

Phase 3

Defibrillator / Transcutaneous Pacer Analyzer

Phase 3 is the first Defibrillator / Pacer Analyzer specifically designed to test Pulsed Multiphasic defibrillators.

Versatility – Phase 3 tests Monophasic, Biphasic and Pulsed Multiphasic Defibrillators, AEDs and Transcutaneous Pacers with 1% accuracy on either line or battery power.

Portability – Detachable Paddle Plate provides easy hands-free testing. Battery provides up to 24 hours of continuous operation.

USB Connectivity – USB Communication capability allows real-time waveform capture and efficient data transfer to your PC.

Real-Time Wave Capture – Capture high-resolution signal data to a PC running Phase3pc software immediately after discharge.

Test Record Storage – Phase 3 provides storage for up to 50 Test Records and up to 10 defibrillator discharge waveforms as Wave Records.

Variable Load Module – Our optional, exclusive VLM allows testing defibrillators at maximum energy with selectable loads from 25 to 175 ohms, in accordance with AAMI DF-80 and IEC 60601-2-4. High-resolution wave graphics and test data are obtained with Phase 3VL software — a standard accessory to the VLM.

Phase 3pc Companion Software – Included as a standard accessory, Phase 3pc allows you to create and edit autosequences, download and store test data and wave graphics to your PC.



Phase 3

Innovation by design



Variable Load Module

Phase 3 – Performance Specifications

Tests Performed

Defibrillator Energy, Charge Time and Cardioversion
Automated External Defibrillator (AED) Performance
ECG Monitor Performance
Pacer Sensitivity, Refractory Periods and Noise Immunity
Pacer Pulse Characteristics

Energy Measurement, General

Load resistance: 50 ohms $\pm 1\%$, non-inductive
ECG amplitude at defib pads: 1 mV QRS
WAVEFORM (oscilloscope) Output
High Range: 1000:1 amplitude attenuation
Low Range: 200:1 amplitude attenuation
Waveform Playback: 200: 1 time base expansion
First Phase Pulse Width: 0.1 - 58 msec
Second Phase Pulse Width: 0.1 - 58 msec
Interphase Delay: 0.1 - 58 msec
Tilt: 0 - 99.9%
Modulation Frequency: 1000 - 8000 Hz
Modulation Duty Cycle: 0 - 99.9%
Test Pulse: 46 Joules $\pm 10\%$

Defibrillator High Range Energy Test

Energy Measurement: 0.0 to 600.0 Joules ($\pm 1\%$ ± 2 LSD)
Voltage Measurement: 0 to 5000 Volts ($\pm 1\%$ ± 2 LSD)
Current Measurement: 0.0 to 100.0 Amps ($\pm 1\%$ ± 2 LSD)
Pulse Width Measurement: Range: 0.5 to 58.36 msec.
($\pm 1\%$ ± 2 LSD)
Trigger Level: 80 Volts
Playback Amplitude: 1 mV per 1000 volts on Lead II;
1 mV per 2000 volts at defib pads
126 Joules $\pm 10\%$

Defibrillator Low Range Energy Test

Energy Measurement: 0.0 to 50.0 Joules ($\pm 1\%$ ± 2 LSD)
Voltage Measurement: 0 to 1000 Volts ($\pm 1\%$ ± 2 LSD)
Current Measurement: 0.0 to 20.0 Amps ($\pm 1\%$ ± 2 LSD)
Pulse Width Measurement: 0.5 to 58.36 msec. ($\pm 1\%$ ± 2 LSD)
Trigger Level: 16 Volts
Playback Amplitude: 1 mV per 200 volts on Lead II;
1 mV per 400 volts at defib paddles

Defibrillator Charge Time Test

Charge Time Measurement: 0.0 to 99.9 seconds (± 1 LSD)

Defibrillator Cardioversion Test

Sync Delay Measurement: -200 to +800 msec. (± 1 LSD)
Delay Target: 20 to 65 msec window when enabled
Sync Point: Selectable, peak of ECG Q or R wave

AED Performance Test

Test Method: Verify AED shock advisory for specified arrhythmia

Pacemaker Pulse Test

Pulse Amplitude Measurement: 4 to 250 milliamps, all loads
($\pm 1\%$ ± 1 LSD)
Pulse Rate Measurement: 20 to 220 PPM ($\pm 1\%$ ± 1 LSD)
Pulse Width Measurement: 0.5 to 58.36 msec. ($\pm 1\%$ ± 2 LSD)
Test Load Range: 50 to 1600 ohms, in 50 ohm steps
WAVEFORM output: 50 milliamps per volt, all loads
Measurement Methods: Average, leading edge, trailing edge, peak
Test Pulse: 145 mA $\pm 10\%$

Pacemaker Noise Immunity Test

Test Waveform: 50Hz or 60Hz sine wave
Noise Amplitude Range: 0.18 to 10.00 mV peak-to-peak
Noise Amplitude Resolution: 0.139 mV

Pacemaker Sensitivity Test

Test Waveform: Square (SQR), Triangle (TRI) or Haversine (SSQ) pulse
Waveform Width: 10, 25, 40, 100, or 200 msec.
Amplitude Range: 0.00 to 3.00 mV peak

Pacemaker Refractory Period Test

Paced Refractory Period (PRP): 50 to 750 msec. (± 1 LSD)
Sensed Refractory Period (SRP): 50 to 750 msec. (± 1 LSD)

ECG Simulator

Performance Test Waveforms

DC Pulse, 4 seconds, Square Wave, 2 Hz, Triangle Wave, 2 Hz
Sine Wave @ 0.1, 0.5, 10, 20, 40, 50, 60, 70, or 100 Hz

Normal Sinus Rhythm

30, 60, 90, 120, 150, 180, 240 or 300 BPM

Cardioversion, Shock Advisory and AED Test Waveforms

Atrial Fibrillation, Coarse
Atrial Fibrillation, Fine
Asystole 1 (random, low-frequency baseline fluctuation)
Asystole 2 (flat line/zero volts)
Supraventricular Tachycardia (SVT-140)
VTACH @ 140, 160, 190 BPM
Torsades de Pointe @ 200 BPM
Coarse Ventricular Fibrillation (CVF) / Fine Ventricular Fibrillation (FVF)
Square Pulse 1ms to 60 BPM

Arrhythmia Simulations

Second Degree A-V Block, Premature Atrial Contraction (PAC), R-on-T
PVC,
Right Bundle Branch Block (RBBB), Premature Ventricular Contraction
(PVC)
Multifocal PVC, Run of 5 PVC, Bigeminy, Trigeminy

Pacemaker Test Waveforms

SQR (square) Pacer Trigger, width = 2, 25, 40, 100 or 200 msec
TRI (triangle) Pacer Trigger, width = 10, 25, 40, 100 or 200 msec
SSQ (haversine) Pacer Trigger, width = 10, 25, 40, 100 or 200 msec

Performance Specifications

Output Level: Selectable, 1 mV, 2 mV or 0.5 mV into ECG Lead II
Impedance: 500 ohms ($\pm 0.2\%$), Amplitude: $\pm 2\%$

Non-Volatile Memory

Data Capacity

50 Test Records, 10 Defibrillator Waveform Records, 32 Autosequences

Test Record Content

Device ID, Time/date of test, Test type (Manual or Auto), Device type
(defib. or AED)
Up to 10 defibrillator energy tests (or 32 AED energy tests)
1 defibrillator charge time test
Up to 4 defibrillator cardioversion tests
Up to 12 ECG performance tests
Up to 10 pacer pulse tests
1 pacer noise immunity test
Up to 2 pacer sensitivity tests
Up to 2 pacer refractory period tests

Interface

LCD (5.2" x 1.5"); 40 characters x 8 lines text; 240 x 64 pixel graphics)
Defibrillator Input: Molex 42820-3212
Pacemaker Input: 2 x safety-style banana jack (red (+)/black (-))
ECG Simulator Outputs: 10 x safety banana jack (RA; RL; LA; LL; V1-V6)
Defibrillator/Pacer Waveform Output: 1/8" mono phono jack
High-Level ECG Output: 1/8" mono phono jack
USB Port: Type "B", USB 1.1 or USB 2.0 compatible.
Serial (RS-232) Port: DB9 Male, RS-232C, bi-dir, CTS handshaking, 9600
baud, 8-N-1
Keyboard Port: PS/2 (6-pin miniDIN female)

Power Supply: Internal 12.5V/1.4A-h NiCad, 24 hours of use between charges

Environment:

15°C to 40°C, 10% to 90% RH, Indoor Use Only, Category II

Dimensions:

9.5" W x 8" H x 5.5" D (24cm W x 20cm H x 14cm D)

Weight: 3 lbs. (1.4 kg)

Chinese version of Phase 3 complies with the Chinese standard.

All specifications subject to change without notice.



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