



Installation for the liwari indoor positioning system

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1. Introduction

liwari Tracking Solutions indoor positioning system offers a simple, robust and affordable solution to boost your business. liwari's patented solution utilizes Ultra Wide Band technology based on radio signals.

Our components are scalable, tested and ready to install. Installation is easy and quick even in large offices or warehouses.

liwari's high-precision positioning system consists of only three different components. The **location tag** sends its location information to the **base stations** and the base station is connected to the **Gateway device**, which in turn is connected to the cloud service.

The liwari positioning system consists of a system installation, cloud-based management software, and a **user interface (Dashboard)**.

Almost wireless system, less installation time, less cost

When the indoor positioning system is so clear and simple, its installation is quick. Since the **low voltage cabling is very convenient to install and the installation can be done even without an electrician. Also**, the small number of cables required by the liwari system compared to other systems is a significant advantage in the installation.

liwari devices can be easily attached to the **light rails, wall and ceiling** with **ready-made connectors**, and the indoor positioning can begin. No special tools nor an electrician is needed for the installation.

Quick installation

In an open space, a medium-sized store can be equipped with an accurate and comprehensive indoor positioning system in a day. Or actually a night, because for work and customer safety, one always have to think about the right timing for the installation.



2. Safety & basics

Always remember safety

When installing Iiwari positioning systems all the needed safety regulations and instructions must be followed. Remember safety gear like **safety boots, reflecting clothes, helmets, safety glasses, hearing protection and dust masks**. Installation often requires working in heights, use only **approved lifts or ladders**.

Basic components in Iiwari's system are tags, base stations, gateway and the cloud system.

- The Tags are the basic components of the indoor positioning system. **Tags** calculate their own locations and send them to **Base Stations**.
- **Base Stations** communicate with tags and relay the tag related information forward to **Master Base Station**. Master Base Stations in the positioning network collect all the location data and send it to local gateway device where the actual positioning algorithms are run.
- A base station is wireless and only requires a 12 V power connection. The optimum height for the base station installation is typically about 3 m.
- The **Master Base Stations** are connected to the **Gateway** device with a Power over Ethernet (PoE) cable (or 12 V power supply via a separate power cord).
- The Gateway is powered with 12 V power source. NOTE! The Gateway only accepts 6-12 V power supplies and connecting a higher voltage will damage the device.

Cell

- One **Master Base Station** connected to 3-8 base stations is called a **cell**.
- Depending on the area, one cell can cover an area between 200 – 2500 m² and can handle any number of individual tags. Cells can be seamlessly linked together to create a positioning network. Individual tags can be tracked from one cell to the next without interruptions.

3. Advance planning

Careful planning in advance is an important part of a successful indoor positioning system. For successful positioning network planning following information is needed:

1. The design is based on a **scale floor plan**. Real photos are also useful in design. In particular, a description of the **structures, such as intermediate walls and other signal blockers in addition to light rails**, which help to attach the devices to the ceiling.
2. It is also important to know what the ceiling is like and what its height is.
3. You need to know **where to get electricity** and where to install.
4. Does the destination already have **an internet connection** or is an operator device being imported?
5. Safety policies and regulations that the installation team must consider when working in the facility.
 - **Scale floor plan**
 - **Real photos**
 - **Structure and height of the ceiling**
 - **Light rails**
 - **Electricity**
 - **An internet connection**
 - **Safety policies**

The system calculates the number of devices required based on the surface area and floor plan.

Origo is the basis of positioning

- Select the origin location ($x = 0m$, $y = 0m$) for a location from which on-site measurement is possible. The location of the origin can still be changed on site.
- Design the cells and set the MBS and BS locations accordingly. The height is also set.
- Gateway (1 or more) and switch locations and ethernet (CAT6 S / FTP) cabling are planned.
- The installation team has an installation diagram of the plan, showing the locations of the positioning devices (MBS/BS) and their coordinates to the nearest cm.



4. Installation on site

- List of required hardware:
 - o Master Base Stations
 - o Base Stations
 - o Gateway
 - o Switches
 - o Transformers
 - o Ethernet cable, amount in meters
 - o Power cord, amount in meters

The installation of the electrification must be agreed in advance.
Check that the floor plan matches the dimensions of the space.

The plan is viewed from the Iiwari Dashboard web interface.
In addition, the Iiwari Setup App installed on your Android phone is used to register devices.
Install the hardware with cabling in the space. For each MBS / BS / GW device:

- Look at the installation location plan.
- Read the code from the bottom of the device, pair and secure the device -> easy!
- Measure the height of the device from the floor and record it in the system via the Android tablet user interface.
- Measure the locations of the devices using a handheld laser ranging device and record it in the app.
- Check that all the Master Base Stations and Base Stations are within an inch or couple of centimeters from the real position. The accuracy of the installation is important for precise positioning results! Check position
- Check that within a cell, all the Base Stations have a line-of-sight to the Master Base Stations

Check list:

- Installation location plan
- Read the code, pair and secure the device
- Connect the power cord
- Measure the height & record it
- Measure the locations (X, Y) of the devices with a laser ranging device
- Check position
- Check line-of-sight (MBS to BS)



Connecting devices

Install a PoE connection between each Master Base Station and Gateway using the required number of switches and cabling (as planned).

In the plan, the devices appear **grey on the dashboard**, the **device turns orange** when it is installed and linked to the system.

A more detailed description of connecting Iiwari devices can be downloaded from https://iiwari.com/installation_instructions/Installation_progress_Connecting_Iiwari_devices.pdf

Checking the system works

After installation, the Android app will check that the backend system can connect to all devices and verify that their status is OK. In the event of a fault, the installer may try to switch off the power to the device for a while. If necessary, replace the device.

The TAGs are paired with the system in the same way as BaseStation.

Testwalk

Positioning is tested by moving the tag through the space and confirming that the location matches the route displayed on the interface.