Instruction Manual of
FS9000 Individual Dosage Alarm Device

I. Notice:

FS9000 radiation individual alarm device is a precise instrument. Please pay attention to protection. The following suggestions are good for the instrument maintenance and longer use life.

1. Please keep dry in the storage and utilization; excessive humidity can damage the instrument.
2. It is forbidden to fall, knock or vibrate violently; otherwise, it can damage the detector.
3. In case of long-term idling, please take out the battery.
4. In case of operational failure, please send to the designated authorized service point for maintenance.

The company has the ultimate interpretation right to the manual.

The company has to reserve the right to upgrade the product performance or revise this operation instruction manual without in-advanced notification.

II. Safe operational regulations:

Please carefully read this operation instruction manual; otherwise, it may lead to operational failure of the instrument.

1. Please adopt standard No. 7 battery or charging battery.
2. The modification or maintenance without approval may damage the instrument.
3. Once you doubt about instrument malfunction in the normal operation, please shut down the instrument and swiftly evacuate from hazardous area; contact with the manufacturer as soon as possible.

III. Functional overview:

FS9000 radiation individual alarm device is collocated with highly flexible Geiger counting pipe as detector; it is mainly responsible for monitoring the radiation of **X**, **γ**and hard **β** ray in various radioactive work areas; it is featured as swift response and broad measurement scope; it is able to display the dosage equivalent rate and accumulative dosage in the work area; during the battery replacement, the calendar, time and accumulative data can be stored permanently; it is widely applied in the individual safety protection monitor and radioactive indication for work personnel in the following fields: nuclear power plant, accelerator, iron & steel industry, chemical industry, isotope application, industrial **X** and**γ**non-destructive flaw detection, radioactive medical treatment, Cobalt source treatment, **γ**radiation, radioactive laboratory and surrounding environment monitor of nuclear facilities.

Features:

1. Monitor of **X**, **γ**and hard **β** ray.
2. The instrument enjoys a high flexibility and can measure the environmental background.
3. Chinese and English operational interface. **Day** and English operational interface
4. Real-time measurement and display of dosage rate and accumulative dosage.
5. Permanent data storage upon power cutoff.
6. Graphic LED and maximum screen. Resolution128X64
7. Low power consumption and battery under-voltage indication function.
8. The instrument can preset the alarm valve value of dosage rate and accumulative dosage.
9. Three selective alarm modes: sound, light and vibration.
10. The device saves the 500-day cumulative dose, the shutdown and power-off data is not lost, and the USB data cable is connected to the computer. The total amount of the daily dose

and the graph data can be queried on the computer.

11. The device is equipped with a detachable clip.

12. Five detection units built into the device: μSv/h, μGy/h, m R/h.CPM .CPS

Technical index:

1. Detection ray: **X**, **γ** and hard **β** ray

2. Detector: Energy compensation GM pipe (Geiger counting pipe)

3. Measurement scope

    a. Dosage equivalent rate: 0.00—99999 μSv/h (maximum: 99.99 mSv/h)

    b. Accumulative dosage equivalence: 0.00μSv—999 mSv

4. Energy scope: 25 keV—1.5 MeV ≤ ± 30 % (as for 137 Cs I)

5. Relative innate error: ≤ ±4 % (137 CS 1 mSv/h) （Comprehensive error）

6. Flexibility: 80 CPM/μSv/h (as for Co—60)

7. Alarm valve value:

    a. Dosage rate: Selection among 0.5, 1.0, 1.5, 2.0, 2.5, 5.0, 10.0, 50.0, 100.0μSv/h at disposal.

    b. Accumulative dosage: Selection among 0.05, 0.5, 1.0, 1.5, 2.0, 5.0, 10.0, 20.0, 50.0, 100.0 m Sv at disposal.

8. Unit of dosage rate: μSv/h, μGy/h, m R/h.CPM .CPS

9. Measurement display: The dosage rate is displayed per second; the protection alarm response is less than 5 seconds.

10. Utilization environment:

Temperature: - 15 ºC — + 45 ºC

Relative humidity: ≤ 95 %

11. Power: Two or four 7 (AAA) batteries or rechargeable batteries.

12. Dimension and weight: 120g; 120 X 70 X 25mm

13. Battery life of the instrument: 360 hours for 2 sessions and 850 hours for 4 sessions.

IV. Key functional specification:

[Menu/OK] key: Enter into the parameter setup menu/confirm operation.

[Return/back] key: Return from next level of menu to previous level of menu.

[Switch/power] key: Switch on/off the instrument/start up the back light of LCD.

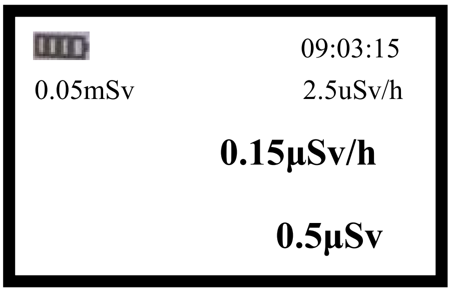
[▼] key: Downward key/minus one to digital item.

[▲] key: Upward key/plus one to digital item.

V. Basic operational methods

1. Startup

Prepare two No. 7 batteries; upon battery installation, the instrument sends out a "beep" and LCD shines; once the instrument has installed the batteries, press [Switch/power] key for 3 seconds—the instrument starts up and LCD displays the following figure:



2. Shutdown

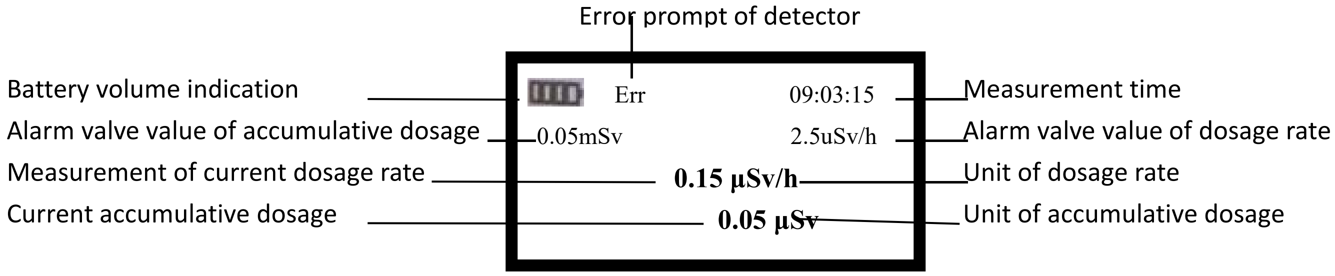
Press [Switch/power] key for 3 seconds; the instrument sends out a "beep" and the instrument is shut down.

3. Measurement

The instrument enters into the measurement status upon startup; during the measurement, it can place in the hand, pocket and backpack. The instrument has two measurement values: dosage rate in the unit of u Sv/h, u Gy/h and m R/h， CPM CPS. accumulative value of dosage rate within a certain period of time: accumulative dosage in the unit of uSv or mSv. Once any measurement value exceeds the setup alarm valve value, the instrument sends out alarm according to the setup alarm mode.

4. Specification of LCD display data

The instrument can display the following information:


Error prompt of detector
Battery volume indication
Err
09:03:15
Measurement time
Alarm valve value of accumulative dosage
0.05mSv
2.5uSv/h
Alarm valve value of dosage rate
Measurement of current dosage rate
0.15 μSv/h
Unit of dosage rate
Current accumulative dosage
0.05 μSv
Unit of accumulative dosage

(Figure 3)

In case of inadequate power supply voltage, the battery under-voltage indication sign displays and blinks.

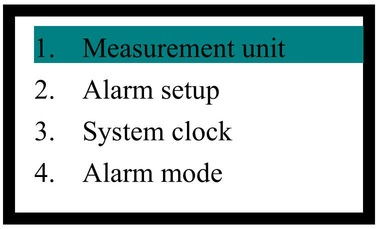
Under normal condition, Err sign does not appear; permanent appearance of Err sign means damage of Geiger counting pipe detector.

VI. Parameter setup:

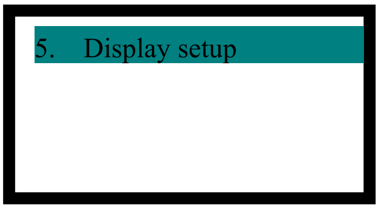
The following instrument parameters can be revised by the user: measurement unit, alarm setup, system clock, alarm mode and display setup. It can revise relevant parameters through the keyboard.

1. Entry into parameter setup status

Under the measurement status, press [Menu/OK] key to enter into the menu selection screen as shown below:



(Figure 4)



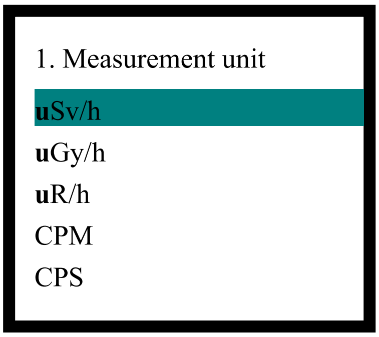
(Figure 5)

Press [▼] or [▲] key to move the icon and select setup items.

Select the setup items and then press [Menu/OK] key for subitem parameter setup; press [Return/back] key to exit the parameter setup.

2. Setup of measurement unit

Press [Menu/OK] key to enter into the menu; select the first menu item “1. Measurement unit” and then press [Menu/OK] key to enter for selection; display three items: uSv/h 、 uGy/hand m R/h,CPM,CPS. press [▼] or [▲] key to select the corresponding unit; press [Menu/OK] key for the second time and instrument stores the current item and returns to the previous level of menu; press [Return/back] key and instrument does not store the current item and returns to the previous level of menu.

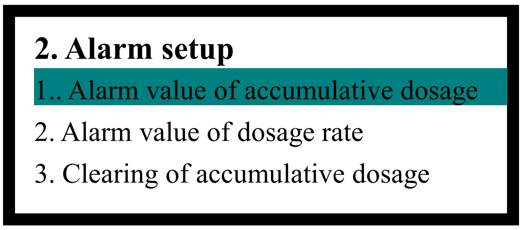

1. Measurement unit
uSv/h
uGy/h
uR/h
CPM
CPS

(Figure 6)

Notice: In the parameter setup status of this instrument, press [Menu/OK] key to express the user's willing to select the current item and enter into the sub-menu; once this item has no sub-menu, store revision value of the current item and return to the previous level of menu; press [Return/back] key to express the user's abandonment of current revision value and return to the previous level of menu.

3. Alarm setup

Press [▼] or [▲] key in the menu selection screen (Figure 4 and Figure 5) to select the second menu item "2. Alarm setup"; press [Menu/OK] key to enter into the item. It displays the following screen:


2. Alarm setup
1.. Alarm value of accumulative dosage
2. Alarm value of dosage rate
3. Clearing of accumulative dosage

(Figure 7)

A. Alarm value of accumulative dosage: Select this item in (Figure 7) screen and press [Menu/OK] key—the instrument enters into the sub-menu of accumulative dosage alarm value; the sub-menu includes nine valve values for selection: 0.05, 0.50, 1.00, 2.00, 5.00, 10.00, 20.00, 50.00 and 100.00 m Sv; select a proper valve value, press

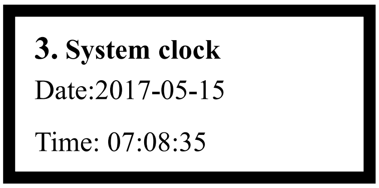
[Menu/OK] key and store setup and return; press [Return/back] key to abandon storage and return.

B. Alarm value of dosage rate: Press [▼] or [▲] key in (Figure 7) screen to select "2. Alarm value of dosage rate" and then press [Menu/OK] key—the instrument enters into the sub-menu of dosage rate alarm value; the sub-menu includes nine dosage rate valve values for selection: 0.50, 1.00, 1.50, 2.00, 2.50, 5.00, 10.00, 50.00 and 100.00μSv/h; the general radioactive work area has to adopt 2.5μSv/h.

C. Clearing of accumulative dosage: Select this item in (Figure 7) and press [Menu/OK] key to enter into deletion interface; press [▼] or [▲] key to select "YES" or "NO" to decide deletion of accumulative dosage.

4. System clock

Press [▼] or [▲] key in menu selection screen (Figure 4 and 5) and select the third menu: "3. System clock"; press [Menu/OK] key to enter for selection. It displays the following screen:



3. System clock

Date:2017-05-15

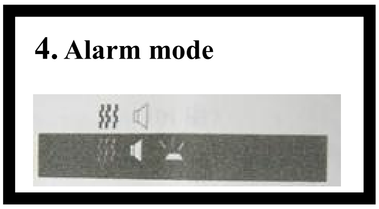
Time: 07:08:35

(Figure 8)

Press [Menu/OK] key in Figure 8; "17" in "2017" blinks and displays; press [▼] or [▲] key to revise "17"; upon revision, press [Menu/OK] key to set up the instrument storage period and blinks the month; set up the figure of "second" according to the same method; press [Menu/OK] key to set up the instrument storage period and then return to the previous level of menu.

5. Alarm mode

Press [▼] or [▲] key in the menu selection screen (Figure 4 and 5) and select 4th menu: “4. Alarm mode”; press [Menu/OK] key to enter for selection. It displays the following screen:



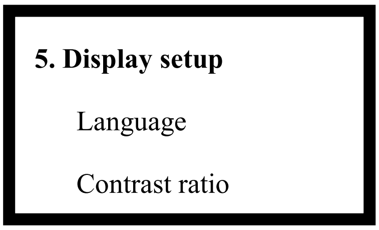
4. Alarm mode

(Figure 9)

≋ in Figure 9 means vibration alarm; 🔈 means sound alarm; 🚨 means light alarm. Press [▼] or [▲] key to select a proper audible and visual vibration alarm mode.

6. Display setup

Press [▼] or [▲] key in the menu selection screen (Figure 4 and 5) and select 2nd menu: “5. Display setup”; press [Menu/OK] key to enter for selection. It displays the following screen:



5. Display setup

Language

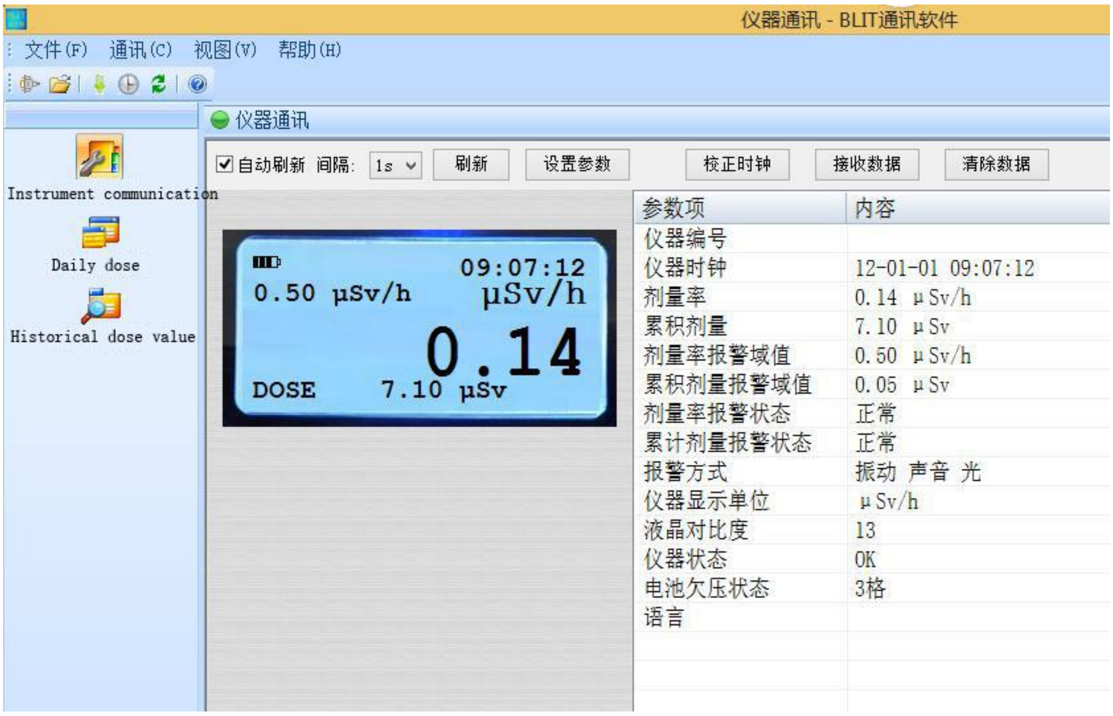
Contrast ratio

(Figure 10)

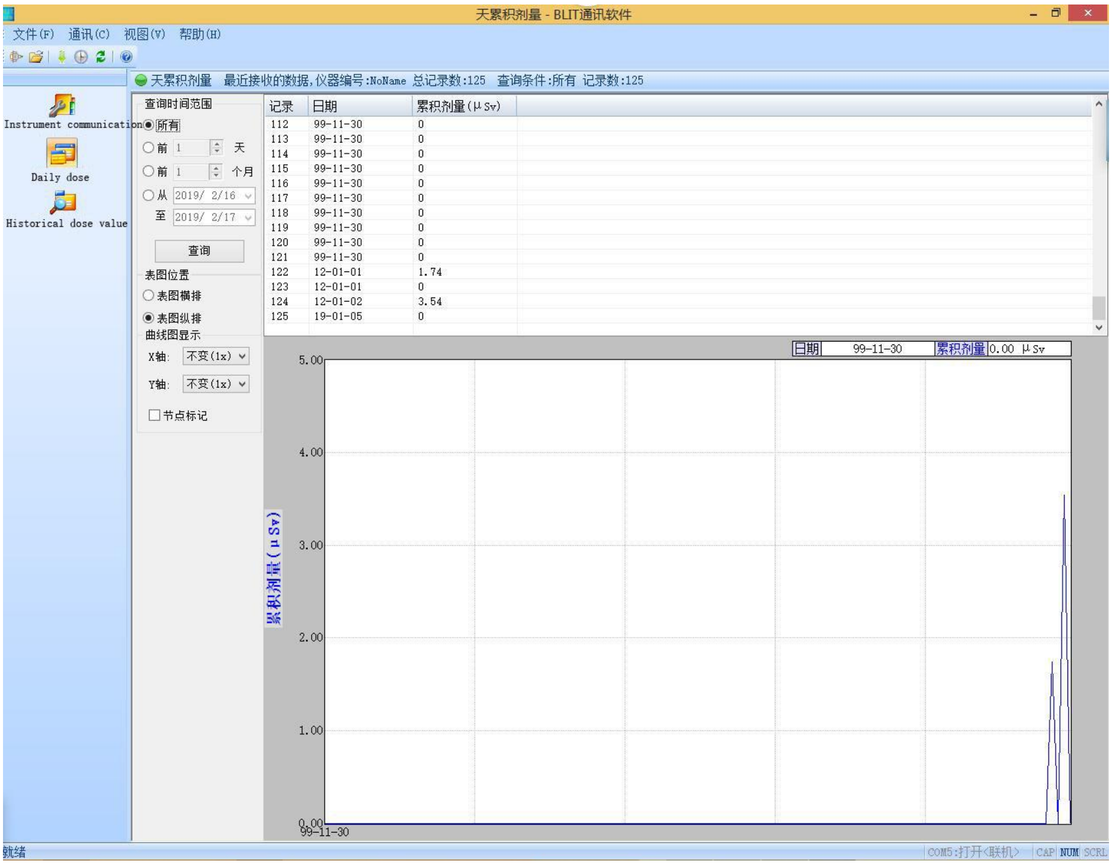
A. Language: Select this item in (Figure 10) screen and then press [Menu/OK] key to select Chinese or English.

B. Contrast ratio: Select “contrast ratio” subitem in (Figure 10) screen and then press [Menu/OK] key to enter for subitem setup; press [▼] or [▲] key to revise the contrast ratio and thus modify LCD effect.

Computer link menu interface


仪器通讯 - BLIT通讯软件
文件(F)
通讯(C)
视图(V)
帮助(H)
仪器通讯
Instrument communication
Daily dose
Historical dose value
☑ 自动刷新
间隔:
1s
刷新
设置参数
校正时钟
接收数据
清除数据
09:07:12
0.50 µSv/h
µSv/h
0.14
DOSE
7.10 µSv

参数项	内容
仪器编号	
仪器时钟	12-01-01 09:07:12
剂量率	0.14 µSv/h
累积剂量	7.10 µSv
剂量率报警域值	0.50 µSv/h
累积剂量报警域值	0.05 µSv
剂量率报警状态	正常
累计剂量报警状态	正常
报警方式	振动 声音 光
仪器显示单位	µSv/h
液晶对比度	13
仪器状态	OK
电池欠压状态	3格
语言	


天累积剂量 - BLIT通讯软件
文件(F) 通讯(C) 视图(V) 帮助(H)
Instrument communication
Daily dose
Historical dose value
查询
日期 99-11-30 累积剂量 0.00 μSv
5.00
4.00
3.00
2.00
1.00
0.00
累积剂量(μSv)
99-11-30
就绪
COM5:打开<联机>
CAP NUM SCRL

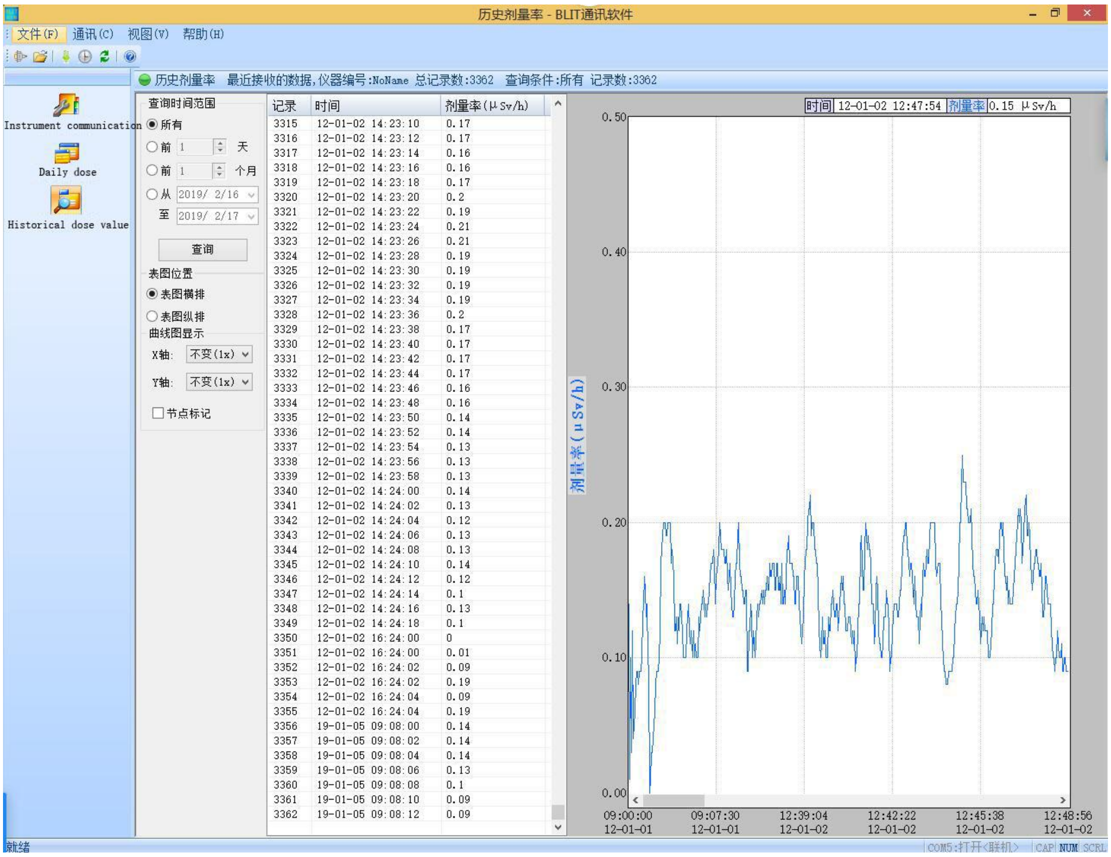
天累积剂量　最近接收的数据,仪器编号:NoName 总记录数:125　查询条件:所有 记录数:125

查询时间范围
● 所有
○ 前 1 天
○ 前 1 个月
○ 从 2019/ 2/16
至 2019/ 2/17

表图位置
○ 表图横排
● 表图纵排

曲线图显示
X轴: 不变(1x)
Y轴: 不变(1x)
☐ 节点标记

记录	日期	累积剂量(μSv)
112	99-11-30	0
113	99-11-30	0
114	99-11-30	0
115	99-11-30	0
116	99-11-30	0
117	99-11-30	0
118	99-11-30	0
119	99-11-30	0
120	99-11-30	0
121	99-11-30	0
122	12-01-01	1.74
123	12-01-01	0
124	12-01-02	3.54
125	19-01-05	0


历史剂量率 - BLIT通讯软件
文件(F) 通讯(C) 视图(V) 帮助(H)
Instrument communication
Daily dose
Historical dose value
查询
时间 12-01-02 12:47:54 剂量率 0.15 μSv/h
0.50
0.40
0.30
0.20
0.10
0.00
剂量率(μSv/h)
09:00:00 12-01-01
09:07:30 12-01-01
12:39:04 12-01-02
12:42:22 12-01-02
12:45:38 12-01-02
12:48:56 12-01-02
就绪
COM5:打开<联机>
CAP NUM SCRL

历史剂量率　最近接收的数据,仪器编号:NoName 总记录数:3362　查询条件:所有 记录数:3362

查询时间范围
● 所有
○ 前 1 天
○ 前 1 个月
○ 从 2019/ 2/16
至 2019/ 2/17

表图位置
● 表图横排
○ 表图纵排

曲线图显示
X轴: 不变(1x)
Y轴: 不变(1x)
☐ 节点标记

记录	时间	剂量率(μSv/h)
3315	12-01-02 14:23:10	0.17
3316	12-01-02 14:23:12	0.17
3317	12-01-02 14:23:14	0.16
3318	12-01-02 14:23:16	0.16
3319	12-01-02 14:23:18	0.17
3320	12-01-02 14:23:20	0.2
3321	12-01-02 14:23:22	0.19
3322	12-01-02 14:23:24	0.21
3323	12-01-02 14:23:26	0.21
3324	12-01-02 14:23:28	0.19
3325	12-01-02 14:23:30	0.19
3326	12-01-02 14:23:32	0.19
3327	12-01-02 14:23:34	0.19
3328	12-01-02 14:23:36	0.2
3329	12-01-02 14:23:38	0.17
3330	12-01-02 14:23:40	0.17
3331	12-01-02 14:23:42	0.17
3332	12-01-02 14:23:44	0.17
3333	12-01-02 14:23:46	0.16
3334	12-01-02 14:23:48	0.16
3335	12-01-02 14:23:50	0.14
3336	12-01-02 14:23:52	0.14
3337	12-01-02 14:23:54	0.13
3338	12-01-02 14:23:56	0.13
3339	12-01-02 14:23:58	0.13
3340	12-01-02 14:24:00	0.14
3341	12-01-02 14:24:02	0.13
3342	12-01-02 14:24:04	0.12
3343	12-01-02 14:24:06	0.13
3344	12-01-02 14:24:08	0.13
3345	12-01-02 14:24:10	0.14
3346	12-01-02 14:24:12	0.12
3347	12-01-02 14:24:14	0.1
3348	12-01-02 14:24:16	0.13
3349	12-01-02 14:24:18	0.1
3350	12-01-02 16:24:00	0
3351	12-01-02 16:24:00	0.01
3352	12-01-02 16:24:02	0.09
3353	12-01-02 16:24:02	0.19
3354	12-01-02 16:24:04	0.09
3355	12-01-02 16:24:04	0.19
3356	19-01-05 09:08:00	0.14
3357	19-01-05 09:08:02	0.14
3358	19-01-05 09:08:04	0.14
3359	19-01-05 09:08:06	0.13
3360	19-01-05 09:08:08	0.1
3361	19-01-05 09:08:10	0.09
3362	19-01-05 09:08:12	0.09

Conversion knowledge of radioactive units

I. International standard (China is in strict adherence to this standard) 1990

1. Radioactive work personnel: 20 mSv/year (10 µSv/hour)
2. General personnel: 1 mSv/year (0.52 µSv/hour)

Remark: The above stipulations are in strict adherence to relevant suggestions of ICRP and basic standard of China’s radioactive sanitation protection (GB—4792—84).

Remark:

Ra—226 (t = 1608 years) r = 0.825 Lun. m^2/hour. Curie

s – 137 (t = 29.9 years) r = 0.33 Lun. m^2/hour. Curie

Co – 60 (t = 5.23 years) r = 1.32 Lun. m^2/hour. Curie

List of fittings

Goods name	Quantity	Unit	Remark
FS9000 main equipment	1	Stage	
Operation instruction manual	1	Entity	
Maintenance assurance card and quality eligibility certificate	1	Piece	