



HIKOB GATEWAY

User Documentation

Version 1.3-2466

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HIKOB



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1 Introduction

When using HIKOB GATEWAY, 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 personnal 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 GATEWAY and keep it handy for reference.



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



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 GATEWAY once you have completely read this guide, contact the HIKOB support or your vendor.

1.2 Safety instructions



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 GATEWAY product. Opening a HIKOB GATEWAY will void the waranty.



Do not overheat, do not dispose in fire, do not crush. Do not heat above 60°C, incinerate, or expose content to water: 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 HIKOB GATEWAY will void the user's authority to operate the equipment.



1.3 Compliance and conformity

1.3.1 Europe



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

Electromagnetic compatibility and radio spectrum

The product HIKOB GATEWAY 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 GATEWAY 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

Models A and B of the HIKOB GATEWAY are certified to follow the EN CB 60 950-22 Am2 outdoor safety standard for electrical devices. With exception for Finland, Norway and Sweden, countries where environment temperature can be lower than operating and safety insurance temeratures for the HIKOB GATEWAY. You install the HIKOB GATEWAY indoors in those geographical areas.

1.3.2 Electromagnetic compatibility Japan



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

1.3.3 USA

Information to user 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 communica-



tions. 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 Apparatus 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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support@hikob.com



2 General description of the HIKOB GATEWAY

The HIKOB GATEWAY 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.



2.1 HIKOB GATEWAY overview

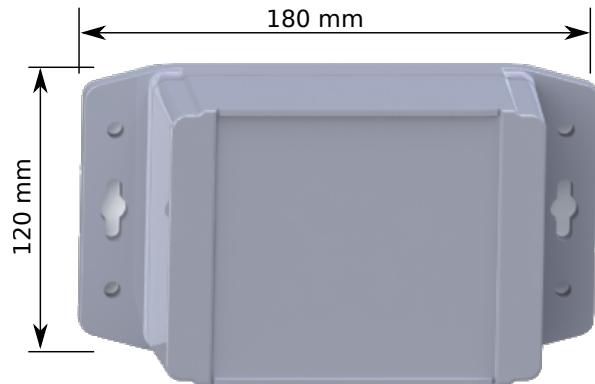


Figure 1: External view of HIKOB GATEWAY

HIKOB GATEWAY interfaces the 2.4Ghz ISM HIKOB radio network by providing connection with any TCP/IP network. It receives and treats sensors measurements that are broadcasted through the multi-hop wireless network formed by HIKOB sensors and HIKOB AZURE LION routers. These measurements are available, either displayed on a web page, or via APIs exposed by an embedded REST server. Information exposed by the HIKOB GATEWAY can therefore be integrated in a 3rd party information system. HIKOB GATEWAY provides as well services to configure HIKOB sensors, and to perform basic maintenance such as firmware update.

The HIKOB GATEWAY is not energy-autonomous: it is powered by the PoE technology (Power over Ethernet) through an Ethernet cable.

Models A and B of the HIKOB GATEWAY can be installed and used outdoor¹. The HIKOB GATEWAY casing is water resistant with an IP65 protection. The first number 6 identifies protection against complete ingress of dust, the second number 5, identifies protection against the effects of spraying water. 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.

Radio and GPS antennas are integrated into the envelope of the HIKOB GATEWAY for A and B models, which are delivered all assembled and ready to be fastened on a pole or a wall, please refer to the Installation section for details. The C model is not suitable for outdoor use due to its SMA connector for remote antenna.

¹Except for countries like Finland Sweden and Norway due to limitations in operating temperatures down to -50°C, please refer to the Compliance and Conformity section



3 Data sheet

Power supply	Power over Ethernet with RJ45 connector following the 802.3at, 802.3af norm. (which corresponds for this product to 36 - 57 VDC, 0.1Amax)
Packaging	IP65 according to EN 60529
Dimensions	22 x 12 x 3.8 cm
Weight	360g
Temperature	Operating and Storage -20°C +60°C

Radio

Frequency Band	2.4GHz ISM
Protocol	IEEE 802.15.4e
Antenna gain	+3dBi
Input level sensitivity	-101dBm
Output power	+4dBm
Range	30m to a buried sensor ¹ , or 50m to router or non-burried sensor

GPS

Constellation	GPS L1
Antenna type	Active patch
Antenna gain	25dB

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. 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 GATEWAY and the HIKOB AZURE LION 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. Ideally for the HIKOB GATEWAY, 5m above your technical enclosure, from where you will pull your Ethernet cable. Should you have distance to cover between the HIKOB GATEWAY and the electrical cabinet, don't go over 100m, which is the recommendation for Cat 5e cables to ensure good data transmission.

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 list 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 link 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.

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



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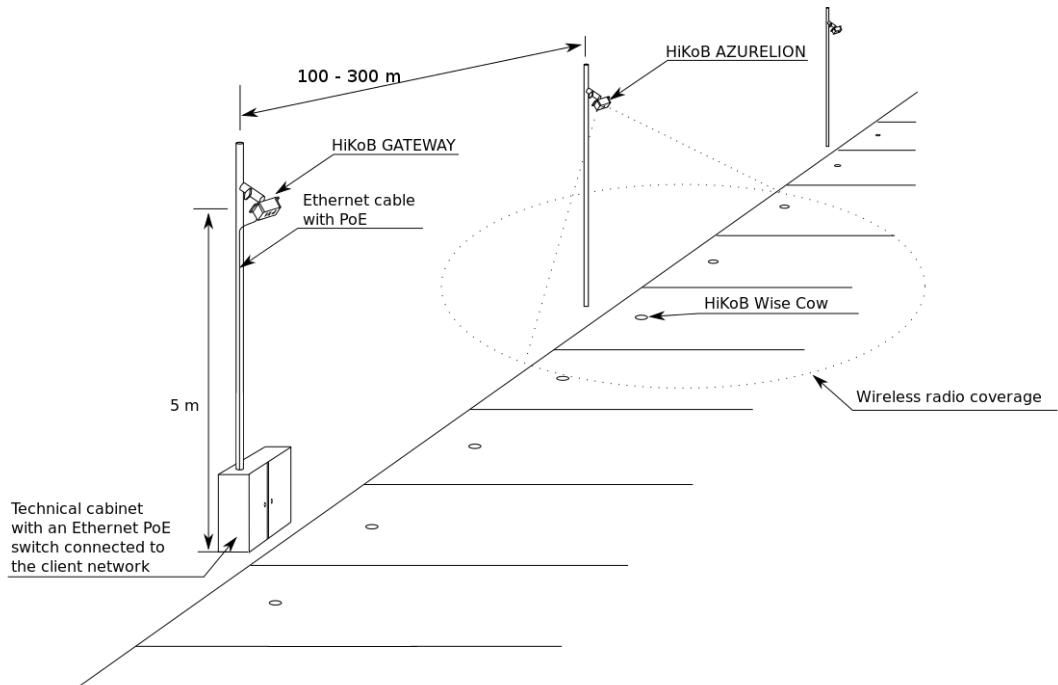


Figure 2: Overview of a complete installation for parking management.



4.2 Connection

4.2.1 PoE connection

The HIKOB GATEWAY is powered via ethernet using the PoE technology (Power over Ethernet) based on the 802.3af-2003 and 802.3af-2009 standards. This allows both data and power delivery over category 5e or better cables. So ideally your site has an ethernet network carrying cables providing PoE.

If your site does not provide a connection insuring the standard PoE technology, then you need to use a PoE injector that must be compliant with the 802.3af-2003 and 802.3af-2009 norm. This standard ensures interoperability between your power sourcing equipment and the powered device HIKOB GATEWAY.

- The PoE connector stamped OUT goes to the HIKOB GATEWAY.
- The PoE connector stamped IN goes to your IP network.
- You supply the PoE injector with cables and plugs following your country / area safety directives for electrical devices.

4.2.2 External antenna

The C model of the HIKOB GATEWAY has an SMA connector to plug an external antenna that must not have a gain higher than +3dB. Observe safety rules installing a remote antenna on the C model: you place the remote antenna inside the same building the HIKOB GATEWAY is installed in.



4.3 Outdoor deployment



It is forbidden to install outdoors the C model of the HIKOB GATEWAY, the one having a external SMA connector for a remote radio antenna.

Models A and B of the HIKOB GATEWAY are suitable for outdoor use: the envelope has maximum protection against dust ingress, and is water resistant (IP65).



In case of an outdoor installation and power for the HIKOB GATEWAY is supplied by a PoE injector, you will have to pay attention to the standard safety rules installing electrical devices outside.

Most likely you'll need a technical electrical enclosure to host the PoE, and to supply power. Some PoE are sold to be useable outdoor, some are sold with an extra IP66 enclosure, when choosing your equipment, pay attention to the 802.3af-2003 and 802.3af-2009 compatibility and to operating temperatures as well. HIKOB has some product references to advise, ask our vendors.

Consider as well other alternatives: you can have the HIKOB GATEWAY installed outside, and the PoE inside.

4.3.1 Ethernet cable set up for outdoor use

HIKOB provides an industrial connector housing (Amphenol Socapex RJF RB 6, which is IP67), to be mounted on the ethernet cable before connecting it to the HIKOB GATEWAY. This is a protective sealed and hardened envelope which can be added around any standard RJ45 connector. Choose an Ethernet cable suitable for outdoor use. You don't need tools to equip your ethernet cable, just follow these step by step graphical instructions:



Figure 3: Steps to dress the Ethernet cable with the Amphenol connector housing.



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Pull a Cat.5e ethernet cable from your electrical cabinet, not going further than 100m long, to ensure data rate quality. Don't connect it while you're doing the installation.

Mount the Amphenol Socapex on the end of the cable that goes to the HIKOB GATEWAY

Plug this set up connector to the female Ethernet connector on the back of the HIKOB GATEWAY.

4.4 HIKOB GATEWAY Mounting procedure

The HIKOB GATEWAY is delivered ready to be installed. HIKOB highly recommends using RAM MOUNTS® products ³ that can be optionally purchased with your HIKOB GATEWAY, ask your vendor. This is a set of 3 elements:



A first ball joint with a male screw that does the female thread on any 4 holes of the HIKOB GATEWAY casing.

RAP-379U-M616



A second ball joint, to be mounted on a wall or a pole. It can be either screwed or attached with plastic clamps, or any method that suits your environment constraints.

RAM-2461U



And the double socket arm allowing good adjustment.

RAM-201U-B

³<http://www.ram-mount.com>



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Figure 4: View of the HIKOB GATEWAY attached on a pole with RAM mount joints