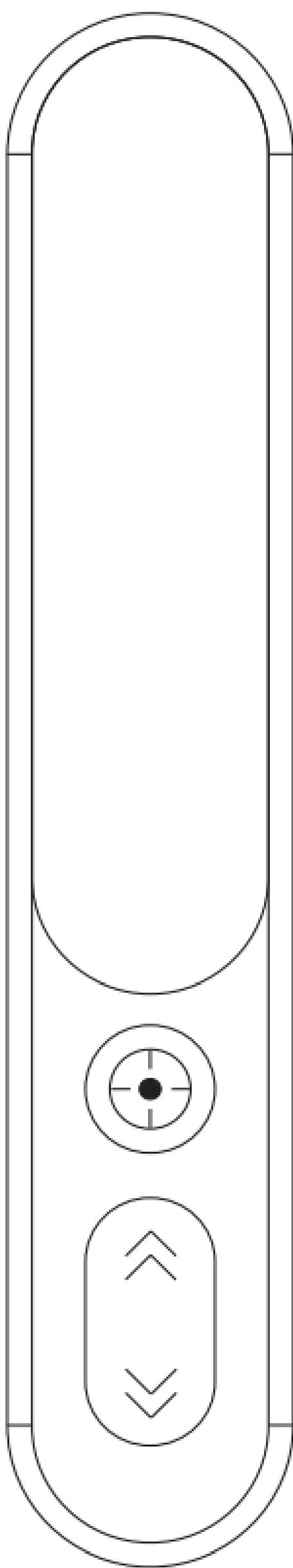


# IAD-I Individual Accuracy Dosimeter

RayWatch



User Manual

# 1. Product Introduction

The IAD-I is a radiation detection device equipped with an OLED display screen. It allows real-time monitoring of dose rate and cumulative dose. It features audible and visual alarms to alert users if radiation levels exceed safety thresholds.

IAD-I utilizes a highly sensitive Geiger-Mueller tube detector, capable of accurately measuring photon and electron radiation intensity in various environments. It has a wide measurement range and is suitable for personnel requiring radiation dose monitoring.

**Table 1. Dose limits for different user groups**

Dose limits for radiation industry personnel	
Continuous 5-year average annual effective dose	20 mSv
Effective dose for any single year	50 mSv
Dose limits for public members	
Annual effective dose	1 mSv
If the 5-year average annual effective dose does not exceed 1 mSv, then the annual effective dose for any single year can be 5 mSv.	5 mSv

Source: "Basic Standards for Ionizing Radiation Protection and Radiation Source Safety (GB18871-2002)"

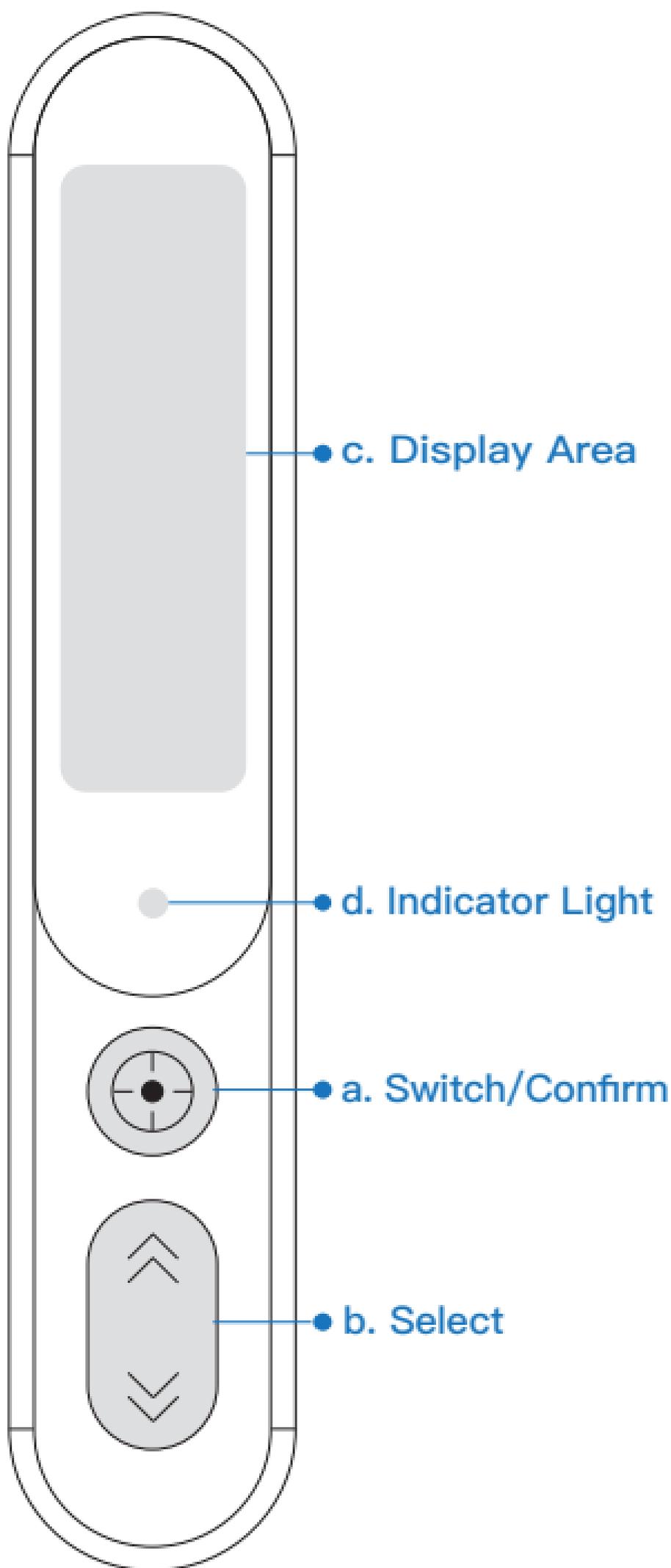
**Table 2. Radiation sources in daily life**

Type	Dose level
Cosmic radiation	0.4mSv/year
Watching TV for 2 hours per day	0.01mSv/year
Smoking 20 cigarettes per day	0.5-1.0mSv/year
Wearing a luminous watch	0.02mSv/year
One chest X-ray examination	0.1mSv
Taking a flight of 2,000km	0.01mSv

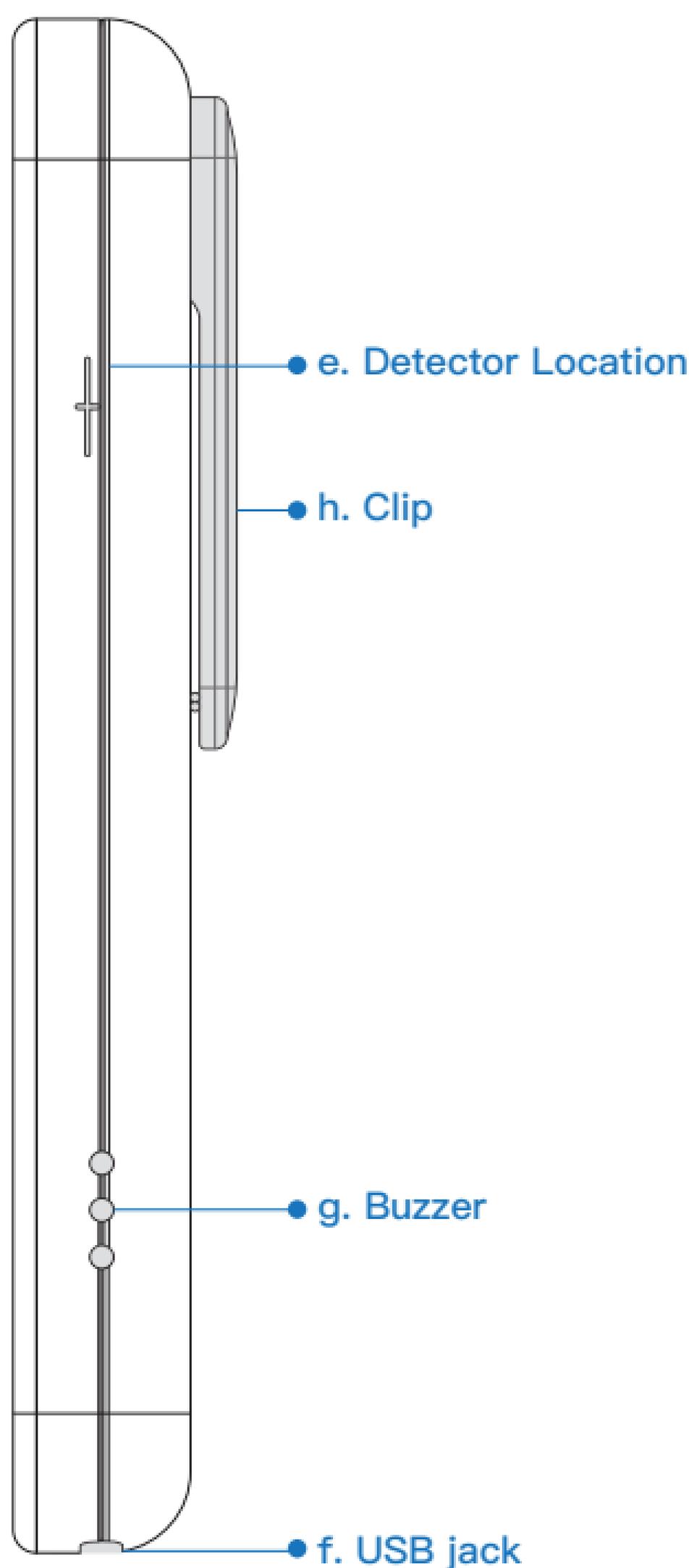
Source: China Society of Radiation Protection

## 2. Structure and Functions

### 2.1 Structure



- a. "⊕": Long press to power on/off. Short press to perform the following functions. enter the main menu,confirm,save and exit.
- b. "⏪ " " ⏩ ": Allows option switching within the menu. Short press to toggle between the main page (see Figure 2.3.1) and the dose details page (see Figure 2.3.2). Long press to switch to the timer mode (see Figure 2.3.3 for details).
- c. **Display Area:** Displays measurement results and other information.
- d. **Indicator Light:** Flashes red when an alarm is triggered due to exceeding threshold values and flashes blue in standby mode.



**e. Detector Location:** Marks the position of the Geiger–Mueller tube.

**f. USB jack:** Type–C charging interface.

**g. Buzzer:** Used for alarm notifications.

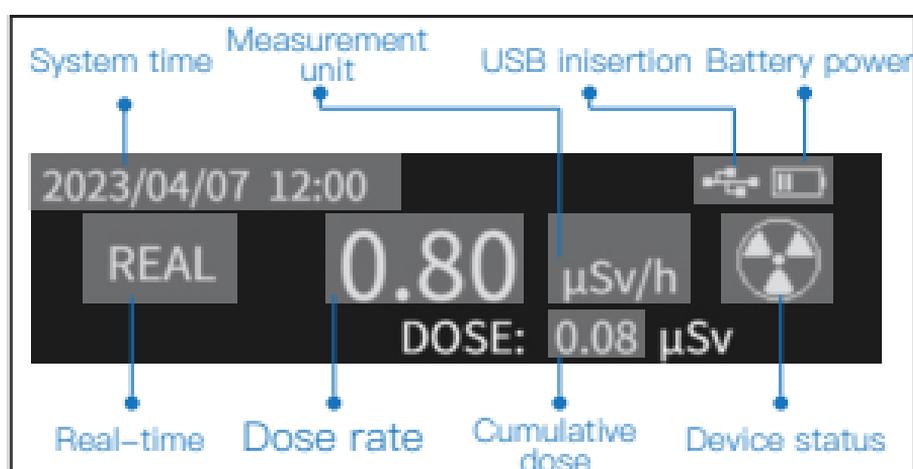
**h. Clip:** Can be used to secure the device to clothing. The clip is detachable.

## 2.2 Functions

- 1) Real-time measurement of dose rate, recording cumulative dose. Users can view daily cumulative dose, average dose rate, and historical cumulative dose at any time.
- 2) Adjustable dose and dose rate alarm thresholds. When thresholds are exceeded, the red light flashes and a beeping alarm sounds.
- 3) Indicator light can signal exceeding thresholds, charging, and standby status.
- 4) Over-range alert function, displaying an over-range warning on the screen when the dose rate exceeds 10 mSv/h.
- 5) Adjustable brightness and screen-off time.
- 6) Built-in storage ensures data is not lost during power outages.
- 7) Battery level display and low battery alert.

## 2.3 Display Interface

### 2.3.1 Main Page



- 1) **USB insertion:** This icon appears when a USB is inserted, indicating that the device is charging. The blue light stays on during charging and turns off when fully charged.
- 2) **REAL:** Displays the ambient radiation dose equivalent rate at the current moment.
- 3) **Measurement unit**
- 4) **Device status:**

Icon	Description
	Normal Operation
	Exceed Set Threshold
	Over Range ( $\geq 10\text{mSv/h}$ )

## 2.3.2 Dose Details Page

Short press "◀" or "▶" to enter the dose details page, which can display the cumulative dose of the day, the average dose rate of the day, and the highest dose rate of the day.

- Note that the daily dose and average dose rate are calculated on a natural day. The system time is automatically reset and saved as a historical record at 24:00, and accumulation begins again.
- The current cumulative total dose is the cumulative dose from the last reset to the current time.
- The cumulative dose is set to zero at the factory, and it automatically starts to accumulate after power-on.

Today's Cum.: 0.70 $\mu\text{Sv}$	Dose in total:
Today's Avg. : 0.70 $\mu\text{Sv/h}$	0.71 $\mu\text{Sv}$
Today's Max. : 0.70 $\mu\text{Sv/h}$	

## 2.3.3 Timer Mode

The timer mode measures the cumulative dose over a specified time period, with a maximum continuous accumulation of up to 99.9 hours.

### Operation Instructions:

- 1) On the main page, long press the select button "◀" to enter this mode, starting the calculation of dose rate and cumulative dose. The screen off does not interrupt the measurement. The elapsed time will be displayed next to icon "🕒".
- 2) Short press "▶" to pause the timer, and the timer icon will change to "⏸".
- 3) Long press "▶" to refresh the timer, and the data will be automatically saved.
- 4) Long press "◀" to exit the timer mode.

Data in timer mode is saved separately, allowing you to view the results of the last two timing records. On the main page, long press "▶" to enter the view page. Long press "▶" again or short press "⊕" to exit.

2023/04/07 12:00	🕒 0 s	
REAL	0.00 $\mu\text{Sv/h}$	
	DOSE: 0.00 $\mu\text{Sv}$	

2023/04/07 12:00	⏸ 11 s	
REAL	0.34 $\mu\text{Sv/h}$	
	DOSE: 0.10 $\mu\text{Sv}$	

## 2.3.4 Main Menu



Click "⊕" to enter the main menu, which includes 4 items. For detailed functions and operations, refer to sections 3.2 to 3.5. The " > " icon indicates the selected item, and " 🏠 " is used to return to the main page. Long press or double-press " ⊕ " to return to the main page.

## 2.4 Technical Specifications

**Detector:** Geiger-Müller tube

**Detector Dimensions:**  $\Phi 6\text{mm} \times 68\text{mm}$

**Dose Rate Range:**  $0.10 \mu\text{Sv/h} - 10.00 \text{mSv/h}$

**Dose Range:**  $0.00 \mu\text{Sv} - 99.99 \text{Sv}$

**Sensitivity:**  $66 \text{cpm}/\mu\text{Sv/h}$

**Energy Range:**  $50\text{keV} - 3\text{MeV} \leq \pm 30\%$

**Maximum Standby Time:** Up to 200 hours

**Dimensions(LxWxH):**

(With Clip)  $13.0 \text{ cm} \times 2.3 \text{ cm} \times 1.9 \text{ cm}$

(Without Clip)  $13.0 \text{ cm} \times 2.3 \text{ cm} \times 1.5 \text{ cm}$

**Weight:** 37g (With Battery)

**Temperature Range:**  $10^\circ\text{C} - 40^\circ\text{C}$

## 3. Operating instructions

### 3.1 Power On/Off

Press and hold the "⊕" button for 3 seconds to power the device on or off.

### 3.2 Threshold Settings

Short press the "⊕" button and select "Threshold" to set the desired thresholds.

Dose rate threshold

TH 10.10  $\mu\text{Sv/h}$

#### A、Dose Rate Threshold

Operating Instructions:

- Press the "⊕" button once to confirm the modification of the current digit and move to the next digit. Press the "⊕" button twice will return to the previous digit.
- Use the "◀" and "▶" buttons to increase or decrease the value.
- Long press the "⊕" button to save and return.

#### B、Dose Threshold

You can set today's cumulative threshold and the total cumulative threshold. The setting method is the same as in section 3.2.A.

- Today's Cumulative Threshold: Sets the threshold for the dose accumulated within a natural day. The device will alarm if this threshold is exceeded. Select "..." to return to the previous menu.
- Total Cumulative Threshold: Sets the threshold for the dose accumulated from the last reset to the present. The device will alarm if this threshold is exceeded. Select "..." to return to the previous menu.

## 3.3 System Settings

### 2. System setting

- > A. Date & time
- B. Display ...
- C. Reset
- D. About

From the main menu, select "System" to enter system settings. Select "  " to return to the previous menu.

#### A. Date & Time

The setting method is the same as in section 3.2.A. Long press "  " to confirm, save, and exit. When exiting, you will be asked whether to clear the cumulative dose for the day. Selecting "Yes" will reset the cumulative dose to zero, while selecting "No" will continue accumulating from the current dose.

#### B. Display

You can set the display brightness and display-off time. Select "  " to return to the previous menu.

- Display Brightness: Press the "  " or "  " button to adjust the brightness, and press "  " to save and exit.
- Display-Off Time: The setting method is the same as above. If there is no operation on the IAD within the set time, the IAD will automatically turn off the screen and enter standby mode. During standby, a blue breathing light will flash once every 5 seconds.

#### C. Reset

After selecting "Reset" , you will be asked, "Confirm to reset?" Use "  " and "  " to select "Yes" or "No," and press "  " to confirm. Note that this operation will revert system settings and threshold settings to their factory preset values, but the system time, history records, and cumulative dose will not be deleted.

#### D. About

You can view information such as the model, manufacturer, and serial number. Use the "  " and "  " buttons to flip pages, and press "  " to exit.

### 3.4 Records

From the main menu, select "Records" to view historical records. Use "◀" and "▶" to flip pages, and press "⊕" to exit.

(Example) 23/05/09 – 0.15 $\mu$ Sv – 0.21 $\mu$ Sv/h  
The cumulative dose from 00:00 to 24:00 on 23/05/09 was 0.15  $\mu$ Sv, and the average dose equivalent rate for the day was 0.21  $\mu$ Sv/h.

23/05/09 - 0.15  $\mu$ Sv - 0.21  $\mu$ Sv/h  
23/05/08 - 0.16  $\mu$ Sv - 0.19  $\mu$ Sv/h

### 3.5 Clear Cumulative Dose

- Select "Clear Cum." to be prompted with "Clear total cumulative dose? ". Use "◀" and "▶" to select "Yes" or "No", and press "⊕" to confirm your choice.
- Once confirmed, the total cumulative dose will be reset to zero, and the IAD will start recalculating the cumulative dose. The cumulative dose results before the reset will be automatically saved to the historical records.

### 3.6 Low Battery Warning and Automatic Shutdown

- When the IAD battery is below 1%, a low battery warning will be displayed, showing a battery icon as .
- The buzzer will emit two alarm beeps to prompt charging. After 3 minutes, a second reminder will occur.
- If a charging device is not connected within 1 minute of the second reminder, the IAD will automatically shut down.

#### Note:

- Battery depletion not only causes the date and time to reset, leading to data confusion but also reduces battery lifespan.
- To ensure data security and extend device lifespan, avoid automatic shutdown due to low battery and charge the IAD promptly.

## 4. Device Malfunction Q&A

### 4.1 Unable to Power On

If IAD fails to power on, please follow these steps:

- Check if the device casing is intact and shake the device to ensure no parts are loose.
- If there are no visible abnormalities, try charging the device using a USB charging cable. After charging for a period, attempt to power on the device again and observe if it returns to normal.
- If there is physical damage to the device, unusual noises, or if it still cannot power on after charging, please contact our personnel for further assistance. Note that we will not repair any damage caused by unauthorized disassembly.

### 4.2 Continuous Alarm

If IAD continues to alarm, follow these steps:

- Immediately leave the area and check if the real-time dose rate or cumulative dose exceeds the threshold.
- If the cumulative dose exceeds the threshold, you can go to the menu and select "4. Clear Cum." to reset the cumulative dose or adjust the cumulative dose threshold higher to stop the alarm.
- If the device is not in a radiation environment, yet the alarm persists, power off the device and contact our personnel for further assistance.

## 4.3 No Alarm in High Radiation Environment

If IAD shows significantly higher real-time dose rates in high radiation environments but does not alarm, follow these steps to check:

- Verify if the set dose rate threshold is too high. Adjust it refer to Section 3.2.A. It is recommended to set the dose rate threshold not exceeding  $2.5 \mu\text{Sv/h}$ .
- If the issue persists, please follow Section 3.3.C to reset the IAD to factory settings.

If the real-time dose rate exceeds the set threshold but IAD does not alarm, please leave the site immediately and contact our personnel for further assistance after reaching a safe environment.

## 4.4 Frozen Page

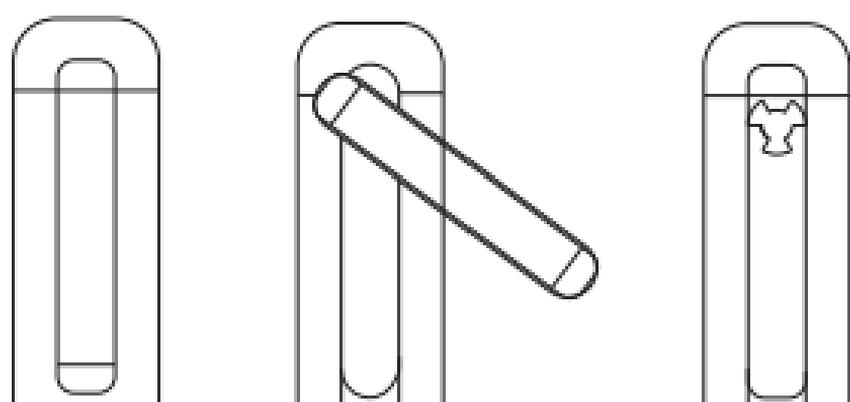
If the screen cannot switch pages or the device status light does not blink, press and hold the "  " button for 10 seconds to force shutdown. Restart the device and check if the page resumes normal operation. If the issue persists, please contact our personnel for further assistance.

## 4.5 Charging Failure or Lack of USB Prompt

When inserting the USB, if the screen does not display the USB icon and the blue light does not illuminate, please confirm if the other end of the USB is connected to a power source. If everything is correctly connected but there is still no charging indication, try replacing the USB cable and attempt charging again. If charging still fails, please contact our personnel for further inspection.

## 4.6 Clip

The clip on the back of IAD is detachable. Please refer to the following diagram.



## 5. Precautions

- Always power off the device when not in use. If it remains unusable for an extended period and won't power on, recharge it first before restarting and promptly adjust the system time.
- Due to the presence of high-voltage circuits inside the device, avoid using it in environments with flammable gases, explosive dust, or similar hazards. If you notice any damage to the casing, refrain from touching internal circuits to prevent electric shock.
- Keep the device away from water during use to prevent circuit short-circuiting and adverse effects.
- Store and operate the device in dry environments as excessive humidity can damage its components.
- Avoid dropping or subjecting the device to strong vibrations to prevent detector damage. If you observe any abnormalities, refrain from using the device in high-intensity radiation areas.
- In case of malfunction preventing normal operation, contact our technical support for repairs and do not attempt to disassemble the device on your own.
- The device contains small parts posing a choking hazard, so store it safely to prevent access and use by children under 3 years of age.
- Refrain from using organic solvents, including ethanol and isopropyl alcohol, or liquids containing organic solvents, for cleaning the equipment surface. Should cleaning be necessary, utilize a soft towel dampened with clean water to gently wipe the surface.

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