

## Important Notes for the RFID-technology in frequency band UHF(868 / 915MHz)

### General

RFID is a contactless electro magnetic data transmission for identification purposes. Below the keyword RFID are several defined frequency bands with different physical capabilities, which are important for the application. The following points are based on physical principles and not depending on specific devices or manufacturers.

RFID-in frequency band UHF has the following specialties:

- high ranges with passive transponders  
Depending on the read / write device and emitted power (ERP) reading ranges between 25cm and 6m are possible. For ERP >0,25W a kind of „blind“ zone directly in front of the device occurs, within transponders could not be read reliably. The reason is the signal with the transponder data in is so weak it will disappear in the electrical noise. Usually the ERP can be set at those devices to adjust it to the application.
- Detection area focused with typically 65° opening angle  
The detection zone in this technique has the form of a truncated cone with the antenna /the reader at the smaller end. Reliable detection is only possible within this area and the transponder (antenna) should be covered about 60% from the field (energy transmission).  
The focussed field here allows more rotation / angle of the transponder antenna to the readers antenna (+-30 ° without range reduction).
- flat surfaces act as a reflector and deflect the detection area (especially metal)  
With the capabilities of the high frequency on flat surfaces where the reader sends out the rates onto appear strong reflections, falsifying the reader results on one hand. The only way to avoid / reduce this is through the adjustment of the antenna (mounting) in a way where reflexions are turned aside. Important is to keep the reflexions out of the detection area, no interfering following pallets or boxes. On the other hand it can happen transponders outside of the detection area are read through the reflexions. For this we recommend an angle of 15-45° between conveyor line and reader.
- Multi transponder functionality and allocation  
All read / write devices of the UHF band are able to handle several transponders at the same time in the field. Unfortunately the technology does not provide any well defined possibility to allocate the transponders where they are in the field. Because of that it is easier for a reliable and clear identification to work with ONLY ONE transponder in the detection area. The high range requires then a suitable distance between the transponders (boxes, pallets, skids), recommended > 2 x range. For the readers it is similar to avoid interferences between them.
- penetration of non metallic materials  
With the capabilities of the high frequency the magnetic field lines are able to penetrate for some cm only especially in compact (dense) materials and so the recommendation is to mount transponders on the surface (best case)
- Electrical and magnetic field  
The high range of this technology is based on a mixture of electrical and magnetic field capabilities. The result is within the detection zone are two types of areas: so called „high points“ means energy rich area (Transponder could be read) and so called „low points“ means weak and energy poor areas (Transponder could NOT be read). The reliable and simple workaround is reading / writing operation in motion in direction to the reader (angle of <45°) crossing several of both of these areas.