

# SIEMENS

## SIMATIC sensors

## RFID systems SIMATIC RF620A

### Operating Instructions

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## 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.

<b>⚠ DANGER</b>
indicates that death or severe personal injury <b>will</b> result if proper precautions are not taken.
<b>⚠ WARNING</b>
indicates that death or severe personal injury <b>may</b> result if proper precautions are not taken.
<b>⚠ CAUTION</b>
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.
<b>CAUTION</b>
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.
<b>NOTICE</b>
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

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 for the specific task, 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:

<b>⚠ WARNING</b>
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 adhered to. The information in the relevant documentation must be observed.

### Trademarks

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### 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.

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## Description

SIMATIC RF620A	Features	
	Field of application	<p>The SIMATIC RF620A is an antenna of compact, industry-standard design.</p> <p>It is suitable for UHF transponders with normal (far field) antenna characteristics, e.g. SIMATIC RF630L, SIMATIC RF620T.</p>
	Antenna field	<p>Designed for transponders that are uniformly aligned whilst directed past the antenna.</p> <p>See Chapter Alignment of transponders to the antenna (Page 15)</p>
	Writing/reading range	<p>Approx. 0.5 m depending on the transponder (see Chapter Read/write ranges (Page 29) )</p>
	Connecting cable	<p>30 cm movable connecting cable and RTNC coupling (an antenna cable, e.g. 6GT2815-0BH30 is required for connection to the reader)</p>
	Readers that can be connected	<ul style="list-style-type: none"> <li>• RF660R (at least 2 antennas)</li> <li>• RF630R (1 or 2 antennas)</li> </ul>
	Polarization	<p>Linear</p>
	Degree of protection	<p>IP67</p>

### Frequency bands

The antenna is available for two different frequency bands that have been specified for the regions of Europe, and China, USA respectively.

- The antenna for Europe operates in the frequency band of 865 to 868 MHz.
- The antenna for China and the USA operates in the frequency band of 902 to 928 MHz.

### Function

The SIMATIC RF620A is used for transmitting and receiving RFID signals in the UHF frequency band. The antennas are connected to the SIMATIC RF600 readers via antenna cables that are available in different lengths.



## Ordering data

Table 2- 1 Ordering data RF620A

Product	Order No.
SIMATIC RF620A (ETSI)	6GT2812-1EA00
SIMATIC RF620A (FCC)	6GT2812-1EA01

## Accessories

Table 2- 2 Ordering data (accessories)

Product	Order No.	
Connecting cable between reader and antenna	3 m (cable loss 1.0 dB)	6GT2815-0BH30
	10 m (cable loss 2.0 dB)	6GT2815-1BN10
	10 m (cable loss 4.0 dB)	6GT2815-0BN10
	20 m (cable loss 4.0 dB)	6GT2815-0BN20





## Installation and assembly

### 3.1 RF620A mounting types

Two holes for M5 screws are provided for mounting the antenna. This is therefore suitable for:

- Mounting on metallic and non-metallic backgrounds

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**Note**

To achieve optimum wave propagation, the antenna should not be surrounded by conducting objects. The area between antenna and transponder should also allow wave propagation without interference.

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## Connecting an antenna to the reader

### 4.1 Overview

The SIMATIC RF620A antenna must be connected to the reader using an antenna cable.

#### Requirement

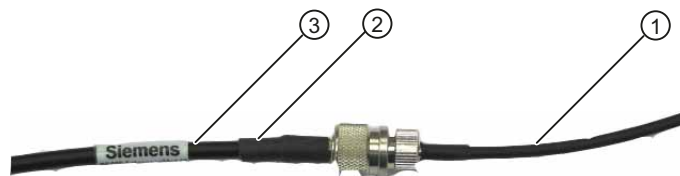
##### Note

##### Use of Siemens antenna cable

To ensure optimum functioning of the antenna, it is recommended that a Siemens antenna cable is used in accordance with the list of accessories.

#### Strain relief

The antenna cable is provided with strain relief as shown in the following diagram:



- ① RF620A connecting cable
- ② RF600 antenna cable
- ③ Strain relief (should take place at this position)

Figure 4-1 Strain relief

#### Bending radii of the cables

Cable designation	Order No.	Length [m]	Cable loss [dB]	Bending radius [mm]
RF620A connecting cable				15
Antenna cable	6GT2815-0BH30	3	1	51
Antenna cable	6GT2815-1BN10	10	2	77
Antenna cable	6GT2815-0BN10	10	4	51
Antenna cable	6GT2815-0BN20	20	4	77

## **4.2 Connecting RF620A to RF630R**

Preassembled standard cables (Page 7) in lengths of 3 m, 10 m and 20 m are available for the connection.

The read range is limited by the cable loss. The maximum range can be achieved with the 6GT2815-0BH30 cable (length 3 m) since this has the lowest cable loss.

### **Connection of one antenna**

When one antenna is used, we recommend that the remaining antenna connection on the RF630R reader be sealed using the supplied protective cap.

### **Connection of two antennas**

When using two antennas on the RF630R, there are no limitations to the positioning.

## 4.3 Connecting RF620A to RF660R

Preassembled standard cables (Page 7) in lengths of 3 m, 10 m and 20 m are available for the connection.

The read range is limited by the cable loss. The maximum range can be achieved with the 6GT2815-0BH30 cable (length 3 m) since this has the lowest cable loss.

At least two antennas must be connected in order to guarantee correct functioning.

### Connection of two antennas

When two antennas are used, we recommend that the antennas be connected to the reader as follows:

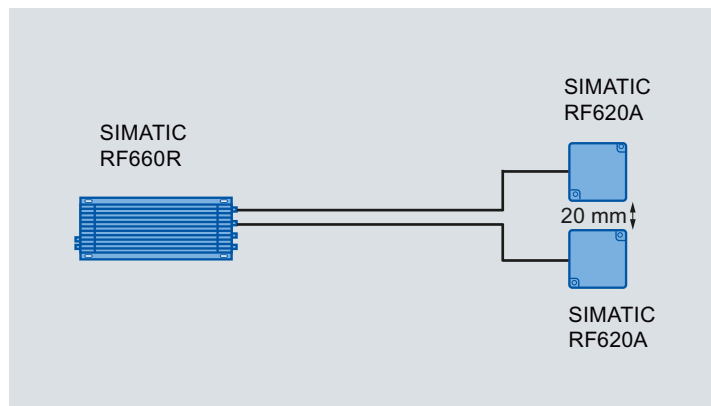


Figure 4-2 Configuration with RF660R

The RF620A antennas must always be arranged in pairs with the RF660R since one antenna is needed for transmitting signals to the transponder whereas the other antenna receives the signals from the transponder.

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### Note

**Operation of the RF660R with more than two RF620A antennas does not offer optimum performance!**

More than two antennas should not be connected due to the functional design of the reader. The optimum read rates cannot be achieved if you connect more than two RF620A antennas.

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## Alignment of transponders to the antenna

### Polarization axis

Since the RF620A antenna has linear polarization, it is necessary to consider the alignment of the transponders with regard to the polarization axis of the antenna.

The polarization axes of antenna and transponder must always be parallel. The symbol on the antenna indicates the polarization axis.



Polarization axis

Figure 5-1 Polarization axis

## Alignment

The following diagram shows the optimum alignment of the RF600 transponders to the RF620A antenna.

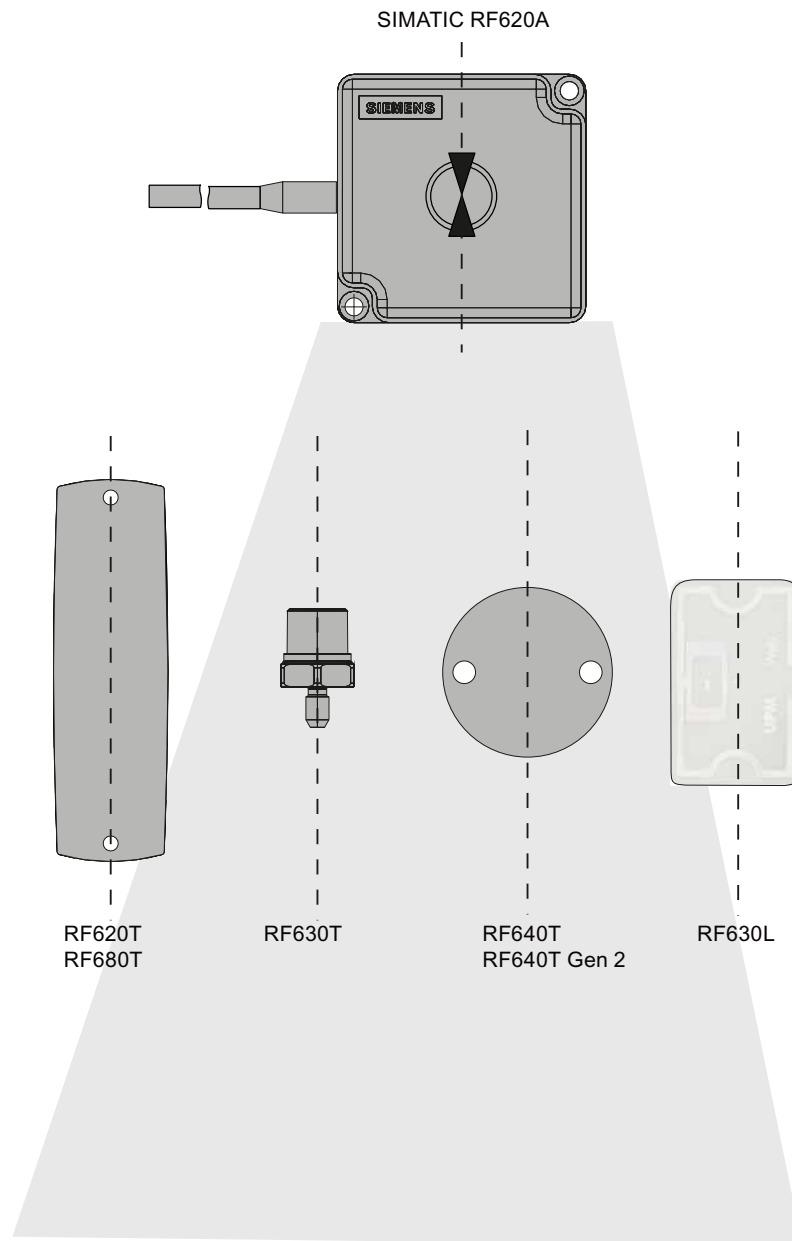


Figure 5-2 Antenna/transponder alignment



### Angle deviation diagram for alignment

The following diagram shows the dependence of the following factors.

- Alignment angle of transponder to antenna
- Maximum range of antenna

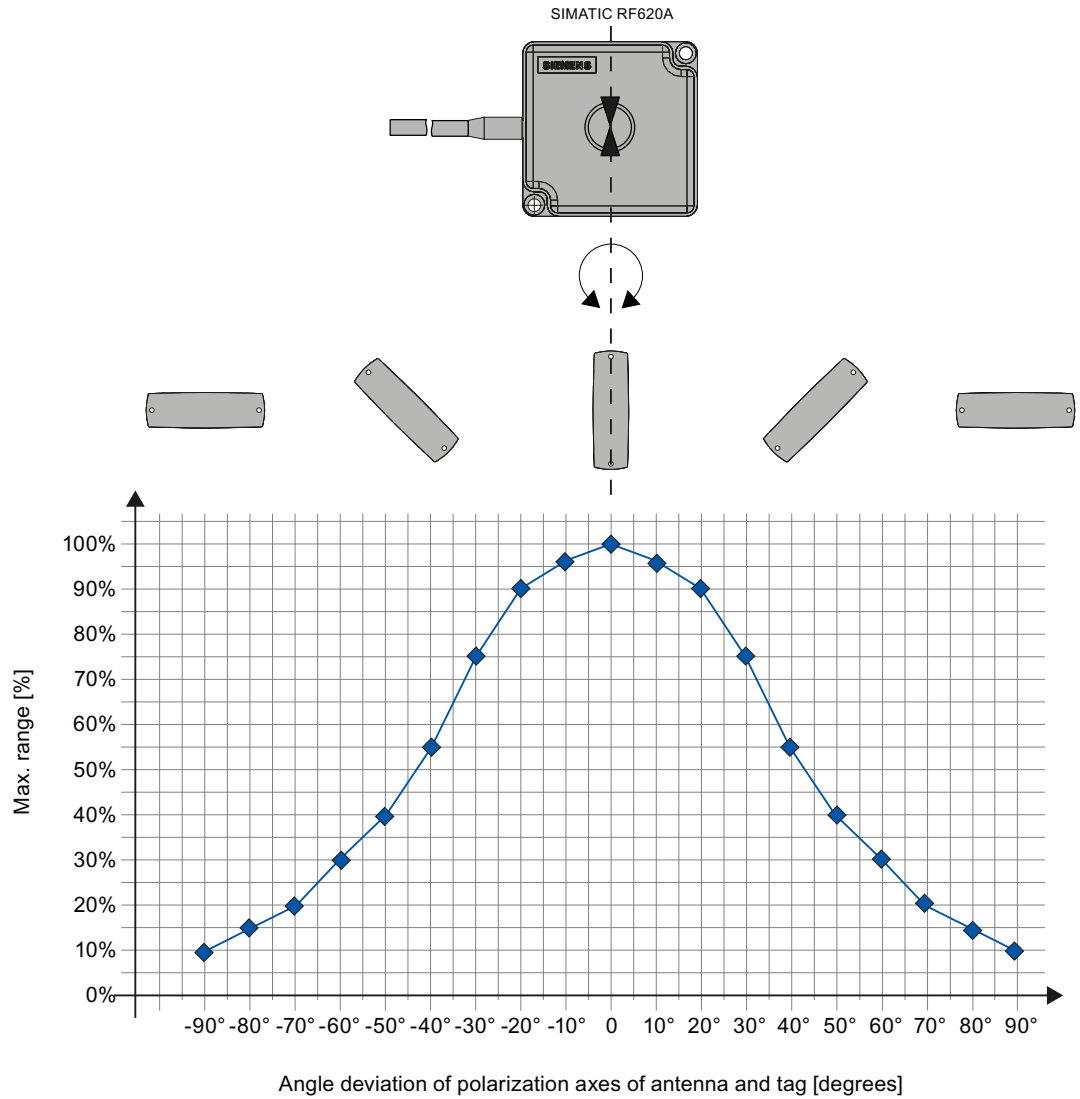


Figure 5-3 Angle deviation diagram for alignment



## Parameterization of RF620A for RF660R

### ETSI antenna

The actual antenna gain for parameterization cannot be directly set.

The maximum range with the SIMATIC RF620A antenna can be achieved with the default values of 7 dBi antenna gain and 4 dB cable loss. With these settings the RF600 system complies with the applicable directives and standards.

Antenna cable	Order No.	Actual cable loss	Set cable loss
3 m	6GT2815-0BH30	1 dB	4 dB
10 m	6GT2815-1BN10	2 dB	4 dB
10 m	6GT2815-0BN10	4 dB	4 dB
20 m	6GT2815-0BN20	4 dB	4 dB

#### NOTICE

##### The actual cable loss and the set cable loss differ

The maximum range can only be achieved with a 3 m cable with 1 dB loss and setting 4 dB.

### FCC antenna and parameterization

Make sure that the values for the actual cable loss are set correctly.

The maximum range with the SIMATIC RF620A antenna can only be achieved with the following settings. With these settings the RF600 system complies with the applicable directives and standards.

Antenna cable	Order No.	Actual cable loss	Set cable loss
3 m	6GT2815-0BH30	1 dB	1 dB
10 m	6GT2815-1BN10	2 dB	2 dB
10 m	6GT2815-0BN10	4 dB	4 dB
20 m	6GT2815-0BN20	4 dB	4 dB



## Antenna patterns

### 7.1 Antenna pattern ETSI

#### Directional radiation pattern Europe (ETSI)

The directional radiation pattern is shown for nominal alignment and a center frequency of 866.3 MHz. The nominal antenna alignment is given when the antenna elevation is provided as shown in the following figure.

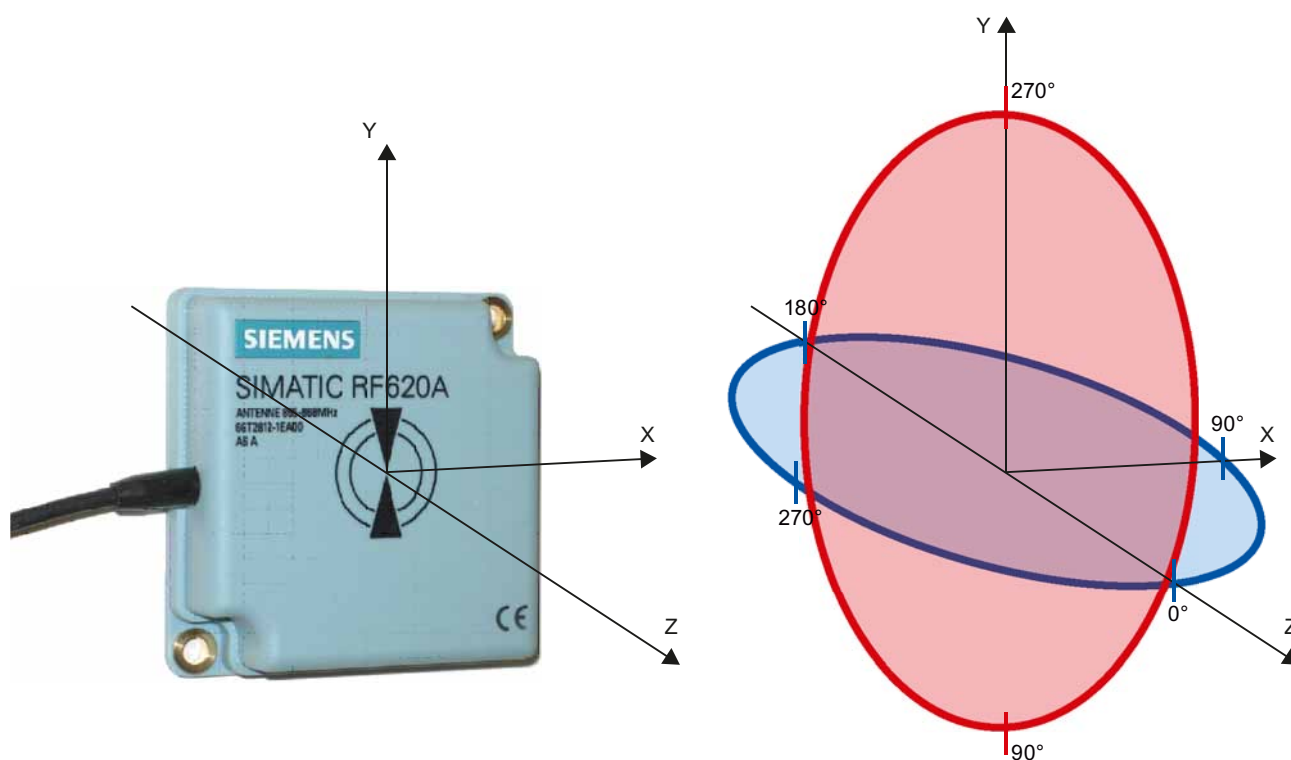


Figure 7-1 Reference system

The half-power beamwidth of the antenna is defined by the angle between the two -3 dB points. Which range (in %) corresponds to the dB values in the patterns can be obtained from this table (Page 27).

Note that the measurements presented graphically below were carried out in a low-reflection environment. Deviations can therefore occur in a normally reflecting environment.

Directional radiation pattern ETSI on metallic mounting surface (15 cm x 15 cm)

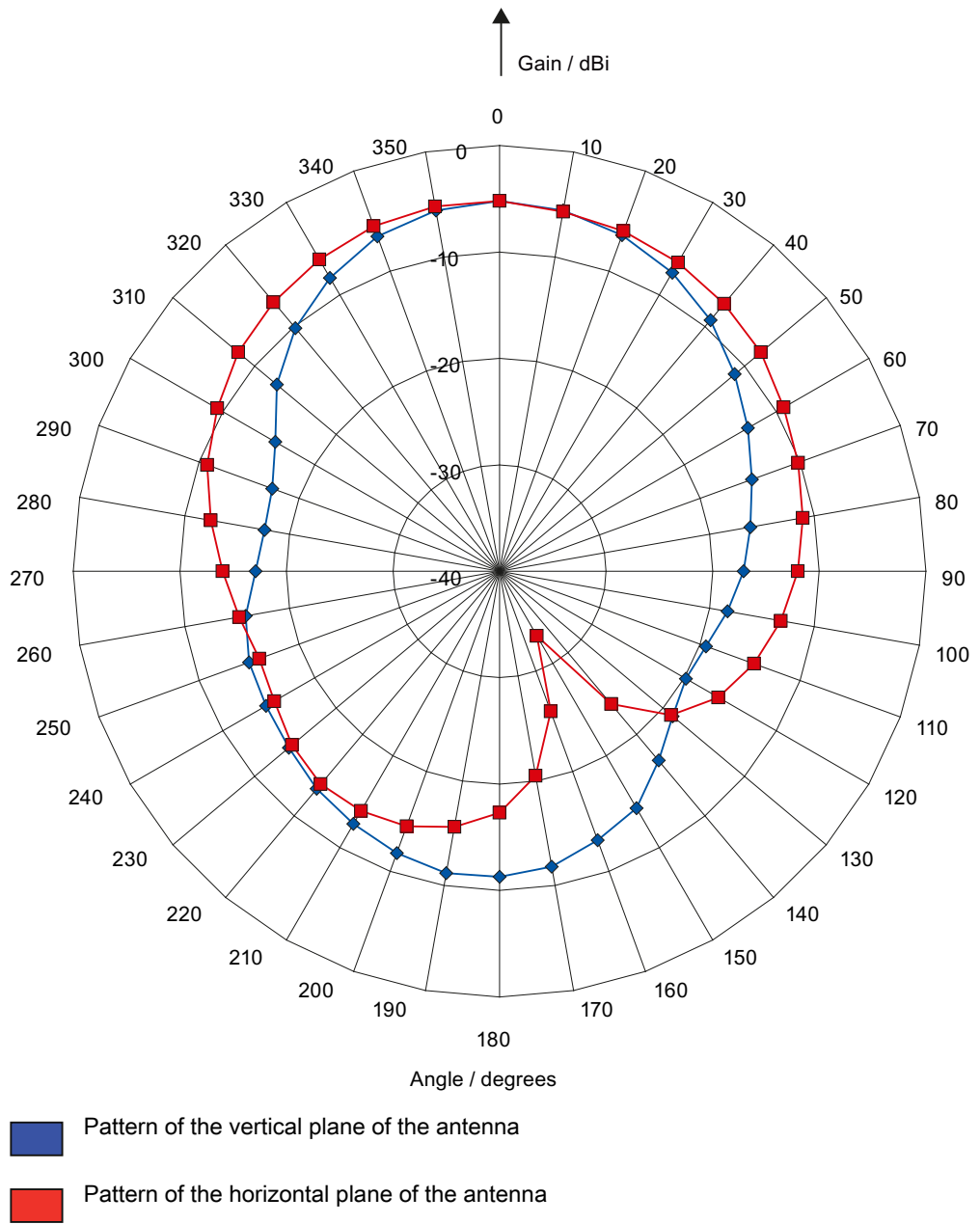


Figure 7-2 Directional radiation pattern RF620A ETSI on metallic mounting surface

Directional radiation pattern ETSI on non-metallic mounting surface

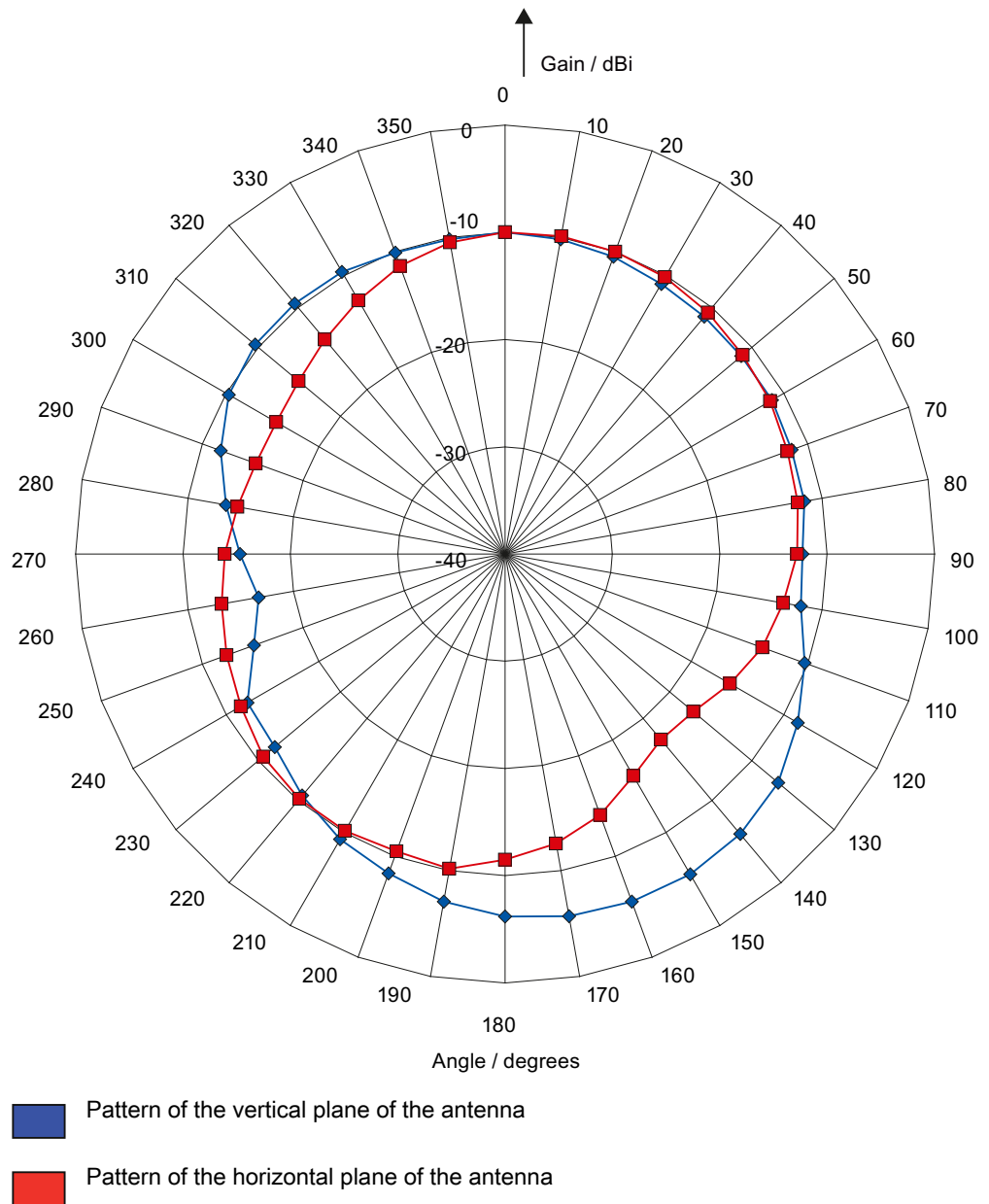


Figure 7-3 Directional radiation pattern RF620A ETSI on non-metallic mounting surface

## 7.2 Antenna pattern FCC

### Directional radiation pattern USA (FCC)

The directional radiation pattern is shown for nominal alignment and a center frequency of 915 MHz.

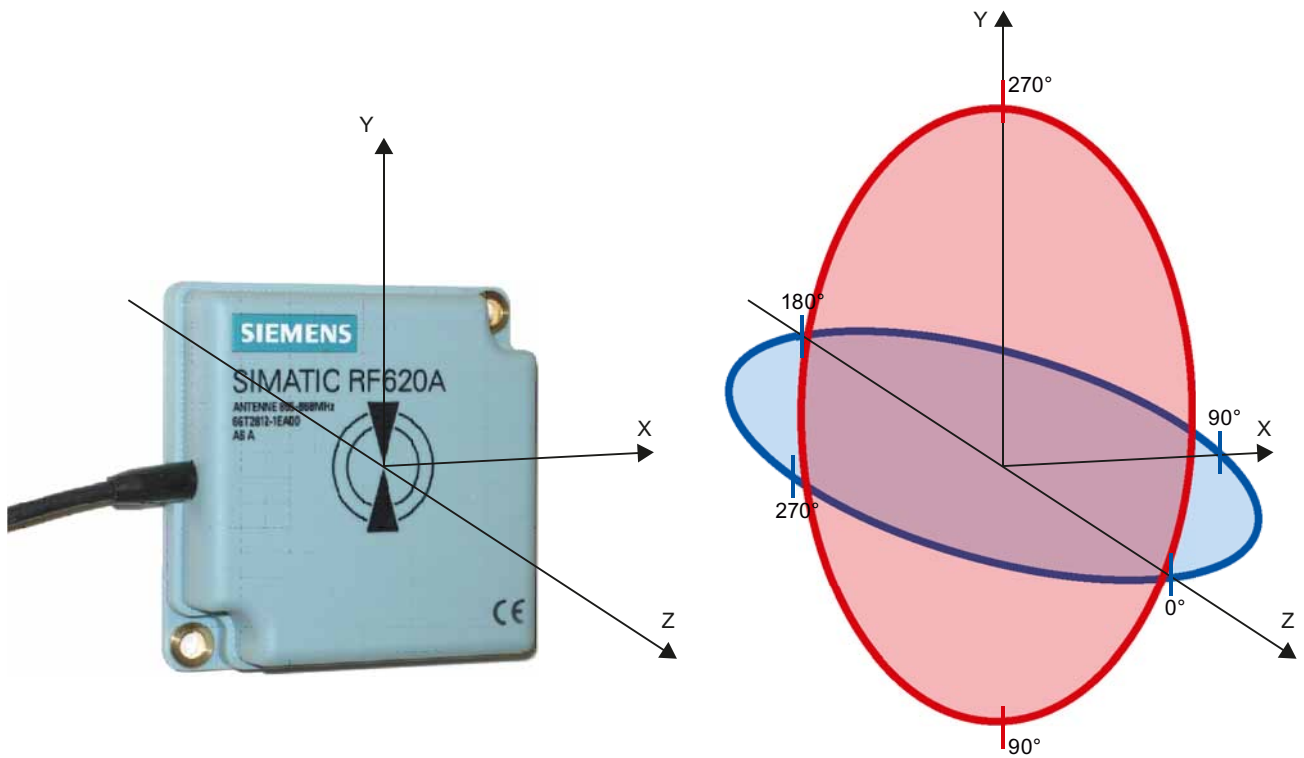


Figure 7-4 Reference system

The half-power beamwidth of the antenna is defined by the angle between the two -3 dB points (corresponding to half the power referred to the maximum power). Which range (in %) corresponds to the dB values in the patterns can be obtained from this table (Page 27).

Note that the measurements presented graphically below were carried out in a low-reflection environment. Low deviations can therefore occur in a normally reflecting environment.



Directional radiation pattern of the RF620A (FCC) on metallic mounting surface (15 cm x 15 cm)

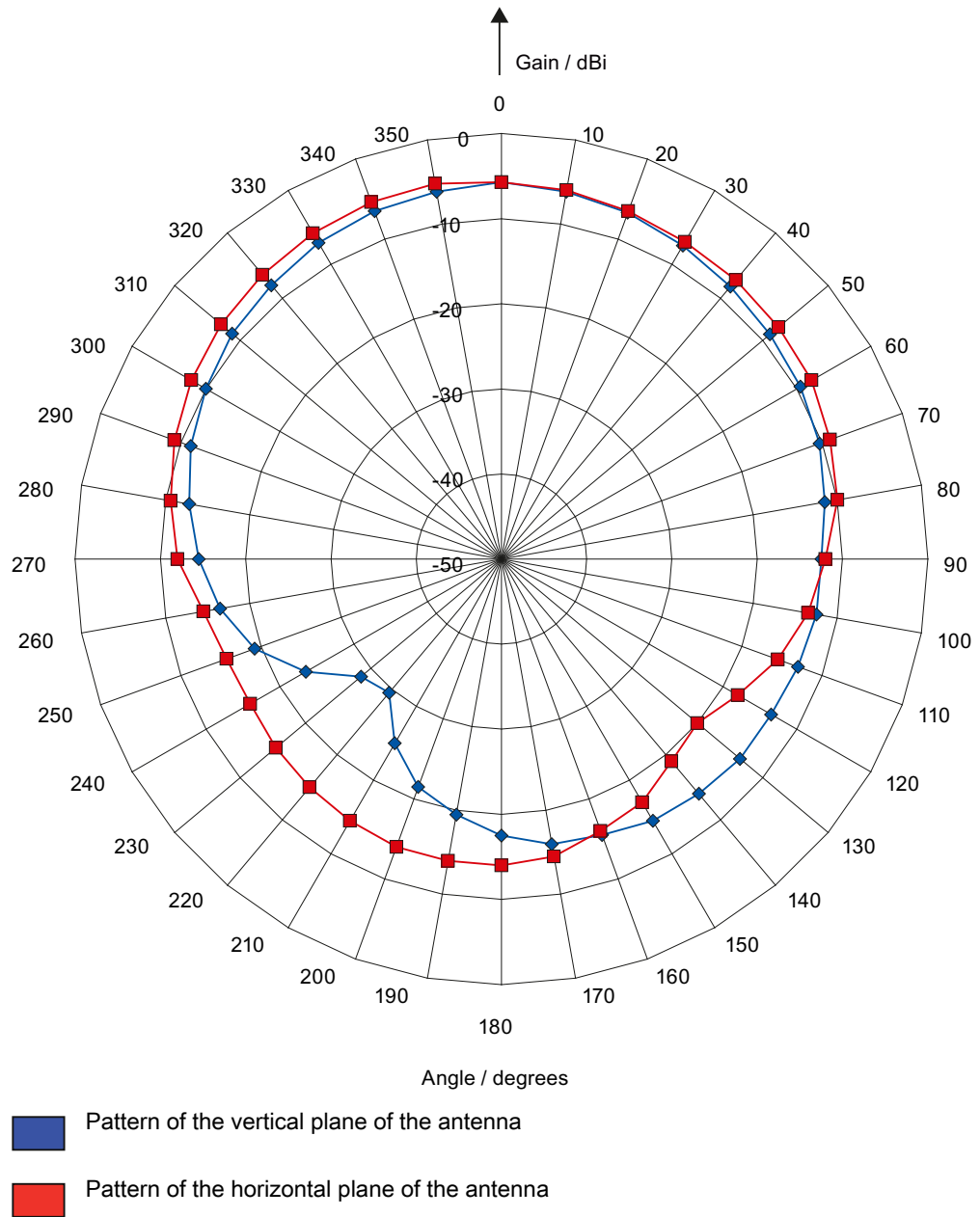


Figure 7-5 Directional radiation pattern of the RF620A (FCC) on metallic mounting surface

Directional radiation pattern of the RF620A (FCC) on non-metallic mounting surface

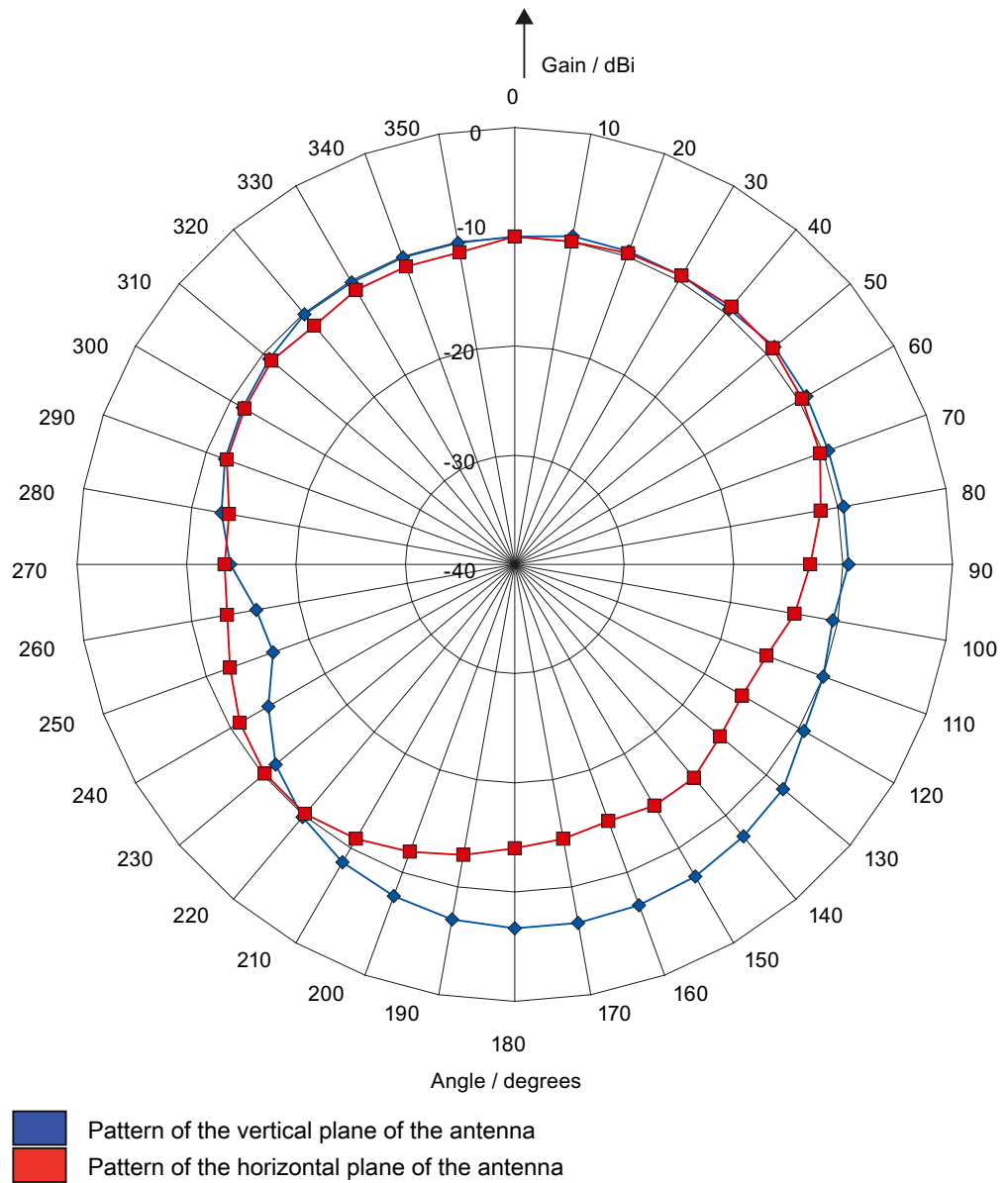


Figure 7-6 Directional radiation pattern of the RF620A (FCC) on non-metallic mounting surface

## 7.3 Interpretation of directional radiation patterns

The following overview table will help you with the interpretation of directional radiation patterns.

The table shows which dBi values correspond to which read/write ranges (in %): You can read the radiated power depending on the reference angle from the directional radiation patterns, and thus obtain information on the read/write range with this reference angle with regard to a transponder.

The dBr values correspond to the difference between the maximum dBi value and a second dBi value.

Deviation from maximum antenna gain [dBr]	Read/write range [%]
0	100
-3	70
-6	50
-9	35
-12	25
-15	18
-18	13

### Example

As one can see from the Antenna pattern ETSI (Page 22), the maximum antenna gain is -5 dBi. In the vertical plane, the antenna gain has dropped to approx. -11 dBi at +40° and 320°. Therefore the dBr value is -6. The antenna range is only 50% of the maximum range at ± 40° from the Z axis within the vertical plane (see values shown in blue in the directional radiation pattern: characteristic of the vertical plane of the antenna (Page 22) and the associated representation of the reference system (Page 21)).



## Read/write ranges

The following tables show the typical read/write ranges of RF600 readers which are connected to the RF620A antenna via the 3 m antenna cable (1 dB loss) and various types of tags.

**Tolerances of  $\pm 20\%$  are admissible due to production and temperature conditions.**

When using other antenna cables, the ranges listed here are reduced as a result of the higher antenna cable losses in the following manner:

Cable designation	Order No.	Length [m]	Cable loss [dB]	Read/write range [%]
Antenna cable	6GT2815-0BH30	3	1	100
Antenna cable	6GT2815-1BN10	10	2	90
Antenna cable	6GT2815-0BN10	10	4	70
Antenna cable	6GT2815-0BN20	20	4	70

The measuring tolerances in the following tables are  $\pm 3$  cm.

### Read distances RF630R

Table 8- 1 Read distances RF630R

Transponder	Connection to RF630R			
	RF620A ETSI on metal [cm]	RF620A ETSI on non-metal [cm]	RF620A FCC on metal [cm]	RF620A FCC on non-metal [cm]
RF630L (6GT2810-2AB00, -2AB01, -2AB02)	90 <sup>1)</sup>	70 <sup>1)</sup>	60 <sup>1)</sup>	50 <sup>1)</sup>
RF630L (6GT2810-2AB03)	55	50	55	45
RF680L	55	50	55	45
RF610T	55	50	55	45
RF620T	55	45	70	60
RF630T	25 <sup>2)</sup>	20 <sup>2)</sup>	35 <sup>2)</sup>	25 <sup>2)</sup>
RF640T Gen 2	55 <sup>2)</sup>	45 <sup>2)</sup>	40 <sup>2)</sup>	35 <sup>2)</sup>
RF680T	60	50	90	70

<sup>1)</sup> Transponder mounted on cardboard

<sup>2)</sup> Transponder mounted on metal

## Write distances RF630R

Table 8- 2 Write distances RF630R

Transponder	Connection to RF630R			
	RF620A ETSI on metal [cm]	RF620A ETSI on non-metal [cm]	RF620A FCC on metal [cm]	RF620A FCC on non-metal [cm]
RF630L (6GT2810-2AB00, -2AB01, -2AB02)	45 <sup>1)</sup>	40 <sup>1)</sup>	35 <sup>1)</sup>	30 <sup>1)</sup>
RF630L (6GT2810-2AB03)	35	30	20	25
RF680L	35	30	20	25
RF610T	35	30	20	25
RF620T	30	30	40	35
RF630T	15 <sup>2)</sup>	5 <sup>2)</sup>	15 <sup>2)</sup>	10 <sup>2)</sup>
RF640T Gen 2	35 <sup>2)</sup>	20 <sup>2)</sup>	20 <sup>2)</sup>	15 <sup>2)</sup>
RF680T	40	30	40	35

<sup>1)</sup> Transponder mounted on cardboard

<sup>2)</sup> Transponder mounted on metal

## Read distances RF660R

Table 8- 3 Read distances RF660R

Transponder	Connection to RF660R			
	RF620A ETSI on metal [cm]	RF620A ETSI on non-metal [cm]	RF620A FCC on metal [cm]	RF620A on non-metal [cm]
RF630L (6GT2810-2AB00, -2AB01, -2AB02)	135 <sup>1)</sup>	120 <sup>1)</sup>	100 <sup>1)</sup>	90 <sup>1)</sup>
RF630L (6GT2810-2AB03)	85	70	75	65
RF680L	85	70	75	65
RF610T	85	70	75	65
RF620T	85	85	95	95
RF630T	40 <sup>2)</sup>	35 <sup>2)</sup>	50 <sup>2)</sup>	35 <sup>2)</sup>
RF640T	40 <sup>2)</sup>	35 <sup>2)</sup>	40 <sup>2)</sup>	30 <sup>2)</sup>
RF640T Gen 2	90 <sup>2)</sup>	70 <sup>2)</sup>	70 <sup>2)</sup>	50 <sup>2)</sup>
RF680T	90	90	135	95

<sup>1)</sup> Transponder mounted on cardboard

<sup>2)</sup> Transponder mounted on metal

## Write distances RF660R

Table 8- 4 Write distances RF660R

Transponder	Connection to RF660R			
	RF620A ETSI on metal	RF620A ETSI on non-metal	RF620A FCC on metal	RF620A on non-metal
RF630L (6GT2810-2AB00, -2AB01, -2AB02)	110 <sup>1)</sup>	90 <sup>1)</sup>	55 <sup>1)</sup>	50 <sup>1)</sup>
RF630L (6GT2810-2AB03)	75	70	60	55
RF680L	75	70	60	55
RF610T	75	70	60	55
RF620T	60	55	60	45
RF630T	30 <sup>2)</sup>	25 <sup>2)</sup>	35 <sup>2)</sup>	25 <sup>2)</sup>
RF640T	35 <sup>2)</sup>	30 <sup>2)</sup>	25 <sup>2)</sup>	25 <sup>2)</sup>
RF640T Gen 2	70 <sup>2)</sup>	60 <sup>2)</sup>	50 <sup>2)</sup>	40 <sup>2)</sup>
RF680T	80	75	100	80

<sup>1)</sup> Transponder mounted on cardboard

<sup>2)</sup> Transponder mounted on metal





## Technical data

Table 9- 1 General technical data RF620A

Feature	SIMATIC RF620A ETSI	SIMATIC RF620A FCC
Dimensions in mm (L x W x H)	75 x 75 x 20	
Color	Pastel turquoise	
Material	PA 12 (polyamide 12) Silicone-free	
Frequency range	865 to 868 MHz	902 to 928 MHz
Plug connection	30 cm coaxial cable with RTNC coupling (for connection of antenna cable)	
Max. radiated power	< 500 mW ERP	No limitation (since antenna gain << 6 dBi)
Max. power	2 W	1 W
Impedance	50 Ohm	
Antenna gain	-10 dBi ... -5 dBi Depends on background, see Chapter Directional radiation pattern ETSI (Page 22)	Depends on background, see Chapter Directional radiation pattern FCC (Page 25)
VSWR (standing wave ratio)	Max. 2:1	
Polarization	Linear	
Radiating/receiving angle	Depends on background, see Chapter Directional radiation pattern ETSI (Page 22)	Depends on background, see Chapter Directional radiation pattern FCC (Page 25)
Shock resistant to EN 60068-2-27	50 g	
Vibration resistant to EN 60068-2-6	20 g	
Attachment of the antenna	2 x M5 screws	
Tightening torque (at room temperature)	≤ 2 Nm	
Ambient temperature		
• Operation	• -20 °C to +70 °C	
• Transport and storage	• -40 °C to +85 °C	
MTBF	25 · 10 <sup>7</sup> h	
Degree of protection according to EN 60529	IP67	
Weight, approx.	90 g	



## Dimension drawing

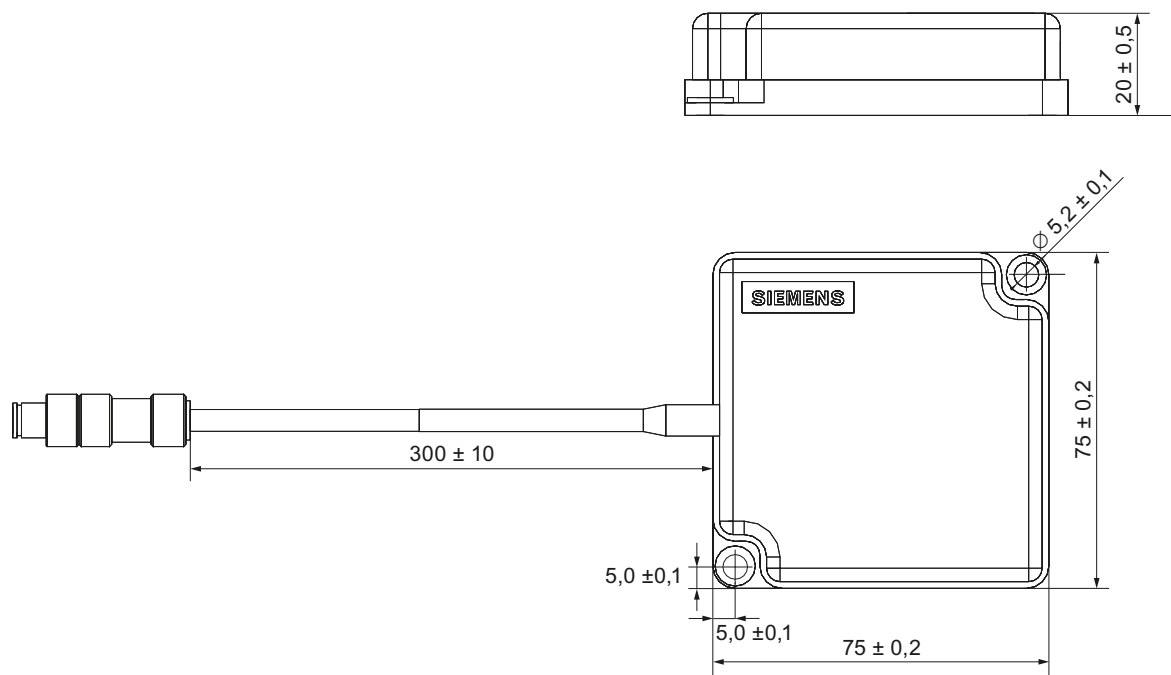


Figure 10-1 Dimension drawing RF620A


All dimensions in mm



## Approvals & certificates



### 11.1 CE mark

Table 11- 1 6GT2812-1EA00

Certificate	Designation
	Conformity in accordance with R&TTE directive in association with the readers and accessories used

### 11.2 FCC approvals

Table 11- 2 6GT2812-1EA01

Standard	
 Federal Communications Commission	FCC CFR 47, Part 15 sections 15.247 Radio Frequency Interference Statement This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. The FCC approval is granted in association with the FCC approval of the following RF600 readers: <ul style="list-style-type: none"> <li>• FCC ID: NXW-RF630R</li> <li>• FCC ID: NXW-RF660</li> </ul>
Industry Canada Radio Standards Specifications	RSS-210 Issue 7, June 2007, Sections 2.2, A8 IC: 267X-RF630 The approval for Industry Canada is granted in association with the Industry Canada approval of the following RF600 readers: <ul style="list-style-type: none"> <li>• IC: 267X-RF630</li> <li>• IC: 267X-RF660</li> </ul>
	This product is UL-certified for the USA and Canada. It meets the following safety standard(s): UL 60950-1 - Information Technology Equipment Safety - Part 1: General Requirements CSA C22.2 No. 60950 -1 - Safety of Information Technology Equipment UL Report E 205089

