International

ISO 29002

# Industrial automation systems and integration — Exchange of characteristic data

*Systèmes d'automatisation industrielle et intégration — Échange de données caractéristiques*

First edition
2026-03

Reference number
ISO 29002:2026(en)



ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

**Foreword** ..... **v**

**Introduction** ..... **vii**

**1 Scope** ..... **1**

**2 Normative references** ..... **2**

**3 Terms and definitions** ..... **2**

**4 Fundamental principles — Exchange of characteristic data** ..... **10**

**5 Basic datatypes to support exchange of characteristic data** ..... **16**
5.1 Overview of datatypes to support exchange of characteristic data ..... 16
5.2 Basic datatypes terminology reference model ..... 18
5.2.1 Overview of the format for basic datatypes ..... 18
5.2.2 Specified datatypes for exchange of characteristic data ..... 18

**6 Identification scheme** ..... **20**
6.1 Purpose of the scheme ..... 20
6.2 Use of the scheme ..... 21
6.2.1 General considerations ..... 21
6.2.2 Using the scheme as a resource for other standards ..... 21
6.3 Administered items ..... 22
6.4 Key characteristics of identifiers for administered items ..... 23
6.4.1 Identification of administered items ..... 23
6.4.2 Overall structure of the IRDI ..... 24
6.4.3 Character set for the IRDI ..... 24
6.4.4 Length of the IRDI ..... 25
6.4.5 Representation of the IRDI ..... 25
6.5 Registration authority identifier ..... 25
6.5.1 Elements of registration authority identifiers ..... 25
6.5.2 Representation of registration authority identifiers ..... 27
6.6 Data identifier ..... 28
6.6.1 Elements of data identifiers ..... 28
6.6.2 Representation of data identifiers ..... 30
6.6.3 Use of escape characters in the item code ..... 31
6.7 Version identifier ..... 31

**7 Concept dictionary access** ..... **31**
7.1 Overview of concept dictionary access ..... 31
7.2 Concept dictionary terminology reference model ..... 34
7.2.1 Overview of the concept dictionary terminology reference model ..... 34
7.2.2 Specified entities for the concept dictionary terminology reference model ..... 35

**8 Characteristic data exchange** ..... **42**
8.1 Overview of characteristic data exchange ..... 42
8.2 Characteristic data terminology reference model ..... 44
8.2.1 Overview of the format for characteristic data ..... 44
8.2.2 Specified entities for exchanging characteristic data ..... 45
8.3 Values in characteristic data ..... 48
8.3.1 Overview of the format for values in characteristic data ..... 48
8.3.2 Specified types for representing values in characteristic data ..... 49

**9 Concept dictionary resolution services** ..... **60**
9.1 Overview of concept dictionary resolution services ..... 60
9.2 Principles for concept dictionary resolution services ..... 61
9.2.1 Identification ..... 61
9.2.2 Types of service ..... 61
9.2.3 Getter methods ..... 62
9.3 Service descriptions and requirements ..... 62

9.3.3 Ontology service ... 64
9.4 Data models for concept dictionary resolution services ... 66
9.4.1 Overview of the data models for concept dictionary resolution services ... 66
9.4.2 Core data model for concept dictionary resolution services ... 67
9.4.3 Location service data model ... 69
9.4.4 Terminology service data model ... 69
9.4.5 Ontology service data model ... 73
9.5 Interface specifications ... 74
9.5.1 Overview of the interface specifications ... 74
9.5.2 Location service ... 74
9.5.3 Terminology service ... 75
9.5.4 Ontology service ... 83
9.6 Search patterns ... 87
9.6.1 Search patterns general ... 87
9.6.2 Search pattern for full text ... 87
9.6.3 Search pattern wildcards ... 88

**10 Query for characteristic data ... 88**
10.1 Overview of query for characteristic data ... 88
10.2 Query for terminology reference model ... 92
10.2.1 Overview of the format for query ... 92
10.2.2 Specified entities for query ... 93

**11 Conformance requirements ... 100**
11.1 General ... 100
11.2 CC1: conformance requirement for basic datatypes ... 100
11.3 CC2: conformance requirement for identification scheme ... 100
11.4 CC3: conformance requirement for concept dictionary access ... 101
11.5 CC4: conformance requirement for characteristic data exchange ... 101
11.6 CC5: conformance requirement for concept dictionary resolution services ... 101
11.7 CC6 and CC7: conformance requirements for query of characteristic data ... 101

**Annex A** (informative) **Information object registration ... 102**

**Annex B** (informative) **Computer interpretable listings ... 103**

**Annex C** (informative) **Generation of XML schema from UML model ... 105**

**Annex D** (informative) **Relation to the ISO 13584 series, the ISO 22745 series and the IEC 61360 series ... 107**

**Annex E** (informative) **Usage guidance for source_location (example) ... 108**

**Annex F** (informative) **Referencing metadata from the characteristic data model ... 110**

**Annex G** (informative) **Using the model of characteristic data ... 111**

**Annex H** (informative) **The role of property value pairs ... 116**

**Annex I** (informative) **Usage guide for get_concept_model ... 119**

**Annex J** (informative) **XSD and JSON parameter names ... 122**

**Annex K** (informative) **The role of data dictionary models in achieving semantic interoperability ... 123**

**Annex L** (informative) **Cross tables of clauses and figures from withdrawn documents ... 127**

**Bibliography ... 135**

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 4, *Industrial data*.

This document cancels and replaces ISO/TS 29002-4:2009, ISO/TS 29002-5:2009, ISO/TS 29002-6:2010, ISO/TS 29002-10:2009, ISO/TS 29002-20:2010 and ISO/TS 29002-31:2009, which have been technically revised.

The main changes are as follows:

— the contents of ISO/TS 29002-4:2009 have been incorporated into Clause 5, Annex A, Annex B and Annex C of this document. The conformance requirements are specified in Clause 11;

— the contents of ISO/TS 29002-5:2009 have been incorporated into Clause 6, Annex A, Annex B and Annex D of this document. The conformance requirements are specified in Clause 11;

— the contents of ISO/TS 29002-6:2010 have been incorporated into Clause 7, Annex A, Annex B, Annex C and Annex E of this document. The conformance requirements are specified in Clause 11;

— the contents of ISO/TS 29002-10:2009 have been incorporated into Clause 8, Annex A, Annex B, Annex F, Annex G and Annex H of this document. The conformance requirements are specified in Clause 11;

— the contents of ISO/TS 29002-20:2010 have been incorporated into Clause 9, Annex A, Annex B and Annex I of this document. The conformance requirements are specified in Clause 11;

— the contents of ISO/TS 29002-31:2009 have been incorporated into Clause 10, Annex A and Annex B of this document. The conformance requirements are specified in Clause 11;

— provisions have been modified to allow the use of new technologies for the exchange of characteristic data;

— the operation of the location service has been clarified;

— an alternative process in the absence of any location service has been added;

— an update has been made to allow references generated by another system [e.g. Universally Unique IDentifiers (UUIDs)] to be represented in the item code;

— the notation style of the figures has been modified to ensure consistency and readability.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Characteristic data are a valuable asset across the industrial sector. These data describe the products and services created, sold and used by organizations. Such data are most useful when organizations exchange and share the data without loss of meaning. Being useful specifically involves improving decision making regarding the described products and services.

Various international standards exist in the field of data that support exchange and sharing of characteristic data. This support is provided by each standard specifying a capability to represent characteristic data. The standards include the ISO 13399 series, the ISO 13584 series, the ISO 15926 series, the ISO 18101 series, the ISO 22745 series, the IEC 61360 series[23] including the IEC Common Data Dictionary[30] and the IEC 62656 series.[25]

While each standard serves a distinct purpose within the wide range of use cases in the industrial sector, the diversity also disrupts reuse of characteristic data across those use cases. Each standard does, however, recognize a consistent theme: a concept dictionary provides the common ground on which organizations can build coherent collections of characteristic data. Such dictionaries serve as a definitive, reusable external reference describing the concepts that give meaning to characteristic data.

Some standards label a concept dictionary as a product ontology, but the core capabilities are the same.

The ontology service specified in this document can be used to retrieve representation forms including a product ontology that conforms to ISO 13584-32 and an identification guide information that conforms to ISO/TS 22745-30.

This document establishes the foundation for building interoperability between standards that specify a capability to represent characteristic data. This foundation consists of elements including:

— conceptual information data models and exchange formats;

— a format for an identification scheme;

— an interface for retrieving information from a concept dictionary;

— capabilities for a location service, a terminology service and an ontology service;

— 20 schemas, in Extensible Markup Language (XML) and OpenAPI Specification (OAS) format (represented in JavaScript Object Notation (JSON) (see Annex B for instructions on how to download electronic versions of the schemas from the ISO website).

These elements can be used by organizations, either:

— as is, i.e. without any model-specific restrictions in combination with other standards including the ISO 13584 series and the ISO 22745 series; or

— according to special adaptations that are defined by the respective standard to tailor the use of a format or functionality to the specific requirements of that standard.

The data models, in particular, address the role of concepts in specifying the preferred common interpretation of terminological items. This common interpretation establishes the items as being semantically equivalent. These items are terms, abbreviations, definitions, graphical representations (images) and symbols. The models enable organizations to combine items from different sources and to collate coherent collections of characteristic data. These sources are typically ISO, IEC or other bodies that operate consensus-based processes to perform terminology work.

In setting up a concept dictionary, organizations do not need to repeat the effort of developing the source terminological items.

By establishing semantic equivalence, a concept dictionary can also function as a thesaurus. This function can integrate communities who either use colloquial terms or different natural languages.

by pre-existing data records.

In this document, the model for a data dictionary and the format for an identification scheme each reflect the respective requirements for such objects in the ISO 8000 series for data quality, as illustrated by the data architecture in ISO 8000-1:2022, Figure 2.

By implementing this document, organizations will deliver the following benefits:

— even when they are familiar with a different term, users more readily identify the correct applicable concept when they are creating new data records, reducing the risk of creating duplicate records;

— improvement in the quality of characteristic data;

— no loss of meaning when exchanging characteristic data;

— possibility for different parties to continue using different preferred terms locally for the same concept;

— interoperability between computer systems that perform processing of characteristic data;

— interoperability across all phases of the data and product life cycles.

NOTE See Annex K for information on the role of data dictionary models in achieving semantic interoperability.