

Operating Instructions

TVH2403

7" Digital Wireless HD Backup Camera System with Night Vision Camera



Please read all operating instructions before installing and operating the system.

Keep the manual for future reference.

OI-SC2403-01-EN_V0.2

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Precautions

Storage and Keeping

- Do not expose the monitor to excessive heat or cold. The storage temperature of the device is -30 - +80°C. The operating temperature is -20 - +70°C. The max. humidity is Rh90%.
- Do not use the monitor in environments with excessive moisture, dust or smoke.
- Avoid dropping or striking the device.
- Avoid using the device in enclosed spaces, areas with excessive vibration or subject to severe impacts.
- Never puncture or scratch the device.
- Do not place cables where they may get pinched or stepped on.
- The monitor is not designed to be waterproof.

Operating Precautions

- The device needs to be powered by an 12 or 24VDC automotive battery or electrical system.
- Remove the power cable connections when you do not intend to use the device.
- Any changes or modifications which are not specially approved in this manual can void your warranty and may necessitate expensive repairs.

Safety Precautions

- There are no parts need to be maintained inside the monitor or camera. Opening the monitor or camera should only be done by professionals.
- Make sure all cables are connected properly, especially observe polarity. Improper cable connections may cause damage to the system, fire or lead to injury.
- The system does not replace the operator's responsibility to observe their surroundings while driving.

	Caution	
	Risk of electric shock Do not open	
Caution: to reduce the risk of electric shock, Do not remove cover (or back). No user-serviceable parts inside. Refer servicing to qualified service personnel.		

Cleaning

- Remove all cable connections from the monitor before cleaning the device.
- Use a mild household detergent to clean the device with a slightly moist soft cloth.
- Never use aggressive cleaning chemicals, thinner or benzine as they may damage the surface of the device.

Declaration of conformity and certifications



This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

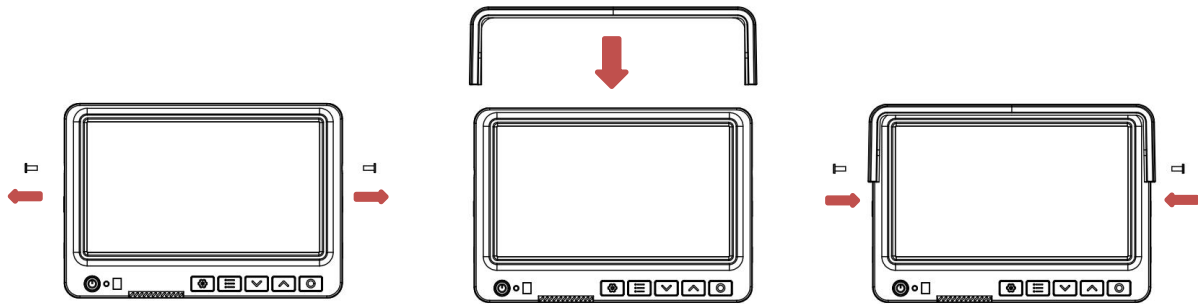
- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation.



Scope of Delivery

		
Wireless Monitor	Sun Shade with Screws	U-Bracket
		
Thumb Screws for U-Bracket	Pedestal Mount	Monitor Cable Harness
		
Wireless Camera with Sun Shade and Mounting Bracket	Power Cable for Camera	

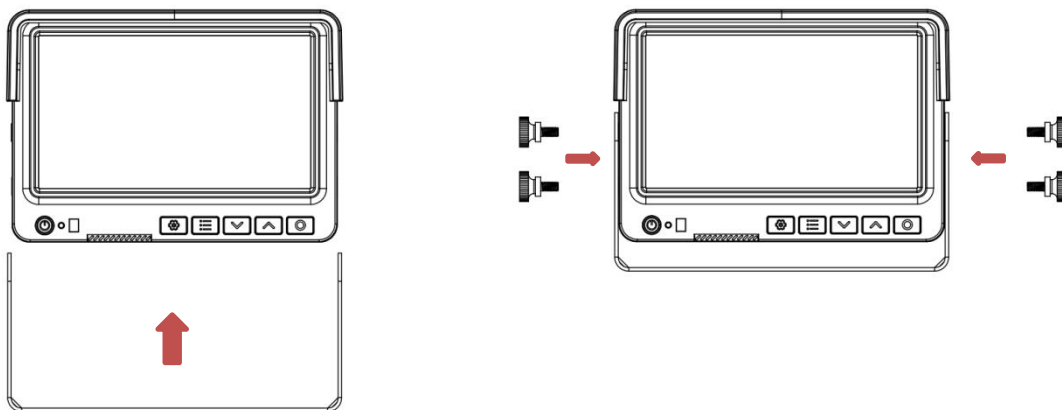
Installing the Sun Shade



- Remove the two M3x6 screws on the sides of the monitor.
- Attach the sun shield to the monitor from the top.
- Install the two M3x6 screws to lock the sun shade in place.

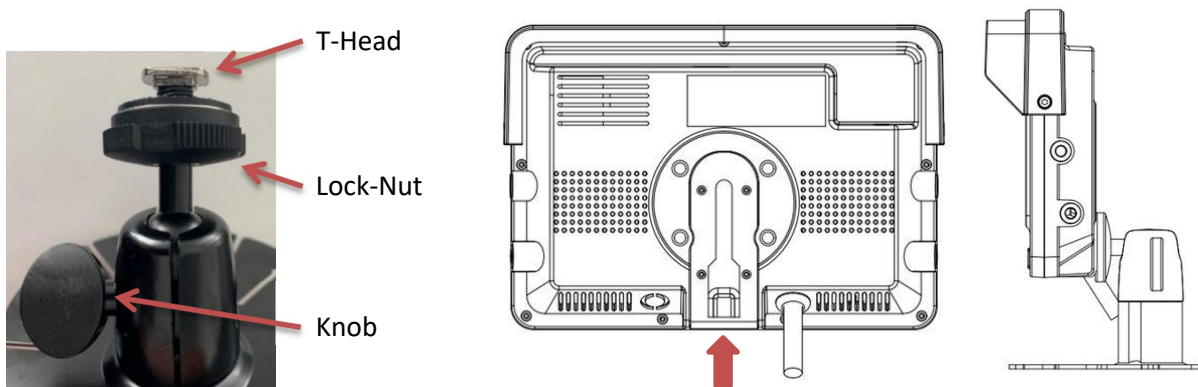
Installing Mounting Brackets

U-Bracket



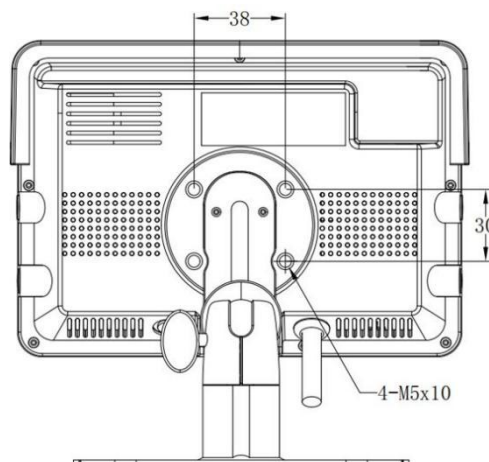
- Install the 4 thumb screws to lock the monitor in place.
- The monitor angle can be adjusted.

Pedestal Mount



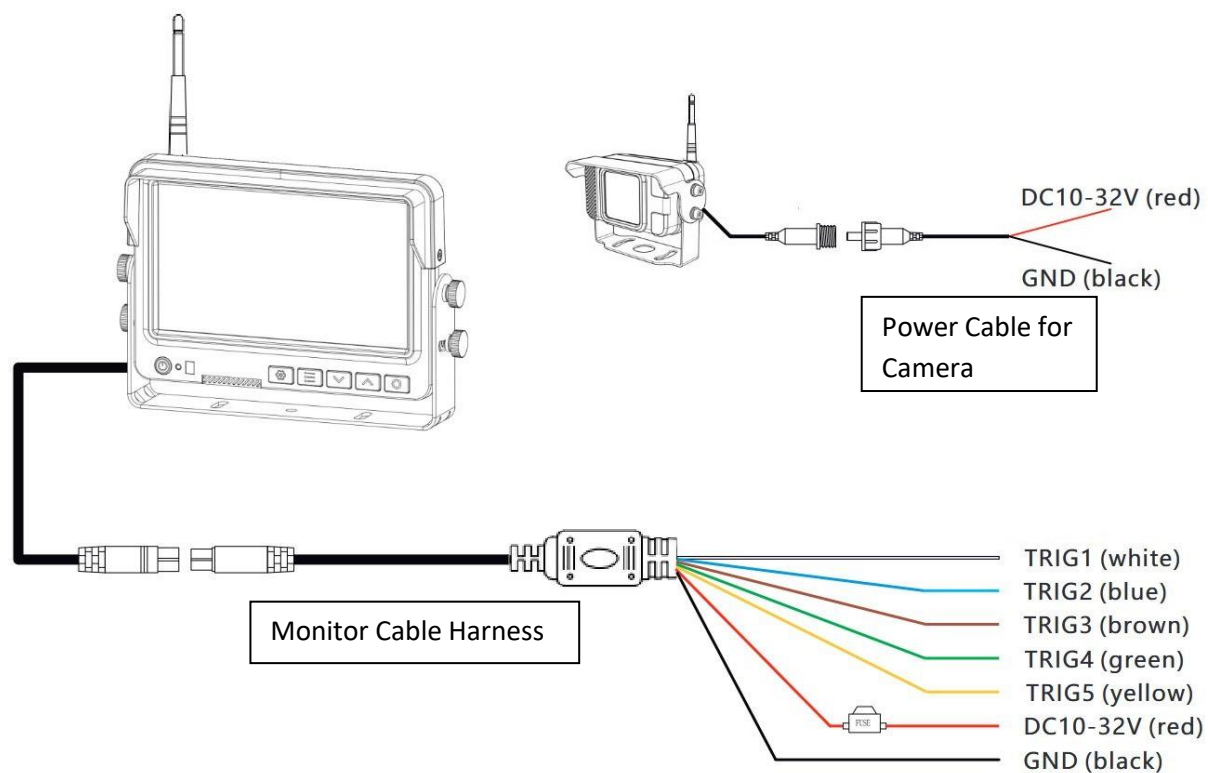
- Assemble the base plate to the mount with 3 screws. If needed attach the adhesive pad to the base plate.
- Loosen the lock-nut of the pedestal mount.
- Slide the T-Head of the pedestal mount into the rail on the back of the monitor from the bottom.
- Adjust the height as needed and tighten the Lock-Nut to lock the monitor in place.
- The monitor angle can be adjusted by the knob.

AMPS Mount



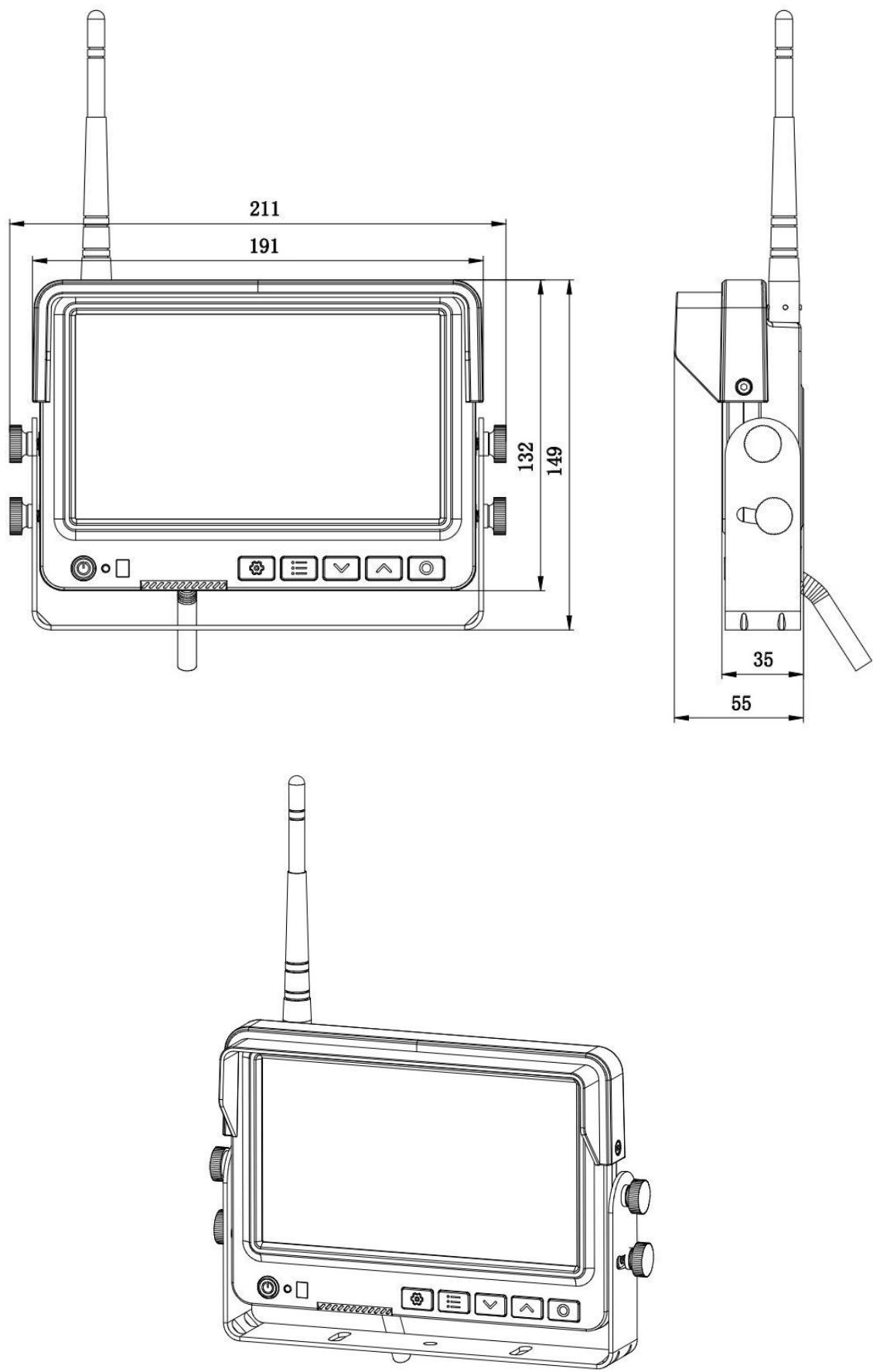
- The monitor can be attached to a standard AMPS mount.
- The maximum screw length is 10mm. Longer screws may damage the monitor.

Wiring Diagram



- The trigger wires can be connected to 12 or 24VDC signals to switch to the corresponding camera channels when signal is active.
- Trigger priorities can be set in the menu.
- Trigger delays can be set in the menu. This will avoid the camera channel to be turned on and off rapidly if connected to e.g. turn signals.

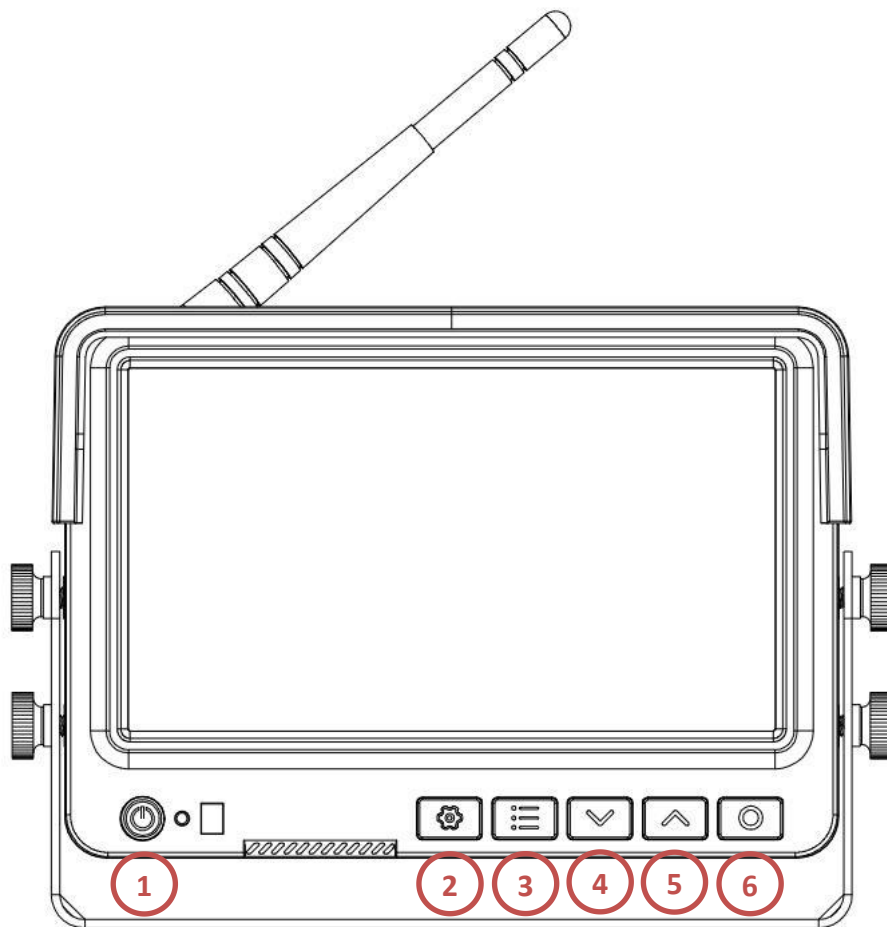
Monitor Dimensions



Monitor Specifications

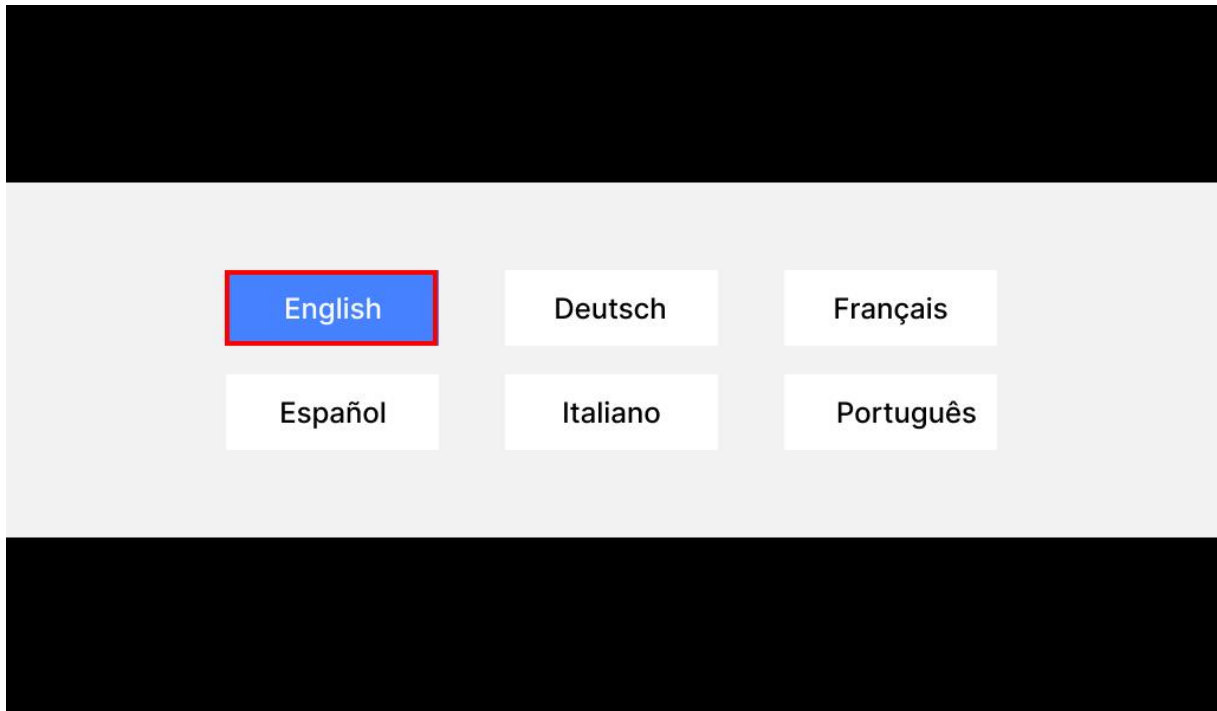
LCD Size	7"			
Resolution	1024 x 600			
Aspect Ratio	16:9			
LCD Panel	IPS			
Video Format	1080p	720p		CVBS
Video System	PAL		NTSC	
Frame Rate	25 fps		30 fps	
Channels	4 CH			
Multiview	Quad			
Brightness	600 cd/m²			
Contrast	600:1			
Viewing Angle	U: 85°, D: 85°, L: 85°, R: 85°			
Touchscreen	No			
Speaker	Yes			
Automatic Dimming	Yes			
Guide Lines	optional			
Picture Modes	Normal	Mirror	Flip	Mirror + Flip
Trigger Wires	5			
Trigger Delay	optional			
Remote Control	No			
OSD Languages	English, German, Spanish, Italian, French, Portuguese			
Frequency Range	2403MHz-2478MHz			
max. Range (Barrier Free)	FCC: 300 m	CE: 200 m		MIC: 100 m
Transmission Power	FCC: ≤26dBm	CE: ≤20dBm		MIC: ≤10dBm
Receiving Sensitivity	-78dBm			
Video Codec	H.264			
RF Bit Rate	max. 12 Mbps			
Modulation	FHSS			
Delay	max. 200 ms			
Operating Voltage	10-32 VDC			
Current @12 VDC	Monitor: MAX300 mA			
Power Consumption	max. 3.6W			
Operating Temperature	-20°C - +70°C			
Storage Temperature	-40°C - +80°C			
Dimensions	211 mm x 149 mm x 55 mm (with Bracket and Sun Shield)			
Weight	643g			
IP Protection Class	IP30			
Vibration Resistant	5 G			
Shock Resistant	7 G			
Mounting Options	Center Bracket	U-Bracket		100x100
Material	ABS, Metal			
Color	Black			
Cable Length	30 cm			
Wire Harness	detachable			
Cable Diameter	5.0 mm			
Monitor Connector	8 Pin			
Monitor Connector Diameter	8 mm			
min. Bending Radius	5 x Cable Diameter			

Monitor Operation



1. Power on/off
 - Turn the monitor on and off manually
2. Menu
 - Enter / exit menu
3. Quick Menu
 - Short press: Enter / exit quick menu
 - Long press: Enter / video playback
4. Down
 - Menu mode: navigate down / decrease value
 - Viewing mode: change to previous channel
5. Up
 - Menu mode: navigate up / increase value
 - Viewing mode: next channel
6. Hotkey
 - Menu mode: select / confirm
 - Viewing mode: 1. short press: hotkey for set channel; 2. Long press 3s: start recording

Language selection at first start



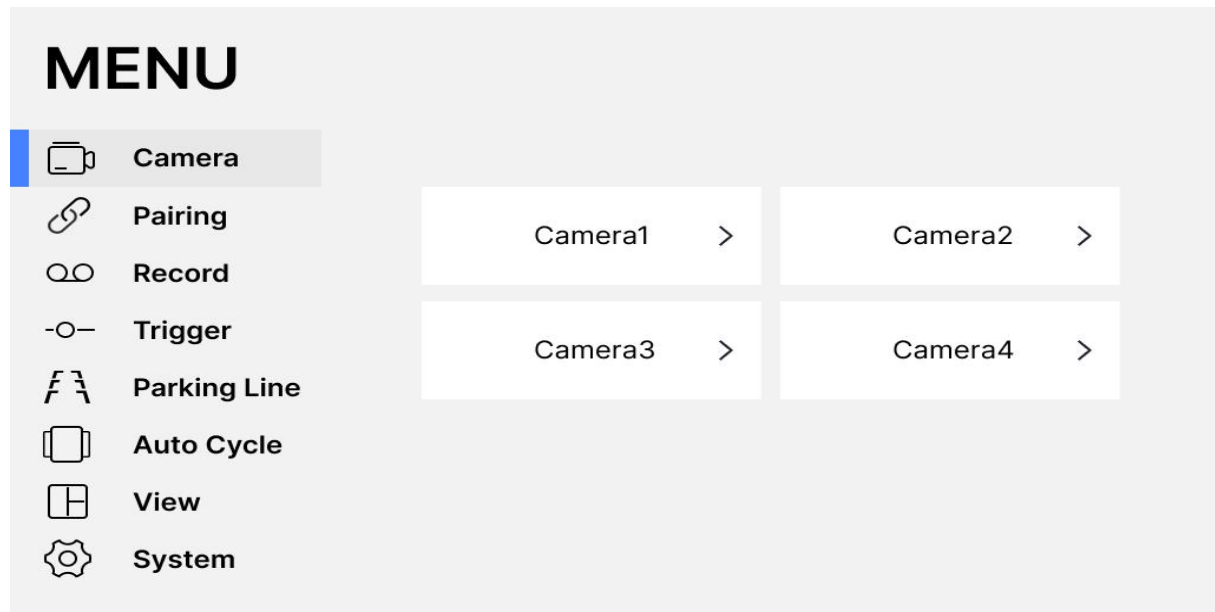
When the Monitor is turned on for the first time or the factory settings have been restored the system language needs to be selected. Afterwards the system language can be changed in the menu.

Pairing of Monitor and Camera

Before first use the monitor and the camera need to be paired. The monitor supports up to 4 cameras. There are two possible options to do the pairing. Please check the corresponding instructions under menu and quick menu below.

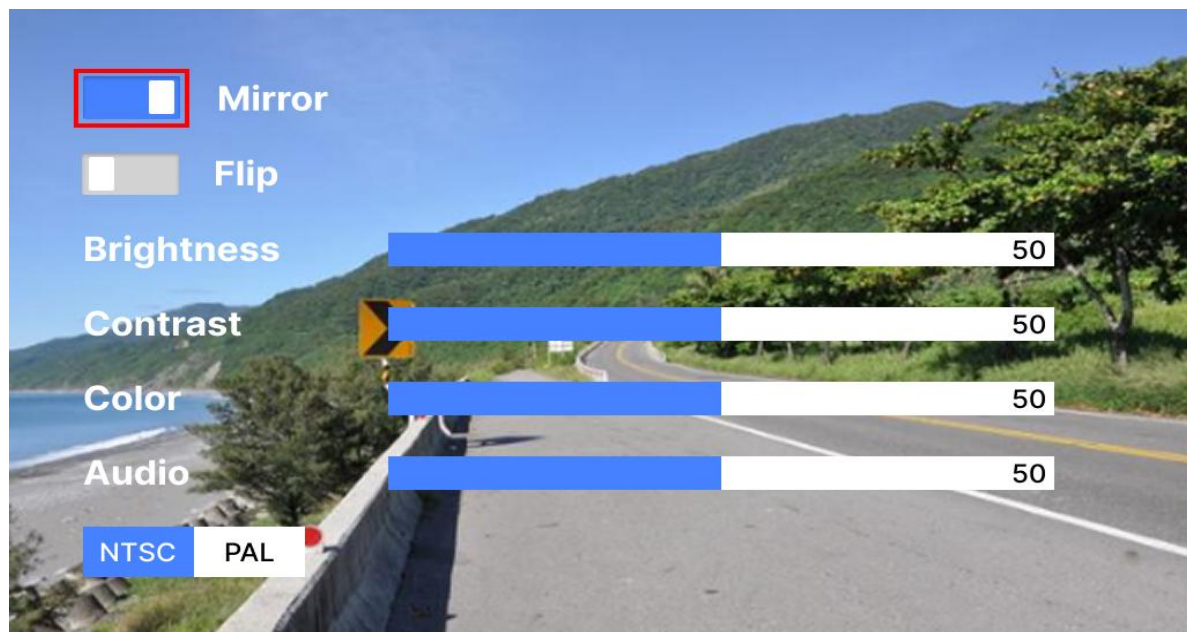
Menu

Camera



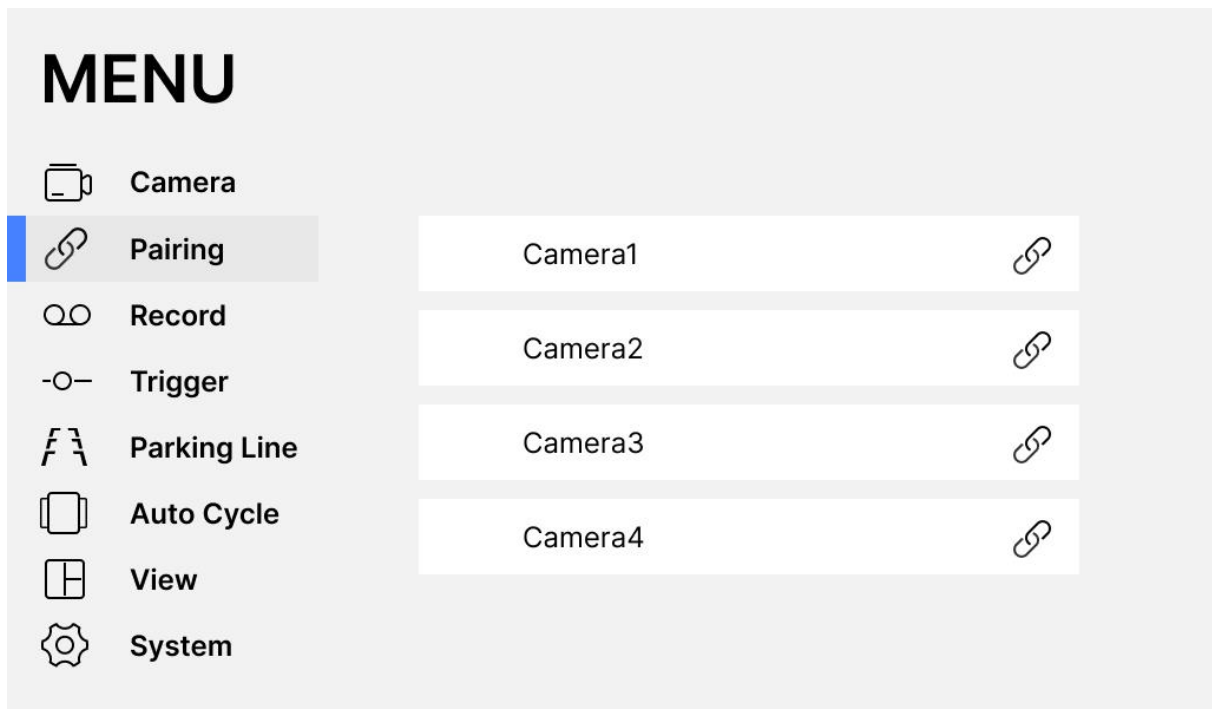
Select Camera1-4 to set image parameters for each channel independently.

Camera Parameters



- Mirror: Mirror the camera image.
- Flip: Flip the camera image upside down.
- Brightness: }
- Contrast: } **Change image settings.**
- Color: }
- Audio: Set the volume of the selected camera channel.
- NTSC/PAL: Change the video format.

Pairing



The pairing only needs to be done once at first use or when connecting a new camera. The configuration is saved after a restart of the system and the monitor will automatically connect to the previous paired camera when in range.

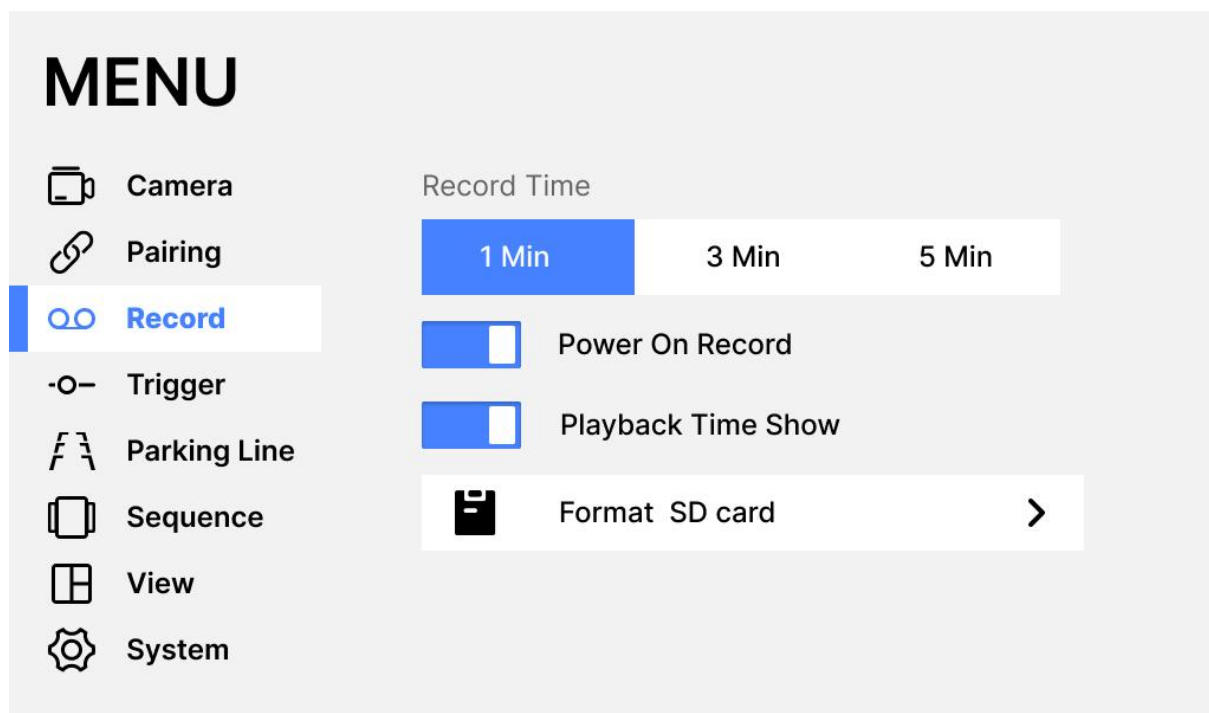
Ensure that the monitor and the camera are turned on and are within range to each other. It is recommended to do a bench test before installation.

Select a camera channel to pair a camera and confirm. A timer of 60 seconds starts. Within this time press the „PAIR“-Button on the backside of the camera. After some seconds the connection will be established and is indicated by a green checkmark.

Repeat with other channels to connect more cameras if needed.

To release a paired connection select and confirm a channel again. The bin symbol indicates that the pairing will be deleted. Afterwards a different camera can be paired to the selected channel.

Record



Record Time: Select the length of the single video files.

Power On Record: Enables the recording when turning on the device.

Playback Time Show: Displays the countdown of the video duration.

Format SD card: Deletes all files on the SD card.

Trigger

MENU

-  Camera
-  Pairing
-  Record
-  **Trigger**
-  Parking Line
-  Auto Cycle
-  View
-  System

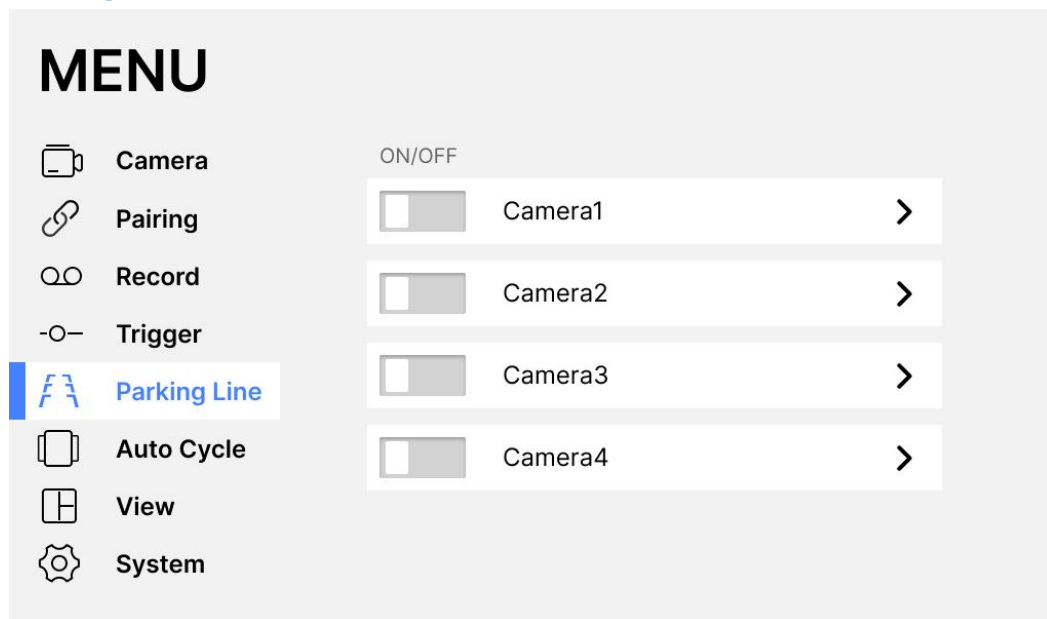
Priority	Delay		Display
1	2s	Trigger1	  
2	2s	Trigger2	  
3	2s	Trigger3	  
4	2s	Trigger4	  
5	2s	Trigger5	  

Priority: Shows the highest priority for the selected Display when multiple triggers are active at the same time. The triggers can be moved up or down to change priority.

Delay: Set the delay to change the display to previous mode after the trigger is deactivated. In case of the trigger is connected to a turn signal it avoids the displayed channel to be switched back and forth continuously.

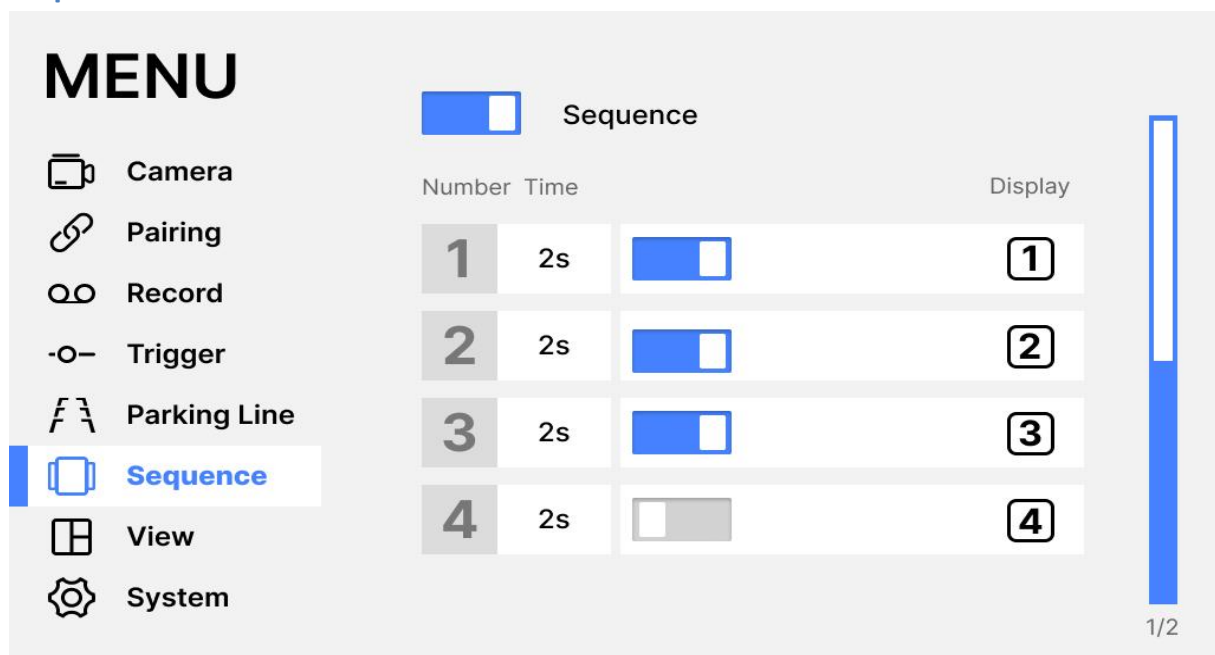
Display: Select the camera channel or multi-view mode activated by the trigger wire.

Parking Line



Parking Line: Parking Lines can be activated for each channel. There are 3 different styles to choose.

Sequence



When activated the auto sequence cycles through the selected display modes automatically.

Number: Position in the sequence.

Time: Time for how long the image is displayed.

Switch: Enables the position.

Display: Select the camera channel or multi-view mode.

The screenshot shows a 'MENU' screen with a list of settings on the left and a table of configurations on the right.

Menu List:

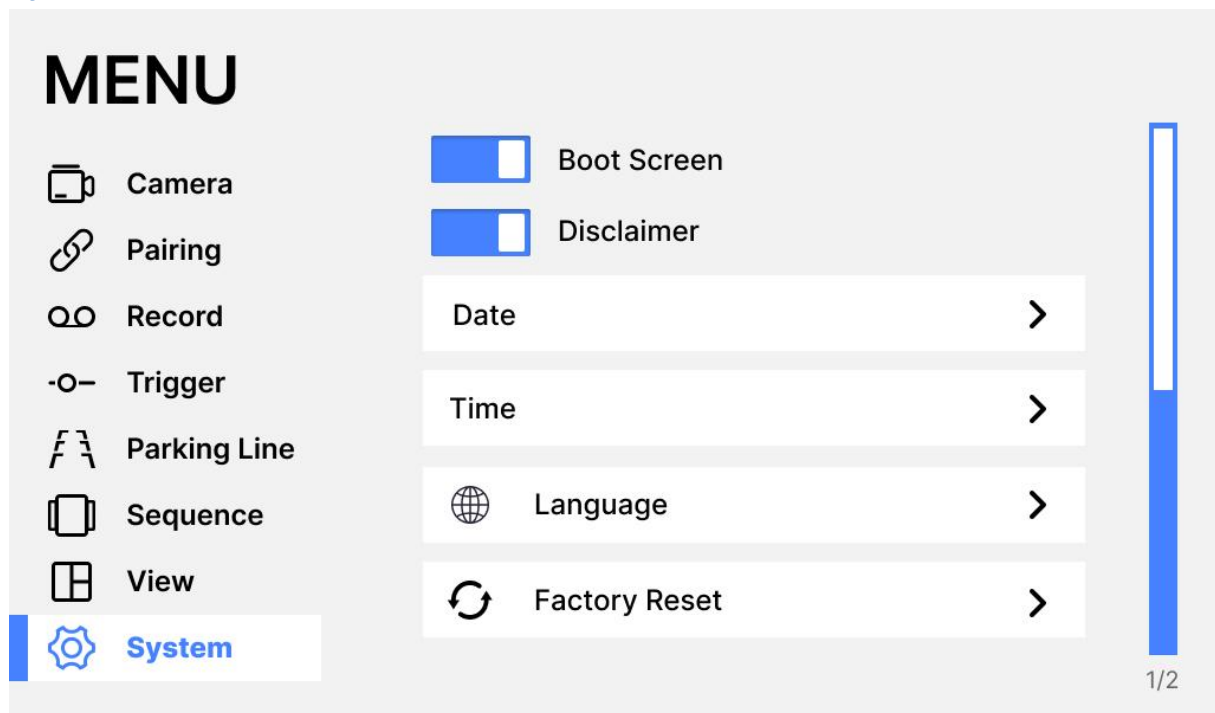
- Camera
- Pairing
- Record
- Trigger
- Parking Line
- Sequence
- View** (highlighted)
- System

Configuration Table:

	View	Power-On Screen	Hot Key
Camera			
Pairing			
Record			
Trigger			
Parking Line			
Sequence			
View			
System			

Power-On & Hotkey: Select one view mode or channel that can be displayed by the hotkey.

System



Boot Screen: Enables Boot Screen when monitor is powered on.

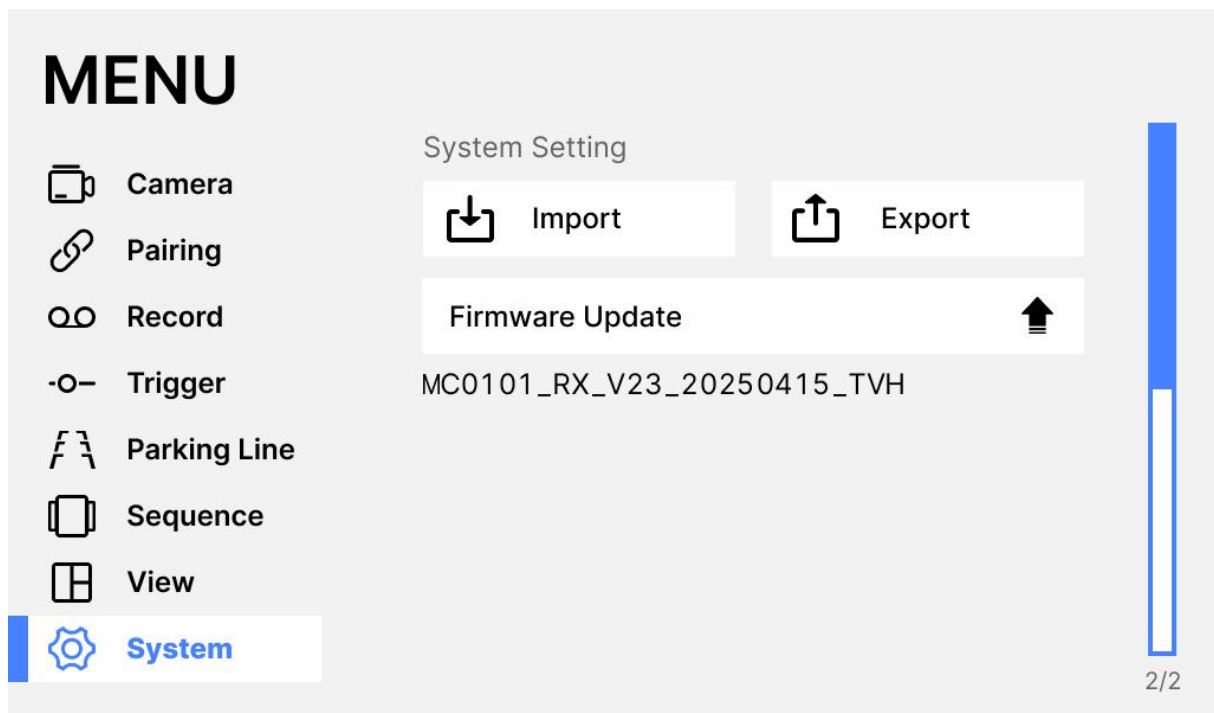
Disclaimer: Enables Safety Disclaimer when monitor is powered on.

Date: Set the system date.

Time: Set the system time.

Language: Select system language.

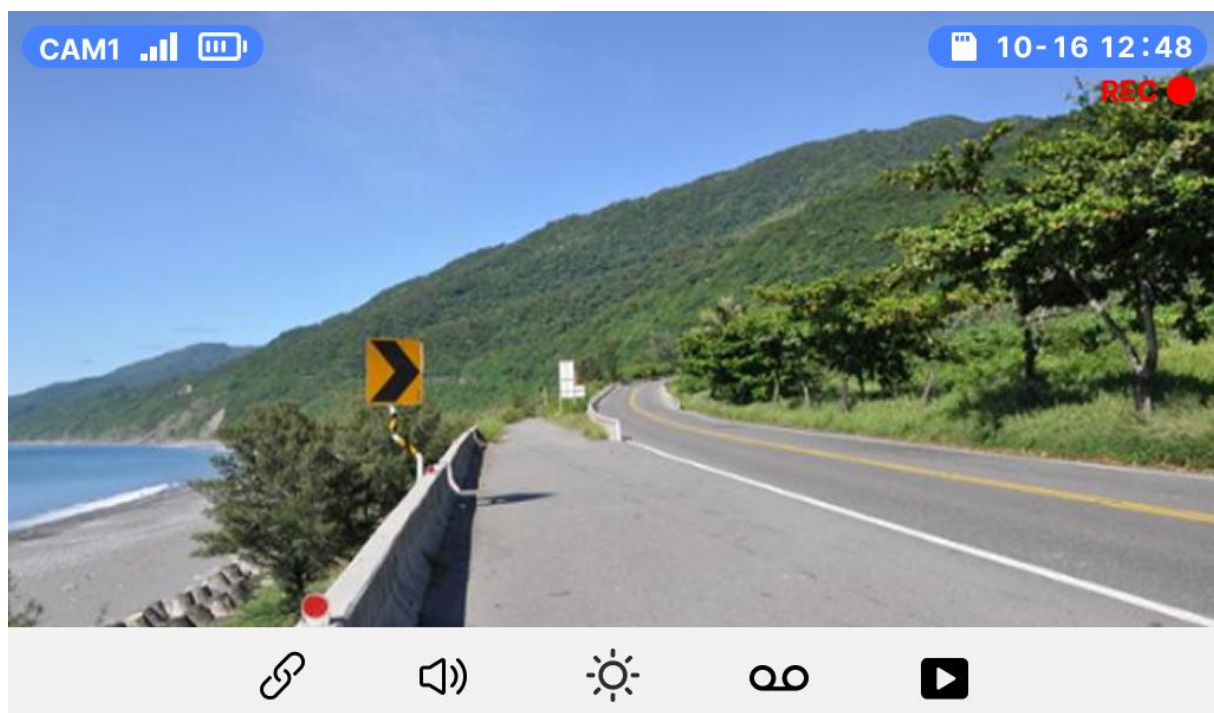
Factory Reset: Restores all factory settings. All changed configurations will be lost.



System Setting: Import and Export the monitor configuration to/from the micro-SD card.

Firmware Update: Updates the monitor firmware with a new version from the micro-SD card.

Quick Menu



The Quick Menu can access frequently used functions easily.

Pairing (chain-symbol): Pairs a camera to the selected channel. Has the same function as described under „MENU Pairing“ above.

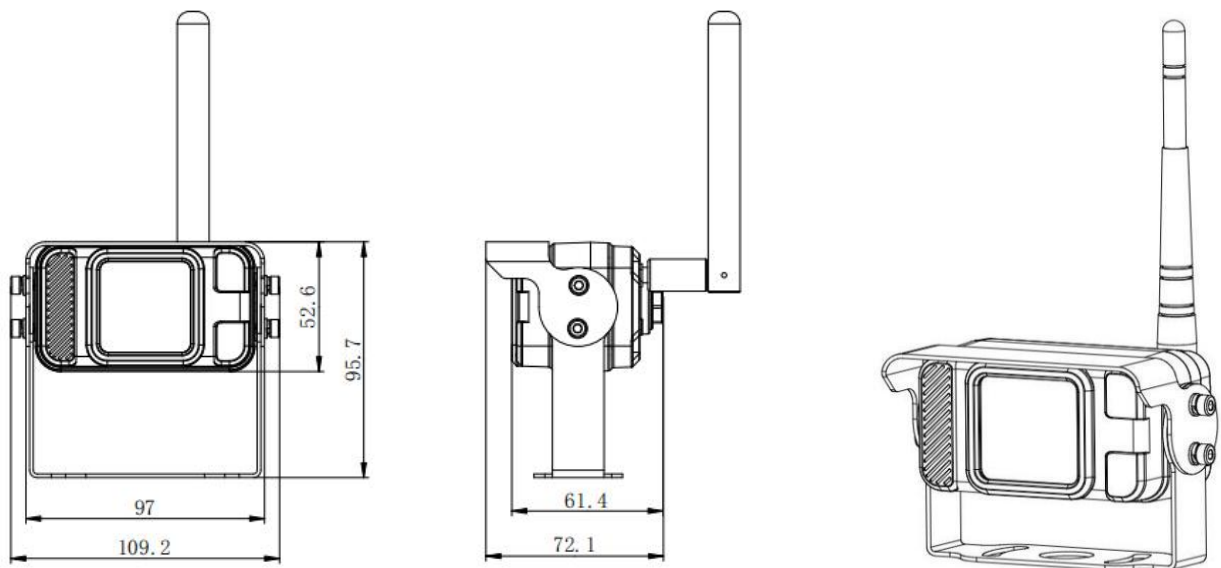
Volume (speaker-symbol): Set the volume of the monitor speaker.

Brightness (sun-symbol): Set the brightness of the monitor. Automatic dim function can be enabled to adjust the screen brightness automatically to the environmental brightness.

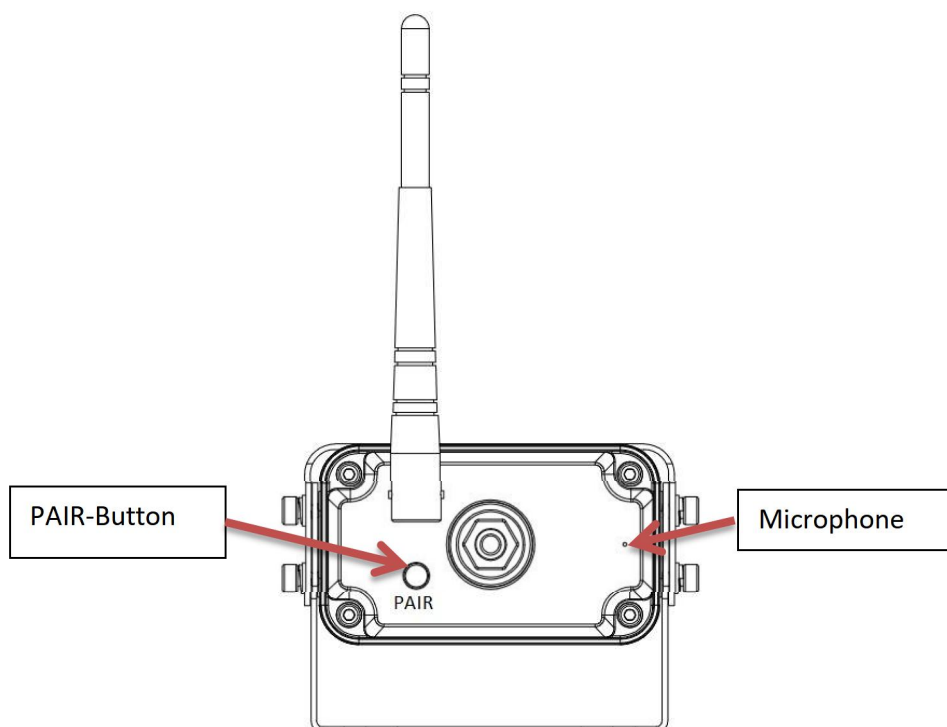
Record (tape-symbol): Enables the recording of the camera channels. If activated it is indicated by the red REC-symbol in the top right corner of the screen.

Playback (play-symbol): Access the recorded files for playback.

Camera Dimensions



Camera Operation



Camera Specifications

Resolution	1920x1080		
Megapixel	2 MP		
Video Format	1080p		
Sensor Type	CMOS		
Sensor Manufacturer	GalaxyCore		
Sensor Size	1/2.9 inch		
Sensing Area	5.59 mm x 3.1 mm		
Pixel Size	2.8 μm x 2.8μm		
Frame Rate	25 fps	30 fps	
Scanning System	Progressive Scan		
Shutter Mode	Rolling Shutter		
S/N Ratio	>52 dB		
Dynamic Range	81dB		
AWB	Auto		
AGC	Auto		
BLC	Auto		
Frequency Range	2403MHz-2478MHz		
max. Range (Barrier Free)	FCC: 300 m	CE: 200 m	MIC: 100 m
Transmission Power	FCC: ≤26dBm	CE: ≤20dBm	MIC: ≤10dBm
Receiving Sensitivity	-78dBm		
Video Codec	H.264		

RF Bit Rate	max. 12 Mbps
Modulation	FHSS
Delay	max. 200 ms
Focal Length	2.8 mm
Aperture	f / 2.3
Focus	Fixed
Field of View (FOV)	120°(D) x 105°(H) x 60°(V)
Operating Voltage	10-32 VDC
Current @12 VDC	Normal: 185 mA, IR: +100 mA
Power Consumption	max. 3.5 W
Operating Temperature	-30°C - +70°C
Storage Temperature	-40°C - +80°C
IR-LED	Yes
IR Wavelength	850 nm
Night Vision Distance	10 – 15 m
IR-Cut	Dual Filter Switch (Auto)
Minimum Illumination	0 Lux
Audio	Yes
Heater	No
Image Mode	Mirror
Dimensions	109.2 mm x 95.7 mm x 72.1 mm (with Bracket and Sun Shield)
Weight	450g
IP Protection Class	IP69K
Vibration Resistant	5.9 G
Shock Resistant	10 G
Material	Aluminum, Glass, Stainless Steel
Color	Black
Cable Length	30 cm
Cable Diameter	5.0 mm
min. Bending Radius	5 x Cable Diameter
Connector Type	Barrel Connector (5.5 mm / 2.1 mm) incl. Adapter with open ends
Connector Diameter	14 mm

Troubleshooting

Problem	Possible Cause	Remedy
Monitor does not turn on.	Cables not plugged in correctly.	Check cable connections of the Monitor power supply.
	Low voltage.	Check if supply voltage is between 10-32VDC.
No Camera image	Camera not paired.	Pair camera.
	Cables not plugged in correctly.	Check cable connections of the Camera.
Monitor is not activated in reverse gear.	Trigger wire is not connected correctly.	Connect the trigger wire to reverse gear signal.
Wrong camera is shown when trigger is active.	Multiple triggers are active at the same time.	Change the camera connections regarding the trigger priorities.

Special Notice

Occasionally highlights or darker spots may occur on the LCD screen. This is a very common phenomenon in active matrix display technology and does not necessarily indicate any defects or faults. If a static image is displayed on the screen over a longer period burn in may occur. This will regenerate after some time a not-static picture is displayed.

All specifications are subject to change without notice.

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.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: 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 instructions, 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 the 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 a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

Radiation Exposure Statement

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum distance of 20cm from your body.



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