

ND1 Nuclear radiation detector

High-sensitivity multifunctional nuclear radiation detector

ALIENTEK

Revision history

Version	Date	Modify
V1.0	2025/03/11	First release
V1.1	2025/05/19	Optimize screen-off wake-up, add simulated detection sound, support long press switch in settings, etc.
V1.2	2025/10/28	Add instructions for Bluetooth functionality
V1.3	2025/12/10	Revise the content of radiation dose knowledge
V1.4	2026/03/30	Calibrate the battery level changes, add standard mode, off-screen time, etc

Table of contents

Notes (Must Read).....	1
1. Characteristic parameters	1
2. Quick Start.....	4
2.1 Appearance Description	4
2.2 Buttons & Operation Instructions	4
3. Functional Description	5
3.1 Main Interface	5
3.2 Nuclear radiation detection interface	5
3.3 Clock interface	7
3.4 Countdown interface	8
3.5 Settings interface	10
3.6 Other interfaces	12
3.7 Firmware Upgrade	13
3.8 Data Recording	14
3.9 Bluetooth Function	15
4. Basic knowledge of radiation dose	16
4.1 Radiation dose description	错误！未定义书签。
4.2 Unit conversion knowledge	16
5. Frequently Asked Questions	16
6. Warranty Terms	17
7. Contact Us	17

Thank you for purchasing this product. In order to let you have a more complete understanding of the product features and operating methods, we recommend that you read this manual carefully before use.

Notes (Must Read)

1. Please read this manual carefully to better use this instrument.
2. Do not use this instrument in flammable, explosive or high humidity environments.
3. This device is a precision instrument. Please do not drop, knock or bump it to avoid damage.
4. When the battery is too low, it may affect the function of the device. Please charge it in time.
5. Do not disassemble or assemble the instrument without permission! To avoid electric shock or damage to the instrument!
6. The instrument can only measure ionizing radiation, but cannot measure the electromagnetic radiation of mobile phones/computers!
7. If there are any differences between the contents of this manual and the actual instrument, please refer to the actual instrument!
8. If you have any problems using it, please contact our after-sales service, and do not disassemble it privately!
9. This product is not a professional laboratory measuring instrument. Its measurement results are for reference only and cannot be used for precise measurements in scientific research, experiments, or similar applications.

1. Characteristic parameters

ND1 nuclear radiation detector is a multifunctional radiation detection instrument newly launched by Guangzhou Xingyi Electronic Technology Co., Ltd. (Zhengdian Atom). It uses a highly sensitive J321 (M4011) Geiger-Mueller counter tube as a radiation detector. It has high sensitivity and supports: radiation intensity detection of β rays, γ rays and X rays, supports current dose and cumulative dose alarm, and supports the recording of about 1 million radiation values. At the same time, ND1 also supports real-time clock, alarm, countdown, temperature and humidity detection (integrated temperature and humidity sensor) and other functions.

The whole machine is exquisite and simple, small in size and easy to carry. The main features of this product are as follows:

- Rich in functions, one machine for multiple uses
- Detection of β , γ , and X-ray radiation intensity

- Highly sensitive J321 large Geiger tube, accurate and reliable
- Real-time clock function, supports alarm/calendar
- Countdown function, automatic sensing, convenient and practical
- Integrated temperature and humidity sensor, temperature and humidity detection
- Support sound and vibration alarm
- Support dose rate and cumulative dose alarm threshold settings
- Supports approximately 1 million radiation value records
- Support USB data export for easy analysis
- Support handheld sensing function, convenient and easy to use
- Support firmware upgrade function, continuous update
- Adopt 2-inch high-definition IPS color screen, delicate and rich
- Extremely small size design, easy to carry

Applicable scope of the instrument:

- Home Radiation Testing
- Medical nuclear radiation detection
- Radioactive testing of seafood
- Import product testing
- Marble/ore testing
- Food/Metal Detection
- Nuclear industry radioactivity detection
- Other nuclear radiation related products, environmental testing
- Ambient temperature and humidity measurement
- Clock Calendar/Time Management

The detailed specifications of ND1 multi-function nuclear radiation detector are shown in Table 1.1 :

project	illustrate
Detection ray type	Beta rays, gamma rays, x-rays
detector	J321 (M4011) Geiger-Mueller counter tube
Dose current rate	0.00 ~ 10000 μ Sv /h (10mv/h)
Cumulative dose equivalent	0.00 μ Sv ~ 900mSv
Sensitivity	80CPM/ μ Sv (Co-60)
Dosage Unit	μ Sv /h, μ Gv /h, mR /h, CPM, CPS
Data Recording	7MB (up to 30 days / $\approx$ 1 million points)
Real-time clock	Time, date, day of the week
Countdown	Five-way quick countdown
Humidity measurement	0 %~100%
Temperature measurement	- 20℃ ~ 60℃
Alarm method	Sound, vibration

Language display	Simplified Chinese, Traditional Chinese, English
Screen parameters	2.0" IPS LCD 320 × 240
Battery capacity	1000mAh
Battery life	≈ 15 hours
Communication/charging interface	TYPE-C
Input voltage	5V, 1A
Operating temperature	-20°C ~ 60°C
Product Weight	≈ 65g
Product size	100mm × 40mm × 19mm

Table 1.1 ND1 detailed specifications

2. Quick Start

2.1 Appearance Description



Figure 2.1.1 Appearance of ND1 nuclear radiation detector

- ①, Temperature and humidity sensor detection port
- ②, USB Type-C , charging/communication interface
- ③, Geiger-Mueller counter tube position
- ④, 2.0 inch IPS LCD (320 × 240)
- ⑤, Five function buttons

2.2 Buttons & Operation Instructions

The 5 buttons and operation instructions of the device are shown in Table 2.2.1 :

button	Click	Long press
OK button	Sure	invalid
▲	up/ Increase	invalid
▼	Down / Decrease	invalid
◀	left	Exit / Return to previous level
▶	To the right	Power on / off

Table 2.2.1 Buttons & Operation Instructions

3. Functional Description

3.1 Main Interface

After the instrument is turned on, it enters the main interface by default (which can be changed in the settings). The main interface includes four functional options: nuclear radiation detection, clock, countdown, and settings. As shown in Figure 3.1.1 :

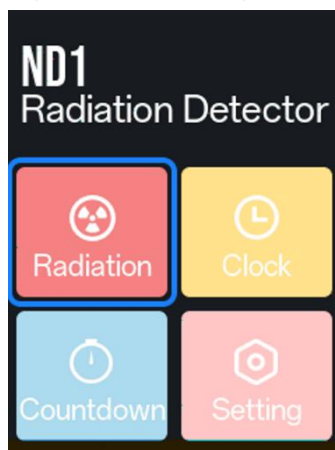


Figure 3.1.1 Main interface

The main interface function description is shown in Table 3.1.1 :

Options	Function
Nuclear radiation detection	Nuclear radiation detection function, supports standard interface and curve interface (switchable by ▼/▲)
clock	Implement clock function, support time, date, week, ambient temperature and humidity, current radiation dose display
Countdown	Countdown function, optional button/ Automatically sense 5 directions for quick countdown
set up	Instrument setting interface, you can set the instrument functions in detail

Table 3.1.1 Main interface function description table

3.2 Nuclear radiation detection interface

Nuclear radiation detection is divided into two interfaces: standard interface and curve interface (switch by ▼/▲ keys).

3.2.1 Standard interface

In the standard interface, important information such as real-time radiation value, real-time cumulative value, cumulative storage value, current alarm value, cumulative alarm value, etc. can be displayed, as shown in Figure 3.2.1.1 :

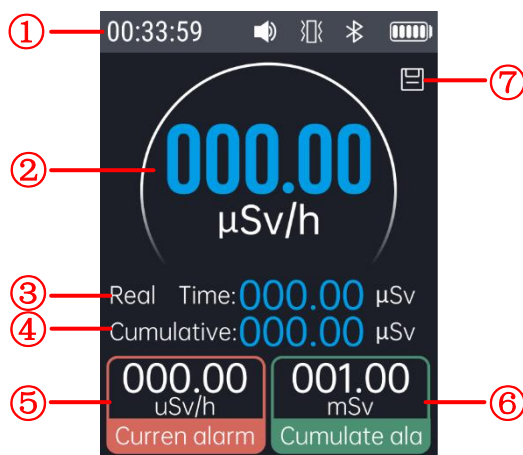


Figure 3.2.1.1 Nuclear radiation detection: standard interface

The standard interface function description is shown in Table 3.2.1.1 :

serial number	Function
①	Status bar, showing time, sound alarm standard, vibration alarm symbol, Bluetooth symbol, battery level and other information
②	Real-time radiation value, real-time display of current radiation dose value
③	Real-time cumulative value, showing the accumulated radiation value after this startup, which will be accumulated again next time it is started
④	Cumulative storage value, the cumulative sum of all radiation values, will not be automatically cleared
⑤	Current alarm value. When the real-time radiation value exceeds this value, the instrument will alarm.
⑥	Accumulated alarm value. When the accumulated storage value exceeds this value, the instrument will alarm.
⑦	The data recording icon will flash when the data recording function is turned on, indicating that the current radiation value is being recorded.

Table 3.2.1.1 Standard interface function description table

The standard interface operation instructions are shown in Table 3.2.1.2 :

button	Click	Long press
OK	invalid	Quickly turn on / off data logging function
▲ / ▼	Switch between standard and curve interface	invalid
◀	invalid	Return to the main interface
▶	invalid	Shutdown

Table 3.2.1.2 Standard interface operation instructions

3.2.2 Curve interface

In the curve interface, the main information can be displayed: real-time radiation value, average radiation value, maximum radiation value, radiation bar graph, etc., as shown in Figure 3.2.2.1 :



Figure 3.2.2.1 Nuclear radiation detection: curve interface

The curve interface function description is shown in Table 3.2.1.1 :

serial number	Function
①	Status bar, showing time, sound alarm standard, vibration alarm symbol, Bluetooth symbol , battery level and other information
②	Real-time radiation value, real-time display of current radiation dose value
③	The bar graph shows the real-time radiation value bar graph waveform, which is convenient for checking the real-time radiation changes.
④	Waveform speed, six-grid waveform, time value corresponding to each grid, the figure represents 10 seconds /grid
⑤	Average, the average radiation value in the past minute
⑥	Maximum value, the maximum radiation value detected after this startup
⑦	The data recording icon will flash when the data recording function is turned on, indicating that the current radiation value is being recorded.

Table 3.2.1.1 Curve interface function description table

Key operation is the same as the standard interface.

3.3 Clock interface

In the standard interface, important information such as real-time radiation value, real-time cumulative value, cumulative storage value, current alarm value, cumulative alarm value, etc. can be displayed, as shown in Figure 3.2.1.1 :

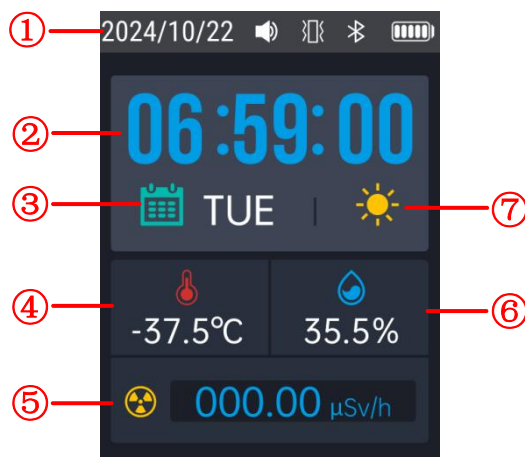


Figure 3.3.1 Clock interface

The clock interface function description is shown in Table 3.3.1 :

serial number	Function
①	Status bar, showing year, month, day, sound alarm standard, vibration alarm symbol, Bluetooth symbol , battery level, etc.
②	Current time, real-time display of current time
③	Week, the English abbreviation shows the current day of the week
④	Ambient temperature, real-time display of current ambient temperature
⑤	Real-time radiation value, real-time display of current radiation dose value
⑥	Ambient humidity, real-time display of current ambient humidity value
⑦	Day/night indicator, showing the sun during the day (6:00 ~ 18:59) and the moon at night (19:00 ~ 5:59)

Table 3.3.1 Standard interface function description table

The clock interface operation instructions are shown in Table 3.3.2 :

button	Click	Long press
◀	invalid	Return to the main interface
▶	invalid	Shutdown

Table 3.3.2 Clock interface operation instructions

3.4 Countdown interface

The countdown interface is used for the countdown function, which is a very practical time management function.

Enter this interface, you can first select the countdown time by pressing the button, or use the 5-direction gravity automatic sensing (just place the instrument as shown in the figure) to select the corresponding countdown. After selection, the instrument will automatically start the countdown. After the countdown ends, if the alarm (sound, vibration) is turned on, a warning will be issued. The countdown interface is shown in Figure 3.4.1 :

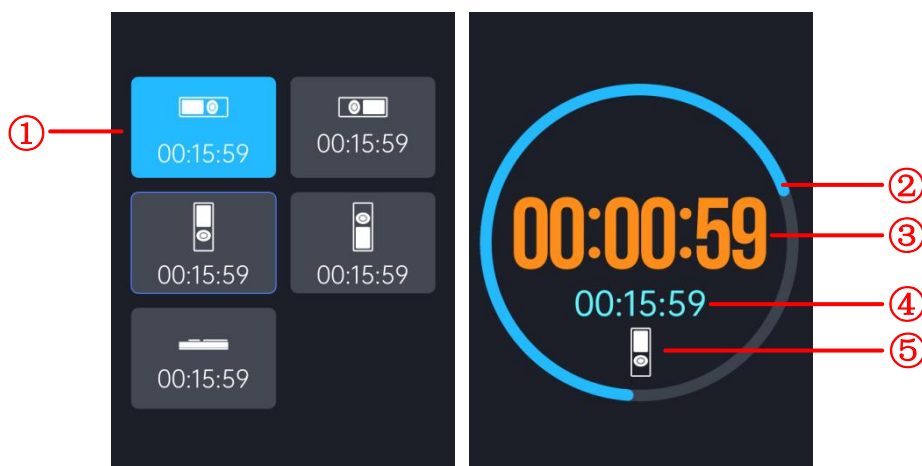


Figure 3.4.1 Countdown interface

The countdown interface function description is shown in Table 3.4.1 :

serial number	Function
①	Countdown selection interface, can be selected by button / instrument automatic sensing ¹
②	Countdown progress bar, showing the countdown progress
③	Countdown remaining time, showing how much time is left to end the countdown
④	Long countdown, showing the total countdown time
⑤	Gravity automatic sensing direction display, place the instrument in the direction shown in the figure, and the countdown will automatically begin

Note 1: Place the instrument in the direction and position as shown in the figure. The instrument will automatically select the corresponding countdown and start timing.

Table 3.4.1 Countdown interface function description table

The operation instructions of the countdown selection interface are shown in Table 3.4.2 :

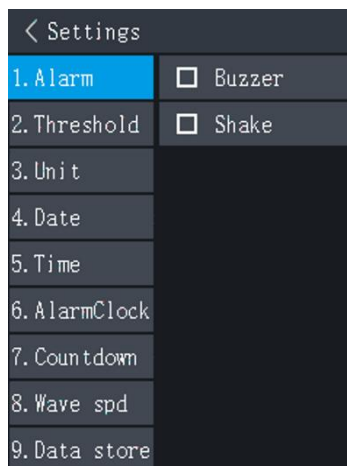
button	Click	Long press
OK button	Select the current countdown	invalid
▲	up	invalid
▼	down	invalid
◀	left	Back to previous level
▶	To the right	Shutdown

Table 3.4.2 Operation Instructions for Countdown Selection Interface

Note: After the countdown starts, pressing any button will automatically exit the countdown and return to the countdown selection interface.

3.5 Settings interface

Enter the setting interface to set various parameters of the instrument in detail, as shown in Figure 3.5.1 :



3.5.1 Setting interface

15 items in total in the setting interface . The meaning, factory settings and adjustable range of each item are shown in Table 3.5.1 :

Menu Items	Interpretation	Factory settings	Adjustable range
1. Alarm method	Set alarm modes such as warning/alarm/countdown, etc. Switch and volume adjustment for simulated detection sound ¹	Buzzer + vibration Simulated detection sound: Off.	☐ Buzzer alarm ☐ Vibration alarm ☐ Simulated detection sound
2 . Alarm settings	Current dose alarm value, real-time dose exceeds this value and alarms	1.00 $\mu\text{Sv/h}$	0 ~ 999.99 $\mu\text{Sv/h}$
	Accumulated dose alarm value, the accumulated dose exceeds this value and alarm is triggered	20.00 mSv	0 ~ 999.99 mSv
	Clear the accumulated storage value. Clear the accumulated storage value.	/	/
3. Unit Settings	Set the unit of the radiation value (see below for explanation and conversion)	$\mu\text{Sv/h}$	● $\mu\text{Sv/h}$ ● $\mu\text{Gy/h}$ ● mR/h ● CPM ● CPS
4. Date settings	Set the instrument's date (year, month, day)	2025 - 03-10	2020 ~ 2099
5. Time settings	Set the instrument time (hours, minutes, seconds)	09: 00 : 00	Any time
6. Alarm setting	Set alarm time (hour, minute, second, week, on/off)	closure	Any time of the week

	Switch on + The alarm can only be turned on when the weekly setting is valid		
7. Countdown	 Quick countdown time for left horizontal direction	30 seconds	00:00:00 ~ 23:59:59
	 Right horizontal direction quick countdown time	1 minute	
	 Quick countdown time in upright position	5 minutes	
	 Quick countdown time for inverted direction	10 minutes	
	 Quick countdown time in the forward direction	1 hour	
8. Waveform speed	Set the waveform refresh speed of the nuclear radiation detection curve interface	10S/div	● 10S/div ● 15S/div ● 30S/div
9. Data Recording	Set the data recording interval of nuclear radiation value	1S	● 1S ● 2S ● 5S ● 10S ● closure
10. Language settings	Set the system language	Simplified Chinese	● Simplified Chinese ● Traditional Chinese ● English
11. Backlight settings	Set the backlight brightness (the brighter the better, but consumes more power)	50%	0% ~ 100%
12. Screen off settings	Set the screen off time. If there is no operation (or sensing) for this period of time, the system will turn off the screen. Click any key to wake up after the screen turns off. Sensor control: The screen will automatically light up when the instrument detects that it is being picked up/shaken	10S (seconds)	● 10 seconds ● 30 seconds ● 1 minute ● 3 minute ● 5 minute ● 10 minute ● Never ☐ Handheld Sensing
13. Shutdown settings	Set the automatic shutdown time. If there is no operation during this time, the system will shut down.	10M (min)	● 10minutes ● 30 minutes ● 60 minutes ● Never
14. Startup interface	Set the interface to enter after the instrument starts	Main Interface	● Main Interface ● Nuclear radiation interface ● Clock interface

15. Other settings	USB connection, enter USB mode and communicate with computer ²	/	/
	Factory Reset, Reset to Factory Settings	/	/
	About, view device version information	/	/
	Response Mode ³	Fast Mode	● Fast Mode ● Standard Mode
	Bluetooth, set Bluetooth switch	closure	Open/ closure

Note 1: The buzzer warning sound has a higher priority than the analog detection sound.

Note 2: In USB mode, you can copy the firmware to a USB flash drive for firmware upgrade.

Note 3: Fast Mode: Fast response speed with relatively large data fluctuations. Standard Mode: Slow response speed, requiring 1 minute of continuous measurement with small data fluctuations.

Table 3.4.1 Setting interface function description table

The menu setting operation instructions are shown in Table 2.2.5.2 :

button	Click	Long press
OK button	Select / Confirm	invalid
▲	Up / Adjust value	Quick Switch/ Adjustment
▼	Down / Adjust value	Quick Switch/Adjustment
◀	Left / Back	Back to previous level
▶	Right / Enter	Shutdown

Table 3.4.2 Setting interface operation instructions

3.6 Other interfaces

3.6.1 Alarm Clock Interface

When the alarm time arrives, the instrument will automatically pop up the alarm interface, as shown in Figure 3.6.1.1 :

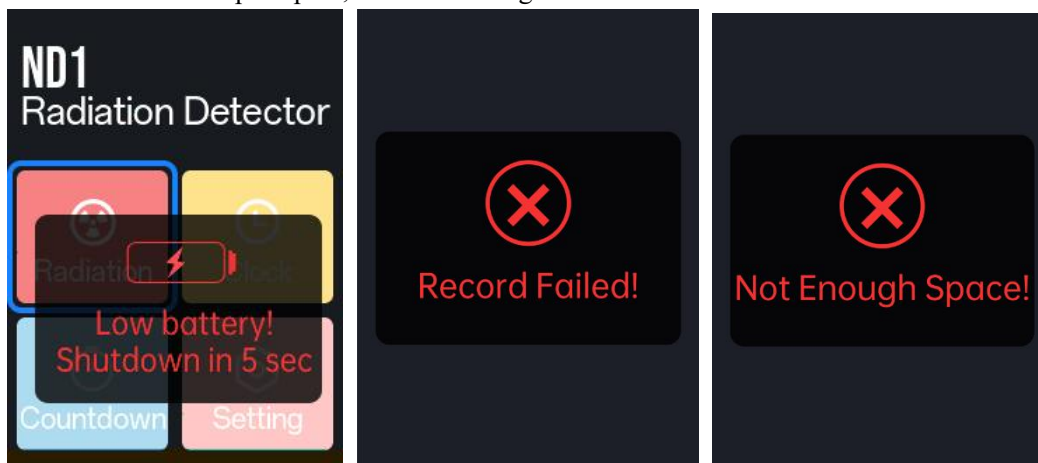


3.6.1.1 Alarm clock interface

If the alarm mode is set, a sound/vibration alarm will be issued simultaneously. We can cancel the alarm by pressing the cancel button, and the system will postpone the alarm time by 5 minutes and the alarm will sound again after 5 minutes by pressing the resound button.

3.6.2 Alarm interface

During the operation of the instrument, if an abnormal situation occurs, the corresponding alarm interface will be prompted, as shown in Figure 3.6.2.1 :



3.6.2.1 Prompt interface

When the battery is too low, a low battery warning will pop up and the device will automatically shut down after 5 seconds. Please charge immediately!

When the data record fails to create a file, a data record failure alarm will pop up. The USB drive may be abnormal! At this time, please connect the instrument to the computer, reformat the USB drive, and then test again.

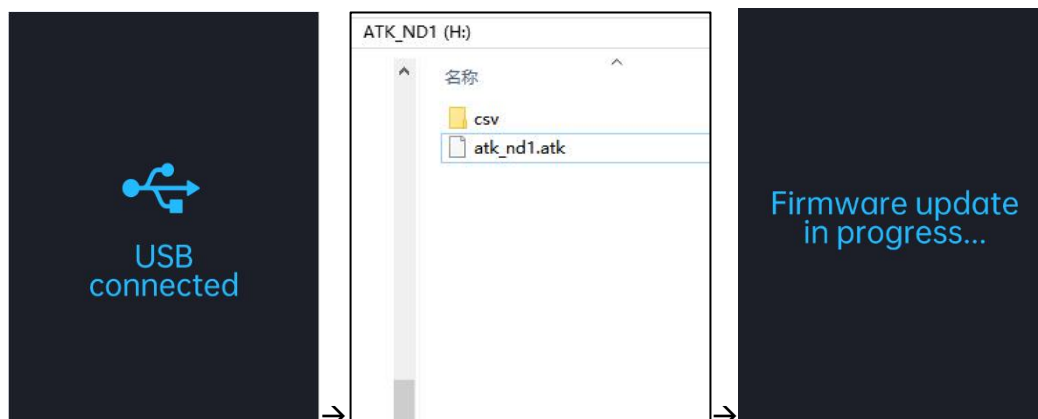
When the U disk space is insufficient, a U disk space shortage warning will pop up. At this time, please connect the instrument to the computer, copy the data out, and delete the U disk data (or reformat the U disk)

3.7 Firmware Upgrade

ND1 supports firmware upgrade. The upgrade method is very simple, the steps are as follows:

1. Connect the USB to the computer. Enter via: Settings interface → Other settings → USB connection.
2. Copy the firmware to the USB flash drive. The firmware name is fixed as: atk_nd1.atk (must be exactly the same) .
3. Press ◀ / ▶ key to exit the USB connection, and the instrument will automatically perform the remaining work of the firmware upgrade.

After the above three steps, the firmware upgrade can be completed. As shown in Figure 3.7.1 :

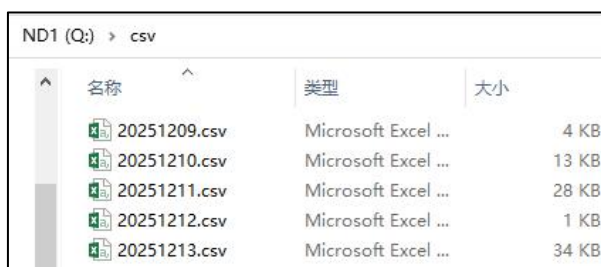


3.7.1 Firmware Upgrade

3.8 Data Recording

ND1 supports real-time radiation data recording. When the instrument turns on the data recording function, it will create a .csv file with the current date as the file name, and record the real-time nuclear radiation dose values in sequence at the set interval. The instrument records up to 30 days of data (i.e. up to 30 .csv files). When more than 30 days pass or the storage capacity is insufficient, the earliest record file will be automatically deleted. Please copy the required data in time to avoid loss!

The .csv file format is stored in the csv folder inside the instrument. The data can be read by a computer through a USB connection for further analysis, as shown in Figure 3.8.1 :



名称	类型	大小
20251209.csv	Microsoft Excel ...	4 KB
20251210.csv	Microsoft Excel ...	13 KB
20251211.csv	Microsoft Excel ...	28 KB
20251212.csv	Microsoft Excel ...	1 KB
20251213.csv	Microsoft Excel ...	34 KB

Figure 3.8.1 USB disk data record file

The .csv data table, after opening, is as shown in Figure 3.8.2 :

	A	B	C
1	TIME: 15:16:12, interval: 1s		
2	0.12		
3	0.12		
4	0.14		
5	0.15		
6	0.15		
7	0.16		
8	0.15		
9	0.17		
10	0.19		

Figure 3.8.2 . csv file content

File name: Record date

TIME : Record time

Interval : Recording interval (unit: seconds)

Value: Real-time nuclear radiation dose value (unit: μ Sv/h)

3.9 Bluetooth Function

ND1 supports Bluetooth communication function and needs to be used with the Bluetooth APP from AtomPoint.

Ways to obtain the Bluetooth APP:

- ① Download the ND1 materials, which include the installation package for the Android version.
- ② Search for the app "正点原子" or "atk_xtool"  in the application store, then download and install it. Meanwhile, turn on the Bluetooth switch in ND1 under Settings → Other Settings.

Turn on Bluetooth and GPS on your phone, open the Bluetooth APP, tap on any device box to initiate a Bluetooth search, and connect to the Bluetooth device named "ND1".

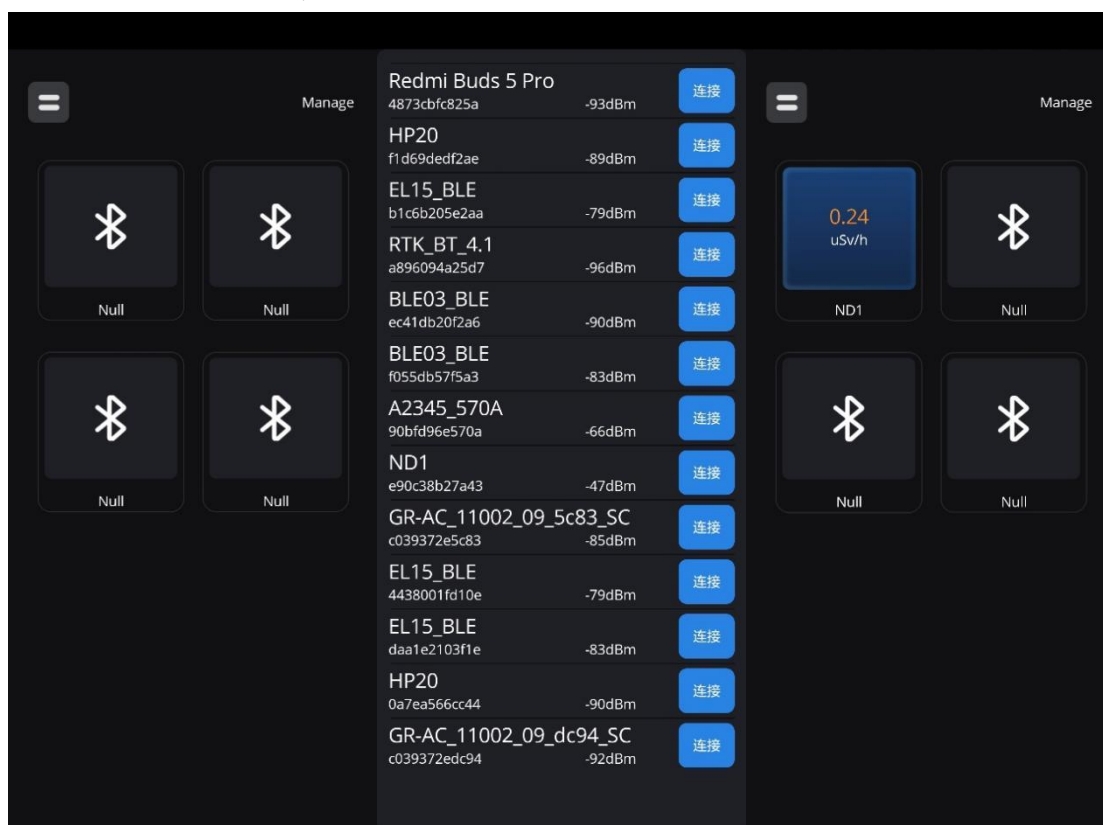


Figure 3.9.1 Bluetooth Function Operation Instructions

After successfully connecting via Bluetooth, you can configure some parameters for the ND1 device and check its status through the APP.

The map viewing feature requires the phone's GPS to be enabled, and the Bluetooth APP's location permission must be set to "Always Allow."

Otherwise, the APP map will not be able to record latitude and longitude information in real time when the phone screen is off. The map positioning function relies on the phone's location information, meaning it uses the phone's position for positioning. The ND1 device itself does not

support positioning functionality. (For some phones, it may also be necessary to disable battery optimization settings for the APP. Please adjust based on the actual phone model and usage.)

Note: The APP's map viewing feature supports use abroad. However, the latitude and longitude error for test points outside the country may be larger than that within the country.

The APP supports viewing historical records, allowing users to review previously recorded movement trajectories and the corresponding radiation values for specific road sections.

4. Basic knowledge of radiation dose

4.1 Unit conversion knowledge

The units of nuclear radiation dose are: Sievert (Sv), Gray (Gy), Roentgen (R), etc. However, the Roentgen unit is rarely used (abolished) now. The commonly used units are: Sievert (Sv) and Gray (Gy), which are explained as follows:

Sievert (Sv): Equivalent dose unit, taking into account the effects of different types of radiation on the human body.

Gray (Gy): Absorbed dose unit, indicating the radiation energy absorbed by unit mass of matter.

The simple conversion relationship between each unit is as follows:

$$1\text{mSv} = 1000 \mu\text{Sv} = 1000 \mu\text{Gy}$$

$$1\text{mR} = 8.76 \mu\text{Sv}$$

ND1 uses a highly sensitive Geiger-Mueller counter tube (J321 , also called M4011) as a sensor. Its output signal is the count value, generally expressed as: CPM/CPS :

CPM : counts per minute

CPS : counts per second

$$1\text{CPM} = 60\text{CPS}$$

The stronger the radiation value in the environment where the instrument is located, the greater the CPM/CPS value. The CPM/CPS value is calculated by the internal algorithm of the instrument and converted into radiation dose units for easy reading and comparison.

5. Frequently Asked Questions

The common problems are summarized in Table 5.1 :

Problem/phenomenon	Solution
Unable to turn on?	The battery of the instrument may be out of power. Please plug in the USB

	cable and try to turn it on again after it is fully charged.
Radiation value is always zero?	The Geiger counter tube of the instrument may be damaged. Please contact the manufacturer for repair.
Why can't I measure the radiation from my mobile phone or computer?	This instrument can only measure ionizing radiation (radioactivity), not electromagnetic radiation (radiation from mobile phones/computers/TVs)
Temperature measurement too high?	The instrument temperature sensor is internal and will be affected by internal heating. For example, after charging or after being turned on for a period of time, the ambient temperature measurement result may be slightly higher.

Table 5.1 Summary of Frequently Asked Questions

6. Warranty Terms

1. Warranty period

Guangzhou Xingyi Electronic Technology Co., Ltd. promises the good quality of its products . If the machine fails under normal use within 7 days from the date of sale, the customer can choose to return or repair it (return is allowed only if it does not affect the secondary sale). If the machine fails within one year of normal use, it can be repaired free of charge.

2. The purchase date shall be based on the purchase invoice or receipt issued by the seller. For online purchases , the transaction screenshot may be used as the basis.

3. No free repair service will be provided for any machine damage caused by man-made damage , unauthorized modification, or unauthorized repair .

7. Contact Us

Purchase address: <https://zhengdianyuanzi.tmall.com>

Download: www.openedv.com/docs/tool/jianceyi/ND1.html

Technical Forum: www.openedv.com/forum.php

B station video: <https://space.bilibili.com/394620890>

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