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framework –
Part 2: Model elements standards.iteh.ai

Mesure, commande et automation dans les processus industriels – Cadre de
l'usine numérique (digital factory) –
Partie 2: Éléments de modèles



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framework –
Part 2: Model elements**

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Partie 2: Éléments de modèles**

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**INDUSTRIAL-PROCESS MEASUREMENT, CONTROL
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Part 2: Model elements
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This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 62832 series, published under the general title, *Industrial-process measurement, control and automation – Digital Factory framework*, can be found on the IEC website.

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INTRODUCTION

IEC 62832 provides a framework used for establishing and maintaining the digital representations of production systems, including the representation of the elements of the production systems and of the relationships between these elements. The framework is intended also to support the exchange of information about these elements.

The framework aims at reducing the interoperability barriers for exchange of information for the various activities related to production systems. The main advantages of this method are that all information related to a production system is described in a standardized manner, and it can be used and modified through its entire life cycle. The method defined in IEC 62832 is kept as generic as possible in order to enable its use in several industrial sectors.

While IEC 62832-1 describes the general principles of the DF reference model together with its most important model elements, this part of IEC 62832 provides a technology-independent definition of all model elements of the DF reference model.

The intention of this document is to provide a common base for implementation of the DF framework using different technologies (for example different dictionary technologies and different engineering data formats). Proposals for such implementations are provided in Annex C.

The data type specification provided with this document is intended to allow mapping of the DF framework to different dictionaries.

Two types of templates for representation, namely for specific DataElementTypes and for model elements, are described in 3.3. Based on these templates, definitions of specific DataElementTypes are given in Clause 4, and definitions of model elements, using the DataElementTypes are given in Clause 5.

To allow broad use of the framework, the requirements for these two sets of definitions are kept as minimal as possible.

If the concepts of DF framework are applied to provide model elements for different engineering domains, domain-specific data specifications will be used (for example based on IEC 62656-1).

INDUSTRIAL-PROCESS MEASUREMENT, CONTROL AND AUTOMATION – DIGITAL FACTORY FRAMEWORK –

Part 2: Model elements

1 Scope

This part of IEC 62832 specifies detailed requirements for model elements of the Digital Factory framework. It defines the nature of the information provided by the model elements, but not the format of this information.

NOTE General requirements for the main model elements of the DF reference model are specified in IEC 62832-1.

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 62832-1:2020, *Industrial-process measurement, control and automation – Digital Factory framework – Part 1: General principles* (standards.iteh.ai)

ISO/IEC 6523 (all parts), *Information technology – Structure for the identification of organizations and organization parts* IEC 62832-2:2020

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ISO TS 29002-5:2009, *Industrial automation systems and integration – Exchange of characteristic data – Part 5: Identification scheme*

IETF RFC 3986, *Uniform Resource Identifier (URI): Generic Syntax*, available at <<http://www.ietf.org>> [viewed 2020-07-28]

3 Terms, definitions, symbols, abbreviated terms and conventions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62832-1 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>

3.2 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

CDEL	Collection of Data Elements
DER	Data Element Relationship
DET	Data Element Type (see IEC 62832-1)
DF	Digital Factory (as qualifier)

DLOP	Device List of Properties (see IEC 61987-10)
IC	Item Code (see IEC 62832-1)
ID	Identifier
IRDI	International Registration Data Identifier (see ISO TS 29002-5)
LOP	List of Properties (see IEC 61987-10)
OLOP	Operational List of Properties (see IEC 61987-10)
PS	Production System (as qualifier)
RAI	Registration Authority Identifier (see ISO/IEC 6523)
UML	Unified Modeling Language (see ISO/IEC 19505-1)
URI	Uniform Resource Identifier (see IETF RFC 3986)
VI	Version Identifier (see IEC 62832-1)

NOTE 1 The abbreviated term DF is only used as a qualifier for model elements specified in this document. It is not understood as a replacement for the Digital Factory concept defined in IEC 62832-1:2020, 3.1.19.

NOTE 2 The abbreviated term PS is only used as a qualifier for model elements specified in this document. It is not understood as a replacement for the production system concept defined in IEC 62832-1:2020, 3.1.24.

3.3 Conventions for representing the definition of a model element

3.3.1 Convention for names

While IEC 62832-1 is using general names for describing the concepts, IEC 62832-2 and IEC 62832-3 define more formal requirements. In order to clearly identify the names of the model elements, the documents IEC 62832-2 and IEC 62832-3 use 'PascalCase' for names.

A help for matching the names between IEC 62832-1 and IEC 62832-2 is provided in Table B.1 (see Annex B).

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3.3.2 Representation of specific DataElementTypes

The template used in this document for representing the definition of specific DataElementTypes of the DF reference model is specified in Table 1.

NOTE Definitions in this document are independent of actual definitions of model elements in any specific dictionary.

Table 1 – Template for representing the definition of specific DataElementTypes

ItemCode	
VersionIdentifier	
PreferredName	
DFMdataType	
Description	

Table 1 shows the mandatory fields for defining a specific DataElementType. Optionally, additional fields may be provided (for example SynonymousName, LetterSymbol, RangeOfPermissibleValues, PhysicalUnit and DETcategory).

Each shaded cell indicates the name of a corresponding field (the value of the field is shown as unshaded cell).

The template provides the definition of a specific DataElementType (identity and meaning). It is formatted as fields with respective values. Because the template is intended to be used when the specific DataElementTypes are registered in a ConceptDictionary, the fields use names of model elements defined in this document.

A specific DataElementType is defined by providing data in the relevant fields (i.e. the table is filled). A "-" in an unshaded cell indicates that the field is not applicable to the definition of the specific DataElementType.

3.3.3 Representation of the definition of model elements

The template used in this document for representing the definition of model elements of the DF reference model is specified in Table 2.

Table 2 – Template for representing the definition of model elements

ItemCode				
VersionIdentifier				
PreferredName				
LetterSymbol				
Description				
ParentModelElement				
Structure				
Structure element	I/R	Cardinality	Conditions	Remarks
		IEC 62832-2:2020		
https://standards.iteh.ai/catalog/standards/sist/e8215cc4-3cc5-4951-889f-2b10949cf77/iec-62832-2-2020				

The upper part of the template provides the definition of a model element (identity and meaning). It is formatted as fields with respective values. Because these fields are intended to be used accordingly when the model elements will be registered in a ConceptDictionary, the fields use names of model elements defined in this document. The ItemCode and VersionIdentifier fields can be used to uniquely identify a model element within the DF framework.

The structure of the model element is represented in the lower part of the template as a list of constituent elements. Depending on cardinality and conditions, each constituent element in the template may be instantiated as a constituent of the defined model element. Constituent elements inherited from the ParentModelElement are not listed.

The field "Structure element" contains a reference to a model element definition. The constituent element is derived from the referenced model element definition.

A constituent element may be defined as an instance of a model element or as a reference to an instance of a model element.

The field "I/R" contains a text string ("I", "R" or "I/R"), which indicates whether the constituent element is defined as an instance or as a reference:

- the value "I" indicates that the structure contains an instance of the particular constituent element (or multiple instances depending on the value of the cardinality);
- the value "R" indicates that the structure contains a reference to an instance of the particular constituent element (or multiple references depending on the value of the cardinality);

- the value "I/R" indicates that the structure contains either an instance of or a reference to an instance of the particular constituent element (or multiple ones depending on the value of the cardinality).

NOTE In the case of "I/R", the use of an instance or a reference is decided by the actual implementation.

The field "Cardinality" contains a range which defines the number of constituent elements, the range is expressed using the following convention:

[a..b]

where:

a is the minimum number of constituent elements;

b is the maximum number of constituent elements.

EXAMPLE 1

The number of constituent elements can be expressed as follows:

[0..1] indicates the model element may have one constituent element;

[0..n] indicates the model element may have one or more constituent elements;

[1..1] indicates the model element shall have exactly one constituent element;

[1..n] indicates the model element shall have one or more constituent elements.

The field "Conditions" contains a text string which describes potential restrictions applicable to the number of constituent elements in terms of relationships with other constituent elements.

The field "Remarks" contains a text string which provides additional information and explanation, without changing the meaning of the definition of the constituent element.

Within the fields "ParentModelElement" and "Structure element", a reference to a model element is provided by combining a PreferredName and an ItemCode (formatted as <PreferredName> ('<ItemCode>')).

EXAMPLE 2 VersionIdentifier (DFF033)

3.3.4 Convention for UML notation

The conventions for UML notation used in this document are defined in Annex E.

4 Definitions of specific DataElementTypes

4.1 General

This Clause 4 defines specific DataElementTypes using the template provided in 3.3.2.

4.2 ConceptIdentifier

Table 3 is the definition of ConceptIdentifier.