

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



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

**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**



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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**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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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.

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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 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.

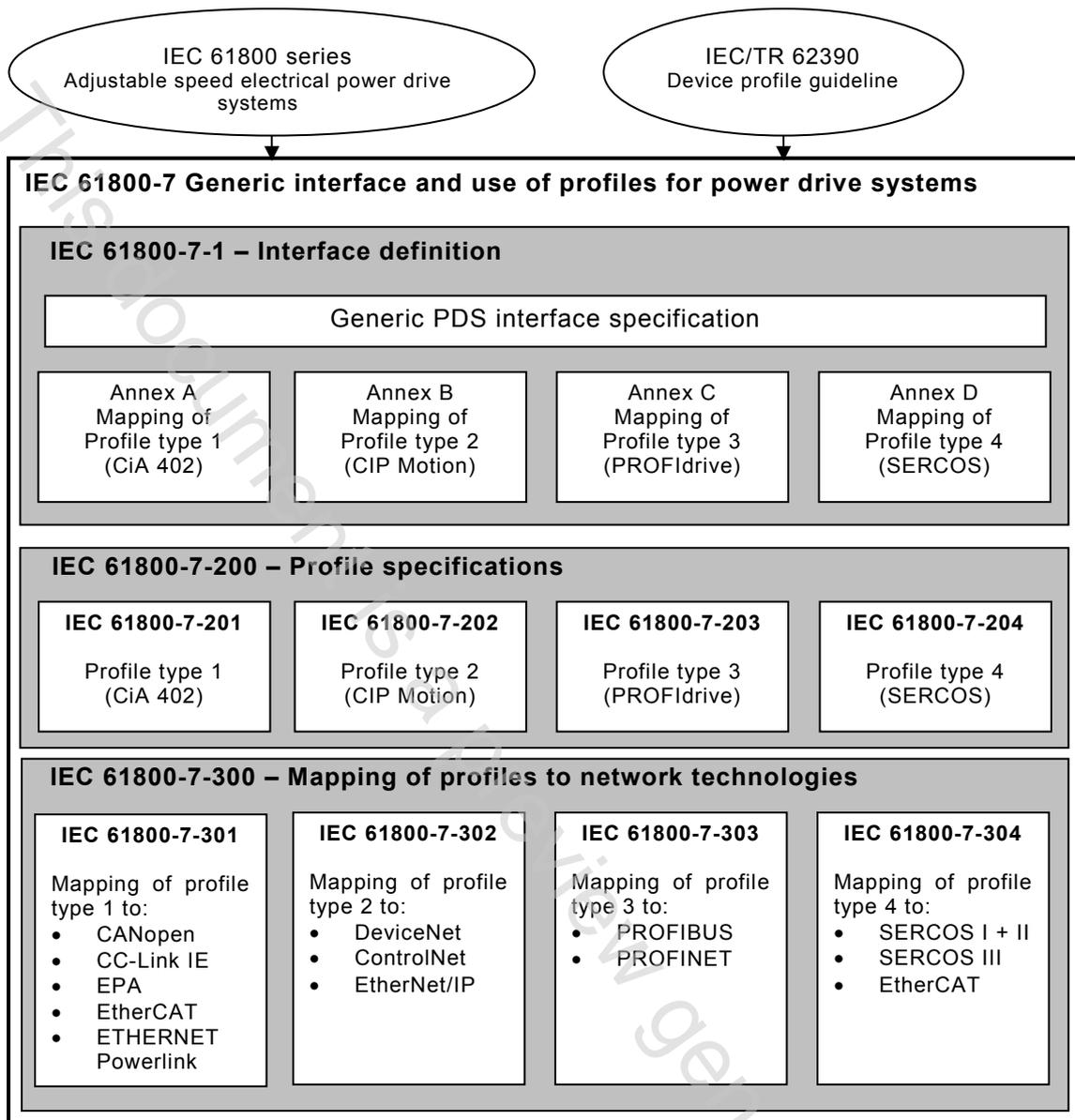
This part of IEC 61800-7 is divided into a generic part and several annexes as shown in Figure 1. The drive profiles types for CiA® 402<sup>1</sup>, CIP Motion™<sup>2</sup>, PROFIdrive<sup>3</sup> and SERCOS®<sup>4</sup> are mapped to the generic interface in the corresponding annex. The annexes have 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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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>®</sup><sup>5</sup>, CC-Link IE<sup>®</sup> Field Network<sup>6</sup>, EPA<sup>™</sup><sup>7</sup>, EtherCAT<sup>®</sup><sup>8</sup>, Ethernet Powerlink<sup>™</sup><sup>9</sup>, DeviceNet<sup>™</sup><sup>10</sup>, ControlNet<sup>™</sup><sup>11</sup>, EtherNet/IP<sup>™</sup><sup>12</sup>, PROFIBUS<sup>13</sup>, PROFINET<sup>14</sup> and SERCOS<sup>®</sup>).

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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*

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*

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

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

#### 3.1 System definitions

##### 3.1.1

##### **power drive system**

PDS

combination of a motor and the Complete Drive Module (CDM)

Note 1 to entry: 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 2 to entry: 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.

Note 3 to entry: This definition is adapted from specifications in IEC 61800-1, IEC 61800-2, IEC 61800-3 and IEC 61800-4.

Note 4 to entry: The English abbreviation PDS is also used in French.

#### 3.2 General definitions

##### 3.2.1

##### **algorithm**

completely determined finite sequence of operations by which the values of the output data can be calculated from the values of the input data

[SOURCE: IEC 60050-351:2013, 351-42-27, modified — The words "instructions" and "variables" are replaced by the words "operations" and "data" and the notes to entry are deleted.]

##### 3.2.2

##### **application**

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

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

[SOURCE: IEC TR 62390:2005, 3.1.2, modified — The term "application program" has been replaced.]

##### 3.2.3

##### **attribute**

property or characteristic of an entity