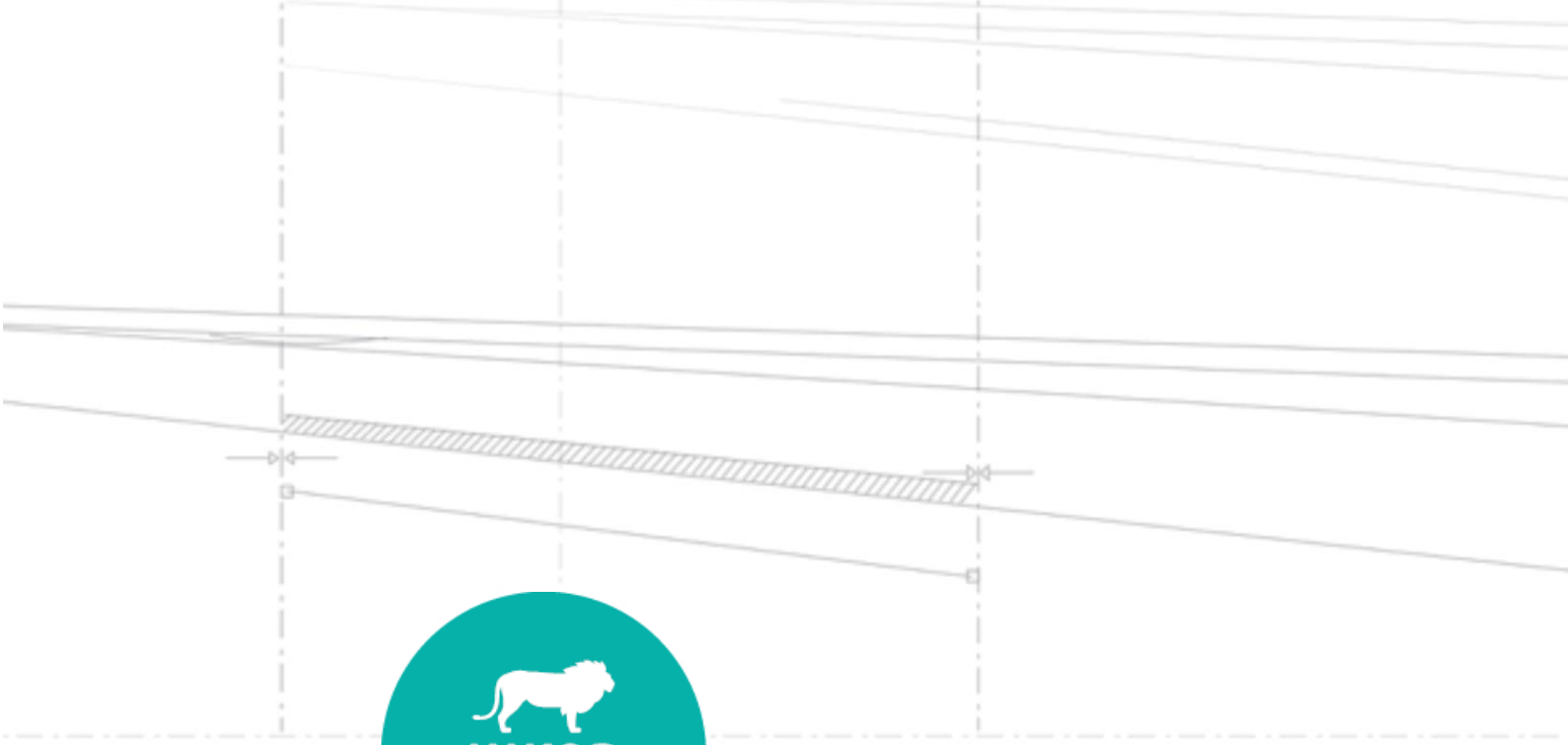

HIKOB LION

Installation guide

INSTALL_LION-V6

2019/01 Edition

Related HIKOB products:

LION H-RT201A

HIKOB

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1. Introduction

When using LION, safety precautions must be taken to avoid injury and damages. Please read this guide before installing, using the product, or performing any maintenance operation. Failure to read, understand and follow herein instructions may result in personal injury. In no event shall HIKOB be held liable for any damages arising out of or related to misunderstanding instructions detailed in this manual.

1.1 Symbols and conventions used in this guide

Read entirely this guide before using the product LION and keep it handy for reference

Caution – Indicates a potentially hazardous situation which, if instructions are not followed, may result in damage to the equipment.

Electrical Hazard – Indicates a dangerous condition such that, if instructions are not followed may result in electric shock and physical injury.

- Carefully follow instructions and warnings given in this guide, as well as instructions indicated on the product.
- Make sure you understand all instructions: refer to symbols definitions and conventions used in the documentation.
- Should you have questions on using the product LION once you have completely read this guide, contact the HIKOB support or your vendor.

1.2 Safety instructions

It is forbidden to install the product in a location accessible to the public. Please refer to the installation section.

Do not disassemble or attempt to open the product. It does not contain any serviceable parts inside. Only qualified staff is allowed to perform maintenance operations on the LION product. Opening a LION will void the warranty.

Do not attempt to change or recharge the batteries. LION batteries are not replaceable, they are recharged automatically and exclusively by its embedded solar panel.

Do not overheat, do not dispose in fire, do not crush. Do not heat above the product maximum operating temperature, incinerate, or expose content to water. LION uses lithium batteries, such improper use may lead to leakage, explosion or fire.

Modifications or changes on the product is strictly prohibited if it is not expressly approved by HIKOB. Modifications or changes performed on LION will void the user's authority to operate the equipment.

1.3 Compliance and conformity

a. Europe

HIKOB SAS declares that the HIKOB LION product is in accordance with stipulations of the RED 2014/53/UE, CEM 2014/30/UE and 2014/35/UE directives.

b. Electromagnetic compatibility Japan

The LION product is certified to be compliant with Japan Radio Law - Article 2 paragraph 1 Item 19.

c. USA

Information to user: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in an installation. If this equipment does cause harmful interference to radio or television reception which can be determined by turning the equipment off and on, the user is encouraged to try to correct interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

RF exposure: This device complies with FCC RF radiation exposure limits set forth for general population. This device must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

d. Canada

Transmitter Antenna: Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropic ally radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Licence-Exempt Radio Appartus: This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

RF Exposure: This device complies with Industry Canada RF radiation exposure limits set forth for general population. This device must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

1.4 WEEE

Information on disposal for users of waste electrical electronical equipment:

This symbol on the product(s) and / or accompanying documents means that used electrical and electronic products should not be mixed with general household waste. For proper treatment, recovery and recycling, please take this product(s) to designated collection points where it will be accepted free of charge. Alternatively, in some countries you may be able to return your products to your local retailer upon purchase of an equivalent new product. Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling.

1.5 Technical Support

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2. General description

2.1 HIKOB Wireless sensor network acquisition system

The LION is one of the elements that constitutes the HIKOB wireless sensor radio network. This system is a set of wireless sensors doing multi-point distributed measures in various domains. These sensors radio transmit their acquired data to the GATEWAY, possibly via LION routers, depending on environment constraints for radio transmission. This local radio network operates in the 2.4GHz ISM bandwidth and implements the standardized IEEE 802.15.4e protocol. The GATEWAY provides the user with these acquisitions through its embedded software: NETPULSE, which makes the interface to any TCP/IP network.

HIKOB systems cover data acquisitions such as vehicle detection for controlled traffic or parking management, various measurements in civil engineering structures from stress gauges to crack/inclinometers, and vibrations from industrial machines for diagnostic purpose, providing tools for predictive maintenance for example

2.2 LION

2.2.1 Overview

Figure 1 – External view of LION

LION is a wireless and energy autonomous router for the HIKOB radio network operating in the 2.4GHz ISM bandwidth. It levers the radio coverage both in terms of range and signal quality. It relays bi-directional information: from any HIKOB sensor to the GATEWAY and vice versa.

Its antenna is embedded in the casing, as well as its solar panel providing the source for rechargeable batteries. The LION casing is water resistant with an IP67 protection: it is

suitable for outdoor installations. Should you decide to perform cleaning tasks on the GATEWAY, don't perform high pressure cleaning, prefer wiping with a dry cloth, or with a neutral agent.

It is delivered all assembled, ready to be fastened on a pole or a wall with provided accessories, please refer to the Installation section for details.

2.2.2 Interfaces

LION, has a red LED that allows to know its state:

• At start-up: the LED lit 2s continuously 4 seconds after start-up,
• Connected to the HIKOB network: 1 beep every 2 s,
• In search of a HIKOB network: 2 beeps every 2 seconds,
• With the battery, low (not connected to the network and not seeking to connect): 3 beeps every 2 s,

LED position into the LION

LION is also equipped with a magnetic switch, allowing its restart.

Positioning of the magnet for restarting the LION

Once the magnet is passed over the switch, the LION restarts.

3. Data sheet

3.1 General

Power supply	Rechargeable battery Li-ion 3,6V-2250mAh
Consumption	< 30mW
Dimensions	8 x 8 x 2.5 cm
Type of fixing	Pole or wall
Weight	150g
Operating and storage temperature	-20°C à +60°C
Water index	IP67 according to EN 60529

3.2 Wireless

3.2.1 HIKOB Network

Frequency band	2.45GHz ISM
Protocol	IEE 802.15.4e
Number of channels	16
Output power	+11dBm
Antenna gain	+3dBm
Range	Between 100 and 300m to GATEWAY or another router. 50m to sensor, 30m to a buried sensor[1]

3.2.2 Maintenance

Frequency band	13.56MHz
Protocol	NFC
Type of receiver	Passive
Usage	Reserved for HIKOB maintenance

[1] *Radio range given for a connection to a WISECOW sensor, these sensor types are installed in road pavement, this alters radio transmission quality*

4. Installation

4.1 Overall methodology

Installing an HIKOB radio network requires a good topology analysis of your site to maximize radio transmission quality by optimizing positions and numbers of HIKOB nodes in the network. A preliminary study done with your vendor determines elements that will constitute your HIKOB radio network acquisition.

Draw a site map: position your stationary sensors on parking places for WISECOW-P; on the way where passing vehicles should be controlled for WISECOW-T; where road temperature have to be measured for WISECOW-W; and so on with other sensors types. Then you can determine the number of routers you need for your network following these rules:

– The maximum distance between buried sensors and the GATEWAY is 30m.
– The maximum distance between a LION and a GATEWAY, varies between 50 and 150m, depending on the terrain topology.
– A GATEWAY hosts 100 elements in all, and 30 as direct children in the multi hop radio network.
– The LION, the HIKOB router hosts 16 sensors or other routers.

For good radio transmission, both GATEWAY and LION need to be installed on elevated spots, around 5m high. You will have better signal transmission with routers close to sensors and far from other routers or GATEWAY.

Keep In mind that RF waves quality heavily rely on the environment they propagate in. Identify the most distant sensors, and zones where you suspect waves will propagate painfully, like having metal or concrete obstacles in the way.

The GATEWAY provides useful user information to appraise the radio signal quality between elements of the HIKOB network. Refer to section Radio quality link in the NETPULSE manual for that.

With a system based on a GATEGAY LITE, useful information to appraise the radio signal quality between elements of the HIKOB network are available into the NETPULSE APP product.

4.2 LION Mounting procedure

The LION is delivered ready to be installed, batteries are charged, so it is useable right away. As its emplacement is already determined by the site pre-study, the following sections explain the mounting procedure itself, and recommendations for final adjustments.

Respect safety rules working at heights when installing the LION: use an elevating work platform, and appropriate PPE. Once installed at heights, the LION remains in place, and is not reachable by unqualified staff.

a. Installation accessories

The LION is delivered with all accessories needed for a good installation. This is a set of 3 elements:

Clip

A clip coupled with a female thread screw. It hosts the mounting bracket of the LION. The clip is then screwed on the articulated arm.

Arm

An orientable arm with a plane base that can be screwed on a wall.

Support

An optional strapping support for round poles. You screw the base of the arm on the support, and you fasten it on round elements using the strapping method adapted to your environment. In the picture below, plastic clamps have been used. Support.

b. Mounting procedure

For mounting on pole:

- Locate the installation location of the router
- Insert the clamp into the holes provided in the flat base of the arm.
- Secure the arm with the clamp on the support post.
- Screw the clip on the arm.
- Clip the router onto the arm.
- Orient the router correctly (serial number downwards and solar panel up)

For wall mounting:

- Locate the installation location of the router and mark the four mounting holes for the plate.
- Drill the four holes, insert the anchors appropriate to the nature of the support.
- Attach the plate to the wall with four screws.
- Repeat the above procedure in step 4**.**

Figure 2 – HIKOB LION installed on a pole.

c. Radio and exposure considerations: orienting well the router:

From your elevated spot, you position the LION to have a good radio coverage and enough radiation on its solar panel:

– The radio antenna is located right behind the brand sign HIKOB engraved on the top transparent lid. The radiation pattern are 2 flattened lobes in the orthogonal direction of the solar panel plane: this determines the zone where emissions and receptions will be the most effective, see figure.

– The best orientation for the solar panel is where solar radiation is the most powerful, and you have best results the whole year with a southern exposure and a 60° slant to the horizontal line.

Figure 3 – Orientation

For the best compromise, choose a good radio coverage rather than the best exposure for the solar panel: the LION is designed to run with 1 hour of sunshine a day, and is autonomous 2 months in total darkness.

Consider as well specific radiation patterns of the sensors involved in your HIKOB network, that is, WISECOW have conic ones. So, in that case, orient the antenna towards the ground.