Dahua Thermal Body Temperature Measurement Solution Installation Guide (BF Series)

V1.6

Zhejiang Dahua Technology Co., Ltd

Summary

The temperature of all materials is higher than absolute zero (- 273.15 ℃) and radiates electromagnetic wave continuously. The thermal imaging camera collects the infrared radiation energy emitted by the measured objects, and establishes the accurate corresponding relationship between the target energy and temperature through complex temperature measurement algorithm and blackbody temperature measurement calibration and other processes, so as to realize the temperature measurement function of human body. It is characterized by non-contact, multi-objective, fast, and no risk to the temperature measurer. It can be easily deployed in densely populated public places, and it can effectively and safely screen the abnormal temperature preliminarily.

Thermal imaging human body temperature measurement, mainly through the measurement of human forehead and face temperature (according to the different environment of about 31-36 ℃), preliminary judgment, found that the suspected abnormal temperature, and then use ear temperature gun or mercury thermometer to further confirm. As the skin surface of forehead and face is exposed to the air, the temperature changes due to the influence of air flow and sweat. Generally, under the indoor ambient temperature of 15 ℃ in winter, if the forehead temperature exceeds 35 ℃, there is a possibility of fever. For other environmental temperature conditions, it is recommended to measure several samples on site, and increase 1 ℃ as the alarm threshold on the basis of normal forehead temperature.

The human body temperature measurement requires high precision, which requires high installation mode, environment and debugging. Please read this article carefully.

Combined with the support experience of the thermal imaging R & D technical support team, this manual describes the installation requirements, common operations and precautions during the actual use of thermal imaging products, so as to facilitate the quick start and reduce unnecessary problems. For more detailed instructions, please refer to the product manual and quick operation manual.

The content described in this article needs to be analyzed in combination with the actual field equipment, which is not the only way. If you have any questions or good suggestions, please contact Xu Fangrong (Short NO: 693802), Fang Lu (Short NO: 685718), Li Fuxiang (Short NO: 638137), Fang Shengdong (short: 669126).

⚠️

- **This manual is only for internal use of Dahua employees. Please do not directly provide it to customers or publish it to public platforms such as the Internet.**
- Reading objects include (but not limited to): Solution Engineer, Pre-sale / in-sale / after-sale technical support engineer, installation and debugging personnel, product engineer, test engineer, marketing and sales personnel and other internal personnel of the company

Change Record

Revision date	Version number	Creater	Reviser
2020.01.27	V1.0	房圣东	
2020.01.28	V1.1	许芳荣/房圣东	房圣东
2020.01.31	V1.2	房圣东	李静
2020.02.03	V1.3	方璐	房圣东

Content

1 Equipment Installation

1.1 Installation Preparation

- Installation Preparation：
  - 5 meter long tape for distance measurement on site
  - **DC12V adapter, used with camera**
  - **Some cable lines**
- Product appearance

BF3221：   BF5421:   Blackbody：

Note: the recorded installation guidance video "Dahua indoor human body temperature measurement product installation video (BF3221)", which adopts tripod mode, is applicable to portable indoor installation guidance reference, and other fixed installation needs to be installed in strict accordance with the specified height, distance and other requirements.

The PPT version of installation guidance video, web operation guidance and guidance document should be obtained from the regional delivery supervisor. In the future, it will be synchronized in the group on the mobile app.

1.2 Installation Distance

focal length	Distance between blackbody and camera	Distance between human forehead and camera	Width at the best distance of temperature measurement
BF3221（3.5mm）	2m	2m (NO Blackbody2m)	1.5m
BF3221（7mm）	3m	3m (NO Blackbody2m)	1.3m
BF5421（13mm）	3m	3m (NO Blackbody2m)	1.5m

The distance from the forehead to the camera and the distance from the blackbody to the camera have the best temperature measurement accuracy. Taking BF3221 (7mm) as an example, the distance between
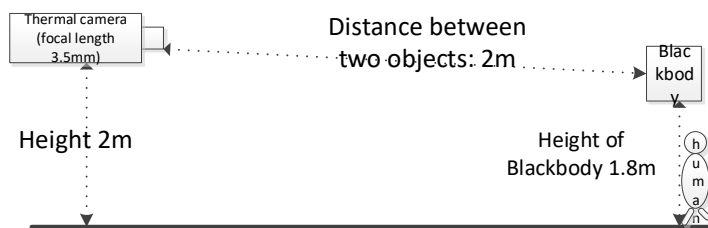
blackbody and camera is 3M, the best distance for temperature measurement is 3M (the straight-line distance between the front of forehead and camera), the best test width at 3m is about 1.3m (about one gate), the forward temperature at 3m will be higher, and the backward temperature will be lower. The ideal situation is to place footprints at the 3m position to guide the thermometer to measure temperature one by one at the designated position.

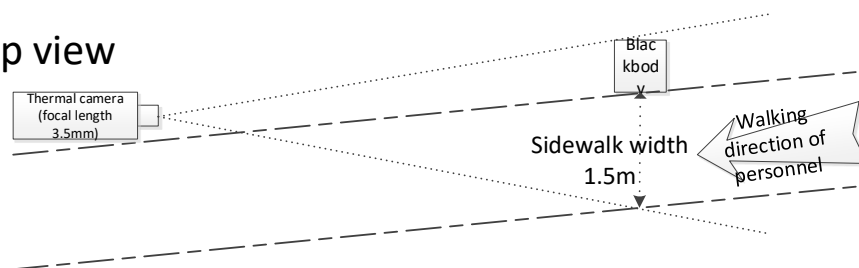BF5421 (13mm) installation requirements are consistent with BF3221 (7mm).

1.3 Installation Diagram

- **BF3221 (3.5mm) installation diagram**

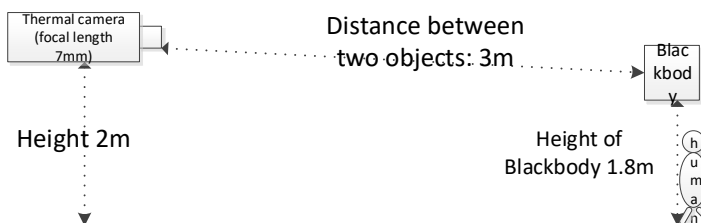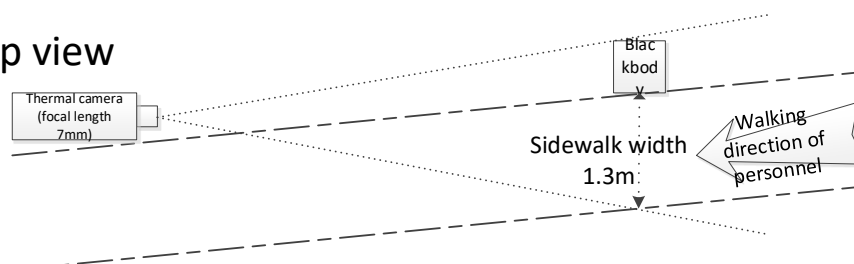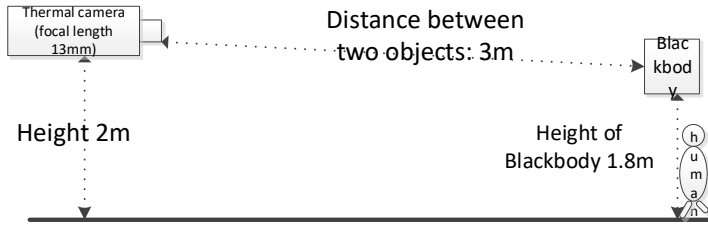## Side view

Top view

- **BF3221(7mm) installation diagram**

Side view

Top view

Side view

Thermal camera
(focal length
13mm)

Distance between
two objects: 3m

Blac
kbod
y

Height 2m

Height of
Blackbody 1.8m

h
u
m
a
n

Top view

Thermal camera
(focal length
13mm)

Blac
kbod
y

Sidewalk width
1.5m

Walking
direction of
personnel
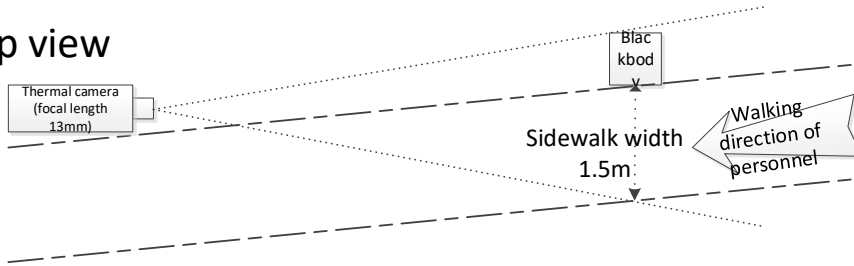
1.4 Real Scene Diagram

● BF3221(7mm) as an example

Height 2m

Distance between
two objects: 3m

Height of Blackbody
1.8m

BF3221
（7mm
）

相机安装
高度2米
Thermal camera

Height:2m

3米

Height of Blackbody
1.8m

黑体安装高度1.8米

黑体

最佳测试距离3米

Best test distance 3m

人员进入方向

Personnel access direction

人员进入方向

注：
1、人为导流通道尽量拉长可
采用多个"弓字型"，室内
外温差大情况下，人在室内
时间越久，额温越稳定；
2、避开门口通风处测温；

1. When the artificial diversion channel is lengthened as far as possible, multiple "S-shaped" can be used. When the indoor and outdoor temperature difference is large, the longer the person is indoors, the more stable the forehead temperature is;

2. Measure the temperature away from the ventilation at the door.

- Monitoring picture, the following is the effect of one person in front of the 13mm lens at the 3m position


5

1.5 Installation Precautions

- The thermal imaging camera and blackbody are installed on the same side to avoid the occlusion between the camera and blackbody.
- The moving direction of the flow of people is toward the camera. During the test, the forehead of the target person is facing the camera. It is better to stay and face the camera for temperature measurement. Temporary measures can be adopted on site to plan the walking route of personnel and guide the person to the camera position; for scenes with large indoor and outdoor temperature difference, multiple bow type routes can be planned and the area with wind at the door shall be avoided, and the temperature measurement can be conducted after the person reaches the indoor forehead temperature to be stable.
- The black body radiation surface (Note: the radiation surface shall not be touched or dirty) shall be facing the camera irradiation direction, the black body shall be on the left or right side of the thermal imaging picture, and the tripod can be protected by temporary fence.

As follows, blackbody is in the upper right corner of the image:
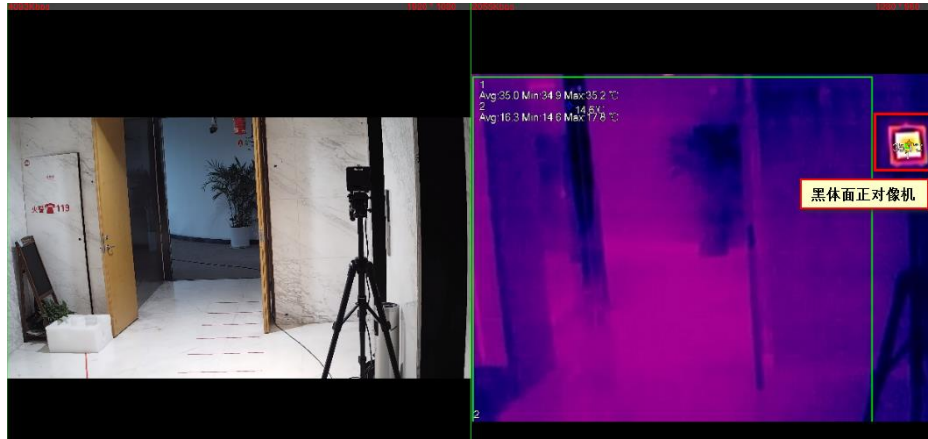
- It is required that the visible light channel has enough illumination and avoid the influence of backlight / reflection / change of strong light / occlusion, etc.
- It is forbidden to have high-temperature heat source or sunlight in the thermal imaging picture, to avoid the interference of heat source such as heater, hot water point, microwave oven, high-power lamp, radiator, etc., so as to avoid the damage of detector.
- The installation area shall be relatively isolated from the outside environment without wind and stability, to avoid the outdoor or the scene connected with the outside, which is not suitable for the environment with air flow or strong electromagnetic interference or vibration.

Installation scenarios to avoid
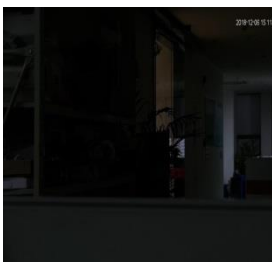
Insufficient light.
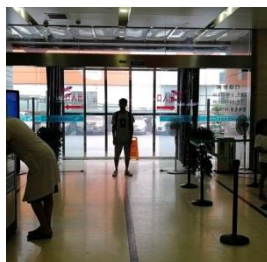
Backlight / scene open to the outside

The direction of people moving is not toward the camera.

2 General Settings

2.1 Equipment Upgrade

The new factory version of the program already supports human body temperature detection and does not need to be upgraded. If there is a new iterative process will be notified in the delivery group, please pay attention to the group information in time.

Note:

(1) If temperature compensation has been carried out in 20200128 procedure, the temperature will be higher after upgrading. You need to adjust the temperature compensation back to the default value of 0.

(2) After 20200210, the black regular window of the program is rectangle.

The default to be restored after upgrading is as follows:
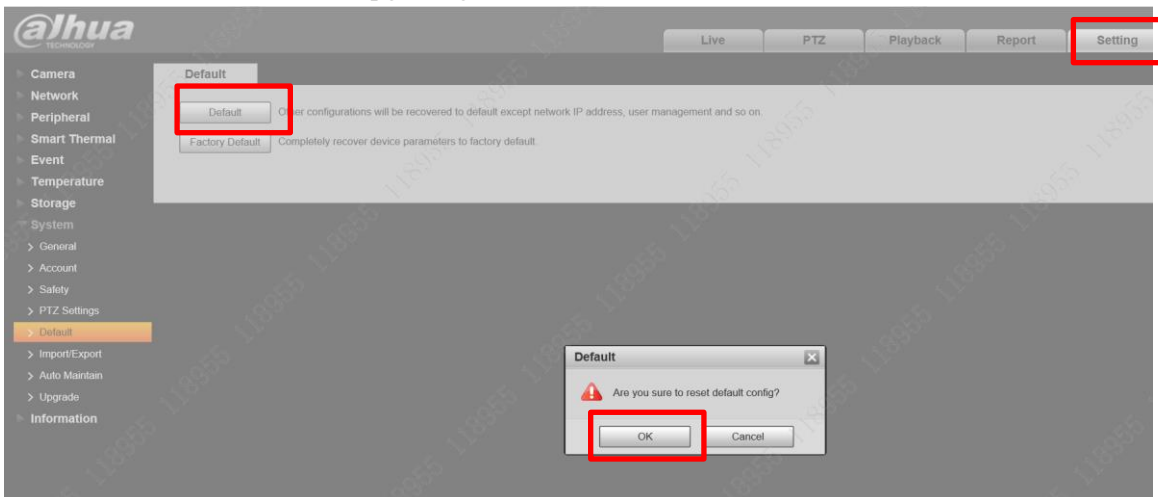
2.2 Debugging Of Human Body Temperature Detection Function

2.2.1 Selection of human body temperature measurement intelligent scheme

2.2.2 Blackbody Parameter Setting

➢ Blackbody calibration.
  Note: the blackbody parameter setting steps are ignored for the scheme without blackbody.

  a) When the blackbody is actually set to 35 ℃, there may be two situations on the back of the blackbody, one is the digital tube display (left), the other is the LCD display (right):

  Note：For the blackbody display of the LED, just press the bottom '⌒' '⌣' to adjust the value; for the LCD display device, press the bottom '<' to select the value to be adjusted, and then press the bottom '⌒' '⌣' to adjust the value.

  b) After fixing the camera and the blackbody position, make sure that the blackbody is on the right or left side of the image and is not blocked (the best position of the blackbody: put it on the top left or the middle position of the 'Cross type' on the top right: as shown below)
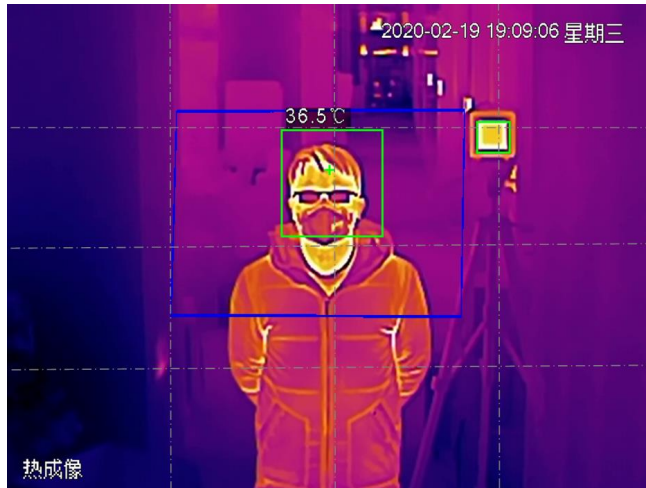
c) (**In the procedure before 20200210**, the rule window should be in the middle of the black body, the smaller the window is, the higher the measurement accuracy is, refer to the green window in the upper right corner of the image below) fill in the black body temperature 35, double-click the image to enlarge to the full screen when drawing the area (double-click again after drawing to restore the original picture size), the rule window should be in the middle of the black body radiation surface, and the rule window should be as small as possible, and click OK to take effect;
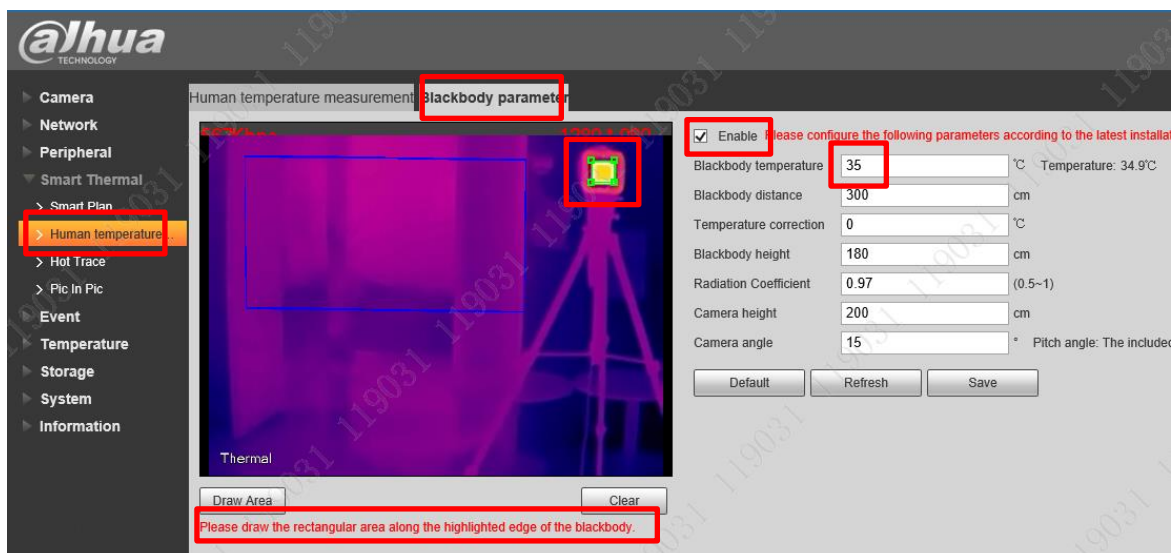
d) (The rule window of the **program after 20200210** is rectangle. The drawing method is as follows: draw the rectangular area along the highlighted edge of the blackbody) **Black regular window drawing is no longer the smaller the better**. You need to draw the rectangular area along the highlighted edge of the blackbody. The blackbody temperature is 35 (the default), and the rule box is shown in the green window below. Click OK to take effect. If the blackbody is facing the camera, the four sides of the blackbody shell will not be exposed, as shown in the following figure:


e) **Confirm that the highest and lowest temperature is within 35 $\pm$ 0.2 ℃ on average**
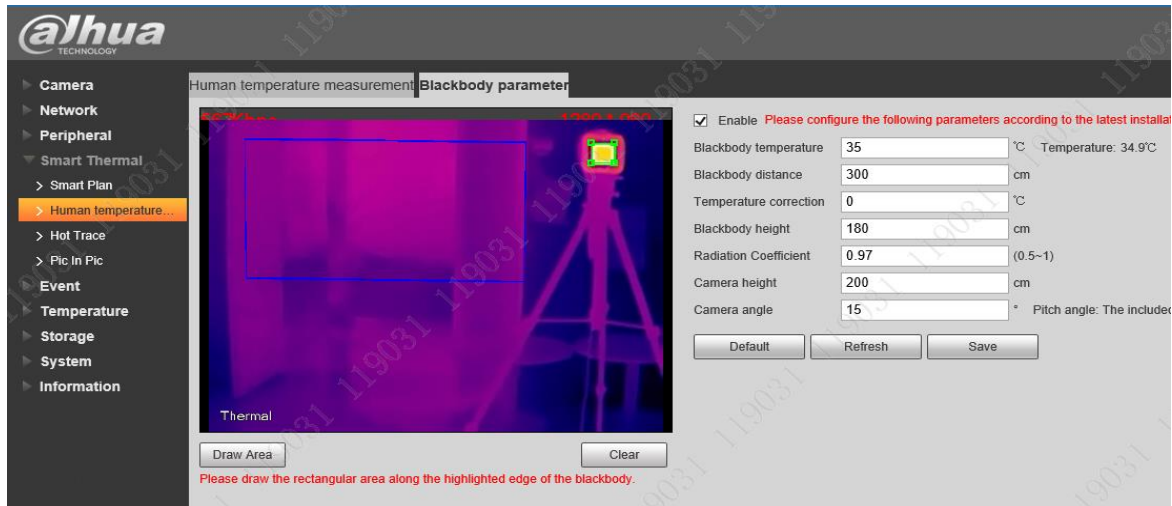
2.2.3 Drawing Of Human Body Temperature Detection Area

a) BF3221（7mm）/BF5421 （13mm）：
  i. The subject stands on the edge of the blackbody (3m away from the camera), faces the camera, and can see the head and shoulder exposed in the picture;
  ii. The lower border of the rule is drawn on the shoulder of the tested person, and the upper border of the rule can be drawn to the upper edge of the image; refer to the following figure for the detection area
b) BF3221（3.5mm）/BF5421 （7.5mm）：
  iii. The tested person is standing on the edge of the blackbody (2 meters away from the camera), and the setting method refers to the 7mm lens;
  The setting in the figure below indicates that an audible and visual alarm will be generated when the head temperature of the subject exceeds 37.3 ℃
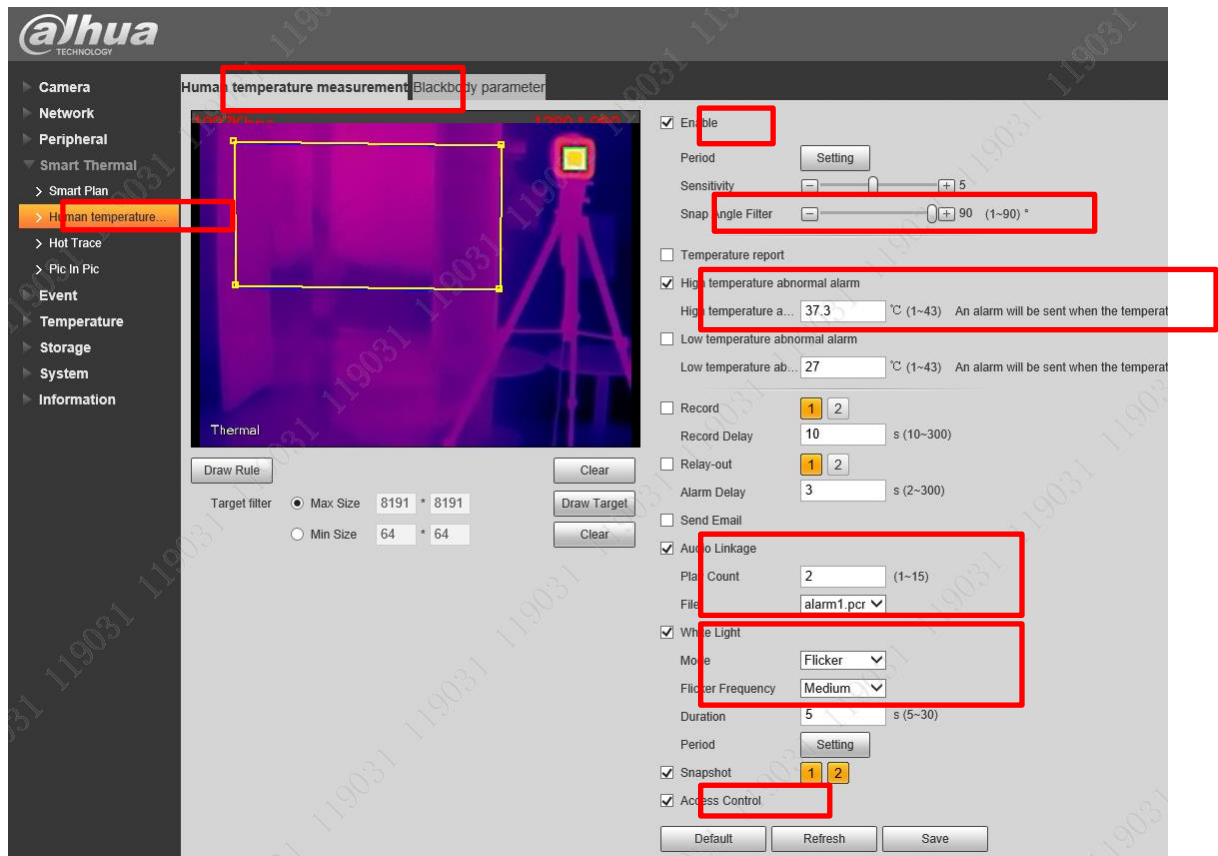
Note:When the snap angle filter value is 1, only the front side (similar to certificate photo) is detected, and the value is 90, and the front side is detected

2.2.4 **Alarm Temperature Correction**

Due to the difference of environment, there may be errors in the temperature of the measured person. If more than 5 person samples stand at the best temperature measurement distance and the measured temperature is generally high or low, they can be compensated by temperature correction. For example, if it is 0.5 ℃ lower, fill in 0.5 ℃ for temperature correction, and if it is 0.5 ℃ higher, fill in - 0.5 ℃

Note: if there is no blackbody on site, when the temperature is corrected, the "enable" in the figure below is not checked, otherwise the temperature measurement will be inaccurate;

If you have blackbody, you need to turn on enable.
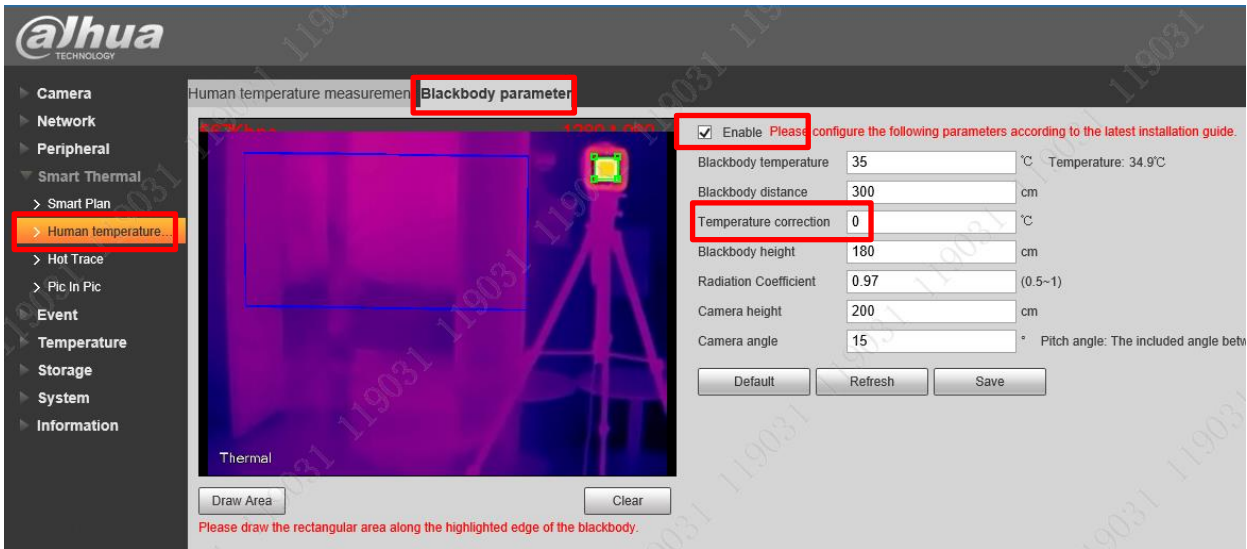
2.2.5 Adjusting The Thermal Camera Face Frame

Camera settings>>camera properties>>channel 2>>find binocular calibration adjustment, adjust the up, down, left and right arrows (set step length) according to the actual situation,you can fine-tune the thermal imaging face frame, and must make the face frame accurate. The following picture:
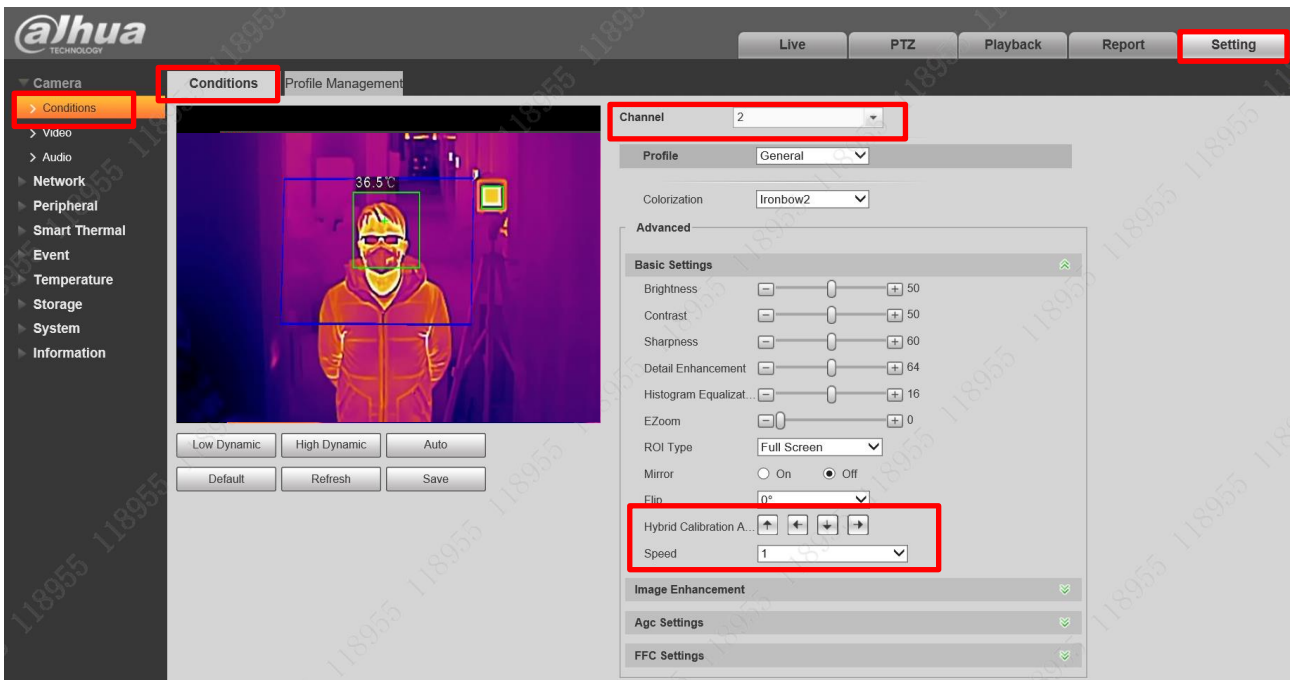
The renderings are as follows:

36.5℃

3 Announcements

The following is for blackbody:

➢ **Warning**

A warning indicates a condition that may cause harm to the user. To avoid personal injury or instrument damage, follow these guidelines:

- Ensure that the place is free of oil, chemicals, inflammables and explosives!
- Use environment is 5 ℃ ~ 40 ℃, (ideal temperature of temperature measurement environment is 10 ℃ ~ 30 ℃). Do not put it into high and low temperature box without permission to avoid accidents!
- Make sure to use grounding socket to prevent accidental electric shock!
- Blackbody cannot be used for applications other than temperature test and calibration!
- It is not allowed to change the boldface range without permission, so as to avoid damaging the boldface or causing safety accidents!
- It is not allowed to dismantle or refit blackbody without permission! Tear up or damage of the tamper proof label, the product is not warranted.

➢ **Notice**

To avoid damaging the instrument or affecting the test accuracy, please follow the following instructions:

- It is not allowed to touch the blackbody radiation surface, and dirt will lead to the decrease of blackbody accuracy or scrap, so as to avoid the scratch of blackbody radiation surface and affect the temperature measurement accuracy.
- Only for indoor use. The use environment shall be free from obvious air convection and strong light irradiation, strong electromagnetic interference and vibration.
- Heat dissipation space shall be reserved around the blackbody, and the distance from the surrounding objects shall not be less than 10cm.

➢ **Calibration**

- In order to ensure the accuracy of blackbody temperature measurement, it is recommended to send blackbody to Dahua Co., Ltd. for paid calibration on a regular basis. The calibration cycle is usually one year.

➢ **Daily maintenance**

- The blackbody shall be managed and maintained by the designated personnel, and the maintenance and use records shall be made.
- In the process of use, it is not allowed to cover any object on the black body, so as not to affect the heat dissipation and thus the temperature accuracy.
- When it is unnecessary to use, dust prevention shall be done well, and the black body shall be put into the packing box or covered with a clean cloth. Ensure that the storage environment temperature and humidity are appropriate.
- It is recommended to use neutral detergent to clean the blackbody shell and soft brush to clean the dust on the radiation surface of blackbody.

4 FAQ

1. What is blackbody? What is the role? Do you need a physical connection to the camera?

Blackbody can be simply understood as a constant temperature reference source (constant temperature can be maintained after power on). When testing human body temperature, blackbody is generally set at 35 ℃, which is used for temperature correction of thermal imaging acquisition, so as to meet the accuracy

requirements of $\pm$ 0.3 ℃.

Bold doesn't need to be connected to the camera, it's separate. After power on, it can be placed in the camera screen according to the installation instructions.

2. Power on stabilization time of equipment.

Blackbody: power on and preheat for 20 minutes; thermal imaging equipment: power on and preheat for 60 minutes, with the best effect.

3. Whether it can be installed in outdoor or semi outdoor environment.

Because the outdoor temperature, wind, humidity and other environmental factors have a great impact on the temperature measurement of the thermal imaging surface, it is not recommended to be installed outdoors or in the area directly connected to the outdoor, but in a closed and relatively stable environment without wind.

4. Why is it recommended to measure the temperature of frontal forehead?

First of all, different people's forehead temperature also has temperature difference. In the case of mask, the exposed area of forehead is relatively large, which is more convenient for temperature measurement.

The actual temperature of the front face and the side face of the same person / same position is different. With masks, the high temperature points are mainly in the forehead, ears and neck, and the temperature is different among different people. Therefore, it is required to face the camera and test the frontal temperature uniformly to reduce the impact of temperature difference between different parts.

5. What is the best temperature range for temperature measurement?

The best temperature range of indoor wind free and stable environment is 10 ℃ ~ 30 ℃

6. The best distance for temperature measurement?

The best temperature measurement distance is the same as the distance between blackbody and equipment. 3.5mm detection distance is 2m, and the transverse width of 2m is about 1.5m; 7mm detection distance is 3m, and the transverse width of 3m is about 1.3m; the temperature measurement value far from the optimal distance will be reduced, and the temperature measurement value close to the optimal distance will be increased.

7. How many heads can be tested?

As shown in the figure below, in normal use, there are not many people (width 1.3-1.5m) at the best distance of temperature measurement. There is no limit to the number of heads in the detection area, but it is too far or there is overlap, which may result in missing or inaccurate temperature measurement. It is recommended to test one by one.

8. Why does the image of thermal imaging channel get stuck after a period of time? Is it normal?

Normal. In order to ensure image uniformity and temperature measurement accuracy, thermal imaging needs a period of time to set the blank back to zero for correction. During the process of setting the blank, the image will get stuck once, and the internal part of the equipment will "click" once, which is a normal situation.

9. Why thermal imaging does not measure temperature after the first configuration

The system time is not synchronized, refer to the time synchronization setting in system debugging.

10. Why is the head frame inaccurate?

It may be related to the installation angle and environmental background on site. If the head detection effect is not ideal, please provide the Dav video with two channels on site. Send Xu Fangrong and Fang Shengdong through Dahua interactive platform (select intranet Download for outgoing type). After receiving the video, the R & D will optimize and iterate according to the scene.

11. How to turn off the bold exception alarm?

Select event management>>blackbody exception alarm>>blackbody exception, enable and turn on or off. The default sensitivity is 60, and the lower the value, the less likely it is to report blackbody abnormality. The following picture: