

**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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drive systems - Interface definition

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 61800-7-1:2008 sisaldab Euroopa standardi EN 61800-7-1:2008 ingliskeelset teksti.

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This Estonian standard EVS-EN 61800-7-1:2008 consists of the English text of the European standard EN 61800-7-1:2008.

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The standard is available from Estonian standardisation organisation.

ICS 29.200, 35.100.05

Võtmesõnad: characteristics, household applications, low-voltage fuses, marking, supplementary requirements, tests, unskilled persons

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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 61800-7-1:2007)**

Entraînements électriques de puissance
à vitesse variable -
Partie 7-1: Interface et utilisation
génériques de profils pour les
entraînements électriques de puissance -
Définition de l'interface
(CEI 61800-7-1:2007)

Elektrische Leistungsantriebssysteme
mit einstellbarer Drehzahl -
Teil 7-1: Generisches Interface
und Nutzung von Profilen
für Leistungsantriebssysteme (PDS) -
Schnittstellendefinition
(IEC 61800-7-1:2007)

This European Standard was approved by CENELEC on 2008-02-01. 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 Central Secretariat or to any CENELEC member.

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

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 22G/183/FDIS, future edition 1 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 was approved by CENELEC as EN 61800-7-1 on 2008-02-01.

This European Standard, together with its companion parts for Profile type 4 (SERCOS), partially replaces EN 61491:1998 which is at present being revised (to be issued as a Technical Report).

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2008-11-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2011-02-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61800-7-1:2007 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 61131-3:2003 (not modified).
IEC 61158	NOTE	Harmonized in EN 61158 series (not modified).
IEC 61158-5-12	NOTE	Harmonized as EN 61158-5-12:2008 (not modified).
IEC 61158-5-13	NOTE	Harmonized as EN 61158-5-13:2008 (not modified).
IEC 61158-5-16	NOTE	Harmonized as EN 61158-5-16:2008 (not modified).
IEC 61158-5-19	NOTE	Harmonized as EN 61158-5-19:2008 (not modified).
IEC 61158-6-12	NOTE	Harmonized as EN 61158-6-12:2008 (not modified).
IEC 61158-6-13	NOTE	Harmonized as EN 61158-6-13:2008 (not modified).
IEC 61158-6-16	NOTE	Harmonized as EN 61158-6-16:2008 (not modified).
IEC 61158-6-19	NOTE	Harmonized as EN 61158-6-19:2008 (not modified).
IEC 61491	NOTE	Harmonized as EN 61491:1998 (modified).
IEC 61499-1	NOTE	Harmonized as EN 61499-1:2005 (not modified).
IEC 61784-1	NOTE	Harmonized as EN 61784-1:2008 (not modified).
IEC 61784-2	NOTE	Harmonized as EN 61784-2:2008 (not modified).
IEC 61800	NOTE	Harmonized in EN 61800 series (not modified).
ISO/IEC 7498-1	NOTE	Harmonized as EN ISO/IEC 7498-1:1995 (not modified).

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<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	- ¹⁾
IEC 61158-5-2	- ¹⁾	Industrial communication networks - Fieldbus specifications - Part 5-2: Application layer service definition - Type 2 elements	EN 61158-5-2	2008 ²⁾
IEC 61158-5-3	- ¹⁾	Industrial communication networks - Fieldbus specifications - Part 5-3: Application layer service definition - Type 3 elements	EN 61158-5-3	2008 ²⁾
IEC 61158-5-10	- ¹⁾	Industrial communication networks - Fieldbus specifications - Part 5-10: Application layer service definition - Type 10 elements	EN 61158-5-10	2008 ²⁾
IEC 61158-6-2	- ¹⁾	Industrial communication networks - Fieldbus specifications - Part 6-2: Application layer protocol specification - Type 2 elements	EN 61158-6-2	2008 ²⁾
IEC 61158-6-3	- ¹⁾	Industrial communication networks - Fieldbus specifications - Part 6-3: Application layer protocol specification - Type 3 elements	EN 61158-6-3	2008 ²⁾
IEC 61158-6-10	- ¹⁾	Industrial communication networks - Fieldbus specifications - Part 6-10: Application layer protocol specification - Type 10 elements	EN 61158-6-10	2008 ²⁾
IEC 61800-7	Series	Adjustable speed electrical power drive systems - Generic interface and use of profiles for power drive systems	EN 61800-7	Series
IEC 61800-7-201	- ¹⁾	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	2008 ²⁾

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61800-7-202	- ¹⁾	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	2008 ²⁾
IEC 61800-7-203	- ¹⁾	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	2008 ²⁾
IEC 61800-7-204	- ¹⁾	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	2008 ²⁾
IEC 61800-7-301	- ¹⁾	Adjustable speed electrical power drive systems - Part 7-301: Generic interface and use of profiles for power drive systems - Mapping of profile type 1 to network technologies	EN 61800-7-301	2008 ²⁾
IEC 61800-7-302	- ¹⁾	Adjustable speed electrical power drive systems - Part 7-302: Generic interface and use of profiles for power drive systems - Mapping of profile type 2 to network technologies	EN 61800-7-302	2008 ²⁾
IEC 61800-7-303	- ¹⁾	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	EN 61800-7-303	2008 ²⁾
IEC 61800-7-304	- ¹⁾	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	2008 ²⁾
IEC/TR 62390	2005	Common automation device - Profile guideline -		-

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INTRODUCTION

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

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.

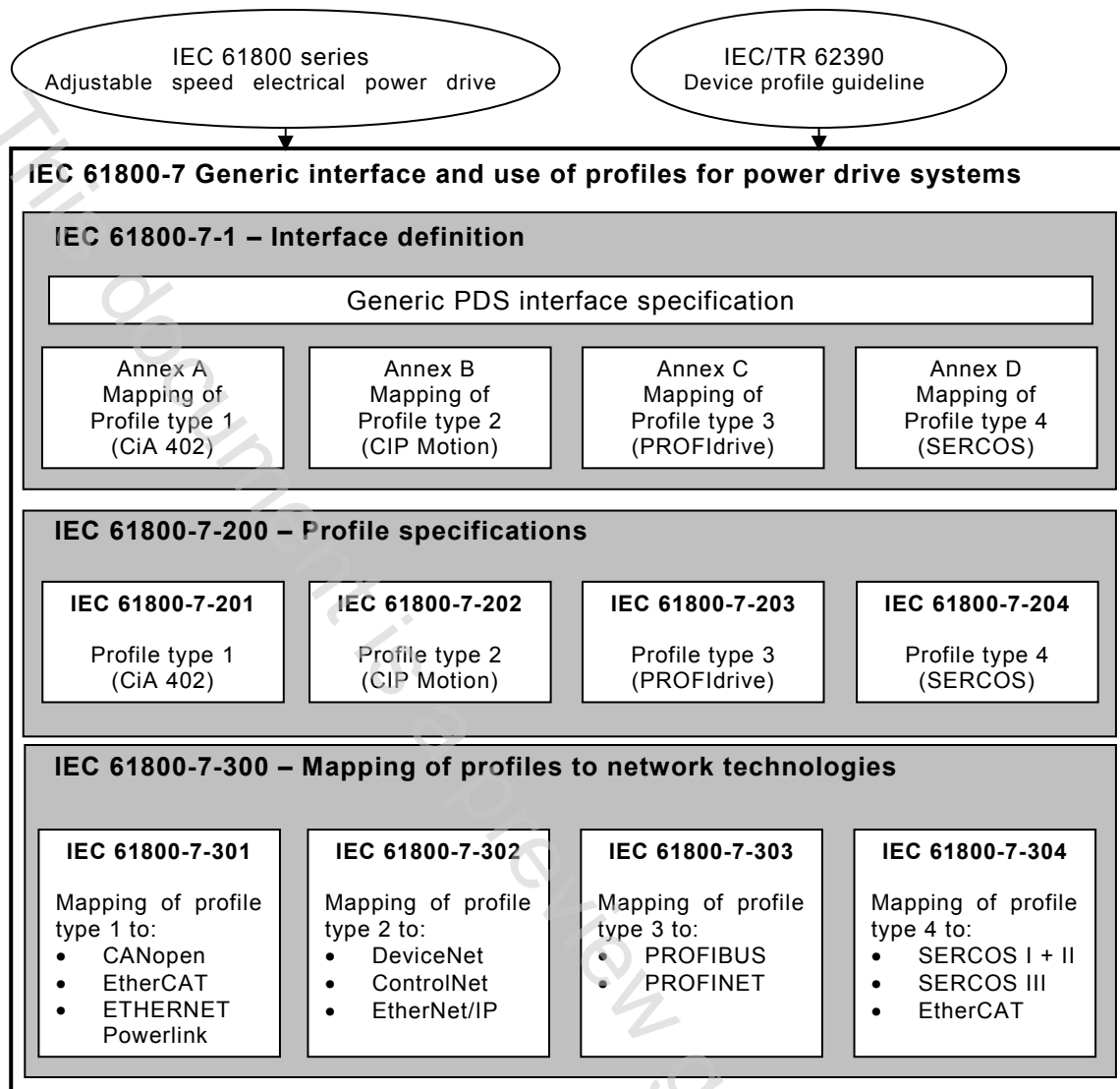
Some applications need device exchangeability or integration of new devices in an existing configuration. They are faced with different incompatible solutions. The efforts to adopt a solution to a drive profile and to manufacturer specific extensions may be unacceptable. This will reduce the degree of 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 402¹, CIP Motion^{TM2}, PROFIdrive³ and SERCOS interface^{TM4} 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.

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 CANopen⁵, EtherCAT^{TM6}, Ethernet Powerlink^{TM7}, DeviceNet^{TM8}, ControlNet^{TM9}, EtherNet/IP^{TM10}, PROFIBUS¹¹, PROFINET¹² and SERCOS interface).

-
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IEC 2106/07

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

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

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.

This part of IEC 61800-7 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 61800-7 specify the mapping of the different drive profiles types onto the generic PDS interface.

2 Normative references

The following referenced documents are indispensable for the application 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 61158-5-2, *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 61800-7-1, *Adjustable speed electrical power drive systems – Part 7-1: Generic interface and use of profiles for power drive systems – Interface definition*

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, *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*

IEC 61800-7-204, *Adjustable speed electrical power drive systems – Part 7-204: Generic interface and use of profiles for power drive systems – Profile type 4 specification*

IEC 61800-7-301, *Adjustable speed electrical power drive systems – Part 7-301: Generic interface and use of profiles for power drive systems – Mapping of profile type 1 to network technologies*

IEC 61800-7-302, *Adjustable speed electrical power drive systems – Part 7-302: Generic interface and use of profiles for power drive systems – Mapping of profile type 2 to network technologies*

IEC 61800-7-303, *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 61800-7-304, *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*

IEC/TR 62390:2005, *Common automation device – Profile guideline*

EN 50325-4, *Industrial communications subsystem based on ISO 11898 (CAN) for controller-device interfaces – Part 4: CANopen*

3 Terms, definitions and abbreviated terms

3.1 Preamble

A Power Drive System (PDS) consists of a motor and the Complete Drive Module (CDM). The complete drive module may include converter, control and self-protection functions and also some auxiliaries (for example ventilation). The PDS does not include the equipment driven by the motor.

NOTE This definition is adapted from IEC 61800-1, IEC 61800-2, IEC 61800-3 and IEC 61800-4.

A logical power drive system consists of the PDS and an interface (e.g. communication network, fieldbus or software interface) and is accessed by an application control program over the generic PDS interface as described in Figure 3 to Figure 5.

3.2 General definitions

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