – CDC: Alarm Set Status (AST)	65
Table 44 – Specialized common data classes.....	66
Table 45 – Wind power plant device name plate common data class specification WDPL.....	67
Table 46 – Common data class attribute semantic	68
Table A.1 – Description of Data.....	77
Table A.2 – Object reference setting group common data class specification.....	78
Table B.1 – SI units: base units.....	80
Table B.2 – SI units: derived units.....	80
Table B.3 – SI units: extended units	81
Table B.4 – SI units: industry specific units.....	81
Table B.5 – Multiplier	82
Table C.1 – LN: Wind turbine state log information (WSLG)	84
Table C.2 – LN: Wind turbine analogue log information (WALG).....	86
Table C.3 – LN: Wind turbine report information (WREP)	89
Table E.1 – Mandatory system specific logical nodes.....	97
Table E.2 – Mandatory wind turbine specific logical nodes	97
Table E.3 – Mandatory wind power plant specific common data classes (CDC)	97
Table E.4 – Mandatory common data classes inherited from IEC 61850-7-3.....	97
Table E.5 – Mandatory common data classes inherited from IEC 61850-7-3 and specialised	98

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WIND TURBINES –

Part 25-2: Communications for monitoring and control of wind power plants – Information models

FOREWORD

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International Standard IEC 61400-25-2 has been prepared by IEC technical committee 88: Wind turbines.

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

FDIS	Report on voting
88/539FDIS	88/551/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.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The scope of revision includes:

- harmonization with Common Data Classes in Edition 2 of IEC 61850-7-3,
- harmonization with Logical node classes in Edition 2 of IEC 61850-7-4,
- harmonization with Information models in IEC 61850-7-410 and IEC 61850-7-420,
- reduction of overlap between standards and simplification by increased referencing,
- extension of Data objects for operation of smart grids (in US and other areas),
- extended and enhanced semantics for existing data objects,

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

- a) The model on alarm handling has been revised and the logical node WALM and associated cdc's have been modified.
- b) A new logical node class WPPD that represents general data for non-turbine devices has been added.
- c) A new logical node class WAVL that represents availability data has been added.
- d) WMET has been revised and harmonized with MMET. If MMET is extended with data object for altitude and ice then WMET may be deleted in future editions.
- e) External Met sensors (WndDir, WndSpd, Humidity, Pressure, Temperature) have been removed from WNAC and moved to WMET.
- f) Some data types, such as CtxInt, are not supported by IEC 61850 so other data types need to be used.
- g) Abbreviations have been changed to resolve inconsistencies with IEC 61850. This affects several data names.
- h) Enumeration values and definitions in the standard have been harmonized.
- i) Additional data objects regarding smart grid have been added.
- j) Wind power specific CDCs that in Edition 1 contained subsets of attributes of CDCs from IEC 61850-7-3 now implicitly include all attributes of these CDCs.
- k) Technical issues related to IEC 61400-25-2:2006 have been resolved and results incorporated in the standard.
- l) The presence conditions for statistical information has been modified compared to IEC 61850-7-4:2010.

This second edition cancels and replaces the first edition published in 2006. This edition constitutes a technical revision.

A list of all parts of the IEC 61400 series, under the general title *Wind turbines*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

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INTRODUCTION

The IEC 61400-25 series defines communication for monitoring and control of wind power plants. The modeling approach of the IEC 61400-25 series has been selected to provide abstract definitions of classes and services such that the specifications are independent of specific protocol stacks, implementations, and operating systems. The mapping of these abstract classes and services to a specific communication profile is not within the scope of this part of the IEC 61400-25 series but within the scope of IEC 61400-25-4.

To reach interoperability, all data in the information model need a strong definition with regard to syntax and semantics. The semantics of the data are mainly provided by names assigned to logical nodes and data they contain, as defined in this part of the IEC 61400-25 series. Interoperability is easiest if as many as possible of the data are defined as mandatory.

It should be noted that data with full semantics is only one of the elements required to achieve interoperability. Since data and services are hosted by intelligent electronic devices (IED), a proper device model is needed along with compatible domain specific services (see IEC 61400-25-3).

This part is used to specify the abstract definitions of a logical device class, logical node classes, data classes, and abstract common data classes. These abstract definitions are mapped into concrete object definitions that are to be used for a particular protocol.

The compatible logical node name, data object name and data attribute name definitions found in this part and the associated semantics are fixed.

NOTE 1 Performance of the IEC 61400-25 series implementations is application-specific. The IEC 61400-25 series does not guarantee a certain level of performance. This is beyond the scope of the IEC 61400-25 series. However, there is no underlying limitation in the communications technology to prevent high-speed application (millisecond level responses).

NOTE 2 Authorisation processes using PKI, role based access control as e.g. defined in the IEC 62351 series of standards or other security and access safety methods are beyond the scope of this standard.

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WIND TURBINES –

Part 25-2: Communications for monitoring and control of wind power plants – Information models

1 Scope

The focus of the IEC 61400-25 series is on the communications between wind power plant components such as wind turbines and actors such as SCADA systems. Internal communication within wind power plant components is outside the scope of the IEC 61400-25 series.

The IEC 61400-25 series is designed for a communication environment supported by a client-server model. Three areas are defined, that are modelled separately to ensure the scalability of implementations:

- 1) wind power plant information models,
- 2) information exchange model, and
- 3) mapping of these two models to a standard communication profile.

The wind power plant information model and the information exchange model, viewed together, constitute an interface between client and server. In this conjunction, the wind power plant information model serves as an interpretation frame for accessible wind power plant data. The wind power plant information model is used by the server to offer the client a uniform, component-oriented view of the wind power plant data. The information exchange model reflects the whole active functionality of the server. The IEC 61400-25 series enables connectivity between a heterogeneous combination of client and servers from different manufacturers and suppliers.

As depicted in Figure 1, the IEC 61400-25 series defines a server with the following aspects:

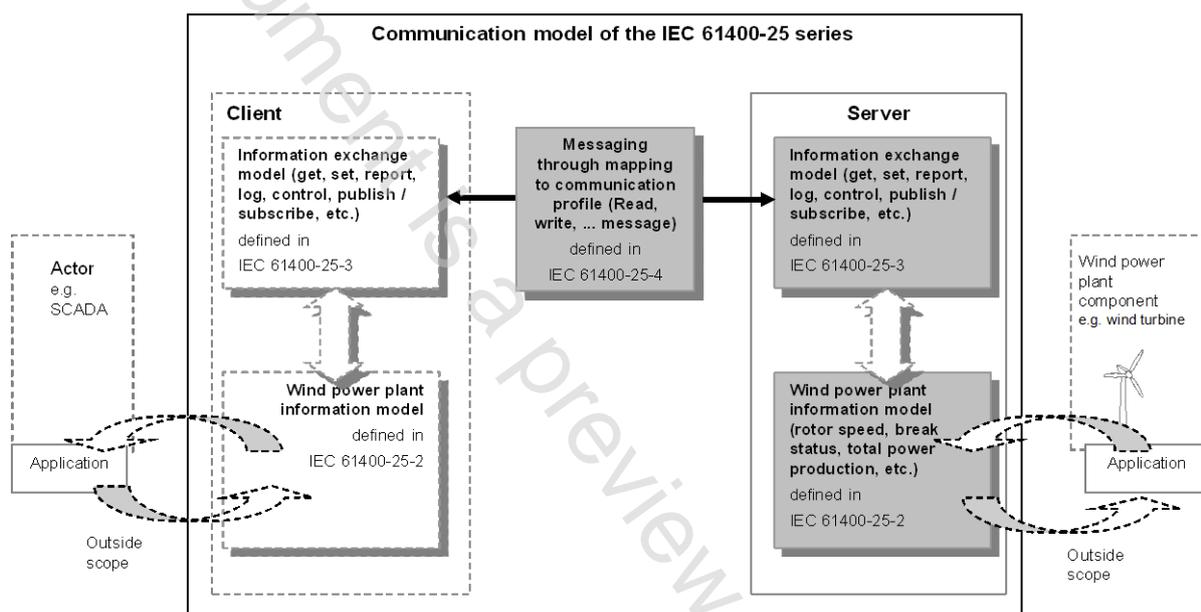
- information provided by a wind power plant component, for example “wind turbine rotor speed” or “total power production of a certain time interval”, is modelled and made available for access;
- services to exchange values of the modelled information defined in IEC 61400-25-3;
- mapping to a communication profile, providing a protocol stack, to carry the exchanged values from the modelled information (IEC 61400-25-4).

The IEC 61400-25 series only defines how to model the information, information exchange and mapping to specific communication protocols. The standard excludes a definition of how and where to implement the communication interface, the application program interface and implementation recommendations. However, the objective of the standard is that the information associated with a single wind power plant component (such as a wind turbine) is accessible through a corresponding logical device.

IEC 61400-25-2 specifies the information model of devices and functions related to wind power plant applications. In particular, it specifies the compatible logical node names, and data names for communication between wind power plant components. This includes the relationship between logical devices, logical nodes and data. The names defined in the IEC 61400-25 series are used to build the hierarchical object references applied for communicating with components in wind power plants.

This part of IEC 61400-25 specifies common attribute types and common data classes related to wind turbine applications. In particular it specifies common data classes for:

- setpoint value,
- status value,
- alarm,
- command,
- event counting,
- state timing,
- alarm set status.



IEC

Figure 1 – Conceptual communication model of the IEC 61400-25 series

Devices implementing the information model of this part choose one or more logical nodes as required by the application.

NOTE 1 The IEC 61400-25 series focuses on the common, non-vendor-specific information. Those information items that tend to vary greatly between vendor-specific implementations can for example be specified in bilateral agreements or by user groups.

NOTE 2 This part does not provide tutorial material.

2 Normative references

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.

IEC 61400-25 (all parts), *Wind turbines – Part 25: Communications for monitoring and control of wind power plants*

IEC 61400-25-1, *Wind turbines – Part 25-1: Communications for monitoring and control of wind power plants – Overall description of principles and models*

IEC 61400-25-3:2015, *Wind turbines – Part 25-3: Communications for monitoring and control of wind power plants – Information exchange models*

IEC 61400-25-4:___¹, *Wind turbines – Part 25-4: Communications for monitoring and control of wind power plants – Mapping to communication profile*

IEC TS 61400-26-1:2011, *Wind turbines – Part 26-1: Time-based availability for wind turbine generating systems*

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

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

IEC 61850-7-2:2010, *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, *Communication networks and systems for power utility automation – Part 7-3: Basic communication structure – Common data classes*

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*

ISO 639 (all parts), *Codes for the representation of names of languages*

ISO 80000-1, *Quantities and units – Part 1: General*

ISO 3166 (all parts), *Codes for the representation of names of countries and their subdivisions*

IEEE 754, *Standard for Binary Floating-Point Arithmetic*

¹ To be published.