

Box Calibrator Series

Overview

The BX1 and BX3 Box Calibrators are the best available and easiest to use self-contained irradiators on the market. They produce a gamma radiation beam inside a fully shielded enclosure. The irradiator consists of a shielded exposure chamber, one or two sources, source shielding, instrument positioning system, a safety interlock system, and a control system.

The box calibrators can be supplied with one or two Cs-137 sources from 10 mCi to 2200 Ci.

A stainless steel and tungsten rod holds the sources in the irradiator. Tungsten used above and below the sources, limits radiation along the axis of the source rod. When two sources are used, an additional section of tungsten separates the sources to minimize cross talk. In the shielded position, the source is shielded on all sides with lead and tungsten.

The single source irradiators use a single actuating pneumatic cylinder to move the source to the storage position when safe and move the source to the centerline of the collimator port when exposed. The dual source irradiators use a two-stage pneumatic cylinder. The first stage moves the lower activity source to the expose position, and the first and second stages move the higher activity source to the expose position. Fully manual systems use a mechanical rod to move the source, rather than the pneumatic cylinder.

Advantages

- Fully self-contained exposure chamber, no additional shielding is required.
- Easy to use and has intuitive operator interface.
- Wide range of exposure rates available with source options and attenuators.
- Large viewing window allows inspection of almost all instruments.
- Includes ports for testing extendable pole detectors.
- High throughput operations.

Shielding

The irradiator consists of two shields, one for storing the radiation sources, and the second for housing the exposure chamber. Both the BX1 and BX3 have exposure chambers that are approximately 16" deep x 31" long x 24" tall. The BX3 has more shielding around the exposure chamber and can operate with larger sources. Radiation levels are less than 5 mR/h at 12 inches from the surface of the irradiator in all normal operating conditions.

On the front of the shield are side ports for extendable probes and a 17" x17" hinged door to access the chamber. A safety interlock secures the door during exposures.

Viewing Window

A large leaded glass window in the top of the shield allows the instrument to be read during exposures. The 12" x 18" window offers full view of the instrument and positioning system so the instrument can be read over the complete range of calibrations.

Attenuators

For the BX3 model, a set of four lead attenuators with attenuation factors of approximately 2, 4, 10, and 100 provide 16 exposure ranges from no attenuation to 8000x. The BX1 model uses three tungsten attenuators with factors of approximately 4, 15, and 30 provide 8 exposure ranges from no attenuation to 1800x.

Positioning System

A linear positioning system is used to place the instrument over a range of 10 to 90 cm. The accuracy of the placement is better than 1 mm and repeatable to better than 0.2 mm. The vertical axis provides more than 20 cm of travel to allow for instrument height adjustment for almost all portable radiation detectors. The 20 cm x 20 cm platform has grid lines and dowel pins for accurate positioning of the jigs and instruments.



Model BX3 Box Calibrators

Standard Models			
Model	Overall Dimensions	Weight	Max Activities
BX1-x	55w x 75h x 35d inches	4000 lbs	50 Ci Cs-137
BX3-x	70w x 80h x 38d inches	9000 lbs	2600 Ci Cs-137

Safety Interlock System

The exposure chamber door is designed with a door interlock. When the door is open, power to the source solenoid is broken, preventing source exposure. When an exposure is in progress, the door is locked and cannot be opened. Indicator lights mounted to the outside of the cabinet show source position and status.

Control Panel Options (-M, -E, -A)

Box calibrator control is available in three versions: manual, electronic, and computer based control. The manual control panel (M) includes a keyed power switch, an expose lever, and a timer. Source position and attenuator selection is performed by moving mechanical levers. Position adjustment is performed by turning a positioning crank for the X and Z axis. When the source is moved to the expose position a timer starts and provides elapsed time until the source is returned. The electronic controller (E) will move the source and attenuators through switches that control the valves and air cylinders.



Model BX1 Box Calibrator

Positioning is done with jog switches. The computer control system (A) offers complete control of the irradiator; including exposure rate calculation, one button set up of irradiator, control of positioning track, and automated irradiator calibration.

Radioactive Sources

- All sources are doubly encapsulated, hermetically sealed, special form sources.
- Up to 2200 Ci of Cs-137

Accessories

Jigs and fixtures are available for a variety of detectors and telepoles.