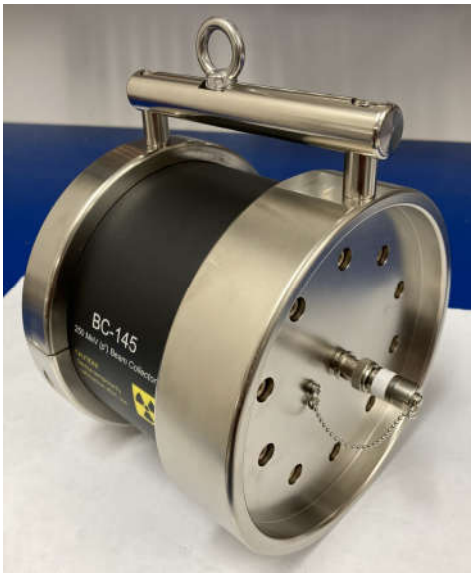
Datasheet **BC-145**

Large Area Proton Beam Collector

Features

- Direct measurement of high energy proton beam current
- Proton energies from 30 to 250 MeV
- Typical absolute accuracy better than 2-3% before calibration
- Low dependence on beam energy
- Large sensitive aperture
- Operates in air - no vacuum system or HV bias required
- 145 mm diameter
- Compatible with IC101, I2 ,F460 and other readout electronics
- Based on a proven concept from Bernard Gottschalk originally developed and used at Harvard Cyclotron Laboratory



Applications	• Proton therapy pencil beam quality assurance • Accelerator development • Proton therapy system commissioning • Flash therapy research including scattered and scanned beams

Specifications

Beam compatibility	
Species	Protons
Energy range	30 MeV to 250 MeV
Beam power handling	Up to 1 kW average for up to 2 minutes, with 5 minute thermal cool-down Up to 2 kW average for up to 1 minute with 5 minute thermal cool-down.
Sensor	
Construction	Pure OFHC copper cylinder 100 mm long and 145 mm diameter with dielectric coating and electrostatic screen.
Sensitive area	139.5 mm nominal diameter, suitable for protons beams including scattered and scanned beams within the sensitive area.
Materials in beam path	Epoxy film, conductive epoxy film, metalized polyimide film, OFHC copper. All beam in the specification energy range stops in the copper.

Specifications (continued)

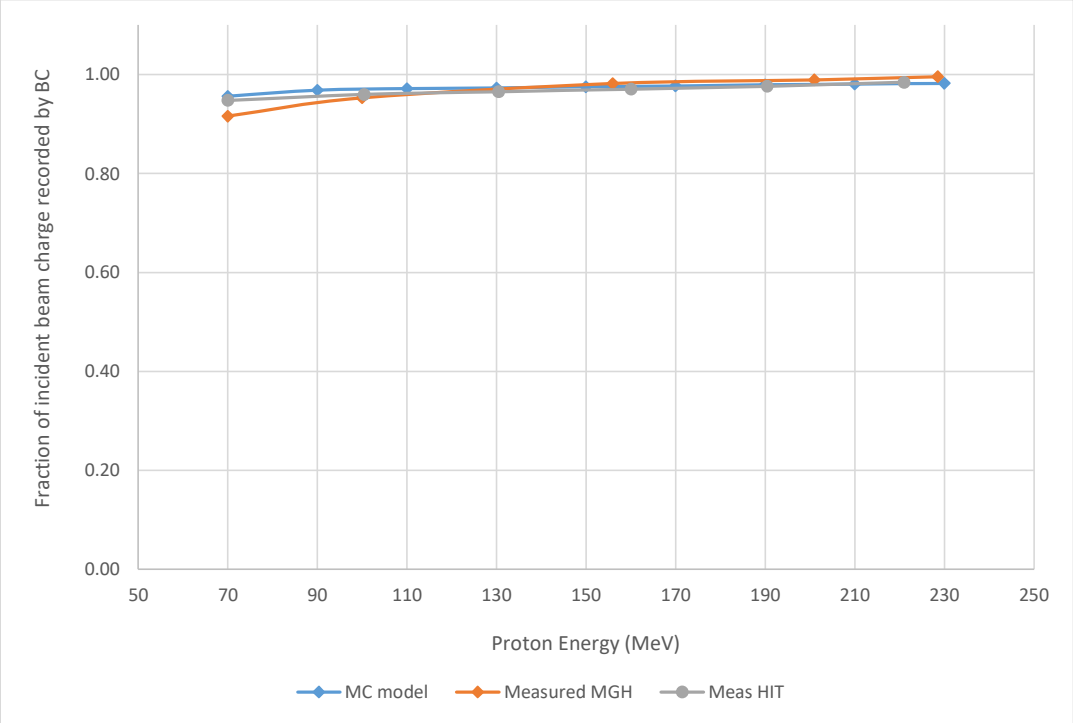
Leakage current	< 5 pA after stabilisation. < 3 pA typical (using IC101 electrometer) Offsets can be compensated by active background subtraction.
Accuracy	The BC-145 provides a direct measurement of beam current that is independent of beam energy to a good approximation in the specified energy range. 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.

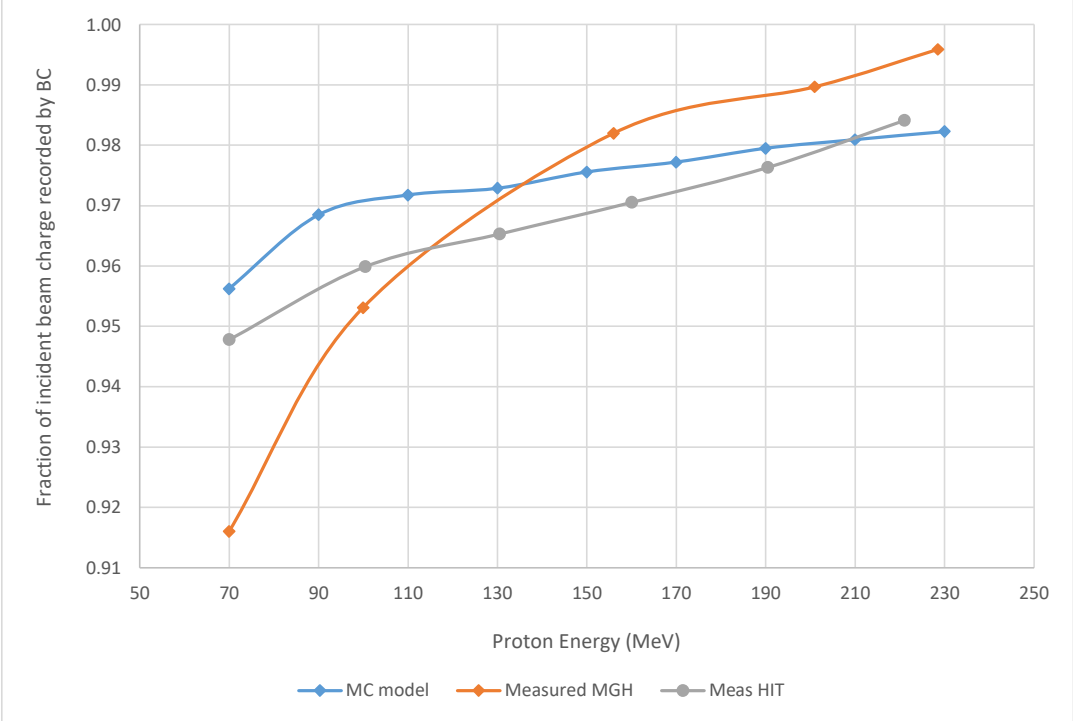
Mechanical	
Stopping material depth	100 mm
Overall size	143 mm by 230 mm by 163 mm approx including handle (see figures)
Weight	16.4 kg (36.0 lb) .
Operating environment	Clean and dust-free, 0 to 35 C (15 to 25 C recommended , < 70% humidity, non-condensing, vibration < 0.05g all axes (1 to 50 Hz) Signal 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-145 is not connected to an electrometer to prevent charge buildup. A terminator plug is included for this purpose.

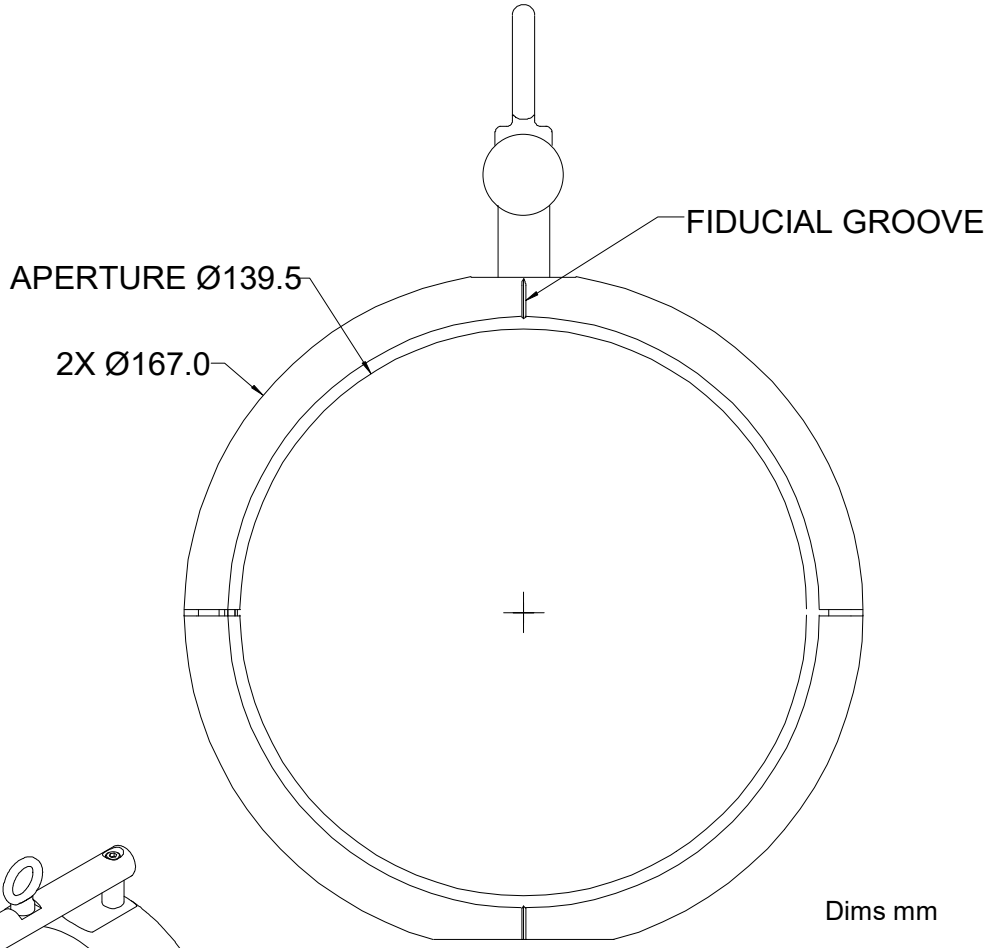
Readout	
Compatible electronics	IC101, I2, I404, F460 by direct connection of BNC-terminated coax cable. F100, ch0 (hcc) inputs of I128 or I6400 via cable adaptor. Standard medical electrometers also compatible with suitable cable adaptation and with signal input bias disabled.
Load	Resistance to ground > 10 GΩ Capacitance < 10 nF, 6 -7 nF typical
Cable	Low-noise RG-58 coax cable recommended.
Software	PTC Diagnostic software provided with Pyramid electronics units.

Nominal energy response curve (before calibration)





Beam entry



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-145 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.

CAUTION: The BC-145 will rise in temperature after prolonged exposure to high power beams. Check before handling.

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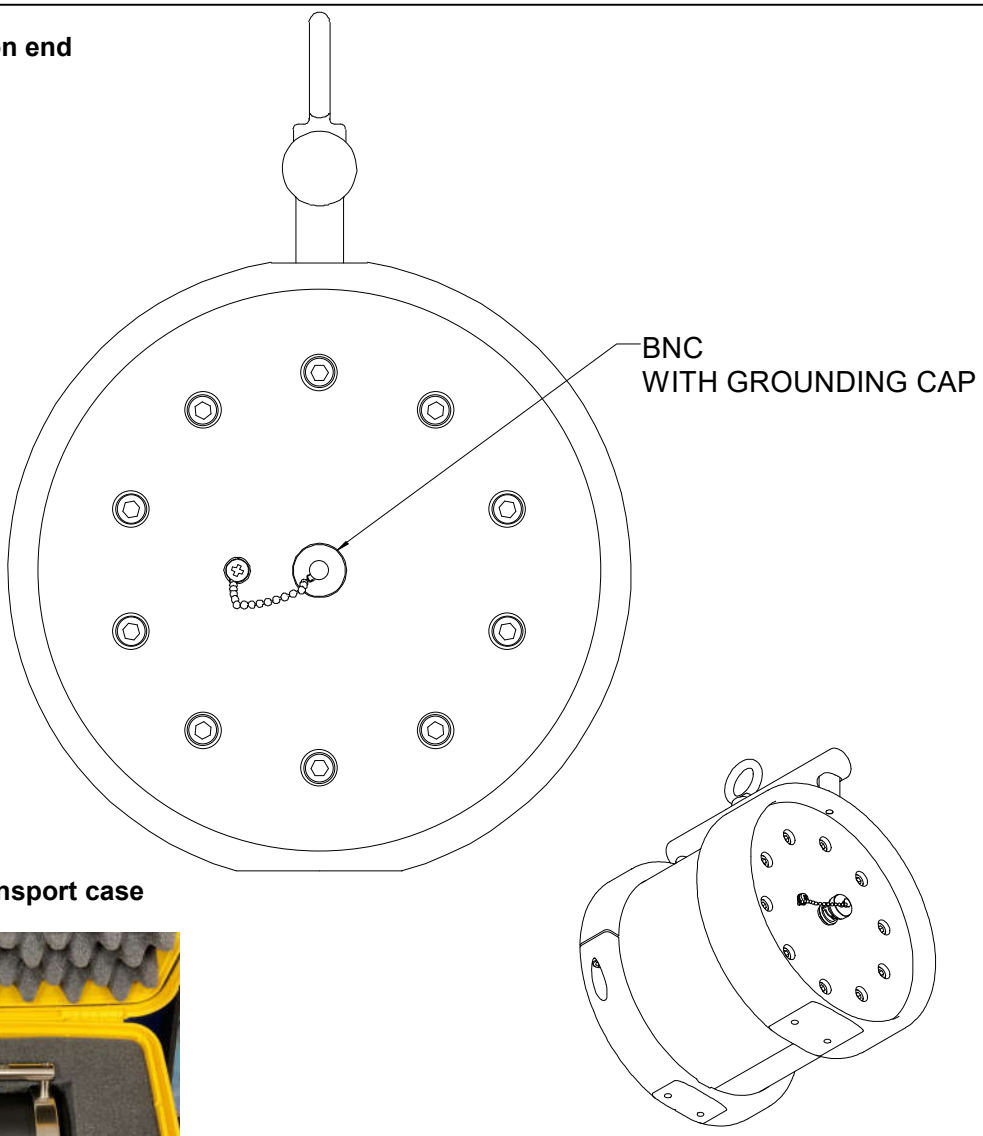
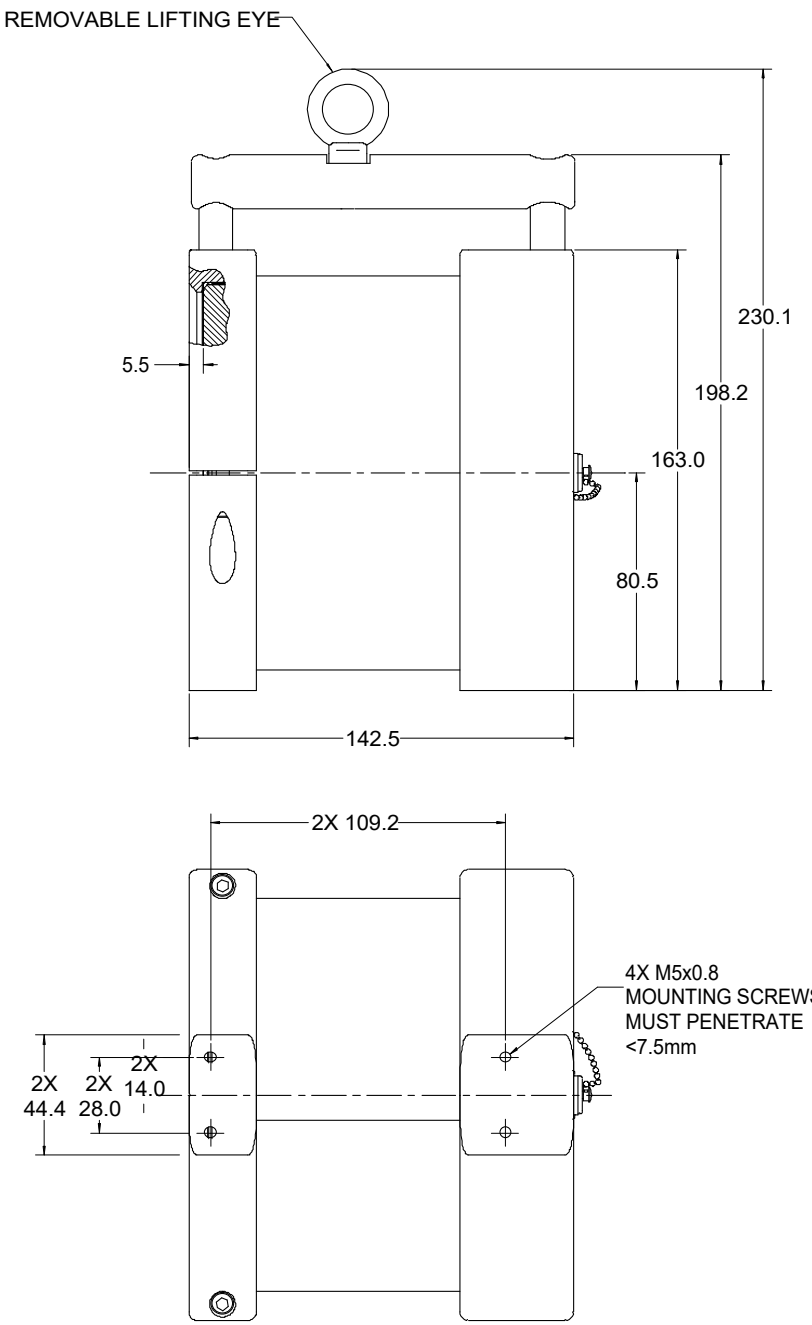
Signal connection end



Storage and transport case

Ordering information

BC-145	In-air beam collector, large area, protons up to 250 MeV. Supplied in transport and storage case.
IC101	Electrometer, single channel.
CAB-BNC-COLN-20-BNC	Low-noise RG-58 cable, 20’ (6.1 m)
BC145-SYS-10	BC-145 system with BC-145, IC101 electrometer, cable, storage case.



Dims mm

Pyramid Technical Consultants, Inc.,
135 Beaver Street Suite 102
Waltham MA 02421 USA
Tel: +1 781 402 1700 (USA),
+44 1273 492002 (UK)

Email: support@ptcusa.com **www.ptcusa.com**

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