

DIN EN 61800-7-302

ICS 29.160.30; 29.200

**Elektrische Leistungsantriebssysteme mit einstellbarer Drehzahl –
Teil 7-302: Generisches Interface und Nutzung von Profilen für
Leistungsantriebssysteme (PDS) –
Abbildung von Profil-Typ 2 auf Netzwerktechnologien
(IEC 61800-7-302:2007);
Englische Fassung EN 61800-7-302:2008**

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 61800-7-302:2007);
English version EN 61800-7-302:2008

Entraînements électriques de puissance à vitesse variable –
Partie 7-302: Interface et utilisation génériques de profils pour les entraînements
électriques de puissance –
Mapping des profils de type 2 pour technologies réseaux (CEI 61800-7-302:2007);
Version anglaise EN 61800-7-302:2008

Gesamtumfang 31 Seiten

DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE

Beginn der Gültigkeit

Die von CENELEC am 2008-02-01 angenommene EN 61800-7-302 gilt als DIN-Norm ab 2008-11-01.

Nationales Vorwort

Vorausgegangener Norm-Entwurf: E DIN IEC 61800-7-3:2006-06.

Für diese Norm ist das nationale Arbeitsgremium K 226 „Ausrüstung von Starkstromgeräten und -anlagen mit elektronischen Betriebsmitteln“ der DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE (www.dke.de) zuständig.

Die enthaltene IEC-Publikation wurde vom SC 22G „Semiconductor power converters for adjustable speed electric drive systems“ erarbeitet.

Diese Norm erscheint ausschließlich in der englischsprachigen Originalfassung.

Das IEC-Komitee hat entschieden, dass der Inhalt dieser Publikation bis zu dem Datum (maintenance result date) unverändert bleiben soll, das auf der IEC-Website unter „<http://webstore.iec.ch>“ zu dieser Publikation angegeben ist. Zu diesem Zeitpunkt wird entsprechend der Entscheidung des Komitees die Publikation

- bestätigt,
- zurückgezogen,
- durch eine Folgeausgabe ersetzt oder
- geändert.

Für den Fall einer undatierten Verweisung im normativen Text (Verweisung auf eine Norm ohne Angabe des Ausgabedatums und ohne Hinweis auf eine Abschnittsnummer, eine Tabelle, ein Bild usw.) bezieht sich die Verweisung auf die jeweils neueste gültige Ausgabe der in Bezug genommenen Norm.

Für den Fall einer datierten Verweisung im normativen Text bezieht sich die Verweisung immer auf die in Bezug genommene Ausgabe der Norm.

Der Zusammenhang der zitierten Normen mit den entsprechenden Deutschen Normen ergibt sich, soweit ein Zusammenhang besteht, grundsätzlich über die Nummer der entsprechenden IEC-Publikation. Beispiel: IEC 60068 ist als EN 60068 als Europäische Norm durch CENELEC übernommen und als DIN EN 60068 ins Deutsche Normenwerk aufgenommen.

**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 61800-7-302:2007)**

Entraînements électriques de puissance
à vitesse variable –
Partie 7-302: Interface et utilisation
génériques de profils
pour les entraînements électriques
de puissance –
Mapping des profils de type 2
pour technologies réseaux
(CEI 61800-7-302:2007)

Elektrische Leistungsantriebssysteme
mit einstellbarer Drehzahl –
Teil 7-302: Generisches Interface
und Nutzung von Profilen
für Leistungsantriebssysteme (PDS) –
Abbildung von Profil-Typ 2
auf Netzwerktechnologien
(IEC 61800-7-302:2007)

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.

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 Central Secretariat has the same status as the official versions.

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/185/FDIS, future edition 1 of IEC 61800-7-302, 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 61800-7-302 on 2008-02-01.

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

The International Electrotechnical Commission (IEC) and CENELEC draw attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning:

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 and CENELEC take no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the IEC that he/she 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 the IEC. Information may be obtained from:

[RA] Rockwell Automation, Inc.
1201 S. Second Street
Milwaukee, WI 53204
USA
Attention: Intellectual Property Dept.

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 and CENELEC shall not be held responsible for identifying any or all such patent rights.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61800-7-302:2007 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 61158-2	NOTE	Harmonized as EN 61158-2:2008 (not modified).
IEC 61158-3-2	NOTE	Harmonized as EN 61158-3-2:2008 (not 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).
IEC 61800-7-1	NOTE	Harmonized as EN 61800-7-1:2008 (not modified).
IEC 61800-7-201	NOTE	Harmonized as EN 61800-7-201:2008 (not modified).
IEC 61800-7-203	NOTE	Harmonized as EN 61800-7-203:2008 (not modified).
IEC 61800-7-204	NOTE	Harmonized as EN 61800-7-204:2008 (not modified).
IEC 61800-7-301	NOTE	Harmonized as EN 61800-7-301:2008 (not modified).
IEC 61800-7-303	NOTE	Harmonized as EN 61800-7-303:2008 (not modified).
IEC 61800-7-304	NOTE	Harmonized as EN 61800-7-304:2008 (not modified).

CONTENTS

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™	15
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	23
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

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.
 - 6 ControlNetTM is a trade name of ControlNet International, Ltd. 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 ControlNetTM. Use of the trade name ControlNetTM requires permission of ControlNet International, Ltd.
 - 7 EtherNet/IPTM is a trade name of ControlNet International, Ltd. and 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 EtherNet/IPTM. Use of the trade name EtherNet/IPTM requires permission of either ControlNet International, Ltd. or Open DeviceNet Vendor Association, Inc.
 - 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.
 - 10 Ethernet PowerlinkTM is a trade name of B&R, control of trade name 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 trademark holder or any of its products. Compliance to this profile does not require use of the trade name Ethernet PowerlinkTM. Use of the trade name Ethernet PowerlinkTM requires permission of the trade name holder.
 - 11 PROFIBUS 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 PROFIBUS. Use of the trade name PROFIBUS requires permission of PROFIBUS International.
 - 12 PROFINET 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 PROFINET. Use of the trade name PROFINET requires permission of PROFIBUS International.

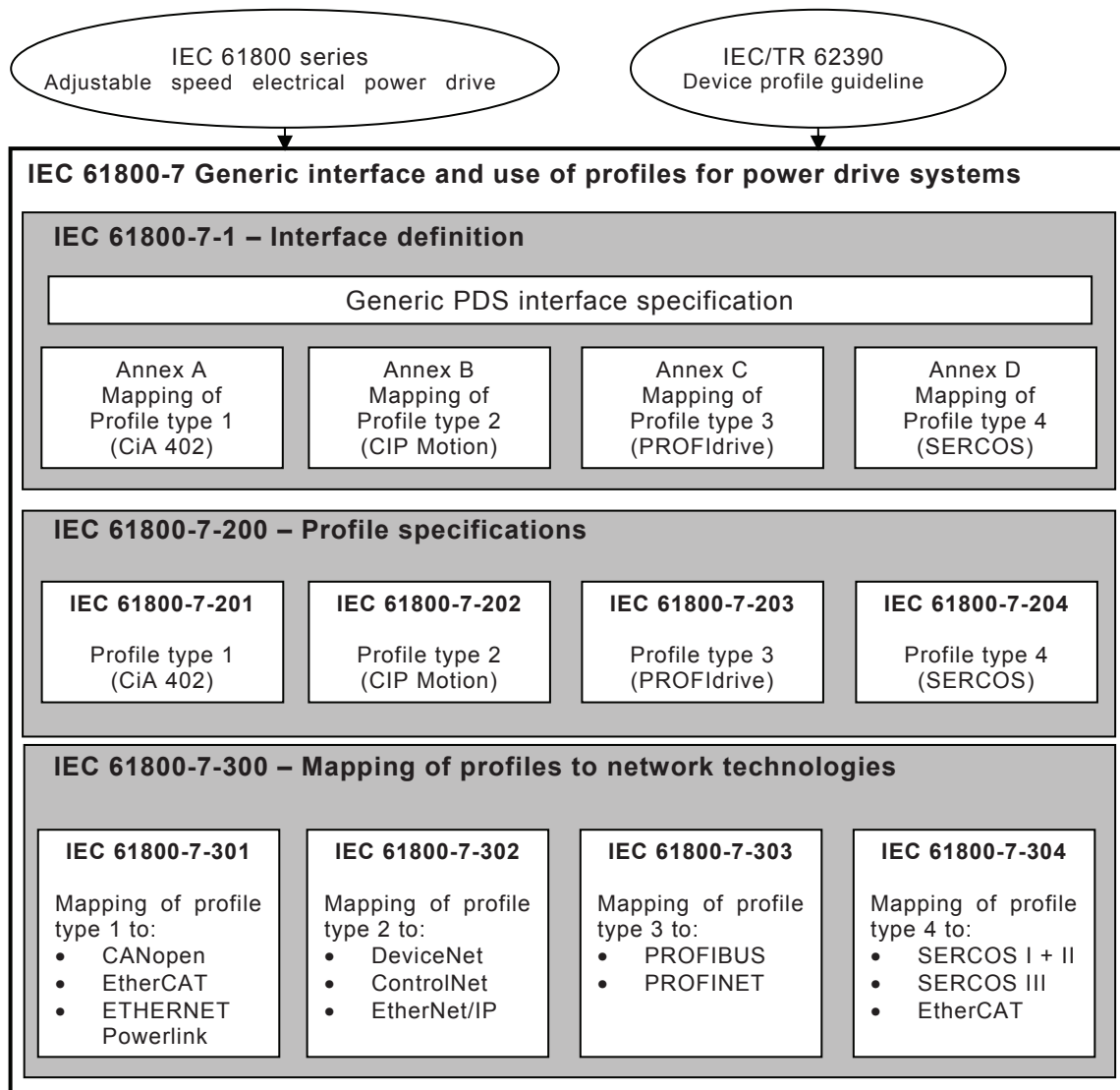


Figure 1 – Structure of IEC 61800-7