

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 IC101, I200, F460 and other readout electronics
- Based on a proven concept from Bernard Gottschalk developed and used at Harvard Cyclotron Laboratory



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	70.5 mm nominal diameter, suitable for protons beams with Gaussian lateral distribution sigma up to 10 mm.
Materials in beam path	Epoxy film, conductive epoxy film, polyimide film, OFHC copper. All beam in the specification energy range stops in the copper.



Specifications (continued)

Leakage current	< 5 pA after stabilisation. < 3 pA typical. 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	143 mm (excluding mating signal cable)
Overall size	143 mm by 127 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

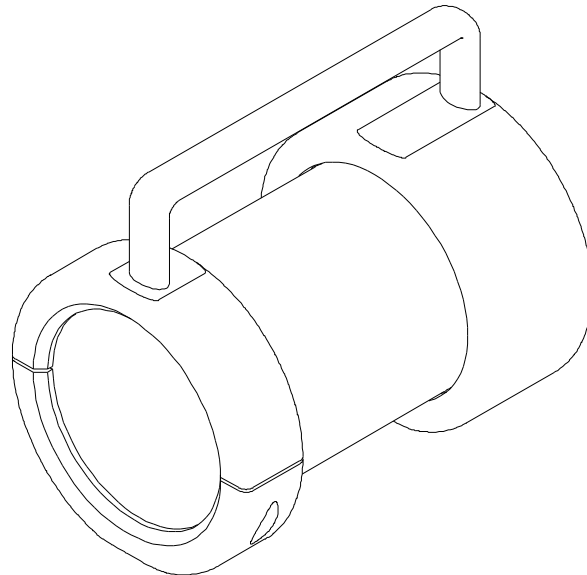
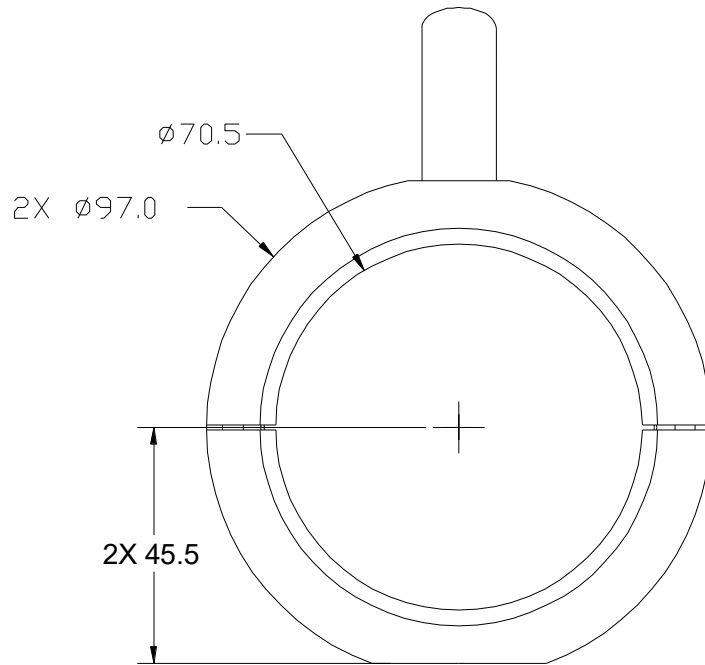
Signal readout	BNC jack. The connector must be shorted if the BC-75 is not connected to an electrometer to prevent charge buildup. A terminator plug is included for this purpose.
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Readout

Compatible electronics	IC101, I200, I404, F460 by direct connection of BNC-terminated coax cable. F100, ch0 inputs of I128 or I6400 via cable adaptor.
Cable	Low-noise RG-58 coax cable recommended.
Software	PTC Diagnostic software provided with electronics units. PTC Imaging Telescope software supports IC101 readout of a BC-75 as part of the imaging telescope isocenter diagnostic system.



Beam entry end



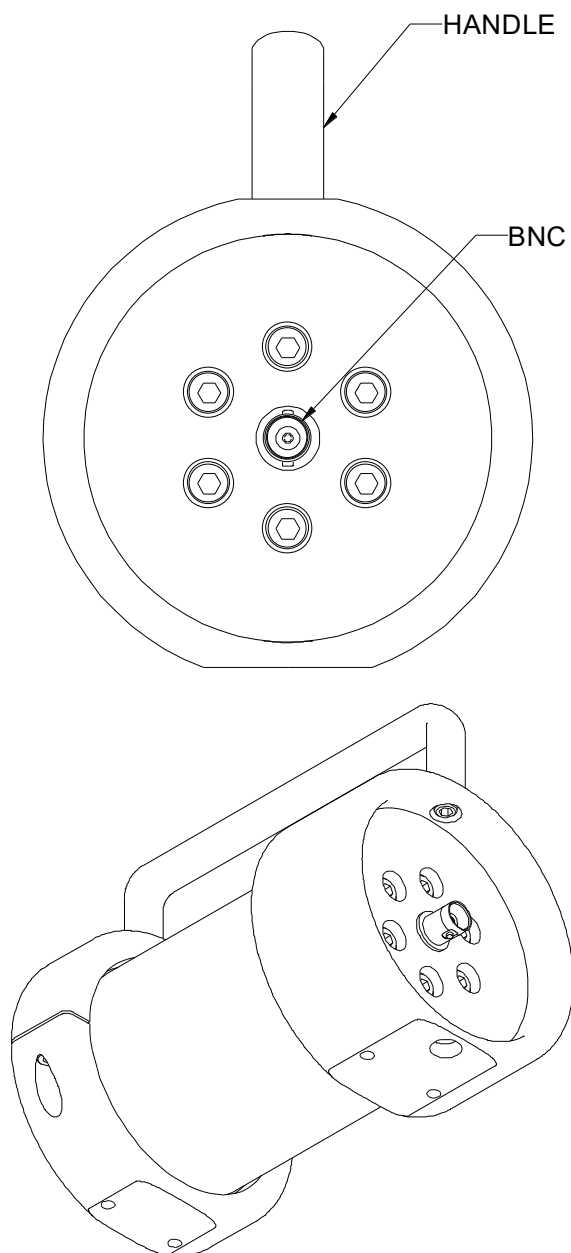
Dims mm

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 recommended before handling. Do not handle more than necessary until cool down.



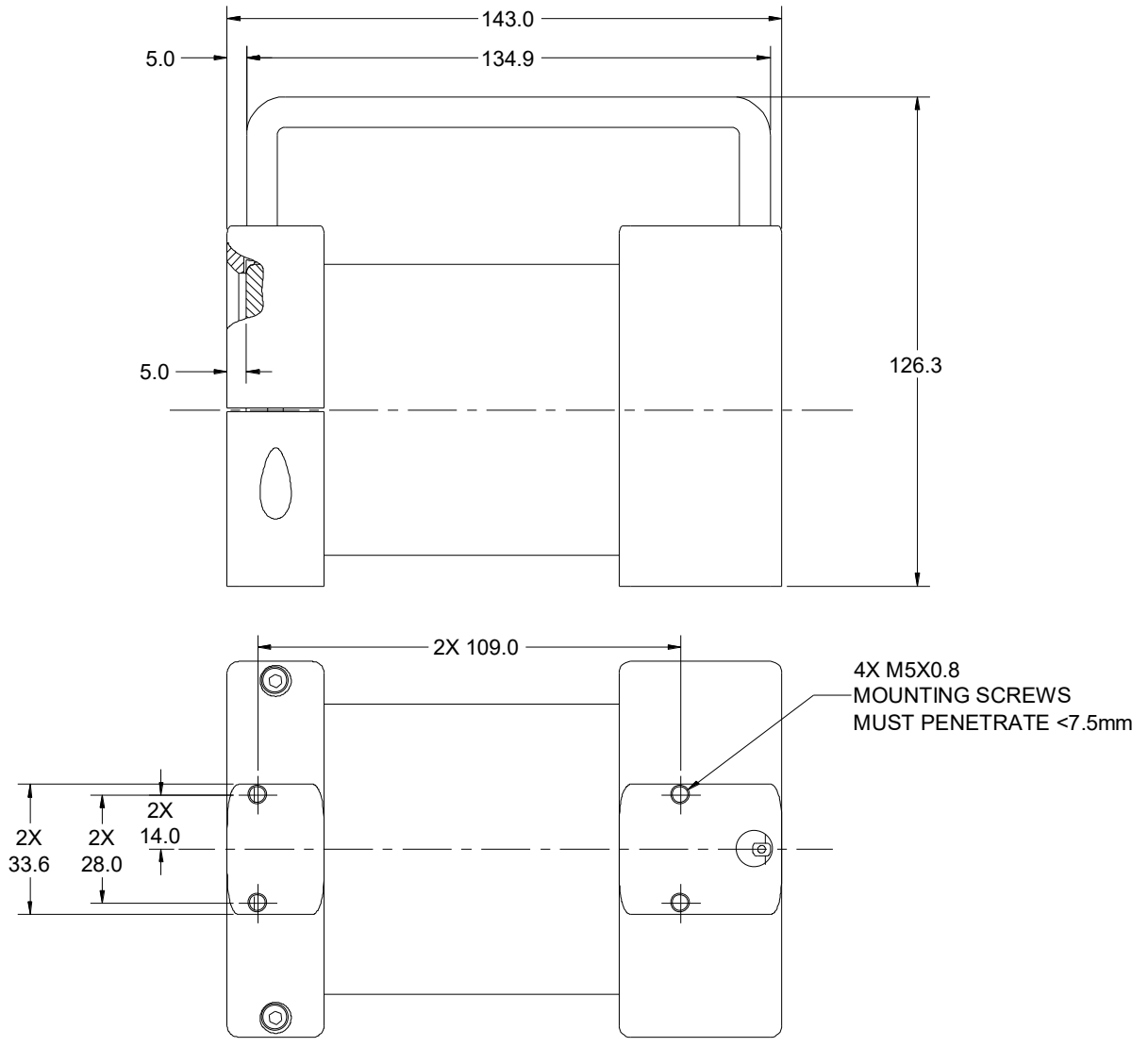
Signal connection end



Ordering information

BC-75	In-air Faraday collector beam stop.
IC101	Electrometer, single channel.
CAB-BNC-COLN-10-BNC	Low-noise RG-58 cable, 10'





Dims mm

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