BS EN IEC 62832-1:2020

BSI Standards Publication

Industrial-process measurement, control and automation — Digital factory framework

Part 1: General principles

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National foreword

This British Standard is the UK implementation of EN IEC 62832-1:2020. It is identical to IEC 62832-1:2020. It supersedes PD IEC/TS 62832-1:2016, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/65, Measurement and control.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 62832-1

December 2020

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English Version

Industrial-process measurement, control and automation - Digital factory framework - Part 1: General principles (IEC 62832-1:2020)

Mesure, commande et automation dans les processus industriels - Cadre de l'usine numérique (digital factory) - Partie 1: Principes généraux (IEC 62832-1:2020)

Industrielle Leittechnik - Grundstruktur der digitalen Fabrik - Teil 1: Allgemeine Grundsätze (IEC 62832-1:2020)

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European foreword

The text of document 65/836/FDIS, future edition 1 of IEC 62832-1, prepared by IEC/TC 65 "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62832-1:2020.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021-08-30
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-11-30

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61360 (series)	NOTE	Harmonized as EN 61360 (series)
IEC 61360-1	NOTE	Harmonized as EN 61360-1
IEC 61360-2	NOTE	Harmonized as EN 61360-2
IEC 61987 (series)	NOTE	Harmonized as EN IEC 61987 (series)
IEC 61987-10:2009	NOTE	Harmonized as EN 61987-10:2009 (not modified)
IEC 62264 (series)	NOTE	Harmonized as EN 62264 (series)
IEC 62264-1:2013	NOTE	Harmonized as EN 62264-1:2013 (not modified)
IEC 62264-2	NOTE	Harmonized as EN 62264-2
IEC 62683 (series)	NOTE	Harmonized as EN 62683 (series)
ISO 11354-1:2011	NOTE	Harmonized as EN ISO 11354-1:2011 (not modified)
IEC 62656 (series)	NOTE	Harmonized as EN IEC 62656 (series)
ISO 19439	NOTE	Harmonized as EN ISO 19439

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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.

Publication	Year	Title	EN/HD	Year
IEC 62832-2	-	Industrial-process measurement, control and automation - Digital factory framework - Part 2: Model elements	EN IEC 62832-2	-
IEC 62832-3	-	Industrial-process measurement, control and automation - Digital factory framework - Part 3: Application of Digital Factory for life cycle management of production systems	EN IEC 62832-3	-
IEC 62832	series	Industrial-process measurement, control and automation - Digital factory framework	EN IEC 62832	series
ISO/IEC 6523	series	Information technology - Structure for the identification of organizations and organization parts	-	-
ISO/IEC 11179-6	-	Information technology - Metadata registries (MDR) – Part 6: Registration	-	-
ISO/TS 29002-5	2009	Industrial automation systems and integration - Exchange of characteristic data – Part 5: Identification scheme	-	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 1: General principles

FOREWORD

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International Standard IEC 62832-1 has been prepared by IEC technical committee 65: Industrial-process measurement, control and automation.

This first edition cancels and replaces the first edition of IEC TS 62832-1 published in 2016. This edition constitutes a technical revision.

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

- correction of terms and definition of additional terms (Clause 3);
- correction of description of header;
- moved UML diagram to IEC 62832-2.

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

FDIS	Report on voting
65/836/FDIS	65/845/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.

A list of all parts in 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.

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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INTRODUCTION

0.1 Market demand and situation

High performance, flexible dynamic processes, and agile machines and production systems are essential to meet the demands for quality, delivery and cost of the products. This situation results in an increased complexity of the plant life cycle. In addition, all existing information of a product or a production system is described and modified through the whole life cycle of a product or of a production system, for example during the planning, development process, and operation. This situation spurs the enterprise to exchange product data and production system data in electronic form.

However, each enterprise and each department inside the enterprise describe their products and production systems according to their own data management schemes, often using different terms, structures, and media.

EXAMPLE Examples for data management schemes are paper-based, databases, disks, e-catalogues, and cloud.

Therefore, no seamless information exchange between all the actors involved in the life cycles of both products and production systems can be found.

Efficient exchange of data between and within enterprises can only be performed if syntax (format) and semantics (meaning) of the information has been defined in a unanimous and shared manner.

0.2 History of standardization in this area

Earlier work on electronic product data started with the initial objective to replace paper data sheets with an electronic description of electronic components used in products, and to use it in software tools for electronic wiring and assembly (for example, when designing electronic boards).

Additionally, concepts were developed for profiling of devices used in production systems, in order to describe parameters and behavioural aspects to facilitate integration and reduce engineering costs, providing guides for standards developers.

NOTE 1 See Device Profile Guideline (IEC TR 62390).

IEC 61987-10 made an important step toward this objective by defining fundamentals that aim at describing devices used in production systems by creating lists of properties (LOPs). The properties themselves are compiled into blocks that describe given features of a device. Further parts of IEC 61987 and other related standards (e.g. IEC 62683 (all parts)) define reference LOPs for electronic/electric components and materials used in electro-technical equipment and systems, such as equipment for measuring flows, pressures, temperatures, levels and densities.

NOTE 2 Although the title of IEC 62683 is "Low-voltage switchgear and controlgear – Product data and properties for information exchange", the intent of IEC 62832 is to use the information exchange for interoperability in describing devices that are used in production systems.

IEC 61360-1, IEC 61360-2 and ISO 13584-42 specify the principles to be used for defining characterization classes of parts and their properties. As a result, a database was developed, also named IEC Common Data Dictionary (IEC CDD), which contains the reference collection of classes and associated properties. ISO 22745 (all parts) specifies open technical dictionaries (OTDs) and their application to master data. ISO/IEC Guide 77 provides recommendations for the description of products and their properties for the creation of these classes, catalogues and reference dictionaries.

NOTE 3 ISO/IEC Guide 77 uses the term "product". It is taken to include devices, processes, systems, installations, etc.

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ISO 15704 specifies requirements of enterprise reference architectures and methodologies for supporting the applications in terms of the interoperability, the integration, and the architectures of the applications throughout the life cycle and supply chain aspects of the systems.

A number of efforts have addressed the development of business and manufacturing enterprise models to aid in understanding of different aspects of the enterprise to realize improvements in enterprise operations. Additionally, models for enterprise and control systems have been developed to support the production operations, but gaps remain in development of models to bridge from the manufacturing system design environments to the manufacturing operation environments, in terms of sharing information of the process, equipment, and devices.

NOTE 4 IEC 62264 (all parts) defines models of functions in the manufacturing and control domains and information exchanged with the enterprise domain.

0.3 Purpose and benefits of IEC 62832 (all parts)

While the standards mentioned above provide a method for describing properties of a given device, IEC 62832 (all parts) extends this method by defining a reference model for the representation of production systems, which include the devices.

In order to manage a production system effectively throughout its life cycle, it is very important to have its digital representation and to maintain the contents appropriately in response to its evolution in its life cycle. Activities related to the production system will access, update, and use the contents of digital representation in order to support the whole life cycle of the production system. This digital representation provides a consistent information interchange between all processes and partners involved and makes related information understandable, reusable and changeable through the entire production system life cycle.

Dictionaries and models can help to establish such digital representation by providing descriptions of elements, such as equipment and devices, of the production system. However, additional information is needed in order to achieve the intended digital representation of production systems, such as descriptions of relationship between the elements.

IEC 62832 (all parts) provides a framework for establishing and maintaining the digital representations of production systems, including the elements, relationships between these elements and 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 (all parts) is kept as generic as possible in order to enable its use in several industrial sectors.

NOTE Enterprise modelling concepts are described in standards referenced in the Bibliography (for example ISO 15704, ISO 11354-1).

0.4 Contents of IEC 62832 (all parts)

IEC 62832 (all parts) consists of multiple parts which provide:

- general introduction to the model and principles of the Digital Factory framework (DF framework) (IEC 62832-1);
- detailed data model for all the model elements of the DF framework (IEC 62832-2);
- description of how the DF framework is used to manage the life cycle of a production system (IEC 62832-3).

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