



INTERNATIONAL STANDARD

**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**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	9
2 Normative references.....	9
3 Terms, definitions and abbreviated terms.....	10
3.1 Terms and definitions.....	10
3.2 Abbreviated terms.....	15
4 Principles for mapping CIP Motion™.....	17
4.1 General principles for mapping CIP Motion™.....	15
4.2 Mapping CIP Motion™.....	16
4.3 Data types.....	17
4.4 I/O connection interface.....	17
4.4.1 General.....	17
4.4.2 I/O connection formats.....	17
4.4.3 Fixed I/O connection format.....	18
4.4.4 Variable I/O connection format.....	19
5 Mapping to DeviceNet™.....	21
5.1 Adaptation of the device model.....	21
5.2 Use of I/O data formats.....	22
6 Mapping to ControlNet™.....	23
6.1 Adaptation of the device model.....	23
6.2 Use of I/O data formats.....	24
7 Mapping to EtherNet/IP™.....	24
7.1 Adaptation of the device model.....	24
7.2 Use of I/O data formats.....	26
Bibliography.....	27
Figure 1 – Structure of IEC 61800-7.....	8
Figure 2 – Overview of CIP-based networks.....	16
Figure 3 – Connection Header.....	17
Figure 4 – Connection Format.....	18
Figure 5 – Fixed Controller to Device I/O Connection Format (fixed size = 16 bytes).....	19
Figure 6 – Fixed Device to Controller I/O Connection Format (fixed size = 16 bytes).....	19
Figure 7 – Controller-to-Device I/O connection format (variable size).....	20
Figure 8 – Device-to-Controller I/O connection format (variable size).....	21
Figure 9 – Object Model for a CIP Motion drive on DeviceNet.....	22
Figure 10 – Object Model for a CIP Motion drive on ControlNet.....	23
Figure 11 – Object Model for a CIP Motion drive on EtherNet/IP.....	25
Table 1 – Data types.....	17
Table 2 – Object classes for a CIP Motion drive device type on DeviceNet.....	22
Table 3 – Object classes for a CIP Motion drive device type on ControlNet.....	24

Table 4 – Object classes for a CIP Motion drive device type on EtherNet/IP 25

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of profiles for power drive systems –
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FOREWORD

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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
US 11/241,539	[RA]	Time Stamped Motion Control Network Protocol That Enables Balanced Single Cycle Timing and Utilization of Dynamic Data Structures

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

[RA]	Rockwell Automation, Inc. 1201 S. Second Street Milwaukee, WI 53204 USA Attention: Intellectual Property Dept.
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The International Standard IEC 61800-7-302 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.

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

FDIS	Report on voting
22G/185/FDIS	22G/185/INF/D

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 maintenance result 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.

A bilingual version of this publication may be issued at a later date.

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.

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^{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 profiles types 1, 2, 3, 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 2 (CIP MotionTM) is mapped to the network technologies DeviceNet^{TM5}, ControlNet^{TM6} and EtherNet/IP^{TM7}.

IEC 61800-7-301, IEC 61800-7-303 and IEC 61800-7-304 specify how the profile types 1, 3 and 4 are mapped to different network technologies (such as CANopen⁸, EtherCAT^{TM9}, Ethernet Powerlink^{TM10}, PROFIBUS¹¹, PROFINET¹² and SERCOS interface).

1 CiA 402 is a trade name of CAN in Automation, 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 name holder or any of its products. Compliance to this profile does not require use of the trade name CiA 402.

2 CIP MotionTM is a trade name of Open DeviceNet Vendor Association, Inc. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trademark holder or any of its products. Compliance to this profile does not require use of the trade name CIP MotionTM. Use of the trade name CIP MotionTM requires permission of Open DeviceNet Vendor Association, Inc.

3 PROFIdrive is a trade name of PROFIBUS 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 International.

4 SERCOSTM and SERCOS interfaceTM are trade names 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 name holder or any of its products. Compliance to this profile does not require use of the trade names SERCOS or SERCOS interface. Use of the trade name SERCOS and SERCOS interface requires permission of the trade name holder.

5 DeviceNetTM is a trade name of Open DeviceNet Vendor Association, Inc. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trademark holder or any of its products. Compliance to this profile does not require use of the trade name DeviceNetTM. Use of the trade name DeviceNetTM requires permission of Open DeviceNet Vendor Association, Inc.

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8 CANopen is an acronym for Controller Area Network *open* and is used to refer to EN 50325-4.

9 EtherCATTM is a trade name 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 trademark holder or any of its products. Compliance to this profile does not require use of the trade name EtherCATTM. Use of the trade name EtherCATTM requires permission of the trade name holder.

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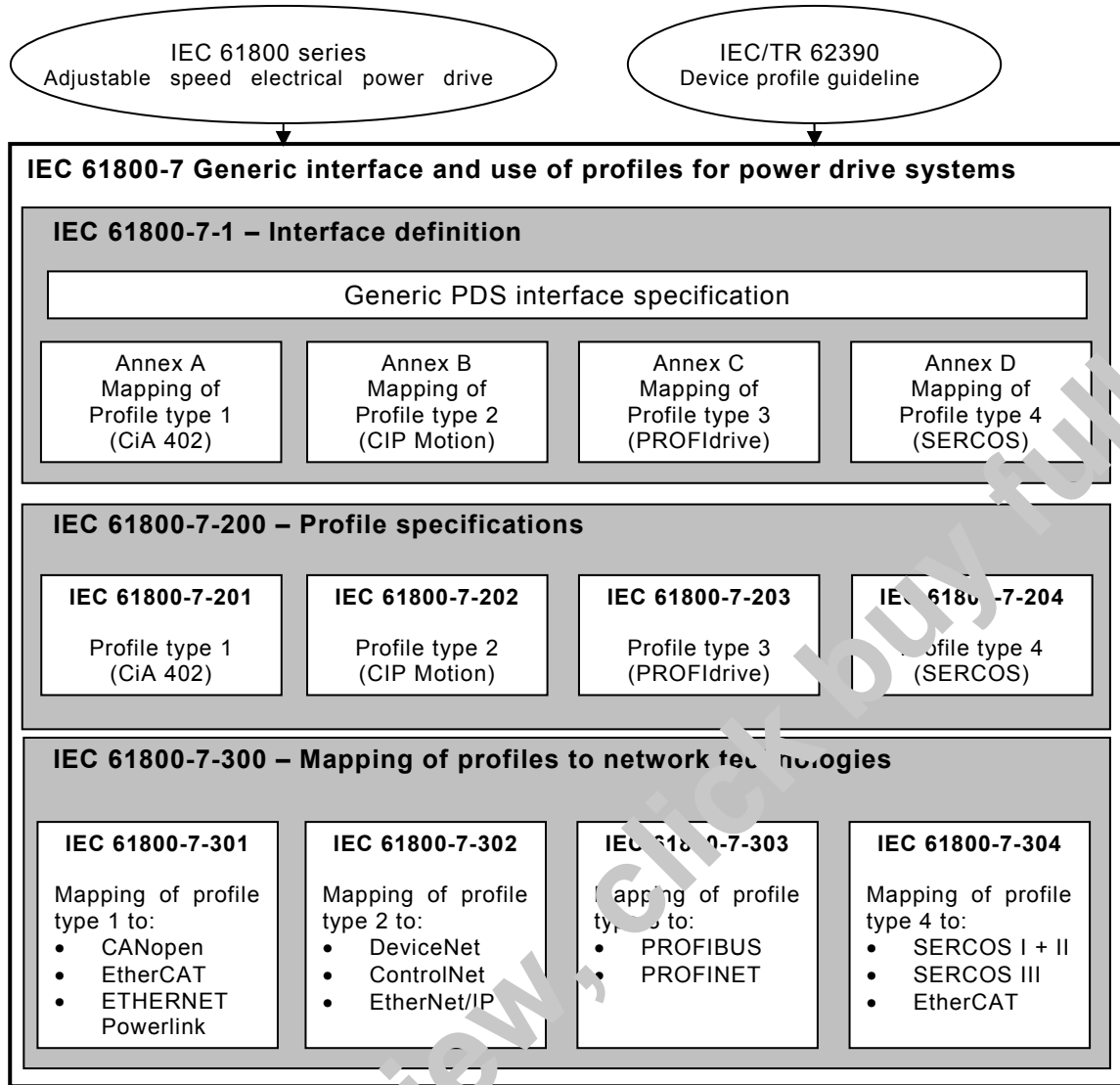


Figure 1 – Structure of IEC 61800-7

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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 the mapping of the profile type 2 (ControlMotion™) specified in IEC 61800-7-202 onto different network technologies.

- DeviceNet™ (CP 2/3), see Clause 5,
- ControlNet™ (CP 2/1), see Clause 6,
- EtherNet/IP™ (CP 2/2), see Clause 7.

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 61158-4-2, *Industrial communication networks – Fieldbus specifications – Part 4-2 (Ed.1.0): Data-link layer protocol specification – Type 2 elements*

IEC 61158-5-2, *Industrial communication networks – Fieldbus specifications – Part 5-2 (Ed.1.0): Application layer service definition – Type 2 elements*

IEC 61158-6-2, *Industrial communication networks – Fieldbus specifications – Part 6-2 (Ed.1.0): Application layer protocol specification – Type 2 elements*

IEC 61588:2001, *Precision clock synchronization protocol for networked measurement and control systems*

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

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*