IEC 63402-2-2

Edition 1.0 2026-08

INTERNATIONAL STANDARD

HORIZONTAL PUBLICATION

GROUP ENERGY EFFICIENCY PUBLICATION

Energy efficiency - Customer energy management system - Part 2-2: Data model and messaging - Interface between the customer energy manager and resource managers

ICS 03.100.70; 27.015; 29.020

ISBN 978-2-8327-1442-3

IEC 63402-2-2:2026-08(en)

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

Tel.: +41 22 919 02 11
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 corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
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 It also gives information on projects, replaced and withdrawn publications.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 once a month by email.

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: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

Energy efficiency - Customer energy management system - Part 2-2: Data model and messaging - Interface between the customer energy manager and resource managers

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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 63402-2-2 has been prepared by subcommittee 23K: Electrical energy efficiency products, of IEC technical committee 23: Electrical accessories. It is an International Standard.

It has the status of a group energy efficiency publication in accordance with IEC Guide 118, *Preparation of basic and group energy efficiency publications including energy efficiency aspects*.

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

Draft	Report on voting
23K/134/FDIS	23K/138/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 63402 series, published under the general title *Energy efficiency - Customer energy management systems*, 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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,
– withdrawn, or
– revised.

Introduction

Over recent decades, energy production and its consumption patterns have changed dramatically. Although central energy production is still dominant, the trend for distributed production is distinctive following an increasing number of renewables. Alternative energy sources are highly fluctuating in their production capabilities, which can result in the grid operators having difficulty to keep a balance between energy production and consumption. The complexity of keeping the grid reliable is further increased by the change in the electric energy consumption and production of the customer itself, e.g., the use of electric vehicles and personal generation facilities.

A Smart Grid allows the grid operator to be flexible and reactive. Such reactivity uses communication between energy consuming and producing entities, from single family houses to large factories.

This document describes aspects of the smart grid that relate specifically to the premises (home or building) part of the smart grid and describes the common interface between equipment in the premises and the smart grid. This document defines the fundamental aspects of semantic interoperability for the S2 interface and the related data exchange between a CEM and the Resource Managers within the premises.

Different use cases are explained in Annex A, which help to understand the philosophy of this document.

This document is based on EN 50491-12-2 [1] which also served as a basis for ETSI TS 103 410-1 SAREF4ENER [2].

1 Scope

This document specifies the fundamental aspects of semantic interoperability for the S2 interface and the related data exchange between a CEM and the resource managers within the premises. It provides a technology independent set of data models and interaction patterns in order to enable applications for energy management within the premises. This document does not include:

– mappings to concrete data representations (XML, JSON and similar);
– mappings to application protocols for the message passing;
– security related aspects.

This group EE publication is primarily intended to be used as an EE standard for the products mentioned in the scope, but is also intended to be used by TCs in the preparation of publications for products which are included in the boundary mentioned in the scope of this document.

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 TR 62746-2:2015, *Systems interface between customer energy management system and the power management system - Part 2: Use cases and requirements*

IEC 63402-1, *Energy Efficiency - Customer Energy Management Systems -- Part 1: General Requirements and Architecture*

ISO 4217, *Codes for the representation of currencies*

ISO 15118-20, *Road vehicles - Vehicle to grid communication interface - Part 20: Network and application protocol requirements*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 63402-1, and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

– IEC Electropedia: available at https://www.electropedia.org/
– ISO Online browsing platform: available at https://www.iso.org/obp

3.1.1
customer energy manager
CEM
internal automation function for optimizing the energy consumption, production and storage within the premises according to the preferences of the customer using internal flexibilities and typically based on external information received through the energy management gateway and possibly other data sources

[SOURCE: IEC 63402-1:2025 [3], 3.1.1]

3.1.2
power envelope based control
coordination of the CEM based on limitations to the device

Note 1 to entry: The CEM can set minimum and maximum values for the power that shall not be exceeded by the device.

3.1.3
power profile based control
control type where coordination from the CEM is based on profile modification, including concepts of sequence shifting, sequence selection

3.1.4
operation mode based control
control type where the resource manager offers the CEM multiple operation modes that the CEM could choose from

Note 1 to entry: The behaviour of the device will be modified by selecting operation modes.

3.1.5
fill rate based control
control type based on measurements indicating the fill level and the fill rate

3.1.6
demand driven based control
control type where the CEM can decide how a given demand should be fulfilled

3.1.7
resource manager
RM
function that exclusively represents a logical group of devices or a single smart device, and is responsible for sending unambiguous instructions to the logical group of devices or to a single device, typically using a device-specific protocol

Note 1 to entry: In the context of this document the resource manager manages the energy flexibility of a logical group of devices or a single smart device.

[SOURCE: IEC 63402-1:2025 [3], 3.1.9]

3.1.8
role
categorization of the behaviour of a participant by its capabilities related to energy management, each participant at least supporting one

3.1.9
S1 communication
interface between CEM and energy management gateway

3.1.10
S2 communication
interface between CEM and resource manager

3.1.11
smart grid
electric power system that utilizes information exchange and control technologies, distributed computing and associated sensors and actuators, for purposes such as:

– to integrate the behaviour and actions of the network users and other stakeholders,
– to efficiently deliver sustainable, economic and secure electricity supplies

3.1.12
smart grid operator
instance requesting energy profiles from the CEM in order to keep the grid stable and reliable

3.1.13
time slot
fixed period of time with a specific duration

3.1.14
use case
case that describes interactions between an actor and another actor or a system to achieve a specific goal, either very abstract or very detailed

Note 1 to entry: The use case can be nested.

3.1.15
user
either a person (e.g. installer or resident) or a surrogate service

3.1.16
prosumer
household or device that produces and consumes energy of the same commodity

[SOURCE: IEC 60050-617:2009 [4], 617-02-16, modified - Replacement of "network user" with "household or device"; addition of "of the same commodity".]

3.1.17
single application smart system
SASS
group of devices having a communication interface for a single application such as heating or lighting, that consume, produce or store energy (or a combination thereof) and that can be controlled by a resource manager for the purpose of energy management

[SOURCE: IEC 63402-1:2025 [3], 3.1.13]

3.1.18
home and building electronic system
building automation control system
HBES
BACS
logical group of devices which uses a multi-application communication system where the functions are distributed and linked through a common communication process

EXAMPLE Management of lighting, heating, energy, water, fire alarms, blinds, different forms of security, etc.

Note 1 to entry: HBES and BACS is used in homes and buildings plus their surroundings. Functions of the system are, for example: switching, open loop controlling, closed loop controlling, monitoring and supervising.

Note 2 to entry: In literature, HBES or BACS can be referred also as "home control system or network", "home electronic systems", "building automation systems", etc.

[SOURCE: IEC 63402-1:2025 [3], 3.1.6]

3.1.19
abnormal condition
situation in which a Resource Manager is sacrificing user comfort when requested by the CEM