



**NSAI**  
Standards

Irish Standard  
I.S. EN 61162-3:2008&A1:2010&A2:2014

# Maritime navigation and radiocommunication equipment and systems - Digital interfaces -- Part 3: Serial data instrument network

**I.S. EN 61162-3:2008&A1:2010&A2:2014**

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

EN 61162-3:2008/A1:2010

EN 61162-3:2008/A2:2014

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

*This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):*

*NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.*

*This document is based on:*

EN 61162-3:2008

*Published:*

2008-09-04

*This document was published  
under the authority of the NSAI  
and comes into effect on:*

2014-10-24

ICS number:

47.020.70

NOTE: If blank see CEN/CENELEC cover page

NSAI  
1 Swift Square,  
Northwood, Santry  
Dublin 9

T +353 1 807 3800  
F +353 1 807 3838  
E standards@nsai.ie  
W NSAI.ie

Sales:  
T +353 1 857 6730  
F +353 1 857 6729  
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 61162-3:2008/A2**

September 2014

ICS 47.020.70

English Version

Maritime navigation and radiocommunication equipment and  
systems - Digital interfaces - Part 3: Serial data instrument  
network  
(IEC 61162-3:2008/A2:2014)

Matériels et systèmes de navigation et de  
radiocommunication maritimes - Interfaces numériques -  
Partie 3: Réseau par liaison de données série d'instruments  
(CEI 61162-3:2008/A2:2014)

Navigations- und Funkkommunikationsgeräte und -systeme  
für die Seeschifffahrt - Digitale Schnittstellen -  
Teil 3: Serielles Dateninstrumentenetz  
(IEC 61162-3:2008/A2:2014)

This amendment A2 modifies the European Standard EN 61162-3:2008; it was approved by CENELEC on 2014-08-25. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 amendment 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**

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 61162-3/A1**

July 2010

ICS 47.020.70

English version

**Maritime navigation and radiocommunication equipment and systems -  
Digital interfaces -  
Part 3: Serial data instrument network  
(IEC 61162-3:2008/A1:2010)**

Matériels et systèmes de navigation  
et de radiocommunication maritimes -  
Interfaces numériques -  
Partie 3: Réseau par liaison de données  
série d'instruments  
(CEI 61162-3:2008/A1:2010)

Navigations-  
und Funkkommunikationsgeräte  
und -systeme für die Seeschifffahrt -  
Digitale Schnittstellen -  
Teil 3: Serielles Dateninstrumentenetz  
(IEC 61162-3:2008/A1:2010)

This amendment A1 modifies the European Standard EN 61162-3:2008; it was approved by CENELEC on 2010-07-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 amendment 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, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

**CENELEC**

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

**Management Centre: Avenue Marnix 17, B - 1000 Brussels**

## Foreword

The text of document 80/580/CDV, future amendment 1 to IEC 61162-3:2008, prepared by IEC TC 80, Maritime navigation and radiocommunication equipment and systems, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 61162-3:2008 on 2010-07-01.

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

The following dates were fixed:

- |   |       |            |
|---|-------|------------|
| – latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2011-04-01 |
| – latest date by which the national standards conflicting with the amendment have to be withdrawn   | (dow) | 2013-07-01 |

---

## Endorsement notice

The text of amendment 1:2010 to the International Standard IEC 61162-3:2008 was approved by CENELEC as an amendment to the European Standard without any modification.

---

## **Annex ZA** (normative)

### **Normative references to international publications with their corresponding European publications**

The following referenced documents are indispensable for the application 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 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

*Replace the existing reference to NMEA 2000, Appendix B, Version 1.210: September 2006 by:*

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
NMEA 2000, Appendix B, Version 1.300	2009	Serial-Data Networking Of Marine Electronic Devices - Data Base	-	-

This page is intentionally left blank

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 61162-3**

September 2008

ICS 47.020.70

English version

**Maritime navigation and radiocommunication equipment and systems -  
Digital interfaces -  
Part 3: Serial data instrument network  
(IEC 61162-3:2008)**

Matériels et systèmes de navigation  
et de radiocommunication maritimes -  
Interfaces numériques -  
Partie 3: Réseau par liaison de données  
série d'instruments  
(CEI 61162-3:2008)

Navigations- und  
Funkkommunikationsgeräte und -systeme  
für die Seeschifffahrt -  
Digitale Schnittstellen -  
Teil 3: Serielles Dateninstrumentenetz  
(IEC 61162-3:2008)

This European Standard was approved by CENELEC on 2008-06-01. 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 two official versions (English and 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, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the 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**



## Foreword

The text of document 80/496/CDV, future edition 1 of IEC 61162-3, prepared by IEC TC 80, Maritime navigation and radiocommunication equipment and systems, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61162-3 on 2008-06-01.

The following dates were fixed:

- latest date by which the EN has to be implemented  
at national level by publication of an identical  
national standard or by endorsement (dop) 2009-03-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2011-06-01

Annex ZA has been added by CENELEC.

---

## Endorsement notice

The text of the International Standard IEC 61162-3:2008 was approved by CENELEC as a European Standard without any modification.

---

## **Annex ZA** (normative)

### **Normative references to international publications with their corresponding European publications**

The following referenced documents are indispensable for the application 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 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60945	- <sup>1)</sup>	Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results	EN 60945	2002 <sup>2)</sup>
ISO 11783	Series	Tractors and machinery for agriculture and forestry - Serial control and communications data network	-	-
ISO 11783-3	- <sup>1)</sup>	Tractors and machinery for agriculture and forestry - Serial control and communications data network - Part 3: Data link layer	-	-
ISO 11783-5 + corr. 1	2001 2002	Tractors and machinery for agriculture and forestry - Serial control and communications data network - Part 5: Network management	-	-
NMEA 2000 Main document, Version 1.200	2004	Serial-Data Networking of Marine Electronic Devices	-	-
NMEA 2000, Appendix A, Version 1.200	2004	Serial-Data Networking of Marine Electronic Devices - Application Layer (Parameter Group Definitions)	-	-
NMEA 2000, Appendix B, Version 1.210	2006	Serial-Data Networking of Marine Electronic Devices - Data Base	-	-
NMEA 2000, Appendix C, Version 1.200	2004	Serial-Data Networking of Marine Electronic Devices - Certification Criteria and Test Methods	-	-
NMEA 2000, Appendix D, Version 1.200	2004	Serial-Data Networking of Marine Electronic Devices - Application Notes	-	-
IMO amended	1974	International Convention for the Safety of Life at Sea (SOLAS) - Chapter V: Safety of navigation	-	-

<sup>1)</sup> Undated reference.

<sup>2)</sup> Valid edition at date of issue.

This page is intentionally left blank



**IEC 61162-3**

Edition 1.0 2008-05

# **INTERNATIONAL STANDARD**

---

**Maritime navigation and radiocommunication equipment and systems –  
Digital interfaces –  
Part 3: Serial data instrument network**



## **THIS PUBLICATION IS COPYRIGHT PROTECTED**

**Copyright © 2008 IEC, Geneva, Switzerland**

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland  
Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
Web: [www.iec.ch](http://www.iec.ch)

### **About the IEC**

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### **About IEC publications**

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: [www.iec.ch/webstore/custserv](http://www.iec.ch/webstore/custserv)

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: [csc@iec.ch](mailto:csc@iec.ch)  
Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00



**IEC 61162-3**

Edition 1.0 2008-05

# **INTERNATIONAL STANDARD**

---

**Maritime navigation and radiocommunication equipment and systems –  
Digital interfaces –  
Part 3: Serial data instrument network**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

PRICE CODE

**Q**

ICS 47.020.70

ISBN 2-8318-9811-0

## CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references .....	6
3 Terms, definitions and conventions.....	7
3.1 Terms and definitions .....	7
3.2 Conventions .....	10
4 Physical layer.....	10
4.1 CAN transceiver .....	10
4.2 Environmental .....	10
4.3 Radio frequency interference.....	10
4.3.1 Unwanted electromagnetic emissions .....	10
4.3.2 Immunity to electromagnetic environment .....	10
4.4 Cables.....	10
4.5 Interface power .....	11
4.6 Network power source .....	11
5 Data link layer .....	11
6 Network layer .....	11
7 Network management.....	11
7.1 Address configuration method .....	11
7.2 Address retention .....	11
8 Application layer.....	11
8.1 Parameter groups.....	11
8.1.1 Parameter group priority .....	11
8.1.2 Parameter group broadcast rate .....	12
9 Test criteria .....	12
10 Application notes .....	12
11 Manufacturer's documentation.....	12
Annex A (informative) System integration .....	13
 Figure A.1 – Example of configuration .....	15
Figure A.2 – Example of configuration .....	15
 Table A.1 – Test characteristics.....	14

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### **MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – DIGITAL INTERFACES –**

#### **Part 3: Serial data instrument network**

#### 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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 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.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61162-3 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

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

CDV	Report on voting
80/496/CDV	80/526/RVC

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 61162 series, under the general title *Maritime navigation and radiocommunication equipment and systems – Digital interfaces*, can be found on the IEC website.

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

A bilingual version of this publication may be issued at a later date.

## INTRODUCTION

This part of IEC 61162 has been developed by the IEC technical committee 80 working group 6, to meet the requirement for a versatile and economic means of connecting a wide range of marine navigation and radiocommunications equipment aboard SOLAS vessels. The National Marine Electronics Association's Standard Committee has developed the NMEA 2000®<sup>1</sup> standard. The NMEA<sup>2</sup> 2000 Standard provides for capabilities across all classes of vessels. The development of NMEA 2000 began in 1994 and was completed in 1999. More than a dozen manufacturers worldwide conducted a two-year beta test. The finalised NMEA 2000 standard version 1.000 was published in 2001. IEC and NMEA have worked together since 1999 to ensure that the NMEA 2000 standard fully supports SOLAS applications. NMEA 2000 version 1.200 was published in 2004, with expanded support for redundant messaging and for equipments such as AIS.

The need for an improved standard, compared with IEC 61162-1 and IEC 61162-2, has arisen due to the increased complexity of the latest equipment and systems. This requires multiple links between equipment and greatly improved communication speed.

The parts 400 of the IEC 61162 series have already been issued and cater for the most complex systems to be found on board a ship.

This new part 3 of IEC 61162 adopts the controller area network (CAN) technology, already well established for many industrial systems. This permits a versatile system to be established with the minimum of effort and reasonable cost. The equipment types supported and the sentence data content developed for IEC 61162-1 has been retained.

IEC 61162-3 describes a low cost, moderate capacity, bi-directional multi-transmitter/multi-receiver instrument network to interconnect marine electronic equipment. The connectors and cables used are compatible with industrial bus systems for instance DeviceNet<sup>TM3</sup> and Profibus<sup>TM4</sup>.

IEC 61162-3 provides for the application of NMEA 2000 aboard SOLAS vessels. Exceptions, additions and specific requirements for implementation upon SOLAS vessels are contained in this document.

---

<sup>1</sup> NMEA 2000® is the registered trademark of the National Marine Electronics Association, Inc. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trademark holder or any of its products. Compliance to this profile does not require use of the trade name. Use of the trade name requires permission of the trade holder.

<sup>2</sup> NMEA is the registered trademark of the National Marine Electronics Association, Inc. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trademark holder or any of its products. Compliance to this profile does not require use of the trade name. Use of the trade name requires permission of the trade holder.

<sup>3</sup> DeviceNet<sup>TM</sup> is the registered trademark of the Open DeviceNet Vendor Association, Inc. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trademark holder or any of its products. Compliance to this profile does not require use of the trade name. Use of the trade name requires permission of the trade holder.

<sup>4</sup> Profibus<sup>TM</sup> is the registered trademark of PROFIBUS International. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trademark holder or any of its products. Compliance to this profile does not require use of the trade name. Use of the trade name requires permission of the trade holder.

## **MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – DIGITAL INTERFACES –**

### **Part 3: Serial data instrument network**

#### **1 Scope**

This part of IEC 61162 is based upon the NMEA 2000 standard. The NMEA 2000 standard contains the requirements for the minimum implementation of a serial-data communications network to interconnect marine electronic equipment onboard vessels. Equipment designed to this standard will have the ability to share data, including commands and status, with other compatible equipment over a single signalling channel.

Data messages are transmitted as a series of data frames, each with robust error check confirmed frame delivery and guaranteed latency times. As the actual data content of a data frame is at best 50 % of the transmitted bits, this standard is primarily intended to support relatively brief data messages, which may be periodic, transmitted as needed, or on-demand by use of query commands. Typical data includes discrete parameters such as position latitude and longitude, GPS status values, steering commands to autopilots, finite parameter lists such as waypoints, and moderately sized blocks of data such as electronic chart database updates. This standard is not necessarily intended to support high-bandwidth applications such as radar, electronic chart or other video data, or other intensive database or file transfer applications.

This standard defines all of the pertinent layers of the International Standards Organisation Open Systems Interconnect (ISO/OSI) model, from the application layer to the physical layer, necessary to implement the required IEC 61162-3 network functionality.

This standard defines data formats, network protocol, and the minimum physical layer necessary for devices to interface. SOLAS applications shall employ redundant designs (for instance dual networks, redundant network interface circuits) to reduce the impact of single point failures. The NMEA 2000 standard provides the fundamental tools and methods to support redundant equipment, buses and messaging. Specific shipboard installation designs are beyond the scope of this standard, however some guidance is given in Annex A.

#### **2 Normative references**

The following referenced documents are indispensable for the application 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.

IEC 60945, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

ISO 11783 (all parts), *Tractors and machinery for agriculture and forestry – Serial control and communications data network*

ISO 11783-3, *Tractors and machinery for agriculture and forestry – Serial control and communications data network – Part 3: Data link layer*

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- 
- Looking for additional Standards? Visit Intertek Inform Infostore
  - Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-