SVENSK STANDARD SS-EN 61800-2

Fastställd	Utgåva	Sida	Ansvarig kommitté
2015-12-16	2	1 (1+94)	SEK TK 22

Varvtalsstyrda elektriska drivsystem – Del 2: Specifikationer och märkdata för lågspända växelströmsdrivsystem med variabel frekvens

Adjustable speed electrical power drive systems –
Part 2: General requirements –
Rating specifications for low voltage adjustable speed a.c. power drive systems

Som svensk standard gäller europastandarden EN 61800-2:2015. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61800-2:2015.

Nationellt förord

Europastandarden EN 61800-2:2015

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 61800-2, Second edition, 2015 - Adjustable speed electrical power drive systems - Part 2: General requirements - Rating specifications for low voltage adjustable speed a.c. power drive systems**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61800-2, utgåva 1, 1998, gäller ej fr o m 2018-08-26.

ICS 29.160.30; 29.200.00

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Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61800-2

September 2015

ICS 29.160.30; 29.200

Supersedes EN 61800-2:1998

English Version

Adjustable speed electrical power drive systems - Part 2: General requirements - Rating specifications for low voltage adjustable speed a.c. power drive systems (IEC 61800-2:2015)

Entraînements électriques de puissance à vitesse variable - Partie 2: Exigences générales - Spécifications de dimensionnement pour systèmes d'entraînement de puissance à vitesse variable en courant alternatif et basse tension (IEC 61800-2:2015)

Drehzahlveränderbare elektrische Antriebe - Teil 2: Allgemeine Anforderungen - Festlegungen für die Bemessung von Niederspannungs-Wechselstrom-Antriebssystemen mit einstellbarer Frequenz (IEC 61800-2:2015)

This European Standard was approved by CENELEC on 2015-08-26. 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

Ref. No. EN 61800-2:2015 E

SEK Svensk Elstandard

European foreword

The text of document 22G/303/FDIS, future edition 2 of IEC 61800-2, 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 61800-2:2015.

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)	2016-05-26
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2018-08-26

This document supersedes EN 61800-2:1998.

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 61800-2:2015 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 60027-3	NOTE	Harmonized as EN 60027-3.
IEC 60034-1	NOTE	Harmonized as EN 60034-1.
IEC 60204-1	NOTE	Harmonized as EN 60204-1.
IEC 60364 Series	NOTE	Harmonized as HD 60364 Series.
IEC 61131-2	NOTE	Harmonized as EN 61131-2.
IEC 61158 Series	NOTE	Harmonized as EN 61158 Series.
IEC 61158-1	NOTE	Harmonized as EN 61158-1.
IEC 61158-2	NOTE	Harmonized as EN 61158-2.
IEC 61378-1	NOTE	Harmonized as EN 61378-1.
IEC 61439-1	NOTE	Harmonized as EN 61439-1.
IEC 61800-1	NOTE	Harmonized as EN 61800-1.
IEC 61800-4	NOTE	Harmonized as EN 61800-4.

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
IEC 60034-9	-	Rotating electrical machines - Part 9: Noise limits	EN 60034-9	-
IEC 60038	-	IEC standard voltages	EN 60038	-
IEC 60050	Series	International Electrotechnical Vocabulary	-	-
IEC 60068	series	Environmental testing	EN 60068	Series
IEC 60068-2-2	2007	Environmental testing - Part 2-2: Tests - Test B: Dry heat	EN 60068-2-2	2007
IEC 60068-2-6	2007	Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6	2008
IEC 60068-2-27	2008	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock	EN 60068-2-27	2009
IEC 60068-2-52	1996	Environmental testing - Part 2-52: Tests - Test Kb: Salt mist, cyclic (sodium chloride solution)	EN 60068-2-52	1996
IEC 60068-2-68	1994	Environmental testing - Part 2-68: Tests - Test L: Dust and sand	EN 60068-2-68	1996
IEC 60068-2-78	2012	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state	EN 60068-2-78	2013
IEC 60079	Series	Explosive atmospheres	EN 60079	Series
IEC 60146-1-1	-	Semiconductor converters - General requirements and line commutated converters - Part 1-1: Specification of basic requirements	EN 60146-1-1	-
IEC/TR 60146-1-2	-	Semiconductor converters - General requirements and line commutated converters - Part 1-2: Application guide	-	-
IEC 60529	-	Degrees of protection provided by enclosures (IP Code)	EN 60529	-

Publication	Year	Title	EN/HD	Year
IEC 60664-1	-	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests	EN 60664-1	-
IEC 60721-3-1	1997	Classification of environmental conditions - - Part 3: Classification of groups of environmental parameters and their severities - Section 1: Storage	EN 60721-3-1	1997
IEC 60721-3-2	1997	Classification of environmental conditions - - Part 3: Classification of groups of environmental parameters and their severities -- Section 2: Transportation	EN 60721-3-2	1997
IEC 60721-3-3 +A1 +A2	1994 1995 1996	Classification of environmental conditions - - Part 3: Classification of groups of environmental parameters and their severities - Section 3: Stationary use at weatherprotected locations	EN 60721-3-3 +A2	1995 1997
IEC 60721-3-4 +A1	1995 1996	Classification of environmental conditions - - Part 3: Classification of groups of environmental parameters and their severities - Section 4: Stationary use at non-weatherprotected locations	EN 60721-3-4 +A1	1995 1997
IEC 61800-3	-	Adjustable speed electrical power drive systems - Part 3: EMC requirements and specific test methods	EN 61800-3	-
IEC 61800-5-1	2007	Adjustable speed electrical power drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy	EN 61800-5-1	2007
IEC 61800-5-2	2007	Adjustable speed electrical power drive systems - Part 5-2: Safety requirements - Functional	EN 61800-5-2	2007
IEC/TR 61800-6	-	Adjustable speed electrical power drive systems - Part 6: Guide for determination of types of load duty and corresponding current ratings	CLC/TR 61800-6	-
IEC 61800-7	Series	Adjustable speed electrical power drive systems - Part 7: Generic interface and use of profiles for power drive systems	EN 61800-7	Series
IEC 61800-7-1	-	Adjustable speed electrical power drive systems - Part 7-1: Generic interface and use of profiles for power drive systems - Interface definition	EN 61800-7-1	-

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ADJUSTABLE SPEED ELECTRICAL POWER DRIVE SYSTEMS –

Part 2: General requirements – Rating specifications for low voltage adjustable speed a.c. power drive systems

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.
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International Standard IEC 61800-2 has been prepared by subcommittee 22G: Adjustable speed electric drive systems incorporating semiconductor power converters, of IEC technical committee 22: Power electronic systems and equipment.

This second edition cancels and replaces the first edition published in 1998. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition.

a) Clause 1 (Scope) has been updated
b) Clause 2 (Normative references) has been updated

c) Clause 3 (Definitions) has been updated including fundamental definitions to be used across the IEC 61800 series of standards.

d) Clause 4 has been updated with respect to:

   1) description of the basic topology for *BDM/CDM/PDS* (4.2);

   2) ratings and performance (4.3 and 4.4);

   3) reference to applicable standards within the IEC 61800 series with respect to EMC (IEC 61800-3), Electrical safety (IEC 61800-5-1), Functional safety (IEC 61800-5-2), Load duty aspects (IEC TR 61800-6), Communication profiles (IEC 61800-7 series) and *Power interface* voltage (IEC TS 61800-8) to avoid conflicting requirements. (4.5, 4.6, 4.7, 4.10, 4.11, 4.12,);

   4) update of requirement for ECO design (4.8);

   5) update of requirement for environmental evaluation. (4.9);

   6) implementation of requirement for explosive atmosphere (4.13).

e) Clause 5 has been updated with test requirement in order to provide a clear link between design requirement and test requirement.

f) Clause 6 has been updated to harmonize the marking and documentation requirement within the IEC 61800 series.

g) Existing Annexes A to G have been deleted and replaced with new Annexes A to C.

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

FDIS	Report on voting
22G/303/FDIS	22G/305/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 in the IEC 61800 series, published under the general title *Adjustable speed electrical power drive systems*, can be found on the IEC website.

In this standard, the terms in *italics* are defined in Clause 3.

The committee has decided that the contents of this publication will remain unchanged until the stability 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.

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

0.1 General

This document is part of the IEC 61800 series specifying requirements for adjustable speed electric drive systems (*PDS*). Since the publication of the first edition of IEC 61800-2 several documents of the IEC 61800 have been developed and maintained, which has resulted in outdated references and conflicting requirements across the IEC 61800 series.

This document contains general requirements for *PDS*s intended to feed a.c. *motors* and with rated *converter* input voltages (line-to-line voltage) up to 1 000 V a.c.

*PDS*s intended to feed a.c. *motors* with rated *converter input* voltages above 1 000 V a.c. are covered by IEC 61800-4.

*PDS*s intended to feed d.c. *motors* are covered by IEC 61800-1.

0.2 Consistency of requirement

This document specifies requirements for *PDS*s under its scope for the identified topics not covered by any other of the standards in the IEC 61800 series.

The following requirements are covered by other standards in the IEC 61800 series:

- EMC requirements are covered in IEC 61800-3;
- electrical safety requirements are covered in IEC 61800-5-1;
- functional safety requirements are covered in IEC 61800-5-2;
- type of load duty requirements are covered by IEC TR 61800-6;
- communication profiles aspects which are covered by IEC 61800-7 series;
- *power interface* voltage specification is specified in IEC TS 61800-8.

Generally this document provides a basic description of topics and refers to the relevant standard for specific requirement. This is done in order to ensure consistency and avoid conflicting requirement within the IEC 61800 series as well as minimize future maintenance of the documents.

As part of the work inside SC22G MT9 this edition of IEC61800-2 defines basic definition as used across the IEC 61800 series of standards.

For issues related to *active infeed converters,* IEC TS 62578 has been considered.

At the time of writing IEC SC 22G is developing a standard to provide requirement for energy *efficiency* for *BDM*/*CDM*/*PDS*. The next edition of IEC 61800-2 will reference this standard similar to the approach taken with the other IEC 61800 series standards.

As a result of the development of the IEC 61800 series of standards the need to reference documents outside the series has decreased and especially the need to reference the IEC 60146 series of standards has decreased dramatically.

0.3 Tool for agreement between *customer* and *manufacturer*

This document is intended to be used to create a comprehensive list of requirements to be used as a specification between *customer* and *manufacturer*. The requirement in this document is in itself not applicable for the *BDM/CDM/PDS*. Instead each topic should be specified by the *customer* as a compliance requirement.

The document may be useful as a specification tool, when *BDM/CDM/PDS*s are built into a final *installation* or application applied as a component. The following applications are considered relevant: lift and hoist, machinery, conveyor, switchgears, heating and ventilation, pump, wind, tidal and marine propulsion applications.

In every application, an identification of the environmental conditions under which the product is stored, transported and operated is essential for the proper specification of the *BDM/CDM/PDS*s. The environmental conditions considered should include electrical, mechanical, thermal, pollution and humidity environmental condition.

ADJUSTABLE SPEED ELECTRICAL POWER DRIVE SYSTEMS –

Part 2: General requirements – Rating specifications for low voltage adjustable speed a.c. power drive systems

1 Scope

This part of IEC 61800 applies to adjustable speed electric a.c. power drive systems, which include semiconductor power conversion and the means for their control, protection, monitoring, measurement and the a.c. *motor*s.

It applies to adjustable speed electric power drive systems intended to feed a.c. *motors* from a *BDM* connected to line-to-line voltages up to and including 1 kV a.c. 50 Hz or 60 Hz and/or voltages up to and including 1,5 kV d.c. input side.

NOTE 1 Adjustable speed electric a.c. power drive systems intended to feed a.c. motors, and with rated *converter* input voltages above 1 000 V a.c. are covered by IEC 61800-4.

NOTE 2 Adjustable speed electric d.c. power drive systems intended to feed d.c. *motors* are covered by IEC 61800-1.

NOTE 3 For adjustable speed electric a.c. power drive systems having series-connected electronic power *converter* sections, the line-to-line voltage is the sum of the series connected input voltages.

Traction applications and electric vehicles are excluded from the scope of this standard.

This part of IEC 61800 is intended to define the following aspects of an a.c. power drive system (*PDS*):

- principal parts of the *PDS*;
- ratings and performance;
- specifications for the environment in which the *PDS* is intended to be installed and operated;
- other specifications which might be applicable when specifying a complete *PDS*.

This standard provides minimum requirements, which may be used for the development of a specification between *customer* and *manufacturer*.

Compliance with this standard is possible only when each topic of this standard is individually specified by the *customer* developing specifications or by product standard committees developing product standards.

For some aspects which are covered by specific *PDS* product standards in the IEC 61800 series, this document provides a short introduction and reference to detailed requirements in these product standards.

This applies to the following aspects:

- EMC which is covered in IEC 61800-3;
- electrical safety which is covered in IEC 61800-5-1;
- functional safety which is covered in IEC 61800-5-2;
- type of load duty which are covered by IEC TR 61800-6;
- communication profiles which are covered by IEC 61800-7 series;
- *power interface* voltage specification which is covered by IEC TS 61800-8.

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 60034-9, *Rotating electrical machines – Part 9: Noise l*imits

IEC 60038, *IEC standard voltages*

IEC 60068 (all parts), *Environmental testing*

IEC 60068-2-2:2007, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-6:2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-27:2008, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-52:1996, *Environmental testing – Part 2: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)*

IEC 60068-2-68:1994, *Environmental testing – Part 2-68: Tests – Test L: Dust and sand*

IEC 60068-2-78:2012, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60050 (all parts): *International Electrotechnical Vocabulary (available at <http://www.electropedia.org>)*

IEC 60079 (all parts), *Explosive atmospheres*

IEC 60146-1-1, *Semiconductor convertors – General requirement and line commutated convertors – Part 1-1: Specification of basic requirements*

IEC TR 60146-1-2, *Semiconductor convertors – General requirement and line commutated convertors – Part 1-2: Application guide*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60664-1, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60721-3-1:1997, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 1: Storage*

IEC 60721-3-2:1997, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 2: Transportation*

IEC 60721-3-3:1994, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 3: Stationary use at weatherprotected locations*
IEC 60721-3-3:1994/AMD1:1995
IEC 60721-3-3:1994/AMD2:1996

IEC 60721-3-4:1995, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 4: Stationary use at non-weatherprotected locations*
IEC 60721-3-4:1995/AMD1:1996

IEC 61800-3, *Adjustable speed electrical power drive systems – Part 3: EMC requirements and specific test methods*

IEC 61800-5-1:2007, *Adjustable speed electrical power drive systems – Part 5-1: Safety requirements – Electrical, thermal and energy*

IEC 61800-5-2:2007, *Adjustable speed electrical power drive systems – Part 5-2: Safety requirements – Functional*

IEC TR 61800-6, *Adjustable speed electrical power drive systems – Part 6: Guide for determination of types of load duty and corresponding current ratings*

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

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