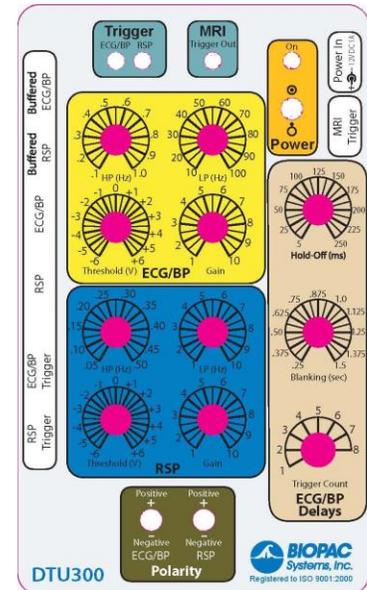
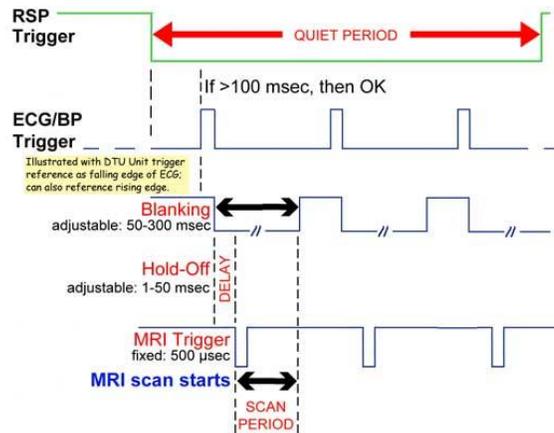
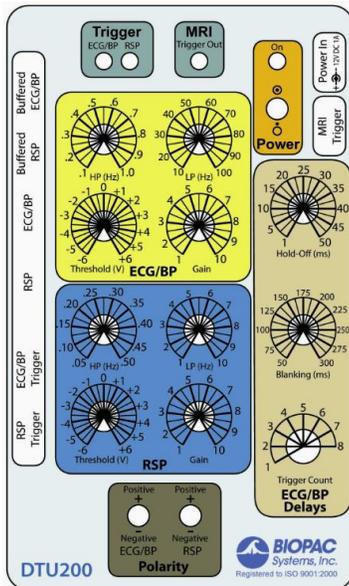


DTU200/300 DUAL CHANNEL GATING SYSTEMS

DTU200 for small animal

DTU300 for human/large animal



DTU200 and DTU300 dual channel gating systems for MRI applications send cardiac trigger pulses to the MRI when a respiration signal is in the quiet phase. Pre-processing filters and gain controls further refine the quality of the signal and ensure reliable triggering.

The system requires two analog input signals:

1. **Cardiac signal** – ECG, BP or Pulse from Electrocardiogram Amplifier (ECG100C/ECG100C-MRI), Micro Pressure Measurement System MPMS200 + TSD283), or Pulse Oximetry System (OXY300-MRI).
2. **Respiration signal** – small animal respiration pad (TSD110-MRI + DA100C General Purpose Transducer Amp) or human respiration transducer (TSD201 + RSP100C + MECMRI-TRANS).

Cardiac phase

- **Threshold:** The ECG or Blood pressure signal passes through a user selectable threshold that creates a square wave (0-5 volt) cardiac trigger signal.
 - **R-wave or BP signal crosses the threshold in both directions to initiate the MRI trigger signal pulse.**
- **Hold-Off:** A delay control allows precise timing of the trigger signal pulse relative to the rising or falling edge of the ECG R-wave (DTU200: 1-50 msec; DTU300 5-250 msec).
- **Blanking:** A blanking control, initiated on the falling edge of the first accepted ECG in the quiet period, provides a time discriminator (DTU200: 50-300 msec; DTU300: 250-1,500 msec) that prevents the DTU system from falsely triggering on an MRI-corrupted ECG signal.
- **Monitoring:** cardiac trigger channel is available for monitoring purposes using a BNC to 3.5mm cable (CBL102 and CBL122 adapter*, included). BIOPAC recommends monitoring this signal with the MP160/150 data acquisition and analysis system.

Respiration

- **Threshold:** The respiratory system also passes through a similar threshold to create a square wave when the signal crosses the threshold in both directions. The quiet period is user-selectable to be the interval between rising and falling edges or falling and rising edges of the RSP signal.
- **Monitoring:** This signal is available for monitoring purposes using a BNC to 3.5 mm cable (included) CBL102 and CBL122 adapter*. BIOPAC recommends monitoring this signal with the MP160/150 data acquisition and analysis system.

*MP150 users with UIM100C module should connect CBL102 directly to the UIM100C and do not need the CBL122 adapter. M160 users with AMI100D or HLT100C must connect CBL102 to the CBL122 and connect the RJ11 end of CBL122 to the AMI100D/HLT100C.

Signal Conditioning

- **Cardiac** Gain: 1-10 Low Pass Filter: 10-100 Hz High Pass Filter: 0.1-1 Hz
- **Respiration** Gain: 1-10 Low Pass Filter: 1-10 Hz High Pass Filter: 0.05-0.5 Hz

Output Controls

The MRI trigger channel only outputs a cardiac trigger when the respiration trigger channel goes into the quiet period, which occurs when the animal is between breaths and still. The system will output a precise number of cardiac triggers between each respiratory period by adjusting the trigger count control (1-8). Cardiac cycles are only considered if they occur >100 msec after the respiration trigger goes into the quiet period. If there isn't enough time to complete the required number of triggers, the unit will stop and wait for the next quiet period before starting a new count. For example, if the counter is set to output 5 triggers, but there is only enough time to send 4, the unit will ignore the fifth trigger and wait for the next quiet period before starting the count again.

Signal Monitoring

There are outputs for the cardiac and respiration conditioned signals (available at BNC ports: Buffered ECG/BP and Buffered RSP) and the respective triggers. The conditioned signals are in the ±10 volt level range and trigger outputs are 0-5 volts. Seven BNC to 3.5 mm monitoring cables (CBL102) and CBL122 adapters* are included.

Compatibility

The unit will interface with either a BIOPAC MP160 or MP150 system. It will also work with third-party amplifiers and data acquisition systems that operate in the ±10 volt range.

DTU200/300 Specifications

Inputs	ECG/BP RSP MRI Trigger	ECG /BP Trigger RSP Trigger Pulse width 500 µsec, active low	Buffered ECG/BP Buffered RSP
Analog Signal Controls	ECG/BP	RSP	
	High-pass filter	0.1 – 1.0 Hz	0.05 – 0.5 Hz
	Low-pass filter	10 – 100 Hz	1 – 10 Hz
	Threshold	-6 to +6 V	-6 to +6 V
	Gain Range	1 – 10	1 – 10
Polarity	ECG/BP/RSP	+ (pos, up) or - (neg, down)	
ECG/BP Delays	Hold-Off	DTU200: 1 - 50 ms, DTU300: 5-250 ms	
	Blanking	DTU200: 50 -300 ms, DTU300: 250-1,500 ms	
	Trigger Count	1 – 8	
Status LED	Trigger	ECG/BP red	RSP red
	MRI Trigger Out	green	
	Power	yellow	
Power	Switch	ON (up), OFF (down)	
	Supply	12 V DC 1 A	

Blood Pressure Gating—Complete Systems

- Provide the cardiac trigger via a micro pressure measurement system

GATE-CARDRESP-E for small animal (DTU200) **GATE-CARDRESP-EL** for human or large animal (DTU300)

Includes:

- Dual Channel Cardiac Respiratory Gating System: DTU200 (-E) DTU300 (-EL)
- MP160/150 Data Acquisition & Analysis System with *AcqKnowledge* software (for Windows or Mac)
- TSD110-MRI Respiration Transducer (transducer, sensor, and tubing)
- DA100C General-purpose transducer amplifier
- Electrocardiography Amplifier ECG100C-MRI with leads and electrodes