BC-75 - Beam Collector Faraday Cup

Features

- Direct measurement of high energy proton beam current
- Proton energies from 30 to 250 MeV
- Typical accuracy better than 2%
- Minimal dependence on beam energy
- Compact, fully-screened design
- Operates in air - no vacuum system or HV bias required
- 75 mm diameter
- Compatible with FX4, F460, IC101, IX256 and other readout electronics
- Based on a proven concept from Bernard Gottschalk developed and used at Harvard Cyclotron Labora-

Applications	• Particle therapy pencil beam quality assurance • Accelerator development • Particle therapy system commissioning • General high energy proton beam diagnostics

Specifications

Beam compatibility	
Species	Protons
Energy range	30 MeV to 250 MeV
Beam power handling	Up to 75 W continuous, up to 1 kW for 5 sec with 100 sec cool-down. Note: high beam intensities will result in high radioactive activation of the device.

Sensor	
Construction	Pure OFHC copper cylinder 100 mm long and 75 mm diameter with dielectric coating and electrostatic screen.
Sensitive area	69.5 mm nominal diameter, suitable for protons beams with Gaussian lateral distribution sigma up to 10 mm.
Materials in beam path	Stainless steel window, epoxy film, Aluminium film, polyimide film, OFHC copper. All beam in the specification energy range stops in the copper.

Specifications

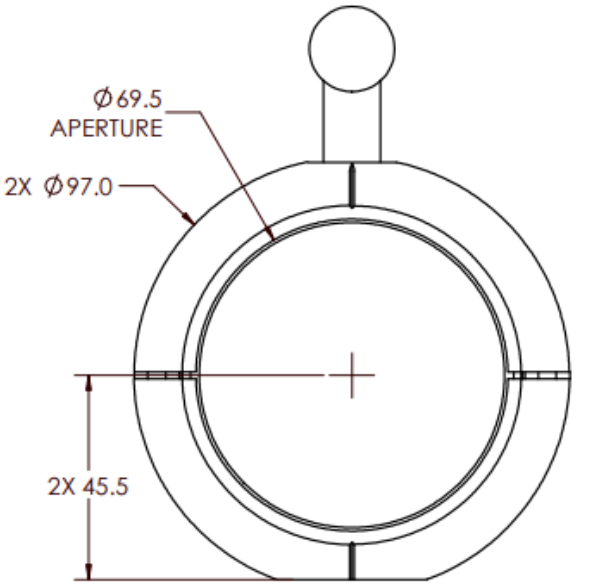
Leakage current	< 8 pA Offsets can be compensated by active background subtraction.
Accuracy	The BC-75 provides a direct measurement of beam current that is independent of beam energy to a good approximation in the specified energy range. The BC design has been measured experimentally against a reference vacuum Faraday collector developed at the Harvard Cyclotron Laboratory and Massachusetts General Hospital. The deficit in measured current relative to the reference Faraday is less than 1.5% at 100 MeV and less than 0.75% at 160 MeV. **Note:** All critical dosimetry measurements must be referenced to traceable external standards, and regularly validated.

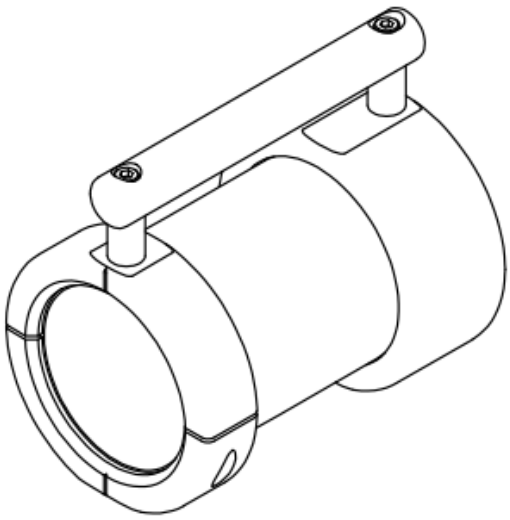
Mechanical	
Length	149 mm (excluding mating signal cable)
Overall size	149 mm by 128 mm by 97 mm approx including handle (see figures)
Weight	4.8 kg (10.6 lb)
Operating environment	Clean and dust-free, 0 to 35 C (15 to 25 C recommended , < 70% humidity, non-condensing, vibration < 0.05g all axes (1 to 50 Hz) Signal output cable must not flex or vibrate.
Shipping and storage environment	-10 to 50 C, < 80% humidity, non-condensing, vibration < 2g all axes, 1 to 100 Hz

Connectors	
Signal readout	BNC jack (female). The connector must be shorted if the BC-75 is not connected to an electrometer to prevent charge buildup. A terminator plug is included for this purpose.

Readout	
Compatible electronics	FX4, F460, IC101, IX256 by direct connection of BNC coax cable. CH0 input of I128 via cable adaptor. IBA DoseX via BNC-TRIAX adapter (recommended adapter: Pomona Electronics 5299)
Cable	LMR-240-UF BNC male to BNC male coax cable recommended.
User Interface	With FX4, IX256: Embedded web server. Accessible from any web browser software running on any platform. With F460, IC101, I128: PTC Diagnostic software provided. With IBA DoseX: Touchscreen or web interface can be used.

Beam entry end



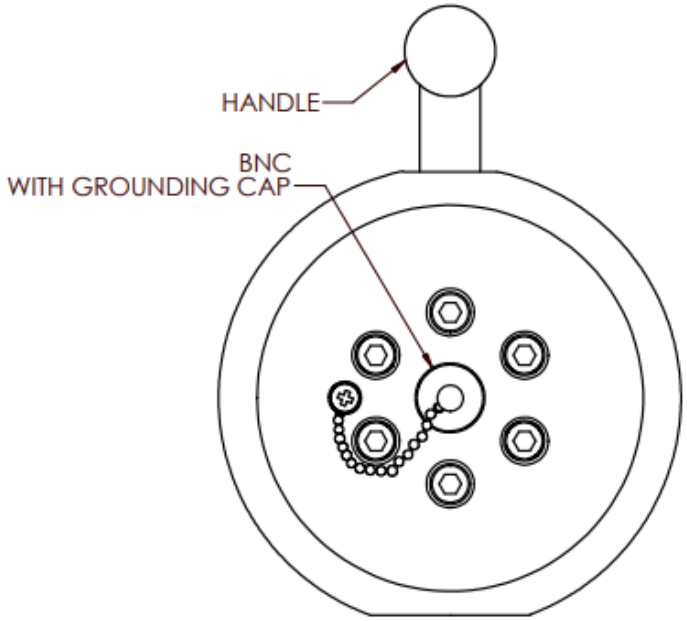


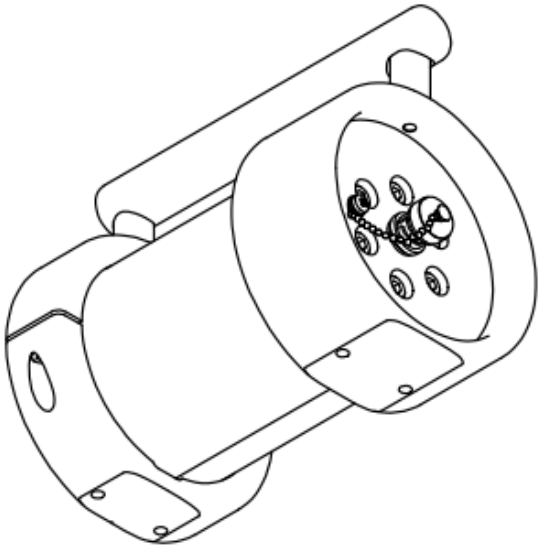
Dims mm

CAUTION: The performance of the device relies on the integrity of the coating layers. Handle with due care and keep sharp implements clear. Return to protective case when not in use.

CAUTION: The BC-75 will become activated due to exposure to high energy proton beams. This does not affect performance, and will decay over time, but the device must be radiation surveyed by an authorized person and suitably packaged before moving it out of a controlled area.
After exposure to an intense beam, a 30 minute radiation cool-down followed by radiation survey is recom-

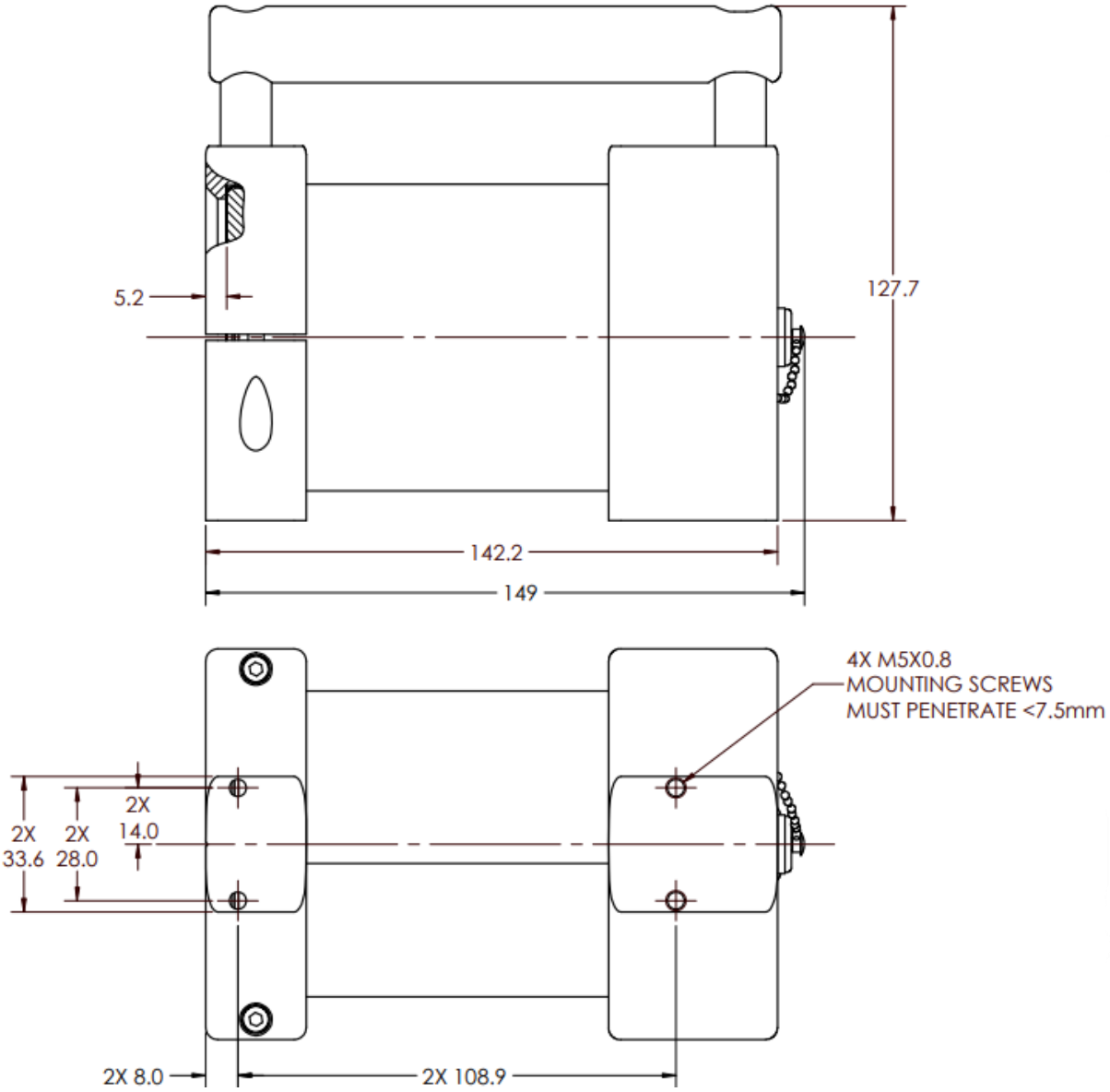
Signal connection end





Ordering information

BC-75	In-air Faraday collector beam stop.
FX4	Electrometer, 4-channel.
CAB-BNC-COLN-10-BNC	Low-noise LMR-240-UF coaxial cable, 3m


5.2
127.7
142.2
149
4X M5X0.8
MOUNTING SCREWS
MUST PENETRATE <7.5mm
2X
14.0
2X
33.6
2X
28.0
2X 8.0
2X 108.9

Dims mm

DATASHEET

BC-75

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