ICS 29.200, 35.100.05 SLOVENSKÁ TECHNICKÁ NORMA August 2016

| STN | **Systémy elektrických výkonových pohonov s nastaviteľnou rýchlosťou. Časť 7-301: Generické rozhranie a použitie profilov pre systémy výkonových pohonov. Mapovanie profilu typu 1 do sieťových technológií.** | **STN EN 61800-7-301**<br><br>35 1720 |
|---|---|---|

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

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 07/16

Obsahuje: EN 61800-7-301:2016, IEC 61800-7-301:2015

Oznámením tejto normy sa od 25.12.2018 ruší
STN EN 61800-7-301 (35 1720) z novembra 2008

**123105**

Úrad pre normalizáciu, metrológiu a skúšobníctvo SR, 2016
Podľa zákona č. 264/1999 Z. z. v znení neskorších predpisov sa môžu slovenské technické normy rozmnožovať a rozširovať iba so súhlasom Úradu pre normalizáciu, metrológiu a skúšobníctvo SR.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN 61800-7-301

February 2016

ICS 29.200; 35.100.05

Supersedes EN 61800-7-301:2008

English Version

# 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 61800-7-301:2015)

Entraînements électriques de puissance à vitesse variable - Partie 7-301: Interface générique et utilisation de profils pour les entraînements électriques de puissance - Mise en correspondance du profil de type 1 avec les technologies de réseaux
(IEC 61800-7-301:2015)

Elektrische Leistungsantriebssysteme mit einstellbarer Drehzahl - Teil 7-301: Generisches Interface und Nutzung von Profilen für Leistungsantriebssysteme (PDS) - Abbildung von Profil-Typ 1 auf Netzwerktechnologien
(IEC 61800-7-301:2015)

This European Standard was approved by CENELEC on 2015-12-25. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

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

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

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

© 2016 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC Members.

## European foreword

The text of document 22G/311/FDIS, future edition 2 of IEC 61800-7-301, 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 approved by CENELEC as EN 61800-7-301:2016.

The following dates are fixed:

| | | |
|---|---|---|
| • latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2016-09-25 |
| • latest date by which the national standards conflicting with the document have to be withdrawn | (dow) | 2018-12-25 |

This document supersedes EN 61800-7-301:2008.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

## Endorsement notice

The text of the International Standard IEC 61800-7-301:2015 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 Series | NOTE | Harmonized as EN 61158 Series. |
| IEC 61499-1 | NOTE | Harmonized as EN 61499-1. |
| IEC 61784-1 | NOTE | Harmonized as EN 61784-1. |
| IEC 61784-2 | NOTE | Harmonized as EN 61784-2. |
| IEC 61800 Series | NOTE | Harmonized as EN 61800 Series. |
| IEC 61800-7-1:2015 | NOTE | Harmonized as EN 61800-7-1:2016 (not modified). |
| IEC 61800-7-202:2015 | NOTE | Harmonized as EN 61800-7-202:2016 (not modified). |
| IEC 61800-7-203:2015 | NOTE | Harmonized as EN 61800-7-203:2016 (not modified). |
| IEC 61800-7-204:2015 | NOTE | Harmonized as EN 61800-7-204:2016 (not modified). |
| IEC 61800-7-302:2015 | NOTE | Harmonized as EN 61800-7-302:2016 (not modified). |
| IEC 61800-7-303:2015 | NOTE | Harmonized as EN 61800-7-303:2016 (not modified). |
| IEC 61800-7-304:2015 | NOTE | Harmonized as EN 61800-7-304:2016 (not modified). |
| IEC 61915-1 | NOTE | Harmonized as EN 61915-1. |

# Annex ZA
(normative)

## Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| | | Industrial communications subsystem based on ISO 11898 (CAN) for controller-device interfaces - Part 4: CANopen | EN 50325-4 | - |
| IEC 61158-4-14 | - | Industrial communication networks - Fieldbus specifications - Part 4-14: Data-link layer protocol specification - Type 14 elements | EN 61158-4-14 | - |
| IEC 61158-5-12 | - | Industrial communication networks - Fieldbus specifications - Part 5-12: Application layer service definition - Type 12 elements | EN 61158-5-12 | - |
| IEC 61158-5-13 | - | Industrial communication networks - Fieldbus specifications - Part 5-13: Application layer service definition - Type 13 elements | EN 61158-5-13 | - |
| IEC 61158-5-14 | - | Industrial communication networks - Fieldbus specifications - Part 5-14: Application layer service definition - Type 14 elements | EN 61158-5-14 | - |
| IEC 61158-5-23 | - | Industrial communication networks - Fieldbus specifications - Part 5-23: Application layer service definition - Type 23 elements | EN 61158-5-23 | - |
| IEC 61158-6-12 | - | Industrial communication networks - Fieldbus specifications - Part 6-12: Application layer protocol specification - Type 12 elements | EN 61158-6-12 | - |
| IEC 61158-6-13 | - | Industrial communication networks - Fieldbus specifications - Part 6-13: Application layer protocol specification - Type 13 elements | EN 61158-6-13 | - |

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 61158-6-14 | - | Industrial communication networks - Fieldbus specifications - Part 6-14: Application layer protocol specification - Type 14 elements | EN 61158-6-14 | - |
| IEC 61158-6-23 | - | Industrial communication networks - Fieldbus specifications - Part 6-23: Application layer protocol specification - Type 23 elements | EN 61158-6-23 | - |
| 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 | EN 61800-7-201 | - |

IEC 61800-7-301

Edition 2.0 2015-11

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

colour inside

## 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

## Entraînements électriques de puissance à vitesse variable – Partie 7-301: Interface générique et utilisation de profils pour les entraînements électriques de puissance – Mise en correspondance du profil de type 1 avec les technologies de réseaux

IEC 61800-7-301:2015-11(en-fr)

**THIS PUBLICATION IS COPYRIGHT PROTECTED**

**Copyright © 2015 IEC, Geneva, Switzerland**

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

**About the IEC**
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

**About IEC publications**
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

**IEC Catalogue - webstore.iec.ch/catalogue**
The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

**IEC publications search - www.iec.ch/searchpub**
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, replaced and withdrawn publications.

**IEC Just Published - webstore.iec.ch/justpublished**
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

**Electropedia - www.electropedia.org**
The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

**IEC Glossary - std.iec.ch/glossary**
More than 60 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

**IEC Customer Service Centre - webstore.iec.ch/csc**
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

---

**A propos de l'IEC**
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

**A propos des publications IEC**
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

**Catalogue IEC - webstore.iec.ch/catalogue**
Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

**Recherche de publications IEC - www.iec.ch/searchpub**
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,…). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

**IEC Just Published - webstore.iec.ch/justpublished**
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

**Electropedia - www.electropedia.org**
Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 15 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

**Glossaire IEC - std.iec.ch/glossary**
Plus de 60 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

**Service Clients - webstore.iec.ch/csc**
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.

IEC 61800-7-301

Edition 2.0 2015-11

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

colour inside

## 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

## Entraînements électriques de puissance à vitesse variable – Partie 7-301: Interface générique et utilisation de profils pour les entraînements électriques de puissance – Mise en correspondance du profil de type 1 avec les technologies de réseaux

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 29.200; 35.100.05

ISBN 978-2-8322-2930-9

**Warning! Make sure that you obtained this publication from an authorized distributor.**
**Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

® Registered trademark of the International Electrotechnical Commission
Marque déposée de la Commission Electrotechnique Internationale

# CONTENTS

FOREWORD ..... 10
INTRODUCTION ..... 12
1 Scope ..... 16
2 Normative references ..... 16
3 Terms, definitions and abbreviated terms ..... 17
3.1 Terms and definitions ..... 17
3.2 Abbreviated terms ..... 20
4 General ..... 21
5 Mapping to CANopen ..... 21
5.1 Overview ..... 21
5.2 Mapping of communication objects ..... 21
5.3 Communication parameter objects ..... 22
5.3.1 General ..... 22
5.3.2 Object $1000_h$: Device type ..... 22
5.3.3 Object $1029_h$: Error behavior ..... 23
5.3.4 Object $67FF_h$: Single device type ..... 24
5.4 Emergency message ..... 24
5.5 Communication fault events ..... 24
5.6 Sets of pre-defined PDOs ..... 24
5.6.1 General ..... 24
5.6.2 PDO set for generic drive device ..... 25
5.6.3 PDO set for frequency converter ..... 56
5.6.4 PDO set for servo drive ..... 69
5.6.5 PDO set for stepper motor ..... 85
5.7 PDO mapping attributes ..... 102
6 Mapping to CC-Link IE Field Network ..... 106
6.1 Overview ..... 106
6.2 Device model ..... 106
6.3 Mapping of communication objects ..... 106
6.3.1 General ..... 106
6.3.2 The detailed mapping of communication objects ..... 106
6.3.3 FAL syntax description ..... 107
6.3.4 FAL transfer syntax ..... 108
6.4 Communication parameter objects ..... 112
6.4.1 General ..... 112
6.4.2 Object $1000_h$: Device type ..... 113
6.5 Sets of pre-defined PDOs ..... 113
6.5.1 General ..... 113
6.5.2 PDO set for generic drive device ..... 113
6.6 PDO mapping attributes ..... 116
7 Mapping to EPA ..... 116
7.1 Overview ..... 116
7.2 Device module ..... 116
7.2.1 Overview ..... 116
7.2.2 Additional definition for mapping to CiA 402 ..... 117

7.2.3 CiA 402 mapping module ..... 119
7.2.4 FAL management object for CiA 402 mapping ..... 120
7.3 PDOs mapping on cyclic PDU transmission ..... 124
7.3.1 Overview ..... 124
7.3.2 Configuration ..... 125
7.3.3 Procedure of sending PDOs ..... 127
7.3.4 Procedure of receiving PDOs ..... 127
7.4 PDOs mapping on acyclic PDU transmission ..... 128
7.4.1 General ..... 128
7.4.2 FRTRead service ..... 128
7.4.3 FRTWrite service ..... 129
7.4.4 FRTRead service process ..... 129
7.4.5 FRTWrite service process ..... 130
7.5 Alarm mechanism ..... 130
7.5.1 Overview ..... 130
7.5.2 EventReport service ..... 130
7.5.3 EventReportAcknowledge service ..... 131
7.5.4 Event object ..... 131
7.5.5 Alarm process ..... 132
7.5.6 Error code ..... 132
8 Mapping to EtherCAT ..... 132
8.1 Overview ..... 132
8.2 Mapping of communication objects ..... 133
8.3 Communication parameter objects ..... 133
8.3.1 General ..... 133
8.3.2 Object $1000_h$: Device type ..... 133
8.4 Sets of pre-defined PDOs ..... 134
8.5 PDO mapping attributes ..... 134
9 Mapping to ETHERNET Powerlink ..... 134
9.1 Overview ..... 134
9.2 Mapping of communication objects ..... 134
9.3 Communication parameter objects ..... 134
9.3.1 General ..... 134
9.3.2 Object $1000_h$: Device type ..... 135
9.3.3 Object $67FF_h$: Single device type ..... 135
9.4 Emergency information ..... 135
9.5 Sets of pre-defined PDOs ..... 135
9.5.1 General ..... 135
9.5.2 PDO set for generic drive device ..... 135
9.5.3 PDO set for frequency converter ..... 142
9.5.4 PDO set for servo drive ..... 146
9.5.5 PDO set for stepper motor ..... 150
9.6 PDO mapping attributes ..... 154
Bibliography ..... 155

Figure 1 – Structure of IEC 61800-7 ..... 15
Figure 2 – Structure of EPA drive system ..... 116
Figure 3 – CiA 402 mapping structure ..... 119

Figure 4 – Format of Type 14 PDU for FRT application ..... 125

Table 1 – List of used data types ..... 22
Table 2 – Additional information field for generic PDO mapping ..... 23
Table 3 – Additional information field for type-specific PDO mapping ..... 23
Table 4 – Value definition ..... 23
Table 5 – Object description ..... 23
Table 6 – Entry description ..... 24
Table 7 – Overview on RPDO ..... 25
Table 8 – Overview on TPDO ..... 25
Table 9 – Object description of communication parameters ..... 26
Table 10 – Entry description of communication parameters ..... 26
Table 11 – Object description of mapping parameters ..... 27
Table 12 – Entry description of mapping parameters ..... 27
Table 13 – Object description of communication parameters ..... 28
Table 14 – Entry description of communication parameters ..... 28
Table 15 – Object description of mapping parameters ..... 29
Table 16 – Entry description of mapping parameters ..... 29
Table 17 – Object description of communication parameters ..... 30
Table 18 – Entry description of communication parameters ..... 30
Table 19 – Object description of mapping parameters ..... 31
Table 20 – Entry description of mapping parameters ..... 31
Table 21 – Object description of communication parameters ..... 32
Table 22 – Entry description of communication parameters ..... 32
Table 23 – Object description of mapping parameters ..... 33
Table 24 – Entry description of mapping parameters ..... 33
Table 25 – Object description of communication parameters ..... 34
Table 26 – Entry description of communication parameters ..... 34
Table 27 – Object description of mapping parameters ..... 35
Table 28 – Entry description of mapping parameters ..... 35
Table 29 – Object description of communication parameters ..... 36
Table 30 – Entry description of communication parameters ..... 36
Table 31 – Object description of mapping parameters ..... 37
Table 32 – Entry description of mapping parameters ..... 37
Table 33 – Object description of communication parameters ..... 38
Table 34 – Entry description of communication parameters ..... 38
Table 35 – Object description of mapping parameters ..... 39
Table 36 – Entry description of mapping parameters ..... 39
Table 37 – Object description of communication parameters ..... 40
Table 38 – Entry description of communication parameters ..... 40
Table 39 – Object description of mapping parameters ..... 41
Table 40 – Entry description of mapping parameters ..... 41
Table 41 – Object description of communication parameters ..... 42

Table 42 – Entry description of communication parameters ..... 42
Table 43 – Object description of mapping parameters ..... 43
Table 44 – Entry description of mapping parameters ..... 43
Table 45 – Object description of communication parameters ..... 44
Table 46 – Entry description of communication parameters ..... 44
Table 47 – Object description of mapping parameters ..... 45
Table 48 – Entry description of mapping parameters ..... 45
Table 49 – Object description of communication parameters ..... 46
Table 50 – Entry description of communication parameters ..... 46
Table 51 – Object description of mapping parameters ..... 47
Table 52 – Entry description of mapping parameters ..... 47
Table 53 – Object description of communication parameters ..... 48
Table 54 – Entry description of communication parameters ..... 48
Table 55 – Object description of mapping parameters ..... 49
Table 56 – Entry description of mapping parameters ..... 49
Table 57 – Object description of communication parameters ..... 50
Table 58 – Entry description of communication parameters ..... 50
Table 59 – Object description of mapping parameters ..... 51
Table 60 – Entry description of mapping parameters ..... 51
Table 61 – Object description of communication parameters ..... 52
Table 62 – Entry description of communication parameters ..... 52
Table 63 – Object description of mapping parameters ..... 53
Table 64 – Entry description of mapping parameters ..... 53
Table 65 – Object description of communication parameters ..... 54
Table 66 – Entry description of communication parameters ..... 54
Table 67 – Object description of mapping parameters ..... 55
Table 68 – Entry description of mapping parameters ..... 55
Table 69 – Overview on RPDO ..... 56
Table 70 – Overview on TPDO ..... 56
Table 71 – Object description of communication parameters ..... 56
Table 72 – Entry description of communication parameters ..... 57
Table 73 – Object description of mapping parameters ..... 57
Table 74 – Entry description of mapping parameters ..... 58
Table 75 – Object description of communication parameters ..... 59
Table 76 – Entry description of communication parameters ..... 59
Table 77 – Object description of mapping parameters ..... 60
Table 78 – Entry description of mapping parameters ..... 60
Table 79 – Object description of communication parameters ..... 61
Table 80 – Entry description of communication parameters ..... 61
Table 81 – Object description of mapping parameters ..... 62
Table 82 – Entry description of mapping parameters ..... 62
Table 83 – Object description of communication parameters ..... 63
Table 84 – Entry description of communication parameters ..... 63

Table 85 – Object description of mapping parameters ..... 64
Table 86 – Entry description of mapping parameters ..... 64
Table 87 – Object description of communication parameters ..... 65
Table 88 – Entry description of communication parameters ..... 65
Table 89 – Object description of mapping parameters ..... 66
Table 90 – Entry description of mapping parameters ..... 66
Table 91 – Object description of communication parameters ..... 67
Table 92 – Entry description of communication parameters ..... 67
Table 93 – Object description of mapping parameters ..... 68
Table 94 – Entry description of mapping parameters ..... 68
Table 95 – Overview on RPDO ..... 69
Table 96 – Overview on TPDO ..... 69
Table 97 – Object description of communication parameters ..... 69
Table 98 – Entry description of communication parameters ..... 70
Table 99 – Object description of mapping parameters ..... 70
Table 100 – Entry description of mapping parameters ..... 71
Table 101 – Object description of communication parameters ..... 71
Table 102 – Entry description of communication parameters ..... 72
Table 103 – Object description of mapping parameters ..... 72
Table 104 – Entry description of mapping parameters ..... 73
Table 105 – Object description of communication parameters ..... 74
Table 106 – Entry description of communication parameters ..... 74
Table 107 – Object description of mapping parameters ..... 75
Table 108 – Entry description of mapping parameters ..... 75
Table 109 – Object description of communication parameters ..... 76
Table 110 – Entry description of communication parameters ..... 76
Table 111 – Object description of mapping parameters ..... 77
Table 112 – Entry description of mapping parameters ..... 77
Table 113 – Object description of communication parameters ..... 78
Table 114 – Entry description of communication parameters ..... 78
Table 115 – Object description of mapping parameters ..... 79
Table 116 – Entry description of mapping parameters ..... 79
Table 117 – Object description of communication parameters ..... 80
Table 118 – Entry description of communication parameters ..... 80
Table 119 – Object description of mapping parameters ..... 81
Table 120 – Entry description of mapping parameters ..... 81
Table 121 – Object description of communication parameters ..... 82
Table 122 – Entry description of communication parameters ..... 82
Table 123 – Object description of mapping parameters ..... 83
Table 124 – Entry description of mapping parameters ..... 83
Table 125 – Object description of communication parameters ..... 84
Table 126 – Entry description of communication parameters ..... 84
Table 127 – Object description of mapping parameters ..... 85

Table 128 – Entry description of mapping parameters ..... 85
Table 129 – Overview on RPDO ..... 86
Table 130 – Overview on TPDO ..... 86
Table 131 – Object description of communication parameters ..... 86
Table 132 – Entry description of communication parameters ..... 87
Table 133 – Object description of mapping parameters ..... 87
Table 134 – Entry description of mapping parameters ..... 88
Table 135 – Object description of communication parameters ..... 88
Table 136 – Entry description of communication parameters ..... 89
Table 137 – Object description of mapping parameters ..... 89
Table 138 – Entry description of mapping parameters ..... 90
Table 139 – Object description of communication parameters ..... 91
Table 140 – Entry description of communication parameters ..... 91
Table 141 – Object description of mapping parameters ..... 92
Table 142 – Entry description of mapping parameters ..... 92
Table 143 – Object description of communication parameters ..... 93
Table 144 – Entry description of communication parameters ..... 93
Table 145 – Object description of mapping parameters ..... 94
Table 146 – Entry description of mapping parameters ..... 94
Table 147 – Object description of communication parameters ..... 95
Table 148 – Entry description of communication parameters ..... 95
Table 149 – Object description of mapping parameters ..... 96
Table 150 – Entry description of mapping parameters ..... 96
Table 151 – Object description of communication parameters ..... 97
Table 152 – Entry description of communication parameters ..... 97
Table 153 – Object description of mapping parameters ..... 98
Table 154 – Entry description of mapping parameters ..... 98
Table 155 – Object description of communication parameters ..... 99
Table 156 – Entry description of communication parameters ..... 99
Table 157 – Object description of mapping parameters ..... 100
Table 158 – Entry description of mapping parameters ..... 100
Table 159 – Object description of communication parameters ..... 101
Table 160 – Entry description of communication parameters ..... 101
Table 161 – Object description of mapping parameters ..... 102
Table 162 – Entry description of mapping parameters ..... 102
Table 163 – PDO mapping attributes of CiA 402 objects ..... 103
Table 164 – Object dictionary structure ..... 106
Table 165 – FieldMotionSpecificTransient ..... 109
Table 166 – command (dataType: $08_h$, dataSubType: $0002_h$) ..... 109
Table 167 – subCommand type for each command type ..... 109
Table 168 – Structure of setCycleTimeRequest ..... 109
Table 169 – ctCycle ..... 110
Table 170 – syCycle ..... 110

Table 171 – Structure of setCycleTimeResponse ..... 111
Table 172 – Result ..... 111
Table 173 – Structure of readObjectRequest ..... 111
Table 174 – Structure of readObjectResponse ..... 112
Table 175 – Structure of writeObjectRequest ..... 112
Table 176 – Structure of writeObjectResponse ..... 112
Table 177 – List of used data types ..... 113
Table 178 – Overview on object in RPDO ..... 113
Table 179 – Overview on object in TPDO ..... 113
Table 180 – Object description of mapping parameters ..... 114
Table 181 – Entry description of mapping parameters ..... 114
Table 182 – Object description of mapping parameters ..... 115
Table 183 – Entry description of mapping parameters ..... 115
Table 184 – List of used data types ..... 116
Table 185 – Overview on RPDO ..... 117
Table 186 – Overview on TPDO ..... 117
Table 187 – Management object base ..... 118
Table 188 – Definition of Type 14 FRT link object ..... 125
Table 189 – Encoding of FRTRead request parameters ..... 128
Table 190 – Encoding of FRTRead positive response parameters ..... 128
Table 191 – Encoding of FRTRead negative response parameters ..... 129
Table 192 – Encoding of FRTWrite request parameters ..... 129
Table 193 – Encoding of FRTWrite positive response parameters ..... 129
Table 194 – Encoding of FRTWrite negative response parameters ..... 129
Table 195 – Encoding of EventReport parameters ..... 131
Table 196 – Format of EventReport service for alarm ..... 131
Table 197 – Encoding of EventReportAcknowledge parameters ..... 131
Table 198 – Format of EventReportAcknowledge sevice for alarm ..... 131
Table 199 – Event object assignment ..... 132
Table 200 – Example of Event object header ..... 132
Table 201 – Example of Event object ..... 132
Table 202 – List of used data types ..... 133
Table 203 – Additional information field for generic PDO mapping ..... 134
Table 204 – List of used data types ..... 135
Table 205 – Overview on objects in RPDO ..... 136
Table 206 – Overview on objects in TPDO ..... 136
Table 207 – Object description of communication parameters ..... 136
Table 208 – Entry description of communication parameters ..... 137
Table 209 – Object description of mapping parameters ..... 137
Table 210 – Entry description of mapping parameters ..... 138
Table 211 – Object description of communication parameters ..... 139
Table 212 – Entry description of communication parameters ..... 140
Table 213 – Object description of mapping parameters ..... 140

Table 214 – Entry description of mapping parameters ..... 141
Table 215 – Overview on objects in RPDO ..... 142
Table 216 – Overview on objects in TPDO ..... 142
Table 217 – Object description of communication parameters ..... 142
Table 218 – Entry description of communication parameters ..... 143
Table 219 – Object description of mapping parameters ..... 143
Table 220 – Entry description of mapping parameters ..... 144
Table 221 – Object description of communication parameters ..... 144
Table 222 – Entry description of communication parameters ..... 145
Table 223 – Object description of mapping parameters ..... 145
Table 224 – Entry description of mapping parameters ..... 146
Table 225 – Overview on objects in RPDO ..... 146
Table 226 – Overview on objects in TPDO ..... 147
Table 227 – Object description of communication parameters ..... 147
Table 228 – Entry description of communication parameters ..... 147
Table 229 – Object description of mapping parameters ..... 148
Table 230 – Entry description of mapping parameters ..... 148
Table 231 – Object description of communication parameters ..... 149
Table 232 – Entry description of communication parameters ..... 149
Table 233 – Object description of mapping parameters ..... 149
Table 234 – Entry description of mapping parameters ..... 150
Table 235 – Overview on objects in RPDO ..... 150
Table 236 – Overview on objects in TPDO ..... 151
Table 237 – Object description of communication parameters ..... 151
Table 238 – Entry description of communication parameters ..... 151
Table 239 – Object description of mapping parameters ..... 152
Table 240 – Entry description of mapping parameters ..... 152
Table 241 – Object description of communication parameters ..... 153
Table 242 – Entry description of communication parameters ..... 153
Table 243 – Object description of mapping parameters ..... 153
Table 244 – Entry description of mapping parameters ..... 154

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

# 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

## FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61800-7-301 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:

- Additional mappings to communication systems are included (see Clause 6 and Clause 7).

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

| FDIS | Report on voting |
|---|---|
| 22G/311/FDIS | 22G/326/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.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

# 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 programming interface 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 profile types for CiA® 402[1], CIP Motion™[2], PROFIdrive[3] 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 trade marks.

The different profile 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 1 (CiA® 402) is mapped to the network technologies CANopen®[5], CC-Link IE® Field Network[6], EPA™[7], EtherCAT®[8] and Ethernet Powerlink™[9].

---

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.

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®. CANopen® is an acronym for *C*ontroller *A*rea *N*etwork *open* and is used to refer to EN 50325-4. Use of the registered trade mark CANopen® requires permission of CAN in Automation e.V. (CiA).

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 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 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 requires permission of the trade mark holder.

IEC 61800-7-302, IEC 61800-7-303 and IEC 61800-7-304 specify how the profile types 2, 3 and 4 are mapped to different network technologies (such as EtherCAT®, DeviceNet™[10], ControlNet™[11], EtherNet/IP™[12], PROFIBUS[13], PROFINET[14] and SERCOS®.

---

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 PROFINET. Use of the trade name PROFINET requires permission of PROFIBUS & PROFINET International.

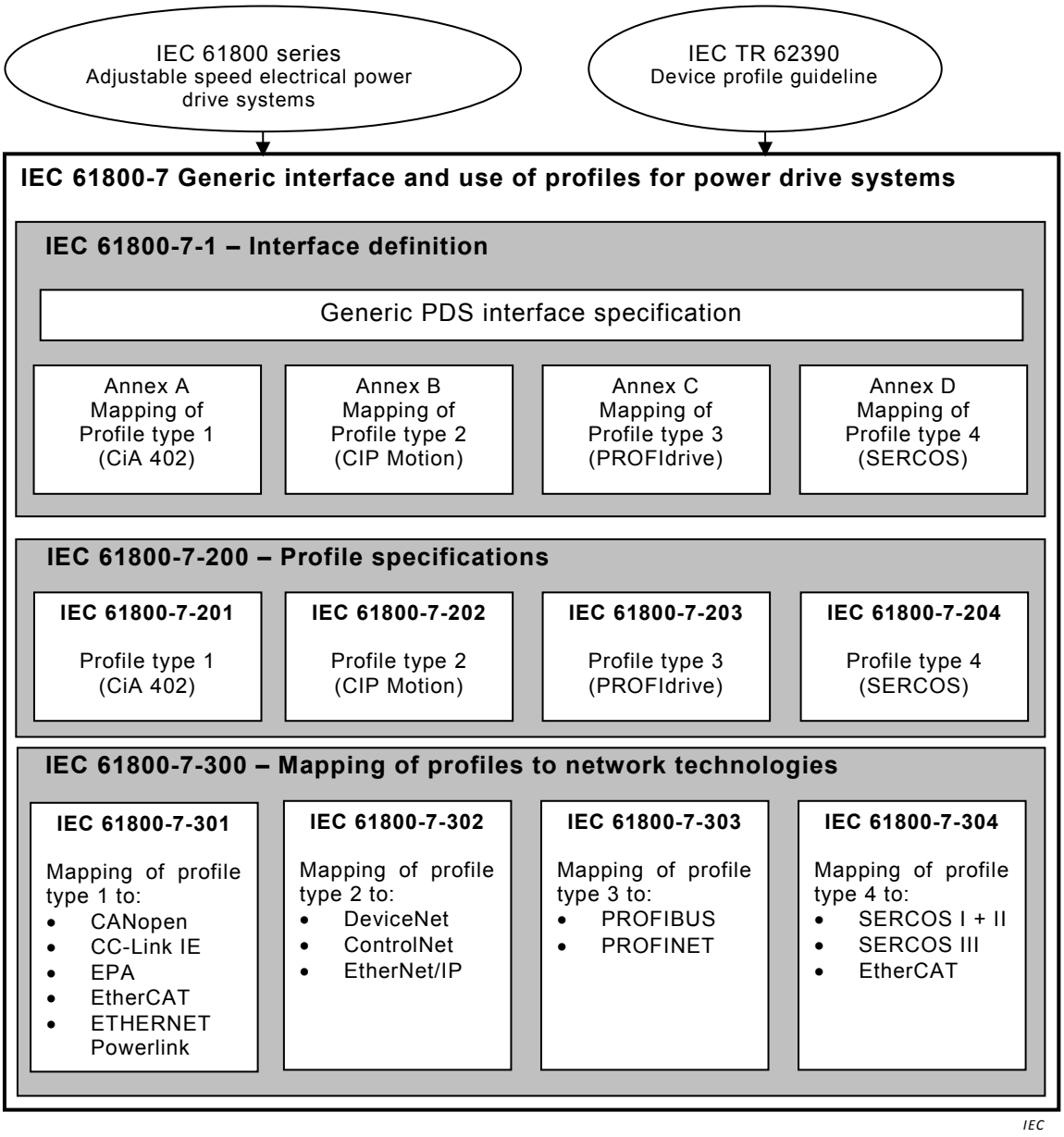


**Figure 1 – Structure of IEC 61800-7**

# 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

## 1 Scope

This part of IEC 61800 specifies the mapping of the profile type 1 (CiA 402) specified in IEC 61800-7-201 onto different 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.

– CANopen, see Clause 5;
– CC-Link IE Field, see Clause 6;
– EPA, see Clause 7;
– EtherCAT, see Clause 8;
– ETHERNET Powerlink, see Clause 9;

## 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 61158-4-14, *Industrial communication networks – Fieldbus specifications – Part 4-14: Data-link layer protocol specificationn – Type 14 elements*

IEC 61158-5-12, *Industrial communication networks – Fieldbus specifications – Part 5-12: Application layer service definition – Type 12 elements*

IEC 61158-5-13, *Industrial communication networks – Fieldbus specifications – Part 5-13: Application layer service definition – Type 13 elements*

IEC 61158-5-14, *Industrial communication networks – Fieldbus specifications – Part 5-14: Application layer service definition – Type 14 elements*

IEC 61158-5-23, *Industrial communication networks – Fieldbus specifications – Part 5-23: Application layer service definition – Type 23 elements*

IEC 61158-6-12, *Industrial communication networks – Fieldbus specifications – Part 6-12: Application layer protocol specification – Type 12 elements*

IEC 61158-6-13, *Industrial communication networks – Fieldbus specifications – Part 6-13: Application layer protocol specification – Type 13 elements*

IEC 61158-6-14, *Industrial communication networks – Fieldbus specification – Part 6-14: Application layer protocol specification – Type 14 elements*

IEC 61158-6-23, *Industrial communication networks – Fieldbus specification – Part 6-23: Application layer protocol specification – Type 23 elements*

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*

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

koniec náhľadu – text ďalej pokračuje v platenej verzii STN