TENS/NMES Pad Testing using the 7600 Plus

Summary:
It is possible to use the 7600 Plus testing of TENS, Transcutaneous Electrical Nerve Stimulation and NMES, Neuromuscular Electrical Stimulation pads. The AC signal levels and results appear to be appropriate for testing pads in a production or R&D environment.

The 7600 Plus is a single piece of equipment and requires minimal operator interaction and training to perform testing. The large LCD display and automatic calculation of Z should reduce operator error and improve data collection. The 7600 Plus also offers RS232 interface for automation if required.

TENS/NMES Pad Testing

TENS, Transcutaneous Electrical Nerve Stimulation and NMES, Neuromuscular Electrical Stimulation pads are tested at frequencies of 10Hz, 100Hz, 1000Hz, 2000Hz, 3000Hz, 4000Hz and 5000Hz at a signal level of 100mA RMS. The 7600 Plus can perform testing at all of these frequencies and the AC signal level output can be set for 100mA constant current output.

Testing was performed using 7600 Plus LCR Meter Serial Number 08391272
Configuration of LCR Meter
Slow Measurement Speed = 1 measurement/second
Range = Autorange

Sequence Test
Sequence 1: Z, 10Hz, 100mA RMS Signal level
Sequence 2: Z, 100Hz, 100mA RMS Signal level
Sequence 3: Z, 1000Hz, 100mA RMS Signal level
Sequence 4: Z, 2000Hz, 100mA RMS Signal level
Sequence 5: Z, 3000Hz, 100mA RMS Signal level
Sequence 6: Z, 4000Hz, 100mA RMS Signal level

Note: Maximum of 6 Sequences can be done in one test. So 5000Hz measurement was not made. It can be made in a separate Setup. Note setups can be saved for easy recall.

The pads placed back to back and connected together. A set of Kelvin cables were connected to the two wires from the defibrillator pads. Multimeter: Fluke 8060A Tool Number: 01-1287 was used to monitor AC Current in IH lead.

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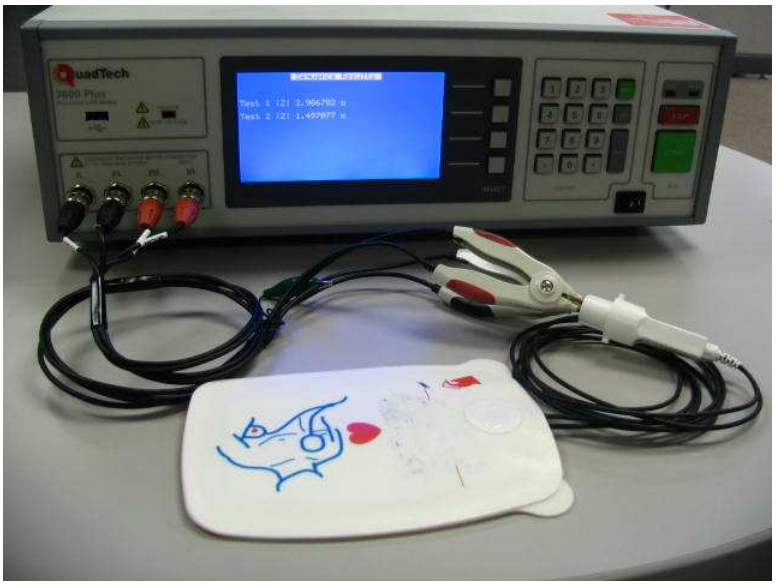
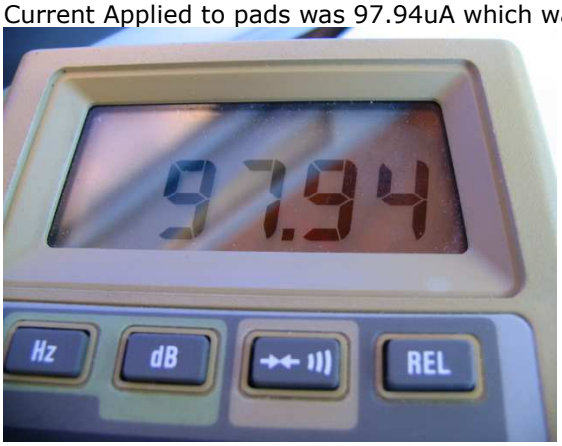


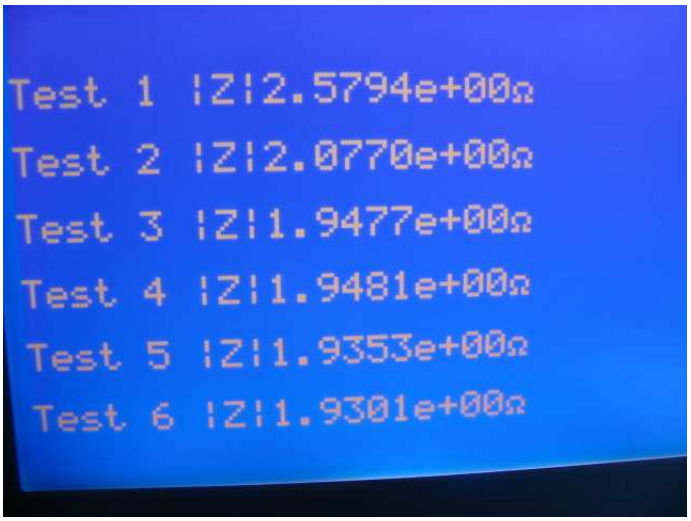
7600 Plus Connected to DF Pads

Results:
Current Applied to pads was 97.94uA which was approximately 2% from the target of 100uA RMS.



Current Measurement using Fluke 8060A Multimeter

Measurement results from LCR
10Hz : Z = 2.579 ohms
100Hz: Z = 2.0770 ohms
1kHz : Z = 1.9477 ohms
2kHz : Z = 1.9481 ohms
3kHz : Z = 1.9353 ohms
4kHz : Z = 1.9301 ohms



Sequence Screen shot operator would see

The 7600 Plus was able to perform measurements at a variety of frequencies and the required signal level of 100uA. Sequence mode allows for measurement at the required frequencies making it easy and repeatable for operators to collect all of the required test results. The 7600 Plus also has the ability to perform a sweep across a frequency range or current range for applications in R&D and production testing of other medical devices such as feed-throughs and defibrillator pads.

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