vPad-A1™

Datrend Systems' vPad-A1, based on our revolutionary Vision-Pad Technology™, is an "all-in-one" patient simulation system. vPad-A1 is modular and is comprised of a Multi-Parameter Patient Simulator, SpO2 test module, and a Non-Invasive Blood Pressure simulation module which may be used together, independently, or in various combinations. An Android handheld device or vPad tablet provides the user interface.

Key Features:

- 12 lead ECG simulation
- ST Segments: 8 elevated and 8 depressed
- Axis Deviation: Normal (intermediate), horizontal, and vertical.
- Neonatal Mode
- ECG Performance Testing
- Over 60 Arrhythmia selections
- 2 channel Invasive BP simulation
- Temperature and Respiration simulations
- Pacer simulations
- Cardiac output
- SpO2 Pulse Oximeter Simulator and Non-Invasive BP modules, compatible with all major industry manufacturers
- Auto Settings
- Auto Sequences
- Test reports - with user entered results
- Control via Bluetooth or USB

innovation by design

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vPad-A1™

The vPad-A1 contains the following modules: A1 Base module, vPad-PS, vPad-O2, and vPad-BP.

The vPad-A1 App is an application developed for an Android handheld device, which serves as the user interface for the vPad-A1 system. It is designed using the same principles as all other Datrend vPad Apps, which are intuitive, ergonomic, and customizable.

The vPad-A1 Base serves as a communication bridge between the Android tablet and the rest of vPad-A1 units via Bluetooth or USB. A DACOM bus connection provides an interface to other vPad devices. The Base also provides power to vPad-PS and vPad-O2.

vPad-PS provides six of the eight available simulations: ECG, two-channel IBP (invasive blood pressure), respiration, temperature, and cardiac output.

vPad-O2 provides SpO2 simulation for testing pulse oximeters, and is compatible with all major pulse oximeter manufacturers.

vPad-BP provides NIBP (non-invasive blood pressure) simulation supporting all major NIBP manufacturers.

DATREND Systems Inc.

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vPad-PS™ - Performance Specifications

ECG General:
- Full 12-Lead ECG; independent outputs for each signal lead - color coded to AHA and IEC Standards.
- Output Impedances: 500, 1000, 1500, & 2000 ohms
- ECG Amplitude: 0.05 - 5.5 mV
  - Amplitude Accuracy: ± (2% setting + 0.05 mV)
- High Level ECG: 500x lead II signal
- High Level Accuracy: ± 5%
- Rate Accuracy: ± 0.25 BPM

Normal Sinus Rhythm:
- Rates: 10-360 BPM, 1 BPM steps, Accuracy ± 0.25BPM
- user defined presets (15), user input specific rates
- Amplitudes (Lead II): 0.05mV to 0.5mV (0.05mV steps; 0.5mV to 5.5 mV (0.25mV steps)
- Neonatal Mode: ECG QRS width is reduced from 80ms to 40ms.
- Artifact: 50Hz, 60Hz, muscle, baseline, respiration
- Axis Deviation: Normal , horizontal, and vertical.

ECG Performance Testing:
- Square Wave: 0.125, 2, 2.5Hz
- Triangle Wave: 0.125, 2, 2.5Hz
- Pulse: 30, 60 BPM with 60ms pulse
- Sine Waves: 0.05 - 200 Hz.
- QRS and R Wave Detection Test:
  - Rate: 30 - 250 BPM triangle wave
  - Width: 8 - 200ms
- ST Segment Adjustment (Lead II):
  - Rate: 60 BPM; ST Segment: ± 80% of ECG amplitude
- Tall T wave:
  - Rate: 80 BPM; ST Segment: 0 - 150% of ECG amplitude

Fetal / IUP(ch1 only) Simulations:
- Fetal heart rates: 60 to 240 BPM 1 BPM steps
  - 12 Preset rates, user defineable
- Uniform, Early and Late Deceleration,
  - Uniform Acceleration
- Dynamic intrauterine pressure (IUP) waveform:
  - Positive bell shaped pressure curve
  - Peak pressure: 50 or 90 mmHg,
  - Contraction duration: 90 sec
- IUP Period: 2, 3, 5 min and Manual
- Pressure transducer sensitivity: 5 or 40 m v/v/mmhg
- Input/output impedance: 300 ohms ±10%

2 Blood Pressure Channels:
- Electrically Isolated Channels
- Transducer Sensitivity: 5 or 40 µV/V/mmHg
- Input/output impedance: 300 ohms ±10%
- Excitation : 2 to 16 Vp; DC to 5000Hz
- Calibrated Rate: 80 BPM normal sinus rhythm
- Static Levels BP1/2:
  - -10 to 400 mmHg in 1 mmHg steps
  - 15 User defined presets; user input specific pressures
- Accuracy: ± (1% of setting + 1mmHg)
- Dynamic Simulations:
  - Arterial (120/80)
  - Arterial (90/40)
  - Arterial (160/110)
  - Radial Artery (120/80)
  - Left Ventricle (120/0)
  - Right Ventricle (25/0)
  - Pulmonary Artery (25/10)
  - Pulmonary Artery Wedge(25/2)
  - Right Atrium [CVP] (120/0)
  - Left Atrium (14/4)
  - Swan-Ganz (channel 1 only)
    - Automatic (every 15, 25sec) with Pause
    - Manual, advance is manually triggered
- Artifact/Respiration (larger of):
  - 5mmHg or 5%
  - 10mmHg or 10%

Pacemaker:
- Pulse Amplitude: -700mV to +700mV
- Pulse Polarity: Positive or negative.
- Pulse Width: 0.1, 0.2, 0.5, 1.0, 2.0 ms
- Accuracy : ±(5% setting + 0.2mV) Lead II
- Pacer Rhythm:
  - Venticular
    - Asynchronous 75 BPM
    - Demand with frequent sinus beat
    - Demand with occasional sinus beat
    - A-V sequential
    - Non-capture
    - Non-function
  - Atrial
    - Atrial 80 BPM
    - A-V sequential

Temperature:
- 20 - 42°C in 0.5°C increments
- Accuracy: ±0.01 °C high precision simulations (30, 32, 35, 37, 40, 42 °C)
  - ±0.03 °C general
- Probe Compatibility: 400 or 700 series YSI

Respiration:
- Baseline Impedance:
  - 500, 1000, 1500, 2000 ohms on LEADS I, II, III
- Impedance Variations (Delta):
  - 0.05 to 1.0Ω in 0.05Ω increments;
  - 1.0 to 5.0Ω in 0.25Ω increments;
- Rates: 10 to 150 BrPM; 1 BrPM steps; 0 BrPM for APNEA
- Apnea Selections: 12, 22, 32 seconds, and continuous
- Respiratory Effort (Inspiration/Expiration Ratio:) 1/1, 1/2, 1/3, 1/4, 1/5
- Ventilated 1/1
- Respiration Lead LA or LL

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Cardiac Output:
Baseline Temperature: 36, 37 and 38°C, ±0.03 °C
8 Inject Temperatures 0, 2, 20 & 24°C; Spacelabs and Phillips
1 user adjustable
Simulations:
C.O. of 3, 4, 5, 6, 7l/min
Slow Injectate Curve
Faulty Injectate Curve
Left to Right Shunt Curve
Cal Pulse: 1°C for 1 second

Arrhythmia Selections:
General 1
Asystole 1
Asystole 2
Asystole 3
PVC1 Bigeminy
PVC1 Trigeminy
PVC2 Bigeminy
PVC2 Trigeminy
Premature Atrial Contraction (PAC)
Nodal Premature Nodal Contraction (PNC)
Multifocal PVC (once)
Frequent Multifocal PVCs

Ventricular Arrhythmia (PVC1\left or 2\right)
PVC Ventricular (once)
PVC Ventricular (every 10th beat)
PVC Early, Ventricular
PVC R-on-T, Ventricular
PVC 6/Minute
PVC 12/Minute
PVC 24/Minute
Pair PVCs (1 time event)
Run 5 PVCs (1 time event)
Run 11 PVCs (1 time event)

Conduction Defects:
First Degree Heart Block
Mobitz I, Second Degree Heart Block
Mobitz II, Second Degree Heart Block
Third Degree Heart Block
Right Bundle Branch Block
Left Bundle Branch Block

Fibrillations
Coarse Atrial Fibrillation
Fine Atrial Fibrillation
Coarse Ventricular Fibrillation
Fine Ventricular Fibrillation

Supraventricular Arrhythmia
Atrial Tachycardia
Paroxysmal Atrial Tachycardia
Supraventricular Rhythm @ 90 & 120 BPM
Supraventricular Tachycardia @ 140, 150, 160, 180, 190, 200, 210 & 220 BPM
NSR @ 160 BPM

General 2
Atrial Flutter
Sinus Arrhythmia
Missed Beat @ 80 BPM (1 time event)
Miss every 10th @ 80 BPM
Miss every 10th @ 120 BPM
Nodal Rhythm
Sinus Bradycardia <60 BPM

AutoSettings
Unlimited number of user programmable, simulation parameter setups available.

Communication / User Interface:
via vPad-A1 Base Unit
Android 5" tablet:
Touchscreen User Interface
Wired (USB) or Bluetooth mode
WiFi
16 GB memory
Dual XBUS for Datrend test automation

Power Supply:
via vPad-A1 Base Unit
External AC adapter
Internal rechargeable Li-Ion batteries (for 10 hrs of simulation with full charge)

Dimensions:
98mm x 208mm x 56mm (3.85" x 8.2" x 2.21")
PS Unit (incl. A1 Base)

Weight:
660g (1.44lb) PS Unit (incl. A1 Base)
200g (0.44lb) wireless tablet interface

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

All specifications subject to change without notice.

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vPad-O_2™ - Performance Specifications

Saturation (SpO_2):
- Range: 30% to 100%
- Increments: 1%
- Presets: 6, user definable
- Range of adjustment and presets may vary according to pulse oximeter specifications

SpO_2 Accuracy:
- Saturation within DUT specified range:
  - ±1 count + specified accuracy of the DUT

Heart Rate:
- Range: 20 to 300 BPM
- Increments: 1 BPM
- Presets : 6, user definable
- Accuracy: ± 0.25 BPM (sync mode) otherwise, ±1 BPM

Pulse Amplitude:
- Range: 0 to 100%
- Increments: 1% steps.
- Presets : 6, user definable
- Accuracy: ± 1%

Signal Artifact:
- Four preset simulations:
  - Movement
  - Tapping (Spike artifact)
  - Shivering (Tremor artifact)
  - Shake Table (2.5Hz Sinewave

Auto Presets:
- Unlimited preset patient simulations
- Default Auto Presets:
  - Normal Adult
  - Hypoxia
  - Movement Artifact
  - Tachycardia
  - Bardycardia
  - Neonate
  - Low Perfusion
  - No perfusion
  - Tremor (Shivering Artifact)

Alarm Tests:
- Automated test sequences for determining oximeter alarm response time to:
  - Low Saturation
  - Low Heart Rate
  - High Heart Rate
  - Low Perfusion
  - Signal Artifact
- Five defaults, plus unlimited programmable alarm sequences

Communication / User Interface:
- via vPad-A1 Base Unit
- Android 5" tablet:
  - Touchscreen User Interface
  - Wired (USB) or Bluetooth mode
  - WiFi
  - 16 GB memory
- Dual XBUS for Datrend test automation

Power Supply:
- via vPad-A1 Base Unit
  - External AC adapter
  - Internal rechargeable Li-Ion batteries (for 10 hrs of simulation with full charge)

Dimensions:
98mm x 208mm x 30mm (3.85" x 8.2" x 1.18") A1 Base
90mm x 160mm x 24mm (3.54" x 6.3" x 0.95") SpO_2 Probe

Weight:
440g (0.96lb) A1 base
122g (0.27lb) SpO_2 Probe

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

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vPad-BP™ - Performance Specifications

Manufacturer Envelopes:
GE Dinamap and Dinamap Pro
Critikon Dinamap Plus
Datascope Passport
Welch-Allyn Spot LXi and 52000
Fukuda Dynascope
Colin Press-Mate
...and more custom simulations

Pressure Units:
mmHg, mbar, kPa, inH_2O, cmH_2O

BP Presets:
Systolic/Diastolic (mmHg)

Adult	Neonatal
255/195	150/100
200/150	120/80
150/100	100/65
120/80	80/50
100/65	60/30
80/50	35/15
60/30	

BP Simulation:
Simulation type: oscillometric
Rate Range: 20 – 240 BPM
Accuracy: ±0.25 BPM in sync mode
±1 BPM otherwise
Amplitude: 0 – 2 mL
1.25 mmHg into 500ml cuff
Amplitude Range: 0 – 150%
Amplitude Accuracy: better than 0.5%
AutoSettings: unlimited, user definable

Envelope Shift:
± 50 mmHg max
Minimum Diastolic: 15 mmHg
Maximum Systolic: 275 mmHg

Manometer:
Pressure Range: 0.0 to 400.0 mmHg
Accuracy: ± 0.5 mmHg
Resolution: 0.1 mmHg

Regulated Pressure Source:
Pressure Range: 10.0 to 400.0 mmHg
Accuracy: ± 0.5 mmHg
Resolution: 0.1 mmHg

Leak Test:
Automatic/manual Inflation
Automatic Timer
Leak Test Time: 30 - 600 seconds (user defined)
Target Pressure: 20 to 400 mmHg
Range: 0 to 200 mmHg/min
User Definable Presets: 12
User Definable AutoSettings: unlimited

OverPressure Test:
Automatic/manual Inflation
Range: 20 - 400 mmHg
Release Time: 1-999 sec
User Definable Presets: 12
User Definable AutoSettings: unlimited

Standard Features / Accessories:
- Autosequences
- Unlimited User Defined Settings
- vPad-A1 Power Base / Display
- Universal Hose Adapter Kit

Communication / User Interface:
via vPad-A1 Base Unit
Android 5" tablet:
Touchscreen User Interface
Wired (USB) or Bluetooth mode
WiFi
16 GB memory
Dual XBUS for Datrend test automation

Power Supply:
External AC adapter
Internal rechargeable Li-Ion batteries (for 200+ simulations with full charge)

Dimensions:
98mm x 275mm x 97mm (3.87" x 10.82" x 3.80")
BP Unit (incl. A1 Base)

Weight:
1080g (2.38lb) BP Unit (incl. A1 Base)
200g (0.44lb) wireless tablet interface

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

Please contact the factory for the availability of other calibration tables, or visit our web site for updates at www.datrend.com

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