

Installation and Operating Instructions

Edition 12.2022



CARGUARD ANGEL VIEW™ – RAV-KI **Artificial intelligence camera with person recognition**



CARGUARD TURN ANGEL VIEW™ – RAV-KI **Turn-off assist system with AI and person recognition**

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Thank you for choosing a product from our company. Our products are manufactured to meet the highest standards of quality, functionality and design and comply with all required guidelines. Please read these instructions carefully before installation and commissioning in order to exclude installation and operating errors.

We wish you much pleasure with your product.

ABOUT THIS PRODUCT

This AI Angel View® camera with artificial intelligence uses deep learning technology and can detect people with high precision in real time, distinguish them from another obstacle such as parked cars, trees or lanterns and reliably warn the driver by a faster sound sequence on the monitor.

The operator can choose to be warned only of collisions with people, or also of vehicles in a freely definable area, thus avoiding unnecessary alerts to other classes of objects.

Without this system, people can only be detected by chance or too late due to blind spots.

With the Turn Angel View® camera variant, the driver can choose up to which speed (0-40 km/h) warnings are issued in a freely definable range to avoid unnecessary alerts. The external GPS antenna ensures safety.

A unique feature is an additional inertial navigation system, a 3D measurement system with several acceleration and angular rate sensors, in case GPS reception should be insufficient for a short time due to weather conditions or high-rise buildings. By connecting a steering angle sensor and/or the turn signals, the warning can also be given only when turning, for example when crossing bicycle lanes.

This artificial intelligence runs on the camera in a space-saving way, without any additional hardware, and it provides a day-bright, crystal-clear 1080p view even at night and in bad weather, resulting in a market-leading detection rate close to 100%.

Key product features:

- 3 freely definable detection zones (can be switched on/off separately and display can be selected)
- Erkannte Personen werden in einem farbigen Rahmen auf dem Bildschirm angezeigt (ein-ausschaltbar)
- Volume, alarm tone and alarm duration is freely selectable
- Detection ranges separately adjustable between 0.1 and 15m (150° horizontally and 40° vertically) at higher mounting, than 3m the range increases
- Detection sensitivity adjustable in 3 steps
- Triggers such as reversing signal, turn signal or steering angle sensor can be connected
- Quick and easy configuration via web interface by connecting your smartphone to the camera via WiFi module
- Alternatively, configuration via PC using USB LAN cable is also possible
- Pause between alarm triggers is freely selectable
- Device configuration easily transferable to the cameras of other vehicles through export
- Alarm output e.g. for activating a robust metal outdoor warning light/siren, Emergency stop of hydraulic aggregates or braking or switching off of machines.
- Anti-vibration certification: ISO 16750-3 (15 G), image can be mirrored and reversed
- Operating temperature between -25 and + 75°C, Highest water resistance IP69K

ABOUT THIS GUIDE

- ▶ Read these instructions carefully and observe all instructions given.
Pay particular attention to all safety instructions and warnings.
Keep these instructions with the product and also pass them on to third parties if necessary.

In case of damage caused by non-observance of the instructions, the warranty claim expires.
We accept no liability for consequential damage resulting from this.

HELP WITH PROBLEMS / HOTLINE

- ▶ Contact our hotline if problems arise during installation or if the instructions are unclear to you. Especially before you try something that could damage the product or your vehicle. You are also welcome to contact our hotline if you have any other questions about one of our products.

Hotline for technical questions and help with installation problems: +49 (0178) 880 8400

GENERAL SAFETY INSTRUCTIONS

Intended use

- The camera is only suitable for permanent installation in vehicles with an on-board power supply of 10 - 32 VDC.
The use of a camera does not release the driver from the general duty of care when driving vehicles. Furthermore, it cannot guarantee a 100% detection rate.
There must be no obstructions in the area of the lens that affect the use of the product.
Intended use also includes reading this manual completely and following all instructions.

Electrical installation

When handling products that come into contact with electrical voltage, the applicable VDE regulations must be observed. These are in particular VDE 0100, VDE 0550/0551, VDE 0700, VDE 0711 and VDE 0860.

- ▶ We recommend that the switch box be installed by a specialist workshop.
- ▶ It is essential that you observe the following instructions when installing the switch box yourself. This will prevent damage to the switch box, the vehicle or vehicle parts.
- ▶ Never use a test lamp to measure the cables, but always use a digital measuring device with the highest possible impedance.
ATTENTION! A test lamp can cause significant damage to your vehicle's electrical system (air-bag deployment, cable fire, etc.).
- ▶ Protect installed components to which the operating voltage of 10 - 32 VDC is connected with an appropriate fuse. Protect the main unit with a max. 3 A fuse. This may be installed with a maximum distance of 20 cm behind the positive pole of the battery.
ATTENTION! Do not insert the main fuse until installation is complete!
- ▶ Select a good ground point to avoid malfunctions.
Good ground points are the negative terminal of the battery and factory ground points on the body of the vehicle.
- ▶ Do not lay cables in places that can become hot or have sharp edges. If possible, lay cables in the cable ducts provided for this purpose by the vehicle manufacturer or fasten cables to the vehicle's existing cable harnesses.
- ▶ Always insulate unneeded cables at the cable end.

Storage and safekeeping

- Observe the permissible temperature ranges for storage and operation (see „Technical data“ on page 21).
- Do not expose the device to dirt, moisture or other harmful influences.
- Do not subject the device to any avoidable mechanical loads.

- Avoid direct impacts to the device.
- Do not open the device or handle it mechanically.

UNPACKING

- ▶ Remove all parts from the packaging and check the scope of delivery.
- ▶ If the scope of delivery is incomplete, please contact the Car Guard Hotline (see „Help with problems / Hotline“ on page 4).
- ▶ Save the packaging for later use or dispose of it in accordance with the regional regulations for the disposal of packaging material.

Scope of delivery

- 1 x AI camera (part no. RUZUKI1W32-004 or RUZUKI1W31-008)
- 1 x video output cable with alarm output (part no. RUZUKI1W31-006)
- 1 x Allen key (for angle adjustment of the camera)
- 1x manual

Accessories

Accessories may vary due to different applications.



Extension cable
1, 3, 5, 10, 15 or 20m



External Wi-Fi module
incl. Y-adapter



Outdoor siren with
Strobe light



GPS antenna



3 zone alarm outputs



Monitor for 3 cameras or
Quad split screen monitor

DEVICE OVERVIEW

Front view



1 AI camera lens

2 Night vision IR LED's

3 Adjustability of the camera angle

4 Fixing screw of the housing

MOUNTING

ATTENTION

Damage due to incorrect mounting or unsuitable mounting location

Incorrect mounting or mounting the camera in an unsuitable location can damage the AI camera or vehicle components.

- ▶ For installation, select a location that meets the following requirements:
 - The camera is not exposed to strong electromagnetic fields (e.g. due to strong electric currents).
 - At the installation site, the environmental conditions (temperature) are observed (see „Technical data“ on page 21).
 - The camera is not exposed to excessively strong vibrations.
- ▶ Mount the camera at the two mounting points provided for this purpose and make sure that the mounting is stable and permanent.
- ▶ Mount the camera in such a way that the connected cables can be routed without tripping and do not obstruct the driver.
- ▶ Do not damage the enclosed rubber seals of the camera.

You will need the following for assembly:

- ✓ Two screws (suitable for the conditions at the mounting location)
 - ✓ Suitable tools: cordless drill for pre-drilling the holes and screwdriver or cordless screwdriver
1. Determine a suitable mounting location by checking the camera image on a connected monitor or via a cell phone display connected via WiFi beforehand, and adjust the camera's tilt by loosening the two screws (No.3) on the housing according to the desired detection area.
 2. Pre-drill the mounting holes.
 3. Make all necessary connections and test for proper operation.
 4. Mount the camera and make sure that the screw connection is permanently stable.

INSTALLATION

⚠ CAUTION

Dangers due to incorrect installation

Incorrect installation with incorrectly routed cables or unprotected cable connections can result in damage to the components and the vehicle, e.g. due to scorched or burnt-out components or cables. Malfunctions caused by this can result in accidents.

- ▶ Lay all cables in such a way that they are protected from wear and tear, do not obstruct the driving of the vehicle and do not pose a trip hazard (e.g. in the entry area).
- ▶ Plug in cable connections completely and screw down screw connections tightly.
- ▶ Seal cable connections additionally with sealing tape if they are exposed to the weather.

Check the function of the camera and monitor before finally installing the cables and connections. In this way, you avoid a possibly time-consuming troubleshooting.

ATTENTION

Connect cables and components

(observance of the sequence is mandatory for correct operation):

- ▶ First connect the camera to one of the following adapters of your choice according to your equipment requirements:
 - **Adapter 1:** USB adapter with the WiFi module (Fig.1)
 - **Adapter 2:** CAN for connection of a DVR (video recorder)
 - **Adapter 3:** RS232 for connecting the outdoor siren with strobe light (fig.2)
 - **Adapter 4:** Alarm outputs for 3 zones (Fig.4)
 - **Adapter 5:** GPS antenna (Fig.3)
- ▶ Connect to the adapter of your choice the extension cable leading to the monitor
- ▶ Connect to the extension cable the Y-cable included in the camera delivery with the alarm output (e.g. +9-32V DC alarm speaker connection or machine stop signal).
- ▶ Connect the monitor to the Y-cable included in the camera delivery with the alarm output or the RAV-000 adapter when using without a monitor (the monitor supplies the camera with power)
- ▶ The camera's power connection is made at the RAV-000 adapter. A loudspeaker for the alarm messages can also be connected here via a cinch connection.
- ▶ The USB-Y adapter with the WiFi module for configuration must always be mounted directly behind the camera, otherwise the connection to the mobile phone is not stable enough.

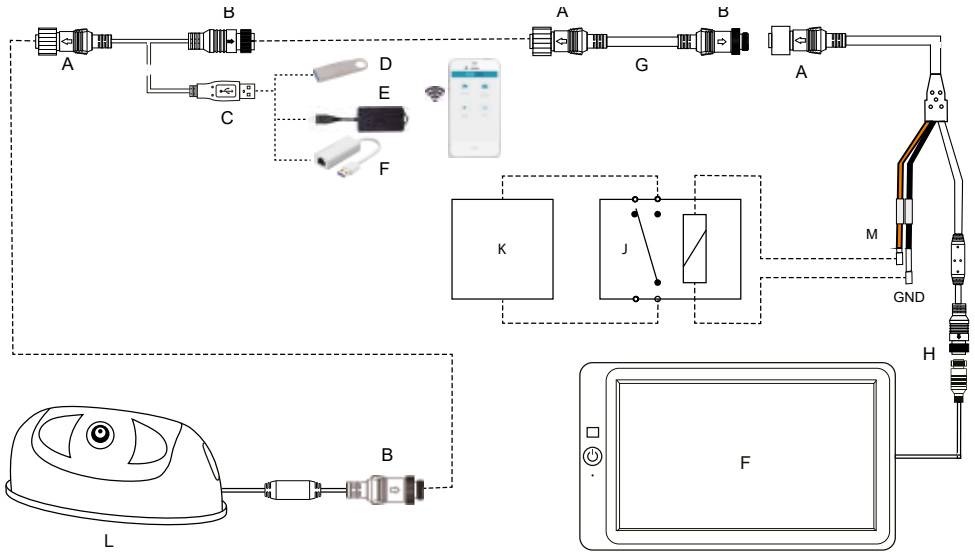


Abb. 1: Connection of the WiFi module for configuration of the camera and connection of the alarm output

Attention: The Y-cable for the WiFi module or LAN cable must be connected directly behind the camera and removed again after configuration.

- A 8PIN Threaded mouse male**
- B 8PIN Threaded mouse female**
- C USB 2.0 Interface male**
- D Flash Disk for updates**
- E WiFi Module (Art.Nr.:**
- F USB-LAN cable (Art.Nr.:**
- G Extension cable (Art.Nr.:**
- H 4PIN Aviation connection**
- I Monitor**
- J Relay with normally closed (NC) contact**
- K Motor interruption or alarm loudspeaker**
- L AI camera**

M Alarm output (max. 200 mA)

- 1. Brown** + 9-32 V DC
- 2. Black** GND

Alarm output (alarm speaker connection or machine stop signal)
 Connection to battery minus (ground)

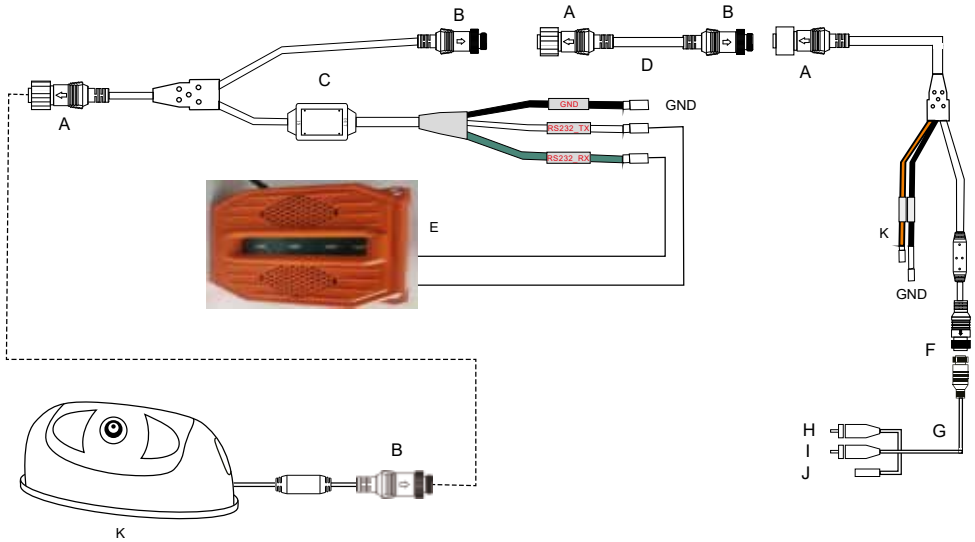


Abb. 2: Connection of the outdoor siren with strobe light

- A 8PIN Threaded mouse male**
- B 8PIN Threaded mouse female**
- C Y-cable for connecting the outdoor siren (Art.no.:**
- D Extension cable (Art.Nr.:**
- E Alarm siren with strobe light (Art.No.:**
- F 4PIN Aviation connection**
- G Adapter (Art.Nr.: RAV-000)**
- H Cinch video (camera image output)**
- I Cinch-Audio (Alarm output)**
- J Camera power supply **+9-32 VDC****
- K AI camera**

L Alarm output (max. 500mA bei 24V)

- 1. Brown** +9-32 V DC
- 2. Black** GND

Alarm output (alarm speaker connection or machine stop signal)

Connection to battery minus (ground)

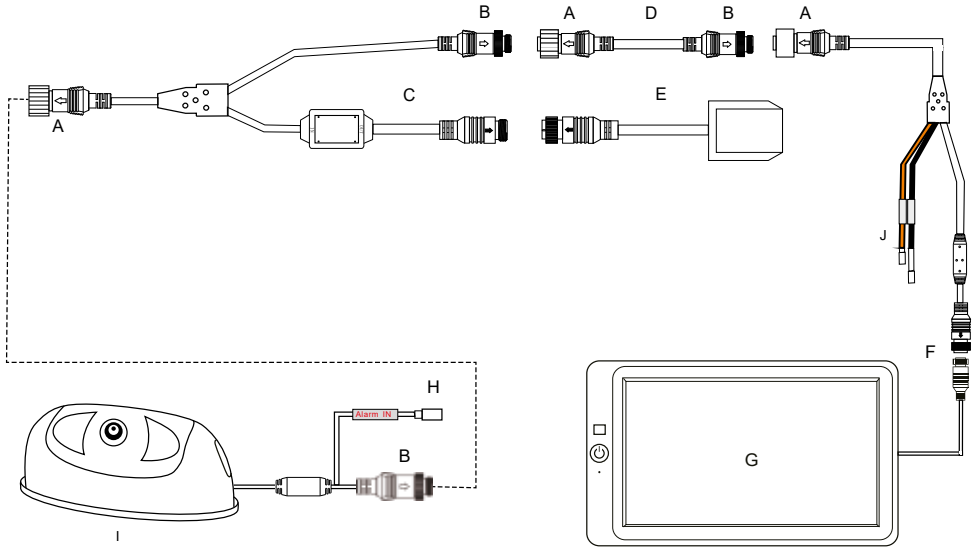


Abb. 3: Connection of the GPS antenna and the alarm input

- A 8PIN Threaded mouse male**
- B 8PIN Threaded mouse female**
- C Y-cable for GPS module (Art.no.:**
- D Extension cable (Art.Nr.:**
- E GPS-Module**
- F 4PIN Aviation connection**
- G Monitor**
- H Alarm input +9-32V DC for steering angle sensor or turn blinker**
- I AI camera**
- J Alarm output (max. 200mA)**
 - 1. Brown + 9-32 V DC**
 - 2. Black GND**

Alarm output (alarm speaker connection or machine stop signal)
 Connection to battery minus (ground)

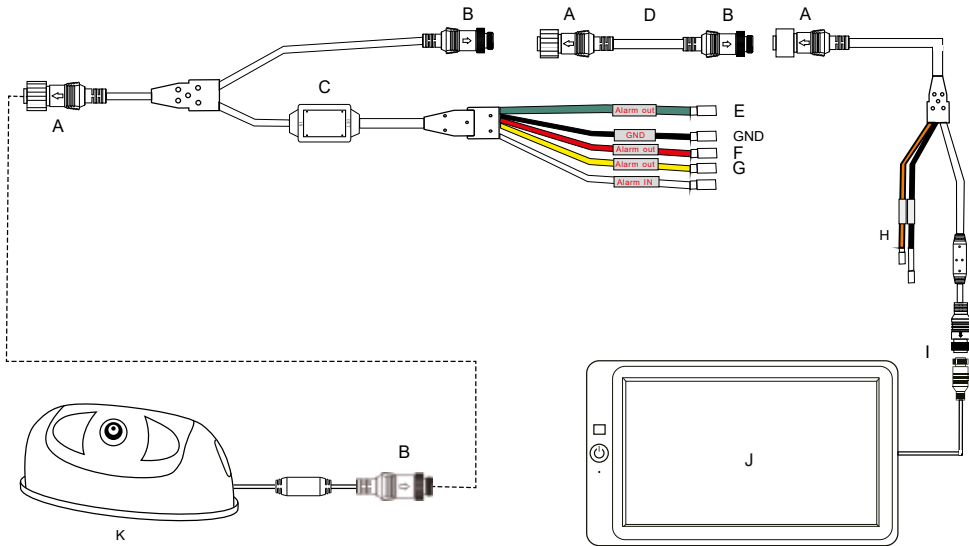


Abb. 4: Connection of the adapter with 3 alarm outputs

- A 8PIN Threaded mouse male**
- B 8PIN Threaded mouse female**
- C Y-cable with 3 separate zone alarm outputs (Art.Nr.:**
- D Extension cable (Art.Nr.:**
- E Alarm output for the green zone (max. 100mA) +9-32V DC**
- F Alarm output for the red zone (max. 100mA) +9-32V DC**
- G Alarm output for the yellow zone (max. 100mA) +9-32V DC**
- H Do not use alarm output**
- I 4PIN Aviation connection**
- J Monitor**
- K AI camera**

COMMISSIONING AND OPERATION

WARNING

Operation while driving

Operating the camera or monitor while driving may cause distraction from traffic and result in an accident.

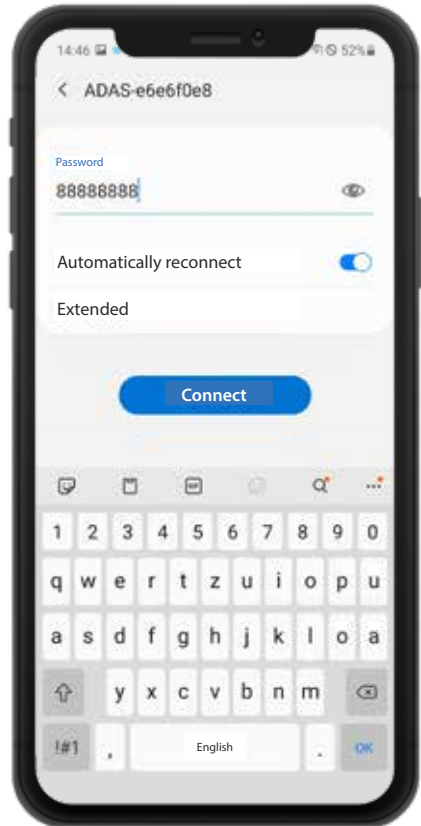
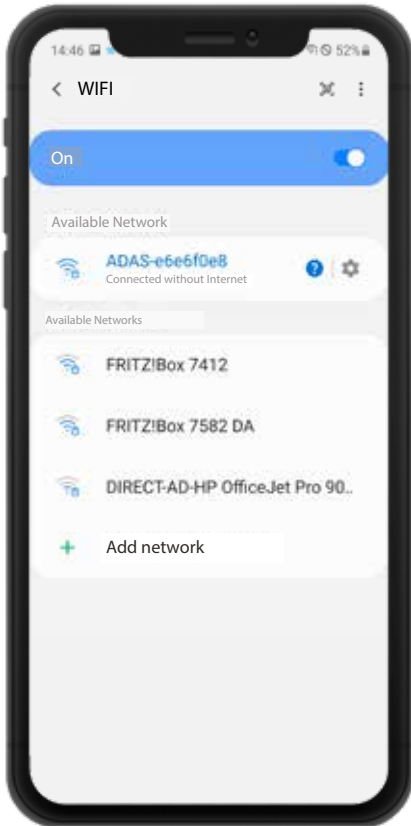
- ▶ Do not operate the camera and monitor while driving.
- ▶ In particular, do not operate the camera for the first time while driving.
- ▶ Do not rely exclusively on this device while driving!

Putting the AI camera into operation

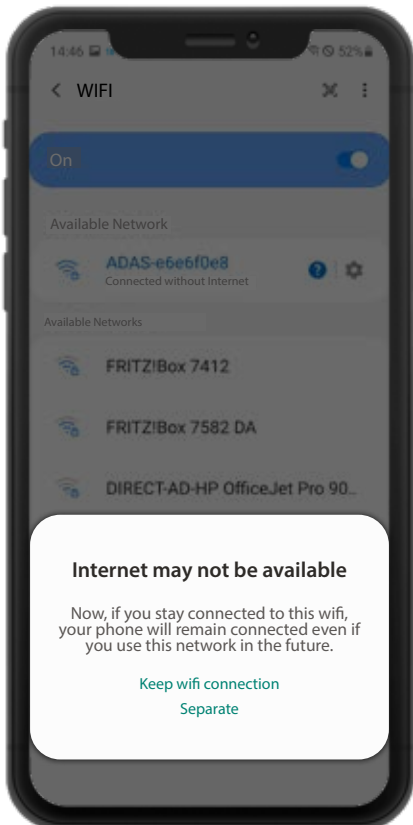
- ✓ AI camera, monitor(s) and camera(s) have been wired according to installation instructions.

CONFIGURING THE CAMERA

1. Install the WiFi module as shown on page 10 Fig.1.
2. Switch on the connected monitor and connect the power to the camera.
3. The start-up process of the camera is displayed on the monitor.
4. As soon as the camera has booted up, the WiFi-SSID number is displayed in green letters at the bottom left of the monitor.
5. Switch on the WiFi connection on your mobile phone and start the search for WiFi devices.
6. When your phone has found the WiFi-SSID number, it is displayed in your list of available WiFi devices.
7. Select it and connect by entering the password 88888888.



- When you connect to the WiFi hotspot for the first time, the following message "Internet may not be available" may be displayed. Please then click on the "Keep WiFi connection" button.
- Now call up your web browser and enter the URL "http://192.168.60.1" there. Alternatively, you can scan the QR code below with a previously installed QR code app and thus establish the connection to the camera.
- The browser opens the camera main menu as shown below.



11. After clicking Login, you will enter the configuration menu of the camera. You do not need a password at the beginning. To protect the configurations, you can assign a password here later in the menu item „System“. The WiFi range to the camera is about 7 m. Please stay within this range during the settings.

Defining the areas to be monitored.

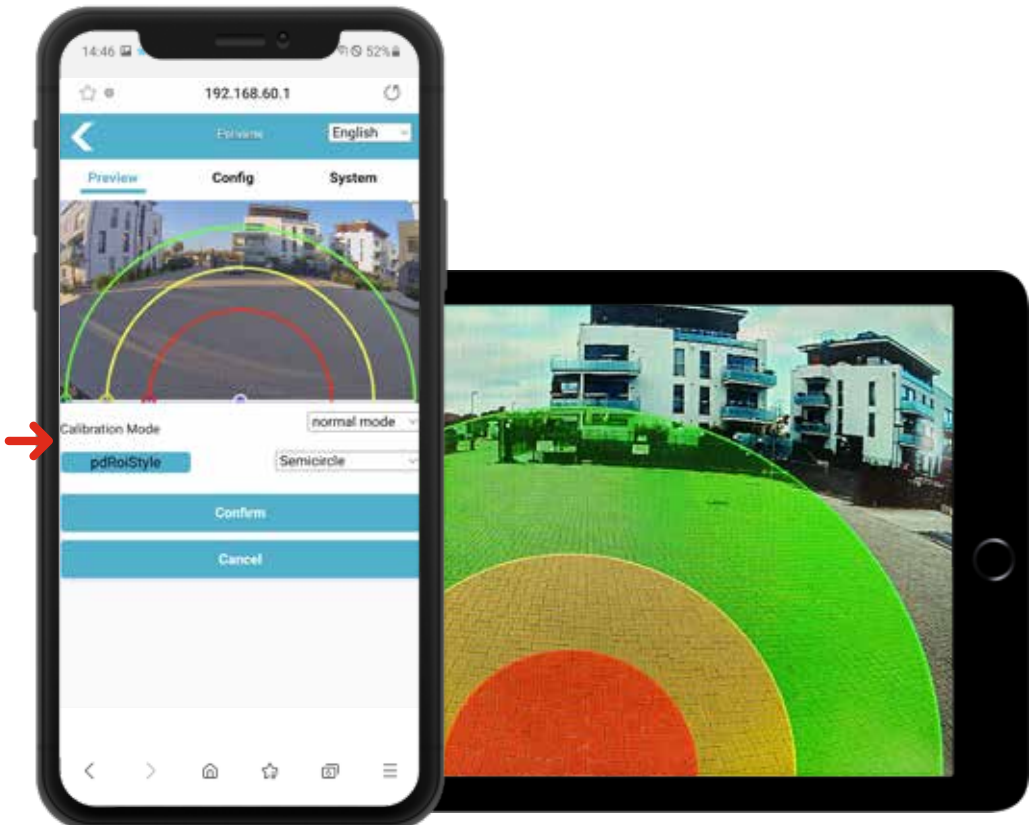
Todo this, please click on the left symbol for calibration



Depending on the purpose of the camera, the vehicle, the machine and the local conditions, you can select from the following different basic shapes and set the shape and size of the monitoring zones individually.

The „Calibration Mode“ should remain set to „normal mode“. The desired basic shape of the detection zones can be selected in the drop-down menu „pdRoiStyle“:

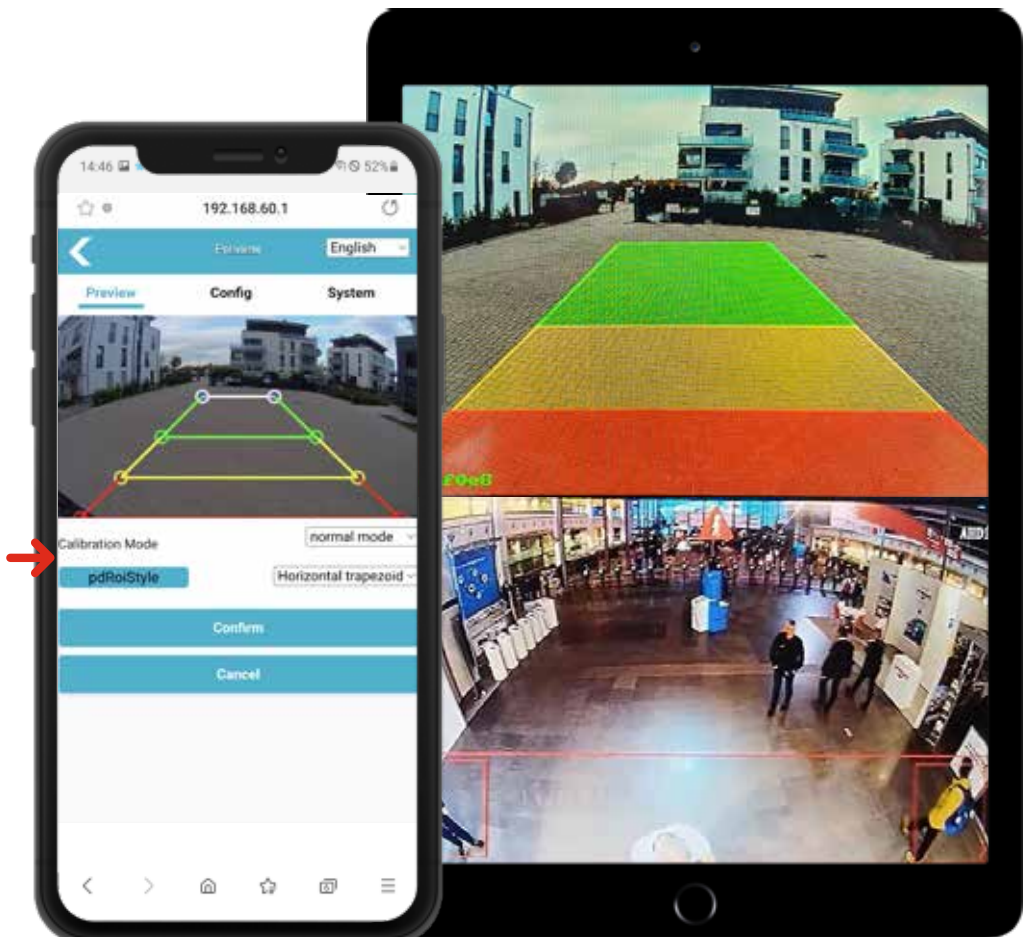
Semicircle: This setting allows for a circular around the vehicle and is best suited for construction equipment such as excavators.



It is possible to adjust the size of the individual monitoring zones according to your wishes. You can use your finger on your mobile phone to drag the small circles on the edges of the individual zones back and forth to adjust them according to your requirements. The changes to the corresponding line segment will take effect immediately and the „detection zone“ displayed on the monitor will be updated immediately.

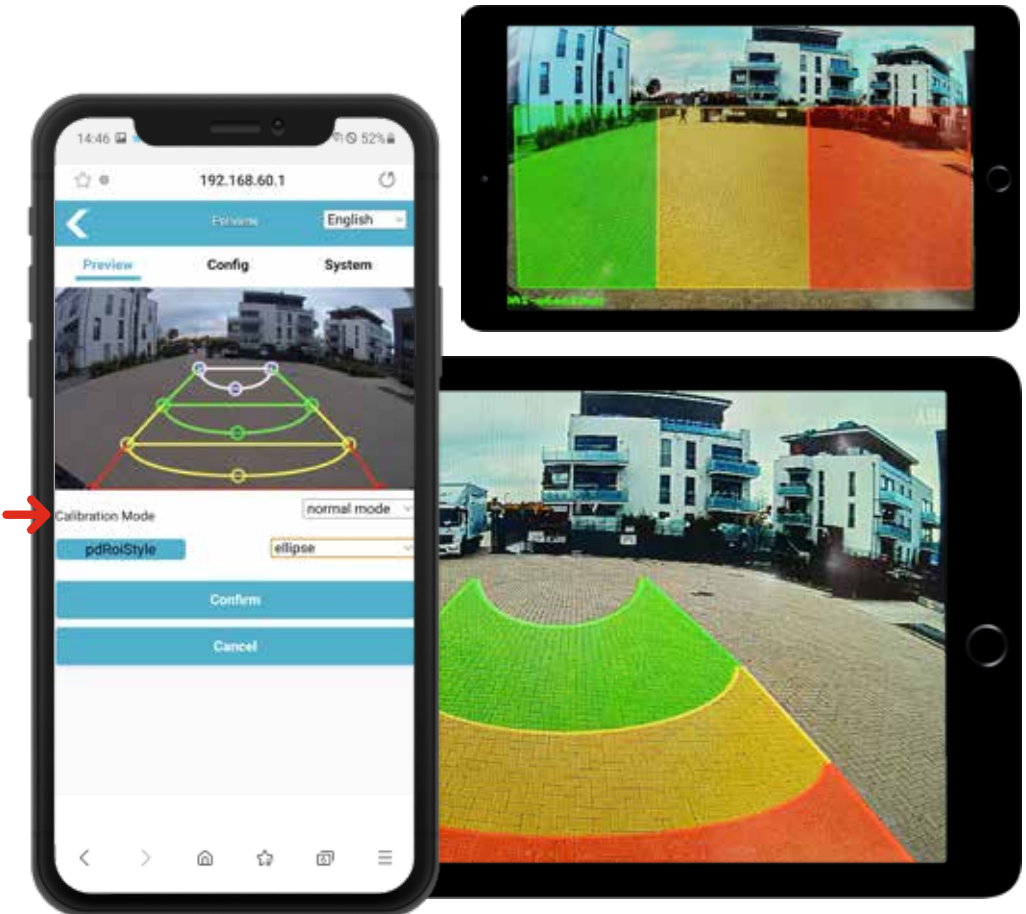
Horizontal trapeziod: This setting allows the monitoring fields to be limited laterally and allows, for example, alignment at the kerbas well as at the lane line on public roads for use as a rear view camera on trucks. (top screenshot)

Monitoring area when used as a **Turn Assistance System** (lower screenshot)



Ellipse: This setting allows the exact adaptation to the outer contour of e.g. construction machinery, as the shape of the elipse can be changed as desired.

Vertical (left red or right red): This setting enables e.g. a warning for persons approaching from the side.



Function description:

When pedestrians enter the detection area, they are framed with the corresponding colour on the display and an alarm signal with different priority is emitted. The alarm sounds until the pedestrians leave the detection area again. Each warning area can be activated and deactivated separately.

Up to three different detection areas can be activated:

Red warning area: If a pedestrian is detected here, a red frame is generated around the pedestrian to indicate that a person is in the danger area. The alarm sound is emitted three times at short intervals and is repeated continuously until the pedestrian moves away again.

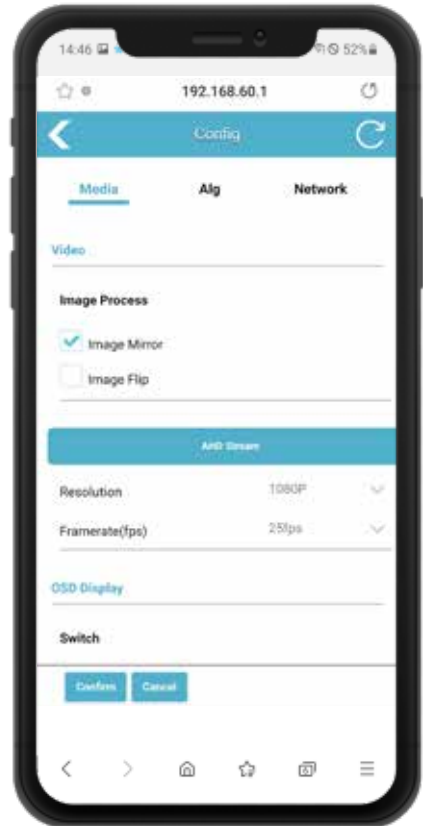
Yellow prewarning area 2: If a pedestrian is detected here, a yellow frame is generated around the pedestrian to indicate that a person is approaching the danger area. The alarm sound is emitted twice at longer intervals and is repeated continuously until the pedestrian moves away again.

Green pre-warning area 1: If a pedestrian is detected here, a green frame is generated around the pedestrian to indicate that a person is approaching the danger zone. The alarm sound is emitted once at long intervals and is repeated continuously until the pedestrian moves away again.

Notice: If you activate multiple detection areas for pedestrian detection, the alarm tone has the following priority: red warning area (highest) yellow pre-warning area (second) green pre-warning area (lowest). So if all three detection areas are entered at the same time, the priority alarm sound is the red warning area alarm sound three times.

System setting:

Clickon the „Config“ button to access the parameter settings, as shown below:

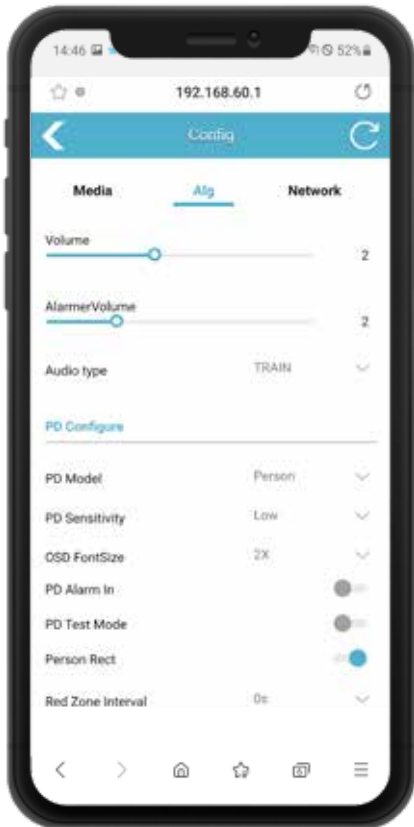


Menu: Config / Media / Video:

- Image Mirror: Here you can mirror the displayed image in order to apply the camera to the front or rear of the vehicle.
- Image Flip: Here you can flip the displayed image to apply the camera to the left or right side of the vehicle.

Menu: Config / Media / AHD Stream:

- Resolution: Here you can select the desired resolution of the camera image and adjust it according to the performance of the monitor used.
- Frame Rate (fps): Here there is the possibility to change the frame rate and thereby eliminate image distortions in case foreignelectronics cause them because they operate at the same frequency.



Menu: Config / Alg:

- **Volume:** Here you can adjust the volume of the alarm sound if you have connected a monitor with built-in loudspeaker. If you are using the RAV-000 cinch adapter instead, use this to change the signal on its white audio cinch plug.
- **Alarmer Volume:** If you have connected our external alarm loudspeaker to the white „Alarm out“ cable of the camera adapter, or if you are using the strobe outdoor siren, you can change its volume here.
- **Audio type:** In this drop-down menu you can choose from different alarm tones.

Menu: Config / Alg / PD Configure:

- **PD Model:** Here you can select whether the camera should only detect people, only vehicles or only people and vehicles. It is precisely distinguished from all other objects and only warns reliably of objects selected here.
- **PD Sensivity:** Here you can set the sensitivity of the detection. We recommend the „Low“ setting unless the camera only operates at night or underground.
- **OSD Font Size:** If you have switched on the PD test mode, a numerical value appears above the detection frame indicating the level of detection quality. Here you can change its font size.
- **PD Alarm In:** If you have connected a steering angle sensor or the turn signals to the white „Alarm input“ cable, switch this function on so that the camera only warns when the indicator is activated or the steering wheel is turned to turn.



Menu: Config / Alg:

- PD test mode: When switched on, blue frames with values between 0 and 1000 are displayed around detected persons. The higher the value, the more precise the person detection. If necessary, you can increase the detection sensitivity via the menu item „PD Sensivity“.
- Person Rect: If required, you can display a coloured frame (red/yellow/green) around persons (and vehicles if required) on the monitor. To do this, switch on this function.
- Red/Yellow/Green Zone Interval: Here you can select how long the pause between the alarm signals of the 3 monitoring zones should be.
- Alarm Out Duration (ms): Set here how long a signal should be present at the white „Alarm output“ cable. This way it can be adapted to the requirements of the connected devices. (e.g. machine stop)

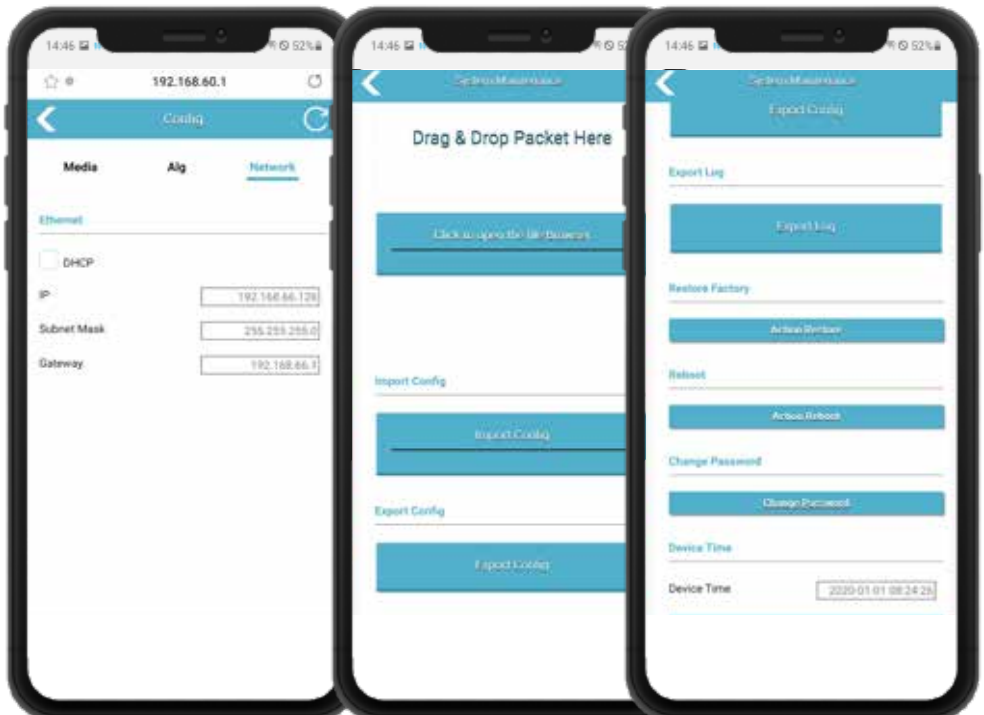
- Alarm Out Switch: Here you can select which monitoring zone is to receive an alarm signal on the white „Alarm output“ cable when it is triggered.
- Detection Zone Switch: Here you can determine which of the 3 monitoring zones should be activated. For a truck turn assist system, please use only the red zone.
- Detection Zone Display Style: Here you can choose between an optical line display, area display or no display of the detection zones on the monitor.
- Min. Work Speed (km/h): Specify here the speed above which warnings are to be issued. For a turn assist system we recommend 0 km/h.
- Max. Work Speed (km/h): Set here the speed up to which the warning should be given. For a turn assist system, we recommend 30 km/h, as the truck does not turn above this speed and poses a greater danger.

Menu: Config / Network

- Network Configuration: Supports manual setting of unit IP, mask, gateway and other parameters. If you are connected to the machine via a network cable you can enter http://IP to access the web page.
- This is an alternative browser connection without using the WiFi module. You need an optional network adapter for this. You can also connect RTSP streams via IP.

Menu: System

- Import Config: If you have several identical vehicles, you do not have to carry out the configuration you have just made again for each vehicle. Simply save simply save it via the menu item „Export Config“ in the file manager on your telephone and call it up again here from your storage location.
- Export Config: Here you can save the configuration you have just made on your mobile phone.
- Export Log: Here you can export the camera log data as RTSP or ONVIF. For the use of video software, IP camera viewer or other software, please ask us for separate instructions
- Resore Factory: Reset to factory settings
- Reboot: Restart the unit
- Password: Change the password for the device login here for configuration setting



MAINTENANCE AND CARE

Maintenance

There are no user-serviceable components inside the AI camera.

- ▶ **Do not open the housing! This will void all warranty claims.**

Reinigung

ATTENTION

Unsuitable cleaning agents and cleaning that is too wet

Unsuitable cleaning agents with dissolving ingredients or cleaning particles can damage the housing. If the temperature and water pressure are too high at short distances, liquid can penetrate the housing and damage the camera.

- ▶ Clean the housing only with a slightly damp cloth.
 - ▶ Remove heavier soiling additionally with a mild cleaning agent.
-

DISPOSAL

Disposal of electrical and electronic equipment

Electrical and electronic devices must not be disposed of in household waste.

- ▶ Hand in old appliances at municipal collection points.
- ▶ Observe the national regulations for disposal in your country.



WARRANTY

All information is without guarantee. Car Guard accepts no liability for errors or misprints. The statutory warranty of 2 years applies.

The warranty is void in the following cases:

- The operating instructions were not followed.
- The device was installed incorrectly.
- The device has been modified or repair attempts have been made to the device.
- The device has been overloaded.
- The device has been connected to the wrong type of current or voltage or has been incorrectly polarized.
- The device has been operated incorrectly or handled negligently.
- The device has been damaged by bypassed or incorrect fuses.
- Components or cables have been damaged by corrosion.

The return of presumably defective parts is always at the expense of the customer.

Please note: Troubleshooting is only possible with a precise description of the error and a copy of the end customer invoice.

We do not assume any warranty or liability for damages or consequential damages in connection with this product.

We reserve the right to repair, rework, supply replacement parts or refund the purchase price.

TECHNICAL DATA

AI camera RAV-KI

Viewing angle (D)	Version 1: 52°/ V2: 170° /V3: 210°
Detection distance (m)	0,2-15 m
Dimensions (mm)	139,7 x 63,2 x 53,5 mm
Weight	386 g
Power supply	10 – 32 V DC
Resolution	HD 1920 x1080 / 25 fps or 1920 x1080/30 fps
Video output	AHD (1.0Vp-p,75Ohm)
Dimensions (W x H x D)	115 mm x 77 mm x 170 mm
Focal length	2,3 mm
Audio output	Acoustic warning signal output
Communication interface	USB 2.0 (for software update)
Input power	10 – 32 V DC
Power dissipation (12V IN)	320 mA
Alarm input	max. 100 mA
Alarm output	max. 100 mA
Working temperature	-20 to 70°C
Storage temperature	-30 to 80°C
Waterproof	IP69K

EU DECLARATION OF CONFORMITY

We, the CARGUARD Technologies GmbH
Address: Röhrichweg 12/ 44263 Dortmund /Germany,
declare on their own responsibility that the product:

Equipment type: ANGEL VIEW™ - RAV-KI and TURN ANGEL VIEW™ - RAV-KI
Model: RUK11W32, RUK11W31

Complies with the following guidelines and standards or regulations:

UNECE R159, EMC Directive from 2004/108/EG
Motor Vehicle EMC Directive 72/245/EEC with amendments until 2009/19/EC

The product is marked with 

Dortmund, Jan. 21, 2023
(Place and date of issue)

Jens Bergemann, Managing Director, CARGUARD Technologies GmbH

(Name and signature of the manufacturer/authorized representative)

CARGUARD® Technologies GmbH | Röhrichweg 12 | D-44263 Dortmund

Installation: (0231) 880 8400 | E-Mail: info@carguard.de | www.carguard.de