IEC 61784-1-0

Edition 1.0 2023-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Industrial networks – Profiles –
Part 1-0: Fieldbus profiles – General concepts and terminology

Réseaux industriels – Profils –
Partie 1-0: Profils de bus de terrain – Concepts généraux et terminologie

IEC 61784-1-0:2023-03(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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NOTE Combinations of protocol types are specified in the IEC 61784-1 series and the IEC 61784-2 series.

IEC 61784-1-0 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation. It is an International Standard.

This first edition, together with the other parts of the same series, cancels and replaces the fifth edition of IEC 61784-1 published in 2019. This first edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 61784-1:2019:

a) split of the original IEC 61784-1 into several subparts, one subpart for the material of a generic nature, and one subpart for each Communication Profile Family specified in the original document;

b) move most contents of the original scope into a new dedicated subclause;

c) addition of a new Communication Profile Family (CPF 22).

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

Draft	Report on voting
65C/1207/FDIS	65C/1236/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 of the IEC 61784-1 series, published under the general title *Industrial networks – Profiles – Part 1: Fieldbus profiles*, 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,
- replaced by a revised edition, or
- amended.

INTRODUCTION

The IEC 61784-1 series provides a set of Communication Profiles (CP) in the sense of ISO/IEC TR 10000-1. These answer the need of identifying the protocol families co-existing within the IEC 61158 series, as a result of the international harmonization of fieldbus technologies available on the market. More specifically, these profiles help to correctly state the compliance with the IEC 61158 series, and to avoid the spreading of divergent implementations, which would limit its use, clearness and understanding. Additional profiles to address specific market concerns, such as functional safety or information security, can be addressed by future parts of the IEC 61784-1 series.

The IEC 61784-1 series contains several Communication Profile Families (CPF), which specify one or more communication profiles. Such profiles identify, in a strict sense, protocol subsets of the IEC 61158 series via protocol specific communication profiles. They do not define device profiles that specify communication profiles together with application functions needed to answer the need of a specific application ("application profiles").

It is agreed that these latter classes of profiles would facilitate the use of the IEC 61158 series of standards; the profiles defined in the IEC 61784-1 series are a necessary step to achieve that task.

It is also important to clarify that interoperability – defined as the ability of two or more network systems to exchange information and to make mutual use of the information that has been exchanged (see ISO/IEC TR 10000-1) – can be directly achieved on the same link only for those devices complying with the same communication profile.

Profiles contained in the IEC 61784-1 series are constructed of references to IEC 61158-2 and the IEC 61158-3, IEC 61158-4, IEC 61158-5 and IEC 61158-6 series, and other IS, TS or worldwide-accepted standards, as appropriate[1]. Each profile is required to reference at least one part of the IEC 61158 series in addition to IEC 61158-1.

Two or more Profiles, which are related to a common family, are specified within a "Communication Profile Family" (CPF).

[1] International Standardised Profiles may contain normative references to specifications other than International Standards; see ISO/IEC JTC 1 N 4047: *The Normative Referencing of Specifications other than International Standards in JTC 1 International Standardized Profiles – Guidelines for ISP Submitters*.

INDUSTRIAL NETWORKS – PROFILES –

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1 Scope

The IEC 61784-1 series defines several Communication Profile Families (CPF). Each CPF specifies a set of protocol specific communication profiles (CPs) based primarily on the IEC 61158 series, to be used in the design of devices involved in communications in factory manufacturing and process control.

This part of IEC 61784-1 defines a common terminology for all CPFs and conventions to be used in the specification of the CPs. It also provides a compliance statement and an overview of the structure and contents of the CPFs in the IEC 61784-1 series.

NOTE The added value of the IEC 61784-1 series is explained in Annex A.

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.

NOTE All parts of the IEC 61158 series, as well as the IEC 61784-1 series and the IEC 61784-2 series are maintained simultaneously. Cross-references to these documents within the text therefore refer to the editions as dated in this list of normative references.

IEC 61158 (all parts), *Industrial communication networks – Fieldbus specifications*

IEC 61784-1 (all parts), *Industrial networks – Profiles – Part 1: Fieldbus profiles*

IEC 61784-1-1:2023, *Industrial networks – Profiles – Part 1-1: Fieldbus profiles – Communication Profile Family 1*

IEC 61784-1-2:2023, *Industrial networks – Profiles – Part 1-2: Fieldbus profiles – Communication Profile Family 2*

IEC 61784-1-3:2023, *Industrial networks – Profiles – Part 1-3: Fieldbus profiles – Communication Profile Family 3*

IEC 61784-1-4:2023, *Industrial networks – Profiles – Part 1-4: Fieldbus profiles – Communication Profile Family 4*

IEC 61784-1-5:2023, *Industrial networks – Profiles – Part 1-5: Fieldbus profiles – Communication Profile Family 5*

IEC 61784-1-6:2023, *Industrial networks – Profiles – Part 1-6: Fieldbus profiles – Communication Profile Family 6*

IEC 61784-1-8:2023, *Industrial networks – Profiles – Part 1-8: Fieldbus profiles – Communication Profile Family 8*

IEC 61784-1-9:2023, *Industrial networks – Profiles – Part 1-9: Fieldbus profiles – Communication Profile Family 9*

IEC 61784-1-16:2023, *Industrial networks – Profiles – Part 1-16: Fieldbus profiles – Communication Profile Family 16*

IEC 61784-1-19:2023, *Industrial networks – Profiles – Part 1-19: Fieldbus profiles – Communication Profile Family 19*

IEC 61784-1-22:2023, *Industrial networks – Profiles – Part 1-22: Fieldbus profiles – Communication Profile Family 22*

3 Terms, definitions, abbreviated terms, symbols, and conventions

3.1 Terms and definitions

For the purposes of this document, all terms and definitions provided in the IEC 61158 series apply.

ISO and IEC maintain terminological 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

3.2 Abbreviations and symbols

3.2.1 IEC 61158 abbreviations and symbols

For the purposes of this document, all abbreviations and symbols defined in the IEC 61158 series apply. The following abbreviations, found within the IEC 61158 series, are repeated here for use by those who wish to understand the general structure of the IEC 61784-1 series without referring to the IEC 61158 series.

AL	Application layer
APDU	Application protocol data unit
AR	Application relationship
ASE	Application service element
DL-	Data-link layer (as a prefix)
DLL	Data-link layer
DLSDU	Data-link service data unit
PhL	Physical layer
TPDU	Transport protocol data unit

3.2.2 Other abbreviations and symbols

CP	communication profile
CPF	communication profile family
MAU	medium attachment unit

3.3 Conventions

3.3.1 Conventions common to all layers

3.3.1.1 (Sub)clause selection tables

(Sub)clause selection for all layers is defined in tables, as shown in Table 1 and Table 2. The selected base specifications are indicated just before the selection table(s). Selection is done at the highest (sub)clause level possible to define the profile selection unambiguously.

Table 1 – Layout of profile (sub)clause selection tables

Clause	Header	Presence	Constraints

Table 2 – Contents of (sub)clause selection tables

Column	Text	Meaning
Clause	<#>	(Sub)clause number of the base specifications
	Next subclauses	Any following subclauses of the same level up to the last subclause
	Next clauses	Any following clauses up to the last clause of the base specification
	Next annexes	Any following annexes up to the last annex of the base specification
Header	<text>	(Sub)clause title of the base specifications
Presence	NO	This (sub)clause is not included in the profile
	YES	This (sub)clause is fully (100 %) included in the profile In this case no further detail is given
	—	Presence is defined in the following subclauses
	Partial	Parts of this (sub)clause are included in the profile
Constraints	See <#>	Constraints/remarks are defined in the given subclause, table or figure of this profile document
	—	No constraints other than given in the reference document (sub)clause, or not applicable
	<text>	The text defines the constraint directly; for longer text, table footnotes or table notes may be used

If sequences of (sub)clauses do not match the profile, then the numbers are concatenated.

EXAMPLE 1 Concatenated subclauses

3.4 – 3.7	—	NO	—

EXAMPLE 2 Concatenated clauses up to the last clause

Next clauses	—	NO	—

EXAMPLE 3 Concatenated annexes up to the last annex

Next annexes	—	NO	—

3.3.1.2 Service selection tables

If selection of services is defined in a table, the format of Table 3 is used. The table identifies the selected services and includes service constraints, as explained in Table 4.

Table 3 – Layout of service selection tables

Service ref.	Service name	Usage	Constraint

Table 4 – Contents of service selection tables

Column	Text	Meaning
Service ref.	<#>	(Sub)clause number of the base specifications where the service is defined
	—	Not applicable
Service name	<text>	The name of the service
Usage	M	Mandatory
	O	Optional
	—	Service is never used
Constraints	See <#>	Constraints/remarks are defined in the given subclause, table or figure of this profile document
	—	No constraints other than given in the reference document (sub)clause, or not applicable
	<text>	The text defines the constraint directly, for longer text, table footnotes or table notes may be used

If selection of service parameters is defined in a table, the format of Table 5 is used. Each table identifies the selected parameters and includes parameter constraints, as explained in Table 6.

Table 5 – Layout of parameter selection tables

Parameter ref.	Parameter name	Usage	Constraint

Table 6 – Contents of parameter selection tables

Column	Text	Meaning
Parameter ref.	<#>	(Sub)clause number of the base specifications where the service is defined
	—	Not applicable
Parameter name	<text>	The name of the service parameter
Usage	M	Mandatory
	O	Optional
	—	Attribute is never present
Constraints	See <#>	Constraints/remarks are defined in the given subclause, table or figure of this profile document
	—	No constraints other than given in the reference document (sub)clause, or not applicable
	<text>	The text defines the constraint directly; for longer text, table footnotes or table notes may be used

3.3.2 Physical layer

No additional conventions are defined.

3.3.3 Data-link layer

3.3.3.1 Service profile conventions

No additional conventions are defined.

3.3.3.2 Service and parameter selections

These are described using the common conventions, see 3.3.1.2.

3.3.4 Application layer

3.3.4.1 Service profile conventions

ASE and class selection is described using (sub)clause selection tables, see 3.3.1.1. If the usage of selected ASE and classes is further constrained, this is specified in the profile (e.g. an optional item of the base standard is mandatory in the profile).

If selection of class attributes is defined in a table, the format of Table 7 is used. The table identifies the selected class attributes and includes their constraints, as explained in Table 8.

Table 7 – Layout of class attribute selection tables

Attribute	Attribute Name	Usage	Constraint

Table 8 – Contents of class attribute selection tables

Column	Text	Meaning
Attribute	<#>	Attribute number of the base specification class
	—	Not applicable
Attribute Name	<text>	The name of the attribute
Usage	M	Mandatory
	O	Optional
	—	Attribute is never present
Constraints	See <#>	Constraints/remarks are defined in the given subclause, table or figure of this profile document
	—	No constraints other than given in the reference document (sub)clause, or not applicable
	<text>	The text defines the constraint directly; for longer text, table footnotes or table notes may be used

3.3.4.2 Service and parameter selections

These are described using the common conventions, see 3.3.1.2.