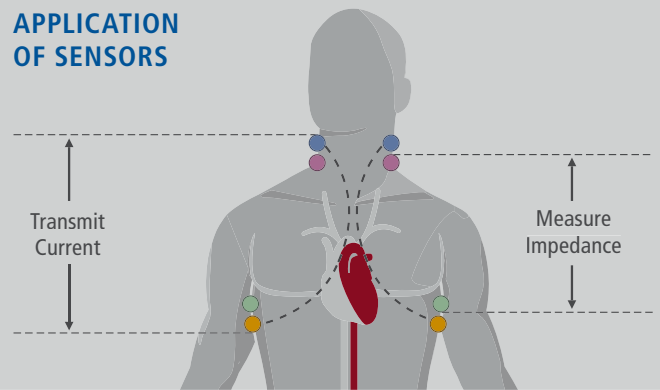


# BASICS OF IMPEDANCE CARDIOGRAPHY · ICG

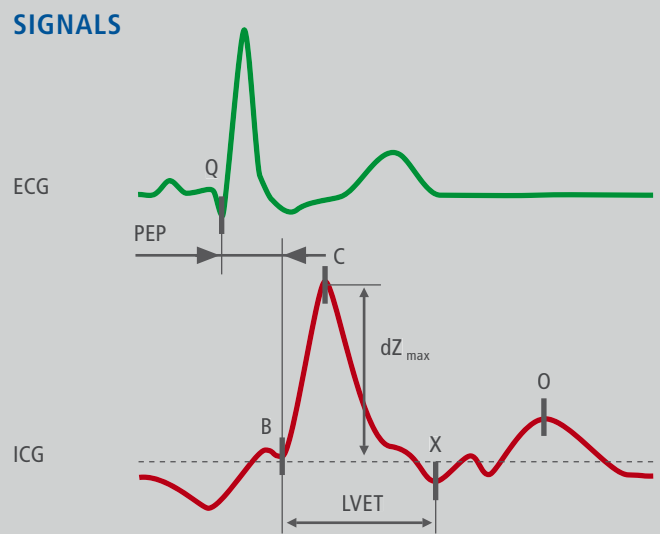
In case of impedance cardiography – often also named electrical bio-impedance or thoracic electrical bio-impedance (TEB) – pulse synchronous variations of the blood flow and volume in the thoracic aorta are determined by measuring changes in electrical impedance of the thorax. For this purpose a very low constant and alternating current (1.5 mA, 86 kHz) is applied which is imperceptible to the patient. The pulse synchronous impedance changes are caused by the blood volume variations in the aorta and the alignment of the orientation of the erythrocytes when the blood is pumped out of the left ventricle of the heart.

For the calculation of the stroke volume the ICG curve is used what is the derived curve of the measured impedance change. In this curve the fiducial points are detected.

## APPLICATION OF SENSORS



## SIGNALS



- B Opening of aortic valve
- C Maximum systolic flow
- X Closing of aortic valve
- O Opening of mitral valve
- PEP Pre-Ejection Period
- LVET Left Ventricular Ejection Time
- $dZ_{max}$  ICG Amplitude

## CALCULATION

$$SV = V_{EPT} \times \frac{dZ_{max}}{Z_0} \times LVET$$

- SV Stroke Volume
- $V_{EPT}$  Part of the thorax volume which is electrically participated, calculated from patient's data : weight, height, gender and age
- $dZ_{max}$  Amplitude of the systolic ICG wave what represents the maximum slope of the impedance change
- $Z_0$  Base impedance (overall impedance of the thorax)
- LVET Left Ventricular Ejection Time what is the time interval between Opening and closing of the aortic valve

