

LEICA BLK247 AI

Extracted Documentation

Volume 1.0



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Leica BLK247 AI

Using advanced machine learning algorithms, the Leica BLK247 AI software allows the classification of objects as “human” or “non-human”. Unlike other technologies, the BLK247 AI classifies objects based on LiDAR data and not on image data. This allows a precise classification under **any lighting conditions** or in areas where the use of RGB images is prohibited **due to privacy reasons**.

The system can recognise and classify humans in all body positions, no matter if they are walking, running, crawling or sitting.

Quick Overview

Classification Categories	Human / Non-human  
Classification Basis	LiDAR data
Classification Range	0-25m (0-82ft)
Processing	Off device on external computer
Activation	Licence based solution
Compatibility	Any BLK247

Data Processing

The classification is processed on a dedicated external computer and can support the AI functionality on up to four BLK247 devices. The minimum requirements for the external computer are as following:

Processor	4 Cores 1.60GHz 64 bit with AVX support ¹
RAM Memory	8GB
Storage	100 GB
Operating System	Linux based 64bit

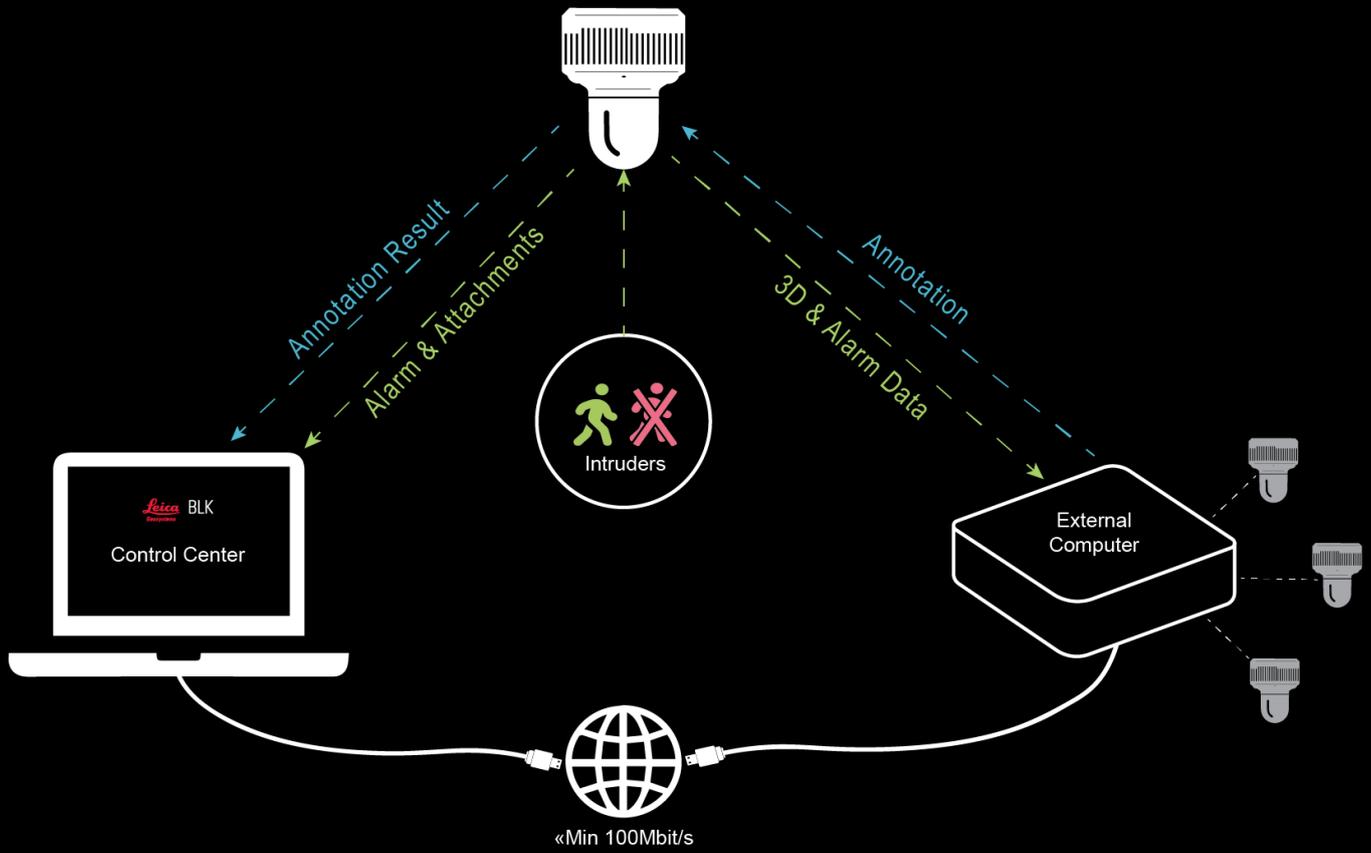
The external computer does not need to be in close proximity to the BLK247, nor does it need to be physically connected to the BLK247. However, both devices need to be connected to the same network. The following requirement needs to be fulfilled:

Network connection between external computer & BLK247	Minimum 100 Mbit/s
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Product recommendation: [Intel® NUC 10th generation or higher](#)

¹ For example Intel® i5/i7/i9

AI Schema



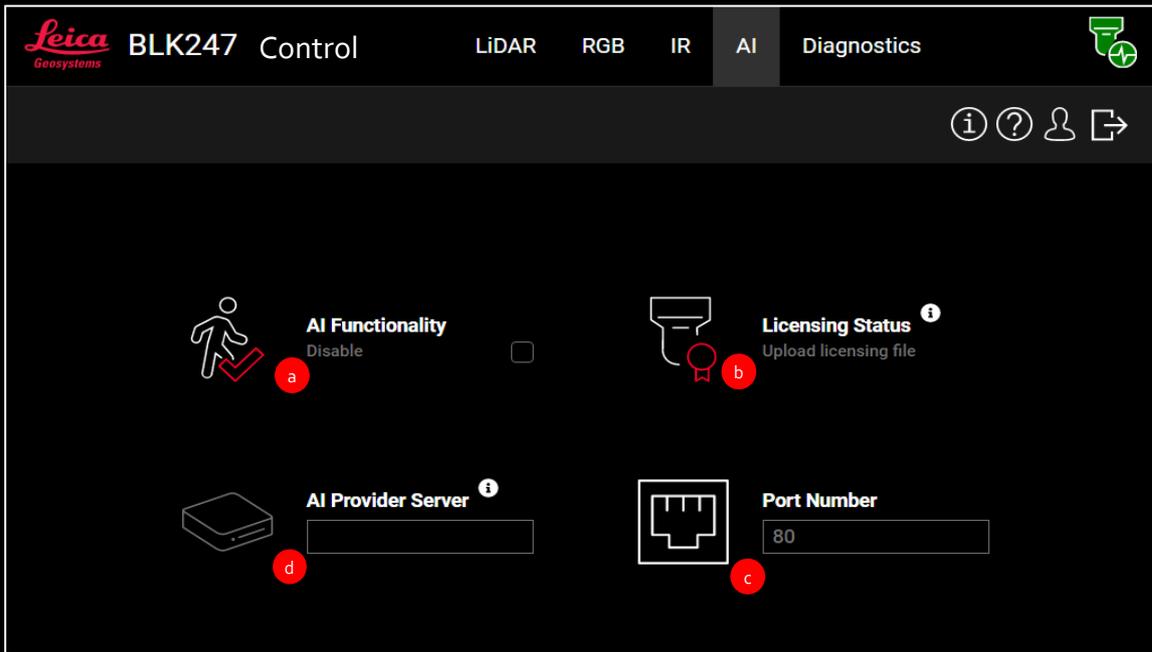
Object Type & Classification

The table below shows different objects types and their expectable classification.

Object	Human	Non-human
Single person	X	
Group of person	X	
Person with dog	X	
Person with smaller objects (suitcase, bag, trolley)	X	
Person on bicycle	X	
Animals		X
Autonomous devices		X
Bicycle		X
Car		X
Car with driver / passenger		X

BLK247 AI Setup and Installation

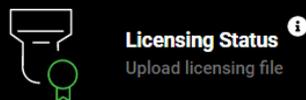
1. Purchase the AI license via the Leica partner store or contact your salesperson. The serial number of the BLK247 must be provided. The AI licence is bound to the selected device and cannot be transferred to any other device.
2. The installed firmware on the BLK247 must be v1.7 or higher
3. Download the AI software and AI model from myWorld
4. Setup the external computer
 - Follow the detailed instructions of the [technical installation manual](#) in the appendix
 - It is recommended to use an IT specialist for the installation
5. Setup AI in the BLK247 Control Center



a) Enable the AI Functionality in the BLK247 Control Center

b) Upload the licensing file

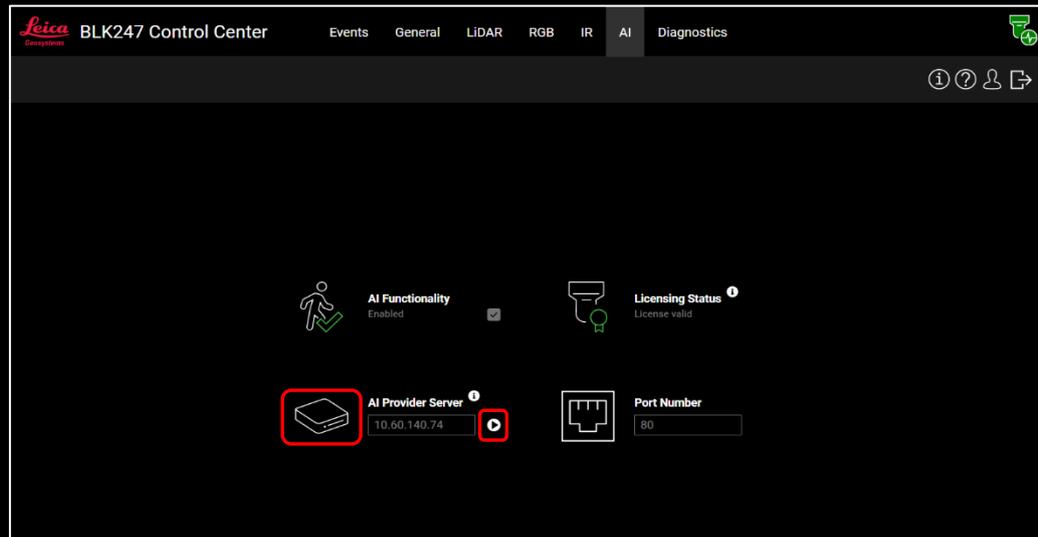
- After your successful purchase, you will receive the license key via email. The license key is also saved in your myWorld account.
- A green icon appears if the license key is valid



c) If needed, modify the port number of the external computer. The default value is port 80.

d) Enter the IP address of the external computer in the BLK247 Control Center

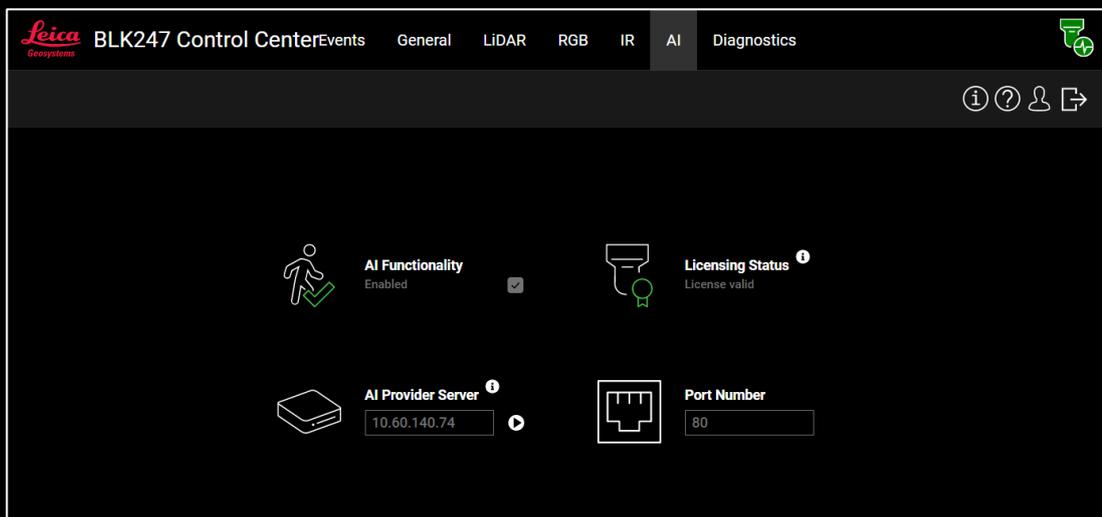
- The AI Provider Server page can be accessed by clicking on the icon or play button on both sides of the entered IP number.



- The AI Provider Server page shows the information and status of all BLKs connected to the AI Provider Server. The user can cancel single or multiple AI connections on this page by simply pressing the x icons. The BLK247 is responsible for reconnecting and restarting the provider if it is not running.

Container	Device	Host	Model	Started	State	
bc123f374de7	BLK247-4110304	10.60.140.125	Model ID 1	3 minutes ago	running	⊗
2987392ba7f0	BLK247-4110311	10.60.140.116	Model ID 1	4 hours ago	running	⊗
3fd8004a2a94	BLK247-4110326	10.60.210.74	Model ID 1	4 hours ago	running	⊗

e) The BLK247 Control Center is now successfully configured and looks as following:



6. The system should now be fully configured and setup.
Any new alarm will be classified as following:

- Objects classified as “human”:
- Objects classified as “non-human”:
- Objects “out of range” (25-30m):
- Failed classifications²:

Leica Geosystems BLK247 Control Center

Events General LIDAR RGB IR AI Diagnostics

From: 2021/12/02 00:00 To: 2021/12/02 23:59 Feature: Any Results: 20 Annotations: Select...

Search Reset

<input type="checkbox"/>	Date	Time	Zone	Feature	Attachments
<input type="checkbox"/>	2021/12/02	14:41:04	Below Scanner	FENCING	INFO RGB 1 RGB 2 RGB 1 RGB 2 IR 3 Mesh PAN R IR 1 PAN M 
<input type="checkbox"/>	2021/12/02	14:40:31	Far Away	FENCING	INFO RGB 1 RGB 2 RGB 1 RGB 2 IR 3 Mesh PAN R IR 1 PAN M 
<input type="checkbox"/>	2021/12/02	14:40:00	Below Scanner	FENCING	INFO RGB 1 RGB 2 RGB 1 RGB 2 IR 3 Mesh PAN R IR 1 PAN M 
<input type="checkbox"/>	2021/12/02	14:35:43	Far Away	FENCING	INFO RGB 1 RGB 2 RGB 1 RGB 2 IR 3 Mesh PAN R IR 1 PAN M 
<input type="checkbox"/>	2021/12/02	14:31:18	Far Away	FENCING	INFO RGB 1 RGB 2 RGB 1 RGB 2 IR 3 Mesh PAN R IR 1 PAN M 
<input type="checkbox"/>	2021/12/02	14:24:31	Below Scanner	FENCING	INFO RGB 1 RGB 2 RGB 1 RGB 2 IR 3 Mesh PAN R IR 1 PAN M 
<input type="checkbox"/>	2021/12/02	14:21:07	Below Scanner	FENCING	INFO RGB 1 RGB 2 RGB 1 RGB 2 IR 3 Mesh PAN R IR 1 PAN M 
<input type="checkbox"/>	2021/12/02	14:15:54	Below Scanner	FENCING	INFO RGB 1 RGB 2 RGB 1 RGB 2 IR 3 Mesh PAN R IR 1 PAN M 
<input type="checkbox"/>	2021/12/02	14:15:29	Far Away	FENCING	INFO RGB 1 RGB 2 RGB 1 RGB 2 IR 3 Mesh PAN R IR 1 PAN M 
<input type="checkbox"/>	2021/12/02	14:14:04	Below Scanner	FENCING	INFO RGB 1 RGB 2 RGB 1 RGB 2 IR 3 Mesh PAN R IR 1 PAN M 
<input type="checkbox"/>	2021/12/02	14:13:37	Below Scanner	FENCING	INFO RGB 1 RGB 2 RGB 1 RGB 2 IR 3 Mesh PAN R IR 1 PAN M 

² Refers to objects that failed to be classified due to e.g. connection problems

FAQ

General

What is the primary benefit of having AI functionality?

- The AI functionality is of most benefit to those who are specifically interested in being notified when humans are entering into a virtually geofenced area. The classification is done based on the 3D LiDAR data and it works regardless of the lighting conditions.

Installation and Setup

Can anyone install and setup AI?

- No, the AI installation needs to be done by an IT specialist with Linux expertise.

Can the external computer also be used to support other non-AI functions?

- No, the external computer must be dedicated to the classification of alarms generated by the BLK247.

Does the external computer need to be located in close proximity to the BLK247?

- No, however, the network connection between the external computer and the BLK247 needs to be at least 100Mbit/s.

Can I connect more than one BLK247 to the external computer?

- Yes. You can connect up to 4 BLK247's to the same external computer provided that it meets the minimum specified requirements.

Can AI be installed and run only on the BLK247?

- No, this is currently not possible. The processing must be done on an external computer.

Can I install the AI system on a computer running the Windows OS?

- Leica does not support this option.

Can I use any CPU?

- No, the AI requires as minimum specification a computer with an Intel Core i5 chipset or similar with VMX instructions support.

Data & Classification

What data is used for the classification?

- Only LiDAR data is used for the classification.

Will AI also work in complete darkness?

- Yes. As the AI is based on LiDAR data it works in both lit environments and in completely dark environments.

Will the AI work where I am not allowed to use RGB cameras due to privacy concerns?

- Yes, for the classification only LiDAR data is used, therefore it does not matter whether you have the RGB cameras enabled.

Does the system automatically learn and improve?

- No, the system is not designed to automatically learn and improve through use.

Are there different software versions available to cover all of my needs?

- Currently, there is only one software type available but we are working on more to cover additional use cases.

Will there also be a classification for animals and vehicles?

- Currently, this is not planned but it is certainly possible to add more objects for classification.

Are classifications 100% accurate?

- Due to the nature of the algorithms we cannot be 100% accurate. The accuracy is significantly affected by the distance to the sensor as well as on other factors (material, proximity of objects with one another, etc).

Is the classification based on the motion patterns of the detected objects moving through the scene?

- No. The classification happens based on one LiDAR frame and it does not study the motion pattern over a longer time to judge if the behaviour fits to a person or not.

How am I classified when I enter a zone on a bicycle?

- Humans are clearly visible on bicycles and are therefore classified as humans. The same applies to motorbikes. However, a person in a car is not identified as a human as the car (including the passengers) is classified as one non-human object.

How am I classified when I enter a zone with a dog?

- This depends how close the dog is walking next to you. If there is enough distance in-between, you are classified as two objects one as human and the dog as non-human. However, if walking very close to each other you will be classified as one human object.

Will someone crawling along the ground be classified as a human?

- Yes. The system is trained to recognise humans in all body positions.

Do classifications function for the entire 30m (98ft) range of the BLK247?

- No. Classification only work up to 25m (82ft). However, you have the ability to receive a new alarm every 10 seconds and if the object is then closer to the BLK247 it will be classified in that next alarm.

Can I change the icons or colours of the icons?

- No, this is currently not possible.

What happens when more than one object enters a zone?

- If more than one objects enter a zone, all objects receive a classification if they are closer than 25m to the BLK247.

Licensing & Costs

I purchased my BLK247's some months ago. Can I purchase and enable AI for these devices?

- Yes. Licenses may be purchased both at the point of sale and afterwards.

Are there any annual recurring costs for licensing or software updates for BLK247 AI?

- No. Licensing is permanent and is bound to the serial number of individual BLK247's and cannot be transferred.

Is it possible to get a trial version of the AI software?

- Trial versions are not currently available. Please contact your sales representative to discuss your needs.