DEUTSCHE NORM

August 2021

DIN EN IEC 61804-3

ICS 35.060; 35.240.50

Ersatz für
DIN EN 61804-3:2016-04
Siehe Anwendungsbeginn

Geräte und Geräteintegration in Unternehmenssysteme – Funktionsbausteine für die Prozessautomation und elektronische Gerätebeschreibungssprache – Teil 3: Elektronische Gerätebeschreibungssprache (EDDL) (IEC 61804-3:2020); Englische Fassung EN IEC 61804-3:2020

Devices and integration in enterprise systems –
Function blocks (FB) for process control and electronic device description language (EDDL) –
Part 3: EDDL syntax and semantics
(IEC 61804-3:2020);
English version EN IEC 61804-3:2020

Les dispositifs et leur intégration dans les systèmes de l'entreprise –
Blocs fonctionnels (FB) pour les procédés industriels et le langage de description électronique de produit (EDDL) –
Partie 3: Sémantique et syntaxe EDDL
(IEC 61804-3:2020);
Version anglaise EN IEC 61804-3:2020

Gesamtumfang 407 Seiten

DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik in DIN und VDE

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Full document details: DIN EN IEC 61804-3:2021-08

Anwendungsbeginn

Anwendungsbeginn für die von CENELEC am 2020-07-29 angenommene Europäische Norm als DIN-Norm ist 2021-08-01.

Für DIN EN 61804-3:2016-04 besteht eine Übergangsfrist bis 2023-07-29.

Nationales Vorwort

Vorausgegangener Norm-Entwurf: E DIN EN IEC 61804-3:2020-12.

Für dieses Dokument ist das nationale Arbeitsgremium DKE/K 956 „Industrielle Kommunikation“ der DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik in DIN und VDE (www.dke.de) zuständig.

Aktuelle Informationen zu diesem Dokument können über die Internetseiten von DKE (www.dke.de) und DIN (www.din.de) durch eine Suche nach der Dokumentennummer aufgerufen werden.

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Diese Ausgabe wurde durch Zusammenführung von Material aus verschiedenen Varianten bestehender EDDL-Spezifikationen erstellt, einschließlich denen von der FieldComm Group (FOUNDATION™ Fieldbus[1], HART®[2]), PROFIBUS™[3] Nutzerorganisation e.V. (PNO) und ISA100_Wireless™[4] Compliance Institute (ISA100 WCI). Alle Stellen, an denen eine Profilabweichung vorliegen kann, sind nun in dem Kontext angegeben, in dem die relative Abweichung zu finden ist. Daher können die Formatierung und Nummerierung dieser Ausgabe von den einzelnen Spezifikationen, aus denen diese Ausgabe abgeleitet wurden, abweichen.

Kopfzeilen, die mit „(void)“ enden, werden verwendet, um die Nummerierung der vorherigen Ausgaben beizubehalten.

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Zukünftige Teile von IEC 61804 werden den neuen, allgemeinen Titel tragen, wie oben angegeben. Titel bestehender Teile werden zum Zeitpunkt der nächsten Ausgabe aktualisiert.

Für den Fall einer undatierten Verweisung im normativen Text (Verweisung auf ein Dokument ohne Angabe des Ausgabedatums und ohne Hinweis auf eine Abschnittsnummer, eine Tabelle, ein Bild usw.) bezieht sich die Verweisung auf die jeweils aktuellste Ausgabe des in Bezug genommenen Dokuments.

Für den Fall einer datierten Verweisung im normativen Text bezieht sich die Verweisung immer auf die in Bezug genommene Ausgabe des Dokuments.

Der Zusammenhang der zitierten Dokumente mit den entsprechenden deutschen Dokumenten ergibt sich, soweit ein Zusammenhang besteht, grundsätzlich über die Nummer der entsprechenden IEC-Publikation. Beispiel: IEC 60068 ist als EN 60068 als Europäische Norm durch CENELEC übernommen und als DIN EN 60068 ins Deutsche Normenwerk aufgenommen.

Das Präsidium des DIN hat mit Präsidialbeschluss 1/2004 festgelegt, dass DIN-Normen, deren Inhalt sich auf internationale Arbeitsergebnisse der Informationsverarbeitung gründet, unter bestimmten Bedingungen allein in englischer Sprache veröffentlicht werden dürfen. Diese Bedingungen sind für die vorliegende Norm erfüllt.

Da sich die Benutzer der vorliegenden Norm der englischen Sprache als Fachsprache bedienen, wird die Englische Fassung der EN IEC 61804-3 veröffentlicht. Zu deren Einleitung, Abschnitt 1, der den Anwendungsbereich festlegt und Abschnitt 3, der die Begriffe, Abkürzungen und Akronyme festlegt, wurde eine Übersetzung angefertigt und als informativer Nationaler Anhang NA der vorliegenden Norm hinzugefügt. Für die meisten der verwendeten Begriffe existieren keine gebräuchlichen deutschen Benennungen, da sich die deutschen Anwender in der Regel ebenfalls der englischen Benennungen bedienen. Diese Norm steht nicht in unmittelbarem Zusammenhang mit Rechtsvorschriften und ist nicht als Sicherheitsnorm anzusehen.

Das Original-Dokument enthält Tabellen und Bilder in Farbe, die in der Papierversion in einer Graustufen-Darstellung wiedergegeben werden. Elektronische Versionen dieses Dokuments enthalten die Tabellen und die Bilder in der originalen Farbdarstellung.

Änderungen

Gegenüber DIN EN 61804-3:2016-04 wurden folgende Änderungen vorgenommen:

a) Kommunikationsprofile ISA100 und GPE wurden hinzugefügt;
b) EDD Identifikationsinformation hat ein neues LAYOUT_TYPE Attribut;
c) neue Konstruktion SEMANTIC_MAP wurde hinzugefügt;
d) CLASS Attribut-Werte LOCAL_A und LOCAL_B wurden hinzugefügt;
e) erweiterte LIST-Funktionalität zur Unterstützung der geräteverwalteten Listen.

Frühere Ausgaben

DIN EN 61804-3: 2007-10, 2011-09, 2016-04

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Nationaler Anhang NA
(informativ)

Auszugsweise Übersetzung

Reihenfolge und Inhalt der folgenden Abschnitte sind identisch mit denen in den jeweiligen Abschnitten der Englischen Fassung.

Einleitung

Die Gerätebeschreibungssprache (EDDL, en: electronic device description language) füllt die Lücke zwischen dem in IEC 61804-2 festgelegten Spezifikationskonzept für Funktionsbausteine und der Produktimplementierung. Sie ermöglicht es den Herstellern, bei auf verschiedenen Technologien und Plattformen basierenden Geräten ein und dasselbe Beschreibungsverfahren anzuwenden. Diese Aspekte sind in Bild 1 dargestellt.

IEC 61804 trägt den allgemeinen Titel „Funktionsbausteine für die Prozessautomation und elektronische Gerätebeschreibungssprache“ und besteht aus den folgenden Teilen:

Teil 2: Festlegung des Funktionsbausteinkonzepts

Teil 3: Elektronische Gerätebeschreibungssprache (EDDL)

Teil 4: Interpretation von Gerätebeschreibungen

Teil 5: Bibliothek vorgefertigter Unterprogramme

Teil 6: Einhaltung der Anforderungen an integrierende Feldbusgeräte in ingenieurstechnischen Werkzeugen für Feldgeräte

Die Gerätebeschreibungssprache kann auch zur Beschreibung von Produkteigenschaften in anderen Bereichen wie z. B. der Industrieautomation angewendet werden. Die Industrieautomation kann Geräte wie z. B. allgemeine digitale und analoge Eingabe/Ausgabe-Module, Bewegungssteuerungen, Mensch-Maschine-Schnittstellen, Sensoren, (echte) Regler, Kodierer, Hydraulikventile und programmierbare Regler umfassen.

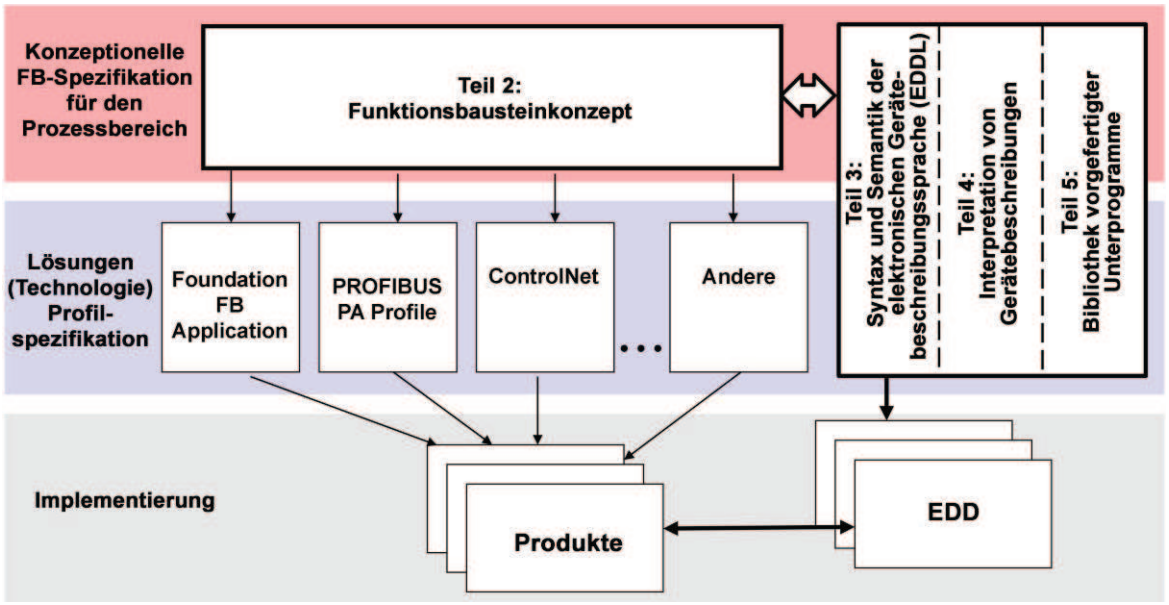

Bild 1 – Stellung der Norm IEC 61804 in Bezug auf andere Normen und Produkte

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1 Anwendungsbereich

In diesem Teil von IEC 61804 wird die Technologie für die elektronische Gerätebeschreibungssprache (en: Electronic Device Description Language, EDDL) festgelegt, die die Integration von Einzelheiten realer Produkte mit Hilfe der Werkzeuge bzw. Tools des ingenieurstechnischen Lebenszyklus ermöglicht.

In diesem Dokument wird EDDL als eine generische Sprache zur Beschreibung der Eigenschaften von Komponenten von Automationssystemen festgelegt. EDDL eignet sich zur Beschreibung von:

- Geräteparametern und ihren Abhängigkeiten;
- Gerätefunktionen, z. B. Simulationsmodus, Kalibrierung;
- grafischen Darstellungen, z. B. Menüs;
- Interaktionen mit Leitgeräten;
- grafischen Darstellungen:
  - erweiterten Benutzerschnittstellen,
  - grafischen Darstellungssystemen;
- permanenten Datenspeichern.

EDDL wird zur Erstellung einer elektronischen Gerätebeschreibung (EDD) verwendet, z. B. für konkrete Geräte, allgemein nutzbare Profile oder Bibliotheken. Diese EDD wird mit entsprechenden Tools zur Erzeugung eines interpretativen Codes angewendet, um den Umgang mit den Parametern, die Bedienung und die Überwachung von Komponenten von Automationssystemen, wie z. B. abgesetzten E/A, Steuer- und Regeleinrichtungen, Sensoren und programmierbaren Reglern, zu unterstützen. Die Implementierung dieser Tools ist nicht Gegenstand dieses Dokuments.

In diesem Dokument wird die semantische und lexikalische Struktur unabhängig von der Syntax festgelegt. In Anhang A wird eine spezielle Syntax definiert, das semantische Modell kann aber auch mit einer anderen Syntax angewendet werden.

IEC 61804-4 spezifiziert die EDD-Interpretation für EDD-Anwendungen und EDDs zur Unterstützung der EDD-Interoperabilität.

IEC 61804-5 spezifiziert die EDDL-Builtin-Bibliothek und stellt die Profile der verschiedenen Feldbusse zur Verfügung.

3 Begriffe, Abkürzungen und Akronyme

3.1 Begriffe

Für die Anwendung dieses Dokuments gelten die Begriffe nach IEC 60050-351, IEC 61804-2 und die folgenden Begriffe.

ISO und IEC stellen terminologische Datenbanken für die Verwendung in der Normung unter den folgenden Adressen bereit:

ISO Online Browsing Platform: verfügbar unter http://www.iso.org/obp
IEC Electropedia: verfügbar unter http://www.electropedia.org/

3.1.1
Builtin
en: builtin
vordefiniertes Unterprogramm, das von der EDD-Anwendung z. B. für Kommunikations- und Anzeigezwecke ausgeführt wird

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3.1.2
Gerät
en: device
unabhängige physische Einheit, die fähig ist, eine oder mehrere spezifische Funktionen in einem speziellen Kontext auszuführen und die durch ihre Schnittstellen abgegrenzt ist

[QUELLE: IEC 61499-1:2012,3.29]

3.1.3
EDD-Anwendung
en: EDD application
Programm, das die EDD oder eine beliebige übersetzte Form der EDD verwendet und Funktionen wie die Kommunikationsdarstellung, die Datendarstellung, die graphische Darstellung usw. bereitstellt

3.1.4
EDDL-Prozessor
en: EDDL processor
Prozessor oder Programm, der/das die EDD in eine ausführbare Form übersetzt, die von einer EDD-Anwendung verarbeitet werden kann

3.1.5
EDDL-Profil
en: EDDL profile
Auswahl der unterstützten Elemente der lexikalischen EDDL-Struktur, einschließlich der Syntaxdefinitionen für eine Anzahl von spezifischen Konsortien

3.1.6
Elektronische Gerätebeschreibungssprache
EDDL
formale Sprache zur Beschreibung von Geräten und Kommunikationskomponenten

3.1.7
Elektronische Gerätebeschreibung
EDD, en: Electronic Device Description
Datensammlung, welche die Geräteparameter, deren Abhängigkeiten und graphische Darstellung sowie eine Beschreibung der übermittelten Datensätze enthält

Anmerkung 1 zum Begriff: Die elektronische Gerätebeschreibung wird unter Verwendung der EDDL erstellt.

3.1.8
EDD-Compiler
en: Electronic Device Description Compiler
Compiler, der die EDD-Quelle in ein internes Format übersetzt, das vom EDD-Interpreter verwendet wird

3.1.9
Elektronischer Gerätebeschreibungsinterpreter
EDDI
Interpreter, der die EDD-Quelle oder ein vom EDDL-Compiler vorgegebenes internes Format verwendet, um dem EDD-Anwender die EDD-Informationen bereitzustellen

3.1.10
Funktionsbaustein
Funktionsbausteininstanz
funktionale Software-Einheit, die eine individuelle, mit einem Namen versehene Kopie einer Datenstruktur und zugeordnete Operationen umfasst, die durch einen entsprechenden FB-Typ festgelegt sind

Anmerkung 1 zum Begriff: Typische Operationen eines FB schließen eine Veränderung der Datenwerte in seiner Datenstruktur ein.

[QUELLE: IEC 61804-2:2018, 3.1.35]

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3.1.11
Hardware
en: hardware
physische Einrichtung im Gegensatz zu Programmen, Prozeduren, Regeln und der zugehörigen Dokumentation

3.1.12
Vorprozessor
en: preprocessor
Teil der Laufzeitumgebung, der die Informationen in einer EDD umwandelt

3.1.13
Anweisungen für den Vorprozessor
en: preprocessor directives
Beschreibung der Bedingungen für die Filterung des EDD-Codes vor der Kompilierung oder Interpretation

Anmerkung 1 zum Begriff: Beispielsweise eine Anweisung für den Vorprozessor zur Festlegung von Namen für Konstanten oder zum Schreiben von Makros für ein vereinfachtes Lesen von Code.

3.1.14
Software
en: software
geistige Schöpfung, die die Programme, Prozeduren, Regeln und alle zugehörigen Dokumentationen umfasst, die zum Betrieb eines Systems gehören

[QUELLE: IEC 61499-1:2012, 3.92, geändert – in der Definition wurde „Konfiguration“ gelöscht.]

3.2 Abkürzungen und Akronyme

ASCII	Amerikanischer Standard-Code für den Informationsaustausch nach ISO/IEC 10646 en: American Standard Code for Information Interchange according to ISO/IEC 10646
CP	Kommunikationsprofil en: Communication Profile
CPF	Kommunikationsprofilfamilie en: Communication Profile Family
CS	Kommunikationsserver en: Communication Server
EDD	elektronische Gerätebeschreibung en: Electronic Device Description
EDDL	elektronische Gerätebeschreibungssprache en: Electronic Device Description Language
EUC	Erweiterter Unicode nach ISO/IEC 10646 en: Extended Unicode according to ISO/IEC 10646
FB	Funktionsbaustein en: Function Block
FF	FOUNDATION-Fieldbus
GPE	Allgemeine Protokoll-Erweiterungen en: Generic Protocol Extension
HART	Highway Addressable Remote Transducer
HMI	Mensch-Maschine-Schnittstelle en: human machine interface
I/O	Eingang/Ausgang bzw. Eingabe/Ausgabe

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ID	Bezeichner en: identifier
ISA100	ISA100_Wireless
OSI	Kommunikation offener Systeme en: open systems interconnection
PI	PROFIBUS und PROFINET International
PB	PROFIBUS
PDU	Protokolldateneinheit en: protocol data unit
PN	PROFINET
PNO	PROFIBUS Nutzerorganisation
QM	Qualitätsmanagement en: Quality Management

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 61804-3

August 2020

ICS 25.040.40; 35.240.50

Supersedes EN 61804-3:2015 and all of its amendments and corrigenda (if any)

English Version

Devices and integration in enterprise systems - Function blocks (FB) for process control and electronic device description language (EDDL) - Part 3: EDDL syntax and semantics (IEC 61804-3:2020)

Les dispositifs et leur intégration dans les systèmes de l'entreprise - Blocs fonctionnels (FB) pour les procédés industriels et le langage de description électronique de produit (EDDL) - Partie 3: Sémantique et syntaxe EDDL (IEC 61804-3:2020)

Geräte und Geräteintegration in Unternehmenssysteme - Funktionsbausteine für die Prozessautomation und elektronische Gerätebeschre bungssprache - Teil 3: Elektronische Gerätebeschreibungssprache (EDDL) (IEC 61804-3:2020)

This European Standard was approved by CENELEC on 2020-07-29. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the respons bility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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

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European foreword

The text of document 65E/631/CDV, future edition 4 of IEC 61804-3, 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 61804-3:2020.

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) 2021-04-29
- Latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-07-29

This document supersedes EN 61804-3:2015 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 61804-3:2020 was approved by CENELEC as a European Standard without any modification.

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

IEC 61131-3	NOTE	Harmonized as EN 61131-3
IEC 61360 (series)	NOTE	Harmonized as EN 61360 (series)
IEC 61499-1:2012	NOTE	Harmonized as EN 61499-1:2013 (not modified)
IEC 61784-1	NOTE	Harmonized as EN IEC 61784-1
IEC 61784-2	NOTE	Harmonized as EN IEC 61784-2
IEC 61987 (series)	NOTE	Harmonized as EN IEC 61987 (series)
ISO/IEC 2382 (series)	NOTE	Harmonized as EN 17054 (series)

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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 60050-351	–	International Electrotechnical Vocabulary – Part 351: Control technology	–	–
IEC 61804-2	–	Function blocks (FB) for process control and electronic device description language (EDDL) – Part 2: Specification of FB concept	EN IEC 61804-2	–
IEC 61804-4	–	Devices and integration in enterprise systems – Function blocks (FB) for process control and electronic device description language (EDDL) – Part 4: EDD interpretation	EN IEC 61804-4[Z1]	–
IEC 61804-5	–	Devices and intergration in enterprise systems – Function blocks (FB) for process control and electronic device description language (EDDL) – Part 5: EDDL Builtin library	EN IEC 61804-5[Z2]	–
IEC 62541-4	–	OPC Unified Architecture – Part 4: Services	–	–
ISO/IEC 7498-1	–	Information technology – Open Systems Interconnection – Basic reference model: The basic model	–	–
ISO/IEC 8859-1	–	Information technology – 8-bit single-byte coded graphic character sets – Part-1: Latin alphabet No. 1	–	–
ISO/IEC 9834-8	–	Information technology – Procedures for the operation of object identifier registration authorities – Part 8: Generation of universally unique identifiers (UUIDs) and their use in object identifiers	–	–

[Z1] To be published. Stage at the time of publication: prEN IEC 61804-4:2018.

[Z2] To be published. Stage at the time of publication: prEN IEC 61804-5:2018.

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ISO/IEC 9899	1999	Programming languages – C	–	–
ISO/IEC 10646	–	Information technology – Universal Coded Character Set (UCS)	–	–
ISO/IEC 10918-1	–	Information technology; digital compression and coding of continuous–tone still images; requirements and guidelines	–	–
ISO/IEC 15948	–	Information technology – Computer graphics and image processing – Portable Network Graphics (PNG) – Functional specification	–	–
ISO 639	series	Code for the representation of names of languages	–	–
ISO 3166-1	–	Codes for the representation of names of countries and their subdivisions – Part 1: Country codes	EN ISO 3166-1	–
ISO/TS 29002-5	–	Industrial automation systems and integration – Exchange of characteristic data – Part 5: Identification scheme	–	–
IEEE 754	–	IEEE Standard for Floating-Point Arithmetic	–	–
RFC 3629	–	UTF-8, User Datagram Protocol	–	–
W3C Recommendation	–	Cascading Style Sheets Level 2 Specification	–	–

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INTRODUCTION

The EDDL fills the gap between the conceptual function block specification of IEC 61804-2 and a product implementation. It allows the manufacturers to use the same description method for devices based on different technologies and platforms. Bild 1 shows these aspects.

IEC 61804 has the general title "Devices and integration in enterprise systems – Function blocks (FB) for process control and electronic device description language (EDDL)" and consists of the following parts:

Part 2: Specification of FB concept

Part 3: EDDL syntax and semantics

Part 4: EDD interpretation

Part 5: EDDL builtin library

Part 6: Meeting the requirements for integrating fieldbus devices in engineering tools for field devices

The EDDL may also be used for the description of product properties in other domains such as industrial automation. Industrial automation may include devices such as generic digital and analog input/output modules, motion controllers, human-machine interfaces, sensors, closed-loop controllers, encoders, hydraulic valves, and programmable controllers.

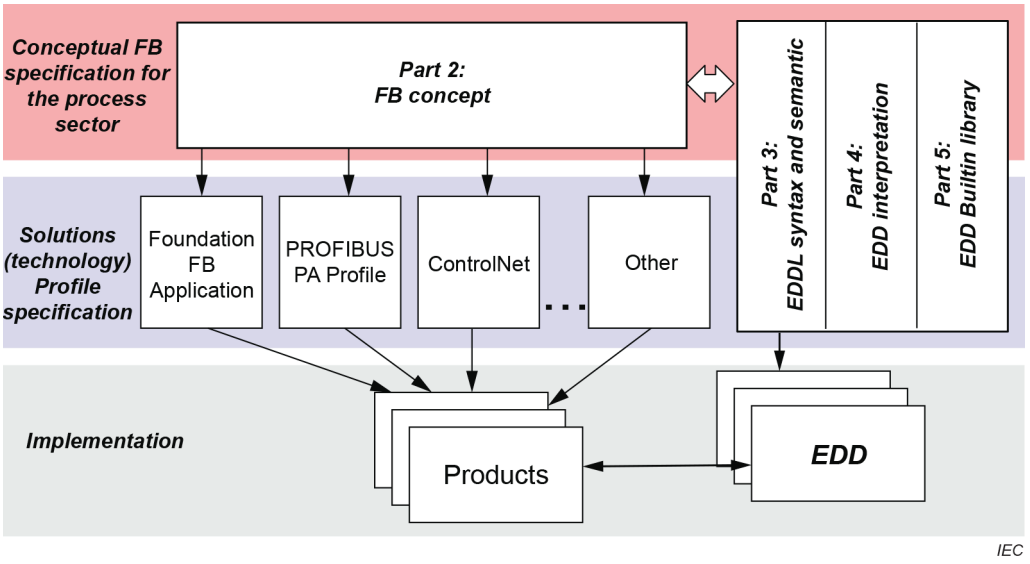

Figure 1 – Position of IEC 61804 in relation to other standards and products

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DEVICES AND INTEGRATION IN ENTERPRISE SYSTEMS – FUNCTION BLOCKS (FB) FOR PROCESS CONTROL AND ELECTRONIC DEVICE DESCRIPTION LANGUAGE (EDDL) –

Part 3: EDDL syntax and semantics

1 Scope

This part of IEC 61804 specifies the electronic device description language (EDDL) technology, which enables the integration of real product details using the tools of the engineering life cycle.

This document specifies EDDL as a generic language for describing the properties of automation system components. EDDL is capable of describing

- device parameters and their dependencies;
- device functions, for example, simulation mode, calibration;
- graphical representations, for example, menus;
- interactions with control devices;
- graphical representations:
  - enhanced user interface,
  - graphing system;
- persistent data store.

EDDL is used to create electronic device description (EDD) for e.g. concrete devices, common usable profiles or libraries. This EDD is used with appropriate tools to generate an interpretative code to support parameter handling, operation, and monitoring of automation system components such as remote I/Os, controllers, sensors, and programmable controllers. Tool implementation is outside the scope of this document.

This document specifies the semantic and lexical structure in a syntax-independent manner. A specific syntax is defined in Annex A, but it is possible to use the semantic model also with different syntaxes.

IEC 61804-4 specifies EDD interpretation for EDD applications and EDDs to support EDD interoperability.

IEC 61804-5 specifies the EDDL builtin library and provides the profiles of the various fieldbuses.

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 60050-351, *International Electrotechnical Vocabulary (IEV) – Part 351: Control technology*

IEC 61804-2, *Function blocks (FB) for process control – Part 2: Specification of FB concept*

IEC 61804-4, *Function blocks (FB) for process control and electronic device description language (EDDL) – Part 4: EDD interpretation*

IEC 61804-5, *Function blocks (FB) for process control and electronic device description language (EDDL) – Part 5: EDDL builtin library*

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

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ISO/IEC 7498-1, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model*

ISO/IEC 8859-1, *Information technology – 8-bit single-byte coded graphic character sets – Part 1: Latin alphabet No. 1*

ISO/IEC 9834-8, *Information technology – Procedures for the operation of object identifier registration authorities – Part 8: Generation of universally unique identifiers (UUIDs) and their use in object identifiers*

ISO/IEC 9899:1999, *Programming languages – C*

ISO/IEC 10646, *Information technology – Universal Coded Character Set (UCS)*

ISO/IEC 10918-1, *Information technology – Digital compression and coding of continuous-tone still images: Requirements and guidelines*

ISO/IEC 15948, *Information technology – Computer graphics and image processing – Portable Network Graphics (PNG): Functional specification*

ISO 639 (all parts), *Codes for the representation of names of languages*

ISO 3166-1, *Codes for the representation of names of countries and their subdivisions – Part 1: Country codes*

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

IEEE 754, *IEEE Standard for Floating-Point Arithmetic*

RFC 3629, *User Datagram Protocol*, available at http://www.ietf.org/rfc/rfc0768.txt [viewed 2018-12-21]

W3C Recommendation, Cascading Style Sheets Level 2 Specification, available at http://www.w3.org/TR/CSS2 [viewed 2018-12-21]

3 Terms, definitions, abbreviated terms and acronyms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-351, IEC 61804-2 and the following apply.

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

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

3.1.1
builtin
predefined subroutine executed by the EDD application, e.g. for communication and display purposes

3.1.2
device
independent physical entity capable of performing one or more specified functions in a particular context and delimited by its interfaces

[SOURCE: IEC 61499-1:2012,3.29]

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3.1.3
EDD application
program using the EDD, or any translated form, which offers functionality such as communication representation, data representation, graphical representation, etc.

3.1.4
EDDL processor
processor or program, which translates the EDD into an executable form that can be processed by an EDD application

3.1.5
EDDL profile
selection of the supported elements of the EDDL lexical structure including the syntax definitions for a number of specific consortia

3.1.6
electronic device description language
EDDL
formal language for describing devices and communication components

3.1.7
electronic device description
EDD
data collection containing the device parameter(s), its(their) dependencies, its(their) graphical representation and a description of the data sets which are transferred

Note 1 to entry: The electronic device description is created using the EDDL.

3.1.8
electronic device description compiler
compiler which translates the EDD source in an internal format that is used by the EDD interpreter

3.1.9
electronic device description interpreter
EDDI
interpreter which uses the EDD source or an internal format that is given by the EDDL compiler to provide the EDD information to the EDD user

3.1.10
function block
function block instance
software functional unit comprising an individual, named copy of a data structure and associated operations specified by a corresponding FB type

Note 1 to entry: Typical operations of an FB include modification of the values of the data in its associated data structure.

[SOURCE: IEC 61804-2:2018, 3.1.35]

3.1.11
hardware
physical equipment, as opposed to programs, procedures, rules and associated documentation

3.1.12
preprocessor
part of the run-time environment that transforms the information given in an EDD

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3.1.13
preprocessor directives
description of conditions for filtering the EDD code before compilation or interpretation

Note 1 to entry: For example, a preprocessor directive providing the facility to define names for constants or to write macros to make code easier to read.

3.1.14
software
intellectual creation comprising the programs, procedures, rules and any associated documentation pertaining to the operation of a system

[SOURCE: IEC 61499-1:2012, 3.92, modified – In the definition, "configurations" has been deleted.]

3.2 Abbreviated terms and acronyms

ASCII	American Standard Code for Information Interchange according to ISO/IEC 10646
CP	Communication Profile
CPF	Communication Profile Family
CS	Communication Server
EDD	Electronic Device Description
EDDL	Electronic Device Description Language
EUC	Extended Unicode according to ISO/IEC 10646
FB	Function Block
FF	FOUNDATION Fieldbus
GPE	Generic Protocol Extension
HART	Highway Addressable Remote Transducer
HMI	Human Machine Interface
I/O	Input/Output
ID	Identifier
ISA100	ISA100_Wireless
OSI	Open Systems Interconnection
PI	PROFIBUS and PROFINET International
PB	PROFIBUS
PDU	Protocol Data Unit
PN	PROFINET
PNO	PROFIBUS Nutzerorganisation
QM	Quality Management

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4 Conformance statement

A statement of conformance to a profile of this document shall be stated as

– compliance to IEC 61804-3 <Type>

where the Type within the angle brackets < > is optional and the angle brackets are not to be included.

The Type may be, for example, the name of the communication protocol abbreviations used such as CS, FF, GPE, HART, ISA100, PB, or PN, or in an encoded way according to the communication profiles specified in IEC 61784-1 or in IEC 61784-2.

Product standards shall not include any conformity assessment aspects (including QM provisions), either normative or informative, other than provisions for product testing (evaluation and examination).

5 EDD and EDDL model

3.1 Overview of EDD and EDDL

An electronic device description (EDD) contains all device parameter(s) of an automation system component. The technology used to describe an EDD is called electronic device description language (EDDL). The EDDL provides a set of scalable basic language elements to handle simple, complex or modular devices. The EDDL is a descriptive language based on an ASCII format with clear separation between data and program.

Data in a text field, which is marked with a country code like Japanese, may use a multi-byte code.

3.2 EDD architecture

From the viewpoint of the OSI model (ISO/IEC 7498-1), an EDD is above Layer 7. However, the EDD application uses the communication system to transfer its information. An EDD contains constructs that support mapping to a supporting communication system.

The device manufacturer defines the objects, which are reflected by the logical representation of the objects within an EDD application. For that reason, EDDL has language elements, which map the EDD data to the data representation of the communication system, so that the user of an EDD does not need to know the physical location (address) of a device object.

EDD describes the management of information to be displayed to the user. The specific representation of such visualization is not part of EDD or EDDL definitions.

3.3 Concepts of EDD

The manufacturer of a device or of an automation system component describes the properties of the device by using the EDDL. The resulting EDD contains information such as:

- description of the device parameters;
- description of parameter dependencies;
- logical grouping of the device parameters;
- selection and execution of supported device functions;
- business logic (programmed functions);
- description of the transferred data sets.

Depending on the required usage, the EDD may be physically located

- in a device;

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- in an external data storage medium such as a compact disk, floppy or a server;
- partially distributed in the device and an external storage medium.

EDD supports text strings (common terms, phrases, etc.) in more than one language (English, German, French, etc.). Text strings may be stored in separate dictionaries. There may be more than one dictionary for one EDD.

An EDD implementation includes sufficient information about the target device to match a specific EDD to a specific device. Manufacturer, device type, and revision are examples of information that can be used to match a device to a specific EDD. An example EDD is provided as a reference in Annex C.

3.4 Principles of the EDD development process

5.4.1 General

The creation of an EDD is a three-stage process: EDD source generation, EDD preprocessing and EDD compilation.

5.4.2 EDD source generation

The EDD generation process is shown in Figure 2.

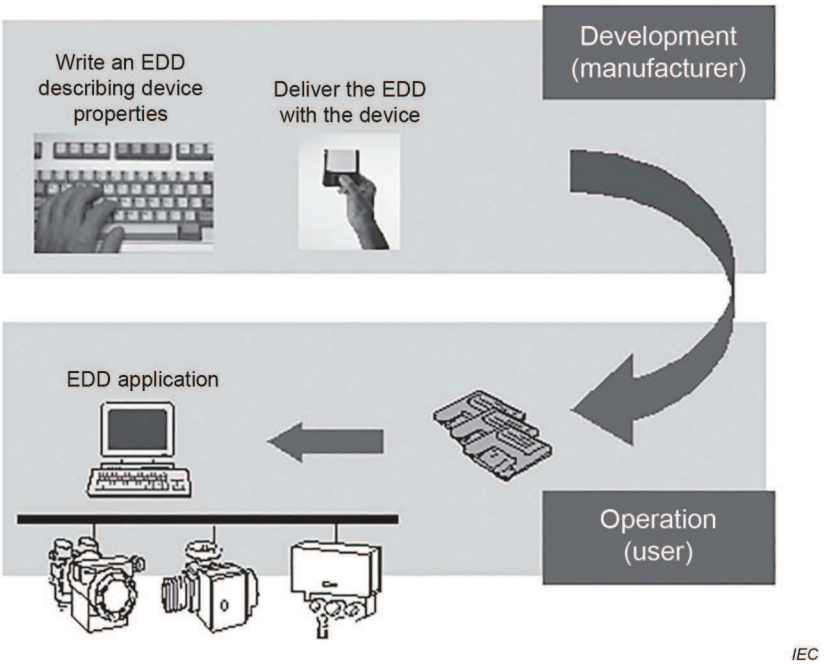

Figure 2 – EDD generation process

The device manufacturer writes an appropriate EDD for his device and delivers both (EDD and device). If the automation system supports the EDD method, a system integration can be made by the user.

The EDDs for devices may be embedded in the device memory or delivered using separate storage media or downloaded from an appropriate network server. The EDD is 'interpreted' or 'browsed' by an EDD-application. EDDs are normally stored as source files or preprocessed files.

5.4.3 EDD preprocessing

In the preprocessing stage, an EDD preprocessor generates a consistent EDD representation suitable for final compilation.

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Preprocessing supports, for example, substitution of definitions and inclusion of external text. The output of the preprocessor is a complete EDD without any preprocessor directive.

5.4.4 EDD compilation

The EDD compilation stage produces an EDD application internal representation from a preprocessed EDD to be used in the EDD application.

3.5 Interrelations between the lexical structure and formal definitions

The lexical structure of EDDL and its elements are described in Clauses 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20. Formal definitions and syntax for each EDDL element are given in Annex A. The lexical structure and its formal description use the same name.

NOTE Instead of the specified formal definitions and syntax in Annex A, another specification can be developed as an additional option.

3.6 Builtins

Builtins are predefined subroutines which are executed in the EDD application.

The library of builtins is defined in IEC 61804-5.

3.7 Profiles

EDDL is a unified specification of existing legacy EDD concepts. Concrete EDD applications use a subset of the EDDL specification. The elements of the specification applicable to various profiles are described in tables throughout this document, along with the description of the element.

In addition to EDD profiles, implementing consortia also publish "Device Profiles", which are used to support the interchangeability of compliant devices. These Device Profiles may be described using the EDDL specified in this document.

6 Conventions

3.1 General

In IEC 61804 (all parts), all keywords are written in uppercase letters. An EDDL element is written in lowercase letters to address the semantic of the whole element.

The EDDL is generally described using lexical structures in which the elements and the presence of fields are specified.

3.2 Conventions for basic construct description

The following conventions apply for the basic construct definition.

– Table 1 defines the format for the builtin overview table.
– Table 2 defines the contents of the columns of Table 1.
– Table 3 defines the usage of attributes of basic constructs or their subattributes.
– EDDL basic constructs and attributes referenced in this document are written in upper case letters.

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Table 1 – Format for the basic construct table

Reference	Basic construct	Attribute	Communication profiles

Table 2 – Contents of the basic construct table

Column	Text	Meaning
Reference		Reference to the respective subclause that specifies the attribute of the basic construct.
Basic construct		Name of the basic construct.
Communication profiles	✓	The basic construct is supported by the respective communication profile.
	x	The basic construct is not supported by the respective communication profile.

Table 3 – Attribute usage descriptions

Usage	Attribute	Description
m	yyy	The presence of this attribute is mandatory.
o	xxx	The presence of this attribute is optional.
s	z1	The presence of this attribute is selectable with other attr butes, which are also marked with "s" in the "usage" column. Only one of the selectable attr butes (z1 or z2) is present.
s	z2	The presence of this attribute is selectable with other attr butes, which are also marked with "s" in the "usage" column. Only one of the selectable attr butes (z1 or z2) is present.
c	uuu	The presence of this attribute is constrained and it is only present if the constraint is met.
L	Vvv	The presence of this attr bute is limited to be used only in specified cases.

The characters in the "usage" column have the following meanings.

m: this attribute is mandatory and shall be present.

o: this attribute is optional and need not be present.

s: this attribute is a selection. One, and only one, of the fields marked with s (z1 or z2) shall be present.

c: this attribute is constrained. The constraint is described in the "description" column.

In the "attribute" column, if more than one attribute exists, which have the same usage, the attributes are sorted in alphabetical order.

3.3 Conventions for lexical structure

The lexical structures in this document are specified using the rules defined in Table 4.

Table 4 – Rules for lexical convention

Lexical structure element	Description
bold	Concrete syntax literals are in **bold.**
italics	Syntax elements are in *italics.*
:=	Definition of a syntax element.

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Lexical structure element	Description
<cond>	The preceding syntax element may be conditionally specified.
[ ]	Grouping of syntax elements
*	The preceding syntax element may appear zero or more times. The syntax element can be a group of syntax elements enclosed in square brackets.
+	The preceding syntax element may appear one or more times. The syntax element can be a group of syntax elements enclosed in square brackets.
?	The preceding syntax element may appear zero or one time. The syntax element can be a group of syntax elements enclosed in square brackets.
|	Alternative syntax elements
expression	An expression
<data type>-expression	An expression that can be resolved to a specified data type.
<data type>-constant	A constant value of the specified data type.
<data type>-value	A value of the specified data type.

Table 5 describes the applicable EDD sources for lexical structure element definitions.

Table 5 – EDD sources

Lexical structure element	Applicable source						
	Constant (Literal)	Referenced attribute	Enumera-ted()	Dictionary reference (only string)	Concate-nation ('+', only string)	Expression incl. type converting	Condition (IF, SELECT)
<data type>-constant	x	x	x	x			
<data type>-value	x	x	x	x	x		
<data type>-value<cond>	x	x	x	x	x		x
<data type>-expression	x	x	x	x	x	x	
<data type>-expression<cond>	x	x	x	x	x	x	x

7 Overview

3.1 EDDL features

The EDDL is a structured and interpretative language for describing device properties. Also the interactions between the devices and the EDD run-time environment are incorporated in the EDDL. The EDDL provides a set of language elements for these purposes.

For a specific EDD implementation it is not necessary to use all of the elements provided by the language.

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Compatible subsets of EDDL are permitted and may be specified using profiles (for example, choice of constructs, number of recursions, and selection of options). EDD developers are required to identify within each EDD details as to which profile has been used.

3.2 Syntax representation

The lexical structure is converted into specific syntaxes specified in Annex A by the element name (for example, VARIABLE in the lexical structure equates to the keyword "VARIABLE" in Annex A).

Beside the defined syntax in this document, it is possible to use other syntax definitions, which may be added in the future to allow other features and representations for future progress.

3.3 EDD language elements

The language is structured with the following language elements:

- identification elements;
- basic construction elements;
- special elements.

Frequently used text strings, for example, help text and multilingual lists of labels should be separated in a text dictionary (see Clause 20).

Identification information is the first entry in every EDD file. The identification information uniquely identifies the version of EDDL used, together with the specific device type, model codes and revision details covered by the EDD file.

3.4 Basic construction elements

7.4.1 General

These basic constructs have been specified to support descriptions of devices used within industrial control applications, together with their properties and functionality.

Some constructs have similar names and functions while differing in their detailed specification. This additional variety has been included to ensure compatibility with several existing description languages. Appropriate mapping cross-references are given by profiles.

Each of the basic constructs has a set of attributes associated with it. Attributes can also have subattributes, which refine the definition of the attribute and hence the definition of the construct itself.

The definition of an attribute may be static or dynamic. A static attribute definition never changes, while a dynamic attribute definition may change in order to accommodate parameter value changes.

7.4.2 AXIS

AXIS describes the axis of a CHART or GRAPH (see 113.7).

7.4.3 BLOB

BLOB describes a Binary Large Object used for transfering binary data to or from a device (see 93.8).

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7.4.4 BLOCK_A

BLOCK_A is a logical grouping of CHARACTERISTICS, PARAMETERS, PARAMETER_LISTS, and ITEM_LISTS, see Figure 3. To access one item of BLOCK_A, the instance of the block should be used (see 133.1 and Figure 3).

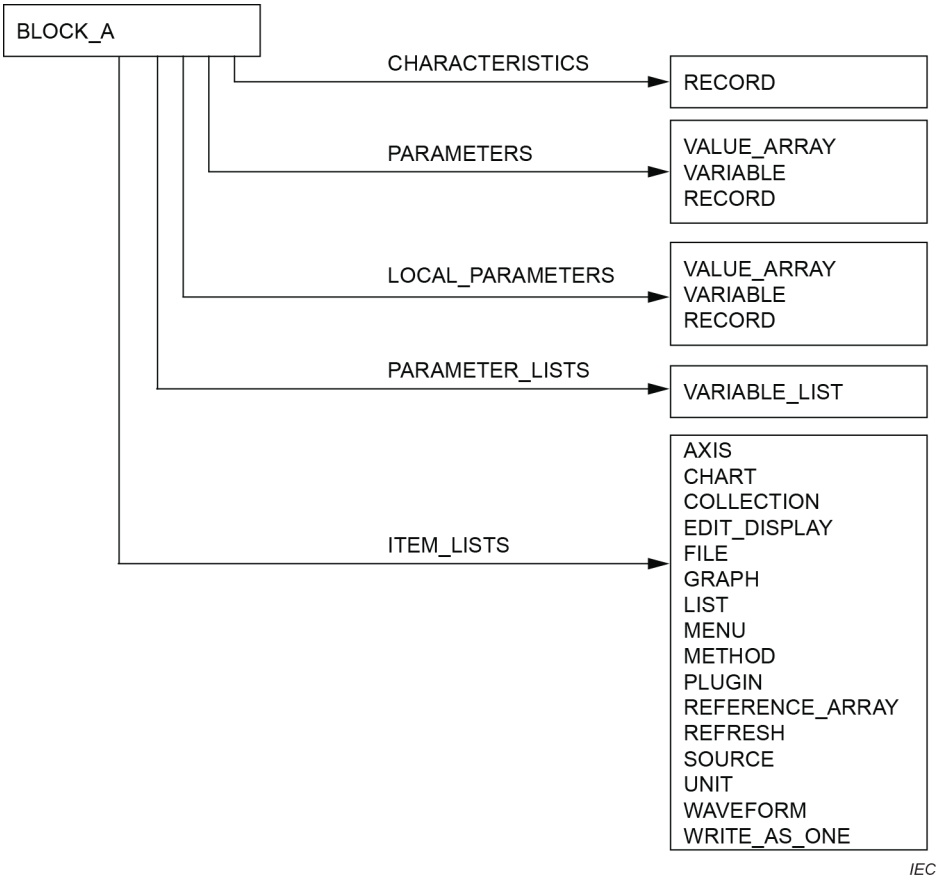

Figure 3 – BLOCK_A

7.4.5 BLOCK_B

BLOCK_B is used to structure variables in instances of logical block types. For accessing a VARIABLE within a BLOCK_B construct, the basic construct COMMAND is used to provide the relative addressing (see 133.2).

7.4.6 CHART

CHART describes a chart used to display data from a device in the EDD application (see 113.5 and Figure 4).

Figure 4 – CHART

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7.4.7 COLLECTION

COLLECTION describes logical groupings of data (see 93.5 and Figure 5).

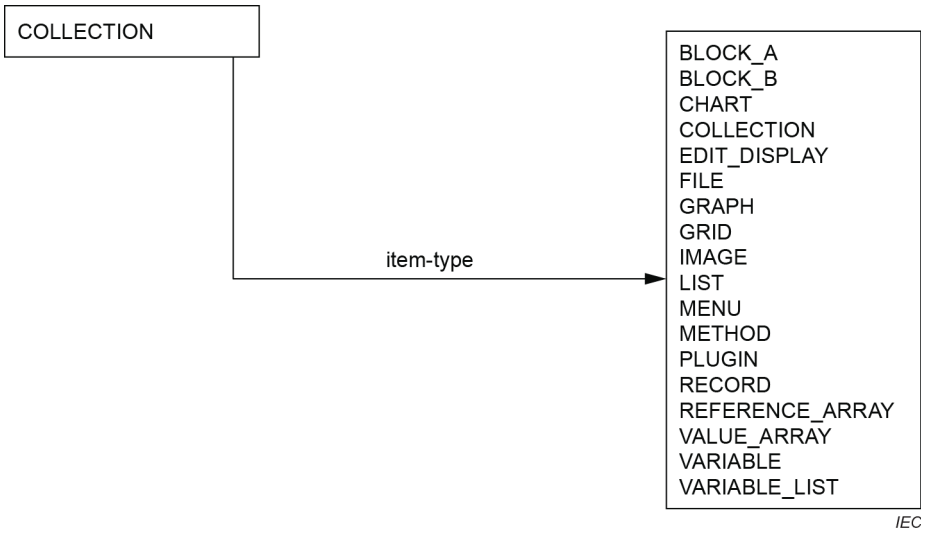

Figure 5 – COLLECTION

7.4.8 COMMAND

COMMAND describes the structure and the addressing of the variables in the device (see 103.1 and Figure 6).

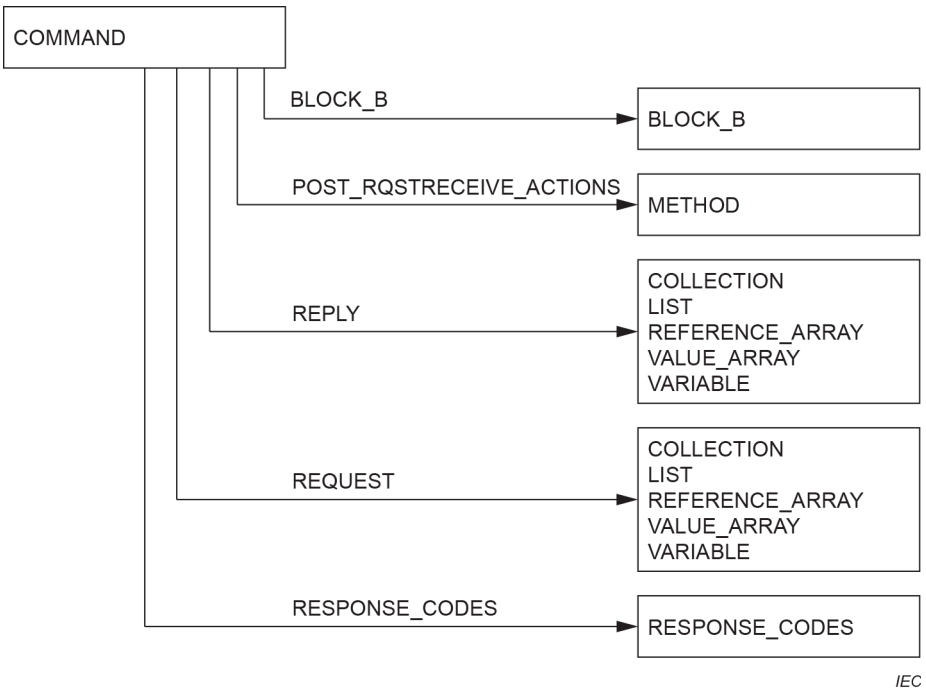

Figure 6 – COMMAND

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7.4.9 COMPONENT

COMPONENT describes the configuration behavior of the device that is described in the EDD (see 133.6 and Figure 7).

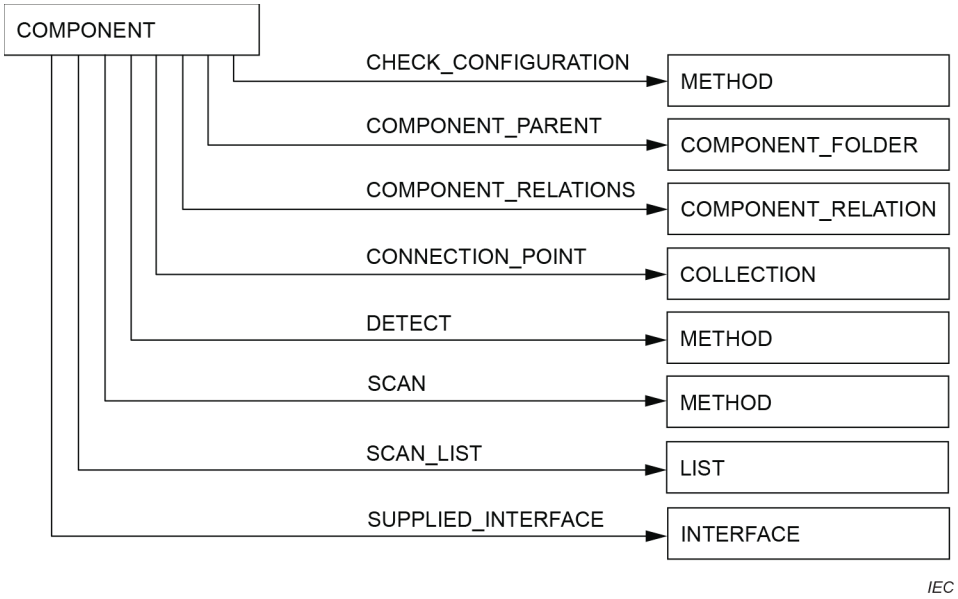

Figure 7 – COMPONENT

7.4.10 COMPONENT_FOLDER

COMPONENT_FOLDER describes a folder in a catalog. Folders allow groupings of components in a catalog (see 133.7 and Figure 8).

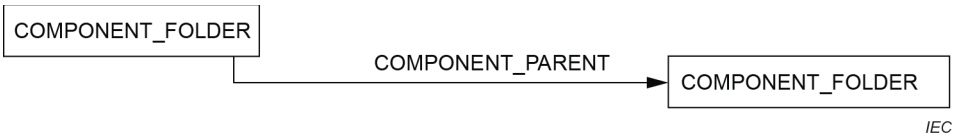

Figure 8 – COMPONENT_FOLDER

7.4.11 COMPONENT_REFERENCE

COMPONENT_REFERENCE refers to a COMPONENT or a COMPONENT_FOLDER (see 133.8 and Figure 9).

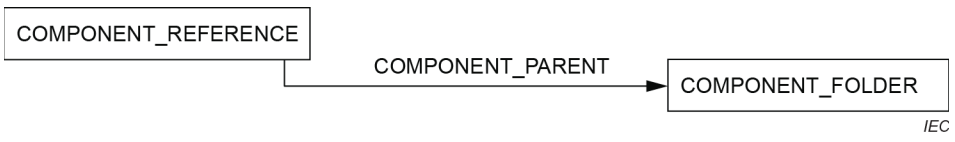

Figure 9 – COMPONENT_REFERENCE

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7.4.12 COMPONENT_RELATION

COMPONENT_RELATION specifies a relation between COMPONENTs, e.g. a module and one or more other modules (see 133.9 and Figure 10).

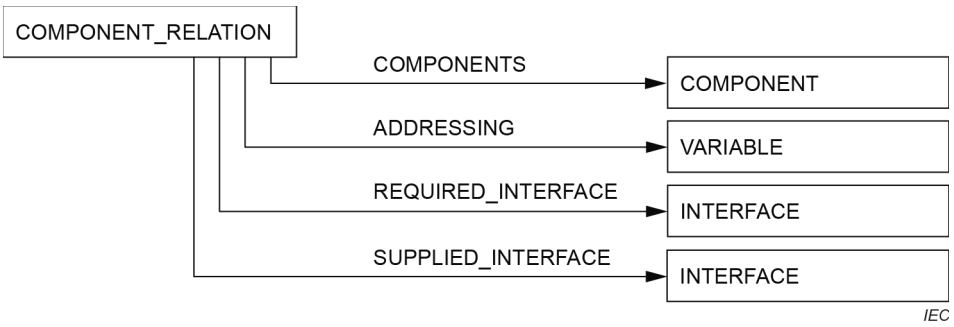

Figure 10 – COMPONENT_RELATION

7.4.13 EDIT_DISPLAY

EDIT_DISPLAY describes how the data will be represented to a user by a display device (see 113.2 and Figure 11).

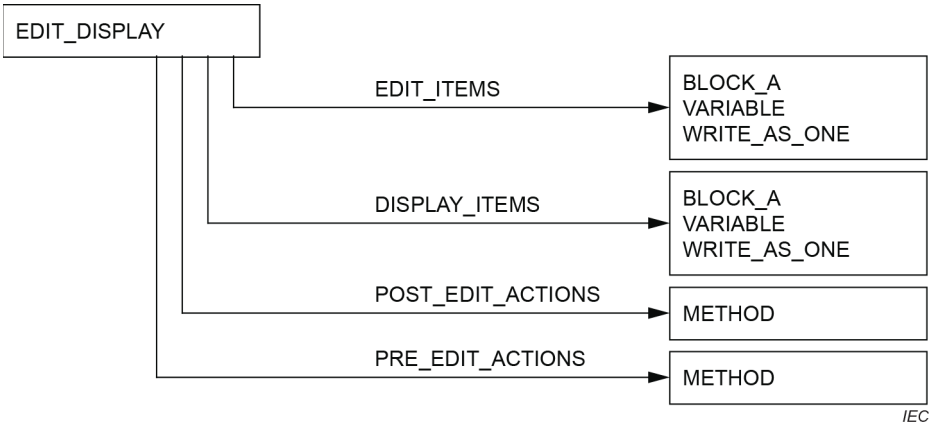

Figure 11 – EDIT_DISPLAY

7.4.14 FILE

FILE describes an area of persistent storage (see 93.6 and Figure 12).

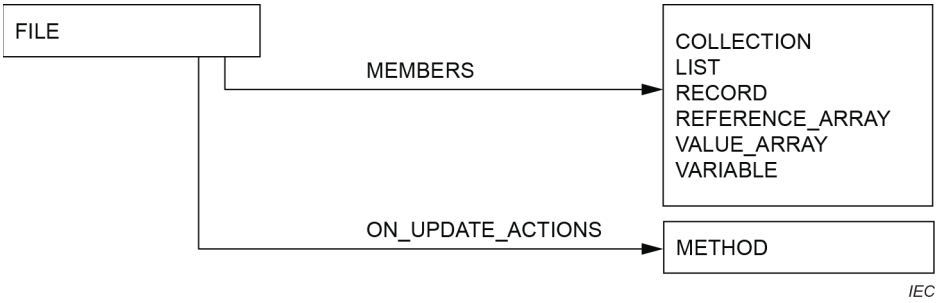

Figure 12 – FILE

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7.4.15 GRAPH

GRAPH describes a graph used to display data from a device in the EDD application (see 113.8 and Figure 13).

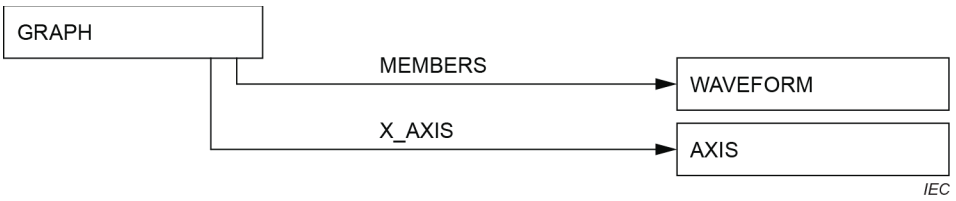

Figure 13 – GRAPH

7.4.16 GRID

GRID describes a matrix used to display data from a device in the EDD application (see 113.4 and Figure 14).

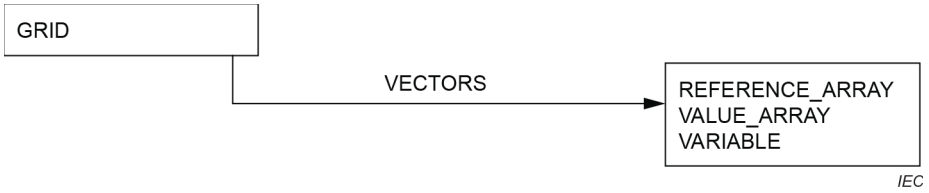

Figure 14 – GRID

7.4.17 IMAGE

IMAGE describes a visual image (see 113.3 and Figure 15).

Figure 15 – IMAGE

7.4.18 IMPORT

IMPORT is used to import an EDD and to modify its existing definitions (see 133.4).

7.4.19 INTERFACE

INTERFACE is used to specify a set of basic constructs of components that are accessible by other components (see 133.10).

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