

INTERNATIONAL STANDARD



**Industrial communication networks – Profiles –
Part 5-6: Installation of fieldbuses – Installation profiles for CPF 6**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2018 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

Tel.: +41 22 919 02 11
info@iec.ch
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.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - webstore.iec.ch/advsearchform

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 It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

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

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 21 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

INTERNATIONAL STANDARD



**Industrial communication networks – Profiles –
Part 5-6: Installation of fieldbuses – Installation profiles for CPF 6**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 25.040.40; 35.100.40

ISBN 978-2-8322-5940-5

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	7
INTRODUCTION.....	9
1 Scope.....	10
2 Normative references	10
3 Terms, definitions and abbreviated terms	10
4 CPF 6: Overview of installation profiles	10
5 Installation profile conventions	11
6 Conformance to installation profiles.....	11
Annex A (normative) CPF 6 Type 8 network specific installation profile.....	13
A.1 Installation profile scope.....	13
A.2 Normative references	13
A.3 Installation profile terms, definitions, and abbreviated terms.....	14
A.3.1 Terms and definitions.....	14
A.3.2 Abbreviated terms.....	14
A.3.3 Conventions for installation profiles	15
A.4 Installation planning	15
A.4.1 General.....	15
A.4.1.1 Objective	15
A.4.1.2 Cabling in industrial premises.....	15
A.4.1.3 The planning process	15
A.4.1.4 Specific requirements for CPs	15
A.4.1.5 Specific requirements for generic cabling in accordance with ISO/IEC 11801-3	15
A.4.2 Planning requirements	15
A.4.2.1 Safety.....	15
A.4.2.2 Security	16
A.4.2.3 Environmental considerations and EMC.....	16
A.4.2.4 Specific requirements for generic cabling in accordance with ISO/IEC 11801-3	16
A.4.3 Network capabilities.....	16
A.4.3.1 Network topology.....	16
A.4.3.2 Network characteristics.....	18
A.4.4 Selection and use of cabling components	21
A.4.4.1 Cable selection.....	21
A.4.4.2 Connecting hardware selection.....	24
A.4.4.3 Connections within a channel/permanent link	26
A.4.4.4 Terminators	27
A.4.4.5 Device location and connection	27
A.4.4.6 Coding and labelling	27
A.4.4.7 Earthing and bonding of equipment and devices and shielded cabling	28
A.4.4.8 Storage and transportation of cables	29
A.4.4.9 Routing of cables.....	29
A.4.4.10 Separation of circuit.....	29
A.4.4.11 Mechanical protection of cabling components	29
A.4.4.12 Installation in special areas	29
A.4.5 Cabling planning documentation	29

A.4.5.1	Common description	29
A.4.5.2	Cabling planning documentation for CPs	29
A.4.5.3	Network certification documentation	29
A.4.5.4	Cabling planning documentation for generic cabling in accordance with ISO/IEC 11801-3	29
A.4.6	Verification of cabling planning specification	29
A.5	Installation implementation	29
A.5.1	General requirements	29
A.5.1.1	Common description	29
A.5.1.2	Installation of CPs	29
A.5.1.3	Installation of generic cabling in industrial premises	29
A.5.2	Cable installation	29
A.5.2.1	General requirements for all cabling types	29
A.5.2.2	Installation and routing	31
A.5.2.3	Specific requirements for CPs	31
A.5.2.4	Specific requirements for wireless installation	31
A.5.2.5	Specific requirements for generic cabling in accordance with ISO/IEC 11801-3	31
A.5.3	Connector installation	32
A.5.3.1	Common description	32
A.5.3.2	Shielded connectors	32
A.5.3.3	Unshielded connectors	32
A.5.3.4	Specific requirements for CPs	32
A.5.3.5	Specific requirements for wireless installation	33
A.5.3.6	Specific requirements for generic cabling in accordance with ISO/IEC 11801-3	33
A.5.4	Terminator installation	33
A.5.5	Device installation	33
A.5.6	Coding and labelling	33
A.5.7	Earthing and bonding of equipment and devices and shield cabling	33
A.5.8	As-implemented cabling documentation	34
A.6	Installation verification and installation acceptance test	34
A.6.1	General	34
A.6.2	Installation verification	34
A.6.2.1	General	34
A.6.2.2	Verification according to cabling planning documentation	34
A.6.2.3	Verification of earthing and bonding	34
A.6.2.4	Verification of shield earthing	34
A.6.2.5	Verification of cabling system	34
A.6.2.6	Cable selection verification	34
A.6.2.7	Connector verification	34
A.6.2.8	Connection verification	34
A.6.2.9	Terminator verification	34
A.6.2.10	Coding and labelling verification	34
A.6.2.11	Verification report	35
A.6.3	Installation acceptance test	35
A.6.3.1	General	35
A.6.3.2	Acceptance test of Ethernet based cabling	35
A.6.3.3	Acceptance test of non-Ethernet-based cabling	35

A.6.3.4	Specific requirements for wireless installation.....	35
A.6.3.5	Acceptance test report.....	35
A.7	Installation administration.....	35
A.8	Installation maintenance and installation troubleshooting.....	35
Annex B (normative)	CPF 6 Ethernet network specific installation profile	37
B.1	Installation profile scope.....	37
B.2	Normative references	37
B.3	Installation profile terms, definitions, and abbreviated terms	38
B.3.1	Terms and definitions.....	38
B.3.2	Abbreviated terms.....	38
B.3.3	Conventions for installation profiles	38
B.4	Installation planning	38
B.4.1	General.....	38
B.4.1.1	Objective	38
B.4.1.2	Cabling in industrial premises	38
B.4.1.3	The planning process	38
B.4.1.4	Specific requirements for CPs	38
B.4.1.5	Specific requirements for generic cabling in accordance with ISO/IEC 11801-3	38
B.4.2	Planning requirements	38
B.4.2.1	Safety.....	38
B.4.2.2	Security	39
B.4.2.3	Environmental considerations and EMC.....	39
B.4.2.4	Specific requirements for generic cabling in accordance with ISO/IEC 11801-3	39
B.4.3	Network capabilities.....	39
B.4.3.1	Network topology.....	39
B.4.3.2	Network characteristics.....	40
B.4.4	Selection and use of cabling components	42
B.4.4.1	Cable selection.....	42
B.4.4.2	Connecting hardware selection.....	44
B.4.4.3	Connections within a channel/permanent link	47
B.4.4.4	Terminators	47
B.4.4.5	Device location and connection	48
B.4.4.6	Coding and labelling	48
B.4.4.7	Earthing and bonding of equipment and devices and shielded cabling	48
B.4.4.8	Storage and transportation of cables	48
B.4.4.9	Routing of cables.....	48
B.4.4.10	Separation of circuit.....	48
B.4.4.11	Mechanical protection of cabling components	48
B.4.4.12	Installation in special areas	48
B.4.5	Cabling planning documentation	48
B.4.6	Verification of cabling planning specification	48
B.5	Installation implementation	48
B.5.1	General requirements	48
B.5.2	Cable installation	48
B.5.2.1	General requirements for all cabling types	48
B.5.2.2	Installation and routing	49

B.5.2.3	Specific requirements for CPs	49
B.5.2.4	Specific requirements for wireless installation.....	50
B.5.2.5	Specific requirements for generic cabling in accordance with ISO/IEC 11801-3	50
B.5.3	Connector installation	50
B.5.3.1	Common description	50
B.5.3.2	Shielded connectors	50
B.5.3.3	Unshielded connectors	50
B.5.3.4	Specific requirements for CPs	50
B.5.3.5	Specific requirements for wireless installation.....	50
B.5.3.6	Specific requirements for generic cabling in accordance with ISO/IEC 11801-3.....	50
B.5.4	Terminator installation	50
B.5.5	Device installation.....	50
B.5.6	Coding and labelling	50
B.5.7	Earthing and bonding of equipment and devices and shield cabling	50
B.5.8	As-implemented cabling documentation	51
B.6	Installation verification and installation acceptance test.....	51
B.6.1	General.....	51
B.6.2	Installation verification	51
B.6.3	Installation acceptance test.....	51
B.7	Installation administration.....	51
B.8	Installation maintenance and installation troubleshooting.....	51
	Bibliography.....	52
	Figure 1 – Standards relationships.....	9
	Figure A.1 – Type 8 network structure example	17
	Figure A.2 – Example of a Type 8 network configuration.....	18
	Figure A.3 – Sub-D connector pin assignment	32
	Figure A.4 – M23 circular connector pin assignment	32
	Figure A.5 – M12 circular connector pin assignment	33
	Figure A.6 – Terminal connector at the device	33
	Figure B.1 – Terminal connector at the device	50
	Table A.1 – Basic network characteristics for balanced cabling not based on Ethernet	19
	Table A.2 – Network characteristics for optical fibre cabling.....	20
	Table A.3 – Information relevant to balanced cable: fixed cables	21
	Table A.4 – Information relevant to balanced cable: cords	22
	Table A.5 – Remote bus fibre optic cable length	24
	Table A.6 – Connectors for copper cabling CPs not based on Ethernet.....	25
	Table A.7 – Optical fibre connecting hardware	25
	Table A.8 – Relationship between FOC and fibre types (Type 8 networks).....	26
	Table A.9 – Colour code for balanced cables used by Type 8 networks	27
	Table A.10 – Parameters for balanced cables	30
	Table A.11 – Parameters for silica optical fibre cables	30
	Table A.12 – Parameters for POF optical fibre cables	30

Table A.13 – Parameters for hard clad silica optical fibre cables.....	31
Table A.14 – Pin assignment of the terminal connector	33
Table B.1 – Network characteristics for balanced cabling based on Ethernet	40
Table B.2 – Network characteristics for optical fibre cabling.....	41
Table B.3 – Information relevant to copper cable: fixed cables.....	42
Table B.4 – Information relevant to copper cable: cords.....	43
Table B.5 – Information relevant to optical fibre cables	44
Table B.6 – Connectors for balanced cabling CPs based on Ethernet	45
Table B.7 – Connectors for copper cabling CPs not based on Ethernet.....	45
Table B.8 – Optical fibre connecting hardware	46
Table B.9 – Relationship between FOC and fibre types (CP 6/2 Ethernet network)	46
Table B.10 – Parameters for balanced cables.....	48
Table B.11 – Parameters for silica optical fibre cables	49
Table B.12 – Parameters for POF optical fibre cables	49
Table B.13 – Parameters for hard clad silica optical fibre cables.....	49

IEC 61784-5-6:2018 is a preview generated by EVS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –
PROFILES –****Part 5-6: Installation of fieldbuses –
Installation profiles for CPF 6****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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 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 61784-5-6 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This fourth edition cancels and replaces the third edition published in 2013. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) alignment with IEC 61918:2018;
- b) addition of new connectors.

This document is to be used in conjunction with IEC 61918:2018.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
65C/924/FDIS	65C/925/RVD

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

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 61784-5 series, published under the general title *Industrial communication networks – Profiles – Installation of fieldbuses*, can be found on the IEC website.

The committee has decided that the contents of this document 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 document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This International Standard is one of a series produced to facilitate the use of communication networks in industrial control systems.

IEC 61918:2018 provides the common requirements for the installation of communication networks in industrial control systems. This installation profile document provides the installation profiles of the communication profiles (CP) of a specific communication profile family (CPF) by stating which requirements of IEC 61918 fully apply and, where necessary, by supplementing, modifying, or replacing the other requirements (see Figure 1).

For general background on fieldbuses, their profiles, and relationship between the installation profiles specified in this document, see IEC 61158-1.

Each CP installation profile is specified in a separate annex of this document. Each annex is structured exactly as the reference document IEC 61918 for the benefit of the persons representing the roles in the fieldbus installation process as defined in IEC 61918 (planner, installer, verification personnel, validation personnel, maintenance personnel, administration personnel). By reading the installation profile in conjunction with IEC 61918, these persons immediately know which requirements are common for the installation of all CPs and which are modified or replaced. The conventions used to draft this document are defined in Clause 5.

The provision of the installation profiles in one document for each CPF (for example IEC 61784-5-6 for CPF 6), allows readers to work with documents of a convenient size.

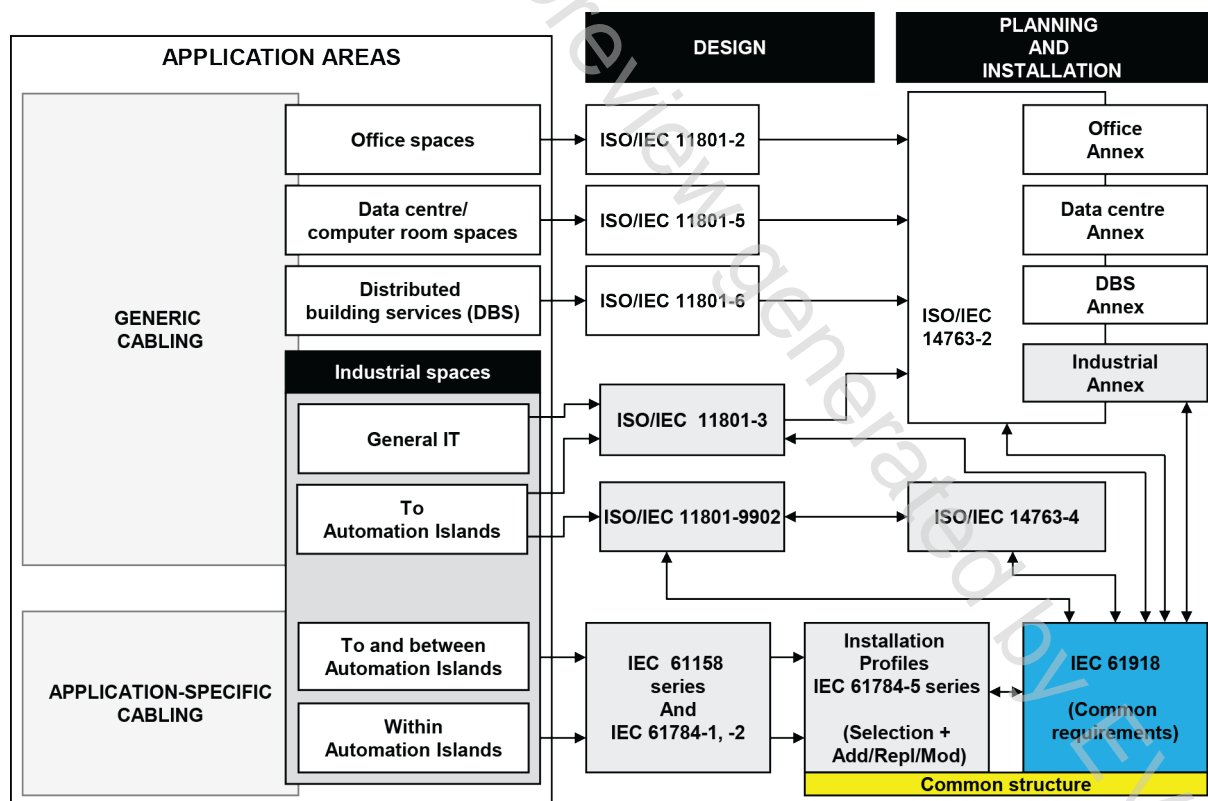


Figure 1 – Standards relationships

INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

Part 5-6: Installation of fieldbuses – Installation profiles for CPF 6

1 Scope

This part of IEC 61784-5 specifies the installation profiles for CPF 6 (INTERBUS)¹.

The installation profiles are specified in the annexes. These annexes are read in conjunction with IEC 61918:2018.

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.

IEC 61918:2018, *Industrial communication networks – Installation of communication networks in industrial premises*

The normative references of IEC 61918:2018, Clause 2, apply.

NOTE For profile specific normative references, see Clauses A.2 and B.2.

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms, definitions and abbreviated terms given in IEC 61918:2018, Clause 3, apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

NOTE For profile specific terms, definitions and abbreviated terms see Clauses A.3 and B.3.

4 CPF 6: Overview of installation profiles

CPF 6 consists of seven communication profiles (see IEC 61784-1:— for CP 6/1, CP 6/2, CP 6/3, see IEC 61784-2:— for CP 6/4, CP 6/5, CP 6/6, see IEC 61784-3-6 for FSCP 6/7).

The CPF 6 Type 8 network (non-Ethernet-based) installation profile is specified in Annex A.

¹ INTERBUS is a trade name of INTERBUS Club, an independent organisation of users and vendors of INTERBUS products. This information is given for the convenience of users of this document 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 INTERBUS. Use of the trade name INTERBUS requires permission of the trade name holder.