

BS EN 61800-7-1:2016



BSI Standards Publication

# Adjustable speed electrical power drive systems

Part 7-1: Generic interface and use of  
profiles for power drive systems —  
Interface definition

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**National foreword**

This British Standard is the UK implementation of EN 61800-7-1:2016. It is identical to IEC 61800-7-1:2015. It supersedes BS EN 61800-7-1:2008, which will be withdrawn on 10 October 2018.

The UK participation in its preparation was entrusted to Technical Committee PEL/22, Power electronics.

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

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**Adjustable speed electrical power drive systems -  
Part 7-1: Generic interface and use of profiles for power drive  
systems - Interface definition  
(IEC 61800-7-1:2015)**

Entraînements électriques de puissance à vitesse variable -  
Partie 7-1: Interface générique et utilisation de profils pour  
les entraînements électriques de puissance - Définition de  
l'interface  
(IEC 61800-7-1:2015)

Elektrische Leistungsantriebssysteme mit einstellbarer  
Drehzahl - Teil 7-1: Generisches Interface und Nutzung von  
Profilen für Leistungsantriebssysteme (PDS) -  
Schnittstellendefinition  
(IEC 61800-7-1:2015)

This European Standard was approved by CENELEC on 2015-12-25. 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 22G/306/FDIS, future edition 2 of IEC 61800-7-1, prepared by SC 22G "Adjustable speed electric drive systems incorporating semiconductor power converters" of IEC/TC 22 "Power electronic systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61800-7-1:2016.

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) 2016-09-25
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-12-25

This document supersedes EN 61800-7-1:2008.

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## Endorsement notice

The text of the International Standard IEC 61800-7-1:2015 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 61158 Series	NOTE	Harmonized as EN 61158 Series.
IEC 61158-5-12	NOTE	Harmonized as EN 61158-5-12.
IEC 61158-5-13	NOTE	Harmonized as EN 61158-5-13.
IEC 61158-5-14	NOTE	Harmonized as EN 61158-5-14.
IEC 61158-5-16	NOTE	Harmonized as EN 61158-5-16.
IEC 61158-5-19	NOTE	Harmonized as EN 61158-5-19.
IEC 61158-5-23	NOTE	Harmonized as EN 61158-5-23.
IEC 61158-6-12	NOTE	Harmonized as EN 61158-6-12.
IEC 61158-6-13	NOTE	Harmonized as EN 61158-6-13.
IEC 61158-6-14	NOTE	Harmonized as EN 61158-6-14.
IEC 61158-6-16	NOTE	Harmonized as EN 61158-6-16.
IEC 61158-6-19	NOTE	Harmonized as EN 61158-6-19.
IEC 61158-6-23	NOTE	Harmonized as EN 61158-6-23.
IEC 61499-1:2012	NOTE	Harmonized as EN 61499-1:2013 (not modified).
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IEC 61784-2	NOTE	Harmonized as EN 61784-2.
IEC 61800 Series	NOTE	Harmonized as EN 61800 Series.
IEC 61800-4:2002	NOTE	Harmonized as EN 61800-4:2003 (not modified).
IEC 61800-7-301	NOTE	Harmonized as EN 61800-7-301.
IEC 61800-7-302	NOTE	Harmonized as EN 61800-7-302.
IEC 61800-7-303	NOTE	Harmonized as EN 61800-7-303.
IEC 62026-3	NOTE	Harmonized as EN 62026-3.

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE 1 When 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](http://www.cenelec.eu)

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
-	-	Industrial communications subsystem based on ISO 11898 (CAN) for controller-device interfaces - Part 4: CANopen	EN 50325-4	-
IEC 61158-5-2	-	Industrial communication networks - Fieldbus specifications - Part 5-2: Application layer service definition - Type 2 elements	EN 61158-5-2	-
IEC 61158-5-3	-	Industrial communication networks - Fieldbus specifications - Part 5-3: Application layer service definition - Type 3 elements	EN 61158-5-3	-
IEC 61158-5-10	-	Industrial communication networks - Fieldbus specifications - Part 5-10: Application layer service definition - Type 10 elements	EN 61158-5-10	-
IEC 61158-6-2	-	Industrial communication networks - Fieldbus specifications - Part 6-2: Application layer protocol specification - Type 2 elements	EN 61158-6-2	-
IEC 61158-6-3	-	Industrial communication networks - Fieldbus specifications - Part 6-3: Application layer protocol specification - Type 3 elements	EN 61158-6-3	-
IEC 61158-6-10	-	Industrial communication networks - Fieldbus specifications - Part 6-10: Application layer protocol specification - Type 10 elements	EN 61158-6-10	-
IEC 61800-7	Series	Adjustable speed electrical power drive systems - Part 7: Generic interface and use of profiles for power drive systems	EN 61800-7	Series

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61800-7-201	-	Adjustable speed electrical power drive systems - Part 7-201: Generic interface and use of profiles for power drive systems - Profile type 1 specification	EN 61800-7-201	-
IEC 61800-7-202	2015	Adjustable speed electrical power drive systems - Part 7-202: Generic interface and use of profiles for power drive systems - Profile type 2 specification	EN 61800-7-202	2016
IEC 61800-7-203	-	Adjustable speed electrical power drive systems - Part 7-203: Generic interface and use of profiles for power drive systems - Profile type 3 specification	EN 61800-7-203	-
IEC 61800-7-204	2015	Adjustable speed electrical power drive systems - Part 7-204: Generic interface and use of profiles for power drive systems - Profile type 4 specification	EN 61800-7-204	2016
IEC 61800-7-304	-	Adjustable speed electrical power drive systems - Part 7-304: Generic interface and use of profiles for power drive systems - Mapping of profile type 4 to network technologies	EN 61800-7-304	-
IEC/TR 62390	2005	Common automation device - Profile guideline	-	-

## CONTENTS

FOREWORD.....	8
INTRODUCTION.....	10
1 Scope.....	14
2 Normative references .....	14
3 Terms, definitions and abbreviated terms .....	15
3.1 System definitions.....	15
3.2 General definitions.....	15
3.3 Specific definitions.....	18
3.3.1 Common definitions .....	18
3.3.2 Definitions for Annex A .....	19
3.3.3 Definitions for Annex B .....	19
3.3.4 Definitions for Annex C .....	21
3.3.5 Definitions for Annex D .....	22
3.4 Abbreviated terms.....	23
3.4.1 Common abbreviations .....	23
3.4.2 Abbreviations for Annex A .....	24
3.4.3 Abbreviations for Annex B .....	24
3.4.4 Abbreviations for Annex C .....	24
3.4.5 Abbreviations for Annex D .....	24
3.5 Conventions.....	24
4 General architecture .....	24
4.1 Generic PDS interface .....	24
4.2 Typical structure of automation systems .....	29
4.3 Structure of the logical PDS .....	30
4.4 Use cases of the PDS .....	33
4.4.1 General .....	33
4.4.2 Use case Engineering.....	33
4.4.3 Use case Operation-control .....	34
5 Functional elements .....	35
5.1 Device identification FE .....	35
5.1.1 General .....	35
5.1.2 Parameters.....	35
5.2 Device control FE .....	35
5.2.1 General .....	35
5.2.2 I/O data .....	36
5.2.3 States.....	36
5.2.4 Parameters.....	38
5.3 Communication FE.....	38
5.3.1 General .....	38
5.3.2 I/O data .....	38
5.3.3 States.....	39
5.3.4 Parameters.....	41
5.4 Basic drive FE .....	41
5.4.1 General .....	41
5.4.2 I/O data .....	42
5.4.3 States.....	43

5.4.4	Parameters .....	44
5.5	Optional application FE .....	45
6	Application modes .....	45
6.1	General.....	45
6.2	Torque control .....	46
6.3	Velocity control .....	47
6.4	Position control .....	48
7	Profile specific extensions .....	49
8	Structure for annexes .....	50
8.1	General.....	50
8.2	Structure of the annexes .....	50
Annex A (normative)	Mapping to profile CiA 402 drive and motion control.....	54
A.1	Overview.....	54
A.2	Mapping of general architecture .....	54
A.2.1	Typical structure of automation system .....	54
A.2.2	Structure of the logical PDS.....	54
A.2.3	Use cases of the PDS.....	55
A.3	Functional elements.....	55
A.3.1	Device identification FE .....	55
A.3.2	Device control FE .....	56
A.3.3	Communication FE .....	57
A.3.4	Basic drive FE .....	58
A.3.5	Optional application functions FE.....	59
A.4	Application modes.....	60
A.4.1	General .....	60
A.4.2	Torque control .....	60
A.4.3	Velocity control.....	61
A.4.4	Position control.....	64
Annex B (normative)	Mapping to profile CIP Motion™ .....	67
B.1	Overview.....	67
B.2	Mapping of general architecture .....	67
B.2.1	Typical structure of automation systems .....	67
B.2.2	Structure of the logical PDS.....	68
B.2.3	Use cases of the PDS.....	69
B.3	Functional elements.....	70
B.3.1	Device identification FE .....	70
B.3.2	Device control FE .....	70
B.3.3	Communication FE .....	72
B.3.4	Basic drive FE .....	74
B.4	Application modes.....	77
B.4.1	General .....	77
B.4.2	Torque control .....	78
B.4.3	Velocity control.....	79
B.4.4	Position control.....	79
B.5	Profile specific extensions.....	79
Annex C (normative)	Mapping to profile PROFIdrive .....	80
C.1	Overview.....	80
C.2	Mapping of general architecture .....	80



C.2.1	Typical structure of automation systems .....	80
C.2.2	Structure of the logical PDS.....	82
C.2.3	Use cases of the PDS.....	83
C.3	Functional elements.....	85
C.3.1	Device identification FE .....	85
C.3.2	Device control FE .....	85
C.3.3	Communication FE .....	87
C.3.4	Basic drive FE .....	88
C.3.5	Optional application functions FE.....	89
C.4	Application modes.....	90
C.4.1	General .....	90
C.4.2	Torque control .....	90
C.4.3	Velocity control.....	90
C.4.4	Position control.....	92
C.5	Profile specific extensions.....	92
Annex D (normative)	Mapping to profile SERCOS .....	93
D.1	Overview.....	93
D.2	Mapping of general architecture .....	93
D.2.1	Typical structure of automation systems .....	93
D.2.2	Structure of the logical PDS.....	95
D.2.3	Use cases of the PDS.....	95
D.3	Functional elements.....	95
D.3.1	Device identification FE .....	95
D.3.2	Device control FE .....	96
D.3.3	Communication FE .....	97
D.3.4	Basic drive FE .....	98
D.3.5	Optional application functions FE.....	100
D.4	Application modes.....	100
D.4.1	General .....	100
D.4.2	Torque control .....	102
D.4.3	Velocity control.....	103
D.4.4	Position control.....	104
D.5	Profile specific extensions.....	105
Bibliography	.....	107
Figure 1	– Structure of IEC 61800-7.....	13
Figure 2	– Definition of power drive system.....	25
Figure 3	– Example of system structures for position-control applications .....	26
Figure 4	– Examples of system structures for velocity-control applications.....	27
Figure 5	– Examples of system structures for torque-control applications .....	28
Figure 6	– Typical structure of automation systems (adapted from IEC TR 62390) .....	29
Figure 7	– Structure of the PDS with functional elements .....	31
Figure 8	– Functional elements (FE) in the logical PDS.....	32
Figure 9	– Use case for the generic PDS interface .....	33
Figure 10	– The generic interface in the use case Operation.....	34
Figure 11	– Device control FE state-chart diagram.....	37
Figure 12	– Device control FE state transition table .....	37

Figure 13 – Communication FE state-chart diagram .....	40
Figure 14 – Communication FE state transition table .....	40
Figure 15 – Optional Communication FE state-chart diagram .....	41
Figure 16 – Optional Communication FE state transition table .....	41
Figure 17 – Basic drive FE state-chart diagram .....	43
Figure 18 – Basic drive FE state transition table .....	43
Figure 19 – Optional Basic drive FE state-chart diagram .....	44
Figure 20 – Optional Basic drive FE state transition table .....	44
Figure 21 – Torque control application mode .....	46
Figure 22 – Torque control with velocity feedback application mode .....	47
Figure 23 – Velocity preset application mode .....	47
Figure 24 – Velocity control application mode .....	48
Figure 25 – Velocity control with position feedback application mode .....	48
Figure 26 – Position preset application mode .....	49
Figure 27 – Position control application mode .....	49
Figure A.1 – CiA 402 logical power drive system model .....	55
Figure B.1 – CIP Motion I/O Connection data structure .....	68
Figure B.2 – Object structure of the logical PDS .....	68
Figure B.3 – Motion Device Axis Object state machine .....	71
Figure C.1 – Overview of communication devices and services in PROFIdrive .....	81
Figure C.2 – Structure of the PROFIdrive device .....	82
Figure C.3 – PROFIdrive Axis type Drive Object .....	83
Figure C.4 – Functional block diagram of the PROFIdrive Axis type DO .....	84
Figure C.5 – Mapping of Communication FE states .....	87
Figure D.1 – Topology example .....	94
Figure D.2 – State machine of Basic drive FE .....	99
Table 1 – Structures within the scope of this part of IEC 61800-7 .....	29
Table 2 – Parameters in the Device identification FE .....	35
Table 3 – Status values for the Device control FE .....	36
Table 4 – Command values for the Device control FE .....	36
Table 5 – Parameters in the Device control FE .....	38
Table 6 – Status values for the Communication FE (see Figure 13) .....	39
Table 7 – Command values for the Communication FE (see Figure 13) .....	39
Table 8 – Status values for the optional Communication FE (see Figure 15) .....	39
Table 9 – Command values for the optional Communication FE (see Figure 15) .....	39
Table 10 – Status values of the Basic drive FE .....	42
Table 11 – Optional status values for the Basic drive FE .....	42
Table 12 – Command values for Basic drive FE .....	42
Table 13 – Optional command values for the Basic drive FE .....	43
Table 14 – Possible generic application modes .....	45
Table 15 – Set-point values for generic application modes .....	46
Table 16 – Mapping of names to profiles .....	50

Table 17 – Structure of annexes .....	51
Table 18 – Profile specific terms .....	52
Table 19 – Supported application modes .....	52
Table 20 – I/O data for profile torque mode.....	52
Table 21 – I/O data for profile velocity mode.....	53
Table 22 – I/O data for profile position mode.....	53
Table A.1 – Profile specific terms.....	54
Table A.2 – Drive device identification parameters.....	56
Table A.3 – Status values for the Device control FE.....	56
Table A.4 – Command values for the Device control FE.....	57
Table A.5 – Parameters in the Device control FE .....	57
Table A.6 – Status values for the Communication FE.....	57
Table A.7 – Command values for the Communication FE .....	58
Table A.8 – Status values for the Basic drive FE.....	58
Table A.9 – Command values for the Basic drive FE.....	58
Table A.10 – Basic drive FE parameters .....	59
Table A.11 – Optional application functions FE parameters.....	60
Table A.12 – Supported application modes .....	60
Table A.13 – I/O data for profile torque mode .....	60
Table A.14 – Parameter for profile torque mode.....	61
Table A.15 – I/O data for cyclic sync torque mode .....	61
Table A.16 – Parameter for cyclic sync torque mode.....	61
Table A.17 – I/O data for velocity mode .....	62
Table A.18 – Parameter for velocity mode.....	62
Table A.19 – I/O data for profile velocity mode.....	62
Table A.20 – Parameter for profile velocity mode .....	63
Table A.21 – I/O data for cyclic sync velocity mode.....	63
Table A.22 – Parameter for cyclic sync velocity mode.....	64
Table A.23 – I/O data for profile position mode .....	64
Table A.24 – Parameter for profile position mode.....	65
Table A.25 – I/O data for interpolated position mode.....	65
Table A.26 – Parameter for interpolated position mode.....	65
Table A.27 – I/O data for cyclic sync position mode .....	66
Table A.28 – Parameter for cyclic sync position mode .....	66
Table B.1 – Profile specific terms.....	67
Table B.2 – Mapping of parameters for the Device identification FE.....	70
Table B.3 – Mapping of status values for the Device control FE .....	71
Table B.4 – Mapping of command values for the Device control FE .....	71
Table B.5 – Mapping of parameters for the Device control FE .....	72
Table B.6 – Mapping of status values for the Communication FE .....	73
Table B.7 – Mapping of command values for the Communication FE .....	73
Table B.8 – Mapping of status values for the optional Communication FE.....	73
Table B.9 – Mapping of command values for the optional Communication FE .....	73

Table B.10 – Status values for the Basic drive FE .....	74
Table B.11 – Command values for the Basic drive FE .....	74
Table B.12 – Drive Control Mode values for the Basic drive FE .....	75
Table B.13 – Command Data Set values for the Basic drive FE .....	76
Table B.14 – Actual Data Set values for the Basic drive FE .....	76
Table B.15 – Status Data Set values for the Basic drive FE .....	77
Table B.16 – Supported application modes .....	78
Table B.17 – Set-point values for the generic application modes.....	78
Table B.18 – I/O data for profile torque mode .....	79
Table B.19 – I/O data for profile velocity mode.....	79
Table B.20 – I/O data for profile position mode .....	79
Table C.1 – Profile specific terms .....	80
Table C.2 – Parameters for device identification .....	85
Table C.3 – Status values for the Device control FE .....	86
Table C.4 – Command values for the Device control FE.....	86
Table C.5 – Device control parameters .....	86
Table C.6 – Status values of the Basic drive FE.....	88
Table C.7 – Command values of the Basic drive FE.....	88
Table C.8 – Status values for the optional Basic drive FE .....	89
Table C.9 – Command values for the optional Basic drive FE .....	89
Table C.10 – Device control parameters .....	89
Table C.11 – Supported application modes .....	90
Table C.12 – I/O data for profile velocity mode .....	91
Table C.13 – I/O data for profile velocity control mode with position feedback .....	91
Table C.14 – I/O data for profile velocity control mode (process technology).....	92
Table C.15 – I/O data for profile position preset.....	92
Table C.16 – I/O data for profile position mode .....	92
Table D.1 – Profile specific terms .....	93
Table D.2 – Device identification parameters .....	96
Table D.3 – Status values for the Device control FE .....	96
Table D.4 – Command values for the Device control FE.....	97
Table D.5 – Parameters for the Device control FE .....	97
Table D.6 – Status values for the Basic drive and Communication FEs .....	99
Table D.7 – Command values for the Basic drive and Communication FEs .....	100
Table D.8 – IDN for operation modes .....	101
Table D.9 – Supported application modes .....	102
Table D.10 – Additional application modes.....	102
Table D.11 – I/O data for profile torque mode .....	102
Table D.12 – Configuration data for torque control.....	103
Table D.13 – I/O data for profile velocity mode .....	103
Table D.14 – Configuration data for velocity control .....	104
Table D.15 – I/O data for profile position mode .....	105
Table D.16 – Configuration data for position control.....	105

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ADJUSTABLE SPEED ELECTRICAL POWER DRIVE SYSTEMS –****Part 7-1: Generic interface and use of profiles for  
power drive systems – Interface definition**

## FOREWORD

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International Standard IEC 61800-7-1 has been prepared by subcommittee SC 22G: Adjustable speed electric drive systems incorporating semiconductor power converters, of IEC technical committee TC 22: Power electronic systems and equipment.

This second edition cancels and replaces the first edition published in 2007. This edition constitutes a technical revision.

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

- a) mapping of drive profile type 1 onto additional network technologies;
- b) minor updates in the subclauses for profile types 1, 2 and 4, in relation with corresponding changes in the dedicated IEC 61800-7-20x parts.

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

FDIS	Report on voting
22G/306/FDIS	22G/321/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 of the IEC 61800 series, under the general title *Adjustable speed electrical power drive systems*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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

The IEC 61800 series is intended to provide a common set of specifications for adjustable speed electrical power drive systems.

IEC 61800-7 specifies profiles for power drive systems (PDS) and their mapping to existing communication systems by use of a generic interface model.

IEC 61800-7 describes a generic interface between control systems and power drive systems. This interface can be embedded in the control system. The control system itself can also be located in the drive (sometimes known as "smart drive" or "intelligent drive").

A variety of physical interfaces is available (analogue and digital inputs and outputs, serial and parallel interfaces, fieldbuses and networks). Profiles based on specific physical interfaces are already defined for some application areas (e.g. motion control) and some device classes (e.g. standard drives, positioner). The implementations of the associated drivers and application programmers interfaces are proprietary and vary widely.

IEC 61800-7 defines a set of common drive control functions, parameters, and state machines or description of sequences of operation to be mapped to the drive profiles.

IEC 61800-7 provides a way to access functions and data of a drive that is independent of the used drive profile and communication interface. The objective is a common drive model with generic functions and objects suitable to be mapped on different communication interfaces. This makes it possible to provide common implementations of motion control (or velocity control or drive control applications) in controllers without any specific knowledge of the drive implementation.

There are several reasons to define a generic interface:

### **For a drive device manufacturer**

- less effort to support system integrators;
- less effort to describe drive functions because of common terminology;
- the selection of drives does not depend on availability of specific support.

### **For a control device manufacturer**

- no influence of bus technology;
- easy device integration;
- independent of a drive supplier.

### **For a system integrator**

- less integration effort for devices;
- only one understandable way of modeling;
- independent of bus technology.

Much effort is needed to design a motion control application with several different drives and a specific control system. The tasks to implement the system software and to understand the functional description of the individual components may exhaust the project resources. In some cases, the drives do not share the same physical interface. Some control devices just support a single interface which will not be supported by a specific drive. On the other hand, the functions and data structures are often specified with incompatibilities. This requires the system integrator to write special interfaces for the application software and this should not be his responsibility.

Some applications need device exchangeability or integration of new devices in an existing configuration. They are faced with different incompatible solutions. The efforts to adapt a solution to a drive profile and to manufacturer specific extensions may be unacceptable. This will reduce the degree of freedom to select a device best suited for this application to the selection of the unit which will be available for a specific physical interface and supported by the controller.

This part of IEC 61800-7 is divided into a generic part and several annexes as shown in Figure 1. The drive profiles types for CiA® 402<sup>1</sup>, CIP Motion™<sup>2</sup>, PROFIdrive<sup>3</sup> and SERCOS®<sup>4</sup> are mapped to the generic interface in the corresponding annex. The annexes have been submitted by open international network or fieldbus organizations which are responsible for the content of the related annex and use of the related trademarks.

The different profile types 1, 2, 3 and 4 are specified in IEC 61800-7-201, IEC 61800-7-202, IEC 61800-7-203 and IEC 61800-7-204.

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<sup>1</sup> CiA® 402 is a registered trade mark of CAN in Automation e.V. (CiA). This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trade mark holder or any of its products. Compliance to this profile does not require use of the registered trade mark CiA® 402. Use of the registered trade mark CiA® 402 requires permission of CAN in Automation e.V. (CiA).

<sup>2</sup> CIP Motion™ is a trade mark of ODVA, Inc. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trade mark holder or any of its products. Compliance to this profile does not require use of the trade mark CIP Motion™. Use of the trade mark CIP Motion™ requires permission of ODVA, Inc.

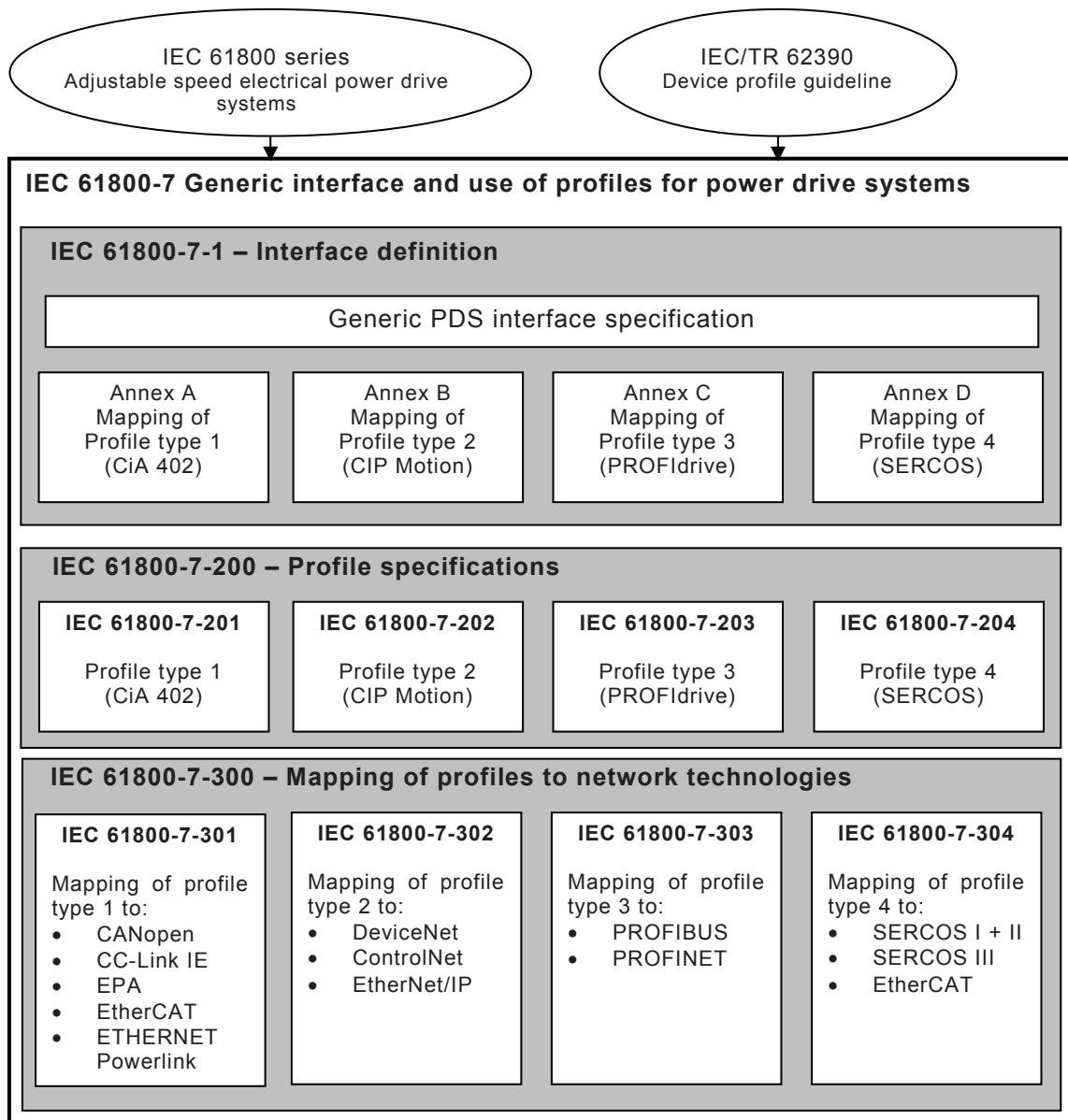
<sup>3</sup> PROFIdrive is a trade name of PROFIBUS & PROFINET International. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trade name holder or any of its products. Compliance to this profile does not require use of the trade name PROFIdrive. Use of the trade name PROFIdrive requires permission of PROFIBUS & PROFINET International.

<sup>4</sup> SERCOS® is a registered trade mark of SERCOS International e.V. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trade mark holder or any of its products. Compliance to this profile does not require use of the registered trade mark SERCOS®. Use of the registered trade mark SERCOS® requires permission of the trade mark holder.



IEC 61800-7-301, IEC 61800-7-302, IEC 61800-7-303 and IEC 61800-7-304 specify how the profile types 1, 2, 3 and 4 are mapped to different network technologies (such as CANopen®<sup>5</sup>, CC-Link IE® Field Network<sup>6</sup>, EPA™<sup>7</sup>, EtherCAT®<sup>8</sup>, Ethernet Powerlink™<sup>9</sup>, DeviceNet™<sup>10</sup>, ControlNet™<sup>11</sup>, EtherNet/IP™<sup>12</sup>, PROFIBUS<sup>13</sup>, PROFINET<sup>14</sup> and SERCOS®).

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- <sup>5</sup> CANopen® is a registered trade mark of CAN in Automation e.V. (CiA). This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trade mark holder or any of its products. Compliance to this profile does not require use of the registered trade mark CANopen®. Use of the registered trade mark CANopen® requires permission of CAN in Automation e.V. (CiA). CANopen® is an acronym for Controller Area Network *open* and is used to refer to EN 50325-4.
- <sup>6</sup> CC-Link IE® Field Network is a registered trade mark of Mitsubishi Electric Corporation. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trade mark holder or any of its products. Compliance to this profile does not require use of the registered trade mark CC-Link IE® Field Network. Use of the registered trade mark CC-Link IE® Field Network requires permission of Mitsubishi Electric Corporation.
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- <sup>9</sup> Ethernet Powerlink™ is a trade mark of Bernecker & Rainer Industrieelektronik Ges.m.b.H., control of trade mark use is given to the non-profit organization EPSG. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trade mark holder or any of its products. Compliance to this profile does not require use of the trade mark Ethernet Powerlink™. Use of the trade mark Ethernet Powerlink™ requires permission of the trade mark holder.
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- <sup>11</sup> ControlNet™ is a trade mark of ODVA, Inc. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trade mark holder or any of its products. Compliance to this profile does not require use of the trade mark ControlNet™. Use of the trade mark ControlNet™ requires permission of ODVA, Inc.
- <sup>12</sup> EtherNet/IP™ is a trade mark of ODVA, Inc. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trade mark holder or any of its products. Compliance to this profile does not require use of the trade mark EtherNet/IP™. Use of the trade mark EtherNet/IP™ requires permission of ODVA, Inc.
- <sup>13</sup> PROFIBUS is a trade name of PROFIBUS & PROFINET International. This information is given for the convenience of users of this International 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 PROFIBUS. Use of the trade name PROFIBUS requires permission of PROFIBUS & PROFINET International.
- <sup>14</sup> PROFINET is a trade name of PROFIBUS & PROFINET International. This information is given for the convenience of users of this International 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 PROFINET. Use of the trade name PROFINET requires permission of PROFIBUS & PROFINET International.



IEC

Figure 1 – Structure of IEC 61800-7

## ADJUSTABLE SPEED ELECTRICAL POWER DRIVE SYSTEMS –

### Part 7-1: Generic interface and use of profiles for power drive systems – Interface definition

#### 1 Scope

This part of IEC 61800 specifies a generic interface between power drive system(s) (PDS) and the application control program in a controller. The generic PDS interface is not specific to any particular communication network technology. Annexes of this part of IEC 61800 specify the mapping of the different drive profiles types onto the generic PDS interface.

The functions specified in this part of IEC 61800 are not intended to ensure functional safety. This requires additional measures according to the relevant standards, agreements and laws.

#### 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 61158-5-2, *Industrial communication networks – Fieldbus specifications – Part 5-2: Application layer service definition – Type 2 elements*

IEC 61158-5-3, *Industrial communication networks – Fieldbus specifications – Part 5-3: Application layer service definition – Type 3 elements*

IEC 61158-5-10, *Industrial communication networks – Fieldbus specifications – Part 5-10: Application layer service definition – Type 10 elements*

IEC 61158-6-2, *Industrial communication networks – Fieldbus specifications – Part 6-2: Application layer protocol specification – Type 2 elements*

IEC 61158-6-3, *Industrial communication networks – Fieldbus specifications – Part 6-3: Application layer protocol specification – Type 3 elements*

IEC 61158-6-10, *Industrial communication networks – Fieldbus specifications – Part 6-10: Application layer protocol specification – Type 10 elements*

IEC 61800-7 (all parts), *Adjustable speed electrical power drive systems – Generic interface and use of profiles for power drive systems*

IEC 61800-7-201, *Adjustable speed electrical power drive systems – Part 7-201: Generic interface and use of profiles for power drive systems – Profile type 1 specification*

IEC 61800-7-202:2015, *Adjustable speed electrical power drive systems – Part 7-202: Generic interface and use of profiles for power drive systems – Profile type 2 specification*

IEC 61800-7-203, *Adjustable speed electrical power drive systems – Part 7-203: Generic interface and use of profiles for power drive systems – Profile type 3 specification*