Impulse 6000D/7000DP
Defibrillator/External Pacer Analyzer

Technical Data

The Impulse 6000D Defibrillator Analyzer and Impulse 7000DP Defibrillator/Transcutaneous Pacer Analyzer Test Systems are rugged, portable precision test instruments that ensure proper operation and ultimate performance of critical life-support cardiac-resuscitation equipment.

The Impulse 6000D and Impulse 7000DP test capabilities encompass the spectrum of worldwide-established pulse shapes, showcase breakthrough AED technology compatibility, and outperform in accuracy and standards. Additionally, the Impulse 7000DP incorporates the tests and the extensive range of test loads and measurement algorithms needed to test external transcutaneous pacemakers.

In conjunction with an Impulse 7000DP, the Impulse 7010 Defibrillator Selectable Load Accessory provides multiple loads of 25 Ω, 50 Ω, 75 Ω, 100 Ω, 125 Ω, 150 Ω, 175 Ω, and 200 Ω for defibrillator performance testing. A standard USB interface enables computer control and data transfer, and optional Ansur PC-based automation software increases productivity by outfitting users with an easy-to-use method to standardize testing procedures and capture, print and document data.

Key features

- Impulse 7010 Defibrillator Selectable Load Accessory provides multiple loads of 25 Ω, 50 Ω, 75 Ω, 100 Ω, 125 Ω, 150 Ω, 175 Ω, and 200 Ω to comply with IEC 60601-2-4 standard (optional)
- Lown, Edmark, trapezoidal, biphasic and pulsed-biphasic defibrillation technology compatibility
- AED technology compatibility
- First-class measurement accuracy ± 1 % of reading + 0.1 J
- Intuitive user interface and backlight, easy-to-read display
- Portable, rugged, easy to carry
- Long-lasting, rechargeable battery
- Pacer brand selections
- Pacer input protected against defibrillator output (7000DP only)
- 10 independent ECG outputs that provide 12 lead combinations for standardized clinical signals
- Flexible heart-rate settings (1 BPM step) facilitate rate meter accuracy and alarm testing
- DSP-based measurements enable future firmware and waveforms upgrade
- Unique integrated posts for secure connections
- Two-year extended warranty (no-cost extended warranty available after first-year calibration at any Fluke Biomedical authorized service center)
- Optional Ansur test automation software to standardize testing procedures, capture waveforms and test results, and print and document test results
- Designed, tested, and built to incomparable Fluke quality standards
**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

**Display**
LCD display

**Communications**
USB device port for computer control

**Modes of operation**
Manual and remote

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**Power**
Internal rechargeable NiMH battery pack for nine hours (typical) operation after full charge or the battery charger can operate the analyzer and charge the battery simultaneously

**Battery charger**
100 V to 240 V input, 15 V/1.5 A output. For best performance, the battery charger should be connected to a properly grounded ac receptacle

**Enclosure**
ABS plastic housing

**Dimensions (WxDxH)**
32 cm x 24 cm x 13 cm (13 in x 9.5 in x 5 in)

**Weight**
3.02 kg (6.6 lb, 0.1 oz)

**Safety standards**
CE: IEC/EN61010-1 2nd Edition;
Pollution degree 2
CAN/CSA–C22.2 No 61010–1;
UL61010–1
C-Tick: Australian EMC

**Electromagnetic compatibility standards (EMC)**
European EMC: EN61326–1

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**Defibrillator analyzer technical specifications**

**Energy output measurement**
Compatible defibrillator waveshapes
Low-energy, Edmark, trapezoidal, dc biphasic, and ac pulsed biphasic

**Note:** AC pulsed biphasic waveform has not been approved in the United States.

**Autoranged measurement**
0.1 J to 600 J

**Accuracy**
0.1 J to 360 J: ± [1 % of reading + 0.1 J]
360 J to 600 J: ± [1 % of reading + 0.1 J], typical

**Note:** For pulsed biphasic defibrillator, specified accuracy is ± [1.5 % of reading + 0.3 J] on both ranges.

**Load resistance**
Resistance: 50 Ω
Accuracy: ± 1 %, non-inductive (<2 μH)

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**Pulse trigger level**
20 V

**Pulse width**
Range: 1 ms to 50 ms
Accuracy: ± 0.1 ms

**Voltage**
Range: 20 V to 5000 V
Accuracy: ± (1 % of reading + 2 V)

**Current**
Range: 0.4 A to 100 A
Accuracy: ± (1 % of reading + 0.1 A)

**Tilt** (biphasic and pulsed biphasic)
Range: 1 % to 99 %
Accuracy: ± 1 digit

**Interphase delay** (biphasic and pulsed biphasic)
Range: 0.1 ms to 9.9 ms
Accuracy: ± 0.1 ms

**Frequency** (pulsed biphasic only)
Range: 2000 Hz to 8000 Hz
Accuracy: ± 1 % of reading

**Duty cycle** (pulsed biphasic only)
Range: 1 % to 99 %
Accuracy: ± 1 digit

**Sample rate**
250 kHz (4 μs sample)

**Maximum average power**
12 W, equivalent to 10 defibrillator pulses of 360 J every 5 minutes

**Scope output**
Autorange: 2000:1, 400:1, and 80:1 depending on range

**Waveform playback**
- Output: BNC
- Output impedance: 50 Ω
- Amplitude accuracy: ± 5 %

**Charge time measurement**
Range: 0.1 s to 100 s
Accuracy: ± 0.05 s, typical

**Synchronization test** (elective cardioversion)
Delay time measurement
- Timing window: ECG R-wave peak to the defibr pulse peak
- Range: ±120 ms to 380 ms; measures timing from 120 ms prior to the R-wave peak to up to 380 ms following the R-wave peak
- Resolution: 1 ms
- Accuracy: ± 1 ms
ECG waves
- Normal sinus rhythm (NSR): 10 BPM to 180 BPM in 1 BPM steps
- Atrial fibrillation: Coarse and fine
- Monomorphic ventricular tachycardia: 120 BPM to 240 BPM in 5 BPM steps
- Asystole: Flat line

Automated defibrillator test
ECG waves
Normal sinus: 10 BPM to 300 BPM in 1 BPM steps
Ventricular fibrillation:
Coarse and fine
Monomorphic ventricular tachycardia: 120 BPM to 300 BPM in 5 BPM steps
Polymorphisic ventricular tachycardia: 5 types
Asystole: Flat line

ECG general
Lead configuration: 12-lead simulation; RA, LL, LA, RL, V1–6 with independent outputs
Lead to lead impedance: 1000 Ω (nominal)
Rate accuracy: ± 1 % nominal

ECG amplitudes
Reference lead: Selectable, Lead II (default) or Lead I
Settings: 0.05 mV to 0.45 mV by 0.05 mV steps and 0.5 mV to 5 mV by 0.5 mV steps
Accuracy (all performance waves and normal sinus R waves):
- Lead II: ± 2 %
- All other leads: ± 5 %
- Defib paddles: ± 5 %

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

ECG waves
Normal sinus waves:
Lead # | Ref. amp. | I | IV | V1 | V2 | V3 | V4 | V5 | V6
---|---|---|---|---|---|---|---|---|---
I | 70 % | 100 % | 30 % | 100 % | 100 % | 100 % | 100 %
II | 100 % | 100 % | 50 % | 100 % | 100 % | 100 % | 100 %
III | 30 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 %
V1 | 24 % | 48 % | 100 % | 100 % | 100 % | 100 % | 100 %
V2 | 48 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 %
V3 | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 %
V4 | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 %
V5 | 112 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 %
V6 | 80 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 %

Lead I reference
Performance waves and R wave detection:
Lead # | Ref. amp. | I | IV | V1 | V2 | V3 | V4 | V5 | V6
---|---|---|---|---|---|---|---|---|---
I | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 %
II | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 %
III | 50 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 %
V1 | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 %
V2 | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 %
V3 | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 %
V4 | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 %
V5 | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 %
V6 | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 %

Noise immunity
Wave: Sine
Line frequency: 50 Hz or 60 Hz (± 0.5 Hz)
Amplitude:
- Range: 0.0 mV to 10 mV in 0.5 mV steps
- Accuracy: ± 5 %

Transvenous pacer pulse simulation
Widths
- Range: 0.1 ms, 0.2 ms, 0.5 ms, 1 ms, and 2 ms
- Accuracy: ± 5 % of setting
Amplitudes:
- Range: 0 [off] and ± 2 mV, ± 4 mV, ± 6 mV, ± 8 mV, ± 10 mV, ± 12 mV, ± 14 mV, ± 16 mV, ± 18 mV, ± 20 mV, ± 50 mV, ± 100 mV, ± 200, ± 500, and ± 700 mV
- Accuracy: ± (10 % setting + 0.2 mV)

Amplitude of transvenous pacer pulse simulation signals relative to amplitude setting (in percent)

ECG normal sinus
Rates: 10 BPM to 360 BPM in 1 BPM steps

ECG high level output (BNC jack)
Amplitude:
- Range: 0.5 V per mV of reference lead setting
- Accuracy ± 5 %
Output impedance: 50 Ω

ECG on defibrillator input load
Same as the Lead II amplitude but limited to ± 4 mV

ECG performance waves
Square wave: 2 Hz and 0.125 Hz
Triangular wave: 2 Hz and 2.5 Hz
Sine waves: 0.05, 0.5, 10, 40, 50, 60, 100, 150, and 200 Hz
Pulse: 30 BPM and 60 BPM, 60 ms pulse width

R-wave detection
Waveform: Haver-triangle
Arrhythmia selections
Pacer interactive (7000DP only)
- Demand: 30 BPM to 360 BPM in 1 BPM steps
- Asynchronous
- Non-capture
- Non-function
- Threshold (interactive pacing simulation only): 10 mA to 250 mA in 10 mA steps

Supraventricular
- Atrial fibrillation course
- 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

Ventricular
- PVCs 6/min
- PVCs 12/min
- PVCs 24/min
- Freq multifocal
- Trigeminy
- Bigeminy
- Pair PVCs
- Run 5 PVCs
- Run 11 PVCs
- Monomorphic ventricular tachycardia: 120 BPM to 300 BPM in 5 BPM steps
- Polymorphic ventricular tachycardia: 1 to 5
- Ventricular fibrillation: coarse and fine
- Asystole

Conduction
- 1° Block
- 2° Block Type I
- 2° Block Type II
- 3° Block
- Right bundle branch block RBBB
- Left bundle branch block LBBB

Transvenous Paced with selectable pacer spike amplitudes and widths
- Atrial 80 BPM
- Async 75 BPM
- Demand with frequent sinus beats
- Demand with occasional sinus beats
- AV sequential
- Non-capture
- Non-function

Selections for all waves in group
Atrial pacer pulse
Width: 0.1, 0.2, 0.5, 1, 2 ms
Polarity: + or -
Amplitude: 0 (off), 2 to 20 (by 2), 50, 100, 200, 500, 700 mV

Ventricular pacer pulse
Width: 0.1, 0.2, 0.5, 1, 2 ms
Polarity: + or -
Amplitude: 0 (off), 2 to 20 (by 2), 50, 100, 200, 500, 700 mV

R-wave detection
Rate: 30, 60, 80, 120, 200, 250 BPM
Width: 8, 10, 12, 20 to 200 (by 10) ms
Amplitude: 0.05 to 0.45 (by 0.05), 0.5 to 5 (by 0.5) mV
**Transcutaneous pacemaker analyzer technical specifications**
*(7000DP only)*

**Test load Selections**

**Defibrillator input**
Fixed load: 50 Ω
Accuracy: ± 1 %, non-inductive (<2 µH)
Power rating: 10 defib pulses of 360 J every 5 minutes

**Pacemaker input**
Variable load: 50 Ω to 1500 Ω in 50 Ω steps
Accuracy: ± 2 %, non-inductive (<2 µH)
Power rating: 5 Ω (average), 40 Ω (peak) @ 1000 Ω

**Measurements**

**Manufacturer specific algorithms**
- GE Responder (1500 and 1700)
- MDE 300 (Medical Data Electronics)
- Medtronic ERS/Physio Control LIFEPAK
- MRL (Medical Research Laboratory/Welch Allyn)
- Philips/Agilent/HP
- Schiller Medical
- ZOLL Medical
  (plus a general purpose Default Algorithm selection)

**Current**
Range: 4 mA to 250 mA
Accuracy: ± 1 % of reading + 0.02 mA

**Pulse rate**
Range: 5 PPM to 800 PPM
Accuracy: ± 0.5 % of reading + 0.1 PPM

**Pulse width**
Range: 1 ms to 100 ms
Accuracy: ± 0.5 % of reading + 0.01 ms

**Energy**
Range: 1 µJ to 2 J
Accuracy: ± 4 % of reading + 10 µJ

**Demand and asynchronous mode test**
Input pacer pulse rates
30 PPM to 200 PPM

**ECG NSR wave**
Rate: 10 BPM to 300 BPM in 1 BPM steps
Amplitude: 1 mV
Underdrive rate: 10 BPM minimum
Overdrive rate: 300 BPM maximum
Accuracy: ± 5 % of setting
Amplitude: 0.05 mV to 0.95 mV (by 0.05 mV), 1 mV to 5 mV (by 0.5 mV)

**Refactory period tests**

**Paced refractory period**
20 ms to 500 ms

**Sensed refractory period**
15 ms to 500 ms

**Accuracy**
± 1 ms

**Pacer pulse rate**
20 PPM to 200 PPM

**ECG R wave**
Waveforms: Square, triangle, sine
Width: 1 ms to 19 ms (by 1 ms), 20 ms to 95 ms (by 5 ms), 100 ms to 300 ms (by 25 ms)
Accuracy: ± 5 % of setting
Amplitude: 0.05 mV to 0.95 mV (by 0.05 mV), 1 mV to 5 mV (by 0.5 mV)

**Sensitivity test**

**Automatic interactive threshold detection**
Compatible pacer rates: 30 PPM to 120 PPM

**ECG Waveform:**
Triangle wave
Pulse width: 40 ms

Impulse 7010 Defibrillator Selectable Load Accessory

General specifications
Maximum voltage
5000 V

Maximum continuous power
12 W, equivalent to 10 defibr pulses of 360 J every 5 minutes

Inductance
< 2 µH, @25 Ω
< 3 µH, @50 Ω
< 4 µH, @75 Ω and 100 Ω
< 5 µH, @125 Ω
< 6 µH, @150 Ω
< 7 µH, @175 Ω
< 8 µH, @200 Ω

Temperature
Operating: 10 °C to 40 °C
(50 °F to 104 °F)
Storage: -20 °C to 60 °C
(-4 °F to 140 °F)

Humidity
10 % to 90 % non-condensing

Dimensions (WxDxH)
154 mm x 272 mm x 138.7 mm
(6.07 in x 10.71 in x 5.46 in)

Weight (net)
1.54 kg (3 lb 6.2 oz)

Safety class
Complies with EN61010-1 2nd Edition, Class II product

Safety and EMC marks

Warranty
Two-year extended warranty
(no-cost extended warranty available after first-year calibration at any Fluke Biomedical authorized service center)

Calibration interval
One-year

Electrical specifications (for Load Accessory and Analyzer together)

Load settings
25 Ω, 50 Ω, 75 Ω, 100 Ω, 125 Ω, 150 Ω, 175 Ω, and 200 Ω ± 1 %

Accuracy
Energy (all except pulsed biphasic): 2 % of reading + 0.1 J with 25, 75 Ω though 200 Ω loads, 1 % of reading + 0.1 J with 50 Ω load
Energy (pulsed biphasic): 2.5 % of reading + 0.3 J with 25, 75 Ω though 200 Ω loads, 1.5 % of reading + 0.3 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

Models
2811928 Impulse 6000D Defibrillator/External Pacer Analyzer 120 V (US)
3077031 Impulse 6000D Defibrillator/External Pacer Analyzer (Schuko)
3077046 Impulse 6000D Defibrillator/External Pacer Analyzer (UK)
3077054 Impulse 6000D Defibrillator/External Pacer Analyzer (Japan)
3085270 Impulse 6000D Defibrillator/External Pacer Analyzer (Australia)
3085281 Impulse 6000D Defibrillator/External Pacer Analyzer (India)
2811919 Impulse 7000DP Defibrillator/Transcutaneous Pacemaker Analyzer 120 V (US)
3077005 Impulse 7000DP Defibrillator/Transcutaneous Pacemaker Analyzer (Schuko)
3077010 Impulse 7000DP Defibrillator/Transcutaneous Pacemaker Analyzer (UK)
3077022 Impulse 7000DP Defibrillator/Transcutaneous Pacemaker Analyzer (Japan)
3085296 Impulse 7000DP Defibrillator/Transcutaneous Pacemaker Analyzer (Australia)
3085308 Impulse 7000DP Defibrillator/Transcutaneous Pacemaker Analyzer (India)
3326874 TA-IMP7KDP Impulse 7000DP Defibrillator/Transcutaneous Pacemaker Analyzer with test automation 120 V (US)
3326888 TA-IMP7KDP-01 Impulse 7000DP Defibrillator/Transcutaneous Pacemaker Analyzer with test automation (Schuko)
3326895 TA-IMP7KDP-02 Impulse 7000DP Defibrillator/Transcutaneous Pacemaker Analyzer with test automation (UK)
3326901 TA-IMP7KDP-03 Impulse 7000DP Defibrillator/Transcutaneous Pacemaker Analyzer with test automation (Japan)
3326912 TA-IMP7KDP-04 Impulse 7000DP Defibrillator/Transcutaneous Pacemaker Analyzer with test automation (Australia)
3326920 TA-IMP7KDP-05 Impulse 7000DP Defibrillator/Transcutaneous Pacemaker Analyzer with test automation (India)

Optional accessories
3091370 Ansur Impulse 6000D/7000DP Plug-In
3065489 MedtronicERS/Physio-Control (FAST PATCH) (set of two): 4 mm defibrillator/Transcutaneous Pacer adapters
3065480 Kimberly Clark/R2 Darox MRL/MDE/NK: 4 mm defibrillator adapters
3065438 Internal discharge paddle contacts (set of two)
3065477 Medtronic ERS/Physio-Control (QUIK PACE) (set of two): 4 mm pacer adapters
3065527 Zoll Medical NTP/PD1400: 4 mm pacer adapters
3065461 Medtronic ERS/Physio-Control (QUIK COMBO): 4 mm defib/pacer adapters
3065492 Philips/Agilent/HP (CODEMAKER Series-Round): 4 mm defib/pacer adapters
3065509 Philips/Agilent HEARTSTART FR2/MRX: 4 mm defib/pacer adapters
3065511 Zoll PD-2200 Multi-Function PD-Series, M-Series, M-Series CCT, AED PRO and AED Plus™ defib/pacer adapters
3065423 GE Marquette (RESPONDER1500/1700 Series) (set of two): 4 mm defib/pacer adapters
3158544 Impulse 7010 Defibrillator Selectable Load Accessory

Standard accessories
1626219 USB Computer Communication Cable
3028681 User Manual CD
3028662 Getting-Started Guide
Battery Eliminator (country specific)
2814980 Carrying Case
3156282 Defib Paddle Contact Plates
About Fluke Biomedical
Fluke Biomedical is the world’s leading manufacturer of quality biomedical test and simulation products. In addition, Fluke Biomedical provides the latest medical imaging and oncology quality-assurance solutions for regulatory compliance. Highly credentialed and equipped with a NVLAP Lab Code 200566-0 accredited laboratory, Fluke Biomedical also offers the best in quality and customer service for all your equipment calibration needs.

Today, biomedical personnel must meet the increasing regulatory pressures, higher quality standards, and rapid technological growth, while performing their work faster and more efficiently than ever. Fluke Biomedical provides a diverse range of software and hardware tools to meet today’s challenges.

Fluke Biomedical Regulatory Commitment
As a medical test device manufacturer, we recognize and follow certain quality standards and certifications when developing our products. We are ISO 9001 certified and our products are:
• CE Certified, where required
• NIST Traceable and Calibrated
• UL, CSA, ETL Certified, where required
• NRC Compliant, where required