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2006-12

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Wind turbines –

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



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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## WIND TURBINES –

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

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

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

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

FDIS	Report on voting
88/275/FDIS	88/281/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.

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 maintenance result date indicated on the IEC web site 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- withdrawn,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.

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

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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 future IEC 61400-25-4<sup>1</sup>.

To reach interoperability, all data in the information model need a strong definition with regard to syntax and semantics. The semantics of the data is 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 much 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 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 and data name definitions found in this part and the associated semantics are fixed.

NOTE Performance of the IEC 61400-25 series implementations are 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).

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

## 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:

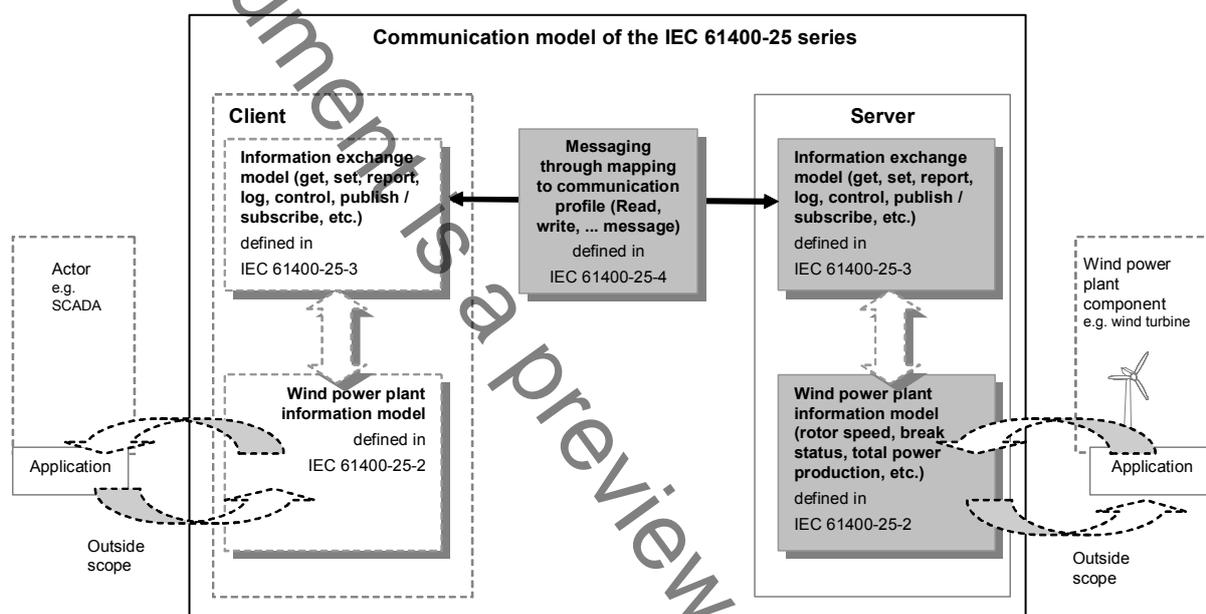
- information provided by a wind power plant component, for example “wind turbine rotor speed” or “total power production of a certain time interval”, is modelled and made available for access.
- services to exchange values of the modelled information defined in IEC 61400-25-3.
- mapping to a communication 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 2172/06

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

Devices implementing the information model of this part shall 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 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.

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

IEC 61850-5, *Communication networks and systems in substations – Part 5: Communication requirements for functions and device models*

IEC 61850-7-1:2003, *Communication networks and systems in substations – Part 7-1: Basic communication structure for substations and feeder equipment – Principles and models*

IEC 61850-7-2:2003, *Communication networks and systems in substations – Part 7-2: Basic communication structure for substations and feeder equipment – Abstract communication service interface (ACSI)*

IEC 61850-7-3, *Communication networks and systems in substations – Part 7-3: Basic communication structure for substations and feeder equipment – Common data classes*

IEC 61850-7-4, *Communication networks and systems in substations – Part 7-4: Basic communication structure for substations and feeder equipment – Compatible logical node classes and data classes*

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

ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units*

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

RFC 2445, *Internet Calendaring and Scheduling Core Object Specification (iCalendar)*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61400-25-1 as well as the following apply.

#### 3.1 conditional

attribute of a common data class provided by an implementation of the IEC 61400-25 series if a certain condition corresponding with the attribute is true

#### 3.2 mandatory

defined content shall be provided in compliance with the IEC 61400-25 series

#### 3.3 optional

defined content can be optionally provided in compliance with the IEC 61400-25 series

### 4 Abbreviated terms

CDC	Common Data Class
DC	Data Class
IED	Intelligent Electronic Device
LCB	Log Control Block
LD	Logical Device
LN	Logical Node
LPHD	Logical node Physical Device Information
RCB	Report Control Block
SBO	Select Before Operate
WPP	Wind Power Plant
WT	Wind Turbine
XML	Extensible Markup Language

Abbreviated terms used to build names of data classes found in LNs shall be as listed below.

EXAMPLE RotPos is constructed by using two names "Rot" which stands for Rotor and "Pos" which stands for "Position". Thus the concatenated name represents a "Rotor Position".