

## UPGRADED BETA SECONDARY STANDARD 2 (BSS-2)

*Upgrades available for all BSS-2 prior to 2018*



### APPLICATION / DESCRIPTION

The Beta Secondary Standard (BSS) was first developed 40 years ago by the German National Metrology Institute (PTB). In 1998, also developed by PTB, a completely redesigned Beta Secondary Standard 2 (BSS-2) was launched.

The BSS-2 is a complete irradiation facility including beta sources, mechanics, electronics, sensors for air pressure, temperature and humidity, an electronic control unit and computer to set and control all irradiation parameters.

The BSS-2 produces beta reference radiation fields for calibrating dosimeters and dose-rate meters using sealed beta sources of the radionuclides Pm-147, Kr-85 and Sr-90/Y-90.

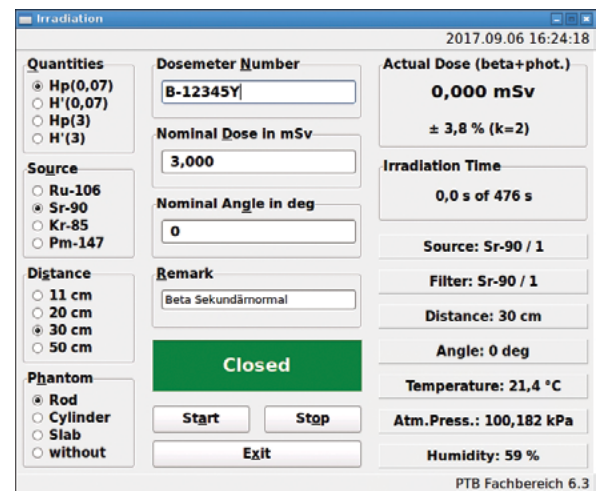
Calibrations of these sources are traceable to the PTB beta primary standard.

The BSS-2 meets the requirements of ISO Standards 6980-1, 6980-2 and 6980-3.

The 2018 upgraded version of the BSS-2 has the PC integrated in the electronic control unit and uses Linux software. All older BSS-2, shipped since 1998 with Windows based software and laptops can now be upgraded to the latest version of the PTB software, correction factors and calibration data.

## BSS-2 MAIN FEATURES

- All parameters computer controlled
- Beta dose pre-selectable, dosimeters can be positioned easily at the calibrated point in the radiation field
- Beta dose corrected for radioactive decay and ambient conditions
- High activity Pm-147, Kr-85 and Sr-90/Y-90 sources with nuclide specific beam flattening filters for homogeneous radiation fields
- Sr-90/Y-90 source is also calibrated without filter for source-detector distances of 11, 20, 30 and 50 cm
- Quantities  $H_p(0.07)$  and  $H'(0.07)$  for all source types and  $H_p(3)$  and  $H'(3)$  for Sr-90/Y-90
- Irradiation table rotates in 5-degree steps for measuring polar response
- Safe source handling – Each source is contained in an individual stainless-steel shield with built-in shutter, no special handling equipment needed.
- Rod and slab phantoms available
- For quality assurance purposes and to deliver the required dose to the dosimeter, the computer automatically records the following parameters:
  1. Radionuclide and source identification number
  2. Type of beam flattening filter
  3. Distance between source and dosimeter
  4. Angle of incidence of radiation
  5. Temperature, humidity and air pressure



Beta Secondary Standard 2 Comprising	Product Code
Basic irradiation facility including mechanics	NIGB6243
Electronic control unit with integrated PC and data storage, PTB software, calibration data and correction factors, 21"-monitor, keyboard with touchpad, data interface	NIGB21463
Digital barometer, mounted in the electronic control unit	NGB7579
Humidity and temperature sensor	NIGB7583
Rod Phantom including storage case	NIGB15800
Slab Phantom including storage case	NIGB21349
Case with accessories	NIGB7581
Radiation Source Set for BSS-2, PTB calibrated Pm-147source, PHRB4809, activity 3.7 GBq Kr-85 source, KARB4810, activity 3.7 GBq Sr-90 source, SIRB4568, activity 460 MBq Each source is calibrated by the PTB and is mounted in a stainless- steel adapter. The sources are supplied with nuclide specific beam flattening filters and a Type-A storage container	QCRB6245



Shielded source adapter



Irradiation stand with mounted beam flattening filter



Irradiation table

## RADIATION SOURCE PARAMETERS

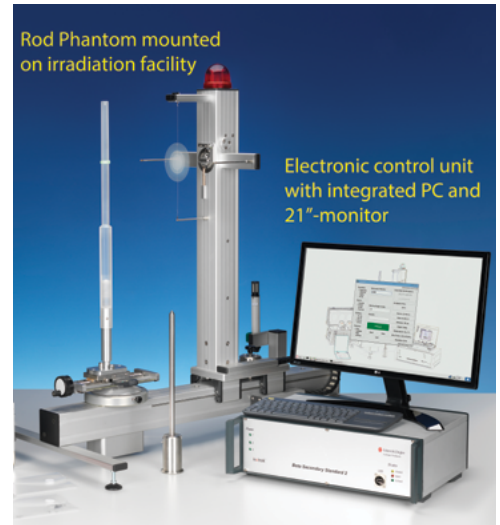
Parameter	Pm-147	Kr-85	Sr-90/Y-90
Half life $T_{1/2}$	2.623 years	10.75 years	28.80 years
Maximum energy $E_{max}$	0.224 MeV	0.687 MeV	2.28 MeV
Mean energy $E_{mean}$	0.07 MeV	0.25 MeV	0.8 MeV
Nominal activity	3.7 GBq	3.7 GBq	460 MBq
Source window in $mg/cm^2$	2.22 Titanium	11.3 Titanium	79 Stainless steel
Calibration distance	20 cm	30 cm	30 cm
Nominal value of the absorbed dose rate to tissue, $D_v$ , at 0.07 mm depth	6 $\mu Sv/s$ at 20 cm	150 $\mu Sv/s$ at 30 cm	360 $\mu Sv/s$ at 11 cm 100 $\mu Sv/s$ at 20 cm 45 $\mu Sv/s$ at 30 cm 18 $\mu Sv/s$ at 50 cm
Drawing/Capsule	VZ-1407-001	VZ-2832-002	VZ-2104-001
US NRC Model number	PHC.C1	KAC.D3	SIC.L8
ISO2919 Classification	ISO/12/C33222	ISO/12/C43332	ISO/12/C64444

## AVAILABLE UPGRADES PACKAGES

BSS-2 Upgrade 1	Package 1 includes:
NIGB21463	Electronic control unit including integrated PC and data storage, 21" monitor, keyboard with touchpad, PTB software and correction factors and data interface
NIGB7579	Beta Secondary Standard Digital Barometer mounted into the control unit
NIGB15800	Beta Secondary Standard Rod Phantom including storage case
NIGB21349	Beta Secondary Standard Slab Phantom including storage case



<b>BSS-2 Upgrade 2</b>	<b>Package 2 includes:</b>
NIGB21463	Electronic control unit including integrated PC and data storage, 21" monitor, keyboard with touchpad, PTB software and correction factors and data interface
NIGB7579	Beta Secondary Standard Digital Barometer mounted into the control unit
NIGB15800	Beta Secondary Standard Rod Phantom including storage case



<b>BSS-2 Upgrade 3</b>	<b>Package 3 includes:</b>
NIGB21463	Electronic control unit including integrated PC and data storage, 21" monitor, keyboard with touchpad, PTB software and correction factors and data interface
NIGB7579	Beta Secondary Standard Digital Barometer mounted into the control unit
NIGB21349	Beta Secondary Standard Slab Phantom including storage case



<b>BSS-2 Upgrade 4</b>	<b>Package 4 includes:</b>
NIGB21463	Electronic control unit including integrated PC and data storage, 21" monitor, keyboard with touchpad, PTB software and correction factors and data interface
NIGB7579	Beta Secondary Standard Digital Barometer mounted into the control unit

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