

	DIN EN 61400-25-2 (VDE 0127-25-2)	DIN
	Diese Norm ist zugleich eine VDE-Bestimmung im Sinne von VDE 0022. Sie ist nach Durchführung des vom VDE-Präsidium beschlossenen Genehmigungsverfahrens unter der oben angeführten Nummer in das VDE-Vorschriftenwerk aufgenommen und in der „etz Elektrotechnik + Automation“ bekannt gegeben worden.	VDE
ICS 27.180 Ersatz für DIN EN 61400-25-2:2007-11 Siehe Anwendungsbeginn Windenergieanlagen – Teil 25-2: Kommunikation für die Überwachung und Steuerung von Windenergieanlagen – Informationsmodelle (IEC 61400-25-2:2015); Englische Fassung EN 61400-25-2:2015 Wind turbines – Part 25-2: Communications for monitoring and control of wind power plants – Information models (IEC 61400-25-2:2015); English version EN 61400-25-2:2015 Eoliennes – Partie 25-2: Communications pour la surveillance et la commande des centrales éoliennes – Modèles d'information (IEC 61400-25-2:2015); Version anglaise EN 61400-25-2:2015 Gesamtumfang 113 Seiten DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik in DIN und VDE		

Anwendungsbeginn

Anwendungsbeginn für die von CENELEC am 2015-08-04 angenommene Europäische Norm als DIN-Norm ist 2016-06-01.

Für DIN EN 61400-25-2:2007-11 besteht eine Übergangsfrist bis 2018-08-04.

Nationales Vorwort

Vorausgegangener Norm-Entwurf: E DIN EN 61400-25-2 (VDE 0127-25-2):2014-09.

Für dieses Dokument ist das nationale Arbeitsgremium K 383 „Windenergieanlagen“ der DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik in DIN und VDE (www.dke.de) zuständig.

Die enthaltene IEC-Publikation wurde vom TC 88 „Wind turbine systems“ erarbeitet.

Das IEC-Komitee hat entschieden, dass der Inhalt dieser Publikation bis zu dem Datum (stability date) unverändert bleiben soll, das auf der IEC-Website unter „<http://webstore.iec.ch>“ zu dieser Publikation angegeben ist. Zu diesem Zeitpunkt wird entsprechend der Entscheidung des Komitees die Publikation

- bestätigt,
- zurückgezogen,
- durch eine Folgeausgabe ersetzt oder
- geändert.

Das Präsidium des DIN hat mit Präsidialbeschluss 1/2004 festgelegt, dass DIN-Normen, deren Inhalt sich auf internationale Arbeitsergebnisse der Informationsverarbeitung gründet, unter bestimmten Bedingungen allein in englischer Sprache veröffentlicht werden dürfen. Diese Bedingungen sind für die vorliegende Norm erfüllt.

Da sich die Benutzer der vorliegenden Norm der englischen Sprache als Fachsprache bedienen, wird die Englische Fassung der EN 61400-25-2 veröffentlicht. Zu deren Abschnitt 1, der den Anwendungsbereich festlegt, und Abschnitt 3, der die Begriffe festlegt, wurde eine Übersetzung angefertigt und als informativer Nationaler Anhang NA der vorliegenden Norm hinzugefügt. Für die meisten der verwendeten Begriffe existieren keine gebräuchlichen deutschen Benennungen, da sich die deutschen Anwender in der Regel ebenfalls der englischen Benennungen bedienen.

Das Original-Dokument enthält Bilder in Farbe, die in der Papierversion in einer Graustufen-Darstellung wiedergegeben werden. Elektronische Versionen dieses Dokuments enthalten die Bilder in der originalen Farbdarstellung.

Änderungen

Gegenüber DIN EN 61400-25-2:2007-11 wurden folgende Änderungen vorgenommen:

- a) Das Model der Alarmbehandlung wurde überarbeitet, das betrifft den Logischen Knoten WALM und die darin verwendeten Common Data Classes (CDCs).
- b) Eine neue Logische-Knoten-Klasse mit dem Namen WPPD wurde hinzugefügt. Diese Klasse repräsentiert allgemeine Daten für nicht Turbinen-spezifische Geräte.
- c) Eine neue Logische-Knoten-Klasse mit dem Namen WAVL wurde hinzugefügt. Diese Klasse repräsentiert die Verfügbarkeit (availability).
- d) Logische-Knoten-Klasse WMET wurde überarbeitet und mit der Klasse MMET (aus IEC 61850-7-4) harmonisiert. Sollte die Klasse MMET um Datenobjekte für Altitude und Eis erweitert werden, dann könnte die Klasse WMET in zukünftigen Ausgaben entfernt werden.
- e) Die Modelle für meteorologische Daten (WndDir, WndSpd, Humidity, Pressure, Temperature) wurden von der Klasse WNAC zur Klasse WMET verschoben.
- f) Datentypen wie beispielsweise CtxInt werden von IEC 61850 nicht mehr unterstützt, so dass die geeigneten Datentypen ausgewählt werden müssen.

- g) Abkürzungen wurden überarbeitet und Inkonsistenzen mit IEC 61850 beseitigt. Diese Änderungen betreffen mehrere Namen von Datenobjekten.
- h) Aufzählungstypen und Werte wurden mit der Normenreihe IEC 61850 harmonisiert.
- i) Zusätzliche Datenobjekte, die sich mit Smart Grid beschäftigen, sind hinzugefügt worden.
- j) Windenergie-spezifische CDCs, die in der Ed. 1 Teilmengen von Attributen der CDCs von IEC 61850-7-3 verwendeten, referenzieren jetzt implizit alle Attribute der entsprechenden CDCs.
- k) Die technischen Probleme im Zusammenhang mit IEC 61400-25-2:2006 sind gelöst worden und die Ergebnisse sind in die vorliegende Norm eingearbeitet.
- l) Die Präsenzbedingung für statische Informationen sind verändert im Vergleich zu IEC 61850-7-4:2010.

Frühere Ausgaben

DIN EN 61400-25-2: 2007-11

Nationaler Anhang NA (informativ)

Zusammenhang mit Europäischen und Internationalen Dokumenten

Für den Fall einer undatierten Verweisung im normativen Text (Verweisung auf ein Dokument ohne Angabe des Ausgabedatums und ohne Hinweis auf eine Abschnittsnummer, eine Tabelle, ein Bild usw.) bezieht sich die Verweisung auf die jeweils aktuellste Ausgabe des in Bezug genommenen Dokuments.

Für den Fall einer datierten Verweisung im normativen Text bezieht sich die Verweisung immer auf die in Bezug genommene Ausgabe des Dokuments.

Eine Information über den Zusammenhang der zitierten Dokumente mit den entsprechenden Deutschen Dokumenten ist nachstehend wiedergegeben.

Tabelle NA.1 (1 von 2)

Europäische Norm	Internationale Norm	Deutsche Norm	Klassifikation im VDE-Vorschriftenwerk
EN 61400-25	IEC 61400-25 (alle Teile)	DIN EN 61400-25 (alle Teile)	–
–	IEC/TS 61400-26-1	–	–
EN 61850-5	IEC 61850-5	DIN EN 61850-5	–
EN 61850-7-1:2011	IEC 61850-7-1:2011	DIN EN 61850-7-1:2012-04	–
EN 61850-7-2:2010	IEC 61850-7-2:2010	DIN EN 61850-7-2:2011-04	–
EN 61850-7-3:2011	IEC 61850-7-3:2010	DIN EN 61850-7-3:2011-08	–
EN 61850-7-4:2010	IEC 61850-7-4:2010	DIN EN 61850-7-4:2010-11	–
–	ISO 639 (alle Teile)	–	–
–	ISO 1000	–	–
–	ISO 3166 (alle Teile)	–	–

Nationaler Anhang NB (informativ)

Literaturhinweise

DIN EN 61400-25 (alle Teile), *Windenergieanlagen*

DIN EN 61850-5, *Kommunikationsnetze und -systeme für die Automatisierung in der elektrischen Energieversorgung – Teil 5: Kommunikationsanforderungen für Funktionen und Gerätemodelle*

DIN EN 61850-7-1:2012-04, *Kommunikationsnetze und -systeme für die Automatisierung in der elektrischen Energieversorgung – Teil 7-1: Grundlegende Kommunikationsstruktur – Grundsätze und Modelle (IEC 61850-7-1:2011); Englische Fassung EN 61850-7-1:2011*

DIN EN 61850-7-2:2011-04, *Kommunikationsnetze und -systeme für die Automatisierung in der elektrischen Energieversorgung – Teil 7-2: Grundlegende Informations- und Kommunikationsstruktur – Abstrakte Schnittstelle für Kommunikationsdienste (ACSI) (IEC 61850-7-2:2010); Englische Fassung EN 61850-7-2:2010*

DIN EN 61850-7-3:2011-08, *Kommunikationsnetze und -systeme für die Automatisierung in der elektrischen Energieversorgung – Teil 7-3: Grundlegende Kommunikationsstruktur – Gemeinsame Datenklassen (IEC 61850-7-3:2010); Englische Fassung EN 61850-7-3:2011*

DIN EN 61850-7-4:2010-11, *Kommunikationsnetze und -systeme für die Automatisierung in der elektrischen Energieversorgung – Teil 7-4: Grundlegende Kommunikationsstruktur – Kompatible Logikknoten und Datenklassen (IEC 61850-7-4:2010); Englische Fassung EN 61850-7-4:2010*

Nationaler Anhang NC (informativ)

Einleitung

Die Normenreihe IEC 61400-25 legt die Kommunikation für die Überwachung und Steuerung von Windenergieanlagen fest. Als Modellierungsansatz für die Normenreihe IEC 61400-25 wurden abstrakte Definitionen von Klassen und Diensten aufgestellt, so dass die Spezifikationen unabhängig von bestimmten Protokollstapeln, Implementierungen und Betriebssystemen sind. Die Abbildung dieser abstrakten Klassen und Dienste auf ein spezifisches Kommunikationsprofil gehört nicht zum Anwendungsbereich des vorliegenden Teils der Normenreihe IEC 61400-25, sondern wird in IEC 61400-25-4 behandelt.

Um Interoperabilität zu erreichen, benötigen alle Daten in dem Informationsmodell eine eindeutige Festlegung hinsichtlich der Syntax und der Semantik. Die Semantik der Daten wird hauptsächlich durch Namen gewährleistet, die den logischen Knoten und deren enthaltenen Daten zugewiesen werden, wie in diesem Teil der Normenreihe IEC 61400-25 festgelegt. Interoperabilität ist am einfachsten zu erreichen, wenn so viele Daten wie möglich verbindlich definiert werden.

Es sollte beachtet werden, dass Daten mit vollständiger Semantik nur einer der erforderlichen Faktoren sind, um Interoperabilität zu erreichen. Seitdem intelligente elektronische Geräte (IED) die Hostfunktion für Daten und Dienste übernehmen, wird zusammen mit kompatiblen domänenspezifischen Diensten ein geeignetes Gerätemodell benötigt (siehe IEC 61400-25-3).

Dieser Teil wird verwendet, um die abstrakten Definitionen einer logischen Geräteklasse, logischer Knotenklassen, Datenklassen und abstrakter allgemeiner Datenklassen festzulegen. Diese abstrakten Definitionen werden auf konkrete Objektdefinitionen abgebildet, die für ein bestimmtes Protokoll zu verwenden sind.

Die in diesem Teil enthaltenen Definitionen der Namen von kompatiblen logischen Knoten, Datenobjekten und Datenattributen sowie die zugehörige Semantik sind unveränderlich.

ANMERKUNG 1 Die Leistungsmerkmale der Implementierungen der Normenreihe IEC 61400-25 sind anwendungsspezifisch. Die Normenreihe IEC 61400-25 gewährleistet keinen bestimmten Leistungspegel. Dies liegt außerhalb des Anwendungsbereiches der Normenreihe IEC 61400-25. Es gibt jedoch keine grundlegenden Einschränkungen für die Kommunikationstechnologie, um Hochgeschwindigkeitsanwendungen (Antworten im Millisekundenbereich) zu unterbinden.

ANMERKUNG 2 Autorisierungsprozesse, die eine PKI, eine rollenbasierte Zugriffssteuerung, wie z. B. in der Normenreihe IEC 62351 festgelegt, oder andere Sicherheits- oder Sicherheitszugriffsmethoden einsetzen, liegen außerhalb des Anwendungsbereiches dieser Norm.

1 Anwendungsbereich

Schwerpunkt der Normenreihe IEC 61400-25 ist die Kommunikation zwischen den Komponenten der Windenergieanlage, wie z. B. Windturbinen, und den Aktoren, wie z. B. SCADA-Systemen. Die interne Kommunikation innerhalb der Windenergieanlagen-Komponenten liegt außerhalb des Anwendungsbereiches der Normenreihe IEC 61400-25.

Die Normenreihe IEC 61400-25 wurde für eine durch ein Client-Server-Modell unterstützte Kommunikationsumgebung entwickelt. Es sind drei Bereiche festgelegt, die einzeln modelliert werden, um die Skalierbarkeit der Implementierungen zu gewährleisten:

- das Windenergieanlagen-Informationsmodell,
- das Informationsaustauschmodell und
- die Abbildung dieser beiden Modelle auf ein genormtes Kommunikationsprofil.

Das Windenergieanlagen-Informationsmodell und das Informationsaustauschmodell stellen zusammen betrachtet eine Schnittstelle zwischen Client und Server dar. In dieser Zusammensetzung dient das Windenergieanlagen-Informationsmodell als Auswertungsrahmen für die verfügbaren Daten der Windenergieanlage. Das Windenergieanlagen-Informationsmodell wird vom Server verwendet, um dem Client eine einheitliche, komponentenbezogene Betrachtung der Daten der Windenergieanlage zu bieten. Das Informationsaustauschmodell spiegelt die vollständige aktive Funktionalität des Servers wider. Die Normenreihe IEC 61400-25 ermöglicht die Anschlussfähigkeit zwischen einer heterogenen Kombination von Clients und Servern von unterschiedlichen Herstellern und Anbietern.

Wie in Bild 1 dargestellt, definiert die Normenreihe IEC 61400-25 einen Server mit folgenden Aspekten:

- Informationen, die von einer Komponente einer Windenergieanlage zur Verfügung gestellt werden, z. B. die „Drehzahl des Rotors einer Windturbine“ oder die „gesamte Energieerzeugung innerhalb eines bestimmten Zeitintervalls“, werden modelliert und für den Zugriff verfügbar gemacht;
- Dienste für den Austausch von Werten der modellierten Informationen nach den Festlegungen in IEC 61400-25-3;
- Abbildung auf ein Kommunikationsprofil, das einen Protokollstapel bereitstellt, um die ausgetauschten Werte aus den modellierten Informationen aufzunehmen (IEC 61400-25-4).

Die Normenreihe IEC 61400-25 legt nur fest, wie die Informationen, der Informationsaustausch und die Abbildung auf spezielle Kommunikationsprotokolle zu modellieren sind. Die Norm enthält keine Festlegungen dazu, wie und wo die Kommunikationsschnittstelle, die Schnittstelle für das Anwendungsprogramm und Implementierungsempfehlungen zu implementieren sind. Zielsetzung dieser Norm ist jedoch, dass auf die Informationen im Zusammenhang mit einer einzelnen Komponente der Windenergieanlage (z. B. einer Windturbine) über ein entsprechendes logisches Gerät zugegriffen werden kann.

IEC 61400-25-2 legt das Informationsmodell der Geräte und Funktionen Windenergieanlagen-bezogener Anwendungen fest. Insbesondere werden die Namen von kompatiblen logischen Knoten und die Datennamen für die Kommunikation zwischen den Komponenten der Windenergieanlage festgelegt. Dies schließt auch die Beziehung zwischen logischen Geräten, logischen Knoten und Daten ein. Die in der Normenreihe IEC 61400-25 festgelegten Namen werden verwendet, um die hierarchischen Objektreferenzen zu bilden, die für die Kommunikation mit Komponenten in Windenergieanlagen gelten.

Dieser Teil von IEC 61400-25 legt die allgemeinen Attributtypen und allgemeinen Datenklassen für Windenergieanlagen-bezogene Anwendungen fest. Insbesondere werden allgemeine Datenklassen festgelegt für:

- Sollwert,
- Statuswert,
- Alarm,
- Befehl,
- Ereigniszählung,
- Zustands-Timing,
- Alarmauslösungsstatus.

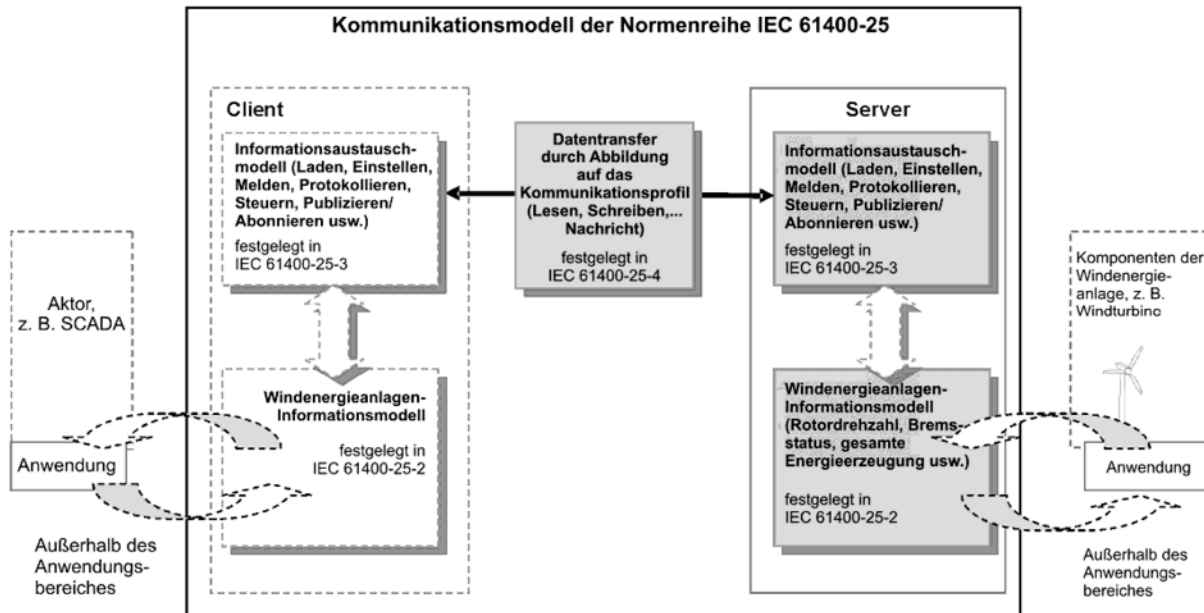


Bild 1 – Konzept des Kommunikationsmodells der Normenreihe IEC 61400-25

Geräte, die das Informationsmodell dieses Teils umsetzen, müssen entsprechend der Anforderung der Anwendung einen oder mehrere logische Knoten auswählen.

ANMERKUNG 1 Die Normenreihe IEC 61400-25 ist auf die allgemeinen, nicht herstellerspezifischen Informationen ausgerichtet. Jene Informationseinheiten, die dazu neigen, sich zwischen den herstellerspezifischen Ausführungen stark zu unterscheiden, können zum Beispiel in zweiseitigen Vereinbarungen oder durch Anwendergruppen festgelegt werden.

ANMERKUNG 2 Dieser Teil stellt kein Anleitungsmaterial zur Verfügung.

3 Begriffe

Für die Anwendung dieses Dokuments gelten die Begriffe nach IEC 61400-25-1 und die folgenden Begriffe.

3.1

konditional

(en: conditional)

Attribut einer allgemeinen Datenklasse, das durch eine Implementierung der Normenreihe IEC 61400-25 zur Verfügung gestellt wird, falls eine bestimmte Bedingung, die dieses Attribut betrifft, wahr ist

3.2

verbindlich

(en: mandatory)

festgelegter Inhalt muss in Übereinstimmung mit der Normenreihe IEC 61400-25 bereitgestellt werden

3.3

wahlfrei

(en: optional)

festgelegter Inhalt kann freigestellt in Übereinstimmung mit der Normenreihe IEC 61400-25 bereitgestellt werden

English Version

**Wind turbines - Part 25-2: Communications for monitoring and
control of wind power plants - Information models
(IEC 61400-25-2:2015)**

Eoliennes - Partie 25-2: Communications pour la
surveillance et la commande des centrales éoliennes -
Modèles d'information
(IEC 61400-25-2:2015)

Windenergieanlagen - Teil 25-2: Kommunikation für die
Überwachung und Steuerung von Windenergieanlagen -
Informationsmodelle
(IEC 61400-25-2:2015)

This European Standard was approved by CENELEC on 2015-08-04. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

The text of document 88/539/FDIS, future edition 2 of IEC 61400-25-2, prepared by IEC TC 88 "Wind turbines" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61400-25-2:2015.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2016-05-20
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-08-04

This document supersedes EN 61400-25-2:2007.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 61400-25-2:2015 was approved by CENELEC as a European Standard without any modification.

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WIND TURBINES –

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

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.

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.

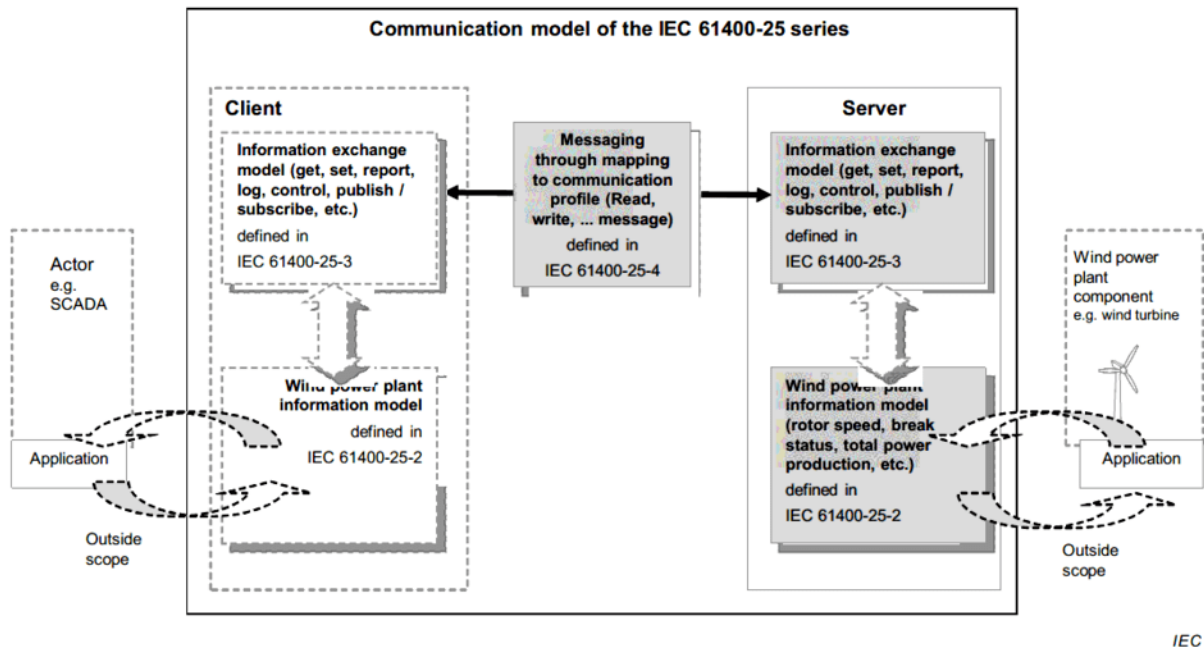


Figure 1 – Conceptual communication model of the IEC 61400-25 series

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.

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 objects 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".

Term	Description
A	Current
AC	AC, alternating current
Acs	Access
Act	Action, activity, active, activate
Alm	Alarm
Alt	Altitude
An	Analogue
Ane	Anemometer
Ang	Angle
Avl	Availability
Bec	Beacon
Beh	Behaviour
Bl	Blade
Bib	Bulb
Blk	Block, blocked
Brg	Bearing
Brk	Brake
Cab	Cable
Cap	Capability, capacity
Ccw	Counter clockwise
Chk	Check
Chr	Characteristic
Cl	Cooling, cooling system
Clc	Calculate, calculated, calculation
Cloud	Cloud
Cmd	Command
Cnt	Counter, counting
Cnv	Converter
Ctl	Control
Cut	Cut, cut-out, cut-in
Cvr	Cover, cover level
Cw	Clockwise
DC	DC, direct current
Dcl	DC-link
Dct	Direct
Dehum	De-humidifier
Del	Delta
Den	Density
Dev	Device
Dew	Dew
Dff	Diffuse
Dir	Direction
DI	Daylight
Dmd	Demand
Dn	Down, downstream
Drp	Droop
Dsp	Displacement
Dur	Duration
EE	External equipment

Term	Description
Emg	Emergency
Ena	Enabled, enable, allow operation
Env	Environment
Eq	Equalization, equal
Exp	Expired
Expt	Export
Ext	Excitation
Fil	Filter, filtration, filtration system
Fll	Fall
Flsh	Flash, flashing
Gbx	Gearbox
Gn	Generator
Gr	Group
Gra	Gradient
Gri	Grid
Gs	Grease
Gust	Gust
Health	Health
Hi	High, highest
Hor	Horizontal
Ht	Heating, heating system
Htex	Heat-exchanger
Hub	Hub
Hum	Humidity
Hy	Hydraulic, hydraulic system
Hz	Frequency
Ia	Information available
Iafm	Information available force majeure
Iano	Information available nonoperative
Ianofo	Information available nonoperative forced outage
Ianopca	Information available nonoperative planned corrective actions
Ianos	Information available nonoperative suspended
Ianosm	Information available nonoperative scheduled maintenance
Iao	Information available operative
Iaog	Information available operative generating
Iaogfp	Information available operative generating with full performance
Iaogpp	Information available operative generating with partial performance
Iaong	Information available operative nongenerating
Iaongel	Information available operative nongenerating out of electrical specification
Iaongen	Information available operative nongenerating out of environmental specification
Iaongrs	Information available operative nongenerating requested shutdown

Term	Description
laongts	Information available operative nongenerating technical standby
Ice	Ice
Impt	Import
In	Input
Inl	Inline
Inlet	Inlet
Insol	Insolation
Intn	Internal
Intv	Interval
Iu	Information unavailable
Key	Key, physical control device
Lev	Level
Lft	Lifting, lift
Lim	Limit
Lo	Low
Loc	Local
Log	Log
Lu	Lubrication
Lum	Luminosity
Min	Minimum
Mod	Mode
Mth	Method
Nam	Name
Num	Number
Of	Off line
Oil	Oil
Op	Operate, Operating
Out	Output
Ov	Over, override, overflow
Per	Periodic, period
PF	Power factor
Phs	Phase
Phy	Physical
Pl	Plant
Plt	Plate, long-term flicker severity
PNV	Phase to neutral voltage
Pos	Position
PPV	Phase to phase voltage
Pres	Pressure
Prod	Production
Proxy	Proxy
Pt	Point
Pth	Pitch
Pwr	Power
Ref	Reference
Rf	Refreshment
Rn	Rain
Rot	Rotational, rotor
Rp	Report

Term	Description
Rs	Reset, resettable
Shft	Shaft
Sign	Sign
Snw	Snow
Spd	Speed
Spt	Setpoint
Src	Source
St	Status, state
Sta	Station, function at plant level
Stat	Statistics
Stop	Stop
Str	Start
Stt	Stator
Sub	Sub
Sup	Supply
Sw	Switch, switched
Syn	Synchronisation, synchronous, synchronism
Sys	System
Tgt	Target
Tm	Time
Tmh	Time in hours
Tmms	Time in milli seconds
Tmp	Temperature
Tms	Time in seconds
Tnk	Tank
Torq	Torque
Tot	Total
Trf	Transformer
Trg	Trigger
Tur	Turbine
Typ	Type
Up	Up, upstream
Urg	Urgent
V	Voltage
VA	Apparent power (volt amperes)
Val	Value
VAR	Reactive power (volt amperes reactive)
VARh	Reactive energy
Vbr	Vibration
Ver	Vertical
Vis	Visibility
W	Active power
Wac	Watchdog
Wd	Wind
Wet	Wet
Wh	Watt hours
Wrm	Warm
Wtr	Water
Wup	Windup

DIN EN 61400-25-2 (VDE 0127-25-2):2016-06
EN 61400-25-2:2015

Term	Description
Xdir	X-direction
Ydir	Y-direction
Yw	Yaw

5 General

5.1 Overview of logical node classes

The following two groups of common logical node classes are defined:

- 1) system specific logical nodes,
- 2) wind power plant specific logical nodes.

System specific logical nodes shall include all common information for physical hosting devices and wind power independent information. Wind power plant specific logical nodes shall inherit at least all mandatory information of system logical nodes.

All logical node classes defined in this part of the IEC 61400-25 series inherit their structure from the abstract logical node class (GenLogicalNode, see Figure 2) defined in 10.1 of IEC 61850-7-2:2010. Apart from the logical node class 'Physical Device Information' (LPHD) all logical node classes (LLN0 and wind power plant specific LNs) defined in this part of the IEC 61400-25 series inherit at least the mandatory information of the wind power plant common logical node.

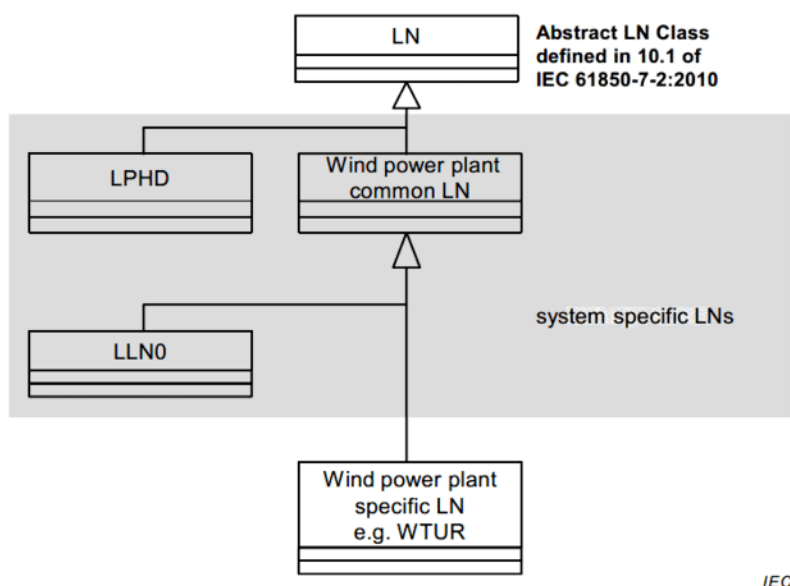


Figure 2 – Relationship of logical nodes

The system specific logical node classes listed in Table 1 are all mandatory. The logical node zero (LLN0) represents common information of the logical device, and the logical node physical device (LPHD) represents common information of the physical devices hosting the logical device (see 8.2 of IEC 61850-7-1:2011).

Table 1 – System specific logical nodes

LN classes	Description	M/O
LLN0	Logical Node Zero	M
LPHD	Physical Device Information	M

Wind power plant information shall be classified in wind power plant specific logical nodes. In principle, classification of wind power plant information in different logical nodes is an arbitrary

process and the modelling method offers flexibility. From the viewpoint of standardisation it is preferable that all wind power plant information will be build unambiguously and in a similar way. A wind power plant consists of several components, including one or more wind turbines, which may be modelled as individual devices. Table 2 shows the wind power plant general information break down into logical nodes which are common to a complete wind power plant. The logical nodes associated with the individual turbines are listed in Table 3.

Table 2 – Wind power plant general logical nodes

LN classes	Description	M/O
WTUR	Wind turbine general information	O
WPPD	Wind power plant general information	O
WALM	Alarm information	O
WMET	Meteorological information	O
WAPC	Active power control information	O
WRPC	Reactive power control information	O
WSLG	State log information	O
WALG	Analogue log information	O
WREP	Report information	O
WAVL	Availability information	O
LTIM	Time management (inherited from IEC 61850-7-4)	O

Table 3 shows the breakdown of a wind turbine into the logical nodes to be used. Each model of a wind turbine shall include the mandatory logical nodes listed in Table 3. Despite the fact that some logical nodes are optional for use, it is recommended in the IEC 61400-25 series to deviate as little as possible from the logical nodes as proposed in Table 3.

Table 3 – Logical nodes for modelling a wind turbine

LN classes	Description	M/O
WTUR	General information	M
WROT	Rotor information	M
WTRM	Transmission information	O
WGEN	Generator information	M
WCNV	Converter information	O
WTRF	Transformer information	O
WNAC	Nacelle information	M
WYAW	Yawing information	M
WTOW	Tower information	O
WALM	Alarm information	M
WMET	Meteorological information	O
WSLG	State log information	O
WALG	Analogue log information	O
WREP	Report information	O
WAVL	Availability information	O
LTIM	Time management (inherited from IEC 61850-7-4)	O

Table 4 shows the wind power plant device specific information for non wind turbine devices break down into logical nodes.

Table 4 – Logical nodes for modelling a non-turbine device

LN classes	Description	M/O
WPPD	Wind power plant device general information	O
WALM	Alarm information	O
WMET	Meteorological information	O
WAPC	Active power control information	O
WRPC	Reactive power control information	O
WSLG	State log information	O
WALG	Analogue log information	O
WREP	Report information	O
WAVL	Availability information	O
LTIM	Time management (inherited from IEC 61850-7-4)	O

As shown in [Table 2](#) and [Table 3](#), information is mainly modelled by a set of LN classes, which are classified by physical turbine decomposition. A useful practical exception involves alarm information; all alarms shall be collected in a separate logical node.

Separate logical nodes for logged events (statuses, alarms, commands, event-counters, state-timers) and logged analogue time series (long period, demands, transient recording), shall model historical logged information.

Besides common information for all turbines (manufacturer independent), most information will, in practice, be determined by the turbine concept, the manufacturer, the site and the state of the art of turbine technology. For this reason, as a modelling guideline, the data class attribute names representing the specific information in the wind power plant specific logical nodes are focussed on the most prevailing modern wind turbine concept, namely 3-bladed, variable speed, active pitch (electric/hydraulic) and gearbox transmission. In case of additional information originated by other wind turbine systems or components, new data classes or specialised data classes to existing LNs could be defined. Additional user-specific LNs could also be defined.

The semantic of the data class names and semantic definitions are alphabetically listed and defined in [6.3](#). Units and multipliers associated with the data classes are specified in [Annex B](#).

The modelling approach, including the general table structure of a logical node, is described in IEC 61400-25-1.

Standardised names for logical node classes are written in capital letters. Data names of the first level in the hierarchy (below the logical node level) start with a capital letter, and attribute names and data names of the second and lower levels in the hierarchy with a small letter.

5.2 Use of logical node classes

The logical node classes defined in this part of the standard, for example, WROT, WTUR, and those referenced from other standards, e. g. XCBB and MMXU from 5.16.2 and 5.10.12 of IEC 61850-7-4:2010, have to be instantiated in real systems. [Figure 3](#) depicts an example of a real wind turbine that uses several instances of logical nodes.

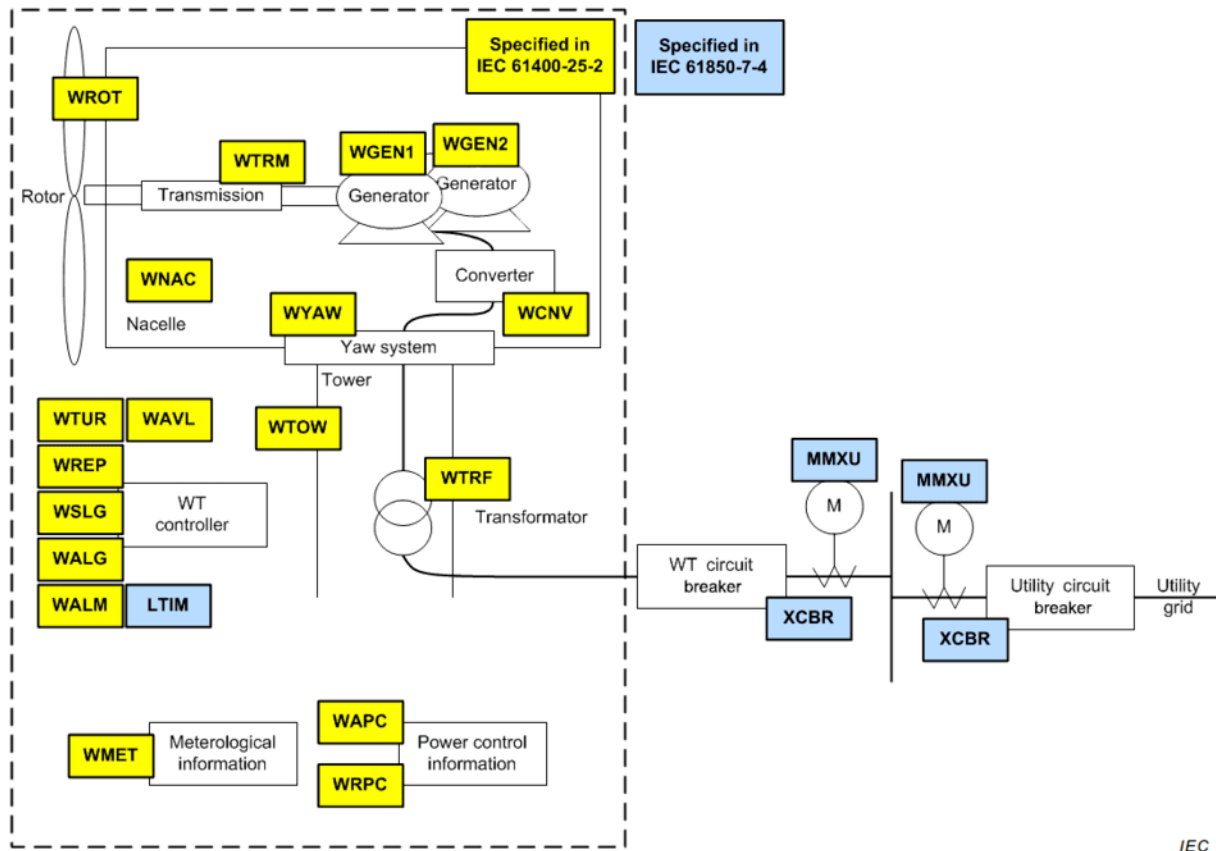


Figure 3 – Use of instances of logical nodes

The logical node instances depicted represent information from wind turbines “WTUR”, yawing system “WYAW”, converter “WCNV”, etc. The instance names, for example of WGEN1 and WGEN2 represent different generators. Figure 3 also illustrates the interfacing electrical system including measurements “MMXU”, circuit breakers “XCBR”, etc. MMXU, XCBR and other logical nodes related to the electrical system are specified in IEC 61850-7-3.

5.3 Extensions of the information model

The information model described in Clause 6 can be extended with additional logical nodes and data for a particular implementation. If a different topology is applied (for example several generators and gearboxes) or more sensors (temperature, current) are used for monitoring purposes, the user is free to assign relevant information to additional data names. Any data can be added to any logical node.

The extension rules for LNs, data classes, and data attributes shall be as defined in Annex A of IEC 61850-7-4:2010. The name space concept defined in Clause 14 of IEC 61850-7-1:2011 allows one to define any extension – the name spaces are differentiated by unique identifiers.

6 Wind power plant logical node classes

6.1 System specific logical nodes

6.1.1 Wind power plant common logical node class

The wind turbine specific compatible logical nodes classes defined in this part of the IEC 61400-25 series are specialisations of the wind turbine common logical node class as defined in Table 5.

Table 5 – Wind power plant common logical node class

Wind power plant common logical node class			
Data Object Name	Common Data Class	Explanation	M/O
LNName		Logical node name. Shall be inherited from GenLogicalNode Class (see 10.1 of IEC 61850-7-2:2010)	M
LNRef		Logical node reference. Shall be inherited from GenLogicalNode Class (see 10.1 of IEC 61850-7-2:2010)	M
Data Objects			
<i>Mandatory and conditional logical node information (Shall be inherited by ALL LN but LPHD)</i>			
<i>Descriptions</i>			
NamPlt	LPL	Name plate (inherited from IEC 61850-7-4)	C1
<i>Status information</i>			
Beh	ENS	Behaviour (inherited from IEC 61850-7-4)	M
Health	ENS	Health (inherited from IEC 61850-7-4)	C1
<i>Controls</i>			
Mod	ENC	Mode (inherited from IEC 61850-7-4)	C1
CmdBlk	SPC	Blocking of control sequences and action triggers of controllable data objects (inherited from IEC 61850-7-4)	C2
<i>Optional logical node information</i>			
EEHealth	INS	External equipment health (inherited from IEC 61850-7-4)	O
EENam	WDPL	External equipment name plate	O
OpCntRs	INC	Operation counter resetable (inherited from IEC 61850-7-4)	O
OpCnt	INS	Operation counter (inherited from IEC 61850-7-4)	O
OpTmh	INS	Operation time in hours (inherited from IEC 61850-7-4)	O
<i>Logical node information (statistical calculation specific – refer to Annex A and IEC 61850-7-4:2010 Annex F)</i>			
<i>Status information</i>			
ClcExp	SPS	Calculation period expired	O
<i>Controls</i>			
ClcStr	SPC	Enables the calculation start at time operTm from the control model (if set) or immediately	O
<i>Settings</i>			
ClcMth	ENG	Calculation method of statistical data. Allowed values: UNSPECIFIED TRUE_RMS PEAK_FUNDAMENTAL RMS_FUNDAMENTAL MIN MAX AVG SDV PREDICTION RATE	C3
ClcMod	ENG	Calculation mode. Allowed values: TOTAL PERIOD SLIDING	C4
ClcIntvTyp	ENG	Calculation interval type	C4
ClcIntvPer	ING	In case ClcIntvTyp equals to MS, PER-CYCLE, CYCLE, DAY, WEEK, MONTH, YEAR, number of units to consider to calculate the calculation interval duration	C4
NumSubIntv	ING	The number of sub-intervals a calculation period interval duration contains	O
ClcRfTyp	ENG	Refreshment interval type	O
ClcRfPer	ING	In case ClcIntvTyp equals to MS, PER-CYCLE, CYCLE, DAY, WEEK, MONTH, YEAR, number of units to consider to calculate the refreshment interval duration	O
ClcSrc	ORG	Object reference to source logical node	C5

Wind power plant common logical node class			
ClcNxTmms	ING	Remaining time up to the end of the current calculation interval in ms	O
InSyn	ORG	Object reference to the source of the external synchronization signal for the calculation interval	O
Condition C1: Mod, Health and NamPit shall be inherited by LLN0 of the root LD of a hierarchy as mandatory and by all other LN as optional.			
Condition C2: CmdBlk shall be inherited as optional data object by all LNs which contain controllable data objects additionally to Mod, if there is no BlkOpn/BlkCls available (like in XCBR).			
Condition C3: This data object is optional but mandatory when considering statistical calculation, especially the MMXU, MMXN LN.			
Condition C4: These data objects are mandatory, except when ClcMth equals UNSPECIFIED.			
Condition C5: This data object is mandatory, if the considered LN is performing statistical calculation derived from another LN.			
NOTE The presence of ClcSrc in a logical node instance indicates that the LN is a derived LN (ie contains statistical data derived from another LN of the same class.) The conditional data C1 and C2 are mandatory if ClcSrc is absent, otherwise forbidden, with exception for "analogue value".			

A specialisation of this wind power plant Common Logical Node class shall inherit all information required in the wind power plant specific logical nodes (see [Table 2](#)). For the optional logical node information, there are three possibilities for specialisation:

- not to inherit a specific information item;
- inherit a specific information item and leave it as optional;
- inherit a specific information item and define it as mandatory.

6.1.2 LN: Logical node zero Name: LLN0

The LLN0 class shall be used to address common issues for Logical Devices as defined in [Table 6](#).

Table 6 – Logical node zero class

LLNO class			
Data Object Name	Common Data Class	Explanation	M/O
		LN shall inherit all Mandatory Data from Wind Power Plant Common Logical Node Class (see 6.1.1).	M
Data Objects			
<i>Status information</i>			
LocKey	SPS	Local operation for complete logical device (inherited from IEC 61850-7-4)	O
Loc	SPS	Local control behaviour (inherited from IEC 61850-7-4)	O
<i>Controls</i>			
LocSta	SPC	Switching authority at station level (inherited from IEC 61850-7-4)	O
<i>Settings</i>			
GrRef	ORG	Reference to a higher level Logical Device	O

LLN0 represents the root name space (logical device namespace, IdNs) for a logical device. The value for the IEC 61400-25 series is "IEC 61400-25:2014". The name space also applies to names inherited from other standards. Only one logical device name space shall be used for each Logical Device, i.e. only one version can be used for a single Logical Device.

6.1.3 LN: Physical device information Name: LPHD

The LPHD class shall model common issues for physical devices as defined in [Table 7](#).

Table 7 – Physical device information class

LPHD class			
Data Object Name	Common Data Class	Explanation	M/O
LNName		Logical node name. Shall be inherited from Logical Node Class (see IEC 61850-7-2)	
Data Objects			
<i>Descriptions</i>			
PhyNam	WDPL	Physical device name plate (see 7.4.2.2)	M
<i>Status information</i>			
PhyHealth	ENS	Physical device health (inherited from IEC 61850-7-4)	M
OutOv	SPS	Output communications buffer overflow (inherited from IEC 61850-7-4)	O
Proxy	SPS	Indicates if this LD is a proxy (inherited from IEC 61850-7-4)	M
InOv	SPS	Input communications buffer overflow (inherited from IEC 61850-7-4)	O
NumPwrUp	INS	Number of power ups (inherited from IEC 61850-7-4)	O
WrmStr	INS	Number of warm starts (inherited from IEC 61850-7-4)	O
WacTrg	INS	Number of watchdog device resets detected (inherited from IEC 61850-7-4)	O
PwrUp	SPS	Power up detected (inherited from IEC 61850-7-4)	O
PwrDn	SPS	Power down detected (inherited from IEC 61850-7-4)	O
PwrSupAlm	SPS	Power supply alarm (inherited from IEC 61850-7-4)	O
<i>Controls</i>			
RsStat	SPC	Reset device statistics (inherited from IEC 61850-7-4)	O

6.2 Wind power plant specific logical nodes

6.2.1 LN: Wind power plant general information Name: WPPD

The logical node comprises the data classes that represent a wind power plant device with its general information.

Table 8 – LN: Wind power plant general information (WPPD)

WPPD class			
Data Object Name	Common Data Class	Explanation	M/O
		LN shall inherit all Mandatory Data from Wind Power Plant Common Logical Node Class (see 6.1.1)	M
Data Objects			
<i>Common information</i>			
StrCnt	CTE	Number of device starts (vendor-specific)	O
StopCnt	CTE	Number of device stops (vendor-specific)	O
<i>Status</i>			
DevSt	STV	Device status	M
<i>Measured and metered values</i>			
<i>Controls</i>			
DevOp	CMD	Device operation command	O

6.2.2 LN: Wind turbine general information Name: WTUR

The logical node comprises the data classes that represent the wind turbine general information as listed in Table 9. This logical node shall be mandatory, which means that at least all mandatory defined data classes shall be available for compliance with this part of the IEC 61400-25 series.

Table 9 – LN: Wind turbine general information (WTUR)

WTUR class			
Data Object Name	Common Data Class	Explanation	M/O
		LN shall inherit all Mandatory Data from Wind Power Plant Common Logical Node Class (see 6.1.1)	M
Data Objects			
<i>Common information</i>			
StrCnt	CTE	Number of turbine starts (vendor-specific)	O
StopCnt	CTE	Number of turbine stops (vendor-specific)	O
TotWh	CTE	Total (net) active energy production	M
TotVARh	CTE	Total (net) reactive energy production	O
DmdWh	BCR	Active (real) energy demand (default demand direction: energy flow from a substation busbar away and towards the wind turbine)	O
DmdVARh	BCR	Reactive energy demand (default demand direction: energy flow from a substation busbar away and towards the wind turbine)	O
SupWh	BCR	Active (real) energy supply (default supply direction: energy flow from the wind turbine and towards a substation busbar)	O
SupVARh	BCR	Reactive energy supply (default supply direction: energy flow from the wind turbine and towards a substation busbar)	O
<i>Status information</i>			
TurSt	STV	Turbine status	M
<i>Measured and metered values</i>			
W	MV	Active power generation	M
VAR	MV	Reactive power generation	O
<i>Controls</i>			
TurOp	CMD	Wind turbine operation command	M
VAROvW	SPC	Activate wind turbine reactive power priority over active power	O
DmdVSpt	SPV	Turbine voltage output setpoint	O
DmdWSpt	SPV	Turbine active power generation setpoint	O
DmdVARspt	SPV	Turbine reactive power generation setpoint	O
DmdPFSpt	SPV	Turbine power factor setpoint	O

6.2.3 LN: Wind turbine rotor information Name: WROT

This logical node shall comprise the data classes that represent the wind turbine rotor information. This logical node is mandatory, and at least all mandatory defined data classes in Table 10 shall be available for compliance with the IEC 61400-25 series.

The data classes focus on a three bladed rotor and active electric/hydraulic pitch control. For active pitch control it is highly recommended to model the pitch angle of at least one rotor blade (reference).

In case of a divergent rotor topology (for example tip brakes, two bladed) or different mounted equipment (for example sensors for ice or lightning detection, blade position detection, UPS equipment), the user is free to assign relevant rotor information to additional data names.

Table 10 – LN: Wind turbine rotor information (WROT)

WROT class			
Data Object Name	Common Data Class	Explanation	M/O
		LN shall inherit all Mandatory Data from Wind Power Plant Common Logical Node Class (see 6.1.1)	M
Data Objects			
<i>Common information</i>			
<i>Status information</i>			
RotSt	STV	Status of rotor	O
BlSt	STV	Status of blade as feedback from the pitch system	O
PthCtlSt	STV	Status of pitch control	O
<i>Measured and metered values</i>			
RotSpd	MV	Rotational speed	O
RotPos	MV	Angular rotor position	O
HubTmp	MV	Temperature in the rotor hub	O
BlPthHyPres	MV	Pressure of hydraulic pitch system	O
BlPthAngTgt	MV	Pitch angle target value	O
BlPthAngVal	MV	Pitch angle for blade as feedback from the pitch system	O
<i>Controls</i>			
RotBlk	CMD	Block rotor position command	O
PthEmgChk	CMD	Check emergency pitch system	O

6.2.4 LN: Wind turbine transmission information Name: WTRM

This logical node shall comprise the data classes that represent wind turbine (mechanical) transmission information. The logical node is optional. It contains the data classes for a usual transmission topology, consisting of a slow speed shaft, multistage gearbox, a fast shaft and a (hydraulically driven) mechanical brake.

In case of a divergent transmission topology (for example direct drive, single stage gearbox) or different mounted equipment (for example sensors, electromechanical brake), the user is free to adapt or extend the data classes as shown in Table 11.

Table 11 – LN: Wind turbine transmission information (WTRM)

WTRM class			
Data Object Name	Common Data Class	Explanation	M/O
		LN shall inherit all Mandatory Data from Wind Power Plant Common Logical Node Class (see 6.1.1)	M
Data			
<i>Common information</i>			
<i>Status information</i>			
BrkOpSt	STV	Status of shaft brake	O
LuSt	STV	Status of gearbox lubrication system	O
FilSt	STV	Status of filtration system	O
CISSt	STV	Status of transmission cooling system	O
HtSt	STV	Status of heating system	O
OilLevSt	STV	Status of oil level in gearbox sump	O
OffFilSt	STV	Status of offline filter contamination	O
InlFilSt	STV	Status of inline filter contamination	O
<i>Measured and metered values</i>			
ShftBrgTmp	MV	Measured temperature of shaft bearing	O
GbxOilTmp	MV	Measured temperature of gearbox oil	O
ShftBrkTmp	MV	Measured temperature of shaft brake (surface)	O
GbxVbr	MV	Measured gearbox vibration of gearbox	O
GsLev	MV	Grease level for lubrication of main shaft bearing	O
GbxOilLev	MV	Oil level in gearbox sump	O
GbxOilPres	MV	Gear oil pressure	O
BrkHyPres	MV	Hydraulic pressure for shaft brake	O
OffFil	MV	Offline filter contamination	O
InlFil	MV	Inline filter contamination	O

6.2.5 LN: Wind turbine generator information Name: WGEN

This logical node shall comprise the data classes that represent wind turbine generator information. This logical node shall be mandatory, which means that at least all mandatory defined data classes in [Table 12](#) shall be available for compliance with the IEC 61400-25 series.

The data classes focus on the operation of a variable speed double fed induction generator or on a (dc-excited) synchronous generator.

If a different topology is applied (for example constant speed, two speed, multi-pole, permanent magnet rotor, multi-phase generator) or more sensors (temperature, current, air-gap distances) are used for monitoring purposes, the user is free to assign relevant generator information to additional data names.

In case two generators (low speed, high speed) are installed in a wind turbine, it is recommended to use two logical nodes: WGEN1, WGEN2.

Table 12 – LN: Wind turbine generator information (WGEN)

WGEN class			
Data Object Name	Common Data Class	Explanation	M/O
		LN shall inherit all Mandatory Data from Wind Power Plant Common Logical Node Class (see 6.1.1)	M
Data Objects			
<i>Common information</i>			
OpTmsRs	TMS	Generator operation time in seconds (vendor specific)	O
<i>Status information</i>			
GnOpSt	STV	Status of generator	O
CISst	STV	Status of generator cooling system	O
<i>Measured and metered values</i>			
RotSpd	MV	Rotational speed	M
W	WYE	Generator active power	O
VAr	WYE	Generator reactive power	O
SttTmp	MV	Temperature measurements for generator stator	O
RotTmp	MV	Temperature measurements for generator rotor	O
InletTmp	MV	Temperature measurement for inlet air/water temperature at generator	O
SttPPV	DEL	Generator stator 3 phase phase-to-phase voltage	O
SttPNV	WYE	Generator stator 3 phase phase-to-neutral voltage	O
SttA	WYE	Generator stator 3 phase current	O
RotPPV	DEL	Generator rotor 3 phase phase-to-phase voltage	O
RotPNV	WYE	Generator rotor 3 phase-to-neutral voltage	O
RotA	WYE	Generator rotor 3 phase current	O
RotExtDC	MV	Generator rotor direct current excitation	O
RotExtAC	MV	Generator rotor alternating current excitation	O

6.2.6 LN: Wind turbine converter information Name: WCNV

This logical node shall comprise the data classes that represent the wind turbine converter information. This logical node shall be optional, but if used, the mandatory defined data classes in [Table 13](#) shall be available for compliance with the IEC 61400-25 series.

The data names are focussed on a back-to-back converter (AC-DC-AC) for variable speed operation of a (rotor-fed) induction generator or a synchronous generator.

If other converting topologies are used (for example soft-starter for constant speed generator, d.c. rotor excitation) or more equipment mounted for monitoring (for example sensors for temperature, current, voltage), the user is free to add or modify extra data names.

In case of two (parallel) converters, it is recommended to use two logical nodes: WCNV1, WCNV2.

Table 13 – LN: Wind turbine converter information (WCNV)

WCNV class			
Data Object Name	Common Data Class	Explanation	M/O
		LN shall inherit all Mandatory Data from Wind Power Plant Common Logical Node Class (see 6.1.1)	M
Data Objects			
<i>Common information</i>			
OpTmsRs	TMS	Converter operation time in seconds (vendor specific)	O
<i>Status information</i>			
CnvOpSt	STV	Status of converter	M
CISst	STV	Status of converter cooling system	O
<i>Measured and metered values</i>			
GnHz	MV	Generator side frequency	O
GriHz	MV	Grid side frequency	O
Torq	MV	Torque value	O
GnPPV	DEL	Generator side 3 phase phase-to-phase voltage	O
GnPNV	WYE	Generator side 3 phase-to-neutral voltage	O
GnA	WYE	Generator side 3 phase current	O
GnPF	WYE	Generator side 3 phase power factor	O
GriPPV	DEL	Grid side 3 phase phase-to-phase voltage	O
GriPNV	WYE	Grid side 3 phase-to-neutral voltage	O
GriA	WYE	Grid side 3 phase current	O
GriPF	WYE	Grid side 3 phase power factor	O
GnTmp	MV	Generator side temperature	O
DclTmp	MV	Temperature inside the converter	O
GriTmp	MV	Grid side temperature	O
DclV	MV	DC-link voltage inside converter	O
DclA	MV	DC-link current inside converter	O

6.2.7 LN: Wind turbine transformer information **Name: WTRF**

This logical node shall comprise the data classes that represent the wind turbine transformer information. This logical node shall be optional, but if used, the mandatory defined data classes in [Table 14](#) shall be available for compliance with the IEC 61400-25 series.

Table 14 – LN: Wind turbine transformer information (WTRF)

WTRF class			
Data Object Name	Common Data Class	Explanation	M/O
		LN shall inherit all Mandatory Data from Wind Power Plant Common Logical Node Class (see 6.1.1)	M
Data Objects			
<i>Common information</i>			
OpTmsRs	TMS	Transformer operation time in seconds (vendor specific)	O
<i>Status information</i>			
CISSt	STV	Status of transformer cooling system	O
OilLevSt	STV	Oil level status information for oil filled transformers	O
TnkPresSt	STV	Gas pressure status of main tank for oil filled transformers	O
<i>Measured and metered values</i>			
TurPPV	DEL	Turbine side 3 phase phase-to-phase voltage	O
TurPNV	WYE	Turbine side 3 phase-to-neutral voltage	O
TurA	WYE	Turbine side 3 phase current	O
GriPPV	DEL	Grid side 3 phase phase-to-phase voltage	O
GriPNV	WYE	Grid side 3 phase-to-neutral voltage	O
GriA	WYE	Grid side 3 phase current	O
TurTmp	MV	Temperature on turbine side	O
GriTmp	MV	Temperature on grid side	O
<i>Controls</i>			
GriSwOp	CMD	Main grid switch command	O

6.2.8 LN: Wind turbine nacelle information Name: WNAC

This logical node shall comprise the data classes that represent information concerning the wind turbine nacelle. It includes the data classes for common equipment in or at the nacelle: vibration measurements and beacon equipment. This logical node is mandatory and at least the mandatory defined data classes in [Table 15](#) shall be available for compliance with the IEC 61400-25 series.