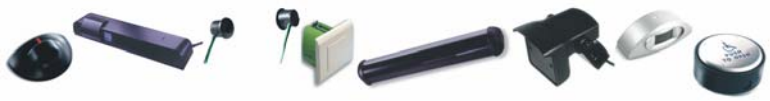
APPLICATION NOTE

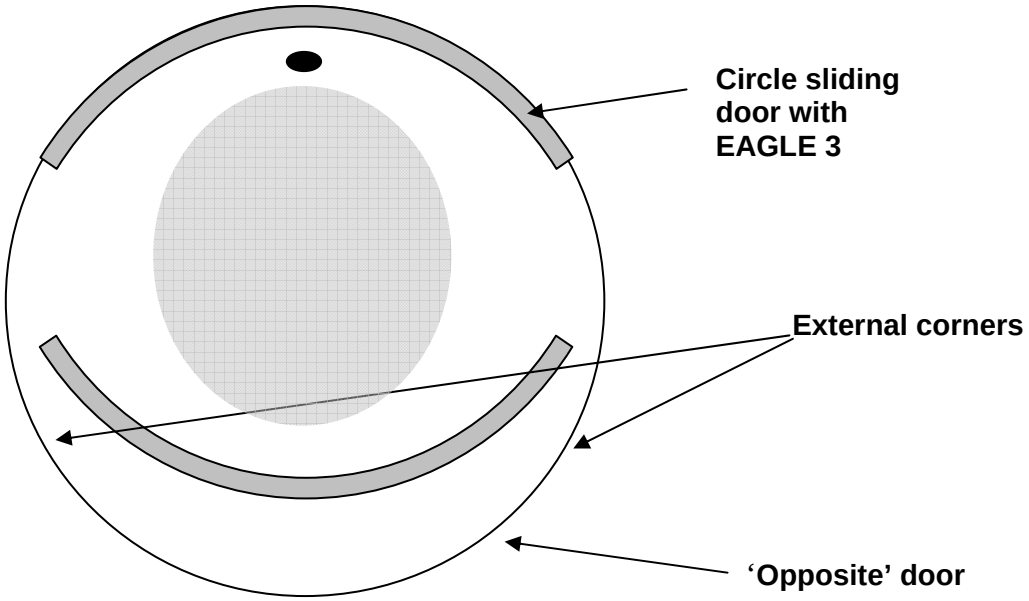


How to install an EAGLE THREE on a circle sliding door?

1 The application

One of our customers was facing some trouble installing an EAGLE 3-N sensor on a circle sliding door due to the fact that the sensor was sensitive to the movement of the opposite door.

Due to reflections, the sensor was, even with the 6-patch antenna, sensitive to the movement of the external corner of the opposite door, especially when ending the opening movement. Decreasing the tilt angle and increasing the sensibility level of the sensor, did not help. In any situation the customer would like to obtain a detection field depth at least equal to 1.5m in order to fulfil the TÜV requirements.



2 Possible solutions

1. EAGLE 3-N with a 9-patch antenna

An EAGLE 3-N prototype with a 9-patch antenna (same as EAGLE HM) has been tested. This antenna provides a detection pattern which is narrower than the 6-patch antenna. The advantage of this approach is that the energy is focused in the axis of the sensor. This reduces disturbances by reflections. The drawback is that the sensor is less sensitive to targets that are coming from the sides. But this would not be any trouble in a circle sliding door application.

The test showed promising results. It was possible to set the detection field depth up to 2.5m without being disturbed by parasitic reflections.

2. EAGLE 3-N with an increased immunity

Increasing the pre-pump limit from 11 (immunity 3) to 30 solves the problem, because the opposite door movement does not reach this limit. But the detection distance is also reduced, because the pedestrian has also to reach that limit in order to activate the sensor.

We also tried to increase the amplitude strength the signal has to reach in order to pass the pre-pump process. This makes the sensor less sensitive to the opposite door movement but it also has an effect on the detection pattern size that has to be considered.

3. EAGLE 3-N with sensitive direction discriminator

We have tried to reset the discriminator as soon as a wrong phase is faced. This does not help because the movement of the opposite door is really clean regarding the phase point of view. It is even worst for the detection of pedestrians because their phase is not as clean as the door movement.

4. EAGLE 3-N with an increased high pass filter

Using the 25Hz filter permanently rejects the opposite door detection because the movement of this door creates signal frequency under that limit. The drawback of that technique is of course that pedestrians who are walking very slowly are not well detected anymore by the sensor.

5. EAGLE 3-N with optimum settings

During our tests we found a setting that cancels the detection of the opposite door movement. The main parameter is the tilt angle. Increasing the tilt angle generates a detection field which is closer to the opposite door. This means the sensitivity level could be decreased down to 3 or 4 to set a detection field depth equal to 2.5m from the « EAGLE » door.

The other consequence is that the opposite door crosses the detection field on a ‘parallel’ way and the external corner movements do not cross parasitic fields anymore. Setting the immunity level to 3 cancels all detections of the opposite door.

The drawback of that setting is that targets are not well detected if they are located just under the sensor.

Conclusion

Being allowed to practice all these tests on a realistic circle slide door application was very helpful. We have learned that playing with phase does not help in this situation. Signals generated by the door movement are very similar to the ones created by pedestrians.

The 9-patch antenna could be an interesting alternative in highly reflective environments. The high pass filter is also a nice solution if the customer could accept the drawback concerning the detection of the slow targets.

Our customer was satisfied with the optimum setting we found. They understood the way microwave sensors work. We tried this technique in a 2m diameter door and the result was very good. We also found that increasing the tilt angle was the best way to set up the sensor. Our customer will apply this solution to set up the sensor on the field to fulfil the end-user's requirements.

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