
**Sistemi generatorjev vetrne turbine – 25-5. del: Komunikacije za spremljanje
in nadzor vetrnih elektrarn – Preskušanje skladnosti**

Wind turbines – Part 25-5: Communications for monitoring and control of wind
power plants – Conformance testing

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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 25-5: Communications for monitoring and control of wind power plants – Conformance testing

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).

No major technical changes have been made as a result of the comments and proposals received on the CD (88/217/CD), most comments having been editorial.

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

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WIND TURBINES

Part 25-5:

Communications for monitoring and control of wind power plants – Conformance testing

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

WIND TURBINES –

**Part 25-5:
Communications for monitoring and control of wind power plants –
Conformance Testing**

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.
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- 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.
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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 61400-25-5 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 of principles and models ¹ |
| Part 25-2: | Information models ¹ |
| Part 25-3: | Information exchange models ¹ |
| Part 25-4: | Mapping to communication profile ¹ |
| Part 25-5: | Conformance testing ¹ |

¹ To be published

INTRODUCTION

This part of IEC 61400-25 is part of a 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 may be found in IEC 61400-25-4.

This part of IEC 61400-25 defines the methods and abstract test cases for conformance testing of devices used in wind power plants. The intended readers are test system developers.

NOTE 1 it is recommended to obtain a common knowledge of the standards IEC 61400-25-1, IEC 61400-25-2, IEC 61400-25-3, and IEC 61400-25-4 before reading this part.

NOTE 2 Abbreviations used in IEC 61400-25-5 may be listed in Clause 3 or may be found in other parts of IEC 61400-25 that are relevant for conformance testing.

NOTE 3 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).

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WIND TURBINES –

Part 25-5: Communications for monitoring and control of wind power plants – Conformance Testing

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. The information modelled in the standard is defined in part IEC 61400-25-2.
- **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.

This part of IEC 61400-25 specifies standard techniques for testing of conformance of implementations, as well as specific measurement techniques to be applied when declaring performance parameters. The use of these techniques will enhance the ability of users to purchase systems that integrate easily, operate correctly, and support the applications as intended.

NOTE 1 the role of the test facilities for conformance testing and certifying the results are outside of the scope of IEC 61400-25-5

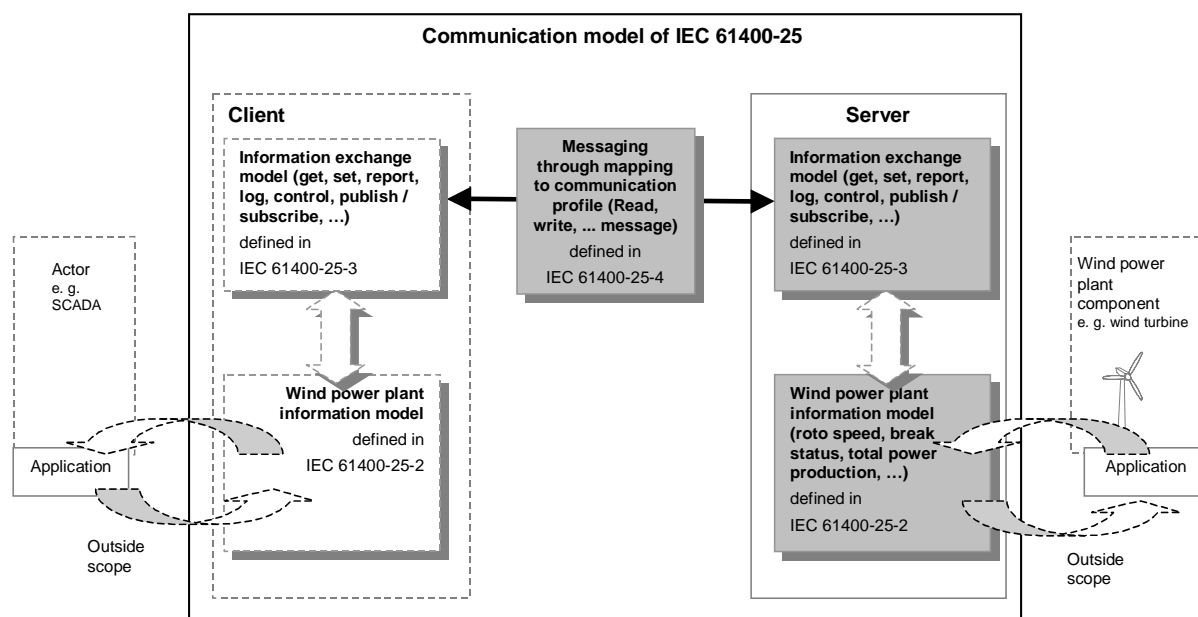


Figure 1 – Conceptual communication model of IEC 61400-25

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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 of principles and models

IEC 61400-25-2, Communications for monitoring and control of wind power plants – information models

IEC 61400-25-3, Communications for monitoring and control of wind power plants – information exchange models

IEC 61400-25-4, Communications for monitoring and control of wind power plants – mapping to communication profile

IEC 61850-2:2003, *Communication networks and systems in substations – Part 2: Glossary*

IEC 61850-4:2002, *Communication networks and systems in substations – Part 4: System and project management*

IEC 61850-5:2003, *Communication networks and systems in substations – Part 5: Communication requirements for functions and device models*

IEC 61850-6:2004, *Configuration description language for communication in electrical substations related to IEDs*

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 substation and feeder equipment – Common data classes*

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 and data classes*

IEC 61850-8-1:2004, *Communication networks and systems in substations – Part 8-1: Specific communication service mapping (SCSM) – Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3*

ISO/IEC 9646-1, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 1: General concepts*

ISO/IEC 9646-2, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 2: Abstract test suite specification*

ISO/IEC 9646-4, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 4: Test realization*

ISO/IEC 9646-5, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 5: Requirements on test laboratories and clients for the conformance assessment process*

- 1 ISO/IEC 9646-6, *Information technology – Open Systems Interconnection – Conformance*
- 2 *testing methodology and framework – Part 6: Protocol profile test specification*
- 3 ISO/IEC 9646-7, *Information technology – Open Systems Interconnection – Conformance*
- 4 *testing methodology and framework – Part 7: Implementation conformance statements*
- 5

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3 Terms and definitions

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

3.1

Factory Acceptance Test - FAT

customer agreed functional tests of the specifically manufactured substation automation system or its parts using the parameter set for the planned application. The FAT shall be carried out in the factory of the manufacturer or other agreed-upon location by the use of process simulating test equipment.

3.2

Interoperability

ability of two or more devices from the same vendor (or different vendors) to exchange information and use that information for correct co-operation.

A set of values defined corresponds with the quantities or values of another set.

3.3

Model Implementation Conformance Statement - MICS

details the standard data object model elements supported by the system or device

3.4

negative test

test to verify the correct response of a device or a system when subjected to:

- IEC 61400-25 series conformant information and services which are not implemented in the device or system under test
- non IEC 61400-25 series conformant information and services sent to the device or system under test

3.5

Protocol Implementation Conformance Statement - PICS

summary of the capabilities of the system to be tested.

3.6

Protocol Implementation eXtra Information for Testing - PIXIT

the Protocol Implementation eXtra Information for Testing document contains system specific information regarding the capabilities of the system to be tested and which are outside the scope of the IEC 61400-25 series. The PIXIT is not subject to standardisation.

3.7

routine test

performed by the manufacturer in order to ensure device operation and safety

3.8

Site Acceptance Test - SAT

verification of each data and control point and the correct functionality within the WPP and its operating environment at the whole installed plant by use of the final parameter set. The SAT is the precondition for the WPP being put into operation.

3.9

system test

verification of correct behaviour of the WPP components and of the overall WPP under various application conditions. The system test marks the final stage of the development of a WPP system component.