# NORDIC ID AR55 INSTALLATION GUIDE



# VERSION HISTORY

| Version | Date | Author | Changes |
|---|---|---|---|
| 0.1 | 26.6.2015 | AN | Initial draft |
| 0.8 | 26.8.2015 | JM | First draft |
| 1.0 | 29.9.2015 | JM | First release |
| 1.1 | 26.9.2016 | MPL | “Extra beam” update |
| | | | |

# TABLE OF CONTENTS

VERSION HISTORY ..... 2
ABOUT THIS GUIDE ..... 4
1. INTRODUCTION ..... 5
1.1. NORDIC ID AR55 READER ..... 5
1.1.1. PHYSICAL CONNECTORS IN NORDIC ID AR55 READER ..... 5
1.1.2. USER INTERFACE ..... 6
2. SETTING UP THE NORDIC ID AR55 READER ..... 7
2.1.1. POWERING THE UNIT AND CONNECTIVITY OPTIONS ..... 7
2.1.2. MOUNTING OPTIONS ..... 7
2.2. GENERAL RF CAHARACTERISTICS OF THE READER ..... 7
2.2.1. NORDICID AR 55 ANTENNA BEAMS ..... 8
2.2.2. ATTACHING EXTERNAL ANTENNAS TO NORDIC ID AR55 ..... 8
2.3. SINGLE READER SETUP ..... 9
2.4. MULTI-READER SETUP ..... 11
2.4.1. TESTING INSTALLATION SETUP ..... 12

# ABOUT THIS GUIDE

This is guide is intended for anyone installing Nordic ID AR55 readers. The guide provides instructions for installing and operating the Nordic ID AR55 reader.

# 1. INTRODUCTION

## 1.1. NORDIC ID AR55 READER

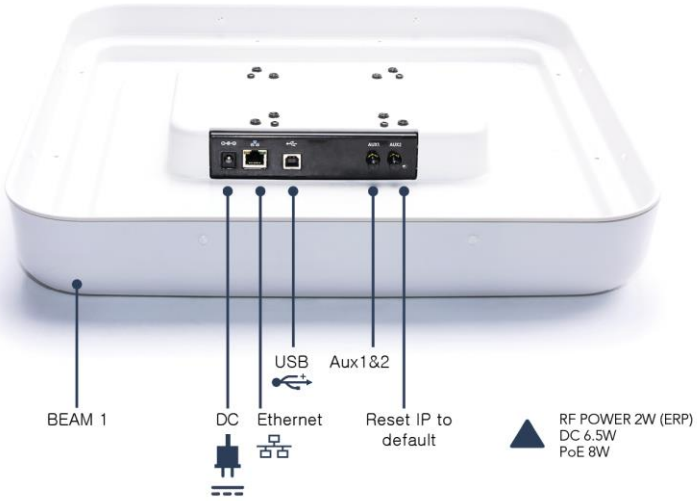
Nordic ID AR55 is a powerful RFID reader with a built-in antenna which can be utilized in various use cases. Due to high output power and beamforming capabilities it can cover a large area and detect tag location and movement. This makes it an excellent choice as a ceiling or gate reader for various business cases.



### 1.1.1. PHYSICAL CONNECTORS IN NORDIC ID AR55 READER

Nordic ID AR55 reader includes:

- DC connector for supplying power if PoE capability is not used (power supply sold separately)
- Ethernet 10/100 Mbit
- USB 2.0, TYPE B
- 2 pcs. AUX (SMA female) for connecting external antennas to the unit



### 1.1.2. USER INTERFACE

The user interface in Nordic ID AR55 consists of 4 LEDs on the front side of the device and a reset button on the back.

**Reset button:**

- Pressing the reset button briefly reboots the device.
- Pressing the reset button down and power cycling the device (Disconnect/connect DC or Ethernet (PoE) cable) and then releasing the reset button and power cycling again, reverts the device back to DHCP mode. This method can be used E.g. when wrong IP address has been assigned for the unit.

**Interpreting LEDs on the front side of the device:**

POWER



- Power is supplied to the device via DC power supply or PoE connection

CONNECTION



- USB connection in use
    - LED off: The USB cable is unplugged.
    - LED on: The USB cable is connected.
- Ethernet or WLAN connection in use
    - LED off: The reader has no IP address. In addition, the red error LED is blinking.
    - LED blinking: The reader has IP address but the host application is not connected.
    - LED on: The reader has IP address and the host application is connected.

RFID READ



- RFID reading is switched on.

INDICATION



- LED on: The device encountered an error. Try pressing the reset button or power cycling the device for recovery. If it doesn't help or the error occurs often, please contact Nordic ID support.
- LED blinking: No IP address for Ethernet or WLAN connection.

# 2. SETTING UP THE NORDIC ID AR55 READER

### 2.1.1. POWERING THE UNIT AND CONNECTIVITY OPTIONS

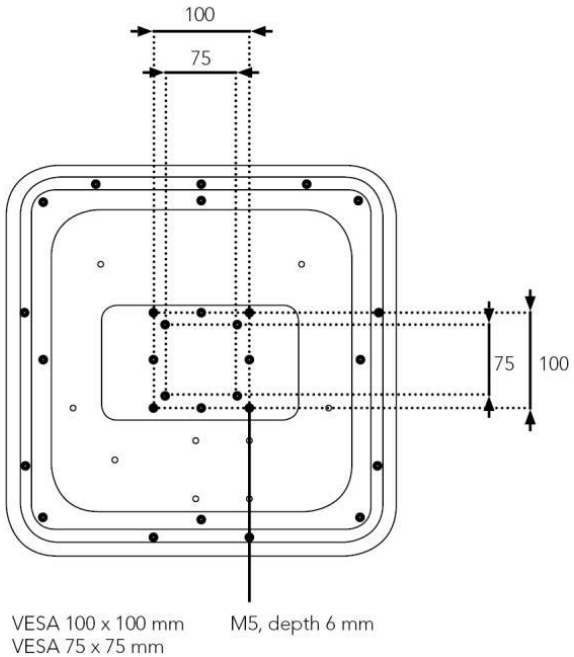
Nordic ID AR55 can be powered via the Ethernet port if the network supports power over Ethernet (PoE) feature or PoE injector is being used. Alternatively, the DC power supply (sold separately) can be used if PoE is not an option. Regardless of what powering method is used, the data communication can be handled via USB connection or if IP connectivity is required then via WLAN or Ethernet.

The rated maximum power consumption for Nordic ID AR55 reader

- Powered via PoE: 8W
- Powered via DC power supply (sold separately): 6.5W, 9-24 VDC

### 2.1.2. MOUNTING OPTIONS

Nordic ID AR55 reader can be mounted with M5 threaded screws to any VESA 75 x 75 mm or VESA 100 x 100 mounting equipment (sold separately). Weight for the Nordic ID AR55 reader (excluding mounting and DC power supply) is 2.10 kg and 2.36 kg with DC power supply.

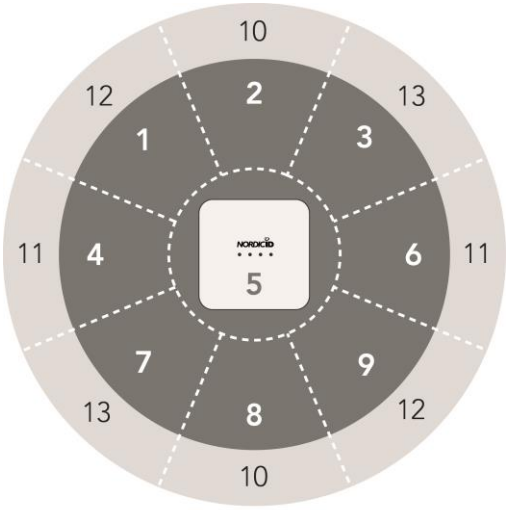


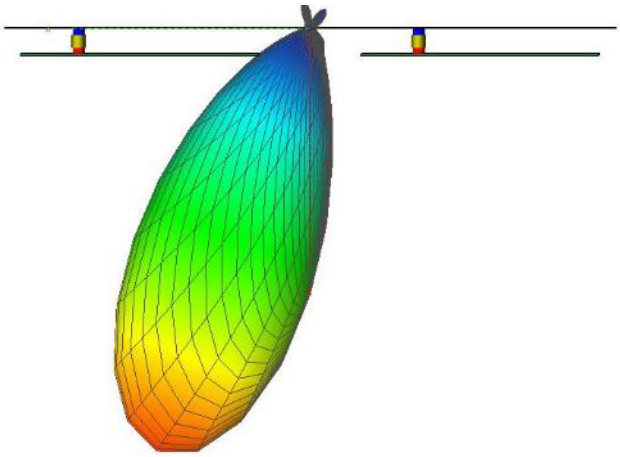

## 2.2. GENERAL RF CAHARACTERISTICS OF THE READER

Nordic ID AR55 reader houses a beamforming antenna which provides significant advantages over a conventional RFID reader; wider coverage and a capability to determine the location of any tag in the reading area. By monitoring the changes in tag location over time allows an easy way for determine the direction of movement in real time which might be desired e.g. in gate setups.

### 2.2.1. NORDICID AR 55 ANTENNA BEAMS

The area Nordic ID AR55 reader covers is divided into 13 sectors according to the below picture. Each sector is covered with a horizontal and vertical polarized beam summing up to 26 separate logical beams which are used in turns when scanning operations are conducted. Which particular beam is used and in which order is entirely software controllable. It's worth to note that the reader API is able to provide an XY -coordinate for each tag only when they are in sectors 1-9. Sectors 10-13 can be used for inventory purposes for enhancing the reading coverage while XY -coordinate is not required.



Each separate beam is 45° in width and can be deflected approx. ±40° from center the point in the horizontal plane. This sum up to approx. 110-120° of effective beam width from the device. How large of an area the device covers depends also on the installation height. A rule of thumb is that in ceiling setups the floor coverage has a diameter of two times that of the installation height. E.g. if the installation height is 2.5m, on the floor the device covers an area 2.5 meters in every direction measured from just underneath the reader.

### 2.2.2. ATTACHING EXTERNAL ANTENNAS TO NORDIC ID AR55

Sometimes there can be challenging spots in the reading area which needs extra coverage. For this purpose, there are 2 SMA female connectors (AUX1&2) in the Nordic ID AR55 reader. The external antennas can be enabled/disabled just as the 26 logical beams of the Nordic ID AR55 reader.

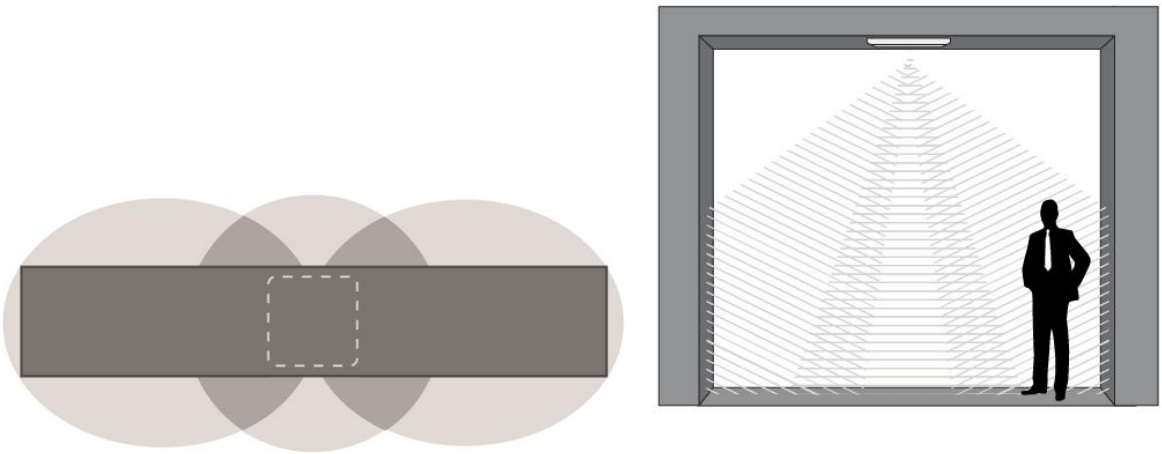
The next section describes some common use cases and how reader beams are configured.

## 2.3. SINGLE READER SETUP

A wide gate setup, no need to detect the direction of movement.

- The Nordic ID AR55 reader is installed in the middle of the gate pointing downwards.
- Beams number 4, 5 and 6 are enabled to cover just the gate area.
- Beams 1, 2, 3, 7, 8, 9, 10, 11, 12 and 13 are disabled to avoid tags in the environment not going through the gate. Additionally, disabling unnecessary beams makes the monitored area significantly smaller making it faster to scan.

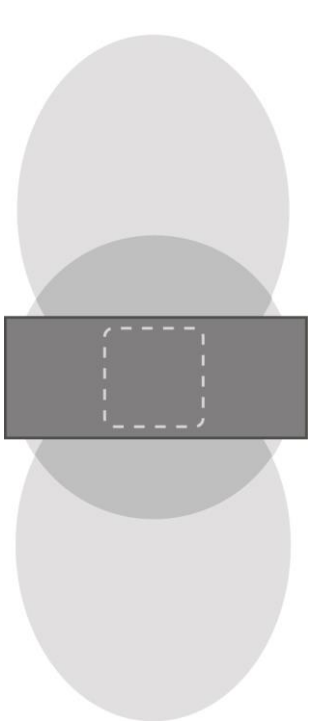
**Top and front view:**

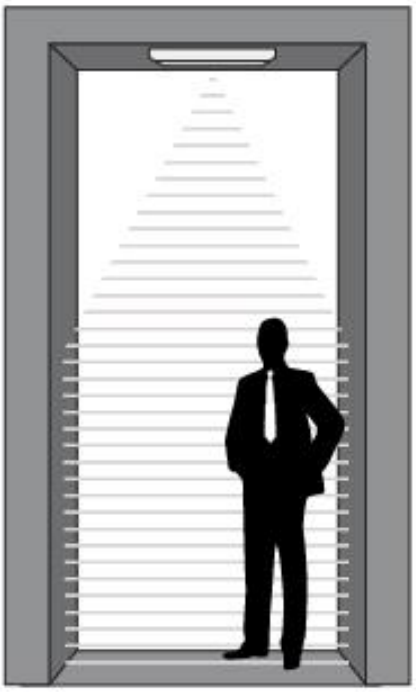


A narrow gate setup, need to detect the direction of movement.

- The Nordic ID AR55 reader is installed in the middle of the gate pointing downwards.
- Beams number 2, 5 and 8 are enabled to cover just the gate area along the path of moving tags.
- Beams 1, 3, 4, 6, 7, 9, 10, 11, 12 and 13 are disabled to avoid tags in the environment not going through the gate. Additionally, disabling unnecessary beams makes the monitored area significantly smaller making it faster to scan and the reader able to detect the movement of tags quicker and more accurately.

**Top view and front view:**



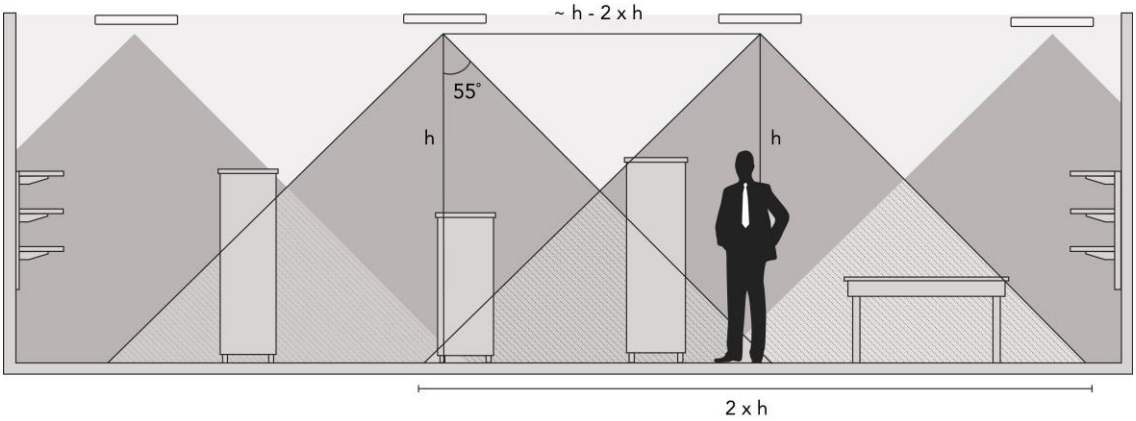


## 2.4. MULTI-READER SETUP

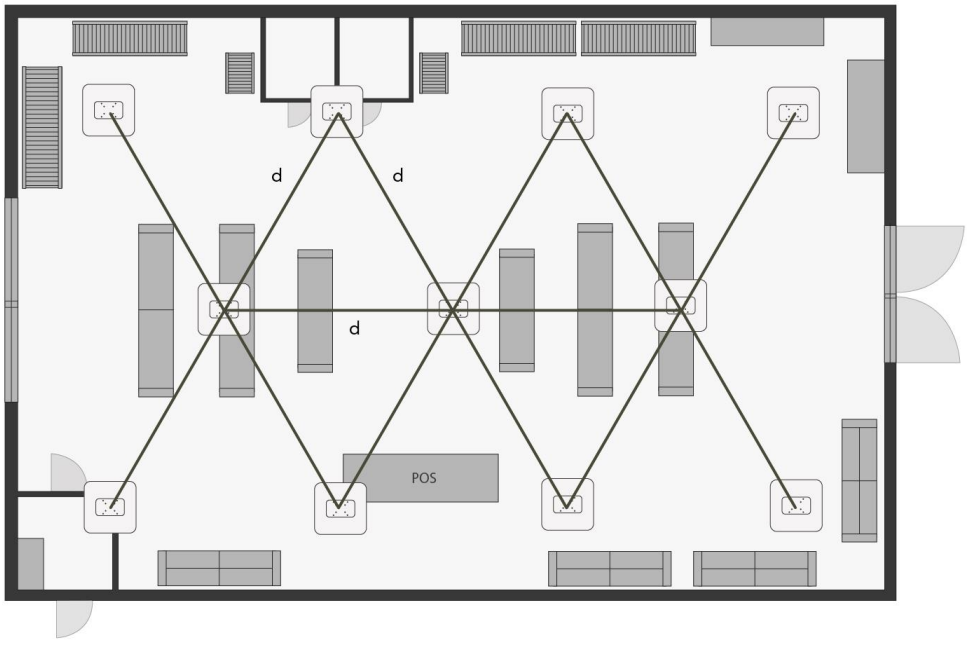
In order to cover larger area, several Nordic ID AR55 readers might be needed. Below are some recommendations regarding the installation pattern. Do note that the optimum setup depends on several variables e.g. tag density, tag alignment, tag RF performance and metallic objects in the area.

Typically, the distance between two Nordic ID AR55 readers in the ceiling in challenging environment is equal to the installation height. In less challenging environment it can be doubled. Note that more densely the readers are installed in the ceiling, the better they cover also the space above the floor plane. This is important in case high shelves are being used in the area.

- Typical installation height 3.5 – 5 m
- Maximum beam angle ca. 110 degrees




Depicted from above, a triangular or diamond shaped installation pattern is the most efficient way of mounting the readers. Arranging readers this way ensures the most evenly distributed RF power towards the scanning area.



### 2.4.1. TESTING INSTALLATION SETUP

In order to test out the reader setup, Nordic ID provides useful SW tools. These tools are available in Nordic ID extranet free of charge

**Nordic ID RFID Configurator**

- As the name suggests, the application is meant for configuring the reader settings. The settings can be e.g. related to network settings or RFID reading parameters and stored into the device as new defaults. Note that e.g. the RFID reading parameters can be assigned to the reader by the host application after successfully connected to the device also. The RFID Configurator is also the tool for updating the device firmware if deemed necessary. The application can connect to Nordic ID AR55 via USB, WLAN or Ethernet connection.

**Nordic ID RFID Demo**

- The Nordic ID RFID Demo application is for conducting the reading tests. It allows connecting the devices and commencing the reading procedure. The application provides statistics on the reading performance and logging capabilities for more thorough evaluation. As the Nordic ID RFID Configurator, this application also allows adjusting the RFID parameters on the fly for better understanding how they impact on the reading performance. The difference however is that altered settings cannot be stored permanently into the device. The settings are reverted to defaults upon power cycle.