

**DIN EN 61804-3**

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Ersatz für  
DIN EN 61804-3:2011-09  
Siehe Anwendungsbeginn

**Funktionsbausteine für die Prozessautomation und elektronische  
Gerätebeschreibungssprache –  
Teil 3: Elektronische Gerätebeschreibungssprache (EDDL)  
(IEC 61804-3:2015);  
Englische Fassung EN 61804-3:2015**

Function Blocks (FB) for process control and Electronic Device Description  
Language (EDDL) –  
Part 3: EDDL syntax and semantics  
(IEC 61804-3:2015);  
English version EN 61804-3:2015

Blocs Fonctionnels (FB) pour les procédés industriels et le Langage de Description  
Electronique de Produit (EDDL) –  
Partie 3: Sémantique et syntaxe EDDL  
(IEC 61804-3:2015);  
Version anglaise EN 61804-3:2015

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## Anwendungsbeginn

Anwendungsbeginn für die von CENELEC am 2015-07-14 angenommene Europäische Norm als DIN-Norm ist 2016-04-01.

Für DIN EN 61804-3:2011-09 besteht eine Übergangsfrist bis 2018-07-14.

## Nationales Vorwort

*Vorausgegangener Norm-Entwurf: E DIN EN 61804-3:2014-03.*

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

Die enthaltene IEC-Publikation wurde vom SC 65E „Devices and integration in enterprise systems“ erarbeitet.

Das IEC-Komitee hat entschieden, dass der Inhalt dieser Publikation bis zu dem Datum (stability date) unverändert bleiben soll, das auf der IEC-Website unter „<http://webstore.iec.ch>“ zu dieser Publikation angegeben ist. Zu diesem Zeitpunkt wird entsprechend der Entscheidung des Komitees die Publikation

- bestätigt,
- zurückgezogen,
- durch eine Folgeausgabe ersetzt oder
- geändert.

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 61804-3 veröffentlicht. Zu deren Abschnitt 1, der den Anwendungsbereich festlegt, und deren Abschnitt 3, der die Begriffe 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 Bilder in Farbe, die in der Papierversion in einer Graustufen-Darstellung wiedergegeben werden. Elektronische Versionen dieses Dokuments enthalten die Bilder in der originalen Farbdarstellung.

## Änderungen

Gegenüber DIN EN 61804-3:2011-09 wurden folgende Änderungen vorgenommen:

- a) Plug-In für das Menü „Schlüsselwort“;
- b) Komponentenkonstrukt für Anforderungen an den Kommunikationsserver (zusätzliche Eigenschaften);
- c) Erweiterung des Klassenattributs;

- d) neue Eigenschaft „private“ einigen Kommunikationsobjekten hinzugefügt.
- e) Die folgenden Änderungen werden in die EDDL, basierend auf der EDDL Harmonisierung integriert:
  - einige ungenutzte Eigenschaften wurden entfernt;
  - einige Profileigenschaften wurden harmonisiert.

**Frühere Ausgaben**

DIN EN 61804-2: 2005-03

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

## Nationaler Anhang NA (informativ)

### Einleitung<sup>N1)</sup>

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

IEC 61804 besteht aus den folgenden Teilen unter dem Haupttitel „Funktionsbausteine für die Prozessautomation und elektronische Gerätebeschreibungssprache“:

- 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 ingenieurtechnischen Werkzeugen für Feldgeräte.

Im vorliegenden Teil der IEC 61804 wurden einige Teile der IEC/TS 61804-1:2003 integriert, die im Januar 2013 zurückgezogen wurde.

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, Regler, Kodierer, Hydraulikventile und programmierbare Steuerungen, umfassen.

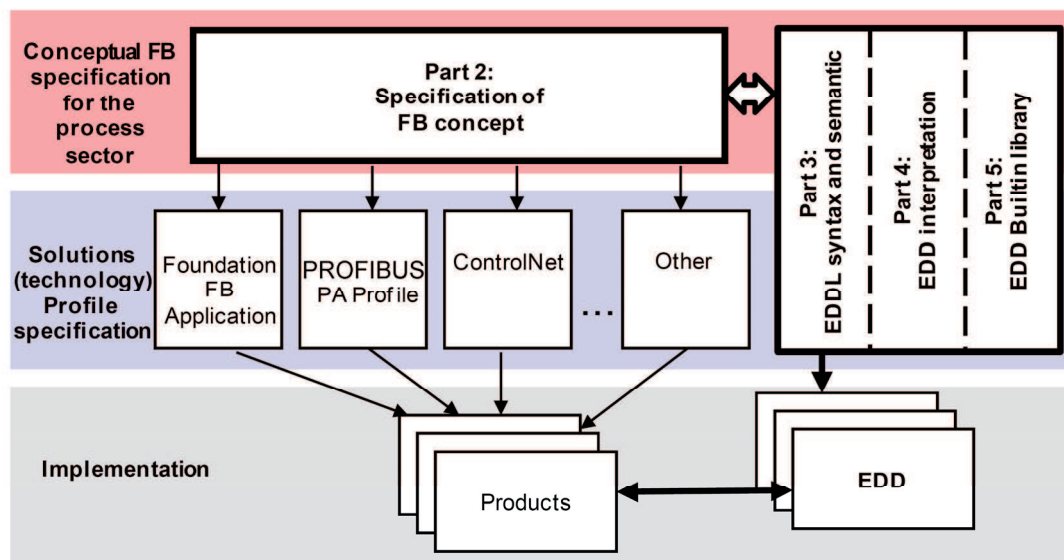


**Bild 1 – Stellung der Norm IEC 61804 in Bezug auf andere Normen und Produkte**

<sup>N1)</sup> Nationale Fußnote: Die Nummerierung der IEC 61804-3:2015 wurde beibehalten.

# 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 Teil von IEC 61804 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 Regleinrichtungen, Sensoren und programmierbaren Reglern, zu unterstützen. Die Implementierung dieser Tools ist nicht Gegenstand dieser Norm.

In diesem Teil von IEC 61804 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.

## 3.1 Begriffe

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

### 3.1.1

#### **Built-in**

(en: **Built-in**)

vordefiniertes Unterprogramm, das von der EDD-Anwendung z. B. für Kommunikations- und Anzeigezwecke ausgeführt wird

### 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**

(en: Electronic Device Description Language)

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

##### **EDD-Interpreter**

##### **EDDI**

(en: Electronic Device Description Interpreter)

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)

(en: function block; function block instance)

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

[QUELLE: IEC 61804-2:–, 3.1.32]

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

#### 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 Codes.

### 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]

– Leerseite –

English Version

**Function Blocks (FB) for process control and Electronic Device  
Description Language (EDDL) - Part 3: EDDL syntax and  
semantics  
(IEC 61804-3:2015)**

Blocs Fonctionnels (FB) pour les procédés industriels et le  
Langage de Description Electronique de Produit (EDDL) -  
Partie 3: Sémantique et syntaxe EDDL  
(IEC 61804-3:2015)

Funktionsbausteine für die Prozessautomation und  
elektronische Gerätebeschreibungssprache - Teil 3:  
Elektronische Gerätebeschreibungssprache (EDDL)  
(IEC 61804-3:2015)

This European Standard was approved by CENELEC on 2015-07-14. 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.

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

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

## **European foreword**

The text of document 65E/451/FDIS, future edition 3 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 61804-3:2015.

The following dates are fixed:

- latest date by which the document has to be (dop) 2016-04-14  
implemented at national level by  
publication of an identical national  
standard or by endorsement
- latest date by which the national (dow) 2018-07-14  
standards conflicting with the  
document have to be withdrawn

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## **Endorsement notice**

The text of the International Standard IEC 61804-3:2015 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 61499-1 | NOTE | Harmonized as EN 61499-1.              |
| IEC 61784-1 | NOTE | Harmonized as EN 61784-1.              |
| IEC 61784-2 | NOTE | Harmonized as EN 61784-2.              |
| IEC 61804-4 | NOTE | Harmonized as EN 61804-4 <sup>1)</sup> |

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1) To be published.

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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. Figure 1 shows these aspects.

IEC 61804 has the general title "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

This part of IEC 61804 has integrated some parts of IEC TS 61804-1:2003, which was withdrawn in January 2013.

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.

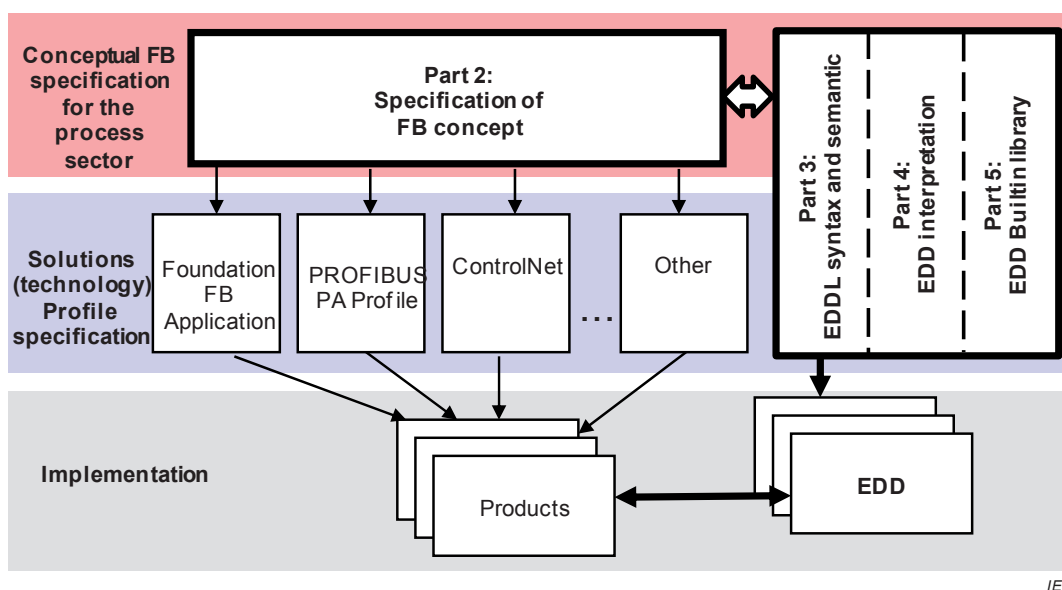


Figure 1 – Position of IEC 61804 in relation to other standards and products

# 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 part of IEC 61804 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 example 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 standard.

This part of IEC 61804 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.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050 (all parts), *International Electrotechnical Vocabulary* (available at <http://www.electropedia.org>)

IEC 61804-2:–1, *Function blocks (FB) for process control and Electronic Device Description Language (EDDL) – Part 2: Specification of FB concept and Electronic Device Description Language (EDDL)*

IEC 61804-5, *Function blocks (FB) for process control and Electronic Device Description Language (EDDL) – Part 5: EDDL Builtin library*

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<sup>1</sup> To be published.

IEC 62541-4, *OPC unified architecture – Part 4: Services*

ISO/IEC 2375, *Information technology – Procedure for registration of escape sequences and coded character sets*

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, *Information technology – Programming languages – C*

ISO/IEC 10646-1, *Information technology – Universal Multiple-Octet Coded Character Set (UCS) – Part 1: Architecture and Basic Multilingual Plane*

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*

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

RFC 3629, *UTF-8, User Datagram Protocol*, available at <http://www.ietf.org/rfc/rfc0768.txt>

W3C Cascading Style Sheets Level 2 Specification <http://www.w3.org/TR/CSS2>

### 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, in IEC 61804-2, as well as the following apply.

##### 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]

##### 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;—, 3.1.32]

#### 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

#### 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]

## 3.2 Abbreviated terms and acronyms

|       |                                                                                 |
|-------|---------------------------------------------------------------------------------|
| ASCII | American Standard Code for Information Interchange according to ISO/IEC 10646-1 |
| CP    | Communication Profile                                                           |
| CPF   | Communication Profile Family                                                    |
| EDD   | Electronic Device Description                                                   |
| EDDL  | Electronic Device Description Language                                          |
| EUC   | Extended Unicode according to ISO/IEC 2022                                      |
| FB    | Function block                                                                  |
| FF    | Fieldbus Foundation <sup>2</sup>                                                |
| HCF   | HART® <sup>3</sup> Communication Foundation                                     |
| HMI   | Human-machine interface                                                         |
| I/O   | Input/Output                                                                    |
| ID    | Identifier                                                                      |
| OSI   | Open Systems Interconnection                                                    |
| PI    | PROFIBUS and PROFINET <sup>4</sup> International                                |
| PDU   | Protocol data unit                                                              |
| PNO   | PROFIBUS Nutzerorganisation                                                     |

## 4 Conformance statement

A statement of conformance to a profile of this part of IEC 61804 shall be stated<sup>5</sup> as

– compliance to IEC 61804-3:–, Annex D.n <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 used such as PROFIBUS, Foundation Fieldbus, or HART Communication Foundation, or in an encoded way according to the Communication Profiles specified in IEC 61784-1 or in IEC 61784-2.

<sup>2</sup> FOUNDATION™ Fieldbus is the trade name of the consortium Fieldbus Foundation (non-profit organization). This information is given for the convenience of users of this standard and does not constitute an endorsement by IEC of the trade name holder or any of its products. Compliance to this profile does not require use of the trade name. Use of the trade names requires permission from the trade name holder.

<sup>3</sup> HART® is a registered trademark of the consortium HART Communication Foundation (HCF) (non-profit organization). This information is given for the convenience of users of this standard and does not constitute an endorsement by IEC of the trade name holder or any of its products. Compliance to this profile does not require use of the trade name. Use of the trade names requires permission from the trade name holder.

<sup>4</sup> PROFIBUS and PROFINET are trade names of PROFIBUS Nutzerorganisation e.V. (PNO) as part of PROFIBUS and PROFINET International. PNO is a non-profit trade organization to support the fieldbus technologies PROFIBUS and PROFINET. This information is given for the convenience of users of this standard and does not constitute an endorsement by IEC of the trade name holder or any of its products. Compliance to this profile does not require use of the tradename. Use of the trade names requires permission from the trade name holder.

<sup>5</sup> In accordance with the ISO/IEC Directives.

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 Conventions

### 5.1 General

In IEC 61804 series 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.

### 5.2 Conventions for lexical structure

#### 5.2.1 ABC field1, field2

ABC is a lexical element. This element shall be coded in a concrete syntax. It is not required to code this element with the name "ABC". It is also possible to code this element, for example, with a tag number.

Field1 and field2 are fields of the lexical element ABC. Each field is mandatory and may have more than one attribute. If a field has attributes, the presence of the attributes is specified in a table. A comma separates field1 and field2. The comma is a lexical element and is not coded explicitly.

If a field has additional attributes, the attributes are defined in a table. The table layout and the possible usage qualifiers are shown in Table 1.

**Table 1 – Field attribute 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 attributes, which are also marked with "s" in the "usage" column. Only one of the selectable attributes (z1 or z2) is present. |
| s     | z2        | The presence of this attribute is selectable with other attributes, which are also marked with "s" in the "usage" column. Only one of the selectable attributes (z1 or z2) is present. |
| c     | uuu       | The presence of this attribute is conditional and it is only present if the condition is true.                                                                                         |

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 conditional. The condition 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.

### 5.2.2 ABC field1+

The plus (+) behind field1 is used to indicate that field1 is used at least once. It may be used more than once.

### 5.2.3 ABC field2\*

The asterisk (\*) behind field2 is used to indicate that field2 is optional and need not be used. If it is used it may be used more than once.

### 5.2.4 ABC [field1, field2]+

The elements field1 and field2 in the square brackets [] are an unsorted list. The plus (+) behind the closing bracket indicates that field1 and field2 are used at least once and may be used more than once as group.

### 5.2.5 ABC field1, (field2, field3)<exp>

<exp> indicates that field2 and field3 are used in conjunction with the conditional expression, (conditional constructs are specified in 7.37). The expression <exp> refers only to the fields within the preceding curved brackets (). Usage of conditional expressions is optional.

## 6 EDD and EDDL model

### 6.1 Overview of EDD and EDDL

An Electronic Device Description (EDD) contains all device parameters 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.

### 6.2 EDD architecture

From the viewpoint of the ISO/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.

### 6.3 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;
- description of the transferred data sets.

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

- in a device;
- 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, for example, manufacturer, device type, revision, etc. This is used to match a specific EDD to a specific device.

## 6.4 Principles of the EDD development process

### 6.4.1 General

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

### 6.4.2 EDD source generation

The EDD generation process is shown in Figure 2.

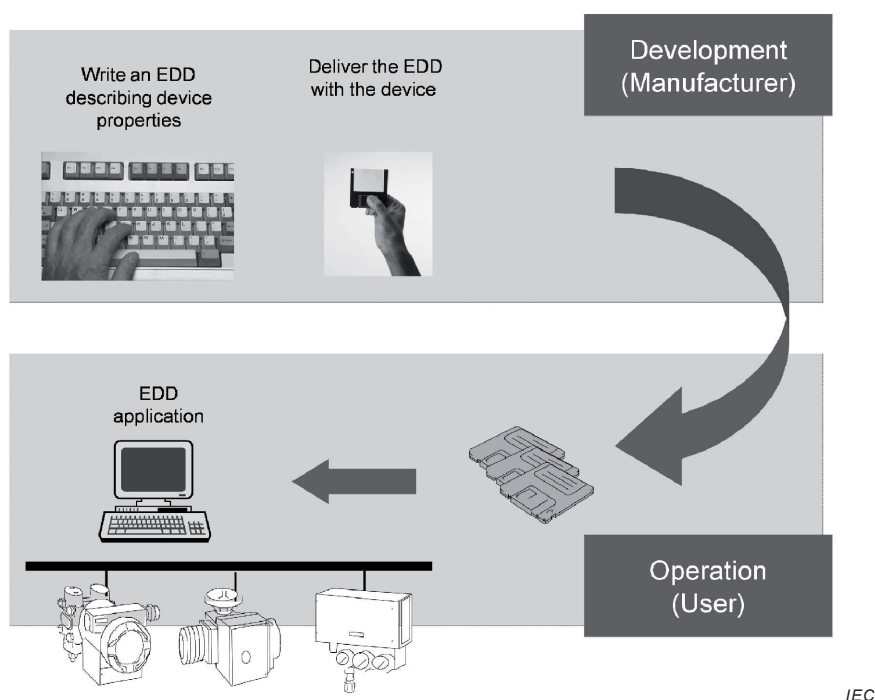


**Figure 2 – EDD generation process**

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.

#### 6.4.3 EDD preprocessing

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

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.

#### 6.4.4 EDD compilation

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

### 6.5 Interrelations between the lexical structure and formal definitions

The lexical structure of EDDL and its elements are described in Clause 7. 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 may be developed as an additional option.

### 6.6 Builtins

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

EXAMPLE A hand-held terminal is a simple device having a small display and limited cursor functions. For this type of device, a Builtin could be specified to provide display entry using only up/down right/left cursor actions.

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

### 6.7 Profiles

EDDL is a harmonized specification of existing legacy EDD concepts. Concrete EDD applications use a subset of the EDDL specification. Selection of EDDL elements and Builtins is made from the profiles defined in Annex D.

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.

## 7 Electronic Device Description Language (EDDL)

### 7.1 Overview

#### 7.1.1 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.

Compatible subsets of EDDL are permitted and may be specified using profiles (for example, choice of constructs, number of recursions, and selection of options). Profiles supported by some industrial consortia are specified in Annex D. EDD developers are required to identify within each device details as to which profile has been used.

### **7.1.2 Syntax representation**

The specification of the EDDL language in Clause 7 of this part of IEC 61804 uses an abstract syntax. The abstract lexical structure in 7.1 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 part of IEC 61804, it is possible to use other syntax definitions, which may be added in the future to allow other features and representations for future progress.

### **7.1.3 EDD language elements**

The language is structured with the following language elements:

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

Frequently used text strings, for example, help text and multi-lingual lists of labels should be separated in a text dictionary (see 7.41).

Identification information shall be the first entry in every EDD file and shall appear only once. 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.

### **7.1.4 Basic construction elements**

#### **7.1.4.1 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.

#### **7.1.4.2 AXIS**

AXIS describes the axis of a CHART or GRAPH (see 7.3).

#### **7.1.4.3 BLOB**

BLOB describes a Binary Large Object used for transferring binary data to or from a device (see 7.43).

7.1.4.4 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 7.4.1 and Figure 3).

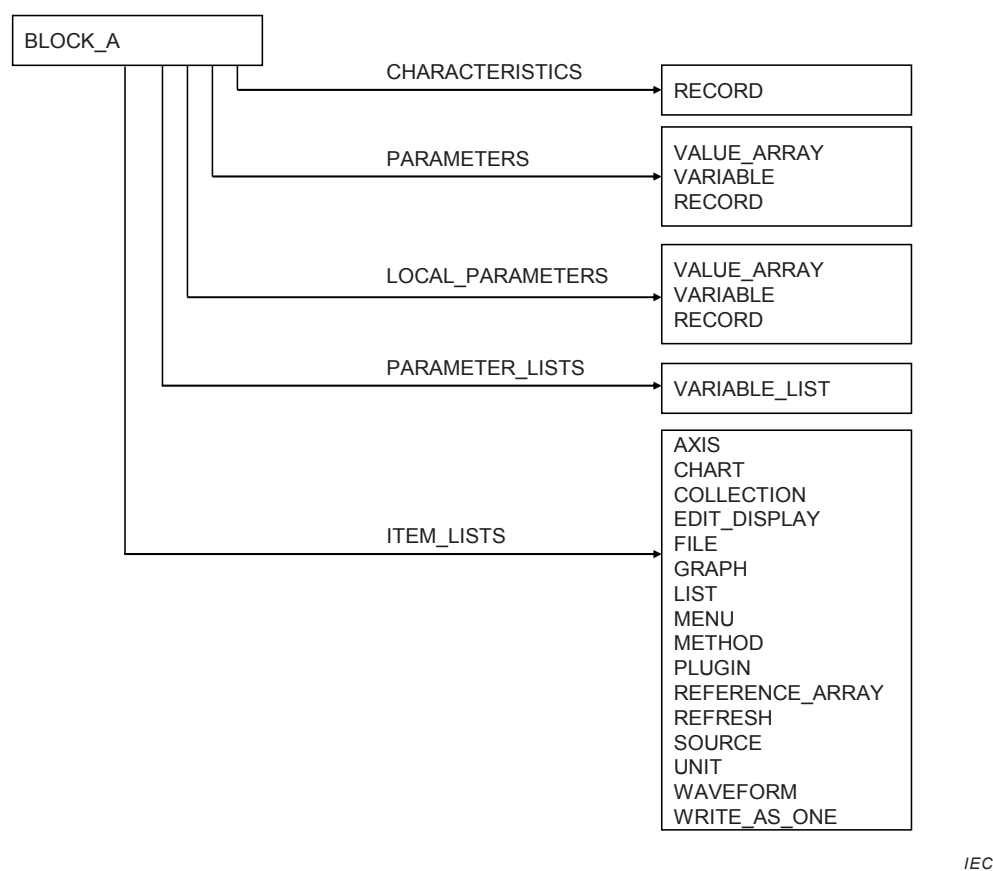


Figure 3 – BLOCK\_A

7.1.4.5 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 7.4.2).

7.1.4.6 CHART

CHART describes a chart used to display data from a device in the EDD application (see 7.5 and Figure 4).



Figure 4 – CHART

#### 7.1.4.7 COLLECTION

COLLECTION describes logical groupings of data (see 7.6 and Figure 5).

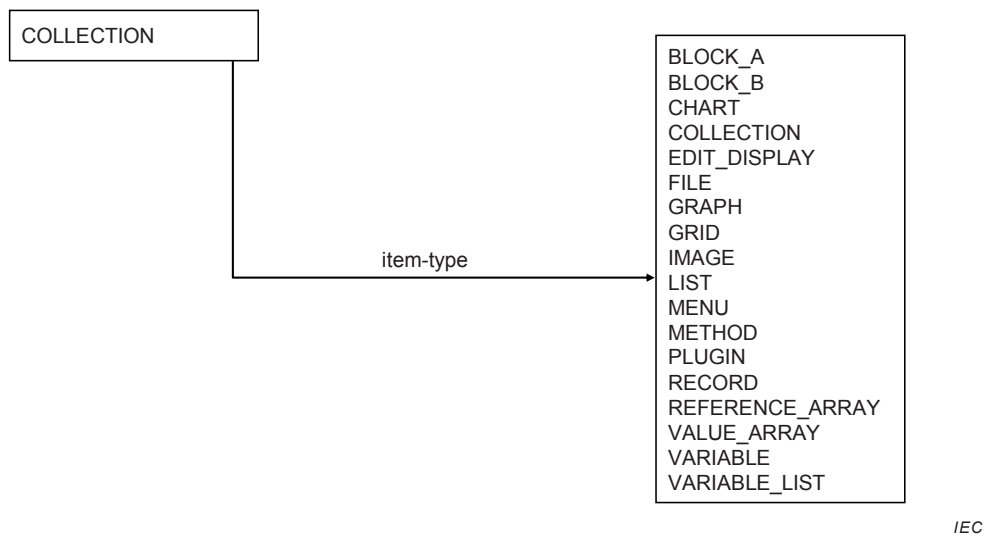


Figure 5 – COLLECTION

#### 7.1.4.8 COMMAND

COMMAND describes the structure and the addressing of the variables in the device (see 7.7 and Figure 6).

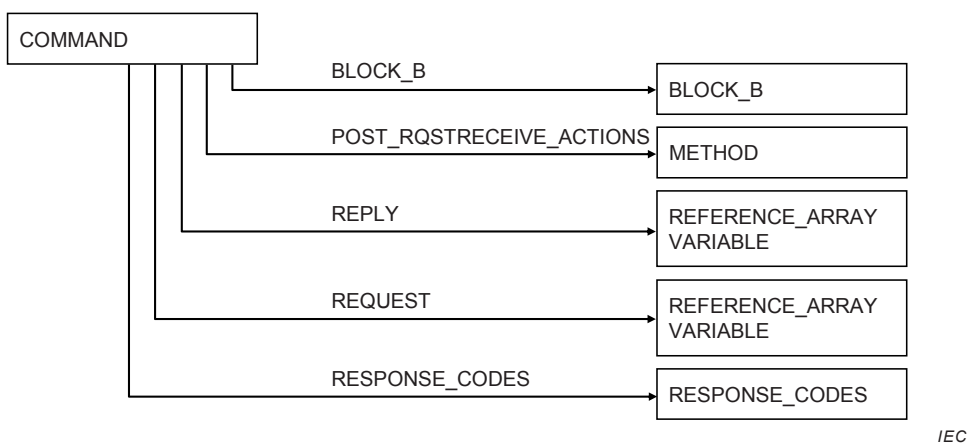


Figure 6 – COMMAND

#### 7.1.4.9 COMPONENT

COMPONENT describes the configuration behavior of the device that is described in the EDD (see 7.8 and Figure 7).

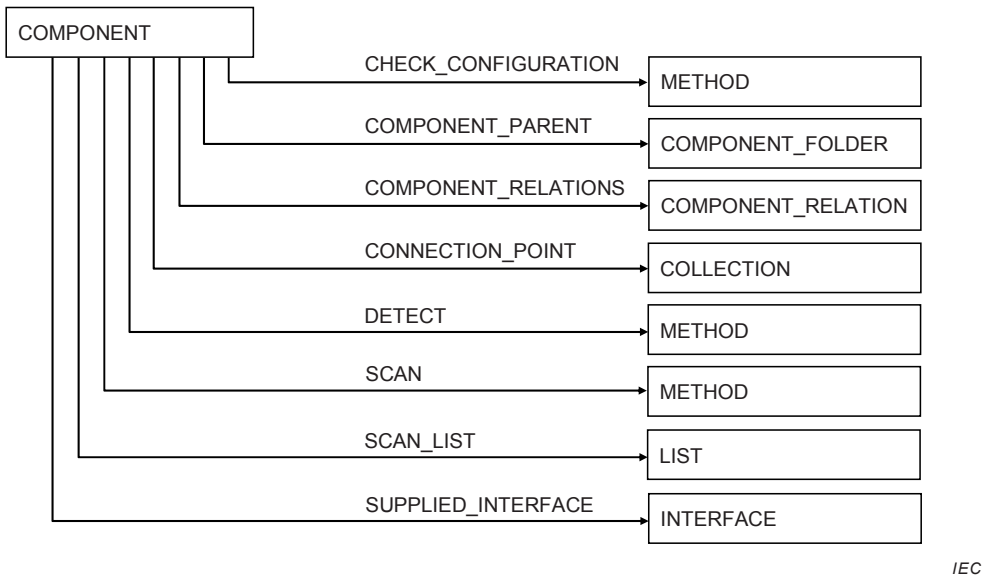


Figure 7 – COMPONENT

7.1.4.10 COMPONENT\_FOLDER

COMPONENT\_FOLDER describes a folder in a catalog. Folders allow groupings of components in a catalog (see 7.9 and Figure 8).



Figure 8 – COMPONENT\_FOLDER

7.1.4.11 COMPONENT\_REFERENCE

COMPONENT\_REFERENCE refers to a COMPONENT or a COMPONENT\_FOLDER (see 7.10 and Figure 9).



Figure 9 – COMPONENT\_REFERENCE

7.1.4.12 COMPONENT\_RELATION

COMPONENT\_RELATION specifies a relation between COMPONENTs, for example a module and one or more other modules (see 7.11 and Figure 10).

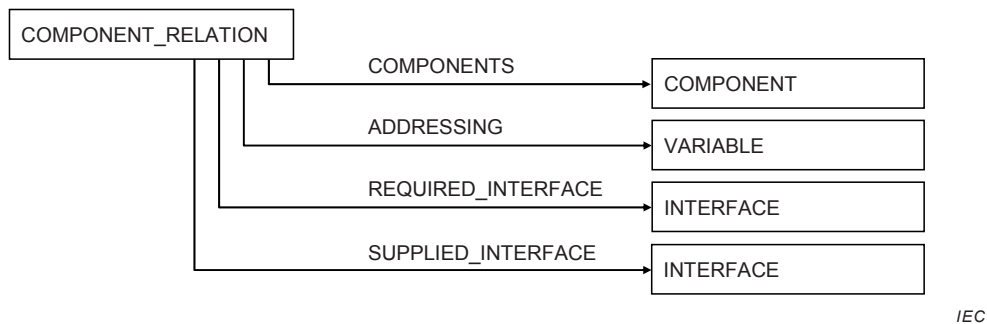


**Figure 10 – COMPONENT\_RELATION**

#### 7.1.4.13 EDIT\_DISPLAY

EDIT\_DISPLAY describes how the data will be represented to a user by a display device (see 7.14 and Figure 11).

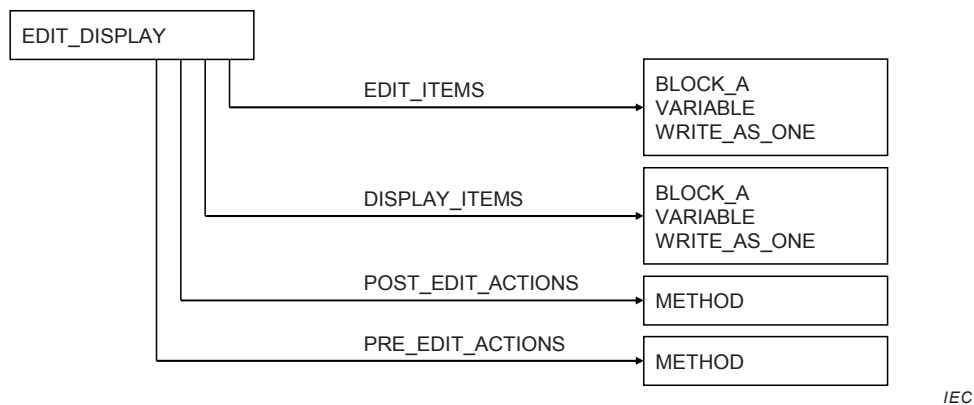


**Figure 11 – EDIT\_DISPLAY**

#### 7.1.4.14 FILE

FILE describes an area of persistent storage (see 7.15 and Figure 12).

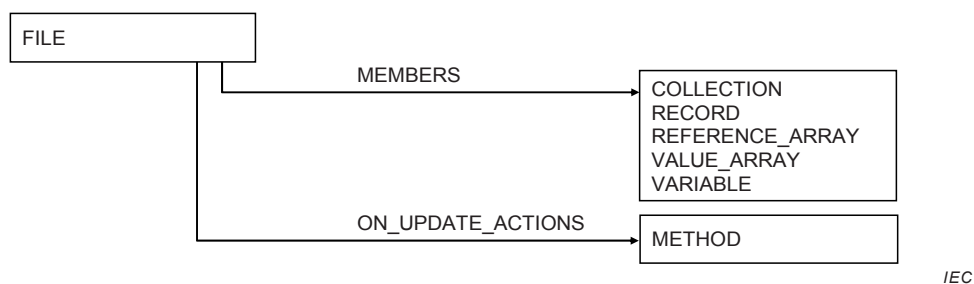


**Figure 12 – FILE**

#### 7.1.4.15 GRAPH

GRAPH describes a graph used to display data from a device in the EDD application (see 7.16 and Figure 13).

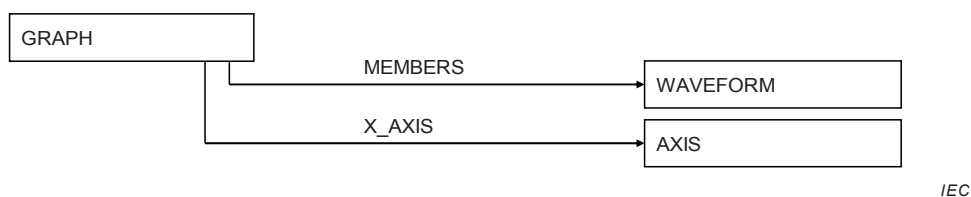


**Figure 13 – GRAPH**

#### 7.1.4.16 GRID

GRID describes a matrix used to display data from a device in the EDD application (see 7.17 and Figure 14).



**Figure 14 – GRID**

#### 7.1.4.17 IMAGE

IMAGE describes a visual image (see 7.18 and Figure 15).

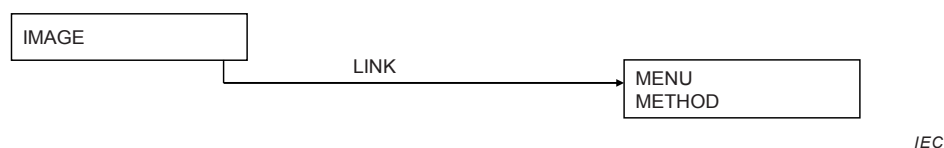


**Figure 15 – IMAGE**

#### 7.1.4.18 IMPORT

IMPORT is used to import an EDD and to modify its existing definitions (see 7.19).

#### 7.1.4.19 LIKE

LIKE creates a new instance of an existing instance of a basic construct. The attributes of the new instance may be redefined, added or deleted (see 7.21 and Figure 16).

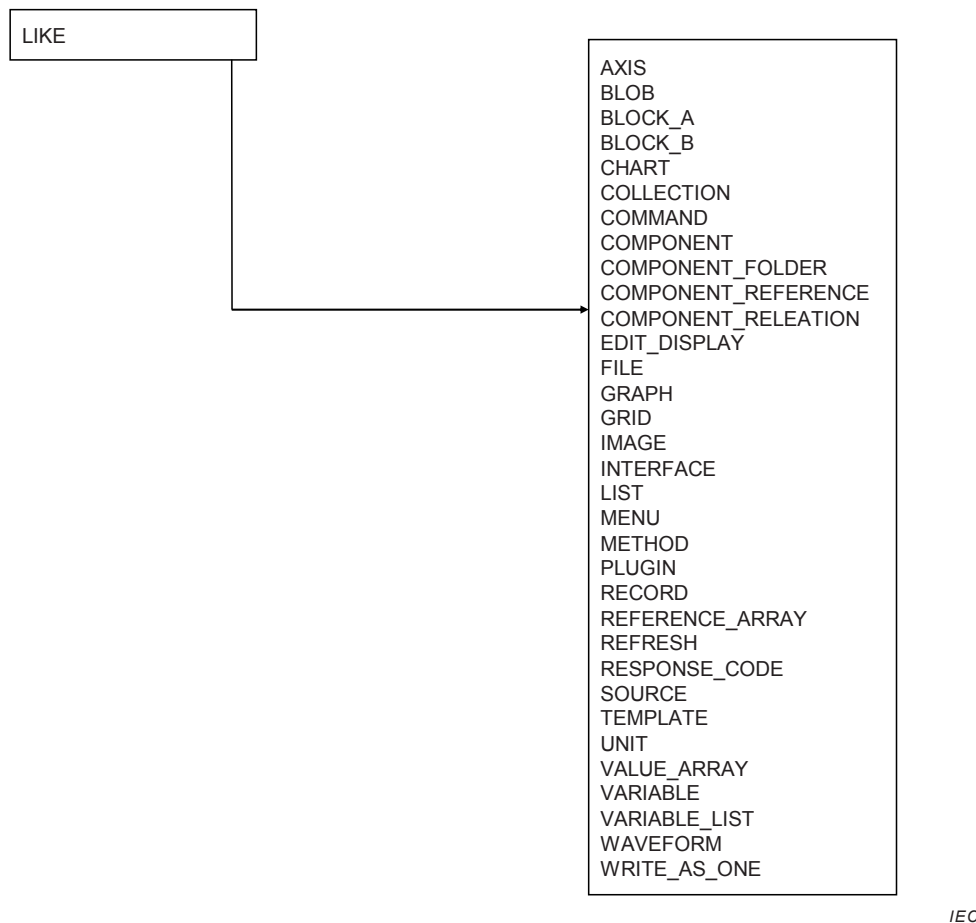


Figure 16 – LIKE

#### 7.1.4.20 LIST

LIST describes a sequence of elements (see 7.22 and Figure 17).

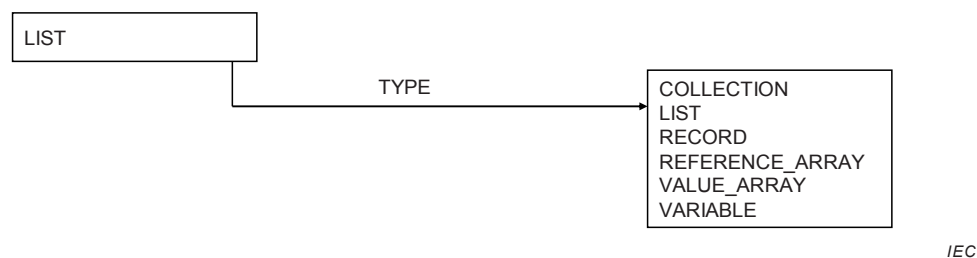


Figure 17 – LIST

#### 7.1.4.21 MENU

MENU describes how the data will be presented to a user by an EDD application (see 7.23 and Figure 18).

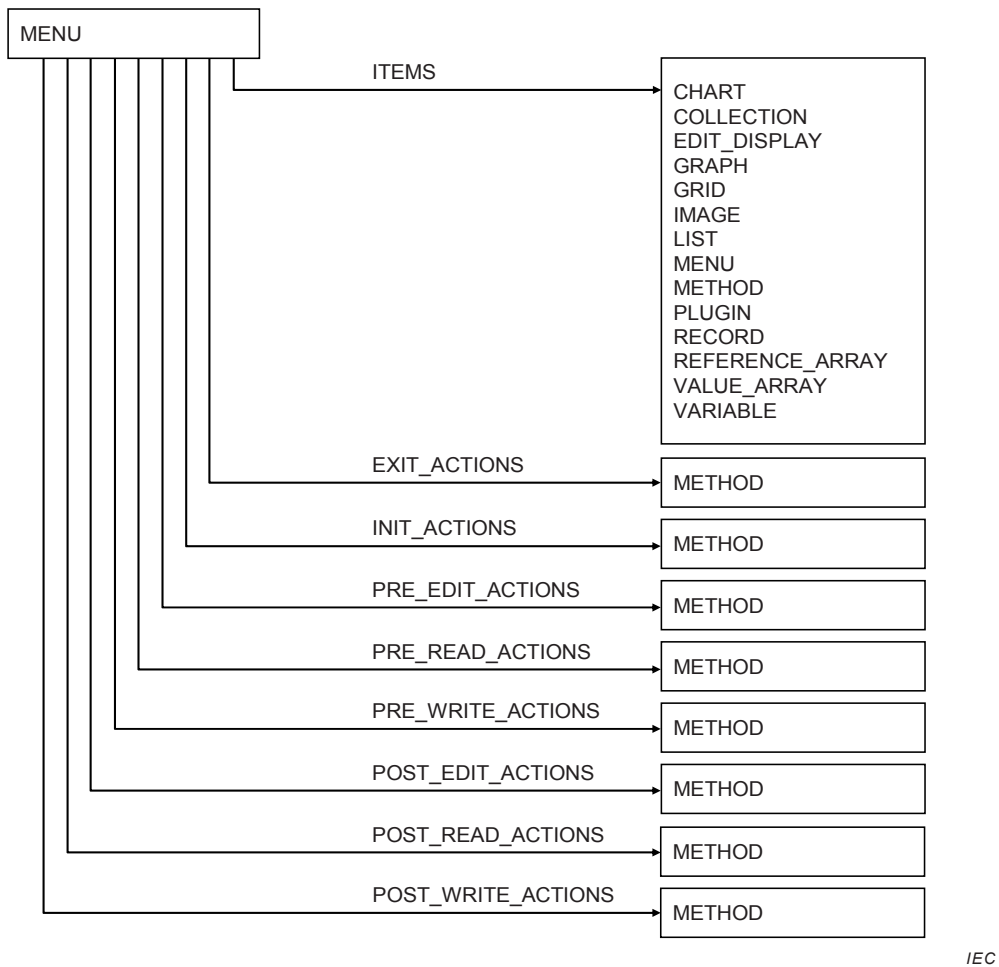


Figure 18 – MENU

7.1.4.22 METHOD

METHOD describes the execution of a complex sequence of event interactions that shall take place between system devices such as display units, configurators and devices (see 7.24).

7.1.4.23 PLUGIN

PLUGIN describes a User Interface Plug-in (UIP) as specified in 7.42.

7.1.4.24 RECORD

RECORD describes the data contained in the device (see 7.26 and Figure 19).

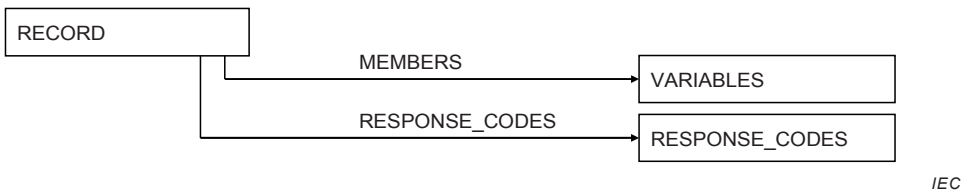


Figure 19 – RECORD

#### 7.1.4.25 REFERENCE\_ARRAY

REFERENCE\_ARRAY is a set of EDD items of the same EDDL item type (for example, VARIABLE or MENU). An item can be referenced in the EDD via the REFERENCE\_ARRAY name and the index associated with the item (see 7.27 and Figure 20).

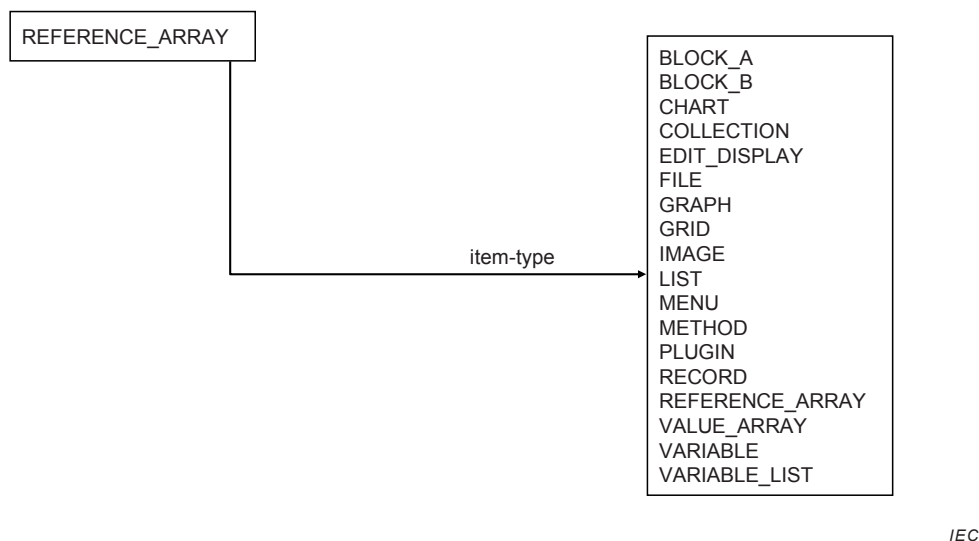


Figure 20 – REFERENCE\_ARRAY

#### 7.1.4.26 Relations

##### 7.1.4.26.1 REFRESH

REFRESH describes relationships between LISTs, RECORDs, VALUE\_ARRAYs and VARIABLES (see 7.28.1 and Figure 21).

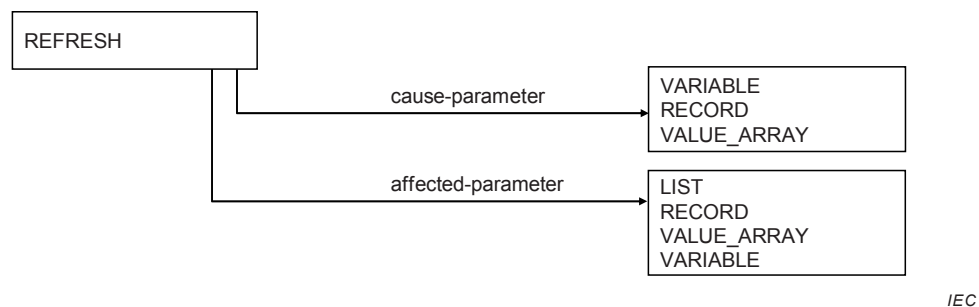


Figure 21 – REFRESH

##### 7.1.4.26.2 UNIT

UNIT describes relationships between AXISs, VALUE\_ARRAYs and VARIABLES (see 7.28.2 and Figure 22).

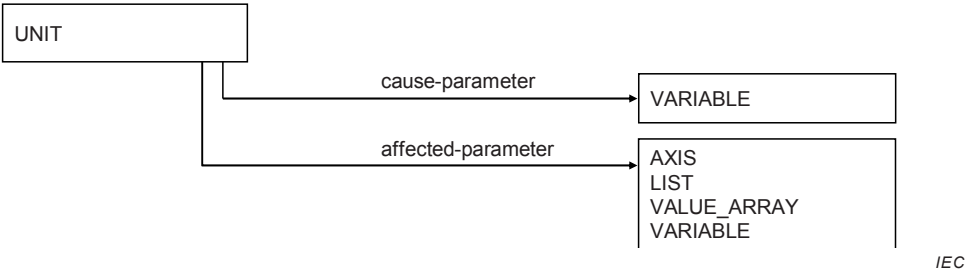


Figure 22 – UNIT

7.1.4.26.3 WRITE\_AS\_ONE

WRITE\_AS\_ONE describes relationships between VARIABLES, RECORDs, and VALUE\_ARRAYs (see 7.28.3 and Figure 23).



Figure 23 – WRITE\_AS\_ONE

7.1.4.27 RESPONSE\_CODES

RESPONSE\_CODES specifies the list of response code elements that shall be used by the EDD application to inform the user about the communication result, for example error, warning (see 7.29).

7.1.4.28 SOURCE

SOURCE describes a source of data values for a CHART (see 7.30 and Figure 24).

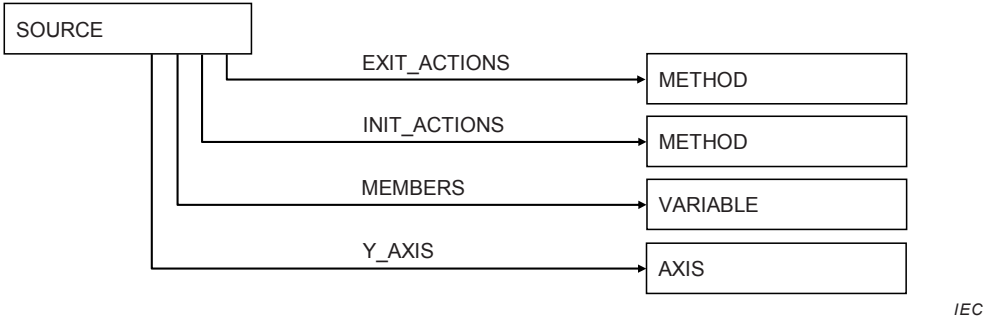


Figure 24 – SOURCE

7.1.4.29 VALUE\_ARRAY

VALUE\_ARRAY describes logical groups of EDDL variables (see 7.32 and Figure 25).

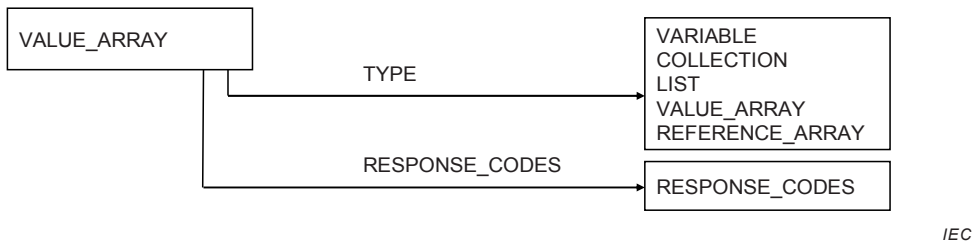


Figure 25 – VALUE\_ARRAY

7.1.4.30 VARIABLE

VARIABLE describes the data contained in the device (see 7.33 and Figure 26).

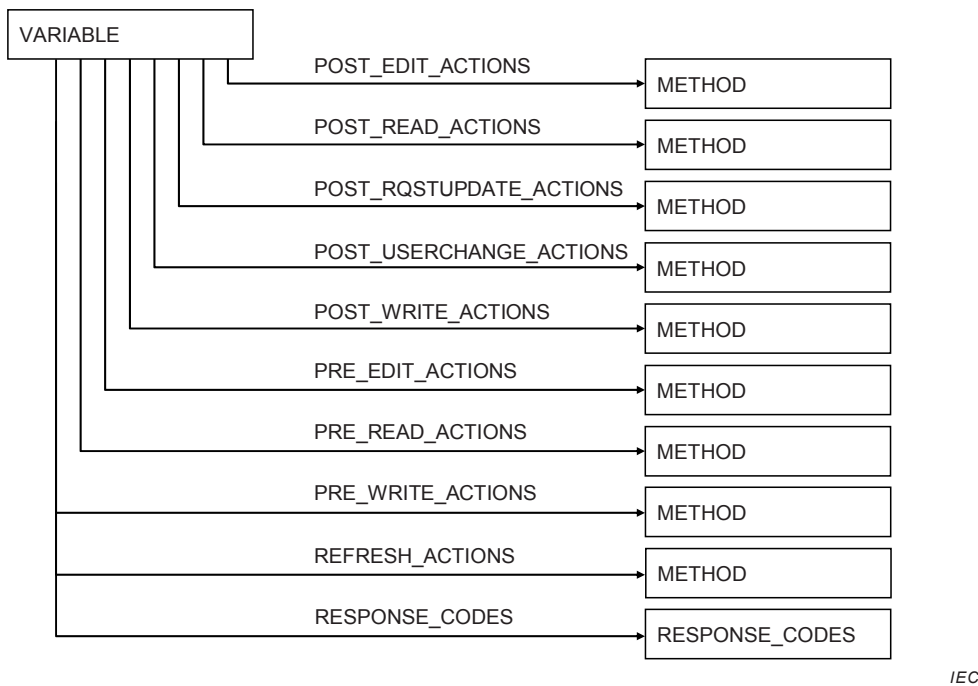


Figure 26 – VARIABLE

7.1.4.31 VARIABLE\_LIST

VARIABLE\_LIST describes logical groupings of data contained in the device that may be communicated as a list (see 7.34 and Figure 27).

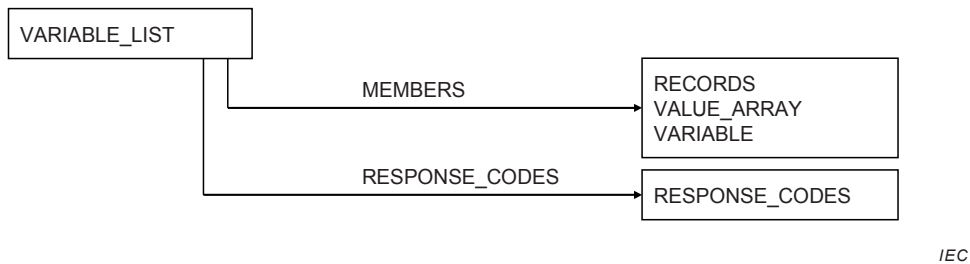
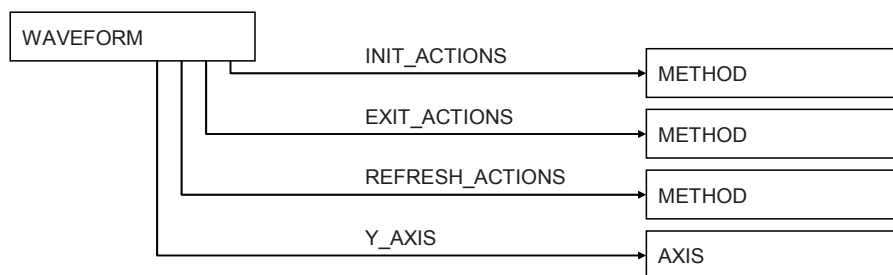


Figure 27 – VARIABLE\_LIST

#### 7.1.4.32 WAVEFORM

WAVEFORM describes a data set that may be displayed by a GRAPH (see 7.35 and Figure 28).



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Figure 28 – WAVEFORM

#### 7.1.5 Common attributes

The following common attributes are used in many basic constructs:

- CLASSIFICATION
- COMPONENT\_PARENT
- COMPONENT\_PATH
- DEFINITION
- EMPHASIS
- HANDLING
- HEIGHT
- HELP
- IDENTITY
- LABEL
- LINE\_COLOR
- LINE\_TYPE
- MEMBERS
- PRIVATE
- PROTOCOL
- RESPONSE\_CODES
- SUPPLIED\_INTERFACE
- VALIDITY
- VISIBILITY
- WIDTH
- WRITE\_MODE

#### 7.1.6 Special elements

The special elements are additional EDDL mechanisms to support file handling, multiple instances and modification of EDDL basic elements, such as:

- **Conditional Expressions** specify attributes values, which are dependent on the values of variables at run-time.
- **Reference** is used throughout a device description to refer to other items within the same EDDL.
- **Expression** is a logical or mathematical operation on variable values in order to modify attribute values of a basic construct at run-time.

#### 7.1.7 Rules for instances

Each instance of a basic construct shall be identified by an identifier of type string. This identifier shall be unique within the complete EDD. All EDDL constructs represent actual instances of device information. If a device contains two or more pieces of information which have the same structure the appropriate construct shall be repeated in the EDD with different identifiers. Alternatively the LIKE construct may be used to create a copy of the construct with a different identifier. The identifier in the lexical definition part is not described within each construct again.

#### 7.1.8 Rules for a list of VARIABLES

A list of VARIABLES may contain VARIABLES, elements of composed types or composed types. Composed types are:

- BLOCK\_A PARAMETERS
- COLLECTIONS
- RECORDS
- REFERENCE\_ARRAY
- VALUE\_ARRAY
- VARIABLE\_LISTS

Instead of referencing every single member of a composed type, a reference can be made to the type instance.

### 7.2 EDD identification information

#### 7.2.1 General structure

##### Purpose

EDD identification information uniquely identifies the device description of a specific device type from a device manufacturer. It also specifies the EDDL version and EDDL profile used.

This identification information shall be the first entry in every EDD and shall appear only once. Strict order of the keywords of the EDD identification information is not necessary.

##### Lexical structure

DD\_REVISION, DEVICE\_REVISION, DEVICE\_TYPE, EDD\_PROFILE, EDD\_VERSION,  
MANUFACTURER, MANUFACTURER\_EXT

#### 7.2.2 Specific attributes

##### 7.2.2.1 DD\_REVISION

##### Purpose

The DD\_REVISION attribute specifies a unique code for the EDD revision of this device, as defined by the manufacturer.

The manufacturer should change the revision number each time a new device description is issued for a device.

There can be multiple EDDs for a particular revision of a particular device, in which case the DD\_REVISION distinguishes them.

### Lexical structure

DD\_REVISION integer

The attribute of DD\_REVISION is specified in Table 2.

**Table 2 – DD\_REVISION attribute**

| Usage | Attribute | Description                                                                      |
|-------|-----------|----------------------------------------------------------------------------------|
| m     | integer   | Two-octet unsigned integer containing the code for a specific EDD file revision. |

### 7.2.2.2 DEVICE\_REVISION

#### Purpose

The DEVICE\_REVISION attribute specifies a unique code for the device revision of the device, as defined by the manufacturer.

### Lexical structure

DEVICE\_REVISION integer

The attribute of DEVICE\_REVISION is specified in Table 3.

**Table 3 – DEVICE\_REVISION attribute**

| Usage | Attribute | Description                                                                    |
|-------|-----------|--------------------------------------------------------------------------------|
| m     | integer   | Two-octet unsigned integer containing the code for a specific device revision. |

### 7.2.2.3 DEVICE\_TYPE

#### Purpose

The DEVICE\_TYPE attribute specifies an identifier for the device type, as defined by the manufacturer of the device. The identifier should be unique for each type.

The device type may specify either a category of devices or a specific product.

### Lexical structure

DEVICE\_TYPE (integer, identifier)

The attributes of DEVICE\_TYPE are specified in Table 4.

**Table 4 – DEVICE\_TYPE attributes**

| Usage                                                                                                                                                                                    | Attribute  | Description                                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------------------------------------------|
| s                                                                                                                                                                                        | integer    | Two-octet unsigned integer containing the code for a specific device type or group of device types.           |
| s                                                                                                                                                                                        | identifier | Reference to a two-octet integer which contains the code for a specific device type or group of device types. |
| The mapping of the identifier to an integer constant may be stored in an extra file named "devices.cfg". This file contains a list of identifiers for devices or groups of device types. |            |                                                                                                               |

#### 7.2.2.4 EDD\_PROFILE

##### Purpose

The EDD\_PROFILE attribute specifies the selected profile of the EDDL as defined in Annex D.

##### Lexical structure

EDD\_PROFILE integer

The attribute of EDD\_PROFILE is specified in Table 5.

**Table 5 – EDD\_PROFILE attribute**

| Usage | Attribute | Description                                                                                                                                                                                                                                                                                                                                                               |
|-------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| o     | integer   | Two-octet unsigned integer containing the code for the specific profiles selected from Annex D.<br><br>The following codes are currently defined:<br>0x01 Profile for HART Communication Foundation (see Clause D.4)<br>0x02 Profile for Fieldbus Foundation (see Clause D.3)<br>0x03 Profile for PROFIBUS (see Clause D.2)<br>0x04 Profile for PROFINET (see Clause D.2) |

#### 7.2.2.5 EDD\_VERSION

##### Purpose

The EDD\_VERSION attribute specifies a unique code for the EDD version, which has been used by the manufacturer in constructing the EDD. This attribute shall be included with all device descriptions conforming to this standard.

##### Lexical structure

EDD\_VERSION integer

The attribute of EDD\_VERSION is specified in Table 6.

**Table 6 – EDD\_VERSION attribute**

| Usage | Attribute | Description                                                                                |
|-------|-----------|--------------------------------------------------------------------------------------------|
| o     | integer   | Two-octet unsigned integer containing the number 1 for this first edition of the standard. |

### 7.2.2.6 MANUFACTURER

#### Purpose

The MANUFACTURER attribute identifies the manufacturer. The code allocation should be managed by the specific organizations which are responsible for the different EDDL profiles. The combination of EDD\_PROFILE and MANUFACTURER shall be unique.

#### Lexical structure

MANUFACTURER (long integer, identifier)

The attributes of MANUFACTURER are specified in Table 7.

**Table 7 – MANUFACTURER attributes**

| Usage                                                                                                                                                                   | Attribute    | Description                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| s                                                                                                                                                                       | long integer | Unsigned long integer containing the code for a specific manufacturer.<br>If all bits in the value of the integer are set to one, the lexical structure "MANUFACTURER_EXT" shall be present and identifies the manufacturer. |
| sm                                                                                                                                                                      | identifier   | Reference to an unsigned long integer which contains the code for a specific manufacturer.                                                                                                                                   |
| The mapping of the identifier to an integer constant should be stored in an extra file named "devices.cfg". This file contains a list of identifiers for manufacturers. |              |                                                                                                                                                                                                                              |

### 7.2.2.7 MANUFACTURER\_EXT

#### Purpose

The MANUFACTURER\_EXT attribute is reserved for future use. It is a placeholder for a string providing global identification for the MANUFACTURER.

NOTE The specification of this attribute will be included when it becomes internationally available.

#### Lexical structure

MANUFACTURER\_EXT string

The attribute of MANUFACTURER\_EXT is specified in Table 8.

**Table 8 – MANUFACTURER\_EXT attribute**

| Usage | Attribute | Description                                                                           |
|-------|-----------|---------------------------------------------------------------------------------------|
| c     | string    | String containing the information for a unique worldwide manufacturer identification. |

## 7.3 AXIS

### 7.3.1 General structure

#### Purpose

AXIS describes an axis of a CHART or GRAPH.

#### Lexical structure

AXIS identifier [CONSTANT\_UNIT , HELP, LABEL, MAX\_VALUE, MIN\_VALUE, SCALING]

The attributes of AXIS are specified in Table 9.

**Table 9 – AXIS attributes**

| Usage | Attribute     | Description                    |
|-------|---------------|--------------------------------|
| o     | CONSTANT_UNIT | Lexical element (see 7.3.2.1). |
| o     | HELP          | Lexical element (see 7.3.6.8). |
| o     | LABEL         | Lexical element (see 7.3.6.9). |
| o     | MAX_VALUE     | Lexical element (see 7.3.2.2). |
| o     | MIN_VALUE     | Lexical element (see 7.3.2.3). |
| o     | SCALING       | Lexical element (see 7.3.2.4). |

### **7.3.2 Specific attributes**

#### **7.3.2.1 CONSTANT\_UNIT**

##### **Purpose**

The CONSTANT\_UNIT attribute is used, if an AXIS has a unit code which never changes. The CONSTANT\_UNIT is specified as a string that will be displayed along with the value. An AXIS without a constant unit either has no units associated with it or the units are not constant.

##### **Lexical structure**

CONSTANT\_UNIT (string)<exp>

The attribute of CONSTANT\_UNIT is specified in Table 176.

#### **7.3.2.2 MAX\_VALUE**

##### **Purpose**

The MAX\_VALUE attribute specifies the value associated with the last tick mark of the AXIS. The last tick mark of an X\_AXIS and Y\_AXIS is the right-most and top-most tick mark, respectively. By default, the value associated with the last tick mark of an AXIS without a MAX\_VALUE attribute is inferred from the WAVEFORMs on the GRAPH.

##### **Lexical structure**

MAX\_VALUE (reference, double, float, integer, unsigned\_integer)<exp>

The attributes of MAX\_VALUE are specified in Table 10.