

INTERNATIONAL STANDARD

NORME INTERNATIONALE



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

**Entraînements électriques de puissance à vitesse variable –
Partie 7-202: Interface générique et utilisation de profils pour les entraînements
électriques de puissance – Spécification de profil de type 2**



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ADJUSTABLE SPEED ELECTRICAL POWER DRIVE SYSTEMS –

Part 7-202: Generic interface and use of profiles for power drive systems – Profile type 2 specification

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International Standard IEC 61800-7-202 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) update of patent information;
- b) new revision of the Drive Profile and Drive Axis specifications, with multiple clarifications and enhancements.

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

FDIS	Report on voting
22G/308/FDIS	22G/323/RVD

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

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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 profiles 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 trademarks.

This part of IEC 61800-7 specifies the profile type 2 (CIP Motion™).

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

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.

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, CC-Link IE⁶ Field Network⁶, EPA⁷, EtherCAT⁸, Ethernet Powerlink⁹, DeviceNet¹⁰, ControlNet¹¹, EtherNet/IP¹², PROFIBUS¹³, PROFINET¹⁴ and SERCOS[®]).

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- ⁵ 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.
- ⁶ 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.
- ⁷ 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.
- ⁸ 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.
- ⁹ 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.
- ¹⁰ 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.
- ¹¹ 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.
- ¹² 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.
- ¹³ 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.
- ¹⁴ 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 PROFIBUS. Use of the trade name PROFIBUS requires permission of PROFIBUS & PROFINET International.

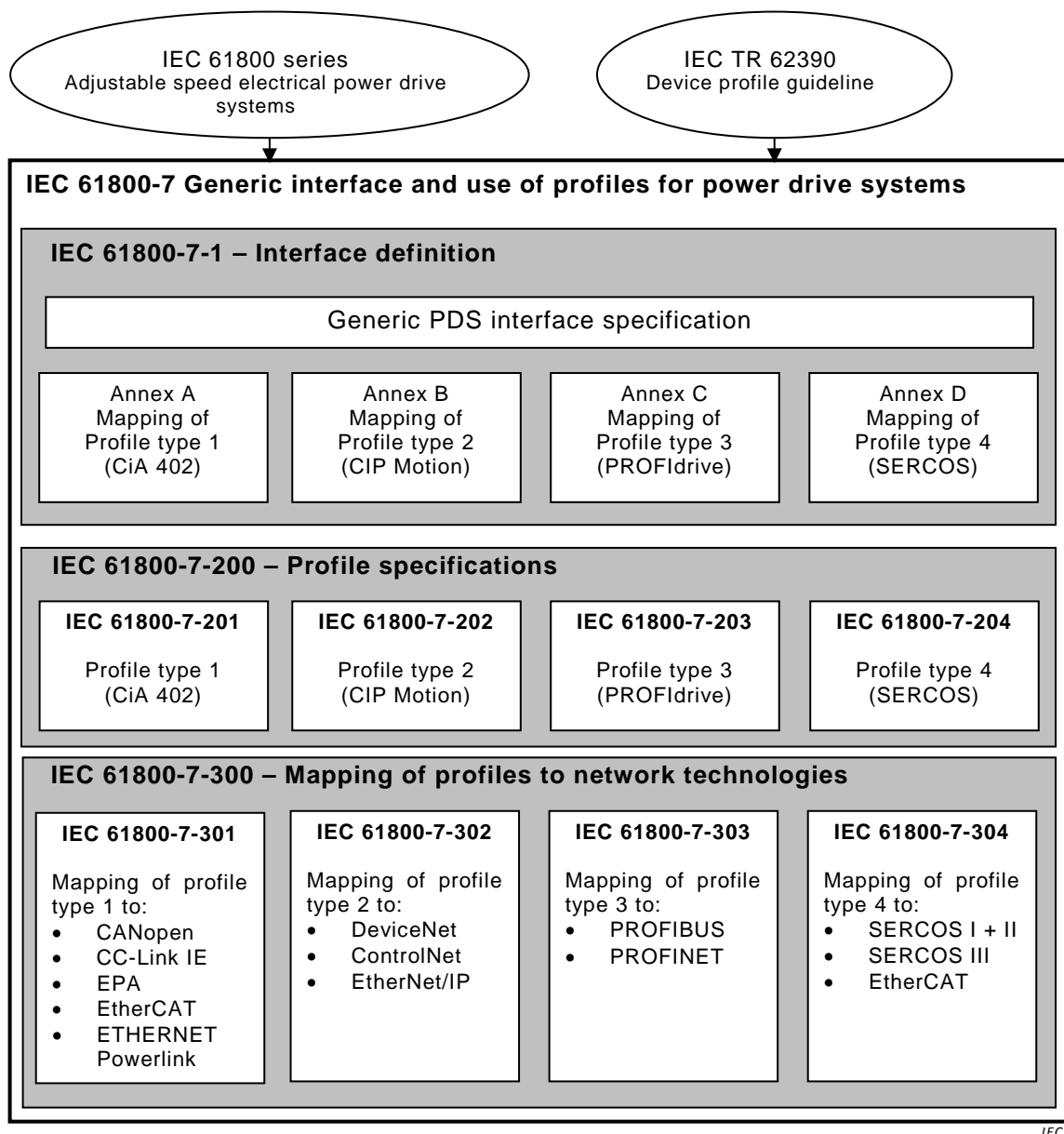


Figure 1 – Structure of IEC 61800-7

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. This patent is held by its inventors under license to ODVA, Inc:

Publication / Application serial number	Holder	Title
US 7,983,769 EP 1659465	[ODVA]	Time stamped motion control network protocol that enables balanced single cycle timing and utilization of dynamic data structures

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

ODVA and the holder of this patent right have assured the IEC that ODVA is willing to negotiate licences either free of charge or under reasonable and non-discriminatory terms and

conditions with applicants throughout the world. In this respect, the statement of ODVA and the holder of this patent right is registered with IEC. Information may be obtained from:

[ODVA]	ODVA, Inc. 2370 East Stadium Boulevard #1000 Ann Arbor, Michigan 48104 USA Attention: Office of the Executive Director email: odva@odva.org
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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 7-202: Generic interface and use of profiles for power drive systems – Profile type 2 specification

1 Scope

This part of IEC 61800 specifies profile type 2 (CIP Motion™) for Power Drive Systems (PDS). Profile type 2 can be mapped onto different communication network technologies.

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 60204-1, *Safety of machinery – Electrical equipment of machines – Part 1: General requirements*

IEC 61158-4-2:2014, *Industrial communication networks – Fieldbus specifications – Part 4-2: Data-link layer protocol specification – Type 2 elements*

IEC 61158-5-2:2014, *Industrial communication networks – Fieldbus specifications – Part 5-2: Application layer service definition – Type 2 elements*

IEC 61158-6-2:2014, *Industrial communication networks – Fieldbus specifications – Part 6-2: Application layer protocol specification – Type 2 elements*

IEC 61588:2009, *Precision clock synchronization protocol for networked measurement and control systems*

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

IEEE Std 112-2004, *IEEE Standard Test Procedure for Polyphase Induction Motors and Generators*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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