IEC 61804-2

Edition 3.0 2018-01

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Function blocks (FB) for process control and electronic device description language (EDDL) –
Part 2: Specification of FB concept

Blocs fonctionnels (FB) pour les procédés industriels et langage de description électronique de produit (EDDL) –
Partie 2: Spécification du concept de FB

IEC 61804-2:2018-01(en-fr)

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FUNCTION BLOCKS (FB) FOR PROCESS CONTROL AND ELECTRONIC DEVICE DESCRIPTION LANGUAGE (EDDL) –

Part 2: Specification of FB concept

FOREWORD

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International Standard IEC 61804-2 has been prepared by subcommittee 65E: Devices and integration in enterprice systems, of IEC technical committee 65: Industrial-process measurement, control and automation.

This third edition cancels and replaces the second edition published in 2006 and integrates parts of IEC 61804-1 which was withdrawn in January 2013. This edition constitutes a technical revision.

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

a) added command communication mapping in Clause 8;
b) moved and reword compatibility level definition from IEC 62804-1 to new Annex B and terms and definitions;

c) added proxy concept in new Annex C.

The text of this standard is based on the following documents:

FDIS	Report on voting
65E/567/FDIS	65E/576/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61804 series, published under the general title *Function blocks (FB) for process control and electronic device description language (EDDL)*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This part of IEC 61804 provides a conceptual function block (FB) specification, which can be mapped to specific communication systems and their accompanying definitions by industrial groups.

The EDDL fills the gap between the conceptual FB specification of this document and a product implementation. Figure 1 shows these aspects.

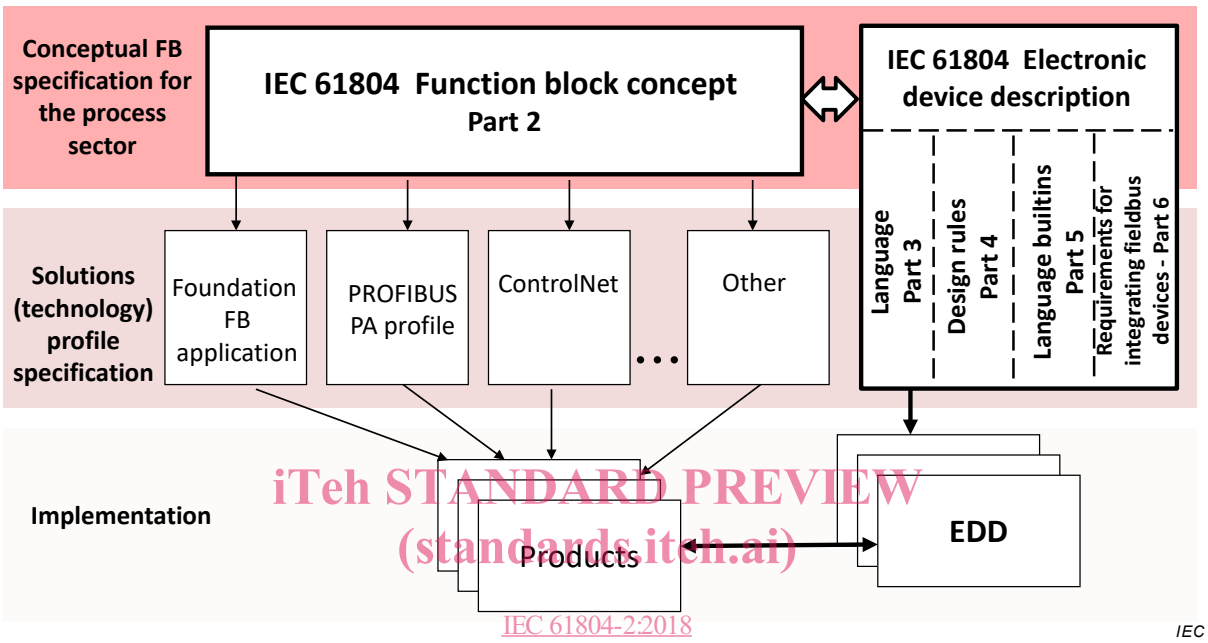

Figure 1 – Position of IEC 61804-2 related to other standards and products

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U.S. Patent No. 5,333,114
U.S. Patent No. 5,485,400
U.S. Patent No. 5,825,664
U.S. Patent No. 5,909,368
U.S. Patent Pending No. 08/916,178
Australian Patent No. 638507
Canadian Patent No. 2,066,743
European Patent No. 0495001
Validated in:
UK – Patent No. 0495001
France – Patent No. 0495001
Germany – Patent No. 69032954.7
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The IEC 61804 series has the general title "Function blocks (FB) for process control and electronic device description language (EDDL)" and consists of the following parts:

Part 2: FB concept

Part 3: Electronic device description language (EDDL)

Part 4: EDD design rules

Part 5: EDDL Builtin library

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

FUNCTION BLOCKS (FB) FOR PROCESS CONTROL AND ELECTRONIC DEVICE DESCRIPTION LANGUAGE (EDDL) –

Part 2: Specification of FB concept

1 Scope

This part of IEC 61804 is applicable to function blocks (FB) for process control.

This document specifies FB by using the result of a harmonization work as regards several elements.

a) The device model which defines the components of an IEC 61804-2 conformant device.

b) Conceptual specifications of FBs for measurement, actuation and processing. This includes general rules for the essential features to support control, whilst avoiding details which stop innovation as well as specialization for different industrial sectors.

c) The electronic device description (EDD) technology, which enables the integration of real product details using the tools of the engineering life cycle.

The standardization work for FB was carried out by harmonizing the description of concepts of existing technologies. It results in an abstract level that allowed the definition of the common features in a unique way. This abstract vision is called here the "conceptual FB specification" and is mapped to specific communication systems and their accompanying definitions by the industrial groups.

NOTE This document can be mapped to ISO 15745-1.

There are solutions on the market today, which fulfil the requirements of this document and show how the conceptual specification is implemented in a given technology. New technologies will need to find equivalent solutions (see Figure 4).

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 61158 (all parts), *Industrial communication networks – Fieldbus specifications*

IEC 61499-1:2012, *Function blocks – Part 1: Architecture*

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

3 Terms, definitions, abbreviated terms and conventions

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

3.1.1
performance
quantitative or qualitative level of a property at any point in time considered

[SOURCE: ISO 15686-1:2011, 3.15, modified – The second term "performance in use" has been deleted. In the definition, the words "quantitative or" have been added and the word "critical" has been deleted.]

3.1.2
semantics
relationships between the symbolic elements and their meanings, interpretation and use

[SOURCE: IEC 61131-3:2013, 3.85, modified – The words "of a programming language" have been deleted.]

3.1.3
algorithm
finite set of well-defined rules for the solution of a problem in a finite number of *operations*

3.1.4
application

software functional unit that is specific to the solution of a problem in industrial-process measurement and control

Note 1 to entry: An application may be distributed among *resources*, and may communicate with other applications.

3.1.5
application function block
application FB
FB which has no input or output to the process

3.1.6
attribute
property or characteristic of an entity, for instance, the version identifier of an FB type specification

Note 1 to entry: The formal description of attributes is part of the solution profiles to get domain specific interoperability. IEC 61804 (all parts) defines the general rules to define the attributes and specifies the EDDL to describe attributes, which may be described in solution profiles.

[SOURCE: IEC 61499-1:2012, 3.6, modified – A note to entry has been added.]

3.1.7
Builtin
predefined subroutine for communication and display executed by the EDD application

3.1.8
coexistence
ability of two or more devices to operate independently of one another in the same network respecting the common rules for sharing the same medium

3.1.9
compatibility
ability of a device to provide the set of functions and data required by an application for a specific role in the physical process

Note 1 to entry: Function comprises application and communication functions including the dynamic behavior.

Note 2 to entry: Data comprises communication frame format and order as well as data type definitions up to semantical description of the functions.

3.1.10
component function block
component FB
FB instance which is used in the specification of an algorithm of a composite FB type

Note 1 to entry: A component FB can be an FB or composite FB type.

3.1.11
composite FB type
FB type whose algorithms are expressed entirely in terms of interconnected component FBs and variables

[SOURCE: IEC 61499-1:2012, 3.16, modified – The words "and the control of their execution" and "event" have been deleted.]

3.1.12
configuration
<of a system or device> selecting functional units, assigning their locations and defining their interconnections

[SOURCE: IEC 61499-1:2012, 3.18]

3.1.13
data
representation of facts, concepts or instructions in a formalized manner suitable for communication, interpretation or processing by human beings or by automatic means

[SOURCE: IEC 61499-1:2012, 3.23, modified – The definition has been rephrased.]

3.1.14
data connection
association established between functional units for conveyance of data

[SOURCE: IEC 61499-1:2012, 3.24, modified – The words "two function blocks" have been replaced by "functional units".]

3.1.15
data input
interface of an FB which receives data from a data connection

[SOURCE: IEC 61499-1:2012, 3.25]

3.1.16
data output
interface of an FB which supplies data to a data connection

[SOURCE: IEC 61499-1:2012, 3.26]

3.1.17
data type
set of values together with a set of permitted operations

[SOURCE: IEC 61499-1:2012, 3.27]

3.1.18
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, modified – The note to entry has been deleted.]

3.1.19
Device Block
FB, which has no input and no output

3.1.20
device management application
application whose primary function is the management of multiple resources within a device

[SOURCE: IEC 61499-1:2012, 3.30]

3.1.21
EDD application
program using the EDD, or any translated form, which offers functionality such as communication representation, data representation, graphical representation, etc.

3.1.22
EDDL processor
processor or program, which translates the EDD into an executable form that can be processed by an EDD application

3.1.23
EDDL profile
selection of the supported elements of the EDDL lexical structure including the syntax definitions for a number of specific consortia

3.1.24
electronic device description language
EDDL
methodology for describing parameter(s) of a automation system component

3.1.25
electronic device description
EDD
data collection containing the device parameter(s), their dependencies, 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 electronic device description language (EDDL).

3.1.26
electronic device description source
EDDS
ASCII file containing a specific device description

3.1.27
electronic device description technology
EDDT
technology which includes the EDD development process, the EDD usage and the involved tool chain

3.1.28
electronic device description language compiler
tool which translates the EDD source in an internal format that is used by the EDD interpreter

3.1.29
electronic device description interpreter
EDDI
tool 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

3.1.30
entity
particular thing, such as a person, place, process, object, concept, association, or event

[SOURCE: IEC 61499-1:2012, 3.31]

3.1.31
event
instantaneous occurrence that is significant to scheduling the execution of an algorithm

Note 1 to entry: The execution of an algorithm may make use of variables associated with an event.

[SOURCE: IEC 61499-1:2012, 3.32]

3.1.32
exception
event that causes suspension of normal execution

[SOURCE: IEC 61499-1:2012, 3.36]

3.1.33
function
intended purpose of an entity or its characteristic action

[SOURCE: IEC 61499-1:2012, 3.44, modified – The word "specific" has been replaced by "intended".]

3.1.34
functional unit
entity of hardware or software, or both, capable of accomplishing a specified purpose

[SOURCE: IEC 61499-1:2012, 3.48]

3.1.35
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 61499-1:2012, 3.45, modified – The definition has been rephrased and the second note to entry has been deleted.]