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OPC Unified Architecture - Part 8: Data Access (IEC 62541-8:2020)

OPC Unified Architecture - Teil 8: Zugriff auf Automatisierungsdaten (IEC 62541-8:2020)

Architecture unifiée OPC - Partie 8: Accès aux données (IEC 62541-8:2020)

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**OPC Unified Architecture - Part 8: Data Access
(IEC 62541-8:2020)**Architecture unifiée OPC - Partie 8: Accès aux données
(IEC 62541-8:2020)OPC Unified Architecture - Teil 8: Zugriff auf
Automatisierungsdaten
(IEC 62541-8:2020)

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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN IEC 62541-8:2020 (E)**European foreword**

The text of document 65E/708/FDIS, future edition 3 of IEC 62541-8, prepared by SC 65E "Devices and integration in enterprise systems" of IEC/TC 65 "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62541-8:2020.

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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC/TR 62541-1	-	OPC unified architecture - Part 1: Overview and concepts	CLC/TR 62541-1	-
IEC 62541-3	-	OPC Unified Architecture - Part 3: Address Space Model	-	-
IEC 62541-4	-	OPC Unified Architecture - Part 4: Services	-	-
IEC 62541-5	-	OPC Unified Architecture - Part 5: Information Model	-	-
UNECE 20	-	Codes for Units of Measure Used in International Trade	-	-

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INTERNATIONAL STANDARD

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**OPC unified architecture –
Part 8: Data access**

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**Architecture unifiée OPC –
Partie 8: Accès aux données**

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CONTENTS

FOREWORD	5
1 Scope	7
2 Normative references	7
3 Terms, definitions and abbreviated terms	7
3.1 Terms and definitions	7
3.2 Abbreviated terms	8
4 Concepts	8
5 Model	9
5.1 General	9
5.2 SemanticsChanged	10
5.3 Variable Types	10
5.3.1 DataItem Type	10
5.3.2 AnalogItem VariableTypes	11
5.3.3 DiscreteItem Type	14
5.3.4 ArrayItem Type	17
5.4 Address Space model	23
5.5 Attributes of DataItems	24
5.6 DataTypes	25
5.6.1 Overview	25
5.6.2 Range	25
5.6.3 EUInformation	25
5.6.4 ComplexNumberType	27
5.6.5 DoubleComplexNumberType	27
5.6.6 AxisInformation	28
5.6.7 AxisScaleEnumeration	28
5.6.8 XVType	29
6 Data Access specific usage of Services	29
6.1 General	29
6.2 PercentDeadband	29
6.3 Data Access status codes	30
6.3.1 Overview	30
6.3.2 Operation level result codes	30
6.3.3 LimitBits	32
Annex A (informative) OPC COM DA to UA mapping	33
A.1 Overview	33
A.2 Security considerations	33
A.3 COM UA wrapper for OPC DA Server	33
A.3.1 Information Model mapping	33
A.3.2 Data and error mapping	37
A.3.3 Read data	40
A.3.4 Write Data	41
A.3.5 Subscriptions	42
A.4 COM UA proxy for DA Client	42
A.4.1 Guidelines	42
A.4.2 Information Model and Address Space mapping	42
A.4.3 Data and error mapping	46

A.4.4	Read data.....	48
A.4.5	Write data.....	49
A.4.6	Subscriptions.....	49
Figure 1	– OPC <i>DataItems</i> are linked to automation data.....	9
Figure 2	– <i>DataItem VariableType</i> hierarchy.....	10
Figure 3	– Graphical view of a <i>YArrayItem</i>	19
Figure 4	– Representation of <i>DataItems</i> in the <i>AddressSpace</i>	24
Figure A.1	– Sample OPC UA Information Model for OPC DA.....	34
Figure A.2	– OPC COM DA to OPC UA data and error mapping.....	38
Figure A.3	– Status Code mapping.....	39
Figure A.4	– Sample OPC DA mapping of OPC UA Information Model and <i>Address Space</i>	43
Figure A.5	– OPC UA to OPC DA data & error mapping.....	46
Figure A.6	– OPC UA Status Code to OPC DA quality mapping.....	48
Table 1	– <i>DataItemType</i> definition.....	11
Table 2	– <i>BaseAnalogType</i> definition.....	12
Table 3	– <i>AnalogItemType</i> definition.....	13
Table 4	– <i>AnalogUnitType</i> definition.....	13
Table 5	– <i>AnalogUnitRangeType</i> definition.....	14
Table 6	– <i>DiscreteItemType</i> definition.....	14
Table 7	– <i>TwoStateDiscreteType</i> definition.....	15
Table 8	– <i>MultiStateDiscreteType</i> definition.....	15
Table 9	– <i>MultiStateValueDiscreteType</i> definition.....	16
Table 10	– <i>ArrayItemType</i> definition.....	17
Table 11	– <i>YArrayItemType</i> definition.....	18
Table 12	– <i>YArrayItem</i> item description.....	20
Table 13	– <i>XYArrayItemType</i> definition.....	20
Table 14	– <i>ImageItemType</i> definition.....	21
Table 15	– <i>CubeItemType</i> definition.....	22
Table 16	– <i>NDimensionArrayItemType</i> definition.....	23
Table 17	– <i>Range</i> <i>DataType</i> structure.....	25
Table 18	– <i>Range</i> definition.....	25
Table 19	– <i>EUInformation</i> <i>DataType</i> structure.....	25
Table 20	– <i>EUInformation</i> definition.....	26
Table 21	– Examples from UNECE Recommendation N° 20.....	26
Table 22	– <i>ComplexNumberType</i> <i>DataType</i> structure.....	27
Table 23	– <i>ComplexNumberType</i> definition.....	27
Table 24	– <i>DoubleComplexNumberType</i> <i>DataType</i> structure.....	27
Table 25	– <i>DoubleComplexNumberType</i> definition.....	28
Table 26	– <i>AxisInformation</i> <i>DataType</i> structure.....	28
Table 27	– <i>AxisScaleEnumeration</i> values.....	28
Table 28	– <i>AxisScaleEnumeration</i> definition.....	29

Table 29 – XVType DataType structure.....	29
Table 30 – XVType definition	29
Table 31 – Operation level result codes for BAD data quality	31
Table 32 – Operation level result codes for UNCERTAIN data quality	31
Table 33 – Operation level result codes for GOOD data quality.....	31
Table A.1 – OPC COM DA to OPC UA Properties mapping.....	36
Table A.2 – DataTypes and mapping	39
Table A.3 – Quality mapping	40
Table A.4 – OPC DA Read error mapping	41
Table A.5 – OPC DA Write error code mapping.....	41
Table A.6 – DataTypes and Mapping	47
Table A.7 – Quality mapping	48
Table A.8 – OPC UA Read error mapping	49
Table A.9 – OPC UA Write error code mapping.....	49

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPC UNIFIED ARCHITECTURE –

Part 8: Data access

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 62541-8 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation.

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

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

- a) added new VariableTypes for AnalogItems;
- b) added an Annex that specifies a recommended mapping of OPC UA Dataaccess to OPC COM DataAccess;
- c) changed the ambiguous description of "Bad_NotConnected";
- d) updated description for EUInformation to refer to latest revision of UNCEFACT units.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
65E/708/FDIS	65E/726/RVD

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

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

Throughout this document and the other parts of the IEC 62541 series, certain document conventions are used:

Italics are used to denote a defined term or definition that appears in the "Terms and definition" clause in one of the parts of the IEC 62541 series.

Italics are also used to denote the name of a service input or output parameter or the name of a structure or element of a structure that are usually defined in tables.

The *italicized terms and names* are, with a few exceptions, written in camel-case (the practice of writing compound words or phrases in which the elements are joined without spaces, with each element's initial letter capitalized within the compound). For example, the defined term is *AddressSpace* instead of Address Space. This makes it easier to understand that there is a single definition for *AddressSpace*, not separate definitions for Address and Space.

A list of all parts of the IEC 62541 series, published under the general title *OPC Unified Architecture*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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OPC UNIFIED ARCHITECTURE –

Part 8: Data access

1 Scope

This part of IEC 62541 is part of the overall OPC Unified Architecture (OPC UA) standard series and defines the information model associated with Data Access (DA). It particularly includes additional *VariableTypes* and complementary descriptions of the *NodeClasses* and *Attributes* needed for Data Access, additional *Properties*, and other information and behaviour.

The complete address space model, including all *NodeClasses* and *Attributes* is specified in IEC 62541-3. The services to detect and access data are specified in IEC 62541-4.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC TR 62541-1, *OPC Unified Architecture – Part 1: Overview and Concepts*

IEC 62541-3, *OPC Unified Architecture – Part 3: Address Space Model*

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IEC 62541-4, *OPC Unified Architecture – Part 4: Services*

IEC 62541-5, *OPC Unified Architecture – Part 5: Information Model*

UN/CEFACT: UNECE Recommendation N° 20, *Codes for Units of Measure Used in International Trade*, available at

https://www.unece.org/cefact/codesfortrade/codes_index.html

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC TR 62541-1, IEC 62541-3, and IEC 62541-4 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1.1

Dataltem

link to arbitrary, live automation data, that is, data that represents currently valid information

Note 1 to entry: Examples of such data are

- device data (such as temperature sensors),

- calculated data,
- status information (open/closed, moving),
- dynamically changing system data (such as stock quotes),
- diagnostic data.

3.1.2

AnalogItem

DatItem that represents continuously variable physical quantities (e.g. length, temperature), in contrast to the digital representation of data in discrete items

Note 1 to entry: Typical examples are the values provided by temperature sensors or pressure sensors. OPC UA defines a specific *VariableType* to identify an *AnalogItem*. *Properties* describe the possible ranges of *AnalogItems*.

3.1.3

DiscreteItem

DatItem that represents data that may take on only a certain number of possible values (e.g. OPENING, OPEN, CLOSING, CLOSED)

Note 1 to entry: Specific *VariableTypes* are used to identify *DiscreteItems* with two states or with multiple states. *Properties* specify the string values for these states.

3.1.4

ArrayItem

DatItem that represents continuously variable physical quantities and where each individual data point consists of multiple values represented by an array (e.g., the spectral response of a digital filter)

Note 1 to entry: Typical examples are the data provided by analyser devices. Specific *VariableTypes* are used to identify *ArrayItem* variants.

3.1.5

EngineeringUnits

units of measurement for *AnalogItems* that represent continuously variable physical quantities (e.g. length, mass, time, temperature)

Note 1 to entry: This standard defines *Properties* to inform about the unit used for the *DatItem* value and about the highest and lowest value likely to be obtained in normal operation.

3.2 Abbreviated terms

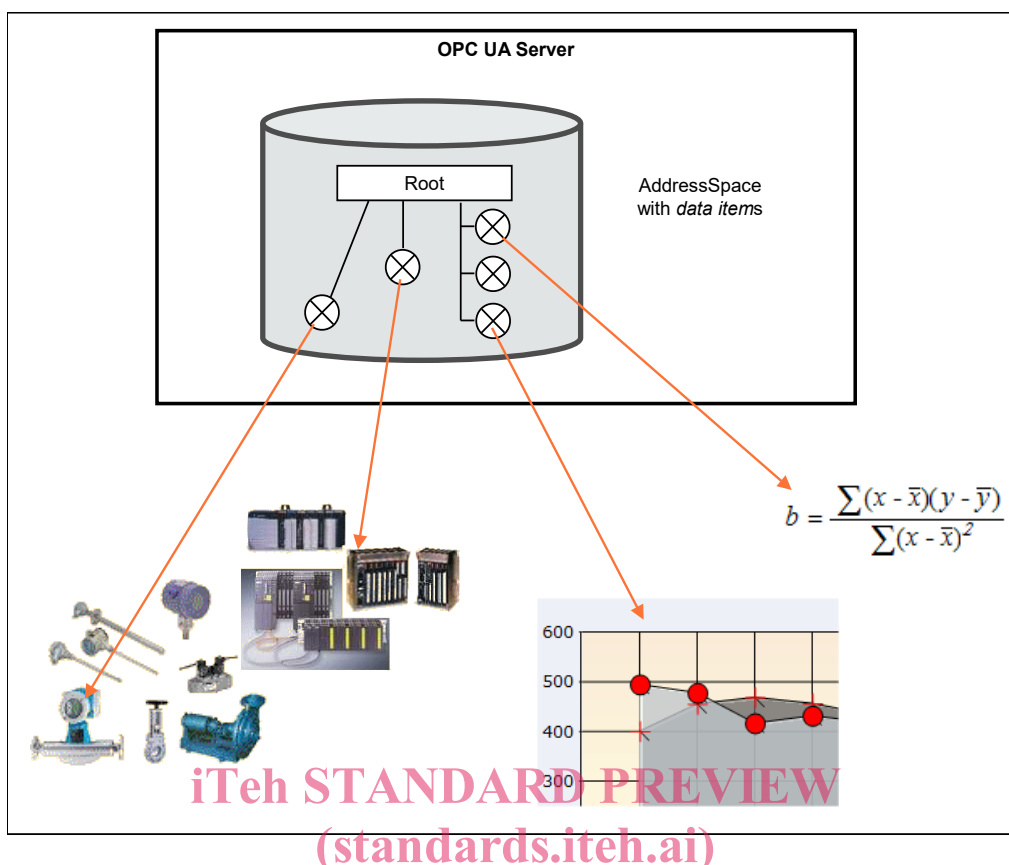
DA	data access
EU	engineering unit
UA	Unified Architecture

4 Concepts

Data Access deals with the representation and use of automation data in Servers.

Automation data can be located inside the *Server* or on I/O cards directly connected to the *Server*. It can also be located in sub-servers or on other devices such as controllers and input/output modules, connected by serial links via field buses or other communication links. OPC UA Data Access Servers provide one or more OPC UA Data Access *Clients* with transparent access to their automation data.

The links to automation data instances are called *DatItems*. The categories of automation data are provided is completely vendor-specific. Figure 1 illustrates how the *AddressSpace* of a *Server* may consist of a broad range of different *DatItems*.



IEC

Figure 1 – OPC DataItems are linked to automation data

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Clients may read or write *DataItems*, or monitor them for value changes. The *Services* needed for these operations are specified in IEC 62541-4. Changes are defined as a change in status (quality) or a change in value that exceeds a client-defined range called a *Deadband*. To detect the value change, the difference between the current value and the last reported value is compared to the *Deadband*.

5 Model

5.1 General

The *DataAccess* model extends the variable model by defining *VariableTypes*. The *DataItem* is the base type. *ArrayItemType*, *BaseAnalogType* and *DiscreteItem* are specializations. See Figure 2. Each of these *VariableTypes* can be further extended to form domain- or server-specific *DataItems*.

Annex A specifies the recommended way for mapping the information received from OPC COM Data Access (DA) Servers to the model in this document.