ICG Measured and Calculated Parameters

Parameter	Abbrev.	Definition	Normal Range	Derivation/Formula
Heart Rate	HR	Number of heart beats each minute	58 - 86 bpm (beats per minute)	Measurement of the R-R interval on the ECG and extrapolation to bpm.
Mean Arterial Pressure (SBP & DBP)	MAP	Average pressure exerted by the blood on the arterial walls.	84 – 100 mmHg	1. If SBP and DBP values manually entered, the formula for MAP = (SBP – DBP)*KP) + DBP 2. If automatic BP (oscillometric method is used), MAP is measured directly and SBP and DBP are derived.
Cardiac Output	CO	Amount of blood pumped by the left ventricle each minute	4.5 – 8.5 l/min (liters per minute)	CO = SV x HR
Cardiac Index	CI	Cardiac Output normalized for body surface area	2.5 - 4.7 l/min/m^2 (liters per minute per meter squared)	CI = CO / BSA
Stroke Volume	SV	Amount of blood pumped by the left ventricle each heartbeat	60 – 130 ml (milliliters)	Z MARC Algorithm: $SV = VEPT \cdot LVET \cdot VI$
Stroke Index	SI	Stroke volume normalized for body surface area	35 - 65 ml/beat/m^2 (milliliters per heart beat per meter squared)	$SI = \frac{SV}{BSA}$
Systemic Vascular Resistance	SVR	The resistance to the flow of blood in the arterial system (often referred to as “Afterload”)	742 – 1378 dynes sec / cm^5 (dynes second per centimeter to the fifth power)	$SVR = 80 \cdot \frac{(MAP - CVP)}{CO}$
Systemic Vascular Resistance Index	SVRI	The resistance to the flow of blood in the arterial system normalized for body surface area	1337 – 2483 dynes sec m^2 / cm^5 (dynes second meters squared per centimeter to the fifth power)	$SVRI = 80 \cdot \frac{(MAP - CVP)}{CI}$
Acceleration Index	ACI	Initial acceleration of blood flow in the aorta, which occurs within the first 10 - 20 milliseconds after the opening of the aortic valve	Males: 70 – 150 / 100 sec^2 Females: 90 – 170 / 100 sec^2 (per 100 seconds squared)	$ACI = \frac{d^2Z/dt^2_{MAX}}{TFI}$

Parameter	Abbrev.	Definition	Normal Range	Derivation/Formula
Velocity Index	VI	Peak velocity of blood flow in the aorta	33 - 65 / 1000 sec (per 1000 seconds)	$VI = \frac{dZ/dt_{MAX}}{TFI}$
Thoracic Fluid Content	TFC	The electrical conductivity of the chest cavity, which is primarily determined by the intravascular, intraalveolar, and interstitial fluids in the thorax	Males: 30 – 50 / kohm Females: 21 - 37 / kohm	$TFC = \frac{1}{TFI}$
Left Cardiac Work	LCW	An indicator of the amount of work the left ventricle must perform to pump blood each minute	5.4 - 10 kg m (kilogram meter)	$LCW = (MAP - PAOP) \cdot CO \cdot 0.0144$
Left Cardiac Work Index	LCWI	LCW normalized for body surface area	3.0 - 5.5 kg m / m^2 (kilogram meter per meter squared)	$LCWI = (MAP - PAOP) \cdot CI \cdot 0.0144$
Systolic Time Ratio	STR	The ratio of the electrical and mechanical systole	0.3 - 0.5	$STR = \frac{PEP}{LVET}$
Pre Ejection Period	PEP	The time interval from the beginning of electrical stimulation of the ventricles to the opening of the aortic valve (electrical systole)	Depends on HR, preload, and contractility	Time interval from the beginning of the Q wave on the ECG to the B point on the dZ/dt waveform
Left Ventricular Ejection Time	LVET	The time interval from the opening to the closing of the aortic valve (mechanical systole)	Depends on HR, preload, and contractility	Time interval from the B point to the X point on the dZ/dt waveform

VEPT	Volume of Electrically Participating Tissue (volume conductor for size of thorax affected by height, weight, and sex)
TFI	Thoracic Fluid Index, which is the baseline thoracic impedance, Z_0
SBP/DBP	Systolic Blood Pressure/Diastolic Blood Pressure
KP	A variable which is dependant on pulse pressure ratio, usually varying between 0.25 – 0.33
BSA	Body Surface Area
dZ/dt_{MAX}	Maximum of the first time derivative of delta Z
d^2Z/dt^2_{MAX}	Maximum of the second derivative of delta Z
CVP	Central Venous Pressure, the BP in the thoracic vena cava and right atrium (default value of 6 mm Hg)
PAOP	Pulmonary Artery Occlusion Pressure or “wedge” pressure (default value of 10 mm Hg)