

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Industrial communication networks – Fieldbus specifications –  
Part 4-19: Data-link layer protocol specification – Type 19 elements**

**Réseaux de communication industriels – Spécifications des bus de terrain –  
Partie 4-19: Spécification de protocole de la couche liaison de données –  
Éléments de Type 19**



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## CONTENTS

FOREWORD.....	24
INTRODUCTION.....	26
1 Scope.....	28
1.1 General.....	28
1.2 Specifications .....	28
1.3 Procedures .....	28
1.4 Applicability .....	28
1.5 Conformance .....	29
2 Normative references .....	29
3 Terms, definitions, symbols, acronyms, abbreviations and conventions .....	29
3.1 Reference model terms and definitions .....	29
3.2 Additional Type 19 terms and definitions.....	30
3.3 Symbols.....	33
3.4 Acronyms and abbreviations .....	34
3.5 Additional conventions .....	35
4 DL-protocol overview.....	35
4.1 Overview .....	35
4.2 General DLPDU identification .....	37
4.2.1 Introduction .....	37
4.2.2 Destination address (Dest MAC).....	37
4.2.3 Source address (Src MAC) .....	37
4.2.4 EtherType.....	37
4.3 General DLPDU structure .....	37
4.3.1 Introduction .....	37
4.3.2 DLPDU header .....	38
4.3.3 DLPDU payload.....	38
4.4 DLPDU header.....	38
4.4.1 Introduction .....	38
4.4.2 DLPDU type.....	38
4.5 MDT DLPDU .....	39
4.5.1 MDT MDT field summary .....	39
4.5.2 Evaluation of MDT header in the slaves.....	39
4.5.3 MDT type.....	40
4.5.4 MDT phase.....	40
4.5.5 MDT CRC.....	40
4.5.6 MDT payload during initialization .....	40
4.5.7 MDT payload in normal operation (CP4) .....	44
4.6 AT DLPDU .....	51
4.6.1 AT header field summary.....	51
4.6.2 Evaluation of AT header in the slaves.....	51
4.6.3 AT type.....	52
4.6.4 AT phase.....	52
4.6.5 AT CRC.....	52
4.6.6 AT Payload during initialization.....	52
4.6.7 AT payload in CP4.....	56
4.7 Mechanisms of connections .....	62
4.7.1 Introduction .....	62

4.7.2	Configuration of connections .....	63
4.7.3	Connection control.....	64
4.7.4	Producer state machine .....	66
4.7.5	Consumer state machine .....	68
5	DL management .....	72
5.1	Overview .....	72
5.2	Initialization of cyclic communication.....	72
5.2.1	Introduction .....	72
5.2.2	Communication phases (CP) .....	73
5.2.3	Switching of communication phases (CPS).....	86
5.2.4	Communication Version.....	89
5.2.5	Address allocation in the master and slave.....	99
5.3	Network topologies .....	101
5.3.1	Introduction .....	101
5.3.2	Ring topology .....	102
5.3.3	Line topology.....	102
5.3.4	Topology conditions of a slave device.....	103
5.3.5	Topology conditions of a multi-slave device.....	104
5.3.6	Topology state machine.....	108
5.3.7	States of Topology state machine of slave.....	109
5.3.8	Transitions of Topology state machine.....	110
5.4	Redundancy of RT communication with ring topology.....	112
5.4.1	Introduction .....	112
5.4.2	Sequence with ring break .....	112
5.4.3	Recovery of ring topology .....	113
5.4.4	Recovery of P channel.....	114
5.4.5	Recovery of S channel.....	115
5.5	Hot-plug procedure .....	115
5.5.1	Introduction .....	115
5.5.2	Hot-plug state machine.....	116
5.5.3	States of HP state machine .....	117
5.5.4	Transitions of HP state machine .....	121
5.6	Watchdog .....	122
5.7	Status procedures.....	122
6	Data transmission methods .....	123
6.1	Overview .....	123
6.2	Service channel (SVC).....	123
6.2.1	SVC handling .....	123
6.2.2	Opening and closing SVC.....	124
6.2.3	Selection of data block element .....	124
6.2.4	Changing of data block element.....	124
6.2.5	Transmission steps.....	125
6.2.6	SVC valid .....	126
6.2.7	Handshake bits.....	126
6.2.8	Read/Write .....	127
6.2.9	Busy bit .....	127
6.2.10	Service channel initialization .....	128
6.2.11	Reaction to SVC handshake timeout.....	128
6.2.12	Reaction to error messages in the service channel .....	128

6.2.13	Service channel error messages .....	128
6.2.14	Procedure command functions via the service channel .....	131
6.3	RT Channel .....	137
6.3.1	Introduction .....	137
6.3.2	Read_Cyclic (RDC) .....	137
6.3.3	Write_Cyclic (WRC).....	137
6.3.4	Notify_Cyclic_Data (NCD) .....	137
6.4	Transmission and activation of Type 19 time.....	137
6.5	Multiplexing of real-time data with data containers .....	139
6.5.1	General .....	139
6.5.2	Functionality of standard data container .....	141
6.5.3	Functionality of extended data container (preferred function).....	145
6.5.4	Data container diagnostic .....	150
6.6	Handling of Real-time bits .....	150
6.6.1	General .....	150
6.6.2	Real-time bits (RTB).....	151
6.6.3	RTB word container .....	152
6.6.4	RTB list container .....	152
6.7	SMP.....	153
6.7.1	Definitions .....	153
6.7.2	Structure of the Session Control Header (SCH) .....	154
6.7.3	Evaluation sequence of session control header by the consumer.....	156
6.7.4	Multiplexing of two sessions (example) .....	157
6.7.5	Priorization .....	157
6.7.6	Diagnosis of SMP .....	158
6.7.7	Definition of SMP containers.....	158
6.7.8	Example .....	158
6.8	Oversampling.....	159
6.8.1	Description .....	159
6.8.2	General .....	159
6.8.3	Constraints .....	159
6.8.4	Oversampling Input .....	159
6.8.5	Oversampling Output.....	160
6.8.6	Oversampling Identification .....	160
6.8.7	Oversampling Configuration.....	161
6.8.8	Application example .....	161
6.8.9	Oversampling State Machine .....	161
7	Telegram timing and DLPDU handling .....	163
7.1	Communication mechanisms.....	163
7.1.1	Cycle time .....	163
7.1.2	Medium access.....	166
7.1.3	Calculation of the Type 19 telegram length .....	168
7.1.4	Timing calculation of RT channel .....	168
7.1.5	Calculation of S-0-1006 AT0 transmission starting time (t1).....	169
7.1.6	Timing calculation of UC channel.....	170
7.1.7	Telegram timing in CP0 .....	171
7.1.8	Telegram timing in CP1 and CP2 .....	172
7.1.9	Telegram timing in CP3 and CP4 .....	174
7.1.10	Unified communication mechanisms .....	175

7.1.11	Internet Protocol Services (IPS).....	187
7.2	Synchronization .....	224
7.2.1	Network synchronization.....	224
7.2.2	Synchronization of producer cycles.....	232
7.3	Processing methods of connection data .....	233
7.3.1	General .....	233
7.3.2	Synchronous processing of application data in the slave .....	234
7.3.3	Cyclic processing of application data in the slave .....	235
7.3.4	Non-synchronous processing of application data in the slave .....	236
8	Communication Error handling and monitoring.....	236
8.1	Invalid telegrams .....	236
8.2	Response to MDT and AT telegram failure.....	237
8.3	Error counters in the slave.....	237
8.3.1	Error effects on communication phases .....	237
8.4	Status codes of Type 19 communication profile (SCP) .....	238
8.5	Priority of diagnosis classes.....	240
Annex A (normative)	IDN – Identification numbers .....	242
A.1	IDN specification.....	242
A.1.1	Introduction .....	242
A.1.2	Element 1: structure of IDN .....	242
A.1.3	Element 2: structure of name.....	243
A.1.4	Element 3: structure of attribute.....	244
A.1.5	Element 4: structure of unit.....	246
A.1.6	Element 5: structure of minimum value .....	247
A.1.7	Element 6: structure of maximum value .....	247
A.1.8	Element 7: structure of operation data .....	247
A.1.9	Structure of Data status .....	249
A.2	Identification numbers in numerical orders .....	250
A.3	Detailed specification of communication-related IDNs .....	254
A.3.1	IDN S-0-0014 Interface status .....	254
A.3.2	IDN S-0-0021 IDN-list of invalid operation data for CP2.....	255
A.3.3	IDN S-0-0022 IDN-list of invalid operation data for CP3.....	256
A.3.4	IDN S-0-0026 IDN allocation of producer RTB word container .....	257
A.3.5	IDN S-0-0027 IDN allocation of consumer RTB word container .....	257
A.3.6	IDN S-0-0127 CP3 transition check .....	258
A.3.7	IDN S-0-0128 CP4 transition check .....	259
A.3.8	IDN S-0-0144 Producer RTB word container.....	260
A.3.9	IDN S-0-0145 Consumer RTB word container .....	260
A.3.10	IDN S-0-0187 IDN-list of configurable data as producer.....	261
A.3.11	IDN S-0-0188 IDN-list of configurable data as consumer .....	261
A.3.12	IDN S-0-0328 Bit allocation of producer RTB word container .....	262
A.3.13	IDN S-0-0329 Bit allocation of consumer RTB word container.....	263
A.3.14	IDN S-0-0360 MDT data container A1.....	263
A.3.15	IDN S-0-0361 MDT data container B1.....	264
A.3.16	IDN S-0-0362 MDT data container A list index .....	265
A.3.17	IDN S-0-0363 MDT data container B list index.....	266
A.3.18	IDN S-0-0364 AT data container A1.....	267
A.3.19	IDN S-0-0365 AT data container B1.....	268
A.3.20	IDN S-0-0366 AT data container A list index.....	269

A.3.21	IDN S-0-0367 AT data container B list index .....	270
A.3.22	IDN S-0-0368 Data container A pointer .....	271
A.3.23	IDN S-0-0369 Data container B pointer .....	273
A.3.24	IDN S-0-0370 MDT data container A/B configuration list .....	274
A.3.25	IDN S-0-0371 AT data container A/B configuration list .....	275
A.3.26	IDN S-0-0394 List IDN .....	275
A.3.27	IDN S-0-0395 List index .....	276
A.3.28	IDN S-0-0396 Number of list elements .....	277
A.3.29	IDN S-0-0397 List segment .....	277
A.3.30	IDN S-0-0398 IDN list of configurable real-time bits as producer .....	278
A.3.31	IDN S-0-0399 IDN list of configurable real-time bits as consumer .....	279
A.3.32	IDN S-0-0444 IDN-list of configurable data in the AT data container .....	280
A.3.33	IDN S-0-0445 IDN-list of configurable data in the MDT data container .....	280
A.3.34	IDN S-0-0450 MDT data container A2 .....	281
A.3.35	IDN S-0-0451 MDT data container A3 .....	282
A.3.36	IDN S-0-0452 MDT data container A4 .....	283
A.3.37	IDN S-0-0453 MDT data container A5 .....	284
A.3.38	IDN S-0-0454 MDT data container A6 .....	285
A.3.39	IDN S-0-0455 MDT data container A7 .....	286
A.3.40	IDN S-0-0456 MDT data container A8 .....	287
A.3.41	IDN S-0-0457 MDT data container A9 .....	288
A.3.42	IDN S-0-0458 MDT data container A10 .....	289
A.3.43	IDN S-0-0459 MDT data container B2 .....	289
A.3.44	IDN S-0-0480 AT data container A2 .....	290
A.3.45	IDN S-0-0481 AT data container A3 .....	291
A.3.46	IDN S-0-0482 AT data container A4 .....	292
A.3.47	IDN S-0-0483 AT data container A5 .....	293
A.3.48	IDN S-0-0484 AT data container A6 .....	294
A.3.49	IDN S-0-0485 AT data container A7 .....	295
A.3.50	IDN S-0-0486 AT data container A8 .....	296
A.3.51	IDN S-0-0487 AT data container A9 .....	297
A.3.52	IDN S-0-0488 AT data container A10 .....	298
A.3.53	IDN S-0-0489 AT data container B2 .....	299
A.3.54	IDN S-0-0490 MDT data container A2 configuration list .....	300
A.3.55	IDN S-0-0491 MDT data container A3 configuration list .....	301
A.3.56	IDN S-0-0492 MDT data container A4 configuration list .....	302
A.3.57	IDN S-0-0493 MDT data container A5 configuration list .....	302
A.3.58	IDN S-0-0494 MDT data container A6 configuration list .....	303
A.3.59	IDN S-0-0495 MDT data container A7 configuration list .....	304
A.3.60	IDN S-0-0496 MDT data container A8 configuration list .....	304
A.3.61	IDN S-0-0497 MDT data container A9 configuration list .....	305
A.3.62	IDN S-0-0498 MDT data container A10 configuration list .....	306
A.3.63	IDN S-0-0500 AT data container A2 configuration list .....	306
A.3.64	IDN S-0-0501 AT data container A3 configuration list .....	307
A.3.65	IDN S-0-0502 AT data container A4 configuration list .....	308
A.3.66	IDN S-0-0503 AT data container A5 configuration list .....	308
A.3.67	IDN S-0-0504 AT data container A6 configuration list .....	309
A.3.68	IDN S-0-0505 AT data container A7 configuration list .....	310
A.3.69	IDN S-0-0506 AT data container A8 configuration list .....	310

A.3.70	IDN S-0-0507 AT data container A9 configuration list .....	311
A.3.71	IDN S-0-0508 AT data container A10 configuration list .....	312
A.3.72	IDN S-0-1000.0.0 List of SCP Classes & Version .....	312
A.3.73	IDN S-0-1000.0.1 Active SCP Classes .....	316
A.3.74	IDN S-0-1000.0.2 Communication compatible functions .....	316
A.3.75	IDN S-0-1002 Communication cycle time .....	317
A.3.76	IDN S-0-1003 Allowed MST losses in CP3/CP4 .....	318
A.3.77	IDN S-0-1005 Minimum feedback processing time ( $t_5$ ) .....	319
A.3.78	IDN S-0-1006 AT transmission starting time ( $t_1$ ) .....	320
A.3.79	IDN S-0-1007 Synchronization time (Tsync) .....	320
A.3.80	IDN S-0-1008 Command value valid time ( $t_3$ ) .....	322
A.3.81	IDN S-0-1009 Device Control (C-DEV) offset in MDT .....	322
A.3.82	IDN S-0-1010 Lengths of MDTs .....	323
A.3.83	IDN S-0-1011 Device Status (S-DEV) offset in AT .....	324
A.3.84	IDN S-0-1012 Lengths of ATs .....	325
A.3.85	IDN S-0-1013 SVC offset in MDT .....	327
A.3.86	IDN S-0-1014 SVC offset in AT .....	327
A.3.87	IDN S-0-1015 Ring delay .....	328
A.3.88	IDN S-0-1016 Slave delay (P/S) .....	329
A.3.89	IDN S-0-1017 UC channel transmission time .....	330
A.3.90	IDN S-0-1019 MAC address .....	331
A.3.91	IDN S-0-1020.0.1 Current IP address .....	331
A.3.92	IDN S-0-1020 IP address .....	332
A.3.93	IDN S-0-1021.0.1 Current subnet mask .....	333
A.3.94	IDN S-0-1021 Subnet mask .....	333
A.3.95	IDN S-0-1022.0.1 Current gateway address .....	334
A.3.96	IDN S-0-1022 Gateway address .....	335
A.3.97	IDN S-0-1023 SYNC jitter .....	336
A.3.98	IDN S-0-1024 SYNC data measuring procedure command .....	337
A.3.99	IDN S-0-1026 Version of communication hardware .....	338
A.3.100	IDN S-0-1027.0.1 Requested MTU .....	339
A.3.101	IDN S-0-1027.0.2 Effective MTU .....	340
A.3.102	IDN S-0-1028 Error counter MST-P/S .....	341
A.3.103	IDN S-0-1031 Test pin assignment Port 1 & Port 2 .....	342
A.3.104	IDN S-0-1032 Communication control .....	343
A.3.105	IDN S-0-1034 PHY error counter Port 1 & Port 2 .....	344
A.3.106	IDN S-0-1035.0.01 Error counter P&S .....	345
A.3.107	IDN S-0-1035.0.0 Error counter Port 1 & Port 2 .....	346
A.3.108	IDN S-0-1036 Inter Frame Gap .....	348
A.3.109	IDN S-0-1037 Slave jitter .....	349
A.3.110	IDN S-0-1039.0.1 Current active hostname .....	350
A.3.111	IDN S-0-1039 Hostname .....	350
A.3.112	IDN S-0-1040 Sub-device address .....	351
A.3.113	IDN S-0-1041 AT Command value valid time ( $t_9$ ) .....	352
A.3.114	IDN S-0-1042 Topology index .....	353
A.3.115	IDN S-0-1044 Device Control (C-DEV) .....	354
A.3.116	IDN S-0-1045 Device Status .....	356
A.3.117	IDN S-0-1046 List of device addresses in device .....	358
A.3.118	IDN S-0-1047 Maximum Consumer Activation Time ( $t_{11}$ ) .....	359

A.3.119	IDN S-0-1048 Activate network settings.....	360
A.3.120	IDN S-0-1050.x.01 Connection setup.....	360
A.3.121	IDN S-0-1050.x.02 Connection Number.....	362
A.3.122	IDN S-0-1050.x.03 Telegram assignment.....	363
A.3.123	IDN S-0-1050.x.04 Max. Length of Connection.....	364
A.3.124	IDN S-0-1050.x.05 Current length of connection.....	365
A.3.125	IDN S-0-1050.x.06 Configuration List.....	365
A.3.126	IDN S-0-1050.x.07 Assigned connection capability.....	366
A.3.127	IDN S-0-1050.x.08 Connection Control.....	367
A.3.128	IDN S-0-1050.x.09 Connection state.....	367
A.3.129	IDN S-0-1050.x.10 Producer cycle time.....	368
A.3.130	IDN S-0-1050.x.11 Allowed Data Losses.....	369
A.3.131	IDN S-0-1050.x.12 Error Counter Data Losses.....	369
A.3.132	IDN S-0-1050.x.20 IDN Allocation of real-time bit.....	370
A.3.133	IDN S-0-1050.x.21 IDN Allocation of real-time bit.....	370
A.3.134	IDN S-0-1051 Image of connection setups.....	371
A.3.135	IDN S-0-1060.x.01 Default configuration.....	372
A.3.136	IDN S-0-1060.x.02 Configuration mask.....	372
A.3.137	IDN S-0-1060.x.03 Maximum quantity of this connection capability.....	373
A.3.138	IDN S-0-1060.x.04 Max. connection length of connection capability.....	373
A.3.139	IDN S-0-1060.x.06 Configurable IDNs of connection capability.....	374
A.3.140	IDN S-0-1060.x.07 Maximum processing time.....	375
A.3.141	IDN S-0-1060.x.10 Minimum producer cycle time.....	376
A.3.142	IDN S-0-1061 Maximum TSref-Counter.....	376
A.3.143	IDN S-0-1080.x.02 Producer RTB list container.....	377
A.3.144	IDN S-0-1080.x.03 IDN allocation of producer RTB list container.....	377
A.3.145	IDN S-0-1080.x.04 Bit allocation of producer RTB list container.....	378
A.3.146	IDN S-0-1081.x.02 Consumer RTB list container.....	379
A.3.147	IDN S-0-1081.x.03 IDN allocation of consumer RTB list container.....	379
A.3.148	IDN S-0-1081.x.04 Bit allocation of consumer RTB list container.....	380
A.3.149	IDN S-0-1099.0.1 Test-IDN Control for SCP Conformity Purpose.....	381
A.3.150	IDN S-0-1099.0.2 Test-IDN Container for SCP Conformity purpose.....	382
A.3.151	IDN S-0-1100.0.01 Diagnostic counter sent SMP fragments.....	382
A.3.152	IDN S-0-1100.0.02 Diagnostic counter received SMP fragments.....	383
A.3.153	IDN S-0-1100.0.03 Diagnostic counter discarded SMP fragments.....	383
A.3.154	IDN S-0-1101.x.01 SMP Container Data.....	384
A.3.155	IDN S-0-1101.x.02 List of session identifiers.....	385
A.3.156	IDN S-0-1101.x.03 List of session priorities.....	385
A.3.157	IDN S-0-1150.x.01 OVS Control (C-OVS).....	386
A.3.158	IDN S-0-1150.x.02 OVS Status (S-OVS).....	387
A.3.159	IDN S-0-1150.x.03 OVS Container.....	388
A.3.160	IDN S-0-1150.x.04 Sample time.....	389
A.3.161	IDN S-0-1150.x.05 Phase shift.....	390
A.3.162	IDN S-0-1150.x.06 Configuration List OVS – IDNs.....	390
A.3.163	IDN S-0-1150.x.07 Configuration List OVS – Offset.....	391
A.3.164	IDN S-0-1150.x.08 Configuration List OVS – Length.....	392
A.3.165	IDN S-0-1150.x.09 Assigned Oversampling Capability.....	392
A.3.166	IDN S-0-1150.x.10 Number of Samples.....	393
A.3.167	IDN S-0-1151.x.01 Maximum number of samples.....	394

A.3.168	IDN S-0-1151.x.02 Internal resolution .....	394
A.3.169	IDN S-0-1151.x.03 Maximum quantity of this oversampling capability .....	395
A.3.170	IDN S-0-1151.x.04 Minimum sample time .....	396
A.3.171	IDN S-0-1151.x.06 Configurable IDNs of OVS capability .....	396
A.3.172	IDN S-0-1151.x.07 Configurable IDNs of OVS Capability – Offset .....	397
A.3.173	IDN S-0-1151.x.08 Configurable IDNs of OVS Capability – Length .....	397
A.3.174	IDN S-0-1152 Amount of OVS Domains .....	398
Annex B (normative)	SCP– Classification .....	399
B.1	General concept of profiling .....	399
B.2	Function Groups related to the SCP .....	400
B.2.1	FG SCP Identification .....	400
B.2.2	FG Timing .....	400
B.2.3	FG Telegram Setup .....	400
B.2.4	FG Control .....	401
B.2.5	FG Bus-Diagnosis .....	401
B.2.6	FG Connection .....	401
B.2.7	FG NRT .....	402
B.2.8	FG MUX .....	402
B.2.9	FG SMP .....	403
B.2.10	FG RTB .....	404
B.3	Type 19 communication classes .....	404
B.3.1	General .....	404
B.3.2	SCP_FixCFG .....	404
B.3.3	SCP_FixCFG_0x02 .....	406
B.3.4	SCP_FixCFG_0x03 .....	406
B.3.5	SCP_VarCFG .....	406
B.3.6	SCP_VarCFG_0x02 .....	407
B.3.7	SCP_VarCFG_0x03 .....	408
B.3.8	SCP_Sync .....	408
B.3.9	SCP_Sync .....	408
B.3.10	SCP_Sync_0x02 .....	409
B.3.11	SCP_Sync_0x03 .....	409
B.3.12	SCP_WD .....	409
B.3.13	SCP_WD_0x02 .....	409
B.3.14	SCP_Diag .....	410
B.3.15	SCP_RTB .....	410
B.3.16	SCP_HP .....	410
B.3.17	SCP_SMP .....	410
B.3.18	SCP_Mux .....	411
B.3.19	SCP_Ext_Mux .....	411
B.3.20	SCP_NRT .....	411
B.3.21	SCP_Sig .....	412
B.3.22	SCP_ListSeg .....	412
B.3.23	SCP_IPS .....	412
B.3.24	SCP_Cap .....	412
B.3.25	SCP_RTBListProd .....	413
B.3.26	SCP_RTBListCons .....	413
B.3.27	SCP_SysTime .....	413
B.3.28	SCP_RTBWordProd .....	413

B.3.29	SCP_RTBWordCons.....	413
B.3.30	SCP_SafetyCon.....	414
B.3.31	SCP_OvS_Basic.....	414
B.3.32	SCP_NRTPC.....	415
B.3.33	SCP_Cyc.....	415
Annex C (normative)	GDP (Generic Device Profile) .....	416
C.1	General.....	416
C.2	Function Groups .....	416
C.2.1	Function Group Diagnosis .....	416
C.2.2	Function Group Archiving .....	418
C.2.3	Function Group Administration.....	418
C.2.4	Function Group Identification.....	418
C.2.5	Function Group State machine.....	419
C.2.6	Function Group Time .....	423
C.2.7	Function Group Conformance Test GDP .....	424
C.3	Classification .....	424
C.3.1	General .....	424
C.3.2	GDP_Basic.....	424
C.3.3	GDP_DiagT .....	424
C.3.4	GDP_DiagTAdv .....	425
C.3.5	GDP_LNg .....	425
C.3.6	GDP_PWD .....	425
C.3.7	GDP_Id .....	425
C.3.8	GDP_Rev .....	425
C.3.9	GDP_QA .....	426
C.3.10	GDP_CKs.....	426
C.3.11	GDP_CKsUser.....	426
C.3.12	GDP_StM .....	426
C.3.13	GDP_BKP.....	426
C.3.14	GDP_BKPAAdv.....	427
C.3.15	GDP_RST.....	427
C.3.16	GDP_CIPSafetyDev.....	427
C.4	List of all GDP related IDNs .....	427
C.4.1	IDN specification .....	427
C.4.2	Identification numbers in numerical orders.....	427
C.4.3	Detailed specification of communication-related IDNs.....	429
C.5	GDP status codes .....	475
Bibliography	.....	477
Figure 1	– Example of offsets within MDT payload .....	45
Figure 2	– Example of Offsets within AT payload .....	57
Figure 3	– Flow of application data .....	63
Figure 4	– Telegram assignment and connection length.....	64
Figure 5	– Connection control state machine producer.....	66
Figure 6	– Connection control state machine consumer .....	69
Figure 7	– Communication phase (CP) state machine .....	74
Figure 8	– Sub-state machine of CP0.....	75

Figure 9 – Sub-state machine of CP1.....	79
Figure 10 – CPSwitch state machine master .....	88
Figure 11 – CPSwitch state machine of the slave.....	93
Figure 12 – Address allocation with line .....	100
Figure 13 – Address allocation with ring.....	100
Figure 14 – Address allocation with interrupted ring.....	101
Figure 15 – Ring topology with P and S channel .....	102
Figure 16 – Line topology with P channel (as example).....	103
Figure 17 – Block diagram of a slave .....	103
Figure 18 – Topology states of a slave.....	104
Figure 19 – Addressing of multi-slave device .....	105
Figure 20 – Multi-slave device in ring topology or not last in line topology.....	106
Figure 21 – Multi-slave device as last in line topology.....	106
Figure 22 – Multi-slave device in line (left).....	108
Figure 23 – Multi-slave device in line (right).....	108
Figure 24 – Multi-slave device in ring.....	108
Figure 25 – Topology state machine of a slave .....	109
Figure 26 – Ring without break .....	112
Figure 27 – Ring break .....	113
Figure 28 – Ring break on master .....	113
Figure 29 – Recovery of P channel (1).....	114
Figure 30 – Recovery of P channel (2).....	114
Figure 31 – Recovery of S channel (1).....	115
Figure 32 – Recovery of S channel (2).....	115
Figure 33 – Communication phase and hot-plug state machine .....	117
Figure 34 – Service channel handling diagram.....	124
Figure 35 – Communication step proceeding diagram .....	125
Figure 36 – State machine for procedure command execution .....	134
Figure 37 – Interaction of procedure command control and acknowledgement .....	135
Figure 38 – Procedure command execution without interrupt .....	136
Figure 39 – Procedure command execution with interrupt .....	136
Figure 40 – Procedure command execution with error message.....	137
Figure 41 – Type 19 Time Transmission .....	139
Figure 42 – Data container configuration without acknowledge (slave).....	143
Figure 43 – Data container configuration with acknowledge (slave).....	144
Figure 44 – Processing of list index in the MDT data.....	145
Figure 45 – Structure of extended data container.....	148
Figure 46 – Transport container.....	154
Figure 47 – UML Sequence Diagram: Multiplexing of two sessions (Example) .....	157
Figure 48 – Oversampling overview .....	159
Figure 49 – Oversampling timing input (producer).....	160
Figure 50 – Oversampling timing output (consumer) .....	160
Figure 51 – Oversampling state machine .....	162

Figure 52 – Synchronized cascaded networks.....	164
Figure 53 – Diagram of phase locked loop .....	165
Figure 54 – Synchronization process .....	166
Figure 55 – Telegram timing reference.....	167
Figure 56 – Calculation of telegram length.....	168
Figure 57 – Calculation of t1 .....	169
Figure 58 – Determination of UC channel.....	171
Figure 59 – Timing diagram of CP0.....	171
Figure 60 – Timing diagram of CP1 and CP2 with 2 MDT, 2AT and UC channel.....	172
Figure 61 – Timing diagram of CP1 and CP2 with 4 MDT, 4 AT and UC channel.....	173
Figure 62 – Timing diagram of CP1 and CP2 with 2 MDT, UC channel and 2 AT.....	173
Figure 63 – Timing diagram of CP1 and CP2 with 4 MDT, UC channel and 4 AT.....	174
Figure 64 – Telegram sequence.....	175
Figure 65 – Time delay of store and forward .....	176
Figure 66 – Time delay of cut through.....	177
Figure 67 – The two defined positions of the UC channel.....	178
Figure 68 – First and last transmit during UC channel.....	179
Figure 69 – UC telegram with payload .....	180
Figure 70 – Activated and deactivated collision buffer.....	183
Figure 71 – Double line without slave in between.....	184
Figure 72 – Double line with one slave in between.....	185
Figure 73 – Double line with several slaves in between.....	186
Figure 74 – S/IP busy response .....	191
Figure 75 – Client connection .....	192
Figure 76 – Server connection .....	193
Figure 77 – S/IP asynchronous request .....	194
Figure 78 – S/IP PDU .....	194
Figure 79 – S/IP error response .....	196
Figure 80 – UDP Browsing.....	201
Figure 81 – Sequence of setting a new network configuration on one device using UDP....	204
Figure 82 – UDP Identification .....	209
Figure 83 – Usage UDP reset request.....	221
Figure 84 – Sequence for watchdog trigger service and client application timeout.....	222
Figure 85 – Synchronization timing .....	225
Figure 86 – Synchronization trigger .....	225
Figure 87 – Timing of TSref with ring and line.....	227
Figure 88 – Timing of TSref with interrupted ring .....	229
Figure 89 – Determination of the SYNC delay time .....	230
Figure 90 – Definition of TSref.....	231
Figure 91 – Timing with different cycle times .....	233
Figure 92 – Timing with the same cycle times .....	233
Figure 93 – Synchronous application data processing.....	235
Figure 94 – Cyclic application data processing.....	236

Figure 95 – Non-synchronous application data processing .....	236
Figure A.1 – IDN name structure .....	244
Figure A.2 – Unit structure .....	246
Figure A.3 – Structure of IDN operation data with variable length .....	248
Figure A.4 – Example of synchronization timing with different producer cycles.....	321
Figure A.5 – Definition of MDT length .....	324
Figure A.6 – Lengths of MDTs (example) .....	324
Figure A.7 – Definition of AT length .....	326
Figure A.8 – Lengths of ATs (example) .....	326
Figure A.9 – Structure of MAC address .....	331
Figure A.10 – Structure of IP address .....	333
Figure A.11 – Structure of subnet mask .....	334
Figure A.12 – Structure of gateway address.....	336
Figure A.13 – Structure of List of Sub-device addresses .....	359
Figure A.14 – Definition of connection length .....	365
Figure A.15 – Synchronization with ring .....	375
Figure A.16 – Configuration example .....	389
Figure B.1 – Technical Profiling in Type 19.....	399
Figure C.1 – State machine without class GDP_StM .....	420
Figure C.2 – State machine without class GDP_StM .....	422
Figure C.3 – Password State Machine .....	437
Figure C.4 – Structure of Date information .....	457
Figure C.5 – Structure of QA date information.....	458
Figure C.6 – Structure of Service date information .....	459
Figure C.7 – Structure of Calibration date information.....	460
Figure C.8 – Structure of Calibration due date information .....	461
Figure C.9 – Mapping of data into the InputData and OutputData container .....	465
Table 1 – Ethernet DLPDU identification .....	37
Table 2 – Data structure in a DLPDU .....	37
Table 3 – DLPDU payload header .....	38
Table 4 – DLPDU type .....	39
Table 5 – MDT header .....	39
Table 6 – MDT header to be considered by the slave.....	39
Table 7 – MDT phase.....	40
Table 8 – MDT0 structure in CP0 .....	41
Table 9 – Communication version .....	41
Table 10 – MDT0 in CP1 and CP2 (topology indices 0 to 127) .....	42
Table 11 – MDT1 in CP1 and CP2 (topology indices 128 to 255) .....	43
Table 12 – MDT2 in CP1 and CP2 (topology indices 256 to 383) .....	43
Table 13 – MDT3 in CP1 and CP2 (topology indices 384 to 511) .....	44
Table 14 – MDT data field.....	45
Table 15 – MDT hot-plug field.....	46

Table 16 – HP address in MDT-HP field.....	46
Table 17 – HP control field (in HP0 and HP1) .....	47
Table 18 – Extended Function Field .....	48
Table 19 – MDT SVC (for each slave).....	49
Table 20 – SVC control word (DLL).....	49
Table 21 – MDT device control .....	50
Table 22 – MDT application data.....	50
Table 23 – Device control field (C-DEV).....	51
Table 24 – AT MST header .....	51
Table 25 – AT header fields to be considered by the slave.....	52
Table 26 – AT0 structure in CP0 .....	53
Table 27 – Topology index in AT0-CP0 .....	53
Table 28 – AT0 in CP1 and CP2 (topology indices 0 to 127) .....	54
Table 29 – AT1 in CP1 and CP2 (topology indices 128 to 255) .....	54
Table 30 – AT2 in CP1 and CP2 (topology indices 256 to 383) .....	55
Table 31 – AT3 in CP1 and CP2 (topology indices 384 to 511) .....	55
Table 32 – AT data field.....	56
Table 33 – AT hot-plug field in HP0 and HP1 .....	57
Table 34 – HP address in AT-HP field.....	58
Table 35 – HP status field (in HP0 and HP1).....	58
Table 36 – AT SVC (for each slave).....	59
Table 37 – AT SVC status description (DLL) .....	59
Table 38 – AT device status.....	60
Table 39 – AT connection data .....	60
Table 40 – Device status field .....	61
Table 41 – Structure of the connection.....	64
Table 42 – Connection control (C-CON).....	65
Table 43 – Connection control combinations .....	67
Table 44 – States of the producer state machine .....	67
Table 45 – States of the producer sub-state machine.....	67
Table 46 – Producer transitions .....	68
Table 47 – States of the consumer state machine .....	70
Table 48 – States of the consumer sub-state machine .....	70
Table 49 – Consumer transitions.....	71
Table 50 – States of master CP0 sub-state machine .....	76
Table 51 – Transitions of master CP0 sub-state machine.....	76
Table 52 – States of slave CP0 sub-state machine .....	77
Table 53 – Transitions of slave CP0 sub-state machine .....	77
Table 54 – States of master CP1 sub-state machine .....	79
Table 55 – Transitions of master CP1 sub-state machine.....	80
Table 56 – States of slave CP1 sub-state machine .....	80
Table 57 – Transitions of slave CP1 sub-state machine .....	81
Table 58 – MDT hot-plug field in CP3 and after ring recovery .....	83

Table 59 – Transitions of CP state machine .....	85
Table 60 – States of master CPSwitch state machine .....	89
Table 61 – Transitions of master CPSwitch state machine .....	90
Table 62 – States of slave CPSwitch state machine .....	94
Table 63 – Transitions of slave CPSwitch state machine .....	95
Table 64 – Transitions of slave CPSwitch state machine (transitions with warning) .....	95
Table 65 – Transitions of slave CPSwitch state machine (transitions with error) .....	96
Table 66 – Diagnostics of CPS state machine slave .....	97
Table 67 – Determination of the topology indices (1) .....	106
Table 68 – Determination of the topology indices (2) .....	106
Table 69 – Determination of the topology indices (3) .....	107
Table 70 – Topology status of multi-slave device .....	107
Table 71 – Topology settings of multi-slave device .....	107
Table 72 – States of Topology state machine of slave .....	109
Table 73 – Transitions of Topology state machine .....	111
Table 74 – Transitions of Topology state machine (transitions with warning) .....	111
Table 75 – Transitions of Topology state machine (transitions with error) .....	112
Table 76 – MDT hot-plug field in HP0 .....	119
Table 77 – MDT hot-plug field in HP1 .....	120
Table 78 – AT hot-plug field in HP1 .....	120
Table 79 – Transitions of HP state machine .....	121
Table 80 – AT hot-plug field in HP1 (error) .....	122
Table 81 – Condition for modifying data block elements .....	125
Table 82 – List of data block element and step numbers .....	126
Table 83 – SVC channel evaluation .....	127
Table 84 – Reaction to handshake timeout .....	128
Table 85 – Reaction to error message .....	128
Table 86 – Error messages .....	129
Table 87 – Structure of Procedure command control .....	132
Table 88 – Procedure command acknowledgment (data status) .....	132
Table 89 – List of valid standard data container combinations .....	142
Table 90 – Example of IDN and bit allocation of RTB container .....	153
Table 91 – Structure of the Session Control Header .....	155
Table 92 – Lists in S-0-1101.7.x .....	158
Table 93 – States of the oversampling state machine .....	162
Table 94 – Transitions of the oversampling state machine .....	163
Table 95 – Summary of Jitter in a Type 19 network .....	165
Table 96 – Parameter for timing calculation .....	167
Table 97 – Default values of CP1/2 (case 1) .....	172
Table 98 – Default values of CP1/2 (case 2) .....	173
Table 99 – Structure of port/MAC table .....	182
Table 100 – Insertion of entry .....	182
Table 101 – Update of entries .....	183

Table 102 – Slave collision buffer .....	184
Table 103 – Physical topology Master (CP0).....	186
Table 104 – Collision buffer of Master.....	187
Table 105 – Definition of data types .....	188
Table 106 – Overview on IP-based protocols .....	189
Table 107 – Message Types .....	195
Table 108 – User-specific Message Types .....	196
Table 109 – Common error codes .....	198
Table 110 – Nameplate IDs.....	210
Table 111 – IPS classes .....	223
Table 112 – Class TCP Basic .....	224
Table 113 – Class UDP Basic .....	224
Table 114 – Class Device Management .....	224
Table 115 – Explore & IP Configuration Services .....	224
Table 116 – Class Type 19 Parameter Access .....	224
Table 117 – SCP specific status codes .....	238
Table 118 – Overview on diagnosis classes .....	241
Table A.1 – Data block structure .....	242
Table A.2 – Parameter structure .....	243
Table A.3 – Element 3 of IDNs.....	245
Table A.4 – Valid combinations of the display formats .....	246
Table A.5 – Example of the structure of an IDN-list.....	249
Table A.6 – Data status structure.....	250
Table A.7 – List of relevant communication-related IDNs .....	250
Table A.8 – Attributes for IDN S-0-0014 .....	254
Table A.9 – Structure of interface status .....	255
Table A.10 – Attributes for IDN S-0-0021 .....	256
Table A.11 – Attributes for IDN S-0-0022 .....	256
Table A.12 – Attributes for IDN S-0-0026 .....	257
Table A.13 – Attributes for IDN S-0-0027 .....	258
Table A.14 – Attributes for IDN S-0-0127 .....	258
Table A.15 – Attributes for IDN S-0-0128 .....	259
Table A.16 – Attributes for IDN S-0-0144 .....	260
Table A.17 – Attributes for IDN S-0-0027 .....	260
Table A.18 – Attributes for IDN S-0-0187 .....	261
Table A.19 – Attributes for IDN S-0-0188 .....	262
Table A.20 – Attributes for IDN S-0-0328 .....	262
Table A.21 – Attributes for IDN S-0-0329 .....	263
Table A.22 – Attributes for IDN S-0-0360 .....	264
Table A.23 – Attributes for IDN S-0-0361 .....	265
Table A.24 – Attributes for IDN S-0-0362 .....	266
Table A.25 – List index of MDT data container A.....	266
Table A.26 – Attributes for IDN S-0-0363 .....	267

Table A.27 – List index of MDT data container B.....	267
Table A.28 – Attributes for IDN S-0-0364.....	268
Table A.29 – Attributes for IDN S-0-0365.....	269
Table A.30 – Attributes for IDN S-0-0366.....	270
Table A.31 – List index of AT data container A.....	270
Table A.32 – Attributes for IDN S-0-0367.....	271
Table A.33 – List index of AT data container B.....	271
Table A.34 – Attributes for IDN S-0-0368.....	272
Table A.35 – Data container A pointer structure.....	273
Table A.36 – Attributes for IDN S-0-0369.....	273
Table A.37 – Data container B pointer structure.....	274
Table A.38 – Attributes for IDN S-0-0370.....	274
Table A.39 – Attributes for IDN S-0-0371.....	275
Table A.40 – Attributes for IDN S-0-0394.....	276
Table A.41 – Attributes for IDN S-0-0395.....	276
Table A.42 – Attributes for IDN S-0-0396.....	277
Table A.43 – Attributes for IDN S-0-0397.....	278
Table A.44 – Attributes for IDN S-0-0398.....	279
Table A.45 – Attributes for IDN S-0-0399.....	279
Table A.46 – Attributes for IDN S-0-0444.....	280
Table A.47 – Attributes for IDN S-0-0445.....	281
Table A.48 – Attributes for IDN S-0-0450.....	281
Table A.49 – Attributes for IDN S-0-0451.....	282
Table A.50 – Attributes for IDN S-0-0452.....	283
Table A.51 – Attributes for IDN S-0-0453.....	284
Table A.52 – Attributes for IDN S-0-0454.....	285
Table A.53 – Attributes for IDN S-0-0455.....	286
Table A.54 – Attributes for IDN S-0-0456.....	287
Table A.55 – Attributes for IDN S-0-0457.....	288
Table A.56 – Attributes for IDN S-0-0458.....	289
Table A.57 – Attributes for IDN S-0-0459.....	290
Table A.58 – Attributes for IDN S-0-0480.....	291
Table A.59 – Attributes for IDN S-0-0481.....	292
Table A.60 – Attributes for IDN S-0-0482.....	293
Table A.61 – Attributes for IDN S-0-0483.....	294
Table A.62 – Attributes for IDN S-0-0484.....	295
Table A.63 – Attributes for IDN S-0-0485.....	296
Table A.64 – Attributes for IDN S-0-0486.....	297
Table A.65 – Attributes for IDN S-0-0487.....	298
Table A.66 – Attributes for IDN S-0-0488.....	299
Table A.67 – Attributes for IDN S-0-0489.....	300
Table A.68 – Attributes for IDN S-0-0490.....	301
Table A.69 – Attributes for IDN S-0-0491.....	301

Table A.70 – Attributes for IDN S-0-0492 .....	302
Table A.71 – Attributes for IDN S-0-0493 .....	303
Table A.72 – Attributes for IDN S-0-0494 .....	303
Table A.73 – Attributes for IDN S-0-0495 .....	304
Table A.74 – Attributes for IDN S-0-0496 .....	305
Table A.75 – Attributes for IDN S-0-0497 .....	305
Table A.76 – Attributes for IDN S-0-0498 .....	306
Table A.77 – Attributes for IDN S-0-0500 .....	307
Table A.78 – Attributes for IDN S-0-0501 .....	307
Table A.79 – Attributes for IDN S-0-0502 .....	308
Table A.80 – Attributes for IDN S-0-0503 .....	309
Table A.81 – Attributes for IDN S-0-0504 .....	309
Table A.82 – Attributes for IDN S-0-0505 .....	310
Table A.83 – Attributes for IDN S-0-0506 .....	311
Table A.84 – Attributes for IDN S-0-0507 .....	311
Table A.85 – Attributes for IDN S-0-0508 .....	312
Table A.86 – Attributes of IDN S-0-1000.0.0 .....	313
Table A.87 – SCP type and version .....	314
Table A.88 – Attributes of IDN S-0-1000.0.1 .....	316
Table A.89 – Attributes of IDN S-0-1000.0.2 .....	317
Table A.90 – Communication compatible status .....	317
Table A.91 – Attributes of IDN S-0-1002 .....	318
Table A.92 – Attributes of IDN S-0-1003 .....	318
Table A.93 – Attributes of IDN S-0-1005 .....	319
Table A.94 – Attributes of IDN S-0-1006 .....	320
Table A.95 – Attributes for IDN S-0-1007 .....	321
Table A.96 – Attributes for IDN S-0-1008 .....	322
Table A.97 – Attributes of IDN S-0-1009 .....	322
Table A.98 – C-DEV Offset in MDT .....	323
Table A.99 – Attributes of IDN S-0-1010 .....	323
Table A.100 – Attributes of IDN S-0-1011 .....	325
Table A.101 – S-DEV Offset in AT .....	325
Table A.102 – Attributes of IDN S-0-1012 .....	326
Table A.103 – Attributes of IDN S-0-1013 .....	327
Table A.104 – SVC Offset in MDT .....	327
Table A.105 – Attributes of IDN S-0-1014 .....	328
Table A.106 – SVC Offset in AT .....	328
Table A.107 – Attributes of IDN S-0-1015 .....	329
Table A.108 – Attributes of IDN S-0-1016 .....	329
Table A.109 – Attributes of IDN S-0-1017 .....	330
Table A.110 – Attributes of IDN S-0-1019 .....	331
Table A.111 – Attributes of IDN S-0-1020.0.1 .....	332
Table A.112 – Attributes of IDN S-0-1020 .....	332

Table A.113 – Attributes of IDN S-0-1021.0.1 .....	333
Table A.114 – Attributes of IDN S-0-1021 .....	334
Table A.115 – Attributes of IDN S-0-1022.0.1 .....	335
Table A.116 – Attributes of IDN S-0-1022 .....	335
Table A.117 – Attributes of IDN S-0-1023 .....	336
Table A.118 – Attributes of IDN S-0-1024 .....	338
Table A.119 – Attributes of IDN S-0-1026 .....	339
Table A.120 – Attributes of IDN S-0-1027.0.1 .....	339
Table A.121 – Upper and lower Limit of MTU .....	340
Table A.122 – Attributes of IDN S-0-1027.0.2 .....	341
Table A.123 – Attributes of IDN S-0-1028 .....	341
Table A.124 – Attributes of IDN S-0-1031 .....	342
Table A.125 – Structure of test pin assignment Port 1 & Port 2 .....	342
Table A.126 – Selectable output signals .....	343
Table A.127 – Attributes of IDN S-0-1032 .....	343
Table A.128 – Communication control.....	344
Table A.129 – Attributes of IDN S-0-1035 .....	344
Table A.130 – Coding of PHY errors .....	345
Table A.131 – Attributes of IDN S-0-1035.0.01 .....	345
Table A.132 – Checking of MAC telegrams .....	346
Table A.133 – Attributes of IDN S-0-1035.0.0 .....	347
Table A.134 – Checking of MAC telegrams .....	347
Table A.135 – Attributes of IDN S-0-1036 .....	348
Table A.136 – Attributes of IDN S-0-1037 .....	349
Table A.137 – Attributes of IDN S-0-1039.0.1 .....	350
Table A.138 – Attributes of IDN S-0-1039 .....	351
Table A.139 – Attributes of IDN S-0-1040 .....	351
Table A.140 – Attributes of IDN S-0-1041 .....	352
Table A.141 – Attributes of IDN S-0-1042 .....	353
Table A.142 – Structure of topology index.....	354
Table A.143 – Topology index (Example 1).....	354
Table A.144 – Topology index (Example 2).....	354
Table A.145 – Attributes of IDN S-0-1044 .....	355
Table A.146 – Device control field (C-DEV) .....	355
Table A.147 – Attributes of IDN S-0-1045 .....	356
Table A.148 – Device status field.....	356
Table A.149 – Attributes of IDN S-0-1046 .....	358
Table A.150 – Attributes of IDN S-0-1047 .....	359
Table A.151 – Attributes of IDN S-0-1048 .....	360
Table A.152 – Attributes of IDN S-0-1050.x.01.....	361
Table A.153 – Connection setup .....	361
Table A.154 – Attributes of IDN S-0-1050.x.02.....	362
Table A.155 – Attributes of IDN S-0-1050.x.03.....	363

Table A.156 – Structure of telegram assignment.....	364
Table A.157 – Attributes of IDN S-0-1050.x.04.....	364
Table A.158 – Attributes of IDN S-0-1050.x.05.....	365
Table A.159 – Attributes of IDN S-0-1050.x.06.....	366
Table A.160 – Attributes of IDN S-0-1050.x.07.....	366
Table A.161 – Attributes of IDN S-0-1050.x.08.....	367
Table A.162 – Attributes of IDN S-0-1050.x.09.....	367
Table A.163 – Connection states .....	368
Table A.164 – Attributes of IDN S-0-1050.x.10.....	368
Table A.165 – Attributes of IDN S-0-1050.x.11.....	369
Table A.166 – Attributes of IDN S-0-1050.x.12.....	369
Table A.167 – Attributes of IDN S-0-1050.x.20.....	370
Table A.168 – Attributes of IDN S-0-1050.x.21.....	371
Table A.169 – Attributes of IDN S-0-1051 .....	371
Table A.170 – Attributes of IDN S-0-1060.x.01.....	372
Table A.171 – Attributes of IDN S-0-1060.x.02.....	372
Table A.172 – Attributes of IDN S-0-1060.x.03.....	373
Table A.173 – Attributes of IDN S-0-1060.x.04.....	374
Table A.174 – Attributes of IDN S-0-1060.x.06.....	374
Table A.175 – Attributes of IDN S-0-1060.x.07.....	375
Table A.176 – Attributes of IDN S-0-1060.x.10.....	376
Table A.177 – Attributes of IDN S-0-1061 .....	376
Table A.178 – Attributes of IDN S-0-1080.x.02.....	377
Table A.179 – Attributes of IDN S-0-1080.x.03.....	378
Table A.180 – Attributes of IDN S-0-1080.x.04.....	378
Table A.181 – Attributes of IDN S-0-1081.x.02.....	379
Table A.182 – Attributes of IDN S-0-1081.x.03.....	380
Table A.183 – Attributes of IDN S-0-1081.x.04.....	380
Table A.184 – Attributes of IDN S-0-1099.0.1 .....	381
Table A.185 – Structure of Test-IDN control.....	381
Table A.186 – Attributes of IDN S-0-1099.0.2 .....	382
Table A.187 – Attributes of IDN S-0-1100.0.01 .....	382
Table A.188 – Attributes of IDN S-0-1100.0.02 .....	383
Table A.189 – Attributes of IDN S-0-1100.0.03 .....	384
Table A.190 – Attributes of IDN S-0-1101.x.01.....	384
Table A.191 – Attributes of IDN S-0-1101.x.02.....	385
Table A.192 – Attributes of IDN S-0-1101.x.03.....	386
Table A.193 – Attributes of IDN S-0-1150.x.01.....	386
Table A.194 – OVS Control structure .....	387
Table A.195 – Attributes of IDN S-0-1150.x.02.....	387
Table A.196 – OVS Status structure .....	388
Table A.197 – Attributes of IDN S-0-1150.x.03.....	388
Table A.198 – Configuration example .....	389

Table A.199 – Attributes of IDN S-0-1150.x.04.....	389
Table A.200 – Attributes of IDN S-0-1150.x.05.....	390
Table A.201 – Attributes of IDN S-0-1150.x.06.....	391
Table A.202 – Attributes of IDN S-0-1150.x.07.....	391
Table A.203 – Attributes of IDN S-0-1150.x.08.....	392
Table A.204 – Attributes of IDN S-0-1150.x.09.....	393
Table A.205 – Attributes of IDN S-0-1150.x.10.....	393
Table A.206 – Attributes of IDN S-0-1151.x.01.....	394
Table A.207 – Attributes of IDN S-0-1151.x.02.....	395
Table A.208 – Attributes of IDN S-0-1151.x.03.....	395
Table A.209 – Attributes of IDN S-0-1151.x.04.....	396
Table A.210 – Attributes of IDN S-0-1151.x.06.....	396
Table A.211 – Attributes of IDN S-0-1151.x.07.....	397
Table A.212 – Attributes of IDN S-0-1151.x.08.....	398
Table A.213 – Attributes of IDN S-0-1152 .....	398
Table C.1 – Type 19 LED.....	417
Table C.2 – SDx LED .....	418
Table C.3 – List of relevant communication-related IDNs .....	428
Table C.4 – Attributes of IDN S-0-0000 .....	429
Table C.5 – Attributes of IDN S-0-0017 .....	430
Table C.6 – Attributes of IDN S-0-0025.....	430
Table C.7 – Attributes of IDN S-0-0095.....	431
Table C.8 – Attributes of IDN S-0-0099.....	431
Table C.9 – Attributes of IDN S-0-0192.....	432
Table C.10 – Attributes of IDN S-0-0262.....	433
Table C.11 – Attributes of IDN S-0-0263.....	433
Table C.12 – Attributes of IDN S-0-0264.....	434
Table C.13 – Attributes of IDN S-0-0265.....	434
Table C.14 – Language codes .....	435
Table C.15 – Attributes of IDN S-0-0266.....	435
Table C.16 – Attributes of IDN S-0-0267.....	436
Table C.17 – States of the password state machine.....	437
Table C.18 – Transitions of the password state machine.....	438
Table C.19 – Changing the password.....	438
Table C.20 – Attributes of IDN S-0-0269.....	439
Table C.21 – Structure of storage mode.....	439
Table C.22 – Attributes of IDN S-0-0270.....	440
Table C.23 – Attributes of IDN S-0-0279.....	440
Table C.24 – Attributes of IDN S-0-0293.....	441
Table C.25 – Attributes of IDN S-0-0326.x.00 .....	442
Table C.26 – Attributes of IDN S-0-0327.x.00 .....	442
Table C.27 – Attributes of IDN S-0-0390.....	443
Table C.28 – Prioritization of diagnostic events.....	444

Table C.29 – Transitions of the password state machine.....	445
Table C.30 – Attributes of IDN S-0-0420 .....	446
Table C.31 – Attributes of IDN S-0-0422 .....	446
Table C.32 – Attributes of IDN S-0-0423 .....	447
Table C.33 – Attributes of IDN S-0-0425 .....	448
Table C.34 – Structure of the sub-device state machine control .....	448
Table C.35 – Attributes of IDN S-0-0531 .....	449
Table C.36 – Attributes of IDN S-0-1300.x.1 .....	449
Table C.37 – Attributes of IDN S-0-1300.x.2 .....	450
Table C.38 – Attributes of IDN S-0-1300.x.3 .....	450
Table C.39 – Vendor code .....	451
Table C.40 – Attributes of IDN S-0-1300.x.4 .....	451
Table C.41 – Attributes of IDN S-0-1300.x.5 .....	452
Table C.42 – Attributes of IDN S-0-1300.x.6 .....	452
Table C.43 – Attributes of IDN S-0-1300.x.7 .....	453
Table C.44 – Attributes of IDN S-0-1300.x.8 .....	453
Table C.45 – Attributes of IDN S-0-1300.x.9 .....	454
Table C.46 – Attributes of IDN S-0-1300.x.10 .....	455
Table C.47 – Attributes of IDN S-0-1300.x.11 .....	455
Table C.48 – Attributes of IDN S-0-1300.x.12 .....	456
Table C.49 – Attributes of IDN S-0-1300.x.13 .....	456
Table C.50 – Attributes of IDN S-0-1300.x.14 .....	457
Table C.51 – Attributes of IDN S-0-1300.x.20 .....	458
Table C.52 – Attributes of IDN S-0-1300.x.21 .....	459
Table C.53 – Attributes of IDN S-0-1300.x.22 .....	460
Table C.54 – Attributes of IDN S-0-1300.x.23 .....	461
Table C.55 – Attributes of IDN S-0-1301 .....	462
Table C.56 – Structure of GDP classes & version .....	462
Table C.57 – Attributes of IDN S-0-1302.x.1 .....	463
Table C.58 – Coding of S-1302.x.01 .....	463
Table C.59 – Attributes of IDN S-0-1302.x.2 .....	464
Table C.60 – Attributes of IDN S-0-1302.x.3 .....	466
Table C.61 – Attributes of IDN S-0-1303.0.1 .....	466
Table C.62 – Attributes of IDN S-0-1303.0.2 .....	467
Table C.63 – Coding of S-1303.0.02 .....	468
Table C.64 – Attributes of IDN S-0-1303.0.3 .....	468
Table C.65 – Coding of S-1303.0.2 .....	469
Table C.66 – Attributes of IDN S-0-1303.0.10 .....	469
Table C.67 – Attributes of IDN S-0-1303.0.11 .....	470
Table C.68 – Attributes of IDN S-0-1303.0.12 .....	471
Table C.69 – Attributes of IDN S-0-1305.0.1 .....	471
Table C.70 – Structure of Type 19 time.....	472
Table C.71 – Attributes of IDN S-0-1305.0.2 .....	472

Table C.72 – Attributes of IDN S-0-1310 ..... 473

Table C.73 – Attributes of IDN S-0-1350 ..... 473

Table C.74 – Attributes of IDN S-0-1310 ..... 474

Table C.75 – Structure of Test IDN Diagnostic Event ..... 475

Table C.76 – Status codes with the diagnosis class "operational state" ..... 476

Table C.77 – Status codes with the diagnosis class "procedure command specific state" ..... 476

# INTERNATIONAL ELECTROTECHNICAL COMMISSION

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## INDUSTRIAL COMMUNICATION NETWORKS – FIELD BUS SPECIFICATIONS –

### Part 4-19: Data-link layer protocol specification – Type 19 elements

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NOTE Combinations of protocol types are specified in IEC 61784-1 and IEC 61784-2.

International Standard IEC 61158-4-19 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This fourth edition cancels and replaces the third edition published in 2014. This edition constitutes a technical revision.

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

- improving the hotplug and redundancy features;
- improving the phase switching and the error handling;
- editorial improvements.

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

FDIS	Report on voting
65C/946/FDIS	65C/955/RVD

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

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

A list of all the parts of the IEC 61158 series, published under the general title *Industrial communication networks – Fieldbus specifications*, can be found on the IEC web site.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

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

## INTRODUCTION

This document is one of a series produced to facilitate the interconnection of automation system components. It is related to other standards in the set as defined by the “three-layer” fieldbus reference model described in IEC 61158-1.

The data-link protocol provides the data-link service by making use of the services available from the physical layer. The primary aim of this document is to provide a set of rules for communication expressed in terms of the procedures to be carried out by peer data-link entities (DLEs) at the time of communication. These rules for communication are intended to provide a sound basis for development in order to serve a variety of purposes:

- a) as a guide for implementors and designers;
- b) for use in the testing and procurement of equipment;
- c) as part of an agreement for the admittance of systems into the open systems environment;
- d) as a refinement to the understanding of time-critical communications within OSI.

This document is concerned, in particular, with the communication and interworking of sensors, effectors and other automation devices. By using this document together with other standards positioned within the OSI or fieldbus reference models, otherwise incompatible systems may work together in any combination.

NOTE Attention is drawn to the fact that use of the associated protocol type(s) is restricted by its (their) intellectual-property-right holder(s). In all cases, the commitment to limited release of intellectual-property-rights made by the holder(s) of those rights permits a particular data-link layer protocol type to be used with physical layer and application layer protocols in Type combinations as specified explicitly in the profile parts. Use of the various protocol type(s) in other combinations may require permission from their respective intellectual-property-right holders.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of patents concerning Type 19 elements and possibly other types given in this document as follows:

DE 102 00 502 4759.8-32	[BR]	Verfahren zur Laufzeitkorrektur in einer Kommunikationsstruktur
DE 102 37 097	[RI]	Korrektur von Signallaufzeiten in verteilten Kommunikationssystemen

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[BR] BoschRexrothAG  
Zum Eisengiesser 1  
D – 97816 Lohr  
Germany

[RI] Rexroth Indramat GmbH  
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## **INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –**

### **Part 4-19: Data-link layer protocol specification – Type 19 elements**

#### **1 Scope**

##### **1.1 General**

The data-link layer provides basic time-critical messaging communications between devices in an automation environment.

This protocol provides communication opportunities to all participating data-link entities

- a) in a synchronously-starting cyclic manner, according to a pre-established schedule, and
- b) in a cyclic or acyclic asynchronous manner, as requested each cycle by each of those data-link entities.

Thus this protocol can be characterized as one which provides cyclic and acyclic access asynchronously but with a synchronous restart of each cycle.

##### **1.2 Specifications**

This document specifies

- a) procedures for the timely transfer of data and control information from one data-link user entity to a peer user entity, and among the data-link entities forming the distributed data-link service provider;
- b) the structure of the fieldbus DLPDUs used for the transfer of data and control information by the protocol of this document, and their representation as physical interface data units.

##### **1.3 Procedures**

The procedures are defined in terms of

- a) the interactions between peer DL-entities (DLEs) through the exchange of fieldbus DLPDUs;
- b) the interactions between a DL-service (DLS) provider and a DLS-user in the same system through the exchange of DLS primitives;
- c) the interactions between a DLS-provider and a Ph-service provider in the same system through the exchange of Ph-service primitives.

##### **1.4 Applicability**

These procedures are applicable to instances of communication between systems which support time-critical communications services within the data-link layer of the OSI or fieldbus reference models, and which require the ability to interconnect in an open systems interconnection environment.

Profiles provide a simple multi-attribute means of summarizing an implementation's capabilities, and thus its applicability to various time-critical communications needs.