FLUKE®
Biomedical

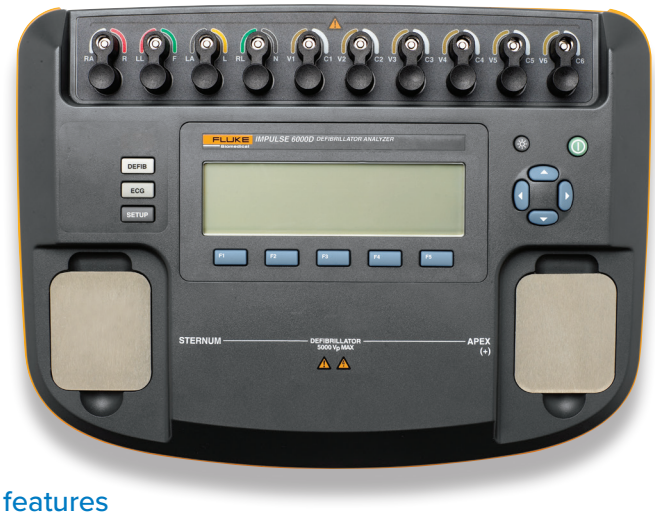
Technical data

Impulse 6000D/7000DP Defibrillator/External Pacer Analyzer

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 testcapabilities encompass the spectrum of worldwideestablished 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.

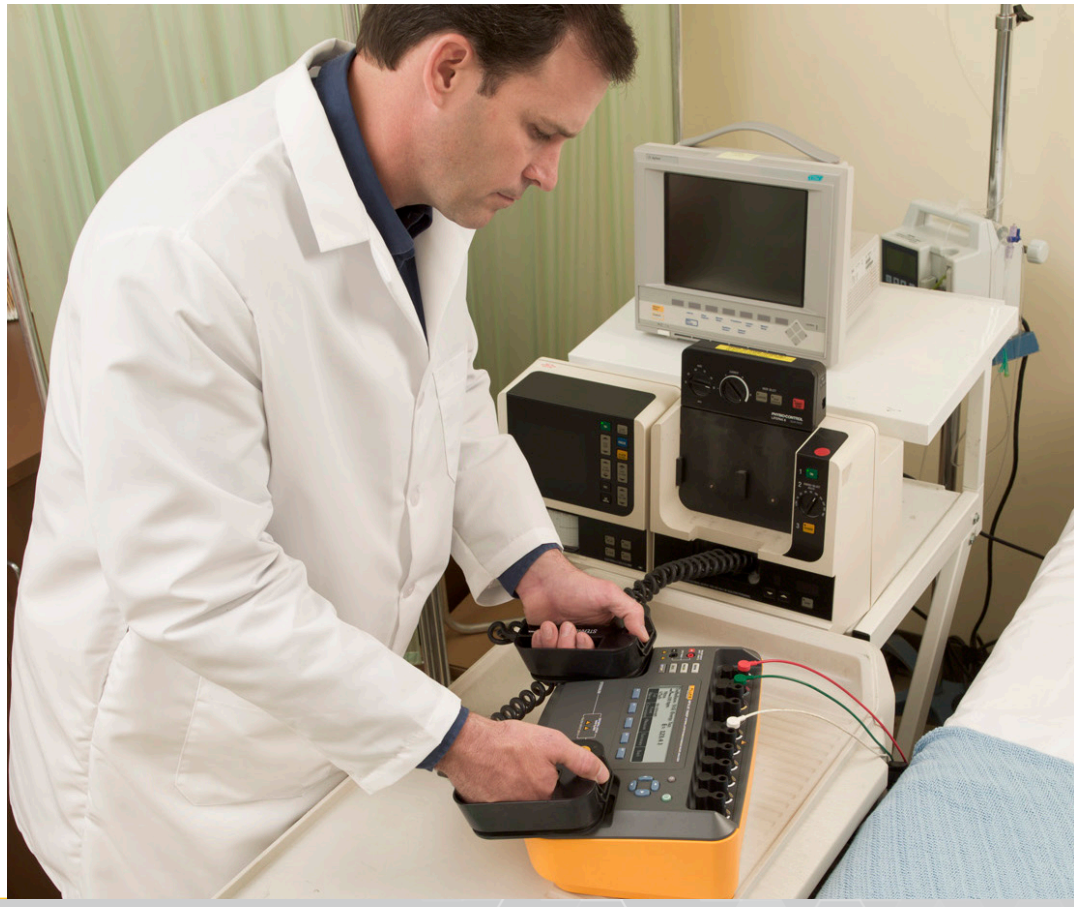


Key features

- 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

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
Display	LCD display
Communications	USB device port for computer control
Modes of operation	Manual and remote
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



Defibrillator analyzer technical specifications

Energy output measurement	
Compatible defibrillator wave-shapes	Lown, 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)
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 defib 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 defib 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
Polymorphic ventricular tachycardia	5 types
Asystole	Flat line

ECG waves

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)	
Lead II reference	
Performance waves and R wave detection	
Lead #	Ref. amp.
I	70 %
II	100 %
III	30 %

V1	100 %
V2	100 %
V3	100 %
V4	100 %
V5	100 %
V6	100 %
Normal sinus waves:	
Lead #	Ref. amp.
I	70 %
II	100 %
III	30 %
V1	24 %
V2	48 %
V3	100 %
V4	120 %
V5	112 %
V6	0 %
Lead I reference	
Performance waves and R wave detection	
Lead #	Ref. amp.
I	100 %
II	150 %
III	50 %
V1	100 %
V2	100 %
V3	100 %
V4	100 %
V5	100 %
V6	100 %
Normal sinus waves:	
Lead #	Ref. amp.
I	100 %
II	150 %
III	50 %
V1	24 %
V2	48 %
V3	100 %
V4	120 %
V5	112 %
V6	80 %

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, 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
Amplitude	0.05 mV to 0.45 mV in 0.05 mV steps and 0.5 mV to 5 mV in 0.5 mV steps
Rate	30, 60, 80, 120, 200, and 250 BPM
Widths	8, 10, 12 ms, and 20 ms to 200 ms in 10 ms steps
Accuracy	± (1 % setting + 1 ms)

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)	
Lead II reference	
Lead #	Ref. amp.
I	67 %
II	100 %
III	33 %
V1	67 %
V2	67 %
V3	67 %
V4	67 %
V5	67 %
V6	67 %
Lead I reference	
Lead #	Ref. amp.
I	100 %
II	150 %
III	50 %
V1	100 %
V2	100 %
V3	100 %
V4	100 %
V5	100 %
V6	100 %

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	Artrial fibrillation course
	Atrial fibrillation fine
	Atrial flutter
	Sinus arrhythmia
	Missed beat
	Atrial tachycardia
	Paroxysmal atrial tachycardia (PAT)
	Nodal rhythm
	Supraventricular tachycardia Premature
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

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

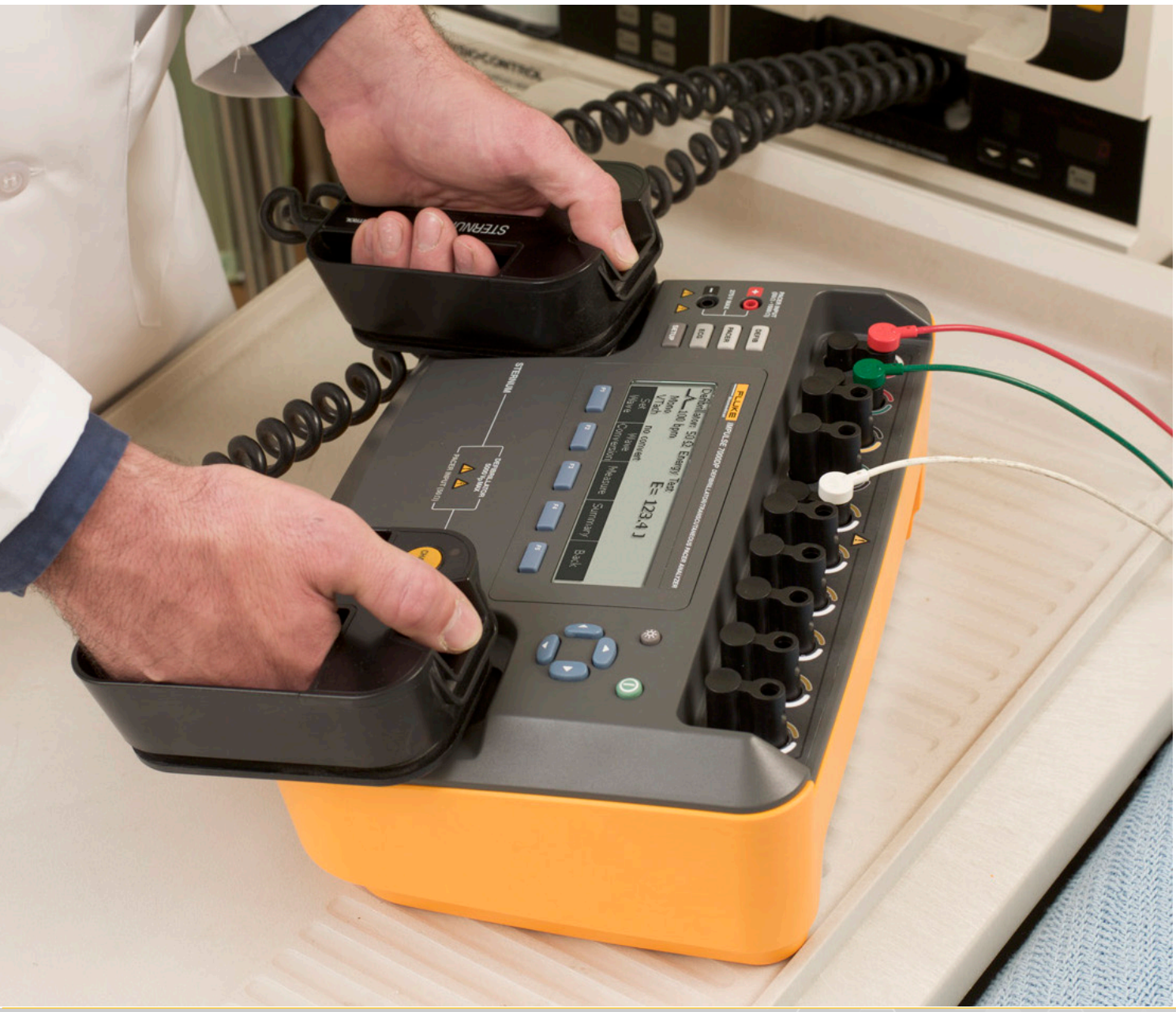
Atrial pacer pulse	
Width	0.1, 0.2, 0.5, 1, 2 ms
Polarity	+ or -
Amplitude	0 (off), 2 to 20 (by 2), 50, 100, 200, 500, 700 mV
Ventricular pacer pulse	
Width	0.1, 0.2, 0.5, 1, 2 ms
Polarity	+ or -
Amplitude	0 (off), 2 to 20 (by 2), 50, 100, 200, 500, 700 mV
R-wave detection	
Rate	30, 60, 80, 120, 200, 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 W (average), 40 W (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
Energy	
Rate	10 BPM to 300 BPM in 1 BPM steps
Amplitude	1 mV
Underdrive rate	10 BPM minimum
Overdrive rate	300 BPM maximum
Sensitivity test	
Automatic interactive threshold detection	
Compatible pacer rates	30 PPM to 120 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)
Accuracy	± 5 % of setting

Refractory 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	
Waveform	Triangle wave
Pulse width	40 ms
Amplitude	1 mV



Impulse 7010 Defibrillator Selectable Load Accessory

General specifications	
Maximum voltage	5000 V
Maximum continuous power	12 W, equivalent to 10 defib 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
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
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/descriptions

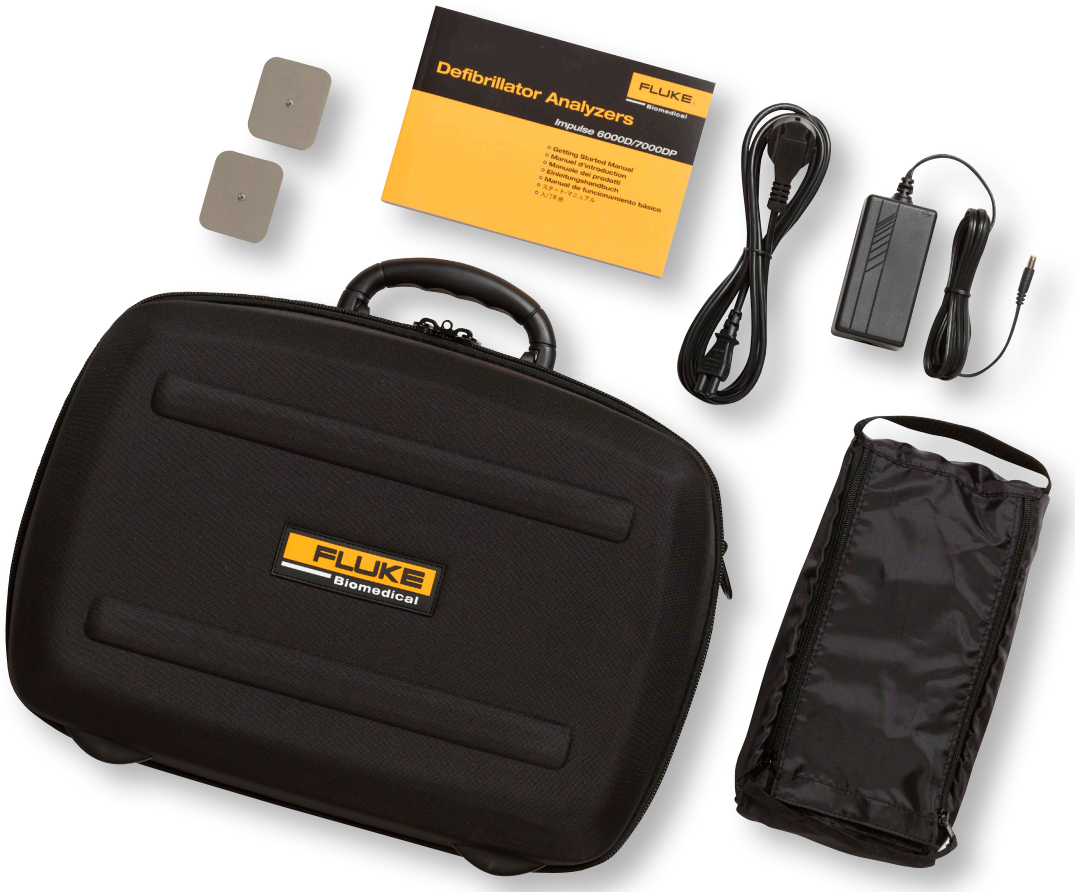
2811928	Impulse 6000D Defibrillator Analyzer 120 V (US)
3077031	Impulse 6000D Defibrillator Analyzer (Schuko)
3077046	Impulse 6000D Defibrillator Analyzer (UK)
3077054	Impulse 6000D Defibrillator Analyzer (Japan)
3085270	Impulse 6000D Defibrillator Analyzer (Australia)
3085281	Impulse 6000D Defibrillator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

Standard accessories

1626219	USB Computer Communication Cable
3028662	Getting-Started Guide
Battery Eliminator	(country specific)
2814980	Carrying Case
3156262	Defib Paddle Contact Plates

Optional accessories

3091370	Ansur Impulse 6000D/7000DP Plug-In
3065489	MedtronicERS/Physio-Control (FAST PATCH) (set of two): 4 mm defibrillator adapters
3065450	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 (CODEMASTER Series-Round): 4 mm defib/pacer adapters
3065509	Philips/Agilent HEARTSTART FR2/ MRX: 4 mm defib/pacer adapters
3065511	Zoll PD-2200 Multi-Function PDSeries, 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



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 and ISO 13485 medical device certified and our products are:

- CE Certified, where required
- NIST Traceable and Calibrated
- UL, CSA, ETL Certified, where required
- NRC Compliant, where required