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Adjustable speed electrical power drive systems - Part 2: General requirements - Rating specifications for adjustable speed AC power drive systems

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EUROPÄISCHE NORM

EN IEC 61800-2

April 2021

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Supersedes EN 61800-2:2015 and all of its amendments and corrigenda (if any)

English Version

Adjustable speed electrical power drive systems - Part 2: General requirements - Rating specifications for adjustable speed AC power drive systems (IEC 61800-2:2021)

Entraînements électriques de puissance à vitesse variable - Partie 2: Exigences générales - Spécifications de dimensionnement pour entraînements électriques de puissance à vitesse variable en courant alternatif (IEC 61800-2:2021)

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The text of document 22G/432/FDIS, future edition 3 of IEC 61800-2, prepared by SC 22G "Adjustable speed electric power drive systems (PDS)" of IEC/TC 22 "Power electronic systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61800-2:2021.

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) 2022-01-07
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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 60034-14	NOTE	Harmonized as EN IEC 60034-14
IEC 60034-18-31	NOTE	Harmonized as EN 60034-18-31
IEC/TS 60034-25	NOTE	Harmonized as CLC/TS 60034-25
IEC 60034-30 (series)	NOTE	Harmonized as EN 60034-30 (series)
IEC 60068-2-6	NOTE	Harmonized as EN 60068-2-6
IEC 60068-2-52	NOTE	Harmonized as EN IEC 60068-2-52
IEC 60068-2-68	NOTE	Harmonized as EN 60068-2-68
IEC 60068-2-78	NOTE	Harmonized as EN 60068-2-78
IEC 60076-1	NOTE	Harmonized as EN 60076-1

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IEC 60146 (series)	NOTE	Harmonized as EN 60146 (series)
IEC 60204-1	NOTE	Harmonized as EN 60204-1
IEC 60364 (series)	NOTE	Harmonized as HD 60364 (series)
IEC 60529	NOTE	Harmonized as EN 60529
IEC 60664-1	NOTE	Harmonized as EN IEC 60664-1
IEC 60721 (series)	NOTE	Harmonized as EN 60721 (series)
IEC 60721-2-6	NOTE	Harmonized as HD 478.2.6 S1
IEC 61131-2	NOTE	Harmonized as EN 61131-2
IEC 61158 (series)	NOTE	Harmonized as EN 61158 (series)
IEC 61378 (series)	NOTE	Harmonized as EN 61378 (series)
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 IEC 61800-1
IEC 61800-4:2002	NOTE	Harmonized as EN 61800-4:2003 (not modified)

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 Where 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	series	Rotating electrical machines	EN IEC 60034	series
IEC 60038	-	IEC standard voltages	EN 60038	-
IEC 60050-112	-	International Electrotechnical Vocabulary - Part 112: Quantities and units	-	-
IEC 60050-113	2011	International Electrotechnical Vocabulary - Part 113: Physics for electrotechnology	-	-
IEC 60050-114	-	International Electrotechnical Vocabulary - Part 114: Electrochemistry	-	-
IEC 60050-151	-	International Electrotechnical Vocabulary - Part 151: Electrical and magnetic devices	-	-
IEC 60050-161	-	International Electrotechnical Vocabulary. Chapter 161: Electromagnetic compatibility	-	-
IEC 60050-192	-	International electrotechnical vocabulary - Part 192: Dependability	-	-
IEC 60050-441	-	International Electrotechnical Vocabulary. Switchgear, controlgear and fuses	-	-
IEC 60050-442	-	International Electrotechnical Vocabulary - Part 442: Electrical accessories	-	-
IEC 60050-551	-	International Electrotechnical Vocabulary - Part 551: Power electronics	-	-

Publication	Year	Title	EN/HD	Year
IEC 60050-601	-	International Electrotechnical Vocabulary. Chapter 601: Generation, transmission and distribution of electricity - General	-	-
IEC 60068	series	Environmental testing	EN 60068	series
IEC 60068-2-27	2008	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock	EN 60068-2-27	2009
IEC 60076	series	Power transformers	EN 60076	series
IEC 60076-11	-	Power transformers - Part 11: Dry-type transformers	EN IEC 60076-11	-
IEC 60079	series	Explosive atmospheres	-	-
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 convertors - General requirements and line commutated convertors - Part 1-2: Application guide	-	-
IEC 60721-3-0	-	Classification of environmental conditions - Part 3-0: Classification of groups of environmental parameters and their severities - Introduction	EN IEC 60721-3-0	-
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	1994	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	1995
+ A1	1995		-	-
+ A2	1996		+ A2	1997

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Publication	Year	Title	EN/HD	Year
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	EN 60721-3-4	1995
+ A1	1996		+ A1	1997
IEC 61800-3	-	Adjustable speed electrical power drive systems - Part 3: EMC requirements and specific test methods	EN IEC 61800-3	-
IEC 61800-5-1	-	Adjustable speed electrical power drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy	EN 61800-5-1	-
IEC 61800-5-2	2016	Adjustable speed electrical power drive systems - Part 5-2: Safety requirements - Functional	EN 61800-5-2	2017
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	-
IEC/TS 61800-8	-	Adjustable speed electrical power drive systems - Part 8: Specification of voltage on the power interface	-	-
IEC 61800-9-1	-	Adjustable speed electrical power drive systems - Part 9-1: Ecodesign for power drive systems, motor starters, power electronics and their driven applications - General requirements for setting energy efficiency standards for power driven equipment using the extended product approach (EPA) and semi analytic model (SAM)	EN 61800-9-1	-
IEC 61800-9-2	-	Adjustable speed electrical power drive systems - Part 9-2: Ecodesign for power drive systems, motor starters, power electronics and their driven applications - Energy efficiency indicators for power drive systems and motor starters	EN 61800-9-2	-

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Publication	Year	Title	EN/HD	Year
IEC/TS 62578	2015	Power electronics systems and equipment - Operation conditions and characteristics of active infeed converter (AIC) applications including design recommendations for their emission values below 150 kHz	-	-

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ADJUSTABLE SPEED ELECTRICAL POWER DRIVE SYSTEMS –

Part 2: General requirements – Rating specifications for adjustable speed AC power drive systems

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

This third edition cancels and replaces the second edition published in 2015. This edition constitutes a technical revision.

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

a) the requirements from IEC 61800-4 for high-voltage PDS are now merged with requirements from IEC 61800-2:2015, and IEC 61800-4:2002 will be withdrawn upon release of this document;
b) Clause 1 has been updated to introduce the new concept of Clause 4;

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c) terms and definitions in Table 1 to Table 4 have been classified in logical order; classification in low voltage and high voltage has been considered in Table 5, and Figure 3 clarifies boundaries within *BDM/CDM/PDS*.

d) Clause 4 is new and creates the methods for evaluating a product to this document;

e) Clause 5 has been updated with respect to:

   1) specific content for high-voltage *BDM/CDM/PDS*;

   2) description of the basic topology for *BDM/CDM/PDS* (5.2);

   3) ratings and performance (5.3 and 5.4);

   4) 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), *power interface* voltage (IEC TS 61800-8), and ecodesign (IEC 61800-9 series) to avoid conflicting requirements (5.5, 5.6, 5.7, 5.10, 5.11, 5.12);

   5) update of requirement for ecodesign (5.8);

   6) update of requirement for environmental evaluation (5.9);

   7) implementation of requirement for explosive atmosphere (5.14);

f) Clause 6 has been updated with test requirement in order to provide a clear link between design requirement and test requirement;

g) Clause 7 has been updated to harmonize the marking and documentation requirement within IEC 61800 (all parts);

h) existing Annex A and Annex B have been updated to include specific detail pertaining to *high voltage BDM/CDM/PDS*.

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

FDIS	Report on voting
22G/432/FDIS	22G/435/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 document, the terms in *italics* are defined in Clause 3.

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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.

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INTRODUCTION

0.1 General

This document is part of the IEC 61800 series specifying requirements for adjustable *speed* electrical *power drive systems* (*PDS*). Since the publication of the second edition of IEC 61800-2, several documents of the IEC 61800 series 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 AC *motors* and with rated *converter* input voltages (line-to-line voltage) up to 35 000 V AC.

PDSs intended to feed DC *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:

- DC *PDS* requirements are covered by IEC 61800-1;
- EMC requirements are covered by IEC 61800-3;
- general safety requirements are covered by IEC 61800-5-1;
- functional safety requirements are covered by IEC 61800-5-2;
- type of load duty guidance is covered by IEC TR 61800-6;
- interface and use of profiles requirements are covered by IEC 61800-7 (all parts);
- *power interface* voltage specification is covered by IEC TS 61800-8;
- ecodesign energy *efficiency* requirements of drive system are covered by IEC 61800-9 (all parts).

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, to avoid conflicting requirement within IEC 61800 (all parts) and to optimize future maintenance of the documents.

As part of the work inside SC 22G MT9, this document defines basic definitions used across the IEC 61800 series. For issues related to *active infeed converters,* IEC TS 62578 has been considered.

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 (all parts) has decreased dramatically.

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

This document provides a non-exhaustive list of requirements to aid in the development of a functional specification between responsible parties. Each topic should be individually specified by the *responsible party*(ies) as a compliance requirement where appropriate for the intended application. When the *manufacturer* is the only *responsible party*, for any reason, the *manufacturer* may choose to select the specific sections of this document which are relevant for the intended application.

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BDM/CDM/PDS may be built into a final installation or imbedded into an extended product as a component. The following are example applications: 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*. The environmental conditions considered should include at least those defined in IEC 60721 (all parts) and EMC.

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