SVENSK STANDARD SS-EN 61158-4-3

| Fastställd | Utgåva | Sida | Ansvarig kommitté |
|---|---|---|---|
| 2014-12-18 | 3 | 1 (1+172) | SEK TK 65 |




# Industriell processtyrning – Fältbuss – Del 4-3: Specifikation av protokoll i datalänkskiktet – Delar i fältbuss, Typ 3

*Industrial communication networks – Fieldbus specifications – Part 4-3: Data-link layer protocol specification – Type 3 elements*

Som svensk standard gäller europastandarden EN 61158-4-3:2014. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61158-4-3:2014.

**Nationellt förord**

Europastandarden EN 61158-4-3:2014

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC

– **IEC 61158-4-3, Third edition, 2014 - Industrial communication networks - Fieldbus specifications - Part 4-3: Data-link layer protocol specification - Type 3 elements**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61158-4-3, utgåva 2, 2012, gäller ej fr o m 2017-09-19.

ICS 25.040.40; 35.100.20; 35.110.00

Denna standard är fastställd av SEK Svensk Elstandard,
som också kan lämna upplysningar om **sakinnehållet** i standarden.
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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN 61158-4-3

October 2014

ICS 25.040.40; 35.100.20; 35.110

Supersedes EN 61158-4-3:2012

English Version

# Industrial communication networks - Fieldbus specifications - Part 4-3: Data-link layer protocol specification - Type 3 elements (IEC 61158-4-3:2014)

Réseaux de communication industriels - Spécifications des bus de terrain - Partie 4-3: Spécification du protocole de la couche liaison de données - Éléments de type 3 (CEI 61158-4-3:2014)

Industrielle Kommunikationsnetze - Feldbusse - Teil 4-3: Protokollspezifikation des Data Link Layer (Sicherungsschicht) - Typ 3-Elemente (IEC 61158-4-3:2014)

This European Standard was approved by CENELEC on 2014-09-19. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.


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**



Ref. No. EN 61158-4-3:2014 E

SEK Svensk Elstandard

## Foreword

The text of document 65C/762/FDIS, future edition 3 of IEC 61158-4-3, 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 61158-4-3:2014.

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) | 2015-06-19 |
| • latest date by which the national standards conflicting with the document have to be withdrawn | (dow) | 2017-09-19 |

This document supersedes EN 61158-4-3:2012

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 61158-4-3:2014 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 60870-5-1 | NOTE | Harmonised as EN 60870-5-1 |
| IEC 61158-1 | NOTE | Harmonised as EN 61158-1 |
| IEC 61158-5-3 | NOTE | Harmonised as EN 61158-5-3 |
| IEC 61158-6-3 | NOTE | Harmonised as EN 61158-6-3 |
| IEC 61784-1 | NOTE | Harmonised as EN 61784-1 |
| IEC 61784-2 | NOTE | Harmonised 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.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 61131-3 | - | Programmable controllers<br>Part 3: Programming languages | EN 61131-3 | - |
| IEC 61158-2 | 2014 | Industrial communication networks - Fieldbus specifications<br>Part 2: Physical layer specification and service definition | EN 61158-2 | 2014 |
| IEC 61158-3-3 | - | Industrial communication networks - Fieldbus specifications<br>Part 3-3: Data-link layer service definition - Type 3 elements | EN 61158-3-3 | - |
| ISO/IEC 2022 | - | Information technology - Character code structure and extension techniques | - | - |
| 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 10731 | - | Information technology - Open Systems Interconnection - Basic Reference Model - Conventions for the definition of OSI services | - | - |
| ISO 1177 | - | Information processing - Character structure for start/stop and synchronous character-oriented transmission | - | - |

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

# INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

## Part 4-3: Data-link layer protocol specification – Type 3 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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8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

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 61158-4-3 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 changes with respect to the previous edition are listed below:

- Corrections in Table A.15 and Table A.16;
- Expired patent removed and added new patents.

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

| FDIS | Report on voting |
|---|---|
| 65C/762/FDIS | 65C/772/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 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.

# 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 data-link protocol provides the data-link service by making use of the services available from the physical layer. The primary aim of this standard is to provide a set of rules for communication expressed in terms of the procedures to be carried out by peer data-link entities (DLEs) at the time of communication. These rules for communication are intended to provide a sound basis for development in order to serve a variety of purposes:

a) as a guide for implementors and designers;

b) for use in the testing and procurement of equipment;

c) as part of an agreement for the admittance of systems into the open systems environment;

d) as a refinement to the understanding of time-critical communications within OSI.

This standard is concerned, in particular, with the communication and interworking of sensors, effectors and other automation devices. By using this standard together with other standards positioned within the OSI or fieldbus reference models, otherwise incompatible systems may work together in any combination.

NOTE Use of some of the associated protocol types is restricted by their 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 particular data-link layer protocol type to be used with physical layer and application layer protocols in Type combinations as specified explicitly in its profile parts. Use of the various protocol types in other combinations may require permission from their respective intellectual-property-right holders.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning Type 3 elements and possibly other types given in the normative elements of this standard.

The following patent rights for Type 3 have been announced by [SI]:

| Publication | Title |
|---|---|
| EP 1253494 | Control device with fieldbus |

IEC takes no position concerning the evidence, validity and scope of these patent rights.

The holder of these patent rights has assured IEC that he/she is willing to negotiate licenses either free of charge or under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of these patent rights is registered with IEC. Information may be obtained from:

[SI]: Siemens AG
CT IP M&A
Otto-Hahn-Ring 6
D-81739 Munich
Germany

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. IEC shall not be held responsible for identifying any or all such patent rights.

ISO (www.iso.org/patents) and IEC (http://patents.iec.ch) maintain on-line databases of patents relevant to their standards. Users are encouraged to consult the databases for the most up to date information concerning patents.

# INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

## Part 4-3: Data-link layer protocol specification – Type 3 elements

## 1 Scope

### 1.1 General

The data-link layer provides basic time-critical messaging communications between devices in an automation environment.

This protocol provides communication opportunities to a pre-selected “master” subset of data-link entities in a cyclic asynchronous manner, sequentially to each of those data-link entities. Other data-link entities communicate only as permitted and delegated by those master data-link entities.

For a given master, its communications with other data-link entities can be cyclic, or acyclic with prioritized access, or a combination of the two.

This protocol provides a means of sharing the available communication resources in a fair manner. There are provisions for time synchronization and for isochronous operation.

### 1.2 Specifications

This standard specifies

a) procedures for the timely transfer of data and control information from one data-link user entity to a peer user entity, and among the data-link entities forming the distributed data-link service provider;

b) the structure of the fieldbus DLPDUs used for the transfer of data and control information by the protocol of this standard, and their representation as physical interface data units.

### 1.3 Procedures

The procedures are defined in terms of

a) the interactions between peer DL-entities (DLEs) through the exchange of fieldbus DLPDUs;

b) the interactions between a DL-service (DLS) provider and a DLS-user in the same system through the exchange of DLS primitives;

c) the interactions between a DLS-provider and a Ph-service provider in the same system through the exchange of Ph-service primitives.

### 1.4 Applicability

These procedures are applicable to instances of communication between systems which support time-critical communications services within the data-link layer of the OSI or fieldbus reference models, and which require the ability to interconnect in an open systems interconnection environment.

Profiles provide a simple multi-attribute means of summarizing an implementation’s capabilities, and thus its applicability to various time-critical communications needs.

### 1.5 Conformance

This standard also specifies conformance requirements for systems implementing these procedures. This standard does not contain tests to demonstrate compliance with such requirements.

## 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 61158-2:2014, *Industrial communication networks – Fieldbus specifications – Part 2: Physical layer specification and service definition*

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

ISO/IEC 2022, *Information technology – Character code structure and extension techniques*

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

ISO 1177, *Information processing – Character structure for start/stop and synchronous character oriented transmission*