BS EN IEC 61987-1:2024

BSI Standards Publication

Industrial- process measurement and control — Data structures and elements in process equipment catalogues

Part 1: Generic structures for measuring equipment

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National foreword

This British Standard is the UK implementation of EN IEC 61987-1:2024. It is identical to IEC 61987-1:2024. It supersedes BS EN 61987-1:2007, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/65/5, Devices and integration in enterprise systems.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Amendments/corrigenda issued since publication

Date	Text affected

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NORME EUROPÉENNE

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English Version

Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 1: Generic structures for measuring equipment (IEC 61987-1:2024)

Mesure et commande dans les processus industriels - Eléments et structures de données dans les catalogues d'équipements de processus - Partie 1: Structures génériques pour équipements de mesure (IEC 61987-1:2024)

Industrielle Leittechnik - Datenstrukturen und -elemente in Katalogen der Prozessleittechnik - Teil 1: Generische Strukturen für Messeinrichtungen (IEC 61987-1:2024)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
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European foreword

The text of document 65E/1113/FDIS, future edition 2 of IEC 61987-1, prepared by SC 65E "Devices and integration in enterprise systems" of IEC/TC 65 "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61987-1:2024.

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)	2025-11-30
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2027-11-30

This document supersedes EN 61987-1:2007 and all of its amendments and corrigenda (if any).

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 61987-1:2024 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 standard indicated:

IEC 60068 (series)	NOTE Approved as EN 60068 (series)
IEC 60873-1:2003	NOTE Approved as EN 60873-1:2004 (not modified)
IEC 61082-1:2014	NOTE Approved as EN 61082-1:2015 (not modified)
IEC 61508 (series)	NOTE Approved as EN 61508 (series)
IEC 61987-10:2009	NOTE Approved as EN 61987-10:2009 (not modified)
IEC 62828 (series)	NOTE Approved as EN IEC 62828 (series)
IEC 82045-1:2001	NOTE Approved as EN 82045-1:2001 (not modified)

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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.cencenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529	1991
-	-		+ corrigendum May	1993
+ A1	1999		+ A1	2000
+ A2	2013		+ A2	2013
IEC 60654-1	1993	Industrial-process measurement and control equipment - Operating conditions - Part 1: Climatic conditions	EN 60654-1	1993
IEC 60721-3	series	Classification of environmental conditions - Classification of groups of environmental parameters and their severities	EN IEC 60721-3	series
IEC 60751	2022	Industrial platinum resistance thermometers and platinum temperature sensors	EN IEC 60751	2022
IEC/TR 61000-1-1	2023	Electromagnetic compatibility (EMC) - Part 1: General - Section 1: Application and interpretation of fundamental definitions and terms	-	-
IEC 61069	series	Industrial-process measurement, control and automation - Evaluation of system properties for the purpose of system assessment	EN 61069	series
IEC 61298	series	Process measurement and control devices - General methods and procedures for evaluating performance	EN 61298	series
IEC 61326	series	Electrical equipment for measurement, control and laboratory use - EMC requirements	EN IEC 61326	series

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IEC 61987-11	-	Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 11: List of properties (LOPs) of measuring equipment for electronic data exchange - Generic structures	EN 61987-11	-
ISO 3511-1	1977	Process measurement control functions and instrumentation; Symbolic representation - Part 1: Basic requirements	-	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INDUSTRIAL-PROCESS MEASUREMENT AND CONTROL – DATA STRUCTURES AND ELEMENTS IN PROCESS EQUIPMENT CATALOGUES –

Part 1: Generic structures for measuring equipment

FOREWORD

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IEC 61987-1 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement and control. It is an International Standard.

This second edition cancels and replaces the first edition published in 2006. This edition constitutes a technical revision.

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

a) Addition of a subclause “Digital communication” in Clause 5, in order to allow a more comprehensive description of the properties of such an interface;
b) Alignment of clause headings, as described in the introduction, to correspond with those of the IEC CDD.

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

Draft	Report on voting
65E/1113/FDIS	65E/1136/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/publications.

A list of all parts in the IEC 61987 series, published under the general title *Industrial-process measurement and control – Data structures and elements in process equipment catalogues,* can be found on the IEC website.

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, or
- revised.

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INTRODUCTION

In recent years, industry has become alert to the fact that a great deal of time and effort is wasted in the transposition of measuring equipment data from one form to another. The technical data of an instrument, for example, may exist at the manufacturer's facility as two separate data sets for paper and electronic presentation: the end-user requires much the same data for works standards, engineering data bases or commercial data bases. In most cases, however, the data cannot be automatically re-used because each application has its own particular data storage format.

A second problem that belies the re-use of technical data is the content of the product descriptions themselves. There is little agreement between manufacturers on what information a technical data sheet should contain, how it should be arranged, or how the results, for example of particular performance tests, should be presented. When transferring this information into a data base, an end-user will always find gaps and proprietary interpretations that make the task more difficult.

This part of IEC 61987 aims to solve these problems by defining a generic structure and its content for industrial process measuring and control equipment. It builds upon the assumption that, for a given class of measuring equipment, for example, pressure measuring equipment, temperature measuring equipment or electromagnetic flow-measuring equipment, a set of non-proprietary structures and product features can be specified. The resulting documents can not only be exchanged electronically, but they can also be presented to humans in an easily understandable form.

This part of IEC 61987 is applicable to electronic catalogues of process measuring equipment. The structure also contains a great many product features that are common to measuring equipment with binary output. Similarly, Annex B has been prepared with a view to future standardisation.

This part of IEC 61987 is not intended as a replacement for existing standards, but rather as a guiding document for all future standards which are concerned with the specifications of process measuring equipment. Every revision of an existing standard should take into account the structures and product features defined in Clause 5 or work towards a harmonisation.

Annex A contains a tabular overview of the classification and catalogue structure of process measuring equipment. Annex B contains tables with a further sub-classification for specific measured variables.

Wherever possible, existing terms from international standards have been used to name the product features within the structures. In accordance with ISO 10241, Clause 3 contains a list of terms, definitions and sources.

Documents created according to the standard are structured. A possible means of exchanging structured information free of layout information is given by SGML (Standard Generalised Mark-Up Language, ISO 8879) or XML (Extensible Mark-Up Language), which is derived from it.

This part of IEC 61987 could also provide the basis for arranging of properties (data element types) that conform to IEC 61360 or ISO 13584. This would require that the features, which in this part of IEC 61987 can be textual units, graphical and tabular representations etc., be broken down into properties (data element types) conformant to the said standards. For example, a range would be expressed as a lower range-limit (LRL) and upper range-limit (URL) with unit of measure; dimensions (L x B x H) as three separate elements, length, breadth and height with unit of measure; or a derating curve as an appropriate series of data element pairs.

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This part of IEC 61987 conforms to ISO 15926-1 and -2 with respect to the data model and associated reference data library (ISO 15926-4), for example, as used for the limited classification structure. At the same time, it is also aligned to STEP: Standard for the Exchange of Product Model Data. The data model and definitions of ISO 10303-221 use the ISO 15926-4 TS Reference Data Library as "library". The current standard can reproduce the data fields as per this ISO 10303-221, including, for example, product structure data, dimensional data, electrical connection data and product properties such as measuring range or power supply.

Since the publication of Edition 1 (2006) of this document a great deal of work has been done on the development of the IEC Common Data Dictionary for equipment for industrial-process automation. This, published as further parts of IEC 61987, covers not only measuring instruments with a variety of inputs and outputs, but also final control elements, infrastructure devices and in future process analysers.

For this reason, the title has been adjusted and the scope has been revised to reflect the current content of the whole IEC 61987 standard series.

During the development of the IEC CCD a number of questions arose regarding the structure proposed in this document, in particular the assignment of any digital communication interface to the output. Although this is not strictly incorrect, it was thought that the properties of such an interface could be better described separately. For this reason, a clause "Digital communication" has been added to this Edition 2. In addition, the clause "Mechanical construction" has been renamed "Mechanical and electrical construction" to reflect its true content.

"Ordering information" is not found as a separate block in the IEC CDD, as it is assumed that the properties there describe the type and particular instance of an already purchased device. For an ordering process using IEC CDD properties, the necessary information is retrieved from the "Identification" which also includes the ordering information.

"Certificates and approvals" can be found both in the device list of properties (0112/2///61987#ABC156) and as a device aspect within the "device documents supplied" (0112/2///61987#ABH517). This is also the location of the information contained in "Documentation".

In preparing the current edition of this document all terms and definitions have been checked and where necessary the references updated. Since the publication of Edition 1 in 2006 a number of standards have been withdrawn. Where no suitable alternative source has been found, a note to this effect has been added, but the original term and definition have been left unchanged.

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INDUSTRIAL-PROCESS MEASUREMENT AND CONTROL – DATA STRUCTURES AND ELEMENTS IN PROCESS EQUIPMENT CATALOGUES –

Part 1: Generic structures for measuring equipment

1 Scope

This part of IEC 61987 defines a generic structure in which product features of industrial process measurement devices shall be arranged, in order to facilitate the understanding of product descriptions when they are transferred from one party to another. It applies to the production of catalogues supplied by the manufacturer of such devices and helps the user to formulate their requirements.

This document will also serve as a reference document for all future standards which are concerned with process measuring equipment.

In addition, this document also provides a basic structure for the production of further standards listing the properties of process control equipment, for example, for actuators and infrastructure devices.

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 60529:1989, *Degrees of protection provided by enclosures (IP Code)*
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60654-1:1993, *Industrial-process measurement and control equipment – Operating conditions – Part 1: Climatic conditions*

IEC 60721-3 (all parts), *Classification of environmental conditions – Classification of groups of environmental parameters and their severities*

IEC 60751:2022, *Industrial platinum resistance thermometers and platinum temperature sensors*

IEC TR 61000-1-1:2023, *Electromagnetic compatibility (EMC) – Part 1: General – Section 1: Application and interpretation of fundamental definitions and terms*

IEC 61069 (all parts), *Industrial-process measurement, control and automation – Evaluation of system properties for the purpose of system assessment*

IEC 61298 (all parts), *Process measurement and control devices – General methods and procedures for evaluating performance*

IEC 61326 (all parts), *Electrical equipment for measurement, control and laboratory use – EMC requirements*

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IEC 61987-11, *Industrial-process measurement and control – Data structures and elements in process equipment catalogues – List of properties (LOPs) of measuring equipment for electronic data exchange – Generic structures*

ISO 3511-1:1977, *Process measurement control functions and instrumentation – Symbolic representation – Part 1: Basic requirements*

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
accuracy
inaccuracy
<of a measuring instrument> quality which characterizes the ability of a measuring instrument to provide an indicated value close to a true value of the measured value under reference conditions

Note 1 to entry: This term is used in the "true value" approach.

Note 2 to entry: Accuracy is all the better when the indicated value is closer to the corresponding true value.

Note 3 to entry: Inaccuracy as defined in IEC 61298-2 includes the errors of non-linearity, non-repeatability and hysteresis.

Note 4 to entry: Accuracy can be expressed as percentage of reading, span or full range etc. or as an absolute value

[SOURCE IEC 60050-311:—, 311-06-08, modified – measured value instead of measurand, under reference conditions added, Notes 3 and 4 added]

3.2
accuracy class
category of instruments or components thereof, all of which are intended to comply with a set of specifications regarding uncertainty

[SOURCE IEC 60050-311:—, 311-06-09 modified – "or components" added]

3.3
ambient temperature
temperature measured at a representative point within the local environment, including adjacent heat generating equipment, in which the measurement and control equipment will normally operate, be stored or transported

SEE: 3.15

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3.4
ambient temperature limits
extreme values of ambient temperature to which a device may be subjected without permanent impairment of operating characteristics

Note 1 to entry: The performance characteristics may be exceeded in the range between the limits of normal operation and the operating temperature limits.

SEE: 3.3, 3.33

3.5
ambient temperature range
range of ambient temperatures within which a device is designed to operate within specified accuracy limits

SEE: 3.31, 3.33

3.6
analog signal
signal each information parameter of which directly represents the respective variable quantity

Note 1 to entry: An analog signal may be a continuous-value signal or a discrete-value signal as well as a continuous-time or a discrete-time signal. Examples may be the pressure in a pneumatic final controlling element with continuous-value and continuous-time information parameter (value of the pressure) as well as a position-modulated pulse signal as an output signal of a computer based controller.

[SOURCE: IEC 60050-351:2013, 351-41-24]

3.7
binary signal
discrete-value signal each information parameter of which may assume one of two values

[SOURCE: IEC 60050-351:2013, 351-41-21]

3.8
climate class
climatic conditions, i.e. ambient temperature, pressure and humidity, to which the measurement equipment can be subjected during operation (including shutdown), transport and storage (over land or sea)

3.9
degree of protection
extent of protection provided by an enclosure against access to hazardous parts, against ingress of solid foreign objects and/or ingress of water, and verified by standardized test methods

[SOURCE: IEC 60529:1989, 3.3]

3.10
dependability
extent to which a system can be relied upon to perform a required function under given conditions at a given instant of time or over a given time interval, assuming that the required external sources are provided

[SOURCE: IEC 61069-1:2016, 3.1.22]

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3.11
device
material element or assembly of such elements intended to perform a required function

Note 1 to entry: A device may form part of a larger device.

[SOURCE: IEC 60050-151: 2001, 151-11-20]

3.12
digital signal
signal each information parameter of which represents the respective variable quantity in coded manner as a symbol of a character set

Note 1 to entry: In most technical cases a digital signal is discrete-value and discrete-time.

Note 2 to entry: A digital signal requires an agreement about the code between transmitter and receiver of the signal.

Note 3 to entry: In many technical cases the symbols may be interpreted as numbers.

[SOURCE: IEC 60050-351:2013, 351-41-25]

3.13
drift
change in the indication of a measuring system, generally slow, continuous, not necessarily in the same direction and not related to a change in the quantity being measured

[SOURCE: IEC 60050-311:—, 311-06-13, modified – quantity being measured for measurand]

3.14
electromagnetic compatibility
ability of equipment or a system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment

[SOURCE: IEC 60050-161:1990, 161-01-07]

3.15
environmental condition
characteristics of the environment which may affect the performance of the device or system

Note 1 to entry: Examples of environmental conditions are pressure, temperature, humidity, vibration, radiation.

[SOURCE: IEC 60050-151:2001, 151-16-03]

3.16
environmental condition class
alphanumeric character sequence denoting a set of environmental conditions to which the equipment is or can be subjected to during operation

Note 1 to entry: The IEC 60721 series defines classes for climatic, mechanical and other environmental influences.

3.17
environmental influence
change in the output of an instrument caused solely by the departure of one of the specified environmental conditions from its reference value, all other conditions being held constant

SEE: 3.21, 3.39

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3.18
equipment
single apparatus or set of devices or apparatuses, or the set of main devices of an installation, or all devices necessary to perform a specific task

Note 1 to entry: Examples of equipment are a power transformer, the equipment of a substation, measuring equipment.

[SOURCE: IEC 60050-151:2001, 151-11-25]

3.19
hysteresis
property of a device or instrument whereby it gives different output values in relation to its input values depending upon the directional sequence in which the input values have been applied

[SOURCE: IEC 61298-2:2008, 3.11]

3.20
influence of ambient temperature
change in zero (lower range-value) and/or span caused by a change in ambient temperature from the reference temperature up to the limits of the ambient temperature range quoted in the performance specifications

SEE: 3.17

3.21
influence quantity
quantity that is not the subject of the measurement and whose change affects the relationship between the indication and the result of the measurement

[SOURCE: IEC 60050-311:—, 311-06-01]

3.22
integrity
assurance provided by the system that the tasks will be performed correctly unless notice is given of any state of the system, which could lead to the contrary

[SOURCE: IEC 61069-1:2016, 3.1.37]

3.23
long-term drift
drift in output monitored for 30 days at 90 % of span

[SOURCE: IEC 61298-2:2008, 7.2, modified – subclause condensed]

3.24
maintainability
ability of an item under given conditions of use, to be retained in, or restored to a state in which it can perform a required function, when maintenance is performed under given conditions and using stated procedures and resources

[SOURCE: IEC 61069-1, 3.1.39]

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3.25
measured error
largest positive or negative value of error of the average upscale or downscale value at each point of measurement

[SOURCE: IEC 61298-2:2008, 3.7, modified – "s" removed from error and value]

3.26
measured variable
quantity intended to be measured

[SOURCE: ISO/IEC Guide 99:2007, 2.3 – modified – term changed to reflect usage in control technology, notes to entry removed]

3.27
measuring instrument
device intended to be used to make measurements, alone or in conjunction with supplementary devices

[SOURCE: IEC 60050-311:—, 311-03-01]

3.28
measuring range
range of values defined by two extreme values within which a variable can be measured within the specified accuracy

Note 1 to entry: The extreme values are usually termed the upper range-limit and the lower range-limit.

[SOURCE: IEC 60050-351:2013, 351-48-11]

3.29
measuring principle
measurement principle
phenomenon or process serving as the basis of a measurement

Note 1 to entry: The measurement principle can be a physical, chemical, or biological phenomenon.

[SOURCE: ISO/IEC Guide 99:2007, 2.4, modified – term "measuring principle" added, note from ISO/IEC Guide 99:2007, 2.3 retained in preference to current notes]

3.30
non-repeatability
repeatability error
algebraic difference between the extreme values obtained by a number of consecutive measurements of the output over a short period of time for the same value of the input under the same operating conditions, approaching from the same direction, for full range traverses

Note 1 to entry: It is usually expressed in percentage of span and does not include hysteresis and drift.

3.31
nominal range of use
specified range of values which an influence quantity can assume without causing a variation exceeding specified limits

[SOURCE: IEC 60050-311:—, 311-07-05]

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3.32
normal operating conditions
range of operating conditions within which a device is designed to operate within specified performance limits

3.33
operating conditions
conditions to which a device is subjected, not including the variables handled by the device

Note 1 to entry: Examples of operating conditions include: ambient pressure, ambient temperature, electromagnetic fields, gravitational force, inclination, power supply variation (voltage, frequency, harmonics), radiation, shock and vibration. Both static and dynamic variations in these conditions should be considered. (see IEC 60654 (all parts)).

[SOURCE: IEC 60050-351:1998, 351-18-33, modified – Note to entry added]

3.34
operating limits
range of operating conditions to which a device may be subject without permanent impairment of operating characteristics

Note 1 to entry: In general, performance characteristics are not stated for the region between the limits of normal operation conditions and the operating limits.

Note 2 to entry: Upon returning within the limits of normal operating conditions, a device may require adjustments that restore normal performance.

Note 3 to entry: The limiting conditions for storage, transport and operation may be different.

3.35
output variable
recordable variable quantity generated by a system, influenced only by the system and via the system by its input variables

[SOURCE: IEC 60050-351:2013, 351-41-07]

3.36
performance
characteristics defining the ability of a measuring instrument to achieve the intended functions.

[SOURCE: IEC 60050-311:—, 311-06-11]

3.37
power source
primary source, usually AC mains, from which the system's energy is derived

3.38
power supply
separate unit which can convert, rectify, regulate or otherwise modify the form of energy from the power source to provide suitable energy for a system or elements of a system for measurement and control

3.39
rated operating condition
operating condition that shall be achieved in order that a measuring instrument or measuring system performs as designed

Note 1 to entry: The rated operating condition generally specifies intervals of values for the quantity being measured and for any influence quantity.

[SOURCE: ISO/IEC Guide 99:2007, 4.9]

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