



HIKOB AZURE LION

User Documentation

Version 2.0-2466

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1 Introduction

When using HIKOB AZURE 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 HIKOB AZURE 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 HIKOB AZURE 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 HIKOB AZURE LION product. Opening a HIKOB AZURE LION will void the warranty.



Do not attempt to change or recharge the batteries. HIKOB AZURE 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. HIKOB AZURE LION uses lithium batteries, such improper use may lead to leakage, explosion or fire.



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

1.3 Compliance and conformity

1.3.1 Europe



The HIKOB AZURE LION product is certified to be compliant with the R&TTE 1999/5/CE directive.

Electromagnetic compatibility and radio spectrum

The product HIKOB AZURE LION is certified to be compliant with the following standards:

- ETSI EN 301 489-1 V1.9.2 (2011-09) et ETSI EN 301 489-17 V2.2.1 (2012-09)
- ETSI EN 300 328 V1.8.1 et EN 62311 (2008)
- ETSI EN 300 330-1 V1.7.1 (2010/02) et ETSI EN 300 330-2 V1.5.1 (2010/02)

Electrical safety:

The product HIKOB AZURE LION is certified to be compliant with the following normalized standards:

- IEC 60950-1:2005 + A1:2010 + A2:2013
- EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013

The HIKOB AZURE LION is certified to follow the IEC 60 950-22 Am2 outdoor safety standard. With exception for Finland, Norway and Sweden, countries where environment temperature can be far lower than the limit for operating and safety assurance temperatures the HIKOB AZURE LION. You install the HIKOB AZURE LION indoors in those geographical areas.

1.3.2 Electromagnetic compatibility Japan



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

1.3.3 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 a particular 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.

1.3.4 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 isotropically 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 electronic 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 of the HIKOB AZURE LION

2.1 HIKOB wireless sensor network acquisition system

The HIKOB AZURE 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 radiotransmit their acquired data to the HIKOB GATEWAY, possibly via HIKOB AZURE 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 HIKOB GATEWAY provides the user with these acquisitions through its embedded software: HIKOB NET PULSE, 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/inclino-meters, and vibrations from industrial machines for diagnostic purpose, providing tools for predictive maintenance for example.

2.2 HIKOB AZURE LION overview



Figure 1: External view of HIKOB AZURE LION

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

Its antenna is embedded in the casing, as well as its solar panel providing the source for



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rechargeable batteries. The HIKOB AZURE LION casing is water resistant with an IP67 protection: it is suitable for outdoor installations. Should you decide to perform cleaning tasks on the HIKOB 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.



3 Data sheet

Power supply	Rechargeable battery Li-ion 3,6V 2250mAh
Packaging	IP67 according to EN 60529
Dimensions	8 x 8 x 2.5 cm
Weight	150g
Temperature	Operating and Storage 0°C +40°C

Radio

Frequency Band	2.4GHz ISM
Protocol	IEEE 802.15.4e
Antenna gain	+3dB
Input level sensitivity	-111dBm
Output power	+11dBm
Range	between 100 and 300m to HIKOB GATEWAY or another router. 50m to sensor, 30m to a burried sensor ¹

¹Radio range given for a connection to a HIKOB WISE COW or HIKOB POLAR BEAR 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 HIKOB WISE COW Parking; on the way where passing vehicles should be controlled for HIKOB WISE COW Traffic; where road temperature have to be measured for HIKOB POLAR BEAR; 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 sensors² and the HIKOB GATEWAY is 30m.
- The maximum distance between a HIKOB AZURE LION and a HIKOB GATEWAY, varies between 100 and 300m, depending on the terrain topology.
- A HIKOB GATEWAY hosts 80 elements in all, and 30 as direct children in the multi hop radio network.
- The HIKOB AZURE LION, the HIKOB router hosts 16 sensors or other routers.

For good radio transmission, both HIKOB GATEWAY and HIKOB AZURE 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 HIKOB GATEWAY.

For an HIKOB AZURE LION routing detections for parked vehicles (HIKOB WISE COW Parking), HIKOB recommends not going further than a distance of 50m between routers, which compensates any problem that could be caused by an unpredictable environment. This will ensure a good signal transmission that won't be altered for example by heavy trucks, passing or parked in the transmission field.

For dynamic counting on road made by HIKOB WISE COW Traffic, you will need one HIKOB AZURE LION per counting site, within a 50m radius. If you have several options positioning the HIKOB AZURE LION, choose the one closer to sensors, moving it away from other routers and / or the HIKOB GATEWAY.

²HIKOB buried sensors are sensors for car detection, that is, HIKOB WISE COW Parking and Traffic, and HIKOB POLAR BEAR for roadway temperature measure



These are theoretical considerations. 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. You can easily find information on the web that lists material disrupting RF waves propagation. The best choice for routers / gateway positions and orientations can be made empirically, by installing the system and running it for a trial fit. The HIKOB 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 NET PULSE manual for that, reorient elements if needed, sometimes adding extra HIKOB AZURE LION enhances radio coverage.

4.2 HIKOB AZURE LION Mounting procedure

The HIKOB AZURE 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 HIKOB AZURE LION: use an elevating work platform, and appropriate PPE. Once installed at heights, the HIKOB AZURE LION remains in place, and is not reachable by unqualified staff.

4.2.1 Radio and exposure considerations: orienting well the router

From your elevated spot, you position the HIKOB AZURE 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 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 pannel 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 2: Orientation

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



Consider as well specific radiation patterns of the sensors involved in your HIKOB network, that is, HIKOB WISE COW and HIKOB POLAR BEAR have conic ones, read their installation manual. So in that case, orient the antenna towards the ground, see figure.

4.2.2 Mounting procedure

The HIKOB AZURE 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 HIKOB AZURE 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 optionnal 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.



Figure 3: HIKOB AZURE LION installed on a pole.