

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Monitoring and measuring systems used for data collection, aggregation and analysis –**

**Part 1: Device requirements**

**Systemes de surveillance et de mesure utilisés pour la collecte, l'agrégation et l'analyse de données –**

**Partie 1: Exigences relatives aux dispositifs**

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# NORME INTERNATIONALE



**Monitoring and measuring systems used for data collection, aggregation and analysis –  
Part 1: Device requirements**

**Systèmes de surveillance et de mesure utilisés pour la collecte, l'agrégation et  
l'analyse de données –  
Partie 1: Exigences relatives aux dispositifs**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MONITORING AND MEASURING SYSTEMS USED  
FOR DATA COLLECTION, AGGREGATION AND ANALYSIS –****Part 1: Device requirements**

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IEC 62974-1 has been prepared by IEC technical committee 85: Measuring equipment for electrical and electromagnetic quantities. It is an International Standard.

This second edition cancels and replaces the first edition published in 2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) the performance criteria have been reviewed;
- b) EMC and safety requirements have been improved;
- c) mechanical requirements have been clarified and amended.

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

Draft	Report on voting
85/920/FDIS	85/929/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.

A list of all parts in the IEC 62974 series, published under the general title *Monitoring and measuring systems used for data collection, aggregation and analysis*, can be found on the IEC website.

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).

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## INTRODUCTION

The use of electrical energy needs to be optimised worldwide to increase the efficient use of available energy sources, for enhanced competitiveness, and for reducing greenhouse gas emissions and other related environmental impacts.

Efficient use of energy sources implies better energy management leading to a necessary improvement of energy performance, particularly in terms of efficiency, use and consumption. Aggregating energy data and ensuring its availability is key to providing an energy management system for organizations.

Energy management systems described in documents such as ISO 50001, ISO 50002, ISO 50006, refer to the measurement of energy as an important improvement of energy performance.

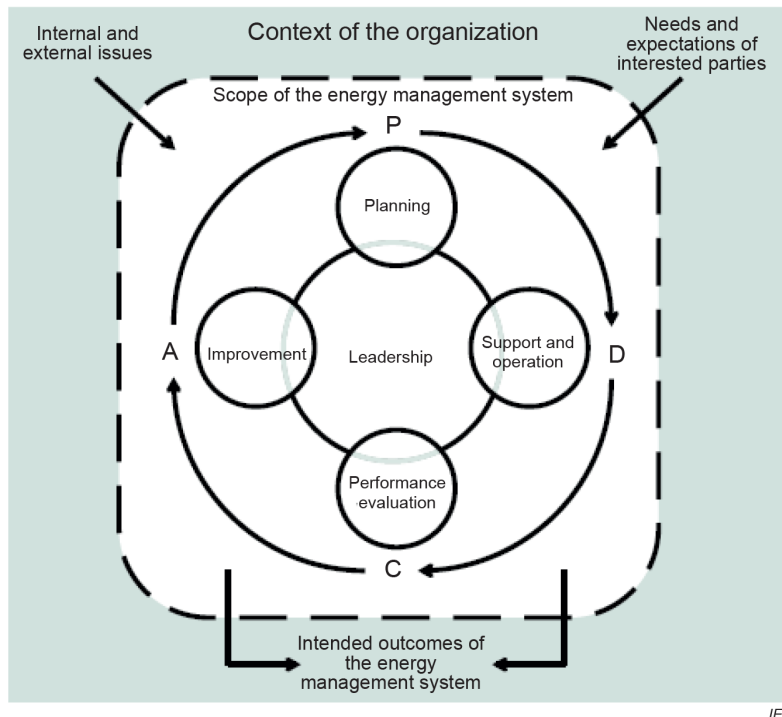
ISO 50001:2018 includes a requirement to "implement an energy data collection plan [...] and its measurement and monitoring equipment" to enable the organization to demonstrate energy performance improvement.

Figure 1 shows the link between the ISO 50001:2018 PDCA model and the continuous improvement of this data collection.

In the context of energy management, the Plan-Do-Check-Act (PDCA) approach (see Figure 1) can be outlined as follows:

- Plan: understand the context of the organization, establish an energy policy and an energy management team, consider actions to address risks and opportunities, conduct an energy review, identify significant energy uses (SEUs) and establish energy performance indicators (EnPIs), energy baseline(s) (EnBs), objectives and energy targets, and action plans necessary to deliver results that will improve energy performance in accordance with the organization's energy policy.
- Do: implement the action plans, operational and maintenance controls, and communication, ensure competence and consider energy performance in design and procurement.
- Check: monitor, measure, analyse, evaluate, audit and conduct management review(s) of energy performance and the EnMS.
- Act: take actions to address nonconformities and continually improve energy performance and the EnMS.





[SOURCE: ISO 50001:2018, reproduced with the permission of the authors]

**Figure 1 – Plan-Do-Check-Act Cycle**

IEC 60364-8-1 provides electrical installation rules for overall energy efficiency functional aspects. It defines requirements, measures and recommendations for the design, erection, operation and verification of all types of low voltage electrical installation including local production and storage of energy for optimizing the overall efficient use of electricity. In particular, it provides recommendations and requirements for the implantation of measurement and data logging devices in low voltage electrical installations, as defined in IEC 62974-1, to improve electrical energy efficiency (EEE) and make energy demand forecasts.

What is not known cannot be changed, and what is not measured is not known. Consequently, there is an increasing need to measure energy within the installations to:

- identify energy saving opportunities; or
- monitor energy performance indicators; or
- educate users.

The measurement data can be gathered manually by employees or automatically by dedicated devices.

Manual data collection can be a restrictive and complicated process to implement. In such a case, measurements would need to be collected by employees at a defined frequency, with a provision for risks of absences being made (vacation, sick leave, etc.), provided the measurements are relevant (number of measurement points to collect) and provided measurements can be relatively coherent (time synchronicity).

This is why data collection should be performed on a fixed schedule and the measurement data relevant to assess the required performance. Commonly, to avoid manual data collection, dedicated devices are used for collection, aggregation and sometimes analysis of measured data. These devices are directly linked to the different measurement devices in the installation to upload or download the energy data. Some typical architectures are given in Annex A.

# MONITORING AND MEASURING SYSTEMS USED FOR DATA COLLECTION, AGGREGATION AND ANALYSIS –

## Part 1: Device requirements

### 1 Scope

This part of IEC 62974 specifies product and performance requirements for devices that fall under the heading of "monitoring and measuring systems used for data collection, aggregation and analysis", for industrial, commercial, and similar use rated below or equal to 1 kV AC and 1,5 kV DC.

These devices are fixed and are intended to be used indoors as panel-mounted devices, or as modular devices fixed on a DIN rail, or as housing devices fixed on a DIN rail, or as devices fixed by other means inside a cabinet.

These devices are used to upload or download information (energy measured on loads, power metering and monitoring data, temperature information, etc.), mainly for energy efficiency purposes. These devices are known as energy servers (ESE), energy data loggers (EDL), data gateways (DGW) and I/O data concentrators (IODC) and are grouped together under the family name of Data Management Devices (DMD).

NOTE These systems are embedded or can be connected to a software application capable of consolidating data and delivering automatic analysis. Automatic analysis can include calculation of energy baselines or energy performance indicators as requested for the energy management system required by ISO 50001 or can be used during energy audits as defined in ISO 50002, or can be used in electrical energy efficiency management systems (EEMS) for monitoring an installation complying with IEC 60364-8-1 for the efficient use of electricity. These devices can also be used for certification according to labels such as LEED, BREEAM, HQE, etc.

This document does not cover:

[IEC 62974-1:2024](https://standards.iteh.ai/catalog/standards/iec/73506da0-8616-481a-9267-92663261b9ea/iec-62974-1-2024)

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- devices used only in the consumer market (living quarters) or household;
- devices used in the smart metering infrastructure (e.g. smart meters);
- devices used in the smart grid infrastructure;
- devices used as IT servers in the information technology business;
- power metering and monitoring devices (PMD);
- I/O data concentrators already covered by a specific product standard;
- communication protocols and interoperability;
- power quality instruments (PQI);
- software used for the data collection and analysis of the power quality for the supply side.

### 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 60068-2-1:2007, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2:2007, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-6:2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-14:2009, *Environmental testing – Part 2-14 – Tests – Test N: Change of temperature*

IEC 60068-2-27:2008, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-78:2012, *Environmental testing – Part 2-78 – Tests – Test Cab: Damp heat, steady state*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 60529:1989/AMD1:1999

IEC 60529:1989/AMD2:2013

IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-5:2014/AMD1:2017

IEC 61000-4-8:2009, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

IEC 61000-4-11:2020, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase*

IEC 61010-1:2010, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*

IEC 61010-1:2010/AMD1:2016

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IEC 61131-2:2017, *Industrial-process measurement and control – Programmable controllers – Part 2: Equipment requirements and tests*

IEC 61326-1:2020, *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements*

IEC 62052-11:2020, *Electricity metering equipment – General requirements, tests and test conditions – Part 11: Metering equipment*

IEC 62262:2002, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

IEC 62262:2002/AMD1:2021

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions 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 General definitions

#### 3.1.1

##### **energy data**

quantities related to the management of energy measured in industrial, commercial and similar plants, including energy consumption, relevant variables and electrical parameters

Note 1 to entry: Energy consumption refers to the various forms of energy (electricity, fossil fuels, steam, heat, compressed air, etc.).

Note 2 to entry: Electrical parameters refer to power, voltage, current, power factor, THD, harmonics, etc., which can also be monitored.

#### 3.1.2

##### **energy performance**

measurable result(s) related to energy efficiency, energy use and energy consumption

Note 1 to entry: Energy performance can be measured against the organization's objectives, energy targets and other energy performance requirements.

Note 2 to entry: Energy performance is one component of the performance of the energy management system.

[SOURCE: ISO 50001:2018, 3.4.3]

#### 3.1.3

##### **energy performance indicator**

##### **EnPI**

measure or unit of energy performance, as defined by the organization

Note 1 to entry: EnPI(s) can be expressed by using a simple metric, ratio, or a model, depending on the nature of the activities being measured.

Note 2 to entry: See ISO 50006 for additional information on EnPI(s).

[SOURCE: ISO 50001:2018: 3.4.4]

#### 3.1.4

##### **relevant variable**

quantifiable factor that significantly impacts energy performance and routinely changes

Note 1 to entry: Significance criteria are determined by the organization.

EXAMPLE Weather conditions, operating conditions (indoor temperature, light level), working hours, production output.

[SOURCE: ISO 50001:2018, 3.4.9]

#### 3.1.5

##### **energy baseline**

##### **EnB**

quantitative reference(s) providing a basis for comparison of energy performance

Note 1 to entry: An energy baseline is based on data from a specified period of time and/or conditions, as defined by the organization.

Note 2 to entry: One or more energy baselines are used for determination of energy performance improvement, as a reference before and after, or with and without implementation of energy performance improvement actions.

Note 3 to entry: See ISO 50015 for additional information on measurement and verification of energy performance.

Note 4 to entry: See ISO 50006 for additional information on EnPIs and EnBs.

[SOURCE: ISO 50001:2018, 3.4.7]

**3.1.6  
energy efficiency**

ratio or other quantitative relationship between an output of performance, service, goods, commodities, or energy and an input of energy

EXAMPLE Conversion efficiency; energy required/energy consumed.

Note 1 to entry: Both input and output should be clearly specified in terms of quantity and quality and be measurable.

[SOURCE: ISO 50001:2018, 3.5.3]

**3.1.7  
electrical energy efficiency  
EEE**

system approach for optimizing the efficiency of electricity usage

Note 1 to entry: Energy efficiency improvement measures take into account the following considerations:

- both the consumption (kWh) and the price of electricity;
- technology;
- environmental impact.

[SOURCE: IEC 60364-8-1:2019, 3.1.7]

**3.1.8  
electrical energy management system  
EEMS**

system monitoring, operating, controlling and managing energy resources and loads of the installations

[SOURCE: IEC 60364-8-1:2019, 3.2.1]

**3.1.9  
data retention**

capability to store data for a specified duration within a powered or unpowered device

**3.1.10  
data backup**

capability to store a copy of data stored in a device for an unlimited duration

Note 1 to entry: The copied data is supposed to provide data in the event of a device failure leading to data loss.

**3.1.11  
human machine interface  
HMI**

equipment function designed to present information output to and accept information from the operator, thus making the human operator an integral part of a process

**3.2 Definitions related to devices****3.2.1  
energy server  
ESE**

device used for the computation and retention of energy data, relevant variables, and visualisation through a local display or remote access in electrical distribution systems of industrial, commercial and similar plants

**3.2.2**  
**energy data logger**

**EDL**

device used for logging and exporting information to networks in electrical distribution systems of industrial, commercial and similar plants

**3.2.3**  
**data gateway**

**DGW**

device used for transmission of information between networks in electrical distribution systems of industrial, commercial and similar plants

**3.2.4**  
**I/O data concentrator**

**IODC**

device used for collection of digital and/or analogue energy data in electrical distribution systems of industrial, commercial and similar plants

**3.2.5**  
**measuring device**

device able to measure energy data

**3.2.6**  
**monitoring and measuring system**

system used for metering, measuring, collecting, concentrating and analysing energy data

**3.3 Definitions related to inputs and outputs**

**3.3.1**  
**pulse**

wave that departs from an initial level for a limited duration of time and ultimately returns to the original level

[SOURCE: IEC 62052-11:2020, 3.2.4]

**3.3.2**  
**pulse input**

pulse for receiving pulses related to an energy measurement (electricity, gas, water, etc.)

[SOURCE: IEC 62052-11:2020, 3.2.8, modified – "related to an energy measurement (electricity, gas, water, etc.)" added.]