GE Healthcare

MAC* 2000
Product datasheet

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 & 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

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	215 mm x 280 mm (letter) and 210 mm x 295 mm (A4), and 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
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 Query	Provides an interface for querying patient demographics
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	Pharma application options include: • Audit trail export • CT Data Guard® • High security login protection

External Peripherals	
Keyboard	Standard USB English Keyboard
Barcode reader	Jadak-1799

Communication

- Internal modem, Secured Digital card, Serial, LAN, and WIFI communicates outbound to MUSE* and CardioSoft*

- 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/CardioSoft	Compatible with MUSE V7.1.1 and MUSE 8.0.1/CardioSoft V6.51, CardioSoft V6.61, and CardioSoft 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

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 • 14-lead IEC/AHA Patient trunk cable • IEC/AHA (Nst, Nax) 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) • Baby MAC electrodes • Silver Mactrode Plus 1000/CASE • Electrode Application System KISS 10-lead without pump • Electrode Application System KISS 12-lead without pump
Other accessories	• Electrode Cream 250g bottle, Electrode Spray • Country specific power cords • Z-fold Thermal Paper with pre-printed grid and perforation with Queue mark or Queue hole of size 215 mm x 280 mm (Letter)/210 mm x 295mm (A4)/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 – 4 GB

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)

Physical specification	
Height	200 mm
Width	390 mm
Depth	330 mm
Weight	Approx. 5 Kg including battery, without paper
Environmental specification	
Temperature	Operating: 10ºC to 40ºC
	Transport/storage: -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 60601-1-1 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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GE imagination at work