IEC 61784-5-19

Edition 2.0 2024-04
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Industrial ~~communication~~ networks – Profiles – Part 5-19: Installation of fieldbuses – Installation profiles for CPF 19

IEC 61784-5-19:2024-04 RLV(en)

Documents
Document Sharing Hub

Full document details: IEC 61784-5-19 2024 RLV

THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2024 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 Secretariat
3, rue de Varembé
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 corrigendum or an amendment might have been published.

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 It also gives information on projects, replaced and withdrawn publications.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 once a month by email.

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.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

Documents
Document Sharing Hub

Full document details: IEC 61784-5-19 2024 RLV

IEC 61784-5-19

Edition 2.0 2024-04
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Industrial ~~communication~~ networks – Profiles –
Part 5-19: Installation of fieldbuses – Installation profiles for CPF 19

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 25.040.40; 35.100.40

ISBN 978-2-8322-8697-5

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

® Registered trademark of the International Electrotechnical Commission

Documents
Document Sharing Hub

Full document details: IEC 61784-5-19 2024 RLV

CONTENTS

FOREWORD 7
INTRODUCTION 2
1 Scope 11
2 Normative references 11
3 Terms, definitions and abbreviated terms 11
4 CPF19: Overview of installation profiles 12
5 Installation profile conventions 12
6 Conformance to installation profiles 13
Annex A (normative) CP 19/1 (MECHATROLINK™-II) specific installation profile 14
A.1 Installation profile scope 14
A.2 Normative references 14
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 14
A.4 Installation planning 15
A.4.1 General 15
A.4.2 Planning requirements 15
A.4.3 Network capabilities 15
A.4.4 Selection and use of cabling components 17
4.4.3.3.1 Common description 22
A.4.5 Cabling planning documentation 25
A.4.6 Verification of cabling planning specification 25
A.5 Installation implementation 25
A.5.1 General requirements 25
A.5.2 Cable installation 25
A.5.3 Connector installation 27
A.5.4 Terminator installation 28
A.5.5 Device installation 28
A.5.6 Coding and labelling 28
A.5.7 Earthing and bonding of equipment and devices and shield cabling 28
A.5.8 As-implemented cabling documentation 28
A.6 Installation verification and installation acceptance test 29
A.6.1 General 29
A.6.2 Installation verification 29
A.6.3 Installation acceptance test 30
A.7 Installation administration 30
A.8 Installation maintenance and installation troubleshooting 31
A.8.1 General 31
A.8.2 Maintenance 31
A.8.3 Troubleshooting 31
A.8.4 Specific requirements for maintenance and troubleshooting 31
Annex B (normative) CP 19/2 (MECHATROLINK™-III) specific installation profile 33
B.1 Installation profile scope 33
B.2 Normative references 33
B.3 Installation profile terms, definitions, and abbreviated terms 33

AVA Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

B.3.1 Terms and definitions 33
B.3.2 Abbreviated terms 33
B.3.3 Conventions for installation profiles 33
B.4 Installation planning 33
B.4.1 General 33
B.4.2 Planning requirements 33
B.4.3 Network capabilities 34
B.4.4 Selection and use of cabling components 35
B.4.5 Cabling planning documentation 41
B.4.6 Verification of cabling planning specification 42
B.5 Installation implementation 42
B.5.1 General requirements 42
B.5.2 Cable installation 42
B.5.3 Connector installation 43
B.5.4 Terminator installation 44
B.5.5 Device installation 44
B.5.6 Coding and labelling 44
B.5.7 Earthing and bonding of equipment and devices and shield cabling 44
B.5.8 As-implemented cabling documentation 44
B.6 Installation verification and installation acceptance test 44
B.6.1 General 44
B.6.2 Installation verification 44
B.6.3 Installation acceptance test 45
B.7 Installation administration 46
B.8 Installation maintenance and installation troubleshooting 46
Annex C (normative) CP19/3 (Σ-LINK™ II) specific installation profile 47
C.1 Installation profile scope 47
C.2 Normative references 47
C.3 Installation profile terms, definitions, and abbreviated terms 47
C.3.1 Terms and definitions 47
C.3.2 Abbreviated terms 47
C.3.3 Conventions for installation profiles 47
C.4 Installation planning 47
C.4.1 General 47
C.4.2 Planning requirements 47
C.4.3 Network capabilities 48
C.4.4 Selection and use of cabling components 49
C.4.5 Cabling planning documentation 61
C.4.6 Verification of cabling planning specification 61
C.5 Installation implementation 61
C.5.1 General requirements 61
C.5.2 Cable installation 62
C.5.3 Connector installation 63
C.5.4 Terminator installation 64
C.5.5 Device installation 64
C.5.6 Coding and labelling 64
C.5.7 Earthing and bonding of equipment and devices and shield cabling 64
C.5.8 As-implemented cabling documentation 64
C.6 Installation verification and installation acceptance test 64

AVA Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

C.6.1 General 64
C.6.2 Installation verification 64
C.6.3 Installation acceptance test 65
C.7 Installation administration 66
C.8 Installation maintenance and installation troubleshooting 66
Annex D (normative) CP 19/4 (MECHATROLINK™-4) specific installation profile 67
D.1 Installation profile scope 67
D.2 Normative references 67
D.3 Installation profile terms, definitions, and abbreviated terms 67
D.3.1 Terms and definitions 67
D.3.2 Abbreviated terms 67
D.3.3 Conventions for installation profiles 67
D.4 Installation planning 67
D.4.1 General 67
D.4.2 Planning requirements 67
D.4.3 Network capabilities 68
D.4.4 Selection and use of cabling components 69
D.4.5 Cabling planning documentation 75
D.4.6 Verification of cabling planning specification 75
D.5 Installation implementation 75
D.5.1 General requirements 75
D.5.2 Cable installation 75
D.5.3 Connector installation 77
D.5.4 Terminator installation 78
D.5.5 Device installation 78
D.5.6 Coding and labelling 78
D.5.7 Earthing and bonding of equipment and devices and shield cabling 78
D.5.8 As-implemented cabling documentation 78
D.6 Installation verification and installation acceptance test 78
D.6.1 General 78
D.6.2 Installation verification 78
D.6.3 Installation acceptance test 79
D.7 Installation administration 80
D.8 Installation maintenance and installation troubleshooting 80
Bibliography 81

Figure 1 – Standards relationships 10
Figure A.1 – Topology of CP 19/1 network 16
Figure A.2 – Network expansion using repeater 16
Figure A.3 – Structure of cable 19
Figure A.4 – Dimensions of single port device connector 20
Figure A.5 – Dimensions of dual ports device connector 21
Figure A.6 – Dimensions of cable connector 21
Figure A.7 – Cable connector with inductors 22
Figure A.8 – Terminator connection in cable connector housing 23
Figure A.9 – Wiring example 27
Figure A.10 – Terminator installed in M-II cable connector 28

AVA Documents
Document Sharing Hub

Full document details: IEC 61784-5-19 2024 RLV

Figure A.11 – Division of network segment by changing terminator location 32
~~Figure B.1 – Dimensions of IMI device connector .....~~
~~Figure B.2 – Dimensions of IMI cable connector .....~~
Figure C.1 – Topology of CP 19/3 combination of linear and T-branch network 48
Figure C.2 – Topology of CP 19/3 network example with Power adaptor 49
Figure C.3 – Structure of 6-conductor cable 52
Figure C.4 – Structure of 8-conductor cable 52
Figure C.5 – Connection for linear network 53
Figure C.6 – Dimensions of device 6 pin connector 54
Figure C.7 – Dimensions of device 6 pin connector 54
Figure C.8 – Dimensions of device 6 pin connector 55
Figure C.9 – Dimensions of device 8 pin male connector 55
Figure C.10 – Dimensions of ejector for device 8 pin male connector 56
Figure C.11 – Dimensions of device 8 pin female connector 56
Figure C.12 – Dimensions of cable 6 pin male connector 57
Figure C.13 – Dimensions of cable 6 pin female connector 57
Figure C.14 – Dimensions of cable 8 pin male connector 57
Figure C.15 – Dimensions of cable 8 pin female connector 58

Table A.1 – Basic network characteristics for balanced cabling not based on Ethernet 17
Table A.2 – Number of devices and maximum segment length 17
Table A.3 – Information relevant to copper cable: fixed cables 18
Table A.4 – Additional cable specifications 18
Table A.5 – Connectors for copper cabling CPs not based on Ethernet 19
Table A.6 – Parameters for balanced cables 26
Table A.7 – Pin assignment and wire colour coding for CP 19/1 connector 27
Table A.8 – Typical problems in a network with balanced cabling 31
Table B.1 – Network characteristics for balanced cabling based on Ethernet 35
Table B.2 – Information relevant to copper cable: fixed cables 36
Table B.3 – Information relevant to copper cable: cords 36
Table B.4 – Connectors for balanced cabling CPs based on Ethernet 37
Table B.5 – Parameters for balanced cables 42
Table B.6 – Pin assignment and wire colour coding for CP 19/2 modular and IMI connector 43
Table B.7 – Pin assignment and wire colour coding for CP 19/2 M12 connector 44
Table C.1 – Basic network characteristics for balanced cabling not based on Ethernet 49
Table C.2 – Information relevant to 6-conductor copper cable 50
Table C.3 – Information relevant to 8-conductor copper cable 51
Table C.4 – Additional cable specifications 51
Table C.5 – Connectors for copper cabling CPs not based on Ethernet 53
Table C.6 – Electric characteristics of 6pin connector 58
Table C.7 – Electric characteristics of 8pin connector 58
Table C.8 – Parameters for balanced cables 62

AVA Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

Table C.9 – Pin assignment and wire colour coding for CP 19/3 6 pin connector 63
Table C.10 – Pin assignment and wire colour coding for CP 19/3 8 pin connector 63
Table D.1 – Network characteristics for balanced cabling based on Ethernet 69
Table D.2 – Information relevant to copper cable: CP 19/4 type A fixed cables 70
Table D.3 – Information relevant to copper cable: CP 19/4 type B fixed cables 70
Table D.4 – Information relevant to copper cable: CP 19/4 type A fixed cords 71
Table D.5 – Information relevant to copper cable: CP 19/4 type B fixed cords 71
Table D.6 – Connectors for balanced cabling CPs based on Ethernet 72
Table D.7 – Parameters for balanced cables 76
Table D.8 – Pin assignment and wire colour coding for CP 19/4 modular and IMI connector 77
Table D.9 – Pin assignment and wire colour coding for CP 19/4 M12-4 connector 77
Table D.10 – Pin assignment and wire colour coding for CP 19/4 M12-8 connector 77

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

INDUSTRIAL ~~COMMUNICATION~~ NETWORKS – PROFILES –

Part 5-19: Installation of fieldbuses – Installation profiles for CPF 19

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) IEC draws attention to the possibility that the implementation of this document may involve the use of a patent. IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of a patent, which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 61784-5-19:2013. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

IEC 61784-5-19 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation. It is an International Standard.

This document is to be used in conjunction with IEC 61918:2018, IEC 61918:2018/AMD1:2022 and IEC 61918:2018/AMD2:2024.

This second edition cancels and replaces the first 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) addition of new installation profiles CP19/3 and CP19/4 in Clause 4;
b) In Annex B, Table B.4 has been changed and Figure B.1 and Figure B.2 have been deleted;
c) Annex C is new installation profiles for CP19/3 and related references have been added;
d) Annex D is new installation profiles for CP19/4 and related references have been added.

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

Draft	Report on voting
65C/1281/FDIS	65C/1296/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts of IEC 61784-5 series, published under the general title *Industrial 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 website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document 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.

Documents
Document Sharing Hub

Full document details: IEC 61784-5-19 2024 RLV

INTRODUCTION

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

IEC 61918:~~2013~~2018 and IEC 61918:2018/AMD1:2022 and IEC 61918/AMD2:2024 provide the common requirements for the installation of communication networks in industrial control systems. This installation profile standard 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 standard 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 standard for each CPF (for example IEC 61784-5-19 for CPF 19) allows readers to work with standards of a convenient size.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

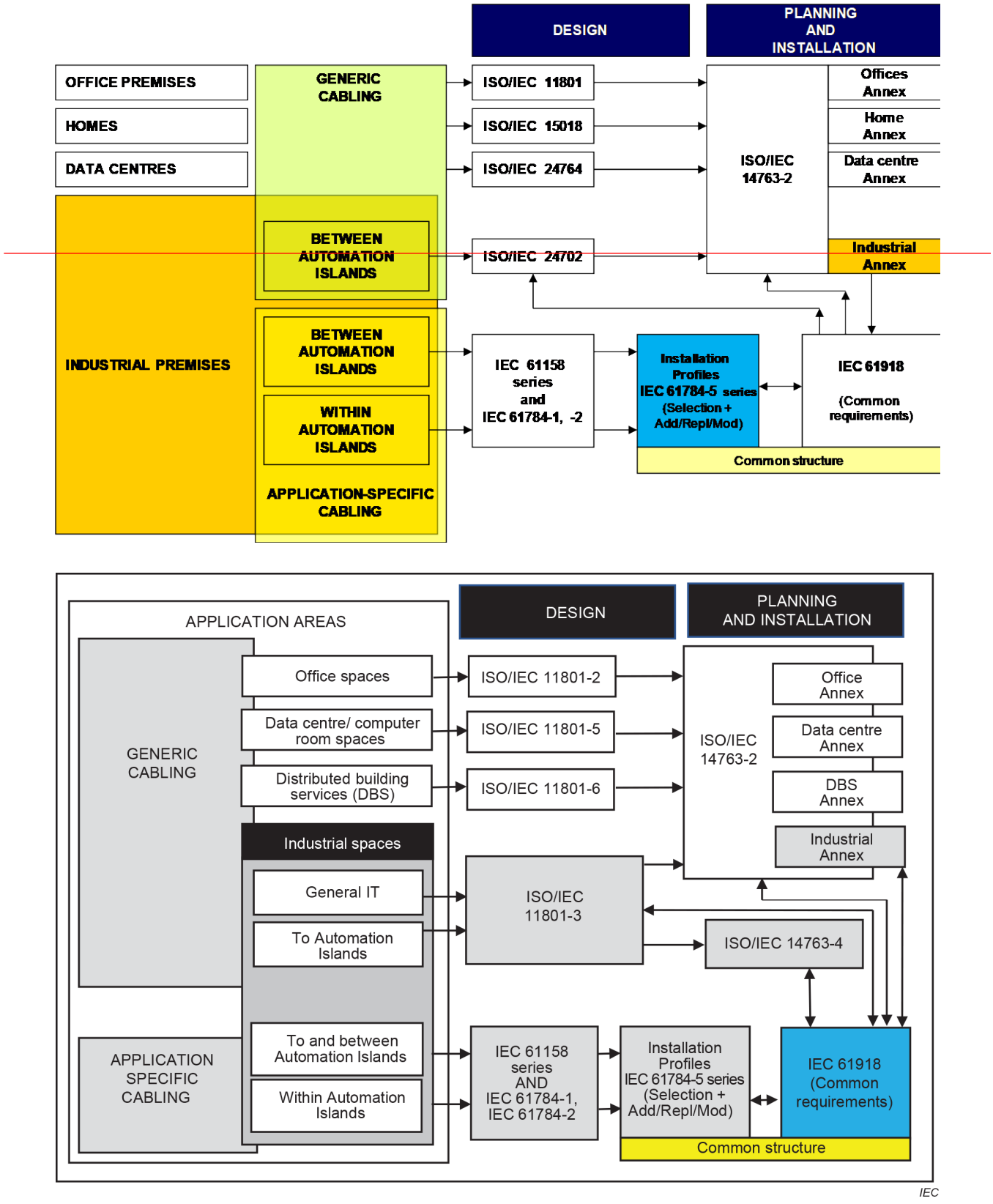

Figure 1 – Standards relationships

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

INDUSTRIAL ~~COMMUNICATION~~ NETWORKS – PROFILES –

Part 5-19: Installation of fieldbuses – Installation profiles for CPF 19

1 Scope

This part of IEC 61784-5 specifies the installation profile for CPF 19 (MECHATROLINK™[1]).

The installation profiles are specified in the annexes. These annexes are read in conjunction with IEC 61918:~~2013~~2018, IEC 61918:2018/AMD1:2022 and IEC 61918:2018/AMD2:2024.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 61918:~~2013~~2018[2], *Industrial communication networks – Installation of communication networks in industrial premises*
IEC 61918:2018/AMD1:2022
IEC 61918:2018/AMD2:2024

~~The normative references of IEC 61918:2013, Clause 2, apply. For profile specific normative references, see Clause A.2.~~

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

3 Terms, definitions and abbreviated terms

~~For the purposes of this document, the terms, definitions and abbreviated terms given in IEC 61918:2013, Clause 3, apply. For profile specific terms, definitions and abbreviated terms see Clauses A.3 and B.3.~~

For the purposes of this document, the terms, definitions and abbreviated terms given in IEC 61918:2018, Clause 3, IEC 61918:2018/AMD1:2022, Clause 3 and Clauses A.3, B.3, C.3, and D.3,apply.

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

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

---

1 MECHATROLINK™ and Σ-LINK™ II are trade names of YASKAWA ELECTRIC CORPORATION. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the trade names holder or any of its products. Compliance to this profile does not require use of the trade names. Use of the trade name ~~MECHATROLINK~~ requires permission of the trade name holder.

2 The normative references of IEC 61918:2018, Clause 2, IEC 61918:2018/AMD1:2022, Clause 2, and IEC 61918:2018/AMD2:2024, Clause 2, apply.

AVA Documents Document Sharing Hub

Full document details: IEC 61784-5-19 2024 RLV

4 CPF19: Overview of installation profiles

CPF 19 consists of ~~two~~ four communication profiles as specified in IEC 61784-1 and IEC 61784-2.

The installation requirements for CP 19/1 (MECHATROLINK™-II) are specified in Annex A.

The installation requirements for CP 19/2 (MECHATROLINK™-III) are specified in Annex B.

The installation requirements for CP 19/3 (∑-LINK™ II) are specified in Annex C.

The installation requirements for CP 19/4 (MECHATROLINK™-4) are specified in Annex D.

5 Installation profile conventions

The numbering of the clauses and subclauses in the annexes of this document corresponds to the numbering of IEC 61918 main clauses and subclauses.

The annex clauses and subclauses of this document supplement, modify, or replace the respective clauses and subclauses in IEC 61918.

Where there is no corresponding subclause of IEC 61918 in the normative annexes in this document, the subclause of IEC 61918 applies without modification.

The annex heading letter represents the installation profile assigned in Clause 4. The annex heading number shall represent the corresponding numbering of IEC 61918.

EXAMPLE "Subclause B.4.4" in IEC 61784-5-19 means that CP 19/2 specifies 4.4 of IEC 61918:2018 and IEC 61918:2018/AMD1:2022.

All main clauses of IEC 61918 are cited and apply in full unless otherwise stated in each normative installation profile annex.

If all subclauses of a (sub)clause are omitted, then the corresponding IEC 61918 (sub)clause applies.

If in a (sub)clause it is written "Not applicable.", then the corresponding IEC 61918 (sub)clause does not apply.

If in a (sub)clause it is written *"Addition:"*, then the corresponding IEC 61918 (sub)clause applies with the additions written in the profile.

If in a (sub)clause it is written *"Replacement:"*, then the text provided in the profile replaces the text of the corresponding IEC 61918 (sub)clause.

NOTE A replacement can also comprise additions.

If in a (sub)clause it is written *"Modification:"*, then the corresponding IEC 61918 (sub)clause applies with the modifications written in the profile.

If all (sub)clauses of a (sub)clause are omitted but in this (sub)clause it is written *"(Sub)clause x has addition:"* (or *"Replacement:"*) or "(Sub)clause x is not applicable.", then (sub)clause x becomes valid as declared and all the other corresponding IEC 61918 (sub)clauses apply.

AVA Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

6 Conformance to installation profiles

Each installation profile within this document includes parts of IEC 61918:~~2013~~2018 and IEC 61918:2018/AMD1:2022. It ~~may~~ can also include defined additional specifications.

A statement of compliance to an installation profile of this document shall be stated[3] as either

Compliance ~~to~~ with IEC 61784-5-19:~~2013~~ [4]2024 for CP 19/~~n~~m <name> or

Compliance ~~to~~ with IEC 61784-5-19 (Ed.~~1~~2.0) for CP 19/~~n~~m <name>

where the name within the angle brackets < > is optional and the angle brackets ~~are~~ shall not ~~to~~ be included. The ~~n~~ m within CP 19/~~n~~m shall be replaced by the profile number 1 to ~~2~~4.

NOTE The name can be the name of the profile, for example MECHATROLINK-II, MECHATROLINK-III, Σ-LINK II or MECHATROLINK-~~III~~4.

If the name is a trade name, then the permission of the trade name holder shall be required.

Product standards shall not include any conformity assessment aspects (including quality management provisions), neither normative nor informative, other than provisions for product testing (evaluation and examination).

~~3 In accordance with ISO/IEC Directives.~~

~~4 The date should not be used when the edition number is used.~~

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

Annex A
(normative)

CP 19/1 (MECHATROLINK™-II) specific installation profile

A.1 Installation profile scope

Addition:

This annex specifies the installation profile for Communication Profile CP 19/1 (MECHATROLINK™-II). The CP 19/1 is specified in IEC 61784-1.

A.2 Normative references

Addition:

~~ANSI~~ TIA~~/EIA~~-485-A, *Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems*

A.3 Installation profile terms, definitions, and abbreviated terms

A.3.1 Terms and definitions

Addition:

A.3.1.~~79~~93
C1 master
master device which initiates cyclic data transfer with slave devices

A.3.1.~~80~~94
C2 master
master device which initiates message data exchange with other devices

A.3.1.~~81~~95
master
device that controls the data transfer on the CP 19/1 network and initiates the media access of the slaves by sending messages and that constitutes the interface to the control system

A.3.1.~~82~~96
slave
device that accesses the medium only after it has been initiated by the preceding master

A.3.2 Abbreviated terms

Addition:

M-II	MECHATROLINK™-II
USB	Universal Serial Bus

A.3.3 Conventions for installation profiles

Not applicable.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

A.4 Installation planning

A.4.1 General

Subclause 4.1.4 is not applicable.

A.4.2 Planning requirements

A.4.2.1 Safety

A.4.2.1.1 General

A.4.2.1.2 Electric safety

A.4.2.1.3 Functional safety

Not applicable.

A.4.2.1.4 Intrinsic safety

Not applicable.

A.4.2.1.5 Safety of optical fibre communication systems

Not applicable.

A.4.2.2 Security

A.4.2.3 Environmental considerations and EMC

A.4.2.3.1 Description methodology

A.4.2.3.2 Use of the described environment to produce a bill of material

A.4.2.4 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

A.4.3 Network capabilities

A.4.3.1 Network topology

A.4.3.1.1 Common description

A.4.3.1.2 Basic physical topologies for passive networks

~~*Modification*~~*Addition:*

CP 19/1 network supports only passive bus topology.

A.4.3.1.3 Basic physical topologies for active networks

Not applicable.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

A.4.3.1.4 Combination of basic topologies

A.4.3.1.5 Specific requirements for CPs

Addition:

CP 19/1 supports passive bus topology by daisy chain connection of devices. Passive star topology is not supported and spurs shall not be used. Figure A.1 shows the CP 19/1 passive bus network.

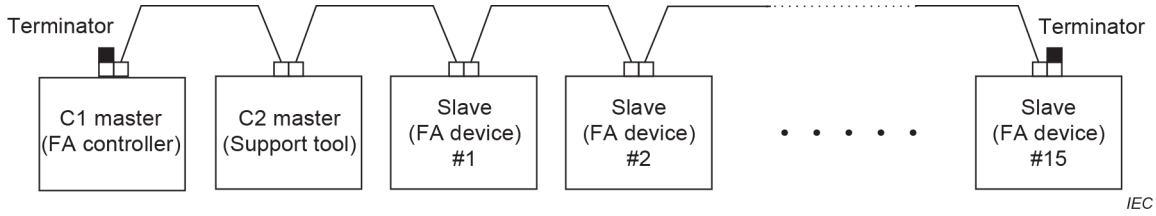

Figure A.1 – Topology of CP 19/1 network

CP 19/1 supports interconnection of two passive bus segments by an active bus repeater. Only one repeater is allowed as shown in Figure A.2.

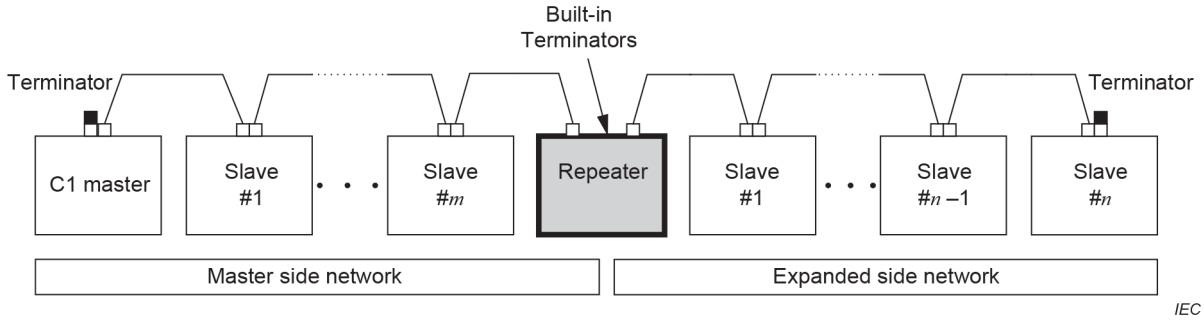

Figure A.2 – Network expansion using repeater

A.4.3.1.6 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

A.4.3.2 Network characteristics

A.4.3.2.1 General

A.4.3.2.2 Network characteristics for balanced cabling not based on Ethernet

Replacement:

Table A.1 provides values based on the template given in IEC 61918:~~2013~~2018, Table 1.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

Table A.1 – Basic network characteristics for balanced cabling not based on Ethernet

Characteristic	CP 19/1 (MECHATROLINK™-II)
Basic transmission technology	~~ANSI~~ TIA~~/EIA~~-485-A Linear bus
Length/transmission speed	Segment length m
10 Mbit/s	50 (less than 17 devices) 30 (17 devices)
Maximum capacity	Max. no.
Devices/segment	17
Devices/network	32

A.4.3.2.3 Network characteristics for balanced cabling based on Ethernet

Not applicable.

A.4.3.2.4 Network characteristics for optical fibre cabling

Not applicable.

A.4.3.2.5 Specific network characteristics

Addition:

The relationship between the number of devices and the maximum segment length is shown in Table A.2 for the topology without repeater shown in Figure A.1. When two network segments are combined using a repeater as shown in Figure A.2, the repeater should be counted as a device on each segment and the number of devices available decreases by one from the value shown in Table A.2. Thus the maximum number of devices per network, which has two segments expanded by a repeater, becomes 32 (17+17-2).

Table A.2 – Number of devices and maximum segment length

Number of devices	Max. segment length
16 or less	50 m
17	30 m
18 or more	Not allowed

Also CP 19/1 has the minimum cable length restriction. The cable between devices shall be at least 0,5 m.

A.4.3.2.6 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

A.4.4 Selection and use of cabling components

A.4.4.1 Cable selection

A.4.4.1.1 Common description

A.4.4.1.2 Copper cables

A.4.4.1.2.1 Balanced cables for Ethernet-based CPs

Not applicable.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

A.4.4.1.2.2 Copper cables for non-Ethernet-based CPs

Replacement:

Table A.3 provides values based on the template given in IEC 61918:~~2013~~2018, Table ~~5~~4.

Table A.3 – Information relevant to copper cable: fixed cables

Characteristic	CP 19/1 (MECHATROLINK™-II)
Nominal impedance of cable (tolerance)	~~130 Ω (±10 %)~~ (130 ± 13) Ω
DCR of conductors	< 120 Ω/km
DCR of shield	–
Number of conductors	2 (twisted pair)
Shielding	Yes
Colour code for conductor	BK, RD
Jacket colour requirements	–
Jacket material	–
Resistance to harsh environment (e.g. UV, oil resist, LS0H)	–
Agency ratings	–
Conductor cross-sectional area	≥ 0,16 mm^2 (AWG25)
Capacitance	< 120 nF/km

Addition:

The additional CP 19/1 cable specifications are shown in Table A.4. Figure A.3 shows the structure of CP 19/1 cable.

Table A.4 – Additional cable specifications

Characteristic	Constraints
Overall diameter	(4,8 ± 0,2) mm
Conductor	Tinned annealed copper
Withstand voltage	AC 1 000 V, 1 min
Insulation resistance	≥ 100 MΩ/km
Attenuation	40 dB/km (at 4 MHz) 60 dB/km (at 10 MHz)

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

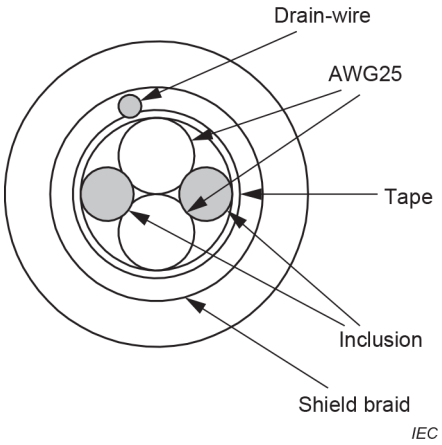

Figure A.3 – Structure of cable

A.4.4.1.3 Cables for wireless installation

Not applicable.

A.4.4.1.4 Optical fibre cables

Not applicable.

A.4.4.1.5 Special purpose balanced and optical fibre cables

A.4.4.1.6 Specific requirements for CPs

Not applicable.

A.4.4.1.7 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

A.4.4.2 Connecting hardware selection

A.4.4.2.1 Common description

A.4.4.2.2 Connecting hardware for balanced cabling CPs based on Ethernet

Not applicable.

A.4.4.2.3 Connecting hardware for copper cabling CPs not based on Ethernet

Replacement:

Table A.5 provides values based on the template given in IEC 61918:~~2013~~2018, Table 8.

Table A.5 – Connectors for copper cabling CPs not based on Ethernet

	IEC 60807-2 or IEC 60807-3	IEC 61076-2-101			IEC 61169-8	ANSI/(NFPA) T3.5.29 R1-2007		Others			
	Sub-D	M12-5 with A-coding	M12-5 with B-coding	M12-n with X-coding	Coaxial (BNC)	M 18	7/8-16 UN-2B THD	Open style	Terminal block	M-II[a]	Others
CP 19/1	No	No	No	No	No	No	No	No	No	Yes	No
NOTE For M12-5 connectors, there are many applications using these connectors that are not compatible and when mixed can cause damage to the applications.											
[a] M-II (MECHATROLINK™-II) connector is specified in the following paragraph.											

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

Addition:

For CP 19/1 network, the CP 19/1 specific connector called M-II (MECHATROLINK™-II) connector shall be used. Figure A.4 and Figure A.5 show the dimensions of the M-II device connectors (receptacles) with single port and dual ports respectively. Figure A.6 shows the dimensions of the M-II cable connector (plug). M-II connector is compatible with the USB series "A" connector specified in Universal Serial Bus Specification Revision 2.0[3] except it has the CP 19/1 specific latching mechanism.

Dimensions in millimetres

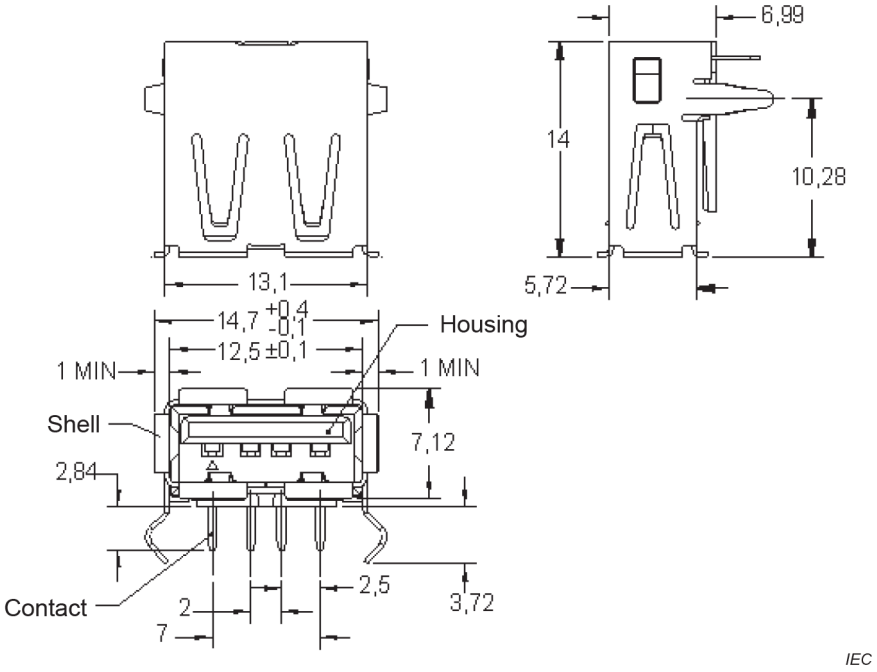

Figure A.4 – Dimensions of single port device connector

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

Dimensions in millimetres

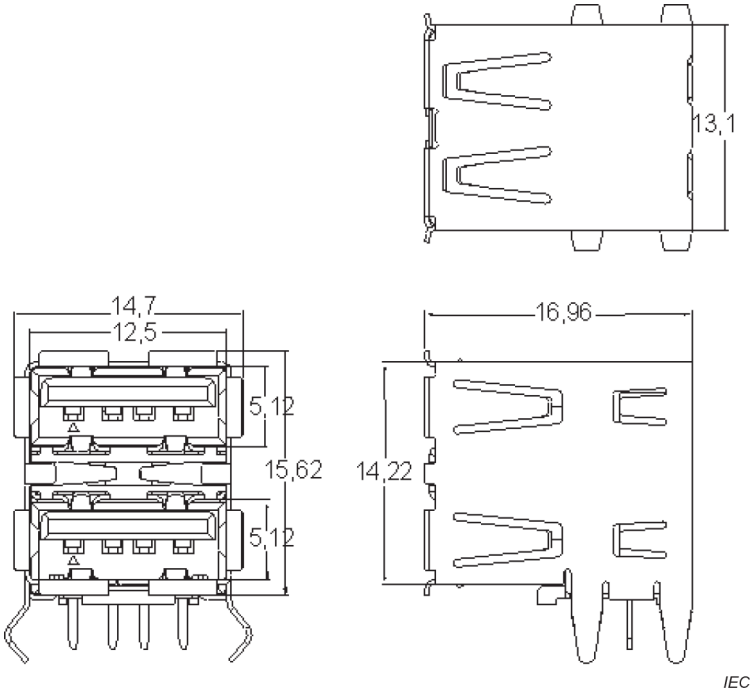

Figure A.5 – Dimensions of dual ports device connector

Dimensions in millimetres

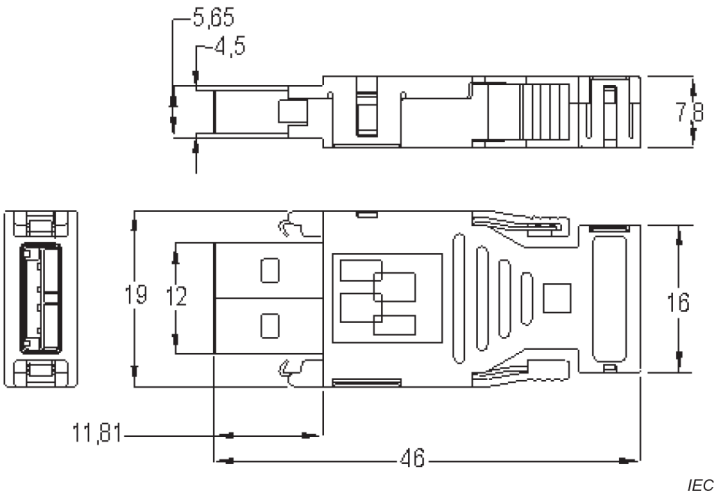

Figure A.6 – Dimensions of cable connector

The M-II cable connector has built-in inductors in a connector housing for impedance matching between the line transceiver of a device and the transmission cable as shown in Figure A.7. Therefore the M-II cable connector can be used only for the connection between CP 19/1 device and cable. It shall not be used for connections or splices within a channel.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

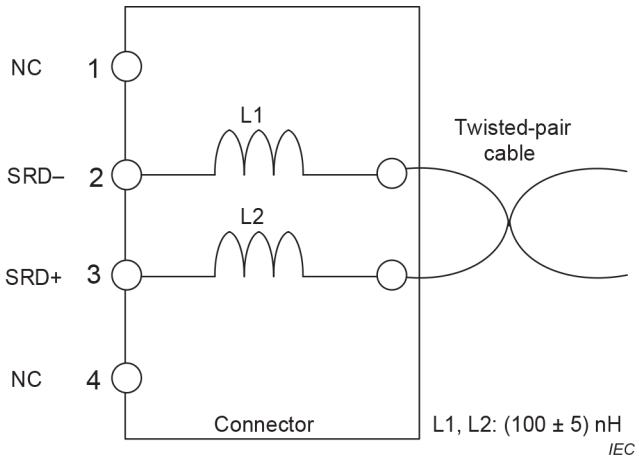

Figure A.7 – Cable connector with inductors

A.4.4.2.4 Connecting hardware for wireless installation

Not applicable.

A.4.4.2.5 Connecting hardware for optical fibre cabling

Not applicable.

A.4.4.2.6 Specific requirements for CPs

Not applicable.

A.4.4.2.7 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~11801-3

A.4.4.3 Connections within a channel/permanent link

A.4.4.3.1 Common description

A.4.4.3.2 Balanced cabling connections and splices for CPs based on Ethernet

Not applicable.

A.4.4.3.3 Copper cabling connections and splices for CPs not based on Ethernet

4.4.3.3.1 Common description

Addition:

For the CP 19/1 network any connection or splice in a channel using CP 19/1 connectors is not allowed. Also the allowed connector type and number of connections are not defined.

A.4.4.3.4 Optical fibre cabling connections and splices for CPs based on Ethernet

Not applicable.

A.4.4.3.5 Optical fibre cabling connections and splices for CPs not based on Ethernet

Not applicable.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

A.4.4.3.6 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

A.4.4.4 Terminators

A.4.4.4.1 Common description

A.4.4.4.2 Specific requirements for CPs

Addition:

The terminator resistance value shall be (130 ± 6,5) Ω (min. 1/2 W). Terminators are usually installed on CP 19/1 cable connector housing and connected to the device located at the end of the network segment. Figure A.8 shows the terminator connection in the CP 19/1 cable connector housing.

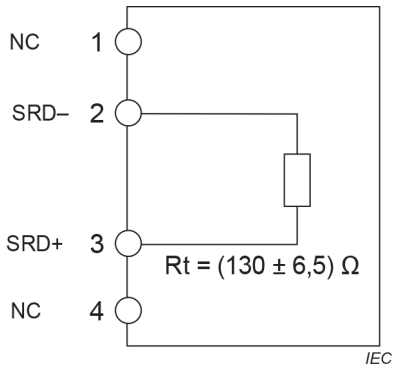

Figure A.8 – Terminator connection in cable connector housing

The network device ~~may~~ can have a built-in terminator and such a device shall be installed at the end of a network segment.

A.4.4.4.3 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

A.4.4.5 Device location and connection

A.4.4.5.1 Common description

A.4.4.5.2 Specific requirements for CPs

Not applicable.

A.4.4.5.3 Specific requirements for wireless installation

Not applicable.

A.4.4.5.4 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

A.4.4.6 Coding and labelling

A.4.4.6.1 Common description

A.4.4.6.2 Additional requirements for CPs

Not applicable.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

A.4.4.6.3 Specific requirements for CPs

Not applicable.

A.4.4.6.4 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

A.4.4.7 Earthing and bonding of equipment and devices and shielded cabling

A.4.4.7.1 Common description

A.4.4.7.2 Bonding and earthing of enclosures and pathways

A.4.4.7.3 Earthing methods

A.4.4.7.4 Shield earthing

Not applicable.

A.4.4.7.4.1 Non-earthing or parallel RC

Not applicable.

A.4.4.7.4.2 Direct

~~Not applicable.~~

Addition:

CP 19/1 requires direct shield earthing. The communication shield of a CP 19/1 device is normally directly connected to the device's protective earth through the connector shield. If the CP 19/1 specific connector is used, no additional shield earthing is needed.

A.4.4.7.5 Specific requirements for CPs

Not applicable.

A.4.4.7.6 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

A.4.4.8 Storage and transportation of cables

A.4.4.8.1 Common description

A.4.4.8.2 Specific requirements for CPs

Not applicable.

A.4.4.8.3 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

A.4.4.9 Routing of cables

A.4.4.9.1 Common description

A.4.4.9.2 Cable routing of assemblies

A.4.4.9.3 ~~Detailed~~ Requirements for cable routing inside enclosures

A.4.4.9.4 Cable routing inside buildings

A.4.4.9.5 Cable routing outside and between buildings

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

A.4.4.9.6 Installing redundant communication cables

Not applicable.

A.4.4.10 Separation of circuits

A.4.4.11 Mechanical protection of cabling components

A.4.4.11.1 Common description

A.4.4.11.2 Specific requirements for CPs

Not applicable.

A.4.4.11.3 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

A.4.4.12 Installation in special areas

A.4.4.12.1 Common description

A.4.4.12.2 Specific requirements for CPs

Not applicable.

A.4.4.12.3 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

A.4.5 Cabling planning documentation

A.4.5.1 Common description

A.4.5.2 Cabling planning documentation for CPs

A.4.5.3 Network certification documentation

A.4.5.4 Cabling planning documentation for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

A.4.6 Verification of cabling planning specification

A.5 Installation implementation

A.5.1 General requirements

A.5.1.1 Common description

A.5.1.2 Installation of CPs

A.5.1.3 Installation of generic cabling in industrial premises

A.5.2 Cable installation

A.5.2.1 General requirements for all cabling types

A.5.2.1.1 Storage and installation

A.5.2.1.2 Protecting communication cables against potential mechanical damage

Replacement:

Table A.6 provides values based on the template given in IEC 61918:~~2013~~2018, Table 18.

AVA Documents Document Sharing Hub

Full document details: IEC 61784-5-19 2024 RLV

Table A.6 – Parameters for balanced cables

Characteristic		Value
Mechanical force	Minimum bending radius, single bending (mm)	20
	Bending radius, multiple bending (mm)	– [a]
	Pull forces (N)	24
	Permanent tensile forces (N)	13
	Maximum lateral forces (N/cm)	– [a]
	Temperature range during installation (°C)	0 to 80
[a] Depending on cable type: see manufacturer's data sheet.		

A.5.2.1.3 Avoid forming loops

A.5.2.1.4 Torsion (twisting)

A.5.2.1.5 Tensile strength (on installed cables)

A.5.2.1.6 Bending radius

A.5.2.1.7 Pull force

A.5.2.1.8 Fitting strain relief

A.5.2.1.9 Installing cables in cabinet and enclosures

A.5.2.1.10 Installation on moving parts

A.5.2.1.11 Cable crush

A.5.2.1.12 Installation of continuous flexing cables

A.5.2.1.13 Additional instructions for the installation of optical fibre cables

Not applicable.

A.5.2.2 Installation and routing

A.5.2.2.1 Common description

A.5.2.2.2 Separation of circuits

A.5.2.3 Specific requirements for CPs

Not applicable.

A.5.2.4 Specific requirements for wireless installation

Not applicable.

A.5.2.5 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

A.5.3 Connector installation

A.5.3.1 Common description

A.5.3.2 Shielded connectors

A.5.3.3 Unshielded connectors

Not applicable.

A.5.3.4 Specific requirements for CPs

Addition:

Figure A.9 shows an example of wiring. See the manufacturer's data sheet for the assembly instructions of the M-II connector housing.

Both ends of the network shall have a terminator installed to reduce signal reflection. If one of the end devices (C1 master in this example) has a built-in terminator, only the other end of the network shall have a terminator as described in Figure A.9.

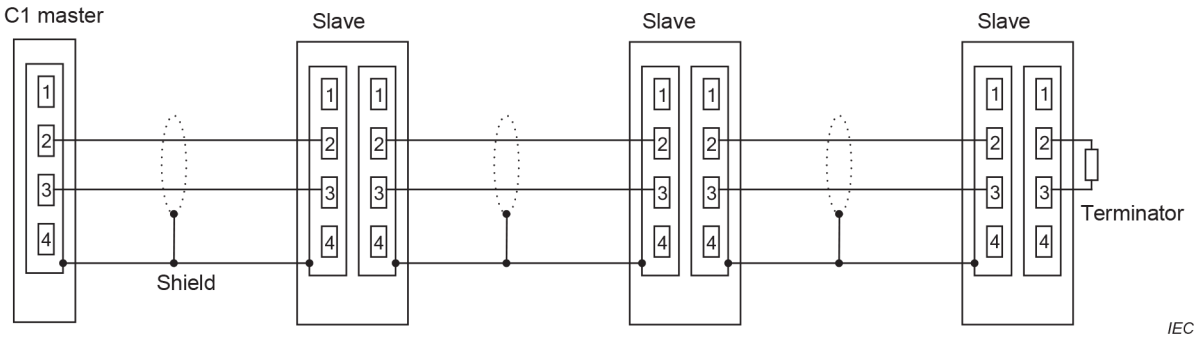

Figure A.9 – Wiring example

Table A.7 shows the pin assignment and wire colour coding for the CP 19/1 connector.

Table A.7 – Pin assignment and wire colour coding for CP 19/1 connector

Pin assignment	Signal	Function	Colour code
1	NC	Not connected	–
2	SRD-	Send/Receive data-	BK
3	SRD+	Send/Receive data+	RD
4	NC	Not connected	–
Shield braid	SH	Shield	–

A.5.3.5 Specific requirements for wireless installation

Not applicable.

A.5.3.6 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

A.5.4 Terminator installation

A.5.4.1 Common description

A.5.4.2 Specific requirements for CPs

Addition:

Both ends of a network segment shall be terminated with a CP 19/1 specific terminator. Some device ~~may~~ can have a built-in terminator inside it. Care shall be taken that only terminators at both ends of the network segment are activated. The terminating resister is usually installed on an M-II connector without cable as shown Figure A.10. For detail of assembly, see manufacturer's data sheet.

Figure A.10 – Terminator installed in M-II cable connector

A.5.5 Device installation

A.5.5.1 Common description

A.5.5.2 Specific requirements for CPs

Not applicable.

A.5.6 Coding and labelling

A.5.6.1 Common description

A.5.6.2 Specific requirements for CPs

Not applicable.

A.5.7 Earthing and bonding of equipment and devices and shield cabling

Subclause 5.7.5 is not applicable.

A.5.8 As-implemented cabling documentation

AVA Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

A.6 Installation verification and installation acceptance test

A.6.1 General

A.6.2 Installation verification

A.6.2.1 General

A.6.2.2 Verification according to cabling planning documentation

A.6.2.3 Verification of earthing and bonding

A.6.2.3.1 General

A.6.2.3.2 Specific requirements for earthing and bonding

Not applicable.

A.6.2.4 Verification of shield earthing

A.6.2.5 Verification of cabling system

A.6.2.5.1 Verification of cable routing

A.6.2.5.2 Verification of cable protection and proper strain relief

A.6.2.6 Cable selection verification

A.6.2.6.1 Common description

A.6.2.6.2 Specific requirements for CPs

Not applicable.

A.6.2.6.3 Specific requirements for wireless installation

Not applicable.

A.6.2.7 Connector verification

A.6.2.7.1 Common description

A.6.2.7.2 Specific requirements for CPs

Not applicable.

A.6.2.7.3 Specific requirements for wireless installation

Not applicable.

A.6.2.8 Connection verification

A.6.2.8.1 Common description

A.6.2.8.2 Number of connections and connectors

A.6.2.8.3 Wire mapping

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

A.6.2.9 Terminator verification

A.6.2.9.1 Common description

A.6.2.9.2 Specific requirements for CPs

Not applicable.

A.6.2.10 Coding and labelling verification

A.6.2.10.1 Common description

A.6.2.10.2 Specific coding and labelling verification requirements

Not applicable.

A.6.2.11 Verification report

A.6.3 Installation acceptance test

A.6.3.1 General

A.6.3.2 Acceptance test of Ethernet-based cabling

A.6.3.2.1 Validation of balanced cabling for CPs based on Ethernet

Not applicable.

A.6.3.2.2 Validation of optical fibre cabling for CPs based on Ethernet

Not applicable.

A.6.3.2.3 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

A.6.3.3 Acceptance test of non-Ethernet-based cabling

A.6.3.3.1 Copper cabling for non-Ethernet-based CPs

A.6.3.3.1.1 Common description

A.6.3.3.1.2 Specific requirements for copper cabling for non-Ethernet-based CPs

Not applicable.

A.6.3.3.2 Optical fibre cabling for non-Ethernet-based CPs

Not applicable.

A.6.3.3.3 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

A.6.3.4 Specific requirements for wireless installation

Not applicable.

A.6.3.5 Acceptance test report

A.7 Installation administration

Subclause 7.8 is not applicable.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

A.8 Installation maintenance and installation troubleshooting

A.8.1 General

A.8.2 Maintenance

A.8.3 Troubleshooting

A.8.4 Specific requirements for maintenance and troubleshooting

Addition:

For CP 19/1 network, typical problems are given in Table A.8 in addition to IEC 61918:~~2013~~2018, Table 22.

Table A.8 – Typical problems in a network with balanced cabling

Problem	Most probable cause	Corrective action
Communication errors occurred at the specific slave device	Failure of the slave device and no error on communication line	Replace the slave device
Communication errors occurred at all the slave devices connected after a specific slave device	Cable disconnection right after the specific slave device	Replace the cable
	Incorrect insertion of cable connector	Insert the cable connector securely
Communication errors occurred at random slave device	Slave device failure or Cable failure	Locate faulty device, cable or connection and replace it
	Terminator failure	Insert terminator securely or replace it
	EMC influence from other device	Check and reduce noise in system
Communication errors occurred at random device or a specific device in a few minutes to several hours after system start up	Malfunction due to ambient temperature rise	Correct thermal condition of faulty device or replace it

The CP 19/1 employs a daisy chain linear bus topology. Therefore, a failure of one slave or cable ~~may cause~~ causes communication errors on successive slaves. To locate the faulty device, divide the network segment by moving the terminator location as shown in Figure A.11. If the divided segment still has a communication error, the faulty device or cable is included in this segment. Divide this segment again until the unique faulty device is located.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

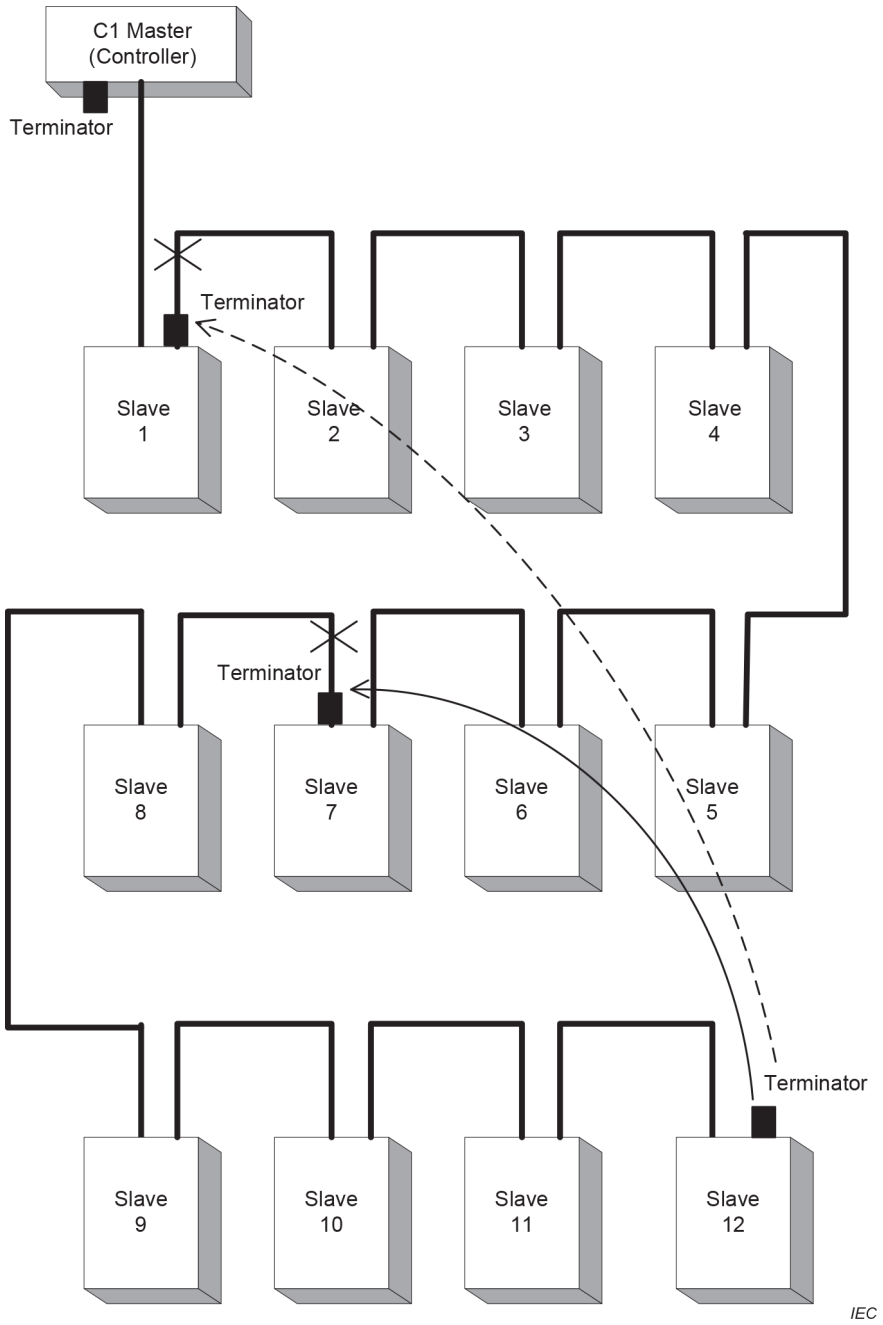

Figure A.11 – Division of network segment by changing terminator location

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

Annex B
(normative)

CP 19/2 (MECHATROLINK™-III) specific installation profile

B.1 Installation profile scope

Addition:

This annex specifies the installation profile for Communication Profile CP 19/2 (MECHATROLINK™-III). The CP 19/2 is specified in IEC 61784-1.

B.2 Normative references

B.3 Installation profile terms, definitions, and abbreviated terms

B.3.1 Terms and definitions

B.3.2 Abbreviated terms

Addition:

IMI	Industrial mini IO

B.3.3 Conventions for installation profiles

Not applicable.

B.4 Installation planning

B.4.1 General

Subclause 4.1.4 is not applicable.

B.4.2 Planning requirements

B.4.2.1 Safety

B.4.2.1.1 General

B.4.2.1.2 Electric safety

B.4.2.1.3 Functional safety

Not applicable.

B.4.2.1.4 Intrinsic safety

Not applicable.

B.4.2.1.5 Safety of optical fibre communication systems

Not applicable.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

B.4.2.2 Security

B.4.2.3 Environmental considerations and EMC

B.4.2.3.1 Description methodology

B.4.2.3.2 Use of the described environment to produce a bill of material

B.4.2.4 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

B.4.3 Network capabilities

B.4.3.1 Network topology

B.4.3.1.1 Common description

B.4.3.1.2 Basic physical topologies for passive networks

Not applicable.

B.4.3.1.3 Basic physical topologies for active networks

B.4.3.1.4 Combination of basic topologies

Not applicable.

B.4.3.1.5 Specific requirements for CPs

Addition:

CP 19/2 (MECHATROLINK™-III) supports linear and star topologies. Ring topology is not supported. Each CP 19/2 devices shall be connected through the crossover cable described in IEC 61918:~~2013~~2018, Annex H.

B.4.3.1.6 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

B.4.3.2 Network characteristics

B.4.3.2.1 General

B.4.3.2.2 Network characteristics for balanced cabling not based on Ethernet

Not applicable.

B.4.3.2.3 Network characteristics for balanced cabling based on Ethernet

Replacement:

Table B.1 provides values based on the template given in IEC 61918:~~2013~~2018, Table 2.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

Table B.1 – Network characteristics for balanced cabling based on Ethernet

Characteristic	CP 19/2
Supported data rates (Mbit/s)	100
Supported channel length (m) [b]	100
Number of connections in the channel (max.) [a,b]	4
Patch cord length (m) [a]	100
Channel class per ISO/IEC ~~24702~~ 11801-3 (min.) [b]	D
Cable category per ISO/IEC ~~24702~~ 11801-3 (min.) [c]	5
Connecting HW category per ISO/IEC ~~24702~~ 11801-3 (min.)	5
Cable types	As needed for application
[a] See B.4.4.3.2. [b] For the purpose of this table the channel definitions of ISO/IEC ~~24702~~ 11801-3 are applicable. [c] For additional information see IEC 61156 series.	

B.4.3.2.4 Network characteristics for optical fibre cabling

Not applicable.

B.4.3.2.5 Specific network characteristics

Not applicable.

B.4.3.2.6 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

B.4.4 Selection and use of cabling components

B.4.4.1 Cable selection

B.4.4.1.1 Common description

B.4.4.1.2 Copper cables

B.4.4.1.2.1 Balanced cables for Ethernet-based CPs

Replacement:

Table B.2 provides values based on the template given in IEC 61918:~~2013~~2018, Table 4.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

Table B.2 – Information relevant to copper cable: fixed cables

Characteristic	CP 19/2
Nominal impedance of cable (tolerance)	(100 ± 15) Ω
DCR of conductors	≤ 52 Ω/km
DCR of shield	–
Number of conductors	4
Shielding	Yes
Colour code for conductor	BU, WH, OG, YE
Jacket colour requirements	–
Jacket material	–
Resistance to harsh environment (e.g. UV, oil resist, LS0H)	–
Agency ratings	–

~~*Replacement:*~~

Table B.3 provides values based on the template given in IEC 61918:~~2013~~2018, Table 5.

Table B.3 – Information relevant to copper cable: cords

Characteristic	CP 19/2
Nominal impedance of cable (tolerance)	(100 ± 15) Ω
DCR of conductors	≤ 52 Ω/km
DCR of shield	–
Number of conductors	4
Length	100 m
Shielding	Yes
Colour code for conductor	BU, WH, OG, YE
Jacket colour requirements	–
Jacket material	–
Resistance to harsh environment (e.g. UV, oil resist, LS0H)	–
Agency ratings	–

B.4.4.1.2.2 Copper cables for non-Ethernet-based CPs

Not applicable.

B.4.4.1.3 Cables for wireless installation

B.4.4.1.4 Optical fibre cables

Not applicable.

B.4.4.1.5 Special purpose balanced and optical fibre cables

B.4.4.1.6 Specific requirements for CPs

Not applicable.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

B.4.4.1.7 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

B.4.4.2 Connecting hardware selection

B.4.4.2.1 Common description

B.4.4.2.2 Connecting hardware for balanced cabling CPs based on Ethernet

Replacement:

Table B.4 provides values based on the template given in IEC 61918:~~2013~~2018, Table 7.

Table B.4 – Connectors for balanced cabling CPs based on Ethernet

	IEC 60603-7 series [a]		IEC 61076-3-106 [b]		IEC 61076-3-117 [b]	IEC 61076-2-101	IEC 61076-2-109	~~Others~~ IEC 61076-3-122
	shielded	unshielded	Var. 1	Var. 6	Var. 14	M12-4 with D-coding	M12-8 with X-coding	IMI connector [c]
CP 19/2	IEC 60603-7-3	No	No	No	No	~~No~~ Yes	No	~~See the following *Addition*~~ Yes

[a] For IEC 60603-7 series, the connector selection is based on the desired channel performance.

[b] Housings to protect connectors.

[c] ~~The IMI connector is specified in the following paragraph.~~

Addition:

~~CP 19/2 defines two types of connectors, the modular connector specified in IEC 60603-7-3 and the CP 19/2 specific connector called IMI (industrial mini IO) connector. The electrical specification of the IMI connector is same as specified in IEC 60603-7-3. Figure B.1 and Figure B.2 show the dimension of the IMI device connector and cable connector respectively.~~

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

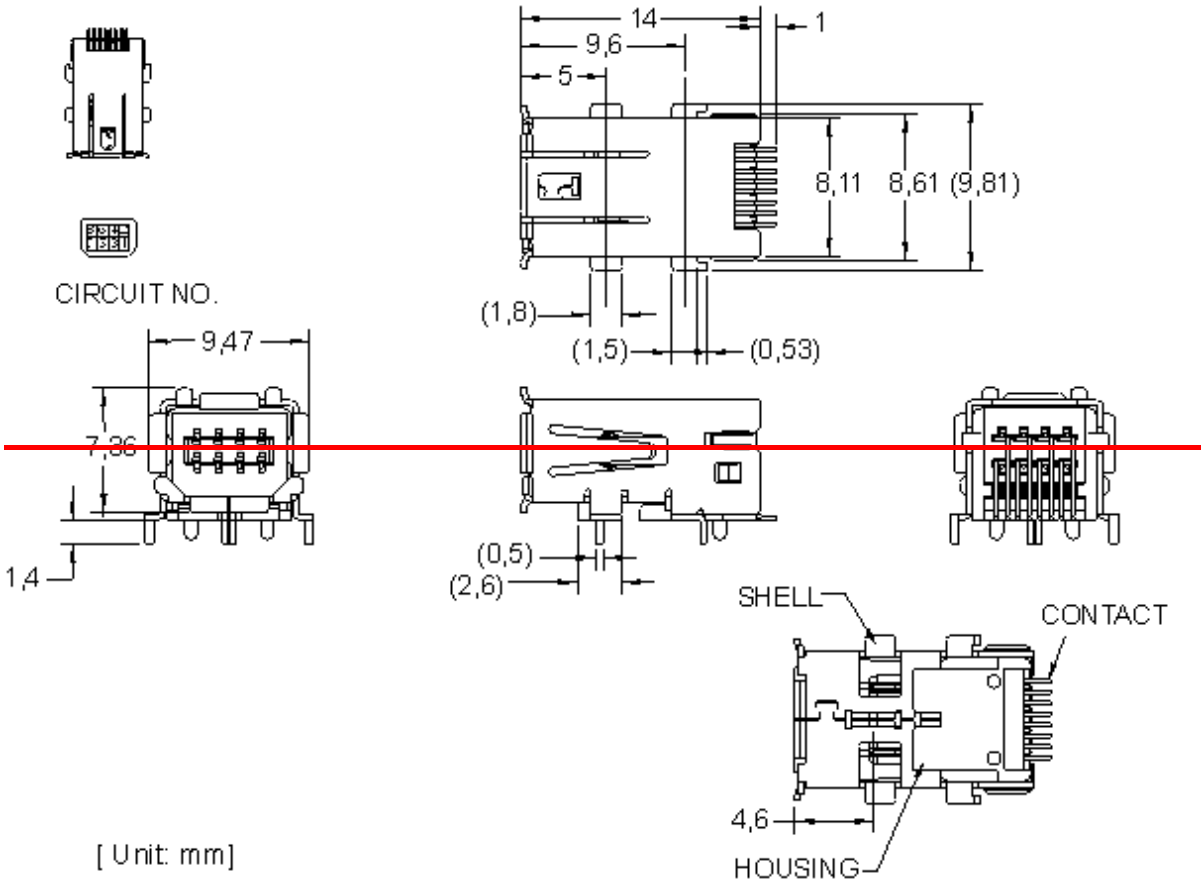

Figure B.1 – Dimensions of IMI device connector

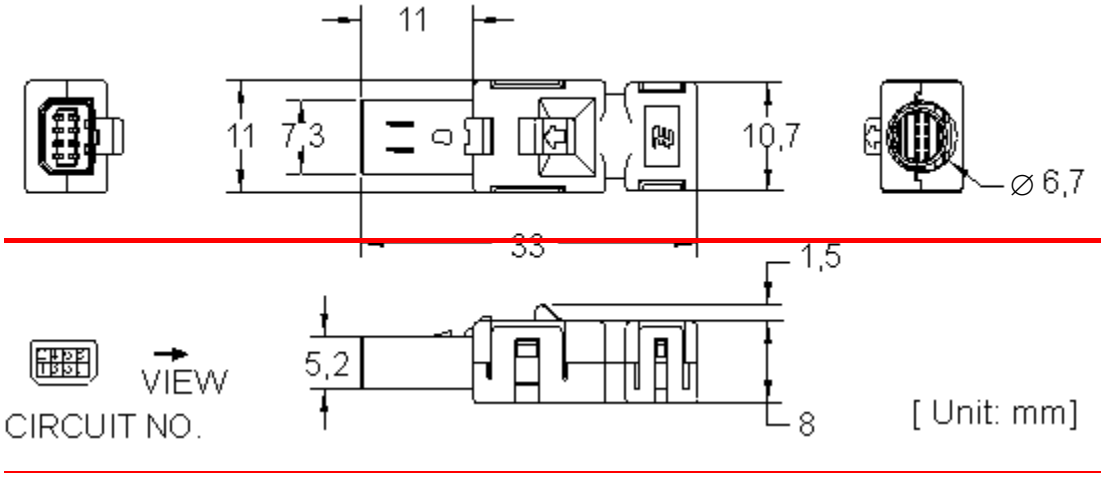

Figure B.2 – Dimensions of IMI cable connector

CP 19/2 defines three types of connectors, modular connector specified in IEC 60603-7-3 and IMI (Industrial Mini IO) connector specified IEC 61076-3-122, and M12-4 connector specified IEC 61076-2-101.

B.4.4.2.3 Connecting hardware for copper cabling CPs not based on Ethernet

Not applicable.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

B.4.4.2.4 Connecting hardware for wireless installation

Not applicable.

B.4.4.2.5 Connecting hardware for optical fibre cabling

Not applicable.

B.4.4.2.6 Specific requirements for CPs

Not applicable.

B.4.4.2.7 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

B.4.4.3 Connections within a channel/permanent link

B.4.4.3.1 Common description

B.4.4.3.2 Balanced cabling connections and splices for CPs based on Ethernet

B.4.4.3.3 Copper cabling connections and splices for CPs not based on Ethernet

Not applicable.

B.4.4.3.4 Optical fibre cabling connections and splices for CPs based on Ethernet

Not applicable.

B.4.4.3.5 Optical fibre cabling connections and splices for CPs not based on Ethernet

Not applicable.

B.4.4.3.6 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

B.4.4.4 Terminators

Not applicable.

B.4.4.5 Device location and connection

B.4.4.5.1 Common description

B.4.4.5.2 Specific requirements for CPs

Not applicable.

B.4.4.5.3 Specific requirements for wireless installation

Not applicable.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

B.4.4.5.4 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

B.4.4.6 Coding and labelling

B.4.4.6.1 Common description

B.4.4.6.2 Additional requirements for CPs

B.4.4.6.3 Specific requirements for CPs

Not applicable.

B.4.4.6.4 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

B.4.4.7 Earthing and bonding of equipment and devices and shielded cabling

B.4.4.7.1 Common description

B.4.4.7.2 Bonding and earthing of enclosures and pathways

B.4.4.7.3 Earthing methods

B.4.4.7.4 Shield earthing

Not applicable.

B.4.4.7.4.1 Non-earthing or parallel RC

Not applicable.

B.4.4.7.4.2 Direct

~~Not applicable.~~

Addition:

CP 19/2 (MECHATROLINK™-III) requires direct shield earthing. The communication shield of a CP 19/2 device is normally directly connected to the device's protective earth through the connector shield. If the CP 19/2 specific connector is used, no additional shield earthing installation is needed.

B.4.4.7.5 Specific requirements for CPs

Not applicable.

B.4.4.7.6 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

B.4.4.8 Storage and transportation of cables

B.4.4.8.1 Common description

B.4.4.8.2 Specific requirements for CPs

Not applicable.

B.4.4.8.3 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

B.4.4.9 Routing of cables

B.4.4.9.1 Common description

B.4.4.9.2 Cable routing of assemblies

B.4.4.9.3 ~~Detailed~~ Requirements for cable routing inside enclosures

B.4.4.9.4 Cable routing inside buildings

B.4.4.9.5 Cable routing outside and between buildings

B.4.4.9.6 Installing redundant communication cables

Not applicable.

B.4.4.10 Separation of circuits

B.4.4.11 Mechanical protection of cabling components

B.4.4.11.1 Common description

B.4.4.11.2 Specific requirements for CPs

Not applicable.

B.4.4.11.3 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

B.4.4.12 Installation in special areas

B.4.4.12.1 Common description

B.4.4.12.2 Specific requirements for CPs

Not applicable.

B.4.4.12.3 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

B.4.5 Cabling planning documentation

B.4.5.1 Common description

B.4.5.2 Cabling planning documentation for CPs

B.4.5.3 Network certification documentation

B.4.5.4 Cabling planning documentation for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

B.4.6 Verification of cabling planning specification

B.5 Installation implementation

B.5.1 General requirements

B.5.1.1 Common description

B.5.1.2 Installation of CPs

B.5.1.3 Installation of generic cabling in industrial premises

B.5.2 Cable installation

B.5.2.1 General requirements for all cabling types

B.5.2.1.1 Storage and installation

B.5.2.1.2 Protecting communication cables against potential mechanical damage

Replacement:

Table B.5 provides values based on the template given in IEC 61918:~~2013~~2018, Table 18.

Table B.5 – Parameters for balanced cables

Characteristic		Value
Mechanical force	Minimum bending radius, single bending (mm)	26 mm
	Bending radius, multiple bending (mm)	See manufacturer's data sheet
	Pull forces (N)	101 N
	Permanent tensile forces (N)	58 N
	Maximum lateral forces (N/cm)	Not defined
	Temperature range during installation (°C)	0 to 80

B.5.2.1.3 Avoid forming loops

B.5.2.1.4 Torsion (twisting)

B.5.2.1.5 Tensile strength (on installed cables)

B.5.2.1.6 Bending radius

B.5.2.1.7 Pull force

B.5.2.1.8 Fitting strain relief

B.5.2.1.9 Installing cables in cabinet and enclosures

B.5.2.1.10 Installation on moving parts

B.5.2.1.11 Cable crush

B.5.2.1.12 Installation of continuous flexing cables

B.5.2.1.13 Additional instructions for the installation of optical fibre cables

Not applicable.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

B.5.2.2 Installation and routing

B.5.2.2.1 Common description

B.5.2.2.2 Separation of circuits

B.5.2.3 Specific requirements for CPs

Not applicable.

B.5.2.4 Specific requirements for wireless installation

Not applicable.

B.5.2.5 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

B.5.3 Connector installation

B.5.3.1 Common description

B.5.3.2 Shielded connectors

B.5.3.3 Unshielded connectors

Not applicable.

B.5.3.4 Specific requirements for CPs

Addition:

Table B.6 shows the pin assignment and wire colour coding for CP 19/2 modular connector and IMI connectors, and Table B.7 shows the pin assignment and wire colour coding for CP 19/2 M12 connectors specified in B.4.4.2.2. The channel between CP 19/2 devices shall be cross over cable as specified in this table. If a cable is added to a channel for connections or splices, straight through cable shall be used to maintain cross over connection on the whole channel.

Table B.6 – Pin assignment and wire colour coding for CP 19/2 modular and IMI connector

Signal	Function	Color code	Pin	
			One end	Other end
TXD+	Transmit Data+	BU	1	3
TXD-	Transmit Data-	WH	2	6
RXD+	Receive Data+	OG	3	1
RXD-	Receive Data-	YE	6	2
SH	Shield	Shield braid		

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

Table B.7 – Pin assignment and wire colour coding for CP 19/2 M12 connector

Signal	Function	Color code	Pin	
			One end	Other end
TXD+	Transmit Data+	BU	1	2
TXD-	Transmit Data-	WH	3	4
RXD+	Receive Data+	OG	2	1
RXD-	Receive Data-	YE	4	3
SH	Shield	Shield braid		

B.5.3.5 Specific requirements for wireless installation

B.5.4 Terminator installation

Not applicable.

B.5.5 Device installation

B.5.5.1 Common description

B.5.5.2 Specific requirements for CPs

Not applicable.

B.5.6 Coding and labelling

B.5.6.1 Common description

B.5.6.2 Specific requirements for CPs

Not applicable.

B.5.7 Earthing and bonding of equipment and devices and shield cabling

Subclause 5.7.5 is not applicable.

B.5.8 As-implemented cabling documentation

B.6 Installation verification and installation acceptance test

B.6.1 General

B.6.2 Installation verification

B.6.2.1 General

B.6.2.2 Verification according to cabling planning documentation

B.6.2.3 Verification of earthing and bonding

B.6.2.3.1 General

B.6.2.3.2 Specific requirements for earthing and bonding

Not applicable.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

B.6.2.4 Verification of shield earthing

B.6.2.5 Verification of cabling system

B.6.2.5.1 Verification of cable routing

B.6.2.5.2 Verification of cable protection and proper strain relief

B.6.2.6 Cable selection verification

B.6.2.6.1 Common description

B.6.2.6.2 Specific requirements for CPs

Not applicable.

B.6.2.6.3 Specific requirements for wireless installation

Not applicable.

B.6.2.7 Connector verification

B.6.2.7.1 Common description

B.6.2.7.2 Specific requirements for CPs

Not applicable.

B.6.2.7.3 Specific requirements for wireless installation

Not applicable.

B.6.2.8 Connection verification

B.6.2.8.1 Common description

B.6.2.8.2 Number of connections and connectors

B.6.2.8.3 Wire mapping

B.6.2.9 Terminator verification

Not applicable.

B.6.2.10 Coding and labelling verification

B.6.2.10.1 Common description

B.6.2.10.2 Specific coding and labelling verification requirements

Not applicable.

B.6.2.11 Verification report

B.6.3 Installation acceptance test

B.6.3.1 General

B.6.3.2 Acceptance test of Ethernet-based cabling

B.6.3.2.1 Validation of balanced cabling for CPs based on Ethernet

Subclause 6.3.2.1.3 is not applicable.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

B.6.3.2.2 Validation of optical fibre cabling for CPs based on Ethernet

Not applicable.

B.6.3.2.3 Specific requirements for generic cabling in accordance with ISO/IEC ~~24702~~ 11801-3

B.6.3.3 Acceptance test of non-Ethernet-based cabling

Not applicable.

B.6.3.4 Specific requirements for wireless installation

Not applicable.

B.6.3.5 Acceptance test report

B.7 Installation administration

Subclause 7.8 is not applicable.

B.8 Installation maintenance and installation troubleshooting

Subclause 8.4 is not applicable.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

Annex C
(normative)

CP19/3 (Σ-LINK™ II) specific installation profile

C.1 Installation profile scope

Addition:

This annex specifies the installation profile for Communication Profile CP 19/3 (Σ-LINK™ II). The CP 19/3 is specified in IEC 61784-1.

C.2 Normative references

C.3 Installation profile terms, definitions, and abbreviated terms

C.3.1 Terms and definitions

Addition:

C.3.1.1 T-Branch

A topology using a tap to branch the trunk line and the spur line

C.3.2 Abbreviated terms

C.3.3 Conventions for installation profiles

Not applicable.

C.4 Installation planning

C.4.1 General

Subclause 4.1.4 is not applicable.

C.4.2 Planning requirements

C.4.2.1 Safety

C.4.2.1.1 General

C.4.2.1.2 Electrical safety

C.4.2.1.3 Functional safety

Not applicable.

C.4.2.1.4 Intrinsic safety

Not applicable.

C.4.2.1.5 Safety of optical fibre communication systems

Not applicable.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV

C.4.2.2 Security

C.4.2.3 Environmental considerations and EMC

C.4.2.3.1 Description methodology

C.4.2.3.2 Use of the described environment to produce a bill of material

C.4.2.4 Specific requirements for generic cabling in accordance with ISO/IEC 11801-3

C.4.3 Network capabilities

C.4.3.1 Network topology

C.4.3.1.1 Common description

C.4.3.1.2 Basic physical topologies for passive networks

Not applicable.

C.4.3.1.3 Basic physical topologies for active networks

Modification:

CP 19/3 network supports 3 types of topologies, about linear, T-branch and Point-to-point.

C.4.3.1.4 Combination of basic topologies

Addition:

CP 19/3 network supports combination topologies which consists of linear and T-branch.

C.4.3.1.5 Specific requirements for CPs

Addition:

CP 19/3 supports active topology by linear, T-branch and combination of linear and T-branch and Point-to-point for connection of devices. Figure C.1 shows the CP 19/3 active networks.

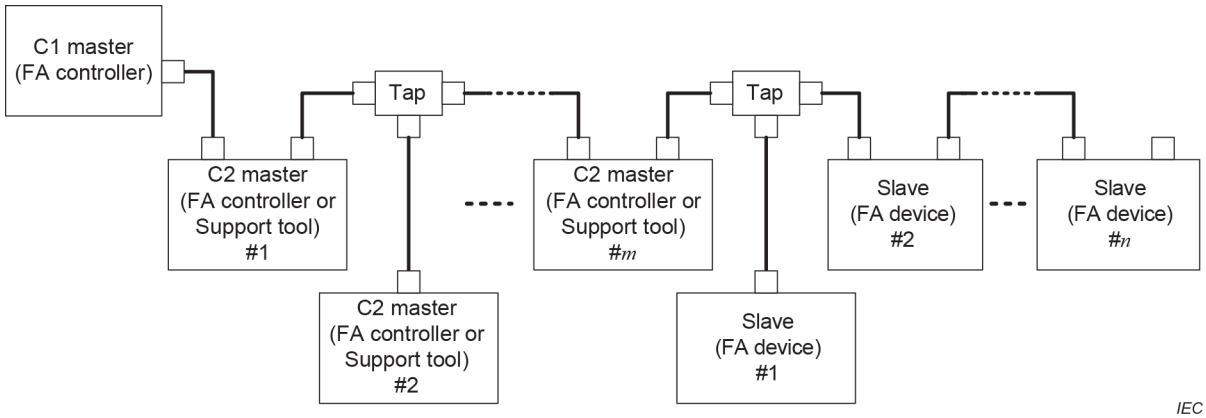

Figure C.1 – Topology of CP 19/3 combination of linear and T-branch network

For the power supply, the network of CP19/3 supports the topology that connects the power adaptor to supply power within the network. The power adaptor can be connected to any place. Figure C.2 shows an example of the power adaptor connections.

Documents
Document Sharing Hub
Full document details: IEC 61784-5-19 2024 RLV