Radiation Detection Manual

09:59
2023 Year
06m 29 day
Ionization mode
RT 0.12 uSv/h
Cum 0.29 uSv
100
80
60
40
20
0

2023-06-V1-157C

Instrument Overview:

Radiation dose alarm instrument built-in high
tube as a detector, mainly used for monitorin
beta rays in various radioactive workplaces,
measurement range. It can display the curre
dose rate of the workplace. Widely used in n
tors, iron and steel, chemical industry, isotop
radiological medical treatment, cobalt source
131, radiological laboratories, environmental
facilities and other fields of staff for personal
and radioactive alerts.

Characteristics of the instru

1. can monitor x, y and beta radiation
2. high sensitivity, can also measure the envi
   radiation
3. Chinese and English bilingual operation in
   easy to use
4. Dose rate and cumulative dose are measu
   same time.
5. LCD screen display
6. Support battery power display
7. The alarm thresholds for dose rate and cu
8. support time and date setting
9. Support alarm switch setting

sensitivity cover technology
g the radiation of x, y and hard
with fast response and wide
nt dose rate and accumulated
uclear power plants, accelera-
e application, industrial X-y,
e treatment, y radiation, iodine
monitoring around nuclear
safety protection monitoring

ment

ironmental background

terface, easy to operate,

ured and displayed at the

mulative dose can be preset.

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~500.0 mSv

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, 100.0 mSv/h arbitrary selection

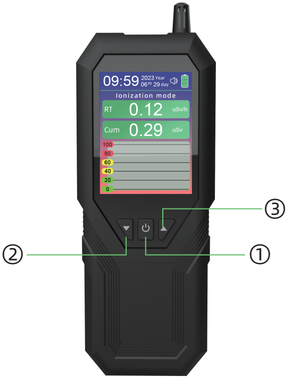
8. Measurement display: dose rate per second display, protection alarm response is less than 5 seconds.
9. Environment: Temperature -10℃~+45℃, relative humidity: ≤95% (+45℃)
10. Size: 189*70*30mm

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.

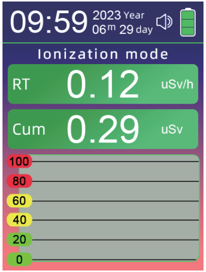
③"△" key: upward key/number item plus one.



Basic operation method

1. Switch on: Press and hold the power button for 2 seconds to switch on the instrument.
2. Switch off: Press the power button for 2 seconds after switching on the instrument, the instrument will be switched off.

3. Measurement: The instrument will enter the measurement state a switching on, there are two kinds of measurement: one is the dos the unit can be set as μSv/h, μGy/h, mR/h, cps, cpm; the other is cumulative value of the dose rate for a period of time, i.e., the cum dose, the unit is μSv. When any of the measured value exceeds t alarm threshold value, the instrument will carry out an alarm prom
4. The instrument can display the information as shown in the figure



Parameter Settings

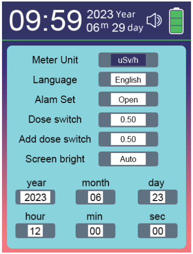
The parameters that can be modified by the user include: measurem unit, system language, alarm setting, dose threshold, accumulation threshold, screen brightness and time setting. The corresponding pa ters can be modified by pressing the key. Under the measurement st double click [Power] key to enter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

fter
e rate,
the
nulative
he
pt.
.

ent

rame-
tate,
▽] or

1. Measurement unit: double-click the [Power] key, press the [Power] key to enter the options, at this time the display "μSv/h, μGy/h, mR/h, cpm" five options. Press [▽] or [△] to select the corresponding unit, then press [Power] to confirm and save.

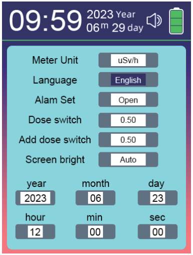


09:59 2023 Year 06m 29 day

Meter Unit	uSv/h
Language	English
Alam Set	Open
Dose switch	0.50
Add dose switch	0.50
Screen bright	Auto

year	month	day
2023	06	23
hour	**min**	**sec**
12	00	00

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



09:59 2023 Year 06m 29 day

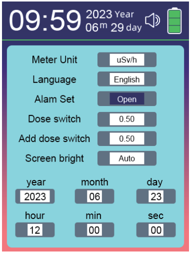
Meter Unit	uSv/h
Language	English
Alam Set	Open
Dose switch	0.50
Add dose switch	0.50
Screen bright	Auto

year	month	day
2023	06	23
hour	**min**	**sec**
12	00	00

3. Alarm settings: doubl
select the third menu iten
options, press the [▽] or
to select the switch alarm

4. Dose threshold: doub
fourth menu item and the
option has "0.05, 0.50, 1.
total of 10 dose rate alarm
[△] to select the appropri
save the setting.

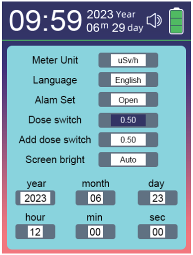
e-click the [Power] key, press the [▽] key to n and then press the [Power] key to enter the [△] to select the switch alarm. Press [▽] or [△] n, press [Power] to save the setting.


09:59 2023 Year 06m 29 day

Meter Unit	uSv/h
Language	English
Alam Set	Open
Dose switch	0.50
Add dose switch	0.50
Screen bright	Auto

year	month	day
2023	06	23
hour	min	sec
12	00	00

ble-click [Power] key, press [▽] key to select the en press [Power] key to enter the option. The 00, 1.50, 2.00, 2.50, 5.00, 10.00, 50.00, 100.0" a m threshold value can be selected. Press [▽] or iate threshold value and then press [Power] to

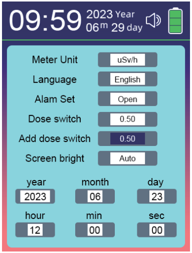

09:59 2023 Year 06m 29 day

Meter Unit	uSv/h
Language	English
Alam Set	Open
Dose switch	0.50
Add dose switch	0.50
Screen bright	Auto

year	month	day
2023	06	23
hour	min	sec
12	00	00

---

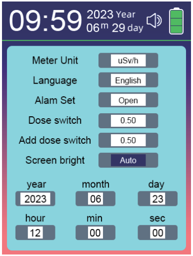
5. Cumulative threshold: double-click [Power] key, press [▽] key to select the fifth menu item and then press [Power] key to enter the option. The option has "0.05, 0.50, 1.00, 2.00, 5.00, 10.00, 20.00, 50.00, 100.0" a total of nine cumulative dose rate alarm threshold value can be selected. Press [▽]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


09:59 2023 Year 06m 29 day

Meter Unit	uSv/h
Language	English
Alam Set	Open
Dose switch	0.50
Add dose switch	0.50
Screen bright	Auto

year	month	day
2023	06	23
hour	min	sec
12	00	00

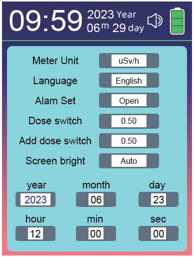
6. Screen brightness: double-click the [Power] key, press the [▽] key to select the sixth menu item and then press the [Power] key to enter the option. The option has "automatic, 25%, 50%, 75%, 100%" can be selected. Press [▽] or [△] to select the appropriate brightness and then press [Power] key to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


09:59 2023 Year 06m 29 day

Meter Unit	uSv/h
Language	English
Alam Set	Open
Dose switch	0.50
Add dose switch	0.50
Screen bright	Auto

year	month	day
2023	06	23
hour	min	sec
12	00	00

7. 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

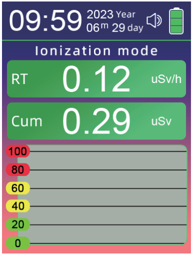

09:59 2023 Year 06m 29 day

Meter Unit: uSv/h
Language: English
Alam Set: Open
Dose switch: 0.50
Add dose switch: 0.50
Screen bright: Auto

year: 2023
month: 06
day: 23
hour: 12
min: 00
sec: 00

Attention! If you press [▽] or [△] alone without pressing the [Power] button to confirm it will not be saved.

The instrument has two


09:59 2023 Year 06m 29 day

Ionization mode
RT 0.12 uSv/h
Cum 0.29 uSv

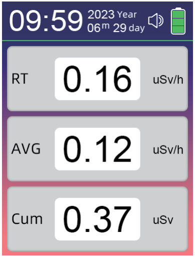
Live Update Test
Cumulative update test
Real-time update of historical data
(in the form of colour charts)

Precautions

The radiation dose alarm instrument is
attention to the protection of the followi
conducive to the maintenance and pro

1. Keep it as dry as possible during sto
cause damage to the instrument.
2. Do not drop, knock or vibrate violent
the detector.
3. When the power marking has no fra
power, and should be charged in tim
power, the instrument is prone to no
screen and other abnormal phenom

interfaces:


09:59 2023 Year 06m 29 day

RT 0.16 uSv/h

AVG 0.12 uSv/h

Cum 0.37 uSv

Real-time update test
Real-time average update test
in one minute
Real-time update of cumulative data

a precision instrument, please pay
ng recommendations will be
long the service life of the instrument.

rage and use, excessive humidity will

ly, otherwise it will cause damage to

me, the power is in the state of under
e; when the power is seriously under
t be able to switch on and off, the
ena.

Knowledge of radioactive unit conversion

1.International standard (our implementation standard) 1990

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

Note: The above is based on the recommendations of the International Commission on Radiological Protection (ICRP) and China's Basic Standard for Radiological Health Protection (GB-4792-84).

2. Knowledge of unit conversion, etc.

1μSv/h=100μR/h
1nCKg-1/h=4μR/h
1μR/h=1γ (the unit used by the former nuclear industry to find minerals)

Radioactivity: 1Ci=3.7×1010Bq=37GBq 1μCi=3.7×107Bq=37MBq 1μCi=3.7×104Bq=KBq 1Bq=2.703×10-11Ci=27.03pci	**Quantity of light** 1R=103mGy=106μR 1R=2.58×10-4CKg-1
Absorbed dose 1Gy=103mGy=106μGy 1Gy=100rad 100μrad=1μGy	**Dose equivalent:** 1Sv=103mSv=106μSy 1Sv=100rem 100μrem=1μSv
Other: 1Sv is equivalent to 1Gy1g radium=0.97Ci≈1Ci Radon unit: 1Bq/L=0.27em=0.27×10-10Ci/L	

3. Calculation of radioisotope decay values

$A=A0el-\lambda t=1n2/T1/2$

T1/2 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.

Reduction by half and to 1/10 value for different substances (cm)						
Radioactive sources	**Lead**		**Iron**		**Concrete**	
	Halve	1/10	Halve	1/10	Halve	1/10
Cesium-137	0.65	2.2	1.6	5.4	4.9	16.3
Iridium-192	0.55	1.9	1.3	4.3	4.3	14.3
Cobalt-60	1.10	4.0	2.0	6.7	6.3	20.3

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