

## DTU100 DIGITAL TRIGGER UNIT

Digital Trigger (MRI Trigger)



Use the DTU100 Digital Trigger Unit to trigger an MRI System with the occurrence of the R-wave present in human or animal (high frequency) ECG data. The DTU100 provides high-level (3000 V) isolation between the MP System and external equipment; the DTU100 is always used with the AMI100D or HLT100C module. This isolation is very important to maintain both subject safety and high quality signal recording. This external hardware module can accept data from any analog output associated with an MP System and convert that analog signal into a TTL compatible trigger suitable for synchronizing with external devices.

For the DTU100, “Analog output” means:

- 1) Analog output associated with any MP module (DA100C, ECG100C, etc) that is sending data to an MP System on Analog Input channels 1–16.
- 2) Analog output coming from the MP system via one of its D/A converters on Analog Output channel 0–1.

## SYNCHRONIZATION

To synchronize an MRI System with the occurrence of the R-wave, record human or animal (high frequency) ECG data on an ECG100C amplifier and direct the output to an analog input channel on the MP160/150 Unit.

- a) Connect the DTU100 RJ11 cable to the AMI100D/HLT100C channel that is sourcing the ECG analog signal. For example, if acquiring ECG waveform on Channel 2, connect DTU100 RJ12 to channel 2 on the AMI100D/HLT100C.
- b) To monitor signals in *AcqKnowledge*, use CBL100 cables to CBL122 adapter to connect the Threshold, Trigger and/or Signal View to unused analog channel inputs on the AMI100D/HLT100C.
- c) Connect the Trigger Out (TTL) line to the MRI system requiring synchronization to the R-wave of the ECG.
- d) If the R-Wave is a clearly defined peak, run the DTU100 in Normal mode. If the R-wave is not always predominant, consider operating the DTU100 in Auto Level mode, or change the location of ECG leads on the subject to obtain a better-defined R-wave peak.
- e) Adjust the Trigger Level potentiometer to obtain a Trigger Signal. Change the Trigger Out polarity to Positive or Negative as required for the MRI equipment. Verify proper operation by noting the periodic lighting of the green Trigger LED. This LED should light briefly whenever the R-wave is detected.

**DTU100 CONTROLS**

**AMI100D/HLT100C** The DTU100 is always used with the AMI100D/HLT100C module. Use the RJ-12 straight through cable provided by BIOPAC to plug the DTU100 into the AMI100D/HLT100C.

**Feedback Views** The DTU100 incorporates three feedback outputs that can be monitored on the MP System to properly set the threshold (trigger) level and required Trigger Out polarity for any type of analog input. Connect a 3.5 mm mono phono cable (CBL100) to a CBL122 (mono-to-RJ12) adapter to connect the respective line to an unused MP system input channel.

*Threshold View* Shows the Threshold (Trigger) Level

*Trigger View* Shows the Trigger Output as sent to the external equipment.

*Signal View* Shows the analog input signal as sent to the DTU100.

**Trigger Out** Connect a TTL line with BNC female connector between the DTU100 and the trigger device.

**Normal/Auto Level** The DTU100 incorporates an optional Automatic Level control circuit. The Automatic Level control circuit will expand or compress the analog input signal to fit inside of a  $\pm 5$  V range.

- Normal — use if the analog input signal is clearly defined.
- Auto Level — use if the analog input signal has a widely varying baseline or significant change in amplitude from one desired trigger point to the next; or to try to improve signal definition.

**Trigger** The Trigger LED (green) lights up whenever the Trigger Out signal goes high.

**Positive/Negative** If analog data is above the threshold setting the DTU100 output can be set to either high (+5 V) or low (0.0 V). When analog data drops below the threshold value the output will be the opposite level.

**Trigger Level** Select a trigger level (threshold) that the analog signal must cross to change the state of the trigger output. This is the level that causes DTU to send a trigger, not the level of the trigger itself (which is fixed at 5 volts).

**See also:** DTU200/300 Systems