MAC 5000 ECG System

Clinical excellence and workflow productivity

MAC® 5000, GE's premier ECG system, delivers advanced disease management capabilities through its industry-leading collection of proven algorithms.

The MAC 5000 system offers the sophistication required for advanced ECG applications, while its ease of use extends this level of performance to the broadest range of users possible. And it's part of the complete GE suite of networked, non-invasive testing solutions designed to maximize patient throughput and department productivity.

Add the stress option, and you combine the industry's leading high-performance resting ECG system with comprehensive, equally advanced exercise-testing capabilities in a single, compact system.

Built on GE's proven performance in ECG analysis:

- Advanced algorithms set the standard in ECG analysis and interpretation.
- Easy-to-use applications and features streamline productivity and workflow.
- Seamless connectivity to the MUSE® Cardiology Information System speeds data storage and ECG retrieval.
- Comprehensive training helps maximize your return on investment.

Now with new features that expand your capabilities:

- Optional MobileLink™ wireless communication lets you pull information directly from the MUSE System to streamline ECG workflow and reduce error potential.
- Barcode and magnetic card scanning options help reduce patient data errors.
- User-configurable password protection addresses security and HIPAA concerns.
- XML capabilities ensure flexible, open communications.
- Trolley incorporates customer-requested ease-of-use features.
Setting the mark for clinical validity and excellence in ECG analysis

Since the introduction of the Marquette® 12SL™ ECG analysis program in 1980 – which set the standard for computerized ECG analysis – GE Medical Systems Information Technologies has steadily expanded its electrocardiograph-based suite of ECG analysis programs and capabilities.

Today, we continue to lead developments in computerized ECG analysis, setting even higher levels of clinical accuracy, validity, and performance. Through extensive clinical evaluation and the use of classic and newly developed ECG interpretation criteria and measurement technologies, we steadily refine and improve our state-of-the-art suite of ECG analysis programs.

- **Regular clinical input from the world’s top consulting cardiologists and physicians** helps our own research and development engineers enhance our programs.

- **Ongoing acquisition of clinically correlated, “gold-standard” databases** allow us to continually evaluate and verify our algorithm performance. Use of the same patient assessment tests employed by practicing physicians ensures clinically accurate values.

- **Rapid assessments and improvements on very large databases** are made possible by sophisticated analysis techniques, developed by our own engineers, that enable us to quickly evaluate the accuracy of our ECG analysis programs.

Our commitment to improving the science of ECG analysis has led to the use of our algorithms across not only GE’s diagnostic and monitoring systems, but also in other industry-leading products.

This implementation makes our programs the preferred choice in a variety of care settings and industries including hospitals, clinics, physician offices, and clinical research organizations (CRO’s).
The most complete suite of analysis algorithms for advanced ECG applications

With the MAC 5000's arrhythmia and chest pain assessment tools, you can address a wider range of disease management needs, make more efficient decisions, and use involved invasive tests more judiciously.

Ongoing development by the industry's leading algorithm design staff provides the latest in advanced capabilities, while validation against clinically-verified databases offers unmatched accuracy across a diverse range of patient populations, from pediatrics to adults.

- **Marquette 12SL ECG Analysis Program for Adults and Pediatrics** – the industry's most thoroughly documented, simultaneous 12-lead ECG acquisition analysis program for uncompromising quality and reliability – remains your most clinically valuable second opinion.

- **Marquette 12SL with Gender-Specific Interpretation** features criteria that help you more easily detect acute myocardial infarction (MI) in female patients, enhancing diagnostic confidence even among occasional readers of ECGs.

- **Marquette 12SL with ACI-TIPI (Acute Cardiac Ischemia Time-Insensitive Predictive Instrument)** – this option considers a patient's age, gender, and chief complaint as well as ECG measurements to generate a numerical score that helps predict the probability of acute cardiac ischemia and provides important additional triage information for patients with chest pain.

- **Simultaneous 15-Lead Acquisition, Storage, and Assessment** provides additional ST measurements for the detection of changes that occur in some non-diagnostic 12-lead cases to facilitate the prompt detection of right ventricular and posterior MI.

- **P-Wave Signal Averaging** option for atrial arrhythmia assessment features a patented templating algorithm that enhances P-wave measurement accuracy.

- **Hi-Res Late Potential Analysis** option supports effective ventricular arrhythmia assessment, with an intuitive design that creates a practical, non-invasive alternative to involved invasive testing.

- **Enhanced Pacemaker-Detection Software** improves sensitivity to electronically paced hearts.

- **Serial ECG Comparison** program, through the MUSE Cardiology Information System, leverages the Marquette 12SL ECG analysis program and analyzes both short- and long-term changes in patient's ECGs.
Features to enhance productivity and workflow

Specifically designed to enhance your entire staff's efficiency, the MAC 5000 combines technological advances with ease-of-use features in one system.

- The digital CAM-14 Module reduces noise and artifact for clearer ECG tracings.
- Large field-of-view display gives you a clear view of the screen from any angle.
- Analog ECG output facilitates easy integration with other cardiac-diagnostic devices, such as echocardiography and nuclear medicine systems.
- Compact system design offers easy mobility.
- Extensive customization – including display and final-report formatting – accommodates individual user preferences.
- Trolley design features a convenient holder for the acquisition module, ample writing surface area, wider bins, and a covered storage compartment.
  - The MAC 5000's stress option incorporates our leading exercise-testing technologies. Signal-acquisition advances help reduce baseline wander and ST-segment distortion to generate clearer, more well-defined ECGs.
  - Barcode and magnetic card reader options help reduce errors by automating the input of patient data.

Barcode and magnetic card reading options
Complete connectivity and network access for improved accuracy and decision support

Tap into the power of GE's MUSE Cardiology Information System – the industry's predominant cardiology management system – to take resting ECG capability to an entirely new level.

- Streamline your ECG workflow with the MobileLink Wireless Communication option.
- Quickly retrieve, manage, and archive patient data through seamless, bi-directional communication with the MUSE System.
- Instantly access procedure requests and download patient demographic data from the MUSE System and Order Manager. This functionality reduces time-consuming patient data entry and minimizes delays in procedure billing.
- Review results or access the computer ECG patient record immediately, any time of day or night, using the Remote Query option for more responsive patient care.
- Access results from the clinic, office, or other remote facility using a standard modem for maximum decision-making efficiency.
- Export and store data in XML format.

Comprehensive training that further enhances your investment:

- CEU credits support your professional career.
- Just-in-time learning is delivered via training when and where you need it.
- Your entire staff receives the same level of high-quality training to ensure consistency.
## Performance Specifications

### Instrument type:
Microprocessor augmented automatic electrocardiograph; 14-leadwire acquisition with programmable lead configuration

### Processing

#### ECG Interpretation:
Marquette 12SL ECG Analysis Program for Adults and Pediatrics

#### Computerized Measurements:
15-lead analysis includes measurements of user-selectable additional 3 leads

#### Optional:
Hi-Res Late Potential Analysis and P-Wave Signal – Averaged ECG

#### Additional ECG Function:
Vectorcardiography

#### ECG Analysis Frequency:
500 samples/second (sps)

#### ECG Storage:
150 typical, 200 ECGs maximum on removable media (1.44 MB, 3.5 in diskette)

#### Digital Sampling Rate:
4000 samples/second/channel

#### Pre-Acquisition:
Provides 10 seconds of instantaneous ECG acquisition

#### Dynamic Range:
AC Differential $\pm$ 5mV
DC offset $\pm$320 mV

#### Resolution:
4.88 $\mu$V/LSB @ 250 sps
1.22 $\mu$V/LSB @ 500 sps

#### Frequency Response:
$-3 \text{ dB} @ 0.01$ to 150 Hz

#### Common Mode Rejection:
$>140 \text{ dB} (123 \text{ dB with AC filter disabled})$

#### Input Impedance:
$>10M\Omega @ 10 \text{ Hz}$, defibrillator protected

#### Patient Leakage:
$<10 \mu\text{A}$

#### Pace Detect:
Orthogonal LA, LL, and V6; 750 $\mu\text{V} @ 50 \mu\text{s}$

#### Special Acquisition Functions:
Disconnected lead detection, electrode impedance, excessive AC noise, baseline wander and muscle tremor messages

#### Heart Rate Meter:
30 to 300 BPM $\pm$10% or 5 BPM, whichever is greater. Heart rates outside this range will not be displayed.

### Communications

#### MUSE Cardiology Information System compatible

#### Optional:
Modem and Fax transmission, Remote Retrieval (Remote Query), Wireless (MobileLink)

## Performance Specifications (cont.)

### Display

#### Display Type:
10.4 in (264 mm) diagonal graphics backlit AM LCD (color optional)

#### Display Resolution:
640 x 480 pixels with waveform enhancement

#### Display Data:
Heart rate, patient name, ID, clock, waveforms, lead labels, speed, gain and filter settings, warning messages, prompts, and help messages

### Writer

#### Writer Technology:
Thermal dot array

#### Writer Speeds:
5, 12.5, 25, & 50 mm/s (same as displayed)

#### Number of Traces:
3, 6, 12, or 15, user-selectable (same as displayed)

#### Writer Sensitivity/Gain:
2.5, 5, 10, 20, 10/5 (split calibration) mm/mV (same as displayed)

#### Writer Speed Accuracy:
$\pm 2\%$

#### Writer Amplitude Accuracy:
$\pm 5\%$

#### Writer Resolution:
Horizontal 1000 dpi @ 25 mm/s, 200 dpi vertical

#### Paper Type:
Thermal, Z-fold, perforated, fan fold, 300 sheets/pack

#### Paper Size:
A Size: 8.45 in x 11 in (214.63 mm x 280 mm)
A4 Size: 8.27 in x 11.7 in (210 mm x 297.5 mm)

### Keyboard

#### Type:
Sealed elastomer with soft function keys, alphanumeric keys, writer controls, and TrimPad cursor controls

### Electrical

#### Power Supply:
AC or battery operation

#### Voltage:
100 to 240 VAC $\pm10$, $\pm15$

#### Current:
0.5A @ 115 VAC, 0.3A @ 240 VAC, typical

#### Frequency:
50 to 60 Hz $\pm10\%$

#### Battery Type:
User replaceable, 18V @ 3.5 AH $\pm10\%$ rechargeable NiMH

#### Battery Capacity:
100 single page reports (typical) or 6 hours continuous display (without printing)

#### Battery Charge Time:
Approximately 4.5 hours from total discharge (with display off)
### Performance Specifications

#### Vectorcardiography

**Report Formats:** Vector loops of component vectors (P, QRS, ST-T)

**Sensitivity:** 20, 40, 80, or 160 mm/mV

**Time Resolution:** 2 ms

#### Hi-Res Late Potential Analysis and P-Wave Signal–Averaged ECG

**Frequency**

- Upper Limit: 250 Hz
- Lower Limit: 0.01, 25, 40, or 80 Hz

**Sensitivities:**

- **Raw Data Template:** 20 mm/mV
- **Average Beat:** 20 mm/mV and 50 mm/mV
- **Filtered Signals and Vector Magnitude:** 1 mm/μV

**Analysis Sampling Rate:** 1000 samples/second/channel

**Digital Sampling Rate:** 4000 samples/second/channel

**High/Low Pass Filters:** Special filter using Fast Fourier Transform (FFT)

**ADC Resolution:** 1.22 μV/LSB

**Analysis Resolution:** 0.1525 μV/LSB

### Physical Specifications

**Height:** 3.7 in (9.4 cm) * with display closed

**Width:** 15 in (38.1 cm) *

**Depth:** 13.8 in (35.1 cm) *

**Weight:** Approximately 6.8 kg (15 lbs) * including battery without paper

### Environmental Specifications

**Temperature:**

- **Operating:** 50° to 104° F (10° to 40° C)
- **Transport/Storage:** −40° to 158° F (−40° to 70° C)

**Humidity:**

- **Operating:** 20% to 95% RH non-condensing
- **Transport/Storage:** 15% to 95% RH non-condensing

**Pressure:**

- **Operating:** 700 to 1060 hPA
- **Transport/Storage:** 500 to 1060 hPA

### Magnetic Card Reader

**Character Set**


### Keyboard Wedge/Decoder

**Dimensions:**

- **Height:** 1.18 in (3.0 cm)
- **Length:** 3.25 in (8.3 cm)
- **Width:** 2.88 in (7.3 cm)

**Electrical:** Complies with UL, CSA, and VDE

**Temperature Ranges:**

- **Operating:** 32° F to 104° F (0° C to 40° C)
- **Storage:** 40°F to 158°F (-40°C to 70°C)

**Humidity:**

- 0% to 95% non-condensing

**Mechanical Shock:** Functions normally after twelve 6 ft. (1.8 cm) drops onto a concrete surface

**EMI Radiation:**

- FCC Class A and **EN55022 Class B (1988)**

**ESD Sensitivity:**

- Meets **IEC 801-2: 1991/1984 and a minimum of 300 discharges at 2.5 kv intervals from 2.5 kv to 17.5 kv**

**Radiated Susceptibility:**

- Meets **IEC 801-3: 1984**

**Electrical Fast Transients:**

- Meets **IEC 801-4: 1988**

*** These requirements combined with EN50082-1: 1992 indicate conformity to the EMC directive 89/336/EEC**
Bar Code Scanner

Specifications

<table>
<thead>
<tr>
<th>Symbologies</th>
<th>Code 39 (extended), PDF-417</th>
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<tbody>
<tr>
<td>Dimensions:</td>
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<tr>
<td>Height</td>
<td>6.0 inches (15.2 cm)</td>
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<tr>
<td>Length</td>
<td>5.3 inches (13.5 cm)</td>
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<td>Width</td>
<td>3.1 inches (7.9 cm)</td>
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<td>Light Source</td>
<td>630 nm visible red LED</td>
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<td>Temperature Ranges:</td>
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<tr>
<td>Operating</td>
<td>32° F to +122° F (0° C to 50° C)</td>
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<tr>
<td>Storage</td>
<td>-4° F to +140° F (-20° C to +60° C)</td>
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<tr>
<td>Humidity</td>
<td>0 to 95% non-condensing</td>
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<tr>
<td>Mechanical</td>
<td>Operational after 25 drops from 5 feet (1.53m) to concrete</td>
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<tr>
<td>Vibration</td>
<td>Withstands 5G peak from 20 to 300 Hz</td>
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<td>ESD Sensitivity</td>
<td>15 kV to any external surface</td>
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<td>Agency Compliance</td>
<td>FCC Class B, EMC Class B, CE Low Voltage Directive, EN60825-1, IEC60825-1, LED Safety: Class 1, UL, cUL, TÜV Certified to EN60950, C-Tic</td>
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</tbody>
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Certification
UL classification, CSA classification, CE marking, CB certificate

Warranty
Standard warranty is one year

Ordering Information
Available in: Dutch, English, French, German, Italian, Spanish, Swedish, Japanese, Danish and Norwegian
Visit gemedical.com or contact your local GE Medical Systems Information Technologies representative.

Accessories available from www.gemedical.com

Bar Code Scanner

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