

# TECHNICAL SPECIFICATION



**Supplementary requirements for intelligent assemblies**

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## SUPPLEMENTARY REQUIREMENTS FOR INTELLIGENT ASSEMBLIES

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IEC TS 63290 has been prepared by subcommittee 121B: Low-voltage switchgear and controlgear assemblies, of IEC technical committee 121: Switchgear and controlgear and their assemblies for low voltage. It is a Technical Specification.

The text of this Technical Specification is based on the following documents:

Draft	Report on voting
121B/202/DTS	121B/203/RVDTS

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 Technical Specification 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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

This document references IEC 61439-1. The provisions of the general rules dealt with in IEC 61439-1 are only applicable to this document insofar as they are specifically cited.

The reader's attention is drawn to the fact that Annex J lists all of the "in-some-country" clauses on differing practices of a less permanent nature relating to the subject of this document. A list of all parts of the IEC 61439 series, under the general title *Low-voltage switchgear and controlgear assemblies*, can be found on the IEC website.

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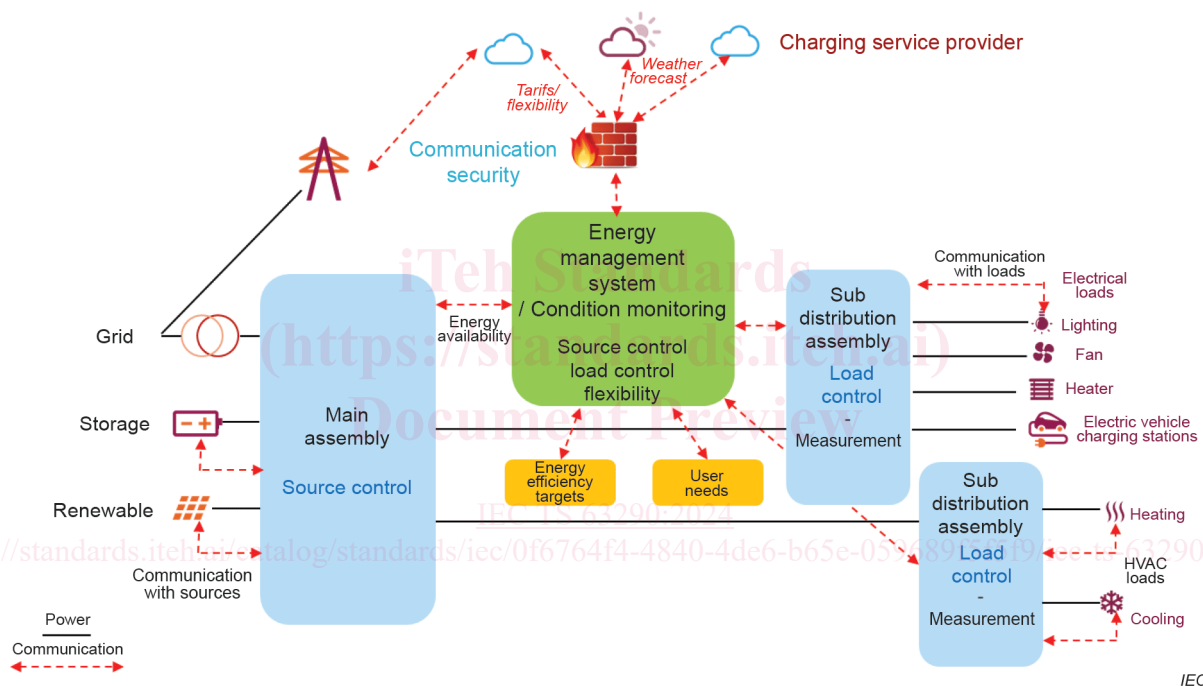
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## INTRODUCTION

The drive for sustainability is prompting significant changes to the role of low-voltage switchgear and controlgear assemblies. Rather than being a manually and locally operated type of equipment, increasingly they are at the centre of an automated energy management system requiring intelligence and communications within/out of the assemblies. These functions are in addition to the conventional electromechanical features of assemblies and require supplementary considerations. Low-voltage assemblies are evolving from electromechanical constructions to assemblies including a multitude of digital functions. The low-voltage assemblies can provide the intelligence to manage different functions, for example, remote monitoring, remote control, local intelligence, or interaction with other systems, to bring a well-adapted solution to the customer.

This document gives the requirements for intelligent assemblies to enable it to form an integral part of a connected network (see Figure 1).



**Figure 1 – Example of a connected environment**

## SUPPLEMENTARY REQUIREMENTS FOR INTELLIGENT ASSEMBLIES

### 1 Scope

This document provides additional requirements for assemblies in accordance with the product standards of the IEC 61439 series (Part 2 onwards) that incorporate digital functions and communication, in addition to the conventional electromechanical features of assemblies to reflect what is defined within this document as intelligence. It specifies the definitions, service conditions, constructional requirements, technical characteristics and verification requirements that can be carried out in addition to the IEC 61439 series for intelligent low-voltage switchgear and controlgear assemblies.

NOTE Throughout this document, the term assembly is used for low-voltage switchgear and controlgear assembly.

Intelligence within an assembly takes many forms and ranges from the measurement of electrical values with analysis to full automation and monitoring for process, energy management, condition monitoring, etc.

This document is applicable to intelligent assemblies for which the rated voltage does not exceed 1 000 V AC or 1 500 V DC; and designed for a nominal frequency of the incoming supply or supplies not exceeding 1 000 Hz.

This document does not apply to electrical equipment of machines (which is covered by the IEC 60204 series), and also does not apply to electrical equipment for measurement, control, and laboratory use (which is covered by the IEC 61010-2 series).

### 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 60255 (all parts), *Measuring relays and protection equipment*

IEC 60364-8-1:2019, *Low-voltage electrical installations – Part 8-1: Functional aspects – Energy efficiency*

IEC 60664-1, *Insulation coordination for equipment within low-voltage supply systems – Part 1: Principles, requirements and tests*

IEC 60947 (all parts), *Low-voltage switchgear and controlgear*

IEC 61010 (all parts), *Safety requirements for electrical equipment for measurement, control and laboratory use*

IEC 61140, *Protection against electric shock – Common aspects for installation and equipment*

IEC 61158 (all parts), *Industrial communication networks – Fieldbus specifications*

IEC 61439 (all parts), *Low-voltage switchgear and controlgear assemblies*

IEC 61439-1:2020, *Low-voltage switchgear and controlgear assemblies – Part 1: General rules*

IEC 61557-12, *Electrical safety in low voltage distribution systems up to 1 000 V AC and 1 500 V DC – Equipment for testing, measuring or monitoring of protective measures – Part 12: Power metering and monitoring devices (PMD)*

IEC 61643-12, *Low-voltage surge protective devices – Part 12: Surge protective devices connected to low-voltage power systems – Selection and application principles*

IEC 61784 (all parts), *Industrial communication networks – Profiles*

IEC 62052 (all parts), *Electricity metering equipment – General requirements, tests and test conditions*

IEC 62053 (all parts), *Electricity metering equipment – Particular requirements*

IEC 62591, *Industrial networks – Wireless communication network and communication profiles – WirelessHART™*

IEC 62601, *Industrial networks – Wireless communication network and communication profiles – WIA-PA*

IEC 62734, *Industrial networks – Wireless communication network and communication profiles – ISA 100.11a*

IEC 62948, *Industrial networks – Wireless communication network and communication profiles – WIA-FA*

IEC TS 63208:2020, *Low-voltage switchgear and controlgear – Security aspects*

IEEE 802.3, *Ethernet LAN*

IEEE 802.11, *Wireless LAN*

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IEEE 802.15, *Personal Area Network*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61439-1 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 intelligent assembly**

assembly which includes functions for either operation or maintenance, or both, for the full life cycle of the system by using sensor technology, digital technology, network technology, communication technology or artificial intelligence technology

Note 1 to entry: Intelligent assemblies realise some or all their functions of either local or remote measurement, or both, provision of information, control, adjustment. The following list gives some examples to be considered:

- Supply and load management for system optimisation.
- Remote load management.
- Either local or remote status indication, or both, including, as appropriate, alarms to indicate overheating, overcurrent, earth leakage, etc.
- Intelligent analysis and storage of faults and other statistics.
- Stable communication and secure data through open communication protocols.
- Either remotely or locally managed protection functions, or both.
- Video monitoring of parts or all of the assemblies running state.
- Monitoring of the intelligent assembly's installation conditions, e.g. ambient temperature, humidity.
- Condition monitoring to enable condition based and preventive maintenance.
- Details of components included in the intelligent assembly, e.g. brand, either type or reference, or both, characteristics, manufacturing date, serial number, firmware revision and date.

### **3.2 gateway**

functional unit that connects two networks with different network architectures and protocols

Note 1 to entry: The networks may be local area networks, wide area networks or other types of networks.

Note 2 to entry: Examples of gateways are a LAN gateway, a mail gateway.

[SOURCE: IEC 60050-732:2010, 732-01-17, modified – Deleted the word "computer" from the definition and Note 1 to entry.]

### **3.3 fieldbus**

communication system based on serial data transfer and used in industrial automation or process control applications

[SOURCE: IEC 61784-3:2021, 3.1.20]

### **3.4 industrial Ethernet**

area and cell networks based on IEEE 802.3 (Ethernet) prepared for the use of industrial environment

### **3.5 remote monitoring**

continuing procedure for the collection and assessment of pertinent information, including measurements, at a point distant from the controlled switching device, assembly or installation

### **3.6 remote control**

control of an operation at a point distant from the controlled switching device, assembly or installation

[SOURCE: IEC 60050-441:1984, 441-16-07, modified – added: assembly or installation.]

**3.7****remote adjustment**

adjust parameters remotely by communication

**3.8****intelligent device**

device where some or all of its operating parameters are either measured or controlled, or both, via digital means

**3.9****interface**

shared boundary between two functional units, defined by functional characteristics, signal characteristics, or other characteristics as appropriate

Note 1 to entry: The concept of interface includes the specification of the connection of two devices having different functions.

Note 2 to entry: The IEC 61439 series uses the term functional unit in a different meaning.

[SOURCE: IEC 60050-171:2019, 171-01-24]

**3.10****electrical energy management system****EEMS**

system operating and controlling energy resources and loads of the installations

[SOURCE: IEC 60050-826:2022, 826-19-04]

**3.11****smart grid****intelligent 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

[SOURCE: IEC 60050-617:2009, 617-04-13]

**3.12****condition monitoring**

obtaining information about physical state or operational parameters

Note 1 to entry: Condition monitoring is used to determine when preventive maintenance may be required.

Note 2 to entry: Condition monitoring may be conducted automatically during operation or at planned intervals.

Note 3 to entry: Condition monitoring methods include: vibration analysis, tribology and thermography.

[SOURCE: IEC 60050-192:2015, 192-06-28]

### 3.13 power metering and monitoring device PMD

combination in one or more devices of several functional modules dedicated to metering and monitoring electrical parameters in energy distribution systems or electrical installations, used for applications such as energy efficiency, power monitoring and network performance

Note 1 to entry: Under the generic term "monitoring" are also included functions of recording, alarm management, etc.

Note 2 to entry: These devices may include demand side quality functions for monitoring inside commercial/industrial installations.

[SOURCE: IEC 61557-12:2018, 3.1.1]

## 4 Symbols and abbreviated terms

Clause 4 of the appropriate part of the IEC 61439 series (Part 1 onwards) is applicable, in addition to the following.

*Addition:*

- EEMS electrical energy management system
- PMD power metering and monitoring device

## 5 Interface characteristics

Clause 5 of the appropriate part of the IEC 61439 series (Part 1 onwards) is applicable, in addition to the following.

*Addition:*

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<https://standards.iteh.ai/standards/iec/63290/2024> The interface characteristics of intelligent assembly may include the following, for more details see Clause 9:

- Communication protocols,
- Media type,
- Communication characteristics (bandwidth, etc.).

## 6 Information

Clause 6 of the appropriate part of the IEC 61439 series (Part 1 onwards) is applicable, in addition to the following.

### 6.1 Assembly designation marking

In addition to the marking required by the appropriate part of the IEC 61439 series, the following may be provided:

aa) IEC TS 63290.