

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Low-voltage switchgear and controlgear – Device profiles for networked industrial devices –

Part 1: General rules for the development of device profiles

Appareillage à basse tension – Profils d'appareil pour les appareils industriels mis en réseau –

Partie 1: Règles générales pour le développement de profils d'appareil



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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –
DEVICE PROFILES FOR NETWORKED INDUSTRIAL DEVICES –**

Part 1: General rules for the development of device profiles

FOREWORD

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International Standard IEC 61915-1 has been prepared by subcommittee 17B: Low-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

This first edition cancels and replaces the IEC/TS 61915 technical specification published in 2003. It now has the status of an International Standard.

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

FDIS	Report on voting
17B/1575/FDIS	17B/1583/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.

A list of all the parts in the IEC 61915 series, under the general title *Low-voltage switchgear and controlgear – Device profiles for networked industrial devices*, can be found on the IEC website.

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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[IEC 61915-1:2007](#)

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INTRODUCTION

The purpose of this International Standard is to provide a framework within which IEC product committees can define profiles for devices within their scope.

NOTE This framework follows the principles given in IEC/TR 62390, the “Common automation device – Profile guideline”, and refers to ISO 15745, “Industrial automation systems and integration – Open systems application integration framework”.

Profiles define a common set of functionality (data and behaviour) for a class of devices in a given industrial domain, thus allowing system designers, system integrators and maintenance staff to handle profile-based devices without special tool configuration. Profiles also provide consistent structuring and semantics of device functionality.

This part of IEC 61915 (Part 1) defines general rules for the development of device profiles for networked industrial devices, including recommendations of general interest and application, for example a documentation template and a profile exchange language. This will allow uniformity of profile structure throughout the different device types.

IEC product committees may define “root device profiles” for their devices, in which they will specify the amount of information which their products should make available through any network, using the general rules defined in this part of IEC 61915. This will facilitate uniformity of profiles throughout the corresponding family of devices. These root device profiles will be published in subsequent parts of the IEC 61915 series.

This International Standard also gives manufacturers or other organizations a common framework to represent their network capable devices.

Manufacturers or other organizations may use the root device profiles specified by the IEC product committees for various device types as a basis for developing device profiles corresponding to their products, using the general rules defined in this part of IEC 61915 to add the required manufacturer-specific extensions. Alternatively, they may develop their own device profiles using only the general rules. These manufacturer’s device profiles will typically be published within the product documentation.

This International Standard facilitates the writing of network independent application software.

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR – DEVICE PROFILES FOR NETWORKED INDUSTRIAL DEVICES –

Part 1: General rules for the development of device profiles

1 Scope

The IEC 61915 series is intended to improve interoperability of devices, network tools and application software.

This part of IEC 61915 defines a framework for common representation of networked industrial devices and provides a template for documenting such a representation, independent of the network used. This framework follows the principles given in IEC/TR 62390, the “Common automation device – Profile guideline”, and refers to ISO 15745, “Industrial automation systems and integration – Open systems application integration framework”.

NOTE 1 The device profile format specified in this part of IEC 61915 is compatible with devices connected to both bit- and byte-oriented networks.

This part of IEC 61915 applies to root device profiles, generic device profiles, and specific device profiles. The root device profiles will be published in subsequent parts of the IEC 61915 series.

NOTE 2 This International Standard is specifically intended for products covered by the IEC 60947 series.

NOTE 3 Organisations, such as consortia are encouraged to use the rules defined in this part of IEC 61915 to develop generic device profiles for use within their own organisations.

Users (product manufacturers and other organizations) should use the root device profiles together with the rules defined in this part of IEC 61915. This part of IEC 61915 allows users to make extensions to the root device profiles and/or generic device profiles. Where no suitable root device profile exists, the user may develop generic or specific device profiles using the rules defined in this part of IEC 61915.

This part of IEC 61915 recommends the use of a profile exchange language for representation of the device profile information in order to facilitate the profile's use by network tools and application software.

NOTE 4 The types of devices may vary from simple devices, such as pilot lights, push-buttons and limit switches, to more complex devices with many bytes of information, such as motor controllers, semiconductor motor starters, etc.

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 60559:1989, *Binary floating-point arithmetic for microprocessor systems*

IEC 61131-3:2003, *Programmable controllers – Part 3: Programming languages*

IEC/TR 62390:2005, *Common automation device – Profile guideline*

ISO 1000:1992, *SI units and recommendations for the use of their multiples and of certain other units*
Amendment 1 (1998)

ISO 15745 (all parts), *Industrial automation systems and integration – Open systems application integration framework*

ISO/IEC 10646:2003, *Information technology – Universal Multiple-Octet Coded Character Set (UCS) – Part 1: Architecture and Basic Multilingual Plane*

ISO/IEC 19501:2005, *Information technology – Open Distributed Processing – Unified Modeling Language (UML) Version 1.4.2*

3 Definitions, abbreviations and symbols

3.1 Terms and definitions

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

3.1.1

device profile

representation of a device that describes the device's data and behaviour as viewed through a network, independent from any network technology

NOTE Description of the communication options to be used to transfer data using a given network technology is outside the scope of the device profile.

[IEC/TR 62390, Definition 3.1.9, modified]

[IEC 61915-1:2007](https://standards.iteh.ai/catalog/standards/sist/d72e5c26-f9c-4d79-a10d-e1066d26808d/iec-61915-1-2007)

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3.1.2

functional element

entity of software or software combined with hardware, capable of accomplishing a specified function of a device

NOTE 1 A functional element has interface(s), associations to other functional elements and functions.

NOTE 2 A functional element can be made out of function block(s), object(s) or parameter list(s).

[IEC/TR 62390, Definition 3.1.12]

3.1.3

generic device profile

manufacturer's device profile for a family of similar devices (e.g. similar device types with differing feature levels)

3.1.4

manufacturer's device profile

device profile, defined by a manufacturer or any other organization, containing the mandatory elements and the selected optional elements of a root device profile, if such a root device profile is applicable, and which may also include manufacturer-specific extension(s)

NOTE 1 A manufacturer's device profile is either a generic device profile, or a specific device profile.

NOTE 2 Organizations include users' organizations, consortia, institutions, or standards bodies.

3.1.5

manufacturer-specific extension

information contained within a manufacturer's device profile which is specified by a particular manufacturer or other organization and is in addition to the mandatory and optional parts of the root profile

3.1.6

parameter

data element that represents device information that can be read from or written to a device, e.g. through the network or a local HMI

NOTE A parameter is typically characterized by a parameter name, data type and access direction.

[IEC/TR 62390, Definition 3.1.22]

3.1.7

parameter assembly

collection of one or more parameters that can be read from or written to a device

NOTE Assemblies are typically used to increase efficiency of data exchanges.

3.1.8

parameter group

logical collection of parameters, typically associated with the same operational purpose or functional element in a device

NOTE 1 Parameter groups may be nested, i.e. It is possible to define a parameter group composed of other parameter groups.

NOTE 2 Contrary to parameter assemblies, parameter groups are not defined to increase efficiency of data exchanges. Instead, they are mainly defined for the purpose of organizing long lists of parameters into meaningful sets (e.g. for HMIs).

3.1.9

root device profile

device profile, defined by an IEC product committee, comprising mandatory and optional elements

NOTE Mandatory and optional elements include parameters, parameter groups, ..., as well as individual characteristics of these.

3.1.10

service

means for a user or an application to request execution of specific actions (e.g. fault reset, calibrate, identify, diagnostics)

NOTE 1 The service may be provided by the device or one of its functional elements.

NOTE 2 Actual execution may require that related preliminary conditions are satisfied.

NOTE 3 Services are further detailed in 5.9.

3.1.11

specific device profile

manufacturer's device profile for a single device (e.g. a specific catalogue model)

NOTE A specific device profile is also commonly referred to as a device description.

3.2 Abbreviations and symbols

A	Applied
D	Device-specific
FE	Functional element
ID	Identifier
m	Mandatory (if defined in a generic device profile)
M	Mandatory (if defined in a root device profile)
O	Optional
R	Read
RW	Read/write
UML	Unified modelling language
W	Write
XML	Extensible markup language
na	Not applicable
r	Reserved

4 Device profiles

4.1 General

iTeh STANDARD PREVIEW
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A device profile consists of the data (parameters, parameter assemblies and parameter groups) and behaviour (functional elements, state model and services) provided by the device. This device profile is used to represent the device independently of the network, e.g. when designing an industrial automation application.

A device profile shall define the format and content of any control and management information (see Annex E) that is received and/or sent by the device. Annex A defines the template for the device profile. The entire template is used as a basis for both root device profiles and manufacturer's device profiles. Unless otherwise instructed in this part of IEC 61915, unused fields shall remain empty.

NOTE 1 If some main template sections are completely empty (e.g. the manufacturer's header for a root device profile), these sections may be omitted in the profile.

Each profile shall stand alone without reference to other profiles, i.e. profiles shall not contain other profiles embedded within them (see Annex C for profile creation guidelines). Simpler device profiles should be subsets of the parameter lists, parameter assemblies, parameter groups, state models and services of more complex device profiles, rather than redefining this information.

Values of the parameters defined by the specific device profile will be transmitted on the network. The application uses the profile information to interpret the parameter values exchanged with the device.

NOTE 2 A device profile exists either on paper or in an electronic format.

NOTE 3 A device may store parts or all of the profile information; in this case, this information may also be read through the network from the device. Format of these exchanges is not covered by this standard.

Parameter assemblies and parameter groups shall only include parameters that are defined in the device profile.

Parameter names and device state names shall use the terminology utilised in the corresponding product standards.

NOTE 4 Annex D gives a recommended syntax for the documentation and transfer of device profiles when using XML.

4.2 Root device profile

A root device profile is created by the relevant IEC product committee for each device type (see Note 3 of Clause 1 for use by other organizations).

When defining root device profiles, IEC product committees shall apply the following rules, unless there is a substantial technical justification.

- a) The same parameters shall be used for the root device profiles of all the devices within a product family.
- b) The meaning assigned to the value of each parameter shall be the same throughout the family, e.g. for a start/stop bit (Boolean) parameter, the value 1 should always mean start.
- c) Similarly, for assemblies the bit and byte order shall be consistent with assemblies in other root device profiles belonging to the same product family, e.g. in a motor starter control assembly, the start bit should be in the same position for each type of motor starter.

A root device profile shall specify which parts of the profile (e.g. parameters) are mandatory, i.e. required for all devices claiming compliance with this specific root device profile, and which parts are optional, i.e. need not be used by all devices using this specific root device profile.

The root device profile shall not include information which is network-specific.

Two practical examples of root device profiles are given in Clause B.2. Figure B.1 provides an example for a photoelectric switch and Figure B.2 provides an example for a motor starter.

EXAMPLE 1 The photoelectric switch root device profile is an example of a presence sensor device that can be configured over the network to detect the presence of an object either by the presence of light or the absence of light, and to transmit a value of 1 over the network for the Presence parameter, indicating the object's presence. The device can also be put in either configuration or automatic mode and normal or test states by sending the device appropriate parameters values over the network. The mandatory requirement of the Device and Operate mode parameters gives the device description "Photoelectric switch with mode control". A manufacturer's device profile could use this root profile to create a device with a profile that only includes the parameters Presence, Device mode and Operate mode. The device manufacturer's description could be the same as the root profile. Or the manufacturer could make a device that adds the Alarm and Test parameters and describe the device as "Mode control photoelectric switch with alarm and test".

EXAMPLE 2 The motor starter root device profile is an example of a motor controller device root profile that would allow a manufacturer's profile based on it to represent either an electro-mechanical, solid state or softstart starter. A particular motor controller device may provide additional information over the network, such as motor current value. Its manufacturer could use the motor starter root device profile as a basis, and extend it by adding specific features such as a "Motor Full Load Current" parameter.

4.3 Manufacturer's device profile

4.3.1 General

Two main types of manufacturer's device profiles may be defined:

- a generic device profile for a family of similar devices (e.g. similar device types with differing feature levels),
- a specific device profile for a single device (e.g. a specific catalogue model).