

3M™ Red Dot™ Electrodes

Factors affecting ECG trace quality

Monitor



- CMRR (Common Mode Rejection Ratio) used to separate ECG from other signals
- Filters
- Bandwidth (frequency response)
- Amplifier noise
- Ground loops
- Saturation distortion (e.g. defibrillation recovery)
- Input impedance
- Differential input (required to generate ECG tracing)

Skin



- Impedance
- Diaphoresis
- Dryness
- Oiliness
- EMG, respiration and other biopotentials (physiological electrical signals)
- Skin preparation techniques
- Obesity
- Skin stretch
- Motion artifact

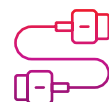
Electrode



- Adhesion
- Conductor
- Gel
- Backing
- Size
- Design
- Motion
- Shelf life
- Application technique
- Electrical/mechanical properties
- Location on the body



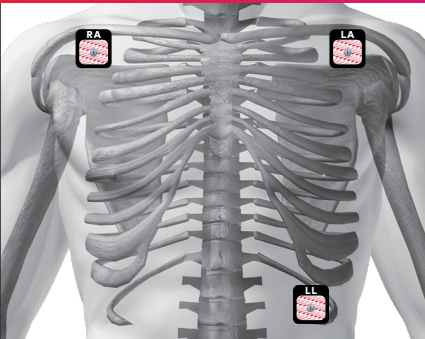
- Electrical field (60 Hz)
- Humidity
- Temperature
- Static electricity
- Magnetic field
- Radiofrequency
- Vicinity of other machines (nebulizers, fans, power cords, etc.)



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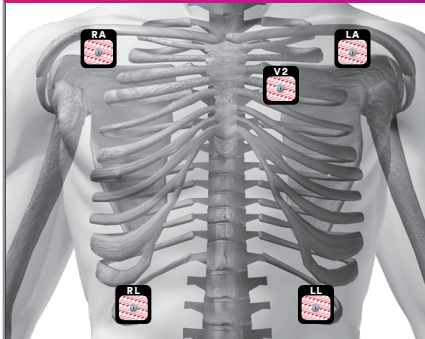
ECG electrode placement

3-lead placement
Monitoring electrodes



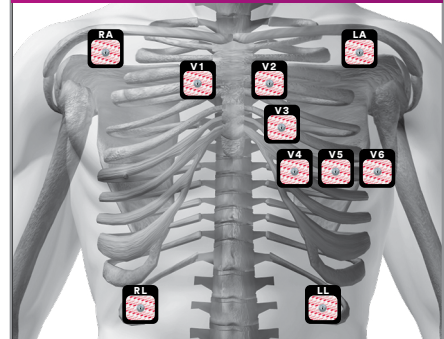
RA: Second intercostal space lateral right side
LA: Second intercostal space lateral left side
LL: Lower left lateral chest or left leg

5-lead placement
Monitoring electrodes



RA: Second intercostal space lateral right side
LA: Second intercostal space lateral left side
LL: Lower left lateral chest or left leg
RL: Lower right lateral chest or right leg
V2: Fourth intercostal space to the left of the sternum


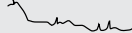




12-lead placement
Resting electrodes



RA: Second intercostal space lateral right side
LA: Second intercostal space lateral left side
LL: Lower left lateral chest or left leg
RL: Lower right lateral chest or right leg
V1: Fourth intercostal space to the right of the sternum
V2: Fourth intercostal space to the left of the sternum
V3: Between V2 and V4
V4: Fifth intercostal space along the mid-clavicular line
V5: Fifth intercostal space between V4 and V6
V6: Fifth intercostal space along the mid-axillary line

Troubleshooting ECG traces

Troubleshoot each artifact in order, starting with ①

Artifacts	Skin impedance	Muscle movement	Electrical continuity	Electrodes	Cabling	Interference	Equipment
No base line 			② Check all connections/ perform continuity check	④ Check for dry-out	③ Check for proper cable		① Check lead switch and ECG machine set-up
Base line wander 	③ Abrade skin	① Stop patient movement	② Check ground connections	④ Use same type of electrodes at all sites	⑥ Check for proper cable	⑤ Check for static build-up	
AC noise 	③ Abrade skin	⑥ May be untreatable involuntary muscle tremor	① Check ground connections	⑤ Check for dry-out	⑦ May need fully shielded cable and lead wires	② Keep cable away from AC cord	④ Turn off fluorescent lights and/or other equipment
Intermittent signal 			① Check for loose connections	② Check for loose electrode or dry-out	④ Perform continuity check	③ Check for static build-up	
Motion artifact 	② Abrade skin	① Move electrodes off muscle mass	③ Check for loose connections	④ Check for loose electrode or dry-out	⑦ Perform continuity check	⑤ Turn off fluorescent lights and/or other equipment	⑥ Check for proper EKG machine set-up
Low amplitude 	③ Abrade skin		① Check all connections	④ Check for dry-out		⑤ Turn off radio, TV and/or other equipment	② Check gain settings



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