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## **Gränssnitt för EMS (EMS-API) – Del 301: Grund för gemensam informationsmodell (CIM)**

*Energy management system application program interface (EMS-API) –  
Part 301: Common information model (CIM) base*

Som svensk standard gäller europastandarden EN 61970-301:2014. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61970-301:2014.

### **Nationellt förord**

Europastandarden EN 61970-301:2014

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 61970-301, Fifth edition, 2013 - Energy management system application program interface (EMS-API) - Part 301: Common information model (CIM) base**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61970-301, utgåva 3, 2013, gäller ej fr o m 2017-01-17.

### *Standarder underlättar utvecklingen och höjer elsäkerheten*

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

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Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

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### **SEK Svensk Elstandard**

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English Version

**Energy management system application program interface  
(EMS-API) - Part 301: Common information model (CIM) base  
(IEC 61970-301:2013)**

Interface de programmation d'application pour système de  
gestion d'énergie (EMS-API) - Part 301: Base de modèle  
d'information commun (CIM)  
(CEI 61970-301:2013)

Schnittstelle für Anwendungsprogramme für  
Netzführungssysteme (EMS-API) - Teil 301: Allgemeines  
Informationsmodell (CIM)  
(IEC 61970-301:2013)

This European Standard was approved by CENELEC on 2014-01-17. 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.

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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**

## Foreword

The text of document 57/1395/FDIS, future edition 5 of IEC 61970-301, 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 61970-301:2014.

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) 2015-01-18
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-01-17

This document supersedes EN 61970-301:2013.

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This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

## Endorsement notice

The text of the International Standard IEC 61970-301:2013 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 61968-11  | NOTE | Harmonised in EN 61968-11.  |
| IEC 61970-501 | NOTE | Harmonised as EN 61970-501. |

## 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 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| <u>Publication</u>                | <u>Year</u> | <u>Title</u>                                                                                                                                                        | <u>EN/HD</u>   | <u>Year</u> |
|-----------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------|
| IEC 60050                         | (Series)    | International Electrotechnical Vocabulary (IEV)                                                                                                                     | -              | -           |
| IEC 60870-6                       | (Series)    | Telecontrol equipment and systems - Part 6-802: Telecontrol protocols compatible with ISO standards and ITU-T recommendations - TASE.2 Object models                | EN 60870-6     | (Series)    |
| IEC 61850                         | (Series)    | Communication networks and systems for power utility automation                                                                                                     | EN 61850       | (Series)    |
| IEC 61850-7-3                     | 2010        | Communication networks and systems for power utility automation - Part 7-3: Basic communication structure - Common data classes                                     | EN 61850-7-3   | 2011        |
| IEC 61850-7-4                     | 2010        | Communication networks and systems for power utility automation - Part 7-4: Basic communication structure - Compatible logical node classes and data object classes | EN 61850-7-4   | 2010        |
| IEC 61968                         | (Series)    | Application integration at electric utilities - System interfaces for distribution management                                                                       | EN 61968       | (Series)    |
| IEC/TS 61970-2                    |             | Energy management system application program interface (EMS-API) - Part 2: Glossary                                                                                 | CLC/TS 61970-2 |             |
| IEC 62325                         | (Series)    | Framework for energy market communications                                                                                                                          | EN 62325       | (Series)    |
| UML 2.0 - Object Group Management |             | Object Management Group: UML 2.0 Specification                                                                                                                      | -              | -           |

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ENERGY MANAGEMENT SYSTEM APPLICATION  
PROGRAM INTERFACE (EMS-API) –****Part 301: Common information model (CIM) base**

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International Standard IEC 61970-301 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

This fifth edition cancels and replaces the fourth edition, published in 2013-05. This fifth edition constitutes a technical revision.

Major changes from the fourth edition include the following.

- transformer models have been modified to be consistent for use by distribution and transmission purposes. Additionally the tap changer model was updated to more clearly reflect the intended usage without relying upon rules for which attributes are appropriate in which situations;
- a more general and clear naming approach was added and several ambiguous attributes related to naming were dropped. The approach allows for users to define new name domains and to give them their own unique description;
- phase component wires models have been enhanced to describe internal phase specific attributes and connections;

- addition of diagram layout models to facilitate the exchange of diagram layout information;
- addition of new data types for Decimal, and clean up of date and time types;
- addition of new Compound data types to the Domain package.

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

| FDIS         | Report on voting |
|--------------|------------------|
| 57/1395/FDIS | 57/1417/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 61970 series, under the general title: *Energy management system application program interface (EMS-API)*, 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 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

This standard is one of the IEC 61970 series which define an application program interface (API) for an energy management system (EMS). This standard was originally based upon the work of the EPRI Control Center API (CCAPI) research project (RP-3654-1). The principal objectives of the EPRI CCAPI project were to:

- reduce the cost and time needed to add new applications to an EMS;
- protect the investment of existing applications or systems that are working effectively with an EMS.

The principal objective of the IEC 61970 series of standards is to produce standards which facilitate the integration of EMS applications developed independently by different vendors, between entire EMS systems developed independently, or between an EMS system and other systems concerned with different aspects of power system operations, such as generation or distribution management systems (DMS). This is accomplished by defining application program interfaces to enable these applications or systems access to public data and exchange information independent of how such information is represented internally.

The common information model (CIM) specifies the semantics for this API. The component interface specifications (CIS), which are contained in other parts of the IEC 61970 standards, specify the content of the messages exchanged.

The CIM is an abstract model that represents all the major objects in an electric utility enterprise typically needed to model the operational aspects of a utility. This model includes public classes and attributes for these objects, as well as the relationships between them.

The objects represented in the CIM are abstract in nature and may be used in a wide variety of applications. The use of the CIM goes far beyond its application in an EMS. This standard should be understood as a tool to enable integration in any domain where a common power system model is needed to facilitate interoperability and plug compatibility between applications and systems independent of any particular implementation.

This standard, IEC 61970-301, defines the CIM base set of packages which provide a logical view of the functional aspects of an energy management system including SCADA. Other functional areas are standardized in separate IEC documents that augment and reference this base CIM standard. For example, IEC 61968-11 addresses distribution models and references this base CIM standard. While there are multiple IEC standards dealing with different parts of the CIM, there is a single, unified information model comprising the CIM behind all these individual standards documents.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning a computer-based implementation of an object-oriented power system model in a relational database. As such, it does not conflict with the development of any logical power system model including the common information model (CIM), where implementation of the model is not defined.

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## ENERGY MANAGEMENT SYSTEM APPLICATION PROGRAM INTERFACE (EMS-API) –

### Part 301: Common information model (CIM) base

#### 1 Scope

The common information model (CIM) is an abstract model that represents all the major objects in an electric utility enterprise typically involved in utility operations. By providing a standard way of representing power system resources as object classes and attributes, along with their relationships, the CIM facilitates the integration of Energy Management System (EMS) applications developed independently by different vendors, between entire EMS systems developed independently, or between an EMS system and other systems concerned with different aspects of power system operations, such as generation or distribution management. SCADA is modeled to the extent necessary to support power system simulation and inter-control center communication. The CIM facilitates integration by defining a common language (i.e. semantics) based on the CIM to enable these applications or systems to access public data and exchange information independent of how such information is represented internally.

The object classes represented in the CIM are abstract in nature and may be used in a wide variety of applications. The use of the CIM goes far beyond its application in an EMS. This standard should be understood as a tool to enable integration in any domain where a common power system model is needed to facilitate interoperability and plug compatibility between applications and systems independent of any particular implementation.

Due to the size of the complete CIM, the object classes contained in the CIM are grouped into a number of logical Packages, each of which represents a certain part of the overall power system being modeled. Collections of these Packages are progressed as separate International Standards. This particular International Standard specifies a Base set of packages which provide a logical view of the functional aspects of Energy Management System (EMS) information within the electric utility enterprise that is shared between all applications. Other standards specify more specific parts of the model that are needed by only certain applications. Subclause 4.2 below provides the current grouping of packages into standards documents.

#### 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 60050 (all parts), *International Electrotechnical Vocabulary (IEV)*  
<http://www.electropedia.org>

IEC 60870-6 (all parts), *Telecontrol equipment and systems – Part 6: Telecontrol protocols compatible with ISO standards and ITU-T recommendations*

IEC 61850 (all parts), *Communication networks and systems for power utility automation*

IEC 61850-7-3:2010, *Communication networks and systems for power utility automation – Part 7-3: Basic communication structure – Common data classes*

IEC 61850-7-4:2010, *Communication networks and systems for power utility automation – Part 7-4: Basic communication structure – Compatible logical node classes and data object classes*

IEC 61968 (all parts), *Application integration at electric utilities – System interfaces for distribution management*

IEC/TS 61970-2, *Energy management system application program interface (EMS-API) – Glossary*

IEC 62325 (all parts), *Framework for energy market communications*

Object Management Group: UML 2.0 Specification – <http://www.omg.org>