

# Application Notes

## Impulse 7010 Defibrillator Selectable Load Accessory

The Impulse 7010 Defibrillator Selectable Load Accessory, in conjunction with Impulse 7000 Defibrillator/External Pacer Analyzer, is specifically designed to facilitate compliance with the IEC 60601-2-4 and AAMI DF80 standards.



For defibrillation to be successful, a sufficient amount of electrical current must be delivered to the heart muscle. Defibrillation current is affected by transthoracic impedance (the body's resistance) to the current flow. Measured in ohms of resistance, impedance comes from all body tissues. Impedance in humans has been shown to vary anywhere from 25 to 180 ohms with the average impedance of an adult around 70 to 80 ohms according to a study conducted by the American Heart Association (AHA).<sup>1</sup>

Section 6.8.3 of the IEC 60601-2-4 standard and AAMI DF80 standards require defibrillators to be tested on different resistance loads of 25, 50, 75, 100, 125, 150, and 175 ohms to ensure proper current is delivered to patients with different impedances. Impulse 7010 is the only tool available today with the capability to test defibrillators beyond 175 ohms. A 200-ohms option gives manufacturers the capability to test defibrillators under extreme impedance conditions.

A well-designed defibrillation waveform must measure patient impedance electrically and adjust the waveform shape and duration accordingly to optimize waveform performance across the range of anticipated impedance values.

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<sup>1</sup> American Heart Association. Guidelines 2000 for Cardiopulmonary Resuscitation and Emergency Care. *Circulation Supplement*. 2000; 102:8

### Fluke Biomedical

6045 Cochran Road, Cleveland, OH 44139-3303 U.S.A.  
Tel: 440.248.9300, Toll free: 800.850.4608, Fax: 440.349.2307  
Email: [sales@flukebiomedical.com](mailto:sales@flukebiomedical.com)  
[www.flukebiomedical.com](http://www.flukebiomedical.com)

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Below are defibrillator discharge curves captured by Ansur PC-based automation software. To compensate for the resistance change (increasing from 50 ohms to 150 ohms), the defibrillator<sup>2</sup> automatically adjusted the current level (reduced), voltage level (increased) and pulse width (increased) to maintain constant energy (100 Joules).

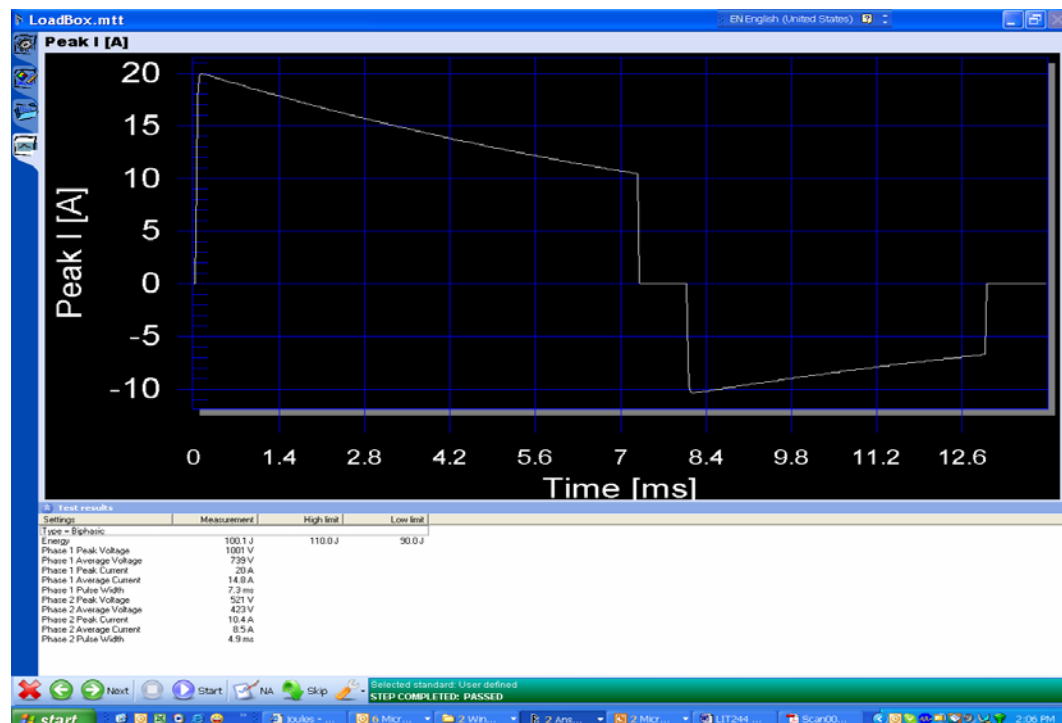


Figure 1: defibrillator discharge curve during energy measurement test (external load 50 ohms, preset energy level 100J)

<sup>2</sup> LIFEPAK 20 used in this example

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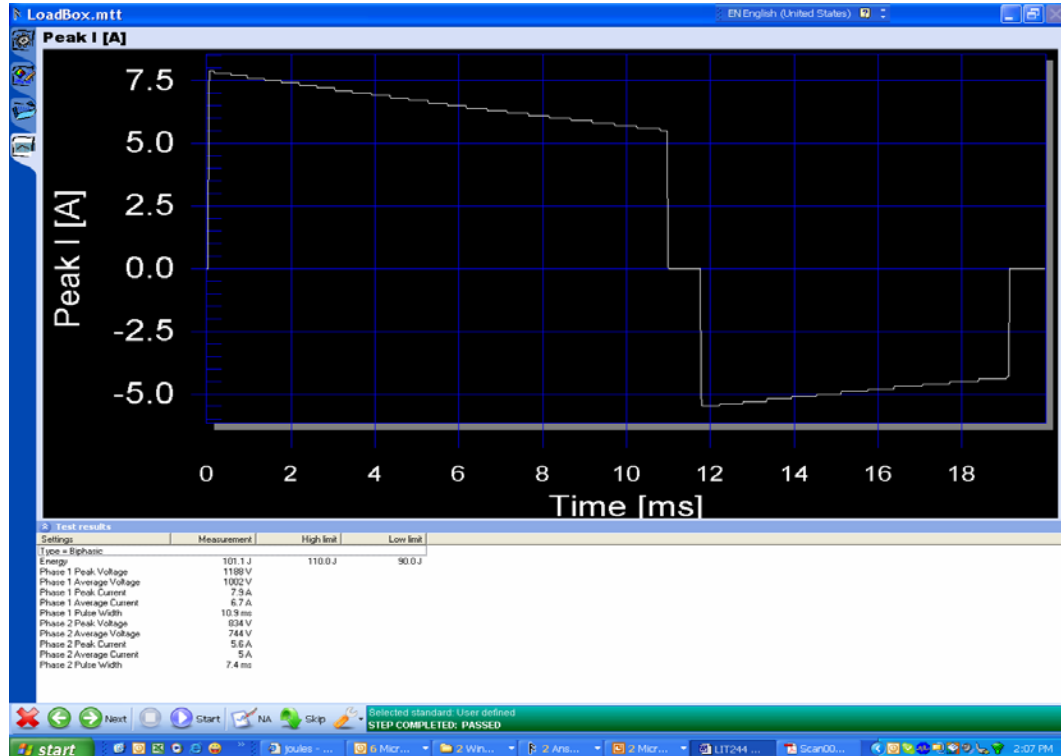


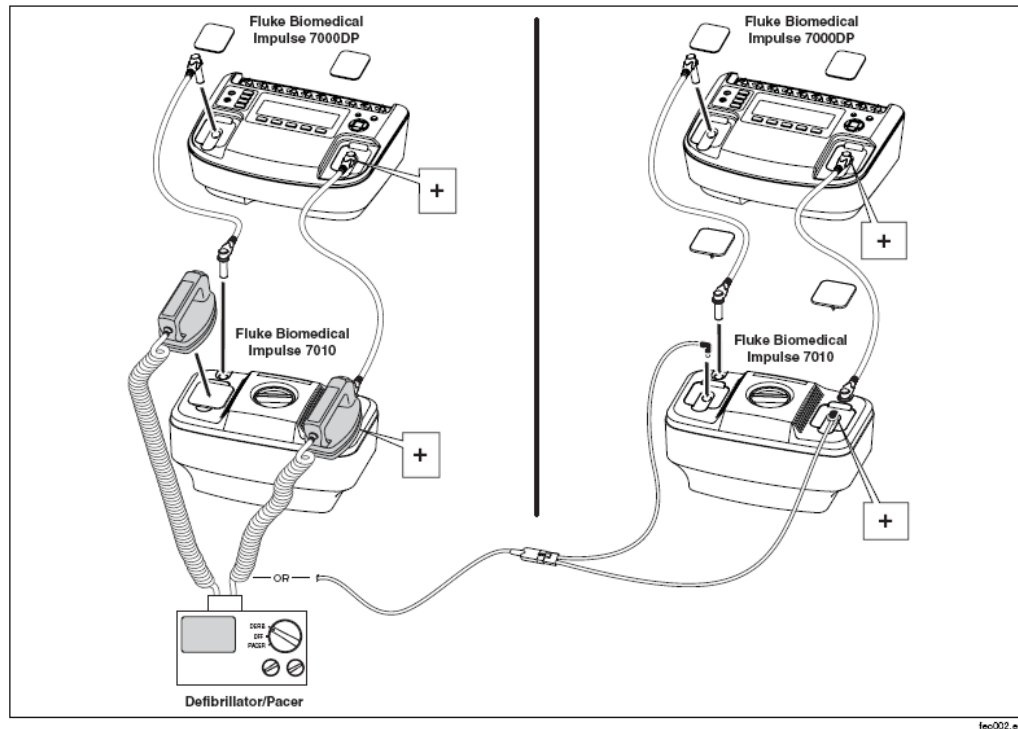
Figure 2: defibrillator discharge curve during energy measurement test (external load 150 ohms, preset energy level 100J)

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Use of Impulse 7010 is easy. Simply connect the Impulse 7010 output connectors to the input connectors of Impulse 7000 as shown in the figure 3 below. The various connection combinations available through the Impulse 7010's rotary switch provide eight different loads for a defibrillator discharge.



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