SVENSK STANDARD SS-EN IEC 61968-5

Fastställd	Utgåva	Sida	Ansvarig kommitté
2020-11-11	1	1 (1+52)	SEK TK 57

Integrering av tillämpningar för elförsörjning – Systemgränssnitt för distributionssystemstyrning – Del 5: Optimering av distribuerad elförsörjning

Application integration at electric utilities –
System interfaces for distribution management –
Part 5: Distributed energy optimization

Som svensk standard gäller europastandarden EN IEC 61968-5:2020. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 61968-5:2020.

Nationellt förord

Europastandarden EN IEC 61968-5:2020

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 61968-5, First edition, 2020 - Application integration at electric utilities - System interfaces for distribution management - Part 5: Distributed energy optimization**

utarbetad inom International Electrotechnical Commission, IEC.

ICS 33.200.00

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 61968-5

September 2020

ICS 33.200

English Version

Application integration at electric utilities - System interfaces for distribution management - Part 5: Distributed energy optimization (IEC 61968-5:2020)

Intégration d'applications pour les services électriques - Interfaces système pour la gestion de distribution - Partie 5: Optimisation de l'énergie distribuée (IEC 61968-5:2020)

Integration von Anwendungen in Anlagen der Elektrizitätsversorgung - Systemschnittstellen für Netzführung - Teil 5: Optimierung dezentraler Energie (IEC 61968-5:2020)

This European Standard was approved by CENELEC on 2020-09-22. 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.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN IEC 61968-5:2020 E

European foreword

The text of document 57/2223/FDIS, future edition 1 of IEC 61968-5, prepared by IEC/TC 57 “Power systems management and associated information exchange” was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61968-5:2020.

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)	2021-06-22
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2023-09-22

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

Endorsement notice

The text of the International Standard IEC 61968-5:2020 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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 60050-300	-	International Electrotechnical Vocabulary -- Electrical and electronic measurements and measuring instruments - Part 311: General terms relating to measurements - Part 312: General terms relating to electrical measurements - Part 313: Types of electrical measuring instruments - Part 314: Specific terms according to the type of instrument		-
IEC/TS 61968-2	-	Application integration at electric utilities -- System interfaces for distribution management - Part 2: Glossary		-
IEC 61968-9	2013	Application integration at electric utilities - System interfaces for distribution management - Part 9: Interfaces for meter reading and control	EN 61968-9	2014
IEC 61968-11	-	Application integration at electric utilities - System interfaces for distribution management - Part 11: Common information model (CIM) extensions for distribution	EN 61968-11	-
IEC 61968-100	2013	Application integration at electric utilities - System interfaces for distribution management - Part 100: Implementation profiles	EN 61968-100	2013
IEC 62055-31	-	Electricity metering - Payment systems - Part 31: Particular requirements - Static payment meters for active energy (classes 1 and 2)	EN 62055-31	-
IEC/TR 62051	-	Electricity metering - Glossary of terms	-	-
IEC/TR 62357-1	2016	Power systems management and associated information exchange - Part 1: Reference architecture		-

IEEE 1547	2018	IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces	-

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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APPLICATION INTEGRATION AT ELECTRIC UTILITIES – SYSTEM INTERFACES FOR DISTRIBUTION MANAGEMENT –

Part 5: Distributed energy optimization

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 61968-5 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
57/2223/FDIS	57/2252/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61968 series, published under the general title *Application integration at electric utilities – System interfaces for distribution management*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document 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

Technology advancements in various types of distributed energy resources (DER), have driven increases in their evaluation and employment by utilities, consumers, and third parties. These DER are often connected to the grid at the distribution level where their presence in large scale or volume could be disruptive if not designed, integrated, and managed properly.

Inverters, the power converter circuits that integrate DER to the grid, are highly-capable devices with fast power controls and no inherent inertia such that they can respond quickly to commands and local conditions. Even small-scale inverters tend to have processing and memory resources and can support a variety of communication protocols and advanced functions. Over the last few years, industry efforts have defined a wide range of standard grid-supportive functions that inverters may provide and standard communication protocols that allow these functions to be remotely monitored and managed.

If these inverter capabilities can be properly exposed and integrated into traditional utility system operations, high penetration DER can be transformed from problematic uncertainties to beneficial tools for distribution management. To achieve these potential benefits, it needs to be possible not just to communicate to individual DER devices using standard protocols, but also for the systems that manage DER, referred to herein as DER Management System or "DERMS", to effectively inform other software applications regarding the resources available and to exchange information that allows the DER to be managed effectively. Additionally, due to scale of some devices, to optimize the management of DER they are managed in aggregate, referred hereafter as "DER group management".

Traditionally, distribution systems have been operated without extensive controls or centralized management. More advanced systems may have On-Load Tap Changing transformers (LTCs) at substations, line regulators, and/or capacitor banks that operate to help optimize distribution voltage and reactive power flow. In many cases, these devices may be fixed or configured to operate autonomously. In a growing number of cases, however, a more central Distribution Management System (DMS) has been used to coordinate their behaviour for a more optimized overall effect. DMS functionality may reside at the utility operations centre, where single, large-scale software manages many circuits, or it may reside in a more limited fashion at the substation or other level, where smaller-scale systems act to manage individual feeders or circuits.

Regardless of the scenario, the present generation of DMS systems is not designed to take advantage of the capabilities that DER may offer. In most cases, DER support within a DMS is limited to monitoring the output of "utility scale" DERs (> one megawatt). In addition, existing industry standards define advanced functions for DER only at the individual device level, and lack the more aggregated, feeder-level representations that are useful for enterprise integration.

This document develops appropriate enterprise-level functions for the integration of distributed energy resources. These functions are intended to work in conjunction with the common functions for smart inverters that have previously been defined.

The high-level use cases that are covered include management of DER group membership, DER group status monitoring, DER group forecasting, and dispatching of real andreactive power and other capabilities of managing DER as aggregated groups.

The IEC 61968 standard, taken as a whole, defines interfaces for the major elements of interface architecture for Distribution Management Systems (DMS). Part 1: *Interface Architecture and General Recommendations*, identifies and establishes requirements for standard interfaces based on an Interface Reference Model (IRM). Parts 3-9 of this standard define interfaces relevant to each of the major business functions described by the Interface Reference Model.

As used in IEC 61968, a DMS consists of various distributed application components for the utility to manage electrical distribution networks. These capabilities include monitoring and control of equipment for power delivery, management processes to ensure system reliability, voltage management, demand-side management, outage management, work management, automated mapping and facilities management.

This set of standards is limited to the definition of interfaces and is implementation independent. They provide for interoperability among different computer systems, platforms, and languages. Methods and technologies used to implement functionality conforming to these interfaces are considered outside of the scope of these standards; only the interface itself is specified in these standards.

APPLICATION INTEGRATION AT ELECTRIC UTILITIES – SYSTEM INTERFACES FOR DISTRIBUTION MANAGEMENT –

Part 5: Distributed energy optimization

1 Scope

The scope of this part of IEC 61968 is the description of a set of functions that are needed for enterprise integration of DERMS functions. These exchanges are most likely between a DERMS and a DMS. However, since this is an enterprise integration standard which may leverage IEC 61968-100:2013 for application integration (using web services or JMS) or other loosely-coupled implementations, there are no technical limitations for systems with which a DERMS might exchange information. Also, it should be noted that a DERMS might communicate with individual DER using a variety of standards and protocols such as IEC 61850, IEEE 2030.5, Distribution Network Protocol (DNP), Sunspec Modbus, or perhaps Open Field Message Bus (OpenFMB). One role of the DERMS is to manage this disparity and complexity of communications on the behalf of the system operator. However, the communication to individual DER is out of scope of this standard. Readers are invited to look to those standards to understand communication to individual DERs' smart inverter.

The scope will be limited to the following use case categories:

- DER group creation – a mechanism to manage DER in aggregate
- DER group maintenance – a mechanism to add, remove, or modify the members and/or aggregated capabilities of a given group of DER
- DER group deletion – removing an entire group
- DER group status monitoring – a mechanism for quantifying or ascertaining the current capabilities and/or status of a group of DER
- DER group forecast – a mechanism for predicting the capabilities and/or status of a group of DER for a given time period in the future
- DER group dispatch – a mechanism for requesting that specified capabilities of a group of DER be dispatched to the grid
- DER group voltage ramp rate control – a mechanism for requesting that a DER group following a ramp rate curve
- DER group connect/disconnect – a mechanism to request that DER either isolate themselves, or reconnect to the grid as needed

To support use cases in the preceding categories, this document specifies the following data requirements (profiles) as shown in Table 1:

Table 1 – IEC 61968-5 Profiles

DERGroups	DERGroupQueries
DERGroupStatuses	DERGroupStatusQueries
DERGroupForecasts	DERGroupForecastQueries
DERGroupDispatches	DERGroupQueries

The profiles in the left column of Table 1 are the "base" DER profiles and appear in the Payload section of IEC 61968-100 compliant messages. Those in the right column of Table 1 are the "query" profiles that appear in the Request section of IEC 61968-100 compliant messages and are used to specify the query parameters when using the "get" CIM verb.

Additionally, this specification uses existing IEC 61968-9:2013, *Application integration at electric utilities - System interfaces for distribution management - Part 9: Interfaces for meter reading and control profiles*, as shown in Table 2, which are used for passing event information and for the DER group connect/disconnect use cases. There are no extensions made to these profiles, only the data specific to these use cases is passed.

Table 2 – IEC 61968-9 Profiles

EndDeviceControls
EndDeviceEvents

In a departure from prior IEC 61968 standards, this document supports specification of both a "constrained" and an "unconstrained" version of each of the "base" profiles. The "constrained" versions have a greater number of non-optional data elements and are intended for use with the "create" and "created" CIM verbs. The "unconstrained" versions have all or almost all of the CIM elements defined as optional, which is required to support operations involving the "change", "changed", "delete", "deleted" and "get" CIM verbs.

This part of IEC 61968 contains the clauses listed in Table 3.

Table 3 – Document overview for IEC 61968-5

Clause	Title	Purpose
1	Scope	The scope and purpose of the document are described.
2	References (Normative and Informative)	Documents that contain provisions which, through reference in this text, constitute provisions of this International Standard.
3	Terms, definitions, and abbreviations	Establish the common terms used in this specification.
4	Document Conventions	Message types related to the exchange of information for documents related to maintenance and construction.
5	DER Enterprise Integration Use Cases	The specific requirements for and details of the message exchanges based on the use cases. Description of general approach to the DER enterprise integration message type terms and the static information.

2 Normative references

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.

IEC 60050-300, *International Electrotechnical Vocabulary (IEV) - Part 300: Electrical and electronic measurements and measuring instruments - Part 311: General terms relating to measurements - Part 312: General terms relating to electrical measurements - Part 313: Types of electrical measuring instruments - Part 314: Specific terms according to the type of instrument*

IEC TS 61968-2, *Application integration at electric utilities - System interfaces for distribution management - Part 2: Glossary*

IEC 61968-9:2013, *Application integration at electric utilities - System interfaces for distribution management - Part 9: Interfaces for meter reading and control*

IEC 61968-11, *Application integration at electric utilities - System interfaces for distribution management - Part 11: Common information model (CIM) extensions for distribution*

IEC 61968-100:2013, *Application integration at electric utilities - System interfaces for distribution management - Part 100: Implementation profiles*

IEC TR 62051, *Electricity metering - Glossary of terms*

IEC 62055-31, *Electricity metering - Payment systems - Part 31: Particular requirements - Static payment meters for active energy (classes 1 and 2)*

IEC TR 62357-1:2016, *Power systems management and associated information exchange - Part 1: Reference architecture*

IEEE 1547-2018, *IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces*