

КЛИЕНТ: „АЕЦ КОЗЛОДУЙ“ ЕАД**На вниманието на:**Виолетка Димитрова
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Страници: 1 от 2

ИНДИКАТИВНО ПРЕДЛОЖЕНИЕ

ОТК – 081 / 23.02.2024г.**ОТНОСНО: Пазарна консултация № 53018 с предмет:**

“Доставка, монтаж и въвеждане в работа към Автоматизирана информационна система за външен радиационен контрол (АИСВРК-ХQ70) на монитори за измерване на I-131 в приземния атмосферен слой”

Уважаема Госпожо Димитрова,

Във връзка с пазарна консултация № 53018, Тита-Консулт ООД Ви представя следната Оферта:

№	Наименование	К-во (бр.)	Ед. цена в лева (без ДДС)	Обща цена в лева (без ДДС)
1.	Доставка, монтаж и въвеждане в експлоатация на монитори Berthold BAI 9103-4 с контролер LB 5340 за измерване на I-131 в приземния атмосферен слой при изпълнени всички изисквания на Техническо задание № 23.ЕП-2.ТЗ.1275	1	2,250,000.00	2,250,000.00
ОБЩО: Два милиона двеста и петдесет хиляди. 00 лева без ДДС				2,250,000.00

ПРОИЗВОДИТЕЛ НА ОБОРУДВАНЕТО:

Berthold Technologies GmbH & Co. KG, Германия

В изпълнение на ТЗ_№ 23.П.ТЗ.1275 ще бъдат произведени и доставени последно поколение на експлоатираните в момента монитори за измерване на I-131 в приземния атмосферен слой към Автоматизирана информационна система за външен радиационен контрол (АИСВРК-ХQ70).

Технически параметри на предлаганото оборудване ще отговарят напълно на посочените в Техническото задание.

ПРИЛОЖЕНИЯ:

1. Technical Data Sheet Iodine Monitor BAI 9103-4
2. Brochure LB 5340_Data Logger

- | | |
|---|--|
| 1. Условия на доставка | DDP АЕЦ Козлодуй |
| 2. Срок на доставка | До 180 календарни дни след поръчка |
| 3. Срок на монтаж и функционални изпитания | До 100 календарни дни след даване фронт за работа |
| 4. Гаранционен срок | 24 месеца |
| 5. Начин на плащане | до 30 дни след получаване на фактура |
| 6. Точен адрес | гр. София 1164, бул. „Джеймс Баучер” № 5А |
| 7. ЕИК | 831508563 |
| 8. ИН по ДДС | BG 831508563 |
| 9. Банкови реквизити | Уникредит Булбанк АД, гр. София, пл. „Света Неделя” № 7 |
| 10. BIC | UNCRBGSF |
| 11. Банкови сметки | В ЛЕВА BG13UNCR76301008140309 |
| 12. Валидност на офертата | 3 месеца |
| 13. Сервизно обслужване | Тита-Консулт ООД в качеството си на официален представител на Berthold Technologies GmbH & Co. KG осигурява гаранционен и извънгаранционен сервиз. |

Надяваме се нашата Оферта да Ви удовлетворява!
За допълнителни въпроси оставаме на Ваше разположение!

**Yavor
Tsvetanov
Andreev**
УПРАВИТЕЛ:

Digitally signed
by Yavor
Tsvetanov
Andreev

/подпис, фамилия/

IODINE MONITOR**CONTENTS**

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0. OPERATING PRINCIPLES

The monitor consists of an Iodine selective collection medium which uses commercial grade Activated Charcoal cartridges. The sample air is split over 2 injection tubes which guide the air to a cartridge holder which absorbs the Iodine. The cartridge holder is constructed in such a way that it can contain 2 standard cartridges in series and an aerosol pre-filter as required by the latest nuclear standards. A Sodium Iodide/PMT detector is looking at the air inlet of the first cartridge. By adjusting the energy threshold settings on the electronics either or both I-125/129 and I-131 can be measured. Also Noble gas compensation (e.g. 2 window method) can be applied.

The Iodine collection unit is designed to measure both particulate and gaseous forms of Iodine by observing the same design principles as required for a particulates monitor.

To improve the absorption efficiency and to greatly eliminate temperature drift of the detector the inlet air is heated before entering the collection unit. This is obtained with a smooth inner surface pipe with an insulated heat tracing lint wrapped around the pipe and a temperature controller unit.

Cartridge replacement is done through a front access door. The cartridge holder containing the 2 cartridges can easily be extracted by a snap lock (bayonet fitting) mechanism.

The collection and detector unit is shielded from ambient background with a 50 mm strong lead shield. A carbon vane pump ensures a stable air flow of ca. 3 m³/h which is optimized for good absorption properties. For stack monitor applications where it is required to regulate the airflow proportional to the air flow in the stack or ventilation duct, the monitor can be equipped with a Mass Flow Controller which can regulate the sample air proportional to a current signal (0/4-20mA) from a stack flow meter.

The measuring range can be changed by modifying the detector geometry. To shift the upper end of the range a smaller detector crystal and / or a collimator may be mounted into the detector tube.

1. SAMPLE

- 1.1. TYPE OF RADIATION :** Gamma radiation of gaseous and particulates fraction of I-123, I-125 / I-129 and/or I-131 measured over most the abundant peak (I-123 159 keV I-125 35.4 keV I-131 364 keV)
System efficiency : 2% - typical for a 1" thick crystal and TEDA activated Charcoal cartridge,

Energy range : 15 keV - 2.5 MeV when a 2x2" NaI(Tl) X-tal is used in the detector
15 keV - 1.25 MeV with a 1"x2" X-tal

1.2. CALCULATION DETECTION LIMIT - MEASURING RANGE - 2 WINDOWS FOR I-131

Formulae and calculations for 2 separated windows i.e. theoretical approach according to DIN 25 482 Part 1, specified from monitor inlet.

- ▶ Confidence level 95%

- ▶ $k_{1-\alpha} = k_{1-\beta} = 1.96$

$$\text{DETECTION LIMIT [cps]} = 2 \times 1.96 \times \sqrt{2} \times \sqrt{\frac{4 \times R_A}{T} + \frac{R_B}{T}}$$

with : T = Measuring time = Sampling time [s]
R_A = Background in (320 – 400) keV window = 0.10 cps
R_B = Background in (282 – 437) keV window = 0.20 cps

MINIMUM DETECTABLE CONCENTRATION (MDC) [Bq/m³] = DETECTION LIMIT x CALIBRATION FACTOR

$$\text{CALIBRATION_FACTOR} \left[\frac{\text{Bq}}{\text{m}^3} \text{ per } \Delta \text{cps} \right] = \frac{1}{\Delta T} \times \frac{1}{E} \times \frac{1}{F} \times C$$

with : E = Average detector efficiency = 5.75x10⁻³ % with 20 mm thick Pb collimator, 1"x2"
X-tal

F = Nominal sample flow = 3 m³/h

C = ECN type test correction factor = 1.2 (for above window settings)
 Difference between solid source calibration and type test with gaseous I-131

Maximum of range calculated as : $R_{sat} \times$ Calibration factor
 with : R_{sat} = Maximum (saturation) count rate = 2×10^5 cps

Meas. time	Det. limit	MDC	Meas. time	Sat. count rate	MAX
[s]	[cps]	[Bq/m ³]	[s]	[cps]	[Bq/m ³]
600	0,175	7320,851	600	2,00E+05	8,35E+09
1800	0,101	1408,898	1800	2,00E+05	2,78E+09
3600	0,072	498,121	3600	2,00E+05	1,39E+09
86400	0,015	4,237	86400	2,00E+05	5,80E+07

1.3. DETECTION LIMIT - MEASURING RANGE - SINGLE WINDOW FOR I-131

Formulae and calculations for 1 single windows i.e. theoretical approach according to DIN 25 482 Part 1, specified from monitor inlet.

- ▶ Confidence level 95%
- ▶ $k_{1-\alpha} = k_{1-\beta} = 1.96$

$$\text{DETECTION LIMIT [cps]} = 2 \times 1.96 \times \sqrt{2} \times \sqrt{2} \times \sqrt{\frac{R_0}{T}}$$

with : T = Measuring time = Sampling time [s]
 R_0 = Background in (320 – 400) keV window = 0.10 cps – typical (I-131 \pm 10%)

MINIMUM DETECTABLE CONCENTRATION (MDC) [Bq/m³] = DETECTION LIMIT \times CALIBRATION FACTOR

$$\text{CALIBRATION_FACTOR} \left[\frac{\text{Bq}}{\text{m}^3} \text{ per } \Delta \text{cps} \right] = \frac{1}{\Delta T} \times \frac{1}{E} \times \frac{1}{F} \times C$$

with : E = Average detector efficiency = 5.75×10^{-3} % (for 1"x2" X-tal, collimator 20 mm Pb)
 F = Nominal sample flow = 3 m³/h
 C = ECN correction factor = 1.2 (for above window settings)

Maximum of range calculated as : $R_{sat} \times$ Calibration factor
 with : R_{sat} = Maximum (saturation) count rate = 2×10^5 cps

Meas. time	Det. limit	MDC	Meas. time	Sat. count rate	MAX
[s]	[cps]	[Bq/m ³]	[s]	[cps]	[Bq/m ³]
600	0,101	4227,370	600	2,00E+05	8,35E+09
1800	0,058	813,558	1800	2,00E+05	2,78E+09
3600	0,041	287,636	3600	2,00E+05	1,39E+09
86400	0,008	2,446	86400	2,00E+05	5,80E+07

1.4. SAMPLE AIR :

Temperature range sample air : -20°C to +45°C
 Humidity for sample air : 10% < RH \leq 95% (non-condensing)
 (May require inline heating at extremes)
 Sample must be free of caustic and acid vapours, solvents

2. MEASURING VESSEL

2.1. CONSTRUCTION MATERIAL :

Stainless steel 304L (all wetted parts)
 Designation : BAI 9103-4
 Dimensions : 6HE - 19" module

2.2. FILTER :

Type : Dual TEDA impregnated carbon TC-12, optional particulates filter S&S N°8
 Retention : 90% - typical (ICH₃)
 Dimensions : Ø2-1/4" ; 1" thick ; 8 - 16 mesh
 Distance to detector : 7 mm

2.3. FILTER CARRIER :

Construction material : Chemically nickle-plated MS 58 DIN 2.0401

Standard : MIL-C-2607B ; Class 2

Combined holder for 2 cartridges and particulates prefilter

Access to filter :

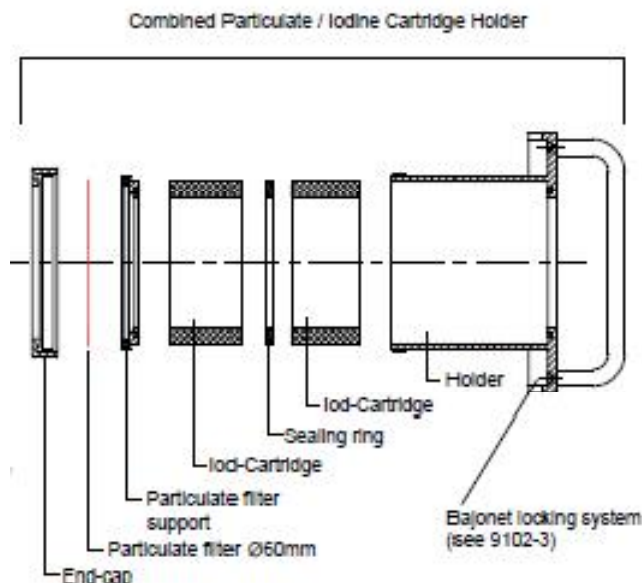
Front loading, access port with lead shield, 2 points hinged

Painting : RAL 7003 autocryl

Construction material : Stainless Steel wetted parts Steel A360 + Lead

Closing : 2 grip latches : Buna shore 60° sealing ring

Weight : approx. 20 kg

**10.2. AIR COUPLINGS :**

Internal tubing :

- ▶ Type : Chiyoda touch tube TP-12
- ▶ Dimensions : ODØ 12 mm ; IDØ 8 mm
- ▶ Material : Polyurethane - black coloured
- ▶ Connections to the measuring vessel : Serto female connector 12-3/8
- ▶ Connection to the differential pressure switch : 3 x 1/2" Female-T - 1 x Reduction 1/2" M - 1/4" F
- ▶ **Connection to the sampling lines** : Neumo DN15 flanges
- ▶ with isolation ball valves SS316L 1/2" 1011T DIN2999

2.5. LEAD SHIELD :

Type : 96% Pb + 4% Sb

Solid angle : 4π ; Thickness : 5 cm

Construction : 6 rings incl. door and end

Weight : 120 kg (lead only)

Assembly : horizontal with mounting set :

1 set of large and 1 set of small supporting brackets

3 long and 3 short thread rods

1 fixation bracket around rear lead rings with small diameter

3. DETECTOR

3.1. DESIGNATION : BAI 9317 SPEZ.

Type : NaI (TI)-PMT integral line scintillator 51S51 / Ø2" x 1" with µ-metal shield

Diameter : 68 mm ; Length : 254 mm (without connectors)

Gamma sensitive detector

Detector housing : Aluminium

System efficiency at 7 mm : Ba-133 : 0.00575 % (With PB Collimator 20mm thick, & 1mm diam hole)

Detector resolution : Better than 8 % for 662 keV

Background : Window 1 : 0.10 cps - typical (measured in system lead shield 5 cm)

Window 2 : 0.20 cps - typical (measured in system lead shield 5 cm)

Measurement conditions : Temperature : 20°C

Pressure : 1013 mbar

Ambient : 0.1 µSv/h

Status signals for failure and alarm via software

3.2. TEMPERATURE STABILITY :

Measured in temperature range of +10°C to +40°C

Temperature drift in window (320 - 400) : -0.43% / °C - typical

Temperature drift in window (596 - 728) : -0.41% / °C - typical

Temperature drift in window (962 - 1232) : -0.20% / °C - typical

Temperature drift in window (1118 - 1386) : -0.67% / °C - typical

Typical value given by manufacturer for detector : -0.7% / °C for the range of 20°C to 40°C. A drift of -0.4 to -1% / °C is not exceptional.

The temperature drift is caused by the variation of amplification of the photomultiplier, meaning that the amplification drops by increasing temperature.

Drift calculated as :

$$\frac{\text{cps [10°C]} - \text{cps [40°C]}}{\text{cps [referencetemperare]} * [\Delta T]}$$

Temperature gradient : max. 5°C/h

3.3. DETECTOR INTERFACING :

A) version with LB 5310B electronics – 2 CHANNEL 2 ROI's system

High voltage LB 3892-42 (400 - 1400 V)

Preamplifier LB 3812-2

Dual energy discriminator LB 3818-2

High voltage control via LB 3971-2 DAC board

B) version with LB3405 Gracon electronics – 10 CHANNEL 10 ROI's system

High voltage LB 3892-2 (400 - 1400 V)

Spectroscopy Preamplifier LB3811

ADC LB3859-51 256 channels

3.4. COMPENSATION TECHNIQUES :

Noble gas rejection with two window compensation method (Kr/Ar)

Window 1 : 328 - 400 (10 % around 364)

Window 2 : 291 - 437 (20 % around 364)

With Netto cps = 2 x cps (window 1) - cps (window 2)

4. FLOW SAMPLING**4.1. PUMP UNIT :**

Type : Nitto VP 0940 : Axial Piston Pump
Nominal flow setpoint : 3 m³/h (230 V / 50 Hz) (At 150 mbar pumphead)
Maximum pumphead : 150 mbar (abs)
Weight : ± 4.5 kg
Thermal protection : Set at approx. 2A (Also on / off switch)
Consumption : approx. 1.3A
Maximum outlet temperature : 80°C at 80% vacuum
Operation hour counter : 0.01 to 99999.99 hrs
Indicators : Power on : Green / front panel
 Flow low : Amber / front panel - latched
 Fuse : 1 A slow (lamps)
Status signal for flow low (filter clogged or pump failure)

4.2. PRESSURE SENSOR PUMPHEAD :

Type : Dwyer 1823-80
Function : Filter clogged detection
Accuracy : ± 5% of setpoint - typical
Setpoint : appr. 100 mbar
Material : Membrane ; NBR base
Range : 2.5 mbar to 210 mbar
Hysteresis : 3 mbar
Enclosure : Aluminium
Output signals : NO ; NC
Connections : G 1/8

4.3. SYSTEM FLOW MEASUREMENT (OPTIONAL) :

Type : VF 563A Vortex flowmeter
Operate on the principle of vortex shedding
A small strut inside the flow tube creates Karman vortices and the vortex formation is sensed by means of an ultrasonic beam directed across the tube.
Construction : Anodised Aluminium
Flow range : 0.42 to 16 m³/h
Error : ±2% (full scale)
Repeatability : ±0.5% of reading
Output : 0 - 5Vdc
Operating pressure : 0.34 to 1.69 bar (abs.)
Operating temperature : -18 to 93°C
Dimensions : (203 x 98 x 88) mm
Line size : ½"

4.4. HEATER :

Type : in line heater Isopad IHH/105 with PT100 sensor 1m long (150W/m)
To stabilise the temperature in the iodine measuring vessel
Better retention efficiency of the charcoal and condensation will be avoided
Incoming air is heated to 40°C
Heat exchanger on the entrance side of the vessel, controlled by temperature sensing elements
Regulation : Hose heating Temp. controller Isopad TCON-TP-7010-0-100C
Range setting : 0-100°C
Temperature sensor : PT100
Consumption : 150W

5. ELECTRONICS

5.1. DATA PROCESSING ELECTRONICS :

Type : LB 5310B

Euro style modular design integrated into 3 HE rack (LB 3800-65)

5.1.1. Software

Designation module : LB 3987 Central processing unit

OS9 operating system ; 196 kByte static RAM (battery buffered)

CPU frequency : 10 MHz

Maximum eprom range : 384 kByte

Program structure : Parameter setup menu ; Running a measurement ; Activation of utilities

Power fail protection : Battery against parameter loss

Sampling time adjustable between 0.02 - 9999 minutes

5.1.2. Detector signal inputs

Number : 3 channels (A, B, C)

Type : Digital

Connection : BNC

Signal type : TTL

Max. frequency : 10^6 cps

5.1.3. Digital signal inputs

Designation : via LB 3986-3 Control II board

Function : status inputs

Number of inputs : 2

Signal type : CMOS / TTL compatible

Assignments :

 Pumping fail" (air sample flow through out of range)

 "Filter change necessary" (Differential pressure between in- and outlet of filter unit too high)

Indication : flashing "A" on display

Connection : 9-pin Cannon socket to relays or switches (External control)

Minimum input pulse width : 1 ms

RC input filter : $\tau = 100 \mu\text{s}$

5.1.4. Digital signal outputs

Designation : via LB 3985 Control I board

Function : status outputs

Number of outputs : 4 (CMOS /TTL) for control of external relays

Outputs for detector : Failure, pre-alarm, alarm, warning (Alarm for difference measurement)
 integral alarm, status for connected external inputs

Reset horn via "H" on keyboard

Type : Open collector

Connection : 7-pin tuchel socket

Maximum output load : 100 mA permanent load

Transistors conductive, if no error is apparent

5.1.5. Serial signal outputs

Designation : LB 3987 RS 232 board

Function : Printer

Port : Printer (back panel)

Type : RS 232

Transmission :

Baudrate : 4800 bps (Fixed)

Parity / Databits : 8N1

Handshaking : CTS

5.1.6. Keyboard / display

Function : visualisation of results, setup of system and user parameters files, parameter file selection

Both integrated in front panel

Function keys / Softkeys

ASCII keyboard

5.2. CABLES :

High voltage cable : HV-C – BNC-HV: Between detector and electronics rack ; Length : 2 m

Signal cable : BNC-BNC : Between detector and electronics rack ; Length : 2 m

Printer cable : LB75x : Between printer and electronics rack ; Length : 2 m

6. ENCLOSURE

19" cabinet to enclosure fore mentioned equipment

Designation : BAI 9852-9103-4

Type : Schroff Minirack 25HE

Dimensions : 600x553x1248 mm³ (DxWxH)

Total weight : appr. 200 kg (incl. electronics)

Painting RAL7030

Steel profile tube and steel plate of 2 mm

7. AMBIENT

Temperature : 0°C to +40°C

Humidity : 10% < RH ≤ 95% (non-condensing)

Protection degree : IP20

Not qualified for applications requiring shock / seismic / vibration certification (IEEE 304)

Noise level : 60dBA

Response raised gamma field : 0.5 cps per μSv/h Co-60 radiation in 328-400 window - typical
0.6 cps per μSv/h Cs-137 radiation in 328-400 window - typical

8. MAINS

Voltage : 230V +6% / -10% single phase / 50Hz

Stability / Brown out : conform to ECMA

Earth requirements :

Section : min. 4 mm²

Resistance : ≤2Ω

Upstream fusing : 16A

Power cord : section : min. 1.5 mm²

Consumption electronics : 0.13A (230V) - 2.1A (+5V) - 0.4A (+15V) - 0.2A (-15V) - Fuse : 1.6AT

9. STANDARDS

Radiological : IEC 60671-4

EMI : conform to IEC 801

CISPR 22 (1985)

VDE 0871 Class B

Safety : IEC 435 / IEC 950 instruments class I

HD 472 S1

EN 50160

10. OPTIONS**10.1. AIR COMPRESSOR FOR PNEUMATIC CHECK SOURCE SYSTEM :**

Designation : BAI 9461
 Standard motor : 230V / 50Hz
 Motor capacity : 0.018W ; 0.65A
 Consumption : 18W
 Weight : approx. 2 kg
 Pressure : 2 bar
 Maximum pumping speed : 12 l/min (Atmospheric pressure)
 Activated in test mode : all channels at the same time (local activation and remote control)
 Connection cable : BAI 9420 (To electronics)

10.2. CHECK SOURCE ACTUATOR :

Designation : BAI 9461-6
 Ba-133 activity : approx. 37 kBq
 Uncertainty : $\pm 5\%$
 Accuracy : $\pm 7\%$
 Installed in lead shielding

10.3. MASS FLOW CONTROLLER MFC (FOR PARTICULATE IODINES IN STACK MONITORS)

Flow regulated proportional to stack flow – isokinetic sampling
 Type : Hastings HFC 303
 Range : 0 – 120 lpm (0- 7 m³/h)
 Function : measure and regulate the flow proportional to the stack flow
 Accuracy : $\pm 1\%$ of FS
 Repeatability : $\pm 0.07\%$ of FS
 Temperature coefficient (zero) : $< 0.09\%/C^\circ$ of FS (0-60°C)
 Temperature coefficient (span) : $< 0.11\%/C^\circ$ of FS (0-60°C)
 Flow meter output : 4-20 mA
 Setting time : $< 2\text{sec}$ (10% to 100% FS)
 Aux. Supply : $\pm 15\text{V}$ 150 mA

10.4. ELECTRONICS LB9000

Multi- channel data acquisition system
 with spectroscopy capabilities

10.5. ALTERNATIVE MAINS :

110 V / 60 Hz / monophase

10.6. MARINELLI GEOMETRY DETECTOR :**10.6.1. Designation detector : BAI 9311**

Type : NaI (TI)-PMT integral line scintillator 38S51 / Ø1.5" x 2" with μ -metal shield
 Diameter : 68 mm ; Length : 273 mm (without connectors)
 Gamma sensitive detector
 Detector housing : Aluminium
 System efficiency : I-131 : 4% - typical (Figure measured at IRE Fleurus, Belgium)
 Window : 340 - 380 keV
 Detector resolution : Better than 8 % for 662 keV
 Measurement conditions : Temperature : 20°C
 Pressure : 1013 mbar
 Ambient : 0.1 $\mu\text{Sv/h}$
 Status signals for failure and alarm via software

10.6.2. Used hardware

Integrated in LB 5310B electronics

High voltage LB 3892-42 (400 - 1400 V)
Preamplifier LB 3812-2
Dual energy discriminator LB 3818-2
High voltage control via LB 3971-2 DAC board

10.7. MARINELLI BEAKER :
Material : Stainless steel / Volume : 170cc

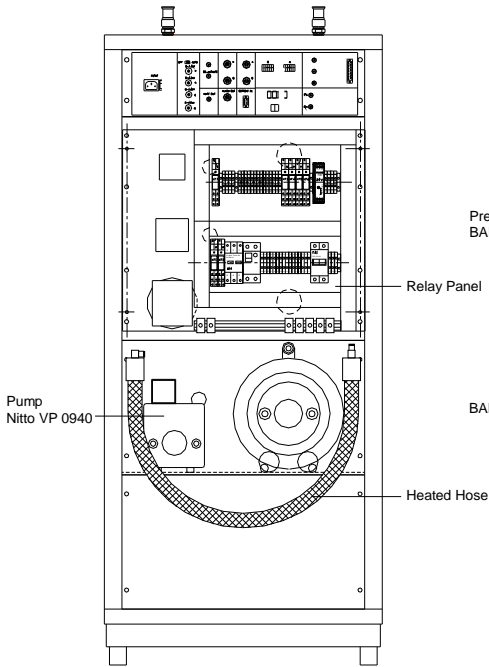
10.8. CALIBRATION SOURCE :
Type : Ba-133
Activity : approx. 5 kBq
Geometry : 2.25" x 1" cartridge
Uncertainty : 5%

11. REFERENCES

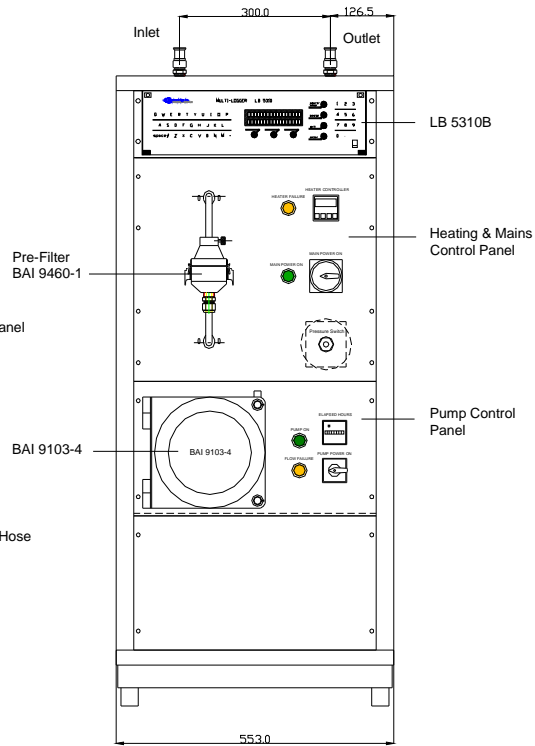
- ▶ Calibration report BAI 9103-2 Iodine monitor at ECN - Author : G.C.H. Groen
(Original : Dutch language)
- ▶ Error propagation - used formulas for calculation of detection limits ; Nr. : 9000-8102-000
- ▶ Detection limits iodine-131 measurement (Two windows 10 % ; 20 % : I-131) ;
Nr. : 9317-8101-000
- ▶ Detection limits iodine-131 measurement (Single window : 20 % : I-131) ; Nr. : 9317-8102-000

12 DIMENSIONS

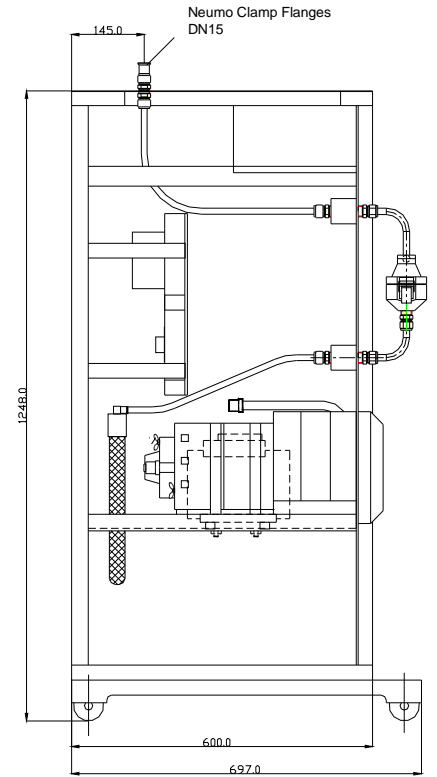
REAR VIEW
(without rear door)



FRONT VIEW



LHS VIEW
(without side panels)





LB 5340 Data Logger

Data Logger for measurement applications in radiation protection

Equipment concept

The Data Logger LB 5340 is a universal data acquisition system, which could be used for a variety of measuring applications in all scopes of radiation protection measurement techniques.

The 19"-rack design enables the usage in a desktop housing or as a rack mounted device. Both versions are characterized by a compact and visually attractive designed metal enclosure and equipped with a colored touch screen. For service purposes a mouse and/or keyboard can be connected.

Due to the modular design the Data Logger can be equipped, according to the application required, with different detectors, sensors and peripherals by means of modules. Up to 6 different modules can be used:

- ABPD-board for pseudo-coincidence measurements
- Detector DAQ-board
- Universal IO-board
- 8-fold current-output-board
- Relay-board with 5 relays with double changers
- Detector Power Supply module (4 Tuchel-connectors)

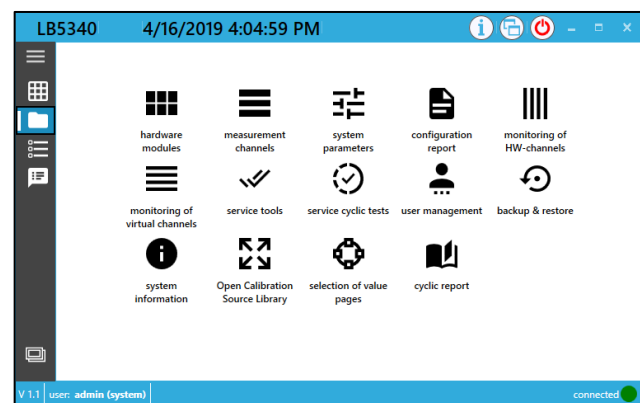
If necessary the modules can be used in a multiple way. Up to 10 slots are available so that you can configure a large-scale system.

All connections are located on the backplane and are easily accessible. One USB-connector is available on the front panel of the device.

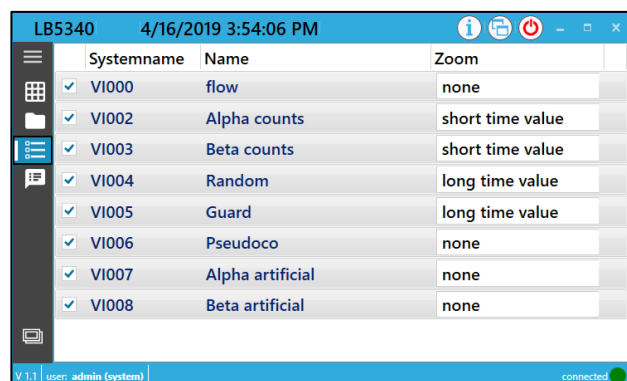
The system processes the module control, calculation of all measuring results, as well as balancing.



LB 5340 Data Logger



Configuration menu



Selection of the displayed virtual channels (example)

Software system

The LB 5340 features the latest state of the art technology and a technically mature software system that can be configured by the user. An attractive and user-friendly user guidance allows a smooth configuration of the parameters.

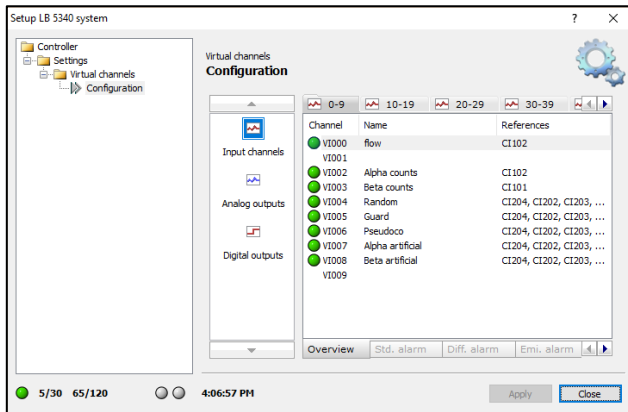
The configuration of the virtual channels is individually programmable for each channel via provided software assistants, for example parametrization of the channels or allocation of averaging algorithms (rate meter or moving average).

Besides the definition of radiometric channels the configuration of the digital in- and outputs as well as the relay outputs are possible.

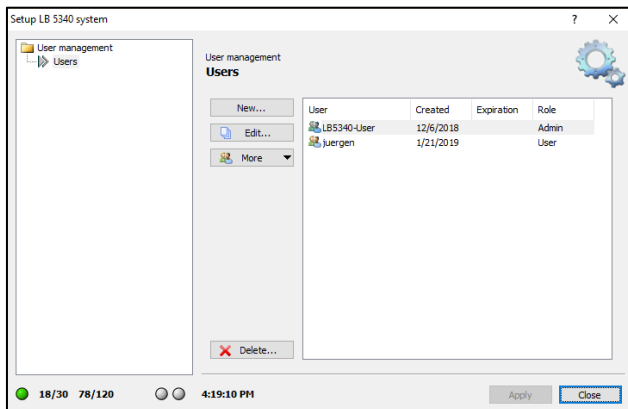
There are various service functions: Background measurement, determination of calibration factors, plateau measurement and determination of pseudo-coincidence factors.

The measured values and graphics are shown by means of different depictions in pre-defined screen pages. It is possible to make a pre-selection of the presented screens. Another possibility for presentation is the zoom-function, which allows an enlarged view of up to 4 measuring channels. This feature enhances the display readability at a greater distance from the data logger.

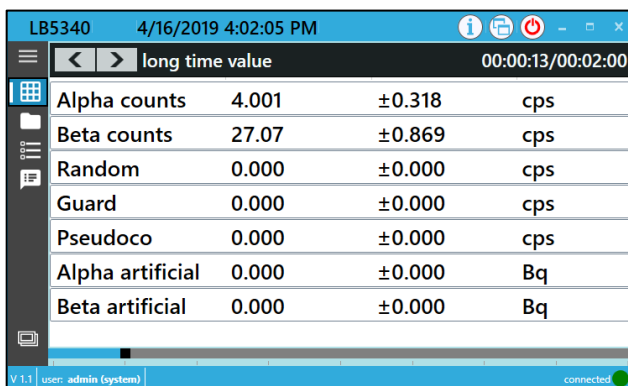
The application software features two password-protected access levels: The User account allows you to set up the system and measurement parameters, run measurements and carry out recurrent test functions. With the Administrator account you can, in addition, configure the complete system: execution of calibration functions, setup of measuring channels and definition of analogue and digital in- and outputs.



Configuration of measurement channels (example)



User Administration



Measured values with corresponding statistical uncertainty

Technical Data

LB 5340 Data Logger

Mechanical Data

Hardware:	19" rack, desktop housing or rack mounting device; passive backplane with 10 slots for plug in boards (modules); Communication between the modules via CAN-bus, On-Off switch and mains fuse
Processor board:	Mini-PC, 7" TFT-Monitor with touch screen CAN card: PC-104/PCI Windows® 10, keyboard with trackball
Interfaces:	Back panel: 3 x USB port, 1 x Ethernet, 2 x RS 232 Front panel: 1 x USB port
Mains supply:	110/230 VAC, max. 100 W, fuse: 3A,T

Ambient conditions

Operating temperature range:	0°C to 50°C
Relative humidity:	20% to 80%, non-condensing

Software

Watchdog function:	Integrated into the relay board firmware
Data communication:	F ² C Protocol via RS 232 or Ethernet
Data buffer:	10.000 measurement records per channel
Back up function:	Parameter up-/download for external back up, setup configuration report in rtf format

Hardware Module

Multi I/O module LB 39417-01:	4 counting inputs, 2 current inputs (0/4-20 mA), 2 current outputs (0/4-20 mA), 4 digital inputs, 4 control voltages for probe high voltage 0-5 V, 8 open-collector-outputs,
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	connection via phoenix terminal block (48 pin connector)
ABPD module LB 39415:	Pseudo-coincidence board with α, β, γ - counter BNC inputs for norm pulses, 2 independent HV-outputs (up to 4 kV)
ABPD module LB 39415-02:	Pseudo-coincidence board with α, β, γ - counter BNC inputs for norm pulses, 2 independent HV-outputs (up to 2.8 kV)
DAQ module LB 39414:	1 HV-supply unit up to 4 kV (12 Bit resolution), preamplifier for GM-, Proportional-Counters and Scintillation detectors, software controlled main amplifier (8 Bit), 2 x freely selectable Regions of Interest (ROI's), 1 integral discriminator, 2 HV-outputs (1 x direct and 1 x over voltage Tripler stage HVx3), 1 BNC counter input and 1 BNC counter output
DAQ module extension LB 39414-01:	2 more energy windows to the DAQ module using the same detector input, allows to set 4 ROI's on the spectrum
8-fold current output board:	8 independent current outputs (0/4-20 mA), linear or logarithmic scale selectable
Relay boards:	5 potential-free, freely programmable relay-outputs with double changer, embedded watchdog function
Low Voltage Board LB 39416:	4 x Tuchel connectors with 5 V and ± 15 V each

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Note:

This instrument is not intended to be used for diagnostic and/or therapeutic purposes for human beings and is not a medical device – according to the definitions of the European Council Directive 93/42/EEC concerning medical devices.