Ha-VIS LOCFIELD®
Flexible, small UHF RFID Antenna

HARTING

Pushing Performance

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No space for installation, metal environments – typical challenges for UHF RFID antennas. The Ha-VIS LOCFIELD® is a traveling wave antenna based on a standard coax cable. The antenna can easily be installed in myriads of shapes in almost any application or environment. Different lengths are available. The read range can be varied from a few centimeters to several meters by choosing the right antenna and adjusting the RF power.

Traveling wave UHF RFID Antenna

Ha-VIS LOCFIELD® UHF RFID antenna – a flexible coax cable

Wouldn't it be great if you could design your RFID reading zone in almost any arbitrary shape you like and need in your current project? The Ha-VIS LOCFIELD® antenna brings you very close to this vision.

LOCFIELD® stands for LOCalized FIELD: the antenna generates a localized electromagnetic field exactly along the contour of the antenna cable. You may think of the field as a tube or cylinder with the antenna cable at the centre of the tube. The diameter of the tube can be determined by changing the RF power of the RFID reader. Depending on reader, transponder, the exact coax cable type and environment, the read range can be adjusted from a few centimetres to about a few meters. The length of the antenna can be varied from 30 cm to about 6 m.

Technical details

The Ha-VIS LOCFIELD® antenna generates a traveling wave with a homogenous electromagnetic field along the antenna cable at the UHF frequency band of 865 – 928 MHz (EU or FCC versions available). Only a negligible fraction of the field energy is radiated. So reflections and interference are avoided especially in metallic environments. The antenna can be connected to any kind of UHF RFID reader. The antenna gain is about -7 dBi depending on exact antenna length. Even with 4 W RF power injected into the antenna, the limits of 2 W ERP (EU) or 4 W EIRP (FCC) are not violated.
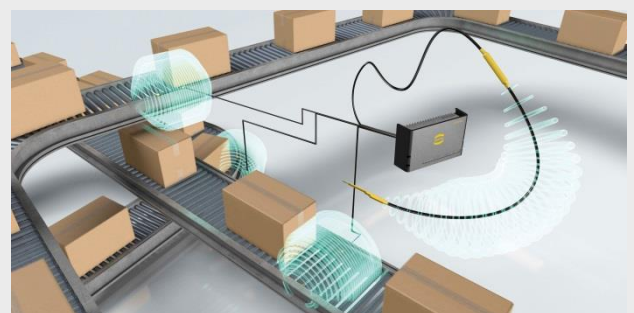
Ha-VIS LOCFIELD® antenna along conveyor belts

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Examples of Applications

- In machines for tool identification
- Along conveyor belts
- Doors / gates
- Smart work bench
- Smart shelf
- Underneath trains or vehicles
- On fork lifts
- Real time inventory
- Asset tracking in 19 inch server racks

ferrite cores 180 mm

PCB 65 mm

HA-VIS LOCFIELD®

active length

total length

Design rules and restrictions

The LOCFIELD® antenna generates an electromagnetic field. The RF field travels along the full length of the coax cable. The traveling wave is generated at the PCB and travels towards the ferrite cores, where the energy is absorbed.

Length

Different standard lengths are available and the portfolio is growing constantly (please refer to our datasheet or sales contact). The length varies from about 30 cm to 6 m. As "active length" we refer to the section between PCB and ferrite cores. At the PCB itself, you can read transponders as well even with a slightly higher read range (few per cent compared to the rest of the antenna).

For very long LOCFIELD® antennas, for example 6 m, the RF field becomes more of a "funnel" than a cylinder, i.e. the read range at the PCB end of the antenna is higher than just before the ferrite cores. This effect can easily be compensated by introducing U-turns along the antenna path.

For orders of 250+ pieces, custom tailored versions can be configured (for extra costs) by multiples of half of the wave length.

Environment

The LOCFIELD® antenna can be perfectly integrated in metal environments as server racks, electrical cabinets or other metal enclosures. However, the active section including the antenna must NOT touch metal or ground. If the RFID performance is not satisfactory, please check first, if the active section or PCB touches metal or ground. The antenna should have a distance of at least 1 cm from the metallic surface. Best performance is obtained with a distance of 5 cm or more. Starting with 1 cm from the surface, the read range will increase with every cm moving away from the metal surface.

In contrast to standard patch antennas, metal surfaces do not reflect the wave generated by the LOCFIELD® antenna. This is due to the different antenna characteristics and physics. Metal surfaces tend to absorb magnetic field lines and may therefore reduce the read range. In addition they can be used to "shape" the read zone by shielding certain areas.

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The antenna should not be placed on the ground directly. In this case, the wave cannot travel along the antenna and the read range is very low. Especially the PCB must NOT touch ground.

When installing the antenna, take care for parallel running cables regardless if network, power, data or signal. Any parallel wires may absorb energy emitted by the LOCFIELD® antenna and reduce read range.

Shape of antenna / boosting read range

The LOCFIELD® antenna can be placed in any shape or configuration. However, the active section should not cross itself.

If a first installation does not deliver the anticipated read range, the emitted RF field can be boosted. A very easy and powerful solution is a so called U-turn.

4 cm
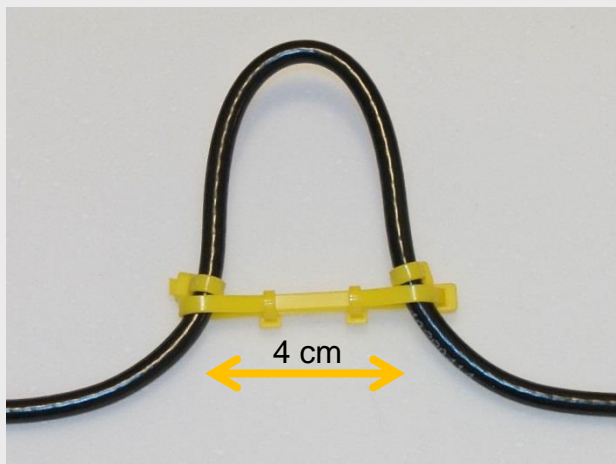
Such a U-turn (about 4 cm wide, 5 cm high) boosts the read range significantly by about 30 %. There are different strategies: either the U-Turn can be placed at a certain point, where more energy should be emitted. Or you can place several U-turns along the antenna. In this case, we recommend making the first U-turn direct near the ferrite cores on the active section of the antenna. The next U-Turn should be about 1 m (four times half the wave length) from the first U-turn and so on.

A different strategy is to install the LOCFIELD® antenna in the shape of sine wave. This creates a very homogeneous field and increases the read range as well.

Polarisation effects / orientation dependent reading

In some applications and depending on the used transponder, the read range may vary with the orientation of the transponder. A simple way to reduce this dependence on orientation is to install the LOCFIELD® antenna as a meander, double U-turn or sine wave.