

SIMATIC Ident

RFID systems SIMATIC RF300

System Manual

<u>Introduction</u>	1
<u>Safety information</u>	2
<u>System overview</u>	3
<u>Planning the RF300 system</u>	4
<u>Readers</u>	5
<u>Antennas</u>	6
<u>RF300 transponder</u>	7
<u>ISO transponder</u>	8
<u>System integration</u>	9
<u>System diagnostics</u>	10
<u>Appendix</u>	A

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Table of contents

1	Introduction	15
1.1	Preface	15
2	Safety information	19
3	System overview	23
3.1	RFID systems	23
3.2	SIMATIC RF300	24
3.2.1	System overview of SIMATIC RF300	24
3.2.2	RFID components and their function	26
3.2.3	Application areas of RF300	34
3.3	System configuration	35
3.3.1	Overview	35
3.3.2	Assembly line example: Use of RF300 transponders	35
3.3.3	Example of container and cardboard container handling: Use of ISO transponders	37
4	Planning the RF300 system	39
4.1	Fundamentals of application planning	39
4.1.1	Selection criteria for SIMATIC RF300 components	39
4.1.2	Transmission window and read/write distance	39
4.1.3	Width of the transmission window	42
4.1.4	Impact of secondary fields	43
4.1.5	Setup help of the readers of the second generation	46
4.1.6	Permissible directions of motion of the transponder	47
4.1.7	Operation in static and dynamic mode	47
4.1.8	Dwell time of the transponder	48
4.1.9	Communication between communications module, reader and transponder	49
4.2	Field data for transponders, readers and antennas	51
4.2.1	Field data of RF300 transponders	51
4.2.2	Field data of ISO transponders (MDS D)	55
4.2.3	Field data of ISO transponders (MDS E)	61
4.2.4	Minimum clearances	63
4.3	Installation guidelines	66
4.3.1	Overview	66
4.3.2	Reduction of interference due to metal	67
4.3.3	Effects of metal on different transponders and readers	71
4.3.4	Impact on the transmission window by metal	71
4.3.4.1	Impact on the transmission window by metal	72
4.3.4.2	RF340R	75
4.3.4.3	RF350R	79
4.3.4.4	RF380R	92
4.3.4.5	RF382R	96
4.4	Chemical resistance of the readers and transponders	97
4.4.1	Readers	97

4.4.1.1	Overview of the readers and their housing materials	97
4.4.1.2	Polyamide 12	97
4.4.2	Transponder	99
4.4.2.1	Overview of the transponders and their housing materials	99
4.4.2.2	Epoxy resin	100
4.4.2.3	Polyamide 6 and Polyamide 6.6 GF30	103
4.4.2.4	Polyamide 12	104
4.4.2.5	Polycarbonate (PC)	106
4.4.2.6	Polyphenylene sulfide (PPS)	107
4.4.2.7	Polyvinyl chloride (PVC)	108
4.5	Guidelines for electromagnetic compatibility (EMC)	109
4.5.1	Overview	109
4.5.2	What does EMC mean?	109
4.5.3	Basic rules	110
4.5.4	Propagation of electromagnetic interference	112
4.5.5	Cabinet configuration	115
4.5.6	Prevention of interference sources	117
4.5.7	Equipotential bonding	118
4.5.8	Cable shielding	119
5	Readers	123
5.1	SIMATIC RF310R	125
5.1.1	Features	125
5.1.2	RF310R ordering data	125
5.1.3	Pin assignment RF310R with RS-422 interface	126
5.1.4	LED operating display	126
5.1.5	Ensuring reliable data exchange	126
5.1.6	Metal-free area	127
5.1.7	Minimum distance between RF310R readers	127
5.1.8	Technical specifications	128
5.1.9	Approvals	130
5.1.10	Dimension drawing	131
5.2	SIMATIC RF310R - 2nd generation	132
5.2.1	Features	132
5.2.2	Ordering data	132
5.2.3	Pin assignment of the RS-422 interface	133
5.2.4	LED operating display	133
5.2.5	Ensuring reliable data exchange	134
5.2.6	Metal-free area	134
5.2.7	Minimum distance between RF310R readers	135
5.2.8	Technical specifications	136
5.2.9	Approvals	137
5.2.10	Dimension drawing	139
5.2.11	Using the reader in hazardous area	140
5.2.11.1	Using the reader in hazardous area for gases	143
5.2.11.2	Using the reader in hazardous area for dust	143
5.2.11.3	Installation and operating conditions for hazardous areas:	144
5.2.11.4	Extended installation and operating conditions for hazardous areas for applications according to UL Hazardous Location (USA and Canada)	144
5.3	SIMATIC RF310R with Scanmode	146
5.3.1	Features	146

5.3.2	Ordering data for RF310R with Scanmode	146
5.3.3	Pin assignment RF310R special version Scanmode RS-422 interface	147
5.3.4	LED operating display	147
5.3.5	Ensuring reliable data exchange	147
5.3.6	Metal-free area	148
5.3.7	Minimum distance between several readers	148
5.3.8	Technical specifications	149
5.3.9	Approvals	151
5.3.10	Dimension drawing	152
5.4	SIMATIC RF310R with Scanmode - 2nd generation	153
5.4.1	Features	153
5.4.2	Ordering data	153
5.4.3	Pin assignment of the RS-422 interface	154
5.4.4	LED operating display	154
5.4.5	Ensuring reliable data exchange	154
5.4.6	Metal-free area	155
5.4.7	Minimum distance between several readers	155
5.4.8	Technical specifications	156
5.4.9	Approvals	158
5.4.10	Dimension drawing	159
5.5	SIMATIC RF340R/RF350R	160
5.5.1	SIMATIC RF340R	160
5.5.1.1	Features	160
5.5.1.2	Ordering data for RF340R	160
5.5.1.3	Pin assignment of RF340R RS422 interface	161
5.5.1.4	LED operating display	161
5.5.1.5	Ensuring reliable data exchange	161
5.5.1.6	Metal-free area	162
5.5.1.7	Minimum distance between RF340R readers	162
5.5.1.8	Technical specifications	163
5.5.1.9	Approvals	165
5.5.1.10	Dimension drawing	166
5.5.2	SIMATIC RF350R	167
5.5.2.1	Features	167
5.5.2.2	Ordering data for RF350R	167
5.5.2.3	Pin assignment of RF350R RS422 interface	168
5.5.2.4	LED operating display	168
5.5.2.5	Ensuring reliable data exchange	168
5.5.2.6	Metal-free area	168
5.5.2.7	Technical specifications	169
5.5.2.8	Approvals	171
5.5.2.9	Dimension drawing	172
5.5.3	Use of the reader in hazardous areas	173
5.5.3.1	Use of the readers in hazardous areas for gases	174
5.5.3.2	Use of the readers in hazardous areas for dusts	174
5.5.3.3	Installation and operating conditions for the hazardous area	175
5.6	SIMATIC RF340R/RF350R - 2nd generation	176
5.6.1	SIMATIC RF340R - 2nd generation	176
5.6.1.1	Features	176
5.6.1.2	Ordering data	176
5.6.1.3	Pin assignment of the RS-422 interface	177

5.6.1.4	LED operating display	177
5.6.1.5	Ensuring reliable data exchange.....	178
5.6.1.6	Metal-free area	178
5.6.1.7	Minimum distance between RF340R readers.....	179
5.6.1.8	Technical specifications	180
5.6.1.9	Approvals	181
5.6.1.10	Dimension drawing	183
5.6.1.11	Using the readers in a hazardous area.....	184
5.6.2	SIMATIC RF350R - 2nd generation.....	190
5.6.2.1	Features	190
5.6.2.2	Ordering data	190
5.6.2.3	Pin assignment of the RS-422 interface	191
5.6.2.4	LED operating display	191
5.6.2.5	Ensuring reliable data exchange.....	192
5.6.2.6	Metal-free area	192
5.6.2.7	Technical specifications	192
5.6.2.8	Approvals	194
5.6.2.9	Dimension drawing	196
5.6.2.10	Using the readers in hazardous areas	196
5.7	SIMATIC RF380R	206
5.7.1	Features	206
5.7.2	RF380R ordering data	206
5.7.3	Pin assignment of RF380R RS-232/RS-422 interface.....	207
5.7.4	LED operating display	207
5.7.5	Ensuring reliable data exchange.....	207
5.7.6	Metal-free area	208
5.7.7	Minimum distance between RF380R readers.....	208
5.7.8	Technical specifications	209
5.7.9	Approvals	211
5.7.10	Dimension drawing	212
5.7.11	Use of the reader in a hazardous.....	213
5.7.11.1	Use of the reader in a hazardous area	213
5.7.11.2	Use of the reader in hazardous areas for gases.....	214
5.7.11.3	Installation and operating conditions for hazardous areas:	215
5.8	SIMATIC RF380R - 2nd generation.....	216
5.8.1	Features	216
5.8.2	RF380R ordering data	216
5.8.3	Pin assignment of RF380R RS-232/RS-422 interface.....	217
5.8.4	LED operating display	217
5.8.5	Ensuring reliable data exchange.....	218
5.8.6	Metal-free area	218
5.8.7	Minimum distance between RF380R readers.....	219
5.8.8	Technical specifications	220
5.8.9	Approvals	222
5.8.10	Dimension drawing	223
5.8.11	Using the reader in hazardous area.....	224
5.8.11.1	Using the reader in hazardous area for gases.....	227
5.8.11.2	Using the reader in hazardous area for dust	227
5.8.11.3	Installation and operating conditions for hazardous areas:	228
5.8.11.4	Extended installation and operating conditions for hazardous areas for applications according to UL Hazardous Location (USA and Canada)	229

5.9	SIMATIC RF382R with Scanmode	230
5.9.1	Characteristics	230
5.9.2	RF382R with Scanmode ordering data.....	230
5.9.3	Pin assignment RF382R Scanmode RS232 interface.....	231
5.9.4	LED operating display.....	231
5.9.5	Ensuring reliable data exchange	231
5.9.6	Mounting on metal	232
5.9.7	Minimum distance between several RF382R Scanmode readers	232
5.9.8	Transmission window.....	233
5.9.9	Technical specifications	236
5.9.10	Approvals	238
5.9.11	Dimensional diagram	239
6	Antennas	241
6.1	Features	241
6.2	Ordering data	244
6.3	Ensuring reliable data exchange	244
6.4	Metal-free area.....	245
6.5	Minimum distance between antennas	248
6.6	Technical specifications	249
6.7	Dimensional drawings.....	251
6.8	ANT 12 (stainless steel variant).....	254
6.8.1	Features	254
6.8.2	Ordering data	254
6.8.3	Antenna connection	255
6.8.4	Transmission window.....	256
6.8.5	Flush-mounted in metal	257
6.8.6	Minimum spacing	257
6.8.7	Technical data.....	259
6.8.8	Dimension drawing	260
6.9	ANT 18 (stainless steel variant).....	261
6.9.1	Features	261
6.9.2	Ordering data	261
6.9.3	Antenna connection	262
6.9.4	Transmission window.....	263
6.9.5	Flush-mounted in metal	263
6.9.6	Minimum spacing	264
6.9.7	Technical data.....	265
6.9.8	Dimension drawing	267
6.10	ANT 30 (stainless steel variant).....	268
6.10.1	Features	268
6.10.2	Ordering data	268
6.10.3	Antenna connection	269
6.10.4	Transmission window.....	270
6.10.5	Flush-mounted in metal	271
6.10.6	Minimum spacing	271
6.10.7	Technical data.....	273
6.10.8	Dimension drawing	274

7	RF300 transponder	275
7.1	Memory configuration of the RF300 transponders	276
7.2	SIMATIC RF320T	279
7.2.1	Features	279
7.2.2	Ordering data	279
7.2.3	Mounting on metal	280
7.2.4	Technical data	281
7.2.5	Dimension drawing	282
7.3	SIMATIC RF330T	283
7.3.1	Features	283
7.3.2	Ordering data	283
7.3.3	Mounting on/in metal	284
7.3.4	Technical specifications	285
7.3.5	Dimension drawing	287
7.4	SIMATIC RF340T	288
7.4.1	Features	288
7.4.2	Ordering data	288
7.4.3	Mounting on metal	289
7.4.4	Technical specifications	290
7.4.5	Dimension drawing	291
7.5	SIMATIC RF350T	292
7.5.1	Features	292
7.5.2	Ordering data	292
7.5.3	Mounting on metal	293
7.5.4	Mounting options	294
7.5.5	Technical data	295
7.5.6	Dimension drawing	296
7.6	SIMATIC RF360T	297
7.6.1	Features	297
7.6.2	Ordering data	297
7.6.3	Mounting on metal	297
7.6.4	Technical data	300
7.6.5	Dimension drawing	301
7.7	SIMATIC RF370T	302
7.7.1	Features	302
7.7.2	Ordering data	302
7.7.3	Mounting on metal	303
7.7.4	Mounting instructions	304
7.7.5	Technical specifications	304
7.7.6	Dimensional drawing	306
7.8	SIMATIC RF380T	307
7.8.1	Features	307
7.8.2	Ordering data	307
7.8.3	Installation guidelines for RF380T	308
7.8.3.1	Mounting instructions	308
7.8.3.2	Metal-free area	311
7.8.4	Configuring instructions	312
7.8.4.1	Temperature dependence of the transmission window	312

7.8.4.2	Temperature response in cyclic operation.....	312
7.8.5	Use of the transponder in the Ex protection area	315
7.8.5.1	Use of the transponder in hazardous areas for gases.....	315
7.8.5.2	Installation and operating conditions for the hazardous area	316
7.8.6	Cleaning the mobile data memory	316
7.8.7	Technical specifications	317
7.8.8	Dimensional drawing.....	318
8	ISO transponder.....	319
8.1	Memory configuration of ISO the transponders	320
8.2	MDS D100	322
8.2.1	Characteristics	322
8.2.2	Ordering data	322
8.2.3	Metal-free area.....	323
8.2.4	Technical data.....	325
8.2.5	Dimension drawing	326
8.3	MDS D117	327
8.3.1	Features	327
8.3.2	Ordering data	327
8.3.3	Mounting in metal.....	328
8.3.4	Technical specifications	328
8.3.5	Dimension drawing	330
8.4	MDS D124	330
8.4.1	Characteristics	330
8.4.2	Ordering data	330
8.4.3	Mounting on metal	331
8.4.4	Technical specifications	332
8.4.5	Using the MDS D124 in hazardous areas	334
8.4.6	EC declaration of conformity according to directive 2014/34/EU MDS D124.....	336
8.4.7	Dimension drawing	337
8.5	MDS D126	337
8.5.1	Characteristics	337
8.5.2	Ordering data	337
8.5.3	Mounting on metal	338
8.5.4	Technical specifications	339
8.5.5	Dimension drawing	340
8.6	MDS D127	341
8.6.1	Features	341
8.6.2	Ordering data	341
8.6.3	Mounting in metal.....	342
8.6.4	Technical specifications	343
8.6.5	Dimension drawing	344
8.7	MDS D139	345
8.7.1	Characteristics	345
8.7.2	Ordering data	346
8.7.3	Mounting on metal	346
8.7.4	Cleaning the mobile data memory	347
8.7.5	Technical specifications	348
8.7.6	Using the MDS D139 in hazardous areas	349

8.7.7	Dimension drawings.....	351
8.8	MDS D160.....	352
8.8.1	Characteristics	352
8.8.2	Information for RF300 compatibility	352
8.8.3	Ordering data	352
8.8.4	Mounting on metal	353
8.8.5	Technical specifications	354
8.8.6	Dimension drawings.....	356
8.9	MDS D165.....	356
8.9.1	Features	356
8.9.2	Ordering data	357
8.9.3	Technical data.....	357
8.9.4	Dimension drawing	358
8.10	MDS D200.....	359
8.10.1	Features	359
8.10.2	Ordering data	359
8.10.3	Mounting on metal	360
8.10.4	Technical data.....	362
8.10.5	Dimension drawing	363
8.11	MDS D261.....	364
8.11.1	Features	364
8.11.2	Ordering data	364
8.11.3	Technical data.....	365
8.11.4	Dimension drawing	366
8.12	MDS D324.....	367
8.12.1	Characteristics	367
8.12.2	Ordering data	367
8.12.3	Mounting on metal	368
8.12.4	Technical specifications	369
8.12.5	Dimension drawing	370
8.13	MDS D339.....	371
8.13.1	Characteristics	371
8.13.2	Ordering data	371
8.13.3	Mounting on metal	372
8.13.4	Cleaning the mobile data memory	373
8.13.5	Technical specifications	373
8.13.6	Using the MDS D339 in hazardous areas	375
8.13.7	Dimensional drawing.....	377
8.14	MDS D400.....	378
8.14.1	Features	378
8.14.2	Ordering data	378
8.14.3	Mounting on metal	379
8.14.4	Technical specifications	381
8.14.5	Dimension drawing	382
8.15	MDS D421.....	383
8.15.1	Characteristics	383
8.15.2	Ordering data	383
8.15.3	Mounting on metal	384

8.15.4	Technical specifications	386
8.15.5	Dimension drawing	388
8.16	MDS D422	388
8.16.1	Characteristics	388
8.16.2	Ordering data	388
8.16.3	Mounting in metal	389
8.16.4	Technical specifications	390
8.16.5	Dimension drawing	391
8.17	MDS D423	392
8.17.1	Characteristics	392
8.17.2	Ordering data	392
8.17.3	Mounting on metal	393
8.17.4	Technical specifications	394
8.17.5	Dimensional drawing	396
8.18	MDS D424	397
8.18.1	Characteristics	397
8.18.2	Ordering data	397
8.18.3	Mounting on metal	398
8.18.4	Technical specifications	399
8.18.5	Dimension drawing	400
8.19	MDS D425	401
8.19.1	Characteristics	401
8.19.2	Ordering data	401
8.19.3	Application example	402
8.19.4	Technical specifications	402
8.19.5	Dimension drawing	404
8.20	MDS D426	405
8.20.1	Characteristics	405
8.20.2	Ordering data	405
8.20.3	Mounting on metal	406
8.20.4	Technical specifications	407
8.20.5	Dimension drawing	408
8.21	MDS D428	409
8.21.1	Characteristics	409
8.21.2	Ordering data	409
8.21.3	Application example	410
8.21.4	Technical specifications	410
8.21.5	Dimension drawing	412
8.22	MDS D460	413
8.22.1	Characteristics	413
8.22.2	Ordering data	413
8.22.3	Mounting on metal	414
8.22.4	Technical specifications	415
8.22.5	Dimension drawings	416
8.23	MDS D521	417
8.23.1	Characteristics	417
8.23.2	Ordering data	417
8.23.3	Mounting on metal	417

8.23.4	Technical specifications	420
8.23.5	Dimension drawing	421
8.24	MDS D522.....	422
8.24.1	Characteristics	422
8.24.2	Ordering data	422
8.24.3	Mounting in metal.....	422
8.24.4	Technical specifications	423
8.24.5	Dimension drawing	424
8.25	MDS D522 special variant	425
8.25.1	Characteristics	425
8.25.2	Ordering data	425
8.25.3	Mounting in metal.....	426
8.25.4	Installation instructions.....	426
8.25.5	Technical specifications	428
8.25.6	Dimensional drawing.....	430
8.26	MDS D524.....	431
8.26.1	Characteristics	431
8.26.2	Ordering data	431
8.26.3	Mounting on metal	432
8.26.4	Technical specifications	433
8.26.5	Dimension drawing	434
8.27	MDS D525.....	435
8.27.1	Characteristics	435
8.27.2	Ordering data	435
8.27.3	Application example.....	436
8.27.4	Technical specifications	436
8.27.5	Dimension drawing	438
8.28	MDS D526.....	439
8.28.1	Characteristics	439
8.28.2	Ordering data	439
8.28.3	Mounting on metal	440
8.28.4	Technical specifications	441
8.28.5	Dimension drawing	442
8.29	MDS D528.....	443
8.29.1	Characteristics	443
8.29.2	Ordering data	443
8.29.3	Application example.....	444
8.29.4	Technical specifications	444
8.29.5	Dimension drawing	446
9	System integration	447
9.1	Introduction	447
9.2	ASM 456	450
9.3	ASM 475	451
9.3.1	Features	451
9.3.2	Ordering data	452
9.3.3	Indicators.....	453
9.3.4	Configuration.....	455

9.3.5	Shield connection.....	457
9.3.6	Technical data.....	458
9.4	RF120C.....	460
9.5	RF160C.....	460
9.6	RF170C.....	461
9.7	RF180C.....	462
9.8	RF182C.....	463
10	System diagnostics	465
10.1	Error codes of the RF300 readers	465
10.2	Diagnostics functions - STEP 7	467
10.2.1	Overview	467
10.2.2	Reader diagnostics with "reader status" (SLG-STATUS).....	468
10.2.3	Transponder diagnostics with "Tag status" (MDS-STATUS).....	472
A	Appendix.....	477
A.1	Certificates & approvals	477
A.2	Accessories.....	479
A.2.1	Transponder holders.....	479
A.2.2	MOBY I migration.....	486
A.2.3	DVD "Ident Systems Software & Documentation"	489
A.3	Connecting cable	490
A.3.1	RF3xxR reader (RS-422) with ASM 456 / RF160C / RF170C / RF180C / RF182C	490
A.3.2	Reader RF3xxR (RS422) with ASM 475	492
A.3.3	Reader RF3xxR (RS-422) with RF120C.....	493
A.3.4	Reader RF380R (RS232) - PC	494
A.4	Ordering data	496
A.5	Service & Support	506

Introduction

1.1 Preface

Purpose of this document

This system manual contains all the information needed to plan and configure the system.

It is intended both for programming and testing/debugging personnel who commission the system themselves and connect it with other units (automation systems, further programming devices), as well as for service and maintenance personnel who install expansions or carry out fault/error analyses.

Scope of validity of this document

This documentation is valid for all variants of the SIMATIC RF300 system and describes the devices shipped as of 10/2018.

Additional information

You will find further information about the readers RF350M, RF310R Scanmode and RF382R Scanmode in the relevant manuals.

Additional information (<https://support.industry.siemens.com/cs/ww/en/ps/15033/man>)

Registered trademarks

SIMATIC ®, SIMATIC RF ®, MOBY ®, RF MANAGER ® and SIMATIC Sensors ® are registered trademarks of Siemens AG.

Recycling and disposal



The products are low in harmful substances, can be recycled and meet the requirements of the Directive 2012/19/EU for disposal of waste electrical and electronic equipment (WEEE).

Do not dispose of the products at public disposal sites.

For environmentally compliant recycling and disposal of your electronic waste, please contact a company certified for the disposal of electronic waste or your Siemens representative.

Note the different country-specific regulations.

History

Currently released versions of the SIMATIC RF300 system manual:

Edition	Remark
05/2005	First Edition
...	...
03/2014	Revised edition, expanded by the reader functionalities "RF300 transponder" and "ISO transponder" for the SIMATIC RF340R and SIMATIC RF350R readers Expanded by the following components: • Reader RF310R with Scanmode, RF382R with Scanmode • Communications module RF120C • Antennas ANT 12 (in conjunction with RF350R) and ANT 8 (in conjunction with RF310M) • RF300 transponder RF330T • ISO transponder MDS D117, D126, D127, D165, D200, D261, D339, D400, D422, D423, D425, D426
10/2016	Revised and expanded edition Expanded by the following components: • Readers of the second generation RF310R, RF340R, RF350R • Reader RF380R Scanmode • Antenna ANT 3, ANT 3S • ISO transponder MDS D5xx • MOBY I migration in SIMATIC RF300
08/2017	Revised and expanded edition Expanded by the following components: • Readers of the second generation RF380R
02/2019	Revised and expanded edition Expanded by the following components: • Second generation readers RF310R Scanmode

Abbreviations and naming conventions

The following terms/abbreviations are used synonymously in this document:

Reader	Write/read device (SLG)
Transponder, tag	Data carrier, mobile data storage, (MDS)
Communications module (CM)	Interface module (ASM)

Safety information

SIMATIC RFID products comply with the salient safety specifications acc. to IEC, VDE, EN, UL and CSA. If you have questions about the permissibility of the installation in the planned environment, please contact your service representative.

WARNING

Opening the device

Do not open the device when the power supply is on. Unauthorized opening of and improper repairs to the device may result in substantial damage to equipment or risk of personal injury to the user.

NOTICE

Alterations not permitted

Alterations to the devices are not permitted.

Failure to observe this requirement shall constitute a revocation of the radio equipment approval, CE approval and manufacturer's warranty.

Installation instructions

NOTICE

Switch/fuse to disconnect the reader from the power supply

Make sure that the readers can be disconnected from the power supply with a switch or a fuse. The function of the switch or fuse must be clearly recognizable.

Operating temperature

CAUTION

Danger of burns

Note that some outer components of the reader are made of metal. Depending on the environmental conditions temperatures can occur on the device that are higher than the maximum permitted operating temperature.

Repairs

WARNING

Repairs only by authorized qualified personnel

Repairs may only be carried out by authorized qualified personnel. Unauthorized opening of and improper repairs to the device may result in substantial damage to equipment or risk of personal injury to the user.

System expansions

Only install system expansions intended for this system. If you install other expansions, you may damage the system or violate the safety requirements and regulations for radio frequency interference suppression. Contact Technical Support or your local sales department to find out which system expansions are suitable for installation.

NOTICE

Warranty conditions

If you cause system defects by installing or exchanging system expansion devices, the warranty becomes void.

Safety distances

CAUTION

Safety distance between reader/antenna and persons

Note that for permanent exposure, the following safety distances must be adhered to:

- RF310R: ≥ 80 mm
- RF340R: ≥ 130 mm
- RF350R + ANT 1: ≥ 140 mm
- RF350R + ANT 3: ≥ 80 mm
- RF350R + ANT 12: ≥ 25 mm
- RF350R + ANT 18: ≥ 50 mm
- RF350R + ANT 30: ≥ 80 mm
- RF380R: ≥ 250 mm
- RF382R: ≥ 130 mm

Note

Safety distance with pacemakers

A safety distance between reader/antenna and persons with pacemakers is not necessary.

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit

Link: (<http://www.siemens.com/industrialsecurity>)

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customers' exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under

Link: (<http://www.siemens.com/industrialsecurity>)

System overview

3.1 RFID systems

RFID systems from Siemens control and optimize material flow. They identify reliably, quickly and economically, are insensitive to contamination and store data directly on the product or workpiece carrier.

Table 3- 1 Overview of SIMATIC RFID systems

Frequency range	HF			UHF
RFID system	SIMATIC RF200	SIMATIC RF300	MOBY D	SIMATIC RF600
Transmission frequency	13.56 MHz	13.56 MHz	13.56 MHz	865 ... 928 MHz ¹⁾
Range, max.	650 mm	240 mm	380 mm	8 m
Protocols (air interface)	• ISO 15693 • ISO 18000-3	• ISO 15693 • ISO 14443 (MOBY E) • RF300 (proprietary)	• ISO 15693 • ISO 18000-3	• ISO 18000-62 • ISO 18000-63
Standards, specifications, approvals	• EN 300330, EN 301489, CE • FCC Part 15 • UL/CSA	• EN 300330, EN 301489, CE • FCC Part 15 • UL/CSA • ATEX	• EN 300330, EN 301489, CE • FCC Part 15 • UL/CSA	• ETSI EN 3002208, CE • FCC • UL
Memory capacity, max.	992 bytes (EEPROM) 8192 bytes (FRAM)	64 kB (EEPROM) 8192 bytes (FRAM)	922 bytes (EEPROM) 2000 bytes (FRAM)	496 bits (EPC), 3424 bytes
Maximum data transfer rate for wireless transmission	25.5 kbps	106 kbps	26.5 kbps	300 kbps
Multitag capability	With RF290R reader only	No	Yes	Yes
Special characteristics	• Particularly compact designs • For particularly low-cost RFID solutions • IO-Link for simple identification tasks	• High data transmission speed • Extended diagnostics options • High memory capacity • Simple migration from old systems MOBY I/E	• SIMATIC or PC/IT integration • External antennas for industrial applications	• SIMATIC or PC/IT integration • Data preprocessing in the readers • Special antennas for industrial applications

¹⁾ Depends on the country of deployment and the frequency range permitted there

3.2 SIMATIC RF300

3.2.1 System overview of SIMATIC RF300

SIMATIC RF300 is an inductive identification system specially designed for use in industrial production for the control and optimization of material flow.

Thanks to its compact dimensions, RF300 is the obvious choice where installation conditions are restricted, especially for assembly lines, handling systems and workpiece carrier systems. RF300 is suitable for both simple and demanding RFID applications and it stands out for its persuasive price/performance ratio.

Scanmode applications

In applications without command control, the transponders are read automatically. The type of data acquisition and transfer is preset in the reader using parameters.

Medium-performance applications

RF300 in conjunction with ISO transponders provides a cost-effective solution for medium-performance applications.

High-performance applications

The high-performance components of RF300 in conjunction with the RF300 transponders provide advantages in terms of high data transmission speeds and storage capacities.

SIMATIC RF300 - second generation

With the current delivery stage an innovative second generation of the readers RF310R, RF340R, RF350R and RF380R is available. These readers apart from additional performance characteristics are 100% compatible with the RF300s of the first generation. The second generation of the RF380R comes later.

Additional performance features:

- Additional transponder protocol ISO 14443 (air interface) for MDS E transponders
- Automatic detection of different transponder types (RF300, ISO 15693, ISO 14443)
- Emulation of MOBY I write/read devices (SLG 4x) in conjunction with RF300 transponders for simplified migration
- Setup help integrated in the reader

The setup help serves the simple optimization of the reader-transponder positioning during installation/commissioning. Further installation or software are not necessary. The setup help becomes active directly after turning the device on.

- Improved 5-color LED display
- Expanded functions for trained users:
 - Address information for the "INIT" command no longer necessary
 - Expanded "RESET" parameter
 - The MDS-STATUS "Mode 3" functions with all transponder types
 - Automatic antenna recognition with the reader RF350R (depending on the antenna)

Table 3- 2 Differences in the features

Feature	SIMATIC RF300 first generation	SIMATIC RF300 second generation
Transponder protocol RF300	✓	✓
Transponder protocol ISO 15693	✓	✓
Transponder protocol ISO 14443	--	✓
Multi-transponder mode	--	--
MOBY I emulation to the controller	--	✓
Integrated setup help	--	✓
LED display	Single (3 colors)	Double (5 colors)
Technology object "SIMATIC Ident"	✓ ¹⁾	✓ ¹⁾
Fast Command (MDS D1xx, D4xx, D5xx)	--	✓

¹⁾ With the TIA Portal as of STEP 7 Basic / Professional V14 SP 1

Configuration and parameter assignment by means of TIA Portal technology object

You can easily and quickly configure and parameterize the entire RF300 system in the TIA Portal (as of STEP 7 Basic / Professional V14 SP 1) with the help of the "SIMATIC Ident" technology object. You can find detailed information about the technology object in the TIA Portal help.

→ Search for: Technology object "SIMATIC Ident"

For a video with a brief introduction for easier commissioning, improved antenna position determination and migration of older MOBY I readers, go to: SIMATIC Ident - RF300 new generation (<https://support.industry.siemens.com/cs/ww/en/view/109751831>)

3.2.2 RFID components and their function

System components overview

Table 3- 3 RF300 system components

Component	Description
Communications module	A communications module is used to integrate the RF identification system in controllers/automation systems.
Reader	The reader ensures inductive communication and power supply to the transponder, and handles the connection to the various controllers (e.g. SIMATIC S7) through the communications module (e.g. ASM 456).
Transponder	The transponder stores all data relevant for production and is used, for example, instead of barcode.

RF300 system components for high-performance applications

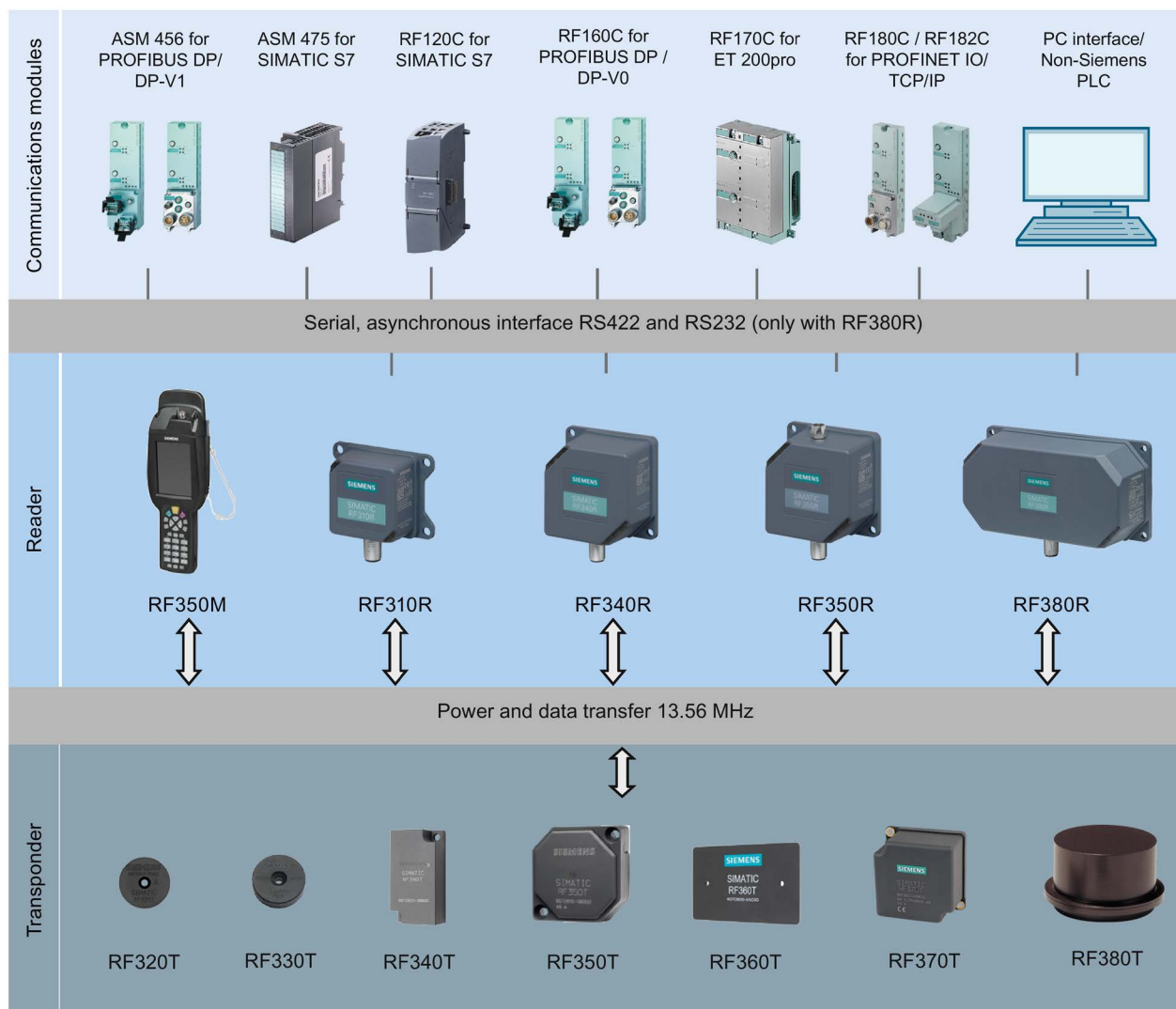


Figure 3-1 High performance system overview

Table 3- 4 Reader-transponder combination options for high-performance applications

Transponder	RF310R	RF340R	RF350R with ANT 1	RF350R with ANT 3	RF350R with ANT 18	RF350R with ANT 30	RF380R
RF320T	✓	✓	✓	✓	✓	✓	✓
RF330T	✓	✓	✓	✓	✓	✓	✓
RF340T	✓	✓	✓	✓	✓	✓	✓
RF350T	✓	✓	✓	--	--	✓	✓
RF360T	✓	✓	✓	--	--	✓	✓
RF370T	✓ ¹⁾	✓	✓	--	--	--	✓
RF380T	--	✓	✓	--	--	--	✓

¹⁾ as of reader version "AS ≥ D"

- ✓ Combination possible
- Combination not possible
- Combination possible, but not recommended

RF300 system components for medium-performance applications

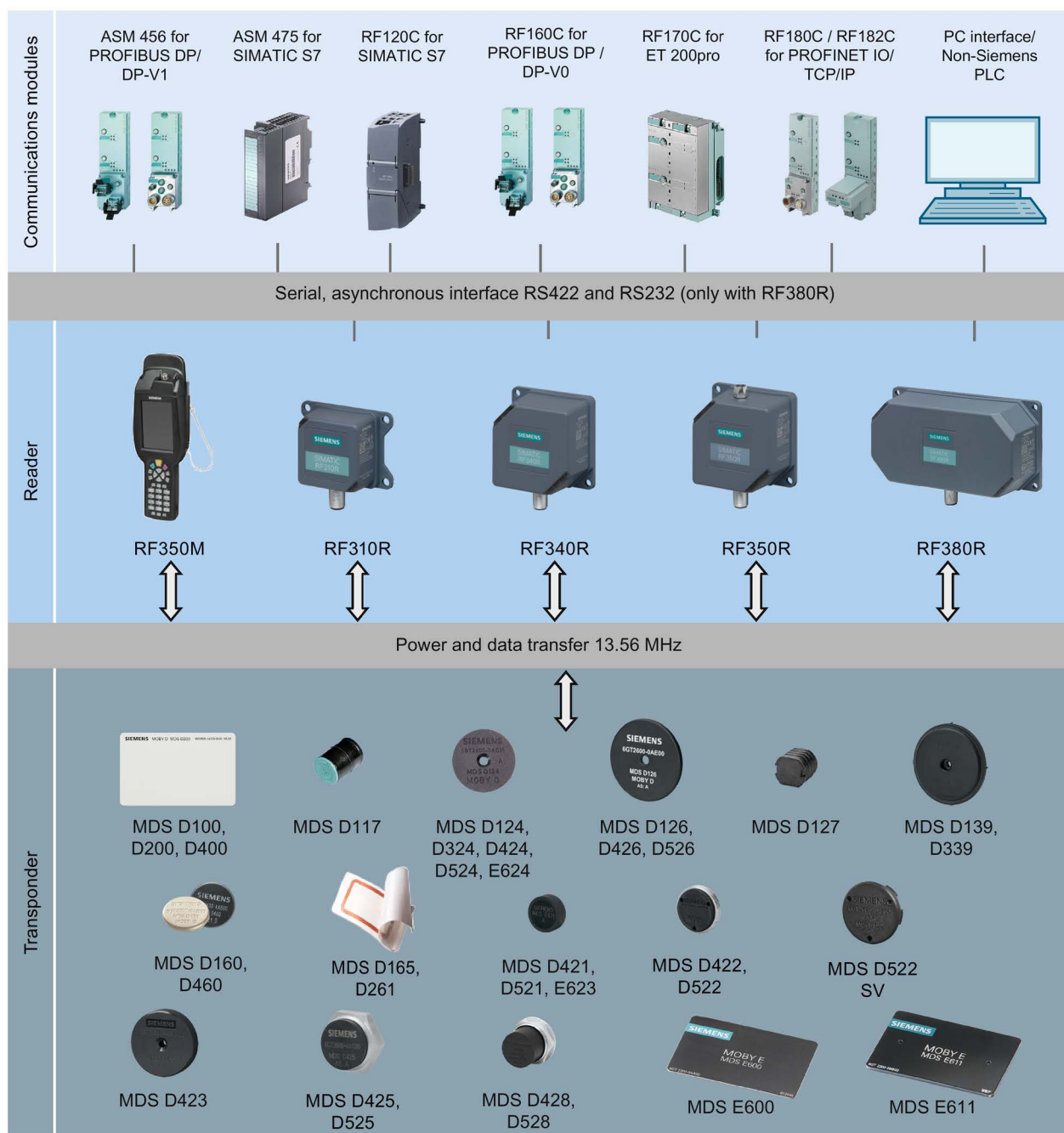


Figure 3-2 System overview medium-performance

Table 3- 5 Reader-transponder combination options for medium-performance applications

Transponder / MDS	RF310R (RS-422)	RF340R	RF350R with ANT 1	RF350R with ANT 3	RF350R with ANT 12	RF350R with ANT 18	RF350R with ANT 30	RF380R
MDS D100	✓	✓	✓	--	--	--	○	✓
MDS D117	--	--	--	--	✓	✓	--	--
MDS D124	✓	✓	✓	✓	○	✓	✓	✓
MDS D126	✓	✓	✓	--	--	--	✓	✓
MDS D127	--	--	--	--	✓	✓	--	--
MDS D139	✓	✓	✓	--	--	--	○	✓
MDS D160	✓	✓	✓	✓	✓	✓	✓	✓
MDS D165	✓	✓	✓	--	--	--	○	✓
MDS D200	✓	✓	✓	--	--	--	○	✓
MDS D261	✓	✓	✓	--	--	--	○	✓
MDS D324	✓	✓	✓	✓	--	✓	✓	✓
MDS D339 ¹⁾	✓	✓	✓	--	--	--	--	✓
MDS D400	✓	✓	✓	--	--	--	--	✓
MDS D421	--	--	--	--	✓	✓	--	--
MDS D422	--	--	--	✓	--	✓	✓	--
MDS D423	✓	✓	✓	✓	--	--	✓	✓
MDS D424	✓	✓	✓	✓	○	✓	✓	✓
MDS D425	✓	✓	✓	✓	○	✓	✓	✓
MDS D426	✓	✓	✓	--	--	--	✓	✓
MDS D428	✓	✓	✓	✓	✓	✓	✓	✓
MDS D460	✓	✓	✓	✓	✓	✓	✓	✓
MDS D521	--	--	--	--	✓	✓	--	--
MDS D522	--	--	--	--	--	✓	✓	--
MDS D524	✓	✓	✓	--	○	✓	✓	✓
MDS D525	✓	✓	✓	--	○	✓	✓	✓
MDS D526	✓	✓	✓	--	--	--	✓	✓
MDS D528	✓	✓	✓	--	✓	✓	✓	✓
MDS E600 ²⁾	✓	✓	✓	--	--	--	○	✓
MDS E611 ²⁾	✓	✓	✓	--	--	--	○	✓
MDS E623 ²⁾	--	--	--	--	✓	✓	--	--
MDS E624 ²⁾	✓	✓	✓	--	○	✓	✓	✓

¹⁾ as of reader version "AS ≥ D"

²⁾ Product to be discontinued; only relevant for migration projects.

- ✓ Combination possible
- Combination not possible
- Combination possible, but not recommended

Note

Note on operation of the transponders MDS D5xx and MDS E6xx

Note that the transponders MDS D5xx and MDS E6xx can only be operated in conjunction with the readers of the second generation (article number "6GT2801-xBAxx").

RF300 system components for Scanmode applications

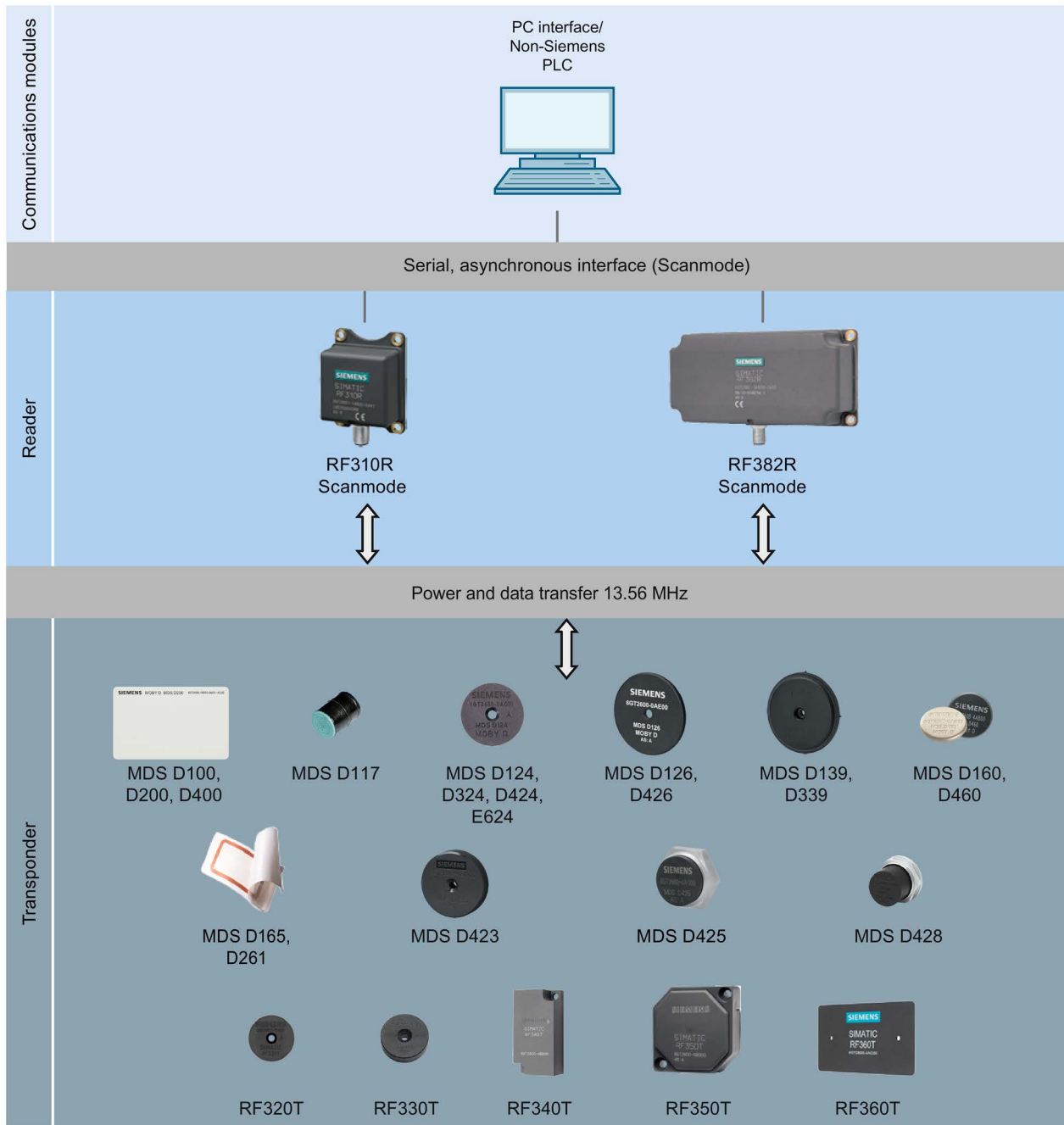


Figure 3-3 Scanmode system overview

Table 3- 6 Reader-transponder combination options for Scanmode applications

Transponder / MDS	RF310R	RF380R	RF382R
MDS D100	✓	✓	--
MDS D124	✓	✓	✓
MDS D126	✓	✓	--
MDS D139	✓	✓	--
MDS D160	✓	✓	✓
MDS D165	✓	✓	--
MDS D200	✓	✓	--
MDS D261	✓	✓	--
MDS D324	✓	✓	✓
MDS D339	✓	✓	--
MDS D400	✓	✓	--
MDS D423	✓	✓	--
MDS D424	✓	✓	✓
MDS D425	✓	✓	--
MDS D426	✓	✓	--
MDS D428	✓	✓	--
MDS D460	✓	✓	✓
RF320T	✓	✓	--
RF330T	✓	✓	--
RF340T	✓	✓	--
RF350T	✓	✓	--
RF360T	✓	✓	--
RF370T	--	✓	--
RF380T	--	✓	--

- ✓ Combination possible
- Combination not possible
- Combination possible, but not recommended

Note

Note on operation of the transponders MDS D5xx and MDS E6xx

Note that the transponders MDS D5xx and MDS E6xx can only be operated in conjunction with the readers of the second generation (article number "6GT2801-xBAxx").

3.2.3 Application areas of RF300

SIMATIC RF300 is primarily used for non-contact identification of containers, palettes and workpiece holders in a closed production circuit. The data carriers (transponders) remain in the production chain and are not supplied with the products. SIMATIC RF300, with its compact transponder and reader enclosure dimensions, is particularly suitable in confined spaces.

Main applications

- Mechanical engineering, automation systems, conveyor systems
- Ancillary assembly lines in the automotive industry, component suppliers
- Small assembly lines

Application examples

- Production lines for engines, gearboxes, axles, etc.
- Assembly lines for ABS systems, airbags, brake systems, doors, cockpits, etc.
- Assembly lines for household electrical appliances, consumer electronics and electronic communication equipment
- Assembly lines for PCs, small-power motors, contactors, switches

Advantages

- Reading and writing of large data volumes within a short time results in shorter production cycle times and helps to boost productivity
- Can be used in harsh environments thanks to rugged components with high degree of protection
- Simple system integration into TCP/IP networks, SIMATIC S7, PROFINET and PROFIBUS (TIA) with little effort
- Shorter commissioning times and fewer plant failures and downtimes thanks to integral diagnostic functionalities
- Cost savings thanks to maintenance-free components

3.3 System configuration

3.3.1 Overview

The SIMATIC RF300 system is characterized by a high level of standardization of its components. This means that the system follows the TIA principle throughout: Totally Integrated Automation. It provides maximum transparency at all levels with its reduced interface overhead. This ensures optimum interaction between all system components.

The RF300 system with its flexible components offers many possibilities for system configuration. This chapter shows you how you can use the RF300 components on the basis of various example scenarios.

3.3.2 Assembly line example: Use of RF300 transponders

In assembly lines, such as in engine manufacturing, many work steps are completed in succession. Automated or manual assembly work is carried out at the individual workstations in relatively short periods of time. The special features of the RF300 transponders, which stand out for their large data memory and high transmission speeds, bring about many advantages in regard to the production unit numbers of such plants.

The possibility of saving large volumes of data means savings in terms of data management on the HOST system and considerably contributes to data security (redundant data management e.g. host database or controller and data carrier)

Advantages at a glance:

- redundant data storage on the basis of large memory, availability of decentralized data
- high data rate
- Data management savings on the host system

Features of the scenario

In this example scenario, engine blocks that are placed on metal pallets are conveyed on an assembly line. The engines are assembled piece-by-piece at the individual workstations. The RFID transponder of the type SIMATIC RF340T is mounted permanently on the underside of the pallet. The transport speed is approx. 0.5 m/s.

In this scenario, it is an advantage that the transponder can be directly secured to metal on the metal pallets. The small-dimensioned SIMATIC RF310R reader is integrated in the conveyor elements in such a manner that it can communicate with the transponders from below. Thus, it is not necessary to align the pallets or to attach several transponders.

The data of the entire production order (5000 bytes) is stored on the transponder. This data is read at each workstation and changed or supplemented depending on the workstation, and then written back again. Thus, the status of the engine block assembly can be determined at any point in time, even if there is a failure at the HOST level.

Thanks to the extremely high data rate, a very short cycle time for the work steps can be planned, which results in high end product unit numbers "engines".

The entire production order that is saved on the transponder can also be read manually via the WIN-LC terminal located at each workstation. This means that virtually no additional data management is required on the control computer.

The production order data can also be read for servicing purposes via the mobile SIMATIC RF350M reader.

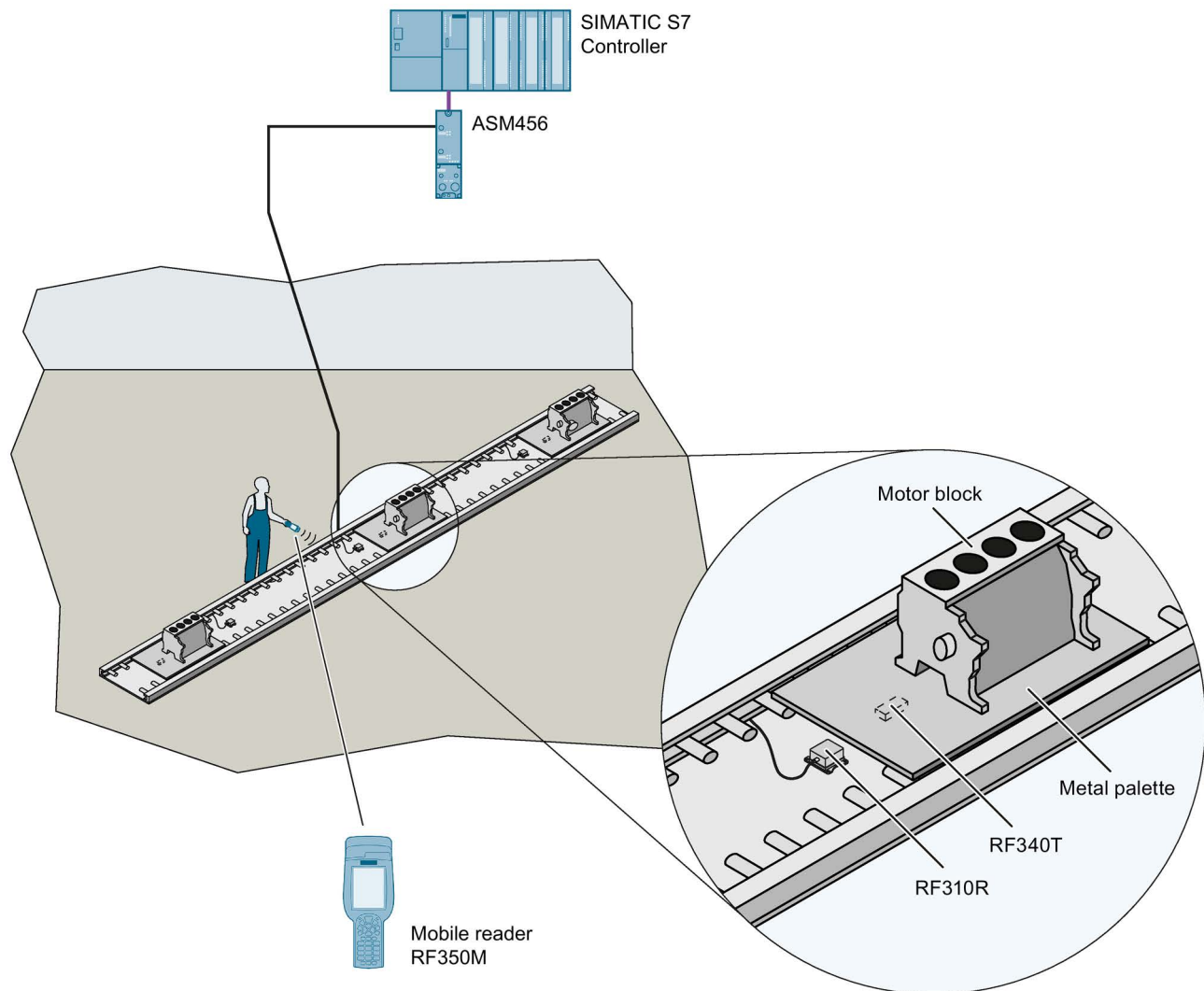


Figure 3-4 Example of engine block production

3.3.3 Example of container and cardboard container handling: Use of ISO transponders

Containers of varying sizes are conveyed to picking workstations in a delivery center. There, the individual goods are removed and packed in cartons according to the delivery note. These cartons are marked with low-cost transponder labels and sorted to small or large packaging workstations (according to the delivery note) by being guided or transported via the corresponding conveyor system. The containers are marked using the MDS D100 ISO transponder.

Advantages at a glance:

- Decision points in the conveyor system can be installed in a more favorable way (mechanically)
- Different sizes of containers with different depths can be identified due to the range
- In contrast to bar codes, the transponders can also be written to
- Different types of transponders can be processed using one and the same reader

Features of the scenario

In this example scenario, containers of varying sizes are conveyed on a conveyor system. Only the unique identification number (8 bytes) is read. The containers to be picked are sorted to the corresponding workstations. The maximum transport speed is 1.0 m/s.

In this scenario, it is an advantage that the RF380R reader can read and write the transponders at different distances on the containers without a great deal of mechanical or control system effort due to the reading range.

During the picking process, the goods are immediately placed in different containers or packed in cartons depending on the destination (small packaging or large packaging station). The containers are equipped with the MDS D100 ISO transponder. The low-cost "one-way tag" (label) is used on the cartons: it is simply glued onto the carton. Thus the goods can be identified at any time. Again, one and the same reader hardware is used for this. The maximum transport speed is 0.8 m/s.

In addition, flexible identification is possible at each location and at any time using the mobile SIMATIC RF350M reader.

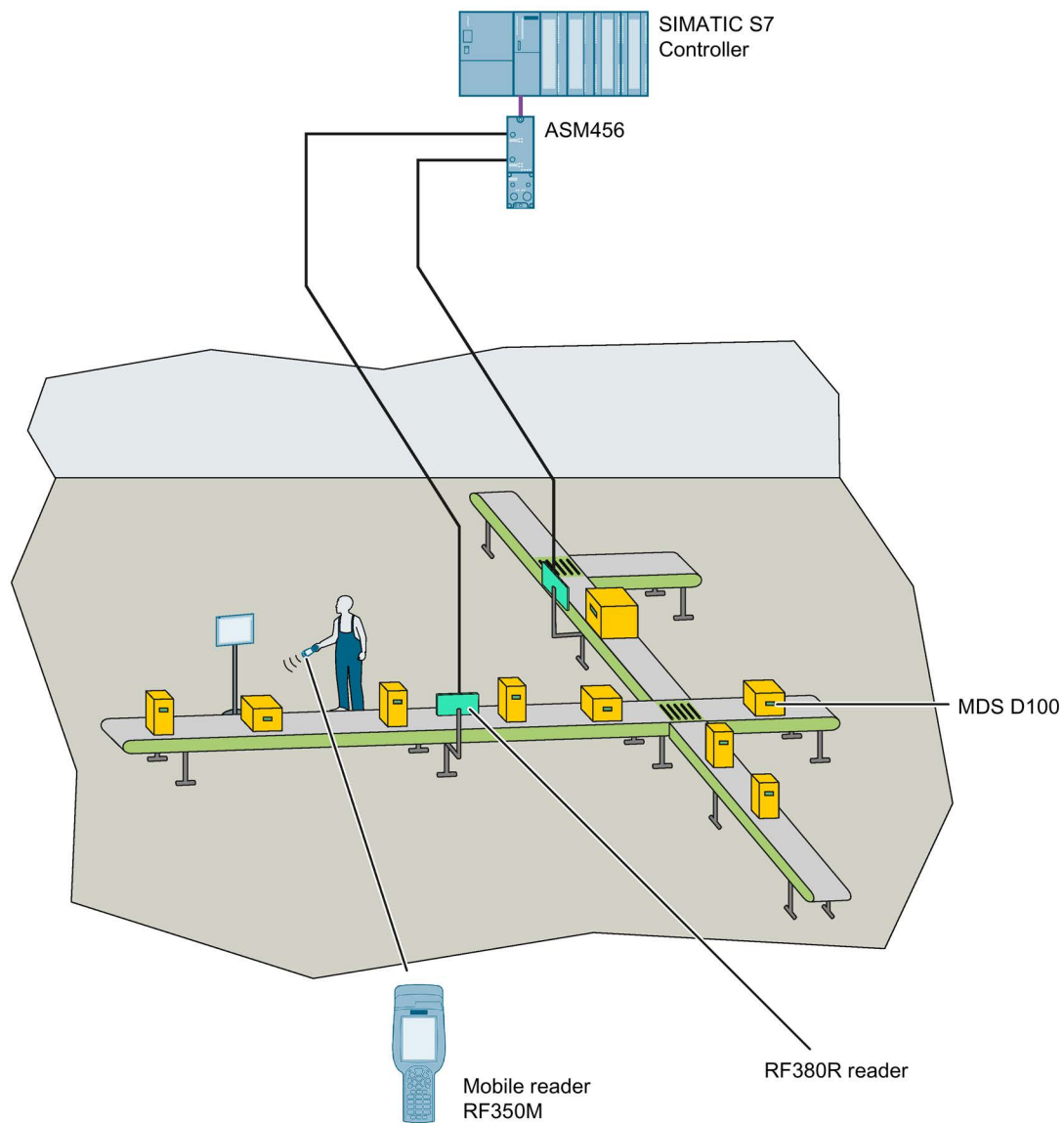


Figure 3-5 Example of container and cardboard handling

Planning the RF300 system

4.1 Fundamentals of application planning

4.1.1 Selection criteria for SIMATIC RF300 components

Assess your application according to the following criteria, in order to choose the right SIMATIC RF300 components:

- Transmission distance (read/write distance)
- Tracking tolerances
- Static or dynamic data transfer
- Data volume to be transferred
- Speed in case of dynamic transfer
- Metal-free rooms for transponders and readers
- Ambient conditions such as relative humidity, temperature, chemical impacts, etc.

4.1.2 Transmission window and read/write distance

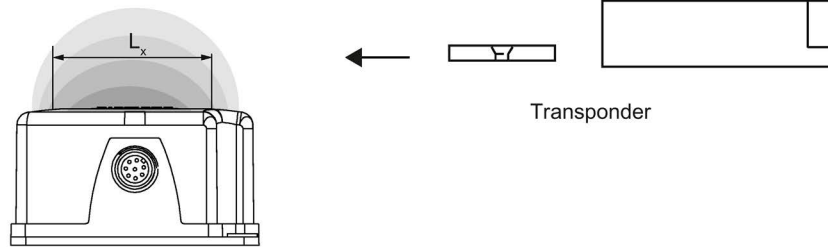
The reader generates an inductive alternating field. The field is strongest close to the reader; however, a read/write distance of "zero" between reader and transponder is not recommended.

The field strength of the alternating field decreases strongly the further away from the reader. The distribution of the antenna field depends on the structure and geometry of the antennas in the reader and transponder.

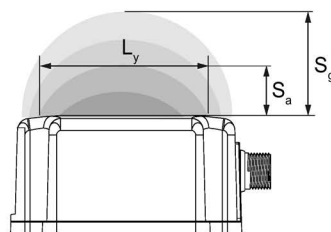
For the transponder to function correctly, a minimum field strength at the transponder must be achieved at a distance S_g from the reader or the antenna.

The figures below show the transmission window between transponder and reader or between transponder and antenna:

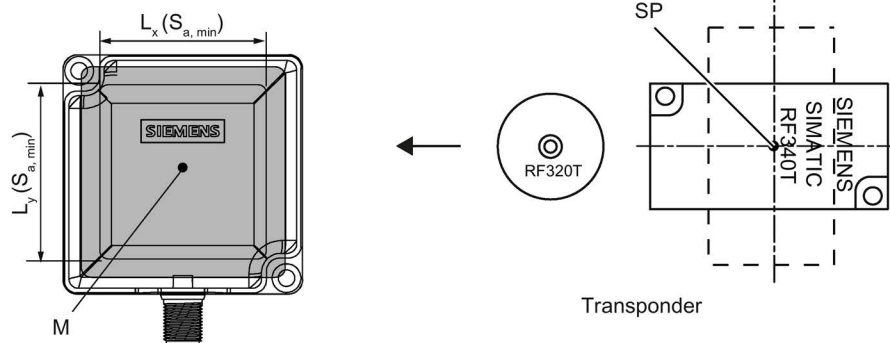
Front view



Side view



View from above



- S_a Operating distance between transponder and reader
- S_g Limit distance (maximum clear distance between upper surface of the reader and the transponder, at which the transmission can still just function under normal conditions)
- L_x Length of a transmission window in the x direction while maintaining the working distance ($L_x \neq L_y$ with RF380R and RF382R)
- L_y Length of a transmission window in the y direction while maintaining the working distance ($L_x \neq L_y$ with RF380R and RF382R)
- M Field centerpoint
- SP Intersection of the axes of symmetry of the transponder

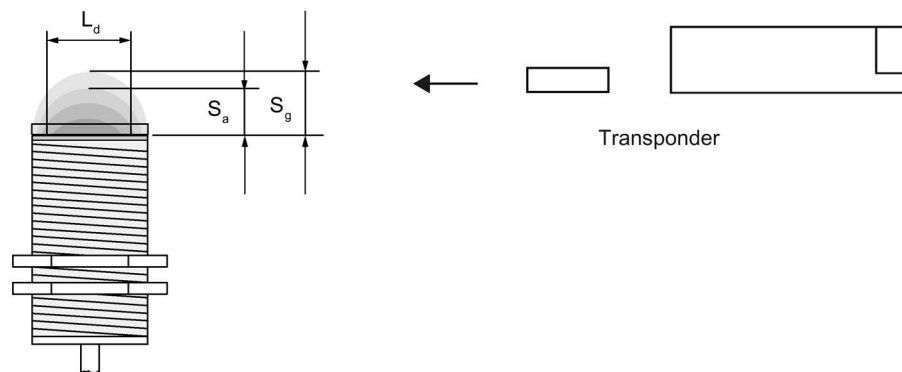
Figure 4-1 Transmission window and read/write distance reader

Note

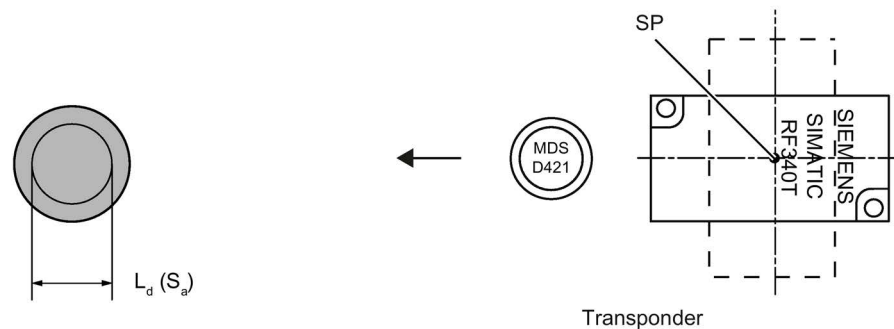
Transmission window with RF380R and RF382R

Note that the transmission window of the reader RF380R is not square ($L_x \neq L_y$). To obtain as large a transmission window as possible, make sure that the transponder only crosses the reader in the x direction.

Front view



View from above



Transmission window

- S_a Operating distance between transponder and reader
- S_g Limit distance (maximum clear distance between upper surface of the reader and the transponder, at which the transmission can still just function under normal conditions)
- L_d Diameter of a transmission window
- SP Intersection of the axes of symmetry of the transponder

Figure 4-2 Transmission window and read/write distance round antenna

The transponder can be used as soon as the intersection (SP) of the transponder enters the area of the transmission window.

From the diagrams above, it can also be seen that operation is possible within the area between S_a and S_g . The active operating area reduces as the distance increases, and shrinks to a single point at distance S_g . Only static mode should thus be used in the area between S_a and S_g .

Aids for calculating the field data

Note

Determining the operating distance, limit distance and transmission window

Remember that you can obtain the values S_a , S_g and L simply and quickly using the tool for field data acquisition. You will find this on the DVD "Ident Systems, Software & Documentation".

4.1.3 Width of the transmission window

Determining the width of the transmission window

The following approximation formula can be used for practical applications:

$$B = 0.4 \cdot L$$

W: Width of the transmission window

L: Length of the transmission window

Tracking tolerance

The width of the transmission window (W) is particularly important for the mechanical tracking tolerance. The formula for the dwell time is valid without restriction when W is observed.

4.1.4 Impact of secondary fields

Secondary fields in the range from 0 mm to 30% of the limit distance (S_g) generally always exist.

They should, however, only be used during configuration in exceptional cases, since the read/write distances are very limited. Exact details of the secondary field geometry cannot be given, since these values depend heavily on the operating distance and the application. When working in dynamic mode, remember that during the transition from the secondary field to the main field the presence of the tag is lost temporarily. It is therefore advisable to select a distance $> 30\%$ of S_g .

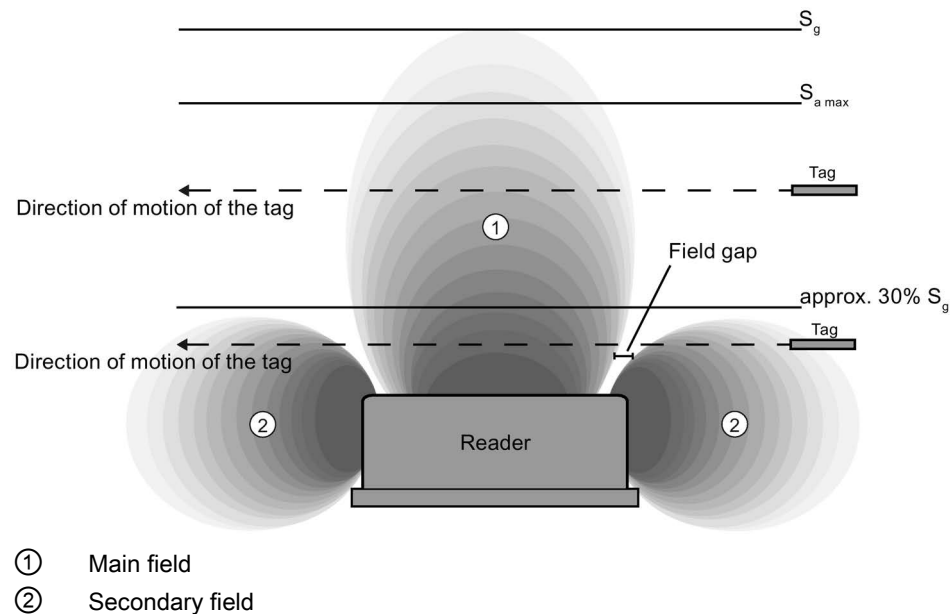
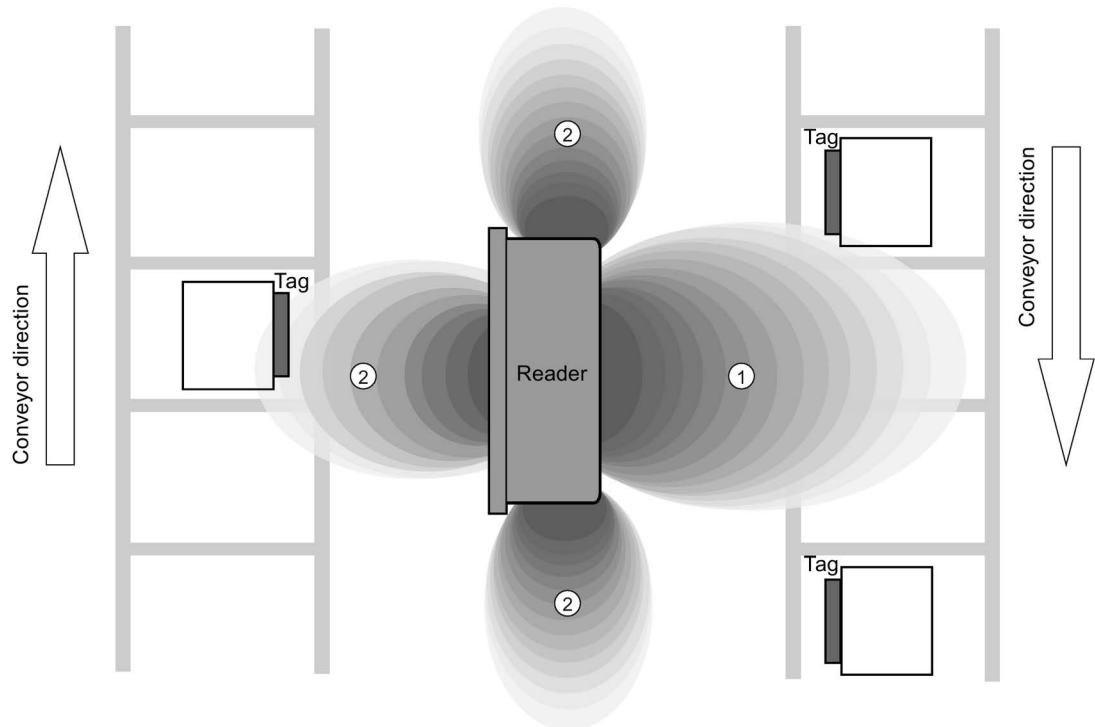


Figure 4-3 Gap in the field resulting from secondary fields

Secondary fields without shielding

The following graphic shows typical primary and secondary fields, if no shielding measures are taken.



- ① Main field
- ② Secondary field

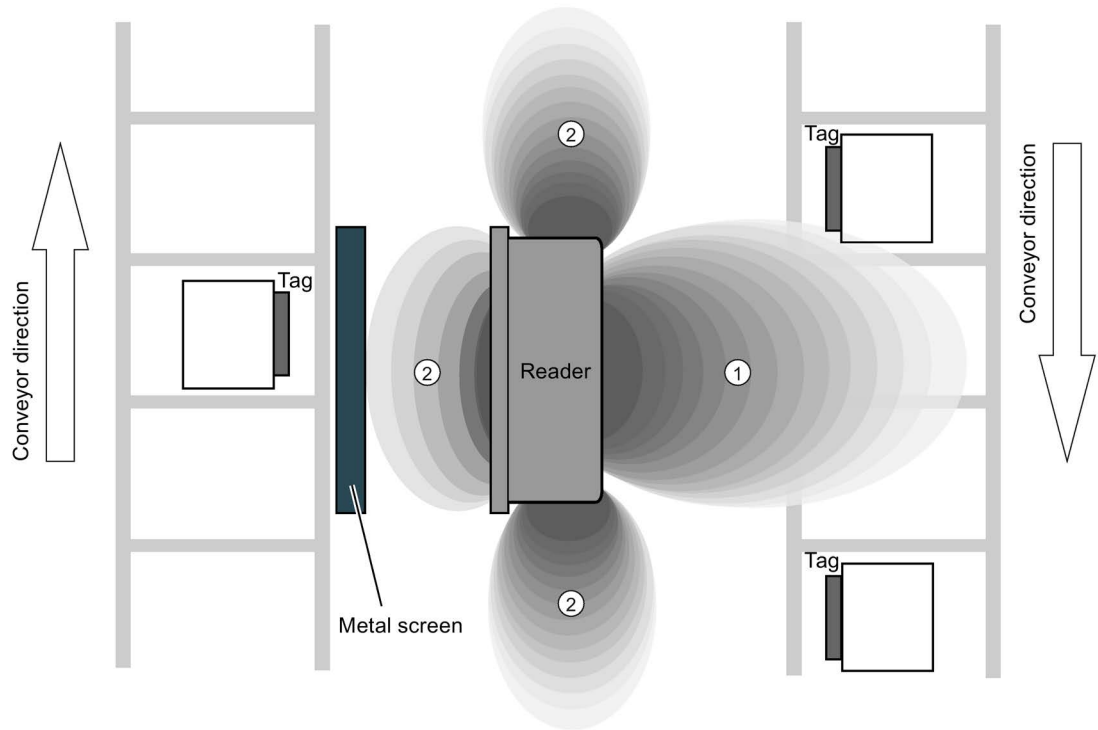
Figure 4-4 Secondary field without shielding

In this arrangement, the reader can also read tags via the secondary field. Shielding is required in order to prevent unwanted reading via the secondary field, as shown and described in the following.

Secondary fields with shielding

The following graphic shows typical primary and secondary fields, with metal shielding this time.

The metal shielding prevents the reader from detecting tags via the secondary field.



- ① Main field
- ② Secondary field

Figure 4-5 Secondary field with shielding

4.1.5 Setup help of the readers of the second generation

After turning on the reader (connection to the power supply) and the following startup phase, the reader automatically changes to the "Setup" mode. During this the antenna (reader-internal or external) is turned on, in contrast to generation 1 in which the antenna is turned on by a RESET.

In this status "search for transponders" the reader scans the antenna field for transponders with all air interface protocols (RF300, ISO 15693, ISO 14443). If a transponder is recognized in the antenna field of the reader only the HF protocol of the recognized transponder type is used and there is a change in the status to "Show quality". In this status you obtain direct feedback about the quality of the communication with the transponder via the LED. Depending on the environment (metal, interference) or the field coupling with the transponder (size of the transponder antenna) as well as the individual field geometry (shape of the main and side lobe) of the reader, communication can be very good (permanent light) or good (flickering) at certain locations in the antenna field. These factors give users the option of finding the optimal area in the specific installation situation or in a combination. If no transponder is recognized for a longer period of time, the reader changes back to the "Search for transponders" status.

When a "RESET" command is received, the reader changes back to the normal operation as known from the RF300.

Meaning of the LED operating display in the "Setup" mode

The operational statuses of the reader are displayed by two LEDs. The LEDs can adopt the colors white green, red, yellow or blue and the statuses off, on, flashing.

Table 4- 1 Display elements

LED	Meaning
	The reader is turned off.
	The reader is turned on and is searching for transponders. The reader is in the "Setup" mode, in the "Search for transponders" status and has not yet received a "RESET" command and is not ready.
	There is transponder in the antenna field. The reader is in the "Setup" mode, in the status "Show quality", has not yet received a "RESET" command and is not ready. Depending on the quality of the communication, the LED flickers or is lit permanently.

4.1.6 Permissible directions of motion of the transponder

Detection area and direction of motion of the transponder

The transponder and reader have no polarization axis, i.e. the transponder can come in from any direction, assume any position as parallel as possible to the reader, and cross the transmission window. The figure below shows the active area for various directions of transponder motion:

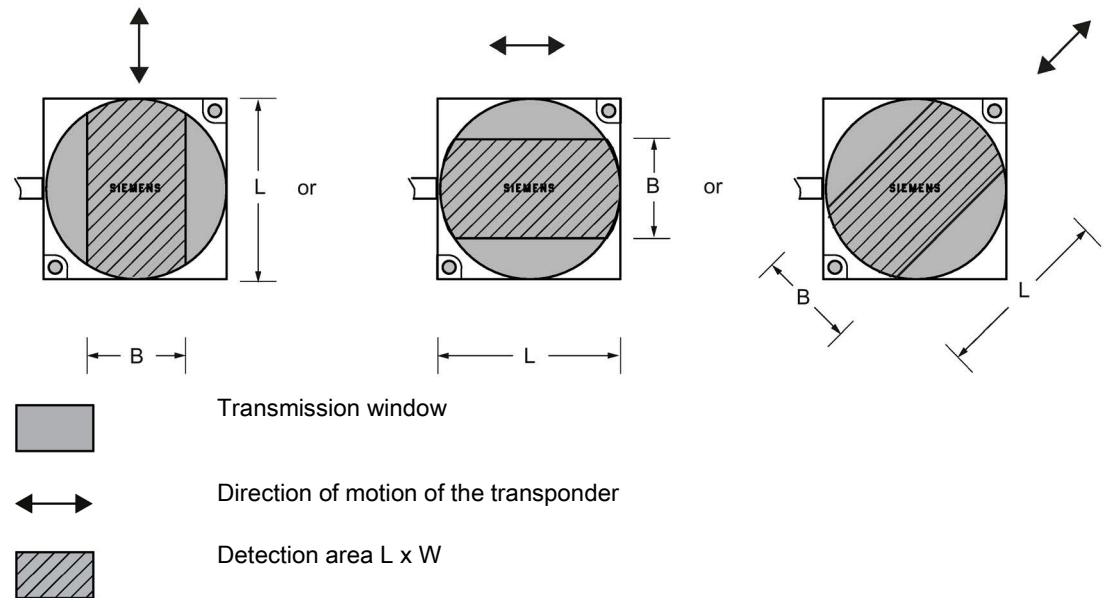


Figure 4-6 Detection areas of the reader for different directions of transponder motion

4.1.7 Operation in static and dynamic mode

Operation in static mode

If working in static mode, the transponder can be operated up to the limit distance (S_g). The transponder must then be positioned exactly over the reader:

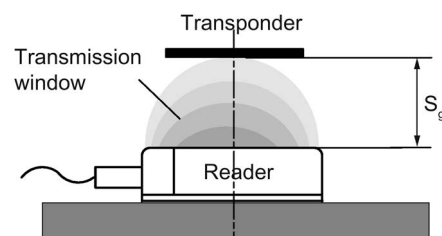


Figure 4-7 Operation in static mode

Operation in dynamic mode

When working in dynamic mode, the transponder moves past the reader. The transponder can be used as soon as the intersection (SP) of the transponder enters the circle of the transmission window. In dynamic mode, the operating distance (S_a) is of primary importance. [Operating distances, see Chapter Field data for transponders, readers and antennas (Page 51)]

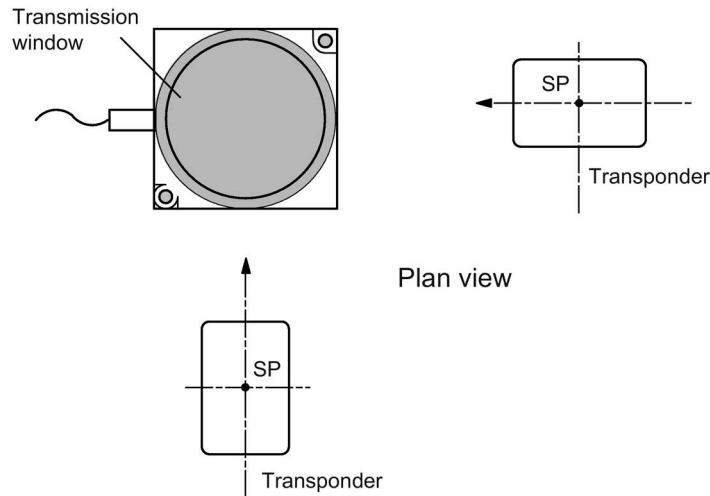


Figure 4-8 Operation in dynamic mode

4.1.8 Dwell time of the transponder

The dwell time is the time in which the transponder remains within the transmission window of the reader. The reader can exchange data with the transponder during this time.

The dwell time is calculated as follows:

$$t_v = (L * 0,8 \text{ [m]}) : V_{\text{Tag}} \text{ [m/s]}$$

t_v : Dwell time of the transponder

L : Length of the transmission window

V_{Tag} : Speed of the transponder (tag) in dynamic mode

0.8: Constant factor used to compensate for temperature influence and production tolerances

The dwell time can be of any duration in static mode. The dwell time must be sufficiently long to allow communication with the transponder.

The dwell time is defined by the system environment in dynamic mode. The volume of data to be transferred must be matched to the dwell time or vice versa. As a general rule:

$$t_v \geq t_k$$

t_v : Dwell time of the data memory in the field of the reader

t_k : Communication time between transponder and communication module

$$t_K = K + t_{\text{Byte}} * n$$

or Calculation of the maximum amount of user data

$$n_{\text{max}} = (t_v - K) : t_{\text{Byte}}$$

- t_K : Communication time between transponder and communication module
 K Constant; the constant is an internal system time. This includes the time for power buildup on the MDS and for command transfer
 t_{Byte} Transmission time for 1 byte
 n Amount of user data in bytes
 n_{max} Maximum amount of user data in bytes in dynamic mode
 t_v Dwell time of the data memory in the field of the reader

4.1.9 Communication between communications module, reader and transponder

Aids for calculating the data transmission times

User-friendly calculation tools are available for the communications modules ASM 456, RF160C, RF170C and RF180C to calculate data transfer times. The calculation tools can be found on the DVD "Ident Systems Software & Documentation", article number 6GT2080-2AA20.

ASM 456 Command Processing Time Calculation V2.2 - 01/2010

Parameter Input

= Input field

CPU	DP-Master
Cycle Time 5 ms	
counter_customer 2	
Transfer Time 3 ms	
Acyc for DP-cycle 2	
Acyc parallel 4	
Supply level 40 %	

Command Parameter:

Data length 1000 Byte

Number of working readers 1

PROFIBUS

Other PROFIBUS Slaves

Slave number 0

Sum I/O 0

ASM 456

Number 1

Baud rate 1.5 Mbaud

Profibus Cycle Time 0.5 ms

Baudrate SLG 115.2 kBaud

SLG / READER

HF transfer

t_{Byte} 0.13 ms/Byte

K 8.5 ms

MDS / TAG

Calculation RESULTS

Processing Time (Estimation) 231 ms

Processing Time HF Field (dynamic mode) 173 ms

Figure 4-9 User interface of the calculation tool for command processing time

Aids for calculating the field data

You will also find a tool for calculating field data on the DVD "Ident Systems, Software & Documentation". Using this tool, among other things you can calculate the operating distance (S_a), limit distance (S_g) and transmission window (L).

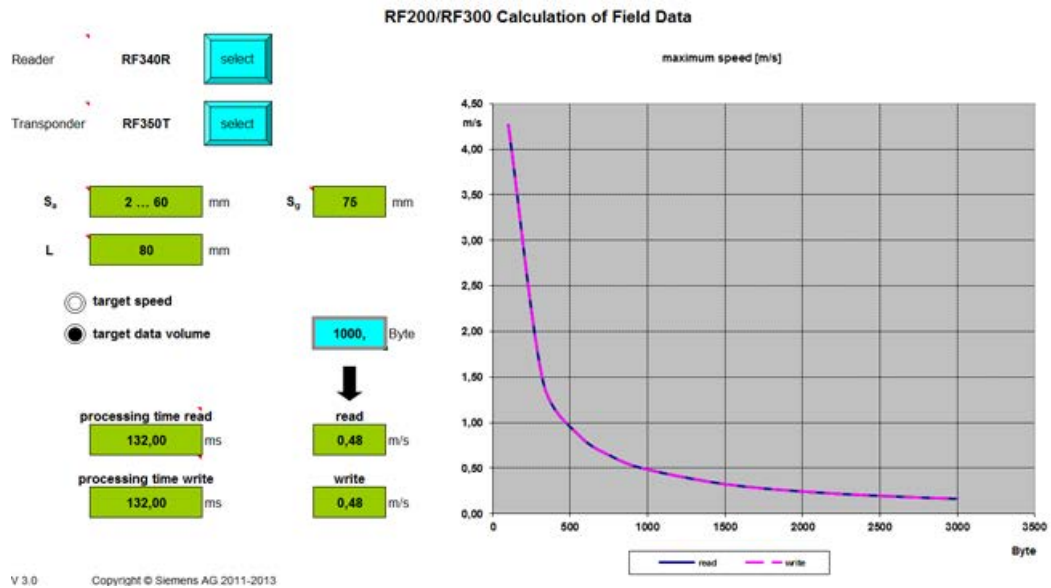


Figure 4-10 User interface of the calculation tool for field data acquisition

4.2 Field data for transponders, readers and antennas

The following tables show the field data for all SIMATIC RF300 components of transponders and readers. This makes the correct selection of a transponder and reader particularly easy.

All the technical specifications listed are typical data and are applicable for an ambient temperature between 0 °C and +50 °C, a supply voltage between 22 and 27 VDC and a metal-free environment. **Tolerances of $\pm 20\%$ are permitted due to production or temperature conditions.**

If the entire voltage range at the reader of 20 VDC to 30 VDC and/or the entire temperature range of transponders and readers is used, the field data is subject to further tolerances.

Note

Transmission gaps

If the minimum operating distance (S_a) is not observed, a transmission gap can occur in the center of the field. Communication with the transponder is not possible in the transmission gap, see section "Impact of secondary fields (Page 43)".

Note

Possible reader-transponder combinations

The tables of the following section show the possible reader-transponder combinations.

4.2.1 Field data of RF300 transponders

The limit distances (S_g) and operating distances (S_a) along with the length of the transmission window for each reader-transponder combination are listed in the tables below.

In dynamic mode, make sure that rectangular transponders cross the antenna field in the longitudinal direction.

Table 4- 2 Field data RF310R reader

	Length of the transmission window (L)	Operating distance (S_a)	Limit distance (S_g)
RF320T	30	1...23	26
RF330T	30	2...18	21
RF340T	40	2...36	41
RF350T	45	2...47	53
RF360T	45	2...60	68
RF370T	70	2...45	60

All values are in mm

The values relate to the RF310R reader as of version "D".

Table 4- 3 Field data RF340R reader

	Length of the transmission window (L)	Operating distance (S _a)	Limit distance (S _g)
RF320T	45	1...20	25
RF330T	40	2...18	23
RF340T	80	2...50	58
RF350T	80	2...60	75
RF360T	90	2...65	85
RF370T	85	5...60	80
RF380T	90	5...80	100

All values are in mm

Table 4- 4 Field data RF350R reader / ANT 1

	Length of the transmission window (L)	Operating distance (S _a)	Limit distance (S _g)
RF320T	45	1...30	37
RF330T	40	1...25	30
RF340T	80	2...55	70
RF350T	80	2...65	85
RF360T	90	2...75	100
RF370T	85	5...65	85
RF380T	90	5...90	110

All values are in mm

Table 4- 5 Field data RF350R reader / ANT 3

	Length of the transmission window (L)	Operating distance (S _a)	Limit distance (S _g)
RF320T	25	1...15	18
RF330T	25	1...10	15
RF340T	40	2...25	30

All values are in mm

Table 4- 6 Field data RF350R reader / ANT 18

	Diameter of the transmission window (L _d)	Operating distance (S _a)	Limit distance (S _g)
RF320T	10	0...10	13
RF330T	10	0...11	13
RF340T	20	0...18	22

All values are in mm

Table 4- 7 Field data RF350R reader / ANT 30

	Diameter of the transmission window (L _d)	Operating distance (S _a)	Limit distance (S _g)
RF320T	15	0...15	20
RF330T	22	0...15	18
RF340T	35	0...25	30
RF350T	35	0...35	40
RF360T	80	2...32	38

All values are in mm

Table 4- 8 Field data RF380R reader

	Length of the transmission window		Operating distance (S _a)	Limit distance (S _g)
	in the x direction (L _x)	in the y direction (L _y)		
RF320T	100	40	2...45	60
RF330T	120	30	5...45	48
RF340T	120	50	2...80	105
RF350T	140	60	2...100	125
RF360T	160	70	2...120	150
RF370T	160	65	5...100	135
RF380T	180	75	5...125	160

All values are in mm

RF380R reader: Setting the transmit power

The RF380R reader (6GT2801-3AB10) allows the transmission output power to be set with the aid of the "distance_limiting" input parameter (you will find more detailed information in the document "Input parameters for the RF300 system for programming via communications modules"). For this, values from 0.5 W to 2.0 W can be set in 0.25 W increments. When doing this, remember that the change to the transmit power will affect the detection in the limit range (upper/ lower operating distance), as well as the minimum distance that is to be maintained between adjacent RF380Rs. A higher working version is not to be expected.

Table 4- 9 Adjustable transmit power of the RF380R reader with the aid of the "distance_limiting" parameter

Value	Transmit power
02	0.5 W
03	0.75 W
04	1.0 W
05	1.25 W (default)
06	1.5 W
07	1.75 W
08	2.0 W

Note

Setting outside the range

Settings outside the specified range (02 ... 08) have the effect that the default value (1.25 W) is set. In this case for reasons of compatibility there is no error message.

This setting is not necessary with the RF380R readers of the 2nd generation (6GT2801-3BAx0) because the power limits are optimized automatically depending on the reader-transponder distance. For reasons of compatibility this setting can nevertheless be made. Note that the values "02", "03" and "04" bring about a reduction of the power of approximately 50%.

You will find more information on this subject in the chapter "Minimum clearances (Page 63)" section "Minimum distance from reader to reader".

See also

Product Information "Input parameters for the RF300 system for programming via communications modules" (<https://support.industry.siemens.com/cs/ww/en/ps/15033/man>)

4.2.2 Field data of ISO transponders (MDS D)

The limit distances (S_g) and operating distances (S_a) along with the length of the transmission window for each reader-transponder combination are listed in the tables below.

Observe the following information for field data of ISO transponders:

- A maximum median deviation of ± 2 mm is permitted in static mode (without affecting the field data).
- In dynamic mode, make sure that rectangular transponders cross the antenna field in the longitudinal direction.

Table 4- 10 Field data RF310R reader

	Length of the transmission window (L)	Operating distance (S_a)	Limit distance (S_g)
MDS D100	40	2...93	105
MDS D124	30	2...64	72
MDS D126	90	2...65	73
MDS D139	105	5...96	109
MDS D160	30	2...39	44
MDS D165	130	2...90	102
MDS D200	120	2...80	90
MDS D261	80	2...74	83
MDS D324	30	2...47	63
MDS D339	85	5...74	84
MDS D400	90	2...104	115
MDS D423	55	2...35	40
MDS D424	35	1...68	75
MDS D425	30	1...22	25
MDS D426	90	5...75	90
MDS D428	30	1...40	45
MDS D460	30	1...32	38
MDS D524	35	1...70	78
MDS D525	30	1...22	25
MDS D526	90	5...80	90
MDS D528	30	1...43	48

All values are in mm

Table 4- 11 Field data RF340R reader

	Length of the transmission window (L)	Operating distance (S _a)	Limit distance (S _g)
MDS D100	90	5...110	140
MDS D124	60	2...60	75
MDS D126	80	2...85	110
MDS D139	90	5...80	110
MDS D160	50	2...35	60
MDS D165	130	15...120	140
MDS D200	125	10...100 ¹⁾	115
MDS D261	95	15...60 ²⁾	70
MDS D324	50	2...55	70
MDS D339	100	5...75	85
MDS D400	140	2...100	130
MDS D423	65	5...40	48
MDS D424	50	2...55	70
MDS D425	45	2...20	30
MDS D426	110	0...80	100
MDS D428	45	2...40	50
MDS D460	45	2...25	40
MDS D524	50	2...55	70
MDS D525	45	2...20	30
MDS D526	110	0...80	100
MDS D528	45	2...40	50

1) When operating the reader of the second generation and an ambient temperature > 50 °C, the operating distance (S_a) is 15 ... 80 mm.

2) When operating the reader of the second generation the operating distance (S_a) is 40 ... 100 mm and the limit distance (S_g) is 150 mm.

All values are in mm

Table 4- 12 Field data RF350R reader / ANT 1

	Length of the transmission window (L)	Operating distance (S _a)	Limit distance (S _g)
MDS D100	80	5...110	140
MDS D124	55	2...65	85
MDS D126	150	2...90	120
MDS D139	75	5...85	115
MDS D160	50	2...35	60
MDS D165	140	5...100	120
MDS D200	130	5...95	115
MDS D261	100	5...80	95
MDS D324	50	2...66	78

	Length of the transmission window (L)	Operating distance (S _a)	Limit distance (S _g)
MDS D339	110	5...90	105
MDS D400	140	2...110	135
MDS D423	85	10...40	50
MDS D424	50	2...75	88
MDS D425	40	2...25	35
MDS D426	110	2...85	95
MDS D428	40	2...40	50
MDS D460	40	2...32	38
MDS D524	50	2...65	85
MDS D525	40	2...25	35
MDS D526	110	2...85	105
MDS D528	40	2...35	50

All values are in mm

Table 4- 13 Field data RF350R reader / ANT 3

	Diameter of the transmission window (L _d)	Operating distance (S _a)	Limit distance (S _g)
MDS D124	40	1...35	42
MDS D160	40	1...28	35
MDS D324	40	1...22	32
MDS D422	20	1...11	18
MDS D423	30	5...20	30
MDS D424	40	1...40	48
MDS D425	25	2...18	22
MDS D428	30	2...28	30
MDS D460	30	1...20	28

All values are in mm

Table 4- 14 Field data RF350R reader / ANT 12

	Diameter of the transmission window (L _d)	Operating distance (S _a)	Limit distance (S _g)
MDS D117	2	0...2	3
MDS D127	2	0...3	4
MDS D160	15	0...8	12
MDS D421	6	0...3	5
MDS D428	15	1...10	17
MDS D460	8	1...8	10

	Diameter of the transmission window (L _d)	Operating distance (S _a)	Limit distance (S _g)
MDS D521	6	0...3	5
MDS D528	15	1...10	17

All values are in mm

Table 4- 15 Field data RF350R reader / ANT 18

	Diameter of the transmission window (L _d)	Operating distance (S _a)	Limit distance (S _g)
MDS D117	3	0...5	6
MDS D124	27	2...24	28
MDS D127	3	0...5	6
MDS D160	20	1...18	20
MDS D324	25	1...22	28
MDS D421	10	0...6	8
MDS D422	20	1...10	13
MDS D424	25	1...27	35
MDS D425	17	1...10	14
MDS D428	17	1...15	20
MDS D460	15	1...12	16
MDS D521	10	0...6	8
MDS D522	20	1...10	13
MDS D524	25	1...27	35
MDS D525	17	1...10	14
MDS D528	17	1...15	20

All values are in mm

Table 4- 16 Field data RF350R reader / ANT 30

	Diameter of the transmission window (L _d)	Operating distance (S _a)	Limit distance (S _g)
MDS D124	30	1...35	40
MDS D126	70	0...42	50
MDS D160	25	1...24	28
MDS D324	30	1...35	40
MDS D422	30	0...14	16
MDS D423	45	5...22	28
MDS D424	28	0...45	50
MDS D425	25	1...15	20
MDS D426	65	0...45	48
MDS D428	25	1...25	28

	Diameter of the transmission window (L_d)	Operating distance (S_a)	Limit distance (S_g)
MDS D460	22	1...18	20
MDS D522	30	0...15	19
MDS D524	28	0...45	50
MDS D525	25	1...15	20
MDS D526	65	0...45	48
MDS D528	25	1...25	28

All values are in mm

Table 4- 17 Field data RF380R reader

	Length of the transmission window		Operating distance (S_a)	Limit distance (S_g)
	in the x direction (L_x)	in the y direction (L_y)		
MDS D100 ¹⁾	140	100	10...170	210
MDS D124	80	80	1...120	140
MDS D126	180	140	2...145	190
MDS D139	140	90	5...160	200
MDS D160	80	40	2...64	80
MDS D165 ¹⁾	200	140	10...170	200
MDS D200 ²⁾	200	160	20...150	195
MDS D261 ³⁾	190	120	20...120	160
MDS D324	100	60	2...96	120
MDS D339	290	140	15...160	180
MDS D400	240	120	10...200	240
MDS D423	110	60	5...75	90
MDS D424	100	70	2...120	140
MDS D425	80	45	2...35	50
MDS D426	220	160	0...155	195
MDS D428	80	50	2...70	95
MDS D460	80	70	2...65	90
MDS D524	100	70	2...120	140
MDS D525	80	45	2...35	50

	Length of the transmission window		Operating distance (S _a)	Limit distance (S _g)
	in the x direction (L _x)	in the y direction (L _y)		
MDS D526	220	160	0...155	195
MDS D528	80	50	2...70	95

All values are in mm

- 1) Keep in mind that the minimum distance must be increased by 10 mm with ambient temperatures of 40 °C and higher.
- 2) Keep in mind that the minimum distance of the reader to the transponder must be increased by 7 mm (1st generation) or 6 mm (2nd generation) for every 5 °C rise in temperature with ambient temperatures of 25 °C and higher. The minimum distance must be increased by 15 mm with ambient temperatures of 50 °C and higher (1st and 2nd generation).
- 3) Keep in mind that the minimum distance of the reader to the transponder must be increased by 5 mm (1st generation) or 3 mm (2nd generation) for every 5 °C rise in temperature with ambient temperatures of 25 °C and higher. The minimum distance must be increased by 9 mm (1st generation) or 14 mm (2nd generation) with ambient temperatures of 50 °C and higher.

Table 4- 18 Field data RF382R reader

	Length of the transmission window		Operating distance (S _a)	Limit distance (S _g)
	in the x direction (L _x)	in the y direction (L _y)		
MDS D124	70	130	40...65	75
MDS D160	50	100	35...50	65
MDS D324	60	120	40...65	75
MDS D424	65	120	40...65	75
MDS D460	40	80	30...50	60

All values are in mm

4.2.3 Field data of ISO transponders (MDS E)

The limit distances (S_g) and operating distances (S_a) along with the length of the transmission window for each reader-transponder combination are listed in the tables below.

Observe the following information for field data of ISO transponders:

- A maximum median deviation of ± 2 mm is possible in static mode (without affecting the field data).
- In dynamic mode, make sure that rectangular transponders cross the antenna field in the longitudinal direction.

Note

Relenace of the MDS E transponders

The MDS E transponders are products that will be discontinued. These are relevant for migration projects in which existing RFID systems are replaced by SIMATIC RF300, generation 2.

Note that the MDS E transponders can only be operated in conjunction with the readers of the second generation!

Table 4- 19 Field data RF310R reader

	Length of the transmission window (L)	Operating distance (S_a)	Limit distance (S_g)
MDS E600	80	2...30	43
MDS E611	80	2...40	60
MDS E624	45	2...25	36

All values are in mm

Table 4- 20 Field data RF340R reader

	Length of the transmission window (L)	Operating distance (S_a)	Limit distance (S_g)
MDS E600	90	5...50	65
MDS E611	90	10...50	65
MDS E624	60	2...35	45

All values are in mm

Table 4- 21 Field data RF350R reader / ANT 1

	Length of the transmission window (L)	Operating distance (S _a)	Limit distance (S _g)
MDS E600	70	10...50	60
MDS E611	100	20...50	65
MDS E624	55	2...35	45

All values are in mm

Table 4- 22 Field data RF350R reader / ANT 12

	Diameter of the transmission window (L _d)	Operating distance (S _a)	Limit distance (S _g)
MDS E623	6	0...3	5

All values are in mm

Table 4- 23 Field data RF350R reader / ANT 18

	Diameter of the transmission window (L _d)	Operating distance (S _a)	Limit distance (S _g)
MDS E623	10	0...6	8
MDS E624	25	2...10	15

All values are in mm

Table 4- 24 Field data RF350R reader / ANT 30

	Diameter of the transmission window (L _d)	Operating distance (S _a)	Limit distance (S _g)
MDS E624	28	1...20	24

All values are in mm

Table 4- 25 Field data RF380R reader

	Length of the transmission window (L _{x/y})	Operating distance (S _a)	Limit distance (S _g)
MDS E600	100/70	10...80	95
MDS E611	110/100	10...115	135
MDS E624	90/50	5...50	60

All values are in mm

4.2.4 Minimum clearances

Minimum distance from transponder to transponder

The specified distances refer to a metal-free environment. For a metallic environment, the specified minimum distances must be multiplied by a factor of 1.5. The transponders designed specifically for installation in/on metal are an exception to this.

Table 4- 26 Minimum distances RF300 transponder

	RF310R	RF340R	RF350R / ANT 1	RF350R / ANT 3	RF350R / ANT 18	RF350R / ANT 30	RF380R
RF320T	≥ 50	≥ 70	≥ 70	40	≥ 20	≥ 40	≥ 120
RF330T	≥ 40	≥ 50	≥ 50	60	≥ 20	≥ 30	≥ 120
RF340T	≥ 60	≥ 80	≥ 80	60	≥ 40	≥ 40	≥ 140
RF350T	≥ 60	≥ 80	≥ 80	--	--	≥ 50	≥ 150
RF360T	≥ 60	≥ 80	≥ 80	--	--	50	≥ 120
RF370T	--	≥ 80	≥ 80	--	--	--	≥ 130
RF380T	--	≥ 80	≥ 80	--	--	--	≥ 150

All values are in mm, relative to the operating distance (S_a) between reader and transponder, and between transponder edge and transponder edge

Table 4- 27 Minimum distances ISO transponder

	RF310R	RF340R	RF350R / ANT 1	RF350R / ANT 3	RF350R / ANT 12	RF350R / ANT 18	RF350R / ANT 30	RF380R	RF382R ¹⁾
MDS D100	≥ 120	≥ 240	≥ 240	--	--	--	--	≥ 420	--
MDS D117	--	--	--	--	≥ 20	≥ 30	--	--	--
MDS D124	≥ 100	≥ 180	≥ 180	90	--	≥ 50	≥ 80	≥ 360	≥ 100, 150
MDS D126	≥ 120	≥ 140	≥ 140	--	--	--	≥ 100	≥ 400	--
MDS D127	--	--	--	--	≥ 25	≥ 30	--	--	--
MDS D139	≥ 200	≥ 200	≥ 200	--	--	--	≥ 80	≥ 450	--
MDS D160	≥ 120	≥ 150	≥ 150	≥ 60	≥ 30	≥ 50	≥ 60	≥ 300	≥ 100, 120
MDS D165	≥ 120	≥ 140	≥ 140	--	--	--	--	≥ 500	--
MDS D200	≥ 120	≥ 150	≥ 150	--	--	--	--	≥ 500	--
MDS D261	≥ 160	≥ 200	≥ 200	--	--	--	--	≥ 400	--
MDS D324	≥ 120	≥ 180	≥ 180	≥ 85	--	≥ 50	≥ 80	≥ 360	≥ 100, 150
MDS D339	≥ 200	≥ 140	≥ 140	--	--	--	--	≥ 450	--
MDS D400	≥ 220	≥ 240	≥ 240	--	--	--	--	≥ 500	--
MDS D421	--	--	--	--	≥ 15	≥ 15	--	--	--
MDS D422	--	--	--	≥ 60	--	≥ 30	≥ 40	--	--
MDS D423	≥ 100	≥ 120	≥ 120	≥ 60	--	≥ 40	≥ 60	≥ 250	--

	RF310R	RF340R	RF350R / ANT 1	RF350R / ANT 3	RF350R / ANT 12	RF350R / ANT 18	RF350R / ANT 30	RF380R	RF382R ¹⁾
MDS D424	≥ 100	180	≥ 180	≥ 80	--	≥ 50	≥ 80	≥ 360	≥ 100, 180
MDS D425	≥ 70	≥ 100	≥ 100	≥ 60	--	--	≥ 60	≥ 250	--
MDS D426	≥ 120	≥ 120	≥ 140	--	--	≥ 30	≥ 60	≥ 400	--
MDS D428	≥ 100	≥ 150	≥ 150	≥ 60	≥ 30	≥ 50	≥ 60	≥ 300	--
MDS D460	≥ 100	≥ 150	≥ 150	≥ 60	≥ 30	≥ 50	≥ 60	≥ 300	≥ 100, 120
MDS D521	--	--	--	--	≥ 15	≥ 15	--	--	--
MDS D522	--	--	--	--	--	≥ 30	≥ 40	--	--
MDS D524	≥ 100	180	≥ 180	--	--	≥ 50	≥ 80	≥ 360	≥ 100, 180
MDS D525	≥ 70	≥ 100	≥ 100	≥ 60	--	--	≥ 60	≥ 250	--
MDS D526	≥ 120	≥ 120	≥ 140	--	--	≥ 30	≥ 60	≥ 400	--
MDS D528	≥ 100	≥ 150	≥ 150	--	≥ 30	≥ 50	≥ 60	≥ 300	--
MDS E600 ²⁾	≥ 120	≥ 240	≥ 240	--	--	--	--	420	--
MDS E611 ²⁾	≥ 120	≥ 240	≥ 240	--	--	--	--	500	--
MDS E623 ²⁾	--	--	--	--	≥ 15	≥ 15	--	--	--
MDS E624 ²⁾	≥ 100	180	≥ 180	≥ 80	--	≥ 50	≥ 80	360	--

¹⁾ The first value is the minimum distance of the transponders in the horizontal field, the second value is the minimum distance of the transponders in the vertical field.

²⁾ Product being discontinued; only relevant for migration projects with the readers of the second generation.

All values are in mm, relative to the operating distance (S_a) between reader and transponder, and between transponder edge and transponder edge

Minimum distance from reader to reader

Table 4- 28 Minimum distances reader

	RF310R to RF310R	RF340R to RF340R ¹⁾	RF380R to RF380R ²⁾	RF382R to RF382R
with 2 readers	≥ 150	≥ 200 / 350	≥ 400	≥ 200
with several readers	≥ 200	≥ 250 / 500	≥ 500	≥ 200

All values are in mm

¹⁾ The value on the left refers to the first generation; the value on the right refers to the second generation of the RF340R.

²⁾ The permissible minimum distance between two RF380Rs depends on the transmit power that is set. The specified minimum distance must be multiplied by the following factor, depending on the output:

Table 4- 29 Effect on the minimum distance of the transmit power with RF380R

"distance_limiting" value (hexadecimal)	Transmit power	Factor
02; 03	0.5 - 0.75 W	0.8
04; 05; 06	1.0 - 1.5 W	1.0
07; 08	1.75 - 2.0 W	1.2

Minimum distance from antenna to antenna

Table 4- 30 Minimum distances antennas

ANT 1	ANT 3	ANT 3S	ANT 8	ANT 12	ANT 18	ANT 30
≥ 300	≥ 150	≥ 20	≥ 50	≥ 70	≥ 100	≥ 100

All values are in mm

You will find detailed information on the minimum distances between antennas the section "Minimum distance between antennas (Page 248)".

Note

Effect on inductive fields by not maintaining the minimum distances of the readers

If the values fall below the values specified in the "Minimum distance readers" and "Minimum distances antennas" tables, there is a risk of the function being affected by inductive fields. In this case, the data transfer time would increase unpredictably or a command would be aborted with an error.

Keeping to the values specified in the "Minimum distance readers" and "Minimum distances antennas" tables is therefore essential.

If the specified minimum distance cannot be complied with due to the physical configuration, the SET-ANT command can be used to activate and deactivate the RF field of the reader. The application software must be used to ensure that only one reader is active (antenna is switched on) at a time.

Note

Please also observe the graphic representations of the minimum distances in the respective chapters on readers.

4.3 Installation guidelines

4.3.1 Overview

The transponder and reader complete with their antennas are inductive devices. Any type of metal in the vicinity of these devices affects their functionality. Some points need to be considered during planning and installation if the values described in the "Field data (Page 51)" section are to retain their validity:

- Minimum spacing between two readers or their antennas
- Minimum distance between two adjacent data memories
- Metal-free area for flush-mounting of readers or their antennas and transponders in metal
- Mounting of multiple readers or their antennas on metal frames or racks

The following sections describe the impact on the operation of the RFID system when mounted in the vicinity of metal.

4.3.2 Reduction of interference due to metal

Table 4- 31 Interference due to metal rack

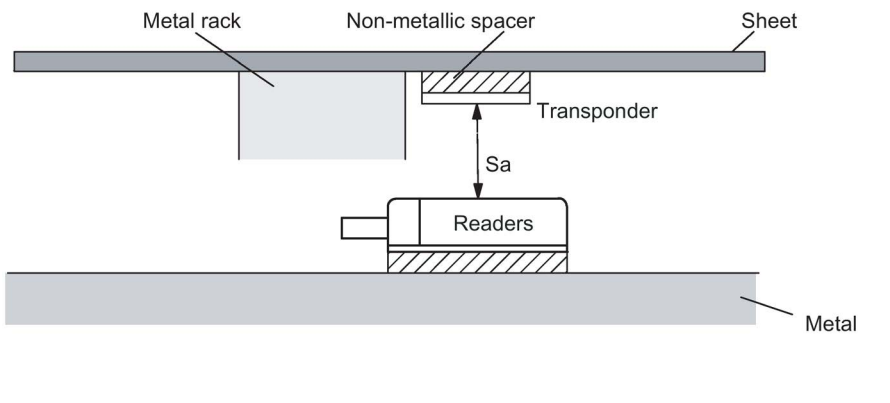
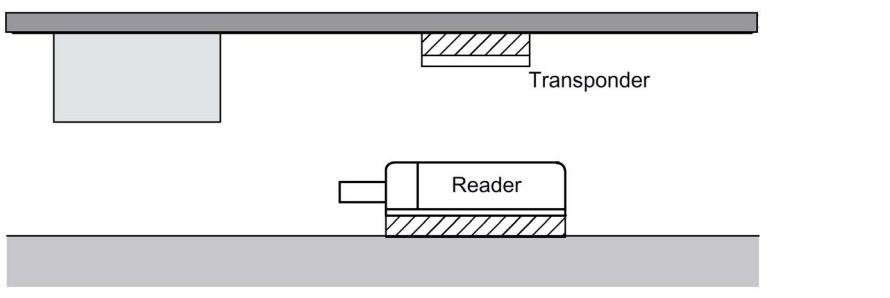
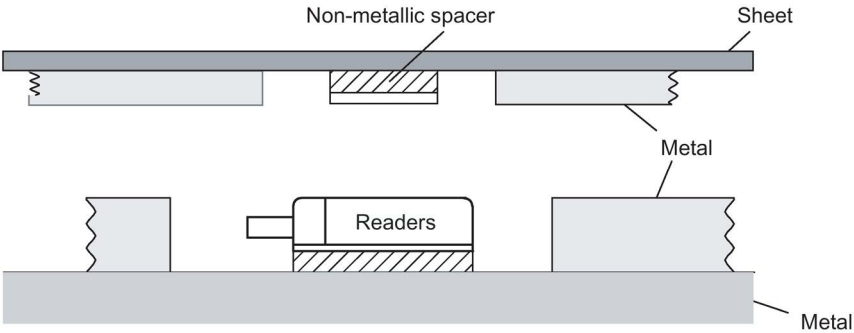
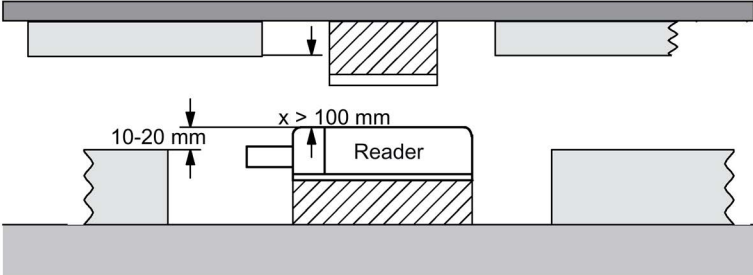
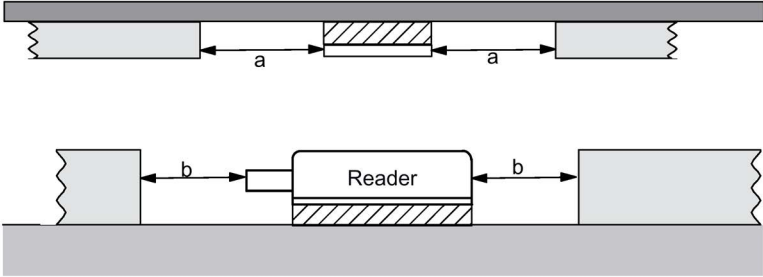
Representation	Description
 The diagram illustrates a cross-section of a metal rack system. At the top, a horizontal bar represents the 'Metal rack'. Below it, a 'Non-metallic spacer' is shown. A 'Sheet' is positioned above the 'Readers' unit. A 'Transponder' is located below the readers. A double-headed arrow labeled 'Sa' indicates the distance between the readers and the transponder. The entire assembly is mounted on a 'Metal' base.	Problem: A metal rack is located above the transmission window of the reader. This affects the entire field. In particular, the transmission window between reader and transponder is reduced.
 The diagram shows the same setup as the previous one, but the 'Transponder' is now mounted to the side of the 'Reader' unit, rather than directly below it. This configuration avoids the interference caused by the metal rack above the reader's transmission window.	Remedy: The transmission window is no longer affected if the transponder is mounted differently.

Table 4- 32 Flush-mounting of transponders and readers

Representation	Description
	Problem: Flush-mounting of transponders and readers is possible in principle. However, the size of the transmission window is significantly reduced. The following measures can be used to counteract the reduction of the window:
	Remedy: Enlargement of the non-metallic spacer below the transponder and/or reader. The transponder and/or reader are 10 to 20 mm higher than the metal surround. (The value $x \geq 100$ mm is valid, e.g. for RF310R. It indicates that, for a distance $x \geq 100$ mm, the reader can no longer be significantly affected by metal.)
	Remedy: Increase the distances a, b to metal. The following rule of thumb can be used: • Increase a, b by a factor of 2 to 3 over the values specified for metal-free areas • Increasing a, b has a greater effect for readers or transponders with a large limit distance than for readers or transponders with a small limit distance.

Mounting of several readers on metal frames or racks

Any reader mounted on metal couples part of the field to the metal frame. There is normally no interaction as long as the minimum distance D and metal-free areas a, b are maintained. However, interaction may take place if an iron frame is positioned unfavorably. Longer data transfer times or sporadic error messages at the communication module are the result.

Note that antenna cables should not be coiled (cable coil = antenna) and should not be mounted directly on metal when coiled to avoid coupling. Antenna cables should be laid separately in a cable channel and not together with the signal/power supply cable of devices (including those of the reader) or other power cables.

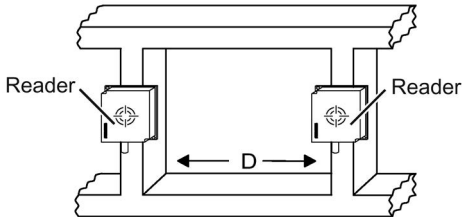
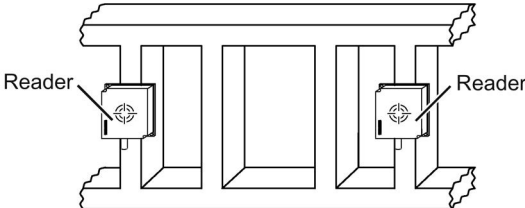
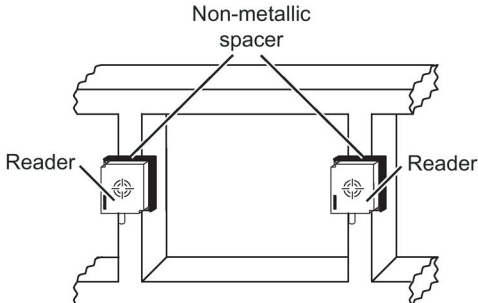
NOTICE

Installation of the readers on a metal construction and mixed mode

Note that if the readers are installed on a metal construction and in mixed mode ¹⁾ the minimum spacing needs to be doubled. This also applies if you are working with external antennas. Moreover the non-metal base on which the reader is mounted should be at least 40 mm thick.

¹⁾ RF300 operation along with ISO 15693 operation or ISO 15693 operation with MOBY E operation etc.

Table 4- 33 Mounting of several readers on metal frames or racks

Representation	Description
 The diagram shows two square readers mounted on a metal frame. A double-headed arrow between them is labeled 'D', indicating the distance between the readers.	Problem: Interaction between readers Remedy: Increase the distance D between the two readers.
 The diagram shows two square readers mounted on a metal frame. Two vertical iron struts are added between the readers to short-circuit stray fields.	Remedy: Introduce one or more iron struts in order to short-circuit the stray fields.
 The diagram shows two square readers mounted on a metal frame. Non-metallic spacers are placed between the readers and the frame, indicated by lines and the label 'Non-metallic spacer'.	Remedy: Insert a non-metallic spacer of 20 to 40 millimeter thickness between the reader and the iron frame. This will significantly reduce the induction of stray fields on the rack:

4.3.3 Effects of metal on different transponders and readers

Mounting different transponders and readers on metal or flush-mounting

Certain conditions have to be observed when mounting the transponders and readers on metal or flush-mounting. For more information, please refer to the descriptions of the individual transponders and readers in the relevant section.

4.3.4 Impact on the transmission window by metal

In general, the following points should be considered when mounting RFID components:

- Direct mounting on metal is allowed only in the case of specially approved transponders.
- Flush-mounting of the components in metal reduces the field data; a test is recommended in critical applications.
- When working inside the transmission window, make sure that no metal rail (or similar part) intersects the transmission field.
The metal rail would affect the field data.
- With readers with a large antenna surface, for reasons of communication reliability, when the transponders are flush-mounted in metal, a metal-free space around the transponders is recommended. This metal-free space should match the size of the antenna surface.
- The reduction of field data is also based on the minimum distance between the reader and transponder. The respective recommendations are listed in the following table.

The impact of metal on the field data (S_g , S_a , L) is shown in a table in this section. The values in the tables describe field data reduction and show the reduced range as a percentage. The range relates to use in a non-metallic environment. A value of 100% means no influence on the range.

Note

Possible reader-transponder combinations

The tables of the following section show the possible reader-transponder combinations.

4.3.4.1 Impact on the transmission window by metal

With RF300 transponders

Table 4- 34 Reduction of field data due to metal, range as %: Transponder and RF310R

Transponder		RF310R reader		
		Without metal	On metal	Flush-mounted in metal (20 mm all-round)
RF320T ¹⁾	Without metal	100	95	80
	On metal; distance 20 mm	100	80	70
	Flush-mounted in metal; distance all round 20 mm ²⁾	80	70	60
RF330T	Without metal	100	95	80
	On metal; distance 0 mm	100	85	75
	Flush-mounted in metal; distance all round 10 mm	85	80	70
	Flush-mounted in metal; without surrounding clearance ²⁾	30	30	25
RF340T	Without metal	100	95	80
	On metal; distance 0 mm	80	80	80
	Flush-mounted in metal; distance all round 20 mm ³⁾	70	70	70
RF350T	Without metal	100	95	85
	On metal; distance 0 mm	70	65	65
	Flush-mounted in metal; distance all round 20 mm ³⁾	60	60	60
RF360T	Without metal	100	95	85
	On metal; distance 20 mm	100	95	75
	Flush-mounted in metal; distance all round 20 mm ³⁾	60	60	60
RF370T	Without metal	100	95	80
	On metal; distance 0 mm	95	90	75
	Flush-mounted in metal; distance all round 20 mm ⁴⁾	70	65	65

¹⁾ Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

²⁾ Transponder flush-mounted in metal; minimum distance to the reader is 5 mm

³⁾ Transponder flush-mounted in metal; minimum distance to the reader is 10 mm

⁴⁾ Transponder flush-mounted in metal; minimum distance to the reader is 15 mm

With ISO transponders (MDS D)

Table 4- 35 Reduction of field data due to metal, range as %: Transponder and RF310R

Transponder		RF310R reader		
		Without metal	On metal	Flush-mounted in metal (20 mm all-round)
MDS D100¹⁾	Without metal	100	95	80
	On metal; distance 20 mm	75	70	65
	Flush-mounted in metal; distance all round 20 mm ⁴⁾	55	55	50
MDS D124¹⁾	Without metal	100	95	80
	On metal; distance 15 mm	90	95	85
	Flush-mounted in metal; distance all round 20 mm ³⁾	80	75	60
MDS D126¹⁾	Without metal	100	90	85
	On metal; distance 25 mm	85	80	75
	Flush-mounted in metal; distance all round 50 mm ³⁾	80	75	70
MDS D139¹⁾	Without metal	100	90	80
	On metal; distance 30 mm	100	90	80
	Flush-mounted in metal; distance all round 100 mm ⁴⁾	100	90	80
MDS D160¹⁾	Without metal	100	90	80
	On metal; distance 10 mm	75	75	75
MDS D165	Without metal	100	90	85
	On metal; distance 25 mm	90	80	75
MDS D200¹⁾	Without metal	100	90	80
	On metal; distance 20 mm	80	70	65
	Flush-mounted in metal; distance all round 20 mm ⁴⁾	60	60	60
MDS D261	Without metal	100	80	85
	On metal; distance 25 mm	90	75	80
MDS D324¹⁾	Without metal	100	95	75
	On metal; distance 15 mm	80	80	75
	Flush-mounted in metal; distance all round 25 mm ³⁾	80	75	70
MDS D339	Without metal	100	90	80
	On metal; distance 30 mm	100	90	80
	Flush-mounted in metal; distance all round 100 mm ⁴⁾	100	90	80
MDS D400¹⁾	Without metal	100	80	75
	On metal; distance 20 mm	65	60	55

Transponder		RF310R reader		
		Without metal	On metal	Flush-mounted in metal (20 mm all-round)
	Flush-mounted in metal; distance all round 20 mm ⁴⁾	55	50	45
MDS D423	Without metal	100	95	90
	On metal; distance 0 mm	150 ⁵⁾	140 ⁵⁾	140 ⁵⁾
	Flush-mounted in metal; distance all round 0 mm ²⁾	70	60	60
MDS D424¹⁾	Without metal	100	90	80
	On metal; distance 15 mm	80	80	70
	Flush-mounted in metal; distance all round 25 mm ²⁾	60	60	50
MDS D425	Without metal	100	100	95
	On metal; distance 0 mm	90	85	80
MDS D426¹⁾	Without metal	100	90	80
	On metal; distance 25 mm	85	80	70
	Flush-mounted in metal; distance all round 50 mm ³⁾	80	75	65
MDS D428	Without metal	100	100	75
	On metal; distance 0 mm	100	100	75
MDS D460¹⁾	Without metal	100	100	80
	On metal; distance 10 mm	80	80	60
MDS D524¹⁾	Without metal	100	90	80
	On metal; distance 15 mm	80	80	70
	Flush-mounted in metal; distance all round 25 mm ²⁾	60	60	50
MDS D525	Without metal	100	100	95
	On metal; distance 0 mm	90	85	80
MDS D526¹⁾	Without metal	100	90	80
	On metal; distance 25 mm	85	80	70
	Flush-mounted in metal; distance all round 50 mm ³⁾	80	75	65
MDS D528	Without metal	100	100	75
	On metal; distance 0 mm	100	100	75

¹⁾ Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

²⁾ Transponder flush-mounted in metal; minimum distance to the reader is 5 mm

³⁾ Transponder flush-mounted in metal; minimum distance to the reader is 10 mm

⁴⁾ Transponder flush-mounted in metal; minimum distance to the reader is 15 mm

⁵⁾ Values of > 100 % can occur if transponders were developed specifically for mounting in/on metallic surroundings.

With ISO transponders (MDS E)

Table 4- 36 Reduction of field data due to metal, range as %: Transponder and RF310R

Transponder		RF310R reader		
		Without metal	On metal	Flush-mounted in metal (20 mm all-round)
MDS E600¹⁾	Without metal	100	95	80
	On metal; distance 20 mm	75	70	65
	Flush-mounted in metal; distance all round 20 mm ³⁾	55	55	50
MDS E611¹⁾	Without metal	100	95	80
	On metal; distance 20 mm	75	70	65
	Flush-mounted in metal; distance all round 20 mm ³⁾	55	55	50
MDS E624¹⁾	Without metal	100	95	80
	On metal; distance 15 mm	90	95	85
	Flush-mounted in metal; distance all round 20 mm ²⁾	80	75	60

¹⁾ Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

²⁾ Transponder flush-mounted in metal; minimum distance to the reader is 5 mm

³⁾ Transponder flush-mounted in metal; minimum distance to the reader is 10 mm

4.3.4.2 RF340R

With RF300 transponders

Table 4- 37 Reduction of field data due to metal, range as %: Transponder and RF340R

Transponder		RF340R reader		
		Without metal	On metal	Flush-mounted in metal (20 mm all-round)
RF320T	Without metal	100	95	90
	On metal; distance 20 mm	85	85	80
	Flush-mounted in metal; distance all round 20 mm ³⁾	75	75	65
RF330T¹⁾	Without metal	100	95	90
	On metal; distance 0 mm	90	90	80
	Flush-mounted in metal; distance all round 10 mm ³⁾	65	65	60

Transponder		RF340R reader		
		Without metal	On metal	Flush-mounted in metal (20 mm all-round)
RF340T	Without metal	100	95	80
	On metal; distance 0 mm	65	65	55
	Flush-mounted in metal; distance all round 20 mm ³⁾	60	60	55
RF350T	Without metal	100	90	85
	On metal; distance 0 mm	75	70	70
	Flush-mounted in metal; distance all round 20 mm ³⁾	55	55	45
RF360T	Without metal	100	95	80
	On metal; distance 20 mm	75	70	65
	Flush-mounted in metal; distance all round 20 mm ³⁾	70	60	50
RF370T	Without metal	100	95	80
	On metal; distance 0 mm	95	90	75
	Flush-mounted in metal; distance all round 20 mm ⁴⁾	70	65	65
RF380T	Without metal	100	95	75
	On metal; distance 0 mm	100	95	70
	Flush-mounted in metal; distance all round 40 mm ⁴⁾	80	75	60

1) Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

2) Transponder flush-mounted in metal; minimum distance to the reader is 5 mm

3) Transponder flush-mounted in metal; minimum distance to the reader is 10 mm

4) Transponder flush-mounted in metal; minimum distance to the reader is 15 mm

With ISO transponders (MDS D)

Table 4- 38 Reduction of field data due to metal, range as %: Transponder and RF340R

Transponder		RF340R reader		
		Without metal	On metal	Flush-mounted in metal (20 mm all-round)
MDS D100 ¹⁾	Without metal	100	90	75
	On metal; distance 20 mm	70	65	60
	Flush-mounted in metal; distance all round 20 mm ⁴⁾	60	45	45

Transponder		RF340R reader		
		Without metal	On metal	Flush-mounted in metal (20 mm all-round)
MDS D124¹⁾	Without metal	100	95	80
	On metal; distance 15 mm	85	85	75
	Flush-mounted in metal; distance all round 20 mm ²⁾	80	80	45
MDS D126¹⁾	Without metal	100	90	85
	On metal; distance 25 mm	80	80	70
	Flush-mounted in metal; distance all round 50 mm ³⁾	75	75	65
MDS D139¹⁾	Without metal	100	95	80
	On metal; distance 30 mm	100	90	75
	Flush-mounted in metal; distance all round 100 mm ⁴⁾	100	90	75
MDS D160¹⁾	Without metal	100	95	80
	On metal; distance 10 mm	85	85	75
MDS D165	Without metal	100	95	85
	On metal, distance 25 mm ⁴⁾	90	80	75
MDS D200¹⁾	Without metal	100	95	90
	On metal; distance 20 mm	90	85	80
	Flush-mounted in metal; distance all round 20 mm ³⁾	75	50	65
MDS D261	Without metal	100	100	100
	On metal, distance 25 mm ³⁾	70	95	90
MDS D324¹⁾	Without metal	100	95	80
	On metal; distance 15 mm	90	85	75
	Flush-mounted in metal; distance all round 25 mm ²⁾	80	80	60
MDS D339	Without metal	100	95	80
	On metal; distance 30 mm	100	90	75
	Flush-mounted in metal; distance all round 100 mm ⁴⁾	100	90	75
MDS D400¹⁾	Without metal	100	90	80
	On metal; distance 20 mm	70	65	80
	Flush-mounted in metal; distance all round 20 mm ³⁾	55	50	50
MDS D423	Without metal	100	95	85
	On metal; distance 0 mm	120 ⁵⁾	120 ⁵⁾	115 ⁵⁾
	Flush-mounted in metal; distance all round 0 mm ²⁾	65	60	60

Transponder		RF340R reader		
		Without metal	On metal	Flush-mounted in metal (20 mm all-round)
MDS D424¹⁾	Without metal	100	95	80
	On metal; distance 15 mm	85	85	75
	Flush-mounted in metal; distance all round 25 mm ³⁾	75	75	70
MDS D425	Without metal	100	95	95
	On metal; distance 0 mm	100	90	90
MDS D426¹⁾	Without metal	100	90	80
	On metal; distance 25 mm	80	75	70
	Flush-mounted in metal; distance all round 50 mm ³⁾	75	70	65
MDS D428	Without metal	100	95	80
	On metal; distance 0 mm	95	80	75
MDS D460¹⁾	Without metal	100	95	95
	On metal; distance 10 mm	85	85	85
MDS D524¹⁾	Without metal	100	95	80
	On metal; distance 15 mm	85	85	75
	Flush-mounted in metal; distance all round 25 mm ³⁾	75	75	70
MDS D525	Without metal	100	95	95
	On metal; distance 0 mm	100	90	90
MDS D526¹⁾	Without metal	100	90	80
	On metal; distance 25 mm	80	75	70
	Flush-mounted in metal; distance all round 50 mm ³⁾	75	70	65
MDS D528	Without metal	100	95	80
	On metal; distance 0 mm	95	80	75

¹⁾ Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

²⁾ Transponder flush-mounted in metal; minimum distance to the reader is 5 mm

³⁾ Transponder flush-mounted in metal; minimum distance to the reader is 10 mm

⁴⁾ Transponder flush-mounted in metal; minimum distance to the reader is 15 mm

⁵⁾ Values of > 100 % can occur if transponders were developed specifically for mounting in/on metallic surroundings.

With ISO transponders (MDS E)

Table 4- 39 Reduction of field data due to metal, range as %: Transponder and RF340R

Transponder		RF340R reader		
		Without metal	On metal	Flush-mounted in metal (20 mm all-round)
MDS E600¹⁾	Without metal	100	90	75
	On metal; distance 20 mm	70	65	60
	Flush-mounted in metal; distance all round 20 mm ³⁾	60	45	45
MDS E611¹⁾	Without metal	100	90	75
	On metal; distance 20 mm	70	65	60
	Flush-mounted in metal; distance all round 20 mm ³⁾	60	45	45
MDS E624¹⁾	Without metal	100	95	80
	On metal; distance 15 mm	85	85	75
	Flush-mounted in metal; distance all round 20 mm ²⁾	80	80	45

1) Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

2) Transponder flush-mounted in metal; minimum distance to the reader is 5 mm

3) Transponder flush-mounted in metal; minimum distance to the reader is 15 mm

4.3.4.3 RF350R

Reader RF350R with ANT 1 and with RF300 transponders

Table 4- 40 Reduction of field data due to metal, range as %: Transponder and RF350R with ANT 1

Transponder		ANT 1 without metal	ANT 1 on metal	ANT 1 flush-mounted in metal (40 mm all-round)
RF320T¹⁾	Without metal	100	90	90
	On metal; distance 20 mm	85	85	75
	Flush-mounted in metal; distance all round 20 mm	75	75	65
RF330T	Without metal	100	90	90
	On metal; distance 0 mm	95	85	75
	Flush-mounted in metal; distance all round 10 mm	65	60	60

Transponder		ANT 1 without metal	ANT 1 on metal	ANT 1 flush-mounted in metal (40 mm all-round)
RF340T	Without metal	100	90	90
	On metal; distance 0 mm	65	65	60
	Flush-mounted in metal; distance all round 20 mm	60	60	55
RF350T	Without metal	100	90	85
	On metal; distance 0 mm	75	70	65
	Flush-mounted in metal; distance all round 20 mm	55	55	45
RF360T	Without metal	100	90	85
	On metal; distance 20 mm	75	75	65
	Flush-mounted in metal; distance all round 20 mm	65	60	50
RF370T	Without metal	100	90	85
	On metal; distance 0 mm	95	88	75
	Flush-mounted in metal; distance all round 20 mm	70	65	65
RF380T	Without metal	100	90	80
	On metal; distance 0 mm	100	90	70
	Flush-mounted in metal; distance all round 40 mm	80	75	60

- 1) Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

Note

The minimum distances are listed in section "RF340R (Page 75)".

Reader RF350R with ANT 1 and with ISO transponders (MDS D)

Table 4- 41 Reduction of field data due to metal, range as %: Transponder and RF350R with ANT 1

Transponder		ANT 1 without metal	ANT 1 on metal	ANT 1 mounted in metal (40 mm all-round)
MDS D100 ¹⁾	Without metal	100	85	80
	On metal; distance 20 mm	70	60	65
	Flush-mounted in metal; distance all round 20 mm	60	45	45

Transponder		ANT 1 without metal	ANT 1 on metal	ANT 1 mounted in metal (40 mm all-round)
MDS D124¹⁾	Without metal	100	95	85
	On metal; distance 15 mm	85	85	80
	Flush-mounted in metal; distance all round 20 mm	85	80	50
MDS D126¹⁾	Without metal	100	85	85
	On metal; distance 25 mm	85	75	75
	Flush-mounted in metal; distance all round 50 mm	80	70	70
MDS D139¹⁾	Without metal	100	90	85
	On metal; distance 30 mm	95	85	85
	Flush-mounted in metal; distance all round 100 mm	95	85	85
MDS D160¹⁾	Without metal	100	95	90
	On metal; distance 10 mm	85	85	80
MDS D165	Without metal	100	85	85
	On metal; distance 25 mm	90	80	75
MDS D200¹⁾	Without metal	100	85	80
	On metal; distance 20 mm	85	75	75
	Flush-mounted in metal; distance all round 20 mm	75	65	65
MDS D261	Without metal	100	90	85
	On metal; distance 25 mm	85	80	80
MDS D324¹⁾	Without metal	100	85	85
	On metal; distance 15 mm	90	80	80
	Flush-mounted in metal; distance all round 25 mm	80	75	65
MDS D339¹⁾	Without metal	100	90	85
	On metal; distance 30 mm	95	85	85
	Flush-mounted in metal; distance all round 100 mm	95	85	85
MDS D400¹⁾	Without metal	100	90	85
	On metal; distance 20 mm	80	70	65
	Flush-mounted in metal; distance all round 20 mm	65	60	60
MDS D423	Without metal	100	90	90
	On metal; distance 0 mm	115 ²⁾	115 ²⁾	115 ²⁾
	Flush-mounted in metal; distance all round 0 mm	80	65	65
MDS D424¹⁾	Without metal	100	90	75
	On metal; distance 15 mm	85	80	75
	Flush-mounted in metal; distance all round 25 mm	75	70	70

4.3 Installation guidelines

Transponder		ANT 1 without metal	ANT 1 on metal	ANT 1 mounted in metal (40 mm all-round)
MDS D425	Without metal	100	95	95
	On metal; distance 0 mm	90	85	85
MDS D426¹⁾	Without metal	100	90	85
	On metal; distance 25 mm	85	80	75
	Flush-mounted in metal; distance all round 50 mm	80	75	70
MDS D428	Without metal	100	90	85
	On metal; distance 0 mm	85	80	80
MDS D460¹⁾	Without metal	100	90	80
	On metal; distance 10 mm	85	80	75
MDS D524¹⁾	Without metal	100	90	75
	On metal; distance 15 mm	85	80	75
	Flush-mounted in metal; distance all round 25 mm	75	70	70
MDS D525	Without metal	100	95	95
	On metal; distance 0 mm	90	85	85
MDS D526¹⁾	Without metal	100	90	85
	On metal; distance 25 mm	85	80	75
	Flush-mounted in metal; distance all round 50 mm	80	75	70
MDS D528	Without metal	100	90	85
	On metal; distance 0 mm	85	80	80

- 1) Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.
- 2) Values of > 100 % can occur if transponders were developed specifically for mounting in/on metallic surroundings.

Note

The minimum distances are listed in section "RF340R (Page 75)".

Reader RF350R with ANT 1 and with ISO transponders (MDS E)

Table 4- 42 Reduction of field data due to metal, range as %: Transponder and RF350R with ANT 1

Transponder		ANT 1 without metal	ANT 1 on metal	ANT 1 mounted in metal (40 mm all-round)
MDS E600¹⁾	Without metal	100	85	80
	On metal; distance 20 mm	70	60	65
	Flush-mounted in metal; distance all round 20 mm	60	45	45
MDS E611¹⁾	Without metal	100	85	80
	On metal; distance 20 mm	70	60	65
	Flush-mounted in metal; distance all round 20 mm	60	45	45
MDS E624¹⁾	Without metal	100	95	85
	On metal; distance 15 mm	85	85	80
	Flush-mounted in metal; distance all round 20 mm	85	80	50

¹⁾ Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

Note

The minimum distances are listed in section "RF340R (Page 75)".

Reader RF350R with ANT 3 and with RF300 transponders

Table 4- 43 Reduction of field data due to metal, range as %: Transponder and RF350R with ANT 3

Transponder		ANT 3 without metal	ANT 3 on metal	ANT 3 flush-mounted in metal (10 mm all-round)
RF320T¹⁾	Without metal	100	90	90
	On metal; distance 20 mm	35	35	35
	Flush-mounted in metal; distance all round 20 mm ²⁾	35	25	15
RF330T	Without metal	100	100	100
	On metal; distance 0 mm	117	106	106
	Flush-mounted in metal; distance all round 10 mm ²⁾	128	128	128

Transponder		ANT 3 without metal	ANT 3 on metal	ANT 3 flush-mounted in metal (10 mm all-round)
RF340T	Without metal	100	75	70
	On metal; distance 0 mm	70	75	63
	Flush-mounted in metal; distance all round 20 mm ²⁾	63	63	58

1) Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

2) Transponder flush-mounted in metal; minimum distance to the reader is 5 mm

Reader RF350R with ANT 3 and with ISO transponders (MDS D)

Table 4- 44 Reduction of field data due to metal, range as %: Transponder and RF350R with ANT 3

Transponder		ANT 3 without metal	ANT 3 on metal	ANT 3 flush-mounted in metal (10 mm all-round)
MDS D124 ¹⁾	Without metal	100	100	90
	On metal; distance 20 mm	33	24	21
	Flush-mounted in metal; distance all round 20 mm	24	24	17
MDS D160 ¹⁾	Without metal	100	100	95
	On metal; distance 0 mm	16	16	21
	Flush-mounted in metal; distance all round 10 mm	24	18	13
MDS D324 ¹⁾	Without metal	100	100	92
	On metal; distance 0 mm	47	34	29
	Flush-mounted in metal; distance all round 20 mm	29	24	18
MDS D421	Without metal	100	100	100
MDS D521	On metal; distance 0 mm	110	110	110
	Flush-mounted in metal; distance all round 0 mm	90	50	50
MDS D422 MDS D522	Without metal	100	100	83
	On metal, distance 0 mm	111	111	111
	Flush-mounted in metal; distance all round 20 mm	83	56	39
MDS D423	Without metal	100	100	93
	On metal; distance 0 mm	125	125	121
	Flush-mounted in metal; distance all round 20 mm	125	143	136

Transponder		ANT 3 without metal	ANT 3 on metal	ANT 3 flush-mounted in metal (10 mm all-round)
MDS D424¹⁾ MDS D524	Without metal	100	100	94
	On metal; distance 0 mm	23	23	21
	Flush-mounted in metal; distance all round 20 mm	17	13	10
MDS D425 MDS D525	Without metal	100	100	100
	On metal; distance 0 mm	89	100	71
	Flush-mounted in metal; distance all round 20 mm	71	54	36
MDS D428 MDS D528	Without metal	100	93	83
	On metal; distance 0 mm	93	93	83
	Flush-mounted in metal; distance all round 20 mm	93	93	83
MDS D460¹⁾	Without metal	100	93	90
	On metal; distance 0 mm	33	33	20
	Flush-mounted in metal; distance all round 20 mm	33	33	17

¹⁾ Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

²⁾ Values of > 100 % can occur if transponders were developed specifically for mounting in/on metallic surroundings.

Reader RF350R with ANT 3 and with ISO transponders (MDS E)

Table 4- 45 Reduction of field data due to metal, range as %: Transponder and RF350R with ANT 3

Transponder		ANT 3 without metal	ANT 3 on metal	ANT 3 flush-mounted in metal (10 mm all-round)
MDS E624¹⁾	Without metal	100	100	94
	On metal; distance 0 mm	23	23	21
	Flush-mounted in metal; distance all round 20 mm	17	13	10

¹⁾ Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

Reader RF350R with ANT 12 and with ISO transponders (MDS D)

Table 4- 46 Reduction of field data due to metal, range as %: Transponder and RF350R with ANT 12

Transponder		ANT 12 without metal	ANT 12 mounted in metal (0 mm all-round)
MDS D117	Without metal	100	85
	On metal; distance 0 mm	90	85
	Flush-mounted in metal; distance all round 0 mm	65	65
MDS D127	Without metal	100	85
	On metal; distance 0 mm	95	85
	Flush-mounted in metal; distance all round 0 mm	65	65
MDS D160¹⁾	Without metal	100	80
	On metal; distance 10 mm	100	80
MDS D421	Without metal	100	80
	On metal; distance 0 mm	90	75
	Flush-mounted in metal; distance all round 0 mm	70	60
MDS D428	Without metal	100	75
	On metal; distance 0 mm	95	75
MDS D460¹⁾	Without metal	100	80
	On metal; distance 10 mm	100	80
MDS D521	Without metal	100	80
	On metal; distance 0 mm	90	75
	Flush-mounted in metal; distance all round 0 mm	70	60
MDS D528	Without metal	100	75
	On metal; distance 0 mm	95	75

¹⁾ Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

Reader RF350R with ANT 12 and with ISO transponders (MDS E)

Table 4- 47 Reduction of field data due to metal, range as %: Transponder and RF350R with ANT 12

Transponder		ANT 12 without metal	ANT 12 mounted in metal (0 mm all-round)
MDS E623	Without metal	100	80
	On metal; distance 0 mm	90	75
	Flush-mounted in metal; distance all round 0 mm	70	60

- ¹⁾ Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

Reader RF350R with ANT 18 and with RF300 transponders

Table 4- 48 Reduction of field data due to metal, range as %: Transponder and RF350R with ANT 18

Transponder		ANT 18 without metal	ANT 18 mounted in metal (10 mm all-round)
RF320T¹⁾	Without metal	100	65
	On metal; distance 20 mm	85	55
	Flush-mounted in metal; distance all round 20 mm	75	45
RF330T	Without metal	100	85
	On metal; distance 0 mm	120 ²⁾	100
	Flush-mounted in metal; distance all round 10 mm	115 ²⁾	95
	Flush-mounted in metal; without surrounding clearance	95	90
RF340T	Without metal	100	85
	On metal; distance 0 mm	65	60
	Flush-mounted in metal; distance all round 20 mm	60	55

- ¹⁾ Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.
- ²⁾ Values of > 100 % can occur if transponders were developed specifically for mounting in/on metallic surroundings.

Reader RF350R with ANT 18 and with ISO transponders (MDS D)

Table 4- 49 Reduction of field data due to metal, range as %: Transponder and RF350R with ANT 18

Transponder		ANT 18 without metal	ANT 18 mounted in metal (10 mm all-round)
MDS D124¹⁾	Without metal	100	85
	On metal, distance 15 mm	85	75
	Flush-mounted in metal; distance all round 15 mm	85	45
MDS D127	Without metal	100	90
	On metal, distance 0 mm	95	85
	Flush-mounted in metal; distance all round 0 mm	60	60
MDS D160¹⁾	Without metal	100	80
	On metal, distance 10 mm	85	75
MDS D324¹⁾	Without metal	100	80
	On metal; distance 15 mm	90	75
	Flush-mounted in metal; distance all round 25 mm	80	65
MDS D421	Without metal	100	85
	On metal, distance 0 mm	90	65
	Flush-mounted in metal; distance all round 0 mm	40	20
MDS D422	Without metal	100	85
	On metal, distance 0 mm	95	85
	Flush-mounted in metal; distance all round 0 mm	90	80
MDS D424¹⁾	Without metal	100	85
	On metal 15 mm	85	80
	Flush-mounted in metal; distance all round 25 mm	75	75
MDS D425	Without metal	100	85
	On metal, distance 0 mm	100	85
MDS D428	Without metal	100	95
	On metal, distance 0 mm	95	95
MDS D460¹⁾	Without metal	100	95
	On metal, distance 15 mm	95	95
MDS D521	Without metal	100	85
	On metal, distance 0 mm	90	65
	Flush-mounted in metal; distance all round 0 mm	40	20

Transponder		ANT 18 without metal	ANT 18 mounted in metal (10 mm all-round)
MDS D522	Without metal	100	85
	On metal, distance 0 mm	95	85
	Flush-mounted in metal; distance all round 0 mm	90	80
MDS D524¹⁾	Without metal	100	85
	On metal 15 mm	85	80
	Flush-mounted in metal; distance all round 25 mm	75	75
MDS D525	Without metal	100	85
	On metal, distance 0 mm	100	85
MDS D528	Without metal	100	95
	On metal, distance 0 mm	95	95

¹⁾ Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

Reader RF350R with ANT 18 and with ISO transponders (MDS E)

Table 4- 50 Reduction of field data due to metal, range as %: Transponder and RF350R with ANT 18

Transponder		ANT 18 without metal	ANT 18 mounted in metal (10 mm all-round)
MDS E623	Without metal	100	85
	On metal, distance 0 mm	90	65
	Flush-mounted in metal; distance all round 0 mm	40	20
MDS E624¹⁾	Without metal	100	85
	On metal, distance 15 mm	85	75
	Flush-mounted in metal; distance all round 15 mm	85	45

¹⁾ Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

Reader RF350R with ANT 30 and with RF300 transponders

Table 4- 51 Reduction of field data due to metal, range as %: Transponder and RF350R with ANT 30

Transponder		Mounting the antenna	
		ANT 30 without metal	ANT 30 mounted in metal (20 mm all-round)
RF320T ¹⁾	Without metal	100	90
	On metal; distance 30 mm	85	75
	Flush-mounted in metal; distance all round 20 mm	75	65
RF330T	Without metal	100	90
	On metal;	110 ²⁾	100
	Flush-mounted in metal; distance all round 10 mm	105 ²⁾	95
	Flush-mounted in metal; without surrounding clearance	90	80
RF340T	Without metal	100	85
	On metal; distance 30 mm	65	55
	Flush-mounted in metal; distance all round 20 mm	60	55
RF350T	Without metal	100	85
	Directly on metal	75	65
	Flush-mounted in metal; distance all round 20 mm	55	45
RF360T	Without metal	100	75
	On metal; distance 20 mm	75	55
	Flush-mounted in metal; distance all round 20 mm	50	35

1) Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

2) Values of > 100 % can occur if transponders were developed specifically for mounting in/on metallic surroundings.

Reader RF350R with ANT 30 and with ISO transponders (MDS D)

Table 4- 52 Reduction of field data due to metal, range as %: Transponder and RF350R with ANT 30

Transponder		ANT 30 without metal	ANT 30 mounted in metal (20 mm all-round)
MDS D124 ¹⁾	Without metal	100	85
	On metal; distance 15 mm	85	75
	Flush-mounted in metal; distance all round 15 mm	80	45

Transponder		ANT 30 without metal	ANT 30 mounted in metal (20 mm all-round)
MDS D126¹⁾	Without metal	100	85
	On metal; distance 25 mm	90	75
	Flush-mounted in metal; distance all round 50 mm	85	70
MDS D160¹⁾	Without metal	100	80
	On metal, distance 10 mm	85	75
MDS D324¹⁾	Without metal	100	80
	On metal; distance 15 mm	90	70
	Flush-mounted in metal; distance all round 25 mm	80	65
MDS D422	Without metal	100	85
	On metal, distance 0 mm	95	85
	Flush-mounted in metal; distance all round 0 mm	90	80
MDS D423	Without metal	100	80
	On metal, distance 0 mm	125 ²⁾	115 ²⁾
	Flush-mounted in metal; distance all round 0 mm	80	70
MDS D424¹⁾	Without metal	100	85
	On metal 15 mm	95	85
	Flush-mounted in metal; distance all round 25 mm	85	75
MDS D425	Without metal	100	80
	On metal, distance 0 mm	95	80
MDS D426¹⁾	Without metal	100	85
	On metal; distance 25 mm	90	75
	Flush-mounted in metal; distance all round 50 mm	80	70
MDS D428	Without metal	100	90
	On metal, distance 0 mm	95	90
MDS D460¹⁾	Without metal	100	90
	On metal, distance 10 mm	95	85
MDS D522	Without metal	100	85
	On metal, distance 0 mm	95	85
	Flush-mounted in metal; distance all round 0 mm	90	80
MDS D524¹⁾	Without metal	100	85
	On metal 15 mm	95	85
	Flush-mounted in metal; distance all round 25 mm	85	75
MDS D525	Without metal	100	80
	On metal, distance 0 mm	95	80

Transponder		ANT 30 without metal	ANT 30 mounted in metal (20 mm all-round)
MDS D526¹⁾	Without metal	100	85
	On metal; distance 25 mm	90	75
	Flush-mounted in metal; distance all round 50 mm	80	70
MDS D528	Without metal	100	90
	On metal, distance 0 mm	95	90

- 1) Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.
- 2) Values of > 100 % can occur if transponders were developed specifically for mounting in/on metallic surroundings.

Reader RF350R with ANT 30 and with ISO transponders (MDS E)

Table 4- 53 Reduction of field data due to metal, range as %: Transponder and RF350R with ANT 30

Transponder		ANT 30 without metal	ANT 30 mounted in metal (20 mm all-round)
MDS E624¹⁾	Without metal	100	85
	On metal; distance 15 mm	85	75
	Flush-mounted in metal; distance all round 15 mm	80	45

- 1) Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

4.3.4.4 RF380R

With RF300 transponders

Table 4- 54 Reduction of field data due to metal, range as %: Transponder and RF380R

Transponder		Reader RF380R (RF300 mode)		
		Without metal	On metal	Flush-mounted in metal (20 mm all- round)
RF320T¹⁾	Without metal	100	95	90
	On metal; distance 20 mm	85	75	70
	Flush-mounted in metal; distance all round 20 mm ⁵⁾	60	55	50

Transponder		Reader RF380R (RF300 mode)		
		Without metal	On metal	Flush-mounted in metal (20 mm all-round)
RF330T	Without metal	100	90	80
	on metal, distance 0 mm ⁴⁾	70	65	60
RF340T	Without metal	100	90	80
	On metal; distance 0 mm	70	65	60
	Flush-mounted in metal; distance all round 20 mm ²⁾	60	60	55
RF350T	Without metal	100	85	80
	On metal; distance 0 mm	70	65	60
	Flush-mounted in metal; distance all round 20 mm ²⁾	55	50	45
RF360T ¹⁾	Without metal	100	95	85
	On metal; distance 20 mm	75	70	65
	Flush-mounted in metal; distance all round 20 mm ³⁾	60	55	50
RF370T	Without metal	100	95	85
	On metal; distance 0 mm	90	85	80
	Flush-mounted in metal; distance all round 20 mm ⁴⁾	65	60	60
RF380T	Without metal	100	95	85
	On metal; distance 0 mm	95	90	80
	Flush-mounted in metal; distance all round 40 mm ⁴⁾ ⁶⁾	65	60	55

¹⁾ Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.

²⁾ Transponder flush-mounted in metal; minimum distance to the reader is 5 mm

³⁾ Transponder flush-mounted in metal; minimum distance to the reader is 10 mm

⁴⁾ Transponder flush-mounted in metal; minimum distance to the reader is 15 mm

⁵⁾ Transponder flush-mounted in metal; minimum distance to the reader is 20 mm

⁶⁾ Transponder flush-mounted in metal; minimum distance to the reader is 25 mm

With ISO transponders (MDS D)

Table 4- 55 Reduction of field data due to metal, range as %: Transponder and RF380R

Transponder		Reader RF380R (ISO mode)		
		Without metal	On metal	Flush-mounted in metal (20 mm all-round)
MDS D100¹⁾	Without metal	100	95	80
	On metal; distance 20 mm	65	60	55
	Flush-mounted in metal; distance all round 20 mm ²⁾	55	50	45
MDS D124¹⁾	Without metal	100	95	90
	On metal; distance 15 mm	95	90	85
	Flush-mounted in metal; distance all round 20 mm ²⁾	70	65	50
MDS D126¹⁾	Without metal	100	90	80
	On metal; distance 25 mm	80	75	70
	Flush-mounted in metal; distance all round 50 mm ³⁾	75	65	65
MDS D139¹⁾	Without metal	100	90	75
	On metal; distance 30 mm	95	85	70
	Flush-mounted in metal; distance all round 100 mm ⁴⁾	90	80	70
MDS D160¹⁾	Without metal	100	95	90
	On metal, distance 10 mm ³⁾	85	85	80
MDS D165	Without metal	100	90	80
	On metal, distance 25 mm ⁴⁾	80	75	70
MDS D200¹⁾	Without metal	100	90	80
	On metal; distance 20 mm	80	75	70
	Flush-mounted in metal; distance all round 20 mm ³⁾	65	60	55
MDS D261	Without metal	100	95	85
	On metal, distance 25 mm ⁴⁾	85	80	75
MDS D324¹⁾	Without metal	100	95	85
	On metal; distance 15 mm	85	85	80
	Flush-mounted in metal; distance all round 25 mm ²⁾	70	65	60
MDS D339¹⁾	Without metal	100	90	80
	On metal; distance 30 mm	85	80	75
	Flush-mounted in metal; distance all round 100 mm ⁵⁾	80	75	70

Transponder		Reader RF380R (ISO mode)		
		Without metal	On metal	Flush-mounted in metal (20 mm all-round)
MDS D400¹⁾	Without metal	100	90	80
	On metal; distance 20 mm	75	70	60
	Flush-mounted in metal; distance all round 20 mm ⁴⁾	60	60	55
MDS D423	Without metal	100	95	85
	On metal; distance 0 mm	100	100	90
	Flush-mounted in metal; distance all round 10 mm ²⁾	75	65	60
MDS D424¹⁾	Without metal	100	90	75
MDS D524¹⁾	On metal; distance 15 mm	75	75	60
	Flush-mounted in metal; distance all round 25 mm ³⁾	60	55	40
MDS D425	Without metal	100	70	90
	On metal, distance 0 mm ²⁾	75	70	60
MDS D426¹⁾	Without metal	100	90	80
MDS D526¹⁾	On metal; distance 25 mm	80	75	70
	Flush-mounted in metal; distance all round 50 mm ³⁾	75	65	65
MDS D428	Without metal	100	90	80
MDS D528	On metal, distance 0 mm ²⁾	85	80	65
MDS D460¹⁾	Without metal	100	95	80
	On metal, distance 10 mm ²⁾	80	75	60
MDS D525	Without metal	100	70	90
	On metal, distance 0 mm ⁶⁾	75	70	60
MDS E600	Without metal	100	95	90
	On metal, distance 20 mm	80	75	60
	Flush-mounted in metal, distance all round 20 mm ³⁾	65	65	60
MDS E611	Without metal	100	95	85
	On metal, distance 20 mm	65	60	55
	Flush-mounted in metal, distance all round 20 mm ³⁾	50	50	45

4.3 Installation guidelines

Transponder		Reader RF380R (ISO mode)		
		Without metal	On metal	Flush-mounted in metal (20 mm all-round)
MDS E624	Without metal	100	95	90
	On metal, distance 15 mm ⁷⁾	75	75	70
	Flush-mounted in metal, distance all round 25 mm ⁷⁾	60	60	55

- 1) Mounting the transponder on or in metal is only possible with the appropriate spacer or if there is adequate clearance to the metal.
- 2) Transponder flush-mounted in metal; minimum distance to the reader is 5 mm
- 3) Transponder flush-mounted in metal; minimum distance to the reader is 10 mm
- 4) Transponder flush-mounted in metal; minimum distance to the reader is 15 mm
- 5) Transponder flush-mounted in metal; minimum distance to the reader is 20 mm
- 6) Transponder flush-mounted in metal; minimum distance to the reader is 28 mm
- 7) Transponder flush-mounted in metal; minimum distance to the reader is 32 mm

4.3.4.5 RF382R

Note

RF382R not suitable for metallic surroundings

The RF382R was not developed for reading transponders in a metallic environment.

With ISO transponders (MDS D)

Table 4- 56 Reduction of field data by metal (in %): Transponder and RF382R

Transponder		Reader RF382R (ISO mode)	
		Without metal	On metal
MDS D124	Without metal	100	110 ¹⁾
MDS D160	Without metal	100	100
MDS D324	Without metal	100	110 ¹⁾
MDS D424	Without metal	100	105 ¹⁾
MDS D460	Without metal	100	115 ¹⁾

- 1) Values of > 100 % can occur if transponders were developed specifically for mounting in/on metallic surroundings.

4.4 Chemical resistance of the readers and transponders

4.4.1 Readers

4.4.1.1 Overview of the readers and their housing materials

Resistance to chemicals depends on the housing materials used to manufacture the reader. The following table provides you with an overview of the housing materials that are used with the RF310R, RF340R, RF350R, RF380R and RF382R readers:

Individual part of the reader	Housing material of the reader
Top cover and bottom	Polyamide 12; The chemical resistance of this plastic is listed in section "Polyamide 12".
Fiber-optic cable	Makrolon®2405
Decorative membrane ¹⁾	Autotex V200
Socket ¹⁾	Brass (copper alloy) CuZn40Pb2

¹⁾ Non-relevant component for resistance of complete housing

In case of questions please contact Siemens Support (section "Service & Support (Page 506)").

4.4.1.2 Polyamide 12

The resistance of the plastic housing to chemicals used in the automobile sector (e.g.: oils, greases, diesel fuel, gasoline, etc.) is not listed extra.

Table 4- 57 Chemical resistance - Polyamide 12

Substance	Test conditions		Rating
	Concentration [%]	Temperature [°C]	
Battery acid	30%	20 °C	++
Ammonia, gaseous	-	60 °C	++++
Ammonia, w.	conc.	60 °C	++++
	10%	60 °C	++++
Benzene	-	20 °C	++++
	-	60 °C	+++
Bleach solution (12.5% effective chlorine)	-	20 °C	++
Butane, gas, liquid	-	60 °C	++++
Butyl acetate (acetic acid butyl ester)	-	60 °C	++++
n(n)	-	20 °C	++++
	-	60 °C	+++

4.4 Chemical resistance of the readers and transponders

Substance	Test conditions		Rating
	Concentration [%]	Temperature [°C]	
Calcium chloride, w.	-	20 °C	++++
	-	60 °C	+++
Calcium nitrate, w.	c. s.	20 °C	++++
	c. s.	60 °C	+++
Chlorine	-	20 °C	○
Chrome baths, tech.	-	20 °C	○
Iron salts, w.	c. s.	60 °C	++++
Acetic acid, w.	50%	20 °C	○
Ethyl alcohol, w., undenaturated	95%	20 °C	++++
	95%	60 °C	+++
	50%	60 °C	++++
Formaldehyde, w.	30%	20 °C	+++
	10%	20 °C	++++
	10%	60 °C	+++
Formalin	-	20 °C	+++
Glycerine	-	60 °C	++++
Isopropyl alcohol	-	20 °C	++++
	-	60 °C	+++
Potassium hydroxide, w.	50%	60 °C	++++
Lysol	-	20 °C	++
Magnesium salts, w.	c. s.	60 °C	++++
Methyl alcohol, w.	50%	60 °C	++++
Lactic acid, w.	50%	20 °C	++
	10%	20 °C	+++
	10%	60 °C	++
Sodium carbonate, w. (soda)	c. s.	60 °C	++++
Sodium chloride, w.	c. s.	60 °C	++++
Sodium hydroxide	-	60 °C	++++
Nickel salts, w.	c. s.	60 °C	++++
Nitrobenzene	-	20 °C	+++
	-	60 °C	++
Phosphoric acid	10%	20 °C	+
Propane	-	60 °C	++++
Mercury	-	60 °C	++++
Nitric acid	10%	20 °C	+
Hydrochloric acid	10%	20 °C	+
Sulfur dioxide	low	60 °C	++++
Sulfuric acid	25%	20 °C	++
	10%	20 °C	+++
Hydrogen sulfide	low	60 °C	++++
Carbon tetrachloride	-	60 °C	++++

Substance	Test conditions		Rating
	Concentration [%]	Temperature [°C]	
Toluene	-	20 °C	++++
	-	60 °C	+++
Detergent	high	60 °C	++++
Plasticizer	-	60 °C	++++

Explanation of the rating	
++++	Resistant
+++	Practically resistant
++	Conditionally resistant
+	Less resistant
○	Not resistant
w.	Water solution
c. s.	Cold saturated

4.4.2 Transponder

4.4.2.1 Overview of the transponders and their housing materials

The following sections describe the resistance to chemicals of the various transponders. Resistance to chemicals depends on the housing materials used to manufacture the transponders.

The following table provides an overview of the housing materials of the transponders:

Table 4- 58 Overview of the housing materials of the transponders

Housing material	Transponder
Polyamide 12	RF340T
	RF350T
	RF370T
Polyphenylene sulfide (PPS)	RF380T
	MDS D117
	MDS D124 (6GT2600-0AC10)
	MDS D139
	MDS D160
	MDS D339
	MDS D423
Polycarbonate (PC)	MDS D100 (6GT2600-0AD10)
Polyvinyl chloride (PVC)	MDS D100 (6GT2600-0AD00-0AX0)
	MDS D200
	MDS D400

Housing material	Transponder
Epoxy resin	RF320T RF360T MDS D124 (6GT2600-0AC00) MDS D324 MDS D421 MDS D424 MDS D460 MDS D521 MDS D524 MDS E610 MDS E611 MDS E623 MDS E624
PA6	MDS D127
PA6.6 GF30	MDS D126 MDS D422 MDS D425 MDS D426 MDS D428 MDS D522 MDS D525 MDS D526 MDS D528

Note

Chemical substances not listed

The following sections describe the resistance of the various transponders to specific substances. If you require information about chemical substances that are not listed, contact Customer Support.

4.4.2.2 Epoxy resin

Table 4- 59 Resistance to chemicals - epoxy resin

Substance	Test conditions		Rating
	Concentration [%]	Temperature [°C]	
Allyl chloride	-	20 °C	++++
Formic acid	50%	20 °C	++++
	100%	20 °C	++
Ammonia, gaseous	-	20 °C	++++

4.4 Chemical resistance of the readers and transponders

Substance	Test conditions		Rating
	Concentration [%]	Temperature [°C]	
Ammonia, liquid, water-free	-	20 °C	○
Ammonium hydroxide	10%	20 °C	++++
Ethanol	-	40 °C	++++
	-	60 °C	++++
Ethyl acrylate	-	20 °C	++++
Ethyl glycol	-	60 °C	++++
Gasoline, aroma-free	-	20 °C	++++
Gasoline, containing benzene	-	20 °C	++++
Benzoates (Na-, Ca- among others)	-	40 °C	++++
Benzoic acid	-	20 °C	++++
Benzene	-	20 °C	++++
Borax	-	60 °C	++++
Boric acid	-	20 °C	++++
Bromine, liquid	-	20 °C	○
Bromides (K-, Na- among others)	-	60 °C	++++
Bromoform	100%	20 °C	++++
Bromine water	-	20 °C	○
Butadien (1.3-)	-	20 °C	++++
Butane, gaseous	-	20 °C	++++
Butanol	-	20 °C	○
Butyric acid	100%	20 °C	++
Carbonates (ammonium-, Na- among others)	-	60 °C	++++
Chlorine, liquid	-	20 °C	○
Chlorine, gaseous, dry	100%	20 °C	○
Chlorobenzene	-	20 °C	++++
Chlorides (ammonium-, Na- among others)	-	60 °C	++++
Chloroform	-	20 °C	○
Chlorophyll	-	20 °C	++++
Chlorosulfuric acid	100%	20 °C	○
Chlorine water (saturated solution)	-	20 °C	++
Chromates (K-, Na- among others)	Up to 50 %	40 °C	++++
Chromic acid	Up to 30 %	20 °C	○
Chromosulfuric acid	-	20 °C	○
Citric acid	-	20 °C	++++
Cyanamide	-	20 °C	++++
Cyanides (K-, Na- among others)	-	60 °C	++++
Dextrin, w.	-	60 °C	++++
Diethyl ether	-	20 °C	++++
Diethylene glycol	-	60 °C	++++

4.4 Chemical resistance of the readers and transponders

Substance	Test conditions		Rating
	Concentration [%]	Temperature [°C]	
Dimethyl ether	-	20 °C	++++
Dioxane	-	20 °C	○
Developer	-	40 °C	++++
Acetic acid	100%	20 °C	++
Ethanol	-	60 °C	++++
Fixing bath	-	40 °C	++++
Fluorides (ammonium-, K-, Na- among others)	-	40 °C	++++
Hydrofluoric acid	Up to 40 %	20 °C	++++
Formaldehyde	50%	20 °C	++++
Formamide	100%	20 °C	++++
Gluconic acid	-	20 °C	++++
Glycerine	-	60 °C	++++
Glycol	-	60 °C	++++
Urine	-	20 °C	++++
Uric acid	-	20 °C	++++
Hydroxides (ammonium...)	10%	20 °C	++++
Hydroxides (Na-, K-)	40%	20 °C	++++
Hydroxides (alkaline earth metal)	-	60 °C	++++
Hypochlorites (K-, Na- among others)	-	60 °C	++++
Iodides (K-, Na- among others)	-	60 °C	++++
Silicic acid	-	60 °C	++++
Cresol	Up to 90 %	20 °C	○
Methanol	100%	40 °C	++++
Methylene chloride	-	20 °C	○
Lactic acid	100%	20 °C	++
Mineral oils	-	40 °C	++++
Nitrates (ammonium..., K- among others)	-	60 °C	++++
Nitroglycerin	-	20 °C	○
Oxalic acid	-	20 °C	++++
Phenol	1%	20 °C	++++
Phosphates (ammonium..., Na- among others)		60 °C	++++
Phosphoric acid	50%	60 °C	++++
	85%	20 °C	++++
Propanol	-	20 °C	++++
Nitric acid	25%	20 °C	○
Hydrochloric acid	10%	20 °C	○
Brine	-	60 °C	○
Sulfur dioxide	100%	20 °C	++
Carbon disulfide	100%	20 °C	○

Substance	Test conditions		Rating
	Concentration [%]	Temperature [°C]	
Sulfuric acid	40%	20 °C	○
Sulfurous acid	-	20 °C	++
Soap solution	-	60 °C	++++
Sulphates (ammonium..., Na- among others)	-	60 °C	++++
Sulfites (ammonium..., Na- among others)	-	60 °C	○
Tar, aroma-free	-	60 °C	++++
Turpentine	-	20 °C	++++
Trichloroethylene	-	20 °C	○
Hydrogen peroxide	30%	20 °C	++++
Tartaric acid	-	20 °C	++++

Explanation of the rating	
++++	Resistant
+++	Practically resistant
++	Conditionally resistant
+	Less resistant
○	Not resistant

4.4.2.3 Polyamide 6 and Polyamide 6.6 GF30

Table 4- 60 Chemical resistance - PA6 and PA6.6 GF30

Substance	Test conditions		Rating
	Concentration [%]	Temperature [°C]	
Mineral lubricants	-	-	++++
Aliphatic hydrocarbons	-	-	++++
Aromatic hydrocarbons	-	-	++++
Gasoline	-	-	++++
Weak mineral acids	-	-	+++
Strong mineral acids	-	-	○
Weak organic acids	-	-	++
Strong organic acids	-	-	○
Oxidizing acids	-	-	○
Weak alkaline solutions	-	-	++
Strong alkaline solutions	-	-	○
Trichloroethylene	-	-	++++
Perchloroethylene	-	-	++++
Acetone	-	-	++++

4.4 Chemical resistance of the readers and transponders

Substance	Test conditions		Rating
	Concentration [%]	Temperature [°C]	
Alcohols	-	-	++++
Hot water (hydrolysis resistance)	-	-	++

Explanation of the rating	
++++	Resistant
+++	Practically resistant
++	Conditionally resistant
+	Less resistant
○	Not resistant

4.4.2.4 Polyamide 12

The resistance of the plastic housing to chemicals used in the automobile sector (e.g.: oils, greases, diesel fuel, gasoline, etc.) is not listed extra.

Table 4- 61 Chemical resistance - Polyamide 12

Substance	Test conditions		Rating
	Concentration [%]	Temperature [°C]	
Battery acid	30%	20 °C	++
Ammonia, gaseous	-	60 °C	++++
Ammonia, w.	conc.	60 °C	++++
	10%	60 °C	++++
Benzene	-	20 °C	++++
	-	60 °C	+++
Bleach solution (12.5% effective chlorine)	-	20 °C	++
Butane, gas, liquid	-	60 °C	++++
Butyl acetate (acetic acid butyl ester)	-	60 °C	++++
n(n)	-	20 °C	++++
	-	60 °C	+++
Calcium chloride, w.	-	20 °C	++++
	-	60 °C	+++
Calcium nitrate, w.	c. s.	20 °C	++++
	c. s.	60 °C	+++
Chlorine	-	20 °C	○
Chrome baths, tech.	-	20 °C	○
Iron salts, w.	c. s.	60 °C	++++
Acetic acid, w.	50%	20 °C	○

4.4 Chemical resistance of the readers and transponders

Substance	Test conditions		Rating
	Concentration [%]	Temperature [°C]	
Ethyl alcohol, w., undenaturated	95%	20 °C	++++
	95%	60 °C	+++
	50%	60 °C	++++
Formaldehyde, w.	30%	20 °C	+++
	10%	20 °C	++++
	10%	60 °C	+++
Formalin	-	20 °C	+++
Glycerine	-	60 °C	++++
Isopropyl alcohol	-	20 °C	++++
	-	60 °C	+++
Potassium hydroxide, w.	50%	60 °C	++++
Lysol	-	20 °C	++
Magnesium salts, w.	c. s.	60 °C	++++
Methyl alcohol, w.	50%	60 °C	++++
Lactic acid, w.	50%	20 °C	++
	10%	20 °C	+++
	10%	60 °C	++
Sodium carbonate, w. (soda)	c. s.	60 °C	++++
Sodium chloride, w.	c. s.	60 °C	++++
Sodium hydroxide	-	60 °C	++++
Nickel salts, w.	c. s.	60 °C	++++
Nitrobenzene	-	20 °C	+++
	-	60 °C	++
Phosphoric acid	10%	20 °C	+
Propane	-	60 °C	++++
Mercury	-	60 °C	++++
Nitric acid	10%	20 °C	+
Hydrochloric acid	10%	20 °C	+
Sulfur dioxide	low	60 °C	++++
Sulfuric acid	25%	20 °C	++
	10%	20 °C	+++
Hydrogen sulfide	low	60 °C	++++
Carbon tetrachloride	-	60 °C	++++
Toluene	-	20 °C	++++
	-	60 °C	+++
Detergent	high	60 °C	++++
Plasticizer	-	60 °C	++++

4.4 Chemical resistance of the readers and transponders

Explanation of the rating	
++++	Resistant
+++	Practically resistant
++	Conditionally resistant
+	Less resistant
○	Not resistant
w.	Water solution
c. s.	Cold saturated

4.4.2.5 Polycarbonate (PC)

Table 4- 62 Chemical resistance - polycarbonate (PPS)

Substance	Test conditions		Rating
	Concentration [%]	Temperature [°C]	
Mineral lubricants	-	-	++
Aliphatic hydrocarbons	-	-	++++
Aromatic hydrocarbons	-	-	○
Gasoline	-	-	○
Weak mineral acids	-	-	++++
Strong mineral acids	-	-	++
Weak organic acids	-	-	++++
Strong organic acids	-	-	++
Oxidizing acids	-	-	○
Weak alkaline solutions	-	-	○
Strong alkaline solutions	-	-	○
Trichloroethylene	-	-	○
Perchloroethylene	-	-	○
Acetone	-	-	○
Alcohols	-	-	++
Hot water (hydrolysis resistance)	-	-	○

Explanation of the rating	
++++	Resistant
+++	Practically resistant
++	Conditionally resistant
+	Less resistant
○	Not resistant

4.4.2.6 Polyphenylene sulfide (PPS)

The data memory has special chemical resistance to solutions up to a temperature of 200 °C. A reduction in the mechanical properties has been observed in aqueous solutions of hydrochloric acid (HCl) and nitric acid (HNO₃) at 80 °C. The plastic housings are resistant to all types of fuel including methanol.

Table 4- 63 Chemical resistance - polyphenylene sulfide (PPS)

Substance	Test conditions		Rating
	Concentration [%]	Temperature [°C]	
Acetone	-	55 °C	++++
n-Butanol (butyl alcohol)	-	80 °C	++++
Butanone-2 (methyl ethyl ketone)	-	60 °C	++++
n-Butyl acetate	-	80 °C	++++
Brake fluid	-	80 °C	++++
Calcium chloride (saturated)	-	80 °C	++++
Diesel fuel	-	80 °C	++++
Diethyl ether	-	23 °C	++++
Frigen 113	-	23 °C	++++
Anti-freeze	-	120 °C	++++
Kerosene	-	60 °C	++++
Methanol	-	60 °C	++++
Engine oil	-	80 °C	++++
Sodium chloride (saturated)	-	80 °C	++++
Sodium hydroxide	30%	80 °C	++++
Sodium hypochlorite (30 or 180 days)	5%	80 °C	++
	5%	80 °C	-
Sodium hydroxide solution	30%	90 °C	++++
Nitric acid	10%	23 °C	++++
Hydrochloric acid	10%	80 °C	-
Sulfuric acid	10%	23 °C	++++
	10%	80 °C	++
	30%	23 °C	++++
Tested fuels	-	80 °C	++++
FAM testing fluid acc. to DIN 51 604-A Toluene	-	80 °C	++
1, 1, 1-Trichloroethane Xylene	-	80 °C	++++
Zinc chloride (saturated)	-	80 °C	++
	-	75 °C	++++

4.4 Chemical resistance of the readers and transponders

Explanation of the rating	
++++	Resistant
+++	Practically resistant
++	Conditionally resistant
+	Less resistant
○	Not resistant

4.4.2.7 Polyvinyl chloride (PVC)

Table 4- 64 Chemical resistance - polyvinyl chloride (PVC)

Substance	Test conditions		Rating
	Concentration [%]	Temperature [°C]	
Salt water	5%	-	++++
Sugared water	10%	-	++++
Acetic acid, w.	5%	-	++++
Sodium carbonate, w.	5%	-	++++
Ethyl alcohol, w.	60%	-	++++
Ethylene glycol	50%	-	++++
Fuel B (acc. to ISO 1817)	-	-	++++
Human sweat	-	-	++++

Explanation of the rating	
++++	Resistant
++++	Practically resistant
++	Conditionally resistant
+	Less resistant
○	Not resistant

4.5 Guidelines for electromagnetic compatibility (EMC)

4.5.1 Overview

These EMC directives answer the following questions:

- Why are EMC directives necessary?
- What types of external interference have an impact on the system?
- How can interference be prevented?
- How can interference be eliminated?
- Examples of interference-free plant design

The description is aimed at "qualified personnel":

- Configuration engineers and planners who plan system configurations with RFID modules and have to observe the necessary guidelines.
- Installation and service engineers who install the connecting cables in accordance with this description or who rectify defects in this area in the event of interference.

Note

Observe the EMC directives

Failure to observe the specifically emphasized notes can result in dangerous conditions in the plant or the destruction of individual components or the entire plant.

4.5.2 What does EMC mean?

The increasing use of electrical and electronic devices is accompanied by:

- Higher component density
- More switched power electronics
- Increasing switching rates
- Lower power consumption of components due to steeper switching edges

The higher the degree of automation, the greater the risk of interaction between devices.

Electromagnetic compatibility (EMC) is the ability of an electrical or electronic device to operate satisfactorily in an electromagnetic environment without affecting or interfering with the environment over and above certain limits.

EMC can be broken down into three different areas:

- Internal immunity to interference:
Immunity to internal (own) electrical disturbance
- External immunity to interference:
Immunity to external electromagnetic disturbances
- Degree of interference emission:
Emission of interference and its effect on the electrical environment

All three areas are considered when testing an electrical device.

The RFID modules are tested for conformity with the limit values required by the CE and RED directives. Since the RFID modules are merely components of an overall system, and sources of interference can arise as a result of combining different components, certain directives have to be followed when setting up a plant.

EMC measures usually consist of a complete package of measures, all of which need to be implemented in order to ensure that the plant is immune to interference.

Note

Adherence to EMC directives

The plant manufacturer is responsible for the observance of the EMC directives; the plant operator is responsible for radio interference suppression in the overall plant.

All measures taken when setting up the plant prevent expensive retrospective modifications and interference suppression measures.

The plant operator must comply with the locally applicable laws and regulations. They are not covered in this document.

4.5.3 Basic rules

It is often sufficient to follow a few elementary rules in order to ensure electromagnetic compatibility (EMC).

The following rules must be observed:

Shielding by enclosure

- Protect the device against external interference by installing it in a cabinet or housing. The housing or enclosure must be connected to the chassis ground.
- Use metal plates to shield against electromagnetic fields generated by inductances.
- Use metal connector housings to shield data conductors.

Wide-area ground connection

- Plan a meshed grounding concept.
- Bond all passive metal parts to chassis ground, ensuring large-area and low-HF-impedance contact.
- Establish a large-area connection between the passive metal parts and the central grounding point.
- Don't forget to include the shielding bus in the chassis ground system. That means the actual shielding busbars must be connected to ground by large-area contact.
- Aluminium parts are not suitable for ground connections.

Plan the cable installation

- Break the cabling down into cable groups and install these separately.
- Always route power cables, signal cables and HF cables through separated ducts or in separate bundles.
- Feed the cabling into the cabinet from one side only and, if possible, on one level only.
- Route the signal cables as close as possible to chassis surfaces.
- Twist the feed and return conductors of separately installed cables.
- Routing HF cables:
avoid parallel routing of HF cables.
- Do not route cables through the antenna field.

Shielding for the cables

- Shield the data cables and connect the shield at both ends.
- Shield the analog cables and connect the shield at one end, e.g. on the drive unit.
- Always apply large-area connections between the cable shields and the shielding bus at the cabinet inlet and make the contact with clamps.
- Feed the connected shield through to the module without interruption.
- Use braided shields, not foil shields.

Line and signal filter

- Use only line filters with metal housings
- Connect the filter housing to the cabinet chassis using a large-area low-HF-impedance connection.
- Never fix the filter housing to a painted surface.
- Fix the filter at the control cabinet inlet or in the direction of the source.

4.5.4 Propagation of electromagnetic interference

Three components have to be present for interference to occur in a system:

- Interference source
- Coupling path
- Interference sink

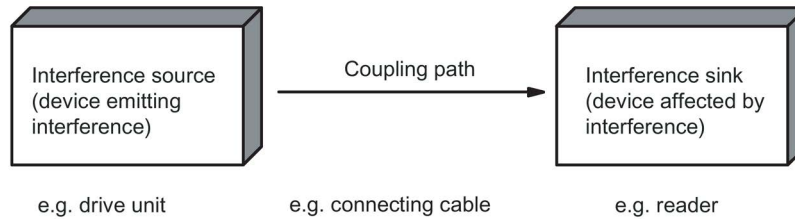


Figure 4-11 Propagation of interference

If one of the components is missing, e.g. the coupling path between the interference source and the interference sink, the interference sink is unaffected, even if the interference source is transmitting a high level of noise.

The EMC measures are applied to all three components, in order to prevent malfunctions due to interference. When setting up a plant, the manufacturer must take all possible measures in order to prevent the occurrence of interference sources:

- Only devices fulfilling limit class A of VDE 0871 may be used in a plant.
- Interference suppression measures must be introduced on all interference-emitting devices. This includes all coils and windings.
- The design of the system must be such that mutual interference between individual components is precluded or kept as small as possible.

Information and tips for plant design are given in the following sections.

Interference sources

In order to achieve a high level of electromagnetic compatibility and thus a very low level of disturbance in a plant, it is necessary to recognize the most frequent interference sources. These must then be eliminated by appropriate measures.

Table 4- 65 Interference sources: origin and effect

Interference source	Interference results from	Effect on the interference sink
Contactors, electronic valves	Contacts	System disturbances
	Coils	Magnetic field
Electrical motor	Collector	Electrical field
	Winding	Magnetic field
Electric welding device	Contacts	Electrical field
	Transformer	Magnetic field, system disturbance, transient currents

Interference source	Interference results from	Effect on the interference sink
Power supply unit, switched-mode	Circuit	Electrical and magnetic field, system disturbance
High-frequency appliances	Circuit	Electromagnetic field
Transmitter (e.g. service radio)	Antenna	Electromagnetic field
Ground or reference potential difference	Voltage difference	Transient currents
Operator	Static charge	Electrical discharge currents, electrical field
Power cable	Current flow	Electrical and magnetic field, system disturbance
High-voltage cable	Voltage difference	Electrical field

What interference can affect RFID?

Interference source	Cause	Remedy
Switched-mode power supply	Interference emitted from the current infeed	Replace the power supply
Interference injected through the cables connected in series	Cable is inadequately shielded	Better cable shielding
	The reader is not connected to ground.	Ground the reader
HF interference over the antennas	caused by another reader	- Position the antennas further apart. - Erect suitable damping materials between the antennas. - Reduce the power of the readers. Please follow the instructions in the section <i>Installation guidelines/reducing the effects of metal</i>

Coupling paths

A coupling path has to be present before the disturbance emitted by the interference source can affect the system. There are four ways in which interference can be coupled in:

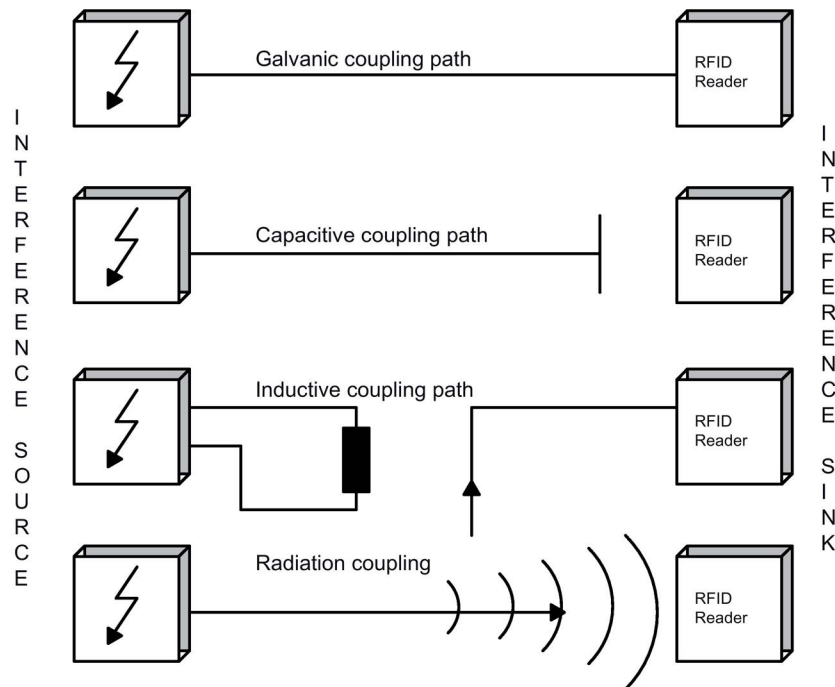


Figure 4-12 Ways in which interference can be coupled in

When RFID modules are used, different components in the overall system can act as a coupling path:

Table 4- 66 Causes of coupling paths

Coupling path	Invoked by
Conductors and cables	• Incorrect or inappropriate installation • Missing or incorrectly connected shield • Inappropriate physical arrangement of cables
Control cabinet or housing	• Missing or incorrectly wired equalizing conductor • Missing or incorrect earthing • Inappropriate physical arrangement • Components not mounted securely • Unfavorable cabinet configuration

4.5.5 Cabinet configuration

The influence of the user in the configuration of an electromagnetically compatible plant encompasses cabinet configuration, cable installation, ground connections and correct shielding of cables.

Note

For information about electromagnetically compatible cabinet configuration, please consult the installation guidelines for SIMATIC PLCs.

Shielding by enclosure

Magnetic and electrical fields and electromagnetic waves can be kept away from the interference sink by using a metal enclosure. The easier the induced interference current can flow, the greater the intrinsic weakening of the interference field. All enclosures and metal panels in the cabinet should therefore be connected in a manner allowing good conductance.

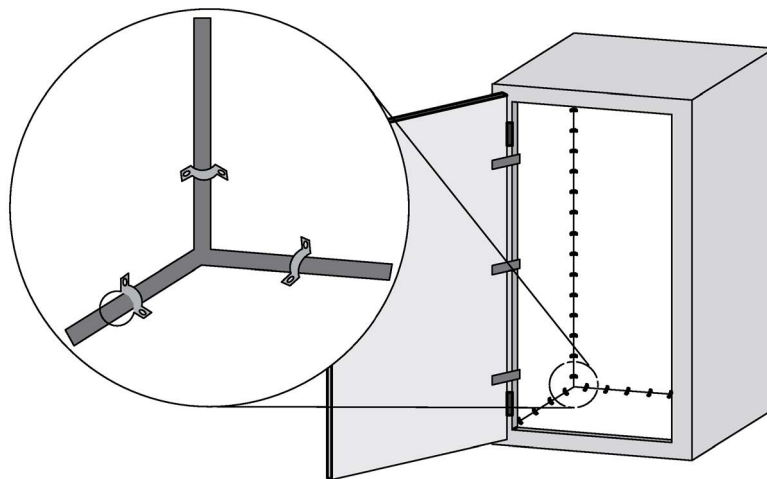


Figure 4-13 Shielding by enclosure

If the control cabinet panels are insulated from each other, a high-frequency-conducting connection can be established using ribbon cables and high-frequency terminals or HF conducting paste. The larger the area of the connection, the greater the high-frequency conductivity. This is not possible using single-wire connections.

Prevention of interference by optimum configuration

Good interference suppression can be achieved by installing SIMATIC PLCs on conducting mounting plates (unpainted). When setting up the control cabinet, interference can be prevented easily by observing certain guidelines. Power components (transformers, drive units, load power supply units) should be arranged separately from the control components (relay control unit, SIMATIC S7).

As a rule:

- The effect of the interference decreases as the distance between the interference source and interference sink increases.
- The interference can be further decreased by installing grounded shielding plates.
- The load connections and power cables should be installed separately from the signal cables with a minimum clearance of 10 cm.

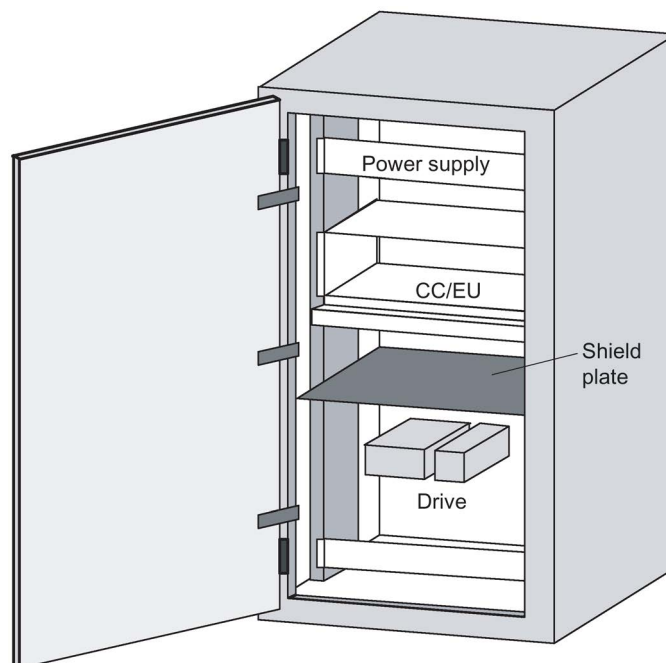


Figure 4-14 Prevention of interference by optimum configuration

Filtering of the supply voltage

External interference from the mains can be prevented by installing line filters. Correct installation is extremely important, in addition to appropriate dimensioning. It is essential that the line filter is mounted directly at the cabinet inlet. As a result, interference is filtered promptly at the inlet, and is not conducted through the cabinet.

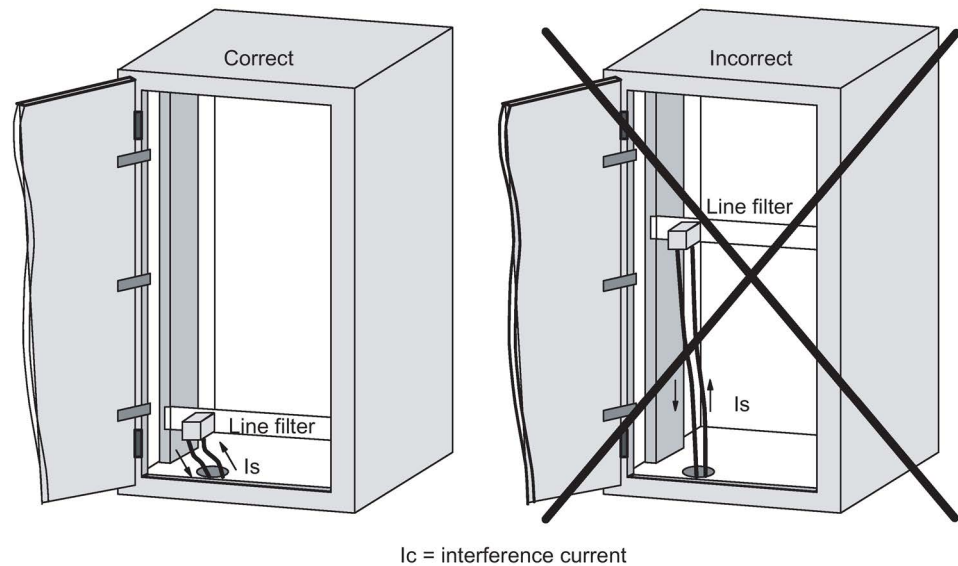


Figure 4-15 Filtering of the supply voltage

4.5.6 Prevention of interference sources

A high level of immunity to interference can be achieved by avoiding interference sources. All switched inductances are frequent sources of interference in plants.

Suppression of inductance

Relays, contactors, etc. generate interference voltages and must therefore be suppressed using one of the circuits below.

Even with small relays, interference voltages of up to 800 V occur on 24 V coils, and interference voltages of several kV occur on 230 V coils when the coil is switched. The use of freewheeling diodes or RC circuits prevents interference voltages and thus stray interference on conductors installed parallel to the coil conductor.

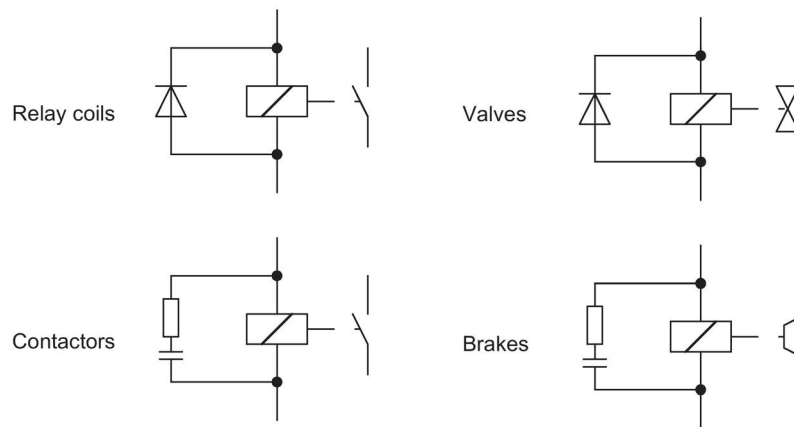


Figure 4-16 Suppression of inductance

Note

All coils in the cabinet should be suppressed. The valves and motor brakes are frequently forgotten. Fluorescent lamps in the control cabinet should be tested in particular.

4.5.7 Equipotential bonding

Potential differences between different parts of a plant can arise due to the different design of the plant components and different voltage levels. If the plant components are connected across signal cables, transient currents flow across the signal cables. These transient currents can corrupt the signals.

Proper equipotential bonding is thus essential.

- The equipotential bonding conductor must have a sufficiently large cross section (at least 10 mm²).
- The distance between the signal cable and the associated equipotential bonding conductor must be as small as possible (antenna effect).
- A fine-strand conductor must be used (better high-frequency conductivity).
- When connecting the equipotential bonding conductors to the centralized equipotential bonding strip (EBS), the power components and non-power components must be combined.
- The equipotential bonding conductors of the separate modules must lead directly to the equipotential bonding strip.

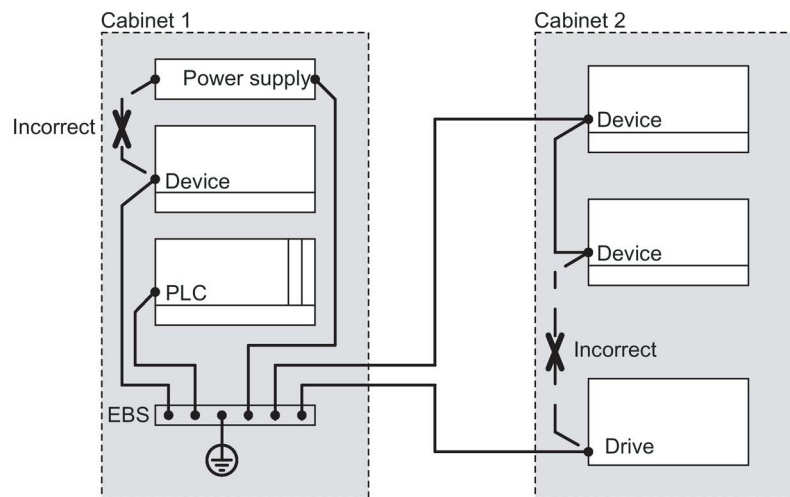


Figure 4-17 Equipotential bonding (EBS = Equipotential bonding strip)

The better the equipotential bonding in a plant, the smaller the chance of interference due to fluctuations in potential.

Equipotential bonding should not be confused with protective earthing of a plant. Protective earthing prevents the occurrence of excessive contact voltages in the event of equipment faults whereas equipotential bonding prevents the occurrence of differences in potential.

4.5.8 Cable shielding

Signal cables must be shielded in order to prevent coupling of interference.

The best shielding is achieved by installing the cables in steel tubes. However, this is only necessary if the signal cable is routed through an environment prone to particular interference. It is usually adequate to use cables with braided shields. In either case, however, correct connection is vital for effective shielding.

The following generally applies:

- For analog signal cables, the shield has to be connected at one end on the receiver side
- For digital signals, the shield has to be connected to the enclosure at both ends
- Since interference signals are frequently within the HF range (> 10 kHz), a large-area HF-proof shield contact is necessary

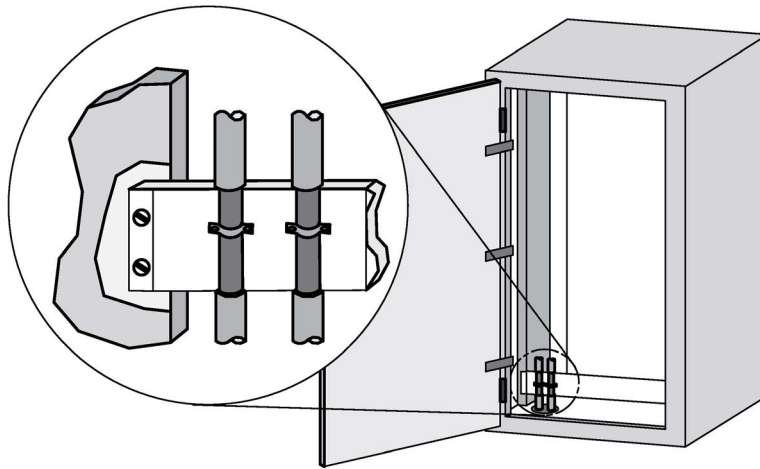


Figure 4-18 Cable shielding

The shielding bus should be connected to the control cabinet enclosure in a manner allowing good conductance (large-area contact) and must be situated as close as possible to the cable inlet. The cable insulation must be removed and the cable clamped to the shielding bus (high-frequency clamp) or secured using cable ties. Care should be taken to ensure that the connection allows good conductance.

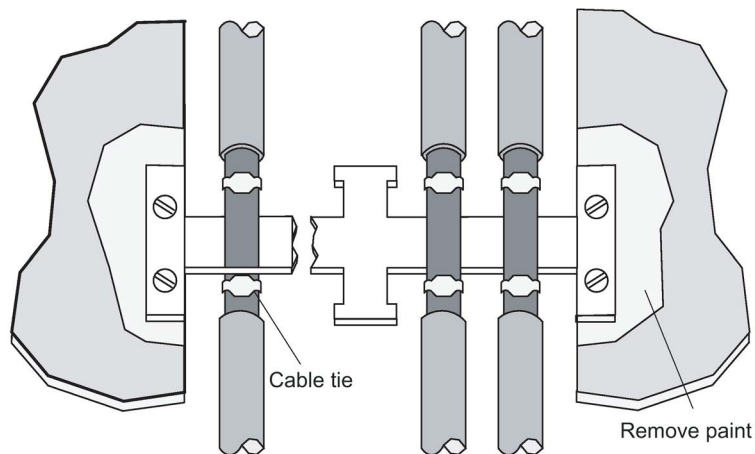


Figure 4-19 Connection of shielding bus

The shielding bus must be connected to the PE busbar.

If shielded cables have to be interrupted, the shield must be continued via the corresponding connector housing. Only suitable connectors may be used for this purpose.

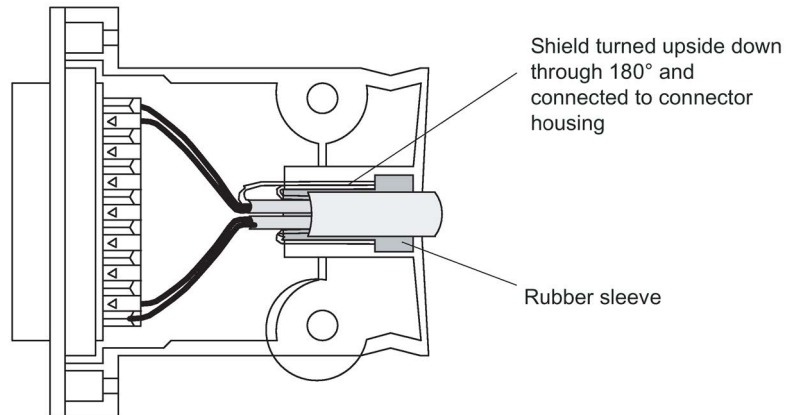


Figure 4-20 Interruption of shielded cables

If intermediate connectors, which do not have a suitable shield connection are used, the shield must be continued by fixing cable clamps at the point of interruption. This ensures a large-area, HF-conducting contact.

Readers

Features of the RF300 reader

The reader provides inductive communication with the transponders and serial connection to the communications modules.

Communication between the transponder and reader takes place over inductive alternating fields.

The transmittable data volume between reader and transponder depends on

- the speed at which the transponder moves through the transmission window of the reader.
- the length of the transmission window,
- the transponder type used (RF300- / ISO 15693- (MDS D)/ ISO 14443 transponder (MDS E)),
- the memory type (FRAM, EEPROM; with RF300 transponders).

ISO 15693 functionality

With all readers of the RF300 family, you can use ISO 15693 transponders. Note that the readers for RF300, ISO 15963 or ISO 14443 operation must have parameters assigned. The parameter assignment done with the aid of the RESET frame (INIT-Run).

For more detailed information on software parameter assignment refer to the manuals.

- Function manual "Ident profile and Ident blocks (<https://support.industry.siemens.com/cs/ww/en/view/106368029>)",
- Product Information "Input parameters for the RF300 system for programming via communications modules (<https://support.industry.siemens.com/cs/ww/en/ps/15033/man>)",
- Function manual "FB 45 (<https://support.industry.siemens.com/cs/ww/en/view/21738808>)" as of version "AS ≥ A3".

ISO 14443 functionality

With all readers of the second generation of the RF300 family, you can use ISO 14443 transponders. The RF300 readers of the second generation therefore replace the MOBY E readers SLG 72 and SLG 75. Note that the readers for RF300, ISO 15963 or ISO 14443 operation must have parameters assigned. The parameter assignment done with the aid of the RESET frame (INIT-Run).

The following commands are supported in ISO 14443 operation of the readers:

- READ
- WRITE
- MDS-STATUS (mode 3)
- INIT
- REPEAT

Special ISO 14443 commands such as "INCREMENT", "DECREMENT" or "SET-VALUE" are not supported.

5.1 SIMATIC RF310R

5.1.1 Features

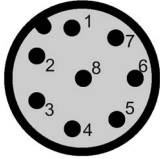
SIMATIC RF310R		Characteristics
	Design	① RS-422 interface ② Status display
	Area of application	Identification tasks on small assembly lines in harsh industrial environments

5.1.2 RF310R ordering data

Table 5- 1 RF310R ordering data

	Article number
RF310R with RS-422 interface (3964R) horizontal base plate	6GT2801-1AB10
RF310R with RS-422 interface (3964R) base plate turned through 90°	6GT2801-1AB10-0AX1

5.1.3 Pin assignment RF310R with RS-422 interface

Pin	Pin Device end 8-pin M12	Assignment
	1	+ 24 V
	2	- Transmit
	3	0 V
	4	+ Transmit
	5	+ Receive
	6	- Receive
	7	Unassigned
	8	Earth (shield)

5.1.4 LED operating display

The operational statuses of the reader are displayed by the LEDs. The LED can adopt the colors green, red or yellow and the statuses off , on , flashing :

Table 5- 2 LED operating display on the reader

LED	Meaning
	The reader is turned off.
	Operating voltage present, reader not initialized or antenna switched off
	Operating voltage present, reader initialized and antenna switched on
	- Operating mode "with presence": Transponder present - Operating mode "without presence": Transponder present and command currently being executed
	There is an error. The number of flashes provides information about the current error. You will find more information on error messages in the section "System diagnostics (Page 465)".

5.1.5 Ensuring reliable data exchange

The "center point" of the transponder must be situated within the transmission window.

5.1.6 Metal-free area

The RF310R can be flush-mounted in metal. Allow for a possible reduction in the field data.

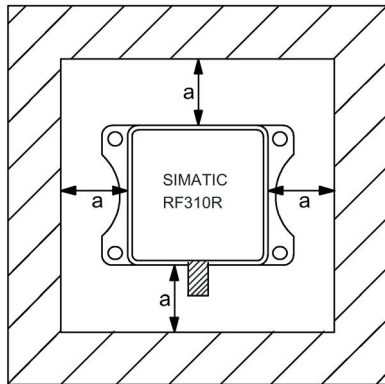
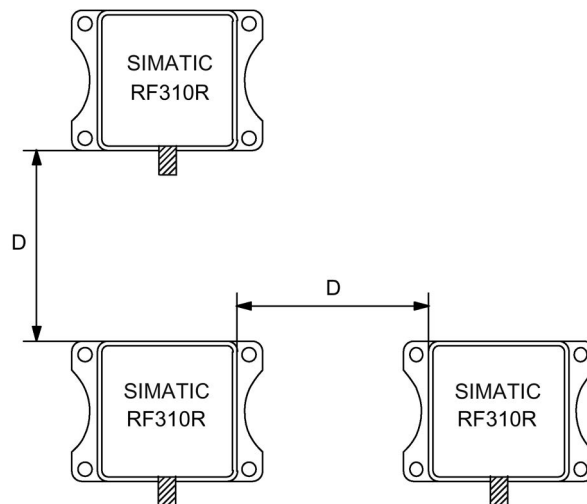


Figure 5-1 Metal-free area for RF310R

To avoid any impact on the field data, the distance a should be ≥ 20 mm.

5.1.7 Minimum distance between RF310R readers

RF310R side by side

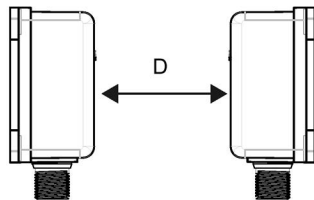


$D \geq 150$ mm (with 2 readers)

$D \geq 200$ mm (with more than 2 readers)

Figure 5-2 Minimum distance between RF310R readers

RF310R face-of-face



$D \geq 300 \text{ mm}$

Figure 5-3 Face-of-face distance between two RF310Rs

5.1.8 Technical specifications

Table 5- 3 Technical specifications of the RF310R reader with RS-422 interface

6GT2801-1AB10		
Product type designation	SIMATIC RF310R	
Radio frequencies		
Operating frequency, rated value	13.56 MHz	
Electrical data		
Maximum range	60 mm	
Maximum data transmission speed reader ↔ transponder	RF300 transponder	ISO transponder
Read	approx. 8000 bytes/s	approx. 1500 bytes/s
Write	approx. 8000 bytes/s	approx. 1500 bytes/s
Transmission speed	19.2, 57.6, 115.2 kBd	
Read/write distances of the reader	See section "Field data for transponders, readers and antennas (Page 51)"	
MTBF (Mean Time Between Failures)	170 years	
Interfaces		
Electrical connector design	M12, 8-pin	
Standard for interfaces for communication	RS-422	
Antenna	integrated	

6GT2801-1AB10

Mechanical specifications

Enclosure

- | | |
|------------|-----------------|
| • Material | • Plastic PA 12 |
| • Color | • Anthracite |

Recommended distance to metal	0 mm
-------------------------------	------

Supply voltage, current consumption, power loss

Supply voltage	24 VDC
----------------	--------

Typical current consumption	50 mA
-----------------------------	-------

Permitted ambient conditions

Ambient temperature

- | | |
|-------------------------------------|------------------|
| • During operation | • -25 ... +70 °C |
| • During transportation and storage | • -40 ... +85 °C |

Degree of protection according to EN 60529	IP67
--	------

Shock-resistant acc. to EN 60721-3-7, Class 7 M2	500 m/s ²
--	----------------------

Vibration-resistant acc. to EN 60721-3-7, Class 7 M2	200 m/s ²
--	----------------------

Torsion and bending load	Not permitted
--------------------------	---------------

Design, dimensions and weight

Dimensions (L x W x H)	75 x 55 x 30 mm
------------------------	-----------------

Weight	200 g
--------	-------

Type of mounting	4 x M5 screw; 1.5 Nm
------------------	-------------------------

Cable length for RS-422 interface, maximum	1000 m
--	--------

LED display design	3-color LED
--------------------	-------------

Standards, specifications, approvals

Proof of suitability	Radio to R&TTE directives EN 300330, EN 301489, CE, FCC, UL/CSA
----------------------	--

5.1.9 Approvals

FCC information

Siemens SIMATIC RF310R (MLFB 6GT2801-1AB10); FCC ID NXW-RF310R

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

5.1.10 Dimension drawing

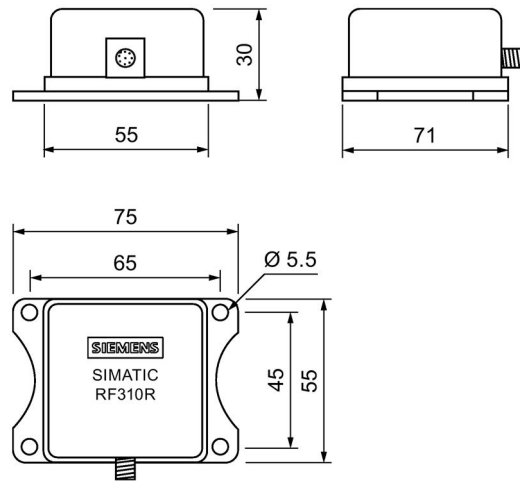


Figure 5-4 Dimension drawing for RF310R

Dimensions in mm

5.2 SIMATIC RF310R - 2nd generation

5.2.1 Features

SIMATIC RF310R		Characteristics	
	Design	① RS-422 interface	② LED operating display
	Area of application	Identification tasks on small assembly lines in harsh industrial environments	

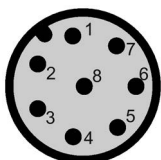
5.2.2 Ordering data

Table 5- 4 RF310R ordering data

	Article number
RF310R with RS-422 interface (3964R)	6GT2801-1BA10
RF310R with RS422 interface (3964R) and ATEX, IECEx, UL HAZ. LOC approval	6GT2801-1BA10-0AX2

5.2.3 Pin assignment of the RS-422 interface

Table 5- 5 Pin assignment

Pin	Pin Device end 8-pin M12	Assignment
	1	+ 24 V
	2	- Transmit
	3	0 V
	4	+ Transmit
	5	+ Receive
	6	- Receive
	7	Unassigned
	8	Earth (shield)

5.2.4 LED operating display

The operational statuses of the reader are displayed by two LEDs. The LEDs can adopt the colors white, green, red, yellow or blue and the statuses off , on , flashing :

Table 5- 6 Display elements

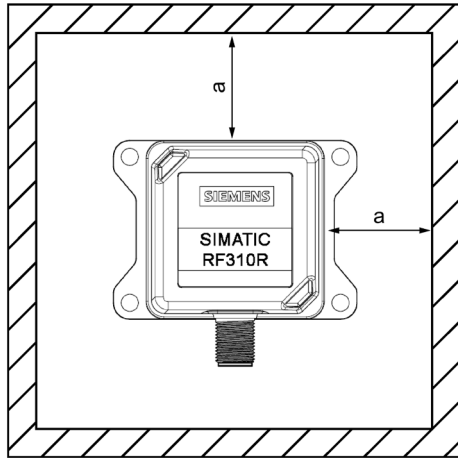
LED	Meaning
	The reader is turned off.
	The reader is turned on and is searching for transponders. The reader is in the "Setup" mode, in the "Search for transponders" status and has not yet received a "RESET" command and is not ready.
 	There is a transponder in the antenna field. The reader is in the "Setup" mode, in the status "Show quality", has not yet received a "RESET" command and is not ready. Depending on the signal strength, the LED flickers or is lit permanently.
	The reader has received a "RESET" command.
	The reader is turned on, the antenna is turned off.
	- Operating mode "with presence": Transponder present - Operating mode "without presence": Transponder present and command currently being executed
	There is an error. The number of flashes provides information about the current error. You will find more information on error messages in the section "System diagnostics (Page 465)".

5.2.5 Ensuring reliable data exchange

The "center point" of the transponder must be situated within the transmission window.

5.2.6 Metal-free area

The RF310R can be flush-mounted in metal. Allow for a possible reduction in the field data. To avoid any influence on the field data, the distance "a" should be kept to.

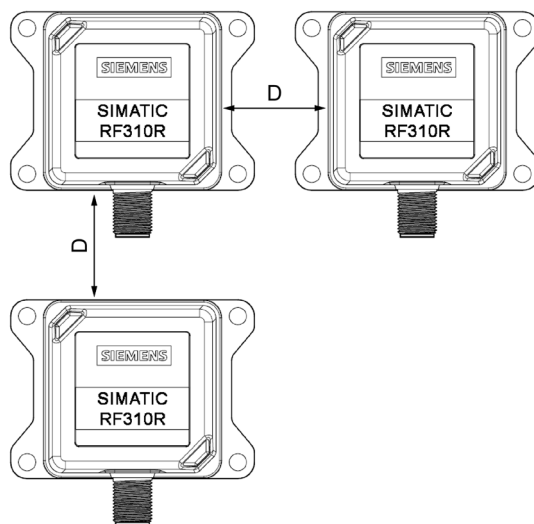


$a \geq 20 \text{ mm}$

Figure 5-5 Metal-free area for RF310R

5.2.7 Minimum distance between RF310R readers

RF310R side by side

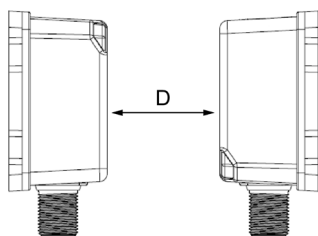


$D \geq 150 \text{ mm}$ (with 2 readers)

$D \geq 200 \text{ mm}$ (with more than 2 readers)

Figure 5-6 Minimum distance between RF310R readers

RF310R face-of-face



$D \geq 300 \text{ mm}$

Figure 5-7 Face-of-face distance between two RF310Rs

5.2.8 Technical specifications

Table 5- 7 Technical specifications of the RF310R reader with RS-422 interface

6GT2801-1BA10			
6GT2801-1BA10-0AX2			
Product type designation	SIMATIC RF310R		
Radio frequencies			
Operating frequency, rated value	13.56 MHz		
Electrical data			
Maximum range	60 mm		
Maximum data transmission speed reader ↔ transponder	RF300 transponder	ISO transponder (MDS D)	ISO tran- sponder (MDS E)
• Read	• ≤ 8000 bytes/s	• ≤ 3300 bytes/s	• ≤ 3400 bytes/s
• Write	• ≤ 8000 bytes/s	• ≤ 1700 bytes/s	• ≤ 800 bytes/s
Transmission speed	19.2, 57.6, 115.2 kBd		
Read/write distances of the reader	See section "Field data for transponders, readers and antennas (Page 51)"		
MTBF (Mean Time Between Failures)	273 years		
Interfaces			
Electrical connector design	M12, 8-pin		
Standard for interfaces for communication	RS-422		
Antenna	integrated		
Mechanical specifications			
Enclosure			
• Material	• Plastic PA 12		
• Color	• TI-Grey		
Recommended distance to metal	0 mm		
Supply voltage, current consumption, power loss			
Supply voltage	24 VDC		
Typical current consumption	60 mA		

6GT2801-1BA10	
6GT2801-1BA10-0AX2	
Permitted ambient conditions	
Ambient temperature	
• During operation	• -25 ... +70 °C
• During transportation and storage	• -40 ... +85 °C
Degree of protection according to EN 60529	IP67
Shock-resistant acc. to EN 60721-3-7, Class 7 M2	500 m/s ²
Vibration-resistant acc. to EN 60721-3-7, Class 7 M2	200 m/s ²
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (L x W x H)	75 x 55 x 30 mm
Weight	100 g
Type of mounting	4 x M5 screws; 1.5 Nm
Cable length for RS-422 interface, maximum	1000 m
LED display design	2 LEDs, 5 colors
Standards, specifications, approvals	
Proof of suitability	Radio according to R&TTE directives EN 300330, EN 301489, CE, FCC, UL/CSA (IEC 61010), Ex approval (only 6GT2801-1BA10-0AX2)

5.2.9 Approvals

FCC information

Siemens SIMATIC RF310R (MLFB 6GT2801-1BA10); FCC ID NXW-RF310R02

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

UL information (IEC 61010-1 / IEC 61010-2-201)

This standard applies to equipment designed to be safe at least under the following conditions:

- a) indoor use;
- b) altitude up to 2 000 m;
- c) temperature -25 °C to 70 °C;
- d) maximum relative humidity 80 % for temperature up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C;
- e) TRANSIENT OVERVOLTAGES up to the levels of OVERVOLTAGE CATEGORY II, NOTE 1: These levels of transient overvoltage are typical for equipment supplied from the building wiring.
- f) using a "NEC Class 2" power supply is required
- g) the device is categorized as pollution degree 3/4

5.2.10 Dimension drawing

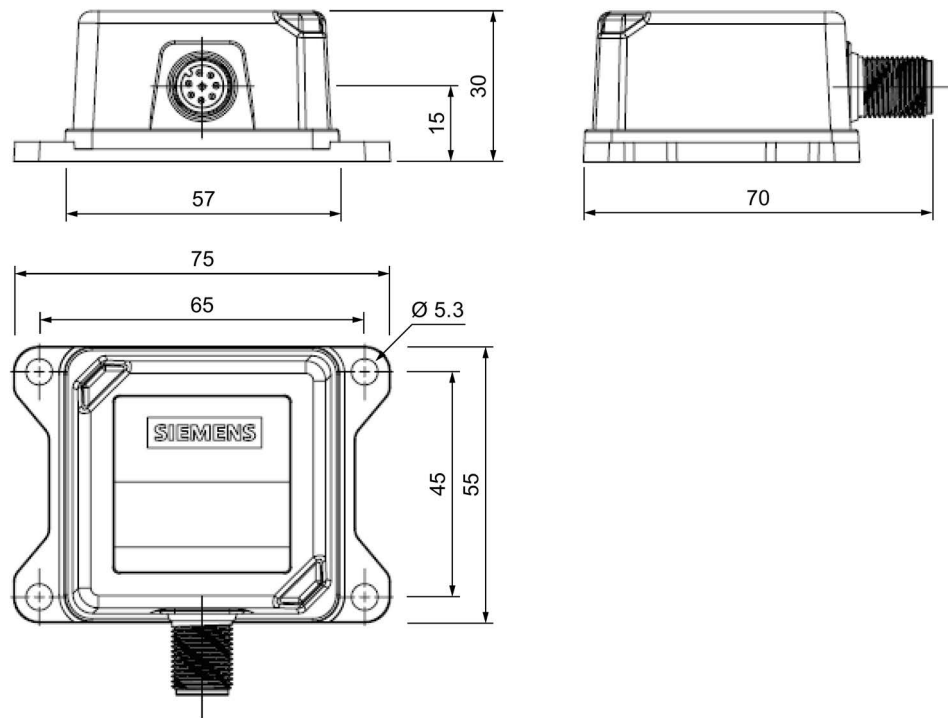


Figure 5-8 Dimension drawing for RF310R

Dimensions in mm

5.2.11 Using the reader in hazardous area

WARNING

Risk of explosion

In a flammable or combustible environment, no cables may be connected to or disconnected from the device.

ATEX

The SIMATIC Ident products meet the requirements of explosion protection acc. to ATEX. The products meet the requirements of the standards:

Document	Title
EN 60079-0	Hazardous areas Part 0: Equipment - General requirements
EN 60079-7	Hazardous areas Part 7: Equipment protection by increased safety "e"
EN 60079-31	Hazardous areas Part 31: Equipment dust ignition protection by enclosure "t"

You will find the current versions of the standards in the currently valid ATEX certificates.

ATEX mark

NOTICE

Validity only when the devices are marked

There is a corresponding approval only with devices to which the Ex mark is applied.

The identification of the electrical equipment is:



 II 3 G Ex ec IIB T4 Gc
 II 3 D Ex tc IIIC T80 °C Dc

-25 °C < Ta < +70 °C

IP64

U_n = 24 V DC, 60 mA

The equipment also has the following additional information:

XXXYYYZZZ [= serial number, is assigned during production]

DEMKO 17 ATEX 1767 X [= certificate number]

IECEX

The SIMATIC Ident products meet the requirements of explosion protection acc. to IECEx. The products meet the requirements of the standards:

Document	Title
IEC 60079-0	Hazardous areas Part 0: Equipment - General requirements
IEC 60079-7	Hazardous areas Part 7: Equipment protection by increased safety "e"
IEC 60079-31	Hazardous areas Part 31: Equipment dust ignition protection by enclosure "t"

You will find the current versions of the standards in the currently valid IECEx certificates.

IECEX mark

NOTICE
Validity only when the devices are marked
There is a corresponding approval only with devices to which the IECEx mark is applied.

The identification of the electrical equipment is:

Ex ec IIB T4 Gc

Ex tc IIIC T80 °C Dc

-25 °C < Ta < +70 °C

IP64

U_n= 24 V DC, 60 mA

The equipment also has the following additional information:

XXXXYYZZZ [= serial number, is assigned during production]

IECEX ULD 17.0012 X [= certificate number]

UL HAZ. LOC.

The SIMATIC Ident products meet the requirements of explosion protection acc. to UL HAZ. LOC. The products meet the requirements of the standards:

Document	Title
UL 60079-0	Hazardous areas
CSA C22.2 NO. 60079-0	Part 0: Equipment - General requirements
UL 60079-7	Hazardous areas
CSA C22.2 NO. 60079-7	Part 7: Equipment protection by increased safety "e"
UL 60079-31	Hazardous areas
CSA C22.2 NO. 60079-31	Part 31: Equipment dust ignition protection by enclosure "t"

You will find the current versions of the standards in the currently valid UL HAZ. LOC. certificates

UL HAZ. LOC. mark

NOTICE
Validity only when the devices are marked There is a corresponding approval only with devices to which the UL HAZ. LOC. mark is applied.

The identification of the electrical equipment is:



LISTED E223122
 IND.CONT.EQ FOR HAZ.LOC.
 CL.I, DIV.2, GP.C,D T4
 CL.II, DIV.2, GP.F,G T80 °C
 AEx ec IIB T4 Gc, Ex ec IIB T4 Gc X
 AEx tc IIIC T80 °C Dc, Ex tc IIIC T80 °C Dc X

-25 °C < Tamb. < +70 °C

IP64

U_n= 24 V DC, 60 mA

The equipment also has the following additional information:

XXXYYYYZZZ

[= serial number, is assigned during production]

5.2.11.1 Using the reader in hazardous area for gases

The temperature class of the reader for hazardous areas depends on the ambient temperature range:

Ambient temperature range	Temperature class
-25 °C < Ta < +70 °C	T4

WARNING

Ignitions of gas-air mixtures

When using the reader, check to make sure that the temperature class is adhered to in keeping with the requirements of the area of application

Non-compliance with the permitted temperature ranges while using the reader can lead to ignitions of gas-air mixtures.

5.2.11.2 Using the reader in hazardous area for dust

The equipment is suitable for dusts whose ignition temperatures for a dust layer of 5 mm are higher than 80 °C (smoldering temperature).

Ambient temperature range	Temperature value
-25 °C < Ta < +70 °C	T80 °C

WARNING

Ignitions of dust-air mixtures

When using the reader, check to make sure that the temperature values are adhered to in keeping with the requirements of the area of application. Non-compliance with the permitted temperature range while using the reader can lead to ignitions of dust-air mixtures.

5.2.11.3 Installation and operating conditions for hazardous areas:

NOTICE**Risk of explosion**

Risk of explosion of dust-air mixtures or gas-air mixtures. Observe the following conditions when installing and operating the device in a hazardous area in order to avoid a risk of explosion and damage to the device:

- Making and breaking of circuits is permitted only in a de-energized state.
- The maximum surface temperature, corresponding to the marking, applies only for operation without a cover of dust.
- The device may only be operated in such a way that adequate protection against UV light is ensured.
- The device may not be operated in areas influenced by processes that generate high electrostatic charges.
- The device should only be cleaned with a damp cloth.
- The device must be set up and installed in such a way that it is mechanically protected.
- The grounding of the plug (8-pin) on the reader must be via its supply cable.
- The device may only be operated with accessories specified or supplied by the manufacturer. All the points above also apply to the accessories (cables and connectors) and to the antennas (exception: the housing of ANT 1 does not need to be installed with impact protection).
- The device sockets incl. the metal parts of the connecting cable must have a shrink-on sleeve pulled over them, in other words, all metal parts apart from the securing sockets of the housing must be fully covered and be inaccessible.
- After removing the connections (antenna cable, signal/supply cable), the connectors must be checked for contamination and, if necessary, cleaned before being inserted again.

5.2.11.4 Extended installation and operating conditions for hazardous areas for applications according to UL Hazardous Location (USA and Canada)

In addition to the instructions listed in ordinary locations File E85972-D1005.

For Div. 2:

This equipment is suitable for use in Class I, Division 2, Groups C and D in HAZARDOUS LOCATIONS, OR NON-HAZARDOUS LOCATIONS ONLY.

**WARNING****WARNING**

EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.

These devices are open-type devices that are to be installed in an enclosure suitable for the environment.

For Zone 2 only:

This equipment is suitable for use in Class I, Division 2, Groups C and D, Class II Groups F and G, OR Zone 2, Group IIB, OR Zone 22, Group IIIC in HAZARDOUS LOCATIONS, OR non-hazardous locations only.

! WARNING

WARNING

EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.

! WARNING

WARNING

WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD.

All models must be mounted in an enclosure with a minimum ingress protection rating of at least IP54 and must be Class I, Zone 2 certified, and used in an environment of not more than pollution degree 2.

The device may only be operated so that there is adequate protection against ultraviolet light.

The device must not be operated in areas influenced by charge-producing processes.

The device must be set up and installed so that it is mechanically protected.

After disconnecting connections (signal/supply cable), before the connectors are plugged in again, the connectors must be checked for contamination and, if necessary, cleaned.

5.3 SIMATIC RF310R with Scanmode

You will find detailed information on the SIMATIC RF310R with Scanmode on the Internet (<https://support.industry.siemens.com/cs/ww/en/ps/15034>).

5.3.1 Features

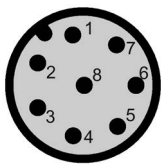
SIMATIC RF310R special version Scanmode	Characteristics	
	Design	① RS-422 interface ② Status display
	Area of application	Identification tasks on small assembly lines in harsh industrial environments

5.3.2 Ordering data for RF310R with Scanmode

Table 5- 8 Ordering data RF310R Scanmode

	Article number
RF310R special version Scanmode with RS-422 interface	6GT2801-1AB20-0AX1

5.3.3 Pin assignment RF310R special version Scanmode RS-422 interface

Pin	Pin Device end 8-pin M12	Assignment
	1	+ 24 V
	2	- Transmit
	3	0 V
	4	+ Transmit
	5	+ Receive
	6	- Receive
	7	Unassigned
	8	Earth (shield)

5.3.4 LED operating display

The operational statuses of the reader are displayed by the LEDs. The LED can adopt the colors green, red or yellow and the statuses off , on , flashing :

Table 5- 9 LED operating display on the reader

LED	Meaning
	The reader is turned off.
	The reader is switched on and ready for operation.
	There is a transponder in the antenna field.
	There is an error. The number of flashes provides information about the current error. You will find more information on error messages in the section "System diagnostics (Page 465)".

5.3.5 Ensuring reliable data exchange

The "center point" of the transponder must be situated within the transmission window.

5.3.6 Metal-free area

The RF310R special version can be flush-mounted in metal. Allow for a possible reduction in the field data.

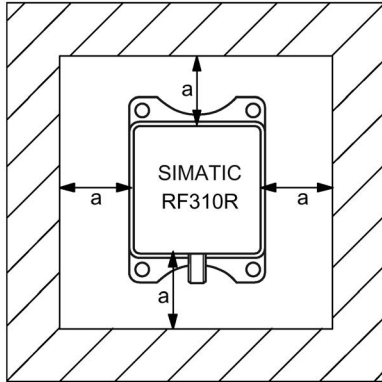
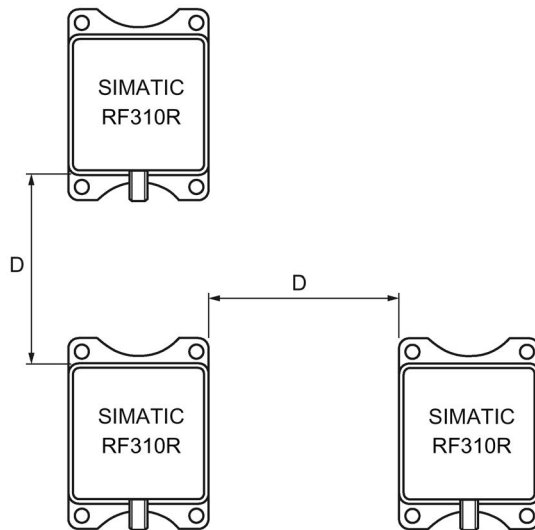


Figure 5-9 Metal-free area for RF310R special version

To avoid any impact on the field data, the distance a should be ≥ 20 mm.

5.3.7 Minimum distance between several readers

RF310R special version side by side

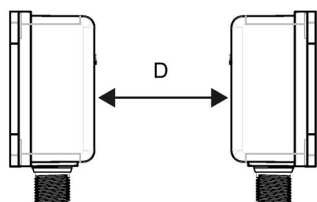


$D \geq 150$ mm (with 2 readers)

$D \geq 200$ mm (with more than 2 readers)

Figure 5-10 Minimum distance between RF310R readers

RF310R special version face-to-face



$D \geq 300 \text{ mm}$

Figure 5-11 Face-to-face distance between two RF310R special version

5.3.8 Technical specifications

Table 5- 10 Technical specifications of the RF310R reader with Scanmode

6GT2801-1AB20-0AX1		
Product type designation	SIMATIC RF310R Scanmode	
Radio frequencies		
Operating frequency, rated value	13.56 MHz	
Electrical data		
Maximum range	60 mm	
Maximum data transmission speed reader ↔ transponder	RF300 transponder	ISO transponder
• Read	• approx. 8000 bytes/s	• approx. 1500 bytes/s
Transmission speed	9.6, 19.2, 38.4, 57.6, 115.2 kBd	
Read/write distances of the reader	See section "Field data for transponders, readers and antennas (Page 51)"	
MTBF (Mean Time Between Failures)	170 years	
Interfaces		
Electrical connector design	M12, 8-pin	
Standard for interfaces for communication	RS-422 (Scanmode)	
Antenna	integrated	
Mechanical specifications		
Enclosure		
• Material	• Plastic PA 12	
• Color	• Anthracite	
Recommended distance to metal	0 mm	

6GT2801-1AB20-0AX1	
Supply voltage, current consumption, power loss	
Supply voltage	24 VDC
Typical current consumption	50 mA
Permitted ambient conditions	
Ambient temperature	
• During operation	• -25 ... +70 °C
• During transportation and storage	• -40 ... +85 °C
Degree of protection according to EN 60529	IP67
Shock-resistant acc. to EN 60721-3-7, Class 7 M3	500 m/s ²
Vibration-resistant acc. to EN 60721-3-7, Class 7 M3	200 m/s ²
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (L x W x H)	75 x 55 x 30 mm
Weight	170 g
Type of mounting	4 x M5 screws; 1.5 Nm
Cable length for RS-422 interface, maximum	1000 m
LED display design	3-color LED
Standards, specifications, approvals	
Proof of suitability	Radio to R&TTE directives EN 300330, EN 301489, CE, FCC, UL/CSA

5.3.9 Approvals

FCC information

Siemens SIMATIC RF310R (MLFB 6GT2801-1AB20-0AX1); FCC ID NXW-RF310R

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

5.3.10 Dimension drawing

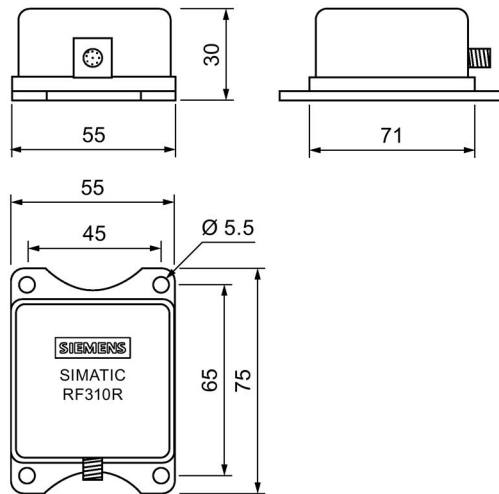


Figure 5-12 Dimension drawing RF310R special version Scanmode

Dimensions in mm

5.4 SIMATIC RF310R with Scanmode - 2nd generation

You will find detailed information on the SIMATIC RF310R with Scanmode on the Internet (<https://support.industry.siemens.com/cs/ww/en/ps/15034/man>).

5.4.1 Features

SIMATIC RF310R special version Scanmode	Characteristics	
	Design	① RS-422 interface ② Status display
	Area of application	Identification tasks on small assembly lines in harsh industrial environments

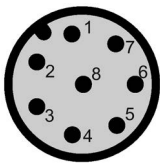
5.4.2 Ordering data

Table 5- 11 Ordering data RF310R Scanmode

	Article number
RF310R Scanmode with RS422 interface	6GT2801-1BA20-0AX1

5.4.3 Pin assignment of the RS-422 interface

Table 5- 12 Pin assignment

Pin	Pin Device end 8-pin M12	Assignment
	1	+ 24 V
	2	- Transmit
	3	0 V
	4	+ Transmit
	5	+ Receive
	6	- Receive
	7	Unassigned
	8	Earth (shield)

5.4.4 LED operating display

The operational statuses of the reader are displayed by the LEDs. The LED can adopt the colors green, red or yellow and the statuses off , on , flashing :

Table 5- 13 LED operating display on the reader

LED	Meaning
	The reader is turned off.
	The reader is switched on and ready for operation.
	There is a transponder in the antenna field.
	There is an error. The number of flashes provides information about the current error. You will find more information on error messages in the section "System diagnostics (Page 465)".

5.4.5 Ensuring reliable data exchange

The "center point" of the transponder must be situated within the transmission window.

5.4.6 Metal-free area

The RF310R Scanmode can be flush-mounted in metal. Allow for a possible reduction in the field data.

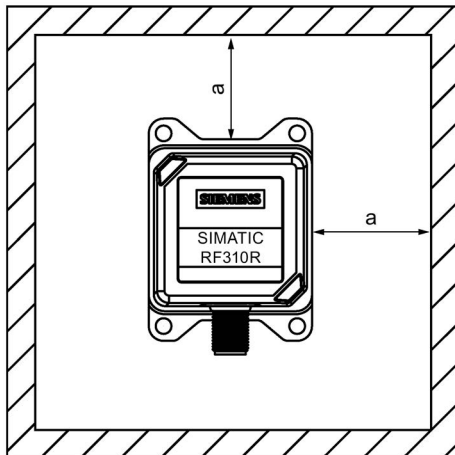
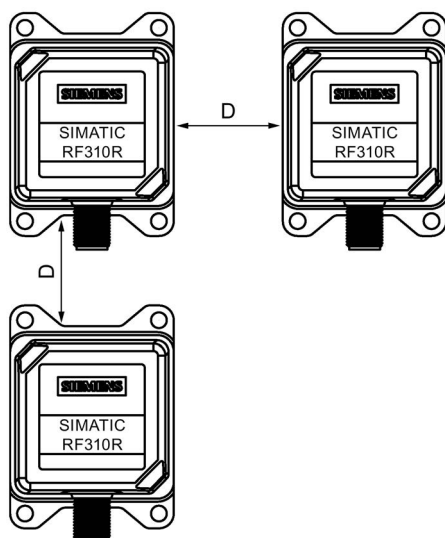


Figure 5-13 Metal-free area for RF310R Scanmode

To avoid any impact on the field data, the distance a should be ≥ 20 mm.

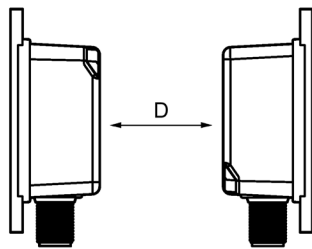
5.4.7 Minimum distance between several readers

RF310R Scanmode readers next to one another



- $D \geq 150$ mm (with 2 readers)
 ≥ 200 mm (with more than 2 readers)

Figure 5-14 Minimum distance between several RF310R Scanmode readers

RF310R Scanmode face-to-face

D ≥ 300 mm

Figure 5-15 Face-to-face distance between two RF310R Scanmode readers

5.4.8 Technical specifications

Table 5- 14 Technical specifications of the RF310R reader with Scanmode

6GT2801-1BA20-0AX1		
Product type designation	SIMATIC RF310R Scanmode	
Radio frequencies		
Operating frequency, rated value	13.56 MHz	
Electrical data		
Maximum range	60 mm	
Maximum data transmission speed reader ↔ transponder	RF300 transponder	ISO transponder
• Read	• approx. 8000 bytes/s	• approx. 1500 bytes/s
Transmission speed	9.6, 19.2, 38.4, 57.6, 115.2 kBd	
Read/write distances of the reader	See section "Field data for transponders, readers and antennas (Page 51)"	
MTBF (Mean Time Between Failures)	170 years	
Interfaces		
Electrical connector design	M12, 8-pin	
Standard for interfaces for communication	RS-422 (Scanmode)	
Antenna	integrated	

6GT2801-1BA20-0AX1

Mechanical specifications

Enclosure

- | | |
|------------|-----------------|
| • Material | • Plastic PA 12 |
| • Color | • Anthracite |

Recommended distance to metal	0 mm
-------------------------------	------

Supply voltage, current consumption, power loss

Supply voltage	24 VDC
----------------	--------

Typical current consumption	50 mA
-----------------------------	-------

Permitted ambient conditions

Ambient temperature

- | | |
|-------------------------------------|------------------|
| • During operation | • -25 ... +70 °C |
| • During transportation and storage | • -40 ... +85 °C |

Degree of protection according to EN 60529	IP67
--	------

Shock-resistant acc. to EN 60721-3-7, Class 7 M2	500 m/s ²
--	----------------------

Vibration-resistant acc. to EN 60721-3-7, Class 7 M2	200 m/s ²
--	----------------------

Torsion and bending load	Not permitted
--------------------------	---------------

Design, dimensions and weight

Dimensions (L x W x H)	79.6 x 55 x 30 mm
------------------------	-------------------

Weight	170 g
--------	-------

Type of mounting	4 x M5 screws; 1.5 Nm
------------------	--------------------------

Cable length for RS-422 interface, maximum	1000 m
--	--------

LED display design	2 LEDs, 5 colors
--------------------	------------------

Standards, specifications, approvals

Proof of suitability	Radio to R&TTE directives EN 300330, EN 301489, CE, FCC, UL/CSA
----------------------	--

5.4.9 Approvals

FCC information

Siemens SIMATIC RF310R (MLFB 6GT2801-1BA20-0AX1); FCC ID NXW-RF310R

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

5.4.10 Dimension drawing

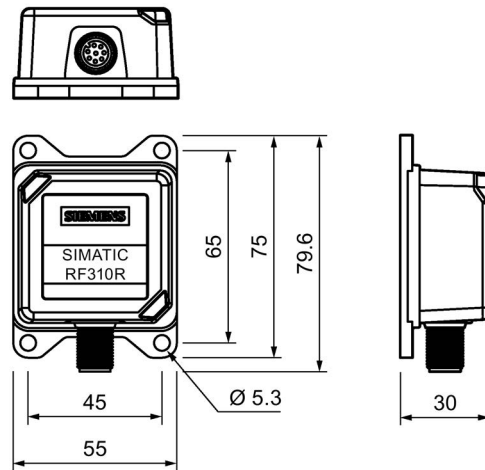


Figure 5-16 Dimension drawing RF310R Scanmode

Dimensions in mm

5.5 SIMATIC RF340R/RF350R

5.5.1 SIMATIC RF340R

5.5.1.1 Features

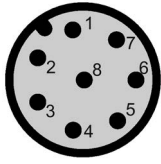
SIMATIC RF340R	Characteristics	
	Design	① RS-422 interface ② Status display
	Area of application	Identification tasks on assembly lines in harsh industrial environments

5.5.1.2 Ordering data for RF340R

Table 5- 15 Ordering data for RF340R

	Article number
RF340R with RS-422 interface (3964R)	6GT2801-2AB10

5.5.1.3 Pin assignment of RF340R RS422 interface

Pin	Pin Device end 8-pin M12	Assignment
	1	+ 24 V
	2	- Transmit
	3	0 V
	4	+ Transmit
	5	+ Receive
	6	- Receive
	7	Unassigned
	8	Earth (shield)

5.5.1.4 LED operating display

The operational statuses of the reader are displayed by the LEDs. The LED can adopt the colors green, red or yellow and the statuses off , on , flashing :

Table 5- 16 LED operating display on the reader

LED	Meaning
	The reader is turned off.
	Operating voltage present, reader not initialized or antenna switched off
	Operating voltage present, reader initialized and antenna switched on
	- Operating mode "with presence": Transponder present - Operating mode "without presence": Transponder present and command currently being executed
	There is an error. The number of flashes provides information about the current error. You will find more information on error messages in the section "System diagnostics (Page 465)".

5.5.1.5 Ensuring reliable data exchange

The "center point" of the transponder must be situated within the transmission window.

5.5.1.6 Metal-free area

The RF340R can be flush-mounted in metal. Allow for a possible reduction in the field data.

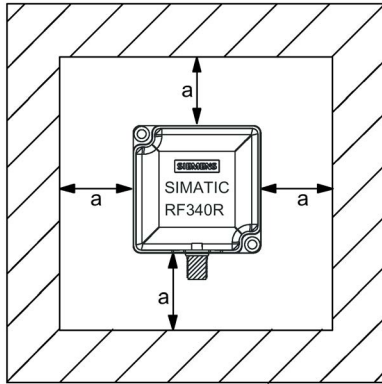
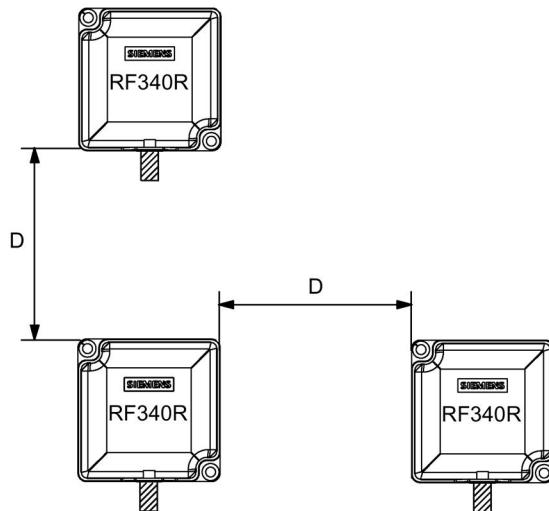


Figure 5-17 Metal-free area for RF340R

To avoid any impact on the field data, the distance a should be ≥ 20 mm.

5.5.1.7 Minimum distance between RF340R readers

RF340R side by side

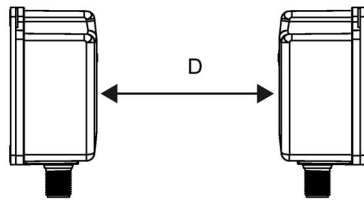


$D \geq 200$ mm (with 2 readers)

$D \geq 250$ mm (with more than 2 readers)

Figure 5-18 Minimum distance between RF340R readers

RF340R face-of-face



$D \geq 500 \text{ mm}$

Figure 5-19 Face-of-face distance between two RF340Rs

5.5.1.8 Technical specifications

Table 5- 17 Technical specifications of the RF340R reader

6GT2801-2AB10		
Product type designation	SIMATIC RF340R	
Radio frequencies		
Operating frequency, rated value	13.56 MHz	
Electrical data		
Maximum range	140 mm	
Maximum data transmission speed reader ↔ transponder	RF300 transponder	ISO transponder
• Read	• approx. 8000 bytes/s	• approx. 1500 bytes/s
• Write	• approx. 8000 bytes/s	• approx. 1500 bytes/s
Transmission speed	19.2, 57.6, 115.2 kBd	
Read/write distances of the reader	See section "Field data for transponders, readers and antennas (Page 51)"	
MTBF (Mean Time Between Failures)	140 years	
Interfaces		
Electrical connector design	M12, 8-pin	
Standard for interfaces for communication	RS-422 (3964R protocol)	
Antenna	integrated	
Mechanical specifications		
Enclosure		
• Material	• Plastic PA 12	

6GT2801-2AB10	
• Color	• Anthracite
Recommended distance to metal	0 mm
Supply voltage, current consumption, power loss	
Supply voltage	24 VDC
Typical current consumption	100 mA
Permitted ambient conditions	
Ambient temperature	
• During operation	• -25 ... +70 °C
• During transportation and storage	• -40 ... +85 °C
Degree of protection according to EN 60529	IP67
Shock-resistant acc. to EN 60721-3-7, Class 7 M2	500 m/s ²
Vibration-resistant acc. to EN 60721-3-7, Class 7 M2	200 m/s ²
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (L x W x H)	75 x 75 x 41 mm
Weight	250 g
Type of mounting	2 x M5 screws; 1.5 Nm
Cable length for RS-422 interface, maximum	1000 m
LED display design	3-color LED
Standards, specifications, approvals	
Proof of suitability	Radio to R&TTE directives EN 300330, EN 301489, CE, FCC, UL/CSA, Ex approval

5.5.1.9 Approvals

FCC information

Siemens SIMATIC RF340R (MLFB 6GT2801-2AA10); FCC ID NXW-RF340R

Siemens SIMATIC RF340R (MLFB 6GT2801-2AB10); FCC ID NXW-RF340R01

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

5.5.1.10 Dimension drawing

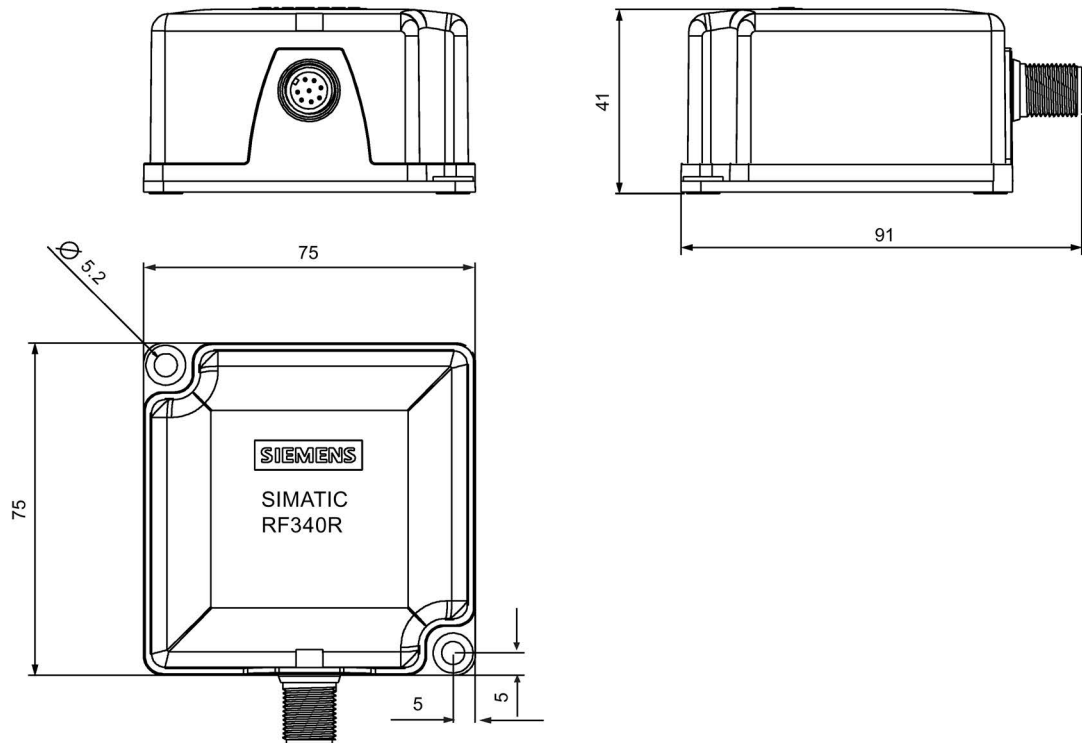


Figure 5-20 Dimension drawing for RF340R

Dimensions in mm

5.5.2 SIMATIC RF350R

5.5.2.1 Features

SIMATIC RF350R	Characteristics	
	Design	① Antenna connection ② RS-422 interface ③ Status display
	Area of application	Identification tasks in assembly lines in harsh industrial environments; for external antennas (ANT 1, ANT 3, ANT 12, ANT 18, ANT 30)

Note

Reader requires external antennas

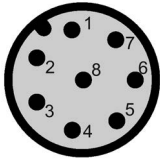
Note that the RF350R reader is designed only for operation with external antennas and only works in conjunction with the antennas ANT 1, ANT 3, ANT 12, ANT 18 or ANT 30.

5.5.2.2 Ordering data for RF350R

Table 5- 18 Ordering data for RF350R

	Article number
RF350R with RS-422 interface (3964R)	6GT2801-4AB10

5.5.2.3 Pin assignment of RF350R RS422 interface

Pin	Pin Device end 8-pin M12	Assignment
	1	+ 24 V
	2	- Transmit
	3	0 V
	4	+ Transmit
	5	+ Receive
	6	- Receive
	7	Unassigned
	8	Earth (shield)

5.5.2.4 LED operating display

The operational statuses of the reader are displayed by the LEDs. The LED can adopt the colors green, red or yellow and the statuses off □, on ■, flashing ■:

Table 5- 19 LED operating display on the reader

LED	Meaning
□	The reader is turned off.
	Operating voltage present, reader not initialized or antenna switched off
	Operating voltage present, reader initialized and antenna switched on
	- Operating mode "with presence": Transponder present - Operating mode "without presence": Transponder present and command currently being executed
	There is an error. The number of flashes provides information about the current error. You will find more information on error messages in the section "System diagnostics (Page 465)".

5.5.2.5 Ensuring reliable data exchange

The "center point" of the transponder must be situated within the transmission window.

5.5.2.6 Metal-free area

The RF350R reader does not have an internal antenna. Operation is not affected by mounting on metal or flush-mounting in metal. For information about the metal-free area required by the external antennas, refer to the corresponding section of the chapter Antennas (Page 241).

5.5.2.7 Technical specifications

Table 5- 20 Technical specifications of the RF350R reader

6GT2801-4AB10		
Product type designation	SIMATIC RF350R	
Radio frequencies		
Operating frequency, rated value	13.56 MHz	
Electrical data		
Maximum range		
• ANT 1	• 140 mm	
• ANT 3 / ANT 3 S	• 50 mm / 20 mm	
• ANT 12	• 16 mm	
• ANT 18	• 35 mm	
• ANT 30	• 55 mm	
Maximum data transmission speed reader ↔ transponder	RF300 transponder	ISO transponder
• Read	• approx. 8000 bytes/s	• approx. 1500 bytes/s
• Write	• approx. 8000 bytes/s	• approx. 1500 bytes/s
Transmission speed	19.2, 57.6, 115.2 kBd	
Read/write distances of the reader	See section "Field data for transponders, readers and antennas (Page 51)"	
MTBF (Mean Time Between Failures)	140 years	
Interfaces		
Electrical connector design	M12, 8-pin	
Antenna connector design	M8, 4-pin	
Standard for interfaces for communication	RS-422 (3964R protocol)	
Antenna	External, antennas ANT 1, ANT 3, ANT 12, ANT 18 or ANT 30	
Mechanical specifications		
Enclosure		
• Material	• Plastic PA 12	
• Color	• Anthracite	
Recommended distance to metal	0 mm	

6GT2801-4AB10	
Supply voltage, current consumption, power loss	
Supply voltage	24 VDC
Typical current consumption	100 mA
Permitted ambient conditions	
Ambient temperature	
• During operation	• -25 ... +70 °C
• During transportation and storage	• -40 ... +85 °C
Degree of protection according to EN 60529	IP65
Shock-resistant acc. to EN 60721-3-7, Class 7 M2	500 m/s ²
Vibration-resistant acc. to EN 60721-3-7, Class 7 M2	200 m/s ²
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (L x W x H)	75 x 75 x 41 mm
Weight	250 g
Type of mounting	2 x M5 screws; 1.5 Nm
Cable length for RS-422 interface, maximum	1000 m
LED display design	3-color LED
Standards, specifications, approvals	
Proof of suitability	Radio to R&TTE directives EN 300330, EN 301489, CE, FCC, UL/CSA, Ex approval

5.5.2.8 Approvals

FCC information

Siemens SIMATIC RF350R (MLFB 6GT2801-4AA10); FCC ID NXW-RF350R

Siemens SIMATIC RF350R (MLFB 6GT2801-4AB10); FCC ID NXW-RF350R01

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

5.5.2.9 Dimension drawing

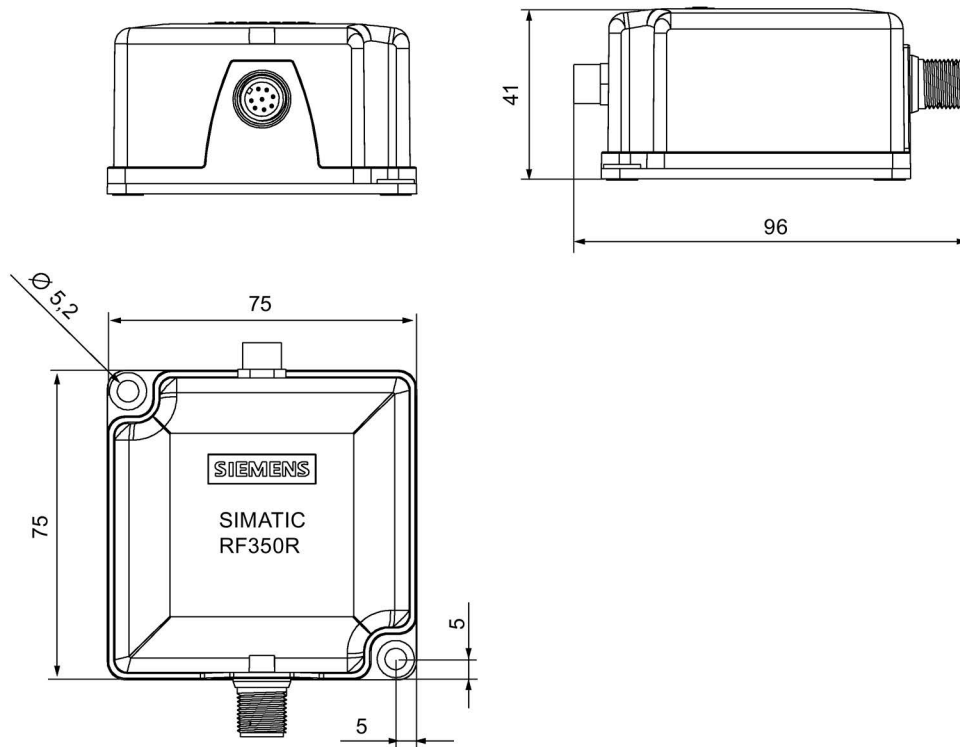


Figure 5-21 RF350R dimension drawing

Dimensions in mm

5.5.3 Use of the reader in hazardous areas

TÜV NORD CERT GmbH as accredited test center and certification body, no. 0044 as per Article 9 of the Directive 94/9/EC of the European Council of 23 March 1994, has confirmed the compliance with the essential health and safety requirements relating to the design and construction of equipment and protective systems intended for use in hazardous areas as per Annex II of the Directive. The essential health and safety requirements are satisfied in accordance with the following standards:

Document	Title
EN 60079-0: 2006	Electrical equipment for hazardous gas atmospheres - Part 0: General requirements
EN 60079-15: 2005	Electrical equipment for hazardous gas atmospheres - Part 15: Design, testing and identification of electrical equipment with type of protection "n"
IEC 61241 -0: 2006	Electrical apparatus for use in the presence of combustible dust - Part 0: General requirements
IEC 61241 -1: 2004	Electrical apparatus for use in the presence of combustible dust - Part 1: Protection through enclosure

 WARNING
EXPLOSION HAZARD
DO NOT CONNECT OR DISCONNECT EQUIPMENT WHEN A FLAMMABLE OR COMBUSTIBLE ATMOSPHERE IS PRESENT.

Identification

The identification of the electrical equipment as an enclosed unit is:



II 3 G Ex nA nC IIB T5
II 3 D Ex tD A22 IP6x T80 °C

-25 °C to +70 °C

U_n = 20 to 30 VDC

The equipment also has the following additional markings:

XXXXYYZZZ

[= serial number, is assigned during production]

TÜV 10 ATEX 556039

[= certificate number]

5.5.3.1 Use of the readers in hazardous areas for gases

Temperature class delineation for gases

The temperature class of the reader for hazardous areas depends on the ambient temperature range:

Ambient temperature range	Temperature class
-25 °C to +70 °C	T5



WARNING

Ignitions of gas-air mixtures

When using the RF340R/RF350R readers, check to ensure that the temperature class is observed in respect of the requirements of the area of application.

Non-compliance with the permitted temperature ranges while using the reader can lead to ignitions of gas-air mixtures.

5.5.3.2 Use of the readers in hazardous areas for dusts

The equipment is suitable for dusts whose ignition temperatures for a dust layer of 5 mm are higher than 80 °C (smoldering temperature). With the ignition temperature according to type of protection iD specified here in compliance with IEC 61241-0 and IEC 61241-11, the smoldering temperature of the dust layer is referenced in this case.

Temperature class delineation for dusts

Ambient temperature range	Temperature value
-25 °C < Ta < +70 °C	T80 °C



WARNING

Ignitions of dust-air mixtures

When using the RF340R/RF350R readers, check to ensure that the temperature values are observed in respect of the requirements of the area of application.

Non-compliance with the permitted temperature ranges while using the reader can lead to ignitions of dust-air mixtures.

5.5.3.3 Installation and operating conditions for the hazardous area

NOTICE

Device may be damaged

Note the following conditions when installing and operating the device in a hazardous zone to avoid damage:

- Making and breaking of circuits is permitted only in a de-energized state.
- The maximum surface temperature, corresponding to the marking, applies only for operation without a cover of dust.
- The device may only be operated in such a way that adequate protection against UV light is ensured.
- The device may not be operated in areas influenced by processes that generate high electrostatic charges.
- The equipment must be installed so that it is mechanically protected.
- The device sockets must be protected with a shrink-on tube.
- The 8 pin connector must be grounded via its supply line.
- The device may only be operated with accessories specified or supplied by the manufacturer. All the points above also apply to the accessories (cables and connectors) and to the antennas (exception: the housing of antenna 1 does not need to be installed with impact protection).

5.6 SIMATIC RF340R/RF350R - 2nd generation

5.6.1 SIMATIC RF340R - 2nd generation

5.6.1.1 Features

SIMATIC RF340R	Characteristics	
	Design	① RS-422 interface ② LED operating display
	Area of application	Identification tasks on assembly lines in harsh industrial environments

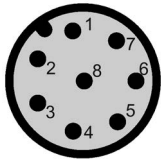
5.6.1.2 Ordering data

Table 5- 21 Ordering data for RF340R

	Article number
RF340R with RS-422 interface (3964R)	6GT2801-2BA10
RF340R with RS422 interface (3964R) and ATEX, IECEx, UL HAZ. LOC approval	6GT2801-2BA10-0AX2

5.6.1.3 Pin assignment of the RS-422 interface

Table 5- 22 Pin assignment

Pin	Pin Device end 8-pin M12	Assignment
	1	+ 24 V
	2	- Transmit
	3	0 V
	4	+ Transmit
	5	+ Receive
	6	- Receive
	7	Unassigned
	8	Earth (shield)

5.6.1.4 LED operating display

The operational statuses of the reader are displayed by two LEDs. The LEDs can adopt the colors white, green, red, yellow or blue and the statuses off , on , flashing :

Table 5- 23 Display elements

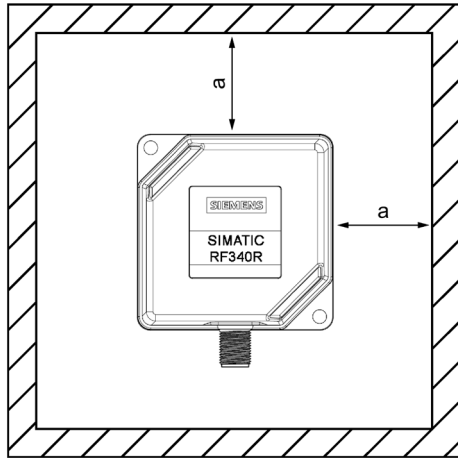
LED	Meaning
	The reader is turned off.
	The reader is turned on and is searching for transponders. The reader is in the "Setup" mode, in the "Search for transponders" status and has not yet received a "RESET" command and is not ready.
 	There is a transponder in the antenna field. The reader is in the "Setup" mode, in the status "Show quality", has not yet received a "RESET" command and is not ready. Depending on the signal strength, the LED flickers or is lit permanently.
	The reader has received a "RESET" command.
	The reader is turned on, the antenna is turned off.
	- Operating mode "with presence": Transponder present - Operating mode "without presence": Transponder present and command currently being executed
	There is an error. The number of flashes provides information about the current error. You will find more information on error messages in the section "System diagnostics (Page 465)".

5.6.1.5 Ensuring reliable data exchange

The "center point" of the transponder must be situated within the transmission window.

5.6.1.6 Metal-free area

The RF340R can be flush-mounted in metal. Allow for a possible reduction in the field data. To avoid any influence on the field data, the distance "a" should be kept to.

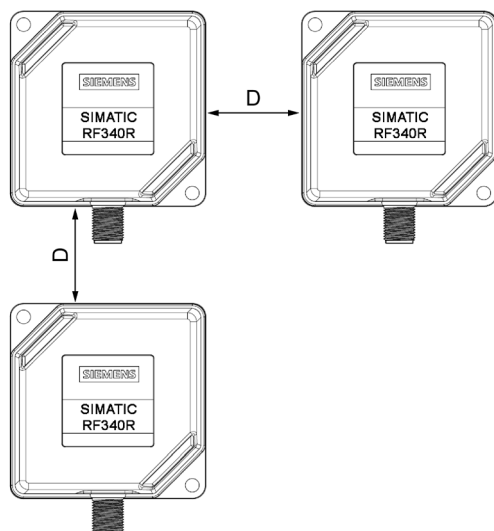


$a \geq 20 \text{ mm}$

Figure 5-22 Metal-free area for RF340R

5.6.1.7 Minimum distance between RF340R readers

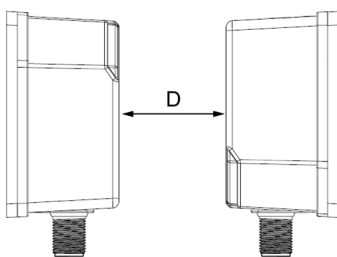
RF340R side by side



$D \geq \begin{matrix} \geq 350 \text{ mm (with 2 readers)} \\ \geq 500 \text{ mm (with more than 2 readers)} \end{matrix}$

Figure 5-23 Minimum distance between RF340R readers

RF340R face-of-face



$D \geq 500 \text{ mm}$

Figure 5-24 Face-of-face distance between two RF340Rs

5.6.1.8 Technical specifications

Table 5- 24 Technical specifications of the RF340R reader

6GT2801-2BA10			
6GT2801-2BA10-0AX2			
Product type designation	SIMATIC RF340R		
Radio frequencies			
Operating frequency, rated value	13.56 MHz		
Electrical data			
Maximum range	140 mm		
Maximum data transmission speed reader ↔ transponder	RF300 transponder	ISO transponder (MDS D)	ISO tran- sponder (MDS E)
• Read	• ≤ 8000 bytes/s	• ≤ 3300 bytes/s	• ≤ 3400 bytes/s
• Write	• ≤ 8000 bytes/s	• ≤ 1700 bytes/s	• ≤ 800 bytes/s
Transmission speed	19.2, 57.6, 115.2 kBd		
Read/write distances of the reader	See section "Field data for transponders, readers and antennas (Page 51)"		
MTBF (Mean Time Between Failures)	260 years		
Interfaces			
Electrical connector design	M12, 8-pin		
Standard for interfaces for communication	RS-422 (3964R protocol)		
Antenna	integrated		
Mechanical specifications			
Enclosure			
• Material	• Plastic PA 12		
• Color	• TI-Grey		
Recommended distance to metal	0 mm		
Supply voltage, current consumption, power loss			
Supply voltage	24 VDC		
Typical current consumption	60 mA		

6GT2801-2BA10	
6GT2801-2BA10-0AX2	
Permitted ambient conditions	
Ambient temperature	
• During operation	• -25 ... +70 °C
• During transportation and storage	• -40 ... +85 °C
Degree of protection according to EN 60529	IP67
Shock-resistant acc. to EN 60721-3-7, Class 7 M2	500 m/s ²
Vibration-resistant acc. to EN 60721-3-7, Class 7 M2	200 m/s ²
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (L x W x H)	75 x 75 x 41 mm
Weight	210 g
Type of mounting	2 x M5 screws; 1.5 Nm
Cable length for RS-422 interface, maximum	1000 m
LED display design	2 LEDs, 5 colors
Standards, specifications, approvals	
Proof of suitability	Radio according to R&TTE directives EN 300330, EN 301489, CE, FCC, UL/CSA (IEC 61010), Ex approval (only 6GT2801-2BA10-0AX2)

5.6.1.9 Approvals

FCC information

Siemens SIMATIC RF340R (MLFB 6GT2801-2BA10); FCC ID NXW-RF340R02

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

UL information (IEC 61010-1 / IEC 61010-2-201)

This standard applies to equipment designed to be safe at least under the following conditions:

- a) indoor use;
- b) altitude up to 2 000 m;
- c) temperature -25 °C to 70 °C;
- d) maximum relative humidity 80 % for temperature up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C;
- e) TRANSIENT OVERVOLTAGES up to the levels of OVERVOLTAGE CATEGORY II, NOTE 1: These levels of transient overvoltage are typical for equipment supplied from the building wiring.
- f) using a "NEC Class 2" power supply is required
- g) the device is categorized as pollution degree 3/4

5.6.1.10 Dimension drawing

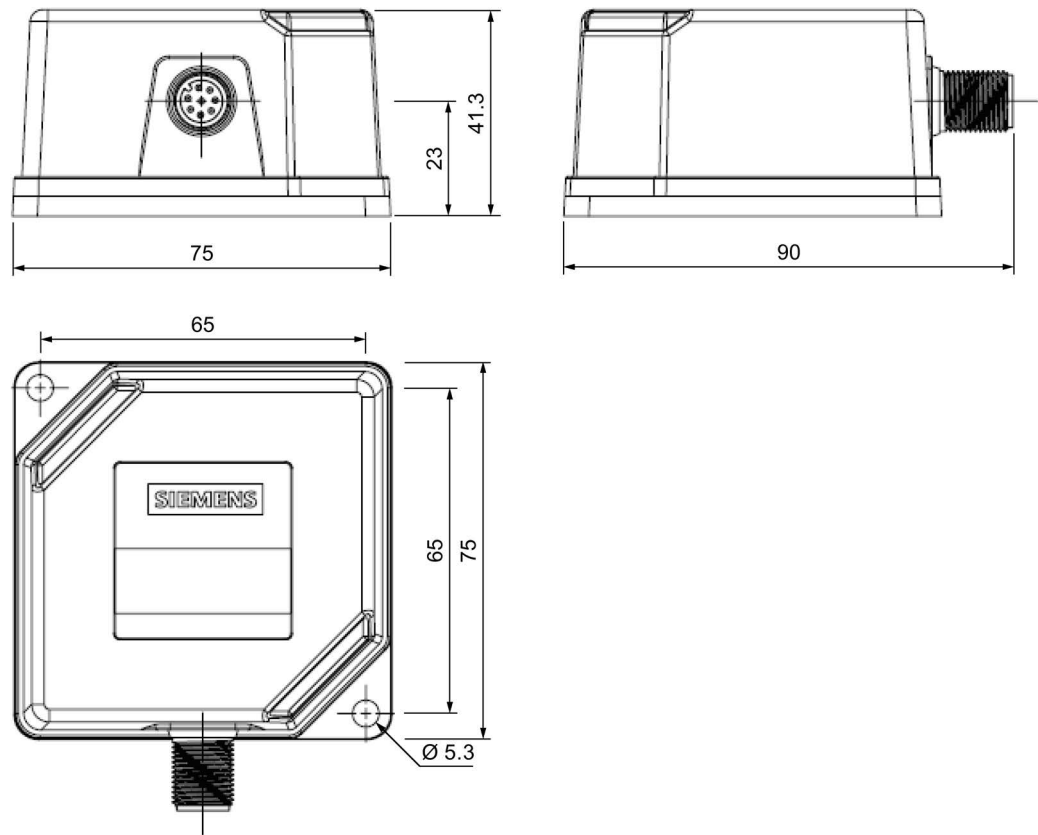


Figure 5-25 Dimension drawing for RF340R

Dimensions in mm

5.6.1.11 Using the readers in a hazardous area

 WARNING
Risk of explosion In a flammable or combustible environment, no cables may be connected to or disconnected from the device.

ATEX

The SIMATIC Ident products meet the requirements of explosion protection acc. to ATEX. The products meet the requirements of the standards:

Document	Title
EN 60079-0	Hazardous areas Part 0: Equipment - General requirements
EN 60079-7	Hazardous areas Part 7: Equipment protection by increased safety "e"
EN 60079-31	Hazardous areas Part 31: Equipment dust ignition protection by enclosure "t"

You will find the current versions of the standards in the currently valid ATEX certificates.

ATEX mark

NOTICE
Validity only when the devices are marked There is a corresponding approval only with devices to which the Ex mark is applied.

The identification of the electrical equipment is:



II 3 G Ex ec IIB T4 Gc
II 3 D Ex tc IIIC T80 °C Dc

-25 °C < Ta < +70 °C

IP64

U_n = 24 V DC, 60 mA

The equipment also has the following additional information:

XXXXXXXXXX [= serial number, is assigned during production]

DEMKO 17 ATEX 1767 X [= certificate number]

IECEx

The SIMATIC Ident products meet the requirements of explosion protection acc. to IECEx. The products meet the requirements of the standards:

Document	Title
IEC 60079-0	Hazardous areas Part 0: Equipment - General requirements
IEC 60079-7	Hazardous areas Part 7: Equipment protection by increased safety "e"
IEC 60079-31	Hazardous areas Part 31: Equipment dust ignition protection by enclosure "t"

You will find the current versions of the standards in the currently valid IECEx certificates.

IECEx mark

NOTICE
Validity only when the devices are marked
There is a corresponding approval only with devices to which the IECEx mark is applied.

The identification of the electrical equipment is:

Ex ec IIB T4 Gc

Ex tc IIIC T80 °C Dc

-25 °C < Ta < +70 °C

IP64

U_n= 24 V DC, 60 mA

The equipment also has the following additional information:

XXXXYYZZZ [= serial number, is assigned during production]

IECEx ULD 17.0012 X [= certificate number]

UL HAZ. LOC.

The SIMATIC Ident products meet the requirements of explosion protection acc. to UL HAZ. LOC. The products meet the requirements of the standards:

Document	Title
UL 60079-0	Hazardous areas
CSA C22.2 NO. 60079-0	Part 0: Equipment - General requirements
UL 60079-7	Hazardous areas
CSA C22.2 NO. 60079-7	Part 7: Equipment protection by increased safety "e"
UL 60079-31	Hazardous areas
CSA C22.2 NO. 60079-31	Part 31: Equipment dust ignition protection by enclosure "t"

You will find the current versions of the standards in the currently valid UL HAZ. LOC. certificates

UL HAZ. LOC. mark

NOTICE
Validity only when the devices are marked
There is a corresponding approval only with devices to which the UL HAZ. LOC. mark is applied.

The identification of the electrical equipment is:



LISTED E223122
 IND.CONT.EQ FOR HAZ.LOC.
 CL.I, DIV.2, GP.C,D T4
 CL.II, DIV.2, GP.F,G T80 °C
 AEx ec IIB T4 Gc, Ex ec IIB T4 Gc X
 AEx tc IIIC T80 °C Dc, Ex tc IIIC T80 °C Dc X

-25 °C < Tamb. < +70 °C

IP64

U_n= 24 V DC, 60 mA

The equipment also has the following additional information:

XXXYYYZZZ [= serial number, is assigned during production]

Using the reader in hazardous area for gases

The temperature class of the reader for hazardous areas depends on the ambient temperature range:

Ambient temperature range	Temperature class
-25 °C < Ta < +70 °C	T4

! WARNING
Ignitions of gas-air mixtures When using the reader, check to make sure that the temperature class is adhered to in keeping with the requirements of the area of application Non-compliance with the permitted temperature ranges while using the reader can lead to ignitions of gas-air mixtures.

Using the reader in hazardous area for dust

The equipment is suitable for dusts whose ignition temperatures for a dust layer of 5 mm are higher than 80 °C (smoldering temperature).

Ambient temperature range	Temperature value
-25 °C < Ta < +70 °C	T80 °C

! WARNING
Ignitions of dust-air mixtures When using the reader, check to make sure that the temperature values are adhered to in keeping with the requirements of the area of application. Non-compliance with the permitted temperature range while using the reader can lead to ignitions of dust-air mixtures.

Installation and operating conditions for hazardous areas:**NOTICE****Risk of explosion**

Risk of explosion of dust-air mixtures or gas-air mixtures. Observe the following conditions when installing and operating the device in a hazardous area in order to avoid a risk of explosion and damage to the device:

- Making and breaking of circuits is permitted only in a de-energized state.
- The maximum surface temperature, corresponding to the marking, applies only for operation without a cover of dust.
- The device may only be operated in such a way that adequate protection against UV light is ensured.
- The device may not be operated in areas influenced by processes that generate high electrostatic charges.
- The device should only be cleaned with a damp cloth.
- The device must be set up and installed in such a way that it is mechanically protected.
- The grounding of the plug (8-pin) on the reader must be via its supply cable.
- The device may only be operated with accessories specified or supplied by the manufacturer. All the points above also apply to the accessories (cables and connectors) and to the antennas (exception: the housing of ANT 1 does not need to be installed with impact protection).
- The device sockets incl. the metal parts of the connecting cable must have a shrink-on sleeve pulled over them, in other words, all metal parts apart from the securing sockets of the housing must be fully covered and be inaccessible.
- After removing the connections (antenna cable, signal/supply cable), the connectors must be checked for contamination and, if necessary, cleaned before being inserted again.

Extended installation and operating conditions for hazardous areas for applications according to UL Hazardous Location (USA and Canada)

In addition to the instructions listed in ordinary locations File E85972-D1005.

For Div. 2:

This equipment is suitable for use in Class I, Division 2, Groups C and D in HAZARDOUS LOCATIONS, OR NON-HAZARDOUS LOCATIONS ONLY.

 WARNING
WARNING EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.

These devices are open-type devices that are to be installed in an enclosure suitable for the environment.

For Zone 2 only:

This equipment is suitable for use in Class I, Division 2, Groups C and D, Class II Groups F and G, OR Zone 2, Group IIB, OR Zone 22, Group IIIC in HAZARDOUS LOCATIONS, OR non-hazardous locations only.

 WARNING
WARNING EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.

 WARNING
WARNING WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD.

All models must be mounted in an enclosure with a minimum ingress protection rating of at least IP54 and must be Class I, Zone 2 certified, and used in an environment of not more than pollution degree 2.

The device may only be operated so that there is adequate protection against ultraviolet light.

The device must not be operated in areas influenced by charge-producing processes.

The device must be set up and installed so that it is mechanically protected.

After disconnecting connections (signal/supply cable), before the connectors are plugged in again, the connectors must be checked for contamination and, if necessary, cleaned.

5.6.2 SIMATIC RF350R - 2nd generation

5.6.2.1 Features

SIMATIC RF350R	Characteristics	
	Design	① Antenna connection ② RS-422 interface ③ LED operating display
	Area of application	Identification tasks in assembly lines in harsh industrial environments; for external antennas (ANT 1, ANT 3, ANT 12, ANT 18, ANT 30)

Note

Reader requires external antennas

Note that the RF350R reader is designed only for operation with external antennas and only works in conjunction with the antennas ANT 1, ANT 3, ANT 12, ANT 18 or ANT 30.

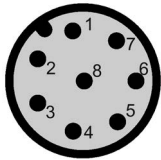
5.6.2.2 Ordering data

Table 5- 25 Ordering data for RF350R

	Article number
RF350R with RS-422 interface (3964R)	6GT2801-4BA10
RF350R with RS422 interface (3964R) and ATEX, IECEx, UL HAZ. LOC approval	6GT2801-4BA10-0AX2

5.6.2.3 Pin assignment of the RS-422 interface

Table 5- 26 Pin assignment

Pin	Pin Device end 8-pin M12	Assignment
	1	+ 24 V
	2	- Transmit
	3	0 V
	4	+ Transmit
	5	+ Receive
	6	- Receive
	7	Unassigned
	8	Earth (shield)

5.6.2.4 LED operating display

The operational statuses of the reader are displayed by two LEDs. The LEDs can adopt the colors white, green, red, yellow or blue and the statuses off , on , flashing :

Table 5- 27 Display elements

LED	Meaning
	The reader is turned off.
	The reader is turned on and is searching for transponders. The reader is in the "Setup" mode, in the "Search for transponders" status and has not yet received a "RESET" command and is not ready.
 	There is a transponder in the antenna field. The reader is in the "Setup" mode, in the status "Show quality", has not yet received a "RESET" command and is not ready. Depending on the signal strength, the LED flickers or is lit permanently.
	The reader has received a "RESET" command.
	The reader is turned on, the antenna is turned off.
	- Operating mode "with presence": Transponder present - Operating mode "without presence": Transponder present and command currently being executed
	There is an error. The number of flashes provides information about the current error. You will find more information on error messages in the section "System diagnostics (Page 465)".

5.6.2.5 Ensuring reliable data exchange

The "center point" of the transponder must be situated within the transmission window.

5.6.2.6 Metal-free area

The RF350R reader does not have an internal antenna. Operation is not affected by mounting on metal or flush-mounting in metal. For information about the metal-free area required by the external antennas, refer to the corresponding section of the chapter "Antennas (Page 241)".

5.6.2.7 Technical specifications

Table 5- 28 Technical specifications of the RF350R reader

6GT2801-4BA10			
6GT2801-4BA10-0AX2			
Product type designation	SIMATIC RF350R		
Radio frequencies			
Operating frequency, rated value	13.56 MHz		
Electrical data			
Maximum range			
• ANT 1	• 140 mm		
• ANT 3	• 50 mm		
• ANT 12	• 16 mm		
• ANT 18	• 35 mm		
• ANT 30	• 55 mm		
Maximum data transmission speed reader ↔ transponder	RF300 transponder	ISO transponder (MDS D)	ISO tran- sponder (MDS E)
• Read	• ≤ 8000 bytes/s	• ≤ 3300 bytes/s	• ≤ 3400 bytes/s
• Write	• ≤ 8000 bytes/s	• ≤ 1700 bytes/s	• ≤ 800 bytes/s
Transmission speed	19.2, 57.6, 115.2 kBd		
Read/write distances of the reader	See section "Field data for transponders, readers and antennas (Page 51)"		
MTBF (Mean Time Between Failures)	260 years		

6GT2801-4BA10	
6GT2801-4BA10-0AX2	
Interfaces	
Electrical connector design	M12, 8-pin
Antenna connector design	M8, 4-pin
Standard for interfaces for communication	RS-422 (3964R protocol)
Antenna	External, antennas ANT 1, ANT 3, ANT 12, ANT 18 or ANT 30
Mechanical specifications	
Enclosure	
• Material	• Plastic PA 12
• Color	• TI-Grey
Recommended distance to metal	0 mm
Supply voltage, current consumption, power loss	
Supply voltage	24 VDC
Typical current consumption	60 mA
Permitted ambient conditions	
Ambient temperature	
• During operation	• -25 ... +70 °C
• During transportation and storage	• -40 ... +85 °C
Degree of protection according to EN 60529	IP65
Shock-resistant acc. to EN 60721-3-7, Class 7 M2	500 m/s ²
Vibration-resistant acc. to EN 60721-3-7, Class 7 M2	200 m/s ²
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (L x W x H)	75 x 75 x 41 mm
Weight	250 g
Type of mounting	2 x M5 screws; 1.5 Nm
Cable length for RS-422 interface, maximum	1000 m
LED display design	2 LEDs, 5 colors

		6GT2801-4BA10
		6GT2801-4BA10-0AX2
Standards, specifications, approvals		
Proof of suitability	Radio according to R&TTE directives EN 300330, EN 301489, CE, FCC, UL/CSA (IEC 61010), Ex approval (only 6GT2801-4BA10-0AX2)	

5.6.2.8 Approvals

FCC information

Siemens SIMATIC RF350R (MLFB 6GT2801-4BA10); FCC ID NXW-RF350R02

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

UL information (IEC 61010-1 / IEC 61010-2-201)

This standard applies to equipment designed to be safe at least under the following conditions:

- a) indoor use;
- b) altitude up to 2 000 m;
- c) temperature -25 °C to 70 °C;
- d) maximum relative humidity 80 % for temperature up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C;
- e) TRANSIENT OVERVOLTAGES up to the levels of OVERVOLTAGE CATEGORY II, NOTE 1: These levels of transient overvoltage are typical for equipment supplied from the building wiring.
- f) using a "NEC Class 2" power supply is required
- g) the device is categorized as pollution degree 3/4

5.6.2.9 Dimension drawing

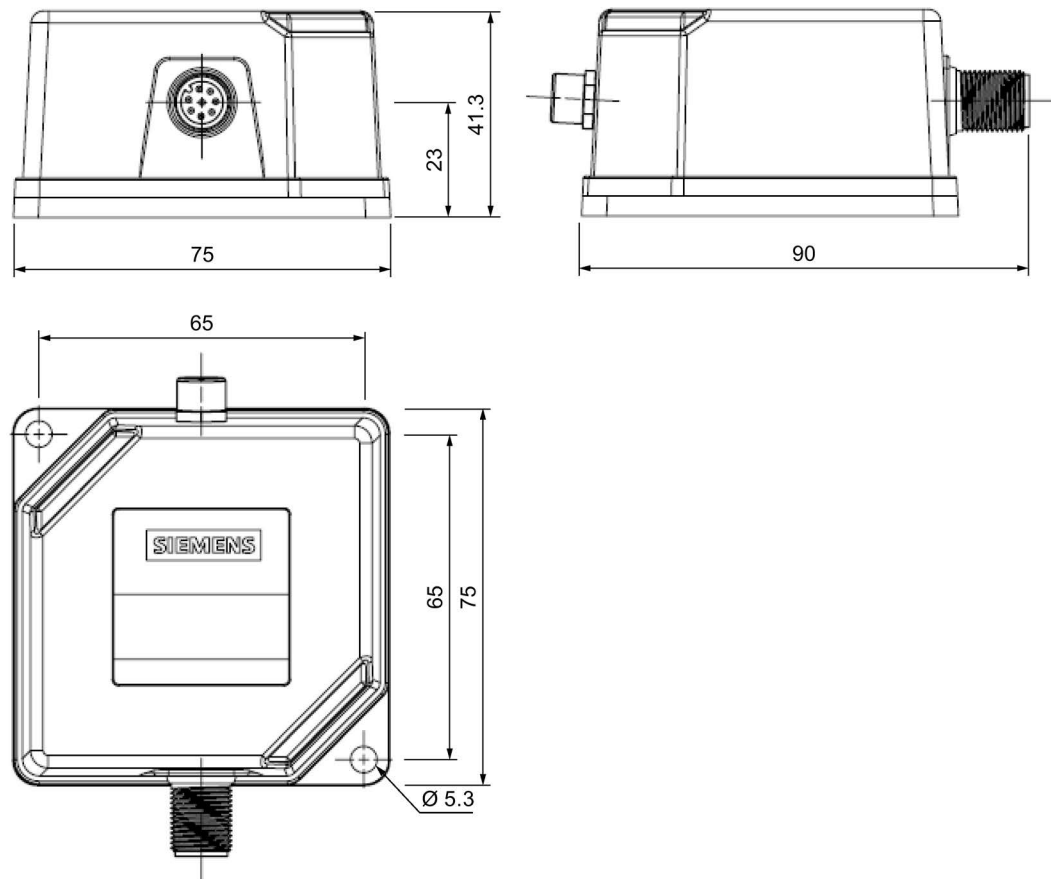


Figure 5-26 RF350R dimension drawing

Dimensions in mm

5.6.2.10 Using the readers in hazardous areas

! WARNING**Risk of explosion**

In a flammable or combustible environment, no cables may be connected to or disconnected from the device.

ATEX

The SIMATIC Ident products meet the requirements of explosion protection acc. to ATEX. The products meet the requirements of the standards:

Document	Title
EN 60079-0	Hazardous areas Part 0: Equipment - General requirements
EN 60079-7	Hazardous areas Part 7: Equipment protection by increased safety "e"
EN 60079-11	Only the antenna connection: Hazardous areas Part 11: Equipment protection by intrinsic safety "i"
EN 60079-31	Hazardous areas Part 31: Equipment dust ignition protection by enclosure "t"

You will find the current versions of the standards in the currently valid ATEX certificates.

ATEX mark

NOTICE
Validity only when the devices are marked
There is a corresponding approval only with devices to which the Ex mark is applied.

The identification of the electrical equipment is:



II 3 GD

Ex ec [ic] IIB T4 Gc

Ex ec [ic IIIC Dc] IIB T4 Gc

Ex tc [ic IIB Gc] IIIC T80 °C Dc

Ex tc [ic] IIIC T80 °C Dc

-25 °C < Ta < +70 °C

IP64

U_n = 24 V DC, 60 mA

U_m = 28 V

The equipment also has the following additional information:

XXXXYYZZZ [= serial number, is assigned during production]

DEMKO 17 ATEX 1767 X [= certificate number]

IECEx

The SIMATIC Ident products meet the requirements of explosion protection acc. to IECEx.
The products meet the requirements of the standards:

Document	Title
IEC 60079-0	Hazardous areas Part 0: Equipment - General requirements
IEC 60079-7	Hazardous areas Part 7: Equipment protection by increased safety "e"
IEC 60079-11	Only the antenna connection: Hazardous areas Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-31	Hazardous areas Part 31: Equipment dust ignition protection by enclosure "t"

You will find the current versions of the standards in the currently valid IECEx certificates.

IECEx mark

NOTICE
Validity only when the devices are marked
There is a corresponding approval only with devices to which the IECEx mark is applied.

The identification of the electrical equipment is:

Ex ec [ic] IIB T4 Gc
 Ex ec [ic IIIC Dc] IIB T4 Gc
 Ex tc [ic IIB Gc] IIIC T80 °C Dc
 Ex tc [ic] IIIC T80 °C Dc
 -25 °C < Ta < +70 °C
 IP64
 U_n = 24 V DC, 60 mA
 U_m = 28 V

The equipment also has the following additional information:

XXXYYYYZZZ [= serial number, is assigned during production]
 IECEx ULD 17.0012 X [= certificate number]

UL HAZ. LOC.

The SIMATIC Ident products meet the requirements of explosion protection acc. to UL HAZ. LOC. The products meet the requirements of the standards:

Document	Title
UL 60079-0	Hazardous areas
CSA C22.2 NO. 60079-0	Part 0: Equipment - General requirements
UL 60079-7	Hazardous areas
CSA C22.2 NO. 60079-7	Part 7: Equipment protection by increased safety "e"
UL 60079-11	Only the antenna connection:
CSA C22.2 NO. 60079-11	Hazardous areas Part 11: Equipment protection by intrinsic safety "i"
UL 60079-31	Hazardous areas
CSA C22.2 NO. 60079-31	Part 31: Equipment dust ignition protection by enclosure "t"

You will find the current versions of the standards in the currently valid UL HAZ. LOC. certificates

UL HAZ. LOC. mark

NOTICE
Validity only when the devices are marked There is a corresponding approval only with devices to which the UL HAZ. LOC. mark is applied.

The identification of the electrical equipment is:



LISTED E223122
 IND.CONT.EQ FOR HAZ.LOC.
 CL.I, DIV.2, GP.C,D T4
 CL.II, DIV.2, GP.F,G T80 °C
 CLI, Zone2, AEx ec [ic] IIB T4 Gc
 CLI, Zone2, AEx ec [ic IIIC Dc] IIB T4 Gc
 CLII, Zone22, AEx tc [ic IIB Gc] IIIC T80 °C Dc
 CLII, Zone22, AEx tc [ic] IIIC T80 °C Dc
 CLI, Zone2, Ex ec [ic] IIB T4 Gc X
 CLI, Zone2, Ex ec [ic IIIC Dc] IIB T4 Gc X
 CLII, Zone22, Ex tc [ic IIB Gc] IIIC T80 °C Dc X
 CLII, Zone22, Ex tc [ic] IIIC T80 °C Dc X

-25 °C < Tamb. < +70 °C

IP64

Un= 24 V DC, 60 mA

The equipment also has the following additional information:

XXXYYYYZZZ

[= serial number, is assigned during production]

Using the reader in hazardous area for gases

The temperature class of the reader for hazardous areas depends on the ambient temperature range:

Ambient temperature range	Temperature class
-25 °C < Ta < +70 °C	T4



WARNING

Ignitions of gas-air mixtures

When using the reader, check to make sure that the temperature class is adhered to in keeping with the requirements of the area of application

Non-compliance with the permitted temperature ranges while using the reader can lead to ignitions of gas-air mixtures.

Using the corresponding antennas in hazardous areas for gases

While the readers stay in safe areas or in category 3 hazardous areas, the corresponding antennas can be operated as simple equipment in hazardous areas via the intrinsically safe antenna connection (ic).

Ambient temperature range	Temperature class
-25 °C < Ta < +70 °C	T4



WARNING

Ignitions of gas-air mixtures

When using the antenna, check that the temperature class is complied with in connection with the requirements of the area of application.

Non-compliance with the permitted temperature ranges while using the antenna can lead to ignitions of gas-air mixtures.

Using the reader in hazardous area for dust

The equipment is suitable for dusts whose ignition temperatures for a dust layer of 5 mm are higher than 80 °C (smoldering temperature).

Ambient temperature range	Temperature value
-25 °C < Ta < +70 °C	T80 °C

 WARNING
Ignitions of dust-air mixtures When using the reader, check to make sure that the temperature values are adhered to in keeping with the requirements of the area of application. Non-compliance with the permitted temperature range while using the reader can lead to ignitions of dust-air mixtures.

Using the corresponding antennas in hazardous areas for dust

The equipment is suitable for dusts whose ignition temperatures for a dust layer of 5 mm are higher than 80 °C (smoldering temperature).

Ambient temperature range	Temperature value
-25 °C < Ta < +70 °C	T80 °C

 WARNING
Ignitions of dust-air mixtures When using the antenna, check that the temperature class is complied with in connection with the requirements of the area of application. Non-compliance with the permitted temperature ranges while using the antenna can lead to ignitions of gas-air mixtures.

Antenna portfolio for use as simple equipment for gases and dust

You can use the following antennas as simple equipment for gases and dust with the RF350R:

Antenna	Article number
ANT1	6GT2398-1CB00
ANT3	6GT2398-1CD40-0AX0
	6GT2398-1CD30-0AX0
ANT3S	6GT2398-1CD50-0AX0
	6GT2398-1CD60-0AX0

Antenna	Article number
ANT12	6GT2398-1CC00
	6GT2398-1CC10
	6GT2398-1DC00
	6GT2398-1DC10
ANT18	6GT2398-1CA00
	6GT2398-1CA10
	6GT2398-1CA10-0AX0
	6GT2398-1DA00
	6GT2398-1DA10
ANT30	6GT2398-1CC00
	6GT2398-1CD10-0AX0
	6GT2398-1DC00
	6GT2398-1DC10

Installation and operating conditions for hazardous areas:

NOTICE

Risk of explosion

Risk of explosion of dust-air mixtures or gas-air mixtures and damage to the device (reader). Note the following conditions when installing and operating the device (reader) in a hazardous area:

- Making and breaking of circuits is permitted only in a de-energized state.
- The maximum surface temperature, corresponding to the marking, applies only for operation without a cover of dust.
- The device may only be operated in such a way that adequate protection against UV light is ensured.
- The device may not be operated in areas influenced by processes that generate high electrostatic charges.
- The device must be set up and installed in such a way that it is mechanically protected.
- The grounding of the plug (8-pin) on the reader must be via its supply cable.
- The device may only be operated with accessories specified or supplied by the manufacturer. All the points above also apply to the accessories (communication / power supply cable and 8-pin connector).
- The device sockets incl. the metal parts of the connecting cable for the signal/supply line must have a shrink-on sleeve pulled over them, in other words, all metal parts apart from the securing sockets of the housing must be fully covered and be inaccessible.
- After removing the connections (signal/supply cable), the connectors must be checked for contamination and, if necessary, cleaned before being inserted again.

Note**Read the document "A5E44647714"**

Read the document "Control Drawing A5E44647714" for installation of the reader RF350R - 2nd Generation in hazardous area.

Installation and operating conditions of antennas for hazardous areas**NOTICE****Risk of explosion**

Risk of explosion of dust-air mixtures or gas-air mixtures and damage to the device (antenna). Note the following conditions when installing and operating the device (antenna) in a hazardous area:

- The maximum surface temperature of the antenna, corresponding to the simple equipment, applies only for operation without a cover of dust.
- The device may not be operated in areas influenced by processes that generate high electrostatic charges.
- The device (antenna) may only be operated with readers specified or supplied by the manufacturer.

Antenna values for the installation U_i , I_i , P_i , C_i , L_i

Table 5- 29 Specific antenna values for the installation

Antenna	Ver- sion	Article number	Description	U_i [V]	I_i [A]	P_i [W]	C_i [pF]	L_i [μ H]
ANT1	C	6GT2398-1CB00	with integrated ca- ble 3 m	34.5	0.105	0.55	314	0.89
ANT8	03	6GT2398-1CF00	without cable	34,5	0.105	0.55	46.0	0.115
	03	6GT2398-1CF00	with cable 3 m	34,5	0.105	0.55	346.8	0.867
ANT12	02	6GT2398-1CC10	with integrated ca- ble 60 m	34,5	0.105	0.55	108.2	0.271
	D	6GT2398-1CC00	without cable	34,5	0.105	0.55	73.5	0.184
	D	6GT2398-1CC00	with integrated ca- ble 3 m	34,5	0.105	0.55	337	0.843
ANT18	B	6GT2398-1CA10	with integrated ca- ble 60 m	34,5	0.105	0.55	95.4	0.239
	B	6GT2398-1CA10- 0AX0	without cable	34,5	0.105	0.55	38.7	0.097
	C	6GT2398-1CA00	without cable	34,5	0.105	0.55	38.2	0.096
	C	6GT2398-1CA00	with integrated ca- ble 3 m	34.5	0.105	0.55	344	0.86

Antenna	Ver- sion	Article number	Description	Ui [V]	Ii [A]	Pi [W]	Ci [pF]	Li [μH]
ANT30	B	6GT2398-1CD10-0AX0	without cable	34,5	0.105	0.55	43.2	0.108
	C	6GT2398-1CD00	with integrated ca- ble 3 m	34.5	0.105	0.55	334	0.835
	02	6GT2398-1DD00	without cable	34,5	0.105	0.55	32.2	0.081
	01	6GT2398-1DD10	with cable 3 m	34,5	0.105	0.55	334.2	0.836

Extended installation and operating conditions for hazardous areas for applications according to UL Hazardous Location (USA and Canada)

In addition to the instructions listed in ordinary locations File E85972-D1005.

For Div. 2:

This equipment is suitable for use in Class I, Division 2, Groups C and D in HAZARDOUS LOCATIONS, OR NON-HAZARDOUS LOCATIONS ONLY.



WARNING

WARNING

EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.

These devices are open-type devices that are to be installed in an enclosure suitable for the environment.

For Zone 2 only:

This equipment is suitable for use in Class I, Division 2, Groups C and D, Class II Groups F and G, OR Zone 2, Group IIB, OR Zone 22, Group IIIC in HAZARDOUS LOCATIONS, OR non-hazardous locations only.



WARNING

WARNING

EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.



WARNING

WARNING

WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD.

All models must be mounted in an enclosure with a minimum ingress protection rating of at least IP54 and must be Class I, Zone 2 certified, and used in an environment of not more than pollution degree 2.

The device may only be operated so that there is adequate protection against ultraviolet light.

The device must not be operated in areas influenced by charge-producing processes.

The device must be set up and installed so that it is mechanically protected.

After disconnecting connections (signal/supply cable), before the connectors are plugged in again, the connectors must be checked for contamination and, if necessary, cleaned.

5.7 SIMATIC RF380R

5.7.1 Features

SIMATIC RF380R 	Characteristics	
	Design	① RS-232 or RS-422 interface ② Status display
Area of application		Identification tasks on assembly lines in harsh industrial environments

5.7.2 RF380R ordering data

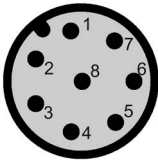
Table 5- 30 RF380R ordering data

	Article number
RF380R with RS-232/RS-422 interface (3964R)	6GT2801-3AB10

5.7.3 Pin assignment of RF380R RS-232/RS-422 interface

You can connect the RF380R reader to a higher-level system via the internal RS-422 interface or via the RS-232 interface. After connection, the interface module automatically detects which interface has been used.

Note correct assignment of the pins here:

Pin	Pin Device end 8-pin M12	Assignment	
		RS-232	RS-422
	1	+ 24 V	+ 24 V
	2	RXD	- Transmit
	3	0 V	0 V
	4	TXD	+ Transmit
	5	not used	+ Receive
	6	not used	- Receive
	7	not used	not used
	8	Ground (shield)	Ground (shield)

5.7.4 LED operating display

The operational statuses of the reader are displayed by the LEDs. The LED can adopt the colors green, red or yellow and the statuses off , on , flashing :

Table 5- 31 LED operating display on the reader

LED	Meaning
	The reader is turned off.
	Operating voltage present, reader not initialized or antenna switched off
	Operating voltage present, reader initialized and antenna switched on
	- Operating mode "with presence": Transponder present - Operating mode "without presence": Transponder present and command currently being executed
	There is an error. The number of flashes provides information about the current error. You will find more information on error messages in the section "System diagnostics (Page 465)".

5.7.5 Ensuring reliable data exchange

The "center point" of the transponder must be situated within the transmission window.

5.7.6 Metal-free area

The RF380R can be flush-mounted in metal. Allow for a possible reduction in the field data.

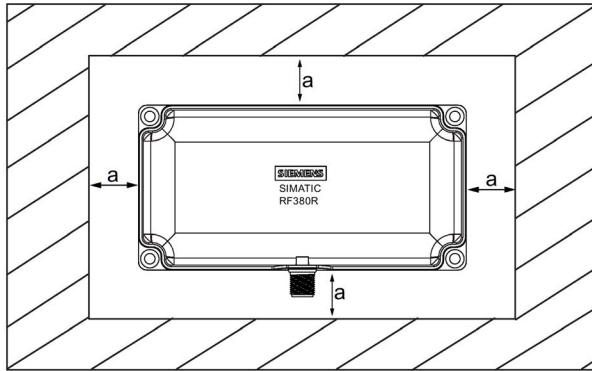
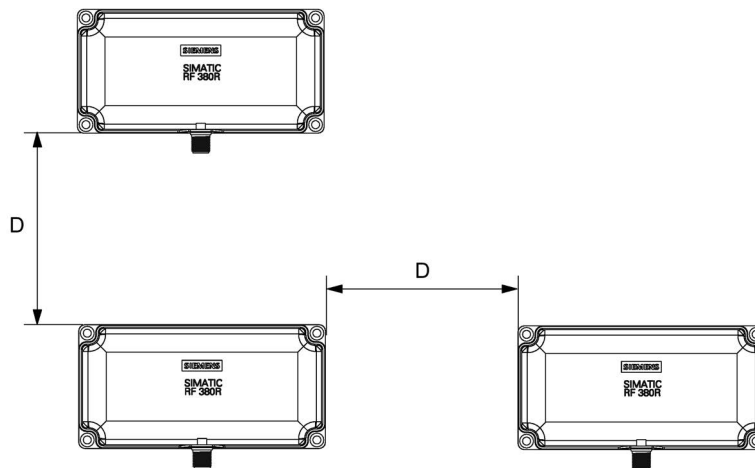


Figure 5-27 Metal-free area for RF380R

To avoid any impact on the field data, the distance a should be ≥ 20 mm.

5.7.7 Minimum distance between RF380R readers

RF380R side by side

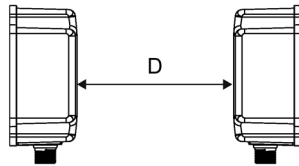


$D \geq 400$ mm (with 2 readers)

$D \geq 500$ mm (with more than 2 readers)

Figure 5-28 Minimum distance between RF380R readers

RF380R face-to-face



$D \geq 800 \text{ mm}$

Figure 5-29 Face-to-face distance between two RF380R

5.7.8 Technical specifications

Table 5- 32 Technical specifications of the RF380R reader

6GT2801-3AB10		
Product type designation	SIMATIC RF380R	
Radio frequencies		
Operating frequency, rated value	13.56 MHz	
Electrical data		
Maximum range	200 mm	
Maximum data transmission speed reader ↔ transponder	RF300 transponder	ISO transponder
• Read	• approx. 8000 bytes/s	• approx. 1500 bytes/s
• Write	• approx. 8000 bytes/s	• approx. 1500 bytes/s
Transmission speed	19.2, 57.6, 115.2 kBd	
Read/write distances of the reader	See section "Field data for transponders, readers and antennas (Page 51)"	
MTBF (Mean Time Between Failures)	109 years	
Interfaces		
Electrical connector design	M12, 8-pin	
Standard for interfaces for communication	RS-232/RS-422 (3964R protocol)	
Antenna	integrated	

6GT2801-3AB10		
Mechanical specifications		
Enclosure		
Material	Plastic PA 12	
Color	Anthracite	
Recommended distance to metal	0 mm	
Supply voltage, current consumption, power loss		
Supply voltage	24 VDC	
Typical current consumption	160 mA	
Permitted ambient conditions		
Ambient temperature		
During operation	-25 ... +70 °C	
During transportation and storage	-40 ... +85 °C	
Degree of protection according to EN 60529	IP67	
Shock-resistant acc. to EN 60721-3-7, Class 7 M2	500 m/s²	
Vibration-resistant acc. to EN 60721-3-7, Class 7 M2	200 m/s²	
Torsion and bending load	Not permitted	
Design, dimensions and weight		
Dimensions (L x W x H)	160 x 80 x 41 mm	
Weight	600 g	
Type of mounting	4 x M5 screws; 1.5 Nm	
Cable length for RS-422 interface, maximum	RS-422	RS-232
	1000 m	30 m
LED display design	3-color LED	
Standards, specifications, approvals		
Proof of suitability	Radio in accordance with R&TTE directives EN 300330, EN 301489, CE, FCC, UL/CSA, Ex: II 3G Ex nC IIB T5	

5.7.9 Approvals

FCC information

Siemens SIMATIC RF380R (MLFB 6GT2801-3AA10); FCC ID NXW-RF380R

Siemens SIMATIC RF380R (MLFB 6GT2801-3AB10); FCC ID NXW-RF380R01

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

5.7.10 Dimension drawing

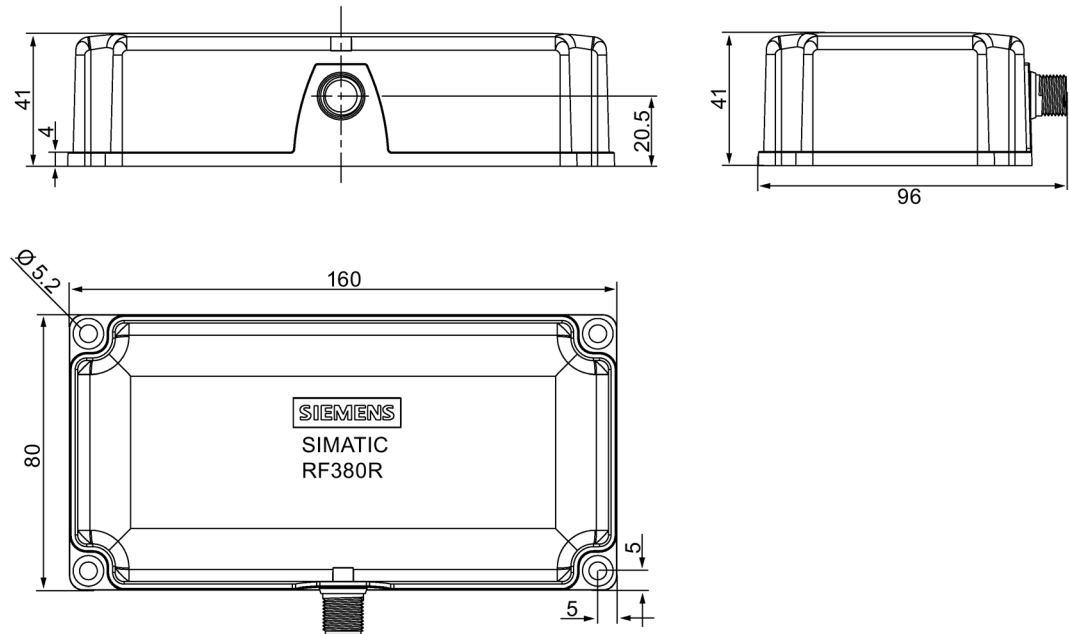


Figure 5-30 Dimension drawing RF380R

Dimensions in mm

5.7.11 Use of the reader in a hazardous

5.7.11.1 Use of the reader in a hazardous area

The TÜV SÜD Automotive GmbH as approved test center as well as the TÜV SÜD Product Service GmbH as certification center, identification number 0123, as per Article 9 of the Directive of the European Council of 23 March 1994 (94/9/EC), has confirmed the compliance with the essential health and safety requirements relating to the design and construction of equipment and protective systems intended for use in hazardous areas as per Annex II of the Directive. The essential health and safety requirements are satisfied in accordance with the following standards:

Document	Title
EN 60079-0: 2006	Electrical equipment for hazardous gas atmospheres - Part 0: General requirements
EN 60079-15: 2005	Electrical equipment for hazardous gas atmospheres - Part 15: Design, testing and identification of electrical equipment with type of protection "n"
DIN VDE 0848-5: 2001 (in parts)	Safety in electrical, magnetic and electromagnetic fields - Part 5: Explosion protection
ZLS SK 107.1	Central office of the states for safety; test components

Identification

The identification of the electrical equipment as an enclosed unit is:



II 3G Ex nC IIB T5

-25°C to +70°C

Um=30 V DC

The equipment is assigned the following references:

XXXXYYZZZ [= serial number, is assigned during production]

TPS 09 ATEX 1 459 X [= certificate number]

"No use of the equipment in the vicinity of processes generating high charges"

"Do not disconnect plug on load"

5.7.11.2 Use of the reader in hazardous areas for gases

Temperature class grading for gases

The temperature class of the reader for hazardous areas depends on the ambient temperature range:

Ambient temperature range	Temperature class
-25 °C to +70 °C	T5

WARNING
--

Ignitions of gas-air mixtures

When using the RF380R reader, check to ensure that the temperature class is observed in respect of the requirements of the area of application
--

Non-compliance with the permitted temperature ranges while using the reader can lead to ignitions of gas-air mixtures.
--

5.7.11.3 Installation and operating conditions for hazardous areas:

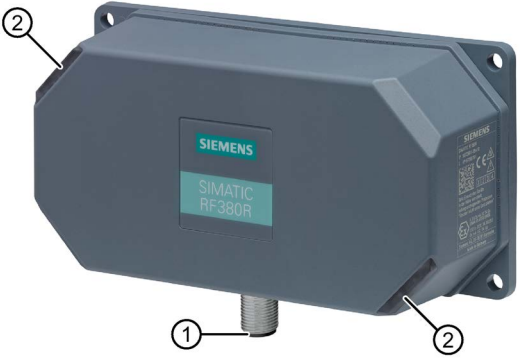
NOTICE**Explosion hazard**

Risk of explosion of gas-air mixtures and the device can be damaged. Note the following conditions when installing and operating the device in a hazardous area:

- Making and breaking of circuits is permitted only in a de-energized state.
- The maximum surface temperature, corresponding to the marking, applies only for operation without a cover of dust.
- The device may only be operated in such a way that adequate protection against UV light is ensured.
- The device may not be operated in areas influenced by processes that generate high electrostatic charges.
- The device must be installed so that it is mechanically protected.
- The grounding of the plug (8-pin) on the reader must be via its supply cable.
- The device may only be operated with accessories specified or supplied by the manufacturer. All the points above also apply to the accessories (cables and connectors) and to the antennas (exception: the housing of ANT 1 does not need to be installed with impact protection).
- The device sockets incl. the metal parts of the connecting cable must have a shrink-on sleeve pulled over them, in other words, all metal parts apart from the securing sockets of the housing must be fully covered and be inaccessible.
- After disconnecting the connections (antenna cable, signal/supply cable), before the plugs are inserted again, they must be checked for contamination and if necessary cleaned.

5.8 SIMATIC RF380R - 2nd generation

5.8.1 Features

SIMATIC RF380R	Characteristics	
	Design	① RS-232 or RS-422 interface ② Status display
	Area of application	Identification tasks on assembly lines in harsh industrial environments

5.8.2 RF380R ordering data

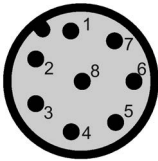
Table 5- 33 RF380R ordering data

	Article number
RF380R with RS-232/RS-422 interface (3964R)	6GT2801-3BA10
RF380R with RS232/RS422 interface (3964R) and ATEX, IECEx, UL HAZ. LOC approval	6GT2801-3BA10-0AX2

5.8.3 Pin assignment of RF380R RS-232/RS-422 interface

You can connect the RF380R reader to a higher-level system via the internal RS-422 interface or via the RS-232 interface. After connection, the interface module automatically detects which interface has been used.

Note correct assignment of the pins here:

Pin	Pin Device end 8-pin M12	Assignment	
		RS-232	RS-422
	1	+ 24 V	+ 24 V
	2	RXD	- Transmit
	3	0 V	0 V
	4	TXD	+ Transmit
	5	not used	+ Receive
	6	not used	- Receive
	7	not used	not used
	8	Ground (shield)	Ground (shield)

5.8.4 LED operating display

The operational statuses of the reader are displayed by two LEDs. The LEDs can adopt the colors white, green, red, yellow or blue and the statuses off, on, flashing:

Table 5- 34 Display elements

LED	Meaning
	The reader is turned off.
	The reader is turned on and is searching for transponders. The reader is in the "Setup" mode, in the "Search for transponders" status and has not yet received a "RESET" command and is not ready.
 	There is a transponder in the antenna field. The reader is in the "Setup" mode, in the status "Show quality", has not yet received a "RESET" command and is not ready. Depending on the signal strength, the LED flickers or is lit permanently.
	The reader has received a "RESET" command.
	The reader is turned on, the antenna is turned off.

LED	Meaning
	- Operating mode "with presence": Transponder present - Operating mode "without presence": Transponder present and command currently being executed
	There is an error. The number of flashes provides information about the current error. You will find more information on error messages in the section "System diagnostics (Page 465)".

5.8.5 Ensuring reliable data exchange

The "center point" of the transponder must be situated within the transmission window.

5.8.6 Metal-free area

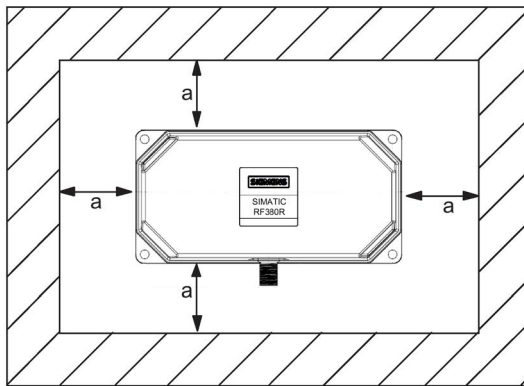


Figure 5-31 Metal-free space for RF380R - 2nd generation

The RF380R can be flush-mounted in metal. Allow for a possible reduction in the field data.

To avoid any impact on the field data, the distance a should be ≥ 20 mm.

5.8.7 Minimum distance between RF380R readers

RF380R side by side

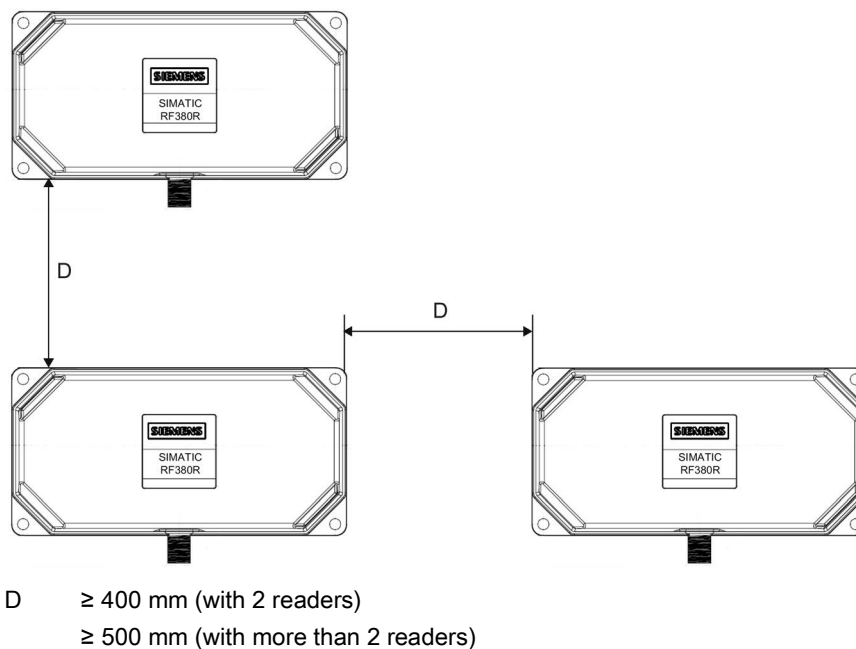


Figure 5-32 Minimum distance between multiple RF380R - 2nd generation

RF380R face-to-face

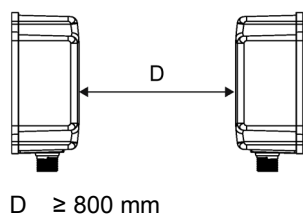


Figure 5-33 Face-of-face distance between two RF380R - 2nd generation

5.8.8 Technical specifications

Table 5- 35 Technical specifications of the RF380R reader

6GT2801-3BA10			
6GT2801-3BA10-0AX2			
Product type designation	SIMATIC RF380R		
Radio frequencies			
Operating frequency, rated value	13.56 MHz		
Electrical data			
Maximum range	240 mm		
Maximum data transmission speed reader ↔ transponder	RF300 transponder	ISO transponder (MDS D)	ISO transponder (MDS E)
• Read	• ≤ 8000 bytes/s	• ≤ 3300 bytes/s	• ≤ 3400 bytes/s
• Write	• ≤ 8000 bytes/s	• ≤ 1700 bytes/s	• ≤ 800 bytes/s
Transmission speed	19.2, 57.6, 115.2 kBd		
Read/write distances of the reader	See section "Field data for transponders, readers and antennas (Page 51)"		
MTBF (Mean Time Between Failures)	172.6 years		
Interfaces			
Electrical connector design	M12, 8-pin		
Standard for interfaces for communication	RS-232/RS-422 (3964R protocol)		
Antenna	integrated		
Mechanical specifications			
Enclosure			
• Material	• Plastic PA 12		
• Color	• Anthracite		
Recommended distance to metal	0 mm		
Supply voltage, current consumption, power loss			
Supply voltage	24 VDC		
Typical current consumption	130 mA		

6GT2801-3BA10		
6GT2801-3BA10-0AX2		
Permitted ambient conditions		
Ambient temperature		
• During operation	• -25 ... +70 °C	
• During transportation and storage	• -40 ... +85 °C	
Degree of protection according to EN 60529	IP67	
Shock-resistant acc. to EN 60721-3-7, Class 7 M2	500 m/s ²	
Vibration-resistant acc. to EN 60721-3-7, Class 7 M2	200 m/s ²	
Torsion and bending load	Not permitted	
Design, dimensions and weight		
Dimensions (L x W x H)	160 x 80 x 41 mm	
Weight	600 g	
Type of mounting	4 x M5 screws; 1.5 Nm	
Cable length for RS-422 interface, maximum	RS-422	RS-232
	1000 m	30 m
LED display design	2 LEDs, 5 colors	
Standards, specifications, approvals		
Proof of suitability	Radio in accordance with R&TTE directives EN 300330, EN 301489, CE, FCC, UL/CSA, Ex: II 3G Ex nC IIB T4 (only 6GT2801-3BA10-0AX2)	

5.8.9 Approvals

FCC information

Siemens SIMATIC RF380R (MLFB 6GT2801-3BA10); FCC ID NXW-RF380R02

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

5.8.10 Dimension drawing

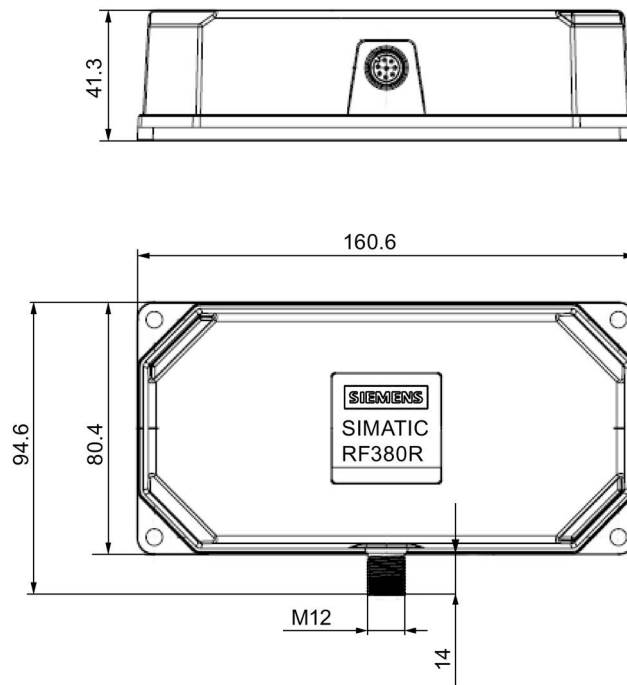


Figure 5-34 Dimension drawing SIMATIC RF380R - 2nd generation

Dimensions in mm

5.8.11 Using the reader in hazardous area

WARNING

Risk of explosion

In a flammable or combustible environment, no cables may be connected to or disconnected from the device.

ATEX

The SIMATIC Ident products meet the requirements of explosion protection acc. to ATEX. The products meet the requirements of the standards:

Document	Title
EN 60079-0	Hazardous areas Part 0: Equipment - General requirements
EN 60079-7	Hazardous areas Part 7: Equipment protection by increased safety "e"
EN 60079-31	Hazardous areas Part 31: Equipment dust ignition protection by enclosure "t"

You will find the current versions of the standards in the currently valid ATEX certificates.

ATEX mark

NOTICE

Validity only when the devices are marked

There is a corresponding approval only with devices to which the Ex mark is applied.

The identification of the electrical equipment is:



 II 3 G Ex ec IIB T4 Gc
 II 3 D Ex tc IIIC T80 °C Dc

-25 °C < Ta < +70 °C

IP64

Un = 24 V DC, 130 mA

The equipment also has the following additional information:

XXXYYYZZZ [= serial number, is assigned during production]

DEMKO 17 ATEX 1767 X [= certificate number]

IECEX

The SIMATIC Ident products meet the requirements of explosion protection acc. to IECEx. The products meet the requirements of the standards:

Document	Title
IEC 60079-0	Hazardous areas Part 0: Equipment - General requirements
IEC 60079-7	Hazardous areas Part 7: Equipment protection by increased safety "e"
IEC 60079-31	Hazardous areas Part 31: Equipment dust ignition protection by enclosure "t"

You will find the current versions of the standards in the currently valid IECEx certificates.

IECEX mark

NOTICE
Validity only when the devices are marked
There is a corresponding approval only with devices to which the IECEx mark is applied.

The identification of the electrical equipment is:

Ex ec IIB T4 Gc

Ex tc IIIC T80 °C Dc

-25 °C < Ta < +70 °C

IP64

U_n= 24 V DC, 130 mA

The equipment also has the following additional information:

XXXXYYZZZ [= serial number, is assigned during production]

IECEX ULD 17.0012 X [= certificate number]

UL HAZ. LOC.

The SIMATIC Ident products meet the requirements of explosion protection acc. to UL HAZ. LOC. The products meet the requirements of the standards:

Document	Title
UL 60079-0	Hazardous areas
CSA C22.2 NO. 60079-0	Part 0: Equipment - General requirements
UL 60079-7	Hazardous areas
CSA C22.2 NO. 60079-7	Part 7: Equipment protection by increased safety "e"
UL 60079-31	Hazardous areas
CSA C22.2 NO. 60079-31	Part 31: Equipment dust ignition protection by enclosure "t"

You will find the current versions of the standards in the currently valid UL HAZ. LOC. certificates

UL HAZ. LOC. mark

NOTICE
Validity only when the devices are marked There is a corresponding approval only with devices to which the UL HAZ. LOC. mark is applied.

The identification of the electrical equipment is:



LISTED E223122
 IND.CONT.EQ FOR HAZ.LOC.
 CL.I, DIV.2, GP.C,D T4
 CL.II, DIV.2, GP.F,G T80 °C
 AEx ec IIB T4 Gc, Ex ec IIB T4 Gc X
 AEx tc IIIC T80 °C Dc, Ex tc IIIC T80 °C Dc X

-25 °C < Tamb. < +70 °C

IP64

U_n= 24 V DC, 130 mA

The equipment also has the following additional information:

XXXYYYYZZZ [= serial number, is assigned during production]

5.8.11.1 Using the reader in hazardous area for gases

The temperature class of the reader for hazardous areas depends on the ambient temperature range:

Ambient temperature range	Temperature class
-25 °C < Ta < +70 °C	T4

WARNING

Ignitions of gas-air mixtures

When using the reader, check to make sure that the temperature class is adhered to in keeping with the requirements of the area of application

Non-compliance with the permitted temperature ranges while using the reader can lead to ignitions of gas-air mixtures.

5.8.11.2 Using the reader in hazardous area for dust

The equipment is suitable for dusts whose ignition temperatures for a dust layer of 5 mm are higher than 80 °C (smoldering temperature).

Ambient temperature range	Temperature value
-25 °C < Ta < +70 °C	T80 °C

WARNING

Ignitions of dust-air mixtures

When using the reader, check to make sure that the temperature values are adhered to in keeping with the requirements of the area of application. Non-compliance with the permitted temperature range while using the reader can lead to ignitions of dust-air mixtures.

5.8.11.3 Installation and operating conditions for hazardous areas:

NOTICE**Risk of explosion**

Risk of explosion of dust-air mixtures or gas-air mixtures. Observe the following conditions when installing and operating the device in a hazardous area in order to avoid a risk of explosion and damage to the device:

- Making and breaking of circuits is permitted only in a de-energized state.
- The maximum surface temperature, corresponding to the marking, applies only for operation without a cover of dust.
- The device may only be operated in such a way that adequate protection against UV light is ensured.
- The device may not be operated in areas influenced by processes that generate high electrostatic charges.
- The device should only be cleaned with a damp cloth.
- The device must be set up and installed in such a way that it is mechanically protected.
- The grounding of the plug (8-pin) on the reader must be via its supply cable.
- The device may only be operated with accessories specified or supplied by the manufacturer. All the points above also apply to the accessories (cables and connectors) and to the antennas (exception: the housing of ANT 1 does not need to be installed with impact protection).
- The device sockets incl. the metal parts of the connecting cable must have a shrink-on sleeve pulled over them, in other words, all metal parts apart from the securing sockets of the housing must be fully covered and be inaccessible.
- After removing the connections (antenna cable, signal/supply cable), the connectors must be checked for contamination and, if necessary, cleaned before being inserted again.

5.8.11.4 Extended installation and operating conditions for hazardous areas for applications according to UL Hazardous Location (USA and Canada)

In addition to the instructions listed in ordinary locations File E85972-D1005.

For Div. 2:

This equipment is suitable for use in Class I, Division 2, Groups C and D in HAZARDOUS LOCATIONS, OR NON-HAZARDOUS LOCATIONS ONLY.

 WARNING
WARNING EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.

These devices are open-type devices that are to be installed in an enclosure suitable for the environment.

For Zone 2 only:

This equipment is suitable for use in Class I, Division 2, Groups C and D, Class II Groups F and G, OR Zone 2, Group IIB, OR Zone 22, Group IIIC in HAZARDOUS LOCATIONS, OR non-hazardous locations only.

 WARNING
WARNING EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.

 WARNING
WARNING WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD.

All models must be mounted in an enclosure with a minimum ingress protection rating of at least IP54 and must be Class I, Zone 2 certified, and used in an environment of not more than pollution degree 2.

The device may only be operated so that there is adequate protection against ultraviolet light.

The device must not be operated in areas influenced by charge-producing processes.

The device must be set up and installed so that it is mechanically protected.

After disconnecting connections (signal/supply cable), before the connectors are plugged in again, the connectors must be checked for contamination and, if necessary, cleaned.

5.9 SIMATIC RF382R with Scanmode

You will find detailed information on the SIMATIC RF382R with Scanmode on the Internet (<https://support.industry.siemens.com/cs/ww/en/ps/15038>).

5.9.1 Characteristics

RF382R Scanmode		Characteristics
	Design	① RS-232 or RS-422 interface ② Status display
	Operating range	Suitable for high speeds, e.g. in • Suspension conveyor systems • Assembly lines • Production • Order picking

5.9.2 RF382R with Scanmode ordering data

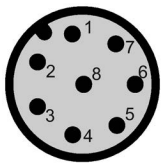
Table 5- 36 RF382R Scanmode ordering data

	Article number
RF382R Scanmode	6GT2801-3AB20-0AX0

5.9.3 Pin assignment RF382R Scanmode RS232 interface

You can connect the RF382R Scanmode reader via the internal RS-232/RS-422 interface or via a higher-level system. (See section "Basic rules (Page 110)") Make sure that the pin assignment is correct. In the factory settings, the reader is set to RS-232. Siemens can change the interface to RS-422.

Table 5- 37 Connector and reader pin assignment

Pin	Pin Device end 8-pin M12	Assignment	
		RS-232	RS-422
	1	+ 24 V	+ 24 V
	2	RXD	- Transmit
	3	0 V	0 V
	4	TXD	+ Transmit
	5	not used	+ Receive
	6	not used	- Receive
	7	not used	not used
	8	Ground (shield)	Ground (shield)

5.9.4 LED operating display

The operational statuses of the reader are displayed by the LEDs. The LED can adopt the colors green, red or yellow and the statuses off , on , flashing :

Table 5- 38 LED operating display on the reader

LED	Meaning
	The reader is turned off.
	The reader is switched on and ready for operation.
	There is a transponder in the antenna field.
	There is an error. The number of flashes provides information about the current error. You will find more information on error messages in the section "System diagnostics (Page 465)".

5.9.5 Ensuring reliable data exchange

The "center point" of the transponder must be situated within the transmission window.

5.9.6 Mounting on metal

The RF382R can be mounted directly on metal. Flush mounting on metal is not permitted.

5.9.7 Minimum distance between several RF382R Scanmode readers

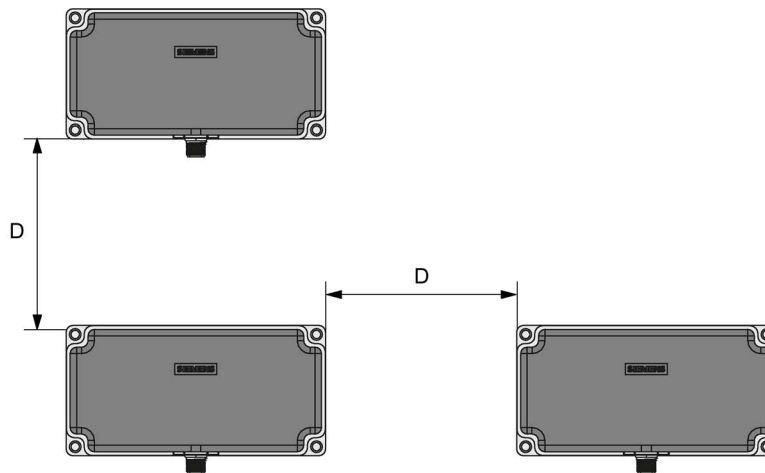


Figure 5-35 Minimum distance between several RF382R Scanmode readers

Minimum distance D from RF382R to RF382R	$D \geq 200 \text{ mm}$
--	-------------------------

5.9.8 Transmission window

Orientation of fields of the SIMATIC RF382R Scanmode

For many applications it may be best to operate the reader so that the tags move from left to right (or from right to left) at a certain distance in front of the narrow edge of the reader. With this direction of movement, the horizontal reader field is used, see figure below.

You also have the option of moving the tags up and down (or down and up) past the narrow edge of the reader. With this direction of movement, the vertical reader field is used.

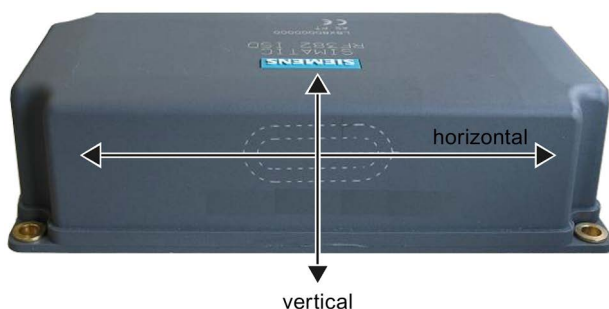


Figure 5-36 Definition of horizontal and vertical reader field

Maximum field strength

The reader creates the maximum field approximately 13 mm below the upper reader edge. For the largest possible reading range the tags you want to read should move in this range. This applies regardless of whether the horizontal or the vertical field is used.



Figure 5-37 Line of maximum magnetic field strength

The area of the maximum field strength and, therefore, the maximum range is identified by a laser icon:

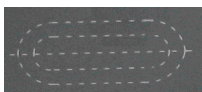


Figure 5-38 Laser labeling

Transmission window horizontal field

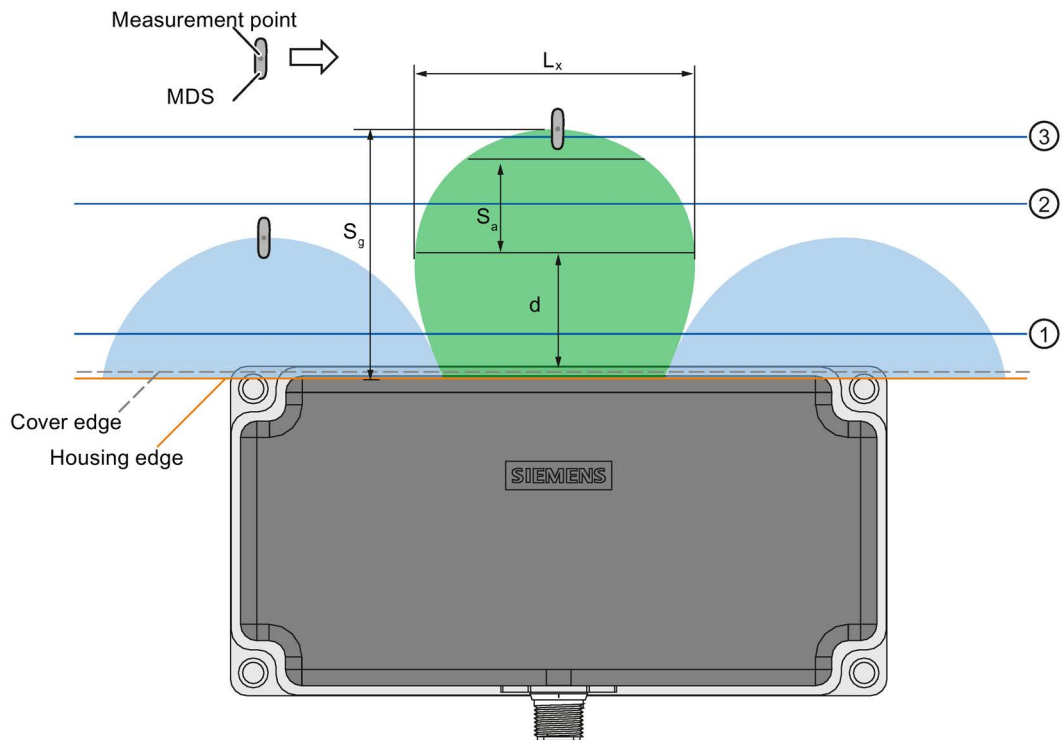


Figure 5-39 Distance definition horizontal field

Green	Main field (processing field)
Blue	Secondary fields, horizontal field
L_x	Maximum length of the main field, horizontal field
d	Distance from the reader edge at which maximum horizontal main field length L exists
S_a	Operating range in the main field
S_g	Limit distance
①	Level 1
②	Level 2
③	Level 3
$\Rightarrow$	Direction of motion of the transponder

Operating range (S_a)

The operating range lies between Level ① and Level ③.

The operating range between Levels ① and ② includes secondary fields.

The recommended operating range therefore lies in the green main field between Level 2 and Level 3.

Limit distance (S_g)

The limit distance lies on Level ③.

Transmission window vertical field

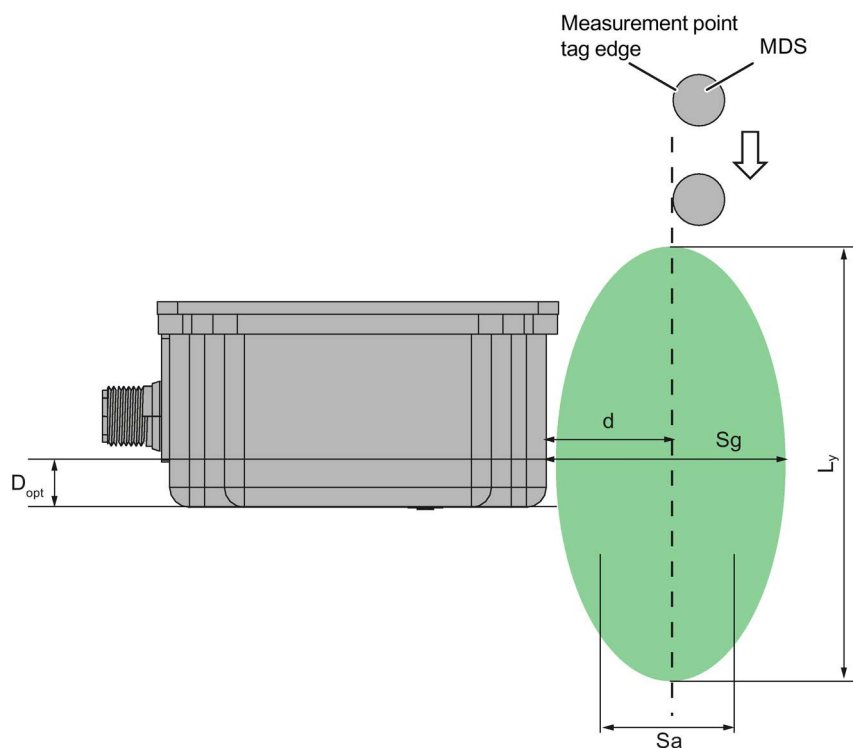


Figure 5-40 Distance definition vertical field

Green	Main field (processing field)
L_y	Maximum length of the main field, vertical field
d	Distance from the reader edge at which maximum vertical main field length L_y exists
S_a	Operating range in the main field
S_g	Limit distance
D_{opt}	= 13 mm
↓	Direction of motion of the transponder

5.9.9 Technical specifications

Table 5- 39 Technical specifications of the RF382R reader with Scanmode

6GT2801-3AB20-0AX0	
Product type designation	SIMATIC RF382R Scanmode
Radio frequencies	
Operating frequency, rated value	13.56 MHz
Electrical data	
Maximum range	75 mm
Maximum data transmission speed reader ↔ transponder	ISO transponder
• Read	• approx. 1500 bytes/s
Transmission speed	19.2, 57.6, 115.2 kBd
Read/write distances of the reader	See section "Field data for transponders, readers and antennas (Page 51)"
MTBF (Mean Time Between Failures)	115 years
Interfaces	
Electrical connector design	M12, 8-pin
Standard for interfaces for communication	RS-232 (factory setting, can be changed to RS-422)
Antenna	integrated
Mechanical specifications	
Enclosure	
• Material	• Plastic PA 12
• Color	• Anthracite
Recommended distance to metal	0 mm
Supply voltage, current consumption, power loss	
Supply voltage	24 VDC
Typical current consumption	140 mA

6GT2801-3AB20-0AX0

Permitted ambient conditions

Ambient temperature

- | | |
|-------------------------------------|------------------|
| • During operation | • -25 ... +70 °C |
| • During transportation and storage | • -40 ... +85 °C |

Degree of protection according to EN 60529	IP67
--	------

Shock-resistant acc. to EN 60721-3-7, Class 7 M2	500 m/s ²
--	----------------------

Vibration-resistant acc. to EN 60721-3-7, Class 7 M2	200 m/s ²
--	----------------------

Torsion and bending load	Not permitted
--------------------------	---------------

Design, dimensions and weight

Dimensions (L x W x H)	160 x 80 x 41 mm
------------------------	------------------

Weight	550 g
--------	-------

Type of mounting	4 x M5 screws; 1.5 Nm
------------------	--------------------------

Cable length for RS-422 interface, maximum	RS-422	RS-232
	1000 m	30 m

LED display design	3-color LED
--------------------	-------------

Standards, specifications, approvals

Proof of suitability	Radio to R&TTE directives EN 300330, EN 301489, CE, FCC, UL/CSA
----------------------	--

5.9.10 Approvals

FCC information

Siemens SIMATIC RF382R (MLFB 6GT2801-3AB20-0AX0); FCC ID NXW-RF382R

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IC information

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Certificates for USA and Canada

	Underwriters Laboratories (UL) acc. to standard UL 60950, Report E11 5352 and Canadian standard C22.2 No. 60950 (I.T.E) or acc. to UL508 and C22.2 No. 142 (IND.CONT.EQ)
---	--

5.9.11 Dimensional diagram

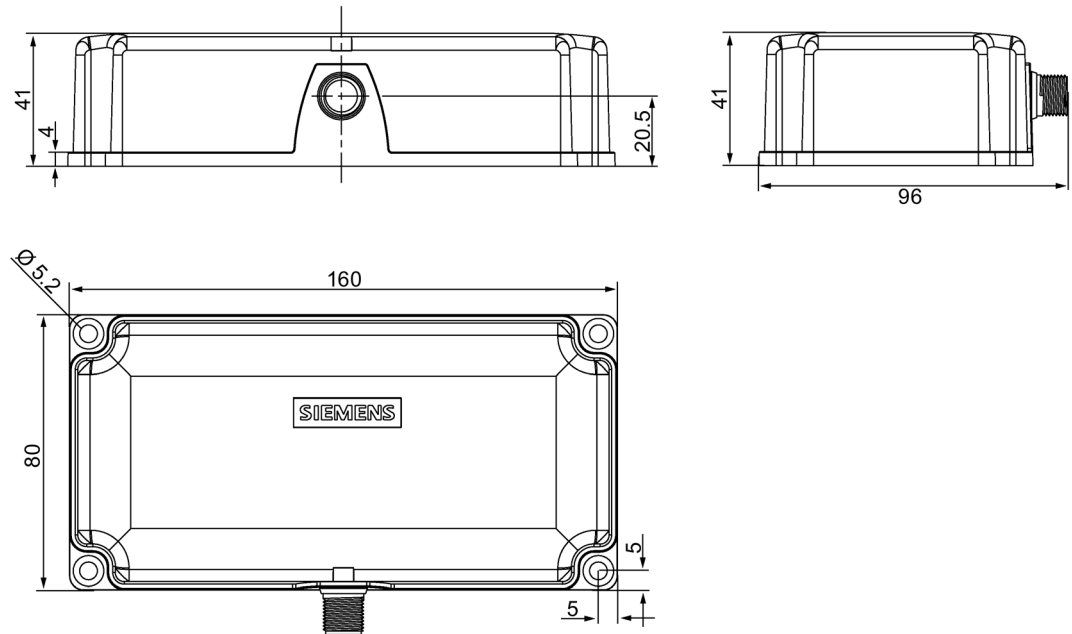


Figure 5-41 Dimension drawing

Antennas

6.1 Features

For the RF350R and RF350M readers, you can use the following plug-in antennas:

Antenna	Product photo	Limit distance S_g ¹⁾	Dimensions
ANT 1		Up to 140 mm	75 x 75 x 20 mm (L x W x H)
ANT 3		Up to 50 mm	50 x 28 x 10 mm (L x W x H)

Antenna	Product photo	Limit distance S_g ¹⁾	Dimensions
ANT 3S		Up to 5 mm	50 × 28 × 10 mm (L × W × H)
ANT 8 ²⁾		Up to 4 mm	M8 × 1.0 × 39 mm (Ø × thread × L)
ANT 12		Up to 16 mm	M12 × 1.0 × 40 mm (Ø × thread × L)
ANT 18		Up to 35 mm	M18 × 1.0 × 55 mm (Ø × thread × L)
ANT 30		Up to 55 mm	M30 × 1.5 × 61 mm (Ø × thread × L)

¹⁾ Depending on the transponder used

²⁾ only released with RF350M und RF350R - second generation

Note

Use of the antennas in hazardous areas

The antennas ANT 1, ANT 12, ANT 18 and ANT 30 are approved for use in hazardous locations. For more information, refer to the section "Use of the reader in hazardous areas (Page 173)".

ANT 1

The ANT 1 is an antenna in the mid performance range and can be used to the customer's advantage in production and assembly lines due to its manageable housing shape. The antenna dimensions make it possible to read/write large quantities of data dynamically from/to the transponder during operation. The antenna cable can be plugged in.

ANT 3

The ANT 3 is designed for use in small assembly lines. The extremely compact design of the antenna allows extremely accurate positioning. The tuning of the ANT 3 antenna is optimized for mounting on metal. The antenna cable can be plugged in.

ANT 3S

Due to its slimline and compact design, the ANT 3S can still be precisely positioned in cramped conditions. Areas of application are, for example, tool identification. The antenna cable can be plugged in.

ANT 8

The ANT 8 is primarily envisaged for tool identification applications. The extremely small design of the antenna allows extremely accurate positioning. The antenna cable can be connected at the reader end and screwed to the antenna.

The antenna ANT 8 has currently only been tested and released for use in conjunction with the mobile reader RF350M and the reader RF350R - second generation.

ANT 12

The ANT 12 is primarily envisaged for tool identification applications. The very small size of the antenna means that highly exact positioning is possible using the plastic nuts included in the scope of delivery. The antenna cable can be plugged in.

ANT 18

The ANT 18 is designed for use in small assembly lines. Due to its small, compact construction, the antenna can be easily positioned for any application using two plastic nuts (included in the package). The antenna cable can be connected at the reader end.

ANT 30

The ANT 30 is designed for use in small assembly lines. In comparison to ANT 18, the maximum write/read distance is approximately 60 % larger. Due to its compact construction, the antenna can be easily positioned for any application using two plastic nuts (included in the package). The antenna cable can be connected at the reader end.

6.2 Ordering data

Table 6- 1 Ordering data for antennas

		Article number
ANT 1	incl. integrated antenna cable 3 m	6GT2398-1CB00
ANT 3	without antenna connecting cable	6GT2398-1CD30-0AX0
	incl. plug-in antenna cable 3 m	6GT2398-1CD40-0AX0
ANT 3S	without antenna connecting cable	6GT2398-1CD50-0AX0
	incl. plug-in antenna cable 3 m	6GT2398-1CD60-0AX0
ANT 8	without antenna connecting cable	6GT2398-1CF00
	incl. plug-in antenna cable 3 m	6GT2398-1CF10
ANT 12	incl. one integrated antenna connecting cable 0.6 m	6GT2398-1CC10
	incl. plug-in antenna cable 3 m	6GT2398-1CC00
ANT 18	incl. one integrated antenna connecting cable 0.6 m	6GT2398-1CA10
	incl. plug-in antenna cable 3 m	6GT2398-1CA00
ANT 30	incl. plug-in antenna cable 3 m	6GT2398-1CD00

Table 6- 2 Antenna accessories ordering data

		Article number
Antenna connecting cable drag-capable	3 m	6GT2391-0AH30

6.3 Ensuring reliable data exchange

The "center point" of the transponder must be situated within the transmission window.

6.4 Metal-free area

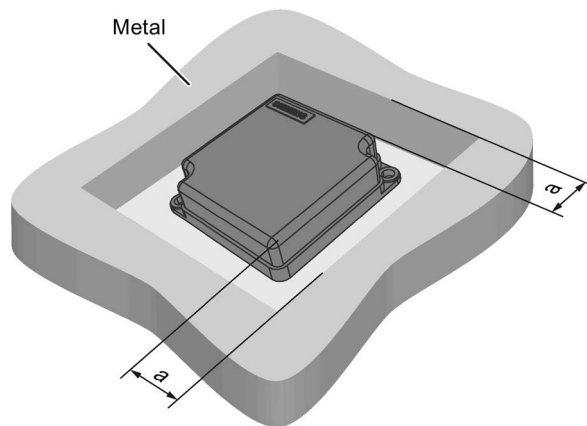
The antennas ANT 1, ANT 8, ANT 12, ANT 18 and ANT 30 can be flush-mounted in metal. Please allow for a possible reduction in the field data values. During installation, maintain the minimum distances (a and b) on/flush with the metal.

Note

Reduction of range if the metal-free space is not maintained

At values lower than a and b, the field data changes significantly, resulting in a reduction in the limit distance and operating distance. Therefore, during installation, maintain the minimum distances (a and b) on/flush with the metal.

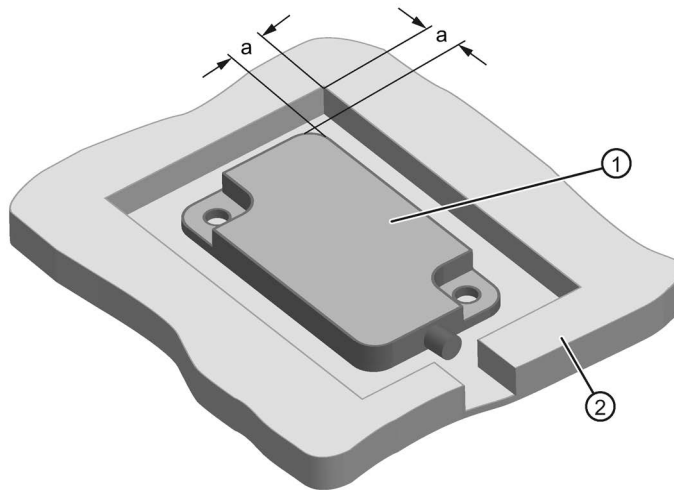
Metal-free space for flush-mounted installation of ANT 1



a = 40 mm

Figure 6-1 ANT 1 flush-mounted in metal

Metal-free space for flush-mounted installation of ANT 3 and ANT 3S



- ① ANT 3
- ② Metal
- a = 10 mm

Figure 6-2 ANT 3 and ANT 3S flush-mounted in metal

Flush-mounting of ANT 8

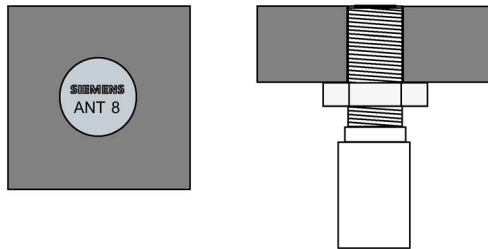


Figure 6-3 ANT 8 flush-mounted in metal

The ANT 8 can be flush-mounted in metal.

Flush-mounting of ANT 12

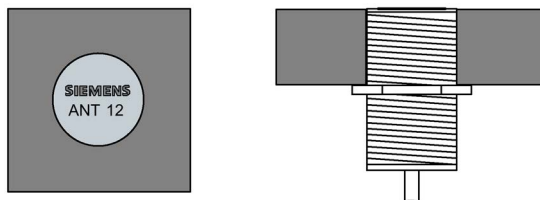
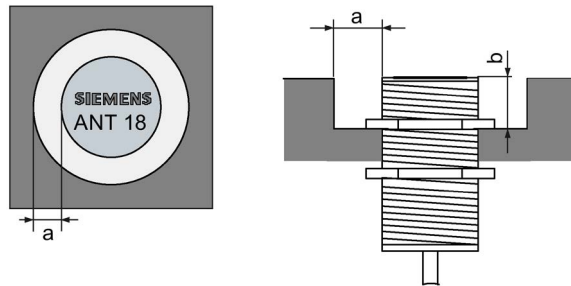


Figure 6-4 ANT 12 flush-mounted in metal

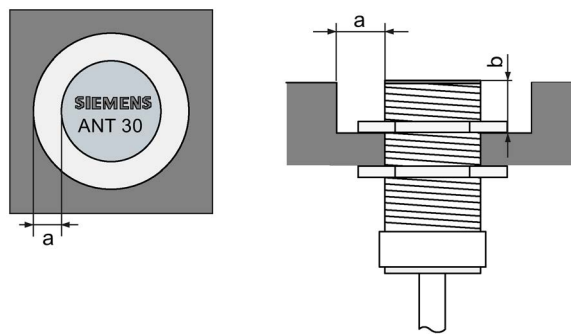
The ANT 12 can be flush-mounted in metal.

Metal-free space for flush-mounted installation of ANT 18

a = 10 mm

b = 10 mm

Figure 6-5 ANT 18 flush-mounted in metal

Metal-free space for flush-mounted installation of ANT 30

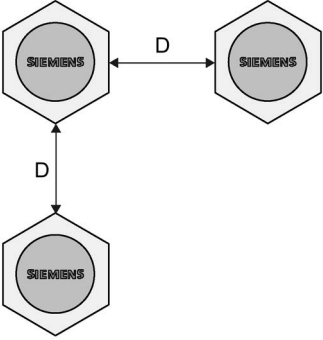
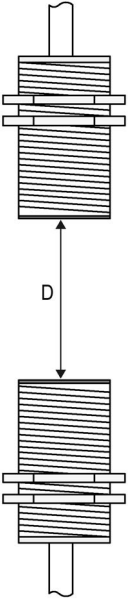
a = 20 mm

b = 20 mm

Figure 6-6 ANT 30 flush-mounted in metal

6.5 Minimum distance between antennas

Table 6- 3 Minimum distance between antennas

Diagram (example)	Minimum distance [mm]	
	Antennas next to each other	
	ANT 1	$D \geq 300 \text{ mm}$
	ANT 3	$D \geq 150 \text{ mm}$
	ANT 3S	$D \geq 20 \text{ mm}$
	ANT 8	$D \geq 50 \text{ mm}$
	ANT 12	$D \geq 70 \text{ mm}$
	ANT 18	$D \geq 100 \text{ mm}$
	ANT 30	$D \geq 100 \text{ mm}$
	Antennas face to face	
	ANT 1	$D \geq 500 \text{ mm}$
	ANT 3	$D \geq 200 \text{ mm}$
	ANT 3S	$D \geq 50 \text{ mm}$
	ANT 8	$D \geq 50 \text{ mm}$
	ANT 12	$D \geq 100 \text{ mm}$
	ANT 18	$D \geq 100 \text{ mm}$
	ANT 30	$D \geq 200 \text{ mm}$

The reader electronics can be mounted directly alongside each other.

6.6 Technical specifications

Table 6- 4 Technical specifications of the antennas ANT 1, ANT 3 , ANT 3S and ANT 8

	ANT 1	ANT 3	ANT 3S	ANT 8
Max. write/read distance antenna ↔ transponder (S _g)	140 mm	50 mm	5 mm	4 mm
Housing dimensions	75 x 75 x 20 mm (L x W x H)	50 x 28 x 10 mm (L x W x H)	50 x 28 x 10 mm (L x W x H)	M8 x 1.0 x 39 mm (Ø x thread x L)
Color	Anthracite	Black	Black	silver-metallic
Material	Plastic PA 12	Plastic PA6-V0	Plastic PA6-V0	Stainless steel
Plug connection	M8, 4-pin; (pins on antenna side)	M8, 4-pin; socket on antenna side	M8, 4-pin; socket on antenna side	M8, 4-pin; (pins on antenna side)
Degree of protection according to EN 60529	IP67			IP67 (front)
Shock-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	500 m/s ²			
Vibration-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	200 m/s ² (3...50 Hz)			
Attachment of the antenna	2 x M5 screws	2 x M4 screws	2 x M4 screws	2x stainless steel nuts M8 x 1.0 mm
Ambient temperature - During operation - During transportation and storage	-25 ... +70 °C -40 ... +85 °C			
Approx. weight - without antenna cable - with antenna cable (3.0 m)	-- 225 g	35 g 160 g	35 g 160 g	10 g 140 g

¹⁾ Warning: The values for shock and vibration are maximum values and must not be applied continuously.

6.6 Technical specifications

Table 6- 5 Technical specifications of the antennas ANT 12, ANT 18 and ANT 30

	ANT 12	ANT 18	ANT 30
Max. write/read distance antenna ↔ transponder (S _g)	16 mm	35 mm	55 mm
Housing dimensions	M12 x 1.0 x 40 mm (Ø x thread x L)	M18 x 1.0 x 55 mm (Ø x thread x L)	M30 x 1.5 x 61 mm (Ø x thread x L)
Color	Pale turquoise		
Material	Plastic Crastin		
Plug connection	M8, 4-pin; (pins on antenna side)		
Degree of protection according to EN 60529	IP67 (front)		
Shock-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	500 m/s ²		
Vibration-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	200 m/s ² (3...50 Hz)		
Attachment of the antenna	2 plastic nuts M12 x 1.0 mm	2 plastic nuts M18 x 1.0 mm	2 plastic nuts M30 x 1.5 mm
Ambient temperature	• During operation • During transportation and storage		
	• -25 ... +70 °C • -40 ... +85 °C		
Approx. weight	• without antenna cable • with antenna cable (3.0 m)		
	• -- • 145 g		
	• -- • 130 g		
	• -- • 180 g		

¹⁾ Warning: The values for shock and vibration are maximum values and must not be applied continuously.

The cable length is 3 m. All dimensions are in mm.

The technical drawing illustrates the dimensions of the Siemens SPS 7000 power supply unit. The main view shows a square front panel with a width and height of 75 mm. It features four mounting holes at the corners, each with a diameter of 5.5 mm. A central circular area indicates the location for ventilation or labeling. The top edge has a small rectangular label with the "SIEMENS" logo. To the left, a cable is shown exiting from the bottom-left corner, bent at a minimum radius of R20. The side view on the right shows the unit's thickness as 20 mm. Detailed dimension callouts include 5 mm for the distance from the bottom edge to the first mounting hole and 5 mm for the distance from the left edge to the first mounting hole.

Technical drawing of the cable assembly showing side and front views with dimensions.

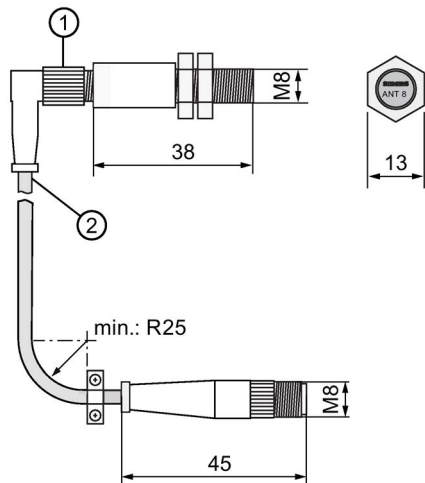
Side View Dimensions:

- Overall length: 240 ± 10
- Length of the main cable section: 190 ± 10
- Outer diameter of the main cable: 10 ± 0.2
- Inner diameter of the main cable: 3 ± 0.1
- Thread specification: Inner thread M8x1

Front View Dimensions:

- Overall width: 50 ± 0.3
- Width of the main body: 40 ± 0.3
- Height of the main body: 28 ± 0.2
- Height of the top section: 18 ± 0.2
- Radius of the top section: $R4.5 \pm 0.1$
- Length of the cable section: 38 ± 0.5
- Height of the cable section: 10 ± 0.3

251

ANT 8

- ① The antenna connector may only be tightened by hand.
 ② The cable must be secured in front of/behind the support sleeve so that no bending strain can be transferred to the antenna connector.

Figure 6-9 Dimension drawing for ANT 8

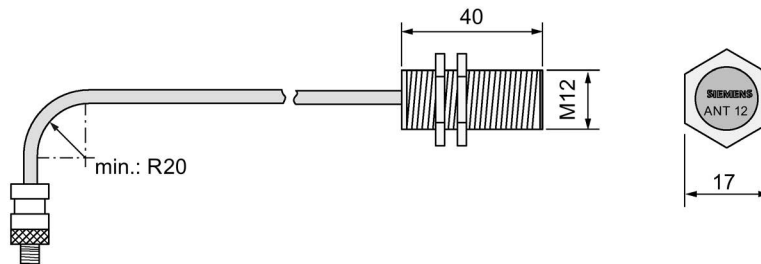
ANT 12

Figure 6-10 Dimension drawing for ANT 12

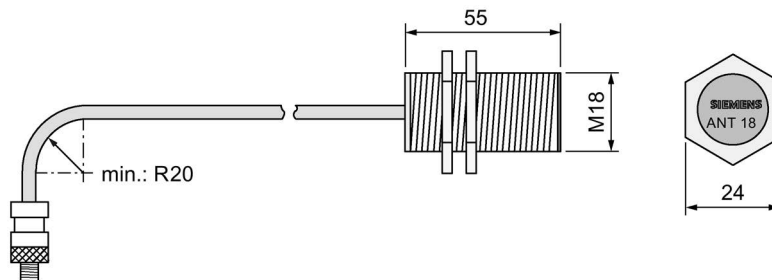
ANT 18

Figure 6-11 Dimension drawing for ANT 18

ANT 30

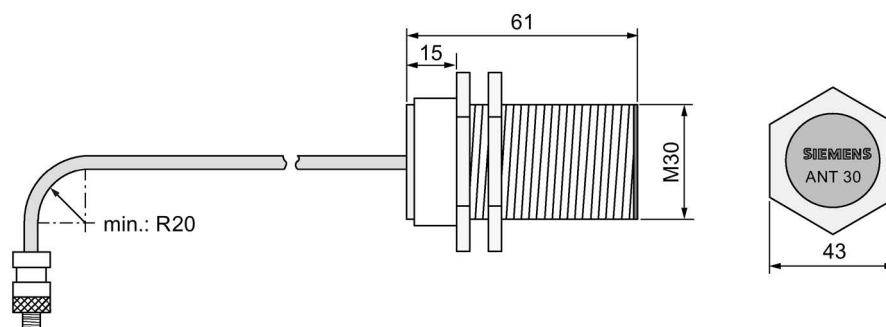


Figure 6-12 Dimension drawing for ANT 30

6.8 ANT 12 (stainless steel variant)

6.8.1 Features

 ANT 12 (stainless steel variant)	Characteristics	
	Area of application	Tool identification
	Writing/reading distance	Up to 16 mm (depending on the transponder)
	Connecting cable	Plug-in 3 m
	Connectable readers	RF350R
	Degree of protection	IP67 with inserted cable

6.8.2 Ordering data

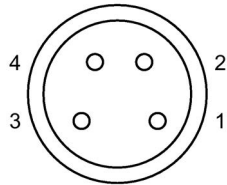
Table 6- 6 Ordering data for ANT 12 (stainless steel variant)

Antenna	Article number
ANT 12 (without antenna cable)	6GT2398-1DC00
ANT 12 (including one plug-in antenna cable 3 m)	6GT2398-1DC10

Table 6- 7 Ordering data ANT 12 accessories

Accessories	Article number
Antenna connecting cable drag-capable, 3 m	6GT2391-0AH30

6.8.3 Antenna connection



Pins 1 and 3 GND
Pins 2 and 4 Signal

! CAUTION

Minimum requirements for the antenna cable

The antennas can only be used with the corresponding Siemens antenna cable "6GT2391-0AH30".

The following minimum requirements for the antenna cable must be observed:

- Temperature: 80 °C
- Conductor cross-section: AWG21

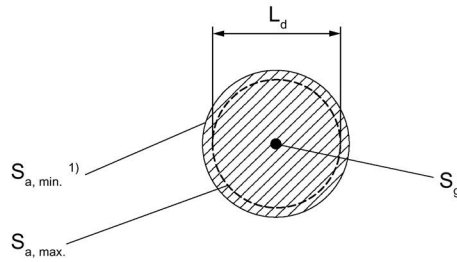
! CAUTION

Check connections

The device could be damaged as a result of missing power supply. Therefore, check all connections prior to commissioning.

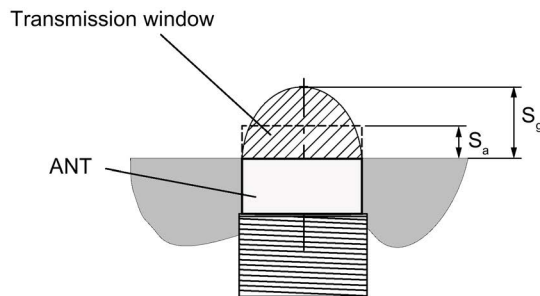
6.8.4 Transmission window

View from above



¹⁾ With $S_{a, min.}$ the transmission window increases

View from the side



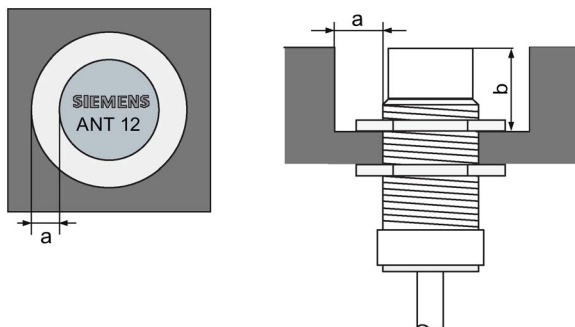
L_d Length of the transmission window (= 20 mm)

S_a Operating distance between antenna and transponder

S_g Limit distance (maximum clear distance between upper surface of the reader and the antenna, at which the transmission can still function under normal conditions)

Figure 6-13 Transmission window ANT 12 (stainless steel variant)

6.8.5 Flush-mounted in metal



a = 10 mm

b = 10 mm

Figure 6-14 ANT 12 (stainless steel variant) flush-mounted in metal

6.8.6 Minimum spacing

Note

Extension of the data transmission time if distance values are undershot

If the distance values specified in the tables are undershot, it is possible that the inductive fields will be affected. In this case, the data transmission time can increase unpredictably or a command is aborted with an error.

For this reason, please observe the values in the tables.

Minimum distances from transponder to transponder (without multitag mode)

Table 6- 8 Minimum distances transponder edge to transponder edge

	MDS D117 / MDS D127	MDS D421 / MDS D422 / MDS D428 / MDS D460 / MDS D522 / MDS D528
RF350R with ANT 12 (stainless steel variant)	≥ 60 mm	≥ 80 mm

Definition of distance D

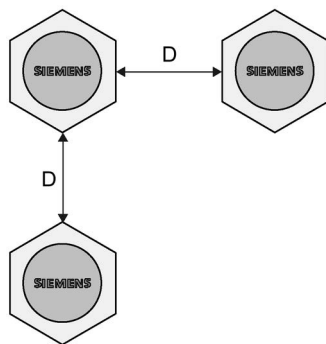
 $D \geq 70 \text{ mm}$

Figure 6-15 Minimum distance ANT 12 (stainless steel variant)

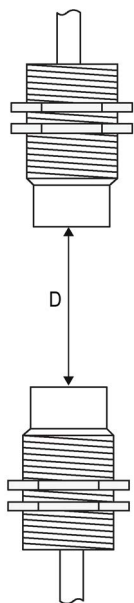
 $D \geq 100 \text{ mm}$

Figure 6-16 Face-to-face minimum distance between two ANT 12 (stainless steel variant)

6.8.7 Technical data

6GT2398-1DC00 ¹⁾	
6GT2398-1DC10	
Product type designation	ANT 12 (stainless steel variant)
Electrical data	
Input voltage of the antenna ²⁾	max. 5 V AC (13.56 MHz)
Input current of the antenna ²⁾	max. 85 mA AC (13.56 MHz)
Maximum write/read distance ANT ↔ transponder (S _g)	16 mm
Interfaces	
Plug connection	4-pin, socket
Mechanical specifications	
Enclosure	
Material	Stainless steel/Pocan
Color	Silver/pastel turquoise
Permitted ambient conditions	
Ambient temperature	
During operation	-20 ... +70 °C
During transportation and storage	-40 ... +85 °C
Ambient conditions regarding UL approval	- for indoor use only (dry location) - Degree of pollution 2 - Altitude < 2000 m - Overvoltage category 2 - Air humidity < 90 %
Degree of protection according to EN 60529	IP67 with inserted cable (IP-Rating is not investigated by UL)
Shock-resistant according to EN 60721-3-7 Class 7 M2 ³⁾	500 m/s ²
Vibration-resistant according to EN 60721-3-7 Class 7 M2 ³⁾	200 m/s ²

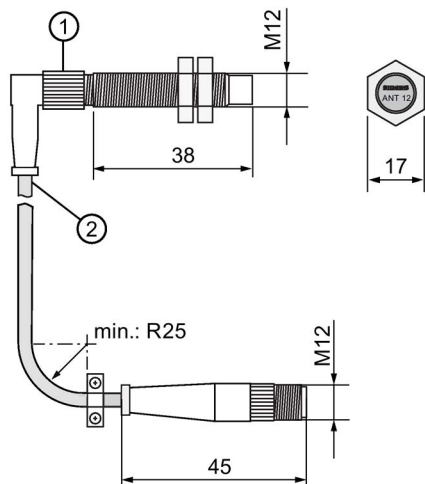
6GT2398-1DC00 ¹⁾

6GT2398-1DC10

Design, dimensions and weight

Dimensions (Ø x L)	12 x 40 mm
Thread (Ø x thread x L)	M12 x 1 x 30 mm
Weight without cable/with cable	15 g / 180 g
Type of mounting	2x stainless steel nuts M12 x 1

- 1) Investigated by UL
- 2) The supply source and ext. circuits intended to be connected to this device shall be galv. separated from mains supply or hazardous live voltage by reinforced or double insulation and meet the requirements of SELV/PELV circuit of UL/IEC61010-2-201 and clause 9.4 Limited energy circuit of UL/IEC 61010-1 or Class 2 of NEC or LPS of UL/IEC 60950".
- 3) Warning: The values for shock and vibration are maximum values and must not be applied continuously.

6.8.8 Dimension drawing

- ① The antenna connector may only be tightened by hand.
- ② The cable must be secured in front of/behind the support sleeve so that no bending strain can be transferred to the antenna connector.

Figure 6-17 Dimension drawing ANT 12 (stainless steel variant)

All dimensions in mm.

6.9 ANT 18 (stainless steel variant)

6.9.1 Features

 ANT 18 (stainless steel variant)	Characteristics	
	Area of application	Small assembly lines
	Writing/reading distance	up to 35 mm (depending on the transponder)
	Connecting cable	Plug-in 3 m
	Connectable readers	RF350R
	Degree of protection	IP67 with inserted cable

6.9.2 Ordering data

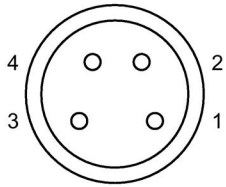
Table 6- 9 Ordering data for ANT 18 (stainless steel variant)

Antenna	Article number
ANT 18 (without antenna cable)	6GT2398-1DA00
ANT 18 (including one plug-in antenna cable 3 m)	6GT2398-1DA10

Table 6- 10 Ordering data ANT 18 accessories

Accessories	Article number
Antenna connecting cable drag-capable, 3 m	6GT2391-0AH30

6.9.3 Antenna connection



Pins 1 and 3 GND

Pins 2 and 4 Signal

! CAUTION

Minimum requirements for the antenna cable

The antennas can only be used with the corresponding Siemens antenna cable "6GT2391-0AH30".

The following minimum requirements for the antenna cable must be observed:

- Temperature: 80 °C
- Conductor cross-section: AWG21

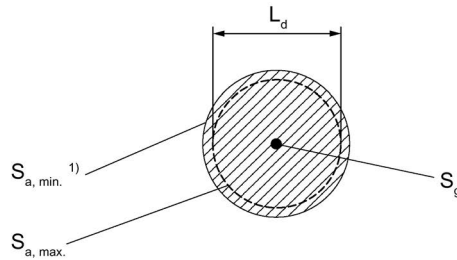
! CAUTION

Check connections

The device could be damaged as a result of missing power supply. Therefore, check all connections prior to commissioning.

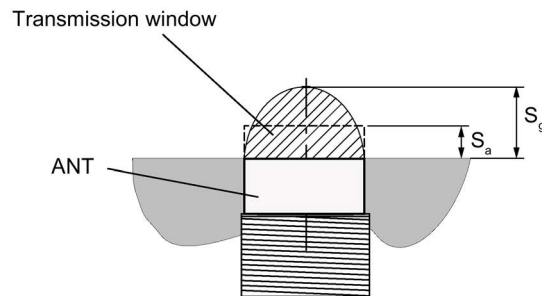
6.9.4 Transmission window

View from above



1) With $S_{a, min.}$ the transmission window increases

View from the side



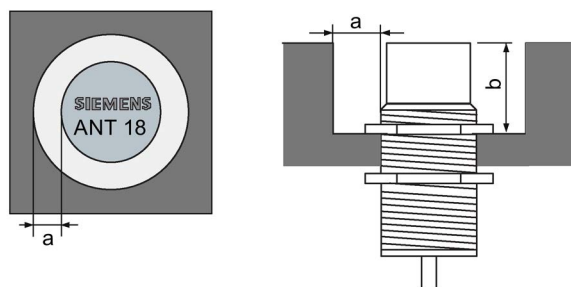
L_d Length of the transmission window (= 30 mm)

S_a Operating distance between antenna and transponder

S_g Limit distance (maximum clear distance between upper surface of the reader and the antenna, at which the transmission can still function under normal conditions)

Figure 6-18 Transmission window ANT 18 (stainless steel variant)

6.9.5 Flush-mounted in metal



a = 10 mm

b = 10 mm

Figure 6-19 ANT 18 (stainless steel variant) flush-mounted in metal

6.9.6 Minimum spacing

Note

Extension of the data transmission time if distance values are undershot

If the distance values specified in the tables are undershot, it is possible that the inductive fields will be affected. In this case, the data transmission time can increase unpredictably or a command is aborted with an error.

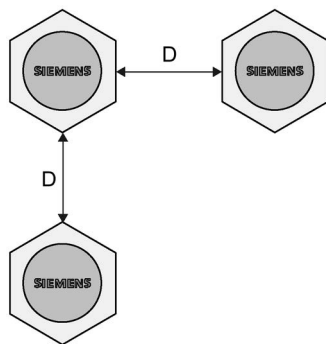
For this reason, please observe the values in the tables.

Minimum distances from transponder to transponder (without multitag mode)

Table 6- 11 Minimum distances transponder edge to transponder edge

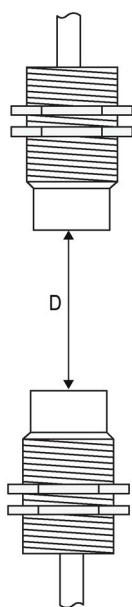
	MDS D124 / MDS D160 / MDS D324	MDS D421 / MDS D422 / MDS D423 / MDS D424 / MDS D425 / MDS D428 / MDS D460 / MDS D522 / MDS D524 / MDS D528
RF350R with ANT 18 (stainless steel variant)	≥ 80 mm	≥ 100 mm

Definition of distance D



$D \geq 100$ mm

Figure 6-20 Minimum distance ANT 18 (stainless steel variant)



$D \geq 100 \text{ mm}$

Figure 6-21 Face-to-face minimum distance between two ANT 18 (stainless steel variant)

6.9.7 Technical data

6GT2398-1DA00 ¹⁾	
6GT2398-1DA10	
Product type designation	ANT 18 (stainless steel variant)
Electrical data	
Input voltage of the antenna ²⁾	max. 5 V AC (13.56 MHz)
Input current of the antenna ²⁾	max. 85 mA AC (13.56 MHz)
Maximum write/read distance ANT ↔ transponder (S _g)	35 mm
Interfaces	
Plug connection	4-pin, socket
Mechanical specifications	
Enclosure	
• Material	• Stainless steel/Pocan
• Color	• Silver/pastel turquoise

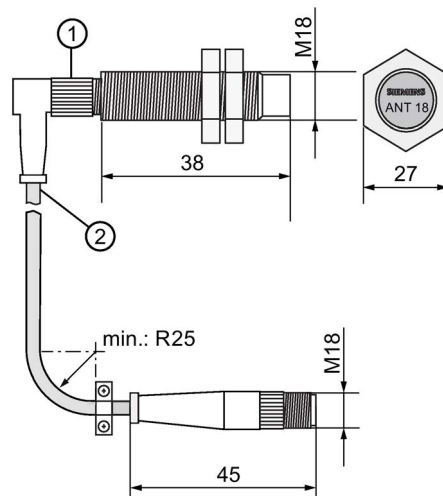
6GT2398-1DA00 ¹⁾	
6GT2398-1DA10	
Permitted ambient conditions	
Ambient temperature	
• During operation	• -20 ... +70 °C
• During transportation and storage	• -40 ... +85 °C
Ambient conditions regarding UL approval	• for indoor use only (dry location) • Degree of pollution 2 • Altitude < 2000 m • Overvoltage category 2 • Air humidity < 90 %
Degree of protection according to EN 60529	IP67 with inserted cable (IP-Rating is not investigated by UL)
Shock-resistant according to EN 60721-3-7 Class 7 M2 ³⁾	500 m/s ²
Vibration-resistant according to EN 60721-3-7 Class 7 M2 ³⁾	200 m/s ²
Design, dimensions and weight	
Dimensions (Ø x L)	18 x 40 mm
Thread (Ø x thread x L)	M18 x 1 x 30 mm
Weight without cable/with cable	40 g / 205 g
Type of mounting	2x stainless steel nuts M18 x 1

¹⁾ Investigated by UL

²⁾ The supply source and ext. circuits intended to be connected to this device shall be galv. separated from mains supply or hazardous live voltage by reinforced or double insulation and meet the requirements of SELV/PELV circuit of UL/IEC61010-2-201 and clause 9.4 Limited energy circuit of UL/IEC 61010-1 or Class 2 of NEC or LPS of UL/IEC 60950".

³⁾ Warning: The values for shock and vibration are maximum values and must not be applied continuously.

6.9.8 Dimension drawing



- ① The antenna connector may only be tightened by hand.
- ② The cable must be secured in front of/behind the support sleeve so that no bending strain can be transferred to the antenna connector.

Figure 6-22 Dimension drawing ANT 18 (stainless steel variant)

All dimensions in mm.

6.10 ANT 30 (stainless steel variant)

6.10.1 Features

ANT 18 (stainless steel variant)	Characteristics	
	Area of application	Small assembly lines
	Writing/reading distance	up to 55 mm (depending on the transponder)
	Connecting cable	Plug-in 3 m
	Connectable readers	RF250R
	Degree of protection	IP67 with inserted cable

6.10.2 Ordering data

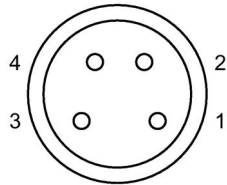
Table 6- 12 Ordering data for ANT 30 (stainless steel variant)

Antenna	Article number
ANT 30 (without antenna cable)	6GT2398-1DD00
ANT 30 (including one plug-in antenna cable 3 m)	6GT2398-1DD10

Table 6- 13 Ordering data ANT 30 accessories

Accessories	Article number
Antenna connecting cable drag-capable, 3 m	6GT2391-0AH30

6.10.3 Antenna connection



Pins 1 and 3 GND
Pins 2 and 4 Signal

! CAUTION

Minimum requirements for the antenna cable

The antennas can only be used with the corresponding Siemens antenna cable "6GT2391-0AH30".

The following minimum requirements for the antenna cable must be observed:

- Temperature: 80 °C
- Conductor cross-section: AWG21

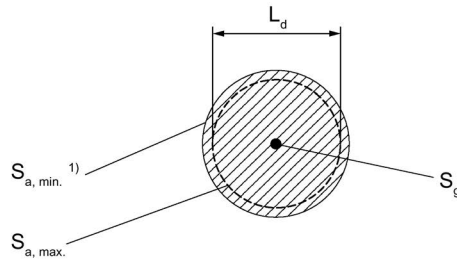
! CAUTION

Check connections

The device could be damaged as a result of missing power supply. Therefore, check all connections prior to commissioning.

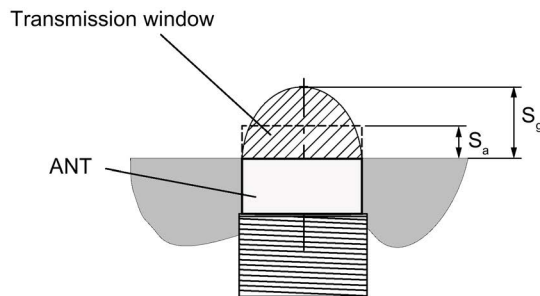
6.10.4 Transmission window

View from above



¹⁾ With $S_{a, min.}$ the transmission window increases

View from the side



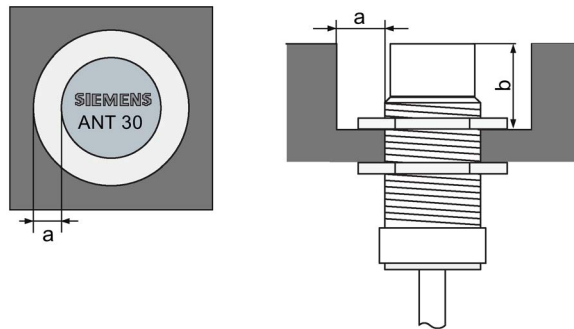
L_d Length of the transmission window (= 60 mm)

S_a Operating distance between antenna and transponder

S_g Limit distance (maximum clear distance between upper surface of the reader and the antenna, at which the transmission can still function under normal conditions)

Figure 6-23 Transmission window ANT 30 (stainless steel variant)

6.10.5 Flush-mounted in metal



a = 20 mm

b = 20 mm

Figure 6-24 ANT 30 (stainless steel variant) flush-mounted in metal

6.10.6 Minimum spacing

Note

Extension of the data transmission time if distance values are undershot

If the distance values specified in the tables are undershot, it is possible that the inductive fields will be affected. In this case, the data transmission time can increase unpredictably or a command is aborted with an error.

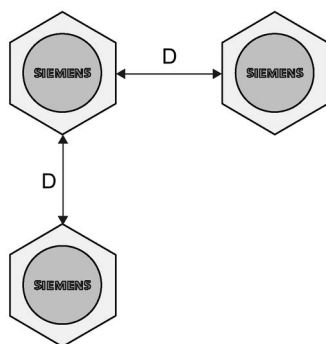
For this reason, please observe the values in the tables.

Minimum distances from transponder to transponder (without multitag mode)

Table 6- 14 Minimum distances transponder edge to transponder edge

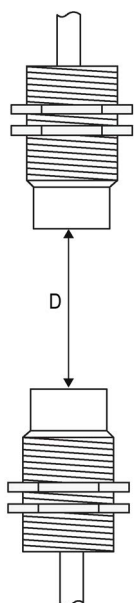
	MDS D124 / MDS D160 / MDS D324 / MDS D423 / MDS D424 / MDS D460 / MDS D524	MDS D422 / MDS D425 / MDS D428 / MDS D522 / MDS D528	MDS D126 / MDS D426 / MDS D526
RF350R with ANT 30 (stainless steel variant)	≥ 100 mm	≥ 80 mm	≥ 150 mm

Definition of distance D



$D \geq 100 \text{ mm}$

Figure 6-25 Minimum distance ANT 30 (stainless steel variant)



$D \geq 200 \text{ mm}$

Figure 6-26 Face-to-face minimum distance between two ANT 30 (stainless steel variant)

6.10.7 Technical data

6GT2398-1DD00 ¹⁾	
6GT2398-1DD10	
Product type designation	ANT 30 (stainless steel variant)
Electrical data	
Input voltage of the antenna ²⁾	max. 5 V AC (13.56 MHz)
Input current of the antenna ²⁾	max. 85 mA AC (13.56 MHz)
Maximum write/read distance ANT ↔ transponder (S _g)	60 mm
Interfaces	
Plug connection	4-pin, socket
Mechanical specifications	
Enclosure	
• Material	• Stainless steel/Pocan
• Color	• Silver/pastel turquoise
Permitted ambient conditions	
Ambient temperature	
• During operation	• -20 ... +70 °C
• During transportation and storage	• -40 ... +85 °C
Ambient conditions regarding UL approval	• for indoor use only (dry location) • Degree of pollution 2 • Altitude < 2000 m • Overvoltage category 2 • Air humidity < 90 %
Degree of protection according to EN 60529	IP67 with inserted cable (IP-Rating is not investigated by UL)
Shock-resistant according to EN 60721-3-7 Class 7 M2 ³⁾	500 m/s ²
Vibration-resistant according to EN 60721-3-7 Class 7 M2 ³⁾	200 m/s ²

6GT2398-1DD00 ¹⁾

6GT2398-1DD10

Design, dimensions and weight

Dimensions (Ø x L)	30 x 40 mm
Thread (Ø x thread x L)	M30 x 1.5 x 30 mm
Weight without cable/with cable	95 g / 260 g
Type of mounting	2x stainless steel nuts M30 x 1.5

- 1) Investigated by UL
- 2) The supply source and ext. circuits intended to be connected to this device shall be galv. separated from mains supply or hazardous live voltage by reinforced or double insulation and meet the requirements of SELV/PELV circuit of UL/IEC61010-2-201 and clause 9.4 Limited energy circuit of UL/IEC 61010-1 or Class 2 of NEC or LPS of UL/IEC 60950".
- 3) Warning: The values for shock and vibration are maximum values and must not be applied continuously.

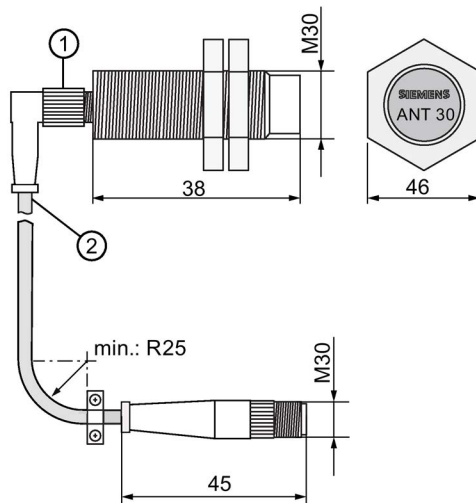
6.10.8 Dimension drawing

Figure 6-27 Dimension drawing ANT 30 (stainless steel variant)

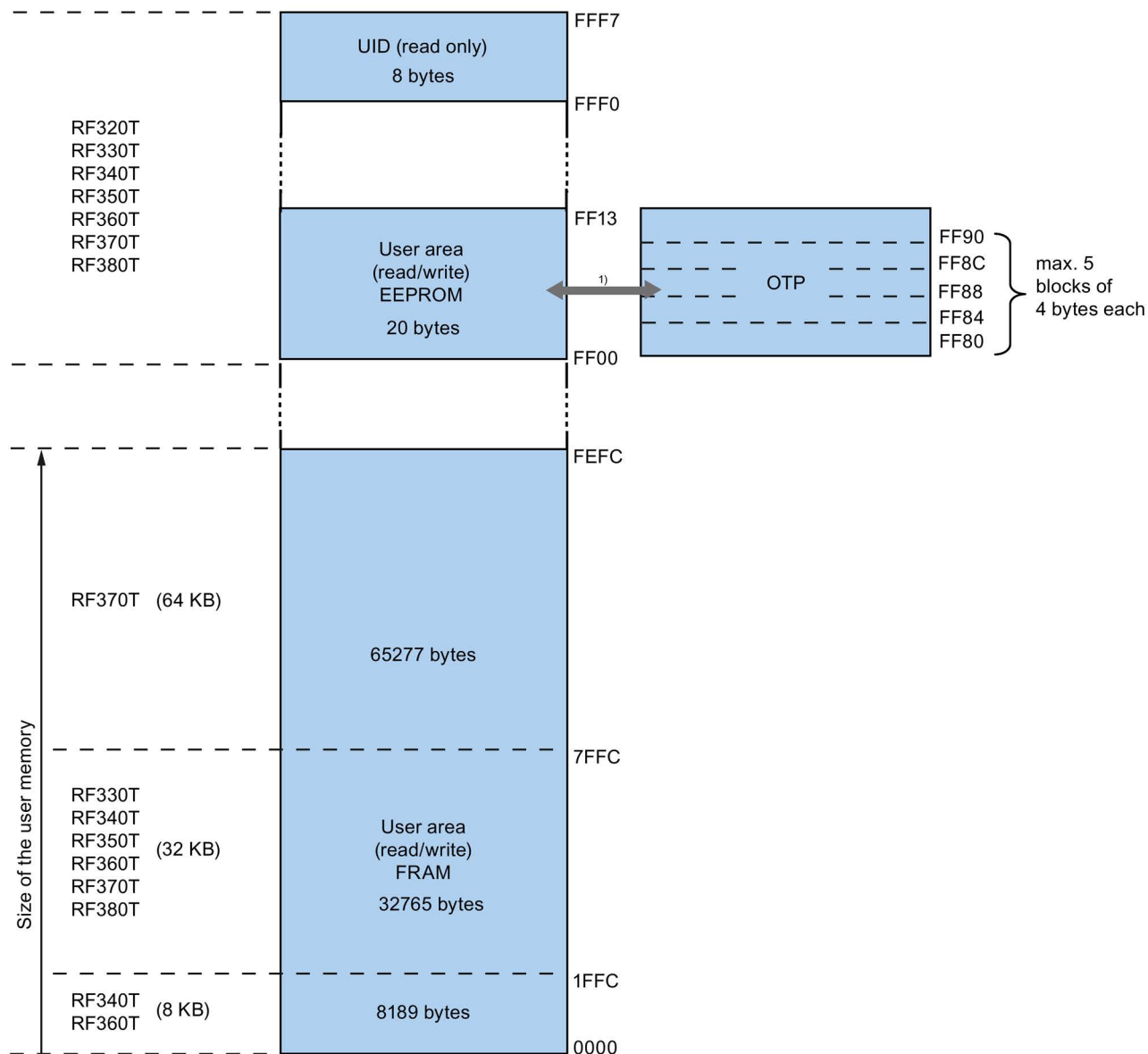
All dimensions in mm.

RF300 transponder

Features of the RF300 transponders

The RF300 transponders (RF3xxT) stand out particularly for their extremely fast data exchange with the RF300 readers (RF3xxR). With the exception of the RF320T transponder, all of the RF300 transponders have 8 to 64 KB of FRAM memory, which has an almost unlimited capacity for reading and writing.

7.1 Memory configuration of the RF300 transponders



- 1) Physically identical memory. When the OTP area is used, the corresponding user area (FF00-FF13) can no longer be modified (read only).

Figure 7-1 Memory configuration of the RF300 transponders

EEPROM area

The memory configuration of an RF300 transponder always comprises an EEPROM that has 20 bytes for user data (read/write) and a 4-byte unique serial number (UID, read only). For reasons of standardization, the UID is transferred as an 8 byte value through a read command to address FFF0 with a length of 8. The unused 4 high bytes are filled with zeros.

Note

Write access

Write access operations with a length that is not divisible by four without a remainder are acknowledged with an address error.

Note

Write speed

The EEPROM user memory (address FF00-FF13, or FF80-FF90) requires significantly more time for writing (approx. 11 ms/byte) than the high-speed FRAM memory. For time-critical applications with write functions, it is advisable to use FRAM transponders (e.g. RF330T, RF340T, RF350T, RF360T, RF370T, RF380T).

FRAM area

Depending on the tag type, high-speed FRAM memory is available. (8 KB, 32 KB, 64 KB). This area does not exist for the RF320T.

In the case of RF3xxT transponders with FRAM memory, the data carrier initialization command (INIT) is only effective on this memory area but not on the EEPROM area (FF00-FF13).

OTP area

The EEPROM memory area (address FF00-FF13) can also be used as a so-called "OTP" memory (One Time Programmable). The 5 block addresses FF80, FF84, FF88, FF8C and FF90 are used for this purpose. A write command to this block address with a valid length (4, 8, 12, 16, 20 depending on the block address) protects the written data from subsequent overwriting.

Note

Seamless use of the OTP area

When the OTP area is used, it must be ensured that the blocks are used starting from Block 0 consecutively.

Examples:

- 3 blocks (with write command), Block 0, 1, 2 (FF80, length = 12): valid
 - 2 blocks (consecutive), Block 0 (FF80, length = 4), Block 1 (FF84, length = 4): valid
 - 2 blocks (consecutive), Block 0 (FF80, length = 4), Block 2 (FF88, length = 4): Invalid
 - 1 Block, Block 4 (FF90, length = 4): Invalid
-

Note

Address error during write access

Write access operations with a length that is not divisible by four without a remainder are acknowledged with an address error.

Note

Use of the OTP area is not reversible

If you use the OPT area, you cannot undo it, because the OPT area can only be written to once.

7.2 SIMATIC RF320T

7.2.1 Features

RF320T	Characteristics	
	Area of application	Identification tasks on small assembly lines in harsh industrial environments
	Memory size	20 bytes of EEPROM user memory
	Write/read range	See section Field data of RF300 transponders (Page 51)
	Mounting on metal	Yes, with spacer
	Degree of protection	IP67/IPx9K

7.2.2 Ordering data

Table 7- 1 Ordering data RF320T

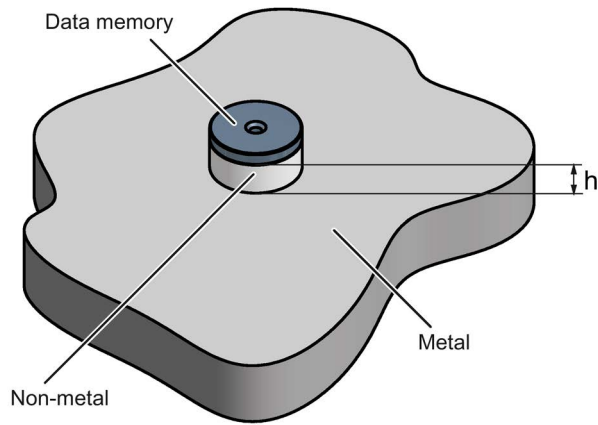
	Article number
RF320T	6GT2800-1CA00

Table 7- 2 Ordering data for RF320T accessories

	Article number
Spacer	6GT2690-0AK00

7.2.3 Mounting on metal

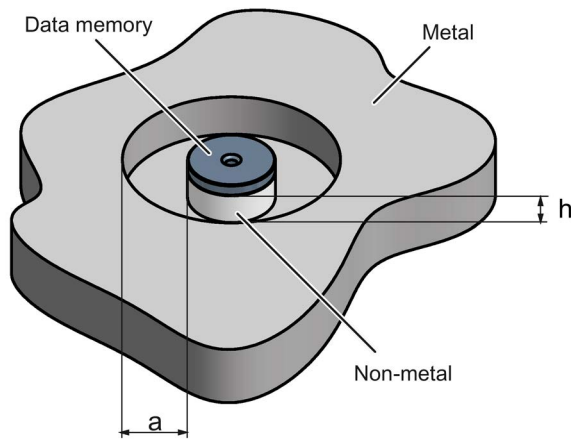
Mounting on metal



$$h \geq 15 \text{ mm}$$

Figure 7-2 Mounting the MDS D124/D324/D424/D524/E624 and RF320T on metal with spacer

Flush-mounting



$$h \geq 15 \text{ mm}$$

$$a \geq 25 \text{ mm}$$

Figure 7-3 Flush-mounting of the MDS D124/D324/D424/D524/E624 and RF320T in metal with spacer

Note

Going below the distances

If the distances (a and h) are not observed, a reduction of the field data results. It is possible to mount the MDS with metal screws (M3 countersunk head screws). This has no tangible impact on the range.

7.2.4 Technical data

Table 7- 3 Technical specifications for RF320T

6GT2800-1CA00	
Product type designation	SIMATIC RF320T
Memory	
Memory organization	Byte-oriented, write protection possible in 4-byte blocks
Memory configuration	
• UID	• 4 bytes EEPROM
• User memory	• 20 bytes EEPROM
• OTP memory	• 20 bytes EEPROM
Read cycles (at < 40 °C)	> 10 ¹⁴
Write cycles (at < 40 °C)	> 10 ⁵
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S ₉)	Dependent on the reader used, see section "Field data of RF300 transponders (Page 51)"
MTBF (Mean Time Between Failures)	1800 years
Mechanical specifications	
Enclosure	
• Material	• Epoxy resin
• Color	• Black
Recommended distance to metal	≥ 20 mm
Power supply	Inductive, without battery

6GT2800-1CA00	
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +125 °C
• outside the read/write field	• -40 ... +140 °C
• during storage	• -40 ... +140 °C
Degree of protection according to EN 60529	• IP67 • IPx9K
Shock-resistant according to EN 60721-3-7 Class 7 M3 ¹⁾	1000 m/s ²
Vibration-resistant according to EN 60721-3-7 Class 7 M3 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (Ø x H)	27 x 4 mm
Weight	5 g
Type of mounting	• 1 x M3 screw ²⁾ ≤ 1.0 Nm • Glued ³⁾

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

²⁾) To prevent it loosening during operation, secure the screw with screw locking varnish.

³⁾ The processing instructions of the adhesive manufacturer must be observed.

7.2.5 Dimension drawing

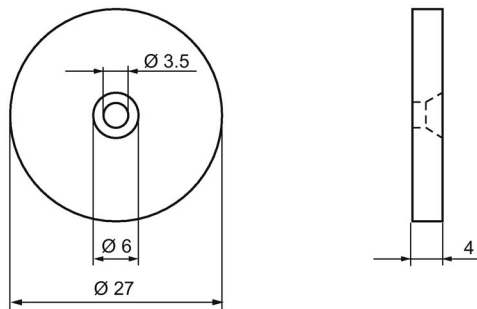


Figure 7-4 RF320T dimension drawing

Dimensions in mm

7.3 SIMATIC RF330T

7.3.1 Features

Table 7- 4

RF330T	Characteristics	
	Area of application	In production automation for identification of metallic workpiece holders, workpieces or containers.
	Memory size	32 KB EEPROM user memory
	Write/read range	See section "Field data of RF300 transponders (Page 51)"
	Mounting on metal	Yes flush mounted on/in metal
	Degree of protection	IP68/IPx9K

7.3.2 Ordering data

Table 7- 5 Ordering data RF330T

	Article number
RF330T	6GT2800-5BA00

Table 7- 6 Ordering data for RF330T accessories

	Article number
Fixing hood RF330T / MDS D423	6GT2690-0AE00

7.3.3 Mounting on/in metal

Direct mounting of the RF330T on metal is permitted.

Mounting of the RF330T on metal

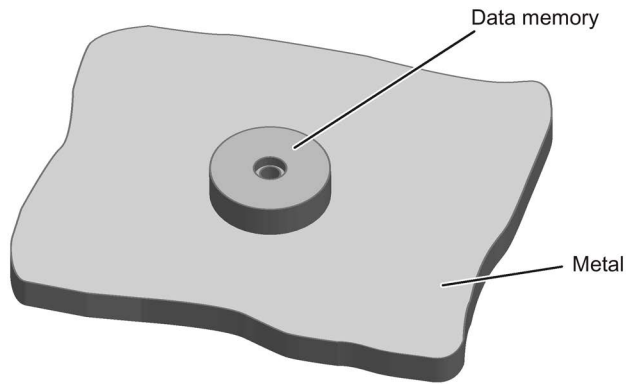
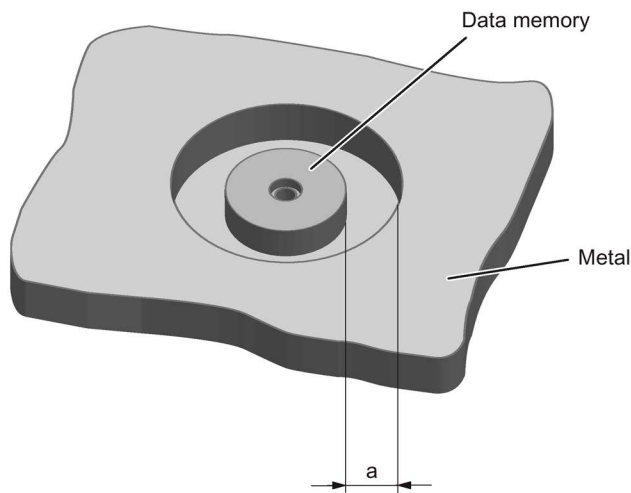


Figure 7-5 Mounting of the RF330T on metal

Flush-mounting of RF330T in metal



$a \geq 10 \text{ mm}$

Figure 7-6 Mounting of the RF330T in metal with 10 mm clearance

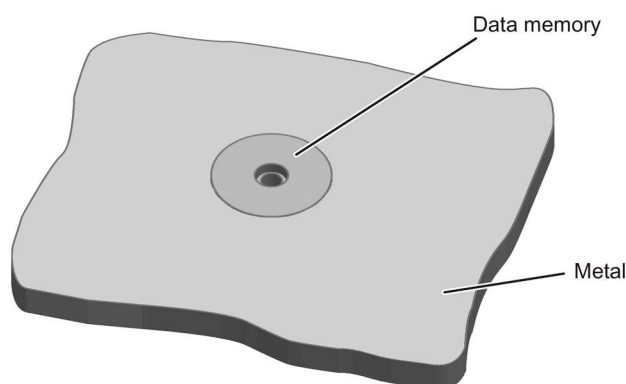


Figure 7-7 Mounting of the RF330T in metal without clearance

Note

Reduction of the write/read range

Note that when the device is flush-mounted in metal without a surrounding clearance ≥ 10 mm, the write/read range is significantly reduced.

7.3.4 Technical specifications

Table 7- 7 RF330T technical specifications

6GT2800-5BA00	
Product type designation	SIMATIC RF330T
Memory	
Memory organization	in bytes
Memory configuration	
• UID	• 4 bytes EEPROM
• User memory	• 8 KB FRAM
• OTP memory	• 20 bytes EEPROM
Read cycles (at $< 40\text{ }^{\circ}\text{C}$)	$> 10^{14}$
Write cycles (at $< 40\text{ }^{\circ}\text{C}$)	$> 10^{14}$
Data retention time (at $< 40\text{ }^{\circ}\text{C}$)	> 10 years
Write/read distance (S_9)	Dependent on the reader used, see section "Field data of RF300 transponders (Page 51)"
MTBF (Mean Time Between Failures)	1200 years

6GT2800-5BA00	
Mechanical specifications	
Enclosure	
• Material	• Plastic PPS
• Color	• Black
Recommended distance to metal	≥ 0 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +100 °C
• during storage	• -40 ... +100 °C
Degree of protection according to EN 60529	• IP68 2 hours, 2 m, 20 °C • IPx9K steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C
Pressure resistance	• Low pressure resistant vacuum dryer: up to 20 mbar • high pressure resistant (see degree of protection IPx9K)
Shock-resistant according to EN 60721-3-7 Class 7 M2 ¹⁾	500 m/s ²
Vibration-resistant according to EN 60721-3-7 Class 7 M2 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (Ø x H)	30 x 8 mm
Weight	10 g
Type of mounting	1 x M4 screw ²⁾ ≤ 1.5 Nm

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

²⁾ To prevent it loosening during operation, secure the screw with screw locking varnish.

7.3.5 Dimension drawing

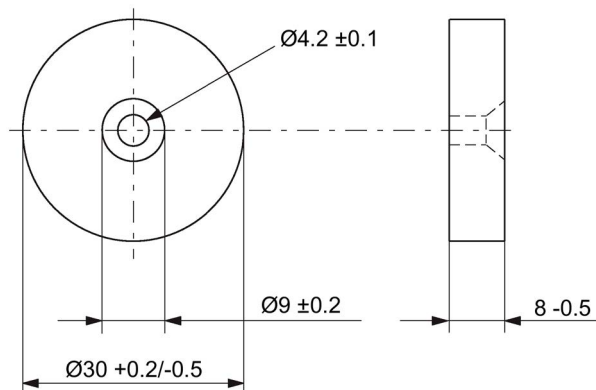


Figure 7-8 RF330T dimension drawing

Dimensions in mm

7.4 SIMATIC RF340T

7.4.1 Features

Table 7- 8

RF340T	Characteristics	
 The image shows a dark grey, rectangular SIMATIC RF340T transponder. It has a small circular feature at the top right corner. The text 'SIMATIC RF 340T' and '6GT2800-4BB00' is visible on the front face.	Area of application	Identification tasks on small assembly lines in harsh industrial environments
	Memory size	8 KB FRAM user memory 32 KB FRAM user memory
	Write/read range	See section Field data of RF300 transponders (Page 51)
	Mounting on metal	Yes
	Degree of protection	IP68/IPx9K

7.4.2 Ordering data

Table 7- 9 Ordering data RF340T

	Article number
RF340T 8 KB FRAM user memory	6GT2800-4BB00
RF340T 32 KB FRAM user memory	6GT2800-5BB00

7.4.3 Mounting on metal

Direct mounting of the RF340T on metal is permitted.

Mounting of RF340T on metal

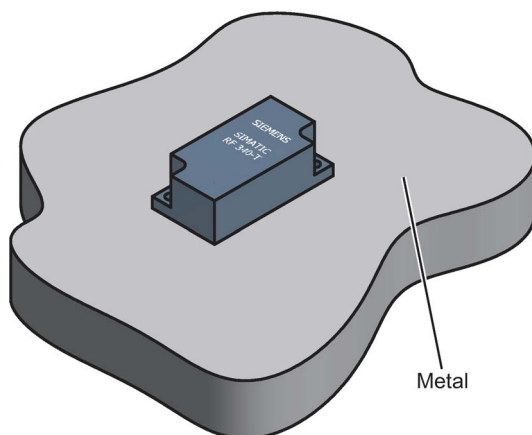


Figure 7-9 Mounting of RF340T on metal

Flush-mounting of RF340T in metal:

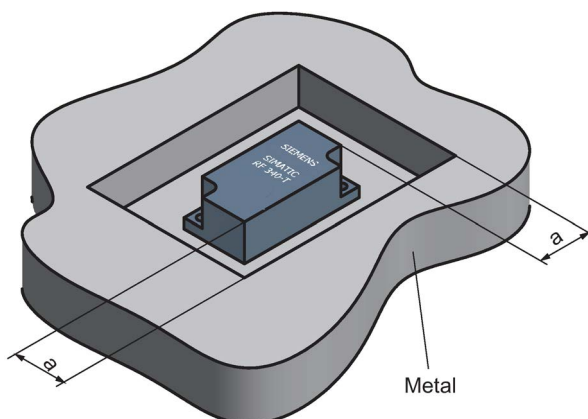


Figure 7-10 Flush-mounting of RF340T in metal

The standard value for a is ≥ 20 mm. At lower values, the field data change significantly, resulting in a reduction in the range.

7.4.4 Technical specifications

Table 7- 10 Technical specifications for RF340T

6GT2800-4BB00 6GT2800-5BB00	
Product type designation	SIMATIC RF340T
Memory	
Memory organization	in bytes
Memory configuration	
• UID	• 4 bytes EEPROM
• User memory	• 8 KB FRAM / 32 KB FRAM
• OTP memory	• 20 bytes EEPROM
Read cycles (at < 40 °C)	> 10 ¹⁰
Write cycles (at < 40 °C)	> 10 ¹⁰
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of RF300 transponders (Page 51)"
MTBF (Mean Time Between Failures)	1200 years
Mechanical specifications	
Enclosure	
• Material	• Plastic PA 12
• Color	• Anthracite
Recommended distance to metal	≥ 0 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +85 °C
• during storage	• -40 ... +85 °C
Degree of protection according to EN 60529	• IP68 • IPx9K
Shock-resistant according to EN 60721-3-7 Class 7 M2 ¹⁾	500 m/s ²
Vibration-resistant according to EN 60721-3-7 Class 7 M2 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted

6GT2800-4BB00
6GT2800-5BB00

Design, dimensions and weight

Dimensions (L x W x H)	47.5 x 25 x 15.4 mm
Weight	25 g
Type of mounting	2 x M3 screws ≤ 1.0 Nm

1) The values for shock and vibration are maximum values and must not be applied continuously.

7.4.5 Dimension drawing

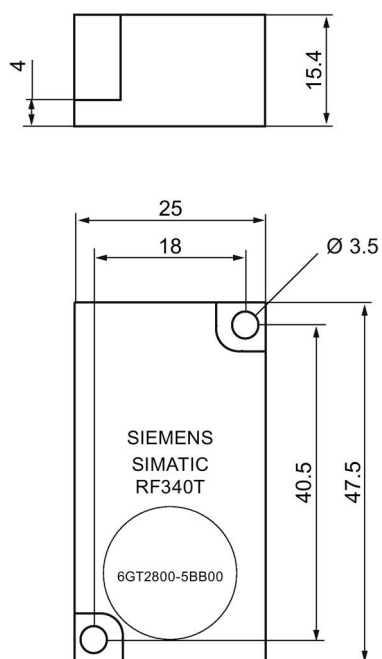


Figure 7-11 Dimension drawing RF340T

Dimensions in mm

7.5 SIMATIC RF350T

7.5.1 Features

RF350T	Characteristics	
	Area of application	Identification tasks on small assembly lines in harsh industrial environments
	Memory size	32 KB FRAM user memory
	Write/read range	See section Field data of RF300 transponders (Page 51)
	Mounting on metal	Yes
	Degree of protection	IP68

7.5.2 Ordering data

Table 7- 11 Ordering data RF350T

	Article number
RF350T	6GT2800-5BD00

7.5.3 Mounting on metal

Direct mounting of the RF350T on metal is permitted.

Mounting of RF350T on metal

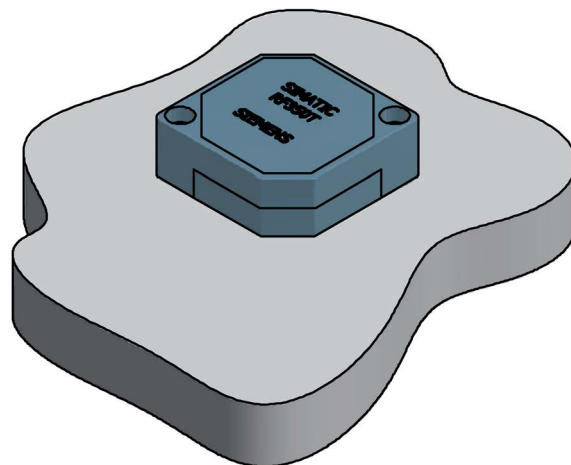


Figure 7-12 Mounting of RF350T on metal

Flush-mounting of RF350T in metal:

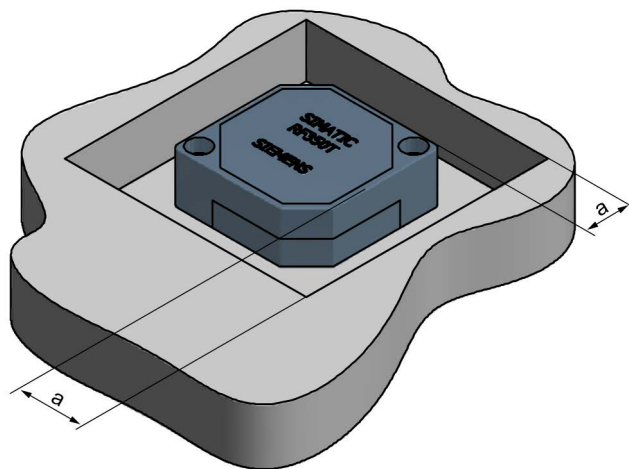


Figure 7-13 RF350T flush-mounted in metal

The standard value for a is ≥ 20 mm. At lower values, the field data change significantly, resulting in a reduction in the range.

7.5.4 Mounting options

Mounting with fixing frame

The RF350T transponder can be mounted as shown with the fixing frame:

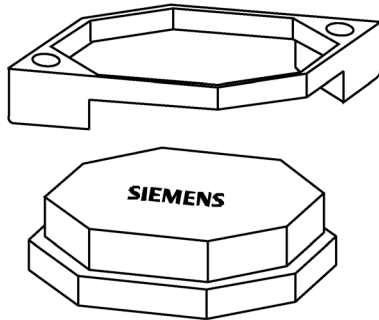


Figure 7-14 Installation diagram

Dimensions of the fixing frame

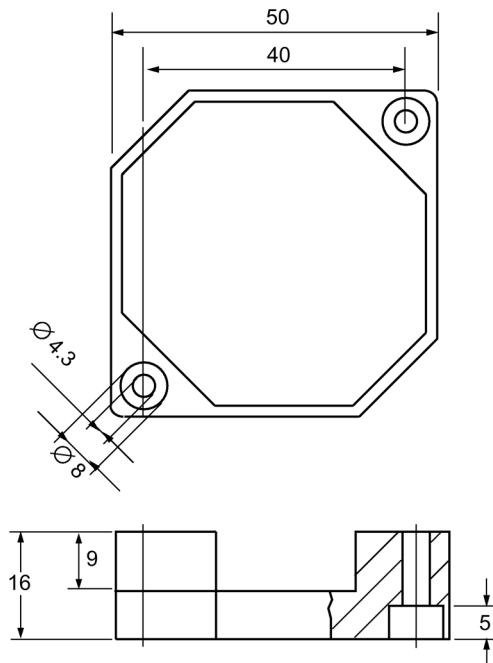


Figure 7-15 RF350T fixing frame

7.5.5 Technical data

Table 7- 12 Technical specifications for RF350T

6GT2800-5BD00	
Product type designation	SIMATIC RF350T
Memory	
Memory organization	in bytes
Memory configuration	
• UID	• 4 bytes EEPROM
• User memory	• 32 KB FRAM
• OTP memory	• 20 bytes EEPROM
Read cycles (at < 40 °C)	> 10 ¹⁰
Write cycles (at < 40 °C)	> 10 ¹⁰
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of RF300 transponders (Page 51)"
MTBF (Mean Time Between Failures)	1200 years
Mechanical specifications	
Enclosure	
• Material	• Plastic PA 12
• Color	• Anthracite
Recommended distance to metal	≥ 0 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +85 °C
• during storage	• -40 ... +85 °C
Degree of protection according to EN 60529	IP68
Shock-resistant according to EN 60721-3-7 Class 7 M2 ¹⁾	500 m/s ²
Vibration-resistant according to EN 60721-3-7 Class 7 M2 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted

6GT2800-5BD00

Design, dimensions and weight

Dimensions (L x W x H)	50 x 50 x 20 mm
Weight	25 g
Type of mounting	2 x M4 screws ≤ 1.5 Nm

1) The values for shock and vibration are maximum values and must not be applied continuously.

7.5.6 Dimension drawing

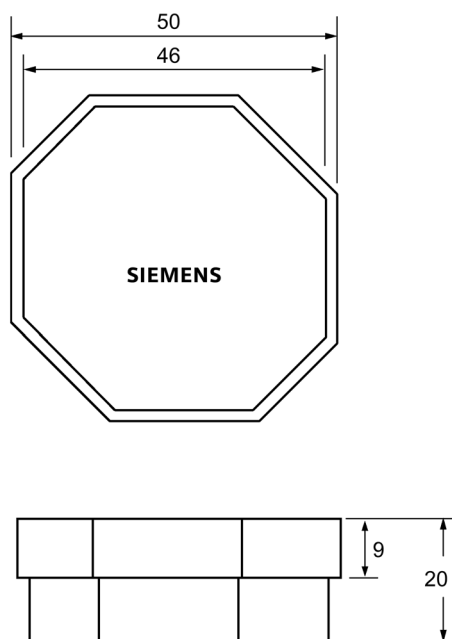


Figure 7-16 RF350T dimension drawing

Dimensions in mm

7.6 SIMATIC RF360T

7.6.1 Features

RF360T	Characteristics	
	Area of application	Identification tasks on small assembly lines in harsh industrial environments
	Memory size	8 KB FRAM user memory 32 KB FRAM user memory
	Write/read range	see section Field data of RF300 transponders (Page 51)
	Mounting on metal	Yes, with spacer
	Degree of protection	IP67

7.6.2 Ordering data

Table 7- 13 Ordering data RF360T

	Article number
RF360T 8 KB FRAM user memory	6GT2800-4AC00
RF360T 32 KB FRAM user memory	6GT2800-5AC00

Table 7- 14 Ordering data for RF360T accessories

	Article number
Spacer (in conjunction with fixing pocket 6GT2190-0AB00)	6GT2190-0AA00
Fixing pocket (in conjunction with spacer 6GT2190-0AA00)	6GT2190-0AB00

7.6.3 Mounting on metal

Direct mounting of the RF360T on metal is not allowed. A distance ≥ 20 mm is recommended. This can be achieved using the spacer 6GT2190-0AA00 in combination with the fixing pocket 6GT2190-0AB00.

Mounting of RF360T on metal

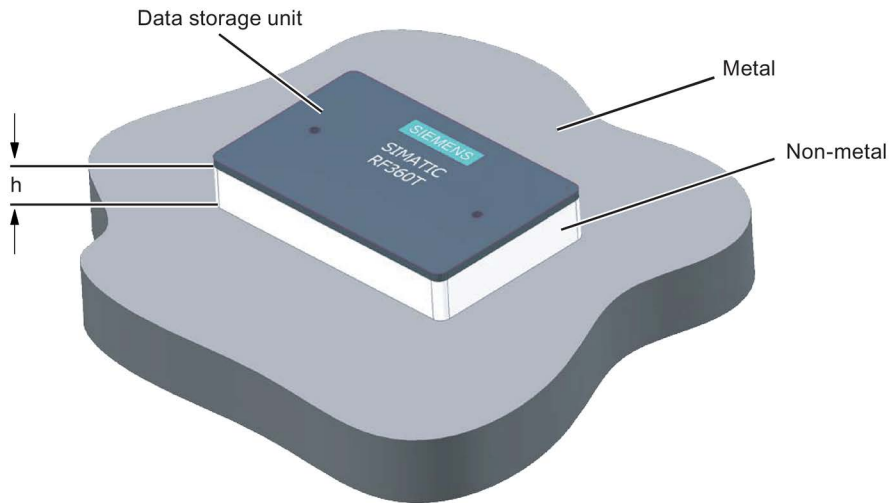


Figure 7-17 Mounting of RF360T with spacer

The standard value for h is ≥ 20 mm.

Flush-mounting of RF360T in metal:

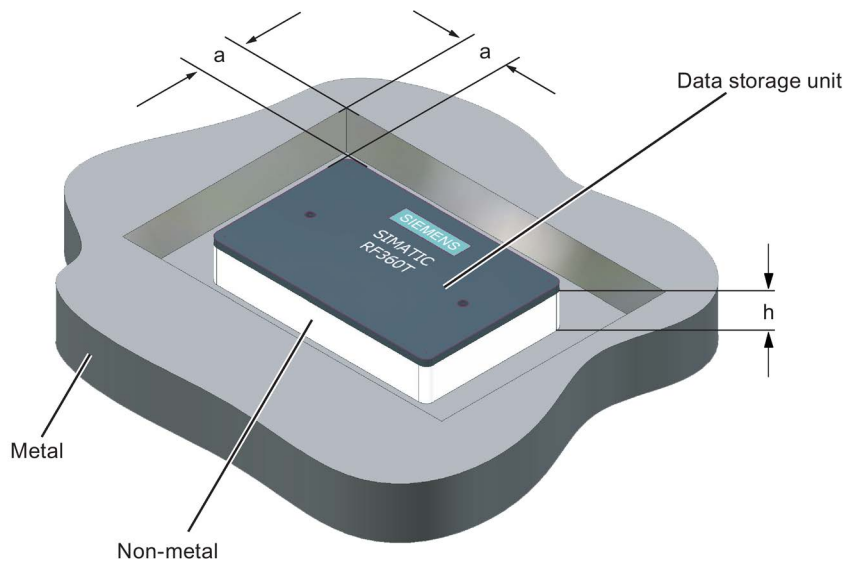


Figure 7-18 Flush-mounting of RF360T with spacer

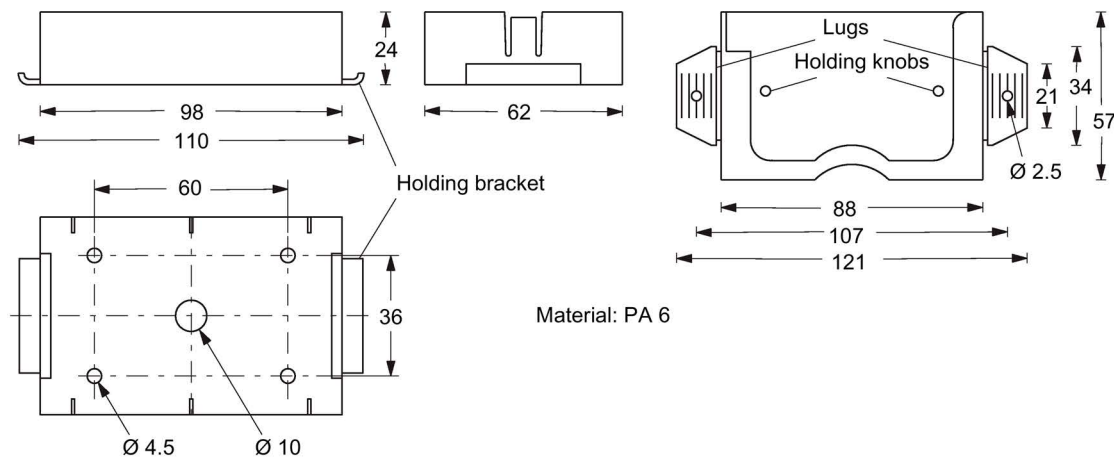
The standard value for a is ≥ 20 mm. At lower values, the field data change significantly, resulting in a reduction in the range.

Dimensions of spacer and fixing pocket for RF360T

Dimension sketch

Spacers: 6GT2190-0AA00

Mounting bracket: 6GT2190-0AB00

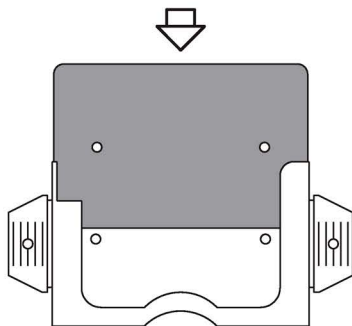


The spacer can be mounted directly on metal. Together with the mounting bracket, this results in a distance of 20 mm between transponder and metal.

Mounting:

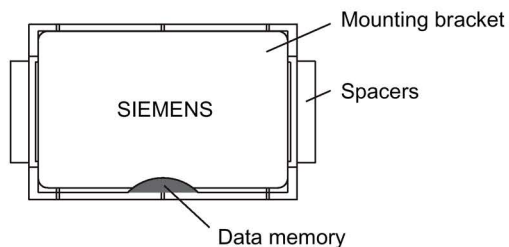
- With 2 or 4 screws (M4)
- With rubber pads on the holding brackets (e.g. on mesh boxes)
- With cable ties on the holding brackets (e.g. on mesh boxes)

Transponder with mounting bracket



The transponder is pushed into the mounting bracket. Locking takes place with holding knobs in the mounting bracket.

Transponder with mounting bracket and spacer (assembled)



The tabs of the mounting bracket are secured to a non-metal base. This can be done as follows:

- Screws in the holes provided
- Rivets in the holes provided
- Nails through the holes
- Staples through the plastic of the tabs
- Insertion in the spacer

The tabs can also be bent by 90°.

Re-assembly instructions:

Slide transponder into the mounting bracket. The tabs are then bent by 90° and inserted into the spacer. Position the mounting bracket so that it covers the transponder (see Figure). It is automatically locked into place.

Figure 7-19 Dimensions of spacer and fixing pocket for RF360T

7.6.4 Technical data

Table 7- 15 Technical specifications for RF360T

6GT2800-4AC00	
6GT2800-5AC00	
Product type designation	SIMATIC RF360T
Memory	
Memory organization	in bytes
Memory configuration	
• UID	• 4 bytes EEPROM
• User memory	• 8 KB FRAM / 32 KB FRAM
• OTP memory	• 20 bytes EEPROM
Read cycles (at < 40 °C)	> 10 ¹⁰
Write cycles (at < 40 °C)	> 10 ¹⁰
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of RF300 transponders (Page 51)"
MTBF (Mean Time Between Failures)	1200 years
Mechanical specifications	
Enclosure	
• Material	• Epoxy resin
• Color	• Anthracite
Recommended distance to metal	≥ 20 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +75 °C
• outside the read/write field	• -40 ... +85 °C
• during storage	• -40 ... +85 °C
Degree of protection according to EN 60529	IP67
Shock-resistant acc. to EN 60721-3-7, Class 7 M2	500 m/s ²
Vibration-resistant acc. to EN 60721-3-7, Class 7 M2	200 m/s ²
Torsion and bending load	Not permitted

6GT2800-4AC00

6GT2800-5AC00

Design, dimensions and weight

Dimensions (L x W x H)	86 x 55 x 2.5 mm
Weight	25 g
Type of mounting	• 2 x M3 screws • ≤ 1.0 Nm • Fixing pocket (6GT2190-0AB00)

7.6.5 Dimension drawing

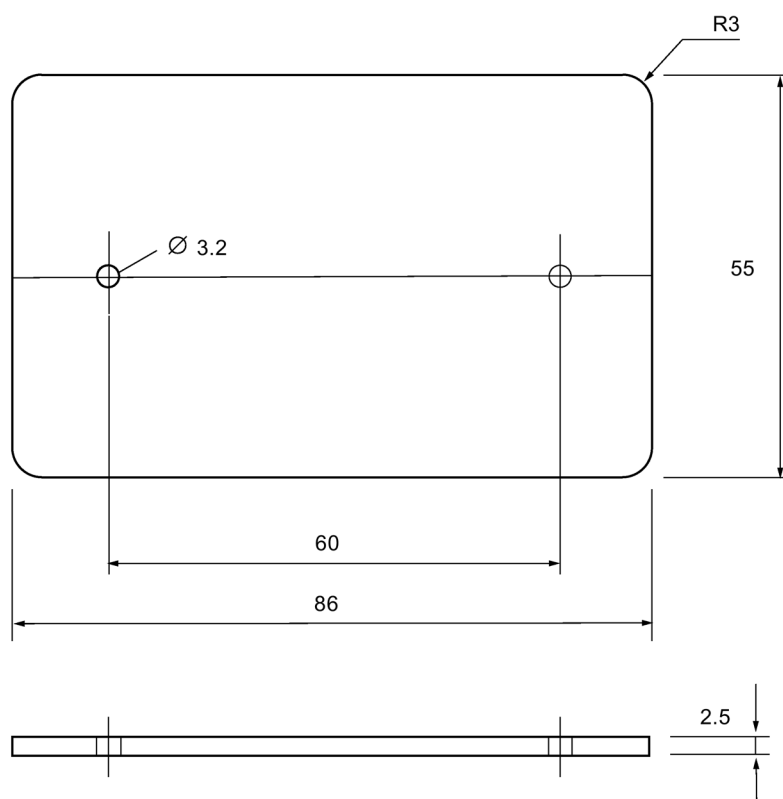


Figure 7-20 RF360T dimension drawing

Dimensions in mm

7.7 SIMATIC RF370T

7.7.1 Features

The SIMATIC RF370T transponder is a passive (i.e. battery-free) data carrier in a square type of construction.

RF370T	Characteristics	
	Area of application	Identification tasks on assembly lines in harsh industrial environments, due to high resistance to oils, lubricants and cleaning agents, and suitable for larger ranges, e.g. automotive industry
	Memory size	• 32 KB FRAM user memory • 64 KB FRAM user memory
	Write/read range	see section Field data of RF300 transponders (Page 51)
	Mounting on metal	Yes
	Degree of protection	IP68/IPx9K

7.7.2 Ordering data

Table 7- 16 Ordering data RF370T

	Article number
RF370T 32 KB FRAM user memory	6GT2800-5BE00
RF370T 64 KB FRAM user memory	6GT2800-6BE00

7.7.3 Mounting on metal

Direct mounting of the RF370T on metal is permitted.

Mounting of RF370T on metal

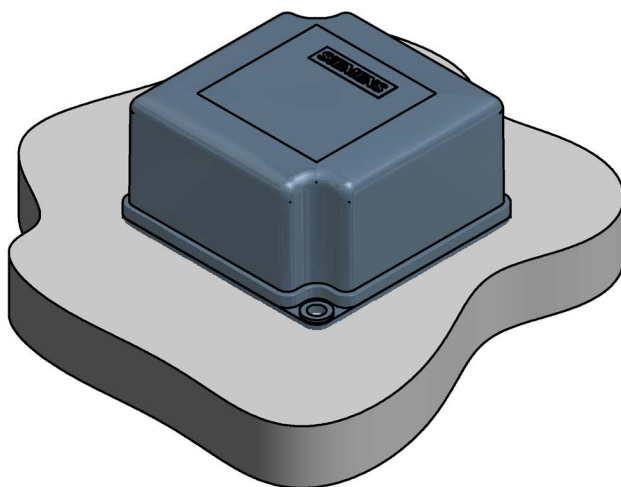


Figure 7-21 Mounting of RF370T on metal

Flush-mounting of RF370T in metal:

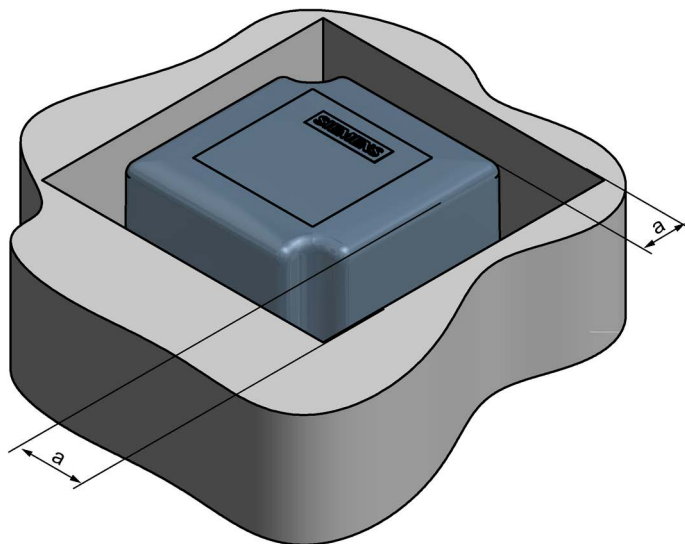


Figure 7-22 RF370T flush-mounted in metal

The standard value for a is ≥ 20 mm. At lower values, the field data change significantly, resulting in a reduction in the range.

7.7.4 Mounting instructions

It is essential that you observe the instructions in the Section Installation guidelines (Page 66).

Properties	Description
Type of installation	Screw fixing (two M5 screws)
Tightening torque	< 1.2 Nm (at room temperature)

7.7.5 Technical specifications

Table 7- 17 Technical specifications RF370T

	6GT2800-5BE00 6GT2800-6BE00
Product type designation	SIMATIC RF370T
Memory	
Memory organization	in bytes
Memory configuration	
• UID	• 4 bytes EEPROM
• User memory	• 32 KB FRAM / 64 KB FRAM
• OTP memory	• 20 bytes EEPROM
Read cycles (at < 40 °C)	> 10 ¹⁰
Write cycles (at < 40 °C)	> 10 ¹⁰
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of RF300 transponders (Page 51)"
MTBF (Mean Time Between Failures)	1200 years
Mechanical specifications	
Enclosure	
• Material	• Plastic PA 12
• Color	• Anthracite
Recommended distance to metal	≥ 0 mm
Power supply	Inductive, without battery

6GT2800-5BE00	
6GT2800-6BE00	
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +85 °C
• during storage	• -40 ... +85 °C
Degree of protection according to EN 60529	IPx9K
Shock-resistant according to EN 60721-3-7 Class 7 M2 ¹⁾	500 m/s ²
Vibration-resistant according to EN 60721-3-7 Class 7 M2 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (L x W x H)	75 x 75 x 41 mm
Weight	200 g
Type of mounting	2 x M5 screws ≤ 1.5 Nm

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

7.7.6 Dimensional drawing

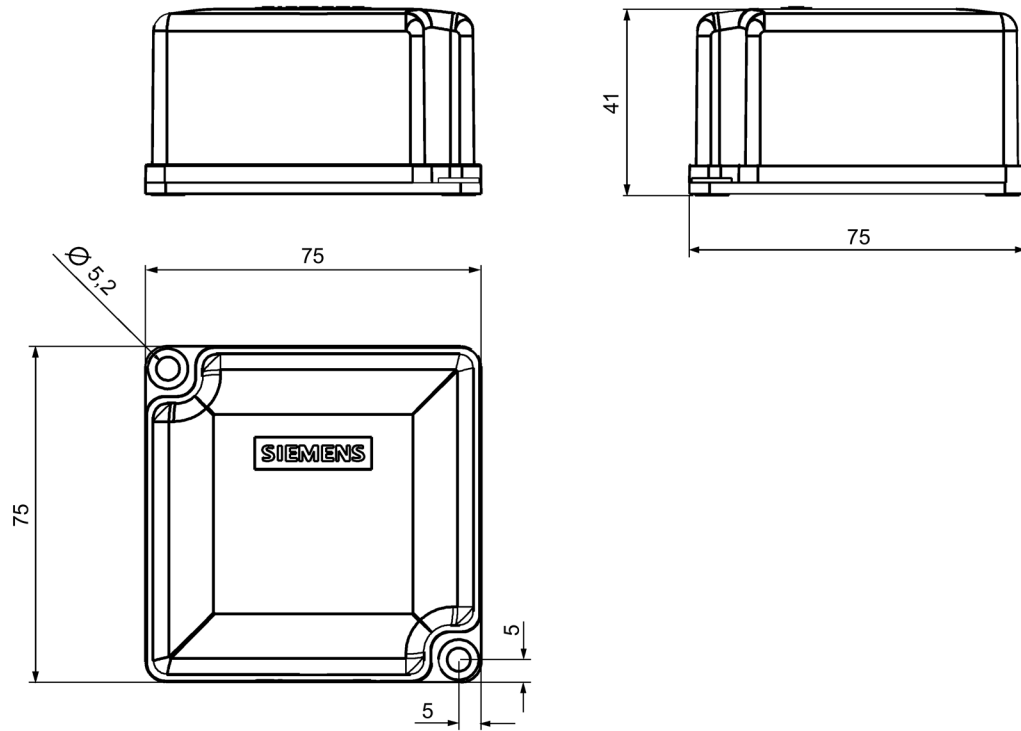


Figure 7-23 RF370T dimension drawing

Dimensions in mm

7.8 SIMATIC RF380T

7.8.1 Features

The SIMATIC RF380T transponder is an extremely rugged and heat-resistant round data carrier suitable e.g. for applications in the automotive industry.

SIMATIC RF380T transponder	Characteristics	
	Area of application	Identification tasks in applications (e.g. automotive industry) with cyclic high temperature stress > 85 °C and < 220 °C Highly resistant to mineral oils, lubricants and cleaning agents Typical applications: • Primer coat, electrolytic dip area, cataphoresis with the associated drying furnaces • Top coat area with drying furnaces • Washing areas at temperatures > 85°C • Other applications with higher temperatures
	Memory size	32 KB FRAM user memory
	Write/read range	see section "Field data of RF300 transponders (Page 51)"
	Mounting on metal	Yes, flush-mounted in metal
	Degree of protection	IP68

7.8.2 Ordering data

Table 7- 18 Ordering data RF380T

	Article number
RF380T User memory 32 KB FRAM (read/write) and 4 bytes EEPROM	6GT2800-5DA00

Table 7- 19 Ordering data for RF380T

	Article number
Holder (short version)	6GT2090-0QA00
Holder (long version)	6GT2090-0QA00-0AX3
Shrouding cover	6GT2090-0QB00
Universal holder	6GT2590-0QA00

7.8.3 Installation guidelines for RF380T

It is essential that you observe the instructions in the Section Installation guidelines (Page 66).

The following section only deals with features specific to the SIMATIC RF380T.

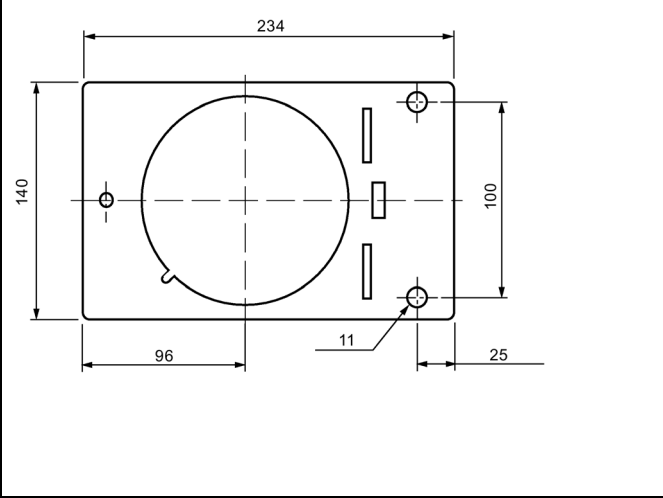
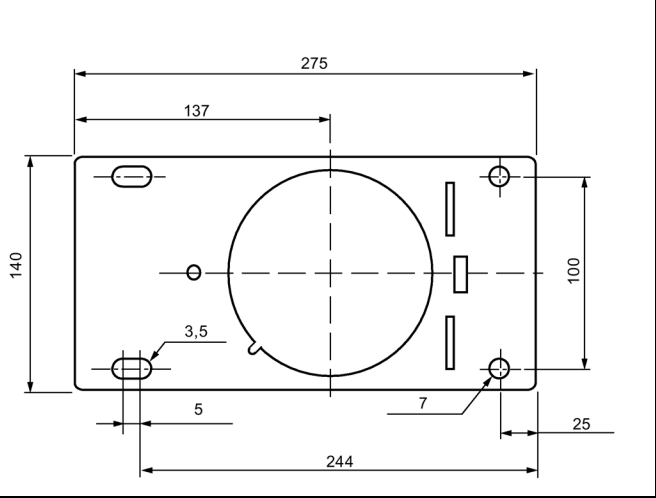
7.8.3.1 Mounting instructions

Note

Only use tag with original holder

You are strongly recommended to only use the tag with the original holder specified. Only this holder guarantees that the data memory observes the listed values for shock, vibration and temperature. A protective cover is recommendable for applications in paint shops.

Data memory holder

Short version (6GT2 090-0QA00)	Long version (6GT2090-0QA00-0AX3)
	
Material: V2A sheet-steel with thickness 2.5 mm BI 2.5 DIN 59382 1.4541	

Assembly of data memory with holder

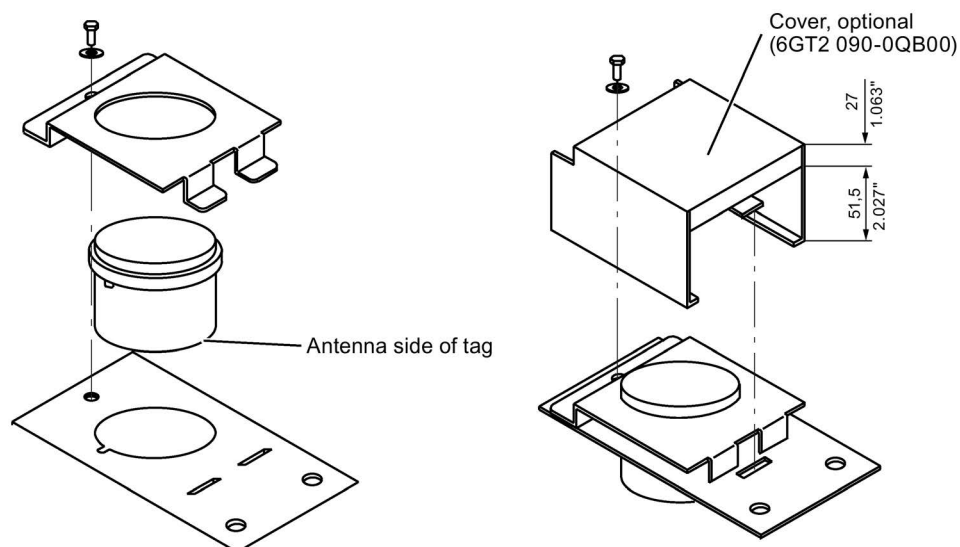


Figure 7-24 Assembly of tag with holder

Scope of supply

The holder is provided with all mounting parts and a mounting diagram. Mounting screws for securing the holder are not included. The mounting screws are of diameter M 10. The minimum length is 25 mm. The optional cover can be used for the long and short versions of the holder.

Universal holder

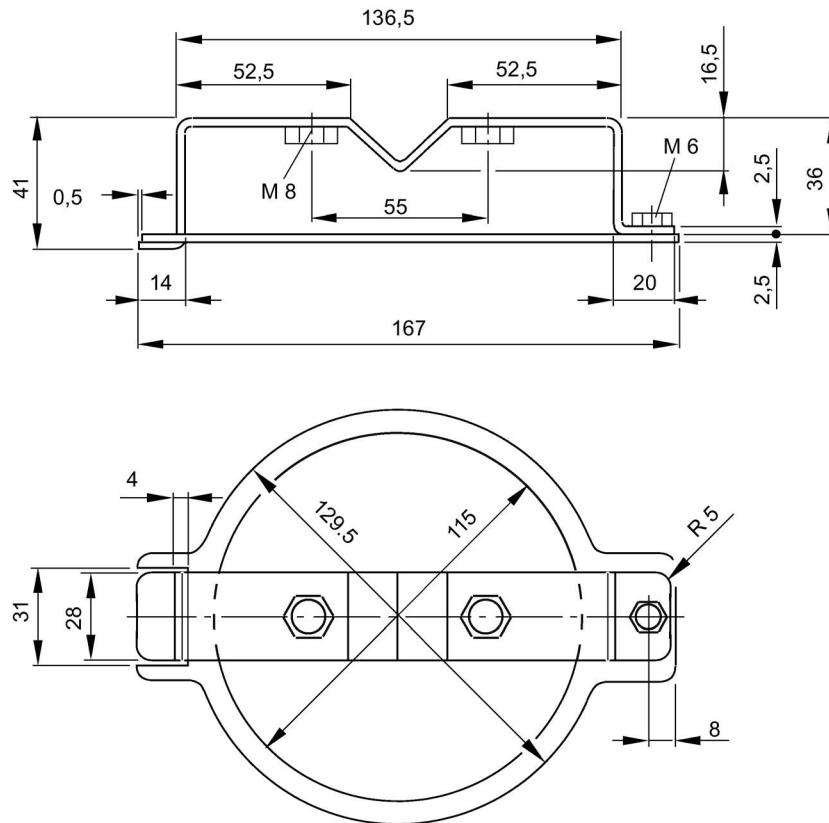


Figure 7-25 Universal holder 6GT2590-0QA00

7.8.3.2 Metal-free area

Direct mounting of the RF380T on metal is permitted.

Mounting of RF380T on metal

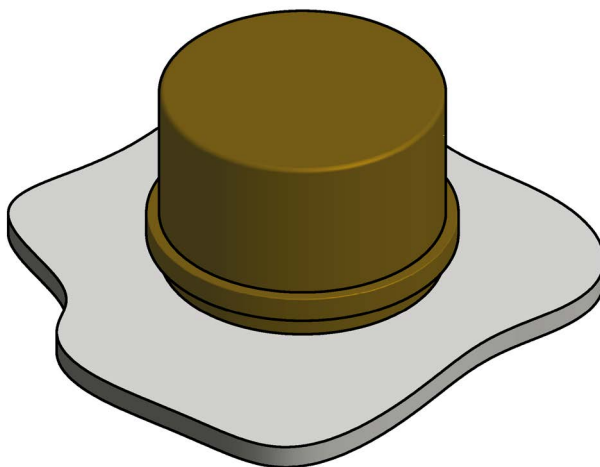


Figure 7-26 Mounting of RF380T on metal

Flush-mounting of RF380T in metal:

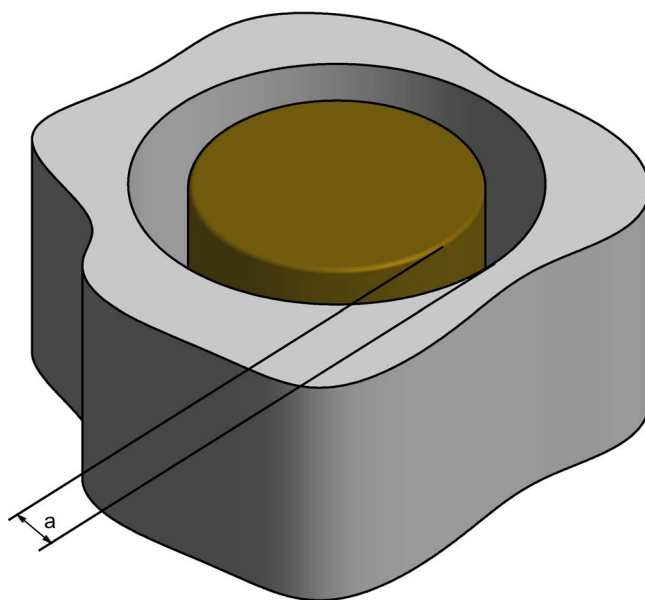


Figure 7-27 RF380T flush-mounted in metal

The standard value for a is ≥ 40 mm. At lower values, the field data change significantly, resulting in a reduction in the range.

7.8.4 Configuring instructions

7.8.4.1 Temperature dependence of the transmission window

The guidelines in the section "Planning the RF300 system" apply to configuration of heat-resistant data memories, with the exception of the limit distance and field length at temperatures above 85 °C. At temperatures above 85 °C, the length of the transmission window is reduced by up to 10%.

7.8.4.2 Temperature response in cyclic operation

At ambient temperatures (T_u) up to 110 °C, cyclic operation is not necessary, i.e. up to this temperature, the transponder can be in constant operation.

Note

Calculation of the temperature curves

Calculation of the temperature curves or of a temperature profile can be carried out on request by Siemens AG. Exact knowledge of the internal temperature facilitates configuration for time-critical applications.

You can also carry out the calculation with the aid of the "SIMATIC RF Temperature Calculator" on the "Ident Systems Software & Documentation" DVD (refer to the section "DVD "Ident Systems Software & Documentation" (Page 489)").

Ambient temperatures > 110 °C

Note

Cancellation of warranty

The internal temperature of the data memory must not exceed the critical threshold of 110 °C. Each heating phase must be followed by a cooling phase. No warranty claims will otherwise be accepted.

Some limit cycles are listed in the table below:

Table 7- 20 Limit cycles of data memory temperature

T_u (heating up)	Heating up	T_u (cooling down)	Cooling down
220 °C	0.5 h	25 °C	> 2 h
200 °C	1 h	25 °C	> 2 h
190 °C	1 h	25 °C	> 1 h 45 min
180 °C	2 h	25 °C	> 5 h
170 °C	2 h	25 °C	> 4 h

The internal temperature of the tag follows an exponential function with which the internal temperature and the operability of the tag can be calculated in advance. This is particularly relevant to temperature-critical applications or those with a complex temperature profile.

Ambient temperatures > 220°C

Note

Cancellation of warranty

The data memory must not be exposed to ambient temperatures > 220 °C. No warranty claims will otherwise be accepted.

However, the mechanical stability is retained up to 230 °C!

Example of a cyclic sequence

Table 7- 21 Typical temperature profile of an application in the paint shop

Start of tag at initial point	Duration (min)	Ambient temperature (°C)
Electrolytic dip	20	30
Electrolytic dip dryer	60	200
Transport	60	25
PVC dryer	25	170
Transport	60	25
Filler dryer	60	160
Transport	60	25
Top coat dryer	60	120
Transport	60	25
Wax dryer	25	100
Transport	150	25

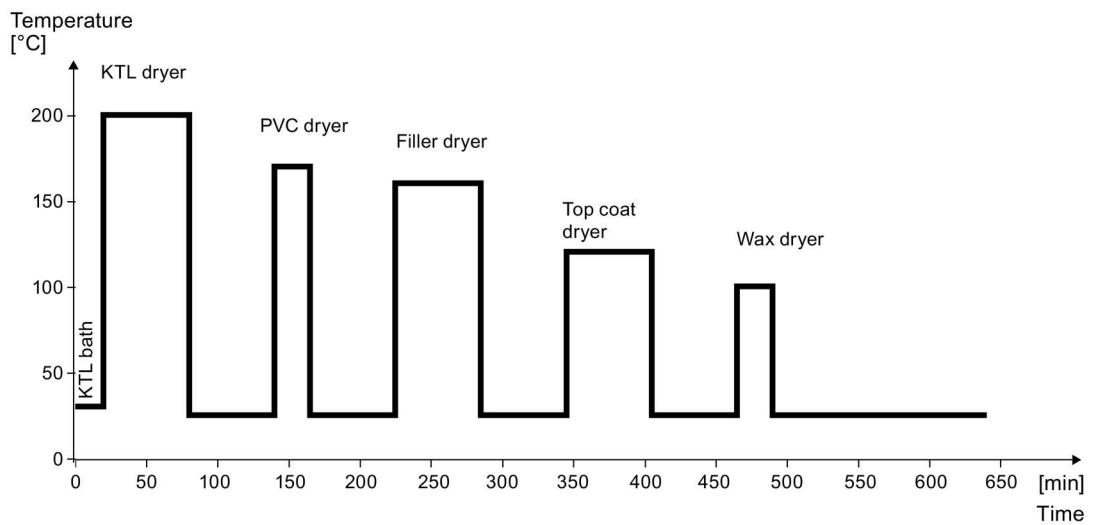


Figure 7-28 Graphic trend of temperature profile from above table

The simulation results in the following:

Following a simulation time of 36.5 hours, a total of 3 cycles were carried out, and an internal temperature of 90 degrees Celsius was reached.

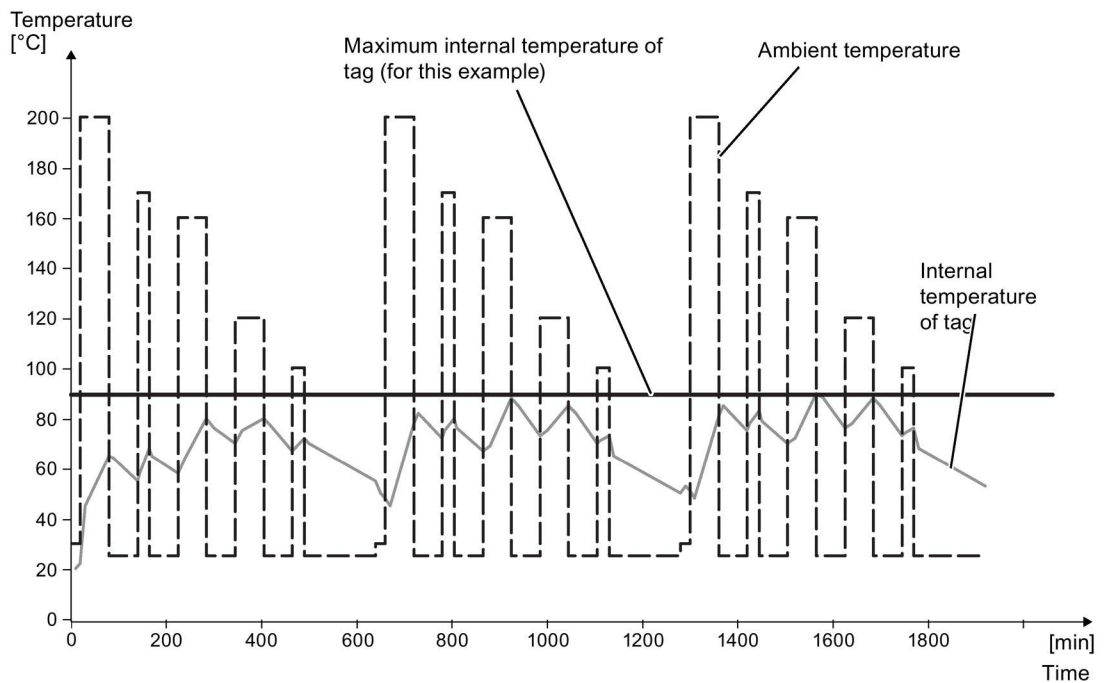


Figure 7-29 Complete temperature response due to simulation

7.8.5 Use of the transponder in the Ex protection area

The TÜV SÜD Automotive GmbH as approved test center as well as the TÜV SÜD Product Service GmbH as certification center, identification number 0123, as per Article 9 of the Directive of the European Council of 23 March 1994 (94/9/EC), has confirmed the compliance with the essential health and safety requirements relating to the design and construction of equipment and protective systems intended for use in hazardous areas as per Annex II of the Directive. The essential health and safety requirements are satisfied in accordance with the following standards:

Table 7- 22 Approvals

Document	Title
EN 60079-0: 2006	Electrical equipment for hazardous gas atmospheres - Part 0: General requirements
EN 60079-15: 2005	Electrical equipment for hazardous gas atmospheres - Part 15: Design, testing and identification of electrical equipment with type of protection "n"
DIN VDE 0848-5: 2001 (in parts)	Safety in electrical, magnetic and electromagnetic fields - Part 5: Explosion protection
ZLS SK 107.1	Central office of the states for safety; test components

Identification

Table 7- 23 The identification of the electrical equipment as an encapsulated unit

	II 3G Ex nC IIB T5
-25°C to +70°C	
Um=30Vdc	

The equipment is assigned the following references:

XXXXYYZZZ [= serial number, is assigned during production]

TPS 09 ATEX 1 459 X [= certificate number]

"No use of the equipment in the vicinity of processes generating high charges"

7.8.5.1 Use of the transponder in hazardous areas for gases

Temperature class delineation for gases

The temperature class of the transponder for hazardous areas depends on the ambient temperature range:

Ambient temperature range	Temperature class
-25 °C to +70 °C	T5

 WARNING

Ignitions of gas-air mixtures

- When using the RF380T transponder, check that the temperature class is kept to in conjunction with the requirements of the area of application.
If the temperature ranges are exceeded during use of the transponder, gas-air mixtures may be ignited.
- The maximum transmit power of the transmitter used to operate the transponder must not exceed 2 W.
If the transmit power is not kept to, gas-air mixtures may ignite.

7.8.5.2 Installation and operating conditions for the hazardous area

- a) Use of the equipment in the vicinity of processes generating high charges is not allowed.
- b) The equipment must be mechanically protected when installed.

7.8.6 Cleaning the mobile data memory

Note

Do not clean the transponder with mechanical tools, sand-blasting or pressure hose. These cleaning methods result in damage to the transponder.

Clean the transponder only with the chemical cleansing agents listed in Chapter Chemical resistance of the readers and transponders (Page 97).

7.8.7 Technical specifications

Table 7- 24 RF380T technical specifications

6GT2800-5DA00	
Product type designation	SIMATIC RF380T
Memory	
Memory organization	in bytes
Memory configuration	
• UID	• 4 bytes EEPROM
• User memory	• 32 KB FRAM
• OTP memory	• 20 bytes EEPROM
Read cycles (at < 40 °C)	> 10 ¹⁰
Write cycles (at < 40 °C)	> 10 ¹⁰
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of RF300 transponders (Page 51)"
MTBF (Mean Time Between Failures)	1177 years
Mechanical specifications	
Enclosure	
• Material	• PPS
• Color	• Anthracite
Recommended distance to metal	≥ 0 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +110 °C • > 110 °C °C: cyclic operation possible
• outside the read/write field	• -40 ... +220 °C
• during storage	• -40 ... +110 °C
Degree of protection according to EN 60529	IP68
Shock-resistant acc. to EN 60721-3-7, Class 7 M2 ¹⁾²⁾	500 m/s ²
Vibration-resistant according to EN 60721-3-7 Class 7 M2 ²⁾	50 m/s ²
Torsion and bending load	Not permitted

6GT2800-5DA00

Design, dimensions and weight

Dimensions (Ø x H)	114 x 83 mm
Weight	900 g
Type of mounting	Holder (must be ordered separately)

- 1) Applies only in conjunction with the original support
- 2) The values for shock and vibration are maximum values and must not be applied continuously.

7.8.8 Dimensional drawing

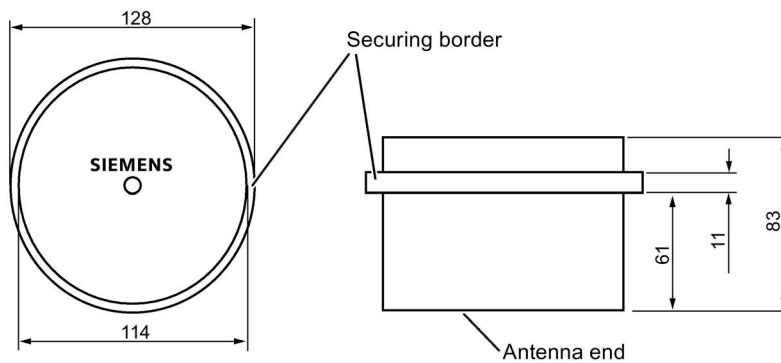


Figure 7-30 Dimension drawing RF380T

Dimensions in mm

ISO transponder

Features of the ISO transponders

The transponders (MDS D) that are compatible with ISO 15693 represent a cost-effective alternative to RF300 transponders. The performance that can be achieved with this (transmission speed, memory size), however, is considerably less than with RF300 transponders.

You will find more information on transmission speeds in the section "Communication between communications module, reader and transponder (Page 49)".

8.1 Memory configuration of ISO the transponders

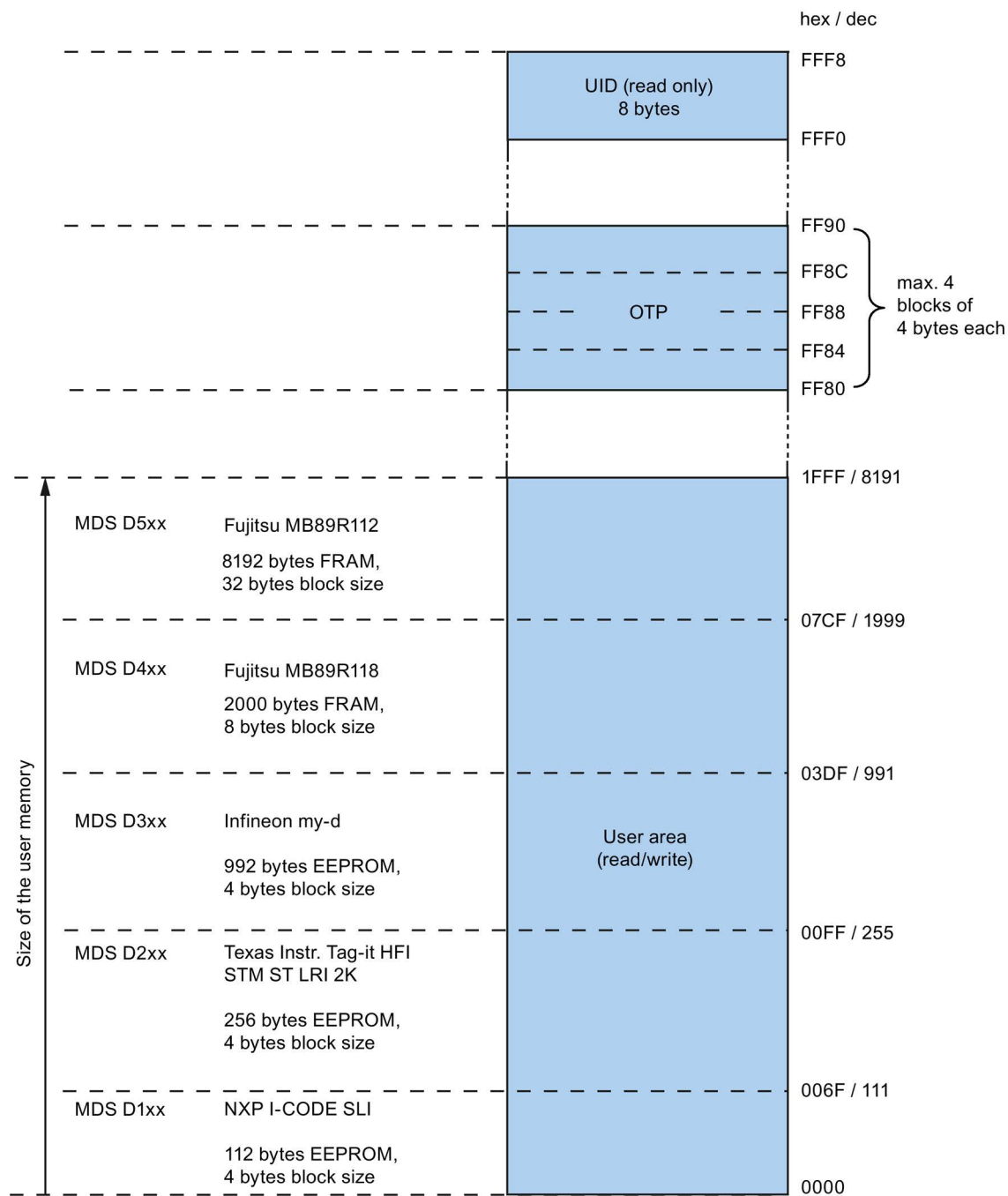


Figure 8-1 Memory configuration of ISO the transponders

Memory areas

Depending on the manufacturer of the transponder chip, the memory configuration of an ISO transponder consists of varying sizes of user memory.

The typical sizes are 112 bytes, 256 bytes, 992 bytes EEPROM or 2000 bytes FRAM. Each ISO transponder chip has an 8-byte long unique serial number (UID, read only). This UID is transferred as an 8 byte value through a read command to address FFF0 with a length of 8.

OTP area

For the OTP area, a 16-byte address space is always reserved at the end of the memory area. The blocks are divided up depending on the chip (see technical specifications). Note that the corresponding addresses for the user data are therefore not available to the application when the OTP area is used.

A total of 4 block addresses ("mapped" addresses) are provided:

- FF80
- FF84
- FF88
- FF8C

A write command to this block address with a valid length (4, 8, 12, 16 bytes depending on the block address) protects the written data from subsequent overwriting.

Note

Exception Fujitsu chip (MDS D4xx and MDS D5xx)

The Fujitsu chip MB89R118 (MDS D4xx) has 8-byte blocks, which means that only 2 block addresses have to be addressed: FF80 and FF88 with the length 8 and 16 bytes).

The Fujitsu chip MB89R112 (MDS D5xx) has 32 byte blocks and can therefore not be addressed in the OTP area.

Note

Restriction to the use of the OTP

Observe the following restrictions when using OTP:

- The OTP write/lock command can only be sent in static operation.
- The OTP write/lock command can not be sent as a chained command.

The Fujitsu chip MB89R112 (MDS D5xx) has 32 byte blocks and can therefore not be addressed in the OTP area.

Note

Use of the OTP area is not reversible

If you use the OPT area, you cannot undo it, because the OPT area can only be written to once.

8.2 MDS D100

8.2.1 Characteristics

MDS D100	Characteristics	
 The image shows a rectangular, light-colored Siemens MDS D100 transponder. It has two small circular holes for mounting. The Siemens logo is in the top left, and 'MDS D100' is in the top right. At the bottom, it says 'Siemens AG, DE-76181 Karlsruhe' and '6GT2600-0AD10 AS.10'. There are also CE and EAC certification marks.	Area of application	From simple identification such as electronic barcode replacement/supplementation, through warehouse and distribution logistics, right up to product identification.
	Memory size	112 bytes of EEPROM user memory
	Write/read range	See section Field data of ISO transponders (MDS D) (Page 55).
	Mounting on metal	Yes, with spacer
	ISO standard	ISO 15693
	Degree of protection	IP68

8.2.2 Ordering data

Table 8- 1 Ordering data for MDS D100

	Article number
MDS D100	6GT2600-0AD10

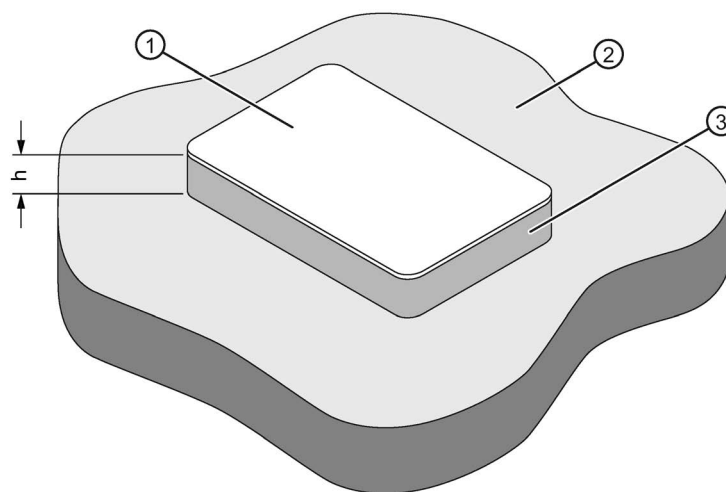
Table 8- 2 Ordering data for MDS D100 accessory

	Article number
Spacer (in conjunction with fixing pocket 6GT2190-0AB00)	6GT2190-0AA00
Fixing pocket (in conjunction with spacer 6GT2190-0AA00)	6GT2190-0AB00
Fixing pocket (not suitable for fixing directly onto metal)	6GT2390-0AA00

8.2.3 Metal-free area

Direct mounting of the MDS D100 on metal is not allowed. A distance of ≥ 20 mm is recommended. This can be achieved using the spacer 6GT2190-0AA00 in combination with the fixing pocket 6GT2190-0AB00.

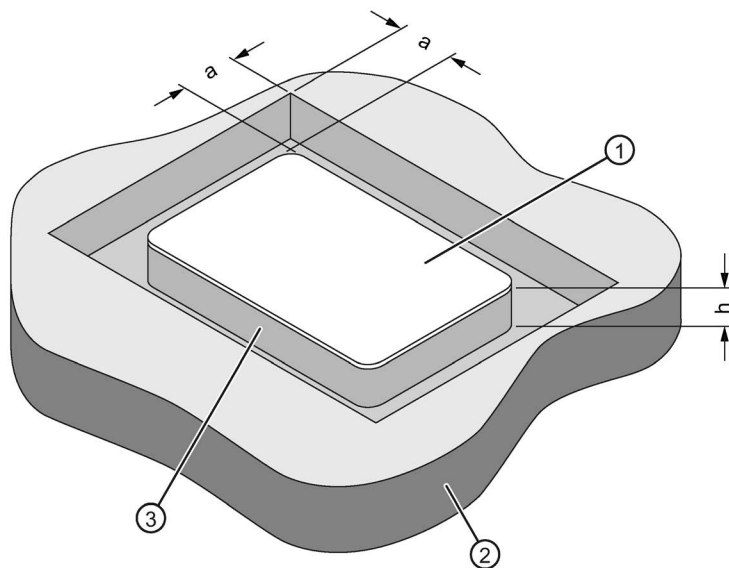
Mounting on metal



- h ≥ 20 mm
① Transponder
② Metal
③ Non-metal

Figure 8-2 Mounting of the MDS D100 on metal with spacer

Flush-mounting



- $a \geq 20 \text{ mm}$
 $h \geq 20 \text{ mm}$
 ① Transponder
 ② Metal
 ③ Non-metal

Figure 8-3 Flush-mounting of MDS D100 in metal with spacer

Note

If the minimum guide values (h or a) are not observed, a reduction of the field data results.

8.2.4 Technical data

Table 8- 3 Technical specifications for MDS D100

6GT2600-0AD10	
Product type designation	SIMATIC MDS D100
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 112 bytes EEPROM
• OTP memory	• 16 bytes (EEPROM)
Read cycles (at < 40 °C)	> 10 ¹⁴
Write cycles (at < 40 °C)	> 10 ⁶
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• PET
• Color	• White/black
Recommended distance to metal	≥ 20 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +80 °C
• outside the read/write field	• -25 ... +80 °C
• during storage	• -25 ... +80 °C
Degree of protection according to EN 60529	IP68
Shock-resistant acc. to EN 60721-3-7, Class 7M2	ISO 10373 / ISO 7810 ¹⁾
Vibration-resistant according to EN 60721-3-7 Class 7M2	ISO 10373 / ISO 7810 ¹⁾
Torsion and bending load	ISO 10373 / ISO 7816-1

6GT2600-0AD10

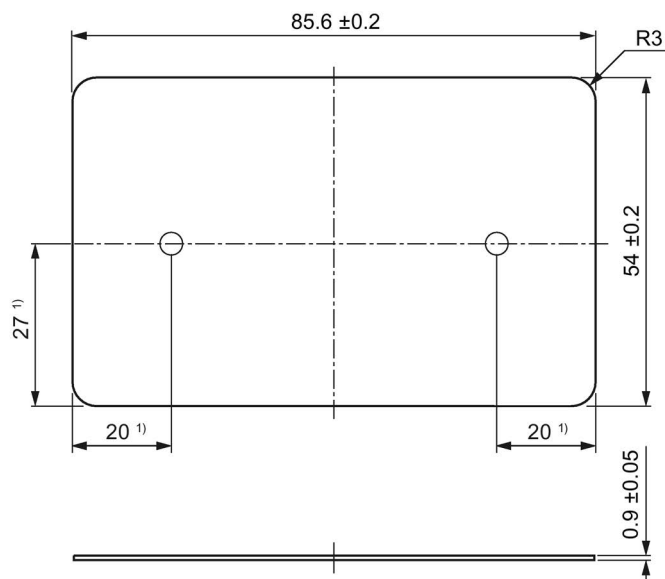
Design, dimensions and weight

Dimensions (L x W x H)	85.6 x 54 x 0.9 mm
Weight	5 g
Type of mounting	• Fixing pocket • Glued ²⁾

1) The values for shock and vibration are maximum values and must not be applied continuously.

2) The processing instructions of the adhesive manufacturer must be observed.

8.2.5 Dimension drawing



Dimensions in mm

1) Dimensions for mounting holes

Figure 8-4 MDS D100 dimension drawing

8.3 MDS D117

8.3.1 Features

MDS D117	Characteristics	
	Area of application	Very compact data carrier that can be cemented into objects where precise positioning is necessary; e.g. tool identification, workpiece holders etc..
	Memory size	112 bytes of EEPROM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55)."
	Mounting in metal	Yes, flush-mounted in metal
	ISO standard	ISO 15693
	Degree of protection	IP68/IPx9K

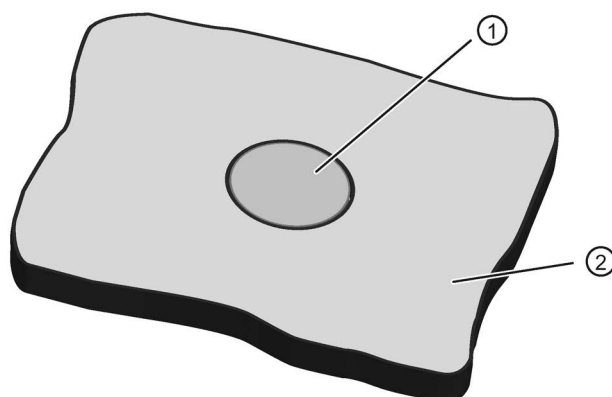
8.3.2 Ordering data

Table 8- 4 Ordering data for MDS D117

	Article number
MDS D117 Pack of 10	6GT2600-0AG00

8.3.3 Mounting in metal

Flush-mounted in metal



- ① Transponder
- ② Metal

8.3.4 Technical specifications

Table 8- 5 Technical specifications for MDS D117

6GT2600-0AG00	
Product type designation	SIMATIC MDS D117
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 112 bytes EEPROM
• OTP memory	• 16 bytes (EEPROM)
Read cycles (at < 40 °C)	> 10 ¹⁴
Write cycles (at < 40 °C)	> 10 ⁶
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years

6GT2600-0AG00	
Mechanical specifications	
Enclosure	
• Material	• PPS
• Color	• Black
Recommended distance to metal	≥ 0 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +125 °C
• during storage	• -40 ... +125 °C
Degree of protection according to EN 60529	IP68 2 hours, 2 bar, +20 °C
Shock-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	1000 m/s ²
Vibration-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (Ø x H)	4 x 5.2 mm
Weight	1 g
Type of mounting	• Fixing pocket • Glued ²⁾

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

²⁾ The processing instructions of the adhesive manufacturer must be observed.

8.3.5 Dimension drawing

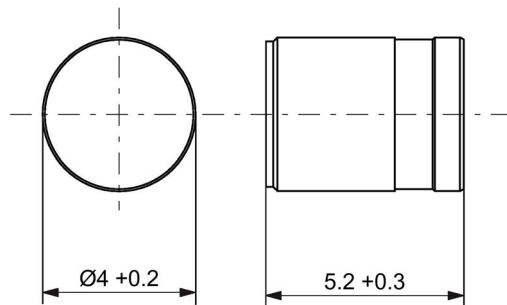


Figure 8-5 Dimensions in mm

8.4 MDS D124

8.4.1 Characteristics

MDS D124	Characteristics	
	Area of application	Application areas in production automation (e.g. small paintshops up to +180 °C)
	Memory size	112 bytes of EEPROM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55)".
	Mounting on metal	Yes, with spacer
	ISO standard	ISO 15693
	Degree of protection	IP68/IPx9K

8.4.2 Ordering data

Table 8- 6 Ordering data for MDS D124

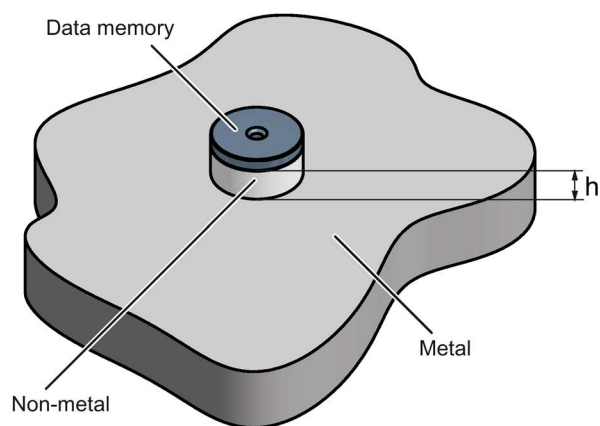
	Article number
MDS D124	6GT2600-0AC10

Table 8- 7 Ordering data for MDS D124 accessories

	Article number
Spacer	6GT2690-0AK00

8.4.3 Mounting on metal

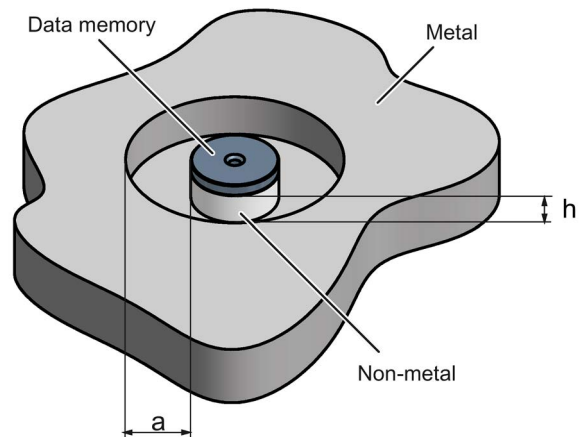
Mounting on metal



$h \geq 15 \text{ mm}$

Figure 8-6 Mounting the MDS D124/D324/D424/D524/E624 and RF320T on metal with spacer

Flush-mounting



$h \geq 15 \text{ mm}$

$a \geq 25 \text{ mm}$

Figure 8-7 Flush-mounting of the MDS D124/D324/D424/D524/E624 and RF320T in metal with spacer

Note**Going below the distances**

If the distances (a and h) are not observed, a reduction of the field data results. It is possible to mount the MDS with metal screws (M3 countersunk head screws). This has no tangible impact on the range.

8.4.4 Technical specifications

Table 8- 8 Technical specifications for MDS D124

6GT2600-0AC10	
Product type designation	SIMATIC MDS D124
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 112 bytes EEPROM
• OTP memory	• 16 bytes (EEPROM)
Read cycles (at < 40 °C)	> 10 ¹⁴
Write cycles (at < 40 °C)	> 10 ⁶
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• PPS
• Color	• Black
Recommended distance to metal	≥ 15 mm
Power supply	Inductive, without battery

6GT2600-0AC10	
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +140 °C • from +125 °C: 20% reduction in the limit distance
• outside the read/write field	• -40 ... +180 °C • at +180 °C: Tested up to 5000 hours or 3000 cycles
• during storage	• -40 ... +125 °C
Degree of protection according to EN 60529	• IP68 2 hours, 2 bar, +20 °C • IPx9K steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C
Shock-resistant according to EN 60721-3-7 Class 7M3 ¹⁾	1000 m/s ²
Vibration-resistant according to EN 60721-3-7 Class 7M3 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (Ø x H)	27 x 4 x mm
Weight	5 g
Type of mounting	• 1 x M3 screw ²⁾ ≤ 1 Nm • Glued ³⁾ • With spacer

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

²⁾) To prevent it loosening during operation, secure the screw with screw locking varnish.

³⁾ The processing instructions of the adhesive manufacturer must be observed.

8.4.5 Using the MDS D124 in hazardous areas

The transponder MDS D124, device group II, category 1G or 1D may be installed and operated in zones 0, 1 and 2 or in the zones 20, 21 and 22.

The following requirements of the 2014/34/EU directive are met:

- EN 60079-0:2012 + A11:2013
- EN 60079-11:2012

When used in hazardous areas, the MDS D124 must not be operated with transmit power greater than 2 W or magnetic field strengths > 5 A/m to avoid impermissible heating.

Therefore, the MDS D124 can be operated with the readers RF210R, RF220R, RF240R, RF250R (incl. all released antennas), RF260R, RF310R, RF340R, RF350R and RF380R. The MDS D124 transponder is not released for operation with the RF290R reader.

Labeling and warning information

Since neither the Ex marking nor the safety marking can be applied to the MDS D124 for space reasons, these are supplied on a label. The identification of the electrical equipment as an enclosed unit is:

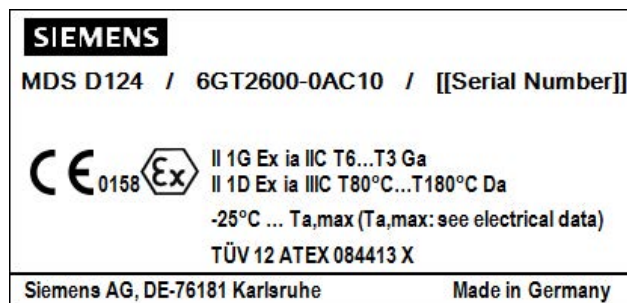


Figure 8-8 Identification label of MDS D124

[[Serial Number]]	Serial number of the transponder
	The serial number is structured as follows:
	LB[A][B][CDEFGH]
LB	Code of manufacturing factory see below
[A]	Year produced
[B]	Month produced
[CDEFGH]	Consecutive number = 000001...999999

Note

Safety marking for hazardous area

Since there is not enough space on the MDS D124 for the safety marking, this is supplied as a label with the device.

This must be affixed immediately next to the MDS D124 so that the label clearly relates to the device.

 WARNING
Installation and operating conditions for hazardous areas • The device may not be used in areas influenced by processes that generate high electrostatic charges. • The device must be installed in such a way that it is mechanically protected. • The device must be mounted on a grounded conductive base. • The device must only be cleaned with a damp cloth. • The device is suitable for use in atmospheres containing dust, but not for full immersion in dust.

Electrical data

Table 8- 9 Energy supply of the transponder (antenna field of the reader)

Date	Value
Operating frequency	13.56 MHz
Transmit power ($P_{\max}$)	2 W
Magnetic field strength ($H_{\max}$)	5 A/m

Thermal specifications

The temperature class of the MDS D124 transponder for hazardous areas for gases depends on the ambient temperature range:

Table 8- 10 Temperature classes for hazardous areas for gases

Ambient temperature of the transponder		Temperature class
RF210R, RF220R, RF240R, RF250R (incl. all released antennas), RF260R, RF310R, RF340R, RF350R	RF380R	
-25 °C ... +175 °C	-25 °C ... +130 °C	T3
-25 °C ... +110 °C	-25 °C ... +65 °C	T4
-25 °C ... +75 °C	-25 °C ... +30 °C	T5
-25 °C ... +60 °C	--	T6

The surface temperature of the MDS D124 transponder for hazardous areas for dust depends on the ambient temperature range:

Table 8- 11 Temperature classes for hazardous areas for dust

Ambient temperature of the transponder		Permitted surface temperature
RF210R, RF220R, RF240R, RF250R (incl. all released antennas), RF260R, RF310R, RF340R, RF350R	RF380R	
-25 °C ... +155 °C	-25 °C ... +110 °C	T180 °C
-25 °C ... +105 °C	-25 °C ... +60 °C	T130 °C
-25 °C ... +80 °C	--	T95 °C
-25 °C ... +55 °C	--	T80 °C

8.4.6 EC declaration of conformity according to directive 2014/34/EU MDS D124

The EC type-examination certificate for the MDS D124 transponder was substantiated by TÜV 12 ATEX 084413 X. Based on this certificate, the CE declaration was made by the manufacturer according to directive 2014/34/EU.

The manufacturing plant of the MDS D124 has an ATEX quality assurance system recognized by DEKRA EXAM GmbH with notification number "BVS 11 ATEX ZQS/E111".

Manufacturer's address - distributor

Siemens AG
DE – 76181 Karlsruhe, Germany

Manufacturer's address - factory

Siemens AG
Würzburger Str. 121
DE - 90766 Fürth, Germany

8.4.7 Dimension drawing

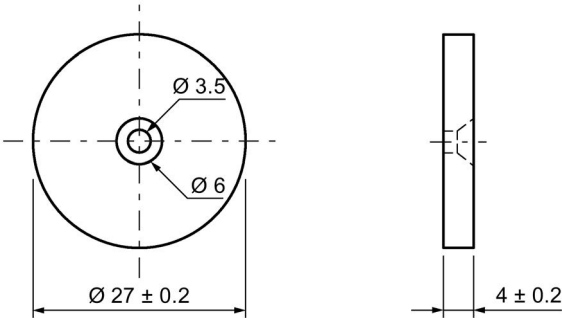


Figure 8-9 Dimension drawing of MDS D124

All dimensions in mm

8.5 MDS D126

8.5.1 Characteristics

MDS D126		Characteristics
	Area of application	Compact and rugged ISO transponder; suitable for identification of transport units in production-related logistics; can also be deployed in harsh conditions
	Memory size	112 bytes of EEPROM user memory
	Write/read range	See section Field data of ISO transponders (MDS D) (Page 55)
	Mounting on metal	Yes, with spacer
	ISO standard	ISO-15693
	Degree of protection	IP68

8.5.2 Ordering data

Table 8- 12 Ordering data for MDS D126

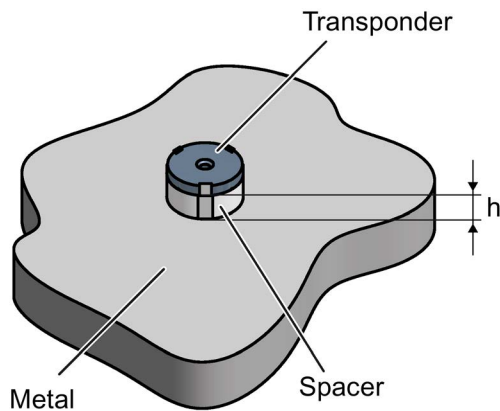
	Article number
MDS D126	6GT2600-0AE00

Table 8- 13 Ordering data for MDS D126 accessories

	Article number
Spacer	6GT2690-0AL00

8.5.3 Mounting on metal

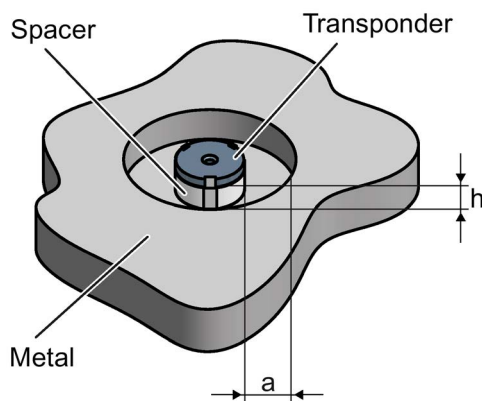
Mounting on metal



$h \geq 25 \text{ mm}$

Figure 8-10 Mounting the MDS D126 / D426 / D526 on metal with spacer

Flush-mounted in metal



$h \geq 25 \text{ mm}$

$a \geq 50 \text{ mm}$

Figure 8-11 Flush installation of the MDS D126 / D426 / D526 in metal with spacer

8.5.4 Technical specifications

Table 8- 14 Technical specifications for the MDS D126

6GT2600-0AE00	
Product type designation	SIMATIC MDS D126
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 112 bytes EEPROM
• OTP memory	• 16 bytes (EEPROM)
Read cycles (at < 40 °C)	> 10 ¹⁴
Write cycles (at < 40 °C)	> 10 ⁶
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• PA6.6 GF
• Color	• Black
Recommended distance to metal	≥ 25 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +100 °C
• during storage	• -40 ... +100 °C
Degree of protection according to EN 60529	IP68 2 hours, 2 bar, +20 °C
Shock-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	500 m/s ²
Vibration-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted

6GT2600-0AE00

Design, dimensions and weight

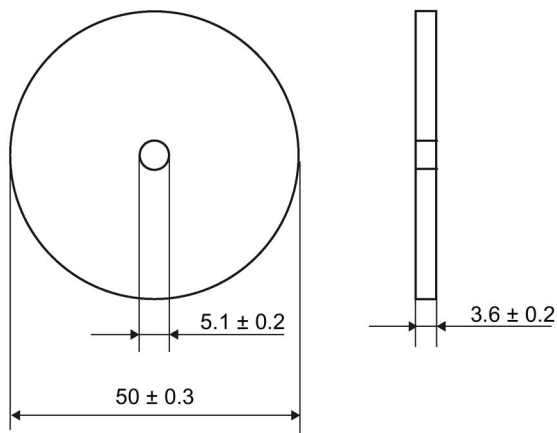
Dimensions (Ø x H)	50 x 3.6 mm
Weight	13 g
Type of mounting	• 1 x M4 screw ²⁾ ≤ 1 Nm • Glued ³⁾

1) The values for shock and vibration are maximum values and must not be applied continuously.

2) To prevent it loosening during operation, secure the screw with screw locking varnish.

3) The processing instructions of the adhesive manufacturer must be observed.

8.5.5 Dimension drawing



Dimensions in mm

Figure 8-12 Dimension drawing of MDS D126

8.6 MDS D127

8.6.1 Features

MDS D127	Characteristics	
	Area of application	Very compact data carrier that can be screwed into areas where precise positioning is necessary; e.g. tool identification, workpiece holders etc.
	Memory size	112 bytes of EEPROM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55)"
	Mounting on metal	Yes, flush-mounted in metal
	ISO standard	ISO 15693
	Degree of protection	IP68/IPx9K

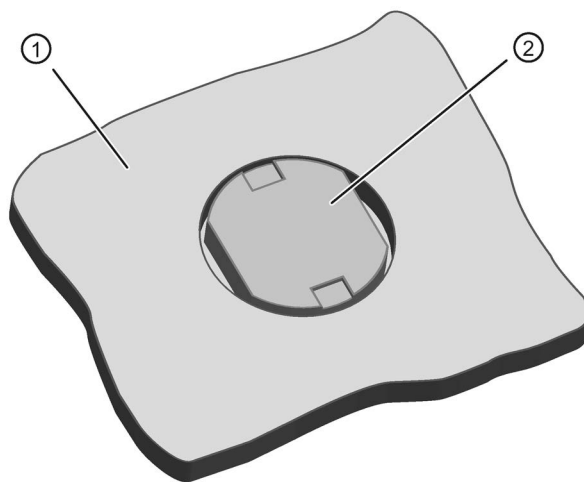
8.6.2 Ordering data

Table 8- 15 Ordering data for MDS D127

	Article number
MDS D127 Pack of 10 (A screw-in aid is supplied with each pack)	6GT2600-0AF00

8.6.3 Mounting in metal

Flush-mounted in metal



- ① Metal
- ② Transponders

Note

Damage to the transponder due to improper mounting

To screw the MDS D127 into a suitable thread, use the supplied screw-in tool. This avoids damage to the MDS D127.



Figure 8-13 Screw-in aid for mounting the MDS D127

8.6.4 Technical specifications

Table 8- 16 Technical specifications for MDS D127

6GT2600-0AF00	
Product type designation	SIMATIC MDS D127
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 112 bytes EEPROM
• OTP memory	• 16 bytes (EEPROM)
Read cycles (at < 40 °C)	> 10 ¹⁴
Write cycles (at < 40 °C)	> 10 ⁶
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• PA6
• Color	• Black
Recommended distance to metal	≥ 0 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +100 °C
• outside the read/write field	• -40 ... +125 °C
• during storage	• -40 ... +125 °C
Degree of protection according to EN 60529	• IP68 2 hours, 2 bar, +20 °C • IPx9K steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C
Shock-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	1000 m/s ²
Vibration-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted

6GT2600-0AF00

Design, dimensions and weight

Dimensions (Ø x H)	M6 x 5.8 mm
Weight	1 g
Type of mounting	• Glued ²⁾ • 1 x M3 screw

1) The values for shock and vibration are maximum values and must not be applied continuously.

2) The processing instructions of the adhesive manufacturer must be observed.

8.6.5 Dimension drawing

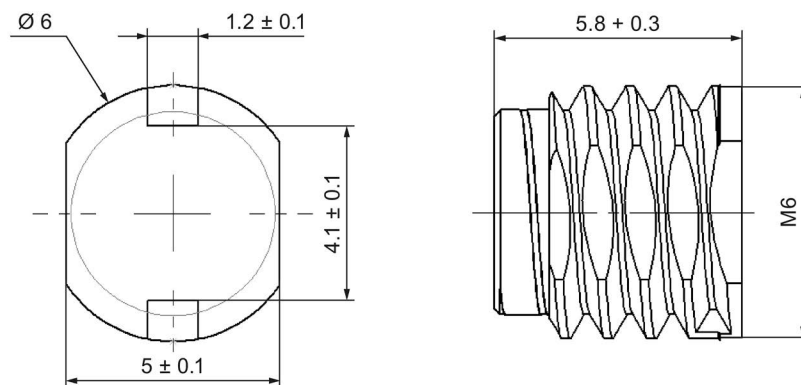


Figure 8-14 Dimensions in mm

8.7 MDS D139

8.7.1 Characteristics

MDS D139	Characteristics	
	Area of application	Applications in production logistics and in assembly lines subject to high temperatures (up to +220 °C) Typical application areas: • Paintshops and their preparatory treatments) • Primer coat, electrolytic dip area, cataphoresis with the associated drying furnaces • Top coat area with drying furnaces • Washing areas at temperatures > 85 °C • Other applications with higher temperatures
	Memory size	112 bytes of EEPROM user memory
	Write/read range	See section Field data of ISO transponders (MDS D) (Page 55).
	Mounting on metal	Yes, with spacer
	ISO standard	ISO 15693
	Degree of protection	IP68/IPx9K

Note

Compatibility with SIMATIC RF300 depending on the article number

The transponder MDS D139 with article number 6GT2600-0AA10 is compatible with the SIMATIC RF300 system. The transponder MDS D139 with article number 6GT2600-0AA00 is not compatible.

8.7.2 Ordering data

Table 8- 17 Ordering data for MDS D139

	Article number
MDS D139	6GT2600-0AA10

Table 8- 18 Ordering data for MDS D139 accessory

	Article number
Spacer	6GT2690-0AA00
Quick change holder (Ø x H): 22 x 60 mm	6GT2690-0AH00
Quick change holder (Ø x H): 22 x 47 mm	6GT2690-0AH10

8.7.3 Mounting on metal

Direct mounting of the MDS D139/D339 on metal is not allowed. A distance of ≥ 30 mm is recommended. This can be achieved using spacers (see "Ordering data (Page 496)").

Mounting on metal

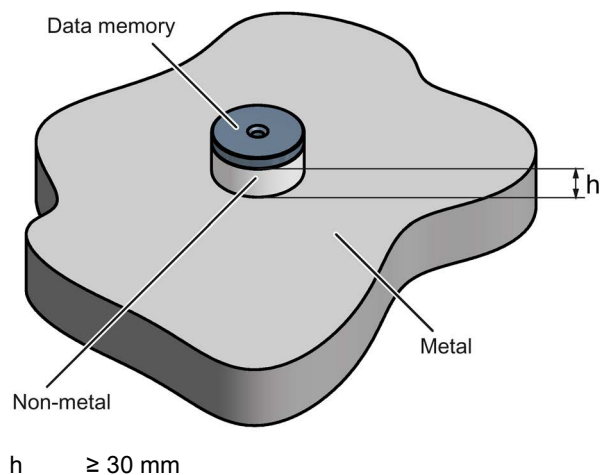


Figure 8-15 Mounting the MDS D139/D339 on metal with spacer

Flush-mounting

It is possible to mount the MDS D139/D339 in metal. With large antennas, for example ANT D5, this leads to a reduction of ranges.

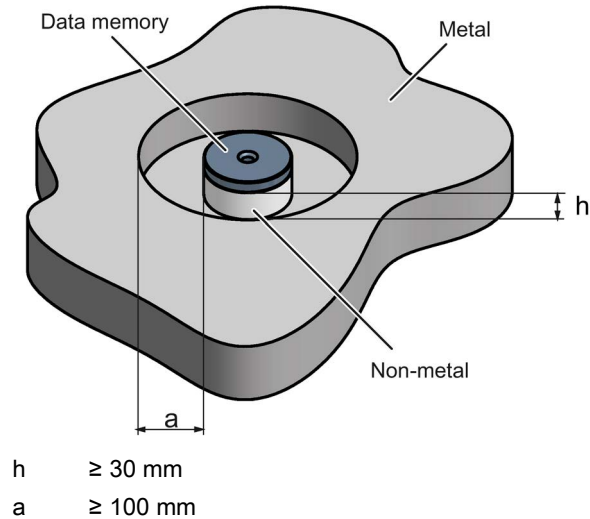


Figure 8-16 Flush-mounting of the MDS D139/D339 in metal with spacer

Note

Going below the distances

If the distances (a and h) are not observed, a reduction of the field data results. It is possible to mount the MDS with metal screws (M5). This has no tangible impact on the range. It is recommended that a test is performed in critical applications.

8.7.4 Cleaning the mobile data memory

Note

Do not clean the transponder with mechanical tools, sand-blasting or pressure hose. These cleaning methods result in damage to the transponder.

Clean the transponder only with the chemical cleansing agents listed in Chapter Chemical resistance of the readers and transponders (Page 97).

8.7.5 Technical specifications

Table 8- 19 Technical specifications for MDS D139

6GT2600-0AA10	
Product type designation	SIMATIC MDS D139
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 112 bytes EEPROM
• OTP memory	• 16 bytes (EEPROM)
Read cycles (at < 40 °C)	> 10 ¹⁴
Write cycles (at < 40 °C)	> 10 ⁶
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• PPS
• Color	• Black
Recommended distance to metal	≥ 30 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +140 °C • from +125 °C: 20% reduction in the limit distance
• outside the read/write field	• -40 ... +220 °C • at +200 °C: Tested up to 5000 hours or 6000 cycles • at +220 °C: Tested up to 2000 hours or 2000 cycles
• during storage	• -40 ... +100 °C

6GT2600-0AA10	
Degree of protection according to EN 60529	• IP68 2 hours, 2 bar, +20 °C • IPx9K steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C
Shock-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	500 m/s ²
Vibration-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted

Design, dimensions and weight

Dimensions (Ø x H)	85 x 15 mm
Weight	50 g
Type of mounting	1 x M5 screw ²⁾ 1.5 Nm

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously. A combination of high application temperatures together with high shock or vibration values is not possible.

²⁾ For mounting with the spacer (6GT2690-0AA00), use a stainless steel M5 screw to avoid damaging the MDS in high temperatures (expansion coefficient).

8.7.6 Using the MDS D139 in hazardous areas

The MDS D139 transponder is classed as simple, electrical equipment and can be operated in Protection Zone 2, Device Group II, Category 3G.

The following requirements of the 94/9/EC directive are met:

- EN 60079-0:2006
- EN 60079-15:2005
- EN 61241-0:2006
- EN 61241-1:2004

Identification



II 3 G Ex nA II T2

II 3 D Ex tD A22 IP68 T 220°C

KEMA 09 ATEX 0133 X

Ta: -25 ... +220°C



WARNING

Gefahr durch elektrostatische Entladungen

Potential electrostatic charging hazard

Danger potentiel de charges électrostatiques

Note

Installations- und Betriebsbedingungen für den explosionsgefährdeten Bereich:

- a) Der Einsatz des Gerätes in der Nähe von stark ladungserzeugenden Prozessen ist untersagt.
- b) Das Gerät ist mechanisch geschützt zu montieren.
- c) Die Montage muss auf einem geerdeten, leitenden Untergrund erfolgen.
- d) Die Reinigung darf nur mit feuchtem Tuch erfolgen.

Installation and operating conditions for hazardous areas:

- a) Use of the equipment in the vicinity of processes generating high charges is not allowed.
- b) The equipment must be mechanically protected when installed.
- c) Installation must be performed on a grounded and conductive mounting surface.
- d) Cleaning only with a wet cloth

Conditions d'installation et de mise en oeuvre pour la zone de protection Ex :

- a) L'utilisation de l'appareil près de processus générant de fortes charges est interdite.
- b) L'appareil doit être monté de manière à être protégé mécaniquement.
- c) Le montage doit être effectué sur un socle conducteur mis à la terre.
- d) Nettoyage uniquement avec un chiffon humide

8.7.7 Dimension drawings

Dimensional drawing of MDS D139

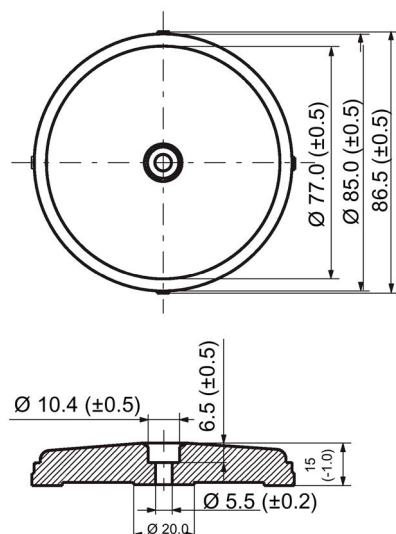


Figure 8-17 Dimensional drawing of MDS D139

Dimensions in mm

8.8 MDS D160

8.8.1 Characteristics

MDS D160	Characteristics	
	Area of application	Thanks to its rugged packaging, the MDS D160 is a transponder that can be used under extreme environmental conditions. It is washable, heat-resistant and resistant to all chemicals generally used in the laundry process. Typical applications are, for example: • Rented work clothing • Hotel laundry • Surgical textiles • Hospital clothing • Dirt collection mats • Clothing for nursing homes/hostels
	Memory size	112 bytes of EEPROM user memory
	Write/read range	See section Field data of ISO transponders (MDS D) (Page 55).
	Mounting on metal	Yes, with spacer
	ISO standard	ISO 15693
	Degree of protection	IP68/IPx9K

8.8.2 Information for RF300 compatibility

Note

Compatibility with SIMATIC RF300 depending on MLFB number

Only the MDS D160 with MLFB 6GT2600-0AB10 is compatible with SIMATIC RF300.

8.8.3 Ordering data

Table 8- 20 Ordering data for MDS D160

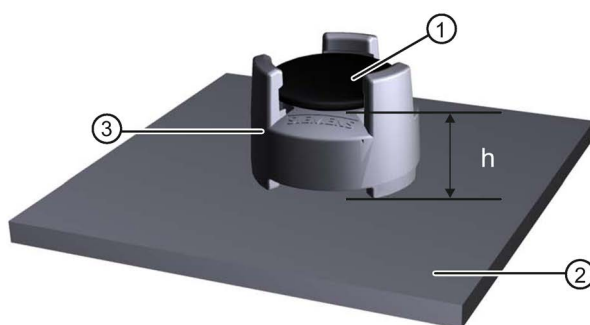
	Article number
MDS D160	6GT2600-0AB10

Table 8- 21 Ordering data for MDS D160 accessories

	Article number
Spacer	6GT2690-0AG00
Corner mounting bracket	6GT2690-0AN00

8.8.4 Mounting on metal

Mounting on metal



- ① Transponder
- ② Metal carrier
- ③ Spacer
- h ≥ 10 mm

Figure 8-18 Mounting the MDS D160 on metal with spacer

Note

Going below the minimum distance (h)

If the minimum distance (h) is not observed, a reduction of the field data results.
In critical applications, it is recommended that a test is performed.

Flush-mounting

Flush-mounting of the MDS D160 in metal is not permitted!

8.8.5 Technical specifications

Table 8- 22 Technical specifications for the MDS D160

6GT2600-0AB10	
Product type designation	SIMATIC MDS D160
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 112 bytes EEPROM
• OTP memory	• 16 bytes (EEPROM)
Read cycles (at < 40 °C)	> 10 ¹⁴
Write cycles (at < 40 °C)	> 10 ⁶
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• PPS
• Color	• beige
Recommended distance to metal	≥ 10 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +175 °C
	• from +125 °C: for 1000 hours, 20% reduction of the limit distance
	• at +175 °C: 100 washing cycles tested
	• at +220 °C: Tested once for up to 30 seconds
• during storage	• -25 ... +100 °C

6GT2600-0AB10	
Mechanical strength	
• Isostatic pressure	• 300 bar for 5 min
• Axial pressure	• 1000 N for 10 s
• Radial pressure	• 1000 N for 10 s
Resistance to chemicals	All chemicals normally used in the washing process
Service life	At least 100 wash cycles
Degree of protection	• IP68 24 hours, 2 bar, +20 °C • IPx9K
Shock-resistant according to IEC 68-2-27 ¹⁾	400 m/s ² 18 ms; 6 axes; 2000 repetitions/h
Vibration-resistant according to IEC 68-2-6 ¹⁾	100 m/s ² 10 ... 2000 Hz; 3 axes; 2.5 h
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (Ø x H)	16 x 3 mm
Weight	1.2 g
Type of mounting	• Patched • Sewn in • Glued ²⁾

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

²⁾ The processing instructions of the adhesive manufacturer must be observed.

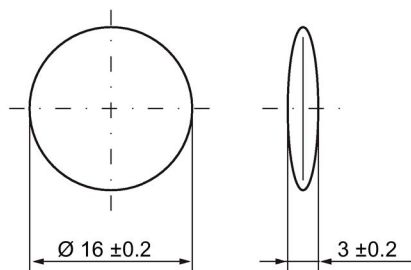
Note

Regeneration time between washing cycles

The regeneration time for the MDS D160 between washing cycles must be at least 24 hours.

8.8.6 Dimension drawings

Dimensional drawing of MDS D160



Dimensions in mm

Figure 8-19 Dimensional drawing of MDS D160

8.9 MDS D165

8.9.1 Features

MDS D165 (special version)	Characteristics	
	Area of application	The design of the transponder (self-adhesive label) permits a variety of designs, guaranteeing optimum dimensioning for the widest variety of applications. From simple identification such as electronic barcode replacement/supplementation, through warehouse and distribution logistics, right up to product identification.
	Memory size	112 bytes of EEPROM user memory
	Write/read range	See section Field data of ISO transponders (MDS D) (Page 55).
	Mounting on metal	Yes, with spacer
	ISO standard	ISO 15693
	Degree of protection	IP65

8.9.2 Ordering data

Table 8- 23 Ordering data for MDS D165

	Article number
MDS D165 (special version ISO-CARD)	6GT2600-1AB00-0AX0

Type of delivery

Minimum order quantity: 1250 units (5 rolls with 250 units each)

8.9.3 Technical data

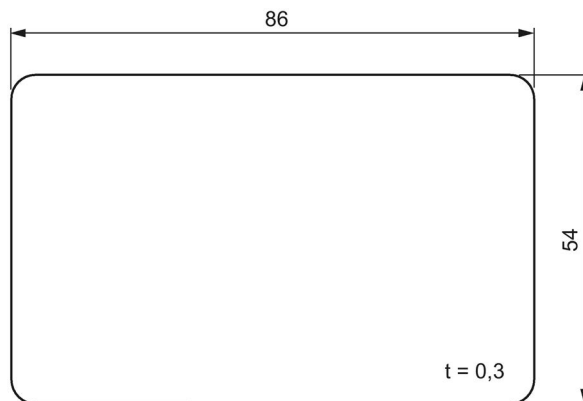
Table 8- 24 Technical specifications for MDS D165

6GT2600-1AB00-0AX0	
Product type designation	SIMATIC MDS D165
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 112 bytes EEPROM
• OTP memory	• 16 bytes (EEPROM)
Read cycles (at < 40 °C)	> 10 ¹⁴
Write cycles (at < 40 °C)	> 10 ⁶
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• Top: PET (label material) • Inlay: PET (carrier material) • Antenna: Aluminum • Bottom: Double-sided transfer adhesive on silicon paper
• Color	• White
Recommended distance to metal	≥ 25 mm
Power supply	Inductive, without battery

6GT2600-1AB00-0AX0	
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +80 °C
• outside the read/write field	• -25 ... +80 °C
• during storage	• +20 to +30 °C
	Can be stored for 2 years, determined by the durability of the adhesive.
Degree of protection	IP65
Design, dimensions and weight	
Dimensions (L x W x H)	86 x 54 x 0.3 mm
Weight	1 g
Type of mounting	Glued with self-adhesive label ¹⁾

¹⁾ The processing instructions of the adhesive manufacturer must be observed.

8.9.4 Dimension drawing



Dimensions in mm

Figure 8-20 Dimension drawing of MDS D165

8.10 MDS D200

8.10.1 Features

MDS D200	Characteristics	
	Area of application	From simple identification such as electronic barcode replacement/supplementation, through warehouse and distribution logistics, right up to product identification.
	Memory size	256 bytes of EEPROM user memory
	Write/read range	See section Field data of ISO transponders (MDS D) (Page 55).
	Mounting on metal	Yes, with spacer
	ISO standard	15693 with Tag-it HFI technology
	Degree of protection	IP67

8.10.2 Ordering data

Table 8- 25 Ordering data for MDS D200

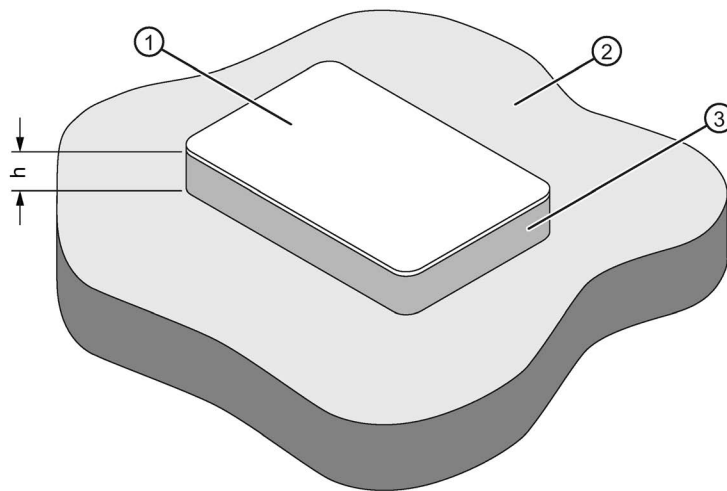
	Article number
MDS D200 (special version ISO-CARD)	6GT2600-1AD00-0AX0

Table 8- 26 Ordering data for MDS D200 accessories

	Article number
Spacer (in conjunction with fixing pocket 6GT2190-0AB00)	6GT2190-0AA00
Fixing pocket (in conjunction with spacer 6GT2190-0AA00)	6GT2190-0AB00
Fixing pocket (not suitable for fixing directly onto metal)	6GT2390-0AA00

8.10.3 Mounting on metal

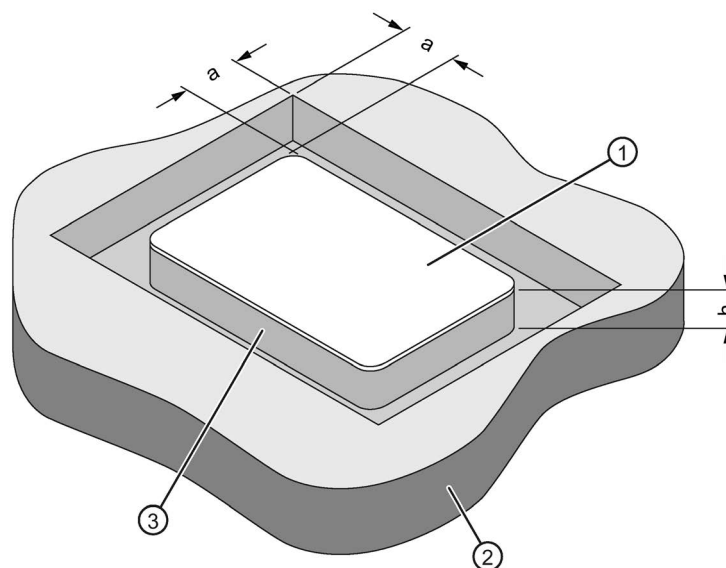
Mounting on metal



- h ≥ 20 mm
- ① Transponder
 - ② Metal
 - ③ Non-metal

Figure 8-21 Mounting of the MDS D200 on metal with spacer

Flush-mounting



- a ≥ 20 mm
h ≥ 20 mm
① Transponder
② Metal
③ Non-metal

Figure 8-22 Flush-mounting of MDS D200 in metal with spacer

Note

If the minimum guide values (h) are not observed, a reduction of the field data results.

8.10.4 Technical data

Table 8- 27 Technical specifications for MDS D200

6GT2600-1AD00-0AX0	
Product type designation	SIMATIC MDS D200
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 256 bytes EEPROM
• OTP memory	• 16 bytes (EEPROM)
Read cycles (at < 25 °C)	> 10 ¹⁴
Write cycles (at < 25 °C)	> 10 ⁶
Data retention time (at < 25 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• PET
• Color	• White
Recommended distance to metal	≥ 20 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -20 ... +60 °C
• outside the read/write field	• -20 ... +60 °C
• during storage	• -20 ... +60 °C
Degree of protection according to EN 60529	IP67
Shock-resistant acc. to EN 60721-3-7, Class 7M2	ISO 10373 / ISO 7810 ¹⁾
Vibration-resistant according to EN 60721-3-7 Class 7M2	ISO 10373 / ISO 7810 ¹⁾
Torsion and bending load	ISO 10373 / ISO 7816-1

6GT2600-1AD00-0AX0

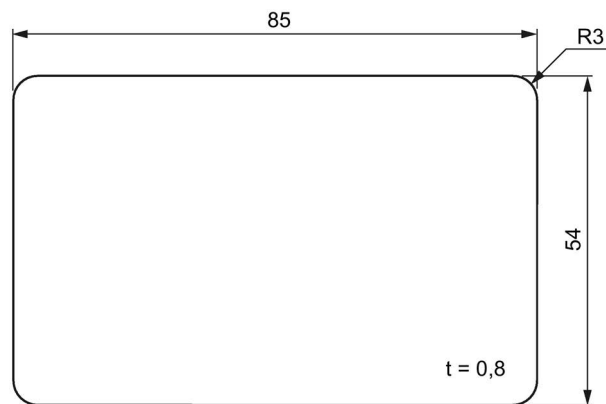
Design, dimensions and weight

Dimensions (L x W x H)	85 x 54 x 0.8 mm
Weight	5 g
Type of mounting	• Fixing pocket • Glued ²⁾

1) The values for shock and vibration are maximum values and must not be applied continuously.

2) The processing instructions of the adhesive manufacturer must be observed.

8.10.5 Dimension drawing



Dimensions in mm

Figure 8-23 Dimension drawing of MDS D200

8.11 MDS D261

8.11.1 Features

MDS D261	Characteristics	
	Area of application	The design of the transponder (self-adhesive label) permits a variety of designs, guaranteeing optimum dimensioning for the widest variety of applications. From simple identification such as electronic barcode replacement/supplementation, through warehouse and distribution logistics, right up to product identification.
	Memory size	256 bytes of EEPROM user memory
	Write/read range	See section Field data of ISO transponders (MDS D) (Page 55).
	Mounting on metal	Yes, with spacer
	ISO standard	ISO 15693
	Degree of protection	IP65

8.11.2 Ordering data

Table 8- 28 Ordering data for MDS D261

	Article number
MDS D261	6GT2600-1AA00-0AX0

Type of delivery

Minimum order quantity: 1250 units (5 rolls with 250 units each)

8.11.3 Technical data

Table 8- 29 Technical specifications of MDS D261

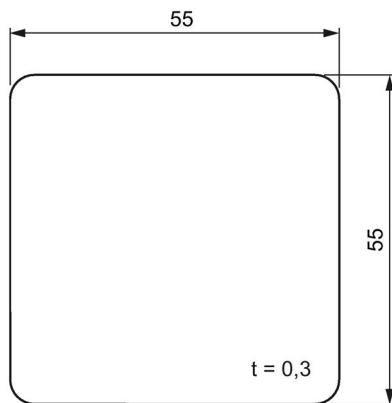
6GT2600-1AA01-0AX0	
Product type designation	SIMATIC MDS D261
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 256 bytes EEPROM
• OTP memory	• 16 bytes (EEPROM)
Read cycles (at < 40 °C)	> 10 ¹⁴
Write cycles (at < 40 °C)	> 10 ⁶
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• Top: PET (label material) • Inlay: PET (carrier material) • Antenna: Aluminum • Bottom: Double-sided transfer adhesive on silicon paper
• Color	• White
Recommended distance to metal	≥ 25 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -20 ... +60 °C
• outside the read/write field	• -20 ... +85 °C
• During transportation and storage	• +20 to +30 °C - Can be stored for 2 years, determined by the durability of the adhesive
Degree of protection	IP65

6GT2600-1AA01-0AX0

Design, dimensions and weight

Dimensions (L x W x H)	55 x 55 x 0.3 mm
Weight	1 g
Type of mounting	Glued with self-adhesive label ¹⁾

¹⁾ The processing instructions of the adhesive manufacturer must be observed.

8.11.4 Dimension drawing

Dimensions in mm

Figure 8-24 Dimension drawing of MDS D261

8.12 MDS D324

8.12.1 Characteristics

MDS D324	Characteristics	
 A circular black transponder with a central hole. The text 'SIEMENS' is at the top, '6GT2600-3AC00' is below it, 'MDS D324' is in the center, and 'MOBY D' is at the bottom.	Area of application	Production and distribution logistics and product identification Can also be used in harsh environments under extreme environmental conditions (e.g. with higher temperature load).
	Memory size	992 bytes of EEPROM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55)."
	Mounting on metal	Yes, with spacer
	ISO standard	ISO 15693
	Degree of protection	IP67; IPx9K

8.12.2 Ordering data

Table 8- 30 Ordering data MDS D324

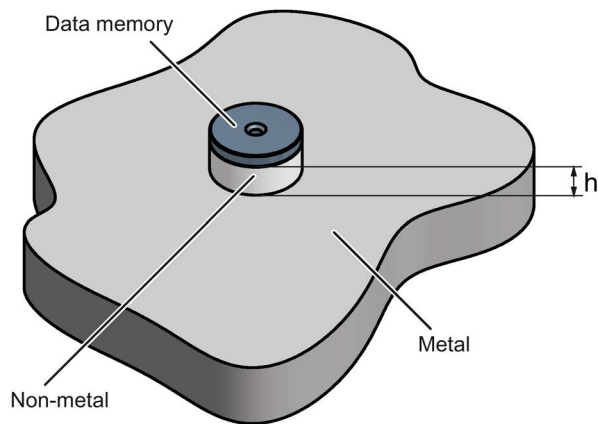
	Article number
MDS D324	6GT2600-3AC00

Table 8- 31 Ordering data MDS D324 accessories

	Article number
Spacer	6GT2690-0AK00

8.12.3 Mounting on metal

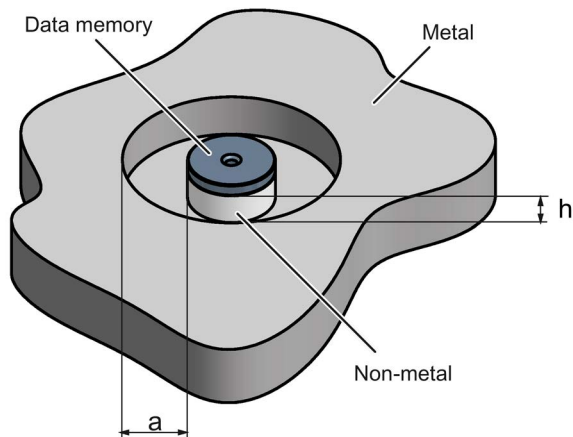
Mounting on metal



$$h \geq 15 \text{ mm}$$

Figure 8-25 Mounting the MDS D124/D324/D424/D524/E624 and RF320T on metal with spacer

Flush-mounting



$$h \geq 15 \text{ mm}$$

$$a \geq 25 \text{ mm}$$

Figure 8-26 Flush-mounting of the MDS D124/D324/D424/D524/E624 and RF320T in metal with spacer

Note

Going below the distances

If the distances (a and h) are not observed, a reduction of the field data results. It is possible to mount the MDS with metal screws (M3 countersunk head screws). This has no tangible impact on the range.

8.12.4 Technical specifications

Table 8- 32 Technical specifications of MDS D324

6GT2600-3AC00	
Product type designation	SIMATIC MDS D324
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 992 bytes EEPROM
• OTP memory	• 16 bytes (EEPROM)
Read cycles (at < 40 °C)	> 10 ¹⁴
Write cycles (at < 40 °C)	> 10 ⁶
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• Epoxy resin
• Color	• Black
Recommended distance to metal	≥ 15 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +125 °C
• outside the read/write field	• -40 ... +140 °C
• during storage	• -40 ... +140 °C

6GT2600-3AC00	
Degree of protection according to EN 60529	• IP67 • IPx9K
Shock-resistant according to EN 60721-3-7 Class 7M3 ¹⁾	1000 m/s ²
Vibration-resistant according to EN 60721-3-7 Class 7M3 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (Ø x H)	27 x 4 mm
Weight	5 g
Type of mounting	• 1 x M3 screw ²⁾ ≤ 1 Nm • Glued ³⁾

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

²⁾) To prevent it loosening during operation, secure the screw with screw locking varnish.

³⁾ The processing instructions of the adhesive manufacturer must be observed.

8.12.5 Dimension drawing

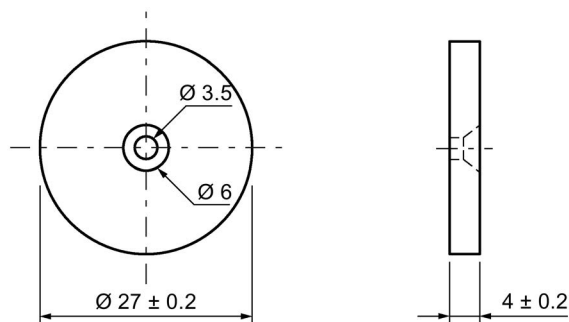


Figure 8-27 Dimension drawing of MDS D324

All dimensions in mm

8.13 MDS D339

8.13.1 Characteristics

MDS D339		Characteristics
	Area of application	Applications in production automation with high temperature demands (up to +220 °C) Typical application areas: • Paintshops and their preparatory treatments • Primer coat, electrolytic dip area, cataphoresis with the associated drying furnaces • Top coat area with drying furnaces • Washing areas at temperatures > 85 °C • Other applications with higher temperatures
	Memory size	992 bytes of EEPROM user memory
	Write/read range	See section Field data of ISO transponders (MDS D) (Page 55).
	Mounting on metal	Yes, with spacer
	ISO standard	ISO 15693
	Degree of protection	IP68/IPx9K

8.13.2 Ordering data

Table 8- 33 Ordering data for MDS D339

	Article number
MDS D339	6GT2600-3AA10

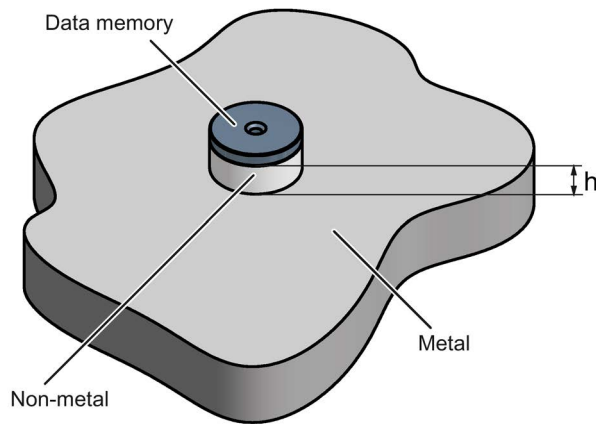
Table 8- 34 Ordering data for MDS D339 accessories

	Article number
Spacer	6GT2690-0AA00
Quick change holder (Ø x H): 22 x 60 mm	6GT2690-0AH00
Quick change holder (Ø x H): 22 x 47 mm	6GT2690-0AH10

8.13.3 Mounting on metal

Direct mounting of the MDS D139/D339 on metal is not allowed. A distance of ≥ 30 mm is recommended. This can be achieved using spacers (see "Ordering data (Page 371)").

Mounting on metal

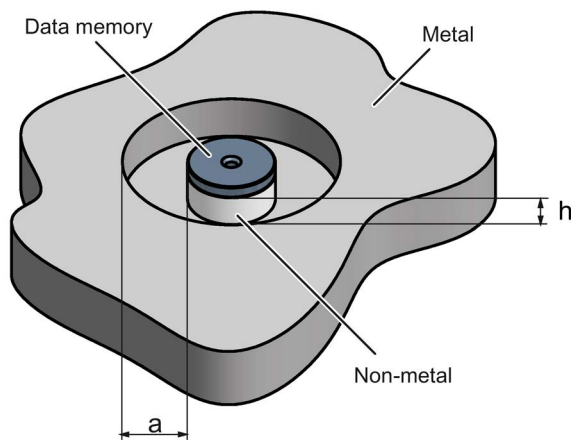


$$h \geq 30 \text{ mm}$$

Figure 8-28 Mounting the MDS D139/D339 on metal with spacer

Flush-mounting

It is possible to mount the MDS D139/D339 in metal. With large antennas, for example ANT D5, this leads to a reduction of ranges.



$$h \geq 30 \text{ mm}$$

$$a \geq 100 \text{ mm}$$

Figure 8-29 Flush-mounting of the MDS D139/D339 in metal with spacer

Note

Going below the distances

If the distances (a and h) are not observed, a reduction of the field data results. It is possible to mount the MDS with metal screws (M5). This has no tangible impact on the range. It is recommended that a test is performed in critical applications.

8.13.4 Cleaning the mobile data memory

Note

Do not clean the transponder with mechanical tools, sand-blasting or pressure hose. These cleaning methods result in damage to the transponder.

Clean the transponder only with the cleaning agents listed in the section "Chemical resistance of the MDS".

8.13.5 Technical specifications

Table 8- 35 Technical specifications of MDS D339

6GT2600-3AA10	
Product type designation	SIMATIC MDS D339
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 992 bytes EEPROM
• OTP memory	• 16 bytes (EEPROM)
Read cycles (at < 40 °C)	> 10 ¹⁴
Write cycles (at < 40 °C)	> 10 ⁶
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S ₉)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years

6GT2600-3AA10	
Mechanical specifications	
Enclosure	
• Material	• PPS
• Color	• Black
Recommended distance to metal	≥ 30 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +100 °C
• outside the read/write field	• -40 ... +220 °C
	• from +125 °C: 20% reduction in the limit distance
	• at +200 °C: Tested up to 5000 hours or 6000 cycles
	• at +220 °C: Tested up to 2000 hours or 2000 cycles
• during storage	• -40 ... +100 °C
Degree of protection according to EN 60529	• IP68 2 hours, 2 bar, +20 °C
	• IPx9K steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C
Shock-resistant according to EN 60721-3-7 Class 7M3 ¹⁾	500 m/s ²
Vibration-resistant according to EN 60721-3-7 Class 7M3 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (Ø x H)	85 x 15 mm
Weight	50 g
Type of mounting	1 x M5 screw ²⁾ 1.5 Nm

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously. A combination of high application temperatures together with high shock or vibration values is not possible.

²⁾ For mounting with the spacer (6GT2690-0AA00), use a stainless steel M5 screw to avoid damaging the MDS in high temperatures (expansion coefficient).

8.13.6 Using the MDS D339 in hazardous areas

The MDS D339 transponder is classed as simple electrical equipment and can be operated in Protection Zone 2, Device Group II, Category 3G.

The following requirements of the 94/9/EC directive are met:

- EN 60079-0:2006
- EN 60079-15:2005
- EN 61241-0:2006
- EN 61241-1:2004

Identification



II 3 G Ex nA II T6

li 3 D Ex tD A22 IP68 T 210°C

KEMA 09 ATEX 0133 X



WARNING

Gefahr durch elektrostatische Entladungen

Potential electrostatic charging hazard

Danger potentiel de charges électrostatiques

Note

Installations- und Betriebsbedingungen für den explosionsgefährdeten Bereich:

- a) Der Einsatz des Gerätes in der Nähe von stark ladungserzeugenden Prozessen ist untersagt.
- b) Das Gerät ist mechanisch geschützt zu montieren.
- c) Die Montage muss auf einem geerdeten, leitenden Untergrund erfolgen.
- d) Die Reinigung darf nur mit feuchtem Tuch erfolgen.

Installation and operating conditions for hazardous areas:

- a) Use of the equipment in the vicinity of processes generating high charges is not allowed.
- b) The equipment must be mechanically protected when installed.
- c) Installation must be performed on a grounded and conductive mounting surface.
- d) Cleaning only with a wet cloth

Conditions d'installation et de mise en oeuvre pour la zone de protection Ex :

- a) L'utilisation de l'appareil près de processus générant de fortes charges est interdite.
 - b) L'appareil doit être monté de manière à être protégé mécaniquement.
 - c) Le montage doit être effectué sur un socle conducteur mis à la terre.
 - d) Nettoyage uniquement avec un chiffon humide
-

8.13.7 Dimensional drawing

MDS D339

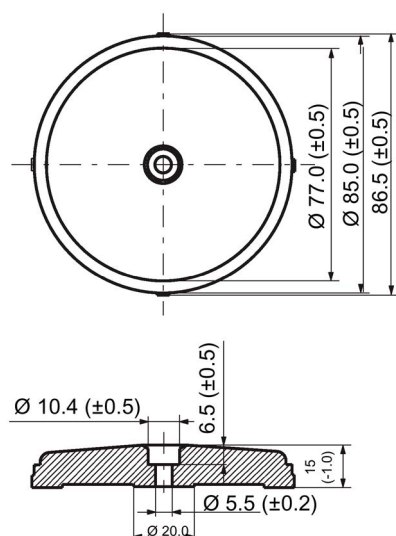


Figure 8-30 Dimension drawing of the MDS D339

Dimensions in mm

8.14 MDS D400

8.14.1 Features

MDS D400	Characteristics	
 SIEMENS MDS D400 6GT2600-4AD00 / AS.01	Area of application	Simple identification such as electronic barcode replacement/supplements, from warehouse and distribution logistics right through to product identification.
	Memory size	2000 bytes of FRAM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55)"
	Mounting on metal	Yes, with spacer
	ISO standard	ISO 15693
	Degree of protection	IP67

8.14.2 Ordering data

Table 8- 36 Ordering data of MDS D400

	Article number
MDS D400	6GT2600-4AD00

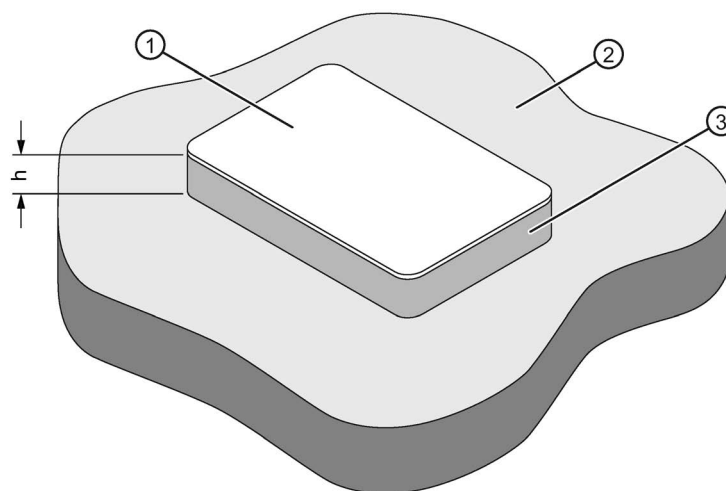
Table 8- 37 Ordering data of MDS D400 accessories

	Article number
Spacer (in conjunction with fixing pocket 6GT2190-0AB00)	6GT2190-0AA00
Fixing pocket (in conjunction with spacer 6GT2190-0AA00)	6GT2190-0AB00
Fixing pocket (not suitable for fixing directly onto metal)	6GT2390-0AA00

8.14.3 Mounting on metal

Mounting on metal

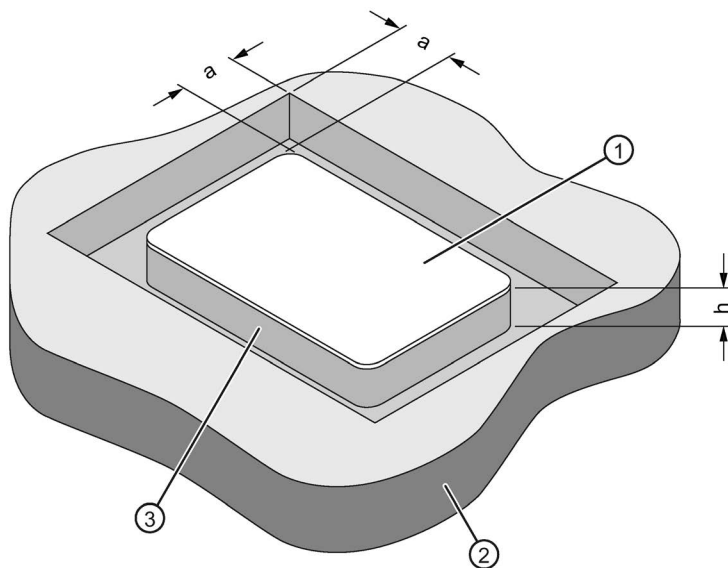
It is possible to mount the MDS D400 on metal.



- h ≥ 20 mm
① Transponder
② Metal
③ Non-metal

Figure 8-31 Mounting of the MDS D400 on metal with spacer

Flush-mounted in metal



- $a \geq 20 \text{ mm}$
 $h \geq 20 \text{ mm}$
 ① Transponder
 ② Metal
 ③ Non-metal

Figure 8-32 Flush-mounting of MDS D400 in metal with spacer

Note

If the minimum guide values (h) are not observed, this will result in a reduction of the field data.

8.14.4 Technical specifications

Table 8- 38 Technical specifications for MDS D400

6GT2600-4AD00	
Product type designation	SIMATIC MDS D400
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 2000 bytes FRAM
• OTP memory	• 16 bytes FRAM
Read cycles (at < 25 °C)	> 10 ¹²
Write cycles (at < 25 °C)	> 10 ¹²
Data retention time (at < 25 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• PVC
• Color	• White
Recommended distance to metal	≥ 20 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -20 ... +60 °C
• outside the read/write field	• -20 ... +60 °C
• during storage	• -20 ... +60 °C
Degree of protection according to EN 60529	IP67
Shock-resistant acc. to EN 60721-3-7, Class 7M2	ISO 10373 / ISO 7810 ¹⁾
Vibration-resistant according to EN 60721-3-7 Class 7M2	ISO 10373 / ISO 7810 ¹⁾
Torsion and bending load	ISO 10373 / ISO 7816-1

6GT2600-4AD00

Design, dimensions and weight

Dimensions (L x W x H)	85 x 54 x 0.8 mm
Weight	5 g
Type of mounting	• Fixing lug • Glued ²⁾

1) The values for vibration are maximum values and must not be applied continuously.

2) The processing instructions of the adhesive manufacturer must be observed.

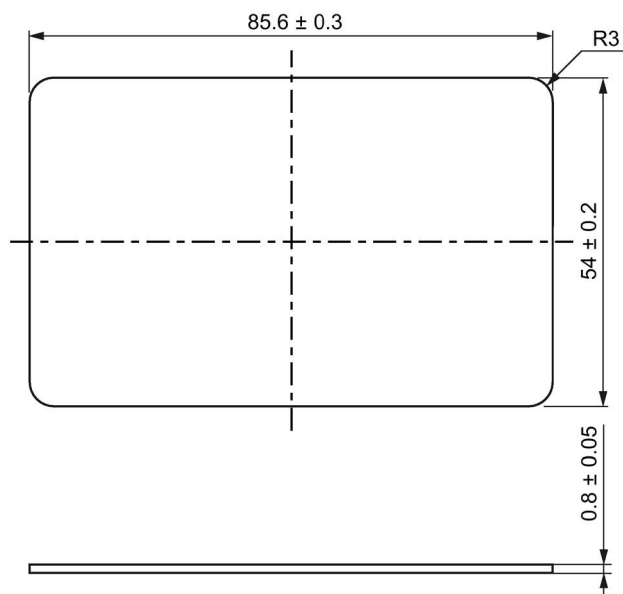
8.14.5 Dimension drawing

Figure 8-33 Dimensional drawing MDS D400 (dimensions in mm)

8.15 MDS D421

8.15.1 Characteristics

MDS D421	Characteristics	
	Area of application	The MDS D421 is designed for tool coding in accordance with DIN 69873. It can be used wherever small data carriers and exact positioning are required, e.g. tool identification, workpiece holders. The rugged housing of the MDS D421 means that it can also be used in a harsh industrial environment without problems.
	Memory size	2000 bytes of FRAM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55)"
	Mounting on metal	Yes, flush-mounted in metal
	ISO standard	ISO 15693
	Degree of protection	IP67/IPx9K

8.15.2 Ordering data

Table 8- 39 Ordering data of MDS D421

	Article number
MDS D421	6GT2600-4AE00

8.15.3 Mounting on metal

Mounting on metal

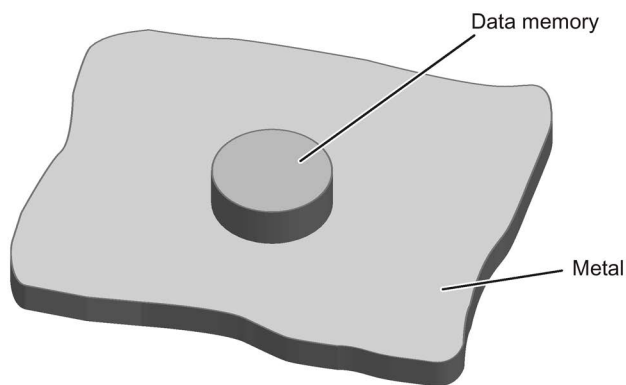


Figure 8-34 Mounting of MDS D421/D521/E623 on metal

Flush-mounting

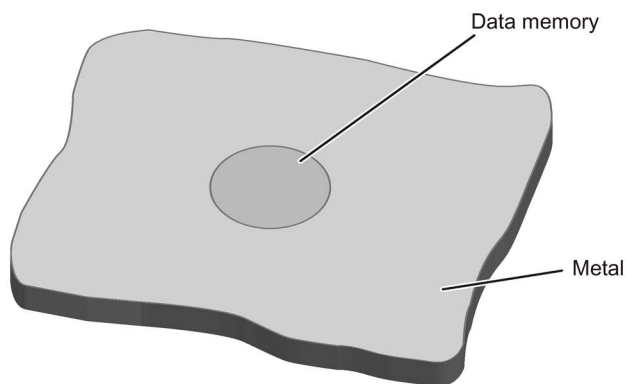


Figure 8-35 Mounting of MDS D421/D521/E623 in metal

Flush-mounting of the MDS in metal with tools

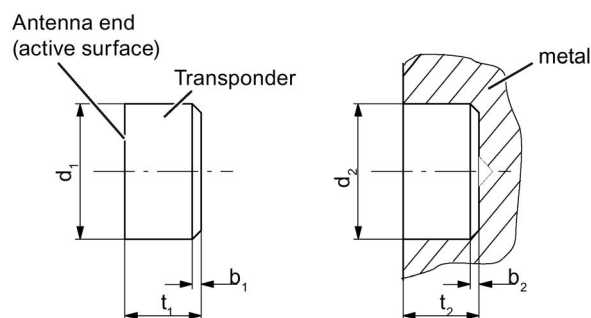


Figure 8-36 Flush-mounting of MDS D421/D521/E623 in metal with tools

b ₁	0.5 x 45°	b ₂	0.3 x 45° or R0.3
d ₁	10 (-0.04... -0.13)	d ₂	10 (+0.09... 0)
t ₁	4.5 (-0 ... -0.1)	t ₂	4.6 (+0.2 ... 0)

All dimensions in mm

Note

Installation instruction

The MDS should not protrude out of the locating hole; it must be flush with the outside contour.

The mounting instructions of the MDS and the conditions associated with the application (e.g. peripheral speed, temperature, and use of coolant) must be observed during the installation.

Mounting information for adhesion

- Drill installation hole
- The adhesive surfaces must be dry, free from dust, oil, stripping agents and other impurities
- Apply adhesive according to the manufacturer's processing instructions
- Press in transponder using your fingers; with antenna side to the outside (see figure above)
- Remove residues of adhesive
- Allow to cure according to the manufacturer's instructions
- Flush-mounting of the transponder in metal with tools

Installation examples

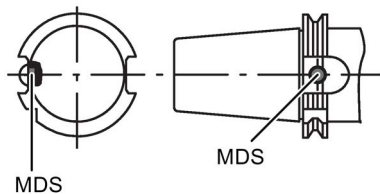


Figure 8-37 Installation example of MDS D421/D521/E623 in a steep cone

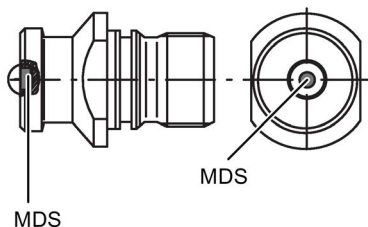


Figure 8-38 Installation example of MDS D421/D521/E623 in a stud bolt

8.15.4 Technical specifications

Table 8- 40 Technical specifications for the MDS D421

6GT2600-4AE00	
Product type designation	SIMATIC MDS D421
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 2000 bytes FRAM
• OTP memory	• 16 bytes FRAM
Read cycles (at < 40 °C)	> 10 ¹²
Write cycles (at < 40 °C)	> 10 ¹²
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S ₉)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years

6GT2600-4AE00

Mechanical specifications

Enclosure

- | | |
|------------|---------------|
| • Material | • Epoxy resin |
| • Color | • Black |

Recommended distance to metal	≥ 0 mm
-------------------------------	--------

Power supply	Inductive, without battery
--------------	----------------------------

Permitted ambient conditions

Ambient temperature

- | | |
|--------------------------------|-------------------|
| • during write/read access | • -25 ... +85 °C |
| • outside the read/write field | • -40 ... +100 °C |
| • during storage | • -40 ... +100 °C |

Degree of protection according to EN 60529

- | |
|--|
| • IP67 |
| • IPx9K
steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C |

Shock-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	1000 m/s ²
---	-----------------------

Vibration-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	200 m/s ²
---	----------------------

Torsion and bending load	Not permitted
--------------------------	---------------

Design, dimensions and weight

Dimensions (Ø x H)	10 x 4.5 mm
--------------------	-------------

Weight	Approx. 1 g
--------	-------------

Type of mounting	Glued ²⁾
------------------	---------------------

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

²⁾ The processing instructions of the adhesive manufacturer must be observed.

8.15.5 Dimension drawing

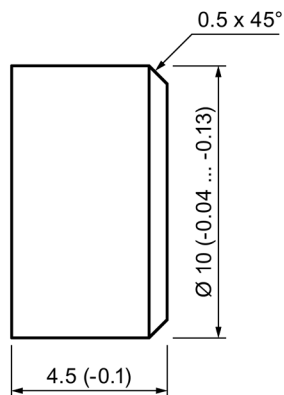


Figure 8-39 Dimension drawing of MDS D421

All dimensions in mm

8.16 MDS D422

8.16.1 Characteristics

MDS D422	Characteristics	
	Area of application	Identification of metallic workpiece holders, workpieces or containers
	Memory size	2000 bytes of FRAM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55).
	Mounting on metal	Yes
	ISO standard	ISO 15693
	Degree of protection	IP68

8.16.2 Ordering data

Table 8- 41 Ordering data of MDS D422

	Article number
MDS D422 A screw-in aid is included in the scope of supply per packaging unit	6GT2600-4AF00

8.16.3 Mounting in metal

Flush-mounting

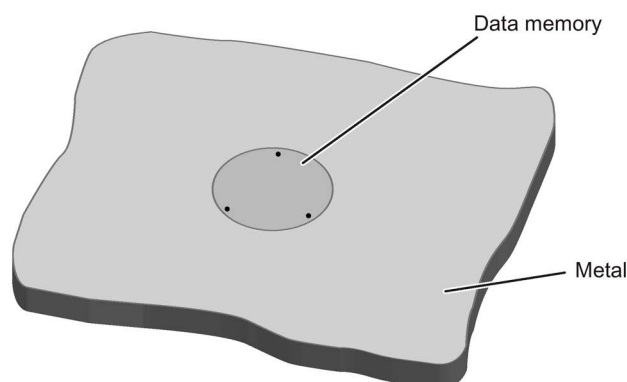


Figure 8-40 Mounting of MDS D422 in metal

Mounting information for screws

You can screw the transponder into a pre-drilled threaded hole using the screw-in aid.

Mounting information for adhesion

- Drill installation hole
- The adhesive surfaces must be dry, free from dust, oil, stripping agents and other impurities
- Apply adhesive according to the manufacturer's processing instructions
- Press in MDS D422 using your fingers; with antenna to the outside
- Remove residues of adhesive
- Allow to cure according to the manufacturer's instructions
- Flush-mounting of MDS D422 in metal with tools

8.16.4 Technical specifications

Table 8- 42 Technical specifications for the MDS D422

6GT2600-4AF00	
Product type designation	SIMATIC MDS D422
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 2000 bytes FRAM
• OTP memory	• 16 bytes FRAM
Read cycles (at < 40 °C)	> 10 ¹²
Write cycles (at < 40 °C)	> 10 ¹²
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	285 years
Mechanical specifications	
Enclosure	
• Material	• Plastic PA 6.6 GF; brass nickel plated
• Color	• Black/silver
Recommended distance to metal	≥ 0 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +100 °C
• during storage	• -40 ... +100 °C
Degree of protection according to EN 60529	IP68 2 hours, 2 bar, +20 °C
Shock-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	500 m/s ²
Vibration-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted

6GT2600-4AF00

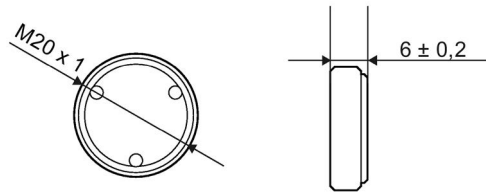
Design, dimensions and weight

Dimensions (Ø x H)	20 x 6 mm
Weight	13 g
Type of mounting	• Glued ²⁾ • 1 x transponder thread M20 ≤ 1 Nm

1) The values for shock and vibration are maximum values and must not be applied continuously.

2) The processing instructions of the adhesive manufacturer must be observed.

8.16.5 Dimension drawing



Dimensions in mm

Figure 8-41 Dimensional drawing of MDS D422

8.17 MDS D423

8.17.1 Characteristics

MDS D423	Characteristics	
	Area of application	Identification of metallic workpiece holders, workpieces or containers, production automation
	Memory size	2000 bytes of FRAM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55)"
	Mounting on metal	Yes, flush-mounted in metal
	ISO standard	ISO 15693
	Degree of protection	IP68/IPx9K

8.17.2 Ordering data

Table 8- 43 Ordering data of MDS D423

	Article number
MDS D423	6GT2600-4AA00

Table 8- 44 Ordering data of MDS D423 accessories

	Article number
Fixing hood RF330T / MDS D423	6GT2690-0AE00

8.17.3 Mounting on metal

Mounting on metal

Direct mounting of the MDS D423 on metal is possible.

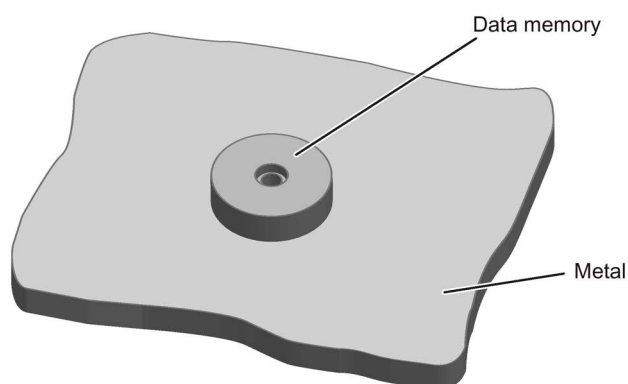
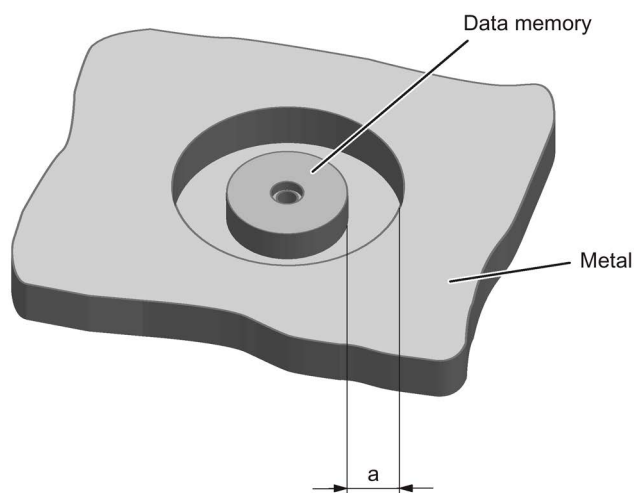


Figure 8-42 Mounting the MDS D423 on metal

Flush-mounted in metal

It is possible to mount the MDS D423 in metal.



$a \geq 10 \text{ mm}$

Figure 8-43 Flush-mounting of the MDS D423 in metal with 10 mm clearance

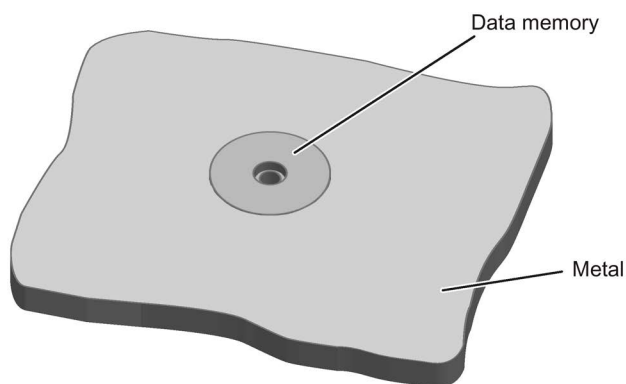


Figure 8-44 Flush-mounting of the MDS D423 in metal without clearance

Note**Reduction of the write/read range**

Note that when the device is flush-mounted in metal without a surrounding clearance ≥ 10 mm, the write/read range is significantly reduced.

8.17.4 Technical specifications

Table 8- 45 Technical specifications of MDS D423

6GT2600-4AA00	
Product type designation	SIMATIC MDS D423
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 2000 bytes FRAM
• OTP memory	• 16 bytes FRAM
Read cycles (at $< 40\text{ }^{\circ}\text{C}$)	$> 10^{12}$
Write cycles (at $< 40\text{ }^{\circ}\text{C}$)	$> 10^{12}$
Data retention time (at $< 40\text{ }^{\circ}\text{C}$)	> 10 years
Write/read distance (S_g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years

6GT2600-4AA00

Mechanical specifications

Enclosure

- | | |
|------------|---------------|
| • Material | • Plastic PPS |
| • Color | • Black |

Recommended distance to metal	≥ 0 mm
-------------------------------	--------

Power supply	Inductive, without battery
--------------	----------------------------

Permitted ambient conditions

Ambient temperature

- | | |
|--------------------------------|-------------------|
| • during write/read access | • -25 ... +85 °C |
| • outside the read/write field | • -40 ... +100 °C |
| • during storage | • -40 ... +100 °C |

Degree of protection according to EN 60529

- IP68
2 hours, 2 bar, +20 °C
- IPx9K
steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C

Shock-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	500 m/s ²
---	----------------------

Vibration-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	200 m/s ²
---	----------------------

Pressure resistance

- Low pressure resistant
vacuum dryer: up to 20 mbar
- High pressure resistant
(see degree of protection IPx9K)

Torsion and bending load

Not permitted

Design, dimensions and weight

Dimensions (Ø x H)	30 x 8 mm
--------------------	-----------

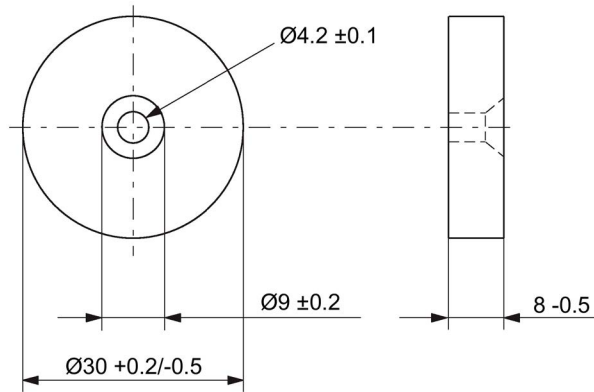
Weight	15 g
--------	------

Type of mounting	1 x M4 screw ²⁾ ≤ 1 Nm
------------------	--------------------------------------

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

²⁾ To prevent it loosening during operation, secure the screw with screw locking varnish.

8.17.5 Dimensional drawing



Dimensions in mm

Figure 8-45 Dimension drawing for MDS D423

8.18 MDS D424

8.18.1 Characteristics

MDS D424	Characteristics	
	Area of application	Production and distribution logistics as well as in assembly and production lines, can also be used in a harsh industrial environment without problem
	Memory size	2000 bytes of FRAM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55)."
	Mounting on metal	Yes, with spacer
	ISO standard	ISO 15693
	Degree of protection	IP67; IPx9K

8.18.2 Ordering data

Table 8- 46 Ordering data of MDS D424

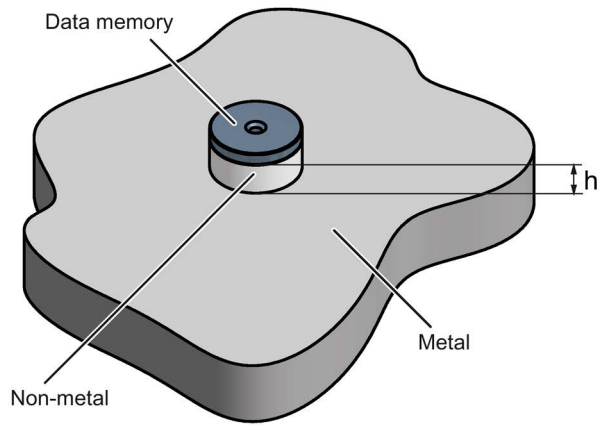
	Article number
MDS D424	6GT2600-4AC00

Table 8- 47 Ordering data of MDS D424 accessories

	Article number
Spacer	6GT2690-0AK00

8.18.3 Mounting on metal

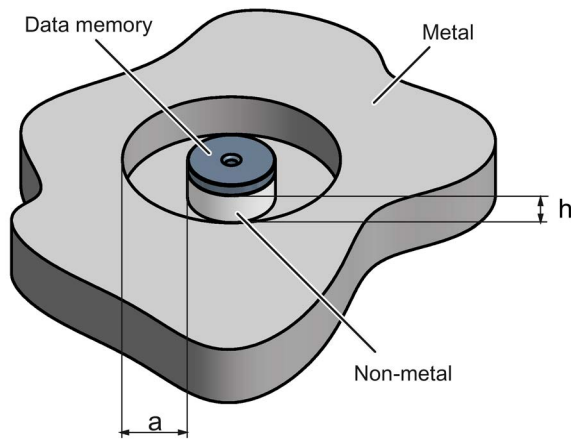
Mounting on metal



$$h \geq 15 \text{ mm}$$

Figure 8-46 Mounting the MDS D124/D324/D424/D524/E624 and RF320T on metal with spacer

Flush-mounting



$$h \geq 15 \text{ mm}$$

$$a \geq 25 \text{ mm}$$

Figure 8-47 Flush-mounting of the MDS D124/D324/D424/D524/E624 and RF320T in metal with spacer

Note

Going below the distances

If the distances (a and h) are not observed, a reduction of the field data results. It is possible to mount the MDS with metal screws (M3 countersunk head screws). This has no tangible impact on the range.

8.18.4 Technical specifications

Table 8- 48 Technical specifications for the MDS D424

6GT2600-4AC00	
Product type designation	SIMATIC MDS D424
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 2000 bytes FRAM
• OTP memory	• 16 bytes FRAM
Read cycles (at < 40 °C)	> 10 ¹²
Write cycles (at < 40 °C)	> 10 ¹²
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• Epoxy resin
• Color	• Black
Recommended distance to metal	≥ 15 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +100 °C
• during storage	• -40 ... +100 °C

6GT2600-4AC00	
Degree of protection according to EN 60529	• IP67 • IPx9K
Shock-resistant according to EN 60721-3-7 Class 7M3 ¹⁾	1000 m/s ²
Vibration-resistant according to EN 60721-3-7 Class 7M3 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (Ø x H)	27 x 4 mm
Weight	5 g
Type of mounting	• Glued ²⁾ • 1x screw M3 ³⁾ ≤ 1 Nm

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

²⁾ The processing instructions of the adhesive manufacturer must be observed.

³⁾) To prevent it loosening during operation, secure the screw with screw-locking varnish.

8.18.5 Dimension drawing

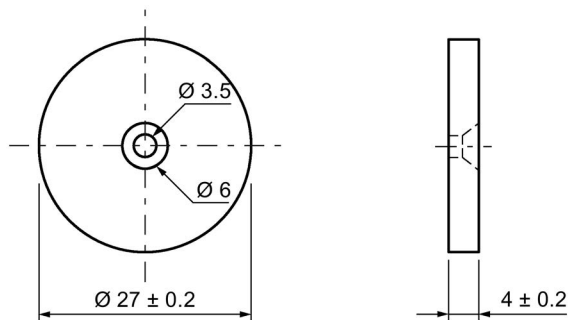


Figure 8-48 Dimension drawing of MDS D424

All dimensions in mm

8.19 MDS D425

8.19.1 Characteristics

MDS D425	Characteristics	
	Area of application	Compact and rugged ISO transponder; suitable for screw mounting Use in assembly and production lines in the powertrain sector; ideal for mounting on motors, gearboxes, and work-piece holders Rugged packaging of the MDS D425; can therefore also be used under extreme environmental conditions without problem
	Memory size	2000 bytes of FRAM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55)".
	Mounting on metal	Yes
	ISO standard	ISO 15693
	Degree of protection	IP68/IPx9K

8.19.2 Ordering data

Table 8- 49 Ordering data of MDS D425

	Article number
MDS D425	6GT2600-4AG00

8.19.3 Application example

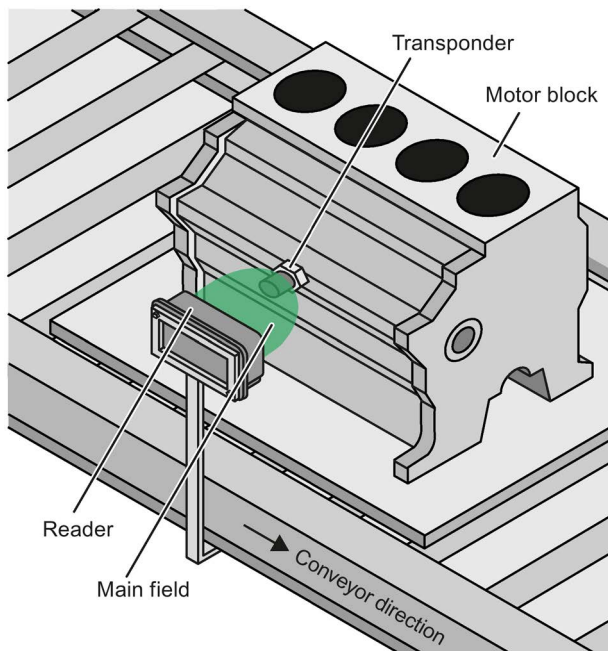


Figure 8-49 Application example

8.19.4 Technical specifications

Table 8- 50 Technical specifications for the MDS D425

6GT2600-4AG00	
Product type designation	SIMATIC MDS D425
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 2000 bytes FRAM
• OTP memory	• 16 bytes FRAM
Read cycles (at < 40 °C)	> 10 ¹²
Write cycles (at < 40 °C)	> 10 ¹²
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S ₉)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years

6GT2600-4AG00**Mechanical specifications****Enclosure**

- | | |
|------------|---------------------|
| • Material | • Plastic PA 6.6 GF |
| • Color | • Black |

Recommended distance to metal	≥ 0 mm
-------------------------------	--------

Power supply	Inductive, without battery
--------------	----------------------------

Permitted ambient conditions**Ambient temperature**

- | | |
|--------------------------------|-------------------|
| • during write/read access | • -25 ... +85 °C |
| • outside the read/write field | • -40 ... +125 °C |
| • during storage | • -40 ... +125 °C |

Degree of protection according to EN 60529

- | |
|--|
| • IP68
2 hours, 2 bar, +20 °C |
| • IPx9K
steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C |

Shock-resistant according to IEC 68-2-27 ¹⁾	500 m/s ²
--	----------------------

Vibration-resistant according to IEC 68-2-6 ¹⁾	200 m/s ²
---	----------------------

Torsion and bending load	Not permitted
--------------------------	---------------

Design, dimensions and weight

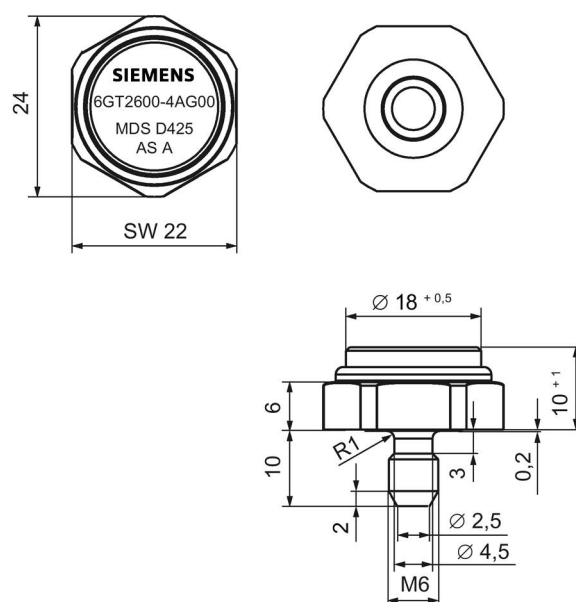
Dimensions (Ø x H)	24 x 10 mm (without set screw)
--------------------	--------------------------------

Weight	35 g
--------	------

Type of mounting	1x transponder set screw M6 SW 22; ≤ 6 Nm
------------------	--

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

8.19.5 Dimension drawing



Dimensions in mm

Figure 8-50 Dimension drawing of MDS D425

8.20 MDS D426

8.20.1 Characteristics

MDS D426	Characteristics	
 SIEMENS 6GT2600-4AH00 MDS D426 MOBY D AS: A	Area of application	Compact and rugged ISO transponder; suitable for identification of transport units in production-related logistics; can also be deployed in harsh conditions
	Memory size	2000 bytes of FRAM user memory
	Write/read range	See section Field data of ISO transponders (MDS D) (Page 55)
	Mounting on metal	Yes, with spacer
	ISO standard	ISO 15693
	Degree of protection	IP68

8.20.2 Ordering data

Table 8- 51 Ordering data of MDS D426

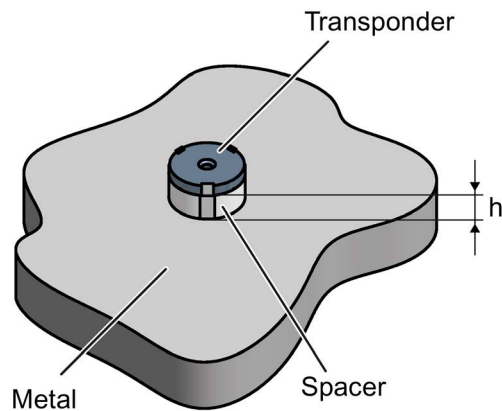
	Article number
MDS D426	6GT2600-4AH00

Table 8- 52 Ordering data of MDS D426 accessories

	Article number
Spacer	6GT2690-0AL00

8.20.3 Mounting on metal

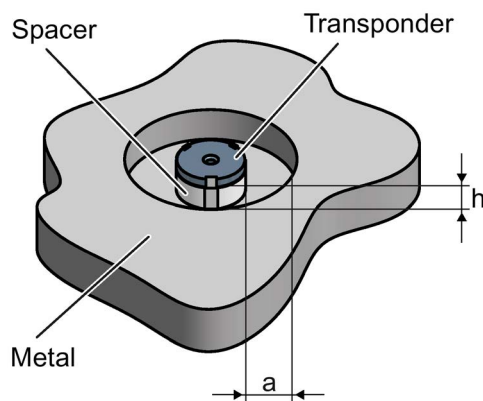
Mounting on metal



$h \geq 25 \text{ mm}$

Figure 8-51 Mounting the MDS D126 / D426 / D526 on metal with spacer

Flush-mounted in metal



$h \geq 25 \text{ mm}$

$a \geq 50 \text{ mm}$

Figure 8-52 Flush installation of the MDS D126 / D426 / D526 in metal with spacer

8.20.4 Technical specifications

Table 8- 53 Technical specifications for the MDS D426

6GT2600-4AH00	
Product type designation	SIMATIC MDS D426
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 2000 bytes FRAM
• OTP memory	• 16 bytes FRAM
Read cycles (at < 40 °C)	> 10 ¹²
Write cycles (at < 40 °C)	> 10 ¹²
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• Plastic PA 6.6 GF
• Color	• Black
Recommended distance to metal	≥ 25 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +100 °C
• during storage	• -40 ... +100 °C
Degree of protection according to EN 60529	IP68 2 hours, 2 bar, +20 °C
Shock-resistant according to IEC 68-2-27 ¹⁾	50 m/s ²
Vibration-resistant according to IEC 68-2-6 ¹⁾	20 m/s ²
Torsion and bending load	Not permitted

6GT2600-4AH00

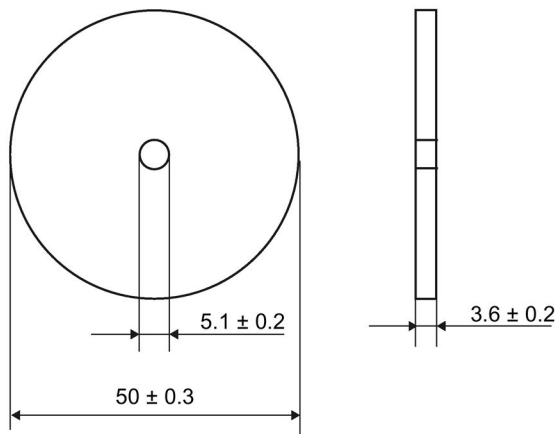
Design, dimensions and weight

Dimensions (Ø x H)	50 x 3.6 mm
Weight	13 g
Type of mounting	1 x M4 screw ²⁾ ≤ 1 Nm

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

²⁾) To prevent it loosening during operation, secure the screw with screw locking varnish.

8.20.5 Dimension drawing



Dimensions in mm

Figure 8-53 Dimension drawing of MDS D426

8.21 MDS D428

8.21.1 Characteristics

MDS D428	Characteristics	
	Area of application	Compact and rugged ISO transponder; suitable for screw mounting. Use in assembly and production lines in the powertrain sector. The rugged housing of the MDS D428 means that it can also be used in extreme environmental conditions without problems.
	Memory size	2000 bytes of FRAM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55)"
	Mounting on metal	Yes
	ISO standard	ISO 15693
	Degree of protection	IP68/IPx9K

8.21.2 Ordering data

Table 8- 54 Ordering data of MDS D428

	Article number
MDS D428	6GT2600-4AK00-0AX0

8.21.3 Application example

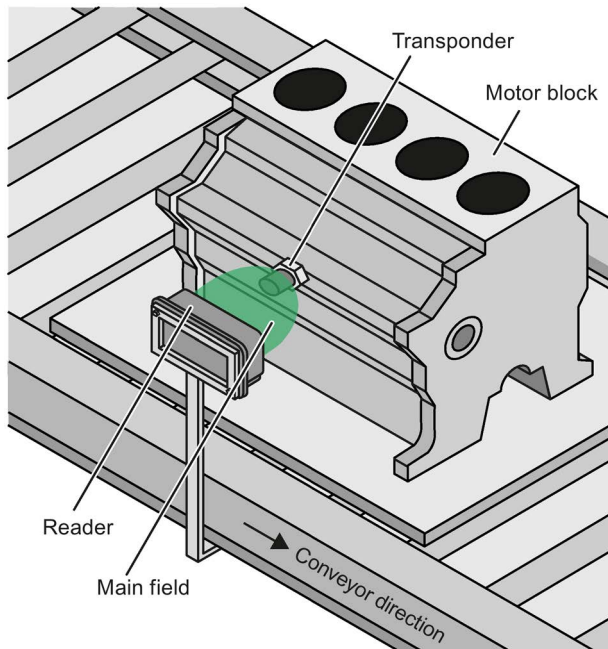


Figure 8-54 Application example

8.21.4 Technical specifications

Table 8- 55 Technical specifications for the MDS D428

6GT2600-4AK00	
Product type designation	SIMATIC MDS D428
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 2000 bytes FRAM
• OTP memory	• 16 bytes FRAM
Read cycles (at < 40 °C)	> 10 ¹²
Write cycles (at < 40 °C)	> 10 ¹²
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S ₉)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years

6GT2600-4AK00**Mechanical specifications****Enclosure**

• Material	• Plastic PA 6.6 GF
• Color	• Black
Recommended distance to metal	≥ 0 mm
Power supply	Inductive, without battery

Permitted ambient conditions**Ambient temperature**

• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +125 °C
• during storage	• -40 ... +125 °C

Degree of protection according to EN 60529	• IP68 2 hours, 2 bar, +20 °C • IPx9K steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C
--	--

Shock-resistant according to IEC 68-2-27 ¹⁾	500 m/s ²
--	----------------------

Vibration-resistant according to IEC 68-2-6 ¹⁾	200 m/s ²
---	----------------------

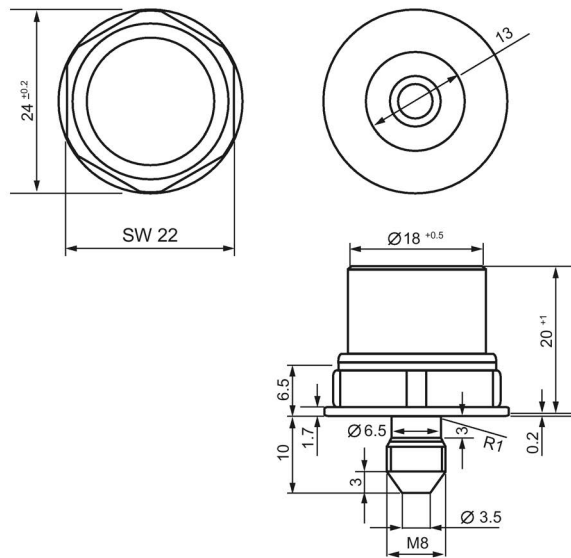
Torsion and bending load	Not permitted
--------------------------	---------------

Design, dimensions and weight

Dimensions (Ø x H)	24 x 20 mm (without set screw)
Weight	35 g
Type of mounting	1x transponder set screw M8 SW 22; ≤ 8 Nm

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

8.21.5 Dimension drawing



Dimensions in mm

Figure 8-55 Dimension drawing of MDS D428

8.22 MDS D460

8.22.1 Characteristics

MDS D460		Characteristics
	Area of application	Identification in small assembly lines; can also be used in a harsh industrial environment
	Memory size	2000 bytes of FRAM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55)"
	Mounting on metal	Yes, with spacer
	ISO standard	ISO 15693
	Degree of protection	IP67/IPx9K

8.22.2 Ordering data

Table 8- 56 Ordering data of MDS D460

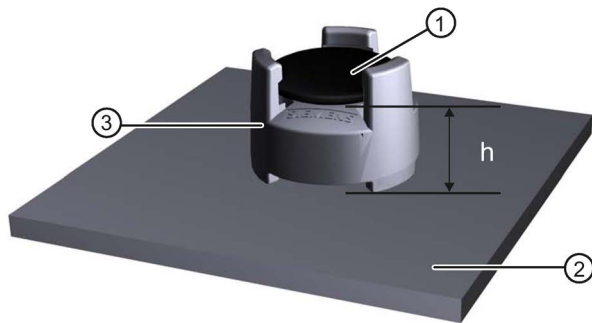
	Article number
MDS D460	6GT2600-4AB00

Table 8- 57 Ordering data of MDS D460 accessories

	Article number
Spacer	6GT2690-0AG00
Corner mounting bracket	6GT2690-0AN00

8.22.3 Mounting on metal

Mounting option on metal with spacer



① Transponder

② Metal

③ Spacer

h ≥ 10 mm

Figure 8-56 Mounting the MDS D460 on metal with spacer

Note

If the minimum guide values (h) are not observed, a reduction of the field data results. In critical applications, it is recommended that a test is performed.

Flush-mounting

Flush-mounting of the MDS D460 in metal is not permitted!

8.22.4 Technical specifications

Table 8- 58 Technical specifications for MDS D460

6GT2600-4AB00	
Product type designation	SIMATIC MDS D460
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 2000 bytes FRAM
• OTP memory	• 16 bytes FRAM
Read cycles (at < 40 °C)	> 10 ¹²
Write cycles (at < 40 °C)	> 10 ¹²
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• Epoxy resin
• Color	• Black
Recommended distance to metal	≥ 10 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +100 °C
• during storage	• -40 ... +100 °C
Degree of protection according to EN 60529	• IP67 • IPx9K steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C
Shock-resistant according to IEC 68-2-27 ¹⁾	500 m/s ²
Vibration-resistant according to IEC 68-2-6 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted

6GT2600-4AB00

Design, dimensions and weight

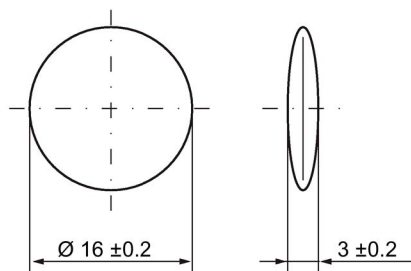
Dimensions (Ø x H)	16 x 3 mm
Weight	3 g
Type of mounting	• Glued ²⁾ • With spacer

1) The values for shock and vibration are maximum values and must not be applied continuously.

2) The processing instructions of the adhesive manufacturer must be observed.

8.22.5 Dimension drawings

Dimensional drawing of MDS D460



Dimensions in mm

Figure 8-57 Dimensional drawing of MDS D460

8.23 MDS D521

8.23.1 Characteristics

MDS D521	Characteristics	
	Area of application	The MDS D521 is designed for tool coding according to DIN 69873. It can be used wherever small data carriers and exact positioning are required, e.g. tool identification, workpiece holders. The rugged housing of the MDS D521 means that it can also be used in a harsh industrial environment without problems.
	Memory size	8192 bytes of FRAM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55)"
	Mounting on metal	Yes, flush-mounted in metal
	ISO standard	ISO 15693
	Degree of protection	IP67/IPx9K

8.23.2 Ordering data

Table 8- 59 Ordering data for MDS D521

	Article number
MDS D521	6GT2600-5AE00

8.23.3 Mounting on metal

Mounting on metal

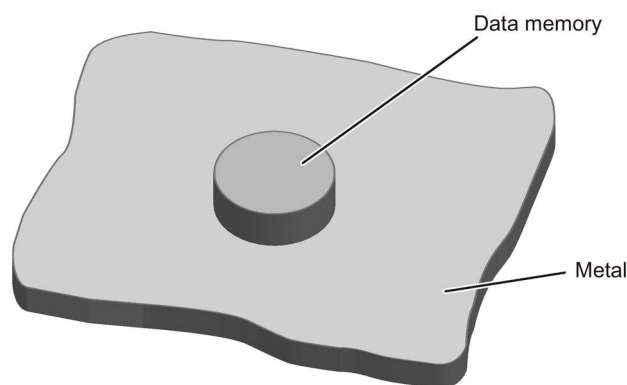


Figure 8-58 Mounting of MDS D421/D521/E623 on metal

Flush-mounting

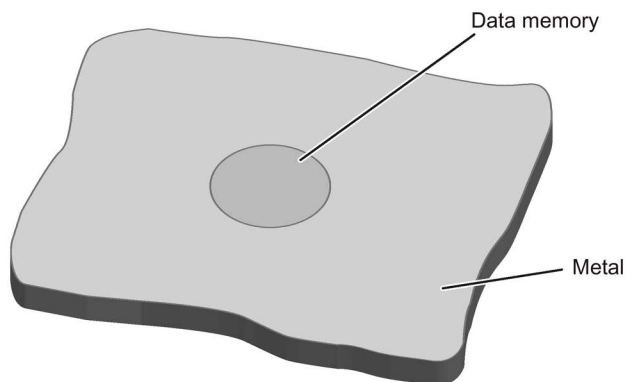


Figure 8-59 Mounting of MDS D421/D521/E623 in metal

Flush-mounting of the MDS in metal with tools

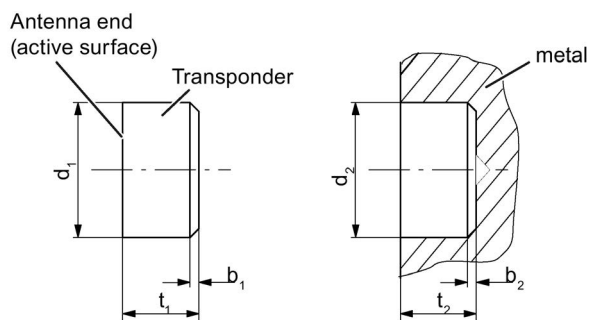


Figure 8-60 Flush-mounting of MDS D421/D521/E623 in metal with tools

b_1	0.5 x 45°	b_2	0.3 x 45° or R0.3
d_1	10 (-0.04... -0.13)	d_2	10 (+0.09... 0)
t_1	4.5 (-0 ... -0.1)	t_2	4.6 (+0.2 ... 0)

All dimensions in mm

Note

Installation instruction

The MDS should not protrude out of the locating hole; it must be flush with the outside contour.

The mounting instructions of the MDS and the conditions associated with the application (e.g. peripheral speed, temperature, and use of coolant) must be observed during the installation.

Mounting information for adhesion

- Drill installation hole
- The adhesive surfaces must be dry, free from dust, oil, stripping agents and other impurities
- Apply adhesive according to the manufacturer's processing instructions
- Press in transponder using your fingers; with antenna side to the outside (see figure above)
- Remove residues of adhesive
- Allow to cure according to the manufacturer's instructions
- Flush-mounting of the transponder in metal with tools

Installation examples

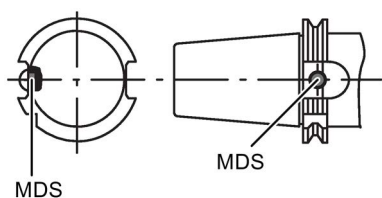


Figure 8-61 Installation example of MDS D421/D521/E623 in a steep cone

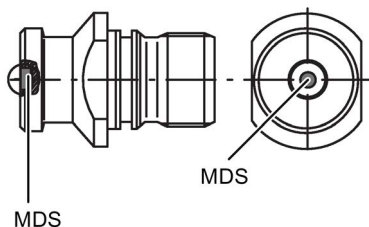


Figure 8-62 Installation example of MDS D421/D521/E623 in a stud bolt

8.23.4 Technical specifications

Table 8- 60 Technical specifications for MDS D521

6GT2600-5AE00	
Product type designation	SIMATIC MDS D521
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 8192 bytes FRAM
Read cycles (at < 40 °C)	> 10 ¹²
Write cycles (at < 40 °C)	> 10 ¹²
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• Epoxy resin
• Color	• Black
Recommended distance to metal	≥ 0 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +100 °C
• during storage	• -40 ... +100 °C
Degree of protection according to EN 60529	• IP67 • IPx9K steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C
Shock-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	1000 m/s ²
Vibration-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted

6GT2600-5AE00

Design, dimensions and weight

Dimensions (Ø x H)	10 x 4.5 mm
Weight	1 g
Type of mounting	Glued ²⁾

1) The values for shock and vibration are maximum values and must not be applied continuously.

2) The processing instructions of the adhesive manufacturer must be observed.

8.23.5 Dimension drawing

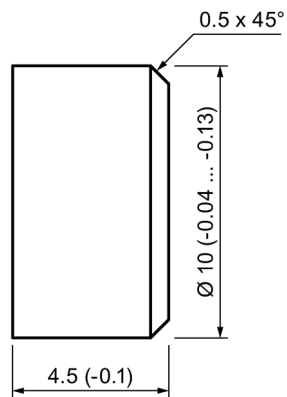


Figure 8-63 Dimension drawing of MDS D521

All dimensions in mm

8.24 MDS D522

8.24.1 Characteristics

MDS D522	Characteristics	
	Area of application	Identification of metallic workpiece holders, workpieces or containers
	Memory size	8192 bytes of FRAM user memory
	Write/read range	See "Field data of ISO transponders (MDS D) (Page 55)."
	Mounting in metal	Yes
	ISO standard	ISO 15693
	Degree of protection	IP68

8.24.2 Ordering data

Table 8- 61 Ordering data for MDS D522

	Article number
MDS D522 Units in a package: 10 units A mounting aid is included in the scope of supply per packaging unit.	6GT2600-5AF00

8.24.3 Mounting in metal

Flush-mounting

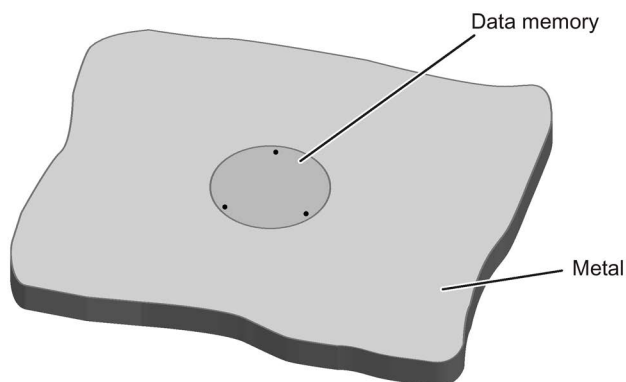


Figure 8-64 Mounting of MDS D522 in metal

Mounting information for screws

You can screw the transponder into a pre-drilled threaded hole using the screw-in aid.

Mounting information for adhesion

- Drill installation hole
- The adhesive surfaces must be dry, free from dust, oil, stripping agents and other impurities
- Apply adhesive according to the manufacturer's processing instructions
- Press in MDS D522 using your fingers; with antenna to the outside
- Remove residues of adhesive
- Allow to cure according to the manufacturer's instructions
- Flush-mounting of MDS D522 in metal with tools

8.24.4 Technical specifications

Table 8- 62 Technical specifications for MDS D522

6GT2600-5AF00	
Product type designation	SIMATIC MDS D522
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 8192 bytes FRAM
Read cycles (at < 40 °C)	> 10 ¹²
Write cycles (at < 40 °C)	> 10 ¹²
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	285 years
Mechanical specifications	
Enclosure	
• Material	• Plastic PA 6.6 GF; brass nickel plated
• Color	• Black/silver
Recommended distance to metal	≥ 0 mm
Power supply	Inductive, without battery

6GT2600-5AF00	
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +100 °C
• during storage	• -40 ... +100 °C
Degree of protection according to EN 60529	IP68 2 hours, 2 bar, +20 °C
Shock-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	500 m/s ²
Vibration-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (Ø x H)	20 x 6 mm
Weight	13 g
Type of mounting	• Glued²⁾ • 1 x transponder thread M20 ≤ 1 Nm

1) The values for shock and vibration are maximum values and must not be applied continuously.

2) The processing instructions of the adhesive manufacturer must be observed.

8.24.5 Dimension drawing

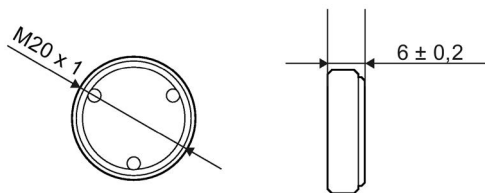


Figure 8-65 Dimensional drawing of MDS D522

All dimensions in mm

8.25 MDS D522 special variant

8.25.1 Characteristics

MDS D522 special version	Characteristics	
	Area of application	Identification of metallic workpiece holders or workpieces
	Memory size	8192 bytes of FRAM user memory
	Write/read range	See "Field data of ISO transponders (MDS D) (Page 55)."
	Mounting in metal	Yes
	ISO standard	ISO 15693
	Degree of protection	IP68

8.25.2 Ordering data

Table 8- 63 MDS D522 special version

	Article number
MDS D522 special version Units in a package: 10 units A mounting aid is included in the scope of supply per packaging unit.	6GT2600-5AF00-0AX0

8.25.3 Mounting in metal

Flush-mounting

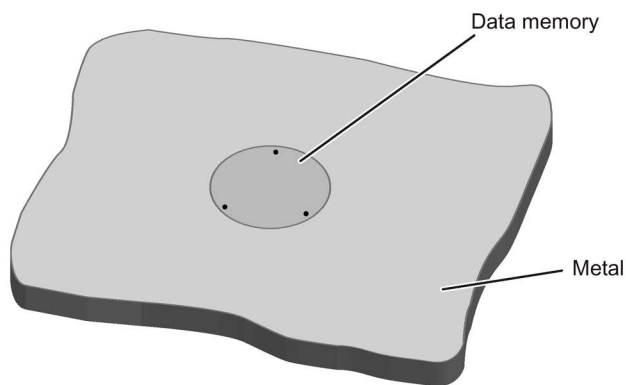


Figure 8-66 Flush installation of the MDS D522 special version in metal without clearance

8.25.4 Installation instructions

The transponder MDS D522 special version is designed to be mounted once.

Note the following instructions when mounting the MDS D522 in a workpiece to avoid damaging the transponder:

- Prepare the workpiece according to the following drawing.
- Using the accompanying mounting aid, press the transponder with uniform and evenly distributed pressure into the drilled hole until the transponder locks in place. Make sure that the transponder does not become tilted.

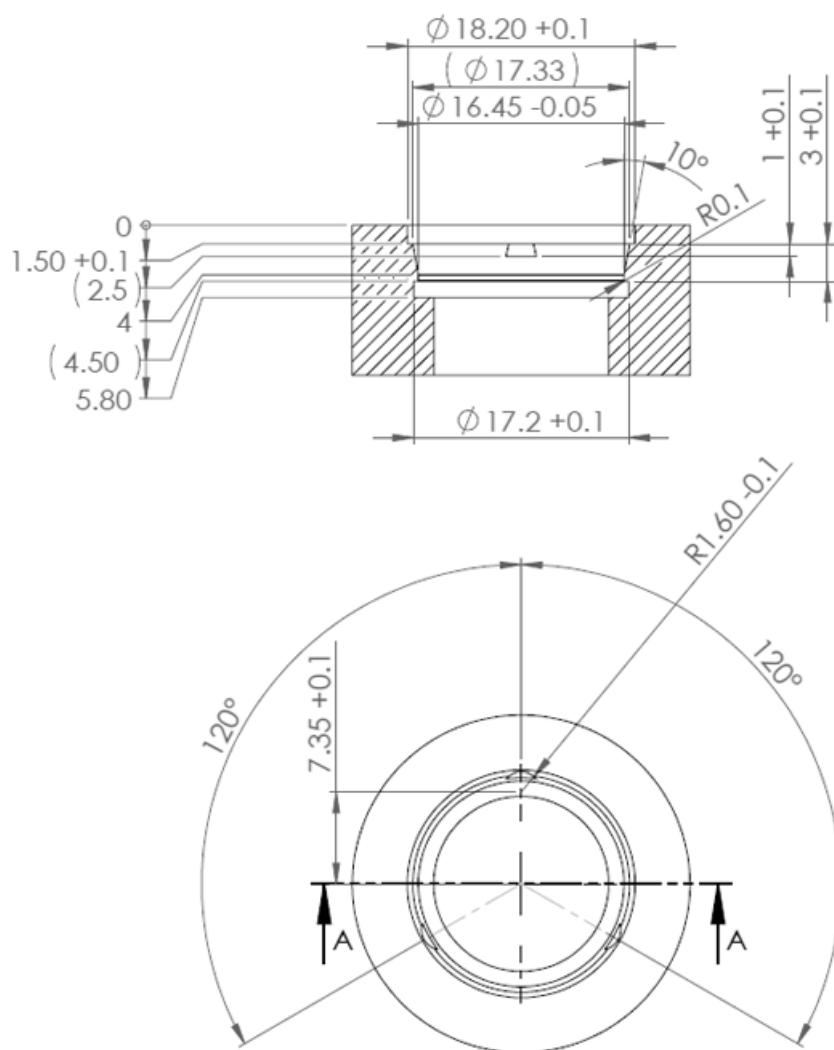


Figure 8-67 Dimension drawing: Workpiece drill hole for mounting the MDS D522 special version

8.25.5 Technical specifications

Table 8- 64 Technical data of MDS D522 special version

6GT2600-5AF00-0AX0	
Product type designation	SIMATIC MDS D522 special version
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 8192 bytes FRAM
Read cycles (at < 40 °C)	> 10 ¹²
Write cycles (at < 40 °C)	> 10 ¹²
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S ₉)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• Plastic PA 6.6 GF
• Color	• Black
Recommended distance to metal	≥ 0 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +100 °C
• during storage	• -40 ... +100 °C
Degree of protection according to EN 60529	IP68 2 hours, 2 bar, +20 °C
Shock-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	500 m/s ²
Vibration-resistant acc. to EN 60721-3-7, Class 7M2 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted

6GT2600-5AF00-0AX0

Design, dimensions and weight

Dimensions (Ø x H)	18 (+0.1) × 5.2 mm
Weight	Approx. 1.2 g
Type of mounting	Clipping in once (with accompanying tool)

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

8.25.6 Dimensional drawing

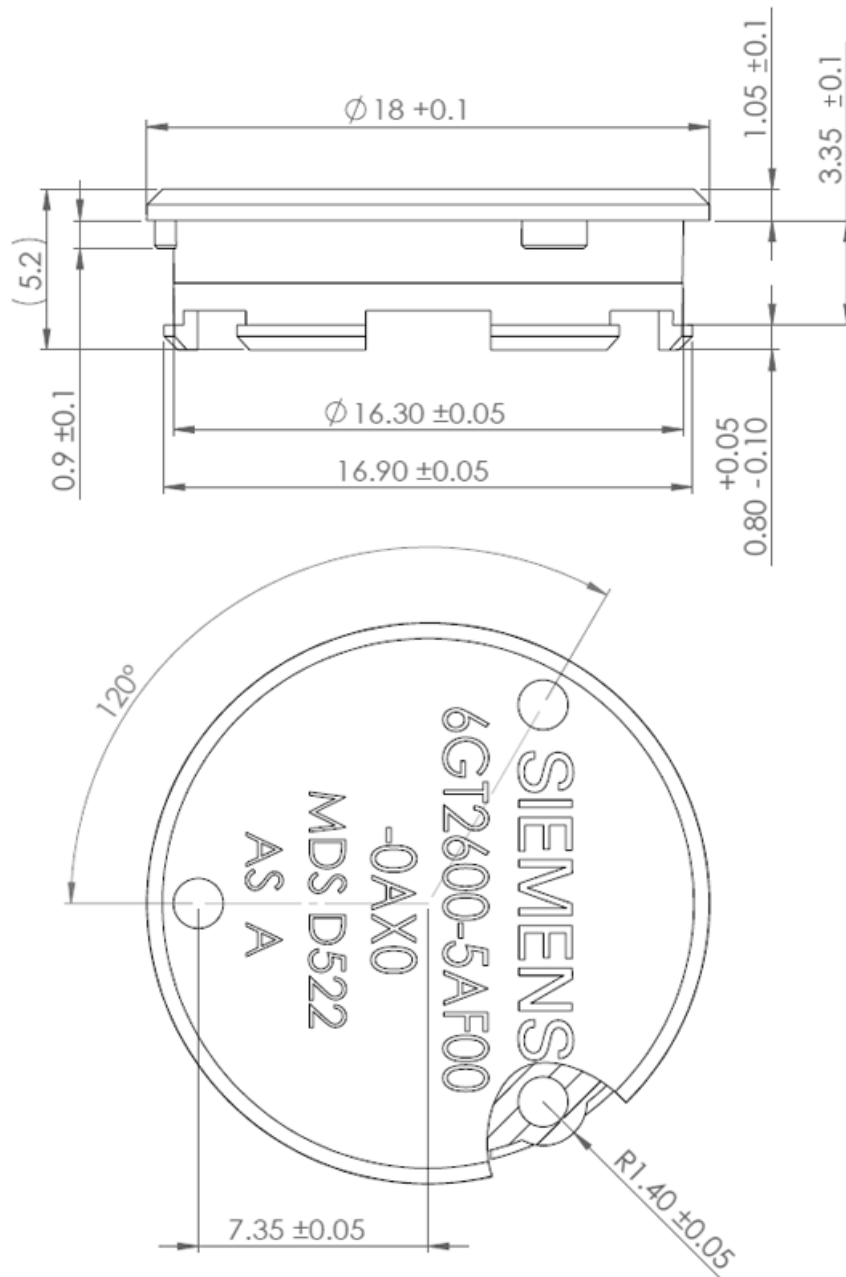


Figure 8-68 Dimension drawing MDS D522 special version

All dimensions in mm

8.26 MDS D524

8.26.1 Characteristics

MDS D524	Characteristics	
	Area of application	Production and distribution logistics as well as in assembly and production lines, can also be used in a harsh industrial environment without problem
	Memory size	8192 bytes of FRAM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55)."
	Mounting on metal	Yes, with spacer
	ISO standard	ISO 15693
	Degree of protection	IP67; IPx9K

8.26.2 Ordering data

Table 8- 65 Ordering data for MDS D524

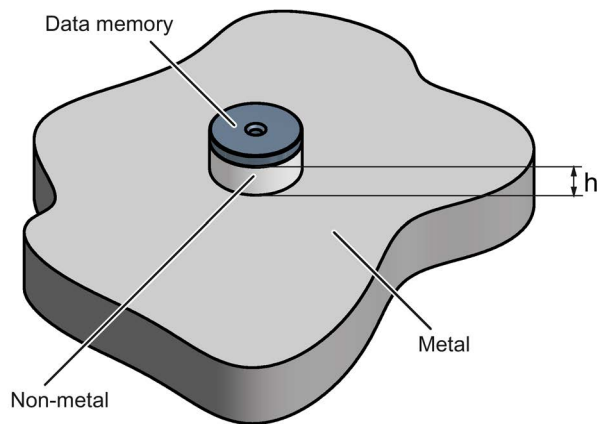
	Article number
MDS D524	6GT2600-5AC00

Table 8- 66 Ordering data of MDS D524 accessories

	Article number
Spacer	6GT2690-0AK00

8.26.3 Mounting on metal

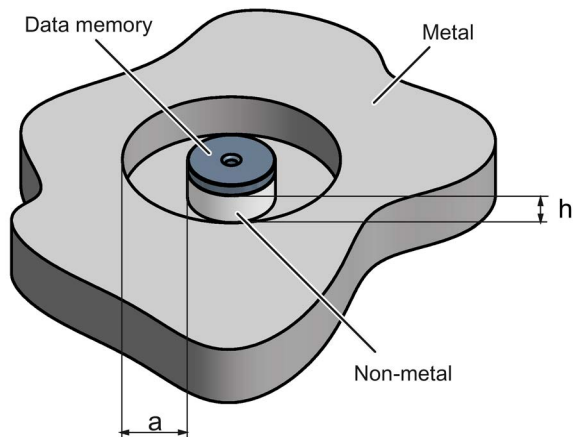
Mounting on metal



$$h \geq 15 \text{ mm}$$

Figure 8-69 Mounting the MDS D124/D324/D424/D524/E624 and RF320T on metal with spacer

Flush-mounting



$$h \geq 15 \text{ mm}$$

$$a \geq 25 \text{ mm}$$

Figure 8-70 Flush-mounting of the MDS D124/D324/D424/D524/E624 and RF320T in metal with spacer

Note

Going below the distances

If the distances (a and h) are not observed, a reduction of the field data results. It is possible to mount the MDS with metal screws (M3 countersunk head screws). This has no tangible impact on the range.

8.26.4 Technical specifications

Table 8- 67 Technical specifications for MDS D524

6GT2600-5AC00	
Product type designation	SIMATIC MDS D524
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 8192 bytes FRAM
Read cycles (at < 40 °C)	> 10 ¹²
Write cycles (at < 40 °C)	> 10 ¹²
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• Epoxy resin
• Color	• Black
Recommended distance to metal	≥ 15 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +100 °C
• during storage	• -40 ... +100 °C

6GT2600-5AC00	
Degree of protection according to EN 60529	• IP67 • IPx9K
Shock-resistant according to EN 60721-3-7 Class 7M3 ¹⁾	1000 m/s ²
Vibration-resistant according to EN 60721-3-7 Class 7M3 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted
Design, dimensions and weight	
Dimensions (Ø x H)	27 x 4 mm
Weight	5 g
Type of mounting	• Glued ²⁾ • 1x screw M3 ³⁾ ≤ 1 Nm

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

²⁾ The processing instructions of the adhesive manufacturer must be observed.

³⁾) To prevent it loosening during operation, secure the screw with screw-locking varnish.

8.26.5 Dimension drawing

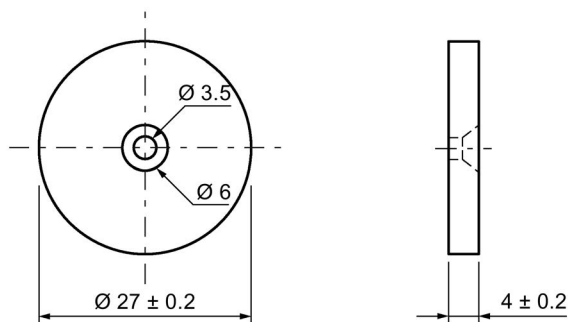


Figure 8-71 Dimensional drawing of MDS D524

All dimensions in mm

8.27 MDS D525

8.27.1 Characteristics

MDS D525	Characteristics	
	Area of application	Compact and rugged ISO transponder; suitable for screw mounting Use in assembly and production lines in the powertrain sector; ideal for mounting on motors, gearboxes, and work-piece holders Rugged packaging of the MDS D525; can therefore also be used under extreme environmental conditions without problems
	Memory size	8192 bytes of FRAM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55)".
	Mounting on metal	Yes
	ISO standard	ISO 15693
	Degree of protection	IP68/IPx9K

8.27.2 Ordering data

Table 8- 68 Ordering data for MDS D525

	Article number
MDS D525	6GT2600-5AG00

8.27.3 Application example

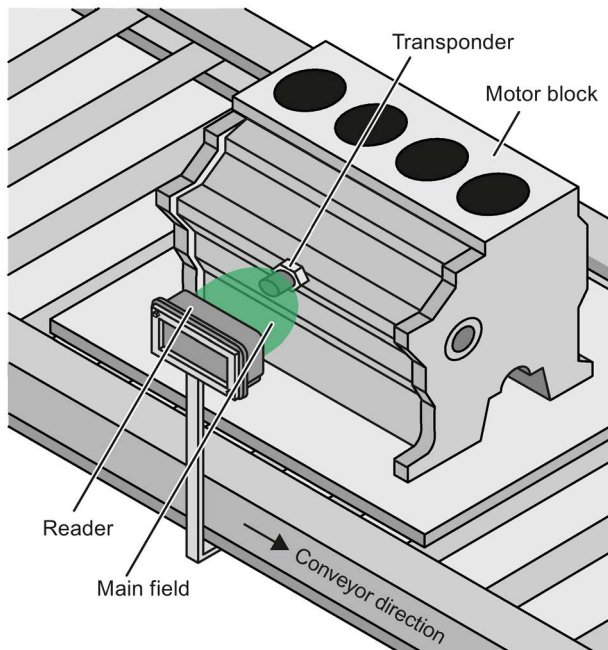


Figure 8-72 Application example

8.27.4 Technical specifications

Table 8- 69 Technical specifications for MDS D525

6GT2600-5AG00	
Product type designation	SIMATIC MDS D525
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 8192 bytes FRAM
Read cycles (at < 40 °C)	> 10 ¹²
Write cycles (at < 40 °C)	> 10 ¹²
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S ₉)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years

6GT2600-5AG00

Mechanical specifications

Enclosure

- | | |
|------------|---------------------|
| • Material | • Plastic PA 6.6 GF |
| • Color | • Black |

Recommended distance to metal	> 0 mm
-------------------------------	--------

Power supply	Inductive, without battery
--------------	----------------------------

Permitted ambient conditions

Ambient temperature

- | | |
|--------------------------------|-------------------|
| • during write/read access | • -25 ... +85 °C |
| • outside the read/write field | • -40 ... +125 °C |
| • during storage | • -40 ... +125 °C |

Degree of protection according to EN 60529

- IP68
2 hours, 2 bar, +20 °C
- IPx9K
steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C

Shock-resistant according to IEC 68-2-27 ¹⁾	500 m/s ²
--	----------------------

Vibration-resistant according to IEC 68-2-6 ¹⁾	200 m/s ²
---	----------------------

Torsion and bending load	Not permitted
--------------------------	---------------

Design, dimensions and weight

Dimensions (Ø x H)	24 x 10 mm (without set screw)
--------------------	--------------------------------

Weight	35 g
--------	------

Type of mounting	1x transponder set screw M6 SW 22; ≤ 6 Nm
------------------	--

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

8.28 MDS D526

8.28.1 Characteristics

MDS D526	Characteristics	
 The image shows a circular black transponder with a white center. Text on the transponder includes 'SIEMENS', '6GT2600-5AH00', 'MDS D526', and 'AS: A'.	Area of application	Compact and rugged ISO transponder; suitable for identification of transport units in production-related logistics; can also be deployed in harsh conditions
	Memory size	8192 bytes of FRAM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55)."
	Mounting on metal	Yes, with spacer
	ISO standard	ISO 15693
	Degree of protection	IP68

8.28.2 Ordering data

Table 8- 70 Ordering data for MDS D526

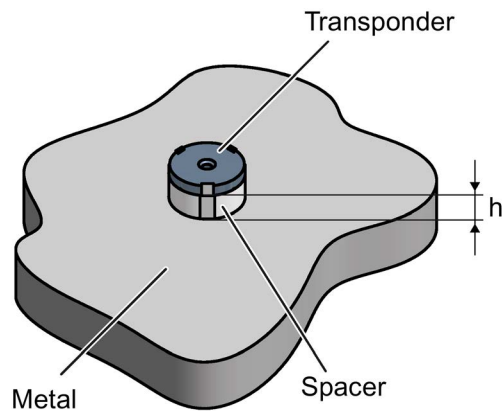
	Article number
MDS D526	6GT2600-5AH00

Table 8- 71 Ordering data for MDS D526 accessories

	Article number
Spacer	6GT2690-0AL00

8.28.3 Mounting on metal

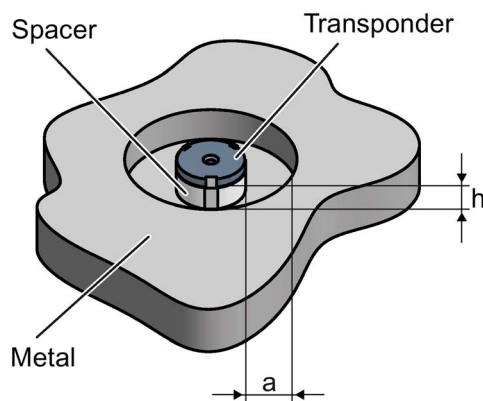
Mounting on metal



$h \geq 25 \text{ mm}$

Figure 8-74 Mounting the MDS D126 / D426 / D526 on metal with spacer

Flush-mounted in metal



$h \geq 25 \text{ mm}$

$a \geq 50 \text{ mm}$

Figure 8-75 Flush installation of the MDS D126 / D426 / D526 in metal with spacer

8.28.4 Technical specifications

Table 8- 72 Technical specifications for MDS D526

6GT2600-5AH00	
Product type designation	SIMATIC MDS D526
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 8192 bytes FRAM
Read cycles (at < 40 °C)	> 10 ¹²
Write cycles (at < 40 °C)	> 10 ¹²
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S _g)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years
Mechanical specifications	
Enclosure	
• Material	• Plastic PA 6.6 GF
• Color	• Black
Recommended distance to metal	≥ 25 mm
Power supply	Inductive, without battery
Permitted ambient conditions	
Ambient temperature	
• during write/read access	• -25 ... +85 °C
• outside the read/write field	• -40 ... +100 °C
• during storage	• -40 ... +100 °C
Degree of protection according to EN 60529	IP68 2 hours, 2 bar, +20 °C
Shock-resistant according to IEC 68-2-27 ¹⁾	500 m/s ²
Vibration-resistant according to IEC 68-2-6 ¹⁾	200 m/s ²
Torsion and bending load	Not permitted

6GT2600-5AH00

Design, dimensions and weight

Dimensions (Ø x H)	50 x 3.6 mm
Weight	13 g
Type of mounting	1 x M4 screw ²⁾ ≤ 1 Nm

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

²⁾) To prevent it loosening during operation, secure the screw with screw locking varnish.

8.28.5 Dimension drawing

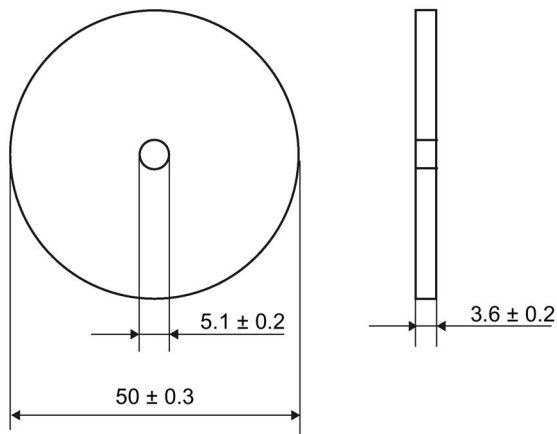


Figure 8-76 Dimensional drawing of MDS D526

All dimensions in mm

8.29 MDS D528

8.29.1 Characteristics

MDS D528	Characteristics	
	Area of application	Compact and rugged ISO transponder; suitable for screw mounting Use in assembly and production lines in the powertrain sector The rugged housing of the MDS D528 means that it can also be used in extreme environmental conditions without problems.
	Memory size	8192 bytes of FRAM user memory
	Write/read range	See section "Field data of ISO transponders (MDS D) (Page 55)"
	Mounting on metal	Yes
	ISO standard	ISO 15693
	Degree of protection	IP68/IPx9K

8.29.2 Ordering data

Table 8- 73 Ordering data for MDS D528

	Article number
MDS D528	6GT2600-5AK00

8.29.3 Application example

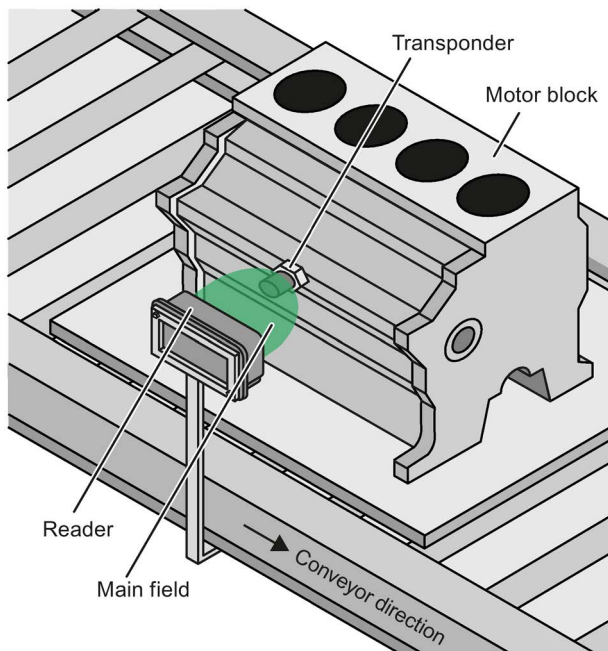


Figure 8-77 Application example

8.29.4 Technical specifications

Table 8- 74 Technical specifications for MDS D528

6GT2600-5AK00	
Product type designation	SIMATIC MDS D528
Memory	
Memory configuration	
• UID	• 8 bytes
• User memory	• 8192 bytes FRAM
Read cycles (at < 40 °C)	> 10 ¹²
Write cycles (at < 40 °C)	> 10 ¹²
Data retention time (at < 40 °C)	> 10 years
Write/read distance (S ₉)	Dependent on the reader used, see section "Field data of ISO transponders (MDS D) (Page 55)"
MTBF (Mean Time Between Failures)	228 years

6GT2600-5AK00

Mechanical specifications

Enclosure

- | | |
|------------|---------------------|
| • Material | • Plastic PA 6.6 GF |
| • Color | • Black |

Recommended distance to metal	≥ 0 mm
-------------------------------	--------

Power supply	Inductive, without battery
--------------	----------------------------

Permitted ambient conditions

Ambient temperature

- | | |
|--------------------------------|-------------------|
| • during write/read access | • -25 ... +85 °C |
| • outside the read/write field | • -40 ... +125 °C |
| • during storage | • -40 ... +125 °C |

Degree of protection according to EN 60529

- IP68
2 hours, 2 bar, +20 °C
- IPx9K
steam jet: 150 mm; 10 to 15 l/min; 100 bar; 75 °C

Shock-resistant according to IEC 68-2-27 ¹⁾	500 m/s ²
--	----------------------

Vibration-resistant according to IEC 68-2-6 ¹⁾	200 m/s ²
---	----------------------

Torsion and bending load	Not permitted
--------------------------	---------------

Design, dimensions and weight

Dimensions (Ø x H)	24 x 20 mm (without set screw)
--------------------	--------------------------------

Weight	35 g
--------	------

Type of mounting	1x transponder set screw M8 SW 22; ≤ 8 Nm
------------------	--

¹⁾ The values for shock and vibration are maximum values and must not be applied continuously.

8.29.5 Dimension drawing

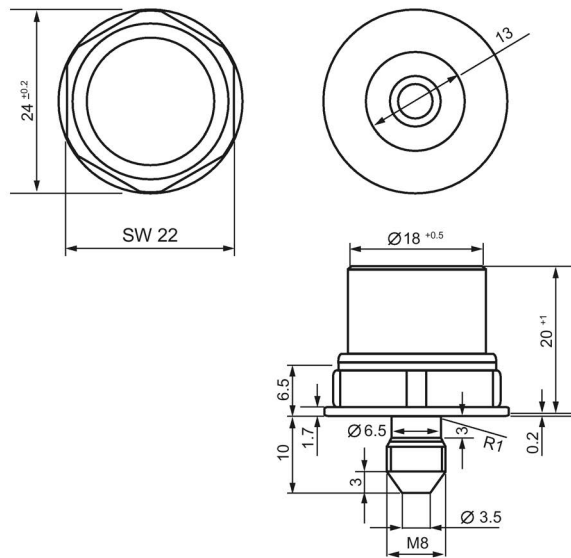


Figure 8-78 Dimensional drawing of MDS D528

All dimensions in mm

System integration

The communication modules (interface modules) are links between the RFID components (reader and transponder) and the higher-level controllers (e.g. SIMATIC S7), or PCs or computers.

9.1 Introduction

The readers are connected to the controller via the following interface or communications modules:

- ASM 456
- ASM 475
- SIMATIC RF120C
- SIMATIC RF160C
- SIMATIC RF170C
- SIMATIC RF180C
- SIMATIC RF182C
- SIMATIC RF185C, RF186C, RF188C
- RFID 181EIP

Function blocks, interface modules/communication modules and readers

Function blocks are used for integration into the SIMATIC. You will find information on the following blocks on the Internet in "Industry Online Support (<https://support.industry.siemens.com/cs/ww/en/ps/14971>)".

- Ident profile and Ident blocks, standard function for RFID systems

The Ident library linked into the TIA Portal as of STEP 7 Basic / Professional V14 SP 1

- RFID standard profile; standard functions for RFID systems
- FB 45 for MOBY U, MOBY D, RF200, RF300
- FB 55
- RF160C communications module with FC 44

Interface modules/communication modules and function blocks

The following table shows the most important characteristics of the interface modules/communications modules.

Table 9- 1 Overview of interface modules/communication modules

ASM/ communications module	Interfaces to the application (PLC)	Interfaces to the reader	Reader con- nections	Dimensions (W x H x D)	Temperature range	Degree of protection
ASM 456	PROFIBUS DP- V1	2 x 8-pin connector socket, M12	2 (parallel)	60 x 210 x 54 or 79 mm	0 °C to +55 °C	IP67
ASM 475	S7-300 (cen- tral), ET200M (PROFIBUS)	Via screw terminals in front connector	2 (parallel)	40 x 125 x 120 mm	0 °C to +60 °C	IP20
SIMATIC RF120C	S7-1200 (cen- tral)	9-pin D-sub socket	1	30 x 100 x 75 mm	0 °C to +55 °C	IP20
SIMATIC RF160C	PROFIBUS DP / DP-V0	2 x 8-pin connector socket, M12	2 (parallel)	60 x 210 x 30 mm	0 °C to +55 °C	IP67
SIMATIC RF170C	PROFIBUS DP- V1 PROFINET IO	2 x 8-pin connector socket, M12	2 (parallel)	90 x 130 x 60 mm	-25 °C to +55 °C	IP67
SIMATIC RF180C	PROFINET IO	2 x 8-pin connector socket, M12	2 (parallel)	60 x 210 x 54 mm	0 °C to +60° C	IP67
SIMATIC RF182C	TCP/IP	2 x 8-pin connector socket, M12	2 (parallel)	60 x 210 x 30 mm	0 °C to +60 °C	IP67
RFID 181EIP	Ethernet IP	2 x 8-pin connector socket, M12	2 (parallel)	60 x 210 x 54 mm	0 °C to +60° C	IP67

The following table shows the program blocks compatible with the interface modules/communications modules.

Table 9- 2 Compatible program blocks

ASM/ communications mod- ule	Compatible program blocks in conjunction with ...		
	S7-300 / S7-400 and STEP 7 Classic V5.5	S7-300 / S7-400 and STEP 7 Basic/Professional	S7-1200 / S7-1500 and STEP 7 Basic/Professional
ASM 456	FB 45 FB 55 FC 56 Standard profile V1.19 Ident profile	FB 45 FB 55 FC 56 Ident profile Ident blocks	Ident profile Ident blocks
ASM 475	FB 45 FB 55	FB 45 FB 55	--
SIMATIC RF120C	--	--	Ident profile Ident blocks
SIMATIC RF160C	FC 44 Application blocks for RF160C	FC 44 Application blocks for RF160C	Application blocks for RF160C
SIMATIC RF170C	FB 45 FB 55 Ident profile	FB 45 FB 55 Ident profile Ident blocks	Ident profile Ident blocks
SIMATIC RF180C	FB 45 FB 55 Standard profile V1.19 Ident profile	FB 45 FB 55 Ident profile Ident blocks	Ident profile Ident blocks
SIMATIC RF185C/RF186C/RF1 88C	FB 45 FB 55 Standard profile V1.19 Ident profile	FB 45 FB 55 Ident profile Ident blocks	Ident profile Ident blocks

9.2 ASM 456

Configured with ASM 456

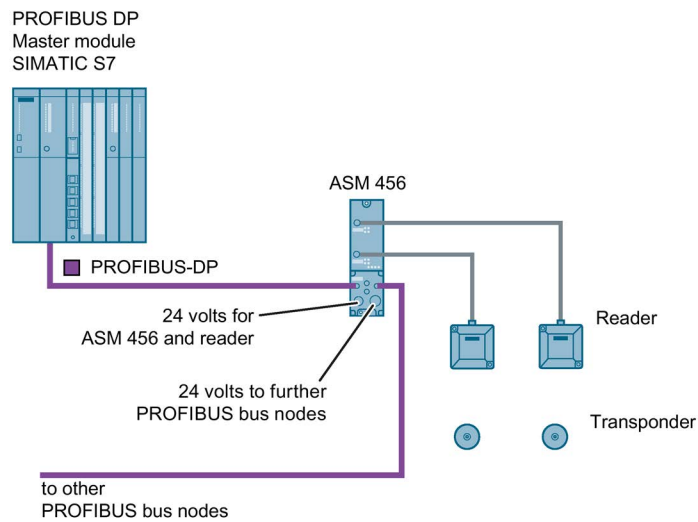


Figure 9-1 Configuration of ASM 456

For more detailed information, please refer to ASM 456 Operating Instructions (<https://support.industry.siemens.com/cs/ww/en/view/32629442>).

9.3 ASM 475

9.3.1 Features

Area of application

The ASM 475 interface module acting as the link between all RF300 systems and SIMATIC S7-300 performs the functions of a communication module. It can be operated centrally in the S7-300 or decentrally in an ET200M.

As many as eight ASM 475 interface modules can be plugged into one SIMATIC S7-300 rack and operated. In a configuration with several racks (max. four), the ASM 475 can be plugged into and operated on any rack. This means that as many as 32 ASMs can be operated in the maximum configuration of a SIMATIC S7-300. The ASM can also be operated in the ET 200M distributed I/O on PROFIBUS. Operation in an S7-400 environment is therefore problem-free. Up to 7 ASMs can be operated on each ET 200M.

Error messages and operating statuses are indicated by LEDs.

Since there is electrical isolation between the read/write device and the SIMATIC S7-300 bus, a configuration that is immune to interference is possible.



Figure 9-2 Interface module ASM 475

The ASM 475 with the article number 6GT2002-0GA10 is a module that can be set in the parameters. The basic functions of the module are then already specified when the module is configured in HW Config (e.g. standard addressing).

The data in the MDS is accessed direct by means of physical addresses using the ASM 475. Operation in a SIMATIC S7 is controlled by the function block FB 45.

ASM 475 and FB 45 form a unit that is used for reading the data of the MDS simply and at optimal speed.

9.3.2 Ordering data

Table 9- 3 Ordering data for ASM 475

	Article number
ASM 475 interface module for SIMATIC S7 2 x RF3xxR reader with RS-422 can be connected in parallel, without front connector	6GT2002-0GA10

Table 9- 4 Ordering data for ASM 475 accessories

	Article number
Front connector (1 x per ASM)	6ES7392-1AJ00-0AA0
Connecting cable ASM 475 ↔ RF3xxR	
Plug-in cable, pre-assembled, length: 2 m (standard length)	6GT2891-0EH20
Plug-in cable, pre-assembled, length: 5 m	6GT2891-0EH50
Terminal element (1 x per reader cable)	6ES7390-5BA00-0AA0
Shield connecting element	6ES7390-5AA00-0AA0

The plug-in cables 6GT2891-4Fxx can be used as extension cables.

9.3.3 Indicators

Bezel and indicator elements

The figure below illustrates the bezel of the ASM 475 and the inside of the front door complete with the associated connection diagram. The read/write devices must be connected to the ASM in accordance with the connection diagram.

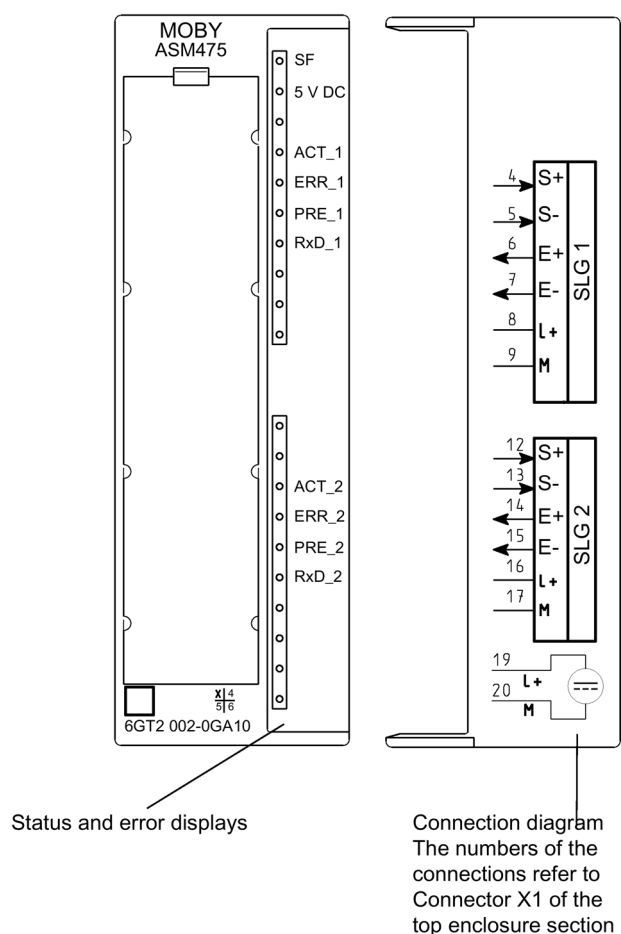


Figure 9-3 Bezel and inside of the front door of the ASM 475

Display elements on the ASM

Table 9- 5 Function of the LEDs on the ASM 475

Light emitting diode	Meaning
SF	System fault (hardware error on ASM)
DC 5V	24 V are connected to ASM and the 5 V voltage on ASM is OK.
ACT_1, ACT_2	The corresponding reader is active in processing a user command.
ERR_1, ERR_2	A flashing pattern indicates the last error to occur. This display can be reset using the parameter Option 1.
PRE_1, PRE_2	Indicates the presence of a transponder.
RxD_1, RxD_2	Indicates live communication with the reader. In the event of a fault on the reader, this display may also be lit.

On the ASM 475, further operating states are indicated with the LEDs PRE, ERR and SF:

Table 9- 6 Operating status display on ASM 475 via LEDs

SF	PRE_1	ERR_1	PRE_2	ERR_2	Meaning
ON	OFF/ON	ON (perm.)	OFF/ON	ON (perm.)	Hardware is defective (RAM, Flash, etc.)
ON	OFF	ON	OFF	OFF	Charger is defective (can only be repaired in the factory).
OFF	2 Hz	OFF	2 Hz	OFF	Firmware loading is active or no firmware detected - Firmware download - ASM must not be switched off
OFF	2 Hz	2 Hz	2 Hz	2 Hz	Firmware loading terminated with errors - Restart required - Load firmware again - Check update files
Any value	5 Hz	5 Hz	5 Hz	5 Hz	Operating system error Switch ASM off/on
OFF	OFF	1 flash every 2 s	OFF	1 flash every 2 s	ASM has booted and is waiting for a RESET (init_run) from the user.

9.3.4 Configuration

Centralized configuration with SIMATIC S7-300

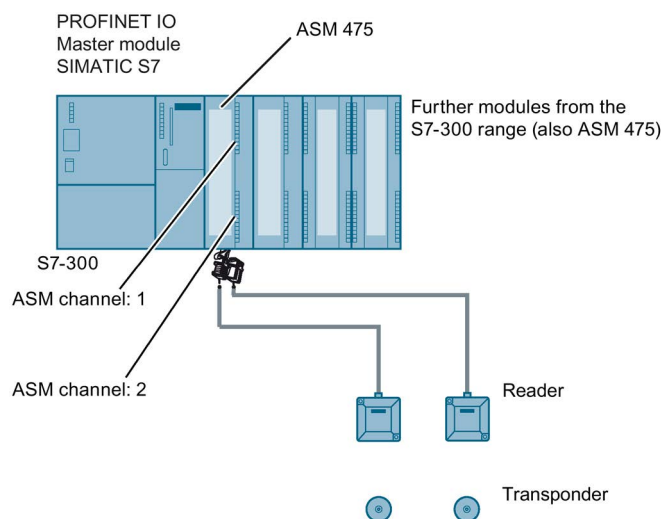


Figure 9-4 Configuration of ASM 475 central

Distributed configuration with ET200M

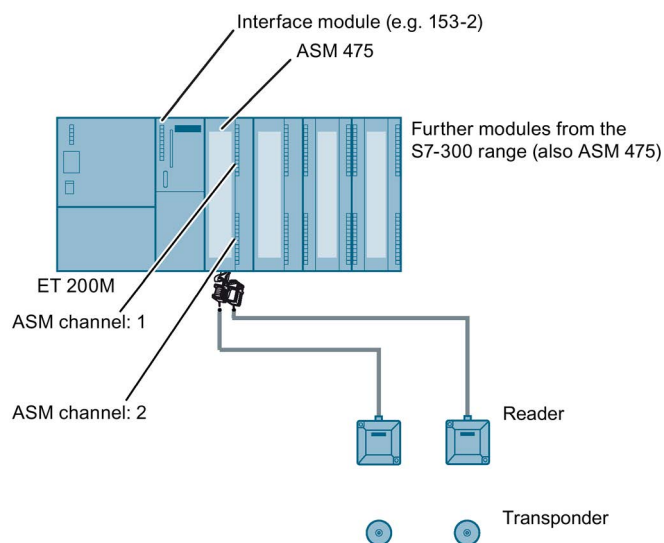


Figure 9-5 Configuration of ASM 475 distributed

Reader connection system

You will find more information on the reader connector technology in the section "Reader RF3xxR (RS422) with ASM 475 (Page 492)".

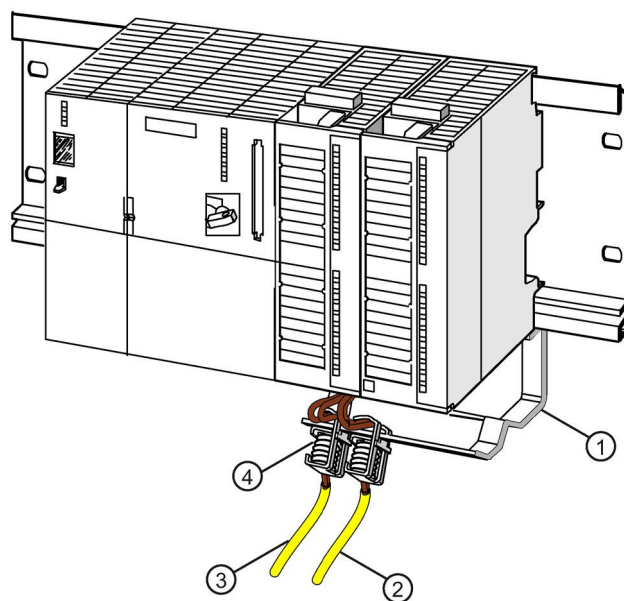
Cable installation

Signal	Pin on M12 connector	Cable	Labeling
24 VDC	1	white	1 Reader 2 8 -16
TX -	2	brown	1 Reader 2 7-15
GND	3	Green	1 Reader 2 9-17
TX +	4	Yellow	1 Reader 2 6-14
RX +	5	Gray	1 Reader 2 4-12
RX -	6	Pink	1 Reader 2 5-13
Shield	8 +	-	

Cable assignment for connection of an RF300 reader to ASM 475

9.3.5 Shield connection

When the reader is connected to the ASM 475, the cable shield must be connected to a shield terminal. Shield terminals and holding clips are standard components of the product spectrum of S7-300.



- ① Holding bracket
- ② Cable to 2nd reader
- ③ Cable to 1st reader
- ④ Shield terminal

Figure 9-6 Shield terminal ASM 475

9.3.6 Technical data

Table 9- 7 Technical specifications for ASM 475

6GT2002-0GA10	
Product type designation	ASM 475 communications module
Interfaces	
Design of the interface point-to-point link	RS-422
Number of connectable readers	2
Electrical connector design	
• Backplane bus	• S7-300 backplane bus
• PROFIBUS interface	• (according to the head module)
• Industrial Ethernet interface	• (according to the head module)
• Supply voltage	• Screw-type or spring-loaded terminals
Design of the interface to the reader for communication	Screw-type or spring-loaded terminals
Mechanical specifications	
Housing	
• Material	• Noryl
• Color	• Anthracite
Supply voltage, current consumption, power loss	
Supply voltage	24 VDC
Typical current consumption	
• Without connected devices	• 0.1 A
• Including connected devices	• 1.0 A
Power dissipation of the module, typ.	2 Watts
Current consumption from I/O bus, max.	80 mA
Electrical isolation between S7-300 and RF300	Yes
Fuse 24 V for the reader	Yes, electronic

6GT2002-0GA10**Permitted ambient conditions**

Ambient temperature

- During operation (horizontal installation) 0 ... +60 °C
- During operation (vertical installation) 0 ... +40 °C
- During transportation and storage -40 ... +70 °C

Degree of protection IP20

Shock-resistant to IEC 61131-2 150 m/s²Vibration-resistant to IEC 61131-2 10 m/s²**Design, dimensions and weight**

Dimensions (L x W x H) 120 x 40 x 125 mm

Weight 0.2 kg

Type of mounting S7-300 rack

Cable length for RS-422 interface, maximum 1000 m

Product properties, functions, components general

- LED display design
- 4 LEDs per reader connector
 - 2 LEDs for device status

Product function transponder file handler addressable Yes

Protocol supported S7 communication Yes

Product functions management, configuration, engineering

Type of parameter assignment Object manager, GSD

Type of programming FB 45, FB 55, FC 56
(FC 45/55 with restricted functionality)

Type of computer-based communication 2 words cyclic, 238 bytes acyclic

Transponder addressing Direct access via addresses

Commands Initialize transponder, read data from transponder, write data to transponder

Standards, specifications, approvals

Proof of suitability CE, FCC, UL/CSA

9.4 RF120C

Configuration with RF120C

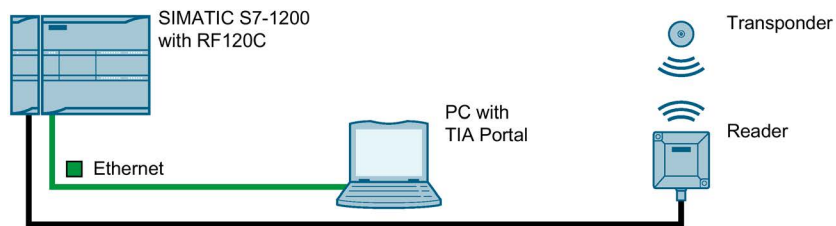


Figure 9-7 Configuration RF120C

For more detailed information, refer to the section " RF120C communications module (<https://support.industry.siemens.com/cs/ww/en/view/77485950>)".

9.5 RF160C

Configuration with RF160C

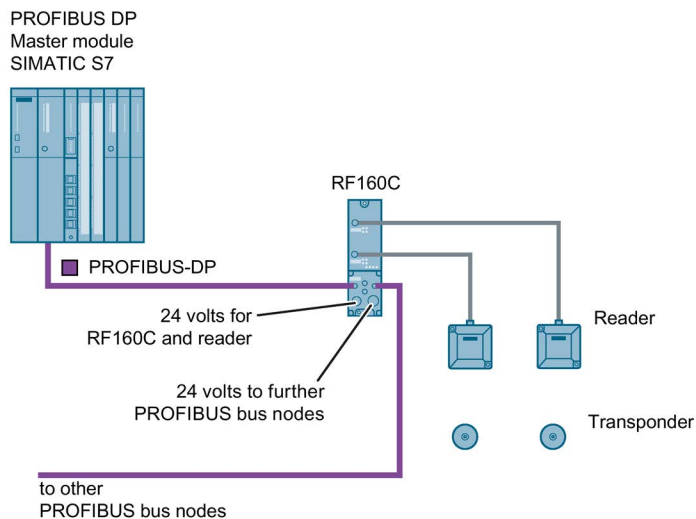


Figure 9-8 Configuration RF160C

For more detailed information, refer to Operating Instructions RF160C (<https://support.industry.siemens.com/cs/ww/en/view/42788808>).

9.6 RF170C

Configuration with RF170C

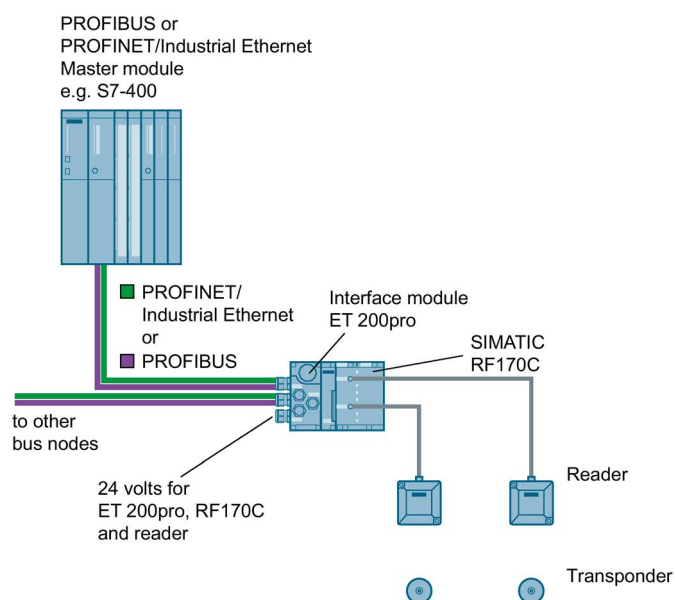


Figure 9-9 Configuration RF170C

For more detailed information, please refer to SIMATIC RF170C Operating Instructions (<https://support.industry.siemens.com/cs/ww/en/view/32622825>).

9.7 RF180C

Configured with RF180C

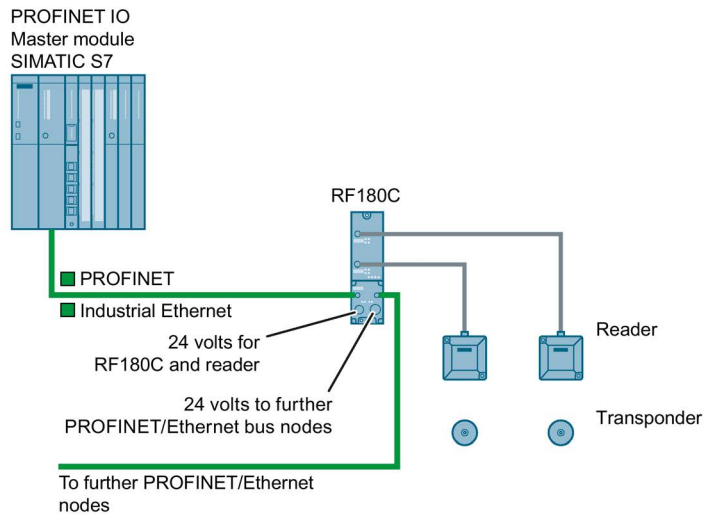


Figure 9-10 Configuration of RF180C

For more detailed information, refer to SIMATIC RF180C Operating Instructions (<https://support.industry.siemens.com/cs/ww/en/view/30012157>).

9.8 RF182C

Configuration with RF182C

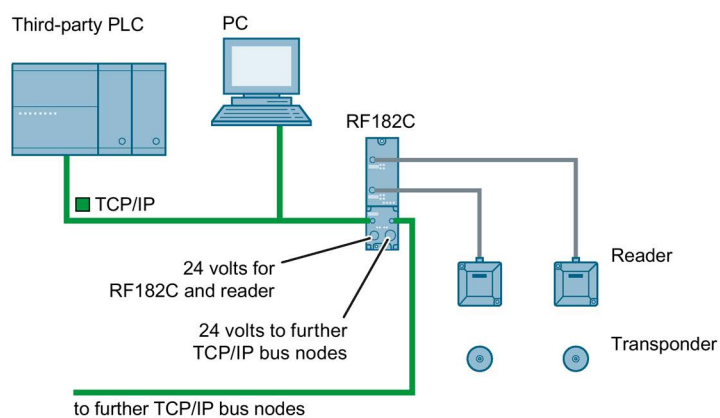


Figure 9-11 Configuration with RF182C

For more detailed information, refer to SIMATIC RF182C Operating Instructions (<https://support.industry.siemens.com/cs/ww/en/view/38507897>).

System diagnostics

10.1 Error codes of the RF300 readers

Error codes of the RF300 readers

Note**Validity of the error codes**

The following error codes apply only to RF300 readers with an RS-422 interface (except for Scanmode).

You have the following options to read out the error code:

- Directly on the reader/communication module by counting the flashing pattern of the red error LED
- With the Ident profile at the output variable "Status"
Take into consideration the structure of the output variable in the table below ("0xE&FE\$\$00"; "&" = 1 ... 5; "\$\$" = error code).
- with FB 45 / FB 55 variable "error_MOBY"

Table 10- 1 Error codes of the readers

Flashing of the red LED operating display on the reader	Error code (hex)	Description
00	0x00	No error
02	0x01	Presence error; possible causes: • The active command was not carried out completely • The transponder left the antenna field while the command was being processed • Communication problem between reader and transponder
05	0x05	Parameter assignment error, possible causes: • Unknown command • Incorrect parameter • Function not allowed
06	0x06	Air interface faulty
11	0x0B	The MDS E transponder could not be successfully authenticated.
12	0x0C	The transponder memory cannot be written, possible causes: • Hardware fault (memory faulty) • Memory write-protected (corresponding OTP area has already been written)
13	0x0D	Error in the specified memory address (access attempted to non-existent or non-accessible memory areas).
19	0x13	Buffer overflow: Insufficient buffer available in the reader for saving the command
20	0x14	Major system fault (hardware fault)
21	0x15	Parameter assignment error: bad parameter in RESET command
24	0x18	Command was sent to a reader that has not yet been initialized
25	0x19	Previous command is still active
28	0x1C	Antenna is not identified Possible causes: • Antenna is not connected. • Antenna cable is defective.
30	0x1E	Incorrect number of characters in frame
31	0x1F	Running command canceled by "RESET" command

10.2 Diagnostics functions - STEP 7

10.2.1 Overview

Extended diagnostic functions with SIMATIC RF300

With SIMATIC RF300, extended diagnostics functions are available with STEP 7 Classic / Basic / Professional which simplify commissioning and maintenance.

Extensive diagnostics functions for the SIMATIC RF300 readers with the TIA Portal for STEP 7 Basic / Professional are being planned. With the aid of the Ident profile and the Ident blocks, you can make different diagnostics queries.

You can access this diagnostics data using the SIMATIC function blocks and the commands "Reader status" and "Tag status" (SLG-STATUS and MDS-STATUS). These two commands can each be called with various attributes or modes (subcommands) for which corresponding data structures (UDTs) are defined.

Table 10- 2 In RF300 mode

Command	Attributes (mode)	Meaning
Reader-Status (SLG-STATUS)	0x81 (01)	Hardware and firmware configuration, parameterization status
	0x86 (06)	Communication error counter, current command status
Tag-Status (MDS-STATUS)	0x81 (01)	Serial number of the transponder (UID), memory configuration. EEPROM write-protection status
	0x82 (02)	Serial number of the transponder (UID), HF field strength value, communication error counter, presence counter (duration)
	0x83 (03)	Serial number of the transponder (UID), transponder type identified in the antenna field (number = tag type, see Reset - "ftim" parameter), memory configuration, write protection status (OTP), size and number of blocks in the user memory

Overview of the diagnostic functions

Table 10- 3 In ISO mode: ISO 15693, ISO 18000-03 or ISO 14443

Command	Attributes	Meaning
Reader-Status (SLG-STATUS)	0x81 (01)	Hardware and firmware configuration, parameterization status
	0x86 (06)	Communication error counter, current command status
Tag-Status (MDS-STATUS)	0x83 (03)	Serial number of the transponder (UID), transponder type identified in the antenna field (number = tag type, see Reset - "ftim" parameter), memory configuration, write protection status (OTP), size and number of blocks in the user memory

10.2.2 Reader diagnostics with "reader status" (SLG-STATUS)

With this command you can query the status and diagnostics data of the reader.

Note

Scope of the described UDTs

Note that below only the variables are listed that are relevant for the RF300 system. You will find the full UDTs in the manual "Ident Profile and Ident Blocks".

Attributes "0x81" (mode 01), corresponds to UDT 110

Table 10- 4 Input parameter

Name	Type	Possible Value (hex)	Comment
hardware	char	0x00	Type of hardware = RF310R, RF340R, RF350R
		0x01	= RF380R
		0x02	= RF310R (ISO)
		0x03	= RF380R (ISO)
		0x04	= RF340R (ISO), RF350R (ISO)
		0x05	= RF310R (ISO)
		0x0A	= RF310R, 2nd generation
		0x0B	= RF340R, 2nd generation
		0x0C	= RF350R, 2nd generation
		0x0D	= RF380R, 2nd generation
hardware_version	word	0x00 ... 0xFF	HW version = Version (high byte): unused (00)
		0x00 ... 0xFF	HW version = Version (low byte) 47 = Readers of the 1st generation 07 = Readers of the 1st generation 11 = Readers of the 1st generation 10 = Readers of the 2nd generation 29 = Readers of the 2nd generation 2B = Readers of the 2nd generation 2C = Readers of the 2nd generation
loader_version	word	0x00 ... 0xFF	Version of loader = Version (high byte)
		0x00 ... 0xFF	= Version (low byte)
firmware	char	0x00 ... 0xFF	Type of firmware 01, 02, 03 = Readers of the 1st generation F = Full version for readers of the 2nd generation P = Pilot version for readers of the 2nd generation

Name	Type	Possible Value (hex)	Comment
firmware_version	word	0x00 ... 0xFF 0x00 ... 0xFF	Firmware version = Version (high byte) = Version (low byte)
driver	char	0x31 0x32 0x33	Driver version 3964R = 3964R = ASCII = ASCII/ScanMode
driver_version	word	0x00 ... 0xFF 0x00 ... 0xFF	Version of driver = Version (high byte) = Version (low byte)
interface	byte	0x01 0x02	Interface type = RS422 = RS232 (only RF380R)
baud	byte	0x01 0x03 0x05	Transmission speed = 19.2 kBd = 57.6 kBd = 115.2 kBd
distance_limiting_SLG	byte	--	Readers of the 1st generation: With this parameter you can change the transmit power (output power) of the RF380R reader of the 1st generation (6GT2801-3AB10). When doing this, remember that the change to the transmit power will affect the detection in the limit range (upper/ lower operating distance), as well as the minimum distance that is to be maintained between adjacent RF380Rs. Settings outside the specified range have the effect that the default value (1.25 W) will be set. In this case for reasons of compatibility there is no error message. Readers of the 2nd generation: This setting is not necessary with the RF380R readers of the 2nd generation (6GT2801-3BAx0) because the power limits are optimized automatically depending on the reader-transponder distance. For reasons of compatibility this setting can nevertheless be made. Note that the values "02", "03" and "04" bring about a reduction of the power of approximately 50%.
			Transmit power
		0x02	0.5 W
		0x03	0.75 W
		0x04	1.0
		0x05	1.25 W (default)
		0x06	1.5 W
		0x07	1.75 W
		0x08	2.0 W
multitag_SLG	byte	0x01	Number of transponders that can be processed in the antenna field = Single tag mode

Name	Type	Possible Value (hex)	Comment
field_ON_time_SLG	byte	0x00 0x01 0x03 0x04 0x05 0x06 0x07 0x08 0x0E 0x10 0x20 0x31 0xFF	Selection of the transponder types used = RF300 (RF3xxT) = ISO 15693 general = ISO 15693 (Infineon, MDS D3xx) = ISO 15693 (Fujitsu - 2 kB, MDS D4xx) = ISO 15693 (NXP, MDS D1xx) = ISO 15693 (TI, MDS D2xx) = ISO 15693 (STM, MDS D261) = ISO 15693 (Fujitsu - 8 kB, MDS D5xx) = ISO (setting with "scanning_time" and "fcon") = RF300 (RF3xxT) = ISO 14443 (MOBY E, E6xx) = General Mode = Setting with "scanning_time" and "fcon"
status_ant	byte	0x01 0x02	Status of the antenna = Antenna is switched on = Antenna is switched off
MDS_control	byte	0x00 0x01 0x04	Presence check = Operation without presence check = Operation with presence check (antenna is permanently switched on.) = Operation without presence check (antenna is switched off.) The antenna is only switched on when one of the following commands is sent. Read, Write, Init, Tag-Status

Attributes "0x86" (mode 06), corresponds to UDT 280

Table 10- 5 Error counter

Name	Type	Possible Values (hex)	Comment
FZP	byte	0x00 ... 0xFF	= Error counter, passive (errors during idle time)
ABZ			= Abort counter
CFZ			= Code error counter
SFZ			= Signature error counter
CRCFZ			= CRC error counter
BSTAT			= Current command status
ASMFZ			= Interface problems to host (CM/PC) parity, BCC, frame error

Note**Counter values are deleted.**

Note that the counter values are deleted after they have been read out (command "Reader status" or "SLG-STATUS").

Explanations:

- "FZP": counts interference pulses when communication with a transponder is not taking place (e.g. electromagnetic interference caused by contactors, motors, etc.). Counter values can, however, also be generated when a transponder is located at the edge of the field even when there is no external interference.
- "ABZ", "CFZ", "SFZ" and "CRCFZ" are counters for protocol errors which may occur during reader-transponder communication. This can be caused by unsuitable reader/transponder positioning (e.g. transponder on field boundary, several transponders in the antenna field) or external EMC interference.

To ensure clear diagnostics of the quality of communication, it is recommended that a "Reader status" (SLG STATUS) command with attribute "0x86" (mode 06) is executed following receipt of the presence message to reset the error counters.

The protocol error counters are not mutually independent. If a code error (CFZ) occurs, this will cause a signature (SFZ) or CRC- (CRCFZ) error.

- "BSTAT" is the status for the most recently executed command. A value other than 0 means that the previous command was repeated by the reader due to faults (see above).
- "ASMfZ" signals line-conducted communication interference between the communications module and the reader. Faults of this type can be caused by contact problems on the connector or the cable connection.

10.2.3 Transponder diagnostics with "Tag status" (MDS-STATUS)

With this command you can query the status and diagnostics data from the transponder currently located in the antenna field.

Attribute "0x04" (mode 01), corresponds to UDT 260 (only for RF300 transponders)

Name	Type	Possible Values (hex)	Comment
UID	array[1...8] byte	0x0000000055555555 ... 0x00000000FFFFFFFF	Unique identifier = b0-31: 4 byte TAG ID, b32-63: 0
MDS_type	byte	0x01 0x02 0x03 0x04	Transponder memory configuration = Transponder without FRAM = Transponder with FRAM 8 KB = Transponder with FRAM 32 KB = Transponder with FRAM 64 KB
Lock_state	byte	0x00 ... 0xFF	EEPROM write protection status Bit: 7 6 5 4 3 2 1 0 not used Block 4 (FF10...FF13) Block 3 (FF0C...FF0F) Block 2 (FF08...FF0B) Block 1 (FF04...FF07) Block 0 (FF00...FF03) Write protection status: 0 = block not protected (r/w) 1 = block protected (ro)

Attribute "0x82" (mode 02), corresponds to UDT 270 (only for RF300 transponders)

Name	Type	Possible Values (hex)	Comment
UID	array[1...8] byte	0x0000000055555555 ... 0x00000000FFFFFFFF	Unique identifier = b0-31: 4 byte TAG ID, b32-63: 0
LFD	byte	0x00 ... 0xFF	= Value for field strength determined in the transponder
FZP	byte	0x00 ... 0xFF	= Error counter (passive) → errors during idle time
FZA	byte	0x00 ... 0xFF	= Error counter (active)
ANWZ	byte	0x00 ... 0xFF	= Presence counter

Note**Counter values are deleted.**

All counter values are deleted when the transponder exits the antenna field or when the antenna is switched off.

Explanations:

- "LFD" is a measured value for the field strength that is determined in the transponder. The lower the value, the higher the field strength.
- "FZP" counts interference pulses when communication with a transponder is not taking place (e.g. electromagnetic interference caused by contactors, motors, etc.). Counter values can also be generated when a transponder is located at the edge of the field even when there is no external interference.
- "FZA" counts errors that can occur during reader-to-transponder communication. This can be caused by unsuitable reader/transponder positioning (e.g. transponder on field boundary or several transponders in antenna field) or external electromagnetic interference.
- "ANWZ" is the value for the time that the transponder remains in the antenna field before the "Tag-Status" (MDS STATUS) with attribute "0x82" (mode 02) is executed. A time step is 10 ms. The maximum time that can be recorded is therefore 2.5 s.

Attribute "0x83" (mode 03), corresponds to UDT 230

Name	Type	Possible Values (hex)	Comment
UID	array[1...8] byte	0000000000000000 ... FFFFFFFFFFFFFFFF	Unique identifier =8 byte UID, MSB first
MDS_type	byte	0x00 0x03 0x04 0x05 0x06 0x07 0x08 0x11 0x12 0x13 0x14 0x21 0x22 0x23 0x41 0x42 0x43 0x44 0x46	Transponder type (vendor, identification) = ISO 15693 general = ISO 15693 (Infineon, MDS D3xx) = ISO 15693 (Fujitsu - 2 kB, MDS D4xx) = ISO 15693 (NXP, MDS D1xx) = ISO 15693 (TI, MDS D200) = ISO 15693 (STM, MDS D261) = ISO 15693 (Fujitsu - 8 kB, MDS D5xx) = RF300 transponder (0 kB) = RF300 transponder (8 kB) = RF300 transponder (32 kB) = RF300 transponder (64 kB) = ISO 14443 (NXP, 1 kB, MDS E) = ISO 14443 (Infineon, 1 kB, MDS E) = ISO 14443 (NXP, 4 kB, MDS E) = P2P RF310R Gen2 = P2P RF340R Gen2 = P2P RF350R Gen2 = P2P RF380R Gen2 = P2P RF382R Gen2
IC_version	byte	0x00 ... 0xFF	Chip version
size	word	0x00 ... 0xFFFF	Memory size in bytes depending on transponder type, e.g. MDS D3xx: 992 bytes
lock_state	byte	0x00 ... 0xFF	Lock state, OTP information: One bit is used per block (4 x 4 bytes or 2 x 8 bytes) (bit = 1: block is locked) Example: 01 = Block 1 of address 0xFF80 ... 0xFF83 is locked or 03 = Block 1 and 2 of address 0xFF80 ... 0xFF87 are locked, e.g. for the Philips SL2 ICS20 (MDS D124, D160 or D100). This chip provides a usable memory with 112 bytes EEPROM from address 0x0000 ... 0x006F (total OTP area "0x0060 ... 0x006F"). In this memory, the locked area corresponds to the addresses 0x0060 ... 0x0063 or 0x0060 ... 0x0067

Name	Type	Possible Values (hex)	Comment
block_size	byte	0x00 ... 0xFF	Block size of the transponder depending on transponder type, e.g. MDS D3xx: 4 bytes
nr_of_blocks	byte	0x00 ... 0xFF	Number of blocks depending on transponder type, e.g. MDS D3xx: 248 bytes

Appendix

A.1 Certificates & approvals

All the latest RFID radio approvals are available on the Internet (<http://www.siemens.com/rfid-approvals>).

Labeling	Description
	Conformity acc. to the RED EU directive

The following applies to the system described in this documentation:
The CE marking on a device indicates the corresponding approval:

Notes on CE marking

The following applies to the system described in this documentation:
The CE marking on a device indicates the corresponding approval.

DIN ISO 9001 certificate

The quality assurance system for the entire product process (development, production, and marketing) at Siemens fulfills the requirements of ISO 9001 (corresponds to EN29001: 1987).

This has been certified by DQS (the German society for the certification of quality management systems).

EQ-Net certificate no.: 1323-01

Country-specific approvals

Safety

If the device has one of the following markings the corresponding approval has been obtained:

Labeling	Description
	Underwriters Laboratories (UL) to UL 60950 Standard (I.T.E), UL508 or UL61010-1/UL61010-2-201 (IND.CONT.EQ)
	Underwriters Laboratories (UL) according to Canadian standard C22.2 No. 60950 (I.T.E), C22.2 No. 142 or C22.2 NO. 61010-1-12 (IND.CONT.EQ)

Labeling	Description
	Underwriters Laboratories (UL) according to Standard UL 60950, Report E11 5352 and Canadian standard C22.2 No. 60950 (I.T.E), UL508 or UL61010-1/UL61010-2-201 (IND.CONT.EQ) and C22.2 No. 142 or C22.2 NO. 61010-1-12 (IND.CONT.EQ)
	UL recognition mark
	Canadian Standard Association (CSA) acc. to standard C22.2. No. 60950 (LR 81690), C22.2 No. 142 or C22.2 NO. 61010-1-12 (LR 63533)
	Canadian Standard Association (CSA) acc. to American Standard UL 60950 (LR 81690), UL508 or UL61010-1/UL61010-2-201 (LR 63533)
	This product meets the requirements of the AS/NZS 3548 Norm.
	USA (FCC) This device complies with Part 15 of the FCC Rules. FCC ID: NXW-RF...
Canada (IC)	Canada (IC) This device complies with Industry Canada licence-exempt RSS standard(s). IC: 267X-RF...
	EAC (Eurasian Conformity) Eurasian Economic Union of Russia, Belarus, Armenia, Kazakhstan and Kyrgyzstan Declaration of conformity according to the technical regulations of the customs union (TR ZU)
	Brazil (ANATEL) ANATEL-ID: XXXX-YY-ZZZZ
Mexico (COFETEL)	Mexico (COFETEL)
	South Africa (ICASA)
China (CMIIT)	China (CMIIT) CMIIT ID: XXXXYYZZZZ
	South Korea (KCC)
	Japan (VCCI)

A.2 Accessories

A.2.1 Transponder holders

Table A- 1 Overview of transponder holders and spacers

Product photo	Insertable transponders	Characteristics
 6GT2190-0AA00	• MDS D100 • MDS D200 • MDS D400 • MDS E600 • MDS E611 • RF360T	• Spacer for mounting on metal, in conjunction with the fixing pocket 6GT2190-0AB00 • Distance from transponder to metal: 25 mm • Mounting: 4 x M4 screws • Material: PA6 • Weight: 31 g • Dimensions (L x W x H): 110 x 62 x 24 mm
 6GT2190-0AB00	• MDS D100 • MDS D200 • MDS D400 • MDS E600 • MDS E611 • RF360T	• Fixing pocket in conjunction with spacer 6GT2190-0AA00 • Mounting: – Locks into spacer – 2 x screws/nails – Tacked • Material: PA6 • Weight: 12 g • Dimensions (L x W x H): 121 x 57 x 5 mm
 6GT2390-0AA00	• MDS D100 • MDS D200 • MDS D400	• Fixing pocket not suitable for mounting directly on metal • Mounting: 2 x M4 countersunk screws • Material: PA6 • Weight: 21 g • Dimensions (L x W x H): 110 x 65 x 5 mm

Product photo	Insertable transponders	Characteristics
 6GT2690-0AA00	• MDS D139 • MDS D339	• Spacer for mounting on metal • Distance from transponder to metal: 30 mm • Mounting: 1 x M5 stainless steel screw • Tightening torque: 1.5 Nm • Material: PPS • Weight: 50 g • Dimensions (Ø x H): 85 x 30 mm
 6GT2690-0AH00	• MDS D139 • MDS D339	• Quick change holder for mounting on metal • Distance from transponder to metal: 30 mm • Mounting: Screw-in • Material: Stainless steel VA • Weight: 80 g • Dimensions (Ø x H): 22 x 60 mm
 6GT2690-0AH10	• MDS D139 • MDS D339	• Quick change holder for mounting on metal • Distance from transponder to metal: 30 mm • Mounting: Screw-in • Material: Stainless steel VA • Weight: 60 g • Dimensions (Ø x H): 22 x 47 mm
 6GT2690-0AK00	• MDS D124 • MDS D324 • MDS D424 • MDS D524 • MDS E624	• Spacer for mounting on metal • Distance from transponder to metal: 15 mm • Mounting: 1 x M4 countersunk screw • Tightening torque: ≤ 1 Nm • Material: PPS • Weight: Approx. 4 g • Remounting cycles: min. 10 • Dimensions (Ø x H): 36 x 22 mm

Product photo	Insertable transponders	Characteristics
 6GT2690-0AL00	• MDS D126 • MDS D426 • MDS D526	• Spacer for mounting on metal • Distance from transponder to metal: 25 mm • Mounting: 1 x M4 countersunk screw • Tightening torque: ≤ 1 Nm • Material: PA6 • Weight: Approx. 12 g • Remounting cycles: min. 10 • Dimensions ($\varnothing$ x H): 59 x 30 mm
 6GT2690-0AG00	• MDS D160 • MDS D460	• Spacer for mounting on metal • Distance from transponder to metal: 10 mm • Mounting: 1 x M3 countersunk screw • Material: PA6 • Weight: 2 g • Dimensions ($\varnothing$ x H): 20 x 14 mm
 6GT2690-0AE00	• MDS D423 • RF330T	• Fixing hood • Mounting: 2 x M4 or 2 x M5 screws with max. head diameter of 9.5 mm • Tightening torque ≤ 0.8 Nm (M4 only with flat washer) • Material: PPS • Weight: 3 g • Dimensions (L x W x H): 49.4 x 20 x 9.8 mm

Dimensional drawings

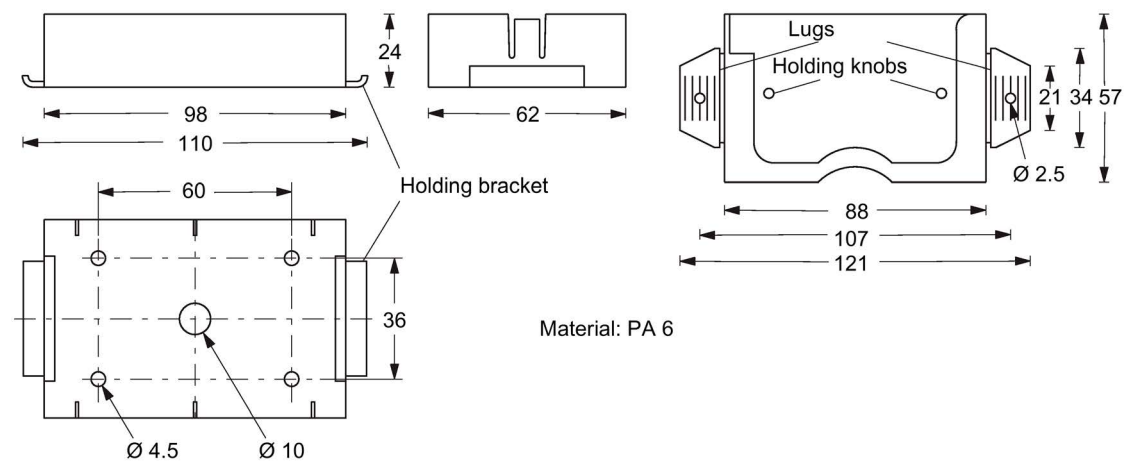


Figure A-1 Dimension drawing of spacer 6GT2190-0AA00 with fixing pocket 6GT2190-0AB00

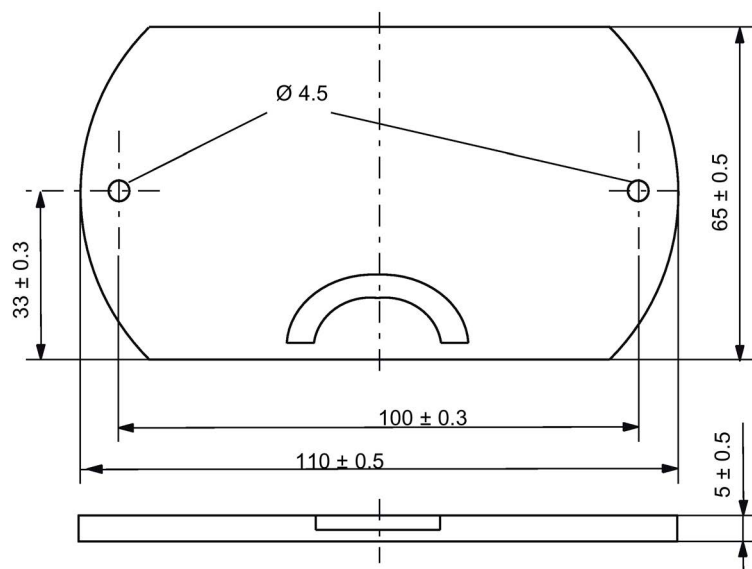


Figure A-2 Dimension drawing of fixing pocket 6GT2390-0AA00

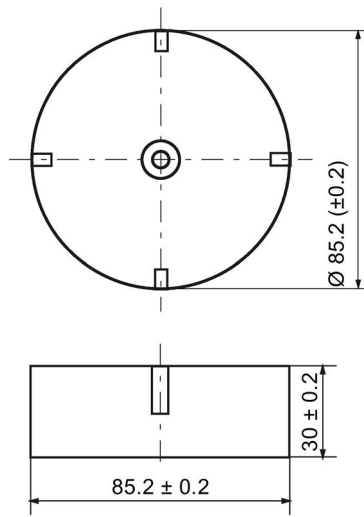


Figure A-3 Dimension drawing of spacer 6GT2690-0AA00

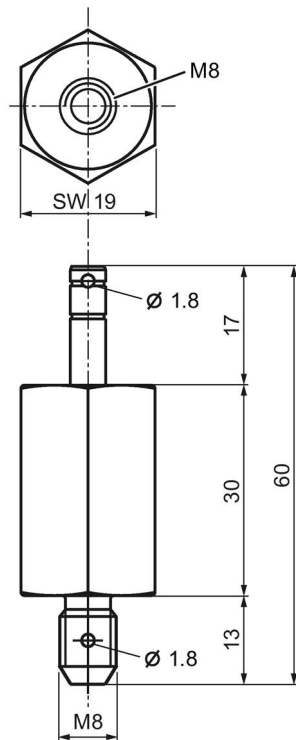


Figure A-4 Dimension drawing of quick change holder 6GT2690-0AH00

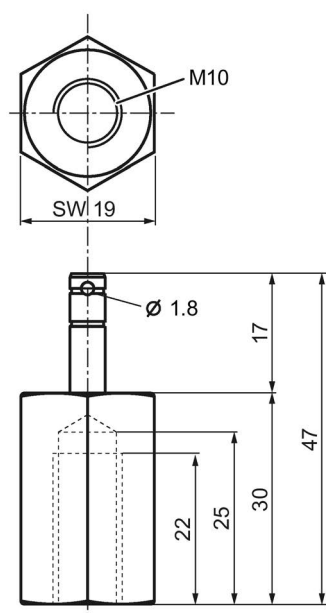


Figure A-5 Dimension drawing of quick change holder 6GT2690-0AH10

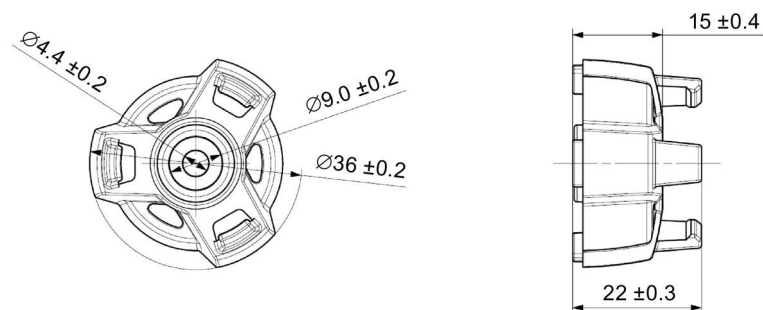


Figure A-6 Dimension drawing of spacer 6GT2690-0AK00

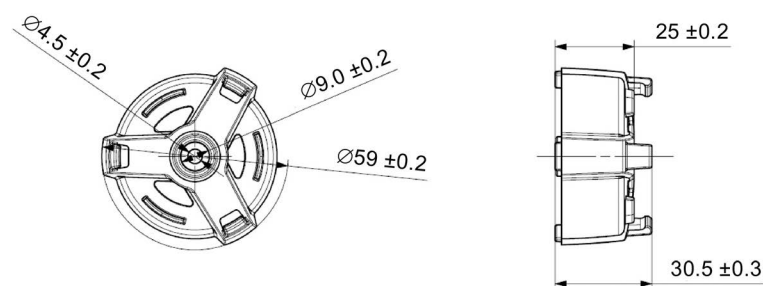


Figure A-7 Dimension drawing of spacer 6GT2690-0AL00

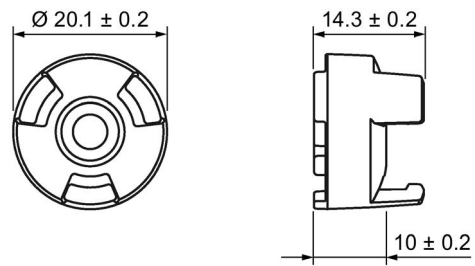


Figure A-8 Dimension drawing of spacer 6GT2690-0AG00

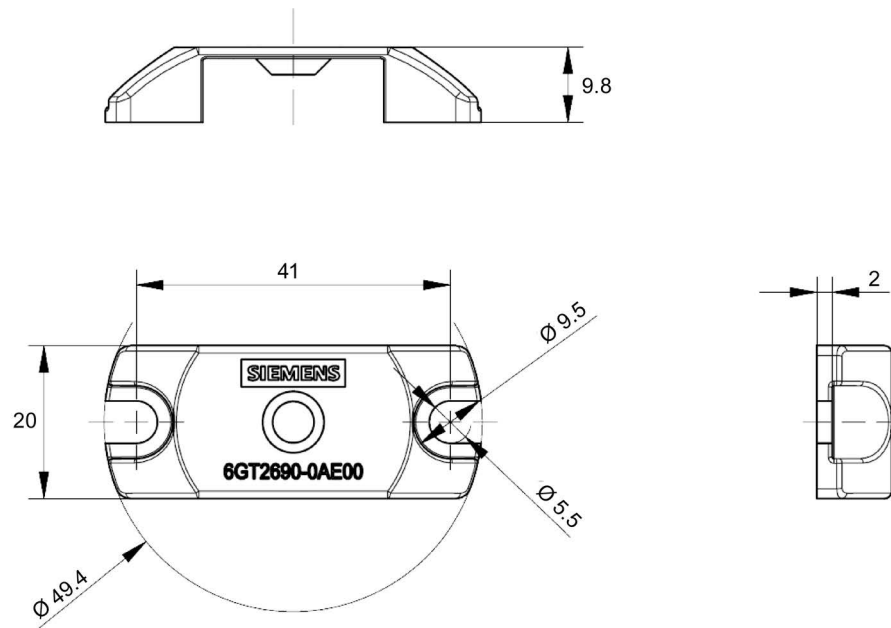


Figure A-9 Dimension drawing of fixing hood 6GT2690-0AE00

A.2.2 MOBY I migration

The RF300 readers of the new generation provide the option of simple migration of existing MOBY I systems to SIMATIC RF300. The so-called MOBY I emulation processes frames of the MOBY I protocol on its serial interface and communicates with the established RF300 transponders.

If the RF300 reader is connected to a communications module with MOBY I capability, the reader automatically recognizes the serial protocol and sets the MOBY I protocol. As a communications module with MOBY I capability, all the communications modules sold for MOBY I count regardless of the mode in which the MOBY I communications modules are operated. This property allows even projects with the ECC mode turned on or with file handlers to be migrated.

Communication modules with MOBY I capability:

RF180C, RFID 181EIP, RF170C, ASM 456, ASM 475, ASM 470, ASM450, ASM 451, ASM 452, ASM 472, ASM 473, ASM 424, ASM 454, ASM 400, CM 422, CM 423, ASM 410, ASM 420, ASM 421, ASM 440, ES030

With the aid of the adapter cable (0.3 m; article number 6GT2091-4VE30) you can migrate existing MOBY I projects without needing to re-cable the connected RFID devices.

The transfer is as usual with MOBY I with a transmission speed of 19.2 kBd. The transmission speed in the application is identical (or slightly slower) than with the original MOBY I hardware.

NOTICE
Changed field geometry When replacing MOBY I components with RF300 components note that the field geometry changes.

Note

LED reaction of the readers in MOBY I mode

Errors are not displayed on the reader. These are only displayed via the connected CM.

In the "None present" mode, the LED of the reader stays blue until initial access (read/write/init) to the transponder takes place. While no other access is initiated, the LED flashes green.

Design of the Y adapter

With the aid of the Y adapter (article number 6GT2090-4VE00) a slow migration of a MOBY I application to RF300 is possible. The Y adapter is mounted in the vicinity of a MOBY I SLG. It forwards signals of a communications module both to the MOBY I SLG and to the RF300 reader to be newly installed. The transponder commands are handled either with a MOBY I transponder or with an RF300 transponder. To do this, no change to the MOBY I application is necessary.



- | | |
|----------------------|---|
| ① ASM TxD (X1) | Connector for the communications module; SLG plug, 6-pin acc. to EN 175201-804 |
| ② Power (X4) | Optional 24 VDC supply voltage; M12 plug, 4-pin |
| ③ MOBY I (X2) | Connector for the MOBY I-SLG; SLG socket (angled), 6-pin acc. to EN 175201-804; cable length: 2 m |
| ④ SIMATIC RF300 (X3) | Connector for RF 300 reader; M12 socket, 8-pin, cable length: 2 m; max. 2 m cable extension permitted |

Figure A-10 Connection graphic of the MOBY Y adapter for MOBY I

The operational statuses of the Y-adapter are displayed by four LEDs. The LEDs can adopt the colors yellow and green and the statuses off , on , flashing :

Labeling	LED	Description
ASM TxD (X1)		No communication module connected to the Y-adapter.
		A communication module is connected to the Y-adapter.
Power (X4)		The Y-adapter is switched off.
		The Y-adapter is switched on. All connected components are supplied with power.
		Flashes at 1:1 rate The following options are available: - Supply voltage at X4, but not at X1. - Supply voltage at X1, but not at X4. - No component is connected to either X2 or X3.
		Flashes at 1:10 rate; indicates an error. A transponder is installed on the MOBY I-SLG as well as on the RF300 reader. The user program displays the error "03".
MOBY I (X2)		No MOBY I-SLG connected to the Y-adapter or the MOBY I-SLG does not work.
		A ready MOBY I-SLG is connected to the Y-adapter. If the LED gets brighter, there is communication to a MOBY I transponder.
SIMATIC RF300 (X3)		No RF300 reader connected to the Y-adapter or the RF300 reader does not work.
		A ready RF300 reader is connected to the Y-adapter. If the LED gets brighter, there is communication to a RF300 transponder.

Optional supply voltage

Use the optional supply voltage under the following conditions:

- If the communication module (X1) cannot supply the current required for 2 readers and the Y-adapter.
- If long cables between the communication module (X1) and the MOBY I-SLG (X2) cause the voltage at the Y-adapter to drop below the minimum supply voltage of 20 V.

Note

Questions on migration

If you have questions about migration, please contact the Siemens Industry Online Support (section "Service & Support (Page 506)").

Command set

The complete command set of the MOBY I SLGs is supported by the RF300 readers. You will find a list of the commands and a description of the commands in the manuals "FB 45" and "FC 56". These manuals can be found in the archive of the DVD "Ident Systems Software & Documentation" (6GT2080-2AA20).

A.2.3 DVD "Ident Systems Software & Documentation"

The DVD contains:

- FB/FC for SIMATIC, 3964R
- Drivers for DOS / Windows
- C libraries
- PC demonstration program
- RFID documentation in PDF format, especially RFID system manuals, programming instructions and operating instructions

Table A- 2 Ordering data DVD

	Article number
DVD "Ident Systems Software & Documentation"	6GT2080-2AA20

Note

Notes on "Ident Systems Software" and licensing

When purchasing a communication module or an interface module, no software or documentation is supplied. The "Ident Systems Software & Documentation" DVD contains all available FBs/FCs for the SIMATIC, C libraries, demo programs, etc. and needs to be ordered separately. In addition, the DVD contains the complete Ident documentation (German and English) in PDF format.

The purchase of a communications module or an interface module includes a payment for the use of the software, including documentation, on the "Ident Systems Software & Documentation" DVD and the purchaser acquires the right to make copies (copy license) insofar as they are required as part of the customer-specific application or development for the plant.

The contract accompanying the DVD pertaining to the use of software products against a one-off payment also applies.

A.3 Connecting cable

In the following chapter, you will find an overview of the connecting cables between the readers and communication modules or PCs.

A.3.1 RF3xxR reader (RS-422) with ASM 456 / RF160C / RF170C / RF180C / RF182C

Connecting cable with straight connector

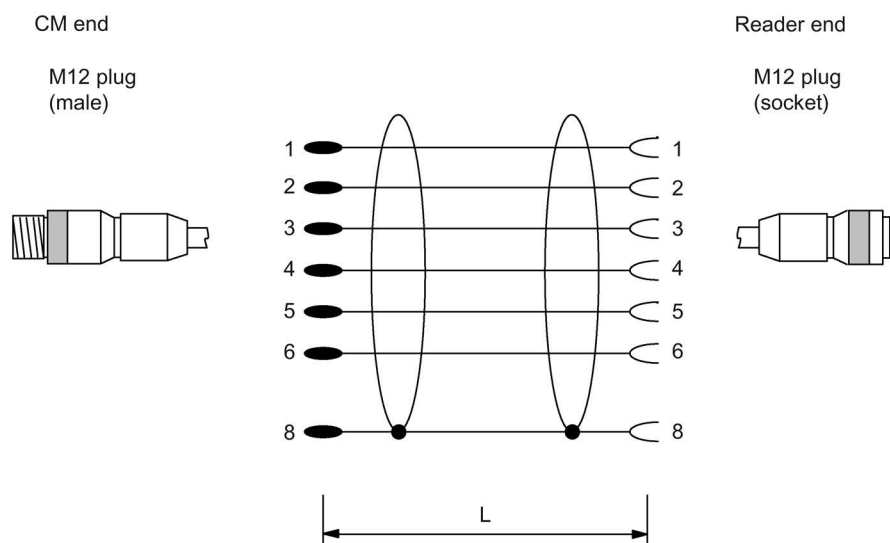


Figure A-11 Connecting cable between ASM 456, RF160C, RF170C, RF180C, RF182C and RF3xxR reader (RS-422)

Table A- 3 Ordering data

Length L	Article number
2 m	6GT2891-4FH20
5 m	6GT2891-4FH50
10 m	6GT2891-4FN10
20 m	6GT2891-4FN20
50 m	6GT2891-4FN50

Connecting cable with angled connector

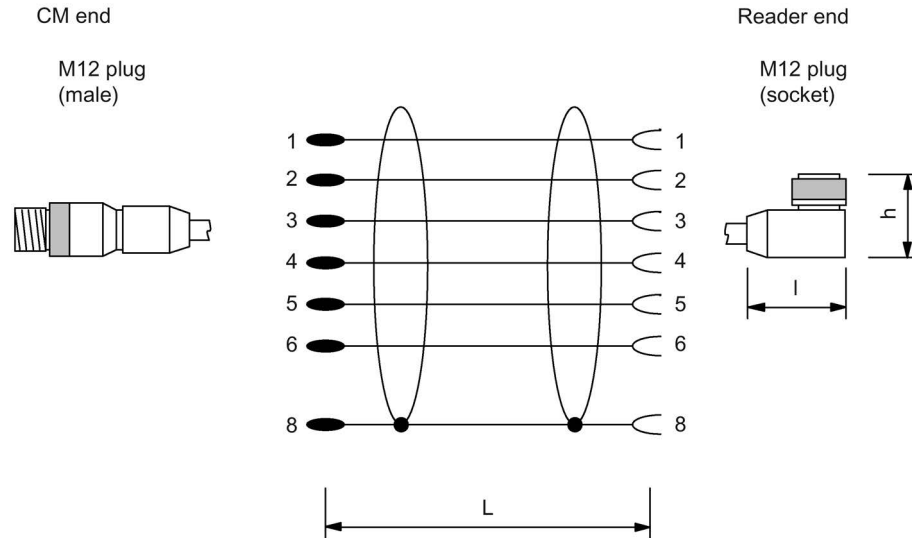


Figure A-12 Connecting cable between ASM 456, RF160C, RF170C, RF180C and RF3xxR reader (RS-422) with angled connector

Table A- 4 Ordering data

Length L	Article number
2 m	6GT2891-4JH20
5 m	6GT2891-4JH50
10 m	6GT2891-4JN10

The angled connector has a height of $h = 29 \text{ mm}$ and a length of $l = 38 \text{ mm}$. Remember that due to the construction, the distance between the edge of the connector and the edge of the reader housing (H) is higher.

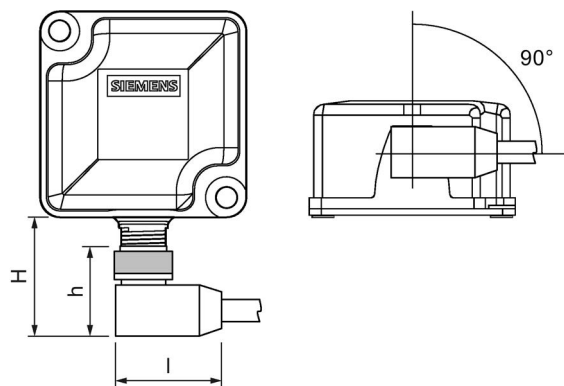


Figure A-13 Distance between connector edge and housing edge

The distance between the connector edge and the housing edge of the reader (H) depends on the reader being used and can be up to 38 mm. If you look at the front of the reader, the angled connector always points to the right and runs parallel to the housing.

A.3.2 Reader RF3xxR (RS422) with ASM 475

Reader connection system

The connecting cable has a length of 2 m (standard) and 5 m. Extensions up to 1000 m are possible with the 6GT2891-4E... plug-in cables.

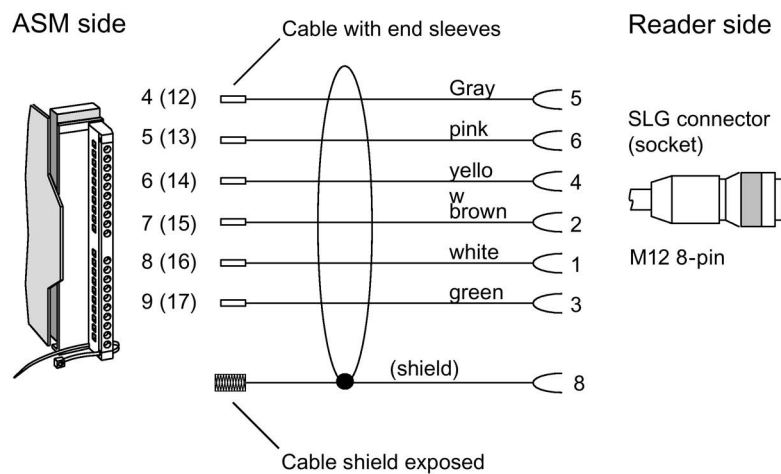


Figure A-14 Structure of the connecting cable between ASM 475 and RF3xx reader with RS-422

Table A- 5 Ordering data

Length L	Article number
2 m	6GT2891-4EH20
5 m	6GT2891-4EH50

A.3.3 Reader RF3xxR (RS-422) with RF120C

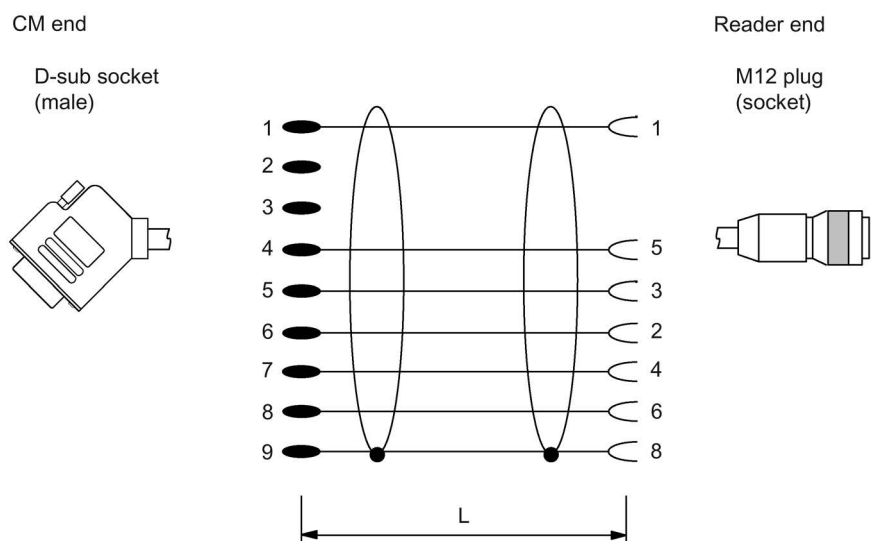


Figure A-15 Connecting cable between RF120C and RF3xxR reader (RS-422)

Table A- 6 Ordering data

Length L	Article number
2 m	6GT2091-4LH20
5 m	6GT2091-4LH50
10 m	6GT2091-4LN10

A.3.4 Reader RF380R (RS232) - PC

The connecting cables have a length of 5 m. The outgoing cable for the power supply has a length of 0.5 m.

With 4-pin power supply connector

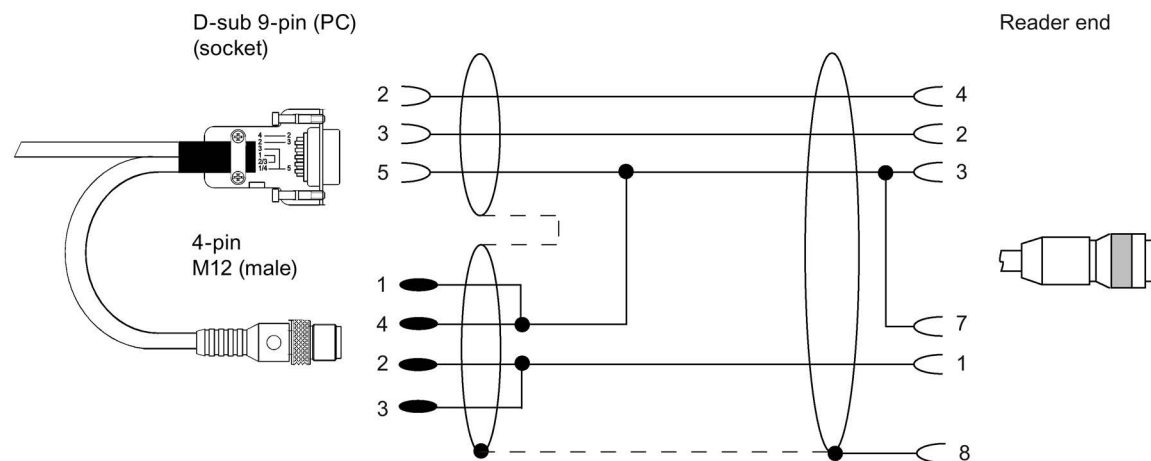


Figure A-16 Connecting cable between PC and RF380R (RS-232) with 4-pin power supply connector

Suitable power supply unit: e.g. wide-range power supply unit

With open ends for the power supply

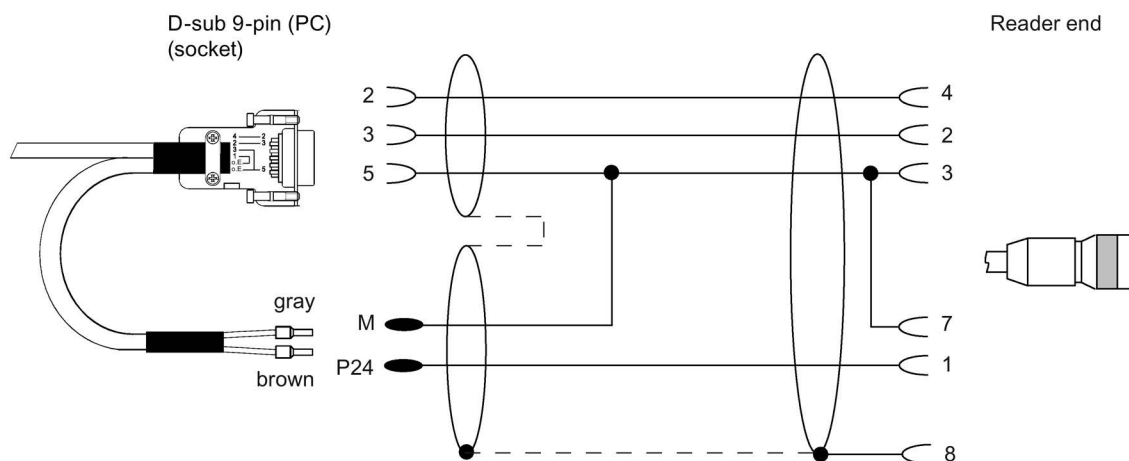


Figure A-17 Connecting cable between PC and RF380R (RS-232) with open ends for the power supply

Table A- 7 Ordering data connecting cable

	Article number
Connecting cable with 4-pin power supply connector (5 m)	6GT2891-4KH50
Connecting cable with open ends (5 m)	6GT2891-4KH50-0AX0

Table A- 8 Ordering data for wide-range power supply unit

	Article number
Wide-range power supply unit for SIMATIC RF-systems (100 - 240 VAC / 24 VDC / 3 A) with 2 m connecting cable with country-specific plug	EU: 6GT2898-0AA00 UK: 6GT2898-0AA10 US: 6GT2898-0AA20

A.4 Ordering data

RF300 components

Note

Product update

Note that readers with the article numbers "6GT2801-xABxx" are being replaced by readers with the article numbers "6GT2801-xBAxx".

Table A- 9 RF300 reader

Reader	Description	Article number
RF310R ¹⁾	- With RS422 interface (3964R) - IP67 - Operating temperature: -25 °C ... +70 °C - Dimensions (L x W x H): 75 x 55 x 30 mm - with integrated antenna - ISO 15693 compatible	horizontal base plate 6GT2801-1AB10
		base plate turned through 90° 6GT2801-1AB10-0AX1
RF310R 2nd generation	- With RS422 interface (3964R) - IP67 - Operating temperature: -25 °C ... +70 °C - Dimensions (L x W x H): 75 x 55 x 30 mm - with integrated antenna - ISO 15693 compatible - ISO 14443 (MOBY E) compatible	6GT2801-1BA10
	Including ATEX approval	6GT2801-1BA10-0AX2
RF310R ¹⁾ (Scanmode)	- with RS422 interface (Scanmode) - IP67 - Operating temperature: -25 °C ... +70 °C - Dimensions (L x W x H): 75 x 55 x 30 mm - with integrated antenna - ISO 15693 compatible	6GT2801-1AB20-0AX1
RF310R (Scanmode) 2nd generation	- with RS422 interface (Scanmode) - IP67 - Operating temperature: -25 °C ... +70 °C - Dimensions (L x W x H): 79.6 x 55 x 30 mm - with integrated antenna - ISO 15693 compatible	6GT2801-1BA20-0AX1

Reader	Description	Article number
RF340R ¹⁾	• With RS422 interface (3964R) • IP67 • Operating temperature -25 °C ... +70 °C • Dimensions (L x W x H): 75 x 75 x 41 mm • with integrated antenna • ISO 15693 compatible	6GT2801-2AB10
RF340R 2nd generation	• With RS422 interface (3964R) • IP67 • Operating temperature -25 °C ... +70 °C • Dimensions (L x W x H): 75 x 75 x 41 mm • with integrated antenna • ISO 15693 compatible • ISO 14443 (MOBY E) compatible	6GT2801-2BA10
	Including ATEX approval	6GT2801-2BA10-0AX2
RF350R ¹⁾	• With RS422 interface (3964R) • IP65 • Operating temperature: -25 °C ... +70 °C • Dimensions (L x W x H): 75 x 75 x 41 mm • Reader for external antennas, with the option of connecting ANT 1, ANT 3, ANT 12, ANT 18, ANT 30 • ISO 15693 compatible	6GT2801-4AB10
RF350R 2nd generation	• With RS422 interface (3964R) • IP65 • Operating temperature: -25 °C ... +70 °C • Dimensions (L x W x H): 75 x 75 x 41 mm • Reader for external antennas, with the option of connecting ANT 1, ANT 3, ANT 12, ANT 18, ANT 30 • ISO 15693 compatible • ISO 14443 (MOBY E) compatible	6GT2801-4BA10
	Including ATEX approval	6GT2801-4BA10-0AX2
RF380R Scanmode	• with RS-422 interface (Scanmode) and RS-232 interface (Scanmode) • IP67 • Operating temperature: -25 °C ... +70 °C • Dimensions (L x W x H): 160 x 80 x 41 mm • with integrated antenna • ISO 15693 compatible	6GT2801-3AB20-0AX1

Reader	Description	Article number
RF380R 2nd generation	• with RS-422 interface (3964R) and RS-232 interface (3964R) • IP67 • Operating temperature: -25 °C ... +70 °C • Dimensions (L x W x H): 160 x 80 x 41 mm • with integrated antenna • ISO 15693 compatible	6GT2801-3BA10
	Including ATEX approval	6GT2801-3BA10-0AX2
RF382R (Scanmode)	• with RS-422 interface (Scanmode) and RS-232 interface (Scanmode) • IP67 • Operating temperature: -25 °C ... +70 °C • Dimensions (L x W x H): 160 x 80 x 41 mm • with integrated antenna • ISO 15693 compatible	6GT2801-3AB20-0AX0
RF350M	• IP54 • Operating temperature: -20 °C ... +55 °C • Dimensions (L x W x H): 250 x 90 x 47 mm • Mobile reader with integrated antenna	6GT2803-1BA00
	• IP54 • Operating temperature: -20 °C ... +55 °C • Dimensions (L x W x H): 250 x 90 x 47 mm • Mobile reader for external antennas, with the option of connecting ANT 8, ANT 12, ANT 18, ANT 30	6GT2803-1BA10

¹⁾ This reader is no longer available and is replaced by the 2nd generation of this reader variant.

Table A- 10 Antennas

Antenna	Description	Article number
ANT 1	• IP67 • Operating temperature: -25 °C ... +70 °C • Dimensions (L x W x H): 75 x 75 x 20 mm • incl. one integrated antenna connecting cable 3 m	6GT2398-1CB00
ANT 3	• IP67 • Operating temperature: -25 °C ... +70 °C • Dimensions (L x W x H): 50 x 28 x 10 mm • without antenna connecting cable	6GT2398-1CD30-0AX0
	• incl. one plug-in antenna connecting cable 3 m	6GT2398-1CD40-0AX0
ANT 3S	• IP67 • Operating temperature: -25 °C ... +70 °C • Dimensions (L x W x H): 50 x 28 x 10 mm • without antenna connecting cable	6GT2398-1CD50-0AX0
	• incl. one plug-in antenna connecting cable 3 m	6GT2398-1CD60-0AX0
ANT 8	• IP67 • Operating temperature: -25 °C ... +70 °C • Dimensions (Ø x L): M8 x 40 mm • without antenna connecting cable	6GT2398-1CF00
	• incl. one plug-in antenna connecting cable 3 m	6GT2398-1CF10
ANT 12	• IP67 • Operating temperature: -25 °C ... +70 °C • Dimensions (Ø x L): M12 x 40 mm • incl. one integrated antenna connecting cable 0.6 m	6GT2398-1CC10
	• incl. one plug-in antenna connecting cable 3 m	6GT2398-1CC00
ANT 18	• IP67 (front) • Operating temperature: -25 °C ... +70 °C • Dimensions (Ø x L): M18 x 55 mm • incl. one integrated antenna connecting cable 0.6 m	6GT2398-1CA10
	• incl. one plug-in antenna connecting cable 3 m	6GT2398-1CA00
ANT 30	• IP67 • Operating temperature: -25 °C ... +70 °C • Dimensions (Ø x L): M30 x 58 mm • incl. one plug-in antenna connecting cable 3 m	6GT2398-1CD00

Table A- 11 RF300 transponder

RF300 transponder	Description	Article number
RF320T	- Memory size: 20 bytes of EEPROM user memory - Dimensions (Ø x H): 27 x 4 mm	6GT2800-1CA00
RF330T	- Memory size: 32 KB FRAM user memory - Dimensions (Ø x H): 30 x 8 mm	6GT2800-5BA00
RF340T (8 KB FRAM)	- Memory size: 8 KB FRAM user memory - Dimensions (L x W x H): 48 x 25 x 15 mm	6GT2800-4BB00
RF340T (32 KB FRAM)	- Memory size: 32 KB FRAM user memory - Dimensions (L x W x H): 48 x 25 x 15 mm	6GT2800-5BB00
RF350T	- Memory size: 32 KB FRAM user memory - Dimensions (L x W x H): 50 x 50 x 20 mm	6GT2800-5BD00
RF360T (8 KB FRAM)	- Memory size: 8 KB FRAM user memory - Dimensions (L x W x H): 85.8 x 54.8 x 2.5 mm	6GT2800-4AC00
RF360T (32 KB FRAM)	- Memory size: 32 KB FRAM user memory - Dimensions (L x W x H): 85.8 x 54.8 x 2.5 mm	6GT2800-5AC00
RF370T (32 KB FRAM)	- Memory size: 32 KB FRAM user memory - Dimensions (L x W x H): 75 x 75 x 41 mm	6GT2800-5BE00
RF370T (64 KB FRAM)	- Memory size: 64 KB FRAM user memory - Dimensions (L x W x H): 75 x 75 x 41 mm	6GT2800-6BE00
RF380T	- Memory size 32 KB FRAM user memory - Dimensions (Ø x H): 114 x 83 mm	6GT2800-5DA00

Table A- 12 ISO transponder

ISO transponder	Description	Article number
MDS D100	- Memory size: 112 bytes of EEPROM user memory - Dimensions (L x W x H): 85.6 x 54 x 0.9 mm - Credit card format	6GT2600-0AD10
MDS D117	- Memory size: 112 bytes of EEPROM user memory - Dimensions (Ø x H): 4 x 5 mm	6GT2600-0AG00
MDS D124	- Memory size: 112 bytes of EEPROM user memory - Dimensions (Ø x H): 27 (±0.2) x 4 (±0.2) mm	6GT2600-0AC10
MDS D126	- Memory size: 112 bytes of EEPROM user memory - Dimensions (Ø x H): 50 x 3.6 mm - Round design with mounting hole	6GT2600-0AE00
MDS D127	- Memory size: 112 bytes of EEPROM user memory - Dimensions (Ø x H): M6 x 5.8 (±0.2) mm	6GT2600-0AF00

ISO transponder	Description	Article number
MDS D139	- Memory size: 112 bytes of EEPROM user memory - Dimensions (Ø x H): 85 (±0.5) x 15 (-1.0) mm	6GT2600-0AA10
MDS D160	- Memory size: 112 bytes of EEPROM user memory - Dimensions (Ø x H): 16 (±0.2) x 3.0 (±0.2) mm - Laundry transponder for cyclic applications	6GT2600-0AB10
MDS D165	- Memory size: 112 bytes of EEPROM user memory - Dimensions (L x W): 86 x 54 mm - Smartlabel (PET) in credit card format	6GT2600-1AB00-0AX0
MDS D200	- Memory size: 256 bytes of EEPROM user memory - Dimensions (L x W x H): 86 x 54 x 0.8 mm - Credit card format	6GT2600-1AD00-0AX0
MDS D261	- Memory size: 256 bytes of EEPROM user memory - Dimensions (L x W): 55 x 55 mm - Smartlabel (PET), small design	6GT2600-1AA00-0AX0
MDS D324	- Memory size: 992 bytes of EEPROM user memory - Dimensions (Ø x H): 27 (±0.2) x 4 (±0.2) mm	6GT2600-3AC00
MDS D339	- Memory size: 992 bytes of EEPROM user memory - Dimensions (Ø x H): 85 (±0.5) x 15 (-1.0) mm	6GT2600-3AA10
MDS D400	- Memory size: 2000 bytes of FRAM user memory - Dimensions (L x W x H) 85.6 (±0.3) x 54 (±0.2) x 0.8 (±0.05) mm	6GT2600-4AD00
MDS D421	- Memory size: 2000 bytes of FRAM user memory - Dimensions (Ø x H): 10 x 4.5 mm	6GT2600-4AE00
MDS D422	- Memory size: 2000 bytes of FRAM user memory - Dimensions (Ø x H): M20 x 6 (±0.2) mm - Can be screwed into metal (flush-mounted)	6GT2600-4AF00
MDS D423	- Memory size: 2000 bytes of FRAM user memory - Dimensions (Ø x H): 30 (+0.2/-0.5) x 8 (-0.5) mm	6GT2600-4AA00
MDS D424	- Memory size: 2000 bytes of FRAM user memory - Dimensions (Ø x H): 27 (±0.2) x 4 (±0.2) mm	6GT2600-4AC00
MDS D425	- Memory size: 2000 bytes of FRAM user memory - Dimensions (Ø x H): 24 X 10 mm; M6 thread - Screw transponder	6GT2600-4AG00
MDS D426	- Memory size: 2000 bytes of FRAM user memory - Dimensions (Ø x H): 50 x 3.6 mm - Round design with mounting hole	6GT2600-4AH00

ISO transponder	Description	Article number
MDS D428	- Memory size: 2000 bytes of FRAM user memory - Dimensions (Ø x H): 18(±1) x 20(±1) mm (without thread); thread M8	6GT2600-4AK00-0AX0
MDS D460	- Memory size: 2000 bytes of FRAM user memory - Dimensions (Ø x H): 16 (±0.2) x 3.0 (±0.2) mm	6GT2600-4AB00
MDS D521	- Memory size: 8192 bytes of FRAM user memory - Dimensions (Ø x H): 10 x 4.5 mm	6GT2600-5AE00
MDS D522	- Memory size: 8192 bytes of FRAM user memory - Dimensions (Ø x H): M20 x 6 (±0.2) mm - Can be screwed into metal (flush-mounted)	6GT2600-5AF00
MDS D522 Special variant	- Memory size: 8192 bytes of FRAM user memory - Dimensions (Ø x H): 18 (+0.1) x 5.2 mm - Can be clipped into metal (flush-mounted)	6GT2600-5AF00-0AX0
MDS D524	- Memory size: 8192 bytes of FRAM user memory - Dimensions (Ø x H): 27 (±0.2) x 4 (±0.2) mm	6GT2600-5AC00
MDS D525	- Memory size: 8192 bytes of FRAM user memory - Dimensions (Ø x H): 24 x 10 (+1.0) mm	6GT2600-5AG00
MDS D526	- Memory size: 8192 bytes of FRAM user memory - Dimensions (Ø x H): 50 x 3.6 mm - Round design with mounting hole	6GT2600-5AH00
MDS D528	- Memory size: 8192 bytes of FRAM user memory - Dimensions (Ø x H): 18(±1) x 20(±1) mm (without thread); thread M8	6GT2600-5AK00

Table A- 13 Communication modules/interface modules

Communications module	Description	Article number
ASM 456	ASM 456 for PROFIBUS DP-V1 max. 2 readers connectable	6GT2002-0ED00
ASM 475	ASM 475 for SIMATIC S7 max. 2 RF3xxR readers with RS-422 can be connected in parallel without a front connector	6GT2002-0GA10
RF120C	Communications module RF120C for SIMATIC S7-1200	6GT2002-0LA00
RF160C	Communications module RF160C for PROFIBUS DP V0 max. 2 readers connectable	6GT2002-0EF00
RF170C	RF170C communications module	6GT2002-0HD00
	RF170C connecting block	6GT2002-1HD00

Communications module	Description	Article number
RF180C	RF180C communications module max. 2 SLGs or readers can be connected	6GT2002-0JD00
	Connecting block M12, 7/8" (5-pin)	6GT2002-1JD00
	Connecting block M12, 7/8" (4-pin)	6GT2002-4JD00
	Push-pull connecting block, RJ-45	6GT2002-2JD00
RF182C	RF182C communications module max. 2 SLGs or readers can be connected	6GT2002-0JD10
	Connecting block M12, 7/8" (5-pin)	6GT2002-1JD00
	Connecting block M12, 7/8" (4-pin)	6GT2002-4JD00
	Push-pull connecting block, RJ-45	6GT2002-2JD00
RFID 181EIP	RF182C communications module max. 2 SLGs or readers can be connected	6GT2002-0JD20
	Connecting block M12, 7/8" (5-pin)	6GT2002-1JD00
	Connecting block M12, 7/8" (4-pin)	6GT2002-4JD00
	Push-pull connecting block, RJ-45	6GT2002-2JD00

Accessories

Table A- 14 Accessories for RF300 reader

Reader	Accessories	Article number
RF380R	RS-232 plug-in cable with 4-pin connector	6GT2891-4KH50
	Plug-in cable RS-232 with open ends (5 m)	6GT2891-4KH50-0AX0
	Plug-in cable RS-232 with D-SUB ↔ M12, 8-pin and with M8, 3-pin power unit connector	6GT2891-4KH50-0AX1

Table A- 15 RF300 transponder accessories

Transponder	Accessories	Article number
RF320T	Spacer (Ø x H): 36 x 22 mm	6GT2690-0AK00
RF330T	Fixing hood (L x W x H): 49.4 x 20 x 9.8 mm	6GT2690-0AE00
RF360T	Spacer (L x W x H): 110 x 62 x 24 mm (in conjunction with fixing pocket 6GT2190-0AB00)	6GT2190-0AA00
	Fixing pocket (L x W x H): 121 x 57 x 5 mm (in conjunction with spacer 6GT2190-0AA00)	6GT2190-0AB00
RF380T	Holder (short version)	6GT2090-0QA00
	Holder (long version)	6GT2090-0QA00-0AX3
	Shrouding cover	6GT2090-0QB00
	Universal holder	6GT2590-0QA00

Table A- 16 Transponder accessories

Transponder	Accessories	Article number
MDS D100 / D200 / D400	Spacer	6GT2190-0AA00
	Fixing pocket	6GT2190-0AB00
	Securing pocket (cannot be mounted directly on metal)	6GT2390-0AA00
MDS D139 / D339	Spacer (Ø x H): 85 x 30 mm	6GT2690-0AA00
	Quick change holder (Ø x H): 22 x 60 mm	6GT2690-0AH00
	Quick change holder (Ø x H): 22 x 47 mm	6GT2690-0AH10
MDS D124 / D324 / D424 / D524	Spacer (Ø x H): 36 x 22 mm	6GT2690-0AK00
MDS D126 / D426 / D526 / E624	Spacer (Ø x H): 59 x 30 mm	6GT2690-0AL00
MDS D160 / D460	Spacer (Ø x H): 20 x 14 mm	6GT2690-0AG00
MDS D423	Spacer (L x W x H): 49.4 x 20 x 9.8 mm	6GT2690-0AE00

Table A- 17 Accessory connecting RF300 reader ↔ PC

Connecting cable	Accessories	Article number
RF240R / RF260R / RF290R (RS232) and PC	Connecting cable RS-232 with M12 male connector (4-pin), 5 m	6GT2891-4KH50
	Connecting cable RS-232 with open ends, 5 m	6GT2891-4KH50-0AX0

Table A- 18 Accessories - connecting cable communications module ↔ reader

Connecting cables	Description Length	Article number
ASM 456 / RF160C / RF170C / RF180C and reader RF3xxR (RS422)	2 m	6GT2891-4FH20
	5 m	6GT2891-4FH50
	10 m	6GT2891-4FN10
	20 m	6GT2891-4FN20
	50 m	6GT2891-4FN50
ASM 456 / RF160C / RF170C / RF180C and RF3xxR reader (RS-422) with angled connector	2 m	6GT2891-4JH20
	5 m	6GT2891-4JH50
	10 m	6GT2891-4JN10
ASM 475 and reader RF3xxR (RS422)	2 m	6GT2891-4EH20
	5 m	6GT2891-4EH50
RF120C and reader RF3xxR (RS422)	2 m	6GT2091-4LH20
	5 m	6GT2091-4LH50
	10 m	6GT2091-4LN10

Table A- 19 RFID accessories, general

RFID general	Article number
DVD "Ident Systems Software & Documentation"	6GT2080-2AA20
Wide-range power supply unit for SIMATIC RF systems (100 - 240 VAC / 24 VDC / 3 A) with country-specific power cable/plug, 2 m	EU: 6GT2898-0AC00
	UK: 6GT2898-0AC10
	US: 6GT2898-0AC20
24 V connecting cable, 5 m	6GT2491-1HH50
M12 connector, 4-pin for wide range power supply unit, pack of 3	6GK1907-0DB10-6AA3

A.5 Service & Support

Industry Online Support

In addition to the product documentation, the comprehensive online information platform of Siemens Industry Online Support at the following Internet address:

Link 1: (<https://support.industry.siemens.com/cs/de/en/>)

Apart from news, there you will also find:

- Project information: Manuals, FAQs, downloads, application examples etc.
- Contacts, Technical Forum
- The option submitting a support query:
link 2: (<https://support.industry.siemens.com/My/ww/en/requests>)
- Our service offer:

Right across our products and systems, we provide numerous services that support you in every phase of the life of your machine or system - from planning and implementation to commissioning, through to maintenance and modernization.

You will find contact data on the Internet at the following address:

Link 3: (http://w3.siemens.com/aspa_app)

RFID homepage

For general information about our identification systems, visit RFID homepage (<http://w3.siemens.com/mcms/identification-systems/>).

Online catalog and ordering system

The online catalog and the online ordering system can also be found on the Industry Mall Homepage (<https://mall.industry.siemens.com>).

SITRAIN - Training for Industry

The training offer includes more than 300 courses on basic topics, extended knowledge and special knowledge as well as advanced training for individual sectors - available at more than 130 locations. Courses can also be organized individually and held locally at your location.

You will find detailed information on the training curriculum and how to contact our customer consultants at the following Internet address:

Link: (<http://sitrain.automation.siemens.com/sitrainworld/>)