

**Electrical equipment of industrial machines -
Serial data link for real-time communication between controls and drives
(IEC/TR 61491:2010)**

Équipement électrique des machines
industrielles -
Liaison des données sérielles pour
communications en temps réel entre
unités de commande et dispositifs
d'entraînement
(CEI/TR 61491:2010)

Elektrische Ausrüstung
von Industriemaschinen -
Serielle Datenverbindung für Echtzeit-
Kommunikation zwischen Steuerungen
und Antrieben
(IEC/TR 61491:2010)

This Technical Report was approved by CENELEC on 2010-09-17.

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CENELEC

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

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Foreword

This Technical Report consists of the text of the International Technical Report IEC/TR 61491:2010 prepared by SC 22G, Adjustable speed electric drive systems incorporating semiconductor power converters, of IEC TC 22, Power electronic systems and equipment.

It was circulated for voting in accordance with the Internal Regulations, Part 2, Subclause 11.4.3.3 (simple majority) and was accepted by CENELEC as CLC/TR 61491 on 2010-09-17.

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.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the Technical Report IEC/TR 61491:2010 was approved by CENELEC as a Technical Report without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

ISO/IEC 7498-1 NOTE Harmonized as EN ISO/IEC 7498-1.

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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 Where 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 61158	series	Industrial communication networks - Fieldbus specifications	EN 61158	series
IEC/TR 61158-1	-	Industrial communication networks - Fieldbus specifications - Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series	CLC/TR 61158-1	-
IEC 61158-2	-	Industrial communication networks - Fieldbus specifications - Part 2: Physical layer specification and service definition	EN 61158-2	-
IEC 61158-3-16	-	Industrial communication networks - Fieldbus specifications - Part 3-16: Data-link layer service definition - Type 16 elements	EN 61158-3-16	-
IEC 61158-3-19	-	Industrial communication networks - Fieldbus specifications - Part 3-19: Data-link layer service definition - Type 19 elements	EN 61158-3-19	-
IEC 61158-4-16	-	Industrial communication networks - Fieldbus specifications - Part 4-16: Data-link layer protocol specification - Type 16 elements	EN 61158-4-16	-
IEC 61158-4-19	-	Industrial communication networks - Fieldbus specifications - Part 4-19: Data-link layer protocol specification - Type 19 elements	EN 61158-4-19	-
IEC 61158-5-16	-	Industrial communication networks - Fieldbus specifications - Part 5-16: Application layer service definition - Type 16 elements	EN 61158-5-16	-
IEC 61158-5-19	-	Industrial communication networks - Fieldbus specifications - Part 5-19: Application layer service definition - Type 19 elements	EN 61158-5-19	-
IEC 61158-6-16	-	Industrial communication networks - Fieldbus specifications - Part 6-16: Application layer protocol specification - Type 16 elements	EN 61158-6-16	-

IEC 61158-6-19	-	Industrial communication networks - Fieldbus specifications - Part 6-19: Application layer protocol specification - Type 19 elements	EN 61158-6-19	-
IEC 61784-1	-	Industrial communication networks - Profiles - Part 1: Fieldbus profiles	EN 61784-1	-
IEC 61784-2	-	Industrial communication networks - Profiles - Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC 8802-3	EN 61784-2	-
IEC 61800-7	series	Adjustable speed electrical power drive systems - Part 7-xxx: Generic interface and use of profiles for power drive systems	EN 61800-7	series
IEC 61800-7-1	-	Adjustable speed electrical power drive systems - Part 7-1: Generic interface and use of profiles for power drive systems - Interface definition	EN 61800-7-1	-
IEC 61800-7-204	-	Adjustable speed electrical power drive systems - Part 7-204: Generic interface and use of profiles for power drive systems - Profile type 4 specification	EN 61800-7-204	-
IEC 61800-7-304	-	Adjustable speed electrical power drive systems - Part 7-304: Generic interface and use of profiles for power drive systems - Mapping of profile type 4 to network technologies	EN 61800-7-304	-
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	-	-

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INTRODUCTION

This technical report replaces the second edition of IEC 61491:2002 which has been separated into:

- a) communication parts, included in the IEC 61158 and IEC 61784 series (prepared by subcommittee 65C: *Industrial networks*, of IEC technical committee 65: *Industrial process measurement, control and automation*);
- b) the application part, included in the IEC 61800-7 series (prepared by subcommittee 22G: *Adjustable speed electric drive systems incorporating semiconductor power converters*, of IEC technical committee 22: *Power electronic systems and equipment*.)

The communication related content of the second edition of IEC 61491:2002 and technical updates are specified by communication profile family 16 (CPF 16) in IEC 61784-1 and IEC 61784-2. The application related content of the second edition of IEC 61491:2002 (drive profile) and technical updates are specified in IEC 61800-7.

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ELECTRICAL EQUIPMENT OF INDUSTRIAL MACHINES – SERIAL DATA LINK FOR REAL-TIME COMMUNICATION BETWEEN CONTROLS AND DRIVES

1 Scope

This technical report presents an overview and guidance for IEC 61158, IEC 61784-1, IEC 61784-2 and IEC 61800-7 with respect to a real-time serial interface between the control unit and its associated devices, which is utilized to transmit periodic and non periodic data.

This interface is intended to apply to industrial machines, such as machine tools, with multiple devices connected via this interface. This interface supports different operation modes.

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 61158 (all parts), *Industrial communication networks – Fieldbus specifications*

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

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

IEC 61158-3-16, *Industrial communication networks – Fieldbus specifications – Part 3-16: Data-link layer service definition – Type 16 elements*

IEC 61158-3-19, *Industrial communication networks – Fieldbus specifications – Part 3-19: Data-link layer service definition – Type 19 elements*

IEC 61158-4-16, *Industrial communication networks – Fieldbus specifications – Part 4-16: Data-link layer protocol specification – Type 16 elements*

IEC 61158-4-19, *Industrial communication networks – Fieldbus specifications – Part 4-19: Data-link layer protocol specification – Type 19 elements*

IEC 61158-5-16, *Industrial communication networks – Fieldbus specifications – Part 5-16: Application layer service definition – Type 16 elements*

IEC 61158-5-19, *Industrial communication networks – Fieldbus specifications – Part 5-19: Application layer service definition – Type 19 elements*

IEC 61158-6-16, *Industrial communication networks – Fieldbus specifications – Part 6-16: Application layer protocol specification – Type 16 elements*

IEC 61158-6-19, *Industrial communication networks – Fieldbus specifications – Part 6-19: Application layer protocol specification – Type 19 elements*

IEC 61784-1, *Industrial communication networks – Profiles – Part 1: Fieldbus profiles*

IEC 61784-2, *Industrial communication networks – Profiles – Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC 8802-3*

IEC 61800-7 (all subparts) *Adjustable speed electrical power drive systems – Part 7-xxx: Generic interface and use of profiles for power drive systems*

IEC 61800-7-1, *Adjustable speed electrical power drive systems – Part 7-1: Generic interface and use of profiles for power drive systems – Interface definition*

IEC 61800-7-204, *Adjustable speed electrical power drive systems – Part 7-204: Generic interface and use of profiles for power drive systems – Profile type 4 specification*

IEC 61800-7-304, *Adjustable speed electrical power drives systems – Part 7-304: Generic interface and use of profiles for power drive systems – Mapping of profile type 4 to network technologies*

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*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in the referenced specifications apply.

3.2 Symbols and abbreviated terms

The following abbreviations apply for this document.

CP Communication profile

CPF Communication profile family

PDS Power drive system

4 Structure of the communication specification

The communication related specification is divided into three communication profiles:

- communication profile 16/1 (CP 16/1) in IEC 61784-1 covers the communication related content of the second edition of IEC 61491:2002;
- communication profile 16/2 (CP 16/2) in IEC 61784-1 covers CP 16/1 and the increased bit rates (8 Mbit/s and 16 Mbit/s);
- communication profile 16/3 (CP 16/3) in IEC 61784-2 covers an extended functionality of CP 16/2 based on ISO/IEC 8802-3.

CP 16/1 and CP 16/2 correspond to Type 16 of the IEC 61158 series. CP 16/3 corresponds to Type 19 of the IEC 61158 series. The relations are shown in Table 1.

The general structure of the IEC 61158 series is explained in IEC 61158-1.