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MPS450

Simulador de Paciente

Descripción

El MPS450 es la siguiente generación de simuladores de paciente multiparamétricos portátil de Fluke Biomedical. Diseñado para evaluar desde los monitores de ECG más simples hasta los sistemas de detección de arritmias más complejos, el MPS450 ofrece un amplio rango de formas de onda fisiológicas para una exhaustiva verificación y entrenamiento.

El MPS450 ofrece múltiples simulaciones de ECG, presión, respiración, temperatura, marcapasos, artefactos y condiciones de arritmia. Opcionalmente incluye gasto cardiáco y simulación fetal/maternal de ECG.

El control del microprocesador, combinado con una extensa memoria digital, permiten una verificación rápida y adecuada. Un interfaz mediante control de menú permite un método intuitivo de conseguir una multitud de pruebas y funciones, y la amplia pantalla permiten una lectura fácil de los resultados de las pruebas. Compacto y portátil, el MPS450 es ideal para técnicos de campo, tanto si la necesidad es un comprobación rápida junto a la cama del paciente como si se trata de un mantenimiento preventivo de un sistema de monitorización de pacientes.

El MPS450 es también una excelente herramienta de entrenamiento que enseña las técnicas para reconocer las condiciones de normalidad y anormalidad en el sistema cardiaco, pulmonar y circulatorio, así como las técnicas de CPR, desfibrilación y cardioversión.

Permite aprender las técnicas de análisis de como interpretar las formas de onda de ECG de la fisiología cardiaca, y el análisis pulmonar de la fisiología respiratoria.

Características principales

- Simulación de 12 derivaciones de ECG
- Selección de 36 arritmias
- Simulación de marcapasos
- 4 canales de presión, incluyendo Swan-Ganz
- Simulación de respiración y temperatura
- Sincronización de la señal de presión con el ECG
- Amplia pantalla, de 4 líneas x 20 caracteres
- Compacto y portátil
- Funcionamiento a pila
- Salida de ECG de nivel alto
- Interfaz intuitivo
- Prueba de detección de onda R
- Puerto RS232 para control de PC

Prestaciones opcionales:

- Simulación de gasto cardiaco (CO)
- ECG fetal / maternal, simulaciones directas con forma de onda de presión intrauterina
- Control remoto HHC3

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Specifications

Normal-sinus-rhythm waveform	
ECG reference	ECG amplitudes specified for lead II (calibration), from baseline to peak of R-wave; other leads proportional
Normal sinus rhythm	12-lead configuration with independent outputs referenced to right leg (RL); output to 10 universal ECG jacks, color-coded to AHA and IEC standards
Low-level amplitude	0.05 mV to 0.50 mV (0.05-mV steps); 0.5 mV to 5.5 mV (0.5-mV steps; power-on default: 1 mV)
Amplitude accuracy	± 2 % of setting lead II
High-level output (available on BP3 connector)	0.2 V/mV ± 5 % of the ECG-amplitude setting
ECG rate	30, 40, 45, 60, 80, 90, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280 and 300 BPM (power-on default: 80 BPM)
Rate accuracy	± 1 % of setting
ECG-waveform selection	Adult (80 ms) or pediatric (40 ms) QRS duration (power-on default: adult QR/P-R interval of 0.16 s)
Superimposed artifact	50 Hz and 60 Hz, muscle, baseline wander, respiration
ST-segment elevation/ depression	Adult mode only: -0.8 mV to 0.8 mV, in 0.1-mV steps; additional steps: 0.05 mV and -0.05 mV (power-on default: elevation 0 mV)
Pacemaker waveform	
Pacer-pulse amplitude	1 mV, 2 mV, 5 mV, 10 mV, ± 10 % (power-on default: 5 mV)
Pacer-pulse width	0.1 ms, 0.5 ms, 1 ms, 1.5 ms, 2 ms, ± 5 % (power-on default: 1 ms)
Pacing rate	75 BPM
Waveforms	(Power-on default: atrial waveform), atrial, asynchronous 75 BPM, demand with frequent sinus beats, demand with occasional sinus beats, AV sequential, noncapture (one time), nonfunction
Arrhythmias	
Baseline NSR	80 BPM
PVC focus	Left focus, standard timing (except where specified)
Supraventricular arrhythmias	(Power-on default: atrial fibrillation, coarse); atrial fibrillation, coarse; atrial fibrillation, fine; atrial flutter; sinus arrhythmia; missed beat (one time); atrial tachycardia; paroxysmal atrial tachycardia (PAT); nodal rhythm; supraventricular tachycardia
Premature arrhythmias (all one-time events)	(Power-on default: premature atrial contraction); premature atrial contraction (PAC); premature nodal contraction (PNC); PVC1 left ventricular; PVC1 left ventricular, R on T; PVC2 right ventricular; PVC2 right ventricular, early; PVC2 right ventricular, R on T; multifocal PVCs
Ventricular arrhythmias	(Power-on default: PVCs 6/min); PVCs 6/min (power-on default); PVCs 12/min; PVCs 24/min; frequent multifocal PVCs; bigeminy; trigeminy; multiple PVCs (one-time run of 2PVCs); multiple PVCs (one-time run of 5 PVCs); multiple PVCs (one-time run of 11 PVCs); ventricular tachycardia; ventricular fibrillation, coarse; ventricular fibrillation, fine; asystole
Conduction defects	(Power-on default: first-degree heart block), first-degree heart block, second-degree heart block, third-degree heart block, right-bundle-branch block, left-bundle-branch block

ECG-performance testing	
Amplitude	0.05 mV to 0.5 mV (0.05-mV steps); 0.5 mV to 5.5 mV (0.5-mV steps) (power-on default: 1 mV)
Pulse wave	30 BPM, 60 BPM, with 60 ms pulse width
Square wave	2 Hz, 0.125 Hz (power-on default: 2 Hz)
Triangle wave	2 Hz, 2.5 Hz
Sine wave	0.5 Hz, 5 Hz, 10 Hz, 40 Hz, 50 Hz, 60 Hz, and 100 Hz
R-wave-detection waveform	Haver-triangle R-wave rate: 30 BPM, 60 BPM, 80 BPM, 120 BPM, 200 BPM, and 250 BPM (power-on default: 60 BPM) R-wave width: 20 ms to 200 ms (10-ms steps); additional steps: 8 ms, 10 ms, and 12 ms (power-on default: 10 ms)
Rate accuracy	1 %
Amplitude accuracy	± 2 %, lead II (exception: ± 5 % for R-waves ≤ 20 ms)
Respiration	
Rate	0 (OFF), 15 BrPM, 20 BrPM, 30 BrPM, 40 BrPM, 60 BrPM, 80 BrPM, 100 BrPM, and 120 BrPM (power-on default: 20 BrPM)
Impedance variations (ΔΩ)	0.2 Ω, 0.5 Ω, 1 Ω, or 3 Ω (power-on default: Δ 1 Ω)
Accuracy delta	± 10 %
Baseline	500 Ω, 1000 Ω, 1500 Ω, and 2000 Ω, leads I, II, III (power-on default: 1000 Ω)
Accuracy baseline	± 5 %
Respiration lead	LA or LL (power-on default: LA)
Apnea selection	12 s, 22 s, or 32 s (one-time events), or continuous (apnea ON = respiration OFF; power-on default: 12 s apnea)
Blood pressure	
Input/output impedance	300 Ω ± 10 %
Exciter-input range	2 V rms to 16 V rms
Exciter-input-frequency range	DC to 5000 Hz
Transducer sensitivity	5 µV/V/mmHg or 40 µV/V/mmHg (power-on default: 5 µV/V/mmHg)
Pressure accuracy	± (2 % of setting + 2 mmHg)
Static levels, P1	-10 mmHg, 0 mmHg, 80 mmHg, 160 mmHg, 240 mmHg, 320 mmHg, and 400 mmHg (power-on default: 0 mmHg)
Static levels, P2	-10 mmHg, 0 mmHg, 50 mmHg, 100 mmHg, 150 mmHg, 200 mmHg, and 240 mmHg (power-on default: 0 mmHg)
Static levels, P3	-5 mmHg, 0 mmHg, 20 mmHg, 40 mmHg, 60 mmHg, 80 mmHg, and 100 mmHg (power-on default: 0 mmHg)
Static levels, P4	-5 mmHg, 0 mmHg, 20 mmHg, 40 mmHg, 60 mmHg, 80 mmHg, and 100 mmHg (power-on default: 0 mmHg)
Dynamic waveforms, P1	Arterial: 120/80 Radial artery: 120/80 Left ventricle: 120/00 Right ventricle: 25/00

Dynamic waveforms, P2	Arterial: 120/80 Radial artery: 120/80 Left ventricle: 120/00 Right atrium (central venous or CVP): 15/10 Right ventricle: 25/00 Pulmonary artery: 25/10 Pulmonary-artery wedge: 10/2 Left atrium: 14/4
Dynamic waveforms, P3	Arterial: 120/80 Radial artery: 120/80 Left ventricle: 120/00 Right atrium (central venous or CVP): 15/10 Right ventricle: 25/00 Pulmonary artery: 25/10 Pulmonary-artery wedge: 10/2 Left atrium: 14/4
Dynamic waveforms, P4 (Swan-Ganz sequence)	Right atrium (CVP) Right ventricle (RV) Pulmonary artery (PA) Pulmonary-artery wedge (PAW)
Respiration artifact	BP delta change from 3 mmHg to 16 mmHg
BP output	Mini DIN 7-pin
Temperature	
0 °C (32 °F), 24 °C (75.2 °F), 37 °C (98.6 °F), and 40 °C (104 °F) (power-on default: 32 °F/0 °C)	
Accuracy	± 0.1 °C
Compatibility	Yellow Springs, Inc. (YSI) Series 400 and 700
Output	Mini DIN 7-pin
Cardiac output (Thermodilution method, optional)	
Catheter type	Baxter Edwards, 93a-131-7f
Calibration coefficient	0.542 (0 °C injectate), 0.595 (24 °C injectate)
Blood temperature	37 °C (98.6 °F) ± 2 %
Injectate volume	10 cc
Injectate temperature	0 °C or 24 °C ± 2 % value (power-on default: 0 °C injectate)
Cardiac output	2.5 lpm, 5 lpm, 10 lpm ± 5 % (power-on default: 2.5 lpm)
Faulty-injection curve	(Waveform for simulation available)
Left-to-right-shunt curve	(Waveform for simulation available)
Calibrated pulse	1.5 ° for 1 s (37 ° * 35.5 °) (waveform for simulation available)
Repeatability	± 1 %

Fetal/maternal ECG (optional)	
Maternal heart rate (fixed)	80 BPM
Fetal heart rate (selectable)	60 BPM, 90 BPM, 120 BPM, 140 BPM, 150 BPM, 210 BPM, and 240 BPM (power-on default: 120 BPM)
Fetal heart rate (IUP)	140 BPM at beginning, then varying with pressure
Intrauterine-pressure waveforms	Acceleration (140 BPM to 175 BPM to 140 BPM; rate change lagging IUP contraction by 30 s); early deceleration (140 BPM to 100 BPM to 140 BPM; no IUP lag time); late deceleration (140 BPM to 100 BPM to 140 BPM, starting at IUP peak)
Wave duration	90 s, bell-shaped pressure curve, from 0 mmHg to 90 mmHg and returning to 0 mmHg, ± 4 mmHg (max)
IUP period	2 min, 3 min, or 5 min; and manual
Computer setup	
Port	Bidirectional (data communications equipment) RS-232
Baud rate	9600
Parity	None
Stop bits	1
Data bits	8
Temperature	
Operating	10 °C to 40 °C (50 °F to 104 °F)
Storage	-25 °C to 50 °C (13 °F to 122 °F)
Humidity	80 % max relative humidity
General information	
Battery replacement	Warning for low-battery condition (batteries to be replaced at this time)
Power	Two 9 V alkaline batteries (8 hours min continuous power); optional battery eliminator 9 V dc, 50 mA
Dimensions (WxDxH)	15.2 cm x 19 cm x 5 cm (6 in x 7.5 in x 2 in)
Weight	0.7 kg (1.5 lb)

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Ordering information

Model

MPS450 MPS450 (base model)
MPS450-01 Australia
MPS450-02 Denmark
MPS450-03 India
MPS450-04 Israel
MPS450-05 Italy
MPS450-06 Schuko
MPS450-07 Switzerland
MPS450-08 United Kingdom
MPS450-09 Brazil
MPS450-CO MPS450 (base model plus cardiac-output simulation)
MPS450-CO-01 Australia
MPS450-CO-02 Denmark
MPS450-CO-03 India
MPS450-CO-04 Israel
MPS450-CO-05 Italy
MPS450-CO-06 Schuko
MPS450-CO-07 Switzerland
MPS450-CO-08 United Kingdom
MPS450-CO-09 Brazil
MPS450-FET MPS450 (base model plus direct fetal/maternal ECG simulations)
MPS450-FET-01 Australia
MPS450-FET-02 Denmark
MPS450-FET-03 India
MPS450-FET-04 Israel
MPS450-FET-05 Italy
MPS450-FET-06 Schuko
MPS450-FET-07 Switzerland
MPS450-FET-08 United Kingdom
MPS450-FET-09 Brazil
MPS450-CO/FET MPS450 (base model plus cardiac-output and direct fetal/maternal ECG simulations)
MPS450-CO/FET-01 Australia
MPS450-CO/FET-02 Denmark
MPS450-CO/FET-03 India
MPS450-CO/FET-04 Israel
MPS450-CO/FET-05 Italy
MPS450-CO/FET-06 Schuko
MPS450-CO/FET-07 Switzerland
MPS450-CO/FET-08 United Kingdom
MPS450-CO/FET-09 Brazil

Standard accessories

9508-0301 User Manual
BEUNVSL IEC320C14P AC Battery Eliminator

Optional accessories

9530-0072 Soft-Sided Vinyl Carrying Case
75034 Serial Cable D9M-D9F
HHC3 HHC3 Handheld Controller
5180500 Cardiac-Output Adapter Box

HHC3

MPS450 optional accessories

Cardiac output adapters

3010-0650FG GE Medical/Marquette cardiac output cable interface cable for GE Medical/Marquette pl. monitors (includes in-line switch box to select injectate temperature) (MPS450)
3010-0285 HPT-2 Temperature adapter (Hewlett Packard/Philips) (2 pin)
(COA-1 also required for cardiac output simulation on HP patient-monitoring systems)
3010-0284 COA-1 Cardiac output adapter
(HPT-2 also required for cardiac output simulation on patient-monitoring systems)
5183004FG Universal injectate temperature adapter pigtail (unterminated)

Optional temperature cables

3010-0285 Temperature adapter (Hewlett Packard/Philips 2 pin) YSI-400 MPS450
TEMP CABLE Temperature cable YSI-400 series, 1/4" phone plug
5183002FG Temperature cable YSI-700 series, 1/4" phone plug
17445 Temp cable, unterminated (universal YSI-400/700)

Optional blood pressure cables

17434 Burdick BP cable (10 socket)
17460 BCI International TK-1,BP cable (6M)
5183006FG BP/Toco cable, unterminated, PS-420/440//320
5183024 Corometrics BP cable (3 pin/3 socket)
17486 Corometrics ext toco simulation cable
17460 Criticare TK-1, (6M)

17460 Critikon-Dynamap Plus (6M)
5183008 datascope BP cable (6 socket)
17434 Datex- PB-2 BP cable, AS/3,CS/3, Compact, Cardiocap II, Critical Care, Light (10F)
17460 Drager-TK-1, BP cable, (6M)
17474 Fukuda Denshi- FD-2 BP cable PS-420/440, DS3300 (12M)
17417 Hewlett Packard/Philips HP-3 BP cable (12 pin), 78-300,-500,-800 Merlin/Viridia (12m 5uV)
MPS450-4401 BP cable HP/Philips 5UV/V IUP BP cable
17487 HP/Ag/Philips (50 & 8040 Series) iup toco simulation cable PS-320
17460 Invivo Research TK-1, BP cable (6M)
17460 Ivy Biomedical TK-1, BP cable (6M)
5183008 Kontron/Roche BP cable (6 socket)
5183027FG Marquette 7000 BP cable (8 pin)
3010-0671FG GE Medical/Marquette Eagle, Tram scope BP cable (11 pin)
17460 Medical data Electronics (MDE) BP cable (6 pin)
5183011 Mennen Medical BP cable (6 pin)
17429 Nihon Kohden-NK-1, BP cable (5M)
17460 North American Drager BP cable (6 pin)
5183024 Novametrix BP cable (3 pin/3 socket)
17460 Ohmeda BP cable (6 pin)
17460 Physio-Control-TK-1, BP cable (6M)
17460 Protocol Systems-TK-1, BP cable, (6M)
17434 Puritan Bennett-PB-2, BP cable, Puritan Bennett, (10F)
17468 Siemens-SM-1, BP cable, Micor/Mingo (15M)
17406 Siemens-SM-1, BP cable (Use with Siemens Medical Transducer Adapter (3368-383-E530U) to run a single invasive BP channel on Siemens Medical SC6000 and SC9000 series monitors.) , Sirecust Series, (10M)
5183008 SMEC BP cable (6 socket)
17460 SpaceLabs (use with SpaceLabs adapters 700-0028-00 & 0120-0551-00 when testing UltraView Command Module.) BP cable (6 pin)
5183020 SpaceLabs/Squibb BP cable Alpha/703R, (5M)
17460 SpaceLabs-TK-1, BP cable , 1050, 1700, PCMS (6M)
17460 Tektronix-Squip-TK-1, BP cable (6M)
5183006FG Universal BP adapter (pigtail/ unterminated)
5183020 Vitastat BP cable (5 pin)
17460 Vitatek/Squibb BP cable (6 pin)

This device is not to replace clinical testing of waveform detecting devices such as patient monitors.

The MPS450 Multiparameter Simulator does not provide simulations for all types of fetal heart rate tracings and contraction patterns, including the following:
- **variable decelerations**
- **sinusoidal pattern**
- **reactive tracing**
- **variations in FHR variability**
- **tachysystole**

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 200566-6 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

Fluke Biomedical.

Better products. More choices. One company.

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