Electrocardiograph, ECG

UMDNS		GMDN	
16231	Electrocardiographs, Multichannel, Interpretive	16231	Interpretive multichannel electrocardiograph
18330	Electrocardiographs, Multichannel, Interpretive, Signal-Averaging	17687	Signal-averaging multichannel electrocardiograph
18329	Electrocardiographs, Multichannel, Noninterpretive	11413	Single-channel electrocardiograph
17687	Electrocardiographs, Multichannel, Noninterpretive, Signal-Averaging		
11413	Electrocardiographs, Single-Channel		

Other common names:
Computer-assisted electrocardiographs; interpretive ECG machines; interpretive electrocardiographs; automated electrocardiographs; EKG machines; Electrocardiograph multichannel;

Health problem addressed

Electrocardiographs detect the electrical signals associated with cardiac activity and produce an ECG, a graphic record of the voltage versus time. They are used to diagnose and assist in treating some types of heart disease and arrhythmias, determine a patient's response to drug therapy, and reveal trends or changes in heart function. Multichannel electrocardiographs record signals from two or more leads simultaneously and are frequently used in place of single-channel units. Some electrocardiographs can perform automatic measurement and interpretation of the ECG as a selectable or optional feature.

Product description

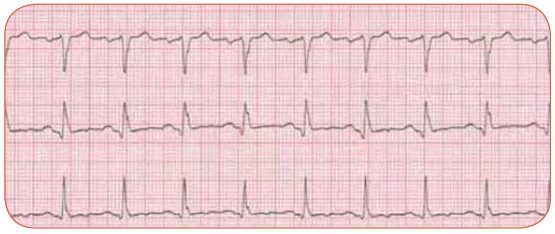
ECG units consist of the ECG unit, electrodes, and cables. The 12-lead system includes three different types of leads: bipolar, augmented or unipolar, and precordial. Each of the 12 standard leads presents a different perspective of the heart's electrical activity; producing ECG waveforms in which the P waves, QRS complex, and T waves vary in amplitude and polarity. Single-channel ECGs record the electric signals from only one lead configuration at a time, although they may receive electric signals from as many as 12 leads. Noninterpretive multichannel electrocardiographs only record the electric signals from the electrodes (leads) and do not use any internal procedure for their interpretation. Interpretive multichannel electrocardiographs acquire and analyze the electrical signals.

Principles of operation

Electrocardiographs record small voltages of about one millivolt (mV) that appear on the skin as a result of cardiac activity. The voltage differences between electrodes are measured; these differences directly correspond to the heart's electrical activity. Each of the 12 standard leads presents a different perspective of the heart's electrical activity; producing ECG waveforms in which the P waves, QRS complex, and T waves vary in amplitude and polarity. Other lead configurations include those of the Frank system and Cabrera leads. The Frank configuration measures voltages from electrodes applied to seven locations—the forehead or neck, the center spine, the midsternum, the left and right midaxillary lines, a position halfway between the midsternum and left midaxillary electrodes, and the left leg.

Operating steps

After the electrodes are attached to the patient, the user selects automatic or manual lead switching, signal sensitivity, frequency-response range, and chart speed. In some units, the operator can choose the lead groupings, their sequence, and the recording duration for each group. In standard 12-lead tracings, signals from each group of leads (i.e., bipolar, augmented, precordial) can be recorded for 2.5 seconds. For a rhythm strip, one lead (usually lead II) is recorded for a full 12 seconds.



Reported problems

Because electrocardiographs have electrical safety standards that are well established and adhered to by all major manufacturers, few problems are associated with their use. Of these, the most common is artifact or noise (e.g., broken electrode wires, poor electrode cleaning or improper application, poor skin preparation, patient movement, baseline drift, and interference). Incorrect placement of ECG leads can cause an abnormality to be overlooked. Chest wall thickness can also affect diagnostic accuracy.

Use and maintenance

User(s): Physicians, nurses, other medical staff

Maintenance: Biomedical or clinical engineer/ technician, medical staff, manufacturer/ servicer

Training: Initial training by manufacturer, operator's manuals, user's guide

Environment of use

Settings of use: Hospital (all areas), family medicine practices and other medical offices

Requirements: Uninterruptible power source, battery backup, appropriate electrodes

Product specifications

Approx. dimensions (mm): 120 x 400 x 350

Approx. weight (kg): 6

Consumables: Batteries, cables, electrodes

Price range (USD): 975 - 6,000

Typical product life time (years): 10

Shelf life (consumables): 1-2 years for disposable electrodes/sensors

Types and variations

Portable, cart, desktop, tabletop