

MAC* 2000

Resting ECG System



Instrument Type

Microprocessor augmented automatic electrocardiograph; 10-leadwire, 12-lead simultaneous acquisition with programmable lead configuration.

Processing

ECG Interpretation	Marquette* 12SL* ECG Analysis Program for Adults and Pediatrics
Computerized measurements	12-lead analysis
ECG analysis frequency	500 or 1000 samples/second/channel
Digital sampling rate	16,000 samples/second/channel for normal data acquisition
Pace sampling rate	75,000 samples/second/channel
ECG on-screen preview	On-screen preview of acquired 10 second ECG waveform
Acquisition mode	Provides 10 seconds of instantaneous ECG acquisition
Dynamic range	AC Differential ± 5 mV, DC offset ± 300 mV
Resolution	4.88 μ V +/-1% per LSB @ 500 SPS
Frequency range	0.04 to 150 Hz
Low cut off frequency	0.04 Hz (ADS off), 0.56 Hz (ADS On)
High cut off frequency	Configurable at 20 Hz, 40 Hz, 100 Hz or 150 Hz
Common mode rejection	>135 dB (with 50/60 Hz filter ON)
Input impedance	>10M Ω @ 10 Hz
Patient leakage	<10 μ A (Normal Condition), <50 μ A (Single Fault Condition)
Lead detection	All disconnected lead detection except RL & RA
Heart rate meter	30 to 300 BPM
Operating system	Microsoft® Windows® CE 6.0
Start-up time	Less than 30 seconds

Patient Information

Supported patient information	Patient ID, secondary patient ID, last name, first name, height, weight, gender, race, pacemaker patient, systolic BP, diastolic BP, location number, room, order number, phone number, medication, ordering physician, referring physician, attending physician, technician, test indication
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Display	
Display type	7 in. color TFT display with support of minimum 32K colors
Display resolution	WVGA resolution – 800 x 480
Display data	Heart rate, patient ID, clock, battery power indicator, waveforms, lead labels, speed, gain and filter settings, warning messages, prompts, help messages, and 12-lead display
Writer	
Writer technology	Thermal dot array
Writer speed	5, 12.5, 25, and 50 mm/s
Number of traces	Up to 12 ECG traces
Writer sensitivity/gain	2.5, 5, 10, 20, 40 mm/mV
Writer speed accuracy	5, 12.5 mm/s @ ±5% and 25, 50 mm/s @ ±2%
Writer amplitude accuracy	±5%
Writer resolution	Horizontal 40 dots/mm @ 25 mm/s, 8 dots/mm vertical
Paper type	Z-fold Thermal Paper with pre-printed grid and perforation with Queue mark or Queue hole
Paper size	Letter size 8.5 x 11 inches (214.6 mm x 280 mm) A4 size 8.27 x 11.7 inches (210 mm x 297.5 mm) (Modified Letter)
Keyboard	
Type	Membrane keyboard with tactile feedback – Soft function keys, alphanumeric keys (Qwerty key set), writer controls and Trim Pad cursor controls
Operating modes and additional features	
Resting ECG mode	Records and prints 12-lead resting ECGs with 10 seconds duration as a standard feature
Arrhythmia mode	Continuously monitors ECG and prints report when arrhythmia events of the user-selected class occur
Hookup advisor	Provides visual indication of signal quality
Multi-language support	Supports 19 languages in User Interface and 31 languages in User Manual
Order manager	Provides an interface for managing orders
File manager	Provides an interface for managing ECG Records
System setup	Provides an interface for managing Device Configuration
Pharma Application Options	
Pharma application	Pharma application options include: <ul style="list-style-type: none"> • Audit trail export • CT Data Guard • High security login protection
External Peripherals	
Keyboard	Standard USB English Keyboard
Barcode reader	Jadak-1799
Barcode Symbologies	Code 39, Code 39EX, Code 128, PDF-417, Interleaved Code 2 of 5, Data Matrix



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Communication	
<ul style="list-style-type: none"> • Internal modem, Secured Digital card, Serial, LAN, and WIFI communicates outbound to MUSE[†] and CS • Internal modem, LAN, and WIFI communicates inbound to MUSE 	
RS232 serial cable	ECG Transmission with A5 & CSI Protocol
Internal Modem	ECG Transmission with CSI Protocol
Supported MUSE/CS	Compatible with MUSE V7.1.1 and MUSE 8.0.1/CS V6.51, CS V6.61, and CS V6.71
RJ45 Wired LAN	ECG Transmission with CSI, DCP Protocol and Shared Directory
Wireless LAN (WIFI)	ECG Transmission with CSI, DCP Protocol and Shared Directory
WiFi Authentication Protocols	Open, Shared, WPA-PSK [†] , WPA2-PSK [†]
WiFi Encryption	<ul style="list-style-type: none"> • Disabled (for Open authentication) • WEP (for Shared and Open authentications) • TKIP (for WPA-PSK and WPA2-PSK authentications) • AES (for WPA-PSK and WPA2-PSK authentications)
Storage	
ECG Storage Format	XML format, Hilltop format, PDF storage format
Storage Capacity	Internal storage of 100 or 200 ECGs
Accessories	
ECG Cables/Leadwires	<ul style="list-style-type: none"> • IEC/AHA Patient cable • IEC/AHA Set of leadwires (4mm connector, defibrillator proof)
ECG Adapter	<ul style="list-style-type: none"> • IEC/AHA Kit Adapter, 10 set Banana • Electrode Prep Pads, CLIP Universal GE 10/Pkg
Electrodes	<ul style="list-style-type: none"> • Baby MAC electrodes • Silver Mactrode Plus 1000/CASE
Other accessories	<ul style="list-style-type: none"> • Electrode Cream 250g bottle, Electrode Spray • Z-fold Thermal Paper with pre-printed grid and perforation with Queue mark or Queue hole (150 sheets/pack, 1500 sheets/case) • USB data matrix barcode scanner
Electrical	
Power supply	Internal AC/DC or battery operation
AC/DC operation specifications	Input voltage: 100 to 240 VAC ±10% Input current: Maximum 1.5A in voltage range 115 V to 230 V AC Input frequency: 47 to 63 Hz
Battery specifications	Battery type: Replaceable and rechargeable, Lithium Ion Battery capacity: 14.4V and 16.8V Max @ 2.2 AH ±10%; 100 single page resting ECG recordings or 3 hours (typical) of continuous monitoring without printing, at a minimum Battery charge time: Approximately 3.5 hours after low battery shut down (with device off)

[†]Certain network settings are required for WPA-PSK and WPA2-PSK support. To determine whether your network is compatible, please refer to the MAC 2000 site survey document 2053535-067.

Physical specification

Height	8 inches/200 mm (approx.)
Width	15.5 inches/390 mm (approx.)
Depth	13 inches/330 mm (approx.)
Weight	11 pounds/5 kg including battery, without paper (approx.)

Environmental specification

Temperature	Operating: 10°C/50°F to 40°C/104°F Transport/storage: -40°C/40°F to 70°C/158°F
Humidity	Operating: 20% to 95% RH non-condensing Transport/storage: 15% to 95% RH non-condensing
Pressure	Operating: 700 to 1060 hPA (Altitude range: 3010.9 to -381.9 meters) Transport/storage: 500 to 1060 hPA (Altitude range: 5570 to -380 meters)

Safety and Regulatory

- CE marking for Council Directive 93/42/EEC concerning medical devices
- EN 60601-1 (IEC 60601-1) Medical electrical equipment - Part 1: General Requirements for Safety
- IEC 60601-1-1 Medical Electrical Equipment: General Requirements for Safety
- IEC 60601-1-2 General Requirements for Safety Electromagnetic Compatibility
- IEC 60601-1-4 Requirements for Collateral Standard Programmable Electrical Medical Systems
- IEC 60601-2-25 Safety of Electrocardiographs
- IEC 60601-2-51 Safety and performance of ECG recorders
- UL 60601-1: 2006 UL Standard for Safety Medical Electrical Equipment, Part 1: General Requirements for Safety
- CAN/CSA C22.2 No. 601.1 M90
- AAMI EC 11: 1991/(R) 2001/(R) 2007 Diagnostic Electrocardiography Devices
- AAMI EC 13: 2002/(R) 2007 Section 4.2.7 only
- IEC 60601-1-6 General Requirements for Safety – Usability

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