

# Guideline 4000 LP+™ Breakout Box Directions for Use

L011-57-02 (Rev. C0, 2016-05-24)

Contains directions for the following products:  
MT-LPP-BOX

**Intended Use:** The Guideline 4000 LP+™ breakout box (MT-LPP-BOX) enables the LP+ to interface with external equipment. The breakout box exposes five independent, earth-referenced, analog outputs - one for each recording channel - which can be connected to a secondary recording system for downstream recording or data analysis. The breakout box also exposes a single digital input which can be used to precisely synchronize recordings with other equipment.

The breakout box is an accessory to the Guideline 4000 LP+™ and should only be used with it. Reference the microTargeting Guideline 4000 LP+™ Directions for Use (L011-57, included with LP+ shipment) for proper use instructions, including important safety precautions and warnings.



Symbol Key		WARNING / Caution, consult documents	EC REP Authorized Representative in the European Community	USA In reference to "Rx only" symbol; this applies to USA audiences only
	Breakout Box		Read usage instructions	Rx only <b>Caution-</b> Federal law (USA) restricts this device to sale by or on the order of a physician.
	Analog Output		Catalog number	
	Digital Input		Serial number	Humidity limitation: Not to exceed 95%
	Manufacturer		Atmospheric pressure limitation: between 500hPa and 1060hPa	
	Telephone number		Temperature limitation: Storage conditions are between 0°C - 40°C (32°F - 104°F)	

## Abbreviated Procedure

**Reference the Guideline 4000 LP+™ Directions for Use and Guideline 4000 LP+™ help files for more detail on usage of the system. These files are available in paper format upon request.**

1. Connect the MT-LPP-BOX breakout box to the 15 pin female connector on the top panel of the LP+.
2. Analog outputs can be configured in the LP+ software to transmit raw (line noise filter only), processed (digital filters and line noise filter), or enhanced audio (see LP+ help files for more detail) output.
  - i. The auxiliary digital input (AUXDIN1) is linked to channel 1. In order to record digital events on AUXDIN1, a recording must be in process on channel 1. AUXDIN1 is a TTL-compatible input. A timestamp is sent to the PC when the voltage on the digital input transitions from low to high.
  - ii.  $V_{LOW} = 0.8 \text{ V}$ , max
  - iii.  $V_{HIGH} = 2 \text{ V}$ , min
  - iv.  $V_{RANGE} = 0-5 \text{ V}$  (20 mA max input current)
3. Digital inputs will be recorded with the same time resolution as channel 1: 48 kHz (20.8  $\mu\text{sec}$ ) by default, user adjustable.
4. Digital inputs will be saved to the patient files (.APM or .PLX format). There will be no visible indication that the digital input has been received.

## Breakout Box Specifications

Digital Input: Quantity – one, earth referenced, patient-isolated, 0-5V, edge triggered

Analog Output: Quantity - one per channel, Range:  $\pm 1.4\text{V}$ , Earth referenced, patient-isolated

Analog Output Mode: Raw (line filtered only), Filtered, Thresholded, Triggered, Pulse

## Ordering Information

**MT-LPP:** Guideline 4000 LP+™ neuromodulation targeting system

**MT-LPP-BOX:** Breakout box for LP+ system



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