MAC™ 2000

Specification Sheet

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	16000 samples/second/channel for normal data acquisition
Pace sampling rate	75K 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 µV +/-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	>10MΩ @ 10 Hz
Patient leakage	<10µA (Normal Condition), <50µA (Single Fault Condition)
Lead detection	All disconnected lead detection except RL and RA

Heart rate meter	30 to 300 BPM
Operating system	Microsoft® Windows® Embedded Compact 7
Start-up time	Less than 30 seconds

Patient information

Supported patient information	Patient ID, secondary patient ID, visit 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

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 lables, 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	8.46 in x 11 in (215 mm × 280 mm) Letter
	8.27 in × 11.69 in (10 mm x 295 mm) A4
	8.43 in x 11 in (214.2 mm x 279.4 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
Exercise mode	Exercise mode for exercise stress testing
RR Analysis mode*	RR analysis for RR intervals analysis
Full Disclosure mode	Store upto 5 minutes of 1 lead data in PDF format
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
ADT and Order Query	Provides an interface for querying patient demographics and orders
File manager	Provides an interface for managing ECG Records
System setup	Provides an interface for managing Device Configuration

Stress/Pharma application options

Stress testing application	Ergometers supported include: eBike Treadmills supported include: T2100, T2000 Master's Step device without interface (acoustic signal only)
	Note: Ergometer, Master Step, and Treadmill sold separately
Pharma application options	• Date & Time Prompt upon log in • Auto Save and export to SD Card of Patient test record after acquisition • 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
Special Characters	In Italian, French, German, English and Spanish Languages

Communication

- Secured Digital card, Serial, LAN, and WIFI communicates outbound to MUSE™ and CardioSoft™
- LAN, and WIFI communicates inbound to MUSE
- MUSE Cardiology Information System and CardioSoft* compatible
- Bi-directional communication enabled with integration capabilities to MUSE, EMR, DICOM and DICOM modality work list systems workflow

RS232 serial cable Protocol	ECG Transmission with A5 and CSI
Supported MUSE/CardioSoft	Compatible with MUSE V 7.1.1, v8.0.1, v9.0.0 and NX
	CardioSoft/CS V6.51, V6.61, V6.71, V6.73 and V7
RJ45 Wired LAN	ECG Transmission with CSI, DCP Protocol, FTPS and Shared Directory‡
Wireless LAN (WIFI)	ECG Transmission with CSI, DCP Protocol, FTPS and Shared Directory‡

WiFi Authentication Protocols

Wireless Bridge Option:	Open, Shared, WPA2 with pre-shared key, WPA/WPA2 Mixed Mode with pre-shared key, WPA2 with PEAP, WPA/WPA2 Mixed Mode with PEAP, WPA2 with EAP-TLS,
	WPA/WPA2 Mixed Mode with EAP-TLS, WPA2 with EAP-TTLS,
	WPA/WPA2 Mixed Mode with EAP-TTLS, WPA2 with EAP-FAST,
	WPA/WPA2 Mixed Mode with EAP-FAST, WPA2 with LEAP,
	WPA/WPA2 Mixed Mode with LEAP
Embedded Wireless Module:	• Open • Shared • WPA – PSK* • WPA2-PSK* • WPA/WPA2 with PEAP • WPA/WPA2 with TLS • WPA/WPA2 with TTLS

Certain network settings are required for WIFI authentication. To determine whether your network is compatible, please refer to the MAC2000 site survey document DOC2368090.

WiFi Encryption

Wireless Bridge Options:	Disabled (for Open authentication), WEP (for Shared and Open authentications)
	TKIP (for WPA/WPA2 Mixed Mode authentications),
	AES (for WPA & WPA2 authentications)
Embedded Wireless Module:	• Disabled (For Open authentication) • WEP (For Shared and Open authentications) • TKIP (for WPA-PSK1, WPA2-PSK1, WPA2 authentications) • AES (for WPA-PSK1, WPA2-PSK1, WPA2 & WPA22 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	IEC/AHA Value 10LD Patient Cable/Leadwire
	10-lead IEC/AHA Patient trunk cable
	IEC/AHA Leadwire set (ECG 10-L w/resist, Banana)
	IEC/AHA Set of leadwires (4mm connector, 10 leads, defibrillator proof)
ECG Adapter	IEC/AHA Kit Adapter, 10 set Banana
	Electrode Prep Pads, CLIP Universal GE 10/Pkg
Electrodes	ECG Electrode Clamp (Large, 4/set)
	ECG Electrode Bulb (6/set)
	Baby MAC electrodes
	Silver Mactrode Plus 1000/CASE
	Electrode Application System KISS 10-lead
Other accessories	Country specific power cords
	Z-fold Thermal Paper with pre-printed grid and perforation with Queue mark or Queue hole of size:
	• 8.46 in x 11 in (215 mm × 280 mm) Letter • 8.27 in × 11.69 in (210 mm x 295 mm) A4 • 8.43 in x 11 in (214.2 mm x 279.4 mm) Modified Letter • 150 sheets/pack, 1500 sheets/case
	USB data matrix barcode scanner
	Secure Digital High Capacity Card – 2GB/4GB/8GB/16GB/32GB

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:	14.54V nominal voltage @ 3.5 AH – 10% 150 single page resting ECG recordings or 6 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) to 90% full capacity

Physical specification

Height	7.87 inches (200 mm)
Width	15.35 inches (390 mm)
Depth	Depth 12.99 inches (330 mm)
Weight	Approx. 11.02 lbs (5 kg) including battery, without paper

Environmental specification

Temperature	Operating: 50ºF to 104ºF (10ºC to 40ºC)
	Transport/storage: -104ºF to 158ºF (-40ºC to 70ºC)
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 60601-1-2 General Requirements for Safety Electromagnetic Compatibility
- IEC 60601-2-25 Safety of Electrocardiographs
- 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
- IEC 60601-1-6 General Requirements for Safety – Usability

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