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

IEC 62974-1:2017
https://standards.iteh.ai/catalog/standards/sist/d29ed479-8b5a-475a-b4e4-fbca08cc9e5f/iec-62974-1-2017
IEC 62974-1:2017
**Systems de surveillance et de mesure utilisées pour la collecte et l'analyse de données –
Partie 1: Exigences relatives aux dispositifs**



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INTERNATIONAL STANDARD

NORME INTERNATIONALE



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

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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 17.220.20

ISBN 978-2-8322-4359-6

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CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	8
3.1 General definitions.....	9
3.2 Device definitions	10
3.3 Definitions related to inputs and outputs	10
4 Environmental conditions.....	11
5 Ratings.....	11
6 Design and construction	11
6.1 General.....	11
6.2 Product coding.....	12
6.3 General architecture of devices.....	12
6.4 General data processing	13
6.5 Requirements on minimum functions embedded in devices	13
6.6 Requirements on functions.....	14
6.6.1 General.....	14
6.6.2 Communication connectivity features.....	14
6.6.3 Management of digital and/or analogue input(s) or output(s).....	15
6.6.4 Data time stamping.....	15
6.6.5 Management of logged data.....	15
6.6.6 Management of aggregated data	16
6.6.7 Analysis of aggregated data	16
6.6.8 Local visualisation on a Human Machine Interface.....	16
6.6.9 Configuration management.....	16
6.7 Safety requirements.....	16
6.7.1 General	16
6.7.2 Clearances and creepage distances	17
6.7.3 Accessible parts	17
6.7.4 Hazardous live parts.....	17
6.8 EMC requirements	17
6.8.1 General	17
6.8.2 Class 1 devices	17
6.8.3 Class 2 devices	17
6.9 Mechanical requirements	17
6.9.1 Product mechanical robustness	17
6.9.2 Enclosure robustness (IK code).....	17
6.9.3 Degree of protection by enclosures (IP code)	18
6.10 Marking.....	18
6.10.1 General	18
6.10.2 Device marking.....	18
6.11 Operating and installation instructions	19
6.11.1 General	19
6.11.2 Pulse input(s)/output(s)	19
6.11.3 Installation description.....	19

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7	Type tests	20
7.1	Performance criteria for type tests	20
7.2	Safety tests	21
7.3	EMC tests	21
7.4	Climatic tests	21
7.5	Mechanical tests	22
7.5.1	Degree of protection provide by enclosures for electrical equipment against external mechanical impacts (IK code)	22
7.5.2	Degree of protection by enclosure (IP code)	22
8	Routine tests	22
	Annex A (informative) Example of system architectures	23
	Annex B (informative) Example of device processing	25
	Bibliography	26
	Figure 1 – Lifecycle solutions for energy efficiency	6
	Figure 2 – General architecture of devices	13
	Figure A.1 – Basic local monitoring and measuring system architecture	23
	Figure A.2 – Advanced local monitoring and measuring system architecture	23
	Figure A.3 – Remote monitoring and measuring system architecture	24
	Figure B.1 – General data processing of the general device	25
	Table 1 – Environmental conditions	11
	Table 2 – Devices coding table	12
	Table 3 – List of minimum functions of the devices	14
	Table 4 – Enclosure mechanical requirements	18
	Table 5 – Minimum IP requirements	18
	Table 6 – Marking to apply to devices	19
	Table 7 – Specific performance criteria	20
	Table 8 – Additional tests for class 2 devices	21
	Table 9 – Climatic requirements	22

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**MONITORING AND MEASURING SYSTEMS USED
FOR DATA COLLECTION, GATHERING AND ANALYSIS –**

Part 1: Device requirements

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

FDIS	Report on voting
85/587/FDIS	85/589/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
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INTRODUCTION

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

It implies better energy management leading to a necessary improvement of energy performance, particularly in terms of efficiency, use and consumption. This can be summarized by the lifecycle shown in Figure 1:

Lifecycle solutions for Energy Efficiency

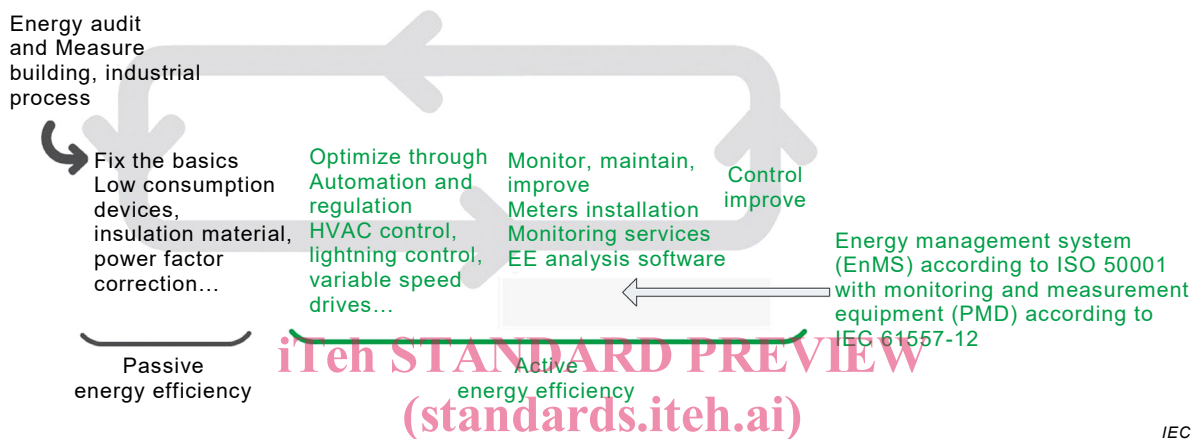


Figure 1 – Lifecycle solutions for energy efficiency

<https://standards.iteh.ai/catalog/standards/sist/d29c8479-8b3a-473a-b4e4-fbca08cc9e5f/iec-62974-1-2017>

Standards such as ISO 50001, ISO 50002, ISO 50006 and IEC 60364-8-1 are providing information related to this topic.

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 in order to:

- monitor performance indicators or to monitor energy baselines, or
- compare energy performance between baseline period and reporting period as described in ISO 50006.

Measurements can be collected by employees at a defined frequency, provided absences are accounted for (vacation, off sick, etc.), provided the measurements are relevant (number of measurement points to collect) and provided measurements can be relatively coherent (synchronism).

This is why more and more devices are used for collection, gathering and sometimes analysis of measured data. Some typical architectures are given in Annex A.

MONITORING AND MEASURING SYSTEMS USED FOR DATA COLLECTION, GATHERING 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, gathering 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...), mainly for energy efficiency purposes. These devices are known as energy servers, energy data loggers, data gateways and I/O data concentrators.

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 for monitoring an installation complying with IEC 60364-8-1. These devices can also be used for certification according to labels such as LEED, BREEAM, HQE, etc.

<https://standards.iteh.ai/catalog/standards/sist/d29c8479-8b3a-473a-b4e4-fbca08cc9e5f/iec-62974-1-2017>

This standard does not cover:

- 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 with additional functions (e.g. energy data logger function);
- 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, *Environmental testing – Part 2-1: Tests – Test A: Cold*

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

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

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

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

IEC 60721-3-1, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 1: Storage*

IEC 60721-3-2, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 2: Transportation*

IEC 60721-3-3, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 3: Stationary use at weatherprotected locations*

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

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

IEC 61000-4-11, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

IEC 61010 (all parts), *Safety requirements for electrical equipment for measurement, control, and laboratory use* <https://standards.iteh.ai/catalog/standards/sist/d29c8479-8b3a-473a-b4e4-fbca08cc9e5f/iec-62974-1-2017>

IEC 61131-2:2003, *Programmable controllers – Part 2: Equipment requirements and tests*

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

IEC 62053-31, *Electricity metering equipment (a.c.) – Particular requirements – Part 31: Pulse output devices for electromechanical and electronic meters (two wires only)*

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

- IEC Electropedia: available at <http://www.electropedia.org>
- ISO online browsing platform: available at <http://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 P, U, I, PF, THD, harmonics, etc., which can also be monitored.

3.1.2

relevant variable

quantifiable factor that impacts energy performance and routinely changes

EXAMPLE: Production parameters (production, volume, production rate, etc.); weather conditions (outdoor temperature, degree days, etc.); operating hours; operating parameters (operational temperature, light level, etc.).

[SOURCE: ISO 50006:2014, 3.14]

3.1.3

energy baseline

EnB

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

Note 1 to entry: An energy baseline can be normalized using variables affecting energy use and/or consumption, such as production level, the degree days (outdoor temperature), etc.

Note 2 to entry: Energy baseline is also used to calculate energy savings, as a reference with and without implementation of energy performance improvement actions, or evaluated over a period of time.

[IEC 62974-1:2017](https://standards.iso.org/standards/catalog/standards/sist/d29c8479-8b3a-473a-b4e4-fbca08cc9e5f/iec-62974-1-2017)

[SOURCE: ISO 13273-1:2015, 3.3.8]
<https://standards.iso.org/standards/catalog/standards/sist/d29c8479-8b3a-473a-b4e4-fbca08cc9e5f/iec-62974-1-2017>

3.1.4

energy performance indicator

EnPI

quantitative value or measure of energy performance

Note 1 to entry: The EnPIs used in energy management systems (EnMS) are defined by the organization.

Note 2 to entry: The EnPIs could be expressed as a simple metric, ratio or a more complex model.

Note 3 to entry: The main types of EnPI are:

- measured energy value: consumption of an entire site, or one or more energy uses measured by a meter;
- ratio of measured values: expression of the energy efficiency;
- statistical model: relationship between energy consumption and the relevant factors using linear or non-linear regressions;
- physical model: relationship between energy consumption and the relevant factors using physical simulations.

[SOURCE: ISO 13273-1:2015, 3.3.6, modified – Addition of Note 3 that refers to the last paragraph of 4.3.1 of ISO 50006:2014]

3.1.5

monitoring and measuring system

system in charge of metering, measuring, collecting, concentrating and analysing energy data

3.1.6

data retention

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

3.1.7**data backup**

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

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

3.2 Device definitions**3.2.1****energy servers****ESE**

devices in charge of 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**

devices in charge of logging and exporting information to networks, in electrical distribution systems of industrial, commercial and similar plants

3.2.3**data gateway****DGW**

devices in charge of transmission of information between networks in electrical distribution systems of industrial, commercial and similar plants

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

devices 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

3.3 Definitions related to inputs and outputs**3.3.1****pulse device**

functional unit for emitting, transmitting, retransmitting or receiving electric pulses, representing finite quantities, such as energy normally transmitted from some form of meter (electricity, gas, water, etc.) to a receiver unit

[SOURCE: IEC 62053-31:1998, 3.2.2, modified – "gas" and "water" added.]

3.3.2**pulse input device**

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

[SOURCE: IEC 62053-31:1998, 3.2.3, modified – "related to an energy measurement (electricity, gas, water, etc.)" added.]

3.3.3**pulse output device**

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

[SOURCE: IEC 62053-31:1998, 3.2.4, modified – "related to an energy measurement (electricity, gas, water, etc.)" added.]

3.3.4 control output

unit able to control the state (on or off) of an external device

EXAMPLE: Control output managing a contactor (digital value) or a temperature regulator (analogue output)

4 Environmental conditions

Typical environmental conditions are described in Table 1.

Table 1 – Environmental conditions

Environmental parameters	Storage and transport	Indoor operation
Ambient temperature: limit range of operation ^{a e}	For K55 class: –25 °C to +70 °C	For K55 class: –5 °C to +55 °C
	For K70 class: –40 °C to + 70 °C	For K70 class: –25 °C to +70 °C
Relative humidity: 24 h average	from 5 % to 95 % ^d	from 5 % to 95 % ^d
Solar radiations	Negligible	Negligible
Wind-driven precipitation (rain, snow, hail, etc.)	Negligible	Negligible
Air pollution by dust, salt, smoke, corrosive/flammable gas, vapours	No significant air pollution ^c	No significant air pollution ^c
Vibration, earth tremors	IEC 60721-3-1 / 1M3 IEC 60721-3-2 / 2M3	IEC 60721-3-3 / 3M3
Electromagnetic disturbance immunity	---	Industrial electromagnetic environment as defined in IEC 61326-1 Table 2
Altitude	---	≤ 2 000 m
Pollution degree	---	2 according to IEC 61010
Overvoltage category (relative to the mains supply)	---	IEC 61010 Overvoltage category III ^b
^a See definition. Temperature may be lower on the front face of panel mounted instruments. ^b For guidance on the overvoltage category, see IEC 61010-1. ^c These conditions correspond to maximum values given for classes 3C2 and 3S2 in IEC 60721-3-3. ^d No condensation or ice is taken into consideration. ^e Limit temperatures are extreme temperatures. The device is not supposed to stay at limit T° during 100% of the time.		

5 Ratings

No requirements.

6 Design and construction

6.1 General

Devices shall comply with the requirements specified hereafter.

6.2 Product coding

Devices shall be classified according to the following criterion.

- Kind of device:
 - IODC: I/O data concentrators;
 - DGW: data gateways;
 - EDL: energy data logger;
 - ESE: energy servers.
- Temperature class:
 - K55 class;
 - K70 class.
- Product performance class:
 - class 1: for devices intended to manage (collect, store, transmit) energy data within the EMC environmental conditions described in Table 1;
 - class 2: for devices intended to manage (collect, store, transmit) energy data within the EMC environmental conditions described in Table 1, and intended to have a better immunity even in the presence of longer or harsher EMC disturbances, and intended to be robust against connectivity losses.

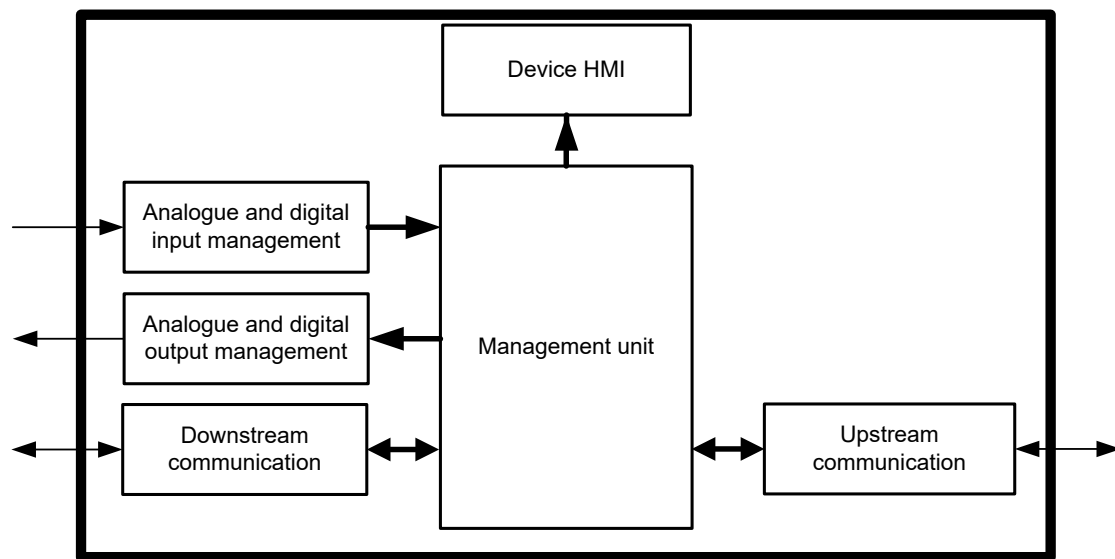
Devices shall be named according to the coding of Table 2.

Table 2 – Devices coding table
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Kind of device	Class	For devices intended to work up to K55 climatic environment	For devices intended to work up to K70 climatic environment
Energy I/O concentrators	Class 1 ^a	EIOC, Class 1, K55	EIOC, Class 1, K70
Data Gateways	Class 1	DGW, Class 1, K55	DGW, Class 1, K70
	Class 2 ^b	DGW, Class 2, K55	DGW, Class 2, K70
Energy Data Logger	Class 1	EDL, Class 1, K55	EDL, Class 1, K70
	Class 2	EDL, Class 2, K55	EDL, Class 2, K70
Energy Servers	Class 1	ESE, Class 1, K55	ESE, Class 1, K70
	Class 2	ESE, Class 2, K55	ESE, Class 2, K70
^a No need for class 2 on IODC ^b Since data gateways are not managing “logged data” or “aggregated date”, they are not subject to the “data retention” requirement			

6.3 General architecture of devices

Energy servers (ESE), energy data loggers (EDL), data gateways (DGW) and I/O data concentrators (IODC) shall be composed of one or several functional blocks as defined in Figure 2.



IEC

Figure 2 – General architecture of devices

6.4 General data processing

ESEs, EDLs, DGWs and IODCs are part of a general data processing system.

NOTE See example shown in informative Annex B. Further information is provided in Annex A.

6.5 Requirements on minimum functions embedded in devices

ESEs, EDLs, DGWs and IODCs shall embed the mandatory functions defined in Table 3.

Requirements on functions listed in Table 3 are specified in 6.6.