

vPad-DF™

Defibrillator / Transcutaneous Pacer / Transvenous Pacer Analyzer

The vPad-DF is the world's first and only all-in-one Analyzer capable of testing Defibrillators, AED's, Transcutaneous Pacemakers, and Transvenous Pacemakers. With its high-power test load, it can continuously withstand tests at maximum energy with no delay between discharges.

Built on the proven Vision-Pad (vPad) platform, vPad-DF joins a family of vPad analyzers, simulators, and other solutions to carry out accurate and efficient testing through its intuitive user interface. Its ability to test automatically with user-programmable sequences and integrate with other analyzers and CMMS systems is unmatched.

When paired with the optional vPad-VLM (Variable Load Module), vPad-DF will enable users to test defibrillators in accordance with IEC 60601-2-4 requirements, in addition to testing the performance of both Transcutaneous and Transvenous Pacemakers.



Key Features:

- Advanced analyzer with easy-to-use interface, short learning curve, high efficiency
- High-resolution tablet display (1920 x 1200)
- Provides both Manual and Automated test modes
- Built-in and user customizable auto-sequences
- Optional vPad-VLM (Variable Load Module) to test in accordance with AAMI DF-80 and IEC 60601-2-4 requirements
- Reversible Paddle Plate Adapters to test with either defib paddles or hands-free cables
- Test report capabilities (built-in option)
- Integration with vPad Electrical Safety Analyzers ¹
- Integration with CMMS Systems ²
- Screenshare Ready (user controlled) for Training and Support
- Wired or wireless control
- Battery or power supply operation
- Backward-compatible with vPad-Check automation for Phase 3 Defib/Pacer Analyzer

Innovation by design

Specifications

General specifications

Operating temperature	10 °C to 40 °C (50 °F to 104 °F)
Storage temperature	-20 °C to 60 °C (-4 °F to 140 °F)
Humidity	10 % to 90 % non-condensing
Ports	USB-A, USB-B, VLM port, Datrend daisy chain ports (XBUS) ECG Output, Scope Output, 12V DC power input
Graphical User Interface	10" Android
Capacity	32 GB
Communications	USB, Bluetooth
Modes of operation	Manual, Automated, Remote
Power	AC/DC Power Supply 100 V to 240 V input, 12 V / 2.5 A output LI-PO battery for 11 hours (typical) from full charge
Enclosure	ABS
Dimensions (WxDxH)	31.8 cm x 22.9 cm x 8.9 cm (12.5 in x 9 in x 3.5 in)
Weight	2.31 kg (5.09 lbs)
Safety standards	EN 61010-1:2010
Electromagnetic compatibility standards (EMC)	EN 61326-1:2013

Scope Output

Connection	3.5 mm (1/8 in) monaural
Amplitude	
Defib test	2 kV per volt
Transcutaneous pacer test	100 mA per volt
Transvenous pacer test	20 mA per volt (Atrial or Ventricular)
Accuracy	±2 % into 1 MΩ scope input

Defibrillator Analyzer Technical Specifications

Energy output measurement

Compatible Defibrillator Waveshapes.....	Lown, Edmark, trapezoidal, DC bi-phasic, AC pulsed bi-phasic
Measurement Range	0.1 to 600 Joules (J)
Accuracy	$\pm(1\% \text{ of reading} + 0.1 \text{ J})$, 0.1 - 600 J, all defib waveshapes

Load resistance

Resistance	50 Ω
Accuracy	$\pm 1\%$, non-inductive ($<4 \mu\text{H}$)

Pulse trigger level

Range	20 to 160 V in 1 V steps (default 40 V)
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Data acquisition

Sample Rate	250 kHz (4 μs sample) or 125 kHz (8 μs sample)
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Pulse width

Range	0.1 to 50.0 ms at 250 kHz sampling rate; 0.2 to 100.0 ms at 125 kHz sampling rate
Accuracy	$\pm 0.1 \text{ ms}$

Voltage

Range	20 to 5000 V
Accuracy	$\pm(1\% \text{ of reading} + 2 \text{ V})$

Current

Range	0.4 to 100.0 A
Accuracy	$\pm(1\% \text{ of reading} + 0.1 \text{ A})$

Tilt (biphasic and pulsed biphasic)

Range	1 to 99 %
Accuracy	± 1 digit

Interphase delay (biphasic and pulsed biphasic)

Range	0.1 to 24.9 ms
Accuracy	$\pm 0.1 \text{ ms}$

Frequency (pulsed biphasic only)

Range	1,000 to 8,000 Hz
Accuracy	$\pm 1\%$ of reading

Duty cycle (pulsed biphasic only)

Range	1 to 99 %
Accuracy	± 1 digit

Maximum average power

Maximum	50 W, equivalent to 42 defib pulses of 360 J every 5 min
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Charge time measurement

Range	0.1 to 100.0 s
Accuracy	$\pm 0.05 \text{ s}$, typical

Synchronization test (Elective Cardioversion)

Delay Time Measurement

Timing window From ECG R-wave peak to start of defib discharge

Range

Normal Sinus Rhythm (NSR)

@10 BPM -3000 ms prior to R-wave to +3000 ms after R-wave

@100 BPM -300 ms prior to R-wave to +300 ms after R-wave

@360 BPM -166 ms prior to R-wave to +166 ms after R-wave

ECG arrhythmias 0 to +700 ms after R-wave

Resolution 1 ms

Accuracy ± 1 ms

User-selectable ECG waves

Normal Sinus Rhythm (NSR) 10 to 360 BPM in 1 BPM steps

Atrial Fibrillation Coarse, Fine

Atrial Flutter 104 BPM

Supraventricular Tachycardia 150 BPM

Monomorphic Ventricular Tachycardia 100 to 300 BPM in 5 BPM steps

Automated External Defibrillator (AED) ECG waves

Normal Sinus Rhythm (NSR) 10 to 360 BPM in 1 BPM steps

Atrial Fibrillation Coarse, Fine

Atrial Flutter 104 BPM

Ventricular Fibrillation Coarse, Fine

Supraventricular Tachycardia 150 BPM

Monomorphic Ventricular Tachycardia 100 to 300 BPM in 5 BPM steps

Polymorphic Ventricular Tachycardia 5 types

Asystole Flat line, random baseline

ECG waves

ECG general

Lead configuration 12-lead simulation; RA, LL, LA, RL and V1-6

Lead-to-lead impedance 1000 Ω (nominal) from RA to RL, LA to RL, or LL to RL

Rate accuracy ± 0.3 % of setting

ECG amplitudes

Reference lead Lead II (default) or Lead I

Range 0.05 to 5.00 mV in 0.01 mV steps

Accuracy (Performance and Normal Sinus Rhythm waves)

Lead II ± 2 %

All other leads ± 5 %

Defib paddles ± 5 %

Amplitude of ECG signals relative to amplitude setting (in percent)

Lead II reference

Performance waves and R waves

Lead I	67 %
Lead II	100 %
Lead III	33 %
V1 to V6	100 %

Normal sinus waves and Arrhythmia simulations

Lead I	67 %
Lead II	100 %
Lead III	33 %
V1	24 %
V2	48 %
V3	100 %
V4	120 %
V5	112 %
V6	80 %

Lead I reference

Performance waves and R waves

Lead I	100 %
Lead II	150 %
Lead III	50 %
V1 to V6	100 %

Normal sinus waves and Arrhythmia simulations

Lead I	100 %
Lead II	150 %
Lead III	50 %
V1	24 %
V2	48 %
V3	100 %
V4	120 %
V5	112 %
V6	80 %

ECG Normal Sinus Simulation

Rate 10 to 360 BPM in 1 BPM steps

ECG high level output

Connection 1/8" phono (monaural)

Amplitude

Range 0.5 V per mV of reference lead setting
0.05 V per mV for transvenous pacer

Accuracy ± 2 %

Output Impedance 500 Ω

ECG on defibrillator input load Same as the Lead II amplitude (up to a maximum of ± 5.0 mV)

ECG performance waves

Square wave	0.1 to 9.9 Hz in 0.1 Hz steps
Triangular wave	0.1 to 9.9 Hz in 0.1 Hz steps
Sine wave	0.03 to 9.99 Hz in 0.01 Hz steps
.....	10.0 to 300.0 Hz in 0.1 Hz steps
DC Pulse	
Width	10 to 10,000 ms in 1 ms steps

R-wave detection test

Waveform	Square, Haver-triangle, Haversine, Sine ² , or ISO 5841-1
Amplitude	0.05 to 5.00 mV in 0.01 mV steps
Rate	10 to 360 BPM in 1 BPM steps
Widths	1 to 300 ms in 1 ms steps
Width accuracy	±1 %

Pacemaker noise immunity

Wave	Sine
Frequency	50 or 60 Hz (± 0.015 Hz)
Amplitude	
Range	0 to 10 mV p-p in 0.2 mV steps (transcutaneous)
.....	0 to 100 mV p-p in 2 mV steps (transvenous)
Accuracy	±2 %

Implanted pacer pulse simulation

Pulse width	
Range	0.1 to 2.5 ms in 0.1 ms steps
Accuracy	± 1 µs, all pulse widths
Pulse amplitude	
Range	0 (off) and ±2 to ±700 mV in 1 mV steps
Accuracy	±2 %

Amplitude of simulated pacing signals relative to pulse amplitude setting (in percent)

Lead II reference	
Lead I	67 %
Lead II	100 %
Lead III	33 %
V1 to V6	100 %
Lead I reference	
Lead I	100 %
Lead II	150 %
Lead III	50 %
V1 to V6	100 %

Arrhythmia Simulations

Pacer interactive Simulations	Demand Mode Asynchronous Mode Non-Function Non-Capture
Supraventricular	Atrial Fibrillation, Coarse Atrial Fibrillation, Fine Atrial Flutter Sinus Arrhythmia Missed Beat Atrial Tachycardia Paroxysmal Atrial Tachycardia (PAT) Nodal Rhythm Supraventricular Tachycardia
Premature	Atrial PAC Nodal PNC PVC1 Left Ventricle PVC1 LV Early PVC1 LV R on T PVC2 Right Ventricle PVC2 RV Early PVC2 RV R on T Multifocal PVCs PVCs 6/min PVCs 12/min PVCs 24/min Freq Multifocal Trigeminy Bigeminy Pair PVCs Run 5 PVCs Run 11 PVCs
Ventricular	Monomorphic VTACH (100 to 300 BPM in 5 BPM steps) Polymorphic VTACH 1 Polymorphic VTACH 2 Polymorphic VTACH 3 Polymorphic VTACH 4 Polymorphic VTACH 5 Ventricular Fibrillation, Coarse Ventricular Fibrillation, Fine
Conduction	Asystole, Flat Line Asystole, Random Baseline 1° Block 2° Block Type I 2° Block Type II 3° Block Right Bundle Branch Block RBBB Left Bundle Branch Block LBBB

Implanted Pacemaker Simulations

Atrial 80 BPM
Async 75 BPM
Demand with frequent sinus beats
Demand with occasional sinus beats
AV Sequential
Non-Capture
Non-Function

Transcutaneous pacemaker analyzer technical specifications

Test load selections

Variable Load	50 to 1600 Ω in 50 Ω steps
Accuracy	± 1 %, non-inductive (<2 μ H)
Power Rating	75 W (avg) @ 1000 Ω

Defibrillator protection

Type	Gas discharge tube, 350 V / 20 kA
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Pulse measurements

Algorithm	Peak, Average, Leading Edge, Trailing Edge
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Current

Range	1.0 to 250.0 mA
Accuracy	± 1 % or ± 20 μ A
Pulse trigger level	1.0 to 8.0 mA

Pulse rate

Range	5 to 1000 PPM
Accuracy	± 0.5 % or ± 0.1 PPM

Pulse width

Range	0.1 to 50.0 ms at 250 kHz sampling rate; 0.2 to 100.0 ms at 125 kHz sampling rate
Accuracy	± 0.01 ms

Energy

Range	0.01 to 2000 mJ
Accuracy	$\pm (2\% \text{ of reading} + 0.01 \text{ mJ})$

Demand & asynchronous mode tests

ECG Waveforms	Normal Sinus Rhythm
Modes	Underdrive (85%) or Overdrive (115%) Aux Rate (10 to 300 BPM)
Intended Pacing Mode	VVI, VOO (30 to 200 PPM)

Interactive ECG simulation

ECG Waveforms	NSR 12-lead ECG, Ventricular Paced Rhythm
Rates	10 to 300 BPM
Pacemaker Capture Threshold	10 to 250 mA
Intended pacing mode	VVI, VOO (30 to 200 PPM)

Sensitivity test

ECG Trigger Waveforms	Square, triangle, haversine, Sine ² , ISO 5841-1
Amplitude	0.05 to 5 mV
Accuracy	±5 %
Width	1 to 300 ms
Accuracy	±1%

Paced refractory period (PRP)

Range	20 to 800 ms
Accuracy	±1 ms
Outputs	12-lead ECG, ventricular load

Sensed refractory period (SRP)

Range	20 to 800 ms
Accuracy	±1 ms
Outputs	12-lead ECG, ventricular load

Noise Immunity

Range	0.0 to 10.00 mV
Accuracy	±2 %
Frequency	Sine 50/60 Hz
Accuracy	±0.015 Hz
Outputs	12-lead ECG, ventricular load

Transvenous pacemaker analyzer (software Option) technical specifications

Input Channels	Atrial and Ventricular
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Test Load (each channel)

Resistance	500 Ω
Accuracy	±1 %, non-inductive (< 2 μH)
Power Rating	4 W avg

Pulse Measurements	Peak, Average, Leading Edge, Trailing Edge
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Current (each channel)

Range	0.05 to 50.0 mA
Accuracy	±1 % or ±10 μA
Pulse trigger level	0.05 mA, 0.5 mA to 5 mA

Voltage (each channel)

Range	0.1 to 25.0 Vpeak
Accuracy	±1 % or 5 mV

Pulse Rate (each channel)

Range	5 to 1000 PPM
Accuracy	±0.5 % or ±0.1 PPM

Pulse Width (each channel)

Range	0.1 to 50.0 ms at 250 kHz sampling rate; 0.2 to 100.0 ms at 125 kHz sampling rate
Accuracy	±0.01 ms

A-V Delay

Range	1 to 5000 ms
Accuracy	±0.1 ms

Energy (each channel)

Range	0.01 to 2000 µJ
Accuracy	±2 % or 0.01 µJ

Demand & Asynchronous mode tests

ECG Waveforms	Triangular, on both Atrial and Ventricular channel with P-R interval adjustable 50 – 250 ms
Modes	Underdrive (85%) or Overdrive (115%) Aux Rate (10 to 300 BPM)
Outputs	Atrial/ventricular load (500 Ω), ECG signal
Intended Pacing Mode	VVI, AAI, DDD, VOO, AOO, DOO (30 to 200 PPM)

Interactive ECG simulation

ECG Waveforms	Triangular, on both Atrial and Ventricular channel with P-R interval adjustable 50 – 250 ms
Rates	10 to 300 BPM
Pacemaker Capture Threshold	2 to 50 mA
Intended pacing mode	VVI, AAI, DDD, VOO, AOO, DOO (30 to 200 PPM)

Sensitivity test

ECG Trigger Waveforms	Square, triangle, haversine, sine ² , ISO 5841-1
Range	0.05 to 50 mV
Accuracy	±5 %
Trigger Width	1 to 300 ms
Accuracy	±1 %

Refractory period (Atrial or Ventricular channel)

Range	20 to 800 ms
Accuracy	±1 ms
ECG Trigger Amplitude	0.05 to 50 mV
Accuracy	±5 %
Trigger Widths	1 to 300 ms
Accuracy	±5 %

Noise immunity

Range	0.0 to 100.0 mV
Accuracy	±2 %
Frequency	Sine 50/60 Hz
Accuracy	±0.015 Hz
Outputs	Atrial/ventricular load, ECG Signal

vPad-VLM - Variable Load Module

General Specifications

Operating temperature	10 °C to 40 °C (50 °F to 104 °F)
Storage temperature	-20 °C to 60 °C (-4 °F to 140 °F)
Humidity	10 % to 90 % non-condensing
Ports	VLM Port
Enclosure	ABS
Dimensions (WxDxH)	31.8 cm x 22.9 cm x 11.6 cm (12.5 in x 9 in x 4.6 in)
Weight	2.23 kg (3.92 lbs)
Safety standards	EN 61010-1:2010
Electromagnetic compatibility standards (EMC)	EN 61326-1:2013

Electrical Specifications

Maximum voltage	5000 V
Maximum continuous power	70 W, equivalent to 12 defib pulses of 360 J every 1 min
Inductance	< 2.0 µH, @ 25 Ω
	< 5.2 µH, @ 50 Ω
	< 5.2 µH, @ 75 Ω
	< 6.5 µH, @ 100 Ω
	< 12 µH, @ 125 Ω
	< 21 µH, @ 150 Ω
	< 68 µH, @ 175 Ω
	< 68 µH, @ 200 Ω

Performance specifications (for vPad-DF and vPad-VLM working in tandem)

Load settings	25, 50, 75, 100, 125, 150, 175, 200 Ω
Accuracy	
Energy	2 % of reading + 0.1 J with 25, 75 Ω through 200 Ω loads
	1 % of reading + 0.1 J with 50 Ω load
Voltage	1 % of reading + 2 V with 25 Ω and 50 Ω loads
	2 % of reading + 2 V with 75 Ω through 200 Ω loads
Current	2 % of reading + 0.1 A with 25 Ω load
	1 % of reading + 0.1 A with 50 Ω through 200 Ω loads

Ordering Information

Part Number / Descriptions

8000-160 - vPad-DF, Defib Tester, Universal

8000-180 - vPad-VLM, Variable Load Module

Optional Upgrade

6960-015 - vPad-DF Transvenous Pacer Testing Option

Optional accessories

7200-660 - Cable, vPad-DF Hands-Free, Physio

7200-661 - Cable, vPad-DF Hands-Free, Philips

7200-662 - Cable, vPad-DF Hands-Free, Zoll

7200-663 - Cable, vPad-DF Hands-Free, Anderson

7200-664 - Cable, vPad-DF Hands-Free, HP Barrel

7200-659 - Cable, vPad-DF Unterminated Hands-Free

7200-667 - Cable, vPad-DF Red Pacer 2 Cable

7200-668 - Cable, vPad-DF Black Pacer 2 Cable

7500-170 - Kit, vPad-DF Transvenous Pacer Test Cables
(includes 6960-015)

7200-665 - Cable, vPad-DF Transvenous Pacer, Red

7200-666 - Cable, vPad-DF Transvenous Pacer, Black

About Datrend Systems Inc.

Datrend Systems is a Canadian owned company focused on developing and manufacturing leading edge biomedical test instruments and solutions for hospitals, clinics, third party service organizations, and medical device manufacturers. Utilizing the latest technology, we develop comprehensive Preventive Maintenance Solutions to help our customers save time and money whilst meeting stringent regulatory requirements.

Datrend Systems subscribes to the regulatory standards of CSA, EU, UL, and UKCA. Products are designed and manufactured following the quality system principles of ISO9001:1994 and FDA QSR/cGMP. Additionally, Datrend's Quality System is registered to ISO13485:2016.

Since our launch in 1991, we have expanded continuously to serve the global market with innovative solutions.



All specifications subject to change without notice.

1. Requires vPad-ES/ES 2/Rugged/Rugged 2 Safety Analyzer with Automation Apps to run an integrated system.
2. Requires specific vPad CMMS App to integrate with CMMS systems



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