

ELECTRODE LEADS

LEAD108 SERIES — MR CONDITIONAL/RADIOTRANSLUCENT LEADS FOR EL508/EL509



Use the LEAD108 Series with EL508 MR Conditional, radiotranslucent electrodes and EL509 disposable radiotranslucent dry electrodes.

All LEAD108 Series terminate in 1.5 mm female Touchproof sockets.

MRI Lead Guidelines

For MRI use, shorter leads are better...specifically, keeping lead lengths much shorter than the wavelength of the Larmor frequency (42.6 MHz/T) is critical. For a 3T machine, this is the speed of light divided by (42.6*3*1E6) or 2.34 meters. As field strengths increase, then lead lengths should continue to shorten. To record ECG, or any other biopotential signal, in MRI, short leads such as LEAD108B (15 cm) and LEAD108C (30 cm) are recommended; do not use 2-meter or 1-meter leads for biopotential signals in MRI.

- *Recommended reading:* Thoralf Niendorf, Lukas Winter and Tobias Frauenrath (2012). [Electrocardiogram in an MRI Environment: Clinical Needs, Practical Considerations, Safety Implications, Technical Solutions and Future Directions](#), Advances in Electrocardiograms - Methods and Analysis, PhD. Richard Millis (Ed.), ISBN: 978-953-307-923-3, InTech, DOI: 10.5772/24340.

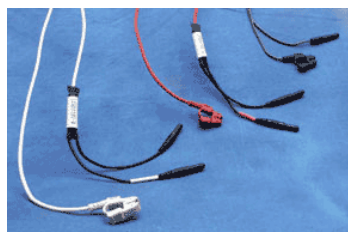
See [BIOPAC MRI Guidelines](#) for additional details.

- MRI Usage:** MR Conditional to 9T
- Condition:** Up to 9T, any scanning sequence, use with EL508 or EL509 MRI/RT electrodes only.
- Lead108 Components:** Polyvinyl chloride (PVC) plastic, carbon fiber leadwire, tinned copper connectors (1.5 mm female Touchproof socket), electrode clip (carbon filled ABS plastic)

SPECIFICATIONS

- Construction:** Carbon fiber leadwire and electrode snap
- Leadwire Diameter:** 1.5 mm
- Leadwire Resistance:** 156 Ohms/meter
- Leadwire Length:** **LEAD108B** 15 cm, **LEAD108C** 30 cm

LEAD110 SERIES — ELECTRODE LEADS

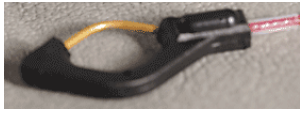


The LEAD110 Series, for use with disposable and other snap connector electrodes, are pinch leads for easy connection between the EL500-series snap electrodes and any BIOPAC biopotential amplifier or the GND terminal on the back of the UIM100C. Leads are 1.9 mm in diameter and terminate in standard 1.5 mm Touchproof connector and connect to BIOPAC modules or to a Modular Extension Cable (MEC series).

LEAD	TYPE	LENGTH	USAGE NOTE
LEAD110	Unshielded	1 m	Works best as a ground electrode
LEAD110A	Unshielded	3 m	Works best with ground or reference electrodes
LEAD110S-R	Shielded; red	1 m	Use with recording electrodes for minimal noise interference. White lead plug is for electrode contact; black lead pin plug is for lead shield.
LEAD110S-W	Shielded; white	1 m	Use with recording electrodes for minimal noise interference. White lead plug is for electrode contact; black lead pin plug is for lead shield.

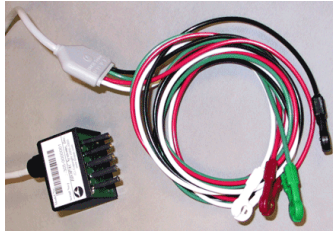
See also: TSD155C Multi-lead ECG Cable
 WT100C Wilson Terminal (virtual reference)

LEAD120 LEAD FOR EL120



This 1-meter lead with 1.5 mm Touchproof connector works exclusively with the reusable EL120 electrode. Snap the electrode into place and then plug the lead in with the Touchproof connector. White—LEAD120-W Red—LEAD120-R

LEAD130 SHIELDED LEAD ASSEMBLY



LEAD130 Shielded Lead Assembly is for use with the EBI100C Electrical Bioimpedance Module or the NICO100C Noninvasive Cardiac Output Module. The shielded lead assembly terminates with an adapter that plugs into the front of the amplifier module and includes four leads:

White = I+ **Red** = Vin+ **Green** = Vin- **Black** = I- (GND)

Important Usage Notes:

- If using multiple biopotential modules, do not connect the ground (GND) for the other modules — establish one ground per subject.
- If using an EDA100C (or older GSR100C) Electrodermal Response Amplifier with the EBI100C or the NICO100C, please note that the black I- (GND) connection will shunt current from the EDA/GSR100C excitation source. Accordingly, EDA/GSR100C measurement values will be shifted somewhat higher in absolute conductance, and should be used for relative measures only.

See also: EBI100C Electrical Bioimpedance Module
 NICO100C Noninvasive Cardiac Output Module
 EL506 Bioimpedance Strip Electrode and EL500 Series Disposable Electrodes
[Application Note 215](#) - Noninvasive Cardiac Output - NICO100C and LEAD130.

LEAD140 SERIES CLIP LEADS



LEAD140 Series clip leads have a 1 m black cable and a 1.5 mm Touchproof connector, and require the SS1LA interface.

- LEAD140 Alligator clip with teeth, 40 mm: Use this fully-insulated, unshielded lead to connect fine wire electrodes, including irregular surfaces. There is ferrous metal in the clip.
- LEAD141 Alligator clip with smooth (flat) clamp, 40 mm: Use this fully-insulated, unshielded lead to connect to fine wire electrodes without damage, including arbitrarily small electrode wires. There is ferrous metal in the clip.
- LEAD142 Retractable clip lead with copper extension contacts, 3.5 mm: Use this unshielded lead to connect to fine wire electrodes up to 1 mm diameter. There is non-ferrous copper alloy in the clip.

MRI Usage: **MR Conditional**
Condition: Tested 3T-9T (LEAD142 only)