

KC-N901

Smart Helmet

User Manual



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1. Introduction

- Please read this manual carefully to learn the functions, operations and precautions before using the KC-N901 Smart Helmet. The contents of this manual are important to the normal use, function and your legal rights of the product.
- All illustrations in this manual are for reference to our clients and partners only, and do not constitute any form of commitment (including but not limited to the appearance, color, structure, function, and etc.). Please refer to the actual product.
- In the principle of continuous improvement and providing better service, the company may change the contents of this manual without notice. The latest version of the manual and other supporting documents can be obtained from the official website of KC Smart Helmet: <https://www.kcwearable.com>

2. Product Overview

2.1. Product Definition

KC-N901 Smart Helmet is a wearable intelligent helmet for the actual combat needs of epidemic control and control in public places. This helmet is designed based on KC intelligent metamaterial technology, and integrates multiple advanced technologies such as infrared thermal imaging, artificial intelligence, AR (augmented reality) display, big data, communication sensing, and advanced aerospace technology. It is the first to implement mobile deployment-based control scenarios. The unaware and contactless temperature measurement is portable, safe and effective in epidemic prevention.



Figure 1. Appearance of the Smart Helmet.

2.2. Product Features

KC-N901 Smart Helmet exhibits the following characteristics:

- **Highly integrated, mobile deployment**

The helmet integrates a variety of functional modules such as data processing, communication and AR displays. It does not require external power supplies, displays, and external black bodies. The helmet is lightweight, comfortable to wear, easy to deploy, and especially suitable for individual equipment.

- **Long temperature measurement distance and high accuracy**

Within the specified distance range (default 2 meters), the

temperature measurement error is ± 0.3 °C

- **Fast temperature measurement and strong environmental adaptability**

Automatic temperature measurement of multiple targets both indoors and outdoors.

- **Powerful AI capabilities**

The helmet has a built-in AI system, which can access database of facial features and vehicle license plates to realize the functions of face recognition and license plate recognition in mobile scenes. This will fulfill the management demands in public security and commercial application scenes.

- **Ultra-long battery life**

Equipped with high-energy density battery and high efficiency energy system to meet the long-running operation requirements in mobile scenarios.

- **AR augmented reality display technology**

Adopting leading AR display technology, the helmet is characterized by large field of view, high resolution, high definition, high contrast, small blind spot, large-scale eye movement, and natural appearance.

- **Lightweight**

The helmet is made of the advanced composite meta-materials. Through the modular design and aerospace-level weight reduction design, while ensuring safety and protection, it achieves high productivity, easy maintenance, and lightweight goals.

- **Ergonomic design, comfortable to wear**

Design of gravity center balancing, modified Lycra lining, high-strength nylon strap and safety magnetic buckle, ensure comfort and safety for wearing.

2.3. Product specification

Basic Information	
Appearance Dimension	Length × width × height : (293 \pm 5)mm * (236 \pm 5)mm * (185 \pm 5)mm
Weights	1080 \pm 10g

Lining Dimensions	L: thickness 3mm ; M: thickness 5mm ; S: thickness 7mm
AR display	
Field of View	35 °
Virtual Screen	Equivalent to watching 74-inch TV from 3m away
Rated Brightness	300nits
Visible light camera	
Maximum Pixels	13 megapixel
Maximum aperture	F2.0
Field of View	78 °
Resolution	1080P@30fps
Data Communication	
Wi-Fi	IEEE 802.11 b/g/n , 2.4GHz
Bluetooth	BT 4.0, backward compatible with 3.0, 2.1, supporting LE
GPS	Support GPS/AGPS/GLONASS
Frequency Band	All Netcom, the support frequency band: 4G : LTE FDD : B5 3G : WCDMA : B2 , B5 2G : GSM : B2 , B5
Electrical Characteristics	
Battery capacity	5000 mAh
Battery Life	Temperature measurement mode: up to 5 hrs QR code /License plate recognition /Face recognition mode: 3 hrs
Voltage	DC3.7 ~ 4.2V
Charging Current	DC5.0V ±5%
Fast Charge	Supporting 2A Fast Charging
Storage Temperature	-20°C ~ 60°C
Operating Temperature	-10°C ~ 40°C
Smart Watch	
Processor	MTK6739 (1.3GHz Quad core cortex-A7)

Operating system	Android 7.1.1
Memory	DDR 1GB
Internal storage	16GB
Display	1.39inch circular screen
Battery	530mAh
Infrared thermal imaging module	
Resolution	384×288
Field of View	33.4 °
Response Wave Band	8μm/14μm
Image Frequency- Frame	25 Hz
Temperature Measurement Range	Temperature measurement mode: 36 °C~42 °C ; thermal imaging mode: -20~120 °C
Margin of Error	±0.3 °C

2.4. Product Composition

KC-N901 Smart Helmet is mainly composed of helmet body, hardware platform, AR display module, infrared thermal imaging module and battery.



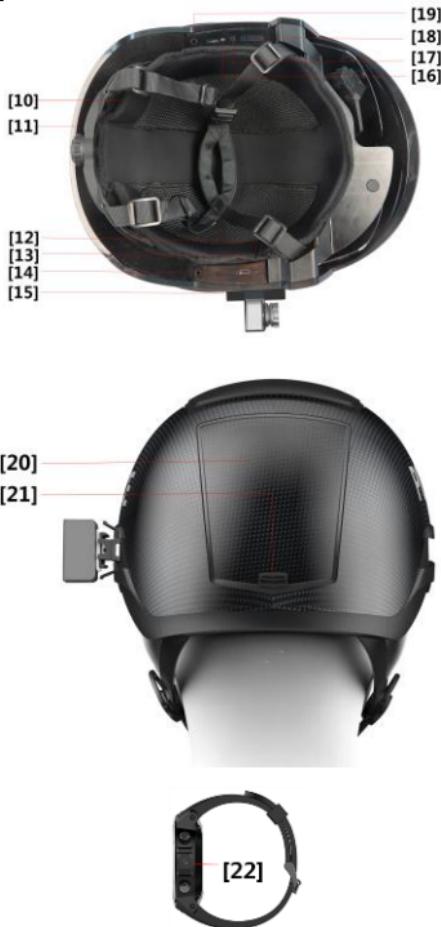


Figure 2. Parts of the Smart Helmet.

[1]	Visible light camera	[12]	The bluetooth key
[2]	Overlay	[13]	TYPE-C port
[3]	Safty goggles .	[14]	Microphone port
[4]	AR display module	[15]	SIM Card Slot
[5]	Strap	[16]	Power indicator
[6]	Microphone	[17]	Power on key
[7]	Strap Buckle	[18]	Volume button

[8]	Mounts of Thermal imaging module	[19]	Headphone port
[9]	Thermal imaging module	[20]	Battery cover
[10]	Lining	[21]	Battery cover lock
[11]	Lining adjustment knob	[22]	Smart Watch

3. Wear and Adjust

3.1. Wear the Smart Helmet

- 1) Connect the thermal imaging module to the connector plug;



Figure 3. Connect thermal imaging module to connector

- 2) Push the thermal imaging temperature measurement module from back to front along the left guide rail of the helmet;



Figure 4. Install the thermal imaging module on the guide rail

- 3) Connect the Type-C cable of the thermal imaging module to the TYPE-C socket of the helmet.



Figure 5. Conenction of thermal imaging module

- 4) Select appropriate-thickness liner in the helmet according to your head size.
- 5) Adjust the tightness of the helmet strap.
- 6) Put on the smart helmet and fasten the buckle.
- 7) Turn the head lock knob to an appropriate position.
- 8) Put on the earphone.

3.2. Retract and Extend the Safety Goggles

To open the goggles, gently lift the safety goggles from both sides (pushing position as show in Figure 4). To retract the goggles, gently lift the safety goggles from both sides and then push the goggles into the helmet.



Figure 6. Pushing position of safety goggles

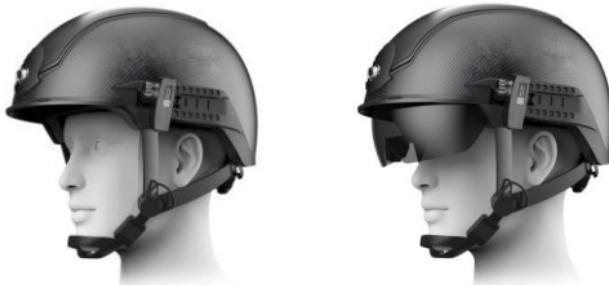


Figure 7. Retracted and Extending State of safety goggles.

3.3. Adjust the AR Glasses.

The AR glasses adapt the right monocular only, which is fixed to the interior of the safety goggles. The position of AR display screen can be fine-tuned by adjusting the arms of the AR glasses to ensure that the AR display screen is in complete and clear vision.



Note: When extending and retracting the safety goggles, be gentle and avoid the collision of the lens of AR glasses with other objects (as the space for extending and retracting of the AR glasses is limited, large-range adjustment of the AR glasses on the safety goggles should be avoided).



Figure 8. The appearance of AR glasses and safety goggles

4. User Guide

The KC-N901 Smart Helmet can be controlled by whether the Android OS-based APP "KC Smart Helmet" or Smart Watch.

4.1. Power On

Press and hold the On/Off button for three seconds, the helmet is power on with the RED indicator lighting up.



Figure 9. Schematic diagram of power switch position

4.2. Controlled by the Android OS-based APP "KC Smart Helmet"

4.2.1. APP installation

The KC-N901 Smart Helmet can be controlled by the Android OS-based APP "KC Smart Helmet".

1) Download APP :

A. Scan the QR code on the product identification card on the side of the carrying bag to download, and it will lead to the download page of the KC Smart Helmet app that can be installed in your android phone.



Figure 10. The product information card inside the carrying bag

B. Go to the official website of KC Smart Helmet (<https://www.kcwearable.com>) and download it from the "Support" section.

2) Name of the installation package:
"AI_PHONE_v1.1.33.2-15_2_release.apk"

4.2.2. Bluetooth Connection

These steps need to be executed only for the first time connection between the smart phone and the smart helmet;

- 1) Turn on bluetooth on the smart phone
- 2) Open "KC Smart Helmet" App.
- 3) Click the icon "🔍" in the top right to search the Bluetooth device nearby, and find the corresponding device number of the helmet in the equipment list. (The device number of the smart helmet is located inside the battery compartment cover, which can be unlocked when the helmet is power down.)
- 4) On APP, click the Device Number to be paired , and click "Pair" in the pop-up dialog box. Then enter Parameter Setting page after successful pairing.

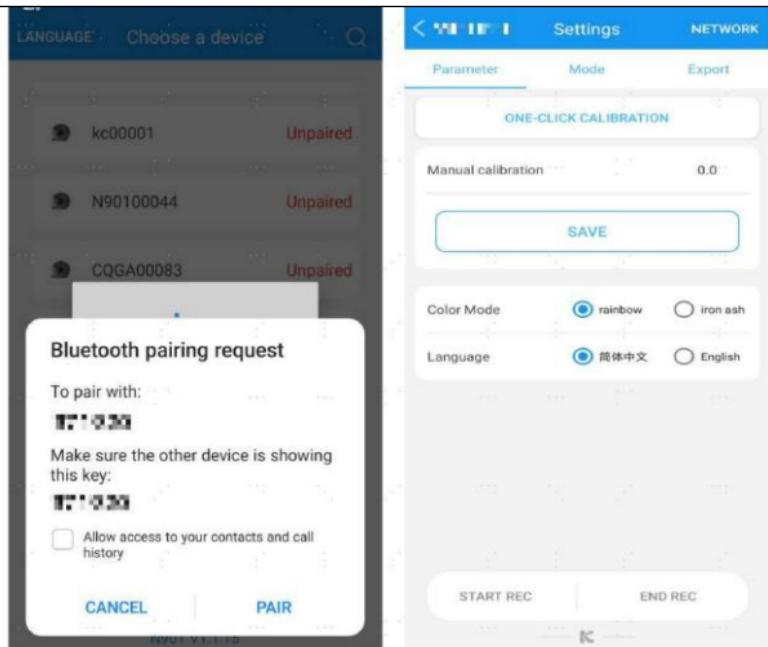


Figure 11. Bluetooth pairing pop-up dialog box and parameter setting page

5) If the connection failed, please try the following:

- Inspect the start-up state of the helmet and device and ensure that the Bluetooth is enabled and is not connected to other Bluetooth device.
- Press and hold the Bluetooth button on the left of the helmet, and click “Pair” again.
- If the problem is still unresolved, please restart the helmet and “KC Smart Helmet” APP and try it again.

Once the first pair is successful, you can select the paired device directly when you connect Bluetooth again.

4.2.3. One-Click Calibration

The user can quickly calibrate the thermal imaging module through the “One-Click Calibration” function. This work should be carried out with the assistance of a second person of normal body temperature.

Step 1: Open “KC Smart Helmet” App and connect the helmet through bluetooth;

Step 2: The calibration assisting person stands 1 meter in front of the thermal imager.

Step 3: Adjust the center of the screen to target the ears or forehead of the assisting person, and click “One-Click Calibration”. The quick calibration is completed as “Calibration complete” prompting on the screen.

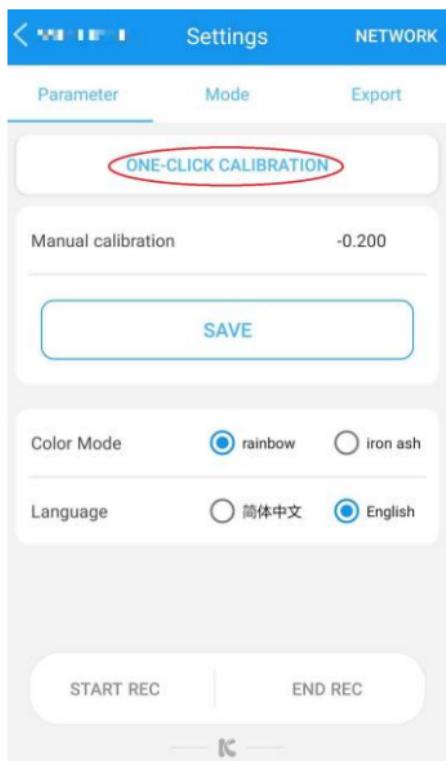


Figure 12. One-Click Calibration Interface



Note :

- Temperature measurement can be started till 5~10 minutes after the boot when the measurement accuracy has already been stabilized.
- When the thermal imaging module is calibrated, it clicks every few seconds, which may be accompanied by a short-time video lag.
- During the whole calibration process, the center of the screen must be targeted at the uncovered forehead or ears of the assisting person. Otherwise, the calibration result may leave a large margin error.
- During the calibration process, the calibration assistant person needs to stand still until the calibration is completed.
- If a large margin error of the temperature measurement occurs as a result of maloperation during the calibration process, please re-execute the one-click calibration or manual calibration procedure (see below).

4.2.4. Manual Calibration

The helmet is ready for temperature measurement after One-Click calibration. However, manual calibration can be applied to adjust the temperature parameters to get a higher accuracy. Manual calibration requires the assistance of a second person of normal body temperature.

Step 1: Let the assisting person stand 1 meter from the thermal imager and measure his forehead temperature with the thermal imager;

Step 2: The temperature reading will rise as increasing the temperature adjusting parameter (see the red frame below) and vice versa. The temperature adjusting parameter should be within the range of -10~+10.

Step 3: Click "save" to confirm the parameters.

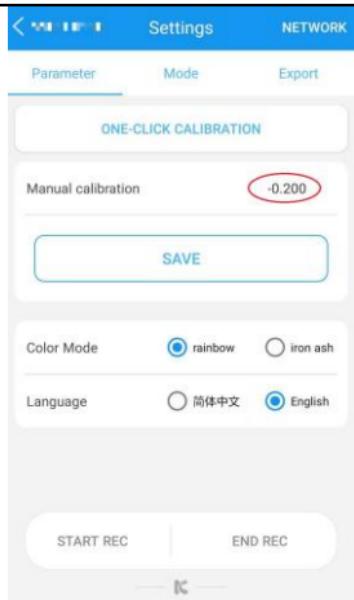


Figure 13. Parameter setting interface of manual calibration



Note:

- Temperature measurement can be started till 5~10 minutes after the boot when the measurement accuracy has already been stabilized.
- The calibration parameter has a great influence on the measurement precision, so the calibration parameter should be reset when the precision has a large error during the usage;
- During the whole calibration process, the center of the screen must be targeted at the uncovered forehead or ears of the assisting person. Otherwise, the calibration result may leave a large margin error.
- During the calibration process, the calibration assistant person needs to stand still until the calibration is completed.
- If a large margin error of the temperature measurement occurs as a result of maloperation during the calibration process, please re-execute the one-click calibration or manual calibration procedure.

4.2.5. Selection of Color Palette

Two color palettes “Rainbow” and “Iron Gray” are available for the users to choose on the “Parameter” setting page according to their preference.

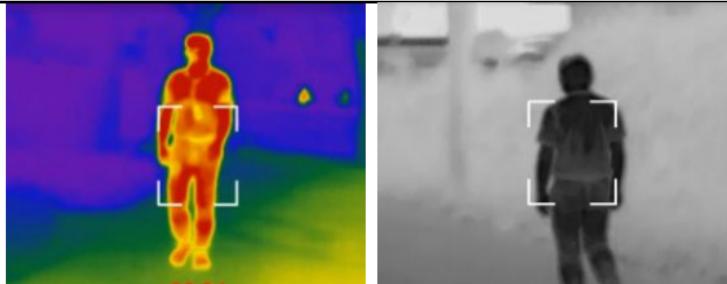


Figure 14. Rainbow mode VS Iron Gray mode

4.2.6. Working modes

The KC-N901 basic version provides only two working mode of “single-person temperature measurement mode” and “large-crowd temperature measurement mode”. While the AI version implements nine additional modes. The specific working mode can be confirmed through the "Mode" setting page in the APP.

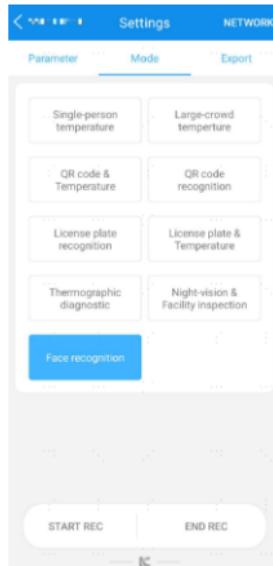


Figure 15. Selecting page of working modes

4.3. Controlled by the Smart Watch

4.3.1. Basic operation

The upper key of smart watch is for the power control, you can long press for power on-off and short press for the screen rest or light. The down key is for the return operation, you can long press to take the picture and short press to go back to the previous menu. By clicking the middle of dial, you can unlock the screen, then swipe left-to-right, you can enter the main control interface through turning on the “KC Smart Helmet” App.

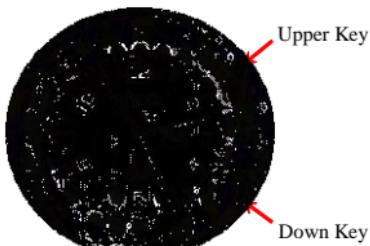


Figure 16. The button of smart watch



Figure 17. The operation screen of smart watch

4.3.2. Bluetooth connection

Press any module of the “KC Smart Helmet” APP main interface to enter the Bluetooth interface. Long press the Bluetooth button of the smart helmet, and click the corresponding content in the red box in the order shown by the arrow in the figure.18 to complete the pairing with the helmet. The device ID of the smart helmet can be found inside the battery compartment cover which can be turn on after power-off.

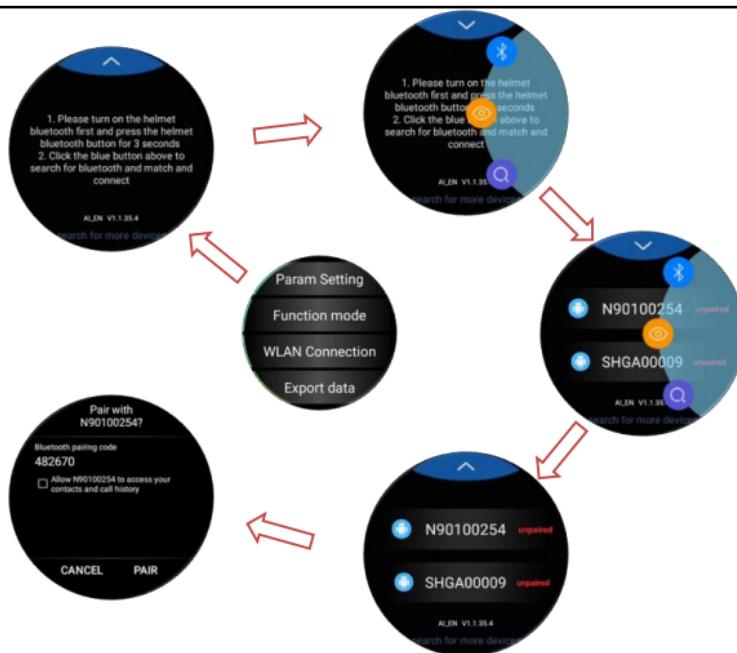


Figure18. The Bluetooth connection interface of Smart Watch

The one-way arrow in the figure above indicates that the operation is in front and back order.

4.3.3. Parameter Setting

Switch the functions of "One-click calibration"、"Correction", "color plate model" 、 "Temperature unit" and so on by parameter setting , and press the "down key" to open the save parameter dialog box. At the same time, it is unnecessary to change the calibration parameters manually after one key calibration.

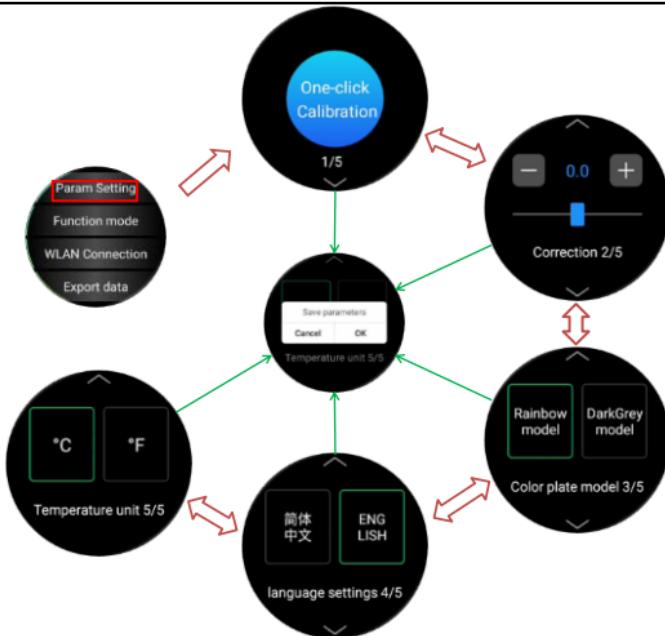


Figure 19. Parameter Setting interface of the smart watch

One-way arrow means to operate in front and back order, the two-way arrow indicates that the operation can be switched repeatedly. And the central interface pointed by green arrow can appear after pressing the “down key”.



Note:

- Temperature measurement can be started till 5~10 minutes after the boot when the measurement accuracy has already been stabilized.
- The calibration parameter has a great influence on the measurement precision, so the calibration parameter should be reset when the precision has a large error during the usage;
- During the whole calibration process, the center of the screen must be targeted at the uncovered forehead or ears of the assisting person. Otherwise, the calibration result may leave a large margin error.
- During the calibration process, the calibration assistant person needs to stand still until the calibration is completed.
- If a large margin error of the temperature measurement occurs as a result of maloperation during the calibration process, please re-execute the one-click calibration or manual calibration procedure.

4.3.4. Working modes

The helmet can be controlled to perform different tasks by selection of different working modes. See the section 4.4 for the details of function introduction.



Figure20. Function interface of the smart watch

One-way arrow means to operate in front and back order, the two-way arrow indicates that the operation can be switched repeatedly

4.4. Introduction of working modes

4.4.1. Single-person temperature measurement mode

In this mode, the thermal imaging module will scan the central frame and display the highest temperature of this area, and the reading will be displayed on the AR module. The center of the screen is targeted to the head of person to measure the temperature.



Figure 21. Single-person temperature measurement mode

The default warning range is $37.3\text{ }^{\circ}\text{C} \sim 42\text{ }^{\circ}\text{C}$. When the highest temperature detected in the center of the screen locates in this range, it will trigger an audible and visual alarm.

This mode can be used for accurate temperature measurement in all scenarios, particularly suitable for the fast temperature measurement outdoors at daytime or in environment with complicated thermal radiation sources.



Note :

- The thermal imaging module could not distinguish the properties of the imaging objects at current version. If temperature of the lamp box, water cup or metal parts exposed to direct sunlight appear in the screen to be in the warning range, it will alarm which requires secondary screening on targets.
- When the thermal imaging module is calibrated, it clicks every 1 minute, which may be accompanied by a short-time video lag.

4.4.2. Large-crowd temperature measurement mode

In large-crowd mode, the thermal imaging module will scan the entire area of the screen and automatically display the temperature values within $36\text{ }^{\circ}\text{C} \sim 42\text{ }^{\circ}\text{C}$. When the thermal imaging module targets the crowds, the temperature of the forehead, collar, arm, and other parts exposed in the entire screen will be displayed.

The default warning range is $37.3\text{ }^{\circ}\text{C} \sim 42\text{ }^{\circ}\text{C}$. When the highest temperature detected in the center of the screen locates in this range, it will trigger an audible and visual alarm.

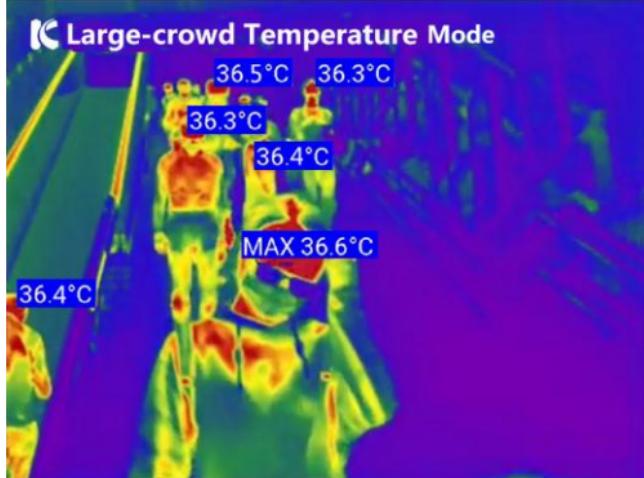


Figure 22. Large-crowd temperature measurement mode



Note :

The thermal imaging module could not distinguish the properties of the imaging objects at current version. If the lamp box, water cup or metal parts exposed to direct sunlight appear in the screen, the temperature value of these parts may be displayed and the readings will be affected. Therefore, single-user mode is recommended for the complicated environment.

4.4.3. QR code recognition mode

Scan the QR code carrying personal information by helmet to automatically record personal info into the database, allowing identification of the person and paperless data logging.



Note :

- Open the user's QR code and scan it using the visible light camera. The optimal working distance is 30 ~ 50 cm;
- A QR code database needs to be established before the first use (See section 4.10.2 for details)



Figure 23. QR code recognition mode

4.4.4. QR code & temperature measurement mode

Scan the QR code to acquire the personal information first, and take a temperature measurement of the person within 3 seconds. The personal temperature info will be automatically recorded into database in real time, allowing paperless data logging, safe distance and fast passing.



Note :

- Open the user's QR code and scan it using the visible light camera. The optimal working distance is 30 ~ 50 cm;
- After personal info displayed on the AR display screen, the central screen must be targeted to the same person to measured the temperature within three seconds.until the personal information and temperature are shown on the AR display screen Otherwise, the temperature of other objects might be recorded as the body temperature of the person under test.
- A QR code database needs to be established before the first use (See section 4.6.2 for details).
- See section 4.6.3 for the export of temperature measurement data.



Figure 24. QR code & temperature measurement mode

4.4.5. License plate recognition mode

Recognize the vehicle license plate, identify and alert unregistered vehicles or suspect vehicles recorded in database.(for mainland China use only.)



Figure 25. License plate recognition mode



Note :

- The License plate recognition distance is within 7m and optimal recognition distance is 3m ~ 4m;
- The license plate information displayed on the AR display screen, indicates that the license plate recognition has been completed;

- The license plate database needs to be established before use (See section 4.6.4 for details);
- The information displayed depends on the tags and rules in the database.

4.4.6. License plate recognition & temperature measurement mode

Recognize the vehicle license plate, identify and alert unregistered vehicles or suspect vehicles recorded in database.(for mainland China use only.) Also take temperature measurements of drivers or passengers on the vehicle.

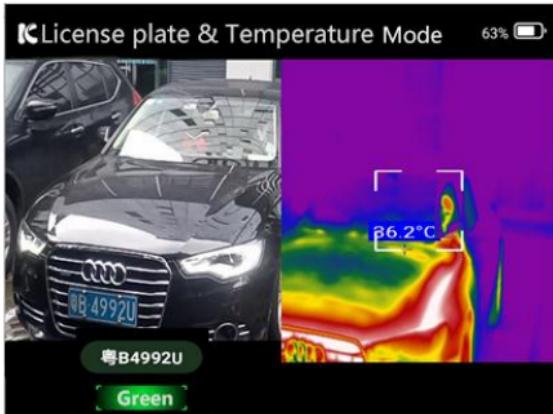


Figure 26. License plate recognition & temperature measurement mode



Note :

- The License plate recognition distance is within 7m and optimal recognition distance is 3m ~ 4m;
- The license plate information displayed on the AR display screen, indicates that the license plate recognition has been completed;
- The license plate database needs to be established before use;
- The information displayed depends on the tags and rules in the database (See section 4.6.4 for details);

4.4.7. Thermographic diagnostic Imaging mode

Thermal imaging detection on specific parts of the human body to assist finding the location and size of the lesion areas that cause fever.

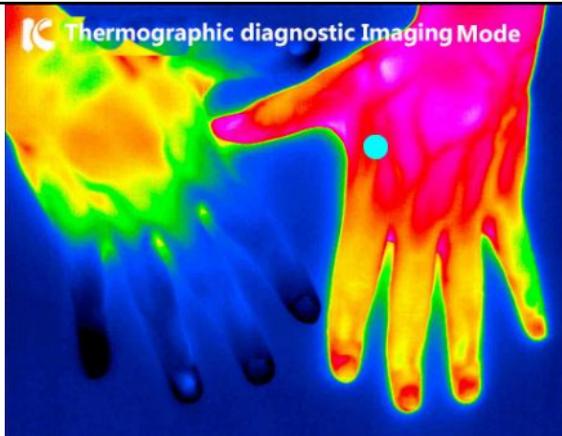


Figure 27. Thermographic diagnostic Imaging mode

4.4.8. Night-vision/Facility inspection mode

Thermal imaging scanning of industrial facilities, HVAC equipment, pipelines and electronic equipment, is applicable for industrial inspection and night vision inspection scenes such as assisting users in qualitative analysis, finding targets or locations with abnormal temperature, searching for people stranded at night and qualitatively analyzing facility working conditions.

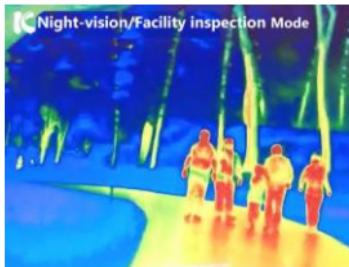


Figure 28. Night-vision

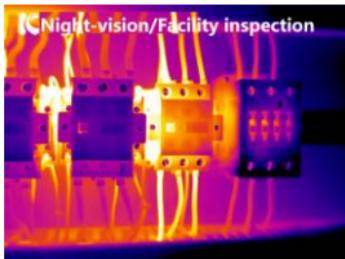


Figure 29. Facility inspection

4.4.9. Face recognition mode

In the facial recognition mode, faces within 5 meters can be recognized by the smart helmet and the personal information will be displayed on the AR screen. This mode is applicable for enterprises and institutions to manage their black and white lists of employees and visitors.

Local face database supports up to 10,000 face data. Please refer to section 4.6.5 for details for the face database setup.



Figure 30. Face recognition mode

4.4.10. Screen Recording

Connect the “KC Smart Helmet”APP to the helmet, click “Start Recording” at the bottom of the page to start screen recording, and click “End Recording” to end .The default recording period is set to be 30 minutes, and you need to restart the recording if you want to continue recording;

4.5. Projection display

During system settings, data importing/exporting or product demonstration, the AR display screen can be projected to the Windows desktop computer. There are two ways to implement the screen projection function:

1) Wired projection using type-C cable

Step1 : Preparation.

Access <https://github.com/barry-ran/QtScrcpy> to download the appropriate version of projection software or access www.wearable.com to download and install it;

Step2: Turn on the smart helmet, unplug the connection cable between the thermal imaging module and the computer, and plug the

included TYPE-C data cable to connect the computer and the smart helmet. Open “QtScrcpy” on computer.

Step 3: Click “Refresh Device List” and select the device number of the specific helmet in the “Device Serial Number” (The device number of the smart helmet is located inside the battery compartment cover);

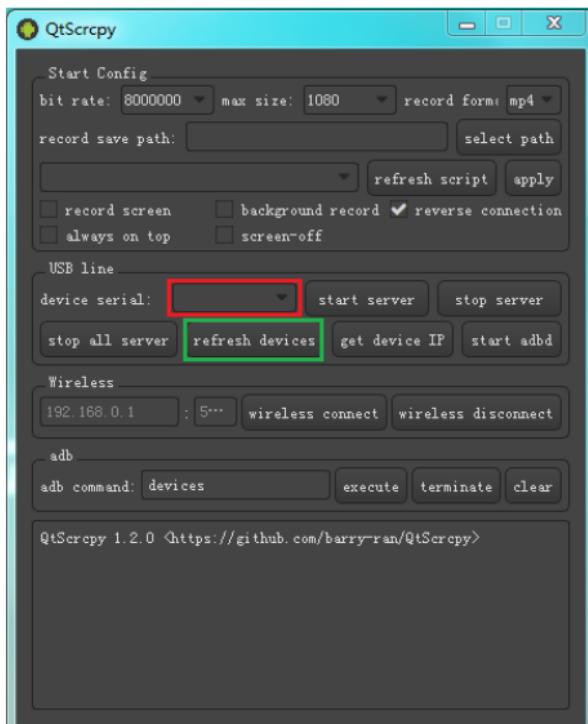


Figure 31. Wired projection setting

Step 4: Click “Start Service”, and the helmet display will be shown in the pop-up window.



Note : Click the return button in the red box as shown in the figure below to return to the helmet system homepage; or click the Home button to return to the system homepage.

2) Wireless projection

Step 1: First use type-C cable to connect the computer and helmet for wired screen projection;

Step 2: Click the small arrow in the red box on the main screen to enter the next interface, and select “setting” (See Figure 32)

Step 3: Connect the helmet and computer to the same WiFi;

Step 4: Return to the operation interface of QtScrcpy after the connection is completed, and click [Get Device IP] ;

Step 5: Click [Start adb];

Step 6: Click [Wireless Connection];

Step 7: Unplug the type-C cable, plug in the infrared module, and then click [Refresh Device List] to select the IP corresponding to the device;

Step 8: Click [Start Service] to complete the wireless projection.

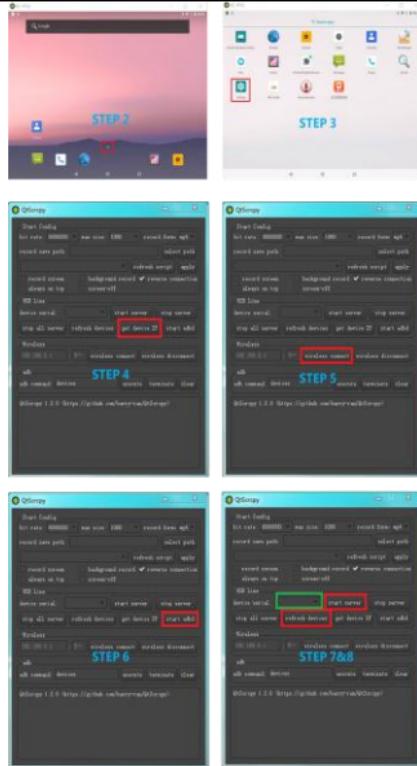


Figure 32. Helmet wireless projection

4.6. Data Import and Export

Both the data import and export operations should be performed after the wired projection of the helmet to the computer.

4.6.1. File viewing

Connect the computer and the helmet through the wired projection , and follow the steps below to view the helmet files:

STEP 1: Open the display interface of “QtScrcpy” , switch to the system homepage interface and click the up arrow in the red box (as shown in the Figure 27 below) ;

STEP 2: In the next page, click “Setting”;

STEP 3: Select “Connected device” in the setting page;

STEP 4: Select “USB”];
STEP 5: Select “File Transfer”;
STEP 6: After completion, the icon of the helmet is shown in “My Computer” and click to view files.

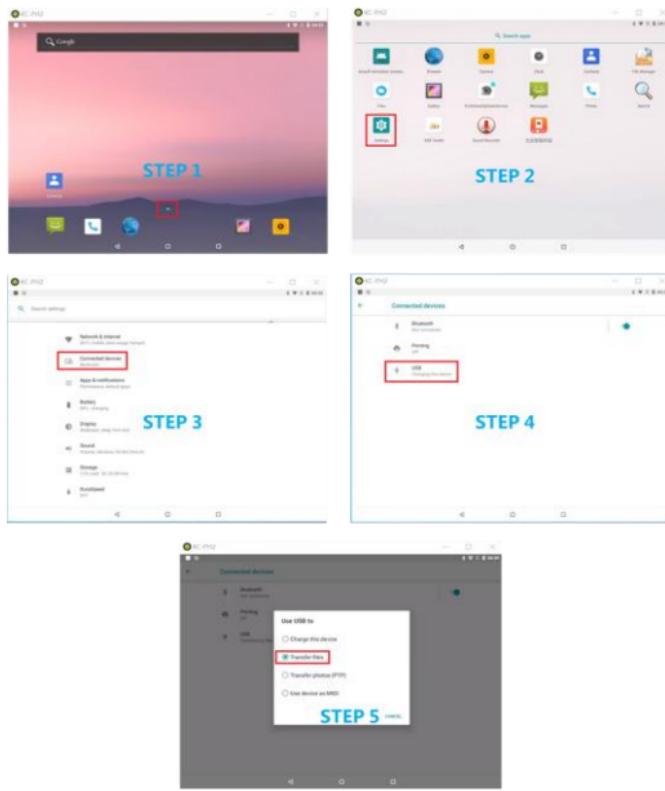


Figure 33. Flow of helmet access

4.6.2. Generation of QR code

Connect the helmet through a wired projection and generate the QR code following the steps below:

Step 1: Unzip the installation package KC_QRcode_V1.0.2.rar (available at <https://www.kcwearable.com>) in the root directory;

Step 2: Open the folder KC_QRcode_V1.0.2, and right-click file "index.html" to open with Google Chrome browser;

Step 3: After opening the web page as shown in the figure below, you

can switch the language of the web page by clicking the down arrow in the upper right corner, as shown in the red box. As inputting the Name and ID information on the page, click “generate QR code” and then click “Download” to download the QR code. The downloaded QR code will be named with Name_ID by default;



KC QR code Generation Platform

single generation batch generation

English

enter related information generate QR code

name:

ID:

generate QR code

here generate QR code

download QR code

Figure 34. Single QR-code generation page

Step 4: Select “batch generation” to generate QR codes in batches. Click “download template” to download the spreadsheet template. A maximum of 500 data can be logged in batch at a time. When the spreadsheet template is completed, click “upload files” to upload the spreadsheet file, and then click “generate QR code” to generate QR codes in batch. Click “download QR code” to download all QR code image information in a spreadsheet.

KC QR code Generation Platform English

single generation batch generation

enter related information, generate QR code

upload files
please click to upload the Excel file

download template

generate QR code

total 0 records

serial number	name	ID	QR code
no data			

download QR code

Figure 35. Batch QR-code generation page

serial number	name	ID	QR code
1	Zhang San	111111	
2	Li Si	111112	
3	Wang Wu	111113	
4	232	12312312312	

Figure 36. Batch QR-code export

4.6.3. Temperature data export

Under the page of "Data Export" on the APP, select the period of time and click the "Data Export" button to generate an Excel file synchronously in the helmet and mobile phone (e.g. "20200407151448.xls").

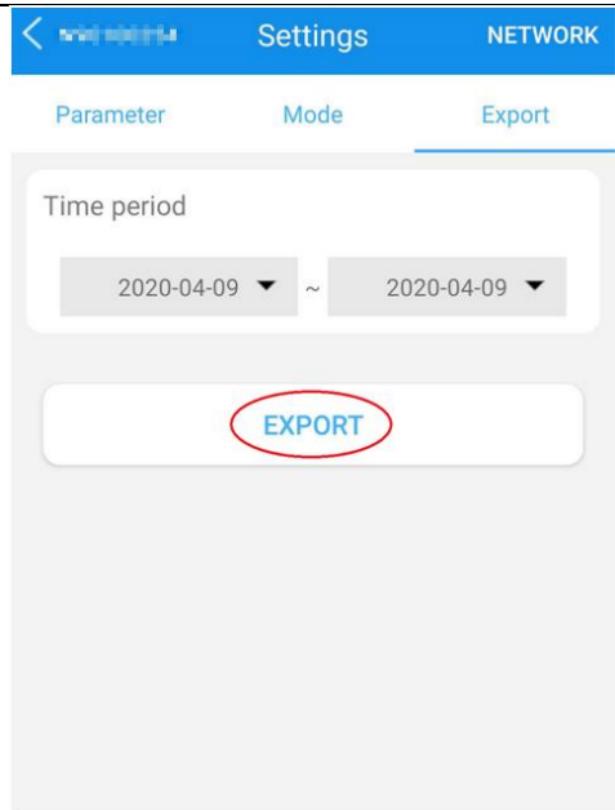


Figure 37. Temperature data export

The temperature data file is stored at “internal storage\KcBlueApp” on the mobile phone, which can be exported directly through the mobile phone. And the temperature data file is stored at “KC-PH2\Internal shared storage\KcUvcCamera\TemperatureData” on the helmet, which can be exported by a wired projection.

Click the “Export data” through the “KC Smart Helmet” app of the Smart Watch. Then click the “Export data” to generate the file of temperature data after the time period selection.

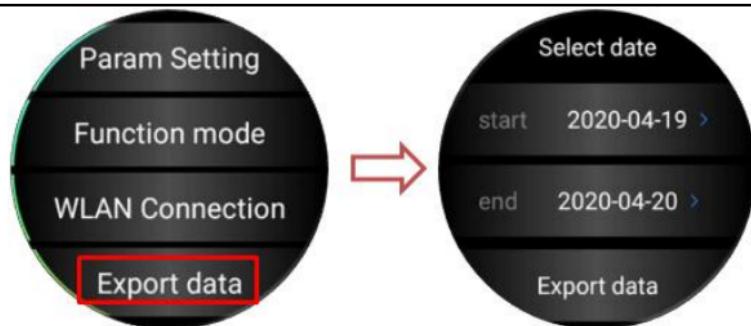


Figure 38. Temperature data export through smart watch

The file of temperature data stores at: internal storage\ KcBlueApp , can be exported through Android OS-based APP; The file of temperature data stores at: KC-PH2 \ Internal shared storage \ KcUvcCamera \ Temperature Data, can be exported through wired screen projection.



Note : If there is no data file in the corresponding file directory of the helmet after you click "Data Export" button, restart the helmet and perform wired screen projection.

4.6.4. Importing License plate database

1) Format specification of License plate database

The helmet supports license plate database in the EXCEL format, in which following information should be included:

license_plate	vehicle_type	vehicle_owner	owner_phone	other	flag
FM 8876	2			Unregistered	0
CG 5504	2			Alerted	1
LA 9731	2			Alerted	1
KS 9961	2			Normal	2
MB 1915	2			Normal	2

Figure 39. Sample of license plate information

The meaning of the terms in the upper table is :

Parameters	Meanings	NOTES
license_plate	License plate number	Required information
vehicle_type	Vehicle type	Required information*
vehicle_owner	Vehicle owner	Optional
owner_phone	Owner phone number	Optional
other	User-defined information to display	Necessary information, words are limited around 10.
flag	Symbol colors	Necessary information: 1 means red, alert

		2 means green, normal 0 means yellow, unregistered/not existing in database
--	--	--

2) Importing License plate database

The license plate database should be established (See part 1 in section 4.10.4 for details) before the license plate recognition function is enabled. Connect the helmet through wired projection (see section 4.9.1 for details) and the license plate data is imported as follows:

STEP 1: Select “KCPH2” in “My Computer” to open the helmet storage folder, and then open the file path:

KC-PH2\Internal shared storage\KcUvcCamera\LicensePlate

STEP 2: Copy and paste the EXCEL files containing the license plate information into this folder (Support up to 15 EXCEL files exporting at a time.);

STEP 3: Click “KC Smart Helmet” or “KCHelmetUpDate Service”, the helmet will automatically load the data and it takes a few minutes. The local EXCEL file will be deleted;

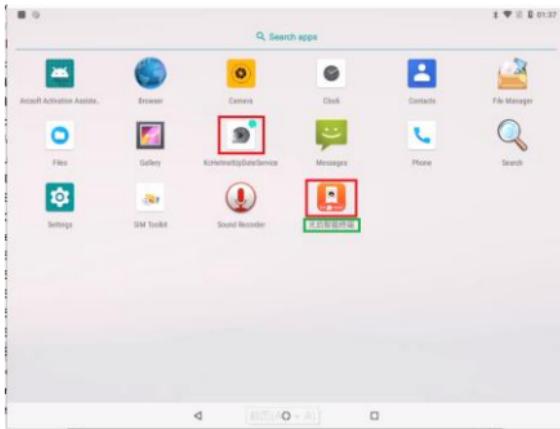


Figure 40. Data Loading

4.6.5. Facial data entry

There are two separate folders for the face photos, the white list and the black list;

Whitelist folder path:

KC-PH2\Internal shared storage\KcFace\register

Blacklist folder path:KC-PH2\Internal shared storage\KcFace\register_important_person

Connect the helmet through a wired projection, and put the photos into the corresponding folder. The photo is required to be in the JPG format of 400x500 pixels, and the file name is the name or ID of the target person which will be displayed on the AR screen as a face recognition result.

4.6.6. Export Video

Please transfer the recorded files in time to save storage. It will remind the user to clear the storage space as only 3G storage left;

The video can be read by connecting the helmet through a wired projection. The video storage path is:

KC-PH2\Internal shared storage\KcUvcCamera\Video

4.7. Standby and Power down

Press the power key (the upper key), the AR display will go out, and the helmet will enter the standby state; press the power key again, the AR display will turn on, and the helmet will enter the working state.

To shut down the helmet after use, press the Power button for three seconds.

5. Cautions

5.1. Battery Usage

- Under any circumstances, please do not modify the built-in battery by yourself to avoid causing damage to the battery.
- Do not put the battery into fire or any other high temperature place, otherwise it will cause fire or explosion of the battery.
- The battery cannot be used for other purposes.
- Do not use any damaged charger or battery.
- If the battery has abnormalities such as overheating, deformation, discoloration, bulging, and leakage during use, charging, or storage, please stop using the battery immediately and contact the service center for battery replacement to avoid safety problems.

5.2. Maintenance

- Keep the product from strong impact and vibrations to avoid damaging, malfunctions or unavailability.
- Please turn off the power before cleaning and maintaining.
- Please turn off the power before charging.
- The normal temperature range of product storage is -20 °C ~ 60 °C. Beyond this temperature range may result in product malfunctions, fire or explosion.
- Do not use chemical solvents or detergents to clean the product.

6. Frequently Asked Questions

6.1. Hardware FAQ

6.1.1. Unable to boot

- 1) Make sure the battery is installed correctly.
- 2) Connect the power cord to charge. If the power indicator is on, charge the helmet for at least 20 minutes to ensure that the battery has enough power to power on. If the power indicator does not light on after power cable connection, the power supply module may be damaged.
- 3) Press and hold the power button to try to power on.
- 4) If it is still not working, please contact the after-sales service for a solution.

6.1.2. No AR display

- 1) Short press the power button. In the helmet working state, the AR display can be turned off or on by short press the power button;
- 2) If the screen does not light up, check whether the helmet is turned off due to maloperation. Press and hold the power button for 3 seconds to restart;
- 3) If press and hold the power button cannot turn the helmet on and the power indicator light is steady red, that indicates the battery runs out. Please replace the battery and restart.

6.1.3. Only system interface shown of the AR display

What if only a standard Android desktop is shown on the AR display of the helmet and working interface cannot initiate properly?

The cause might be the disconnection or unstable connection between the thermal imaging module and the helmet. Re-plug the cable of thermal imaging module and wait for a few seconds.

6.1.4. Thermal imaging screen is stuck or ghosting or smearing

What should I do when thermal image is ghosting and, smearing?

Please replug the connection cable or restart the helmet. If the problem is still unresolved, please contact the after-sales customer service.

6.1.5. Short battery life

Under normal circumstances, the battery life of helmet is up to 5 hours for temperature measurement ; and the battery life will be shortened to 3 hours in heavy load modes when the visible light camera and infrared thermal imaging module work at the same time, e.g. in the license plate recognition or QR code recognition mode. A possible cause for the significant shorter battery life is that the battery is not fully charged.

The blue light lighting up shows the battery in trickle charging mode, when charging the helmet battery either with a dock charger or a cable charger. At this time, it takes another 30 minutes to fully charge the battery.

6.1.6. No headphones output

- 1) Adjust volume key on the smart helmet, check the volume setting not set to mute.
- 2) If the volume setting is normal, check the appearance of the headphones for damage. If the headphones are damaged, please contact the after-sales service for replacement.
- 3) If the headphones are not damaged, reboot the system and try again.
- 4) If the problem cannot be solved after system reboot, please contact after-sales service.

6.2. Functional and Operational FAQ

6.2.1. Questions about battery

- 1) Q: Does the smart helmet have to be turned off to recharge?
A: Yes, according to the helmet's protection design, it must be turned off to charge
- 2) Q: How could I check the battery level when the helmet is power off?
A: You can view the current battery level on the AR glasses screen during the charging process when the power is off.

6.2.2. Questions about starting the helmet

- 1) Q: What color is the indicator light?
A: The indicator is red when the battery is not fully red, while it turns blue when the battery is fully charged.
- 2) Q: How long do I need to press the power button to boot?
A: Press and hold for 3 seconds to boot.

6.2.3. Questions about wearing adjustment

1) Q: How many places can I adjust when wearing the smart helmet?

A:

A. Strap Length

B. The optical waveguide AR glasses are installed on the safety goggles, and the AR glasses position can be adjusted by adjusting the AR glasses arm. (As the space for extending and retracting of the AR glasses is limited, large-range adjustment of the AR glasses on the safety goggles should be avoided). If the AR glasses require a wide adjustment range, the AR glasses should be adjusted after the helmet is removed. And after adjustment, the safety goggles should be extended or retracted for several times to test whether collision occurs.

C. Appropriate thickness of the liner, can be chosen for assembly according to the actual head shape.

D. Lining adjustment knob, can tighten or relax the lining by turning knob.

7. Notices and after-sales service

7.1. Disclaimer

- 1) Please read this manual carefully before usage to fully understand your legal rights and responsibilities; otherwise, it may cause property damage or personal injury. The company shall not be liable for any direct or indirect property damage and personal injury caused by failure to use this product in accordance with this manual.
- 2) The company has done its best to ensure the content in this manual is accurate and reliable. However, the company will not be liable for losses and damages caused by omissions, inaccuracies or errors in the documentation.
- 3) Please use the genuine accessories supplied by original factory to avoid unexpected damage. The product will have its warranty void if you fail to use the product following the correct guidelines or connect incompatible accessories. In this regard, the company should not be liable for such losses.
- 4) Once you start to use this product, you are deemed to have understood, approved and accepted all the terms and contents of this statement. Users promise to be responsible for their actions and all consequences arising therefrom. The user promises to use this product only for legitimate purposes, and agrees to these terms and relevant policies or guidelines that the company may formulate.
- 5) The company reserves the right to update this disclaimer. The latest version posted on the product's official website and sent by email, prevail.

7.2. Customer service policy under warranty

- 1) The warranty period of the product is 1 year from the date of product acceptance (The warranty period of wearing parts is half a year). During the warranty period, the company is responsible for free repair or replacement if the product has any quality problems NOT caused by improper use. After the warranty period ends, the company will actively cooperate with the customer for repair and debug within the period agreed by the two parties, and the costs incurred shall be paid by the customer.
- 2) The product will have its warranty void if you disassemble or modify the helmet shell.

- 3) This product requires the power to be turned off during the charging process. The product will have its warranty void if you use the product while it is being charged and cause damage.
- 4) Damage to the product and its subsidiary systems, due to non-quality reasons such as incorrect use and sabotage, are not covered by the warranty.
- 5) Under any circumstances, the company will not bear any responsibility regarding personal injury or properties losses of the users or any other third party caused by non-product quality problems.

8. FCC Warning

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

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.

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 equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End user must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The device is designed to meet the requirements for exposure to radio waves established by the Federal Communications Commission (USA). These requirements set a SAR limit of 1.6 W/kg averaged over one gram of tissue. The highest SAR value reported under this standard during product certification for use when properly worn on the head is 0.676 W/kg.



WEB: www.kcwearable.com