

© Copyright SEK. Reproduction in any form without permission is prohibited.

## Industriell processtyrning – Profiler – Del 5-16: Installation av fältbussar – Installationsprofiler för CPF 16 (SERCOS)

*Industrial communication networks –  
Profiles –  
Part 5-16: Installation of fieldbuses –  
Installation profiles for CPF 16*

Som svensk standard gäller europastandarden EN 61784-5-16:2013. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61784-5-16:2013.

### Nationellt förord

Europastandarden EN 61784-5-16:2013

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 61784-5-16, First edition, 2013 - Industrial communication networks - Profiles - Part 5-16: Installation of fieldbuses - Installation profiles for CPF 16**

utarbetad inom International Electrotechnical Commission, IEC.

Standarden ska användas tillsammans med SS-EN 61918, utgåva 2, 2014.

---

ICS 25.040.40; 35.100.40

---

Denna standard är fastställd av SEK Svensk Elstandard, som också kan lämna upplysningar om **sakinnehållet** i standarden.  
Postadress: Box 1284, 164 29 KISTA  
Telefon: 08 - 444 14 00.  
E-post: [sek@elstandard.se](mailto:sek@elstandard.se). Internet: [www.elstandard.se](http://www.elstandard.se)

---

### *Standarder underlättar utvecklingen och höjer elsäkerheten*

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

### *SEK är Sveriges röst i standardiseringsarbetet inom elområdet*

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

### *Stora delar av arbetet sker internationellt*

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

### *Var med och påverka!*

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

### **SEK Svensk Elstandard**

Box 1284  
164 29 Kista  
Tel 08-444 14 00  
[www.elstandard.se](http://www.elstandard.se)

English version

**Industrial communication networks -  
Profiles -  
Part 5-16: Installation of fieldbuses -  
Installation profiles for CPF 16  
(IEC 61784-5-16:2013)**

Réseaux de communication industriels -  
Profils -  
Partie 5-16: Installation des bus de terrain -  
Profils d'installation pour CPF 16  
(CEI 61784-5-16:2013)

Industrielle Kommunikationsnetze -  
Profile -  
Teil 5-16: Feldbusinstallation -  
Installationsprofile für die  
Kommunikationsprofilfamilie 16  
(IEC 61784-5-16:2013)

This European Standard was approved by CENELEC on 2013-10-18. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

**CENELEC**

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

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

## Foreword

The text of document 65C/738/FDIS, future edition 1 of IEC 61784-5-16, prepared by SC 65C "Industrial networks" of IEC/TC 65 "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61784-5-16:2013.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2014-07-18
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-10-18

This standard is to be used in conjunction with EN 61918:2013.

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

## Endorsement notice

The text of the International Standard IEC 61784-5-16:2013 was approved by CENELEC as a European Standard without any modification.

**Annex ZA**  
(normative)

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

The following 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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

***Annex ZA of EN 61918:2013 applies, except as follows:***

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
<b><i>Addition to Annex ZA of EN 61918:2013:</i></b>				
IEC 61918	2013	Industrial communication networks - Installation of communication networks in industrial premises	EN 61918	2013

## CONTENTS

INTRODUCTION.....	9
1 Scope.....	10
2 Normative references .....	10
3 Terms, definitions and abbreviated terms .....	10
4 CPF 16: Overview of installation profiles .....	10
5 Installation profile conventions .....	10
6 Conformance to installation profiles.....	11
Annex A (normative) CP 16/1 (SERCOS I) and CP 16/2 (SERCOS II) specific installation profile .....	13
A.1 Installation profile scope.....	13
A.2 Normative references .....	13
A.3 Installation profile terms, definitions, and abbreviated terms.....	13
A.3.1 Terms and definitions .....	13
A.3.2 Abbreviated terms .....	13
A.3.3 Conventions for installation profiles.....	13
A.4 Installation planning .....	13
A.4.1 General .....	13
A.4.1.1 Objective .....	13
A.4.1.2 Cabling in industrial premises.....	13
A.4.1.3 The planning process .....	13
A.4.1.4 Specific requirements for CPs .....	13
A.4.1.5 Specific requirements for generic cabling in accordance with ISO/IEC 24702 .....	13
A.4.2 Planning requirements.....	13
A.4.2.1 Safety.....	13
A.4.2.2 Security.....	13
A.4.2.3 Environmental considerations and EMC.....	14
A.4.2.4 Specific requirements for generic cabling in accordance with ISO/IEC 24702 .....	14
A.4.3 Network capabilities .....	14
A.4.3.1 Network topology.....	14
A.4.3.2 Network characteristics .....	14
A.4.4 Selection and use of cabling components.....	15
A.4.4.1 Cable selection .....	15
A.4.4.2 Connecting hardware selection .....	16
A.4.4.3 Connections within a channel/permanent link.....	17
A.4.4.4 Terminators .....	17
A.4.4.5 Device location and connection.....	18
A.4.4.6 Coding and labelling .....	18
A.4.4.7 Earthing and bonding of equipment and devices and shielded cabling.....	18
A.4.4.8 Storage and transportation of cables.....	18
A.4.4.9 Routing of cables .....	18
A.4.4.10 Separation of circuit.....	18
A.4.4.11 Mechanical protection of cabling components .....	18

A.4.4.12	Installation in special areas .....	18
A.4.5	Cabling planning documentation .....	19
A.4.6	Verification of cabling planning specification .....	19
A.5	Installation implementation .....	19
A.5.1	General requirements .....	19
A.5.2	Cable installation .....	19
A.5.2.1	General requirements for all cabling types .....	19
A.5.2.2	Installation and routing .....	20
A.5.3	Connector installation .....	20
A.5.3.1	Common description .....	20
A.5.3.2	Shielded connectors .....	20
A.5.3.3	Unshielded connectors .....	20
A.5.3.4	Specific requirements for CPs .....	20
A.5.3.5	Specific requirements for wireless installation .....	20
A.5.4	Terminator installation .....	20
A.5.5	Device installation .....	20
A.5.6	Coding and labelling .....	20
A.5.7	Earthing and bonding of equipment and devices and shield cabling .....	20
A.5.8	As-implemented cabling documentation .....	20
A.6	Installation verification and installation acceptance test .....	20
A.6.1	General .....	20
A.6.2	Installation verification .....	20
A.6.2.1	General .....	20
A.6.2.2	Verification according to cabling planning documentation .....	20
A.6.2.3	Verification of earthing and bonding .....	21
A.6.2.4	Verification of shield earthing .....	21
A.6.2.5	Verification of cabling system .....	21
A.6.2.6	Cable selection verification .....	21
A.6.2.7	Connector verification .....	21
A.6.2.8	Connection verification .....	21
A.6.2.9	Terminators verification .....	21
A.6.2.10	Coding and labelling verification .....	21
A.6.2.11	Verification report .....	21
A.6.3	Installation acceptance test .....	21
A.6.3.1	General .....	22
A.6.3.2	Acceptance test of Ethernet-based cabling .....	22
A.6.3.3	Acceptance test of non-Ethernet-based cabling .....	22
A.6.3.4	Specific requirements for wireless installation .....	22
A.6.3.5	Acceptance test report .....	22
A.7	Installation administration .....	22
A.7.1	General .....	22
A.7.2	Fields covered by the administration .....	22
A.7.3	Basic principles for the administration system .....	22
A.7.4	Working procedures .....	22
A.7.5	Device location labelling .....	22
A.7.6	Component cabling labelling .....	22
A.7.7	Documentation .....	22
A.7.8	Specific requirements for administration .....	22
A.8	Installation maintenance and installation troubleshooting .....	22

A.8.1	General .....	22
A.8.2	Maintenance .....	22
A.8.3	Troubleshooting .....	22
A.8.4	Specific requirements for maintenance and troubleshooting .....	22
Annex B (normative)	CP 16/3 (SERCOS III) specific installation profile .....	23
B.1	Installation profile scope .....	23
B.2	Normative references .....	23
B.3	Installation profile terms, definitions, and abbreviated terms .....	23
B.3.1	Terms and definitions .....	23
B.3.2	Abbreviated terms .....	23
B.3.3	Conventions for installation profiles .....	23
B.4	Installation planning .....	23
B.4.1	General .....	23
B.4.1.1	Objective .....	23
B.4.1.2	Cabling in industrial premises .....	23
B.4.1.3	The planning process .....	23
B.4.1.4	Specific requirements for CPs .....	23
B.4.1.5	Specific requirements for generic cabling in accordance with ISO/IEC 24702 .....	23
B.4.2	Planning requirements .....	23
B.4.2.1	Safety .....	23
B.4.2.2	Security .....	23
B.4.2.3	Environmental considerations and EMC .....	24
B.4.2.4	Specific requirements for generic cabling in accordance with ISO/IEC 24702 .....	24
B.4.3	Network capabilities .....	24
B.4.3.1	Network topology .....	24
B.4.3.2	Network characteristics .....	24
B.4.4	Selection and use of cabling components .....	26
B.4.4.1	Cable selection .....	26
B.4.4.2	Connecting hardware selection .....	30
B.4.4.3	Connections within a channel/permanent link .....	31
B.4.4.4	Terminators .....	32
B.4.4.5	Device location and connection .....	32
B.4.4.6	Coding and labelling .....	32
B.4.4.7	Earthing and bonding of equipment and devices and shielded cabling .....	33
B.4.4.8	Storage and transportation of cables .....	33
B.4.4.9	Routing of cables .....	33
B.4.4.10	Separation of circuit .....	33
B.4.4.11	Mechanical protection of cabling components .....	33
B.4.4.12	Installation in special areas .....	33
B.4.5	Cabling planning documentation .....	33
B.4.6	Verification of cabling planning specification .....	33
B.5	Installation implementation .....	33
B.5.1	General requirements .....	33
B.5.2	Cable installation .....	33
B.5.2.1	General requirements for all cabling types .....	33
B.5.2.2	Installation and routing .....	35



B.5.2.3 Specific requirements for CPs .....	35
B.5.2.4 Specific requirements for wireless installation.....	35
B.5.2.5 Specific requirements for generic cabling in accordance with ISO/IEC 24702 .....	35
B.5.3 Connector installation.....	35
B.5.4 Terminator installation.....	35
B.5.5 Device installation .....	35
B.5.6 Coding and labelling.....	35
B.5.7 Earthing and bonding of equipment and devices and shield cabling.....	35
B.5.8 As-implemented cabling documentation.....	35
B.6 Installation verification and installation acceptance test.....	35
B.6.1 General .....	35
B.6.2 Installation verification.....	35
B.6.3 Installation acceptance test .....	35
B.7 Installation administration.....	35
B.7.1 General .....	35
B.7.2 Fields covered by the administration .....	35
B.7.3 Basic principles for the administration system .....	35
B.7.4 Working procedures .....	35
B.7.5 Device location labelling.....	36
B.7.6 Component cabling labelling.....	36
B.7.7 Documentation .....	36
B.7.8 Specific requirements for administration .....	36
B.8 Installation maintenance and installation troubleshooting .....	36
B.8.1 General .....	36
B.8.2 Maintenance.....	36
B.8.3 Troubleshooting .....	36
B.8.4 Specific requirements for maintenance and troubleshooting .....	36
Bibliography.....	37
Figure 1 – Standards relationships.....	9
Table A.1 – Network characteristics for optical fibre cabling.....	15
Table A.2 – Information relevant to optical fibre cables .....	16
Table A.3 – Optical fibre connecting hardware .....	16
Table A.4 –Relationship between FOC and fibre types (CP 16/1 and CP 16/2) .....	17
Table A.5 – Parameters for POF optical fibre cables .....	19
Table A.6 – Parameters for hard clad silica optical fibre cables.....	19
Table B.1 – Network characteristics for balanced cabling based on Ethernet .....	25
Table B.2 – Network characteristics for optical fibre cabling.....	26
Table B.3 – Information relevant to copper cable: CP 16/3 Type A (fixed cables).....	27
Table B.4 – Information relevant to copper cable: CP 16/3 Type B (flexible cables) .....	28
Table B.5 – Information relevant to copper cable: CP 16/3 Type C (special cables) .....	29
Table B.6 – Information relevant to optical fibre cables .....	30
Table B.7 – Connectors for balanced cabling CPs based on Ethernet .....	30
Table B.8 – Optical fibre connecting hardware .....	31
Table B.9 –Relationship between FOC and fibre types (CP 16/3).....	31

Table B.10 – Parameters for balanced cables .....	33
Table B.11 – Parameters for silica optical fibre cables .....	34
Table B.12 – Parameters for POF optical fibre cables .....	34
Table B.13 – Parameters for hard clad silica optical fibre cables.....	34

## INTRODUCTION

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

IEC 61918:2013 provides 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 standard, see IEC 61158-1.

Each CP installation profile is specified in a separate annex of this standard. 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 standard are defined in Clause 5.

The provision of the installation profiles in one standard for each CPF (for example IEC 61784-5-16 for CPF 16), allows readers to work with standards of a convenient size.

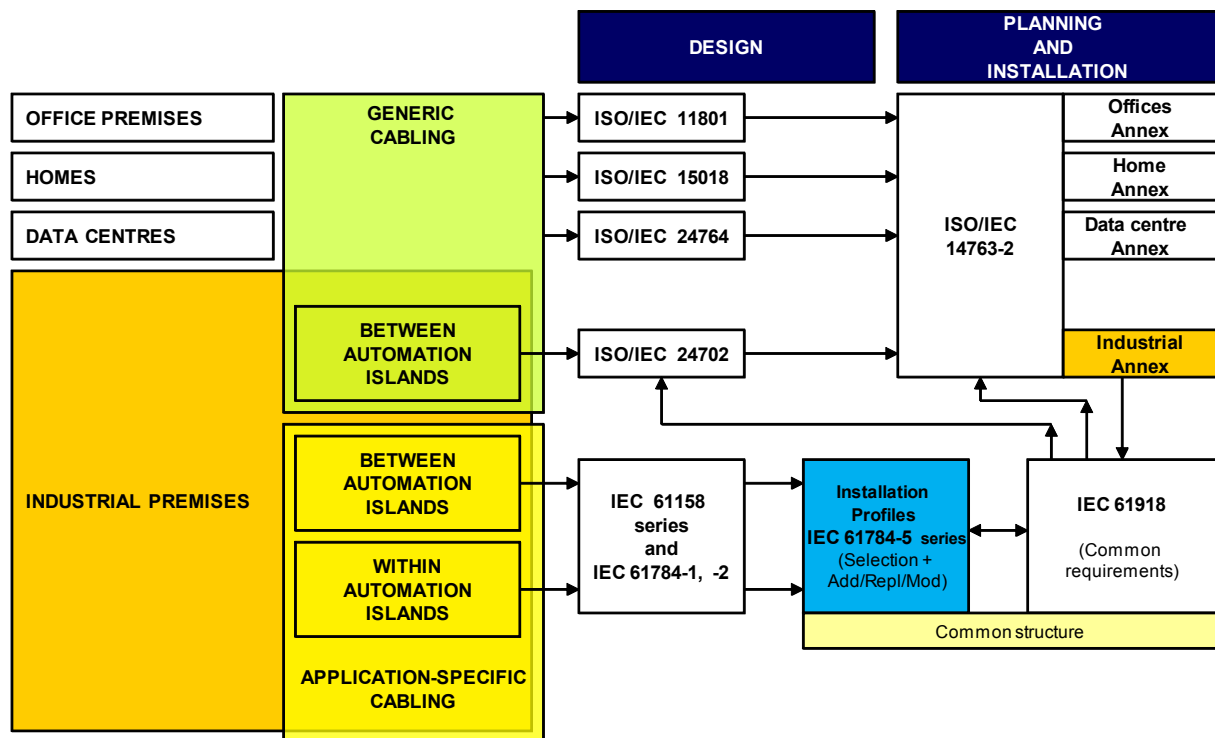


Figure 1 – Standards relationships

## INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

### Part 5-16: Installation of fieldbuses – Installation profiles for CPF 16

#### 1 Scope

This part of IEC 61784-5 specifies the installation profiles for CPF 16 (SERCOS<sup>1</sup>).

The installation profiles are specified in the annexes. These annexes are read in conjunction with IEC 61918:2013.

#### 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 61918:2013, *Industrial communication networks – Installation of communication networks in industrial premises*

The normative references of IEC 61918:2013, Clause 2, apply.

---

<sup>1</sup> SERCOS is a trade name of SERCOS International. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the trade mark holder or any of its products. Use of the trade name requires permission of the trade name holder.