

**EGG100C – ELECTROGASTROGRAM AMPLIFIER MODULE**

ZERO

**EGG100C**

GAIN

500  
1000  
2000  
5000

0.1Hz LP  
1.0Hz

0.05Hz HP  
DC

0.005Hz HP  
DC


SHIELD

VIN+

GND

VIN-

SHIELD



The EGG100C amplifies the electrical signal resulting from stomach and intestinal smooth muscle activity. The amplifier monitors the DC potential on the skin surrounding, or surface of, the intestine and stomach, which is indicative of the degree of slow wave contraction. The amplifier permits DC coupling to electrodes for signal amplification and presentation without discernible decay. The EGG100C also has built-in drive capability for use with shielded electrode leads.

The gastric slow wave (ECA) originates in the proximal stomach and propagates distally towards the pylorus. For recording, place multiple surface electrodes on the abdomen along the gastric axis and connect them to respective EGG100C amplifiers that have a common reference electrode placed near the xiphoid process. For consistent electrode-to-electrode spacing, use the EL500 dual electrodes with LEAD110 leads. For extremely tight electrode-to-electrode spacing, use the EL254 or EL258 reusable Ag-AgCl lead electrodes. The signals amplified at each electrode will be displayed on consecutive channels in AcqKnowledge.

**FREQUENCY RESPONSE CHARACTERISTICS**

The 0.005 Hz high pass lower frequency response setting is a single pole, roll-off filter.

**See also:** Frequency Response Plots: 0.05 Hz HP, 0.1 Hz LP, 1 Hz LP.

**EGG100C CALIBRATION**

The EGG100C is factory set and does not require calibration. To confirm the accuracy of the device, use the CBLCALC.

**EGG100C SPECIFICATIONS**

Gain & Input Voltage:	<u>Gain</u>	<u>V<sub>in</sub> (mV)</u>
	500	±20
	1000	±10
	2000	±5
	5000	±2

Maximum Over-voltage for Differential Input: ±25 V

Output Range: ±10 V (analog)

Frequency Response Maximum bandwidth (DC – 1 Hz)

Low Pass Filter: 0.1Hz, 1Hz

High Pass Filter: DC, 0.005 Hz, 0.05 Hz

Noise Voltage: 0.1µV rms – (0.005-1.0 Hz)

Signal Source: Electrodes (three electrode leads required)

Z (input)

Differential: 2 MΩ

Common mode: 1000 MΩ

CMRR: 110 dB min (50/60 Hz); **see also:** [Shield Drive Operation](#)

CMIV—referenced to

Amplifier ground: ±10 V

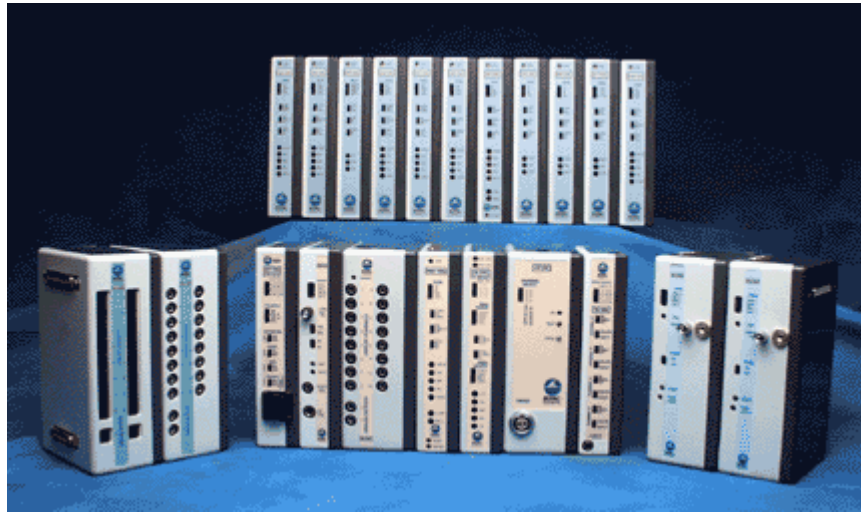
Mains ground: ±1500 VDC

Weight: 350 grams

Dimensions: 4 cm (wide) x 11 cm (deep) x 19 cm (high)

Input Connectors: Five 1.5 mm male Touchproof sockets (Vin+, Ground, Vin-, 2 of shield)

## AMPLIFIER MODULES

*100C series modules*

The 100C series biopotential/transducer amplifier modules are single channel, differential input, linear amplifiers with adjustable offset and gain. These modules are used to amplify smaller voltage signals coming from raw electrodes and transducers (typically less than  $\pm 0.01$  volt). In addition to amplifying signals, most of the 100C series modules include selectable signal conditioning ability so that data may be filtered or transformed as it is being collected.

- **Biopotential modules:** ECG100C, EEG100C, EGG100C, EMG100C, EOG100C, ERS100C
- **Transducer modules:** EDA100C; PPG100C; RSP100C; SKT100C
- **MRI Smart modules**—advanced signal processing circuitry removes spurious MRI artifact from the source physiological data: ECG100C-MRI; EDA100C-MRI; EEG100C-MRI; EMG100C-MRI; PPG100C-MRI.

Modules can be cascaded by snapping the modules together. Up to sixteen 100C series modules can be connected to the MP System at any one time.

**IMPORTANT**

When cascading modules, it is important to remember that **no two amplifiers may be set to the same channel**. If two connected amplifier modules are left on the same channel, then contention will result and both amplifier outputs will give erroneous readings.

**Amplifier offset** Set by the zero adjust control trim potentiometer near the top of the module. The offset control can be used to adjust the zero point or “baseline” of a signal.

**Gain Switch** The four-position slide Gain switch controls sensitivity. Lower gain settings will amplify the signal to a lesser extent than higher gain settings. If the signal plotted on the screen appears to be very small for a given channel, increase the Gain for that particular channel. Conversely, if the signal seems to be “cropped” at +10 Volts or –10 Volts, decrease the Gain.

**Connections** Transducers and electrodes connect to the amplifiers using 1.5 mm female Touchproof connectors.

- Electrodes** The biopotential amplifier modules use a three-electrode arrangement (VIN+, GND, VIN-). Although certain applications may require different arrangements of electrodes and/or transducers, some generalizations about electrode and transducer connections can be made. Electrodes measure the electrical activity at the surface of the skin, and since electricity flows from – to +, measuring the flow of a signal requires that there be (at least) one “-” electrode and (at least) one “+” electrode. An additional electrode, a “ground” (or earth) electrode is used to control for the general level of electrical activity in the body.
- Leads** Typically, electrode leads are used to connect individual electrodes to the xxx100C amplifier. Most electrode leads are shielded, which means they introduce less noise than an unshielded lead. A shielded electrode lead has an extra jack on one end that plugs into the SHIELD input on the amplifier modules. A standard electrode lead configuration consists of two LEAD110S electrode leads (one connected to the VIN + input and one to the VIN – input on the amplifier) and a single LEAD110 (connected to the GND input on a biopotential amplifier).
- Transducers** Transducers, on the other hand, are not designed to measure electrical activity directly and usually involve simpler connections. The transducers discussed in this manual translate physical changes (in temperature, for instance) into electrical signals. Connections for individual transducers are discussed in each section.
- Channel** The active channel is selected using the channel select switch on the top of the module. The channel select switch can direct the amplifier output to one of sixteen possible MP System input channels. *Remember to make sure that each amplifier module is set to a unique channel.*
- Zero Adjust** On input signals, a limited range in baseline level (DC offset) can be “zeroed out” using the zero adjust potentiometer. Typically, the zero adjust will not have to be used (as it is preset at the factory). However, some of the 100C series modules can measure DC signals and, in certain circumstances, signal “zeroing” may be required.
- Setup** All 100C Series biopotential or transducer amplifiers incorporate specific gain, coupling and filtering options that are appropriate for the biopotential type or transducer signal that requires measurement. Generally, when an electrode or transducer is inserted into the corresponding 100C series module, the amplifier will immediately produce a useful output, with no user adjustments necessary.
- Certain functionality is added to each module to optimize its performance with its intended signal measurement. For example, all 100C series biopotential amplifiers incorporate a selectable interference filter. When the interference filter is on, 50/60 Hz interfering signals are suppressed.
- Filters** All 100C series amplifiers are constructed with filters that have a high degree of phase linearity. This means the 100C series modules will filter signals with as little distortion as possible. These modules also incorporate protection circuitry to limit input current in the event of input signal overload. Notch and bandstop filters have the potential to cause distortion, especially in the form of “ringing” in the data stream; biopotential hardware notch filters are implemented in conjunction with LP or HP functions to minimize distortion.
- Line Freq** Line Frequency is set using the recessed switch boxes on the left panel of the amplifier module (50 Hz = all switches down, 60 Hz = all switches up). It is important to select the correct line frequency for your geographical region. Typically, U.S. line frequency is 60 Hz; Europe and China 50 Hz. Contact BIOPAC for additional line frequency information. All MP biopotential amplifier modules which contain a 50/60 Hz notch filter only engage the filter when the pass filter is also ON:
- ECG100C, EEG100C, EOG100C amplifiers: the 50/60 Hz notch is only engaged when the 35 Hz LPN low pass notch filter switch is set to ON.
  - EMG100C, ERS100C amplifiers: the 50/60 Hz notch is only engaged when the 100 Hz HPN high pass notch filter switch is set to ON.

See individual module sections for details.