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TECHNICAL REPORT

RAPPORT TECHNIQUE

Electrical equipment of industrial machines – Serial data link for real-time communication between controls and drives

Équipement électrique des machines industrielles – Liaison des données sérielles pour communications en temps réel entre unités de commande et dispositifs d'entraînement

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

FOREWORD

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IEC 61491, which is a technical report, has been prepared by subcommittee 22G: Adjustable speed electric drive systems incorporating semiconductor power converters, of IEC technical committee 22: Power electronic systems and equipment.

This first edition of the technical report cancels and replaces the second edition of IEC 61491, published in 2002. The changes are primarily to make reference to material that was moved to IEC 61158, IEC 61784 and IEC 61800-7 series of standards.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
22G/199/DTR	22G/209/RVC

Full information on the voting for the approval of this technical report 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.

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- withdrawn,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.

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: I*ndustrial 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.

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.

Table 1 – Overview on communication profiles of CPF 16

CP	CPF	Type	Physical layer	Data link layer	Application layer
16/1	16	16	IEC 61158-2	IEC 61158-3-16 IEC 61158-4-16	IEC 61158-5-16 IEC 61158-6-16
16/2	16	16	IEC 61158-2	IEC 61158-3-16 IEC 61158-4-16	IEC 61158-5-16 IEC 61158-6-16
16/3	16	19	ISO/IEC 8802-3	IEC 61158-3-19 IEC 61158-4-19	IEC 61158-5-19 IEC 61158-6-19

5 Structure of the application specification

The application related specification (drive profile) is split into three documents:

- IEC 61800-7-1 describes a generic interface of power drive systems (PDS) from the controllers point of view and the relations with different drive profiles specified in the IEC 61800-7-2xxx subparts;
- IEC 61800-7-204 specifies the drive profile in accordance with the second edition of IEC 61491:2002 and technical updates;
- IEC 61800-7-304 specifies the mapping of this drive profile onto CP 16/1, CP 16/2 and CP 16/3.