

辐射检测仪说明书



2023-06-V1-162

仪器概述:

辐射剂量报警仪内置高灵敏度半导体管作为探测器，主要用于监测各种放射性工作场所的X、y以及β射线的辐射，具有响应快、测量范围宽的特点。能显示工作场所的当前剂量率和累积剂量率。广泛应用于核电站、加速器、钢铁、化工、同位素应用、工业X-y、放射性医疗、钴源治疗、y辐射、碘131、放射性实验室、核设施周围环境监测等领域中的工作人员进行个人安全防护监测及放射性提示。

仪器特点

1. 可以监测X、y以及β射线
2. 仪器灵敏度高，对环境本底射线亦可测量
3. 中、英文双语操作界面，操作简单，使用方便
4. 剂量率和累积剂量同时测量和显示
5. LCD屏显示
6. 支持电池电量显示
7. 本仪器可预设剂量率和累积剂量报警阈值
8. 支持时间日期设置
9. 支持报警开关设置

主要技术指标

1. 探测射线: y、X和β射线
2. 探测器: 能量补偿CM管 (盖革计数管), 低能响应得到提高
3. 正常含量标准0.5μSv/h内
4. 测量范围:
 - a. 剂量当量率: 0.01~1000μSv/h (最大10mSv/h)
 - b. 累积剂量当量: 0.01μSv/h~500.0mSv
5. 能量响应: 50KeV~1.5MeV±30% (对137Cs-)
6. 灵敏度: 80CPM/μSv/h (对于Co-60)

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7. 报警阈值:
 - a. 剂量率: 可在0.5、1.0、1.5、2.0、2.5、5.0、10.0、50.0、100.0μSv/h任意选择
 - b. 累积剂量: 可在0.05、0.5、1.0、2.0、5.0、10.0、20.0、50.0、100.0mSv/h任意选择
8. 测量显示: 剂量率每秒显示, 防护报警响应小于5秒
9. 使用环境: 温度-10℃~+45℃, 相对湿度: ≤95% (+45℃)
10. 尺寸: 189*70*30

仪器按键功能说明

- ① “电源”键: 开、关机/开机状态下双击进入设置界面/确认操作
- ② “▽”键: 向下键/数字项减一
- ③ “△”键: 向上键/数字项加一



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1. 开机: 长按电源键2秒开机
2. 关机: 关机状态下按电源键2秒后, 仪器将关闭
3. 测量: 仪器开机后即进入测量状态, 本仪器的测量有两种: 一种是剂量率, 单位可设置为μSv/h、μGy/h、mR/h、cps、cpm; 另一种是一段时间内剂量率的累积值即累积剂量, 单位为μSv。当任意一种测量值超过设定的报警阈值时仪器将进行报警提示
4. 本仪器可显示的信息如图所示



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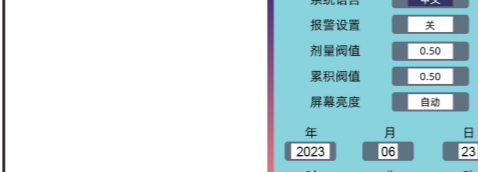
参数设置

本仪器可供用户修改的参数有: 测量单位、系统语言、报警设置、剂量阈值、累积阈值、屏幕亮度、时间设置。通过按键可对相应的参数进行修改。在测量状态下, 双击【电源】键进入菜单选择画面。按【▽】或【△】键可移动光标来选择需要设置的项目。

1. 测量单位: 双击【电源】键后, 按【▽】键进入选项, 此时显示“μSv/h、μGy/h、mR/h、cpm”五个选项。按【▽】或【△】选择对应单位, 再按【电源】键确认并保存。



2. 系统语言: 双击【电源】键后, 按【▽】键选择第二个菜单项再按【电源】键进入选项。按【▽】或【△】来选择中文/英文的语言。再按【电源】键保存设置。



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3. 报警设置: 双击【电源】键后, 按【▽】键选择第三个菜单项再按【电源】键进入选项, 按【▽】或【△】选择开关报警, 选择完毕再按【电源】键保存设置。



4. 剂量阈值: 双击【电源】键后, 按【▽】键选择第四个菜单项再按【电源】键进入选项。该选项有“0.05、0.50、1.00、1.50、2.00、2.50、5.00、10.00、50.00、100.0”共10个剂量率报警阈值可选择。按【▽】或【△】选择合适的阈值后按【电源】键保存设置。



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5. 累积阈值: 双击【电源】键后, 按【▽】键选择第五个菜单项再按【电源】键进入选项, 该选项有“0.05、0.50、1.00、2.00、5.00、10.00、20.00、50.00、100.0”共9个累积剂量率报警阈值可选择。按【▽】或【△】选择合适的阈值后按【电源】键保存设置。



6. 屏幕亮度: 双击【电源】键后, 按【▽】键选择第六个菜单项再按【电源】键进入选项。该选项有“自动、25%、50%、75%、100%”可选择。按【▽】或【△】选择合适的亮度后按【电源】键保存设置。



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7. 时间设置: 双击【电源】键后, 按【▽】键分别选择“年、月、日、时、分、秒”六个选项, 再按【电源】键选择对应选项, 按【▽】或【△】进行调整。再按【电源】键保存设置。

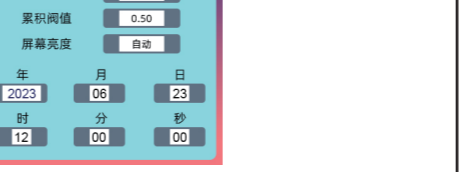


8. 剂量率: 双击【电源】键后, 按【▽】键选择第七个菜单项再按【电源】键进入选项, 该选项有“实时、平均、累计”三个选项。按【▽】或【△】选择对应的选项, 再按【电源】键保存设置。



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9. 报警开关: 双击【电源】键后, 按【▽】键选择第八个菜单项再按【电源】键进入选项, 该选项有“开、关”两个选项。按【▽】或【△】选择对应的选项, 再按【电源】键保存设置。



10. 报警声音: 双击【电源】键后, 按【▽】键选择第九个菜单项再按【电源】键进入选项, 该选项有“蜂鸣器、铃声”两个选项。按【▽】或【△】选择对应的选项, 再按【电源】键保存设置。

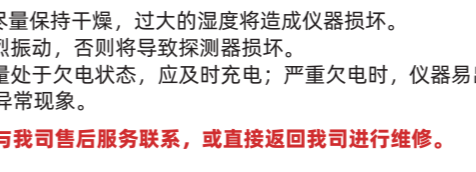


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11. 报警音量: 双击【电源】键后, 按【▽】键选择第十个菜单项再按【电源】键进入选项, 该选项有“1、2、3、4、5、6、7、8、9、10”十个选项。按【▽】或【△】选择对应的选项, 再按【电源】键保存设置。



12. 报警频率: 双击【电源】键后, 按【▽】键选择第十一个菜单项再按【电源】键进入选项, 该选项有“1、2、3、4、5、6、7、8、9、10”十个选项。按【▽】或【△】选择对应的选项, 再按【电源】键保存设置。

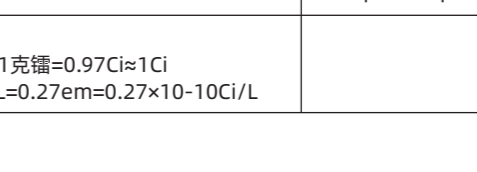


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13. 报警模式: 双击【电源】键后, 按【▽】键选择第十二个菜单项再按【电源】键进入选项, 该选项有“蜂鸣器、铃声、蜂鸣器+铃声”三个选项。按【▽】或【△】选择对应的选项, 再按【电源】键保存设置。



14. 报警时间: 双击【电源】键后, 按【▽】键选择第十三个菜单项再按【电源】键进入选项, 该选项有“1、2、3、4、5、6、7、8、9、10”十个选项。按【▽】或【△】选择对应的选项, 再按【电源】键保存设置。

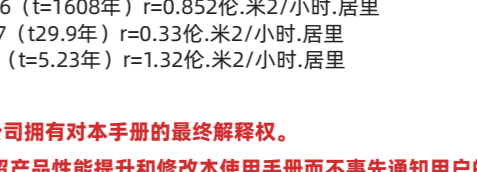


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15. 报警颜色: 双击【电源】键后, 按【▽】键选择第十四个菜单项再按【电源】键进入选项, 该选项有“红、黄、蓝、绿、紫、橙、粉、灰、黑、白”十个选项。按【▽】或【△】选择对应的选项, 再按【电源】键保存设置。

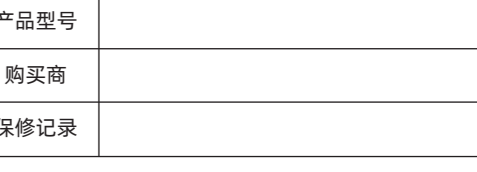


16. 报警图标: 双击【电源】键后, 按【▽】键选择第十五个菜单项再按【电源】键进入选项, 该选项有“1、2、3、4、5、6、7、8、9、10”十个选项。按【▽】或【△】选择对应的选项, 再按【电源】键保存设置。

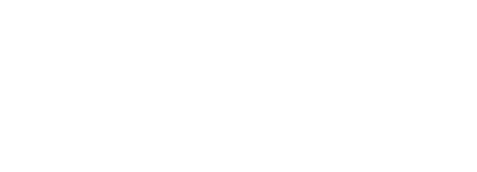


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17. 报警声音: 双击【电源】键后, 按【▽】键选择第十六个菜单项再按【电源】键进入选项, 该选项有“蜂鸣器、铃声、蜂鸣器+铃声”三个选项。按【▽】或【△】选择对应的选项, 再按【电源】键保存设置。



18. 报警音量: 双击【电源】键后, 按【▽】键选择第十七个菜单项再按【电源】键进入选项, 该选项有“1、2、3、4、5、6、7、8、9、10”十个选项。按【▽】或【△】选择对应的选项, 再按【电源】键保存设置。



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Radiation Detection Manual



2023-06-V1-162

Instrument Overview:

Radiation dose alarm instrument built-in high sensitivity cover technology tube as a detector, mainly used for monitoring the radiation of x, y and hard beta rays in various radioactive workplaces, with fast response and wide measurement range. It can display the current dose rate and accumulated dose rate of the workplace. Widely used in nuclear power plants, accelerators, iron and steel, chemical industry, isotope application, industrial X-y, radiological medical treatment, cobalt source treatment, y radiation, iodine 131, radiological laboratories, environmental monitoring around nuclear facilities and other fields of staff for personal safety protection monitoring and radioactive alerts.

Characteristics of the instrument

1. can monitor x, y and beta radiation
2. high sensitivity, can also measure the environmental background radiation
3. Chinese and English bilingual operation interface, easy to operate, easy to use
4. Dose rate and cumulative dose are measured and displayed at the same time.
5. LCD screen display
6. Support battery power display
7. The alarm thresholds for dose rate and cumulative dose can be preset.
8. support time and date setting
9. Support alarm switch setting

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Main technical indicators

1. Detection of rays: y, X and β-rays
2. Detector: Energy-compensated CM tube (Geiger counting tube) with improved low-energy response.
3. Normal content standard within 0.5μSv/h
4. Measurement range:
 - a. Dose equivalent rate: 0.01~1000μSv/h (max. 10mSv/h)
 - b. Cumulative dose equivalent: 0.01μSv/h~500.0mSv
5. Energy response: 50KeV~1.5MeV±30% (for 137Cs-)
6. Sensitivity: 80CPM/μSv/h (for Co-60)
7. Alarm threshold.
 - a. Dose rate: can be in 0.5, 1.0, 1.5, 2.0, 2.5, 5.0, 10.0, 50.0, 100.0μSv/h Any selection
 - b. Cumulative dose: can be in 0.05, 0.5, 1.0, 2.0, 5.0, 10.0, 20.0, 50.0, 100.0mSv arbitrary selection
8. Measurement display: dose rate per second display, protection alarm response is less than 5 seconds.
9. Environment: Temperature -10℃~+45℃, relative humidity: ≤95% (+45℃)
10. Size: 189*70*30mm

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Functional description of instrument keys

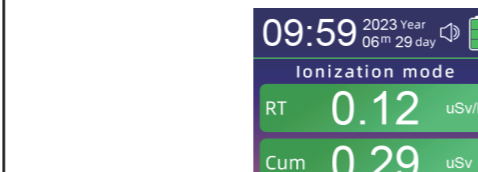
- ① “Power” key: switch on, switch off / double-click to enter the setup interface under the state of switching on / confirm the operation.
- ② “▽” key: down key/number item minus one.
- ③ “△” key: upward key/number item plus one.



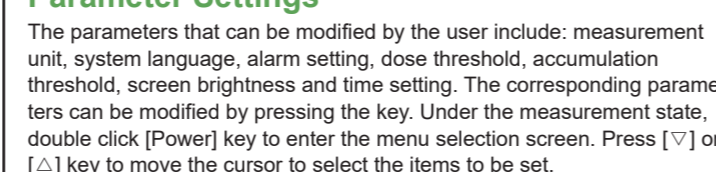
03

Parameter Settings

The parameters that can be modified by the user include: measurement unit, system language, alarm setting, dose threshold, accumulation threshold, screen brightness and time setting. The corresponding parameters can be modified by pressing the key. Under the measurement state, double click [Power] key to enter the menu selection screen. Press [▽] or [△] key to move the cursor to select the items to be set.



1. Measurement unit: double-click the [Power] key, press the [Power] key to select the first menu item and then press [Power] key to enter the option. The option has “0.05, 0.50, 1.00, 1.50, 2.00, 2.50, 5.00, 10.00, 50.00, 100.0” a total of 10 dose rate alarm threshold value can be selected. Press [▽] or [△] to select the appropriate threshold value and then press [Power] to save the setting.



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Alarm Settings

Alarm settings: double-click the [Power] key, press the [▽] key to select the third menu item and then press the [Power] key to enter the option. Press [▽] or [△] to select the corresponding unit, then press [Power] to confirm and save.



2. System language: After double-clicking the [Power] key, press [▽] to select the second menu item and then press [Power] key to enter the option. Press [▽] or [△] to select Chinese/English language. Press [Power] key again Save the settings.



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Dose Threshold

Dose threshold: double-click [Power] key, press [▽] key to select the fourth menu item and then press [Power] key to enter the option. The option has “0.05, 0.50, 1.00, 1.50, 2.00, 2.50, 5.00, 10.00, 50.00, 100.0” a total of 10 dose rate alarm threshold value can be selected. Press [▽] or [△] to select the appropriate threshold value and then press [Power] to save the setting.



3. Alarm settings: double-click the [Power] key, press the [▽] key to select the third menu item and then press the [Power] key to enter the option. Press [▽] or [△] to select the switch alarm, press [Power] to save the setting.



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Cumulative Threshold

Cumulative threshold: double-click [Power] key, press [▽] key to select the fifth menu item and then press [Power] key to enter the option. The option has “0.05, 0.50, 1.00, 2.00, 5.00, 10.00, 20.00, 50.00, 100.0” a total of nine cumulative dose rate alarm threshold value can be selected. Press [▽] or [△] to select the appropriate threshold value and then press [Power] to save the setting.



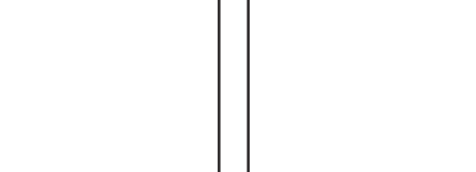
4. Dose threshold: double-click [Power] key, press [▽] key to select the sixth menu item and then press the [Power] key to enter the option. The option has “automatic, 25%, 50%, 75%, 100%” can be selected. Press [▽] or [△] to select the appropriate brightness and then press [Power] key to save the setting.



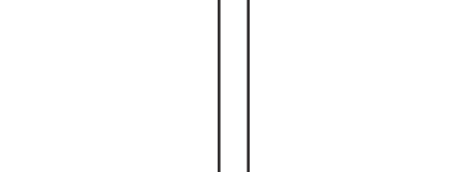
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Screen Brightness

Screen brightness: double-click the [Power] key, press the [▽] key to select the sixth menu item and then press the [Power] key to enter the option. The option has “automatic, 25%, 50%, 75%, 100%” can be selected. Press [▽] or [△] to select the appropriate brightness and then press [Power] key to save the setting.



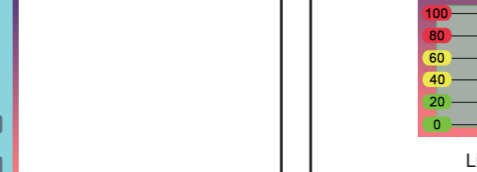
5. Cumulative threshold: double-click [Power] key, press [▽] key to select the fifth menu item and then press [Power] key to enter the option. The option has “0.05, 0.50, 1.00, 2.00, 5.00, 10.00, 20.00, 50.00, 100.0” a total of nine cumulative dose rate alarm threshold value can be selected. Press [▽] or [△] to select the appropriate threshold value and then press [Power] to save the setting.



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Time Setting

Time setting: Double-click the [Power] key, press the [▽] key to select the six options of year, month, day, hour, minute, second”. Then press [Power] key to select the corresponding option, press [▽] or [△] to adjust. Then press [Power] key to save the setting

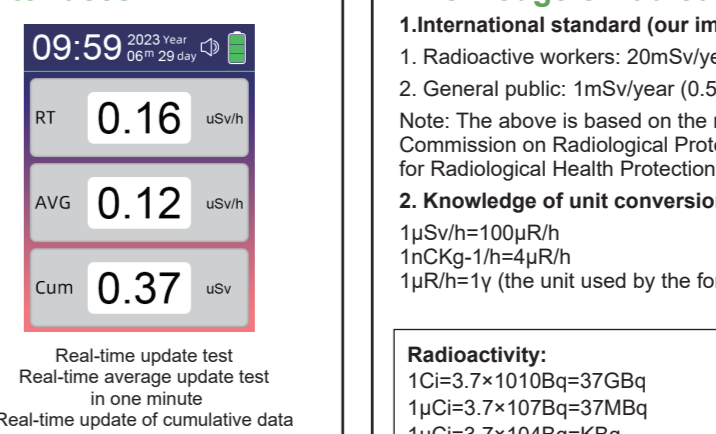


6. Screen brightness: double-click the [Power] key, press the [▽] key to select the sixth menu item and then press the [Power] key to enter the option. Press [▽] or [△] to select the appropriate brightness and then press [Power] key to save the setting.



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The instrument has two interfaces:



Real-time update test (in the form of colour charts)

Real-time update of cumulative data

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Knowledge of radioactive unit conversion

1. International standard (our implementation standard) 1990
A=A0e^{-λt} λ=ln2/T_{1/2}
T_{1/2} is the half-life; A0 is the known source intensity
A is the intensity after time t

2. Knowledge of unit conversion, etc.
1μSv/h=100μR/h
1nCkg-1h=4μR/h
1μR/h=1v (the unit used by the former nuclear industry to find minerals)

Radioactive sources	Reduction by half and to 1/10 value for different substances (cm)			
	Lead	Iron	Concrete	
Cesium-137	0.65	2.2	1.6	5.4
Iridium-192	0.55	1.9	1.3	4.3
Cobalt-60	1.10	4.0	2.0	6.3

3. Calculation of radioisotope decay values
A=A0e^{-λt} λ=ln2/T_{1/2}
T_{1/2} is the half-life; A0 is the known source intensity
A is the intensity after time t

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保修卡

本产品自收到货起, 正常操作使用并未经拆修, 经保修人确认产品质量问题。一年内享受保修服务, 在任何正常情况下均提供维修。

顾客姓名	
购买日期	
产品型号	
购买商	
保修记录	

根据放射性衰变计算表查表计算放射屏蔽

放射源	不同物质的减少一半和减少到1/10值 (cm)					
	铅	铁	混凝土			
铯-137	0.65	2.2	1.6	5.4	4.9	16.3
铱-192	0.55	1.9	1.3	4.3	4.3	14.3
钴-60	1.10	4.0	2.0	6.7	6.3	20.3

四、放射性与距离的关系
放射源强度与距离的平方成反比
X=A.r/R²
A: 点状源的放射性活度
R: 与源的距离
R: 照射量率常数
注: Ra-226 (t=1608年) r=0.852伦.米²/小时.居里
Cs-137 (t29.9年) r=0.33伦.米²/小时.居里
Co-60 (t=5.23年) r=1.32伦.米²/小时.居里

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3. Calculation of radioisotope decay values
A=A0e^{-λt} λ=ln2/T_{1/2}
T_{1/2} is the half-life; A0 is the known source intensity
A is the intensity after time t

Calculate radioactive shielding by looking up the table from the radioactive decay calculator.

4. Relationship between radioactivity and distance
The intensity of a radioactive source is inversely proportional to the square of the distance multiplied by the square of the distance
X=A.r/R²
A: Activity of the point source
R: distance from the source
R: radiation rate constant
Note: Ra-226 (t=1608 years) r=0.852 Len. m²/hour. Curie
Cs-137 (t29.9 years) r = 0.33 Lun. m²/hr. Curie
Co-60 (t=5.23 years) r=1.32 Lun. m²/hour. Curie

Note: The company has the final interpretation of this manual. The company reserves the right to improve the performance of the product and modify this manual without prior notice to the user.

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