

# SLOVENSKI STANDARD

## SIST EN 61158-5-12:2015

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**Industrijska komunikacijska omrežja - Specifikacije za procesna vodila - 5-12. del:  
Definicija opravil na aplikacijski ravni - Elementi tipa 12 (IEC 61158-5-12:2014)**

Industrial communication networks - Fieldbus specifications - Part 5-12: Application layer service definition - Type 12 elements (IEC 61158-5-12:2014)

Industrielle Kommunikationsnetze - Feldbusse - Teil 5-12: Dienstfestlegungen des Application Layer (Anwendungsschicht) - Typ 12-Elemente (IEC 61158-5-12:2014)

Réseaux de communication industriels - Spécifications des bus de terrain - Partie 5-12: Définition des services de la couche application - Éléments de type 12 (CEI 61158-5-12:2014)

**Ta slovenski standard je istoveten z: EN 61158-5-12:2014**

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35.100.70	Uporabniški sloj	Application layer
35.110	Omreževanje	Networking

**SIST EN 61158-5-12:2015**

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EUROPEAN STANDARD

**EN 61158-5-12**

NORME EUROPÉENNE

EUROPÄISCHE NORM

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**Industrial communication networks - Fieldbus specifications -  
Part 5-12: Application layer service definition - Type 12 elements  
(IEC 61158-5-12:2014)**

Réseaux de communication industriels - Spécifications des  
bus de terrain - Partie 5-12: Définition des services de la  
couche application - Éléments de type 12  
(CEI 61158-5-12:2014)

Industrielle Kommunikationsnetze - Feldbusse -  
Teil 5-12: Dienstfestlegungen des Application Layer  
(Anwendungsschicht) - Typ 12-Elemente  
(IEC 61158-5-12:2014)

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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.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

[SIST EN 61158-5-12:2015](#)

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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**

## Foreword

The text of document 65C/763/FDIS, future edition 3 of IEC 61158-5-12, 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 61158-5-12:2014.

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 61158-5-12:2012.

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### Endorsement notice

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61158-2	NOTE	Harmonized as EN 61158-2.
IEC 61158-4-12	NOTE	Harmonized as EN 61158-4-12.
IEC 61158-6-12	NOTE	Harmonized as EN 61158-6-12.
IEC 61784-1	NOTE	Harmonized as EN 61784-1.
IEC 61784-2	NOTE	Harmonized as EN 61784-2.

## 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](http://www.cenelec.eu)

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61131-3	-	Programmable controllers - Part 3: Programming languages	EN 61131-3	-
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 61158-3-12	-	Industrial communication networks - Fieldbus specifications - Part 3-12: Data-link layer service definition - Type 12 elements	EN 61158-3-12	-
ISO/IEC 646	1991	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 7498-3	-	Information technology - Open Systems Interconnection - Basic reference model: Naming and addressing	-	-
ISO/IEC 8802-3	-	Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications	-	-
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	-	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO/IEC/IEEE 60559	-	Information technology - Microprocessor Systems - Floating-Point arithmetic	-	-
IEEE 802.1D	-	IEEE Standard for local and metropolitan area networks - Media Access Control (MAC) Bridges	-	-
IETF RFC 791	-	Internet Protocol - DARPA Internet Program Protocol Specification	-	-

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IEC 61158-5-12

Edition 3.0 2014-08

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Industrial communication networks – Fieldbus specifications –  
Part 5-12: Application layer service definition – Type 12 elements**

**Réseaux de communication industriels – Spécifications des bus de terrain –  
Partie 5-12: Définition des services de la couche application – Éléments  
de type 12**

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## CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope .....	8
1.1 General.....	8
1.2 Specifications .....	9
1.3 Conformance.....	9
2 Normative references .....	9
3 Terms, definitions, symbols, abbreviations and conventions .....	10
3.1 Reference model terms and definitions.....	10
3.2 Service convention terms and definitions.....	11
3.3 Application layer and data-link service terms and definitions.....	11
3.4 Common symbols and abbreviations .....	15
3.5 Conventions .....	16
4 Concepts.....	17
4.1 Common concepts.....	17
4.2 Type specific concepts .....	17
5 Data type ASE.....	26
5.1 General.....	26
5.2 Formal definition of data type objects.....	26
5.3 FAL defined data types.....	26
5.4 Data type ASE service specification.....	35
6 Communication model specification.....	35
6.1 ASEs.....	35
6.2 AR .....	116
Bibliography .....	129
Figure 1 – Producer consumer model.....	19
Figure 2 – Client server model .....	19
Figure 3 – Server triggered invocation.....	19
Figure 4 – Slave reference model.....	21
Figure 5 – Simple slave device.....	22
Figure 6 – Complex slave device.....	23
Figure 7 – Master functional overview .....	24
Figure 8 – Process output data sequence.....	36
Figure 9 – Process input data sequence.....	37
Figure 10 – CoE server model.....	55
Figure 11 – Successful single SDO-Download sequence.....	60
Figure 12 – Unsuccessful single SDO-Download sequence.....	61
Figure 13 – Successful segmented SDO-Download sequence.....	62
Figure 14 – Successful single SDO-Upload sequence.....	63
Figure 15 – Unsuccessful single SDO-Upload sequence.....	64
Figure 16 – Successful segmented SDO-Upload sequence.....	65



Figure 17 – SDO information sequence .....	66
Figure 18 – Emergency service .....	67
Figure 19 – Command sequence .....	68
Figure 20 – PDO mapping .....	70
Figure 21 – Sync manager PDO assignment .....	71
Figure 22 – RxPDO service .....	73
Figure 23 – TxPDO service .....	74
Figure 24 – RxPDO remote transmission sequence .....	75
Figure 25 – TxPDO remote transmission sequence .....	76
Figure 26 – EoE sequence .....	96
Figure 27 – FoE read sequence with success .....	104
Figure 28 – FoE read sequence with error .....	105
Figure 29 – FoE write sequence with success .....	106
Figure 30 – FoE write sequence with error .....	107
Figure 31 – FoE write sequence with busy .....	108
Figure 32 – Successful AL control sequence .....	118
Figure 33 – Unsuccessful AL control sequence .....	119
Figure 34 – AL state changed sequence .....	120
<b>ITeh STANDARD PREVIEW</b>	
Table 1 – Process output data .....	39
Table 2 – Process input data .....	40
Table 3 – Update process input data .....	41
Table 4 – SII read .....	49
Table 5 – SII write .....	50
Table 6 – SII reload .....	51
Table 7 – Allocation of SDO areas .....	55
Table 8 – SDO download expedited .....	80
Table 9 – SDO download normal .....	81
Table 10 – Download SDO segment .....	82
Table 11 – SDO upload expedited .....	83
Table 12 – SDO upload normal .....	84
Table 13 – Upload SDO segment .....	85
Table 14 – Abort SDO transfer .....	85
Table 15 – Get OD list .....	86
Table 16 – OD list segment .....	87
Table 17 – Get object description .....	88
Table 18 – Get entry description .....	89
Table 19 – Object entry segment .....	91
Table 20 – Emergency .....	92
Table 21 – RxPDO .....	93
Table 22 – TxPDO .....	93
Table 23 – RxPDO remote transmission .....	94
Table 24 – TxPDO remote transmission .....	94

Table 25 – Initiate EoE.....	99
Table 26 – EoE fragment .....	100
Table 27 – Set IP parameter .....	101
Table 28 – Set address filter .....	102
Table 29 – FoE read .....	109
Table 30 – FoE write.....	110
Table 31 – FoE data .....	110
Table 32 – FoE ack.....	111
Table 33 – FoE busy .....	111
Table 34 – FoE error.....	112
Table 35 – MBX read .....	113
Table 36 – MBX write.....	114
Table 37 – MBX read upd .....	115
Table 38 – AL management and ESM service primitives .....	117
Table 39 – AL control.....	127
Table 40 – AL state change .....	128

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –  
 FIELDBUS SPECIFICATIONS –**
**Part 5-12: Application layer service definition –  
 Type 12 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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NOTE Combinations of protocol types are specified in IEC 61784-1 and IEC 61784-2.

International Standard IEC 61158-5-12 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:

- bug fixes;
- editorial improvements;
- support of Explicit Device Identification added in ESM (see 6.2.2)

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.

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## 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.

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## INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

### Part 5-12: Application layer service definition – Type 12 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 12 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 different Types of the 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 IEC fieldbus Application Layer, in conformance with the OSI Basic Reference Model (ISO/IEC 7498) 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 any given Type of 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, *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 61158-3-12, *Industrial communication networks – Fieldbus specifications – Part 3-12: Data-link layer service definition – Type 12 elements*

ISO/IEC 646:1991, *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*