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INTERNATIONAL STANDARD

Control technology – Rules for the designation of measuring instruments

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

CONTROL TECHNOLOGY – RULES FOR THE DESIGNATION OF MEASURING INSTRUMENTS

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International Standard IEC 62419 has been prepared by IEC technical committee 65: Industrial-process measurement, control and automation.

This standard cancels and replaces IEC/PAS 62419 published in 2005. This first edition constitutes a technical revision.

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

FDIS	Report on voting
65/429/FDIS	65/430/RVD

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

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

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- reconfirmed,
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INTRODUCTION

The state of science concerning quantities and units has undergone significant changes in the last century. During the period from 1920 to 1960 there was a fundamental change in the comprehension and usage of physical quantities, which was particularly promoted by the works of Julius Wallot published between 1922 and 1953. In this process the various systems of physical units and the usage of numerical equations were replaced by the SI-units (see ISO 1000) and the usage of quantity equations. So the quantities were no longer linked to certain units.

This development culminated in the publishing of the first edition of the German standard DIN 1313 *Notation of physical equations in sciences and technology* in 1931 and the resolutions of the tenth general conference of weights and measures in 1954. Since then it has been considered incorrect to address a quantity by its unit.

In view of this, measuring instruments should not be addressed by the unit of the measured quantity but only by the measured quantity or the measuring task itself.

Referring to the question of market relevance, it must be stated, that especially with respect to the international project of standardized classification and documentation in multilingual equipment descriptions, it is important to critically address the situation regarding the designation of measuring instruments. Ideally, every manufacturer should use the same terminology. In practice, there is confusion in the proper designation of measuring instruments within catalogues and sales brochures which also has consequences in technical literature.

It is not the intention of this standard to enforce particular usages in any language but to make recommendations that remove the linguistic confusion in this field – or at least, reduce it. Considering the urgent necessity of unambiguous technical communication over language boundaries, this is a legitimate goal. This could also be considered to be a matter of global importance.

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CONTROL TECHNOLOGY – RULES FOR THE DESIGNATION OF MEASURING INSTRUMENTS

1 Scope and object

This International Standard is applicable to measurement technology. It defines rules for the unambiguous designation of different types of measuring instruments and of measuring instrument features with the intention of enabling unambiguous technical communication over language boundaries.

The scope of this International Standard is

– the adaptation of the designation of measuring instruments and of measuring instrument features to the state of science by designating them according to the measuring quantity or the measuring task instead of the unit, and
– the adaptation of the designation of measuring instruments and of measuring instrument features to the terms given in the ISO/IEC Guide 99 (VIM).

It is strongly recommended that "..... measuring instrument" is used as secondary component in compound terms. This is consistent with the objective of standardization, namely uniformity, especially since the meaning of other secondary components, e.g. "indicator", "gauge", "meter", is no more descriptive than that of the standard component in this context. For exceptions see 4.1 and A.2.

The ambiguous secondary component "... sensor" shall not be used. In its place one of the secondary components "... sensing element", "... detector", "... transformer", "... transducer", "... transmitter", "... measuring instrument" or "... measuring chain" shall be used, depending on the task of the functional unit being termed. The definitions for detector (detecting device), transformer, transducer and transmitter are given in IEC 60050-351.

2 Normative references

The following referenced documents are indispensable for the application 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 60050-311, *International Electrotechnical Vocabulary – Part 311: General terms relating to measurements*

IEC 60050-312, *International Electrotechnical Vocabulary – Part 312: General terms relating to electrical measurements*

IEC 60050-351: 2006, *International Electrotechnical Vocabulary – Part 351: Control Technology*

ISO/IEC Guide 99: 2007, *International vocabulary of metrology – Basic and general concepts and associated terms (VIM)*

ISO 31 series, *Quantities and units*

ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units*

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3 Terms and definitions

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

3.1
measuring instrument
device intended to be used to make measurements, alone or in conjunction with supplementary devices
[IEV 311-03-01]

[ISO/IEC Guide 99, 3.1]

NOTE 1 Material measures are also measuring instruments.

NOTE 2 An instrument is also a measuring instrument if its output is transmitted, converted, processed or stored and cannot be perceived directly by the observer.

NOTE 3 The designation measuring instrument without any supplementary designation components should only be used as a generic term referring to all types of measuring instruments. In compound expressions, the term "measuring instrument" should only be used to signify a displaying measuring instrument.

EXAMPLE The *Measuring Instruments and Measuring Systems* catalogue (also contains, for example, signal generators and measuring assemblies).

3.1.1
displaying measuring instrument
displaying instrument
measuring instrument where the output signal is presented in visual form
[ISO/IEC Guide 99, 3.4 modified]

NOTE 1 Several parameters may be required to output the measured value, e.g. power and energy when referring to the supply of electrical energy.

NOTE 2 The output measured value can refer directly to the measured quantity, or it can be derived from this using a processing method. The processing method can be invariable, manually adjustable or programmable.

NOTE 3 Linguistic usage is not unambiguous. In IEC 60050-311 displaying measuring instruments are also termed "indicating (measuring) instruments". In ISO/IEC Guide 99, displaying measuring instrument and indicating measuring instrument are not synonyms.

3.1.2
measuring instrument with signal output
measuring instrument providing an image of the measured quantity by an output signal

NOTE 1 Several parameters may be required to output the measured value, e.g. power and energy when referring to the supply of electrical energy.

NOTE 2 The output measured value can refer directly to the measured quantity, or it can be derived from this using a processing method. The processing method can be invariable, manually adjustable or programmable.

3.1.3
material measure
measuring instrument reproducing or supplying, in a permanent manner during its use, quantities of one or more given kinds, each with an assigned quantity value
[ISO/IEC Guide 99, 3.6]

EXAMPLES Standard weight, volume measure, standard electric resistor, standard signal generator.

NOTE A material measure can be a measurement standard.

3.2
measuring device
assembly of measuring instruments intended for specified measurement purposes
[IEV 311-03-05, modified]

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3.3
measuring system
complete set of measuring instruments and other equipment assembled to carry out specific measurements
[IEV 311-03-06]

[ISO/IEC Guide 99, 3.2 modified]

3.4
measuring chain
series of elements of a measuring instrument or system that constitutes the path of the measurement signal from the input to the output
[IEV 311-03-07]

[ISO/IEC Guide 99, 3.10 modified]

EXAMPLE Set of transducers and connecting elements between one or more measuring instruments placed between the sensing element, which is the first element in the chain, and the last element of the chain, e.g. the indicating, recording or storage device.

3.5
measurement standard
etalon
realization of the definition of a given quantity, with stated quantity value and associated measurement uncertainty, used as a reference
[ISO/IEC Guide 99, 5.1]

NOTE 1 In a measuring chain, the measurement standard is a functional unit which provides a defined value of a measured quantity for measuring purposes.

NOTE 2 Several parameters may be required for purposes of definition, e.g. frequency and amplitude of a sinusoidal a.c. voltage.

NOTE 3 The value can be invariable, manually adjustable or programmable.

3.6
measuring assembly
functional unit performing a measurement task which generally combines other functional units or measuring instruments to form a common control unit and measurement result output

NOTE The processing method can be fixed, manually adjustable or controlled by a computer.

4 Designation rules

4.1 General rules

There are no particular grammatical rules to be observed in the designation of instruments, except that the resulting designation is clear and understandable. Hyphens should be used to avoid ambiguity, e.g. “moving-coil galvanometer” and not “moving coil galvanometer”.

Terms for physical quantities and their units are given in the ISO 31, the ISO/IEC 80000 and the IEC 60027 series of standards. In addition, terms for their units are given in ISO 1000.

Abbreviated terms (e.g. “tension” instead of “mechanical tension” or “electric tension”) can be used if the quantity is clearly defined by the context.

The use of “indicator”, “gauge”, or “meter” etc. as secondary components in contexts where they have an unambiguous or universally agreed meaning, e.g. sight glass flow indicator, bourdon tube pressure gauge, mirror galvanometer, is not precluded.

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4.2 Designation rules for measuring instruments

To designate a measuring instrument, the words “measuring instrument” are combined with a word indicating the measuring task or measured quantity and written as a compound noun (“...measuring instrument”) or in dissolved form (“measuring instrument for ...”).

NOTE 1 A measuring instrument often has a measurement standard as an internal component or as an accessory, e.g. Balance with weights, measuring instrument for electrical voltage with integrated voltage measurement standard.

NOTE 2 Other terms may be used for complex measuring tasks.

EXAMPLES

Compound noun:
temperature measuring instrument
pressure measuring instrument
rotational speed measuring instrument
sound level measuring instrument

Dissolved form:	**Context-related short form:**
measuring instrument for electrical voltage	voltage measuring instrument
measuring instrument for alternating voltage	alternating voltage measuring instrument
measuring instrument for mechanical tension	tension measuring instrument
measuring instrument for electrical power	power measuring instrument

4.2.1 Designation rules for displaying measuring instruments

To designate a displaying measuring instrument, the words “displaying instrument” are combined with a word indicating the measuring task or measured quantity and written as a compound noun (“...displaying instrument”) or in dissolved form (“displaying instrument for ...”).

NOTE 1 A displaying instrument that requires no external power to indicate the measured quantity is often termed a “gauge”.

NOTE 2 Other terms may be used for complex measuring tasks.

EXAMPLES

Compound noun:
flow displaying instrument
level displaying instrument

Dissolved form:	**Context-related short form:**
displaying instrument for electrical voltage	voltage measuring instrument
measuring instrument for direct current	direct current measuring instrument

4.2.2 Designation rules for measuring instruments with signal output

To designate a measuring instrument with signal output, the first component “measuring” shall be placed in front of a word which indicates the method of transmission or processing.

EXAMPLES

Compound noun:
measuring amplifier
measuring rectifier
measuring demodulator
measuring bridge
measuring transformer
measuring transducer
measuring converter

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To specify the precise type of measuring transducer, a word which indicates the measured quantity can be placed in front of “measuring transducer”.

NOTE 1 If the input quantity is electrical, the input and output quantities may not be of the same kind, e.g. a voltage and a current.

NOTE 2 In certain instances, measuring transducers may also have a specific term in respect of their function (for example amplifier, converter, transformer, frequency transducer, etc.)
[IEV 312-02-15, definition approximates to ISO/IEC Guide 99, 4.3].

4.3 Designation rules for measurement standards

To designate a measurement standard the words “measurement standard” are combined with a word indicating the measured quantity and written as a compound noun (“... measurement standard”) or in dissolved style (“measurement standard for ...”).

NOTE Other terms may be used for complex measurement standards.

EXAMPLES

Compound noun:
length measurement standard
mass measurement standard
quartz-time measurement standard
caesium-time measurement standard

Dissolved form:
measurement standard for electrical voltage
measurement standard for electrical resistance

Context-related short form:
voltage measurement standard
resistance measurement standard

Complex measurement standard:
signal generator
triple-point cell

4.4 Designation rules for measuring assemblies

To designate a measuring assembly, the words “measuring assembly” are combined with a word indicating the measuring task and written as a compound noun (“... measuring assembly”) or in dissolved form (measuring assembly for ...”).

EXAMPLES

Compound noun:
radio communication measuring assembly
frequency response measuring assembly
gas analysis measuring assembly
material constant measuring assembly

Dissolved form:
measuring assembly for GSM cellular radio units
measuring assembly for frequency response determination
measuring assembly for CO and NOx components in vehicle exhaust gas

Context-related short form:
GSM radio measuring assembly
frequency response measuring assembly (also: sweep measuring assembly)
exhaust gas measuring assembly

4.5 Examples of terms of measuring instruments for complex measuring tasks

spectrum analyzer
harmonics analyzer
FFT analyzer
measuring receiver
atmospheric pollutant analyzer

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Annex A
(informative)

Examples of recommended terms

A.1 Recommended terms

Recommended term	Term allowable in context
differential pressure measuring instrument	differential pressure meter
flow measuring instrument	flow meter, flow gauge
temperature measuring instrument	temperature meter, temperature gauge
rotational speed measuring instrument	rotational speed transmitter
atomic time measurement standard	atomic clock
voltage measuring instrument	voltage meter, voltmeter
current measuring instrument	current meter, ammeter
resistance measuring instrument	resistance meter, ohmmeter

Recommended term	Term allowable for specific types
pressure measuring instrument	manometer
temperature measuring instrument	thermometer

Recommended term	Term to be avoided
pressure measuring instrument	pressure sensor
temperature measuring instrument	temperature sensor
variable-area flow measuring instrument	rotameter

A.2 Exceptions

Rules

Terms adopted for measuring instruments which clearly and unambiguously perform very specific measuring procedures can be retained.

EXAMPLES

Interferometer

absorption spectrometer

psychrometer

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ISO/IEC 8000 series, *Quantities and units*

DIN 1313, *Größen*[1] *(Quantities)*

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[1] There is no corresponding international standards for this reference.

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