SLOVENSKI STANDARD
SIST EN 61158-2:1998

01-november-1998

Fieldbus standard for use in industrial control systems - Part 2: Physical layer specification and service definition (IEC 61158-2:1993)

Fieldbus standard for use in industrial control systems -- Part 2: Physical layer specification and service definition

Feldbus für industrielle Leitsysteme -- Teil 2: Spezifikation der Bitübertragungsschicht (Physical layer) und Definition deren Dienste

Bus de Terrain utilisé dans les systèmes de contrôle industriels -- Partie 2: Spécification de la couche physique et définition du service

Ta slovenski standard je istoveten z: EN 61158-2:1994

ICS:

25.040.40	Merjenje in krmiljenje industrijskih postopkov	Industrial process measurement and control
35.100.10	Fizični sloj	Physical layer
35.110	Omreževanje	Networking

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EUROPEAN STANDARD

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EN 61158-2

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Descriptors: Industrial control systems, digital communications, Fieldbus, physical layer specification, physical layer service definitions

ENGLISH VERSION

Fieldbus standard for use in industrial control systems
Part 2: Physical layer specification and service definition
(IEC 1158-2:1993)

Bus de Terrain utilisé dans les systèmes de contrôle industriels
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(CEI 1158-2:1993)

Feldbus für industrielle Leitsysteme
Teil 2: Spezifikation der Bitübertragungsschicht (Physical layer) und Definition deren Dienste
(IEC 1158-2:1993)

This European Standard was approved by CENELEC on 1993-09-22. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B-1050 Brussels

Ref. No. EN 61158-2:1994 E

FOREWORD

The text of document 65C(CO)34, as prepared by Sub-Committee 65C: Digital communications, of IEC Technical Committee 65: Industrial-process measurement and control, was submitted to the IEC-CENELEC parallel vote in November 1992.

The reference document was approved by CENELEC as EN 61158-2 on 22 September 1993.

The following dates were fixed:

- latest date of publication of an identical national standard	(dop)	1994-12-15
- latest date of withdrawal of conflicting national standards	(dow)	1995-12-15

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given only for information.
In this standard, annexes A and ZA are normative and annexes B and C are informative.

ENDORSEMENT NOTICE

The text of the International Standard IEC 1158-2:1993 was approved by CENELEC as a European Standard without any modification.

ANNEX ZA (normative)

OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD WITH THE REFERENCES OF THE RELEVANT EUROPEAN PUBLICATIONS

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

NOTE : When the international publication has been modified by CENELEC common modifications, indicated by (mod), the relevant EN/HD applies.

IEC Publication	Date	Title	EN/HD	Date
255-22-1	1988	Electrical relays - Part 22: Electrical disturbance tests for measuring relays and protection equipment - Section one: 1 MHz burst disturbance tests	-	-
529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529	1991
760	1989	Flat, quick-connect terminations	-	-
801-1	1984	Electromagnetic compatibility for industrial-process measurement and control equipment - Part 1: General introduction	HD 481.1 S1	1987
801-2	1984	Part 2: Electrostatic discharge requirements	HD 481.2 S1*	1987
801-3	1984	Part 3: Radiated electromagnetic field requirements	HD 481.3 S1	1987
801-4	1988	Part 4: Electrical fast transient/burst requirements	-	-
807-3	1990	Rectangular connectors for frequencies below 3 MHz - Part 3: Detail specification for a range of connectors with trapezoidal shaped metal shells and round contacts - Removable crimp contact types with closed crimp barrels, rear insertion/rearextraction	-	-

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* HD 481.2 S1 is superseded by EN 60801-2:1993, which is based on IEC 801-2:1991

IEC Publication	Date	Title	EN/HD	Date
1131-2	1992	Programmable controllers Part 2: Equipment requirements and test	-	-
1158-1	-	Fieldbus - Part 1: Introductory guide (under consideration)	-	-
1158-3	-	Part 3: Data link service definition (under consideration)	-	-
1158-4	-	Part 4: Data link protocol specification (under consideration)	-	-
1158-5	-	Part 5: Application service definition (under consideration)	-	-
1158-6	-	Part 6: Application protocol specification (under consideration)	-	-
1158-7	-	Part 7: Fieldbus management (under consideration)	-	-
1158-8	-	Part 8: Conformance testing (under consideration)	-	-

Other publications:

ISO 7498:1984 - Information processing systems - Open systems interconnection Basic reference model

ISO/IEC 10022:1990 - Information technology - Open system interconnection - Physical service definition

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Partie 2:
Spécification de la couche physique et définition du service

Fieldbus standard for use in industrial control systems –

Part 2:
Physical layer specification and service definition

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIELDBUS STANDARD FOR USE IN INDUSTRIAL CONTROL SYSTEMS –

Part 2: Physical layer specification and service definition

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international cooperation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of the IEC on technical matters, prepared by technical committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

3) They have the form of recommendations for international use published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

International Standard IEC 1158-2 has been prepared by IEC by sub-committee 65C: Digital communications, of IEC technical committee 65: Industrial-process measurement and control.

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

DIS	Report on voting
65C(CO)34	65C(CO)37

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

Annex A form an integral part of this standard.

Annexes B and C are for information only.

INTRODUCTION

A Fieldbus is a digital, serial, multidrop, data bus for communication with low-level industrial control and instrumentation devices such as transducers, actuators and local controllers. The Physical Layer specified in this part of IEC 1158 provides for transparent transmission of data units between Data Link Layer entities across physical connections.

The Physical Layer receives data units from the Data Link Layer, adds preamble and delimiters, provides encoding and transmits the resulting physical signals to the transmission medium at one node. Signals are then received at one or more other nodes, decoded and stripped of preamble and delimiters, before being passed to the Data Link Layer of the receiving device.

Currently this part of IEC 1158 only specifies wire media. The common characteristics for wire media are as follows:

a) digital data transmission;

b) self-clocking;

c) half-duplex communication (bidirectional but in only one direction at a time);

d) Manchester coding.

The major variations for these media are two modes of coupling and three signalling speeds as follows:

1) voltage mode (parallel coupling), 31,25 kbit/s;

2) voltage mode (parallel coupling), 1,0 Mbit/s;

3) current mode (serial coupling), 1,0 Mbit/s;

4) voltage mode (parallel coupling), 2,5 Mbit/s.

The voltage mode variations 1), 2), and 4) may be implemented with inductive coupling using transformers. This is not mandatory if the isolation requirements of this part of IEC 1158 are met by other means.

Alternative media (e.g. coaxial cable, optical fibre and radio transmission) and speeds are not included in this edition of this part of IEC 1158.

The Physical Layer provides the options:

i) no power via the bus conductors; not intrinsically safe;

ii) power via the bus conductors; not intrinsically safe;

iii) no power via the bus conductors; intrinsically safe;

iv) power via the bus conductors; intrinsically safe.

A Fieldbus communication element is considered to be implemented in two parts, the Data Terminal Equipment (DTE) and the Data Communication Equipment (DCE). The DTE includes only one part of the Physical Layer, the DCE Independent Sublayer (DIS). The DIS transfers Interface Data Units (octets) across a Data Link Layer – Physical Layer interface which is not exposed to the user. The DIS then passes the Interface Data as a serial stream of binary Physical Layer Service Data Units (bits) across the DTE – DCE interface, which may optionally be exposed to the user, to a Medium Dependent Sublayer (MDS).

Three alternative types of MDS are currently envisaged; one for wire media, one for optical media, and one for radio. The MDS adds preamble plus start delimiter before the data block, adds an end delimiter after the data block and encodes the data. In the reverse direction it decodes signals received via the medium, removing preamble and delimiters and providing signal quality error checking.

Serial encoded signals are passed across an interface, which may optionally be exposed, to a Medium Attachment Unit (MAU) which transmits and receives Physical Layer signals via the medium. A general model of the Physical Layer is shown in figure 1.