SLOVENSKI PREDSTANDARD

oSIST prEN 61400-25-2:2005

november 2005

Sistemi generatorjev vetrne turbine – 25-2. del: Komunikacije za spremljanje in nadzor vetrnih elektrarn – Informacijski modeli

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

ICS 27.180; 35.240.50

Referenčna številka
oSIST prEN 61400-25-2:2005(en)

88/239/CDV

COMMITTEE DRAFT (CD)

IEC/TC or SC: TC 88	Project number IEC 61400-25-2 Ed.1	
Title of TC/SC: Wind turbines	Date of circulation **2005-08-05**	Closing date for comments **2006-01-06**
Also of interest to the following committees TC 57	Supersedes document 88/214/CD & 88/234/CC	
Functions concerned: ☐ Safety ☐ EMC ☐ Environment ☐ Quality assurance		
Secretary: A.C. van der Giessen	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.	

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

Introductory note

This CDV contains a solution for communications for monitoring and control of wind power plants. IEC 61400-25 defines wind power plant specific information, the mechanisms for information exchange and the mapping to communication protocols. IEC 61400-25 consists of the following parts, under the general title Communications for monitoring and control of wind power plants:

Part 25-1 Overall description of principles and models
Part 25-2: Information models
Part 25-3: Information exchange models
Part 25-4: Mapping to communication profile
Part 25-5: Conformance testing

The documents have been drawn up by IEC TC88 Project Team 25, consisting of experts from many of the large vendors as well as representatives of utilities, consultants and suppliers of third-party products.

All parts are distributed for comments and voting simultaneously, as committee drafts for voting (CDV).

The following major changes have been made as a result of the comments and proposals received on the CD (88/214/CD):

- Logical node WALM, used for representing all possible wind turbine alarms has been replaced by WEVT – wind power plant event information. WEVT can be used to represent active alarms or events for a wind turbine or any other WPP components.
- Information related to transformer has been collected in a new logical node WTRF. For information related to grid connection, e.g breakers logical nodes in IEC 61850 can be reused.
- Mandatory and optional data of logical nodes have been modified, added or deleted.
- The names and semantics of several Data and CDC's have been coordinated with related names used in IEC 61850.
- An informative annex that shall contain a complete list of all mandatory data and data attributes of the information has been added. The content will be added after the CDV.

The P-members of TC88 are encouraged to pay special attention to the revised information model for alarms and events. Two specific questions are:

1) To what extent shall the standard specify a model for how to represent the total list of possible alarms?
2) Shall the CDC ALM be made more general so that it can be used not only for alarms, or shall a new CDC be created to represent events?

ATTENTION	ATTENTION
CDV soumis en parallèle au vote (CEI) et à l'enquête (CENELEC)	**Parallel IEC CDV/CENELEC Enquiry**

WIND TURBINES

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

Version: 61400-25-2_R0-5 Draft1CDV_2005-07-11

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

WIND TURBINES –

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

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organisation for standardisation comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardisation in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organisations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organisation for Standardisation (ISO) in accordance with conditions determined by agreement between the two organisations.

2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.

3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.

6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

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.

This committee draft for voting of the International Standard IEC 61400-25 has been prepared by IEC technical committee 88: Wind turbines Project team 25.

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

IEC 61400-25 consists of the following parts, under the general title *Communications for monitoring and control of wind power plants*:

Part 25-1: Overall description on principles and models[1]

Part 25-2: Information models[1]

Part 25-3: Information Exchange Models[1]

Part 25-4: Specific communication service mappings (SCSM)[1]

Part 25-5: Conformance testing[1]

_____

[1] To be published

INTRODUCTION

This part of IEC 61400-25 is a part of set of specifications. IEC 61400-25 defines communication architecture for wind power plants. This architecture has been chosen 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 communication stacks is outside the scope of IEC 61400-25-2 and may be found in 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 is mainly provided by names assigned to logical nodes and data they contain, as defined in this part. 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 shall be 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 1 Performance of IEC 61400-25 implementations are application specific. The standard does not guarantee a certain level of performance. That's out of the scope. However there is no underlying limitation in the communications technology to prevent high speed application (millisecond level responses).

NOTE 2 The standard IEC 61400-25 has a close relation with other IEC projects like IEC 61850 Addendum 1 (Communication networks and systems in substations - Power Quality Monitoring), IEC 62350 (Communications Systems for Distributed Energy Resources (DER)), and IEC 62344 (Hydroelectric power plants – Communication for monitoring and control).

WIND TURBINES –

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

1 Scope

The focus of IEC 61400-25 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 this standard.

IEC 61400-25 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 available 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. IEC 61400-25 enables connectivity between a heterogeneous combination of client and servers from different manufacturers and suppliers.

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

- **information** provided by a real application of a wind power plant component, e. g., “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 part IEC 61400-25-3

- **mapping to a communication profile**, providing a protocol stack, to carry the exchanged values from the modelled information (part IEC 61400-25-4)

IEC 61400-25 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. However, the objective of the standard is that the information associated with a single wind power plant component (such as the wind turbine) is accessible through a corresponding logical device.

Part 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 device names, 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 this document 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

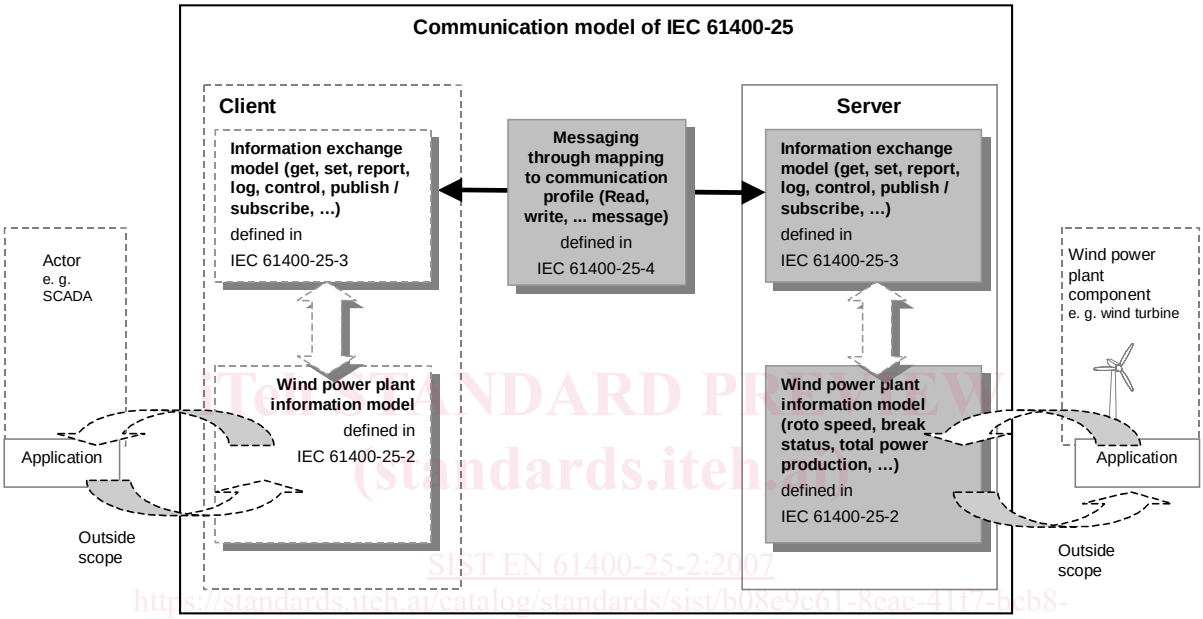

Figure 1 – Conceptual communication model of IEC 61400-25

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

NOTE 1 The table notation used in this draft has been derived from the normative XML presentation. This table notation is intended for human readers. In addition to this table notation there is a separate html file derived from the XML presentation for easier navigation through the information model.

INTERIMS NOTE (for 1CDV review only) The XML files for the information models will be provided after the 1CDV publication.

NOTE 2 IEC 61400-25 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 3 IEC 61400-25 excludes definition of an application program interface and implementation recommendations, e.g., the calculation algorithm and number of samples used for the calculation of any analogue information is an implementation issue.

NOTE 4 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 61400-25-1, Communications for monitoring and control of wind power plants – Overall description on principles and models [2]

IEC 61400-25-3, *Communications for monitoring and control of wind power plants -- Information Exchange Model* [2]

IEC 61400-25-4, *Communications for monitoring and control of wind power plants -- Mapping to XML based communication profile* [2]

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 61850-7-3:2003, *Communication networks and systems in substations – Part 7-3: Basic communication structure for substations and feeder equipment – Common data classes*

IEC 61850-7-3 Amendment 1, *Communication networks and systems in substations – Part 7-3: Basic communication structure for substations and feeder equipment – Common data classes* [2]

IEC 61850-7-4:2003, *Communication networks and systems in substations – Part 7-4: Basic communication structure for substations and feeder equipment – Compatible logical node classes and data classes*

IEC 61850-7-4 Amendment 1, *Communication networks and systems in substations – Part 7-4: Basic communication structure for substations and feeder equipment – Compatible logical node classes and data classes* [2]

[2] To be published

3 Terms and definitions

For the purpose of this document, the terms and definitions defined in part IEC 61400-25-1 and the following apply.

3.1
conditional
the attribute of a common data class shall be provided by an implementation of this standard if a certain condition corresponding with the attribute is true.

3.2
mandatory
information shall be provided by an implementation of this standard.

3.3
optional
information may be provided by an implementation of this standard.

1 # 4 Abbreviated terms

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

2

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

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

6

Term	Description
A	Current
AC	AC
Ack	Acknowledge
Acs	Access
Act	Actual
Al	Alarm
An	Analogue
Ane	Anemometer
Ang	Angle
Alt	Altitude
At	Active (real)
Atv	Activate
Avg	Average
Avl	Availability
Az	Azimuth
Bec	Beacon
Bl	Blade
Blk	Blocked
Brg	Bearing
Brk	Brake
Cab	Cable
Ccw	Counter clockwise
Ch	Characteristic
Chg	Change
Chk	Check

Term	Description
Chrg	Charge
Cl	Cooling
Cm	Command
Cnv	Converter
Ct	Counting
Ctl	Control
Cw	Clockwise
d	Description
Dat	Data
Db	Deadband
DC	DC (Direct Current)
Dcl	Dc-link
Dec	Decrease
Dehum	De-humidifier
Del	Delta
Det	Detection
Dir	Direction
Disp	Displacement
Dly	Daily
Dmd	Demand
Drv	Drive
Dn	Down
Egy	Energy
Elev	Elevator
Emg	Emergency