SVENSK STANDARD SS-EN 61158-5-2

Fastställd	Utgåva	Sida	Ansvarig kommitté
2015-01-28	3	1 (1+212)	SEK TK 65

Industriell processtyrning – Fältbuss – Del 5-2: Definition av tjänster i applikationsskiktet – Delar i fältbuss, Typ 2

Industrial communication networks – Fieldbus specifications – Part 5-2: Application layer service definition – Type 2 elements

Som svensk standard gäller europastandarden EN 61158-5-2:2014. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61158-5-2:2014.

Nationellt förord

Europastandarden EN 61158-5-2:2014

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 61158-5-2, Third edition, 2014 - Industrial communication networks - Fieldbus specifications - Part 5-2: Application layer service definition - Type 2 elements**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61158-5-2, utgåva 2, 2012, gäller ej fr o m 2017-09-22.

ICS 25.040.40; 35.100.70; 35.110.00

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61158-5-2

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Supersedes EN 61158-5-2:2012

English Version

Industrial communication networks - Fieldbus specifications - Part 5-2: Application layer service definition - Type 2 elements (IEC 61158-5-2:2014)

Réseaux de communication industriels - Spécifications des bus de terrain - Partie 5-2: Définition des services de la couche application - Eléments de type 2 (CEI 61158-5-2:2014)

Industrielle Kommunikationsnetze - Feldbusse - Teil 5-2: Dienstfestlegungen des Application Layer (Anwendungsschicht) - Typ 2-Elemente (IEC 61158-5-2:2014)

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

The text of document 65C/763/FDIS, future edition 3 of IEC 61158-5-2, prepared by SC 65C “Industrial networks” of IEC/TC 65 “Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61158-5-2:2014.

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)	2015-06-22
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2017-09-22

This document supersedes EN 61158-5-2:2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

Endorsement notice

The text of the International Standard IEC 61158-5-2:2014 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 standards indicated:

IEC 61131-1	NOTE	Harmonized as EN 61131-1.
IEC 61158-2:2014	NOTE	Harmonized as EN 61158-2 [1)] (not modified).
IEC 61784-1:2014	NOTE	Harmonized as EN 61784-1:2014 (not modified).
IEC 61784-2:2014	NOTE	Harmonized as EN 61784-2 [1)] (not modified).
IEC 62026-3	NOTE	Harmonized as EN 62026-3 (not modified).

[1)] To be published.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When 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.cenelec.eu

Publication	Year	Title	EN/HD	Year
IEC 61131-3	2003 [2)]	Programmable controllers - Part 3: Programming languages	EN 61131-3	2003 [3)]
IEC 61158-1	2014	Industrial communication networks - Fieldbus specifications - Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series	EN 61158-1	2014
IEC 61158-3-2	2014	Industrial communication networks - Fieldbus specifications - Part 3-2: Data-link layer service definition - Type 2 elements	EN 61158-3-2 [4)]	-
IEC 61158-4-2	2014	Industrial communication networks - Fieldbus specifications - Part 4-2: Data-link layer protocol specification - Type 2 elements	EN 61158-4-2 [4)]	-
IEC 61158-6-2	2014	Industrial communication networks - Fieldbus specifications - Part 6-2: Application layer protocol specification - Type 2 elements	EN 61158-6-2 [4)]	-
IEC 61588	2009	Precision clock synchronization protocol for networked measurement and control systems	-	-
IEC 61784-3-2	-	Industrial communication networks - Profiles - Part 3-2: Functional safety fieldbuses - Additional specifications for CPF 2	EN 61784-3-2	-
ISO/IEC 646	-	Information technology - ISO 7-bit coded character set for information interchange	-	-
ISO/IEC 7498-1	-	Information technology - Open Systems Interconnection - Basic reference model: The basic model	-	-

[2)] Superseded by IEC 61131-3:2013.

[3)] Superseded by EN 61131-3:2013 (IEC 61131-3:2013).

[4)] To be published.

Publication	Year	Title	EN/HD	Year
ISO/IEC 8859-1	-	Information technology - 8-bit single-byte coded graphic character sets - Part-1: Latin alphabet No. 1	-	-
ISO/IEC 8859-5	1988 [5)]	Information processing - 8-bit single-byte coded graphic character sets - Part 5: Latin/Cyrillic alphabet	-	-
ISO/IEC 8859-9	1989 [6)]	Information processing - 8-bit single-byte coded graphic character sets - Part 9: Latin alphabet No. 5	-	-
ISO/IEC 9545	-	Information technology - Open Systems Interconnection - Application layer structure	-	-
ISO/IEC 10646	-	Information technology - Universal Coded Character Set (UCS)	-	-
ISO/IEC 10731	-	Information technology - Open Systems Interconnection - Basic Reference Model - Conventions for the definition of OSI services	-	-
ISO/IEC/IEEE 60559	-	Information technology - Microprocessor Systems - Floating-Point arithmetic	-	-
ISO 639-2	-	Codes for the representation of names of languages - Part-2: Alpha-3 code	-	-
ISO 8859-1	1987 [7)]	Information processing - 8-bit single-byte coded graphic character sets - Part 1: Latin alphabet No. 1	-	-
ISO 8859-2	1987 [8)]	Information processing - 8-bit single byte coded graphic character sets - Part 2: Latin alphabet No. 2	-	-
ISO 8859-3	1988 [9)]	Information processing - 8-bit single-byte coded graphic character sets - Part-3: Latin alphabet no. 3	-	-
ISO 8859-4	1988 [10)]	Information processing - 8-bit single-byte coded graphic character sets - Part-4: Latin alphabet no. 4	-	-
ISO 8859-6	1987 [11)]	Information processing - 8-Bit single-byte coded graphic character sets - Part 6: Latin/Arabic alphabet	-	-

[5)] Superseded by ISO/IEC 8859-5:1999.
[6)] Superseded by ISO/IEC 8859-9:1999.
[7)] Superseded by ISO/IEC 8859-1:1998.
[8)] Superseded by ISO/IEC 8859-2:1999.
[9)] Superseded by ISO/IEC 8859-3:1999.
[10)] Superseded by ISO/IEC 8859-4:1998.
[11)] Superseded by ISO/IEC 8859-6:1999.

Publication	Year	Title	EN/HD	Year
ISO 8859-7	1987 [12)]	Information processing - 8-bit single-byte coded graphic character sets - Part 7: Latin/Greek alphabet	-	-
ISO 8859-8	1988 [13)]	Information processing - 8-bit single-byte coded graphic character sets - Part-8: Latin/hebrew alphabet	-	-
ISO 11898	1993 [14)]	Road vehicles - Interchange of digital information - Controller area network (CAN) for high-speed communication	-	-
IETF RFC 1759	-	Printer MIB	-	-

[12)] Superseded by ISO/IEC 8859-7:2003.

[13)] Superseded by ISO/IEC 8859-8:1999.

[14)] Superseded by ISO 11898-1:2003 and ISO 11898-2:2003.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 5-2: Application layer service definition – Type 2 elements

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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Attention is drawn to the fact that the use of the associated protocol type is restricted by its intellectual-property-right holders. In all cases, the commitment to limited release of intellectual-property-rights made by the holders of those rights permits a layer protocol type to be used with other layer protocols of the same type, or in other type combinations explicitly authorized by its intellectual-property-right holders.

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

International Standard IEC 61158-5-2 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This third edition cancels and replaces the second edition published in 2010. This edition constitutes a technical revision.

The main changes with respect to the previous edition are listed below:

- Updates of definitions used by the Time Sync ASE;
- Corrections to numbering of services in 6.2;
- Addition of “member” and and object specific services in 6.2.1.2.1, 6.2.1.2.3, 6.2.1.3.1, 6.2.1.3.20 to 6.2.1.3.23, 6.2.1.3.28, and 6.5;
- Updates of Identity ASE in 6.2.1.2.2;
- Updates of Assembly ASE in 6.2.1.2.3;
- Updates of Message Router ASE in 6.2.1.2.4;
- Updates of Time Sync ASE in 6.2.1.2.6;
- Updates of FAL service status codes in 6.2.1.3.3;
- Miscellaneous clarifications of FAL services in 6.2.1.3.4 to 6.2.1.3.19;
- Updates of Connection Manager ASE in 6.2.2;
- Updates of Connection ASE in 6.2.3;
- Removal of obsolete transport classes 4 to 6 in 6.3.1, 6.3.3 and 6.4;
- Miscellaneous editorial corrections.

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

FDIS	Report on voting
65C/763/FDIS	65C/773/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 ISO/IEC Directives, Part 2.

A list of all parts of the IEC 61158 series, published under the general title *Industrial communication networks – Fieldbus specifications*, can be found on the IEC web site.

The committee has decided that the contents of this publication will remain unchanged until the stability 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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This part of IEC 61158 is one of a series produced to facilitate the interconnection of automation system components. It is related to other standards in the set as defined by the “three-layer” fieldbus reference model described in IEC 61158-1.

The application service is provided by the application protocol making use of the services available from the data-link or other immediately lower layer. This standard defines the application service characteristics that fieldbus applications and/or system management may exploit.

Throughout the set of fieldbus standards, the term “service” refers to the abstract capability provided by one layer of the OSI Basic Reference Model to the layer immediately above. Thus, the application layer service defined in this standard is a conceptual architectural service, independent of administrative and implementation divisions.

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 5-2: Application layer service definition – Type 2 elements

1 Scope

1.1 General

The fieldbus application layer (FAL) provides user programs with a means to access the fieldbus communication environment. In this respect, the FAL can be viewed as a “window between corresponding application programs.”

This standard provides common elements for basic time-critical and non-time-critical messaging communications between application programs in an automation environment and material specific to Type 2 fieldbus. The term “time-critical” is used to represent the presence of a time-window, within which one or more specified actions are required to be completed with some defined level of certainty. Failure to complete specified actions within the time window risks failure of the applications requesting the actions, with attendant risk to equipment, plant and possibly human life.

This standard defines in an abstract way the externally visible service provided by the Type 2 fieldbus application layer in terms of

a) an abstract model for defining application resources (objects) capable of being manipulated by users via the use of the FAL service,
b) the primitive actions and events of the service;
c) the parameters associated with each primitive action and event, and the form which they take; and
d) the interrelationship between these actions and events, and their valid sequences.

The purpose of this standard is to define the services provided to

a) the FAL user at the boundary between the user and the application layer of the fieldbus reference model, and
b) Systems Management at the boundary between the application layer and Systems Management of the fieldbus reference model.

This standard specifies the structure and services of the Type 2 fieldbus application layer, in conformance with the OSI Basic Reference Model (ISO/IEC 7498-1) and the OSI application layer structure (ISO/IEC 9545).

FAL services and protocols are provided by FAL application-entities (AE) contained within the application processes. The FAL AE is composed of a set of object-oriented application service elements (ASEs) and a layer management entity (LME) that manages the AE. The ASEs provide communication services that operate on a set of related application process object (APO) classes. One of the FAL ASEs is a management ASE that provides a common set of services for the management of the instances of FAL classes.

Although these services specify, from the perspective of applications, how request and responses are issued and delivered, they do not include a specification of what the requesting and responding applications are to do with them. That is, the behavioral aspects of the applications are not specified; only a definition of what requests and responses they can

send/receive is specified. This permits greater flexibility to the FAL users in standardizing such object behavior. In addition to these services, some supporting services are also defined in this standard to provide access to the FAL to control certain aspects of its operation.

1.2 Specifications

The principal objective of this standard is to specify the characteristics of conceptual application layer services suitable for time-critical communications, and thus supplement the OSI Basic Reference Model in guiding the development of application layer protocols for time-critical communications.

A secondary objective is to provide migration paths from previously-existing industrial communications protocols. It is this latter objective which gives rise to the diversity of services standardized as the various Types of IEC 61158, and the corresponding protocols standardized in subparts of IEC 61158-6.

This specification may be used as the basis for formal application programming interfaces. Nevertheless, it is not a formal programming interface, and any such interface will need to address implementation issues not covered by this specification, including

a) the sizes and octet ordering of various multi-octet service parameters, and

b) the correlation of paired request and confirm, or indication and response, primitives.

1.3 Conformance

This standard does not specify individual implementations or products, nor does it constrain the implementations of application layer entities within industrial automation systems.

There is no conformance of equipment to this application layer service definition standard. Instead, conformance is achieved through implementation of conforming application layer protocols that fulfill the Type 2 application layer services as defined in this standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 IEC 61784-1 and IEC 61784-2 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 61131-3:2003[1], *Programmable controllers – Part 3: Programming languages*

IEC 61158-1:2014, *Industrial communication networks – Fieldbus specifications – Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series*

IEC 61158-3-2:2014, *Industrial communication networks – Fieldbus specifications – Part 3-2: Data-link layer service definition – Type 2 elements*

IEC 61158-4-2:2014, *Industrial communication networks – Fieldbus specifications – Part 4-2: Data-link layer protocol specification – Type 2 elements*

[1] A newer edition of this standard has been published, but only the cited edition applies.

IEC 61158-6-2:2014, *Industrial communication networks – Fieldbus specifications – Part 6-2: Application layer protocol specification – Type 2 elements*

IEC 61588:2009, *Precision clock synchronization protocol for networked measurement and control systems*

IEC 61784-3-2, *Industrial communications networks – Profiles – Part 3-2: Functional safety fieldbuses – Additional specifications for CPF 2*

ISO/IEC 646, *Information technology – ISO 7–bit coded character set for information interchange*

ISO/IEC 7498-1, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model*

ISO/IEC 8859-1, *Information technology – 8-bit single-byte coded graphic character sets – Part 1: Latin alphabet No. 1*

ISO/IEC 9545, *Information technology – Open Systems Interconnection – Application Layer structure*

ISO/IEC 10646, *Information technology – Universal Coded Character Set (UCS)*

ISO/IEC 10731, *Information technology – Open Systems Interconnection – Basic Reference Model – Conventions for the definition of OSI services*

ISO/IEC/IEEE 60559, *Information technology – Microprocessor Systems – Floating-Point arithmetic*

ISO 639-2, *Codes for the representation of names of languages – Part 2: Alpha-3 code*

ISO 8859-1[2]:1987, *Information processing – 8-bit single-byte coded graphic character sets – Part 1: Latin alphabet No. 1*

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2 A newer edition of this standard has been published by ISO/IEC, but the cited edition is the one used in the referenced IETF standards.

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[3] A newer edition of this standard has been published, but only the cited edition applies.