SIEMENS

SIMATIC Sensors

RFID systems
Guidelines for selecting RFID UHF antennas

Configuration Manual

04/2008

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Safety Guidelines

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
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE
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 device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:

⚠WARNING
This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

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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1 Introduction

1.1 About this documentation

Target group

This documentation has been prepared for configuration engineers who thoroughly understand and wish to carry out the selection and installation of an external antenna or an external cable for the SIMATIC RF600 system. The various antenna and cable parameters are explained, and information is provided on the criteria you must particularly observe. Otherwise this documentation is equally suitable for theoretical and practice-oriented users.

Purpose of this document

The document enables you to select the appropriate external antenna or cable with consideration of all important criteria and to carry out the corresponding settings in the configuration software of the SIMATIC RF600 system. Correct and safe integration into the SIMATIC RF600 system is only possible following adaptation of all required parameters.

History

Edition	Comment
04/2008	First edition

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2.1 Safety instructions

Always observe the following general safety instructions before selecting a UHF antenna from a different vendor:

The manufacturer accepts no responsibility for functional suitability or legal implications for the installation of third-party antennas.

NOTICE
Loss of radio equipment approvals
Alterations to the SIMATIC RF600 devices themselves are not permitted. Failure to observe this requirement shall constitute a revocation of the CE, FCC, UL, CSA radio equipment approvals and the manufacturer's warranty.

Modifications to the SIMATIC RF600 system

CAUTION
Damage to the system
If you install unsuitable or unapproved extensions, you may damage the system or violate the safety requirements and regulations for radio frequency interference suppression. Contact your technical support team or where you purchased your device to find out which system extensions may safely be installed.

CAUTION
Loss of warranty
If you cause defects on the SIMATIC RF600 system by improperly installing or exchanging system expansions, the warranty becomes void.

NOTICE
Loss of validity for type tests and certificates
SIMATIC RFID products comply with the salient safety specifications to VDE/DIN, IEC, EN, UL and CSA. When using RFID components which do not belong to the RF600 range of products, the validity of all type tests as well as all certificates relevant to the RF600 are canceled: CE, FCC, UL, CSA.

Note

User responsibility for modified product

As a user of the modified product, you accept responsibility for use of the complete RFID product comprising both SIMATIC RF600 components and third-party RFID components. This particularly applies to modification or replacement of:

- Antennas
- Antenna cables
- RF660R readers
- Power supply units with connection cables

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3.1 Overview of the total SIMATIC RF600 system and its influencing factors

The following graphic shows the design of the total SIMATIC RF600 system and the factors which have an influence on the total system.

You must be aware of these influencing factors and also consider them if you wish to integrate third-party components such as antennas or cables into the system. These influencing factors are described in more detail in Sections Antennas (Page 13) and Antenna cables (Page 25).

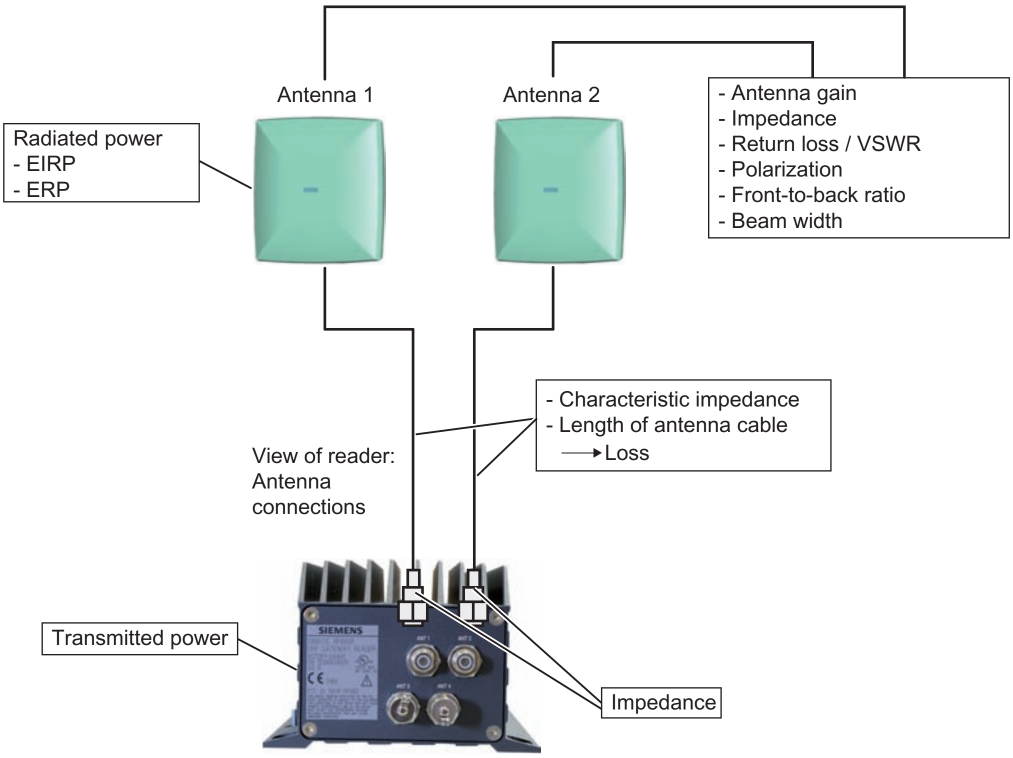


Figure 3-1 Overview of total system and influencing factors

When operating the RF600 system, additional influencing factors must also be observed such as minimum spacing between antennas in the room. You will find this information in the System Manual "SIMATIC RF600".

3.2 Environmental conditions

CAUTION
Damage to the device In line with the application, you must take into consideration the mechanical loads (shock and vibration) as well as environmental demands such as temperature, moisture, UV radiation. The device could be damaged if these factors are not considered.

3.3 General procedure

Depending on whether you wish to use a third-party antenna or antenna cable - or both - in combination with the SIMATIC RF660R reader, these instructions will help you to select the components and to set the important parameters in the SIMATIC RF660R configuration software.

There are two different application cases:

- Selection of third-party components:
  you wish to select appropriate third-party components for the SIMATIC RF600 system and to subsequently configure the reader for these components.
- Configuration of existing third-party components:
  you already have third-party components (antenna, antenna cable or both) and wish to appropriately configure the reader for these components.

Procedure for selecting third-party components

Always proceed in the following order during your considerations and the practical implementation:

1. Consider which third-party components you wish to use in the SIMATIC RF600 system.
2. Depending on the third-party component required, refer either to Section Antennas (Page 13) or Section Antenna cables (Page 25) for the important criteria for selection of your components. The selection criteria/parameters are sorted in descending relevance.
3. Use the specified equations to calculate your missing parameters, and check whether the required values are reached (e.g. antenna gain) and that important secondary values (e.g. cable loss) are not exceeded or undershot.
4. Configure the reader with the parameters of your third-party components. You can usually carry this out in the SIMATIC RF660R configuration software. The exact procedure is described in Section Setting of parameters in the SIMATIC RF660R configuration software (Page 29).
5. For advanced users or in exceptional cases, e.g. input of an antenna gain <4.0 dBi), it is recommendable to carry out the configuration directly using XML commands. For further information, refer to Section Setting of antenna parameters using XML commands (Page 31) .

Procedure for configuration of existing third-party components

If you already have third-party components which you wish to integrate into the SIMATIC RF600 system, proceed as follows:

1. Depending on the third-party component, refer either to Section "Antennas" or Section "Antenna cables" for the important criteria of your components. The parameters are sorted in descending relevance.
2. Compare the limits with the data of your antenna or cable vendor.
3. Subsequently proceed exactly as described above in "Procedure for selecting third-party components" from Paragraph 3. onwards.

Antennas

4

4.1 Types of antenna and properties

Basically all types of directional antennas can be considered as third-party antennas for integration into the SIMATIC RF600 system. Directional antennas have a preferred direction in which more energy is radiated than in other directions.

4.2 Antenna parameters

4.2.1 Overview

The properties of an antenna are determined by a large number of parameters. You must be aware of these properties in order to make the correct selection for your appropriate UHF antenna. The most important parameters are described below. These important parameters are described in detail in the following sections. The following parameters describe both the send and receive functions of the antenna (reciprocity). The antenna is a passive antenna. A two-way relationship exists.

- Radiated power
- Antenna gain
- Impedance
- Return loss / VSWR
- Power rating
- Polarization
- Front-to-back ratio
- Beam width

4.2.2 Radiated power

In order to comply with national directives with regard to the radiated power (which differ depending on the location or country of use), the RF660R reader together with the antenna cable(s) and antenna(s) must be exactly parameterized or configured.

This means that the product of the transmitted power P_0 of the reader and the antenna gain G must always have the correct ratio with regard to the radiated power "EIRP" depending on the location of use or the permissible frequency range.

Calculation of the radiated power is briefly described below.

Calculation of the radiated power

The radiated power is the total power radiated by the antenna in the room. The isotropic radiator serves as the physical computing model which uniformly radiates the power into the room (spherically).

EIRP

Directional antennas concentrate the radiation, and therefore have a higher power density in the main beam direction compared to an isotropic radiator. To enable antennas of different design or directional radiation pattern to be compared with one another, the equivalent isotropic radiated power (EIRP) has been introduced which represents the effective power which must be applied to an isotropic radiator in order to deliver the same power density in the main beam direction of the antenna.

EIRP is the product of the transmitted power P_0 and the antenna gain G:

$$\mathrm{EIRP} = P_0 * G$$

ERP

Also common is specification of the equivalent radiated power referred to the half-wave dipole "ERP" (effective radiated power):

$$\mathrm{ERP} = P_0 * G_d = P_0 * \frac{G}{1{,}64}$$

Logarithmic and standardized data

Approximate calculations are easier to carry out as additions than as products, therefore the logarithms are taken for the above equations and the power data standardized to 1 mW and specified in decibels (dBm or dBi).

$$\frac{\mathrm{EIRP}}{\mathrm{dBm}} = \frac{P_0}{\mathrm{dBm}} + \frac{G}{\mathrm{dBi}}$$

Calculation of the radiated power with consideration of the cable loss a_k

If the transmitted power is not applied directly but via a cable with loss a_K, this loss should be compensated such that the same radiated power is obtained.

$$\frac{EIRP}{dBm} = \frac{P_0}{dBm} + \frac{G}{dBi} - \frac{a_k}{dB} \text{ if } \quad a_k > 0$$

If the loss is not appropriately compensated, the radiated power is too small.

4.2.3 General preliminary information on the unit "dB"

Requirements

This section provides you with information on the unit "decibel". This knowledge is a requirement for optimum understanding of the following section. You can ignore this section if you already have the appropriate knowledge.

Definition

When specifying decibels, the ratios between powers or voltages are not defined directly but as logarithms. The decibel is therefore not a true unit but rather the information that the specified numerical value is the decimal logarithm of a ratio of two power or energy variables P1 and P2 of the same type.

This ratio is defined by the following equation:

$$a = 10 * \log_{10}\left(\frac{P_1}{P_2}\right) dB$$

Example:

If P1 = 200 W and P2 = 100 mW, how large is the ratio a in dB?

$$a = 10 * \log_{10}\left(\frac{P_1}{P_2}\right) dB =$$

$$= 10 * \log_{10}(2000) dB =$$

$$= 33{,}01 \text{ dB}$$

Use with other units

As with other units, there are also different versions of the unit for decibel depending on the reference variable. With this reference, the logarithmic power ratio becomes an absolute variable. The following table lists the most important combinations in this context with other units:

Versions of decibel	Description
0 dBm	Power level with the reference variable 1 mW.
dBi	Power level with the reference variable on the isotropic spherical radiator (see also Section Antenna gain (Page 16)).

4.2.4 Antenna gain

Definition

The antenna gain specifies the degree to which the antenna outputs or receives its power in the preferred angle segment.

With this theoretical variable, a comparison is always made with an isotropic spherical radiator, a loss-free antenna which does not exist in reality. It describes how much power has to be added to the isotropic spherical radiator so that it outputs the same radiated power in the preferred direction like the antenna to be considered. The unit for the antenna gain is therefore specified in dBi (dB isotropic).

The antenna gain is defined for the receive case as the ratio between the power received in the main beam direction and the received power of the isotropic spherical radiator.

Specifications

You must know the antenna gain in the corresponding frequency band or range. You can obtain the value of the antenna gain from the technical specifications of your antenna vendor.

- With a cable loss of 4 dB, a gain ≥ 6 dBi(L) is required since otherwise the maximum radiated power will not be achieved.
- In the case of antennas used in the FCC area of approval, a gain of at least 6 dBi(L) is required since otherwise the permissible radiated power of 4 W EIRP will not be reached.
- If the gain is > 6 dBi(L)*, the difference is compensated in accordance with the directives by reducing the transmitted power.

* (L) is the reference to the linear polarization.

Dependencies

- Frequency dependency:
  if a frequency dependency exists in the frequency band used, you must apply the highest value in each case for the antenna gain. With the cable loss, on the other hand, you must select the smallest value in each case it frequency dependency exists.

This procedure means that the permissible radiated power will not be exceeded in the extreme case.

- Dependency on plane:
  If the data for the antenna gain are different in the horizontal and vertical plane, you must use the higher value in each case.

4.2.5 Impedance

Definition

Impedance is understood as the frequency-dependent resistance. The impedances of the antenna, reader and antenna cables should always be the same. Differences in the impedance result in mismatching which in turn means that part of the applied signal is reflected again and that the antenna is not fed with the optimum power.

Specifications

- Only antennas can be used whose connection has a characteristic impedance of Z = 50 Ohm.
- The mechanical design of the coaxial antenna connection is of secondary importance; N, TNC and SMA plug connectors are usual.

4.2.6 Return loss / VSWR

Definition

Since the impedance at the antenna connection is frequency-dependent, mismatching automatically occurs with broadband use. This mismatching can be reflected by two parameters:

- The voltage standing wave ratio VSWR
- The return loss

Voltage standing wave ratio VSWR

The power sent by the transmitter cannot flow unhindered to the antenna and be radiated as a result of the mismatching described by the VSWR. Part of the power is reflected at the antenna and returns to the transmitter. The powers in the forward and reverse directions produce a standing wave which has a voltage maximum and a voltage minimum. The ratio between these two values is the VSWR (voltage standing wave ratio).

Return loss

The return loss parameter is based on the reflection factor which describes the voltage ratio between the forward and reverse waves.

Specifications

So that the smallest possible transmitted and received powers are reflected by the antenna under ideal conditions, you should observe the following data for the VSWR and the return loss $|S_{11}|$/ dB in the respective frequency band (865-870 MHz or 902-928 MHz):

- VSWR < 1.24:1 or
- $|S_{11}|$/ dB ≥ 20 dB

4.2.7 Power rating

Definition

The power rating is understood as the maximum power defined by the vendor with which the device may be operated.

Specifications

Third-party antennas must be dimensioned for an effective power applied to the antenna connection of at least 4 Watt.

4.2.8 Polarization

Definition

The polarization parameter describes how the electromagnetic wave is radiated by the antenna. A distinction is made between linear and circular polarization. With linear polarization, a further distinction is made between vertical and horizontal polarization.

Specifications

UHF transponders usually have a receive characteristic similar to that of a dipole antenna which is linearly polarized. Horizontal or vertical polarization is then present depending on the transponder mounting.

Selection of circular polarized antenna

If the orientation of the transponder is unknown, or if an alternating orientation can be expected, the transmit and receive antennas must have circular polarization.

When selecting a circular antenna, the polarization purity must be observed in addition to the polarization direction. A differentiation is made between left-hand and right-hand circular polarization (LHCP and RHCP). The two types cannot be combined in the same system. On the other hand, selection of the polarization direction is insignificant if the antenna system of a transponder is linearly polarized. With actual antennas, elliptical polarization is encountered rather than the ideal circular polarization. A measure of this is the ratio between the large and small main axes of the ellipse, the axial ratio (AR), which is frequently specified as a logarithm.

Axial ratio	AR
Ideal	0 dB
Real	2-3 dB

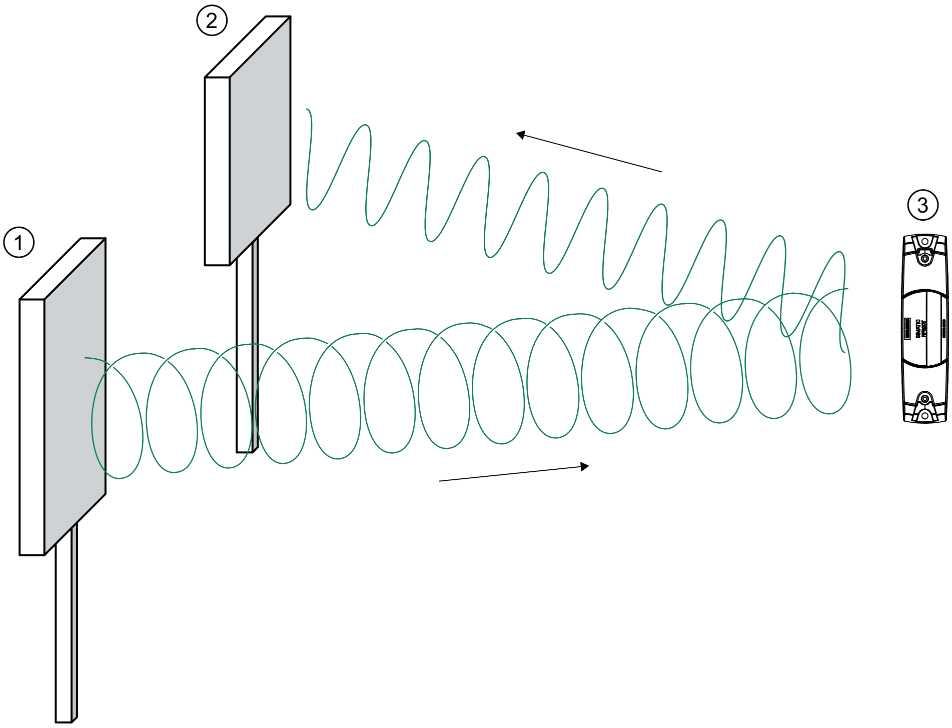


Figure 4-1 Circular polarization of antenna system and transponder

Selection of linear polarized antenna

When using linear polarized antennas, you must always make sure that the transmitter antenna, receiver antenna and transponder have identical polarizations (vertical or horizontal). As a result of the principle used, no special requirements need be observed to suppress the orthogonal components (cross-polarization).

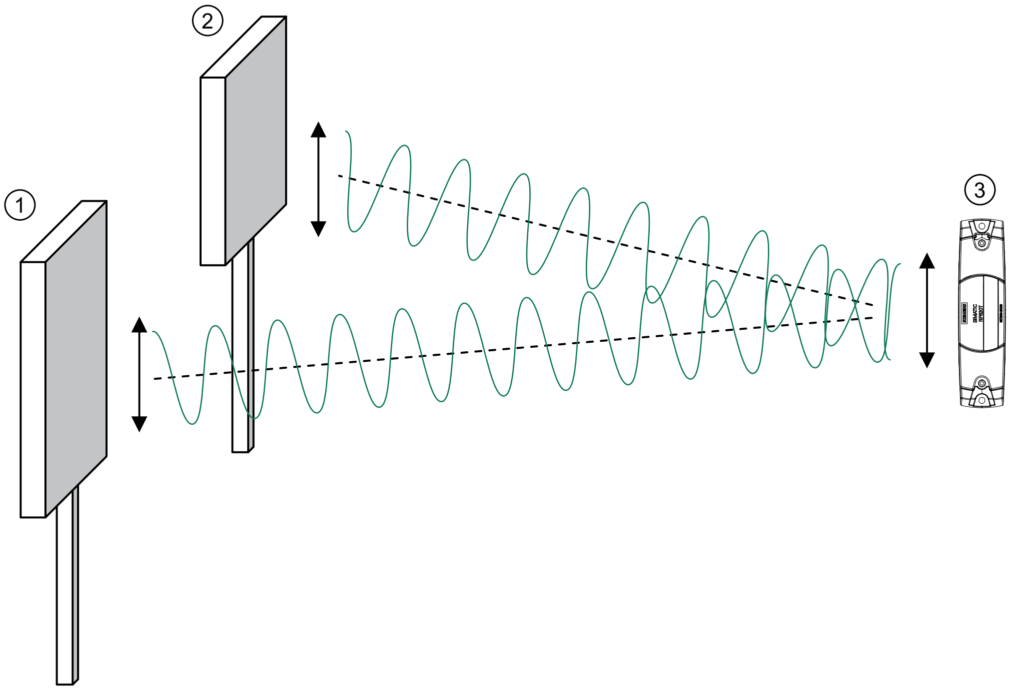


Figure 4-2 Homogenous vertical polarization of antenna system and transponder

① Transmitter antenna, vertical polarization
② Receiver antenna, vertical polarization
③ Transponder dipole

4.2.9 Front-to-back ratio

Definition

As a result of their design, directional antennas not only transmit electromagnetic waves in the main beam direction but also in other directions, particularly in the reverse direction. The largest possible suppression of these spurious lobes is expected in order to reduce faults and to keep the influence on other radio fields low. This attenuation of spurious lobes in the opposite direction to the main beam is called the front-to-back ratio.

Specifications

Requirement: The front-to-back ratio must be ≥ 10 dB. This requirement also applies to spurious lobes illustrated by the following graphics in Section Beam width (Page 21).

4.2.10 Beam width

Definition

A further description of the directional characteristic is the beam width. The beam width is the beam angle at which half the power (-3 dB) is radiated referred to the maximum power. The antenna gain is directly related to the beam width. The higher the antenna gain, the smaller the beam angle.

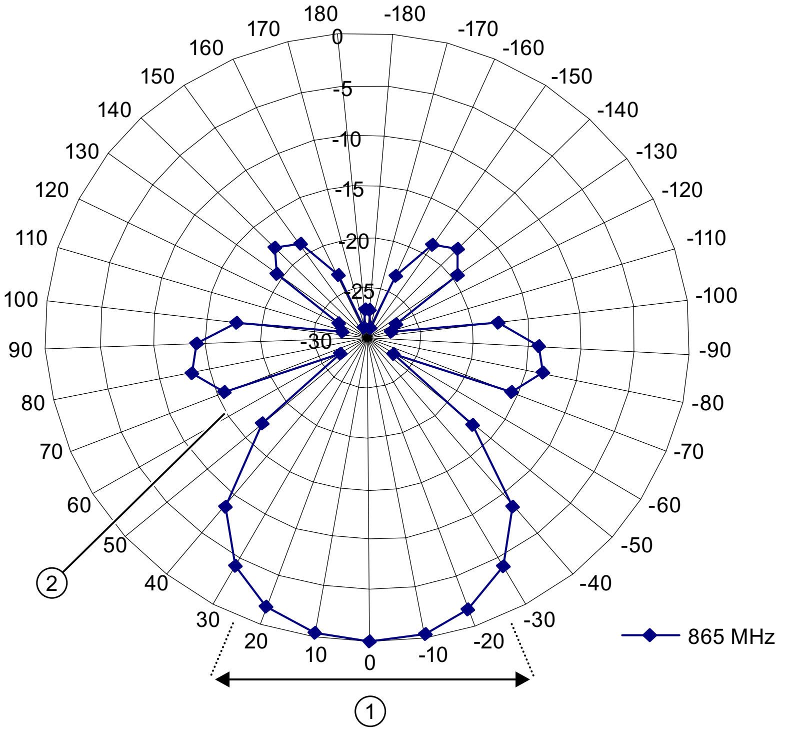
Coupling in ETSI

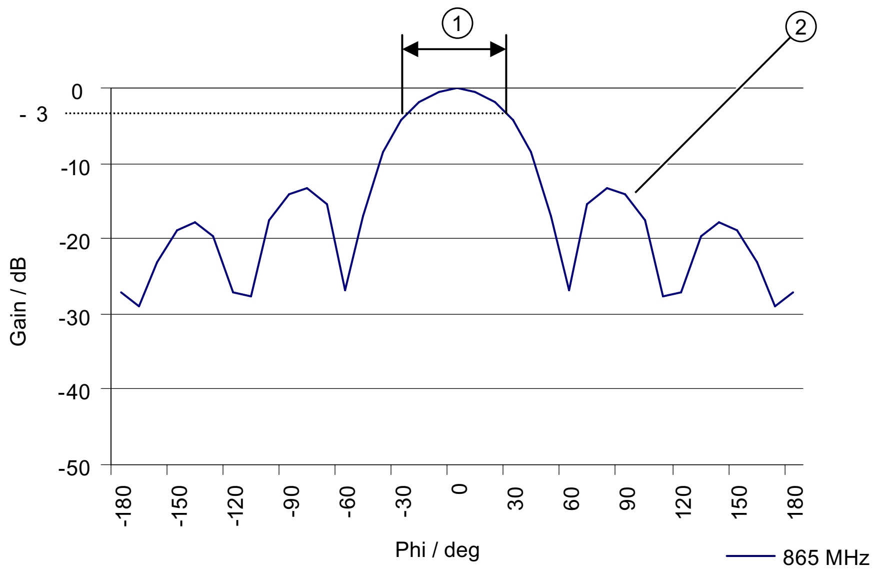
In ETSI EN 302 308 (release version V1.1.2 2006-07), the radiated power is coupled to the beam width, i.e.

- Radiated power 500-2000 mW ERP: beam width ≤ 70 degrees
- Radiated power < 500 mW ERP: beam width ≤ 90 degrees

The beam width requirement applies to both the horizontal and vertical plane. The FCC directives do not envisage coupling with the beam width.

The following graphics show examples of the directional characteristic of an antenna in polar and linear representations for which both the horizontal and vertical plane must be considered.

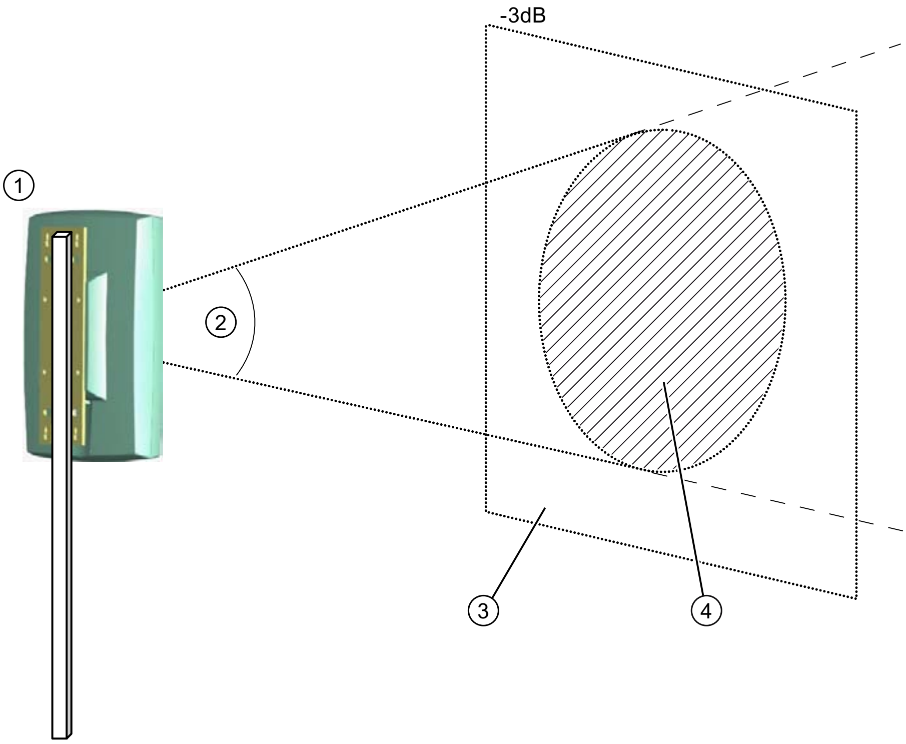
Directional radiation pattern in polar representation	
	
①	Beam width
②	Spurious lobe

Directional radiation pattern in linear representation	
	
①	Beam width
②	Spurious lobe

Specifications

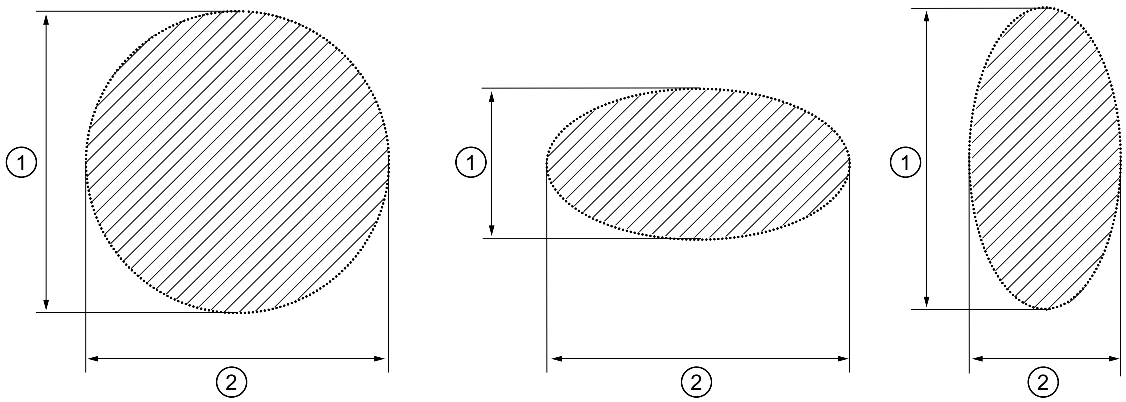
Selection of the beam angle within the approval directives also has effects on the field of application, since a larger beam angle allows a larger area to be covered by RFID transponders. The following graphic clarifies the cross-section of the beam cone with the covered area.

Beam angle: cross-section of the beam cone with the covered area



①	Third-party antenna
②	Beam angle
③	Covered area
④	Activation or reading range

The reading range depends on the horizontal and vertical beam widths in the case of equal distances from the transmitter antenna. Depending on the mechanical mounting and the ratio between the vertical beam width ① and the horizontal beam width ②, read areas result as shown in the following graphic:

Read area depending on the beam width	
	
①	Vertical beam width
②	Horizontal beam width

5 Antenna cables

5.1 Selection criteria

You must observe the criteria listed below when selecting the appropriate antenna cable for your third-party antenna.

5.1.1 Characteristic impedance

Definition

If the input impedance of a device does not agree with the cable impedance, reflections occur which reduce the power transmission and can result in the appearance of resonance and thus to a non-linear frequency response.

Specifications

- You must only use coaxial antenna cables when connecting a third-party antenna.
- This antenna cable must have a nominal characteristic impedance of Z = 50 Ohm.

5.1.2 Antenna cable loss

In order to be able to transmit the available UHF power from the SIMATIC RF660R reader to the antenna(s), the antenna cable loss must not exceed a value of approx. 4 dB.

Dependency of the cable loss

The cable loss depends on two important factors:

- External characteristics of cable. These includes the cable length, diameter and design.
- As a result of the physical principle, the cable loss is also frequency-dependent, i.e. the cable loss increases at higher transmitter frequencies. Therefore the cable loss must be specified in the frequency range from 860 to 960 MHz.

Cable vendors usually provide tables or calculation aids for their types of cable which usually include the transmitter and receiver frequencies as well as the cable length. Therefore contact your cable vendor in order to determine the appropriate type of cable using the approximate value referred to above.

5.2 Notes on use

5.2.1 Shielding of the antenna cable

Coaxial antenna cables always have a shielded design and therefore radiate little of the transmitted power to the environment.

Note

Cable with double shielding

You should therefore preferentially select cable with double shielding since this provides the best damping.

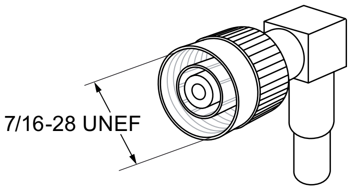
5.2.2 Bending radius of the antenna cable

The properties of the cable shield are influenced by mechanical loading or bending. You must therefore observe the static and dynamic bending radii specified by the cable vendor.

5.2.3 Connectors and adapters

You must use connectors and adapters of type "Reverse Polarity R-TNC" (male connector) for your antenna cables from a third-party supplier in order to guarantee correct connection to the SIMATIC RF660R reader.

The figure below shows the standard for a suitable thread:



You can find more information in the catalog data of your cable vendor.

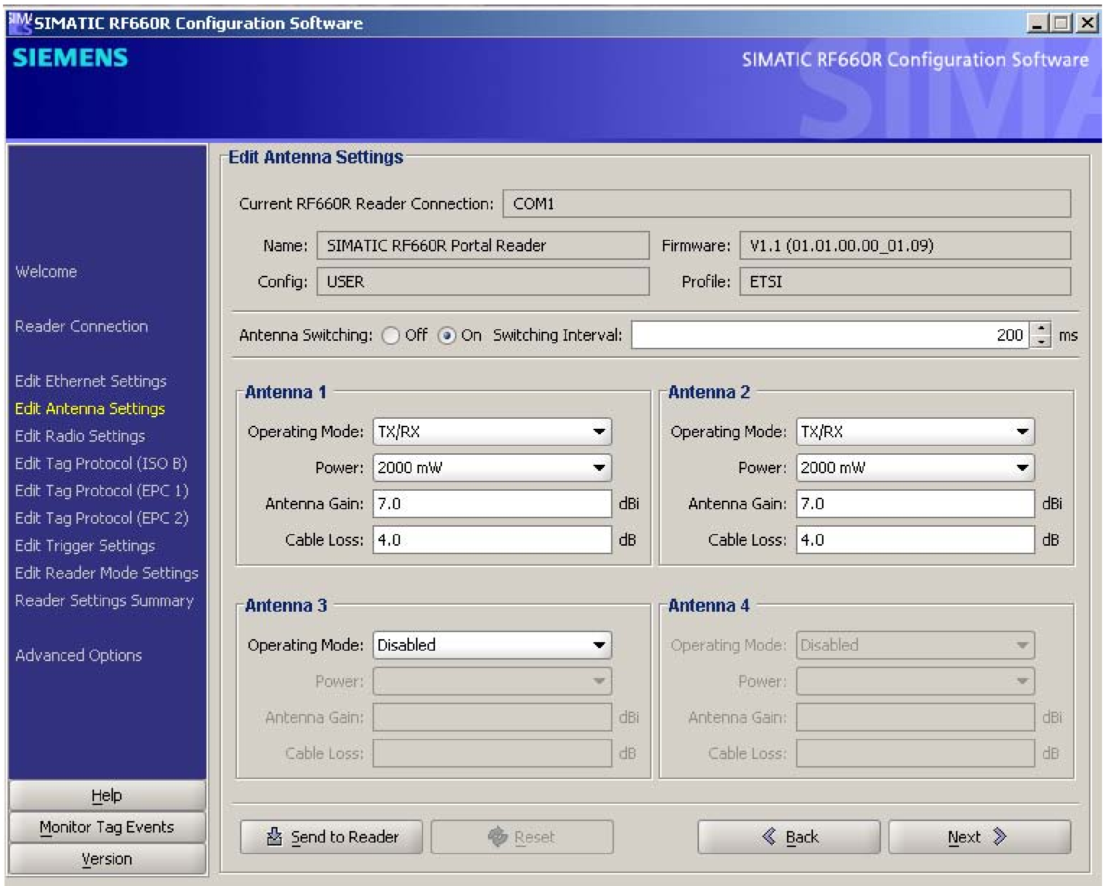
Parameterization 6

6.1 Setting of parameters in the SIMATIC RF660R configuration software

The radiated power of the SIMATIC RF660R reader can be automatically set and calculated using the configuration software with the data of the parameters mentioned above.

Procedure

1. Select the "Edit Antenna Settings" screen form.



2. Enter the following parameters in the screen form.

Parameter name	Description
Operating mode	• Only Tx • Only Rx • Tx/Rx Using the drop-down list "Operating mode", you can select whether the antenna is to only transmit (Tx), only receive (Rx) or alternately send and receive (Tx/Rx).
Power	The maximum radiated power is defined through selection of the corresponding country and radio profile in the welcome screen form. The radiated power can be reduced if necessary.
Antenna gain	The antenna gain must be entered referred to the isotropic radiator (specified in "dBi"). • Software version 1.18 does not permit values < 4.0 dBi to be entered. Only a configuration using XML commands is possible in this case. See Section Setting of antenna parameters using XML commands (Page 31) .
Cable loss	Enter the cable loss as described in Section Antenna cable loss (Page 26) . If you enter a value < 1 dB, the value is automatically reset to a realistic value.

1. Upload the configured values to the reader by clicking the "Send to reader" button.

7 Setting of antenna parameters using XML commands

Advantages

You can also directly set the antenna parameters in XML code instead of with the SIMATIC RF660R configuration software. The advantage of this method for advanced users is that you have greater flexibility for your customized applications.

Exact configuration of the antenna parameters using XML commands is described in the "Function Manual SIMATIC RF660R XML Interface".

Standard configuration

An example of a standard configuration for two antennas is shown below:

```
- <message>
    <name type="c">set</name>
  - <paramGroup name="antennaConfig">
      <switchingState>ON</switchingState>
      <switchingInterval>100</switchingInterval>
      <antenna number="1" power="1000" gain="6.0" cableLoss="4.0">TXRX</antenna>
      <antenna number="2" power="1000" gain="6.0" cableLoss="4.0">TXRX</antenna>
      <antenna number="3" power="0" gain="0.0" cableLoss="0">OFF</antenna>
      <antenna number="4" power="0" gain="0.0" cableLoss="0">OFF</antenna>
    </paramGroup>
  </message>
```

Figure 7-1 XML code

8 Application example

This section contains an example with specific values. Using this example it is possible to understand how the complete selection procedure for antennas, cables and adapters as well as the settings on the SIMATIC RF660R reader could be carried out.

In the example it is assumed that you wish to use your SIMATIC RF600 system with your third-party components in Germany.

Procedure

1. Compare the technical specifications of your antenna with the values required by the SIMATIC RF600 system.

Values	Example antenna	Required values	OK?
Frequency range	865...870 MHz	865…868 MHz	OK
Impedance	50 Ohm	50 Ohm	OK
VSWR	<1.5	<1.24	Not OK
Polarization	Circular, right		OK
Antenna gain	8.5 dBi	>6 dBi	OK
Beam width horizontal/vertical	63°	≤70°	OK
Front-to-back ratio	-18 dB	≥10 dB	OK
Spurious lobe suppression	-16 dB	≥10 dB	OK
Axial ratio	2 dB	≤3 dB	OK
Maximum power	6 W	4 W	OK

Since the specific VSWR value of the antenna does not agree with the value required by the system, you must have this value checked. Therefore contact your antenna vendor or an EMC laboratory.

1. Compare the technical specifications of your cables and connectors with the values required by the system.
   For example, you can use cables of type "LMR-195" from the company "TIMES MICROWAVE SYSTEMS". Suitable cables have e.g. an outer diameter of 5 mm. The company offers various designs of cables depending on the requirements. Numerous connectors are also available for their cables.

Values	Example cable	Required values	OK?
Cable loss	36.5 dB / 100 m at 900 MHz With an assumed length of 10 m, this results in a loss of 3.65 dB.	≤4 dB	OK
Impedance	50 Ohm	50 Ohm	OK

Values		Example connector	OK?
Type of plug on reader side	R-TNC socket	R-TNC plug	OK
Type of plug on antenna side	N socket	N plug	OK

1. Set the following values in the configuration software of the reader:

- Antenna gain: 8.5 dBi
- Cable loss: 4 dB (due to adaptation and damping losses of the connectors)

1. You must subsequently have your desired system requirements measured and verified according to EN 302 308 in an absorber chamber.
   You may only use your SIMATIC RF600 system with the new third-party components when this has been carried out.

Glossary

Active field / active area

Area with minimum field strength containing the sensing range. Within this sensing range, data can be read from the tag or written to the tag.

Active tag/transponder

Active transponders are battery-operated, i.e. they obtain the energy required to save data on the microchip from a built-in battery.

CE guidelines

See CE Label

CE Label

Communauté Européenne (product mark of the European Union); specified by law.

dBm

Dimensional unit for the transmitted power in the logarithmic relation to 1 mW (Milliwatt).

0dBm = 1mW, +23dBm = 200mW, +30dBm = 1W.

Decibel (dB) / dB

Unit of measurement for the logarithmic relationship between two variables.

EIRP / Effective Isotropic Radiated Power

Effective Isotropic Radiated Power; unit of measurement for the transmission power of antennas (referred to an isotropic radiator) mainly used in the USA. EIRP is specified in Watt, and is not equal to ERP. (0dbi = - 2.14 dBm)

Electromagnetic compatibility (EMC)

Electromagnetic compatibility 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 directive

Guidelines for electromagnetic compatibility This guideline relates to any electrical or electronic equipment, plant or system containing electric or electronic components.

EPC global / EPC

Electronic Product Code. Standardized number system for identifying articles with a data width of either 64, 96 or 256 bits.

ERP / Effective Radiated Power

Effective Radiated Power; unit of measurement for the transmission power of antennas (referred to an ideal dipole) mainly used in Europe. ERP is specified in Watt, and is not equal to EIRP. (0dbm = + 2.14 dBi)

ESD directive

Directive for handling Electrostatic Sensitive Devices

ETSI

European Telecommunications Standard Institute

eXtensible markup language

See XML.

FCC

Federal Communications Commission (USA)

Interrogator

See readers

MDS

Mobile data memory, see Transponder.

Mobile Data Memory (MDS)

Mobile data memory, see Transponder

Passive tag/transponder

A tag without its own power supply. Passive transponders obtain the energy required to supply the microchips from the radio waves they receive.

Read rate

Number of tags which can be read within a defined time.
The read rate can also be used for the maximum rate at which data can be read from a tag. The unit is bits per second or bytes per second.

Reader (also interrogator)

Readers transfer data between mobile data memories (transponders) and the higher-level systems. The data, including the energy required for processing and sending back, are transmitted to the transponder across an electromagnetic alternating field. This principle enables contact-free data transmission, ensures high industrial compatibility and works reliably in the presence of contamination or through non-metallic materials.

Reciprocity

Reciprocity means that a two-way relationship exists between the transmit and receive case of a passive antenna.

RFID

Radio Frequency Identification; a method of identifying items using electromagnetic waves. The reader supplies energy to the tag and communicates with it.

RFID systems

SIMATIC RF identification systems control and optimize material flow and production sequences. They identify reliably, quickly and economically, use non-contact data communication technology, and store data directly on the product. They are also resistant to contamination.

RH circular

Right hand circular polarization

R-TNC

Connector designation (Reverse TNC). Industrial coaxial connector with screw coupling, can be used for frequencies of up to 2 GHz. The mechanical design of the R-TNC connector is not compatible with the TNC connector.

Secondary fields

In addition to the main sensing range (antenna's main direction of transmission) there are secondary fields. These secondary fields are usually smaller than the main fields. The shape and characteristics of the secondary field depend on the metallic objects in the surroundings. Secondary fields should not be used in configuring.

Sensing range

Area in which reliable data exchange between transponder and reader is possible due to a particular minimum field strength.

Tag

See transponder

TCP/IP

Transmission Control Protocol/Internet Protocol

TNC

Connector designation (Threaded Neill Concelman). Industrial coaxial connector with screw coupling, can be used for frequencies of up to 2 GHz.

Transponder

An invented word from transmitter and responder. Transponders are used on the product, the product carrier, the object, or its transport or packaging unit, and contain production and manufacturing data, i.e. all application-specific data. They follow the product through assembly lines, transfer and production lines and are used to control material flow.

Because of their wireless design, transponders can be used, if necessary, at individual work locations or manufacturing stations, where their data can be read and updated.

UHF

Ultra-high frequency; frequency range from 300 MHz to 3 GHz. UHF RFID tags usually operate between 866 MHz and 960 MHz. This corresponds to a wave length of approx. 33 cm.

writer

See readers

XML

eXtensible markup language; XML is a language derived from SGML with which other languages (document types) can be described. In the meantime, XML is a widely used language for distributing information on the Internet. Data exchange between reader and read station is carried out using XML commands.

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