

Selecting the right RAIN RFID antenna for your project

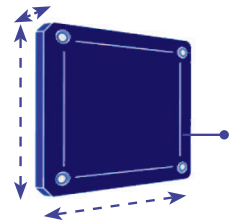
When selecting a RAIN RFID antenna that is suitable for your project, you have to consider some important factors. Such as the dimension of the antenna, the desired read range and polarization, the environmental protection and more. In this white paper we discuss different ways to approach the selection of the correct antenna for your project.

Dimension of the antenna

Reader antennas are available in different form factors. There are small sized antennas, large antennas, antennas with a hard case and antennas which can be embedded in other devices.

RFID reader antennas are available in many different sizes. You have to take into account there can be size constraints in the area the antenna is going to be placed. Not in every environment there is room for a large antenna.

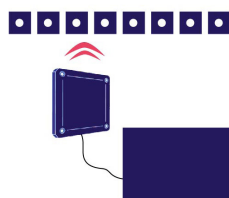
Besides the length and width, you also need to consider the height of the RFID antenna. Aesthetic factors also sometimes play a role in the project.



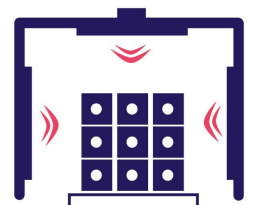
Read range of the antenna (near-field/far-field)

Antennas can be classified in near-field and far-field antennas. Far-field antennas operate at a greater distance whereas the near-field antennas operate only at short distances. The difference is the way they communicate with an RFID tag. Near-field antennas have a short reading distance (up to 15 cm) because of their non-propagating electromagnetic field.

The read distance depends on the sensitivity and size of the tag. Far-field antennas have a propagating electromagnetic field and a read range of up to 15 meter.



The read range also depends on the tag type, cable loss and reader as well as the permitted max wattage allowed for RFID for each country. The read range of a RAIN RFID antenna can be extended or reduced by adjusting the power levels of the RAIN RFID reader.



Some examples of applications for near-field and far-field antennas:

Applications for Near-Field antennas:

- Access control & security
- POS
- Libraries

Applications for Far-Field antennas:

- Logistic & SCM
- Industrial automation
- Race timing

Environmental Protection (IP rating)

Are you going to place the RFID antenna indoors or outdoors? Is the antenna placed in a dusty environment or does it need to be waterproof?

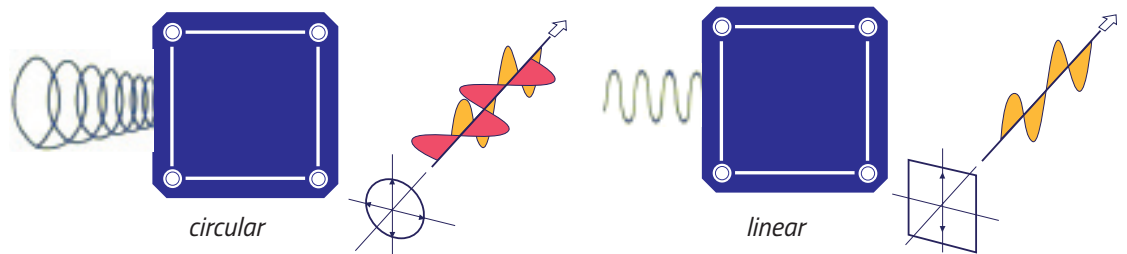
Every RFID antenna is, like every other electronic device, rated with an International Protection Rating (IP rating). The IP-rating consists of two numbers.

The first indicates the degree of dust tightness and can be between 0-6. The second number indicates the degree of water tightness with a degree between 0-9. Antennas with an IP rating of IP69 are fully dust tight and protected from high pressure liquid.



Polarization: Circular or Linear

Far-field antennas can be linear (horizontally or vertically) and circular polarized. Which polarization you need depends on the orientation of the tag. If you know the orientation of the tag, a linear antenna is always more powerful, thus has a longer read range. If you can't control the tag's orientation, a circular antenna is the better choice to achieve reliable reads.



Wide or narrow beam pattern

To choose the right antenna, you need to determine which beam pattern your project needs. What are the coverage requirements, what is the shape of the area that needs to be covered? Overall, the narrower the beam, the higher the gain. The beam angle is usually measured in degrees (beam width) and can be found in the antenna's datasheet.

Reader with a integrated antenna or an external antenna

Antennas are available separate or integrated in a reader. You have to look carefully at your project to see if you need an external antenna or a reader with integrated antenna. When one antenna is needed, a reader with integrated antenna may suit better.

External antenna

- More components to install
- More flexible: A wider variety of size, shape, beam width etc.
- Suitable for most applications
- Ability to define the read-zone

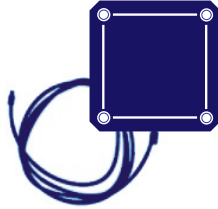
Reader with integrated antenna

- Fewer components to install
- Less choice for size, shape, beam width etc.
- Ideal for low cost applications
- Easy to install

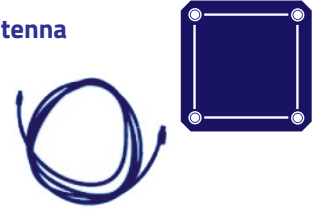
Antenna connectors / Cable length

RAIN RFID antennas are available with either a connector or a cable. Both options have their advantages and disadvantages. The requirements of your project will determine, which one fits best. Here are some pros and cons of a cabled antenna versus an antenna with connector.

Cabled antenna



Connectorized antenna



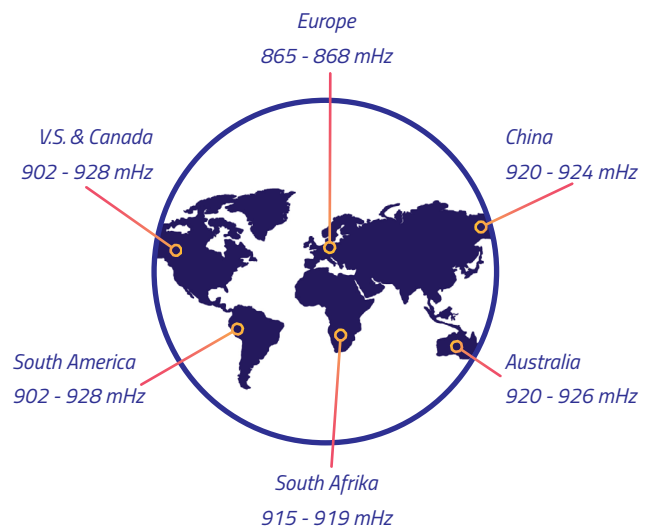
- | | |
|---|---|
| <p>PROS</p> <ul style="list-style-type: none"> ▪ The cable is already provided ▪ There is no power loss from an extra connector <p>CONS</p> <ul style="list-style-type: none"> ▪ The quality of the cable is not selectable ▪ If the cable is damaged the whole antenna must be replaced. | <ul style="list-style-type: none"> ▪ Lower replacement costs in case of cable damage ▪ You can choose your own length and quality cable <ul style="list-style-type: none"> ▪ A bit of power loss because of the extra connector ▪ Cable routing limited to connector location |
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Power loss: Every meter cable and every connector will result in more power loss. Approximately 0.5db per meter for a standard cable. But the real loss depends on the cable rate. Higher rated cables are thicker so harder to bend. Lower rated cables are more flexible but with more power loss.



Frequency / region

Antennas have, like RFID readers and tags, a specific frequency band in which they operate. RAIN RFID technology uses two major frequency ranges - 902-928 MHz and 865-868 MHz. Different countries use different frequency ranges. Please refer to the UHF regulation guide to find out about the frequency ranges that apply in different countries. There are also wide-band antennas. These antennas can operate in a wide frequency range that cover all the RAIN RFID regions. Also called 'the global operating region'. Make sure the RAIN RFID reader you choose is tuned for the region you are using it in.



Cisper offers a wide range of RAIN RFID antennas. Do you need help choosing the right antenna? Our RFID experts can answer all of your questions and help you pick the right RFID antennas for your project. Please contact us. We are happy to assist!