

Interactions Between Hospital Monitoring or Diagnostic Equipment and Pacemakers Using Minute Ventilation Sensors

SUMMARY

Hospital monitoring or diagnostic equipment has the potential to interact with implanted pacemakers that utilize minute ventilation (MV) rate-response control. Always program MV Off during mechanical ventilation.

To resolve suspected interactions, consider one of the following:

- Program the device to a non-rate responsive mode.
- Deactivate the MV feature.
- Activate magnet rate to ignore MV data and pace asynchronously.

CRM PRODUCTS REFERENCED*
 PULSAR®, PULSAR MAX, PULSAR MAX II,
 INSIGNIA® Plus, INSIGNIA Ultra,
 ALTRUA™, ZOOM® LATITUDE®
 Programmer

*Products referenced herein may not be approved in all geographies. For comprehensive information on device operation, reference the appropriate product labeling.

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Certain Boston Scientific rate-adaptive pacemakers may use minute ventilation (MV) to drive the pacing rate during activity. The MV sensor uses a transthoracic impedance measurement to monitor respiratory pattern changes and to calculate the sensor-indicated rate. To obtain the transthoracic impedance, a low-level electrical current is applied between two electrodes (Figure 1).

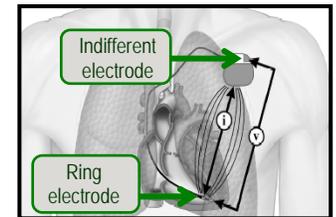
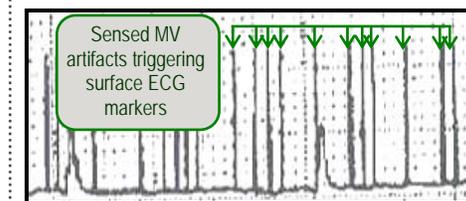
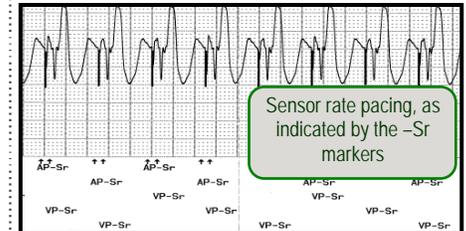


Figure 1. Transthoracic impedance used for MV.

Potential Interactions

Some hospital equipment used for monitoring a patient's respiratory, cardiac, and hemodynamic parameters deliver similar low-level electrical currents into the body to obtain transthoracic impedance measurements. Examples of such equipment include, but are not limited to respiratory monitors, diagnostic echo imaging, and ECG and hemodynamic machines. Since impedance measurements from this and other types of hospital or diagnostic equipment are obtained using similar operating principals as the MV feature in some Boston Scientific pacemakers, one device may temporarily interfere with the other when used in combination. For example:

- **External equipment-to-pacemaker interaction.** The pacemaker may detect both the external monitor's test signals and its own impedance test signals, which could result in an inappropriate pacing rate, possibly up to the maximum sensor rate.
- **Pacemaker-to-external equipment interaction.** A surface ECG monitor may sense the implanted pacemaker's MV signals, which may alter diagnostic test results or appear as artifacts on the external surface ECG.



Resolving Suspected Interactions

To resolve suspected interactions between hospital monitoring and/or diagnostic equipment and implanted pacemakers using MV sensor technology, consider the following:

- If a ZOOM® LATITUDE® programmer is available, program the device to a non-rate responsive mode (e.g., DDD), or program the MV feature to Passive or Off.
- If a programmer is not available, apply a magnet to the pacemaker to disregard MV data and pace asynchronously at 100 ppm. Asynchronous pacing will continue as long as the magnet remains positioned over the implanted device.
- **MV should always be programmed Off during mechanical ventilation.**
- If a pacemaker MV signal is triggering artifacts on an external ECG recorder, consider having the pacing spike enhancement feature tuned Off, if appropriate.

Upon completion of medical procedures which introduce electrical signals into the body, confirm pacemaker function and if necessary, reprogram the pacemaker.