

# SLOVENSKI STANDARD

## SIST EN 61784-3-13:2018

01-februar-2018

Nadomešča:

SIST EN 61784-3-13:2010

---

**Industrijska komunikacijska omrežja - Profili - 3-13. del: Funkcijska varnost procesnih vodil - Dodatne specifikacije za CPF 13 (IEC 61784-3-13:2016)**

Industrial communication networks - Profiles - Part 3-13: Functional safety fieldbuses - Additional specifications for CPF 13 (IEC 61784-3-13:2016)

Industrielle Kommunikationsnetze - Profile - Teil 3-13: Funktionale sichere Übertragung bei Feldbussen - Zusätzliche Festlegungen für die Kommunikationsprofilfamilie 13 (IEC 61784-3-13:2016)

Réseaux de communication industriels - Profils - Partie 3-13: Bus de terrain de sécurité fonctionnelle - Spécifications complémentaires pour CPF 13 (IEC 61784-3-13:2016)

**Ta slovenski standard je istoveten z: EN 61784-3-13:2017**

**ICS:**

25.040.40	Merjenje in krmiljenje industrijskih postopkov	Industrial process measurement and control
35.100.05	Večslojne uporabniške rešitve	Multilayer applications

**SIST EN 61784-3-13:2018**

**en,fr,de**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 61784-3-13:2018](https://standards.iteh.ai/catalog/standards/sist/d03d49e3-2e92-4f5e-86cc-15ff72349187/sist-en-61784-3-13-2018)

<https://standards.iteh.ai/catalog/standards/sist/d03d49e3-2e92-4f5e-86cc-15ff72349187/sist-en-61784-3-13-2018>

EUROPEAN STANDARD

**EN 61784-3-13**

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2017

ICS 25.040.40; 35.100.05

Supersedes EN 61784-3-13:2010

English Version

**Industrial communication networks - Profiles - Part 3-13:  
Functional safety fieldbuses - Additional specifications for CPF  
13  
(IEC 61784-3-13:2016)**

Réseaux de communication industriels - Profils - Partie 3-13: Bus de terrain de sécurité fonctionnelle - Spécifications complémentaires pour CPF 13  
(IEC 61784-3-13:2016)

Industrielle Kommunikationsnetze - Profile - Teil 3-13: Funktional sichere Übertragung bei Feldbussen - Zusätzliche Festlegungen für die Kommunikationsprofilfamilie 13  
(IEC 61784-3-13:2016)

This European Standard was approved by CENELEC on 2016-08-19. 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

## European foreword

The text of document 65C/851/FDIS, future edition 2 of IEC 61784-3-13:2016, 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 61784-3-13:2017.

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2018-06-01
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2020-12-01

This document supersedes EN 61784-3-13:2010.

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

## iTeh STANDARD PREVIEW Endorsement notice (standards.iteh.ai)

The text of the International Standard IEC 61784-3-13:2016 was approved by CENELEC as a European Standard without any modification.

[SIST EN 61784-3-13:2018](https://standards.iteh.ai/catalog/standards/sist/61784-3-13-2018)

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60204-1	NOTE Harmonized as EN 60204-1
IEC 61000-6-7	NOTE Harmonized as EN 61000-6-7
IEC 61131-2	NOTE Harmonized as EN 61131-2
IEC 61131-6	NOTE Harmonized as EN 61131-6
IEC 61158 (all parts)	NOTE Harmonized as EN 61158 (all parts)
IEC 61326-3-1	NOTE Harmonized as EN 61326-3-1
IEC 61326-3-2	NOTE Harmonized as EN 61326-3-2
IEC 61496 (all parts)	NOTE Harmonized as EN 61496 (all parts)
IEC 61508-1:2010	NOTE Harmonized as EN 61508-1:2010 (not modified).
IEC 61508-4:2010	NOTE Harmonized as EN 61508-4:2010 (not modified).
IEC 61508-5:2010	NOTE Harmonized as EN 61508-5:2010 (not modified).
IEC 61511 (all parts)	NOTE Harmonized as EN 61511 (all parts)
IEC 61784-1	NOTE Harmonized as EN 61784-1
IEC 61784-5 (all parts)	NOTE Harmonized as EN 61784-5 (all parts)
IEC 61800-5-2	NOTE Harmonized as EN 61800-5-2
IEC 62061	NOTE Harmonized as EN 62061
IEC 62443 (all parts)	NOTE Harmonized as prEN 62443 (all parts)
IEC/TR 62685	NOTE Harmonized as CLC/TR 62685
ISO 10218-1	NOTE Harmonized as EN ISO 10218-1
ISO 12100	NOTE Harmonized as EN ISO 12100
ISO 13849-1	NOTE Harmonized as EN ISO 13849-1
ISO 13849-2	NOTE Harmonized as EN ISO 13849-2

## Annex ZA (normative)

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

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cenelec.eu](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61131-3	-	Programmable controllers - Part 3: Programming languages	EN 61131-3	-
IEC 61158-3-13	-	Industrial communication networks - Fieldbus specifications - Part 3-13: Data link layer service definition - Type 13 elements	EN 61158-3-13	-
IEC 61158-4-13	-	Industrial communication networks - Fieldbus specifications - Part 4-13: Data-link layer protocol specification - Type 13 elements	EN 61158-4-13	-
IEC 61158-5-13	-	Industrial communication networks - Fieldbus specifications - Part 5-13: Application layer service definition - Type 13 elements	EN 61158-5-13	-
IEC 61158-6-13	-	Industrial communication networks - Fieldbus specifications - Part 6-13: Application layer protocol specification - Type 13 elements	EN 61158-6-13	-
IEC 61508	series	Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 1: General requirements	EN 61508	series
IEC 61784-2	-	Industrial communication networks - Profiles - Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC 8802-3	EN 61784-2	-
IEC 61784-3	-	Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions	EN 61784-3	-
IEC 61784-5-13	-	Industrial communication networks - Profiles -- Part 5-13: Installation of fieldbuses - Installation profiles for CPF 13	EN 61784-5-13	-
IEC 61918	-	Industrial communication networks - Installation of communication networks in industrial premises	EN 61918	-
ISO/IEC 19501	-	Information technology - Open Distributed Processing - Unified Modeling Language (UML) Version 1.4.2	-	-

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 61784-3-13:2018](https://standards.iteh.ai/catalog/standards/sist/d03d49e3-2e92-4f5e-86cc-15ff72349187/sist-en-61784-3-13-2018)

<https://standards.iteh.ai/catalog/standards/sist/d03d49e3-2e92-4f5e-86cc-15ff72349187/sist-en-61784-3-13-2018>



# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Industrial communication networks – Profiles –  
Part 3-13: Functional safety fieldbuses – Additional specifications for CPF 13**

**Réseaux de communication industriels – Profils –  
Partie 3-13: Bus de terrain de sécurité fonctionnelle – Spécifications  
supplémentaires pour CPF 13**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 25.040.40, 35.100.05

ISBN 978-2-8322-3492-1

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	13
0 Introduction .....	15
0.1 General.....	15
0.2 Patent declaration .....	17
1 Scope.....	19
2 Normative references.....	19
3 Terms, definitions, symbols, abbreviated terms and conventions.....	20
3.1 Terms and definitions .....	20
3.1.1 Common terms and definitions .....	20
3.1.2 CPF 13: Additional terms and definitions .....	25
3.2 Symbols and abbreviated terms.....	26
3.2.1 Common symbols and abbreviated terms.....	26
3.2.2 CPF 13: Additional symbols and abbreviated terms.....	27
3.3 Conventions.....	28
3.3.1 Hexadecimal values .....	28
3.3.2 Binary values .....	28
3.3.3 Wildcard digits .....	28
3.3.4 Diagrams .....	28
4 Overview of FSCP 13/1 (openSAFETY™).....	28
4.1 Functional Safety Communication Profile 13/1 .....	28
4.2 Technical overview.....	29
5 General.....	29
5.1 External documents providing specifications for the profile .....	29
5.2 Safety functional requirements .....	30
5.3 Safety measures .....	30
5.4 Safety communication layer structure .....	31
5.5 Relationships with FAL (and DLL, PhL).....	33
5.5.1 General .....	33
5.5.2 Data types .....	33
6 Safety communication layer services.....	33
6.1 Modelling .....	33
6.1.1 Reference model.....	33
6.1.2 Communication model.....	34
6.1.3 Device roles and topology .....	35
6.2 Life cycle model .....	39
6.2.1 General .....	39
6.2.2 Concept, planning and implementation .....	39
6.2.3 Commissioning .....	40
6.2.4 Operation terms .....	41
6.2.5 Maintenance terms.....	43
6.3 Non safety communication layer .....	43
6.3.1 General .....	43
6.3.2 Requirements for data transport .....	43
6.3.3 Domain protection and separation .....	46
7 Safety communication layer protocol .....	47



7.1	Safety PDU format .....	47
7.1.1	Structure of Safety PDUs .....	47
7.1.2	Address field (ADR) .....	50
7.1.3	PDU identification field (ID) .....	50
7.1.4	Length field (LE) .....	51
7.1.5	Consecutive Time field (CT) .....	51
7.1.6	Payload data field (DB0 to DBn) .....	52
7.1.7	Cyclic Redundancy Check field (CRC-8 / CRC-16) .....	52
7.1.8	Time Request Address field (TADR) .....	52
7.1.9	Time Request Distinctive Number field (TR) .....	52
7.1.10	UDID of SCM coding (UDID of SCM) .....	52
7.2	Safety Process Data Object (SPDO) .....	53
7.2.1	General .....	53
7.2.2	SPDO telegram types .....	53
7.2.3	Data Only telegram .....	53
7.2.4	Data with Time Request telegram .....	54
7.2.5	Data with Time Response telegram .....	55
7.3	Safety Service Data Object (SSDO) .....	56
7.3.1	General .....	56
7.3.2	SSDO telegram types .....	56
7.3.3	SSDO services and protocols .....	57
7.3.4	SSDO Download Initiate .....	59
7.3.5	SSDO Download Segment .....	60
7.3.6	SSDO Block Download Initiate .....	61
7.3.7	SSDO Block Download Segment .....	62
7.3.8	SSDO Upload Initiate .....	64
7.3.9	SSDO Upload Segment .....	65
7.3.10	SSDO Block Upload Initiate .....	66
7.3.11	SSDO Block Upload Segment .....	67
7.3.12	SSDO Abort .....	67
7.4	Safety Network Management (SNMT) .....	69
7.4.1	General .....	69
7.4.2	SNMT telegram types .....	69
7.4.3	SNMT services and protocols .....	69
7.5	Safety Object dictionary (SOD) .....	81
7.5.1	General .....	81
7.5.2	Object dictionary entry definition .....	81
7.5.3	Data type entry specification .....	87
7.5.4	Object description .....	88
7.6	Safety related PDO mapping .....	123
7.6.1	General .....	123
7.6.2	Transmit SPDOs .....	124
7.6.3	Receive SPDOs .....	124
7.6.4	SPDO mapping parameter .....	124
7.6.5	SPDO mapping example .....	125
7.6.6	SPDO error handling .....	127
7.7	State and sequence diagrams .....	127
7.7.1	Safety Process Data Object (SPDO) .....	127
7.7.2	Time synchronization and validation .....	132

7.7.3	Safety Service Data Object (SSDO).....	141
7.7.4	SOD access.....	143
7.7.5	Safety Network Management Object (SNMT) .....	153
7.7.6	SN power up.....	155
7.7.7	SN power down.....	159
7.7.8	SN recovery after Restart / Error .....	159
7.7.9	SCM power up .....	159
7.7.10	Address verification.....	162
7.7.11	Commissioning mode .....	164
7.7.12	Handle single UDID mismatch .....	164
7.7.13	Activate SN.....	168
7.7.14	Device exchange .....	169
8	Safety communication layer management.....	169
8.1	General.....	169
8.2	Goals of parameterization .....	169
8.3	Initial configuration of a device .....	169
8.3.1	General .....	169
8.3.2	SD setup by only configuring the SCM.....	170
8.3.3	SD setup configuring each SN.....	170
8.4	Avoiding of parameterizing the wrong device .....	170
8.5	Parameter check mechanism.....	170
9	System requirements.....	171
9.1	Indicators and switches .....	171
9.2	Installation guidelines.....	171
9.3	Safety function response time.....	171
9.4	Duration of demands.....	172
9.5	Constraints for calculation of system characteristics .....	172
9.5.1	General .....	172
9.5.2	Number of sinks limit.....	172
9.5.3	Message rate limit.....	172
9.5.4	Message payload limit.....	172
9.5.5	Bit error rate considerations .....	173
9.5.6	Residual error rate .....	173
9.6	Maintenance .....	174
9.6.1	Diagnostic information.....	174
9.6.2	Replacement of safety related devices.....	174
9.6.3	Modification .....	175
9.6.4	Machine part changing .....	175
9.6.5	Firmware update of safety related nodes .....	175
9.6.6	Machine check due to service interval .....	175
9.7	Safety manual.....	175
10	Assessment.....	175
10.1	General.....	175
10.2	CP 13/1 assessment .....	176
10.3	FSCP 13/1 conformance test.....	176
10.4	Approval of functional safety by competent assessment body.....	176
Annex A (informative) Additional information for functional safety communication profiles of CPF 13.....		177
A.1	Hash function calculation.....	177

A.2 .....	180
Annex B (informative) Information for assessment of the functional safety communication profiles of CPF 13 .....	181
Bibliography .....	182
Figure 1 – Relationships of IEC 61784-3 with other standards (machinery).....	15
Figure 2 – Relationships of IEC 61784-3 with other standards (process) .....	16
Figure 3 – Producer consumer example .....	29
Figure 4 – Client server example .....	29
Figure 5 – Communication layer structure.....	32
Figure 6 – Safety communication channel .....	33
Figure 7 – Characteristic producer / consumer communication.....	34
Figure 8 – Extended producer / consumer communication .....	35
Figure 9 – Client Server communication .....	35
Figure 10 – Topology overview.....	36
Figure 11 – Safety Domain protection (example).....	37
Figure 12 – Safety Domain separation (example).....	38
Figure 13 – Data flow example .....	42
Figure 14 – Communication model .....	43
Figure 15 – SPDO transport .....	44
Figure 16 – SSDO transport .....	45
Figure 17 – Diagnostic data representation.....	46
Figure 18 – Safety PDUs inside a CP-13/PDU .....	47
Figure 19 – Basic Safety PDU for n = 0 – 8 octet payload data .....	47
Figure 20 – Basic Safety PDU from 9 octet payload data .....	48
Figure 21 – Slim Safety PDU for n = 0 – 8 octet payload data .....	49
Figure 22 – Slim Safety PDU from 9 octet payload data .....	49
Figure 23 – SPDO_Data_Only telegram .....	54
Figure 24 – SPDO_Data_with_Time_Request telegram .....	54
Figure 25 – SPDO_Data_with_Time_Response telegram .....	55
Figure 26 – SSDO download protocols .....	58
Figure 27 – SSDO upload protocols .....	59
Figure 28 – SSDO Download Initiate protocol .....	59
Figure 29 – SSDO Download Segment protocol.....	60
Figure 30 – SSDO Block Download Initiate protocol.....	61
Figure 31 – SSDO Block Download Segment protocol.....	63
Figure 32 – SSDO Upload Initiate protocol .....	64
Figure 33 – SSDO Upload Segment protocol .....	65
Figure 34 – SSDO Block Upload Initiate protocol .....	66
Figure 35 – SSDO Block Upload Segment protocol.....	67
Figure 36 – SSDO Abort protocol .....	67
Figure 37 – UDID Request / Response protocol.....	70
Figure 38 – SADR Assignment protocol.....	71
Figure 39 – Reset Node Guarding Time protocol .....	72

Figure 40 – SN set to Pre-Operational protocol.....	73
Figure 41 – SN set to Operational protocol .....	74
Figure 42 – SN Acknowledge protocol .....	76
Figure 43 – SN set to stop protocol .....	77
Figure 44 – SCM set to Operational protocol .....	77
Figure 45 – Node Guarding protocol.....	78
Figure 46 – Additional SADR Assignment protocol.....	79
Figure 47 – UDID of SCM Assignment protocol.....	80
Figure 48 – SPDO mapping example.....	125
Figure 49 – State diagram TxSPDO.....	128
Figure 50 – SPDO communication producer .....	128
Figure 51 – State diagram RxSPDO .....	129
Figure 52 – SPDO communication consumer.....	130
Figure 53 – State diagram process data .....	131
Figure 54 – Time synchronization and validation.....	132
Figure 55 – Time synchronization detail .....	133
Figure 56 – Calculation of propagation delay .....	134
Figure 57 – Time validation, propagation delay explanation limits .....	135
Figure 58 – Time synchronization on a nonsafe network .....	136
Figure 59 – Explanation of time synchronization .....	137
Figure 60 – Time synchronization failure .....	137
Figure 61 – State diagram time synchronization producer.....	139
Figure 62 – State diagram time synchronization consumer.....	140
Figure 63 – State diagram SSDO client .....	142
Figure 64 – State diagram SSDO server.....	143
Figure 65 – Expedited SOD access .....	144
Figure 66 – State diagram segmented SOD download access client.....	145
Figure 67 – Segmented SOD download access.....	146
Figure 68 – State diagram segmented SOD download access server .....	147
Figure 69 – State diagram SOD block download access client .....	149
Figure 70 – SOD block download access.....	150
Figure 71 – State diagram SOD block download access server .....	152
Figure 72 – State diagram SNMT master .....	154
Figure 73 – State diagram SNMT slave .....	155
Figure 74 – State diagram SN power up .....	156
Figure 75 – State diagram SN Pre-Operational .....	157
Figure 76 – State diagram SN Operational .....	158
Figure 77 – Life Guarding telegram .....	159
Figure 78 – State diagram SCM power up .....	160
Figure 79 – State diagram SCM Operational.....	161
Figure 80 – State diagram SCM address verification.....	163
Figure 81 – State diagram SCM handle single UDID mismatch.....	165
Figure 82 – State diagram SCM verify parameters.....	167

Figure 83 – State diagram activate SN .....	168
Figure 84 – Safety function response time .....	171
Figure 85 – Assessment flow of devices .....	176
Table 1 – Communication errors and detection measures (cyclic) .....	30
Table 2 – Communication errors and detection measures (acyclic).....	31
Table 3 – Device roles .....	36
Table 4 – Basic Safety PDU format .....	48
Table 5 – Slim Safety PDU format .....	49
Table 6 – PDU identification field (ID).....	50
Table 7 – Used ID field combinations .....	51
Table 8 – Request / response identification .....	51
Table 9 – Type of CRC depending on LE .....	51
Table 10 – CRC polynoms for SPDUs .....	52
Table 11 – SPDO telegram types (ID field, bits 2, 3 and 4).....	53
Table 12 – Fields of SPDO_Data_Only telegram.....	54
Table 13 – Fields of SPDO_Data_with_Time_Request telegram.....	55
Table 14 – Fields of SPDO_Data_with_Time_Response telegram .....	55
Table 15 – SSDO telegram types (ID field, bits 2, 3 and 4).....	56
Table 16 – SOD Access Command (SACmd) – bit coding .....	57
Table 17 – Fields of Download Initiate SSDO_Service_Request telegram .....	60
Table 18 – Fields of Download Initiate SSDO_Service_Response telegram.....	60
Table 19 – Fields of Download Segment SSDO_Service_Request telegram .....	61
Table 20 – Fields of Download Segment SSDO_Service_Response telegram.....	61
Table 21 – Fields of Block Download Initiate SSDO_Service_Request telegram .....	62
Table 22 – Fields of Block Download Initiate SSDO_Service_Response telegram.....	62
Table 23 – Fields of Block Download Segment SSDO_Service_Request telegram .....	63
Table 24 – Fields of Block Download Segment SSDO_Service_Response telegram .....	63
Table 25 – Fields of Upload Initiate SSDO_Service_Request telegram.....	64
Table 26 – Fields of Upload Initiate SSDO_Service_Response telegram .....	64
Table 27 – Fields of Upload Segment SSDO_Service_Request telegram.....	65
Table 28 – Fields of Upload Segment SSDO_Service_Response telegram .....	65
Table 29 – Fields of Block Upload Initiate SSDO_Service_Request telegram .....	66
Table 30 – Fields of Block Upload Initiate SSDO_Service_Response telegram.....	66
Table 31 – Fields of Block Upload Segment SSDO_Service_Response telegram.....	67
Table 32 – Fields of SSDO Abort telegram .....	68
Table 33 – SSDO Abort codes.....	68
Table 34 – SNMT telegram types (ID field, bits 2, 3 and 4).....	69
Table 35 – Fields of SNMT_Request_UDID telegram .....	70
Table 36 – Fields of SNMT_Response_UDID telegram .....	70
Table 37 – Fields of SNMT_Assign_SADR telegram .....	71
Table 38 – Fields of SNMT_SADR_Assigned telegram.....	71
Table 39 – Fields of SNMT_SN_reset_guarding_SCM telegram .....	72

Table 40 – SNMT request telegram types .....	72
Table 41 – SNMT response telegram types .....	73
Table 42 – Fields of SNMT_SN_set_to_PRE_OP telegram .....	73
Table 43 – Fields of SNMT_SN_status_PRE_OP telegram.....	74
Table 44 – Fields of SNMT_SN_set_to_OP telegram .....	74
Table 45 – Fields of SNMT_SN_status_OP telegram .....	75
Table 46 – Fields of SNMT_SN_busy telegram .....	75
Table 47 – Fields of SNMT_SN_FAIL telegram .....	75
Table 48 – SNMT_SN_FAIL Error Group values .....	76
Table 49 – SNMT_SN_FAIL Error Code values.....	76
Table 50 – Fields of SNMT_SN_ACK telegram .....	76
Table 51 – Fields of SNMT_SCM_set_to_STOP telegram .....	77
Table 52 – Fields of SNMT_SCM_set_to_OP telegram .....	78
Table 53 – Fields of SNMT_SCM_guard_SN telegram .....	78
Table 54 – Fields of SNMT_SN_status_OP/SNMT_SN_status_OP telegrams .....	79
Table 55 – Fields of SNMT_assign_additional_SADR telegram .....	79
Table 56 – Fields of SNMT_assigned_additional_SADR telegram .....	80
Table 57 – Fields of SNMT_assign_UDID_of_SCM telegram.....	80
Table 58 – Fields of SNMT_assigned_UDID_of_SCM telegram.....	81
Table 59 – Object type definition (standards.iteh.ai).....	82
Table 60 – Access attributes for data objects.....	83
Table 61 – SPDO mapping attributes for data objects.....	84
Table 62 – Basic data type object definition example.....	84
Table 63 – Compound data type object definition example .....	84
Table 64 – Sub index interpretation .....	85
Table 65 – NumberOfEntries sub index specification .....	85
Table 66 – RECORD type object sub index specification.....	85
Table 67 – ARRAY type object sub index specification.....	86
Table 68 – StructureOfObject encoding .....	86
Table 69 – Object dictionary data types.....	87
Table 70 – 0021h Compound data type description example .....	88
Table 71 – 0021h Compound sub index descriptions example.....	88
Table 72 – Standard objects.....	89
Table 73 – Common communication objects .....	89
Table 74 – Receive SPDO communication objects .....	89
Table 75 – Receive SPDO mapping objects.....	90
Table 76 – Transmit SPDO communication objects .....	90
Table 77 – User parameter (writeable at any time).....	90
Table 78 – Transmit SPDO mapping objects.....	90
Table 79 – SADR DVI list.....	91
Table 80 – Additional SADR list .....	91
Table 81 – SADR UDID list .....	91
Table 82 – Object 1001h Error Register.....	92

Table 83 – Object 1001h Error Register value interpretation .....	92
Table 84 – Object 1002h Manufacturer status register .....	92
Table 85 – Object 1003h Pre defined error field .....	93
Table 86 – Object 1003h sub index 00h .....	93
Table 87 – Object 1003h sub index 01h .....	93
Table 88 – Object 1003h sub index 02h to FEh .....	94
Table 89 – Object 100Ch Life Guarding .....	94
Table 90 – Object 100Ch sub index 00h .....	94
Table 91 – Object 100Ch sub index 01h .....	95
Table 92 – Object 100Ch sub index 02h .....	95
Table 93 – Object 100Dh Refresh Interval of Reset Guarding .....	95
Table 94 – Object 100Dh Refresh Interval of Reset Guarding .....	96
Table 95 – Object 1018h Device Vendor Information .....	96
Table 96 – Object 1018h sub index 00h .....	97
Table 97 – Object 1018h sub index 01h .....	97
Table 98 – Object 1018h sub index 02h .....	97
Table 99 – Object 1018h sub index 03h .....	98
Table 100 – Object 1018h sub index 04h .....	98
Table 101 – Object 1018h sub index 05h .....	98
Table 102 – Object 1018h sub index 06h .....	99
Table 103 – Object 1018h sub index 07h .....	99
Table 104 – Structure of Revision Number .....	99
Table 105 – Structure of parameter checksum domain .....	100
Table 106 – CRC polynom for parameter checksum .....	100
Table 107 – Object 1019h Unique Device ID .....	101
Table 108 – Object 101Ah Parameter Download .....	101
Table 109 – Format of Parameter Download .....	101
Table 110 – Object 101Bh SCM Parameters .....	102
Table 111 – Object 101Bh sub index 00h .....	102
Table 112 – Object 101Bh sub index 01h .....	102
Table 113 – Object 1200h Common Communication Parameter .....	103
Table 114 – Object 1200h sub index 00h .....	103
Table 115 – Object 1200h sub index 01h .....	103
Table 116 – Object 1200h sub index 02h .....	103
Table 117 – Object 1200h sub index 03h .....	104
Table 118 – Object 1200h sub index 04h .....	104
Table 119 – Object 1201h SSDO Communication Parameter .....	105
Table 120 – Object 1201h sub index 00h .....	105
Table 121 – Object 1201h sub index 01h .....	105
Table 122 – Object 1201h sub index 02h .....	105
Table 123 – Object 1202h SNMT Communication Parameter .....	106
Table 124 – Object 1202h sub index 00h .....	106
Table 125 – Object 1202h sub index 01h .....	106