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Date: 12 March 2021

Origin: International

Latest date for receipt of comments: 28 April 2021

Project No. 2021/00661

Responsible committee: PEL/88 Wind turbines

Interested committees:

Title: Draft BS EN 61400-25-2 Ed.3.0 Wind turbines. Part 25-2: Communications for monitoring and control of wind power plants - Information models.

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

PROJECT NUMBER: IEC 61400-25-2 ED3	
DATE OF CIRCULATION: 2021-03-05	CLOSING DATE FOR COMMENTS: 2021-05-28
SUPERSEDES DOCUMENTS: 88/805/RR	

IEC TC 88 : WIND ENERGY GENERATION SYSTEMS	
SECRETARIAT: Denmark	SECRETARY: Mrs Christine Weibøl Bertelsen
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 57	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY	

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

NOTE FROM TC/SC OFFICERS: Please note that two computer readable NSD files are attached as a single Zip file together with this CD (UML generated document).

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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 organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61400-25-2 has been prepared by IEC technical committee 88: Wind energy generation systems.

This third edition cancels and replaces the second edition published in 2015-06-30. This edition constitutes a technical revision.

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

1. The harmonisation of IEC 61400-25-2 with IEC 61850 thorough restructuring of the IEC 61400-25-2 document. The IEC 61400-25-2 Edition 3 is autogenerated from a formal UML model, following the process set-up in TC57 and described in IEC 61850-1-2:2020.
2. Through inheritance of basic supervision signals a common handling of communication errors, control behaviour test modes is achieved that is used also substation, hydropower and distributed energy domains.

In addition this new versions of the standard is driven by:

- Clarification on existing definitions: definitions or description may sometimes have been interpreted differently leading therefore to editorial tissues or interoperability issues.

- Fixing errors: this is necessary if faults or inconsistencies exist. Corrections are required and must be performed, even if it endangers compatibility.
- Enhancements: adding new features to support new functionality. The introduction of new elements of the data model is driven by functional requirements introduced in network codes introduced in recent years, mainly IEEE 1547 and European network code for generators.
- Modifications to ensure the wind information model in IEC 61400-25 series reflects and support new turbine design and the current wind power plant operating principles.

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

FDIS	Report on voting
88/xxx/FDIS	88/xxx/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

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

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

This IEC standard includes Code Components i.e. components that are intended to be directly processed by a computer. Such content is any text found between the markers and, or otherwise is clearly labelled in this standard as a Code Component.

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Table 1 shows all tracking information of IEC 61400-25-2:2021A namespace building-up

Table 1 – Tracking information of IEC 61400-25-2:2021A namespace building-up

Attribute	Content
Namespace IEC specific information	
Version of the UML model used for generating the document (informative)	JWG25build3draft
Date of the UML model used for generating the document (informative)	2021-02-18
Autogeneration software name and version(informative)	j61850DocBuilder 01v01 based on jCleanCim 02v02-NS beta5

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.

The National Committees are requested to note that for this publication the stability date is 20xx.

THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE PUBLICATION STAGE.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

1 INTRODUCTION

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

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

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

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

18 The compatible logical node name and data name definitions found in this part and the
19 associated semantics are fixed.

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

24 NOTE 2 Security of communication based on the IEC 61400-25 shall be achieved by application the IEC 62351 series
25 using authorization, role based access control and other methods as defined in IEC 62351 series.
26

WIND ENERGY GENERATION SYSTEMS –

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

1 Scope

1.1 General

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 based on the IEC 61850 and 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.

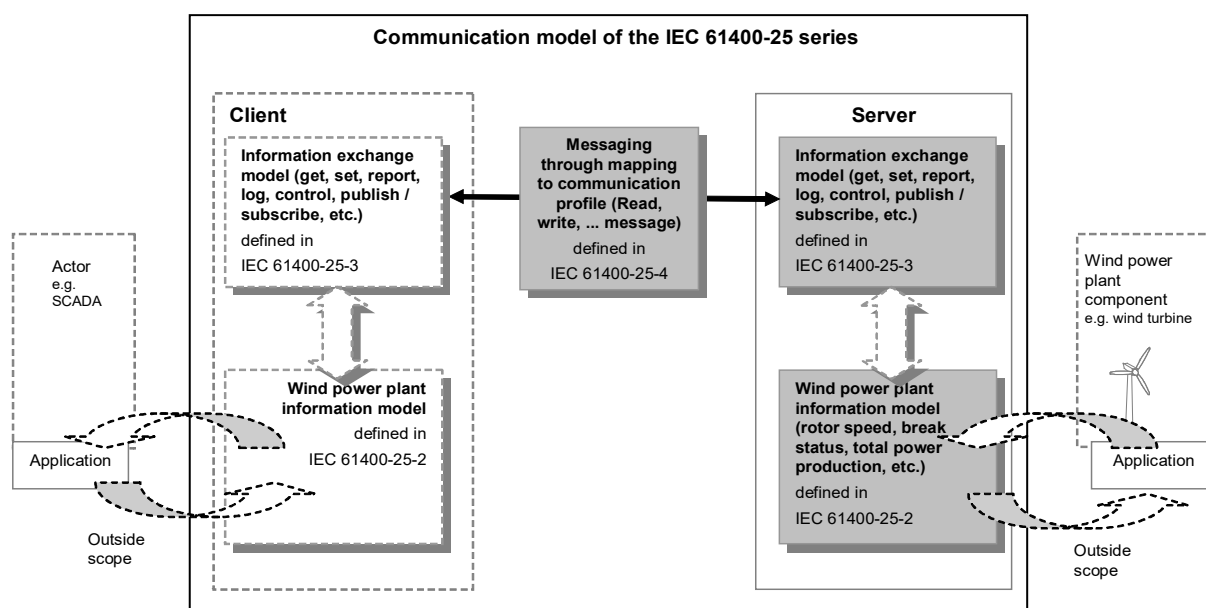


Figure 1 – Conceptual communication model of the IEC 61400-25 series

IEC 2172/06

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.

1.2 Data model Namespace name and version

This new subclause is mandatory for any IEC 61850 namespace (as defined by IEC 61850-7-1).

Table 2 shows all attributes of IEC 61400-25-2:2021A namespace.

Table 2 – Attributes of IEC 61400-25-2:2021A namespace

Attribute	Content
Namespace nameplate	
Namespace Identifier	IEC 61400-25-2
Version	2021
Revision	A

Attribute	Content
Full Namespace Name	IEC 61400-25-2:2021A
Namespace Type	domain
Namespace dependencies	
includes	IEC 61850-7-4:2007B version :2007 revision :B

88

89 1.3 Data model Namespace Code Component distribution

90 The Code Components are in light and full version:

- 91 • The full version is named : *IEC_61400-25-2.NSD.2021A.Full*. It contains definition of the
- 92 whole data model defined in this standard with the documentation associated and
- 93 access is restricted to purchaser of this part
- 94 • The light version is named : *IEC_61400-25-2.NSD.2021A.Light*. It doesn't contain any
- 95 documentations but contains the whole data model as per full version, and this light
- 96 version is freely accessible on the IEC website for download at :
- 97 <http://www.iec.ch/tc57/supportdocuments>, but the usage remains under the licensing
- 98 conditions.

99 The Code Components for IEC 61850 data models are formatted in compliance with the NSD
100 format defined by the standard IEC 61850-7-7. Each Code Component is a ZIP package
101 containing :

- 102 • the electronic representation of the Code Component itself (possibly multiple files),
- 103 • the grammar files (XSD) enabling to check the consistency of the associated files
- 104 against the defined version of NSD, but as well against the IEC 61850 flexibility rules in
- 105 case of private extensions
- 106 • a file describing the content of the package (IECManifest.xml).

107 The IEC Manifest contains different sections giving information on:

- 108 • The copyright notice
- 109 • The identification of the code component
- 110 • The publication related to the code component
- 111 • The list of the electronic files which compose the code component
- 112 • An optional list of history files to track changes during the evolution process of the code
- 113 component

114 The life cycle of a code component is not restricted to the life cycle of the related publication.
115 The publication life cycle goes through two stages, Version (corresponding to an edition) and
116 Revision (corresponding to an amendment). A third publication stage (Release) allows
117 publication of Code Component in case of urgent fixes of InterOp Tissues, thus without need to
118 publish an amendment.
119 Consequently new release(s) of the Code Component may be released, which supersede(s) the
120 previous release, and will be distributed through the IEC TC57 web site at:
121 <http://www.iec.ch/tc57/supportdocuments>.

122 The latest version/release of the document will be found by selecting the file named *IEC_61400-*
123 *25-2.NSD.{VersionStateInfo}.Light* with the filed VersionStateInfo of the highest value.

124

125

126

2 Normative references

The following documents referenced documents are indispensable for its application of this standard. 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, *Wind turbines – Part 25-3: Communications for monitoring and control of wind power plants – Information exchange models*

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

IEC 61400-25-5, *Wind turbines – Part 25-5: Communications for monitoring and control of wind power plants – Compliance testing*

IEC 61400-25-71, *Wind turbines – Part 25-71: Communications for monitoring and control of wind power plants – Configuration description language*

IEC IS 61400-26-1:2019, *Wind turbines – Part 26-1: Time-based availability for wind turbine generating systems*

IEC 61850-1-2:2020, *Communication networks and systems for power utility automation – Part 1-2: Guideline on extending IEC 61850*

IEC 61850-5:2013, *Communication networks and systems for power utility automation – Part 5: Communication requirements for functions and device models*

IEC 61850-7-1:2011+AMD1:2020, *Communication networks and systems for power utility automation – Part 7-1: Basic communication structure – Principles and models*

IEC 61850-7-2:2011+AMD1:2020, *Communication networks and systems for power utility automation – Part 7-2: Basic information and communication structure – Abstract communication service interface (ACSI)*

IEC 61850-7-3:2011+AMD1:2020, *Communication networks and systems for power utility automation – Part 7-3: Basic communication structure – Common data classes*

IEC 61850-7-4:2011+AMD1:2020, *Communication networks and systems for power utility automation – Part 7-4: Basic communication structure – Compatible logical node classes and data object classes*

IEC 61850-90-18:xxxx¹, *Communication networks and systems for power utility automation – Part 90-18: Alarm handling*

¹ To be published – Exact reference will be updated at a later stage of publication.

3 Terms and definitions

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

3.1

177 **Conditional**

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

3.2

180 **Mandatory**

181 Defined content shall be provided in compliance with the IEC 61400-25 series.

3.3

182 **Optional**

183 Defined content can be optionally provided in compliance with the IEC 61400-25 series.

3.4

184 **Descriptor**

185 A data item derived from raw or processed parameters or external observation

186 Descriptors are used to express symptoms and anomalies. The descriptors used for monitoring
187 and diagnostics are generally those obtained from condition monitoring systems. However,
188 operational parameters, like any other measurement, can be considered as descriptors.

189 Descriptors are also referred to as “condition monitoring descriptors”.

190 [Source: ISO 13372:2012, clause 6.2, modified]

4 Abbreviated terms

191 **4.1 General purpose 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
WTCMD	Wind Turbine Condition Monitoring Device
XML	Extensible Markup Language

192

193

4.2 Abbreviated terms used in data object names

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".

Table 3 – Normative abbreviations for data object names

Term	Description
A	Current; phase A (L1)
AC	AC, alternating current
AGC	Automatic generation control
ASG	Analogue setting CDC
AWatt	Wattmetric component of current
Abr	Abrasion
Abs	Absolute
Absb	Absorbing
Acc	Accuracy; acceleration (deprecated: use Accl instead)
Accl	Acceleration
Accm	Accumulated, accumulator
Ack	Acknowledgement, acknowledge
Acs	Access
Act	Action, activity, active, activate
Actr	Actuator
Acu	Acoustic
Addr	Address
Adj	Adjustment
Admin	Administrative
Adp	Adapter, adaptation
Aff	Affected
Age	Ageing
Ahr	Ampere hours
Air	Air, aircraft
Alg	Algorithm
Alm	Alarm, alarm trigger status
Als	Alarm trigger status set
Alt	Altitude
Altn	Alternate
Amnt	Amount
Amp	Ampere, current DC or non-phase-related AC

Term	Description
An	Analogue
Anc	Ancillary
Ane	Anemometer
Ang	Angle
Ap	Access point
Apc	Analogue point control
App	Apparent
Ar	Amperes reactive (reactive current)
Arc	Arc
Area	Area
Arr	Array
Asyn	Asynchronous
At	At
Auth	Authorisation
Auto	Automatic
Aux	Auxiliary
Av	Average
Avi	Aviation
Avl	Availability
Ax	Axial
Azi	Azimuth
B	Bushing; phase B (L2)
BG	Before Gain
Bac	Binary-controlled analogue value
Bar	Barrier
Base	Base
Bat	Battery
Bck	Backup
Bec	Beacon
Beh	Behaviour
Ber	Bit error rate
Bias	Bias
Bl	Blade
Bib	Bulb
Blk	Block, blocked
Blow	Blowby
Bnd	Band, bandwidth
Boil	Boiler

Term	Description
Bot	Bottom
Brcb	Buffered report control block
Brg	Bearing
Brk	Brake
Bsc	Binary status control
Bst	Boost
Bt	Heartbeat
Bub	Bubbling
Bus	Bus
Byp	Bypass
C	Carbon; phase C (L3)
C2H2	Acetylene
C2H4	Ethylene
C2H6	Ethane
CB	Circuit breaker
CE	Cooling equipment (see also CI)
CG	Core ground
CH4	Methane
CHP	Combined heat and power
CO	Carbon monoxide
CO2	Carbon dioxide
Cab	Cable, cabinet
Cal	Calorie, caloric
Cam	Cam, e.g. rotating non-circular disk
Can	Cancel
Cap	Capability, capacity
Capac	Capacitance
Car	Carrier
Cbr	Calibration
Ccw	Counter clockwise
Ccy	Currency
Cds	Condensation
Ceil	Ceiling
Cel	Cell
Cf	Crest factor
Cff	Coefficient
Cfg	Configuration
Cg	Combusted Gas
Ch	Channel
Cha	Charger
Chg	Change
Chk	Check
Chr	Characteristic
Chs	Chassis

Term	Description
Circ	Circulating, circuit
CI	Cooling, coolant, cooling system (see also CE)
Clc	Calculate, calculated
Clip	Clip
Clk	Clock
Cloud	Cloud
Clr	Clear
Cls	Close, closed
Cm	Centimetres
Cmbu	Combustible, combustion
Cmd	Command
Cmpl	Completed, completion, complete
Cmut	Commute, commutator
Cndct	Conductivity, Conducting
Cnt	Counter
Cntt	Contractual
Cnv	Converter
Col	Coil
Comm	Communication
Comp	Compensation
Conf	Configuration
ConfRev	Configuration revision (confRev from IEC 61850-7-2)
Conn	Connected, connections
Cons	Constant (general)
Cor	Correction
Core	Core
Cost	Cost
Crank	Crank
Crd	Coordination
Crit	Critical
CrI	Correlation
Crp	Creeping, slow movement
Crv	Curve
Csmp	Consumption, consumed
Ctl	Control
Ctr	Center
Cum	Cumulative
Cur	Current
Cut	Cut, cut-out, cut-in
Cvr	Cover, cover level
Cw	Clockwise
Cwb	Crowbar
Cyc	Cycle

Term	Description
D	Derivate
DC	DC, direct current
DER	Distributed energy resource
DExt	De-excitation
DPCSO	Double point controllable status output
DQ0	Direct, quadrature, and zero axis quantities
DS	Device state
DT	Daylight saving time
Dam	Dam
Damp	Damping
Date	Date, date and time of action
Day	Day
Db	Deadband
Dcl	DC-link
Dct	Direct
De	De (prefix)
Dea	Dead
Dec	Decrease
Deg	Degrees
Dehum	De-humidifier
Del	Delta
Den	Density
Dep	Dependent
Desc	Description
Det	Detected
Detun	Detuning
Dev	Device
Dew	Dew
Dff	Diffuse
Dfl	Deflector (used in Pelton turbines)
Dft	Default
Dia	Diaphragm
Diag	Diagnostics
Dif	Differential, difference
Dig	Digital
Dip	Dip
Dir	Direction
Dis	Distance
Dist	Distribution
Dith	Dither
DI	Delay
Dlt	Delete
Dlv	Delivery

Term	Description
Dmd	Demand
Dn	Down, downstream
Dpc	Double point control
Dpt	Departure
Drag	Drag hand
Dropout	Dropout
Drp	Droop
Drt	Derate
Drtb	Draft tube
Drv	Drive
Dsa	Disable, disabled
Dsc	Discrepancy
Dsch	Discharge
Dscon	Disconnected
Dsp	Displacement
Dtc	Detection
Dur	Duration
Dust	Dust
Dv	Deviation
Dw	Delta Omega
Dyn	Dynamic
EE	External equipment
EF	Earth fault
EFN	Earth-fault neutraliser (Petersen coil)
EMA	E-mobility Account
ENG	Enumerated status setting CDC
ENS	Enumerated status CDC
EPC	Emergency Power Control
EV	Electrical Vehicle
EVSE	EV Supply Equipment
Echo	Echo
Ecp	Electrical connection point
Edt	Edit, edited
Efc	Efficiency
EI	Elevation
Ela	Elasticity
Em	Emission
Emg	Emergency
En	Energy
Ena	Enabled, enable, allow operation
Enc	Enumerated control
Encl	Enclosure
End	End
Eng	Engine

Term	Description
Ent	Entity, entities
Entr	Entry, entries
Env	Environment
Eq	Equalization, equal, equivalent
Err	Error
Est	Estimated
Ev	Evaluation
Evn	Even
Evt	Event
Ex	External
ExIm	Export/import
Exc	Exceeded
Excl	Exclusion
Exp	Expired
Exps	Expansion
Expt	Export
Ext	Excitation
F	Float
FA	Fault arc
FPM	Fuel processing module
Fa	"Fire all" sequence (to thyristors)
Fact	Factor
Fail	Failure
Fan	Fan
Fbc	Field breaker configuration
Fer	Frame error rate
Fil	Filter, filtration system
Fire	Fire
Fish	Fish
Fix	Fixed
Fld	Field
Flk	Flicker
Fll	Fall
FIm	Flame
Flood	Flood
Flsh	Flash, flashing
Flt	Fault
Flush	Flush
Flw	Flow, flowing
Fol	Follower, following
Forc	Forced
Fu	Fuse
Fuel	Fuel
Full	Full

Term	Description
Fun	Function
Fwd	Forward
Gain	Gain
Gas	Gas
Gbx	Gearbox
Gdv	Guide vane
Gen	General
Glob	Global
Gm	Grand master
Gn	Generator
Gnd	Ground
GoCBRef	GOOSE control block reference
Gocb	GOOSE control block
Gr	Group
Gra	Gradient
Grd	Guard
Gri	Grid
Gross	Gross
Gs	Grease
Gte	Gate
Gust	Gust
H	Harmonics (phase-related)
H2	Hydrogen
H2O	Water (chemical aspect: liquid, steam, etc.)
HP	Hot point
HPH	Harmonics phase
Ha	Harmonics (non-phase-related AC)
Har	Harmonic
Hb	Harmonic bin
Hd	Head
Health	Health
Heat	Heater, heating, heat (see also Ht)
Heli	Helihoist
Hello	Hello signal, Live signal, "I am alive" signal
Hi	High, highest
Hlf	Half
Hold	Hold
Hor	Horizontal
Horn	Horn
Ht	Heating, heating system (see also Heat)
Htex	Heat-exchanger
Hub	Hub

Term	Description
Hum	Humidity
Hy	Hydraulic, hydraulic system
Hyd	Hydrological, hydro, water
Hys	Hysteresis
Hz	Frequency
Hz1	Frequency at side 1
Hz2	Frequency at side 2
I	Integral, integration
ING	Integer status setting CDC
INS	Integer status CDC
ISCSO	Integer status controllable status output
Ia	Information available
Iafm	Information available force majeure
Iano	Information available non-operative
Ianofo	Information available non-operative forced outage
Ianopca	Information available non-operative planned corrective action
Ianos	Information available non-operative suspended
Ianosm	Information available non-operative 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 non-generating
Iaongel	Information available operative non-generating out of electrical specification
Iaongen	Information available operative non-generating out of environment specification
Iaongrs	Information available operative non-generating requested shutdown
Iaongts	Information available operative non-generating technical standby
Ice	Ice
Id	Identity, identifier
Ieee	IEEE definition
IeeeKH	Proportional gain HF (High Frequency). Defined in IEEE 421.5
IeeeKH 1	Proportional gain HF positive. Defined in IEEE 421.5
IeeeKH 11	Lead gain HF positive. Defined in IEEE 421.5

Term	Description
IeeeKH 17	Lead gain HF negative. Defined in IEEE 421.5
IeeeKH 2	Proportional gain HF negative. Defined in IEEE 421.5
IeeeKI	Proportional gain IF (Intermediate Frequency). Defined in IEEE 421.5
IeeeKI1	Proportional gain IF positive. Defined in IEEE 421.5
IeeeKI1 1	Lead gain IF positive. Defined in IEEE 421.5
IeeeKI1 7	Lead gain IF negative. Defined in IEEE 421.5
IeeeKI2	Proportional gain IF negative. Defined in IEEE 421.5
IeeeKL	Proportional gain LF (Low Frequency). Defined in IEEE 421.5
IeeeKL 1	Proportional gain LF positive. Defined in IEEE 421.5
IeeeKL 11	Lead gain LF positive. Defined in IEEE 421.5
IeeeKL 17	Lead gain LF negative. Defined in IEEE 421.5
IeeeKL 2	Proportional gain LF negative. Defined in IEEE 421.5
IeeeKs1	Gain Ks1. Defined in IEEE 421.5
IeeeKs2	Gain Ks2. Defined in IEEE 421.5
IeeeKs3	Gain Ks3. Defined in IEEE 421.5
IeeeM	Ramptrack lowpass degree M. Defined in IEEE 421.5
IeeeN	Ramptrack overall degree N. Defined in IEEE 421.5
IeeeT1	Time constant T1. Defined in IEEE 421.5
IeeeT10	Time constant T10. Defined in IEEE 421.5
IeeeT11	Time constant T11. Defined in IEEE 421.5
IeeeT2	Time constant T2. Defined in IEEE 421.5
IeeeT3	Time constant T3. Defined in IEEE 421.5
IeeeT4	Time constant T4. Defined in IEEE 421.5
IeeeT7	Time constant T7. Defined in IEEE 421.5
IeeeT8	Time constant T8. Defined in IEEE 421.5
IeeeT9	Time constant T9. Defined in IEEE 421.5
IeeeTH 1	Time constant TH1 (High frequency positive). Defined in IEEE 421.5
IeeeTH 10	Time constant TH10 (High frequency negative). Defined in IEEE 421.5
IeeeTH 11	Time constant TH11 (High frequency negative). Defined in IEEE 421.5

Term	Description
leeeTH12	Time constant TH12 (High frequency negative). Defined in IEEE 421.5
leeeTH2	Time constant TH2 (High frequency positive). Defined in IEEE 421.5
leeeTH3	Time constant TH3 (High frequency positive). Defined in IEEE 421.5
leeeTH4	Time constant TH4 (High frequency positive). Defined in IEEE 421.5
leeeTH5	Time constant TH5 (High frequency positive). Defined in IEEE 421.5
leeeTH6	Time constant TH6 (High frequency positive). Defined in IEEE 421.5
leeeTH7	Time constant TH7 (High frequency negative). Defined in IEEE 421.5
leeeTH8	Time constant TH8 (High frequency negative). Defined in IEEE 421.5
leeeTH9	Time constant TH9 (High frequency negative). Defined in IEEE 421.5
leeeTI1	Time constant TI1 (Intermediate frequency positive). Defined in IEEE 421.5
leeeTI10	Time constant TI10 (Intermediate frequency negative). Defined in IEEE 421.5
leeeTI11	Time constant TI11 (Intermediate frequency negative). Defined in IEEE 421.5
leeeTI12	Time constant TI12 (Intermediate frequency negative). Defined in IEEE 421.5
leeeTI2	Time constant TI2 (Intermediate frequency positive). Defined in IEEE 421.5
leeeTI3	Time constant TI3 (Intermediate frequency positive). Defined in IEEE 421.5
leeeTI4	Time constant TI4 (Intermediate frequency positive). Defined in IEEE 421.5
leeeTI5	Time constant TI5 (Intermediate frequency positive). Defined in IEEE 421.5
leeeTI6	Time constant TI6 (Intermediate frequency positive). Defined in IEEE 421.5
leeeTI7	Time constant TI7 (Intermediate frequency negative). Defined in IEEE 421.5
leeeTI8	Time constant TI8 (Intermediate frequency negative). Defined in IEEE 421.5
leeeTI9	Time constant TI9 (Intermediate frequency negative). Defined in IEEE 421.5
leeeTL1	Time constant TL1 (Low frequency positive). Defined in IEEE 421.5
leeeTL10	Time constant TL10 (Low frequency negative). Defined in IEEE 421.5

Term	Description
leeeTL11	Time constant TL11 (Low frequency negative). Defined in IEEE 421.5
leeeTL12	Time constant TL12 (Low frequency negative). Defined in IEEE 421.5
leeeTL2	Time constant TL2 (Low frequency positive). Defined in IEEE 421.5
leeeTL3	Time constant TL3 (Low frequency positive). Defined in IEEE 421.5
leeeTL4	Time constant TL4 (Low frequency positive). Defined in IEEE 421.5
leeeTL5	Time constant TL5 (Low frequency positive). Defined in IEEE 421.5
leeeTL6	Time constant TL6 (Low frequency positive). Defined in IEEE 421.5
leeeTL7	Time constant TL7 (Low frequency negative). Defined in IEEE 421.5
leeeTL8	Time constant TL8 (Low frequency negative). Defined in IEEE 421.5
leeeTL9	Time constant TL9 (Low frequency negative). Defined in IEEE 421.5
leeeTw1	Time constant wash out Tw1. Defined in IEEE 421.5
leeeTw2	Time constant wash out Tw2. Defined in IEEE 421.5
leeeTw3	Time constant wash out Tw3. Defined in IEEE 421.5
leeeTw4	Time constant wash out Tw4. Defined in IEEE 421.5
leeeVHMax	Maximum limit set-point HF. Defined in IEEE 421.5
leeeVHMin	Minimum limit set-point HF. Defined in IEEE 421.5
leeeVIMax	Maximum limit set-point IF. Defined in IEEE 421.5
leeeVIMin	Minimum limit set-point IF. Defined in IEEE 421.5
leeeVLMax	Maximum limit set-point LF. Defined in IEEE 421.5
leeeVLMin	Minimum limit set-point LF. Defined in IEEE 421.5
leeeVsi1Max	Input High Limit 1. Defined in IEEE 421.5
leeeVsi1Min	Input Low Limit 1. Defined in IEEE 421.5
leeeVsi2Max	Input High Limit 2. Defined in IEEE 421.5
leeeVsi2Min	Input Low Limit 2. Defined in IEEE 421.5
leeeVstMax	Output High Limit. Defined in IEEE 421.5
leeeVstMin	Output Low Limit. Defined in IEEE 421.5
Imb	Imbalance
Imp	Impedance non-phase-related AC
Impact	Impact

Term	Description
Impt	Import
In	Input
Ina	Inactivity
Inc	Integer control
Incl	Inclination
Incr	Increment, increase
Ind	Indication
Indp	Independent
Iner	Inertia
Inh	Inhibit
Inl	Inline
Inlet	Inlet
Inn	Inner
Ins	Insulation
Insol	Insolation
Inst	Instantaneous
Int	Integer
Intm	Intermediate
Intn	Internal
Intr	Interrupt, interruption
Intv	Interval
Inv	Inverter, inverted, inverse
Isc	Integer status control
Isld	Islanded
Iso	Isolation
Iu	Information unavailable
Ix	Index
Jmp	Jump
Jnt	Joint
K	Constant (regulation)
K0Fact	Zero-sequence (residual) compensation factor
KFact	K factor (harmonics)
Kck	Kicker
Key	Key, physical control device
L	Lower (action)
LDC	Line drop compensation
LDCR	Line drop compensation resistance
LDCX	Line drop compensation reactance
LDCZ	Line drop compensation impedance
LED	Light-emitting diode
LTC	Load tap changer
Last	Last
Ld	Lead

Term	Description
Ldp	Link discovery protocol
Leap	Leap (second)
Len	Length
Lev	Level
Lft	Lifting, lift
Lg	Lag
Life	Lifetime
Lim	Limit
Lin	Line
Liv	Live
Lkd	Locked
Lkg	Leakage
LI	Last long (interval)
Lo	Low (state or value)
Loc	Local, location
Locb	Log control block
Lod	Load, loading
Log	Log
Lok	(use Lkd instead) Locked
Loop	Loop
Los	Loss
Ls	Last short (interval)
Lst	List
Lub	Lubrication
Lum	Luminosity
M	Minutes
MV	Measured value CDC
Mac	Media access control, MAC-address
Made	Made
Mag	Magnetic, magnitude
Maint	Maintenance
Man	Manual
Mat	Material
Mau	Medium access unit
Max	Maximum
Mbr	Membrane
Md	Motor drive
Mdul	Module
Meas	Measurement
Mech	Mechanical
Media	Media
Mem	Memory
Min	Minimum
Mir	Mirror

Term	Description
Mlt	Multiple
Mns	Mains
Mod	Mode
Mot	Motor
Mrg	Margin
Mrk	Market
Mst	Moisture
Msv	Main signaling voltage
Msvcb	Multicast sampled values control block
Mth	Method
Mult	Multiplier
Mvm	Movement, moving
N2	Nitrogen
NOx	Nitrogen oxide
NQS	Average partial discharge current
Nac	Nacelle (of a wind turbine)
Nam	Name
Name	Name (reserved for use in data objects EEName and LNName only)
Nav	Navigation
Ndl	Needle (used in Pelton turbines)
NdsCom	Needs commissioning
Neut	Neutral
Ng	Negative
Ngt	Negotiation
Nhd	Net head
Night	Night
No	No, not
Noi	Noise
Nom	Nominal, normalising
Num	Number
Nxt	Next
O2	Oxygen
O3	Ozon, trioxigen
Obl	Obligation
Oc	Open circuit
Odd	Odd
Of	Offline
Off	Off, device disengaged, not running
Ofs	Offset
Oil	Oil
On	On, device applied, running
Oo	Out of
Op	Operate, operating, operation

Term	Description
Operate	Operate order to any device
Opn	Open, opened
Ord	Order
Out	Output
Ov	Over, override, overflow
Ovl	Overload
Ox	Oxidant
P	Proportional
PF	Power factor
PH	Acidity, value of pH
PNV	Phase-to-neutral voltage
POW	Point on wave switching
PP	Phase to phase
PPV	Phase to phase voltage
PT1	Low-pass exponential time rate filter
Pa	Partial
Pair	Pair, paired
Pap	Paper
Par	Parallel
Pas	Passive
Path	Path
Pcb	Power quality classifier bin
Pct	Percent, percentage
Pdm	Power quality demodulation
Pe	Electric Power
Per	Periodic, period
Ph	Phase to reference
Phs	Phase
Phy	Physical
Pi	Instantaneous real power
Pin	Pin
Pipe	Pipe
Pk	Peak
Pl	Plant
Plg	Plug
Pls	Pulse
Plt	Plate; long-term flicker severity
Pmp	Pump
Po	Polar
Pol	Polarizing
Polytr	Polytropic
Port	Port
Pos	Position
Pot	Potentiometer, potential

Term	Description
Prc	Price, pricing
Pre	Pre-
Prec	Precondition, initial status
Pres	Pressure
Prg	Progress, in progress
Prim	Primary
Prio	priority
Prm	Permissive
Pro	Protection
Proc	Process
Proxy	Proxy
Prs	Presence
Prt	Parts, part
Ps	Positive
Psk	Penstock
Pss	PSS, power system stabiliser function
Pst	Post, short-term flicker severity
Pt	Point
Pth	Pitch
Pwr	Power
Qty	Quantity
Qu	Queue
Qud	Quad
R	Raise, increase
Rad	Radiation
Ral	Rail
Ramp	Ramp
Rat	Ratio
Rb	Runner blade
Rcd	Record, recording
Rch	Reach
Rcl	Reclaim
Rct	Reaction
Rdy	Ready
Re	Retry
React	Reactance, reactive
Rear	Rear
Rec	Reclose
Rec1	Reclose after single phase fault
Rec13	Reclose after evolving fault
Rec3	Reclose after three phase fault
Recha	Recharge, recharging
Rect	Rectifier
Red	Redundant, reduction

Term	Description
Ref	Reference
Reg	Regulation
Rel	Release
Req	Requested
Res	Residual
Reso	Resonance
Reuse	Reuse
Rev	Revision
Rf	Refreshment
Rin	Reinsertion
Ris	Resistance
RI	Relation, relative
Rm	Mutual resistance
Rmp	Ramping, ramp
Rms	Root mean square
Rn	Rain
Rnbk	Runback
Rng	Range
Rod	Rod
Root	Root
Rot	Rotation, rotor
Rpt	Repeat, repetition
Rs	Reset, resettable
Rsl	Result
Rst	Restraint, restriction
Rsv	Reserve
Rt	Ride-through
Rte	Rate
Rtg	Rating
Rub	Run-up/back
Run	Run
Rv	Reverse
Rvc	Rapid voltage change
Rvrt	Revert
Rwy	Runaway, e.g. in runaway speed
Rx	Receive, received
S10	Coefficient S1.0
S12	Coefficient S1.2
SM	Servo, servo-motor
SNL	Speed-no-load, connected but not generating
SOx	Sulphur oxide
SPCSO	Single point controllable status output
SPG	Single point setting CDC

Term	Description
SPS	Single point status CDC
SPI	Single pole/phase
ST	Standard time
Saf	Safety
Sag	Sag
Sar	Surge arrestor
Sat	Saturation
Sc	Short circuit
Scale	Scale
Schd	Schedule
Scnd	Secondary
Sco	Supply change over
Sec	Security
Sel	Select
Self	Self
Seq	Sequence
Ser	Series, serial
Set	Setting
Sgcb	Setting group control block
Sh	Shunt
Shar	Shared
Shft	Shaft
Shld	Shielded
Sig	Signal
Sign	Sign
Sim	Simulation, simulated
Sld	Solidity
Slnt	Salinity, saline content
Slp	Sleep; slip
Smok	Smoke
Smp	Sampling
Snd	Sound pressure
Snpt	Snapshot
Snr	Signal to noise ratio
Snw	Snow
Soc	State of charge
Sof	Switch on to fault
Spc	Single point control
Spcf	Specific
Spd	Speed
Spec	Spectra
Spir	Spiral
Spt	Setpoint
Spv	Supervision

Term	Description
Sq	Square
Src	Source
Srfc	Surface
St	Status, state
Sta	Station, function at plant level
Stab	Stabilizer
Stat	Statistics
Stc	Stack
Std	Standard
Stdby	Standby
Step	Step
Stk	Stroke
Stl	Still, not moving
Stnd	Stand, standing
Sto	Storage, e.g. activity of storing data
Stop	Stop
Storm	Storm
Stow	Stow
Str	Start
Strg	String
Stt	Stator
Stuck	Stuck, cannot move
Sub	Sub
Sum	Sum
Sup	Supply
Sv	Sampled value
SvCBRef	SV control block reference
Svc	Service
Sw	Switch, switched
Swg	Swing
Swl	Power quality event swell
Syn	Synchronisation, synchronous, synchronism, synchrocheck
Sys	System
TP	Three pole/phase
Ta	Armature time constant
Tag	Tag (maintenance work in progress)
Tap	Tap
Task	Task
Td	Transformer derating
Td0p	Td0'
Td0s	Td0''
Tdd	Total demand distortion
Tdf	Transformer derating factor

Term	Description
Tdp	Td'
Tds	Td''
Tech	Technology
Term	Termination
Test	Test
Tgt	Target
Thd	Total harmonic distortion
Thm	Thermal
Ti	Telephone influence
Tilt	Tilt
Tm	Time
Tm1	Time constant 1
Tm2	Time constant 2
Tm3	Time constant 3
Tmh	Time in h
Tmm	Time in min
Tmms	Time in ms
Tmp	Temperature (°C)
Tms	Time in s
Tnk	Tank
Tns	Tension (stress)
Top	Top (position)
Topo	Topology
Torq	Torque
Tot	Total
Tow	Tower
Tp	Test Point
Tpc	Teleprotection
Tpy	Temporarily
Tq0p	Tq0'
Tq0s	Tq0''
Tqp	Tq'
Tqs	Tq''
Tr	Trip (electrical protection function)
Trf	Transformer
Trg	Trigger
Trip	Trip (non-electrical function)
Trk	Track, tracking
Trp	Transient Performance Class
Trs	Transient
Trunk	Trunk
Ts	Total signed
Tu	Total unsigned
Tun	Tuning

Term	Description
Tur	Turbine
Tx	Transmit, transmitted
Typ	Type
UPS	Uninterruptible power supply
UTC	Coordinated Universal Time
Uhf	Ultra-high-frequency
Un	Un-; under
Unav	Unavailable
Unb	Unbalanced
Unld	Unload
Unt	Unit, production unit
Up	Up, upstream
Ups	Uninterruptible Power Supply
Urcb	Unbuffered report control block
Use	Use
Used	Used
Usvcb	Unicast sampled values control block
Util	Utility
V	Voltage
V1	Voltage at side 1
V2	Voltage at side 2
VA	Apparent power (volt amperes)
VAh	Apparent energy
VAr	Reactive power (volt amperes reactive)
VARh	Reactive energy
Va	Variation
Vac	Vacuum
Val	Value
Vbr	Vibration
Ver	Vertical
Viol	Violation
Vis	Visibility
Visc	Viscosity
Vlan	VLAN
Vld	Valid, validate, validated
Vlm	Volume
Vlv	Valve
Vn	Wind vane
Vol	Voltage DC or non-phase-related AC
VolAmp r	Non-phase-related AC reactive power
Vss	Steady state voltage
W	Active power
W200	Watts peak at 200 W/m2

204

Term	Description
Wac	Watchdog
Wash	Washout
Watt	Active power non-phase-related AC
Wav	Wave, waveform
Wd	Wind
Week	Week
Wei	Weak end infeed
Wet	Wet
Wgt	Weight
Wh	Watt hours
Wid	Width
Win	Window
Wkup	Wake up
Wld	Welding
Wnd	Winding
Wrm	Warm
Wrn	Warning, warning trigger status
Wrs	Warning trigger status set
Wtr	Water (physical aspect: river, cooling, etc.)
Wup	Windup
X	Reactance (imaginary part of impedance)
X0	Zero sequence reactance
X1	Positive sequence reactance
X2	Negative sequence reactance X2
Xd	Synchronous reactance Xd
Xdir	X-direction
Xdp	Transient synchronous reactance Xd'
Xds	Subtransient reactance Xd''
Xm	Mutual reactance
Xq	Synchronous reactance Xq
Xqp	Transient synchronous reactance Xq'
Xqs	Subtransient reactance Xq''
Xsec	Cross-section
Ydir	Y-direction
Yw	Yaw
Z	Impedance
Zer	Zero
Zero	(use 'Zer' instead) Zero
Zm	Mutual impedance
Zn	Zone
Zro	Zero sequence
km	Kilometre
ppm	Parts per million

5 General

5.1 Overview of logical node classes

All logical node classes defined in this part of the IEC 61400-25 series inherit their structure from the abstract logical node class `AbstractLNsCommons::FunctionLN` defined in clause 6.2.2.6 of IEC 61850-7-4. 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.

The system specific logical node classes listed in Table 1 are inherited from IEC 61850 and 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).

Table 1 – System specific logical nodes

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

A wind power plant consists of several components, including one or more wind turbines, which may be modelled as individual devices. Wind power plant information shall be classified in turbine and wind power plant specific logical nodes. From the viewpoint of standardisation, it is preferable that all wind power plant information are built unambiguously and in a similar way. Table 2 shows the wind power plant general information break down into logical nodes that are common to a complete wind power plant. Table 3 lists the logical nodes associated with the individual turbines.

One instance of wind power plant general logical nodes is anticipated at power plant level, constituting one single point of communication to the power plant. In addition, instances of logical nodes in Table 2 may be instantiated at wind turbine level as well, if required.

Table 2 – Wind power plant general logical nodes

LN classes	Description	M/O
WPPL	Wind power plant faceplate information	O
WALM	Alarm information	O
WMET	Meteorological information	O
WAPC	Active power control information	O
WRPC	Reactive power control information	O
WAVL	Availability information	O
WCUT	Wind power plants high wind cut off	O
WINR	Inertia response	O
LTIM	Time management (inherited from IEC 61850-7-4)	O
WHZW	Frequency response information	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.

237

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
WAVI	Aviation and navigation information (AviNavi).	O
WHYD	General hydraulic system information	O
WAVL	Availability information	O
LTIM	Time management (inherited from IEC 61850-7-4)	O
WCMS	Turbine supervision status from the turbine condition monitoring device	O
WHZW	Frequency response information	O
WINR	Inertia response information	O

238

239 Table 4 shows the break down into logical nodes of wind power plant device specific
 240 information for non-wind turbine devices. Such devices can be a met mast controller or a
 241 gateway device.

242 WHZW and WINR logical nodes are indicated for cases a non-turbine device such as a storage
 243 system controller is part of the frequency and inertia response handling.

244

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
WAVL	Availability information	O
LTIM	Time management (inherited from IEC 61850-7-4)	O
WHZW	Frequency response information	O
WINR	Inertia response information	O

245

246

247 As shown in Table 2 and Table 3, information is mainly modelled by a set of LN classes,
 248 which are classified by physical turbine decomposition.

249

250 Besides common information for all turbines (manufacturer independent), most information
 251 will, in practice, be determined by the turbine concept, the manufacturer, the site and the
 252 state of the art of turbine technology. For this reason, as a modelling guideline, the data class
 253 attribute names representing the specific information in the wind power plant specific logical
 254 nodes are focused on the most prevailing modern wind turbine concept, namely 3-bladed,
 255 variable speed, active pitch (electric/hydraulic) and gearbox transmission. In case of
 256 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 7.1. 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, for example XCBR and MMXU from IEC 61850-7-4, have to be instantiated in real systems. Figure 3 depicts an example of a real wind turbine that uses several instances of logical nodes.

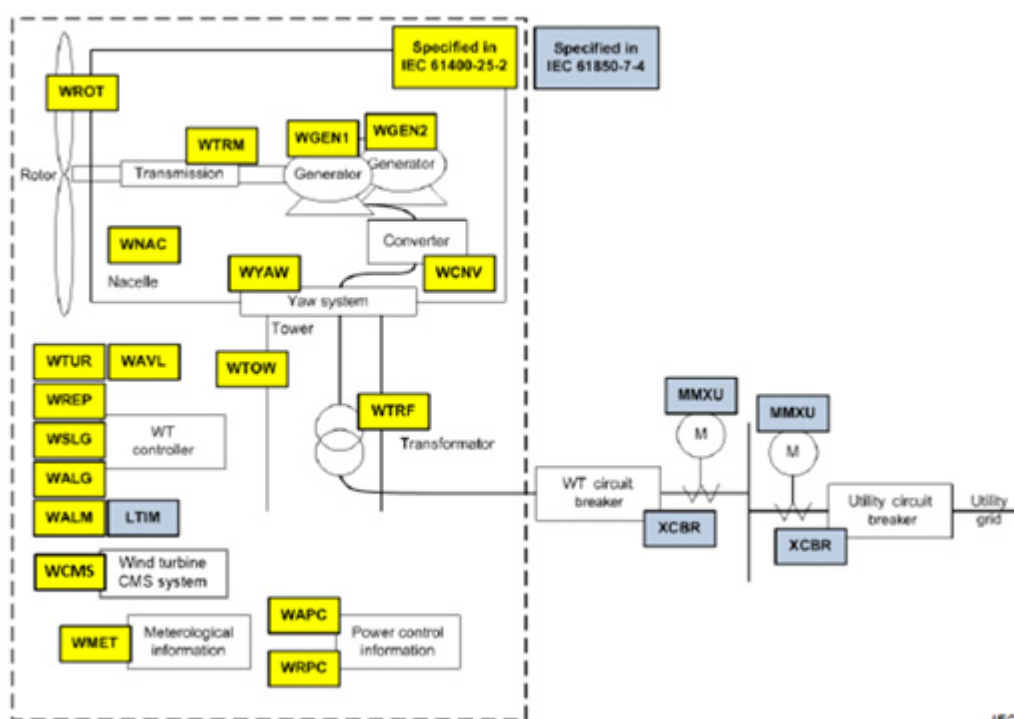


Figure 3 – Use of instances of logical nodes

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 more sensors (temperature, current) are used for monitoring purposes, the user is free to assign relevant information to additional data names. Private data can be added assuming the IEC 61850 extension rules are applied as defined in IEC 61850-1-2.

6 Logical node classes

6.1 General

This clause specifies logical nodes defined in IEC 61400-25-2.

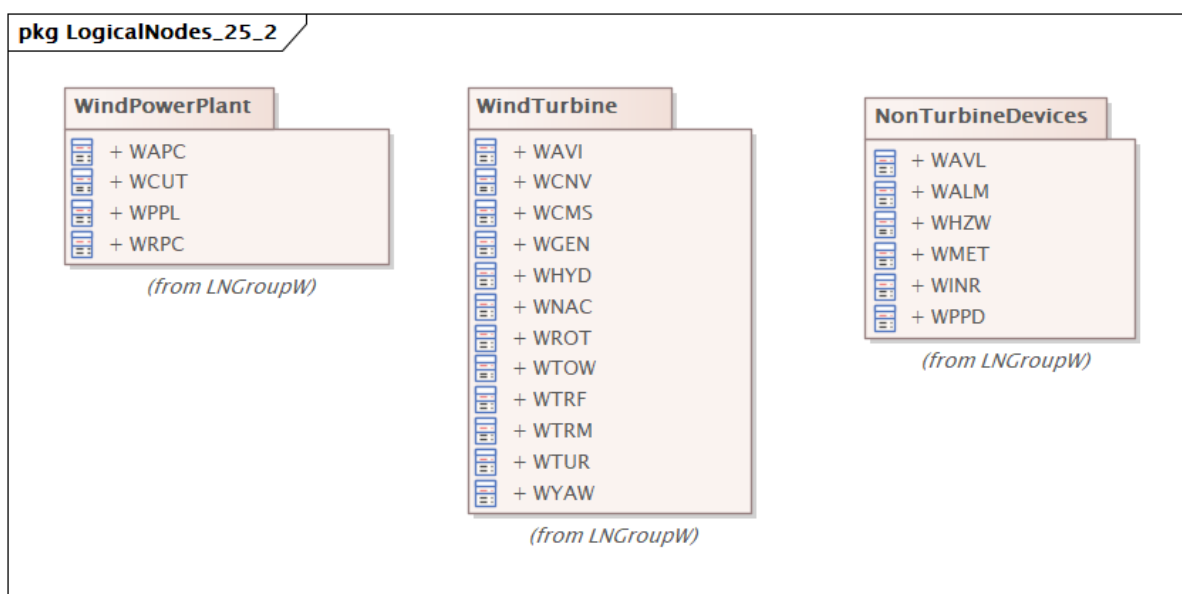


Figure 2 – Package diagram LogicalNodes_25_2: LogicalNodes_25_2

Figure 2: This diagram shows all the Logical Nodes defined in the IEC 61400-25-2. The grouping denotes the typical expected usage at the power plant or at the individual wind turbine level.

6.2 Wind Power logical nodes (LNGroupW)

6.2.1 General

Logical nodes in the Group W are the Wind Power specific Logical nodes.

6.2.2 Non-turbine devices logical nodes (NonTurbineDevices)

6.2.2.1 General

The logical nodes in this group are used to model data for non-turbine devices.

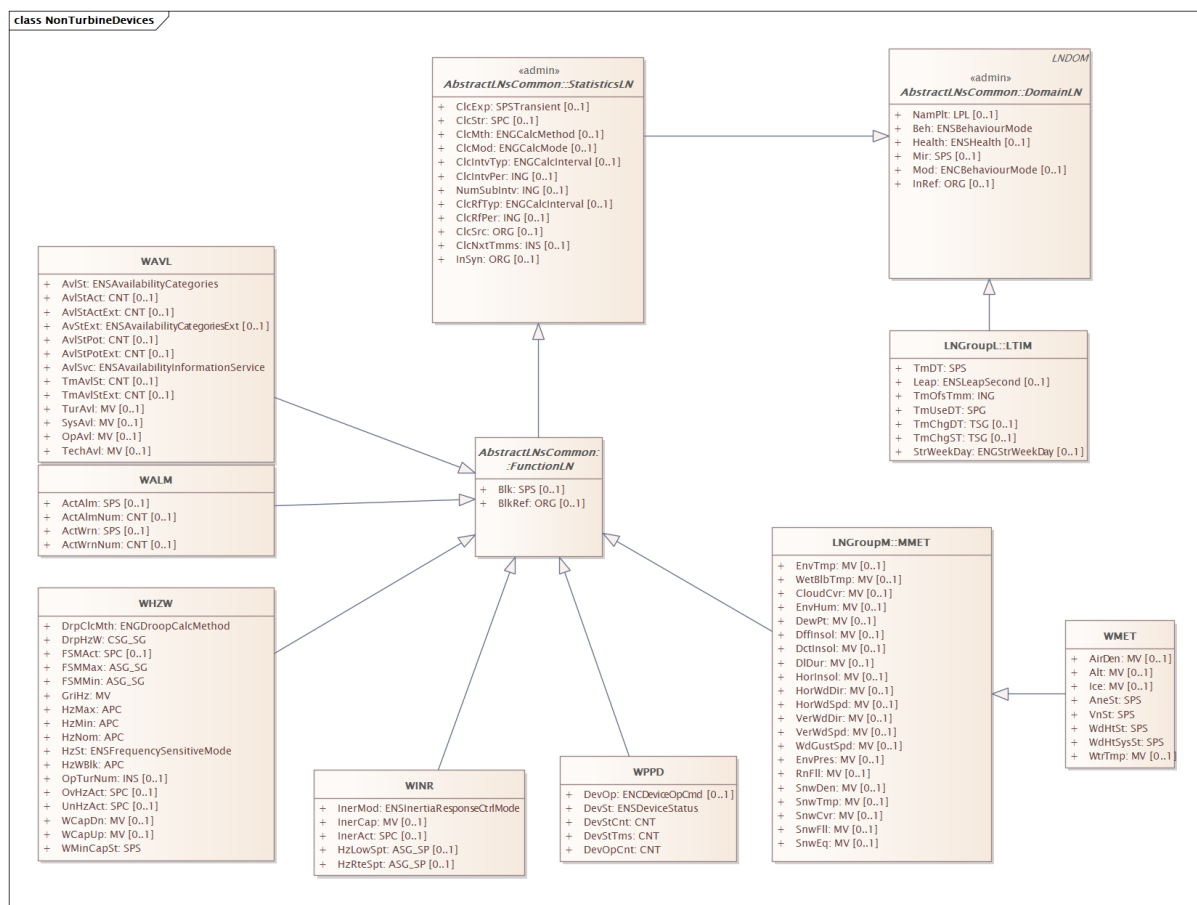


Figure 3 – Class diagram NonTurbineDevices: NonTurbineDevices

Figure 3: This diagram shows all the Logical Nodes defined in the IEC 61400-25-2 to model data for non-turbine devices.

6.2.2.2 LN: Wind turbine availability information Name: WAVL

This logical node shall comprise the data classes that represent wind turbine availability information.

Each service defined in IEC 61400-26-1:2019 shall be modeled with a separate instance of WAVL. According to IEC 61400-26-1:2019 services may be, but are not limited to:

- Supply of active power;
- Supply of reactive power;
- Support of electrical stability of the grid.

It is recommended that the first instances of WAVL is used for active power.

The service provided by a specific instance of WAVL is configured in the data object data object AvlService.

Please refer to Annex C for a detailed explanation about the information model for availability data and the use of the WAVL logical node.

NOTE: The process information data is a dimensionless measured value for the calculation methods defined in IEC 61400-26-1 Annex C.

Table 4 shows all data objects of WAVL.

323

Table 4 – Data objects of WAVL

WAVL				
Data object name	Common data class	T	Explanation	PresConds/ds
Descriptions				
NamPlt	LPL		inherited from: DomainLN	MONamPlt / MONamPlt
Status information				
AvlSt	ENS (AvailabilityCategoriesKind)		Currently active availability information category (level 1-4) as per IEC 61400-26-1.	M / F
AvlStAct	CNT		Actual (level 1-4) service delivery as per IEC 61400-26-1. The value shall be expressed in Wh or VARh.	O / O
AvlStActExt	CNT		Actual lower level availability information category (level 5,6...) service delivery as per IEC 61400-26-1. The value shall be expressed in Wh or VARh.	O / O
AvStExt	ENS (AvailabilityCategoriesExtKind)		Currently active lower level availability information category (level 5,6...) as per IEC 61400-26-1.	O / F
AvlStPot	CNT		Potential (level 1-4) service delivery as per IEC 61400-26-1. The value shall be expressed in Wh or VARh.	O / O
AvlStPotExt	CNT		Potential lower level availability information category (level 5,6...) service delivery as per IEC 61400-26-1. The value shall be expressed in Wh or VARh.	O / O
AvlSvc	ENS (AvailabilityInformationServiceKind)		Information service for which availability information is provided.	M / F
TmAvlSt	CNT		Time-based availability information (level 1-4) service delivery as per IEC 61400-26-1. The value shall be expressed in seconds.	O / O
TmAvlStExt	CNT		Time-based lower level availability information category (level 5,6...) service delivery as per IEC 61400-26-1. The value shall be expressed in seconds.	O / O
Blk	SPS		inherited from: FunctionLN	O / F
ClcExp	SPS	T	inherited from: StatisticsLN	O / O
ClcNxtTmmss	INS		inherited from: StatisticsLN	O / O
Beh	ENS (BehaviourModeKind)		inherited from: DomainLN	M / M
Health	ENS (HealthKind)		inherited from: DomainLN	O / O
Mir	SPS		inherited from: DomainLN	MOcond(1) / MOcond(1)
Measured and metered values				
TurAvl	MV		Turbine availability (vendor specific, deprecated).	O / O
SysAvl	MV		System availability (vendor specific, deprecated).	O / O
OpAvl	MV		Operational availability according to IEC 61400-26-1, the fraction of a given period of time in which a turbine is actually producing. The value shall be expressed in percentage of the considered period of time, or be dimension-less.	O / O
TechAvl	MV		Technical availability according to IEC 61400-26-1, the fraction of a given period of time in which a	O / O

WAVL				
Data object name	Common data class	T	Explanation	PresConds/ds
			turbine is operating according to its design specifications. The value shall be expressed in percentage of the considered period of time, or be dimension-less.	
Controls				
ClcStr	SPC		inherited from: StatisticsLN	O / O
Mod	ENC (BehaviourModeKind)		inherited from: DomainLN	O / O
Settings				
BlkRef	ORG		inherited from: FunctionLN	Omulti / F
ClcMth	ENG (CalcMethodKind)		inherited from: StatisticsLN	O / M
ClcMod	ENG (CalcModeKind)		inherited from: StatisticsLN	O / O
ClcIntvTyp	ENG (CalcIntervalKind)		inherited from: StatisticsLN	O / O
ClcIntvPer	ING		inherited from: StatisticsLN	O / O
NumSubIntv	ING		inherited from: StatisticsLN	O / O
ClcRfTyp	ENG (CalcIntervalKind)		inherited from: StatisticsLN	O / O
ClcRfPer	ING		inherited from: StatisticsLN	O / O
ClcSrc	ORG		inherited from: StatisticsLN	F / M
InSyn	ORG		inherited from: StatisticsLN	O / O
InRef	ORG		inherited from: DomainLN	Omulti / Omulti

324

325 6.2.2.3 LN: Alarm information Name: WALM

326 This logical node shall comprise the data classes that represent information related to alarms
 327 status. Individual alarms may be contained in any logical node (including WAVL) and shall
 328 defined with the common data class ALM as per the IEC 61850-90-18.

329 Note to readers - CD stage: A logical node SALM is under discussion as part of the IEC 61850-
 330 90-18 work on alarm handling. WALM may be replaced at a later draft stage of this publication
 331 according to the resulting work on 61850-90-18.

332 Table 5 shows all data objects of WALM.

333

Table 5 – Data objects of WALM

WALM				
Data object name	Common data class	T	Explanation	PresConds/ds
Descriptions				
NamPlt	LPL		inherited from: DomainLN	MONamPlt / MONamPlt
Status information				
ActAlm	SPS		If true, one or more alarm is active; if false, no alarm is active.	O / F
ActAlmNum	CNT		Number of active alarms.	O / S

WALM				
Data object name	Common data class	T	Explanation	PresConds/ds
ActWrn	SPS		If true, one or more warning is active; if false, no warning is active.	O / F
ActWrnNum	CNT		Number of active warnings.	O / O
Blk	SPS		inherited from: FunctionLN	O / F
ClcExp	SPS	T	inherited from: StatisticsLN	O / O
ClcNxtTmm s	INS		inherited from: StatisticsLN	O / O
Beh	ENS (BehaviourModeKind)		inherited from: DomainLN	M / M
Health	ENS (HealthKind)		inherited from: DomainLN	O / O
Mir	SPS		inherited from: DomainLN	MOcond(1) / MOcond(1)
Controls				
ClcStr	SPC		inherited from: StatisticsLN	O / O
Mod	ENC (BehaviourModeKind)		inherited from: DomainLN	O / O
Settings				
BlkRef	ORG		inherited from: FunctionLN	Omulti / F
ClcMth	ENG (CalcMethodKind)		inherited from: StatisticsLN	O / M
ClcMod	ENG (CalcModeKind)		inherited from: StatisticsLN	O / O
ClcIntvTyp	ENG (CalcIntervalKind)		inherited from: StatisticsLN	O / O
ClcIntvPer	ING		inherited from: StatisticsLN	O / O
NumSubInt v	ING		inherited from: StatisticsLN	O / O
ClcRfTyp	ENG (CalcIntervalKind)		inherited from: StatisticsLN	O / O
ClcRfPer	ING		inherited from: StatisticsLN	O / O
ClcSrc	ORG		inherited from: StatisticsLN	F / M
InSyn	ORG		inherited from: StatisticsLN	O / O
InRef	ORG		inherited from: DomainLN	Omulti / Omulti

334

335 6.2.2.4 LN: Wind power plant frequency response information Name: WHZW

336 This logical node shall comprise the data classes that represent information concerning wind
 337 power plant frequency response. The existing active power output (WAPC) has the gradient
 338 information and controls the active power in normal (energy maximizing) plant operation. WHZW
 339 is defined with a curve. One instances of WHZW shall always be active to fulfil the grid code
 340 requirements for over and under frequency control of active power.

341 When frequency is lower than the dead band in the active droop curve, the frequency response
 342 of WHZW shall have priority and remove curtailments or reduction from other functions, except
 343 for protection functions for the turbines themselves. This implies that WAPC delta function and
 344 frequency sensitive mode can be activated independently from each other.

345 One instance of WHZW shall exist at power plant level, constituting one single point of
 346 communication to the power plant. In addition, instances of WHZW may be instantiated at wind
 347 turbine level.

WHZW has several distinct operation areas depicted in the figure below. The operation areas of the WHZW are as follows:

- A deadband near the nominal frequency, defined by a zero slope in the DrpHzW droop curve.

- A controlband in which Frequency Sensitive Mode (FSMAct) is activated with a droop defined in DrpHzW.

- Overfrequency region above control band where active power output can be decreased according to droop in DrpHzW.

- Underfrequency region below control band where turbines, if operating below their maximum power capacity, will increase production according to droop in DrpHzW. See the note below for more information.

- Region of extreme overfrequency, above HzMax, for which power plant is blocked from producing active power and may disconnect.

- Region of extreme underfrequency, below HzMin, for which wind power plant may disconnect.

Note: When operating in the underfrequency region, the turbines may be operating below their maximum power capacity due to:

1. Wind power plant active power reserve is active, utilising the delta function WAPC.DeIEna.
2. Curtailment through active power set-point below maximum capability WAPC.WCap.
3. Available power is higher than active power reference value, due to an increase in wind since snapshot of reference was taken for droop calculation.
4. Desire to utilise rotor kinetic power through the emergency inertia response, WINV, at frequency drop. This is sometime called “synthetic inertia”.

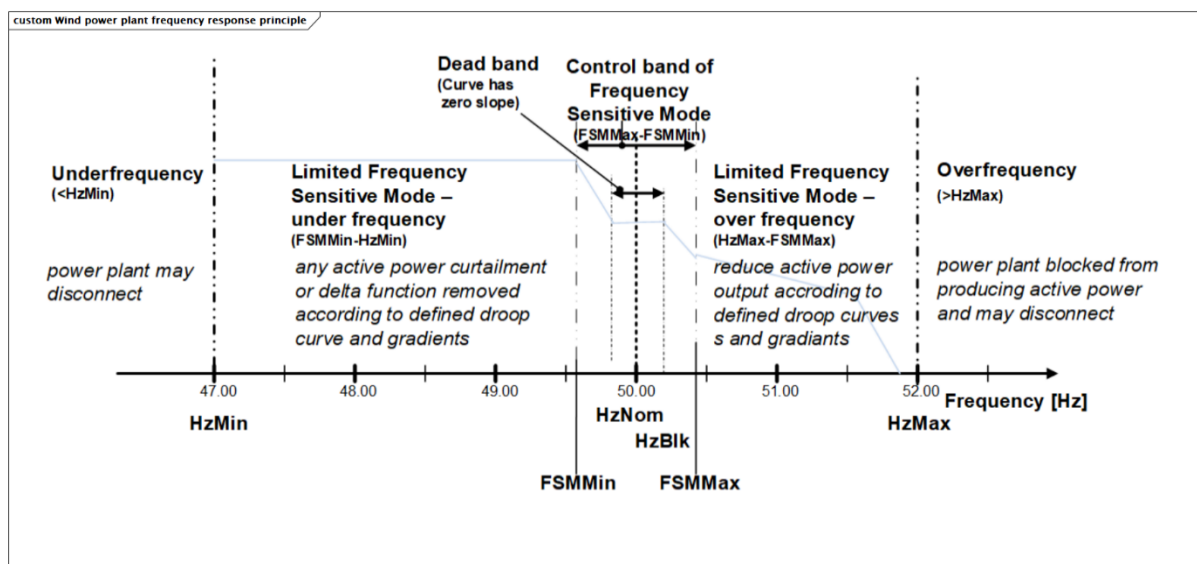


Figure 4 – Wind power plant frequency response principle

Figure 4: The active power (dW/dt) gradient set in WAPC shall apply. The Data Objects of WCUT provide the four corners of the curves.

Table 6 shows all data objects of WHZW.

374

Table 6 – Data objects of WHZW

WHZW				
Data object name	Common data class	T	Explanation	PresConds/ds
Descriptions				
NamPlt	LPL		inherited from: DomainLN	MONamPlt / MONamPlt
Status information				
HzSt	ENS (FrequencySensitiveModeKind)		Currently active Frequency Sensitive Mode.	M / F
OpTurNum	INS		Actual number of wind turbines taking part in the frequency response function. Value shall be 1 if the LN is instantiated for a single turbine and providing frequency support.	O / O
WMinCapSt	SPS		If true, frequency response is deactivated due to having reached the minimum power capacity (as exposed by 'WAPC.WMinCap').	M / F
Blk	SPS		inherited from: FunctionLN	O / F
ClcExp	SPS	T	inherited from: StatisticsLN	O / O
ClcNxtTmmss	INS		inherited from: StatisticsLN	O / O
Beh	ENS (BehaviourModeKind)		inherited from: DomainLN	M / M
Health	ENS (HealthKind)		inherited from: DomainLN	O / O
Mir	SPS		inherited from: DomainLN	MOcond(1) / MOcond(1)
Measured and metered values				
GriHz	MV		Grid side frequency.	M / O
WCapDn	MV		Available capability for decreasing power output during a high frequency condition when 'OvHzAct' is active, including consuming active power.	O / O
WCapUp	MV		Available capability for increasing power output during a low frequency condition when 'UnHzAct' is active.	O / O
Controls				
FSMAct	SPC		Frequency sensitive active power control mode command. Operating with value true sets the frequency sensitive active power control mode: Active for frequency between 'FSMMin' and 'FSMMax'. 'stVal' reflects the last accepted control value.	O / F
HzMax	APC		Sets the maximum frequency above which the power plant is blocked from producing active power and may disconnect. 'mxVal' reflects the currently applied value.	M / O
HzMin	APC		Sets the minimum frequency below which the power plant may disconnect. 'mxVal' reflects the currently applied value.	M / O
HzNom	APC		Sets the power plant nominal frequency reference. 'mxVal' reflects the currently applied value.	M / O
HzWBlk	APC		Following an over frequency condition, the active power production is prevented from increasing until frequency is restored below this setpoint.	M / O

WHZW				
Data object name	Common data class	T	Explanation	PresConditions/ds
			'mxVal' reflects the currently applied value.	
OvHzAct	SPC		Operating with value true activates frequency response causing power output reduction if frequency is above FSMMax.	O / F
UnHzAct	SPC		Operating with value true activates frequency response causing power output reduction to stop if frequency is below FSMMin.	O / F
ClcStr	SPC		inherited from: StatisticsLN	O / O
Mod	ENC (BehaviourModeKind)		inherited from: DomainLN	O / O
Settings				
DrpClcMth	ENG (DroopCalcMethodKind)		Calculation method used for droop.	M / F
DrpHzW	CSG_SG		Active power droop calculated according to 'DrpClcMth'. Paired array of independent and dependent variables. For each curve point ('crvPts'), two values are set: - xVal = delta frequency (in Hz) from nominal frequency - yVal = W value calculated according to 'DrpClcMth'	M / F
FSMMax	ASG_SG		Sets the delta frequency above the nominal frequency below which to activate FSM function. 'mxVal' reflects the currently applied value.	M / F
FSMMin	ASG_SG		Sets the delta frequency below the nominal frequency above which to activate FSM function. 'mxVal' reflects the currently applied value.	M / F
BlkRef	ORG		inherited from: FunctionLN	Omulti / F
ClcMth	ENG (CalcMethodKind)		inherited from: StatisticsLN	O / M
ClcMod	ENG (CalcModeKind)		inherited from: StatisticsLN	O / O
ClcIntvTyp	ENG (CalcIntervalKind)		inherited from: StatisticsLN	O / O
ClcIntvPer	ING		inherited from: StatisticsLN	O / O
NumSubIntv	ING		inherited from: StatisticsLN	O / O
ClcRfTyp	ENG (CalcIntervalKind)		inherited from: StatisticsLN	O / O
ClcRfPer	ING		inherited from: StatisticsLN	O / O
ClcSrc	ORG		inherited from: StatisticsLN	F / M
InSyn	ORG		inherited from: StatisticsLN	O / O
InRef	ORG		inherited from: DomainLN	Omulti / Omulti

375

376 **6.2.2.5 LN: Wind power plant meteorological information Name: WMET**

377 This logical node shall comprise the data classes that represent meteorological information.

378 The data classes as shown in the table below focus on met station meteorological information.

379 If additional or divergent measurement equipment (for example ice growth, rainfall, wave
 380 elevation, lightning) have been installed, this logical node can be extended by additional data
 381 names.

382 In case of different met stations, it is recommended to use more logical nodes: WMET1, WMET2
 383 etc. If meteorological equipment has been installed at more than one altitude at a Met Station,
 384 separate instances of WMET shall be instantiated for each altitude (and with a proper value for
 385 the Alt data object).

386 Table 7 shows all data objects of WMET.

387 **Table 7 – Data objects of WMET**

WMET				
Data object name	Common data class	T	Explanation	PresConds/ds
Descriptions				
NamPlt	LPL		inherited from: DomainLN	MONamPlt / MONamPlt
Status information				
AneSt	SPS		Status of the anemometer. If true, the anemometer is operational; if false, it is not.	Omulti / F
VnSt	SPS		Status of the wind vane. If true, the wind vane is operational; if false, it is not.	Omulti / F
WdHtSt	SPS		Status of heating for the wind sensor. If true, heating is active.	Omulti / F
WdHtSysSt	SPS		Status of heating system for the wind sensor. If true, the heating system is operational; if false, it is not.	Omulti / F
Blk	SPS		inherited from: FunctionLN	O / F
ClcExp	SPS	T	inherited from: StatisticsLN	O / O
ClcNxtTmm s	INS		inherited from: StatisticsLN	O / O
Beh	ENS (BehaviourModeKind)		inherited from: DomainLN	M / M
Health	ENS (HealthKind)		inherited from: DomainLN	O / O
Mir	SPS		inherited from: DomainLN	MOcond(1) / MOcond(1)
Measured and metered values				
AirDen	MV		Density of air.	Omulti / O
Alt	MV		Sensor (or sensor group) altitude.	O / O
Ice	MV		Thickness of ice.	Omulti / O
WtrTmp	MV		Temperature of water.	Omulti / O
EnvTmp	MV		inherited from: MMET	O / O
WetBibTmp	MV		inherited from: MMET	O / O
CloudCvr	MV		inherited from: MMET	O / O
EnvHum	MV		inherited from: MMET	O / O
DewPt	MV		inherited from: MMET	O / O
DfflInsol	MV		inherited from: MMET	O / O
DctInsol	MV		inherited from: MMET	O / O
DiDur	MV		inherited from: MMET	O / O
HorInsol	MV		inherited from: MMET	O / O

WMET				
Data object name	Common data class	T	Explanation	PresConds/ds
HorWdDir	MV		inherited from: MMET	O / O
HorWdSpd	MV		inherited from: MMET	O / O
VerWdDir	MV		inherited from: MMET	O / O
VerWdSpd	MV		inherited from: MMET	O / O
WdGustSpd	MV		inherited from: MMET	O / O
EnvPres	MV		inherited from: MMET	O / O
RnFil	MV		inherited from: MMET	O / O
SnwDen	MV		inherited from: MMET	O / O
SnwTmp	MV		inherited from: MMET	O / O
SnwCvr	MV		inherited from: MMET	O / O
SnwFil	MV		inherited from: MMET	O / O
SnwEq	MV		inherited from: MMET	O / O
Controls				
ClcStr	SPC		inherited from: StatisticsLN	O / O
Mod	ENC (BehaviourModeKind)		inherited from: DomainLN	O / O
Settings				
BlkRef	ORG		inherited from: FunctionLN	Omulti / F
ClcMth	ENG (CalcMethodKind)		inherited from: StatisticsLN	O / M
ClcMod	ENG (CalcModeKind)		inherited from: StatisticsLN	O / O
ClcIntvTyp	ENG (CalcIntervalKind)		inherited from: StatisticsLN	O / O
ClcIntvPer	ING		inherited from: StatisticsLN	O / O
NumSubIntv	ING		inherited from: StatisticsLN	O / O
ClcRfTyp	ENG (CalcIntervalKind)		inherited from: StatisticsLN	O / O
ClcRfPer	ING		inherited from: StatisticsLN	O / O
ClcSrc	ORG		inherited from: StatisticsLN	F / M
InSyn	ORG		inherited from: StatisticsLN	O / O
InRef	ORG		inherited from: DomainLN	Omulti / Omulti

388

389 **6.2.2.6 LN: Inertia response Name: WINR**

390 This logical node shall comprise the data classes that represent information concerning the
391 wind turbines emergency inertia response.

392 Like WHZW this function is activated for a frequency contingency. This function harnesses the
393 kinetic energy stored in rotational parts of wind turbines to enable an additional power for a few
394 seconds. This control strategy is sometime referred to as “synthetic inertia” where the control
395 system detects the frequency deviation and adjusts the power flow into the grid based on this.
396 After the release of the energy, the turbine will operate at sub-optimal rotor speed, resulting in
397 lower efficiency. Thus, this function is an emergency delta power and should not be confused
398 with boost of power above 100% by temporarily exceeding design criteria.

399 The amount of power supplied over time is complex; depending on the current operation point
 400 and duration of the additional power injection. Therefore, it is only foreseen as viable to agree
 401 on provision of an estimate of the amount of additional power (kW) that can be directly supplied
 402 under present operational circumstances.

403 The release of the inertia response can be either triggered by a frequency drop below a
 404 predetermined setpoint, or based on a df/dt criteria.

405 This logical node is optional; but when used, at least the mandatory defined data classes shall
 406 be available for compliance with the IEC 61400-25 series.

407 Conditions:

408 MFcond(2): Element is mandatory if the inertia response function supports activation triggered
 409 on frequency rate of change, otherwise forbidden.

410 MFcond(1): Element is mandatory if the inertia response function supports activation triggered
 411 on low frequency, otherwise forbidden.

412 Table 8 shows all data objects of WINR.

413 **Table 8 – Data objects of WINR**

WINR				
Data object name	Common data class	T	Explanation	PresConditions/ds
Descriptions				
NamPlt	LPL		inherited from: DomainLN	MONamPlt / MONamPlt
Status information				
InerMod	ENS (InertiaResponseCtrl ModeKind)		Currently active inertia response control mode.	M / F
Blk	SPS		inherited from: FunctionLN	O / F
ClcExp	SPS	T	inherited from: StatisticsLN	O / O
ClcNxtTmm s	INS		inherited from: StatisticsLN	O / O
Beh	ENS (BehaviourModeKind)		inherited from: DomainLN	M / M
Health	ENS (HealthKind)		inherited from: DomainLN	O / O
Mir	SPS		inherited from: DomainLN	MOcond(1) / MOcond(1)
Measured and metered values				
InerCap	MV		Estimated amount of additional power (normally in percent of rated power) that can be provided upon activation of the inertia response function.	O / O
Controls				
InerAct	SPC		Inertia response control function command. Operating with value true activates the inertia response control function, false deactivates it. 'stVal' reflects the last accepted control value.	O / F
ClcStr	SPC		inherited from: StatisticsLN	O / O
Mod	ENC (BehaviourModeKind)		inherited from: DomainLN	O / O
Settings				

WINR				
Data object name	Common data class	T	Explanation	PresConditions/ds
HzLowSpt	ASG_SP		Low frequency threshold that initiates release of inertia response emergency delta power, usually in Hz.	MFcond(1) / F
HzRteSpt	ASG_SP		Rate of change in frequency that initiates release of inertia response emergency delta power, usually in Hz per second.	MFcond(2) / F
BlkRef	ORG		inherited from: FunctionLN	Omulti / F
ClcMth	ENG (CalcMethodKind)		inherited from: StatisticsLN	O / M
ClcMod	ENG (CalcModeKind)		inherited from: StatisticsLN	O / O
ClcIntvTyp	ENG (CalcIntervalKind)		inherited from: StatisticsLN	O / O
ClcIntvPer	ING		inherited from: StatisticsLN	O / O
NumSubIntv	ING		inherited from: StatisticsLN	O / O
ClcRfTyp	ENG (CalcIntervalKind)		inherited from: StatisticsLN	O / O
ClcRfPer	ING		inherited from: StatisticsLN	O / O
ClcSrc	ORG		inherited from: StatisticsLN	F / M
InSyn	ORG		inherited from: StatisticsLN	O / O
InRef	ORG		inherited from: DomainLN	Omulti / Omulti

414

415 **6.2.2.7 LN: Wind power plant general information Name: WPPD**

416 The logical node is used for modeling a non-turbine device. It comprises the data classes that
 417 represent general information related to a non-turbine wind power plant device such as a met
 418 mast controller or a gateway device.

419 Table 9 shows all data objects of WPPD.

420

Table 9 – Data objects of WPPD

WPPD				
Data object name	Common data class	T	Explanation	PresConditions/ds
Descriptions				
NamPlt	LPL		inherited from: DomainLN	MONamPlt / MONamPlt
Status information				
DevSt	ENS (DeviceStatusKind)		Device status.	M / F
DevStCnt	CNT		Total number of times the device has been in each state for which counting is configured, usually since commissioning.	M / O
DevStTms	CNT		Total time the device has been in each state for which time duration is configured, usually since commissioning.	M / O
DevOpCnt	CNT		Total number of times each configured command value has been accepted, usually since commissioning.	M / O