

© Copyright SEK. Reproduction in any form without permission is prohibited.

Varvtalsstyrda elektriska drivsystem – Del 7-303: Generellt gränssnitt och användning av profiler för drivsystem – Mappning av profil av typ 3 på nät

*Adjustable speed electrical power drive systems –
Part 7-303: Generic interface and use of profiles for power drive systems –
Mapping of profile type 3 to network technologies*

Som svensk standard gäller europastandarden EN 61800-7-303:2016. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61800-7-303:2016.

Nationellt förord

Europastandarden EN 61800-7-303:2016

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 61800-7-303, Second edition, 2015 - Adjustable speed electrical power drive systems - Part 7-303: Generic interface and use of profiles for power drive systems - Mapping of profile type 3 to network technologies**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61800-7-303, utgåva 1, 2008, gäller ej fr o m 2018-12-25.

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

Genom att utforma sådana standarder blir säkerhetsfordringar tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK Svensk Elstandard

Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

English Version

Adjustable speed electrical power drive systems -
Part 7-303: Generic interface and use of profiles for power drive
systems - Mapping of profile type 3 to network technologies
(IEC 61800-7-303:2015)

Entraînements électriques de puissance à vitesse variable -
Partie 7-303: Interface générique et utilisation de profils
pour les entraînements électriques de puissance - Mise en
correspondance du profil de type 3 avec les technologies
de réseaux
(IEC 61800-7-303:2015)

Elektrische Leistungsantriebssysteme mit einstellbarer
Drehzahl - Teil 7-303: Generisches Interface und Nutzung
von Profilen für Leistungsantriebssysteme (PDS) -
Abbildung von Profil-Typ 3 auf Netzwerktechnologien
(IEC 61800-7-303:2015)

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.

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

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



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

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

European foreword

The text of document 22G/313/FDIS, future edition 2 of IEC 61800-7-303, 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 61800-7-303:2016.

The following dates are fixed:

- latest date by which the document has to be (dop) 2016-09-25
implemented at national level by
publication of an identical national
standard or by endorsement
- latest date by which the national (dow) 2018-12-25
standards conflicting with the
document have to be withdrawn

This document supersedes EN 61800-7-303:2008.

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

Endorsement notice

The text of the International Standard IEC 61800-7-303:2015 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 61158-2:2014	NOTE	Harmonized as EN 61158-2:2014 (not modified).
IEC 61158-3-3:2014	NOTE	Harmonized as EN 61158-3-3:2014 (not modified).
IEC 61158-4-3:2014	NOTE	Harmonized as EN 61158-4-3:2014 (not modified).
IEC 61499-1:2005	NOTE	Harmonized as EN 61499-1:2005 ¹⁾ (not modified).
IEC 61800 Series	NOTE	Harmonized as EN 61800 Series.
IEC 61800-7:2015 Series	NOTE	Harmonized as EN 61800-7:2016 Series.
IEC 61800-7-1:2015	NOTE	Harmonized as EN 61800-7-1:2016 (not modified).
IEC 61800-7-201:2015	NOTE	Harmonized as EN 61800-7-201:2016 (not modified).
IEC 61800-7-202:2015	NOTE	Harmonized as EN 61800-7-202:2016 (not modified).
IEC 61800-7-204:2015	NOTE	Harmonized as EN 61800-7-204:2016 (not modified).
IEC 61800-7-301:2015	NOTE	Harmonized as EN 61800-7-301:2016 (not modified).
IEC 61800-7-302:2015	NOTE	Harmonized as EN 61800-7-302:2016 (not modified).
IEC 61800-7-304:2015	NOTE	Harmonized as EN 61800-7-304:2016 (not modified).

¹⁾ Superseded by EN 61499-1:2013 (IEC 61499-1:2012).

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

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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 61158-6-3	-	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 61784-1	-	Industrial communication networks - Profiles - Part 1: Fieldbus profiles	EN 61784-1	-
IEC 61784-2	-	Industrial communication networks - Profiles - Part 2: Additional fieldbus profiles for real- time networks based on ISO/IEC 8802-3	EN 61784-2	-
IEC 61800-7-203	2015	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	2016

CONTENTS

FOREWORD.....	7
INTRODUCTION.....	9
0.1 General	9
0.2 Patent declaration	12
1 Scope	14
2 Normative references	14
3 Terms, definitions and abbreviated terms	14
3.1 Terms and definitions.....	14
3.2 Abbreviated terms.....	19
4 Mapping to PROFIBUS DP	21
4.1 General.....	21
4.2 Mapping to PROFIBUS data types	21
4.3 Base Model at PROFIBUS DP.....	22
4.3.1 Communication devices	22
4.3.2 Communication relationship.....	23
4.3.3 Communication network.....	24
4.3.4 Communication services	25
4.3.5 P-Device communication model	27
4.3.6 Base Model State Machine	28
4.3.7 Definition of the CO	29
4.4 Drive Model at PROFIBUS DP	29
4.4.1 P-Device.....	29
4.4.2 Drive Unit	30
4.5 DO IO Data	30
4.5.1 COs for DO IO Data configuration.....	30
4.5.2 Standard telegram configuration	32
4.5.3 Cyclic Data Exchange between DP-Slaves (DXB)	34
4.6 Parameter Access.....	43
4.6.1 PAP for Parameter Access	43
4.6.2 Definition of the Base Mode Parameter Access mechanism	45
4.7 P-Device configuration.....	53
4.7.1 P-Device configuration on PROFIBUS DP.....	53
4.7.2 Drive Unit configuration on PROFIBUS DP	53
4.7.3 Getting the Drive Object – ID (DO-ID).....	55
4.8 Diagnosis.....	57
4.9 Clock Synchronous Operation	57
4.9.1 Sequence of an isochronous DP cycle	57
4.9.2 Time settings	58
4.9.3 Running-up, cyclic operation.....	63
4.9.4 Parameterisation, configuring (Set_Prm, GSD)	73
4.9.5 Clock cycle generation (Global Control) and clock cycle save	75
4.9.6 Monitoring mechanisms	79
4.10 PROFIBUS DP specific parameter	81
4.10.1 Overview of the communication interface related parameters.....	81
4.10.2 Definition of the specific parameters	81
4.11 Specified communication functions for the Application Classes	82

5	Mapping to PROFINET IO.....	83
5.1	General.....	83
5.2	Mapping to PROFINET IO data types.....	83
5.3	Base Model at PROFINET IO.....	84
5.3.1	Communication devices.....	84
5.3.2	Communication relationship.....	85
5.3.3	Communication network.....	86
5.3.4	Communication services.....	87
5.3.5	P-Device communication model.....	88
5.3.6	Base Model State Machine.....	90
5.3.7	Definition of the CO.....	91
5.4	Drive Model at PROFINET IO.....	91
5.4.1	P-Device.....	91
5.4.2	Drive Unit.....	92
5.4.3	DO architecture.....	92
5.4.4	Definition of the Module Ident Number and API.....	94
5.4.5	Definition of the Submodule Ident Number.....	94
5.5	DO IO Data.....	96
5.5.1	COs for DO IO Data configuration.....	96
5.5.2	IO Data Producer and Consumer Status.....	96
5.6	Parameter Access.....	96
5.6.1	PAPs for Parameter Access.....	96
5.6.2	Base Mode Parameter Access.....	97
5.7	P-Device Configuration.....	99
5.7.1	P-Device Configuration on PROFINET IO.....	99
5.7.2	Drive Unit Configuration on PROFINET IO.....	100
5.7.3	Getting the Drive Object – ID (DO-ID).....	100
5.8	Diagnosis.....	101
5.8.1	Use of PROFINET IO Diagnosis for PROFIdrive.....	101
5.8.2	Use of the Alarm ASE.....	101
5.8.3	Use of the ChannelDiagnosisData structure.....	102
5.8.4	Use of the ChannelErrorType.....	104
5.8.5	On demand access of Diagnosis Information.....	104
5.9	Clock Synchronous Operation.....	105
5.10	PROFINET IO specific parameter.....	106
5.10.1	Overview about the communication interface related parameters.....	106
5.10.2	Definition of the specific parameters.....	106
5.11	Specified communication functions for the Application Classes.....	108
5.12	I&M data records.....	108
	Bibliography.....	109
	Figure 1 – Structure of IEC 61800-7.....	12
	Figure 2 – PROFIBUS DP Devices in a PROFIdrive drive system.....	23
	Figure 3 – PROFIdrive Devices and their relationship for PROFIBUS DP.....	24
	Figure 4 – General Communication Model for PROFIdrive at PROFIBUS DP.....	25
	Figure 5 – PROFIBUS DP DXB communication designations.....	26
	Figure 6 – Synchronous communication for PROFIdrive at PROFIBUS DP.....	27
	Figure 7 – Overview about the P-Device communication model on PROFIBUS.....	27

Figure 8 – Mapping of the Base Model State Machine at PROFIBUS DP.....	29
Figure 9 – PROFIBUS DP specific logical P-Device model (multi axis drive)	30
Figure 10 – Mapping of PROFIBUS Slot to the PROFIdrive DO.....	31
Figure 11 – Application example of DXB communication.....	36
Figure 12 – Dataflow inside a Homogeneous P-Device with DXB relations.....	39
Figure 13 – Structure of a DXB Subscriber Table (inside a Prm-Block)	40
Figure 14 – Timing diagram of PROFIBUS with Cyclic Data Exchange between DP-slaves	41
Figure 15 – PAP and Parameter Access mechanism for a PROFIBUS homogeneous P-Device.....	44
Figure 16 – PAP and Parameter Access mechanism for a PROFIBUS heterogeneous P-Device.....	45
Figure 17 – Telegram sequence via MS1 AR or MS2 AR.....	47
Figure 18 – Drive Unit Structure.....	54
Figure 19 – Configuration and communication channels for the Modular Drive Unit type at PROFIBUS DP	55
Figure 20 – Meaning of parameter PNU978 (list of all DO-IDs) for the DU at PROFIBUS DP	56
Figure 21 – Example of P978 for a complex Modular Drive Unit at PROFIBUS DP	57
Figure 22 – Sequence of an isochronous DP cycle.....	58
Figure 23 – Time settings	59
Figure 24 – Example: Simplest DP cycle.....	61
Figure 25 – Example: Optimised DP cycle.....	62
Figure 26 – Example: Optimised DP cycle ($T_{MAPC} = 2 \times T_{DP}$)	63
Figure 27 – Running-up (sequence with respect to time).....	64
Figure 28 – Phase 1: Slave parameterisation, configuration.....	65
Figure 29 – Phase 2: Synchronisation of the PLL to the Clock Global Control	66
Figure 30 – Phase 3: Synchronisation of the slave application with the master's Sign-Of-Life	68
Figure 31 – State diagram of Phases 2 and 3 of the run-up.....	69
Figure 32 – Phase 4: Synchronisation of the master application to the slave's Sign-Of-Life	70
Figure 33 – Example: Running-up to cyclic operation (Phase 1) ($T_{MAPC}/T_{DP} = 2/1$).....	71
Figure 34 – Example: Running-up to cyclic operation (Phase 2) ($T_{MAPC}/T_{DP} = 2/1$).....	72
Figure 35 – Example: Running-up to cyclic operation (Phase 3) ($T_{MAPC}/T_{DP} = 2/1$).....	72
Figure 36 – Example: Running-up to cyclic operation (Phase 4) ($T_{MAPC}/T_{DP} = 2/1$).....	73
Figure 37 – Example: Running-up to cyclic operation (Phase 5) ($T_{MAPC}/T_{DP} = 2/1$).....	73
Figure 38 – PLL for clock regeneration in the slave.....	77
Figure 39 – Run time compensation.....	79
Figure 40 – DP cycle violation.....	80
Figure 41 – Example: Clock failure (fault after 4 DP cycles)	81
Figure 42 – PROFINET IO Devices in a PROFIdrive drive system.....	85
Figure 43 – PROFIdrive Devices and their relationship for PROFINET IO	86
Figure 44 – General Communication Model for PROFIdrive at PROFINET IO.....	87
Figure 45 – Synchronous communication for PROFIdrive at PROFINET IO	88

Figure 46 – Overview about the P-Device communication model on PROFINET IO	88
Figure 47 – Contents of IO AR and Supervisor AR	89
Figure 48 – M CR used for Cyclic Data Exchange between P-Devices	90
Figure 49 – Mapping of the Base Model State Machine at PROFINET IO	91
Figure 50 – PROFINET IO specific Logical P-Device model (multi axis drive)	92
Figure 51 – Representation of the PROFIdrive DO by PROFINET IO Submodules (CO).....	93
Figure 52 – Hierarchical model of the P-Device on PROFINET IO	94
Figure 53 – Modularity of the DO IO Data block (example).....	96
Figure 54 – Data flow for request and response for the Base Mode Parameter Access	99
Figure 55 – Configuration and communication channels for the Modular Drive Unit type at PROFINET IO	100
Figure 56 – Meaning of parameter P978 "List of all DO-IDs" for the DU at PROFINET IO	101
Figure 57 – Generation of Diagnosis Data according to the fault classes mechanism.....	103
Figure 58 – Sequence of an isochronous Data Cycle	105
Table 1 – Mapping of data types	22
Table 2 – DP IDs and PROFIdrive IDs of the standard telegrams.....	32
Table 3 – 1 Drive Axis, standard telegram 3.....	33
Table 4 – 2 Drive Axes, standard telegram 3.....	33
Table 5 – 2 Drive Axes, standard telegram 3, per axis one DXB link each with 2 words	34
Table 6 – 1 Drive Axis, standard telegram 20.....	34
Table 7 – Slave No.11 (Publisher)	37
Table 8 – Slave No.12 (Publisher and Subscriber)	37
Table 9 – Configuration of the DXB communication link of the coating drive.....	38
Table 10 – Slave No.10 (Subscriber)	38
Table 11 – Configuration of the DXB communication links of the unwinder.....	38
Table 12 – Parameters (Set_Prm, GSD) for slave-to-slave communication (Data- eXchange Broadcast).....	43
Table 13 – Services used for Parameter Access on PROFIBUS DP	46
Table 14 – Defined PAPs for Parameter Access.....	46
Table 15 – State machine for DP-slave processing	48
Table 16 – MS1/MS2 AR telegram frame, Write request.....	48
Table 17 – MS1/MS2 AR telegram frame, Write response	49
Table 18 – MS1/MS2 AR telegram frame, Read request	49
Table 19 – MS1/MS2 AR telegram frame, Read response	49
Table 20 – Process data ASE telegram frame, Error response	50
Table 21 – Allocation of Error class and code for PROFIdrive	51
Table 22 – Data block lengths.....	51
Table 23 – Limits due to the Process data ASE data block length	52
Table 24 – GSD parameters for the MS1/MS2 AR services	53
Table 25 – DP services for running-up, cyclic operation	63
Table 26 – Parameters (Set_Prm, GSD) for "Clock Cycle Synchronous Drive Interface"	74
Table 27 – Possible synchronisation type combinations	75

Table 28 – Conditions for Isochronous Mode	76
Table 29 – Input signals of the PLL	77
Table 30 – Output signals of the PLL	78
Table 31 – Overview of the specific PROFIBUS DP parameters for “Communication system interfaces”	81
Table 32 – PROFIdrive specific parameter listed by number	82
Table 33 – Coding of the data rate in parameter 963	82
Table 34 – Specified communication functions for the Application Classes	83
Table 35 – Mapping of data types	84
Table 36 – Structure of the Submodule-ID	95
Table 37 – Definition of Submodule-Type Classes	95
Table 38 – Definition of Parameter Access Modes (PAP)	97
Table 39 – Use of the AlarmNotification-PDU	102
Table 40 – Use of ChannelDiagnosisData	102
Table 41 – Use of ChannelErrorType	104
Table 42 – Use of the DiagnosisData	104
Table 43 – Overview of the specific PROFINET IO parameters for “Communication system interfaces”	106
Table 44 – PROFIdrive Specific Parameter listed by number	107
Table 45 – Specified communication functions for the Application Classes	108

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ADJUSTABLE SPEED ELECTRICAL POWER DRIVE SYSTEMS –**Part 7-303: Generic interface and use of profiles for power drive systems – Mapping of profile type 3 to network technologies**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

International Standard IEC 61800-7-303 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) Enhanced definition of the using of PROFINET IO Diagnosis ASE and Alarm ASE;
- b) Minor updates in the mapping of the Base Mode Parameter Access to PROFIBUS and PROFINET.

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

FDIS	Report on voting
22G/313/FDIS	22G/328/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 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

0.1 General

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.

IEC 61800-7-1 is divided into a generic part and several annexes as shown in Figure 1. The drive profile types for CiA® 402¹, CIP Motion™², PROFIdrive³ and SERCOS®⁴ 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 trade marks.

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.

This part of IEC 61800-7 specifies how the profile type 3 (PROFIdrive) is mapped to the network technologies PROFIBUS⁵ and PROFINET⁶.

¹ 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).

² 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.

³ 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.

⁴ 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.

⁵ 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.

⁶ 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 61800-7-301, IEC 61800-7-302 and IEC 61800-7-304 specify how the profile types 1, 2 and 4 are mapped to different network technologies (such as CANopen[®]7, CC-Link IE[®] Field Network8, EPA[™]9, EtherCAT[®]10, Ethernet Powerlink[™]11, DeviceNet[™]12, ControlNet[™]13, EtherNet/IP[™]14, and SERCOS[®]).

-
- ⁷ 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.
- ⁸ 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.
- ⁹ EPA[™] is a trade mark of SUPCON Group Co. Ltd. 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 EPA[™]. Use of the trade mark EPA[™] requires permission of the trade mark holder.
- ¹⁰ EtherCAT[®] is a registered trade mark of Beckhoff, Verl. 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 EtherCAT[®]. Use of the registered trade mark EtherCAT[®] requires permission of the trade mark holder.
- ¹¹ 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 organisation 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.
- ¹² DeviceNet[™] 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 DeviceNet[™]. Use of the trade mark DeviceNet[™] requires permission of ODVA, Inc.
- ¹³ 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.
- ¹⁴ 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.

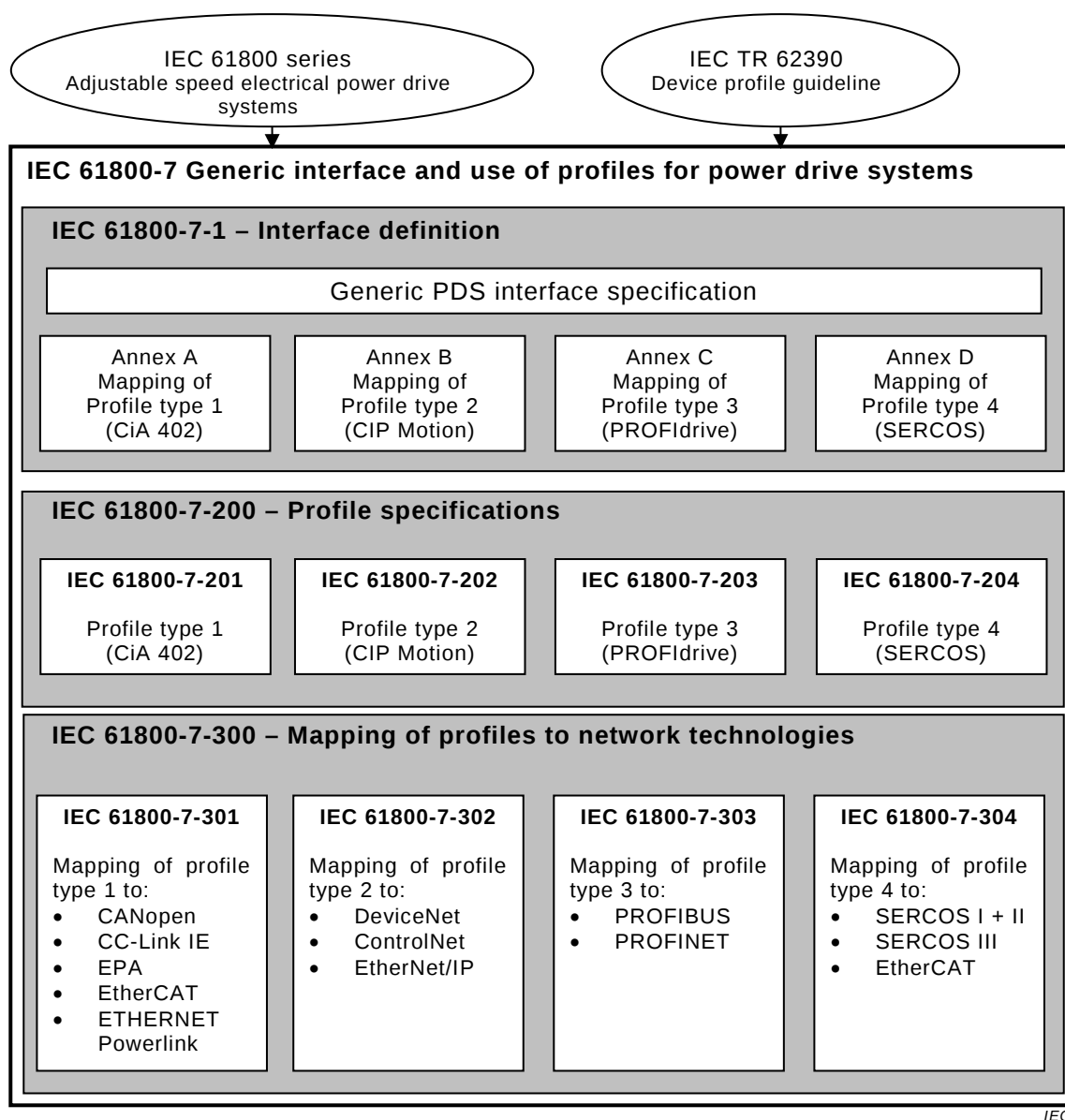


Figure 1 – Structure of IEC 61800-7

0.2 Patent declaration

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning the following.

Publication / Application serial number	Holder	Title	Derwent accession Number	Derwent publication
EP844542	[SI]	Numerical control method and control structure for controlling of movement of objects whereby speed control is effected at a higher rate than position control	1998-274369	EP844542-A1 27.05.1998; DE59603496-G 02.12.1999; EP844542-B1 27.10.1999

The IEC takes no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the IEC that he is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with IEC. Information may be obtained from

[SI]	Siemens AG Corporate Intellectual Property Licensing & Transactions Otto-Hahn-Ring 6 81730 Munich Germany
------	--

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

ISO (www.iso.org/patents) and IEC (<http://patents.iec.ch>) maintain on-line data bases of patents relevant to their standards. Users are encouraged to consult the data bases for the most up to date information concerning patents.

ADJUSTABLE SPEED ELECTRICAL POWER DRIVE SYSTEMS –

Part 7-303: Generic interface and use of profiles for power drive systems – Mapping of profile type 3 to network technologies

1 Scope

This part of IEC 61800 specifies the mapping of the profile type 3 (PROFIdrive) specified in IEC 61800-7-203 onto different network technologies.

- PROFIBUS DP, see Clause 4,
- PROFINET IO, see Clause 5.

The functions specified in this part of IEC 61800-7 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 61158-5-3, *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 61158-6-3, *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 61784-1, *Industrial communication networks – Profiles – Part 1: Fieldbus profiles*

IEC 61784-2, *Industrial communication networks – Profiles – Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC 8802-3*

IEC 61800-7-203:2015, *Adjustable speed electrical power drive systems – Part 7-203: Generic interface and use of profiles for power drive systems – Profile type 3 specification*