

- my R51 -
geiger counter
Hardware: V24.1 Firmware: V42.26

Calibrated and tested with Cs-137 - from 70 nSV/h to 5 mSV/h

High accuracy ca. 10% by Cs-137 from 10 µSV/h to 1,2 mSV/h

Lilon battery pack with integrated charging electronics with overload protection

Supply current: 1.6 .. 3 mA (without LED backlight)

Backlight, sound and measuring mode switchable

Excellent accuracy – max. ±10% correction table by Cs-137 and dead time correction



#R51 – is the third modification/decoupling of the original #R10 and #R42
4N-Galaxy autonomous, solar powered station for environmental radioactivity

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General instructions & notices

my R51 – is the third modification/decoupling of the original - #R10 4N-GX Autonomous, solar powered station for environmental radioactivity 433.92 MHz radio or cable connection to the evaluator - developed and designed by 4N-GALAXY. http://www.4n-gx.de/R10_de.html

Special feature: **Average Power Consumption 2,1 mA**

ATTENTION!

Do not touch the high-voltage part.

Keep the board clean and dry.

Pay attention to the LCD glass, particularly at the corners.

Use only DC voltage of 5 Volt as power supply.

Do not operate in direct sunlight – it can influence the measurement results because of overheating.

WARNING!

When powered up, this board produces a high voltage of 250 to 700 Volt.

If you buy this kit you are full responsible for any possible injury caused during assembly or using of this device. Never touch the board during operation. Before powering on, place the finished kit into a plastic case to prevent touching high voltage elements .

GUARANTEE

24 months from date of purchase.



07.09 uSv/h Hi!
000621 iP/30Sec

Thank you for your trust and purchase!

Now have fun with R51 4N-GX team

ask, help, feedback: <mailto:RRM@4N-GALAXY.DE?subject=#R51>

Information on housing and Li-Ion accu

Housing	PVC 2 mm, Gamma attenuation approx. 0,1%
Housing dimensions	146 x 86 x 25 (in mm)
Accu	Li-Ion 3,7V
Accu protection	Accu internal: PCB protection circuit Accu external: deep discharge- overload- short- circuit protection Software: Deep discharge overload protection - LCD message
Accu runtime 1 charge	without LCD backlight > 200 hours with LCD backlight 22 hours
Accu charging time	60 .. 90 minuten via USB 2.0 5 pol. connector (4,5..5,5V DC) (PC, Powerbank, Power adapter)
LED indicators	Li-Ion battery is charging - LED green on Li-Ion battery fully charged – LED green off Tube has registered discharge - LED 2 white short on Tube has registered no discharge – LED 2 white off
Remark	Housing is not waterproof

Function / Handling



Charge battery pack – LiIon accu

#R51 device has integrated charging electronics with overload protection.

Connect the Mini USB 5 pol. cable to the #R51 device USB connector.

Connect the other end from the USB cable to a PC, power bank or power adapter.

#R51 needs 5V DC 100..500 mA voltage - default USB voltage.

Now the CHR LED is glowing.

If the battery pack is fully charged then the CHR LED is off.

The charging process takes 60..90 minutes when the battery was completely empty.
Usually the charging process takes about 40..50 minutes.

After charging the USB cable can be disconnected.

Do not load the #R51 unattended!

Switch on / Measuring

Press short the PWR button to turn on the #R51 device.

Now you can see on the LC Display how the device makes self-checking.
Then the #R51 high voltage for the geiger tube is regulated to 400V.

Now the measurement starts.

The measurement takes 30 seconds in high accuracy mode.

The measurement takes 5, 10, 15, 20, 25 or 30 seconds in low accuracy mode depending on radiation dose.

When the measurement is ready, the result is shown on the LC Display.

The counted impulses per 30 seconds are also displayed.

Possible displays are: *and conversion*

120 nSv/h $0,12 \mu\text{Sv}/\text{h}$

10 $\mu\text{Sv}/\text{h}$ 10000 nSv/h

1,1 mSv/h 1100 $\mu\text{Sv}/\text{h}$

Another new measurement starts automatically immediatly.

When the measurement is proceeding then moving points are visible.
The greater the radiation dose the faster the moving points.

Endless loop until the #R51 device is switched off.

To turn off the #R51 device press PWR button again.

Measuring range is from 80 nSv/h .. 1,2 mSv/h with overload upto 5 mSv/h.

Measuring accuracy is max $\pm 10\%$ in high accuracy mode (30 seconds measuring)

The #R51 is calibrated and tested with Cs-137

Switch on / Measuring

If 10 $\mu\text{Sv}/\text{h}$ are exceeded 10 $\mu\text{Sv}/\text{h}$ an alarm sound appears. It can be switched off with Sound off .

Backlight, sound and measuring mode

You can turn on or off: LCD backlight and sound and the measuring mode.

Press short the SET button to switch the settings. 8 settings are possible which cover all possibilities.

The changeover takes place in endless loop.

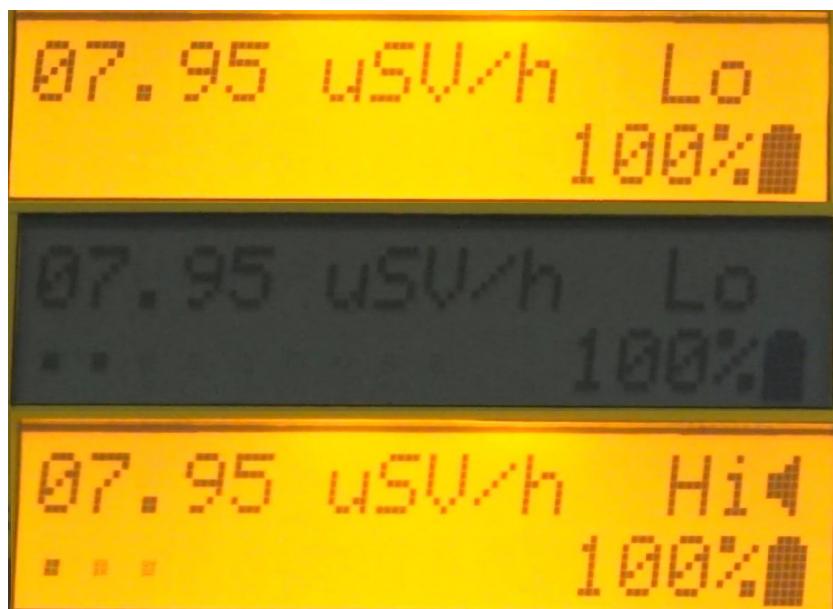
If the end of the table is reached it continues at the table beginning.

The last used setting is permanently stored/saved in the #R51.

The device always starts with the last settings.

Setting No.	Accuracy mode Hi,Lo	Sound	LCD backlight amber directly visible
1	low	off	off
2	low	off	on
3	low	on	off
4	low	on	on
5	high	off	off
6	high	off	on
7	high	on	off
8	high	on	on

The settings are displayed on the display as follows:



Technical specifications

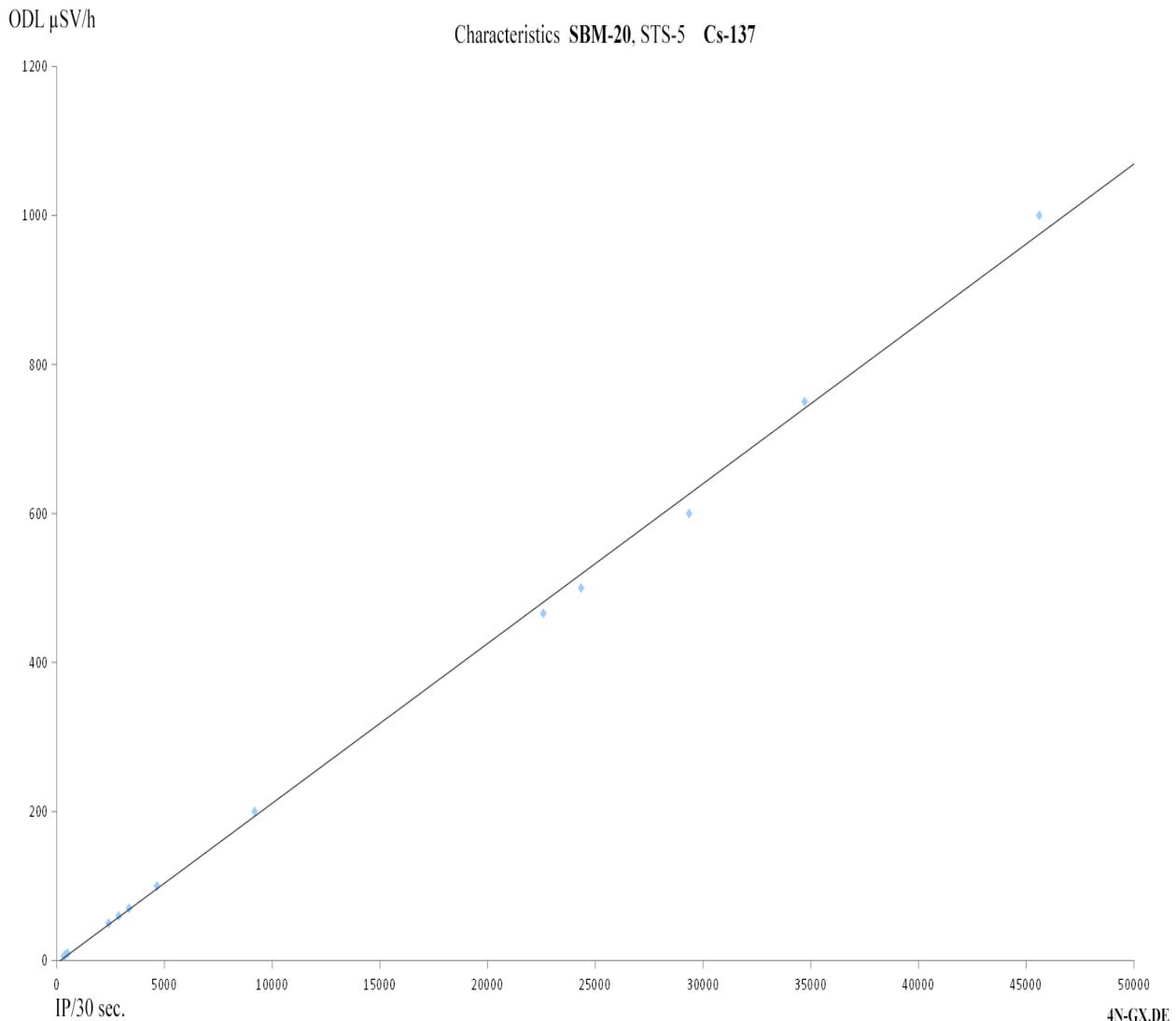
Product	R51
Accuracy by Cs-137	max. \pm 10% tested with Cs-137 - 0,8 μ SV/h to 1,2 mSV/h
Overload test	x five, 5 mSv/h
Supply voltage	Li-Ion Accu 3,7V DC
Supply current	2..3 mA by 5,5V DC
Accu runtime 1 charge	with LCD backlight 22 hours, without LCD backlight > 200 hours
Accu charging time	60 .. 90 minutes via USB 2.0 5 pol. connector (4,5..5,5V DC) (PC, Powerbank, Power adapter)
LC Display	Character 2x16 with amber backlight
Radiation Dose range with SBM-20	80 nSV/h .. 1,2 mSV/h
Radiation Dose range LCD	80 nSV/h .. 99 mSV/h
Conversion Factor	87,5
Alarm Value	10 μ Sv/h
Alarm Speakers	Yes for alarm sound melody and ticks
Geiger Event indication	LED white flash
1. Firmware controller	16 Bit controller Freescale
2. Firmware controller	8 Bit controller Freescale
Liton Voltage measuring	Yes, Yes 2.00 .. 6.00V by turn on
Tube high voltage measuring	Yes 16 Bit controller
Tube high voltage regulate	Yes 8 Bit controller 16 bit timer & PWM
USB connector	USB mini 5 pol.
Measurement Period	High accuracy 30 sec. or Low accuracy automatic 5, 10, 15, 20, 25 sec.
High Voltage range adjustable	250 .. 700V
Dimensions	146 x 86 x 25 (in mm)
Geiger Tube	SBM-20 or STS-5
PCB RoHS 2 conform	Yes

Test / pictures



my R51 wurde auf einem amtlichen Prüfstand mit einem Cs-137 Prüfstrahler getestet. Entfernung zur Quelle ca. > 2,5m Ergebnis: alle von my R42 angezeigten Werte stimmen überein mit dem Ist ODL Wert. Bei einer Leistung von 1,00 mSv/h werden 1,01 mSv/h von my R42 angezeigt. Das SBM-20 Rohr arbeitet bis ca. 1,4 mSv/h. Ein 50-faches Überlasttest wurde bestanden.

Cs-137 my R42 with SBM-20 characteristics by 4N-GX
my #R42 used Dead-Time correction + SBM-20 correction table



SBM-20 tube specifications

SBM-20 Geiger-Müller Rohr

Füllgas

Ne, Br₂, Ar

Plateaubereich Spannung

400 V

Totzeit

190 µS bei 400 V

Anoden Widerstand

5,1 MΩ

Arbeitsbereich

0,004 .. 40 mR/s

Arbeitsbereich

0,014 .. 144 mR/h

γ Sensitivität Ra_266

29 cps/mR/hr

γ Sensitivität Co_60

22 cps/mR/hr

Nullrate

1 cps

Rohr Kapazität

4,2 pF

Lebensdauer

2 * 10¹⁰

Kathode

Rostfreier Stahl

Länge

107 mm

Querschnitt

9,9 mm (max. 10,5)

Arbeitstemperatur Bereich

-60..+70 °C

Gewicht

~ 10 g

Reference measurements CS-137

my R51 wurde auf einem amtlichen Prüfstand mit einem Cs-137 Prüfstrahler getestet. Entfernung zur Quelle ca. > 2,5m. Ein 50-faches Überlasttest wurde bestanden – 50 mSv/h.

K1 - ip Correctur On

F0875 - conversions factor: 87,5

T400 - tube voltage: 400V

Reference radiation $\mu\text{Sv}/\text{h}$	LC display value $\mu\text{Sv}/\text{h}$	Dead Time correction	SBM-20 correction	Overload
6	6,05		x	
7	7,31		x	
10	9,4		x	
50	48,85		x	
100	97,83	x	x	
466	450,68	x	x	
500	500,43	x	x	
1000	1,05	x	x	
1500	1,62	x	x	x
2000	2,6			x
3000	2,6			x
10000	2,6			x
50000	2,6			x



Warning & Instructions to battery

- Lithium-Batterien sind bei ordnungsgemäßem Umgang sicher.
- Bei unsachgemäßer Benutzung und Lagerung können sie aber Brände verursachen.
- Verwenden Sie keine defekten Lithium-Batterien.
- Kleben Sie die Pole bei Lagerung und Entsorgung ab, damit keine Kurzschlüsse entstehen.
- Entsorgen Sie Altbatterien und Altakkus sachgerecht in Sammelboxen (Handel) oder bei kommunalen Sammelstellen.
- Bei Versand: **Lithium-Batterien: Warnhinweis Brandgefahr** aufkleber verwenden!

Lithium batteries are safe when handled properly.
However, they can cause fires if they are used improperly.
Do not use defective lithium batteries.
Tape the poles off during storage and disposal in order to avoid short circuits.
Dispose of old batteries properly in collection boxes (trade) or at municipal collection points.
For shipping: Lithium batteries: Warnings Use fire hazard stickers!



4N-GALAXY
Bornheide 80
22549 Hamburg
Germany



Declaration Of Conformity for RoHS (2011/65/EU) (RoHS 2)

The Directive 2002/95/EC (RoHS) on the restriction of the use of certain hazardous substances in electrical and electronic equipment has been transposed into national German law by the Electrical and Electronic Equipment Act (Elektro- und Elektronikgerätegesetz/ElektroG) of March 24th, 2005.

4N-GALAXY implemented this in due time to June 30th, 2006.

On June 8th 2011 the Directive 2011/65/EC (RoHS 2) entered into force and replaced Directive 2002/95/EC (RoHS).

According to §5 of the Electrical and Electronic Equipment Act (ElektroG) the following maximum concentration values are permitted in homogeneous materials as per July 1st, 2006:

Lead	Mercury	Hexavalent chromium	Cadmium	PBB	PBDE
1000 ppm	1000 ppm	1000 ppm	100 ppm	1000 ppm	1000 ppm
0,1%	0,1%	0,1%	0,01%	0,1%	0,1%

Unaffected by the ElectroG the Annex III of exemptions to the Directive 2011/65/EC remains applicable.

4N-GALAXY products listed below meet the requirements of Directive 2011/65/EC of the European parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

USB 2.0 converter products and RS232 converter products

This certification has been prepared and issued on the basis of currently applicable laws and regulations and our best knowledge and expertise currently available; the addressee or recipient is advised to regularly request updates hereof.

This certification replaces all previous ones relating to this subject.

Hamburg, 2015-09-30

A handwritten signature in black ink, appearing to read "Hans-Joachim Schmitz".

Quality Management

4N-GALAXY

EG-Konformitätserklärung

Im Sinne der EG-Richtlinie Elektromagnetische Verträglichkeit 2014/30/EU



**Hiermit erklären wir, dass die Geräte,
der Baureihen:**

USB 2.0 <-> xxx #2xx & #Rxx

mit den grundlegenden Anforderungen der unter Punkt 1 aufgeführten EG-Richtlinie übereinstimmen. Bei einer nicht mit uns abgestimmten Änderung der aufgeführten Geräte verliert diese Erklärung, für dieses Gerät, ihre Gültigkeit.

Wir haben bei der Entwicklung und Herstellung folgende EG-Richtlinien und EN-Normen beachtet:

1. EG-Richtlinien EG-Richtlinie 2014/30/EU 20.04.2016

**2. Angewandte
harmonisierte
Normen** EN 50081-1 Störaussendung Wohn-Gewerbebereich, Kleinindustrie
EN 50082-2 Störfestigkeit, Industrie

Die Übereinstimmung eines Baumusters der oben genannten Produktfamilie mit den Vorschriften der genannten EG-Richtlinien wurde bescheinigt durch:

**Anschrift der
Prüfstelle** Die Prüfungen sind in Eigenverantwortung
durchgeführt worden.

A handwritten signature in black ink.

Hamburg, den 10.03.2016

i.V. Mroz
(Manager Development & Production Division)

Die Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. ~~Die Sicherheitshinweise der mitgelieferten Produktdokumentationen sind zu beachten.~~

Hinweise:

Geräte Online_Dokumentation ist zu beachten.
Es ist vor der Inbetriebnahme eines Gerätes generell zu prüfen, ob dieses Gerät oder Modul grundsätzlich für den Anwendungsfall, für den es vorgesehen werden soll, geeignet ist.
Sollten Sie sich über den korrekten Anschluß nicht im klaren sein oder sollten sich Fragen ergeben, die nicht im Laufe der Online_Dokumentation abgeklärt werden, so setzen Sie sich bitte mit uns in Verbindung. Online_Dokumentation ist unter der URL: <http://www.4n-galaxy.de> abrufbar.

4N-GALAXY

Bornheide 80

DE-22549 Hamburg - Germany - T (040) 4840 9080 F (040) 4840 908