SVENSK STANDARD

SS-EN IEC 62872-2, utg 1:2022

| Fastställd | Sida | Ansvarig kommitté |
|---|---|---|
| 2022-08-24 | 1 (1+55) | SEK TK 65 |



# Industriell processtyrning – Del 2: Sakernas internet (IoT) – Ramverk för tillämpningar för behovsanpassad elförsörjning för industriella anläggningar

*Industrial-process measurement, control and automation – Part 2: Internet of Things (IoT) – Application framework for industrial facility demand response energy management*

Som svensk standard gäller europastandarden EN IEC 62872-2:2022. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 62872-2:2022.

## Nationellt förord

Europastandarden EN IEC 62872-2:2022

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC

– **IEC 62872-2, First edition, 2022 - Industrial-process measurement, control and automation - Part 2: Internet of Things (IoT) - Application framework for industrial facility demand response energy management**

utarbetad inom International Electrotechnical Commission, IEC.

ICS 35.020.00; 27.015

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN IEC 62872-2

March 2022

ICS 27.015; 35.020

English Version

# Industrial-process measurement, control and automation - Part 2: Internet of Things (IoT) - Application framework for industrial facility demand response energy management (IEC 62872-2:2022)

Mesure, commande et automatisation dans les processus industriels - Partie 2: Internet des objets (IdO) - Cadre d'application pour la gestion d'énergie de la réponse à la demande des installations industrielles (IEC 62872-2:2022)

Industrielle Automatisierungs- und Leittechnik - Teil 2: Internet der Dinge (IoT) - Anwendungsrahmen für das Energiemanagement von Industrieanlagen (IEC 62872-2:2022)

This European Standard was approved by CENELEC on 2022-03-15. 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.

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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 62872-2:2022 E

SEK Svensk Elstandard SS-EN IEC 62872-2, utg 1:2022

# European foreword

The text of document 65/898/FDIS, future edition 1 of IEC 62872-2, prepared by IEC/TC 65 "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62872-2:2022.

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) 2022-12-15
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2025-03-15

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.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

## Endorsement notice

The text of the International Standard IEC 62872-2:2022 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 61158-3 (series) | NOTE Harmonized as EN 61158-3 (series) |
| IEC 62056-5-3 | NOTE Harmonized as EN 62056-5-3 |
| IEC 62056-6-1 | NOTE Harmonized as EN 62056-6-1 |
| IEC 62056-6-2 | NOTE Harmonized as EN IEC 62056-6-2 |
| IEC 62264-1:2013 | NOTE Harmonized as EN 62264-1:2013 (not modified) |
| IEC 62714-1:2018 | NOTE Harmonized as EN IEC 62714-1:2018 (not modified) |
| IEC 61850-7-420:2021 | NOTE Harmonized as EN IEC 61850-7-420:2021 (not modified) |
| ISO 14040:2006 | NOTE Harmonized as EN ISO 14040:2006 (not modified) |

# 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 TS 62872-1 | 2019 | Industrial-process measurement, control and automation - Part 1: System interface between industrial facilities and the smart grid | - | - |
| ISO/IEC TR 22417 | 2017 | Information technology - Internet of things (IoT) - IoT use cases | - | - |
| ISO/IEC 30141 | 2018 | Internet of Things (IoT) - Reference architecture | - | - |

IEC 62872-2

Edition 1.0 2022-02

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

colour inside

## Industrial-process measurement, control and automation – Part 2: Internet of Things (IoT) – Application framework for industrial facility demand response energy management

## Mesure, commande et automatisation dans les processus industriels – Partie 2: Internet des objets (IdO) – Cadre d'application pour la gestion d'énergie de la réponse à la demande des installations industrielles

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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# INDUSTRIAL-PROCESS MEASUREMENT, CONTROL AND AUTOMATION –

# Part 2: Internet of Things (IoT) – Application framework for industrial facility demand response energy management

## 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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IEC 62872-2 has been prepared by IEC technical committee 65: Industrial-process measurement, control and automation. It is an International Standard.

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

| Draft | Report on voting |
|---|---|
| 65/898/FDIS | 65/911/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/standardsdev/publications.

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,
- replaced by a revised edition, or
- amended.

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# INTRODUCTION

The World Energy Outlook 2017 [19][1] reported that industry consumed over 40 % of world electricity generation in 2015. Furthermore, industry itself is a significant generator of internal power, with many facilities increasingly implementing their own generation, co-generation and energy storage resources. As a major energy consumer, the ability of some industries to schedule their consumption can be used to minimize peak demands on the electrical grid. As an energy supplier, industries with in-house generation or storage resources can also assist in grid load management. For example, in-house generation can supply energy to the smart grid and to the facility. Furthermore, storage resources can assist in smart grid load management. While some larger industrial facilities already manage their use and supply of electric power, more widespread deployment, especially by smaller facilities, will depend upon the availability of a readily available standard interface between industrial automation equipment and the "smart grid".

NOTE In this document "smart grid" is used to refer to the external-to-industry entity with which industry interacts for the purpose of energy management. In other documents this term can be used to refer to all of the elements, including internal industrial energy elements, which work together to optimize energy generation and use.

Standards are already being developed for home and building automation interfaces to the smart grid; however, the requirements of industry differ significantly and are addressed in this document. For industry, the planning of energy resources and production processes are under the responsibility of the facility energy planner and production planner while operations are under the responsibility of the facility energy operator and production operator.

Incorrect operation of a resource could impact the safety of personnel, the facility, the environment or lead to production failure and equipment damage. In addition, larger facilities may have in-house production planning capabilities which could be coordinated with smart grid planning, to allow longer term energy planning.

IEC TS 62872-1:2019 defines the interface, in terms of information flow, between industrial facilities and the "smart grid". It identifies, profiles and extends where required the standards needed to allow the exchange of the information needed to support the planning, management and control of electric energy flow between the industrial facility and the smart grid.

"Internet of Things" (IoT) is being applied into different domains to facilitate the application. Building on the system interface between industrial facilities and the smart grid defined in IEC TS 62872-1:2019, this document addresses IoT application for industrial facility demand response energy management (FDREM). The smart grid is a modern electric power grid infrastructure system, whereby advanced information and communication technologies (ICTs) are integrated with the power grid. Industry is the largest consumer of electricity among all end user sectors. This has led to significant interest in the development of industrial energy management around the world in recent years. Interconnectivity and interoperability are very important features in the development of integrated energy management systems for industrial facilities. Therefore, IoT technologies are needed and suitable for exchanging energy-related information in FDREM. By using the IoT for communication, it enables real-time data-acquisition (In this document, it means acquisition of real time data, not data in real time.) and efficient data-analysis, which can make industrial energy management more intelligent and cost-saving. Currently, there may exist different implementation of IoT-based FDREM. Thus, a standard specification is urgently needed to guide different kinds of IoT application to data-exchange in industrial energy management.

[1] Numbers in square brackets refer to the Bibliography.

The proposed IoT application framework is divided into the utility side and industrial electricity demand side, with the utility meter as the boundary between the two. Functional components that are essential for building the automatic demand response energy management are described clearly in this framework. the IoT application framework is compliant with the IoT Reference Architecture (IoT RA) standardized in ISO/IEC 30141, therefore, functional components of the IoT application framework can be mapped to the IoT RA appropriately.

This document will also describe the functionality of each IoT protocol stack layers in regard to communication of the IoT application framework, aiming to provide related information exchange services for functional components. Identification of existing IoT protocols will be executed to support this kind of information exchange. Non-functional communication requirements will also be analysed to ensure comprehensive performance of the information exchange.

There are gaps in existing standards for supporting industrial facility energy management with IoT technologies; this document fills the gaps to support IoT frameworks, but also can guide the deployment of IoT into different energy management applications. For this purpose, this document will specify a general IoT-based communication framework for industrial FDREM.

# INDUSTRIAL-PROCESS MEASUREMENT, CONTROL AND AUTOMATION –

# Part 2: Internet of Things (IoT) – Application framework for industrial facility demand response energy management

## 1 Scope

This part of IEC 62872 presents an IoT application framework for industrial facility demand response energy management (FDREM) for the smart grid, enabling efficient information exchange between industrial facilities using IoT related communication technologies. This document specifies:

– an overview of the price-based demand response program that serves as basic knowledge backbone of the IoT application framework;

– a IoT-based energy management framework which describes involved functional components, as well as their relationships;

– detailed information exchange flows that are indispensable between functional components;

– existing IoT protocols that need to be identified for each protocol layer to support this kind of information exchange;

– communication requirements that guarantee reliable data exchange services for the application framework.

## 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 TS 62872-1:2019, *Industrial-process measurement, control and automation – Part 1: System interface between industrial facilities and the smart grid*

ISO/IEC 30141:2018, *Internet of Things (IoT) – Reference architecture*

ISO/IEC TR 22417:2017, *Information technology – Internet of things (IoT) use cases*