Anaestheasier

Graphical Flashcards

Physics

For the Primary FRCA

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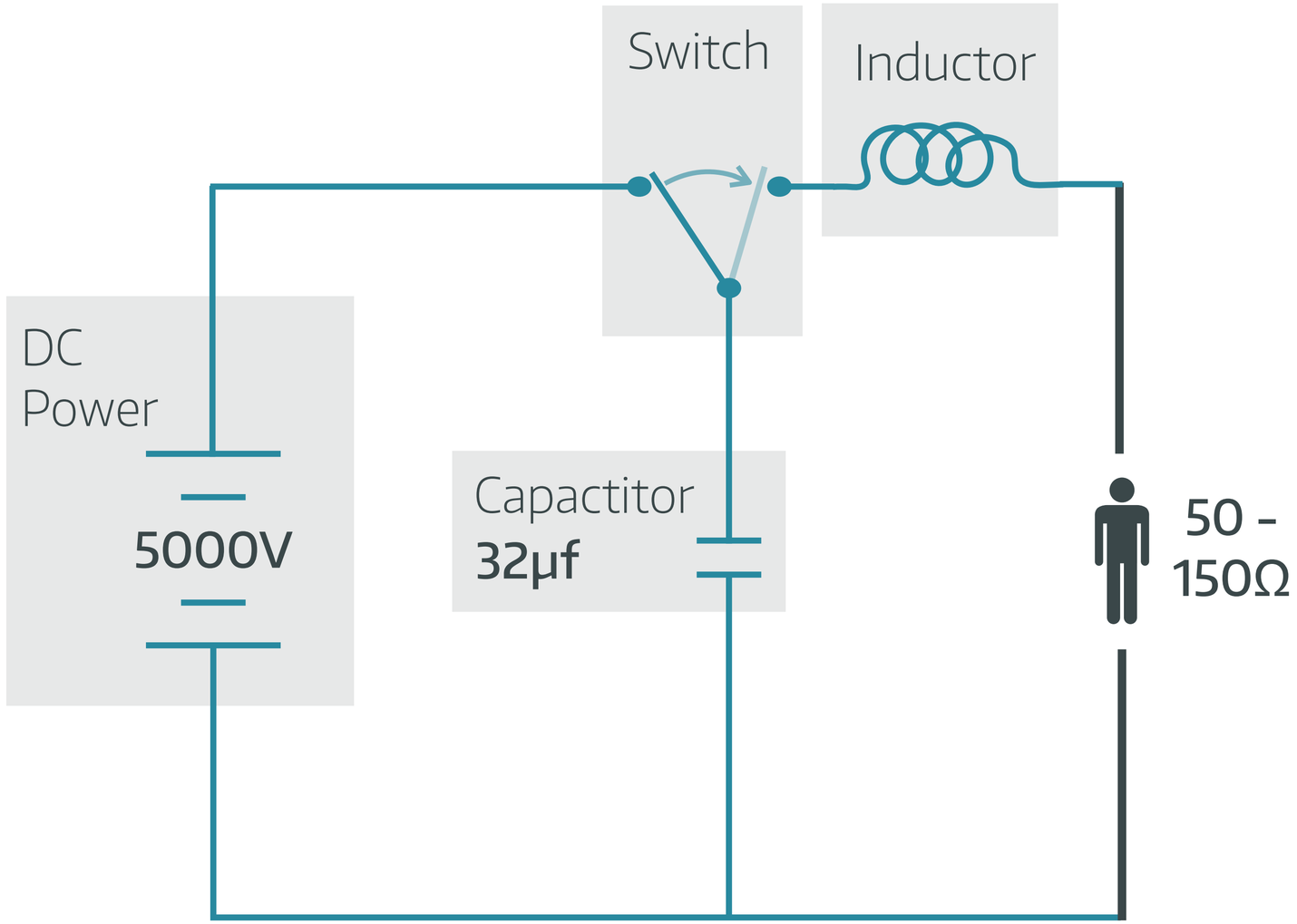
Defibrillators



Monophasic Shock

35A for 3ms

Biphasic

May require less energy and cause less damage

Transthoracic Impedance

Repeated DC shocks cause a decline in transthoracic impedance due to increasing blood flow and tissue oedema. This results in increasing energies delivered to the myocardium with each subsequent shock.

Useful Equations

$V = I R$

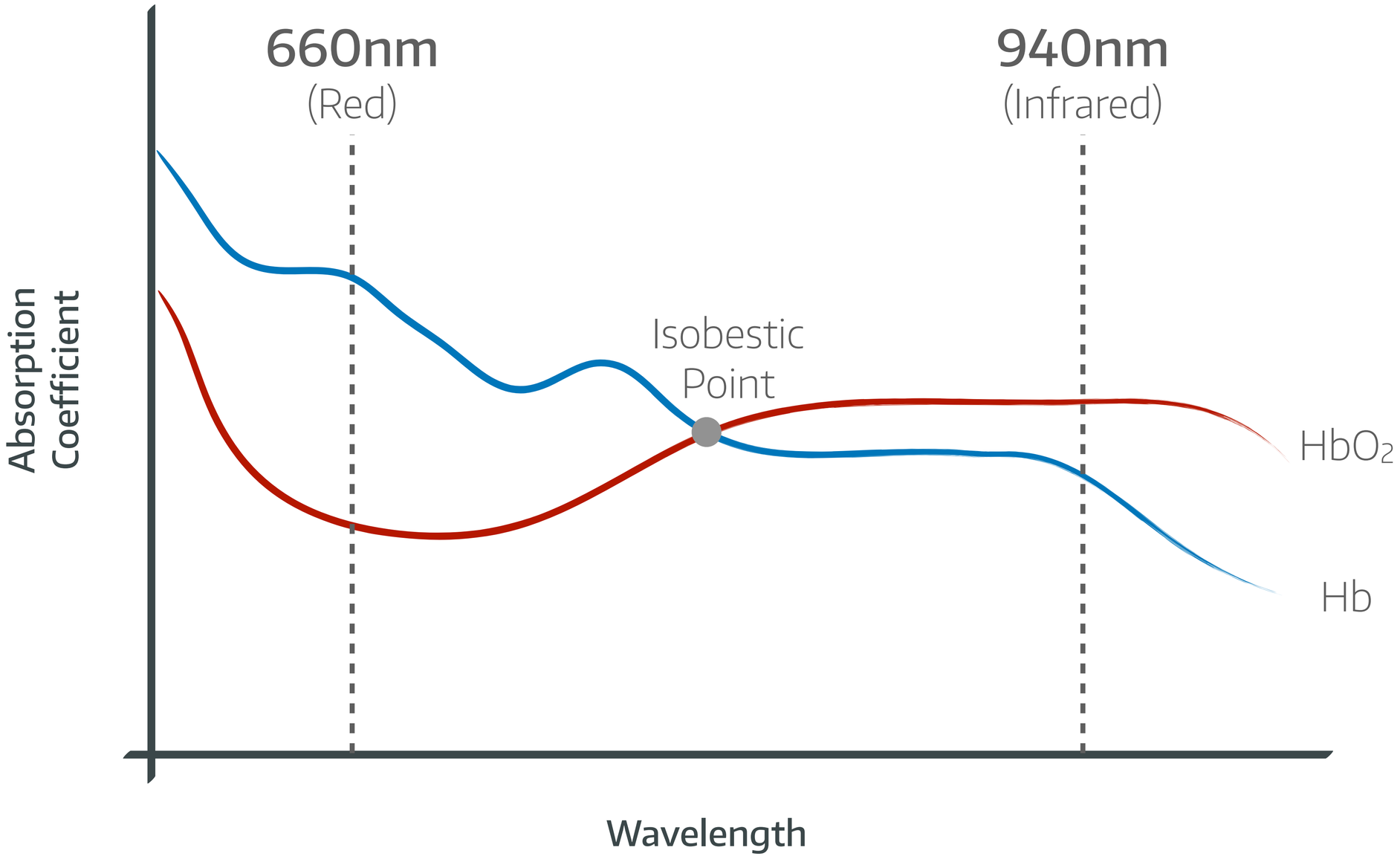
$P = I V = I^2 R$

$Q = I t = C V$

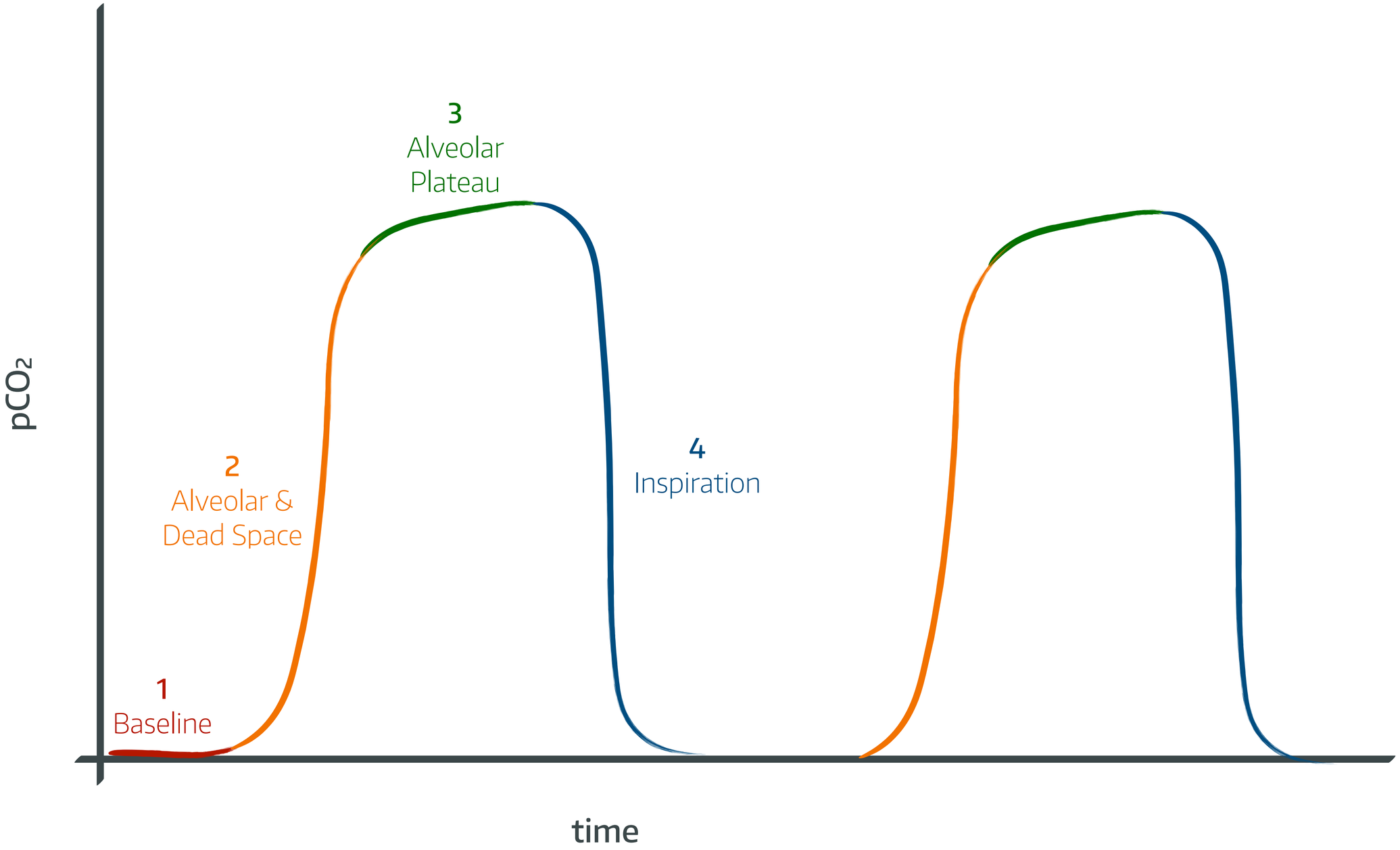
$E = \frac{1}{2} Q V = C V^2$

V = voltage
I = current
R = resistance
P = power
t = time
C = capacitance
Q = charge

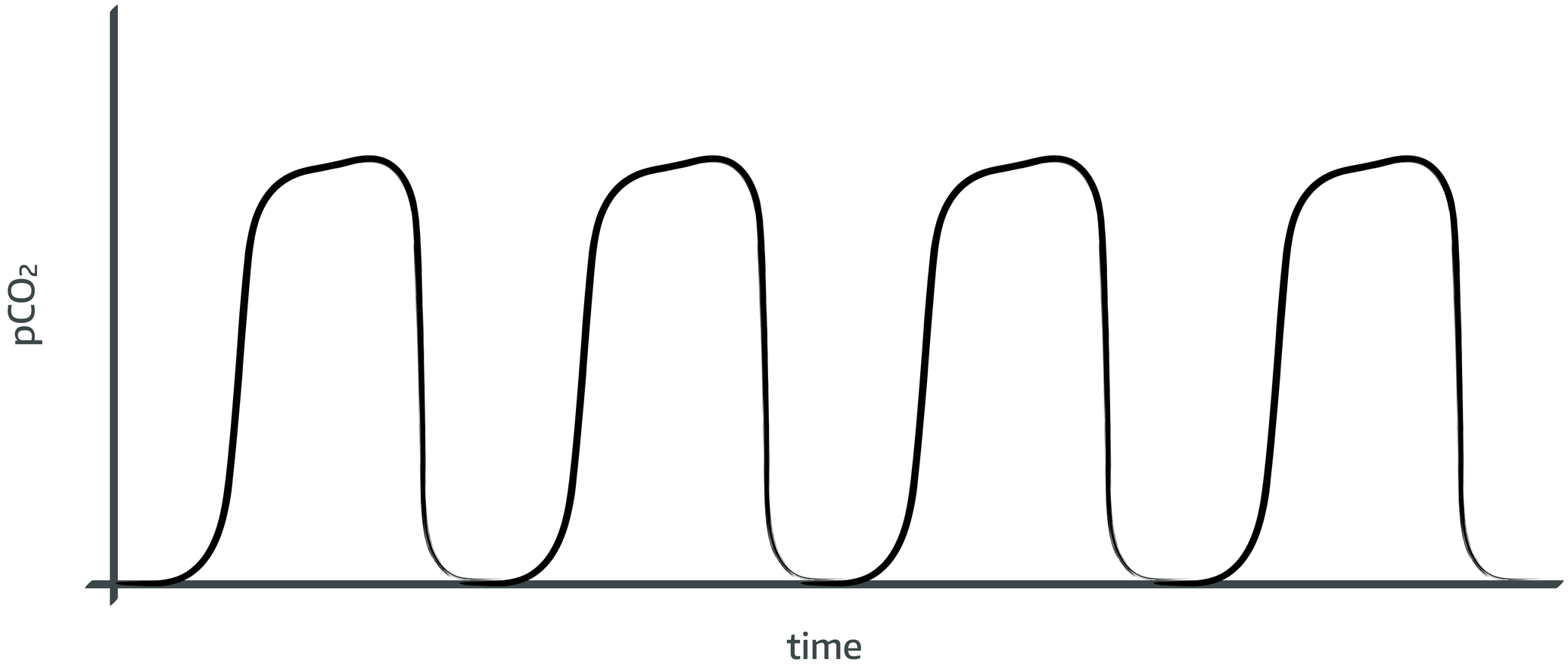
Pulse Oximetry



CAPNOGRAPHY



CAPNOGRAPHY



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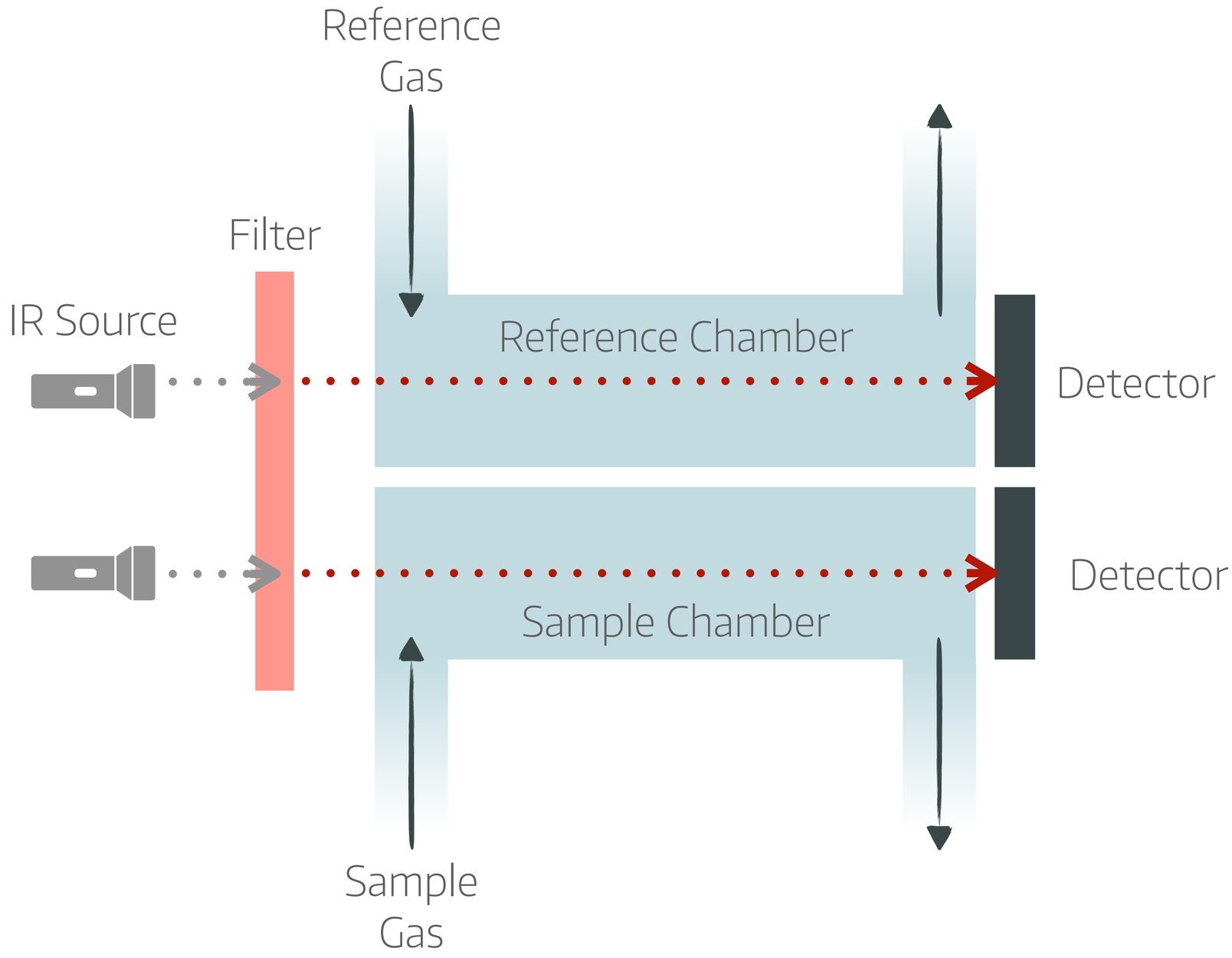
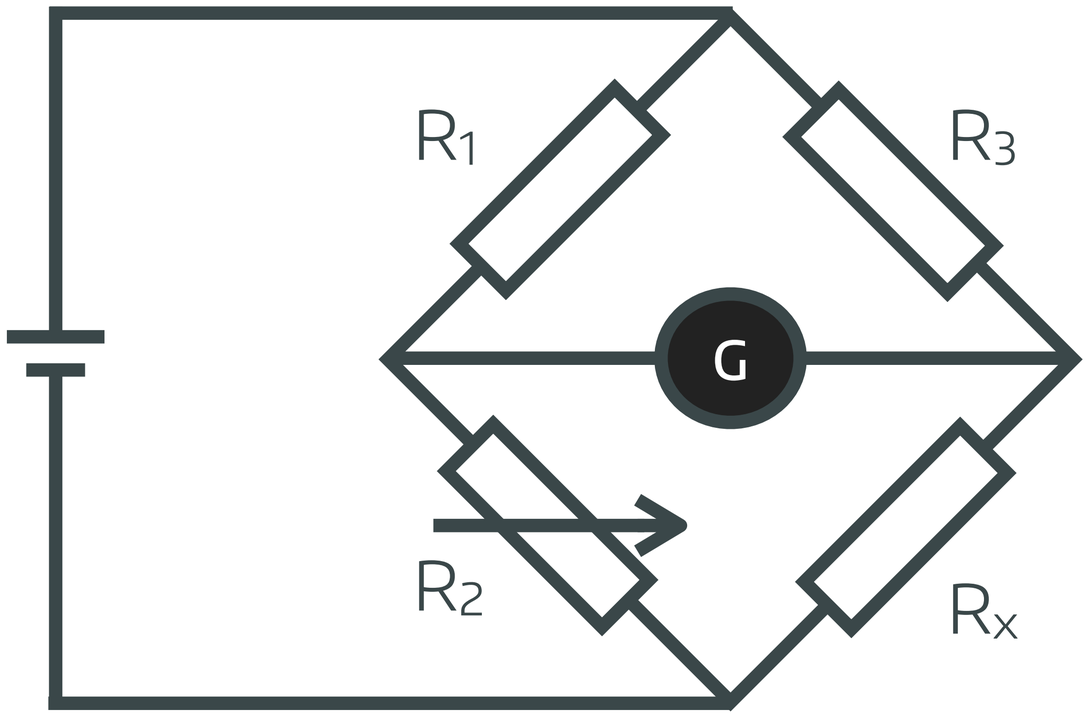


Wheatstone Bridge



If $\frac{R_1}{R_2} = \frac{R_3}{R_x}$

then the bridge is **balanced** and no current flows through the galvanometer

VENTILATORS

1 Breath = **Inspiration** (positive flow) + **Expiration** (negative flow)

Trigger: initiates the start of **inspiration**
Cycle: initiates the start of **expiration**

→ may be patient-initiated or ventilator-initiated

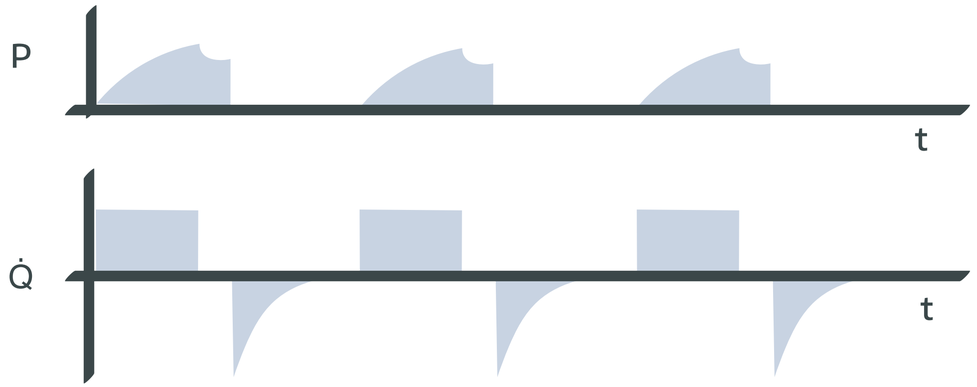
	Continuous Mandatory	Intermittent Mandatory	Continuous Spontaneous
Pressure Control	PC - CMV	PC - SIMV	PC - CSV
Volume Control	VC - CMV	VC - SIMV	N/A

VENTILATORS

Breath Control Variable	+	Breath Sequence	+	Targeting Scheme	=	VENTILATION MODE
Volume Control		Continuous Mandatory		Set Point		
Pressure Control		Intermittent Mandatory		Dual		
		Continuous Spontaneous		Bio-variable		
				Servo		
				Optimal		
				Intelligent		

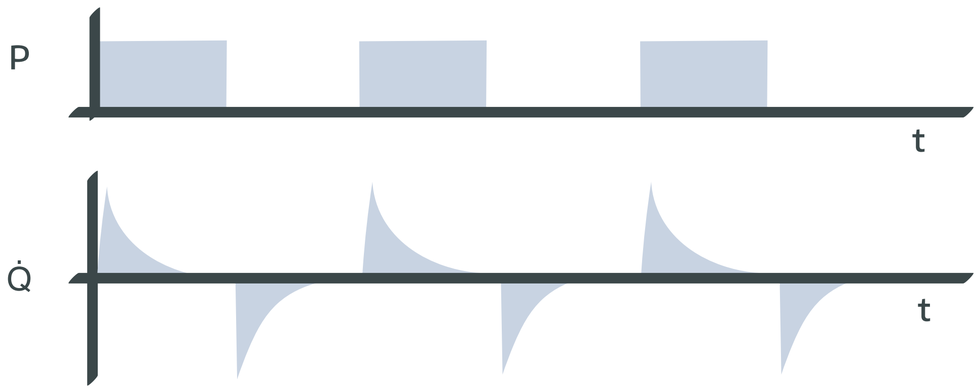
The Breath Control Variables

Volume Control



- ✓ Guarantees T_V irrespective of changing lung compliance, keeping M_V more stable
- ◉ Mean Airway Pressure is lower (resulting in potentially poorer oxygenation)
- ◉ Mean Airway Pressure may be unstable in the presence of a leak
- ◉ Lung units with poor compliance may be poorly recruited

Pressure Control

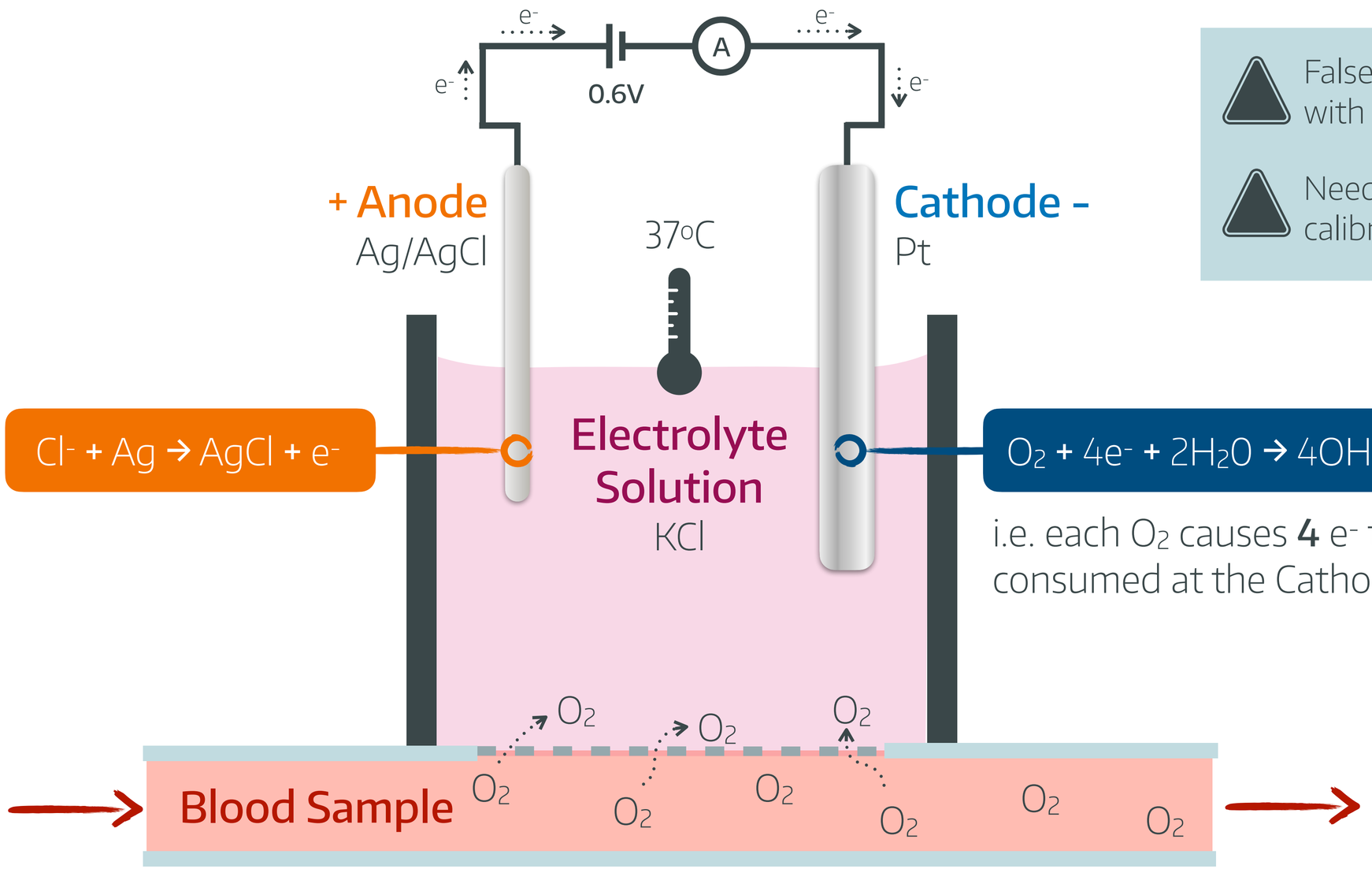


- ✓ Mean Airway Pressure is higher (resulting in potentially better oxygenation)
- ✓ Higher pressure earlier in the breath result in longer direction of alveolar recruitment
- ✓ Protection from barotrauma
- ◉ T_V will vary if compliance changes so can make P_aCO_2 control difficult
- ◉ Potential to cause volutrauma

Arterial Blood Gas Sampling

Clarke Electrode

measures O_2 in **blood** samples



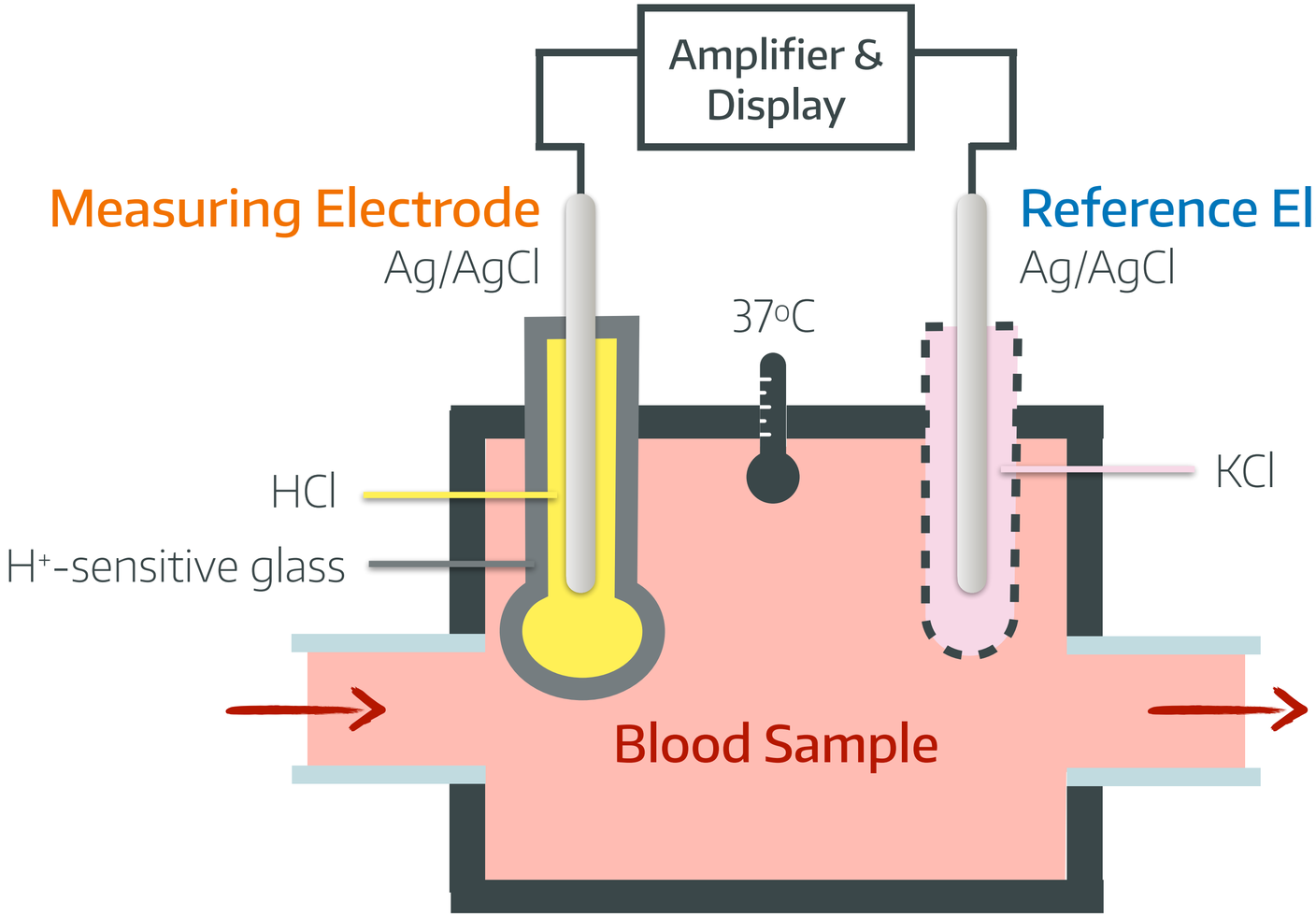
Falsely high readings with Halothane

Needs 2 point calibration

i.e. each O_2 causes **4** e^- to be consumed at the Cathode

pH Electrode

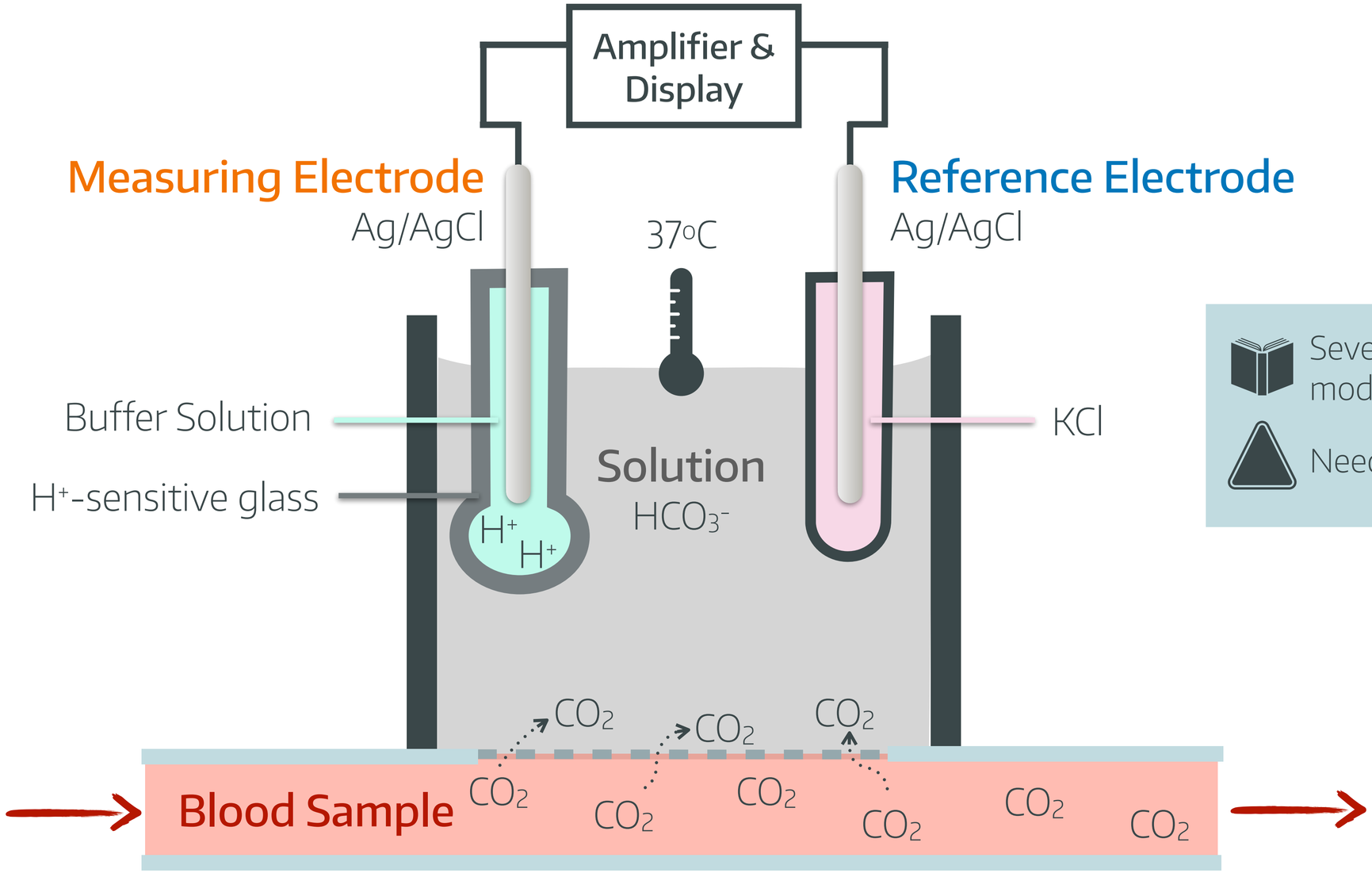
measures pH in **blood** samples



- Hypothermia increases pH (as reduced pCO_2)
- Needs 2 point calibration

Severinghaus Electrode

measures CO_2 in **blood** samples

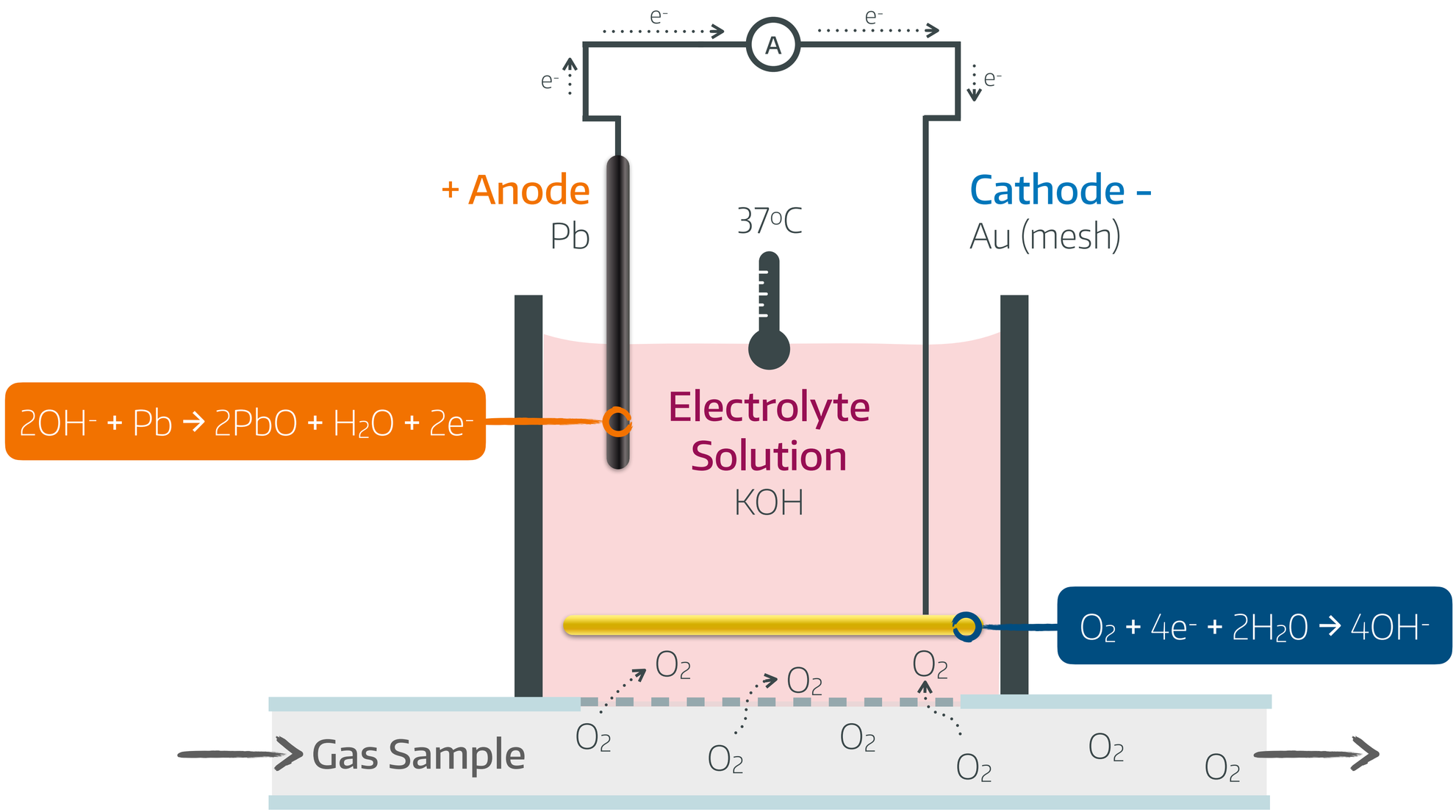


Severinghaus is a modified pH Electrode

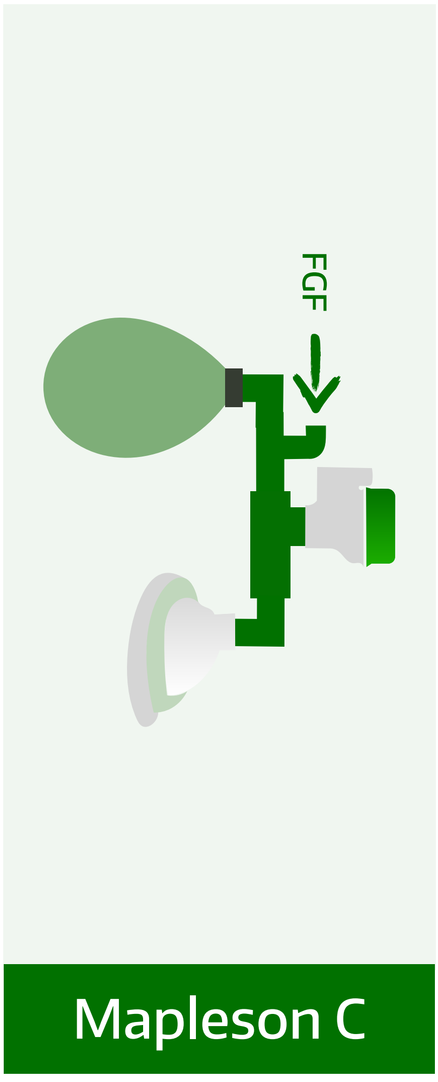
Needs calibration

Fuel Cell / Galvanic O_2 Analyser

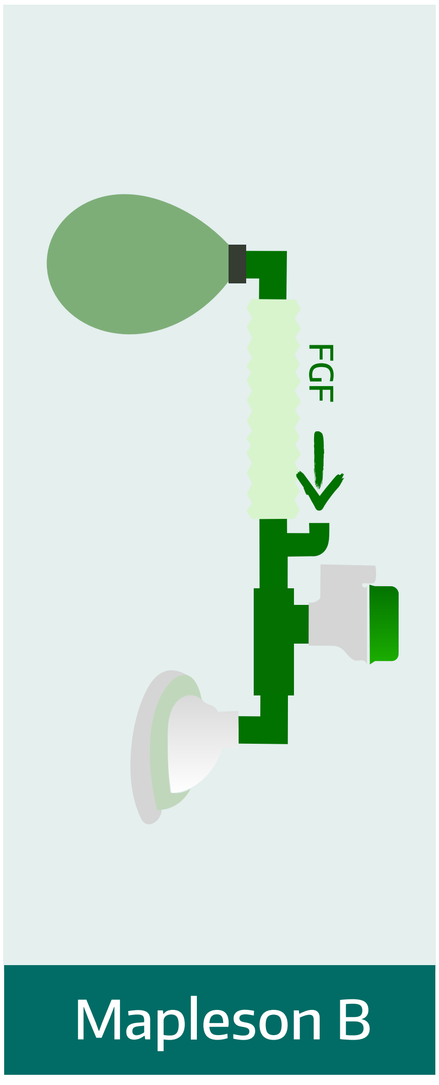
measures O_2 in **gas** samples



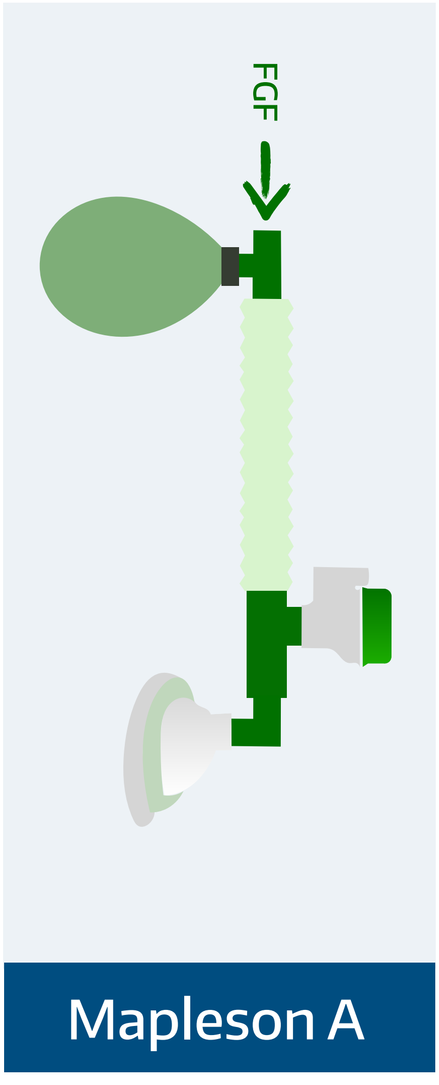
Mapleson Circuits



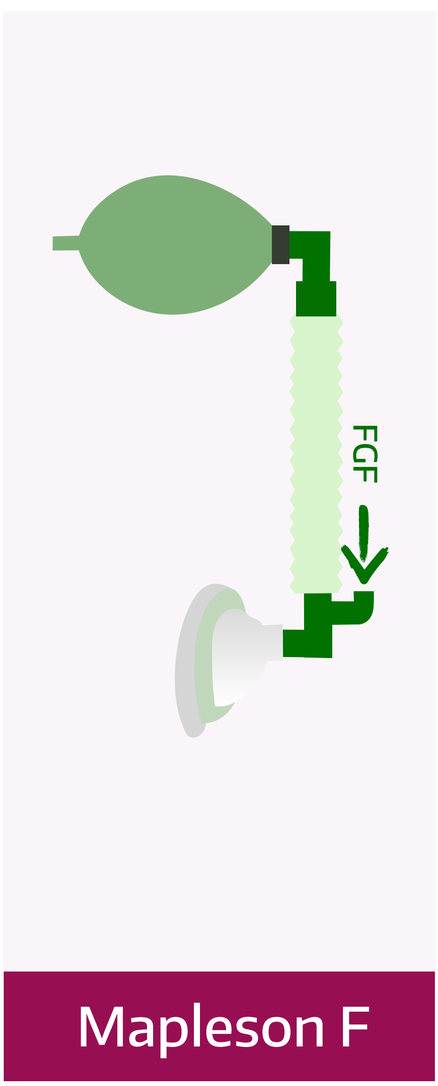
Mapleson C



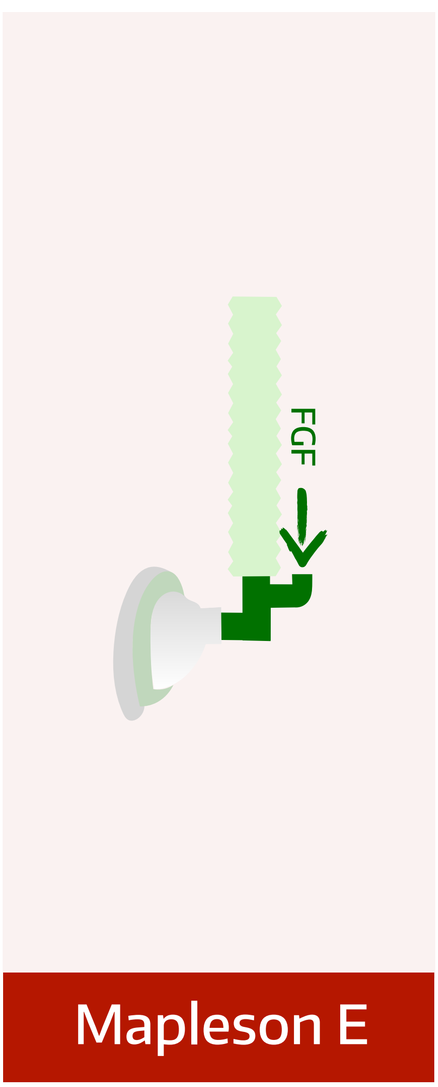
Mapleson B



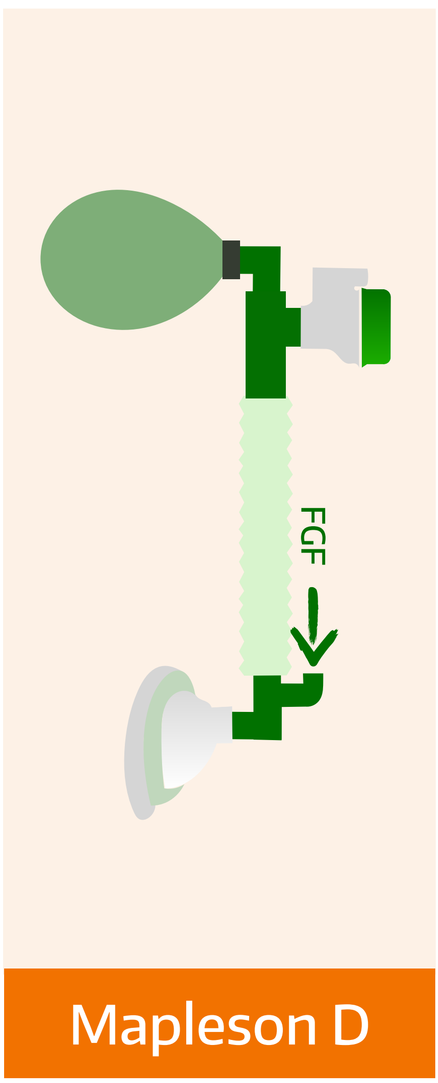
Mapleson A



Mapleson F



Mapleson E

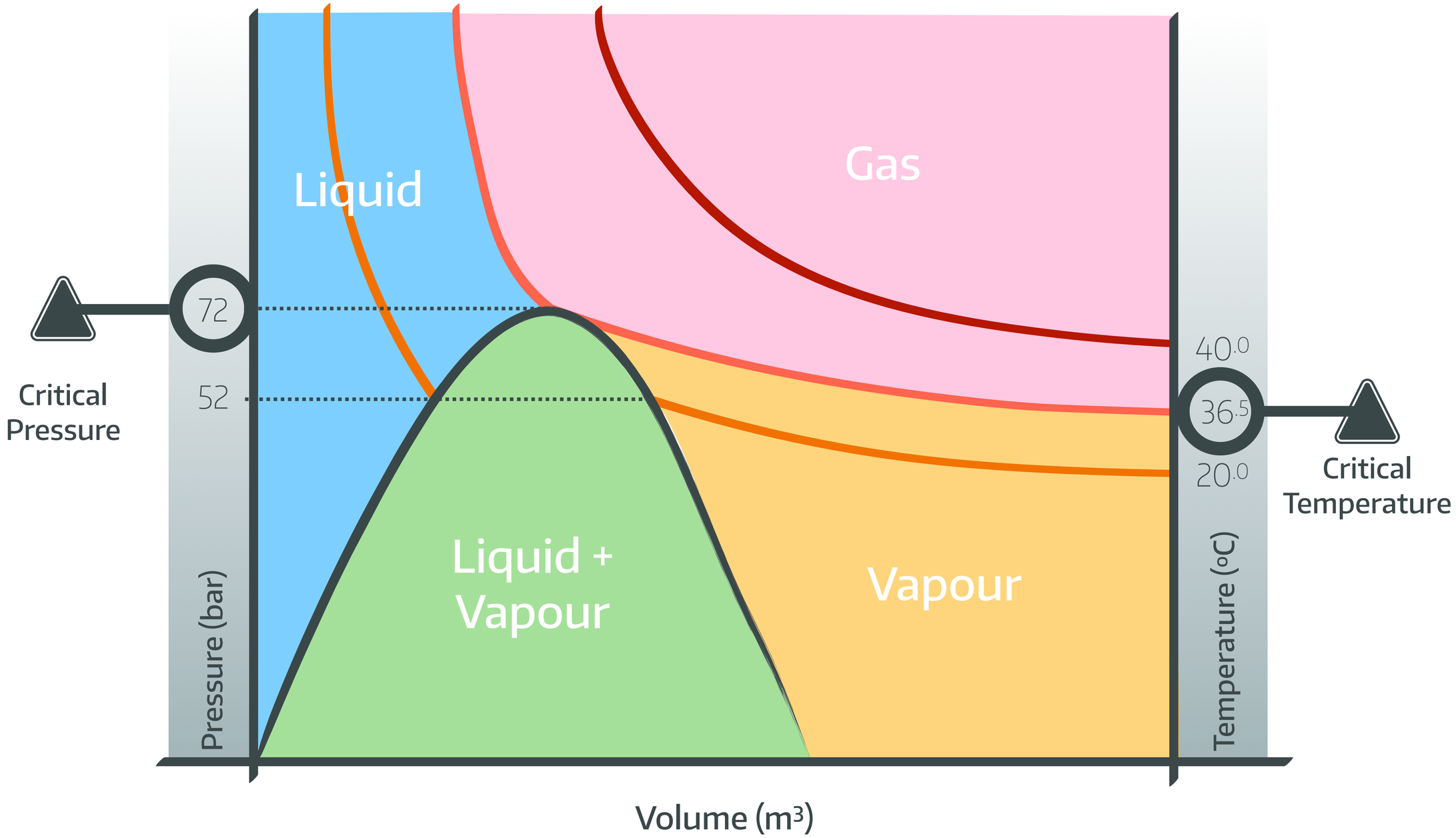


Mapleson D

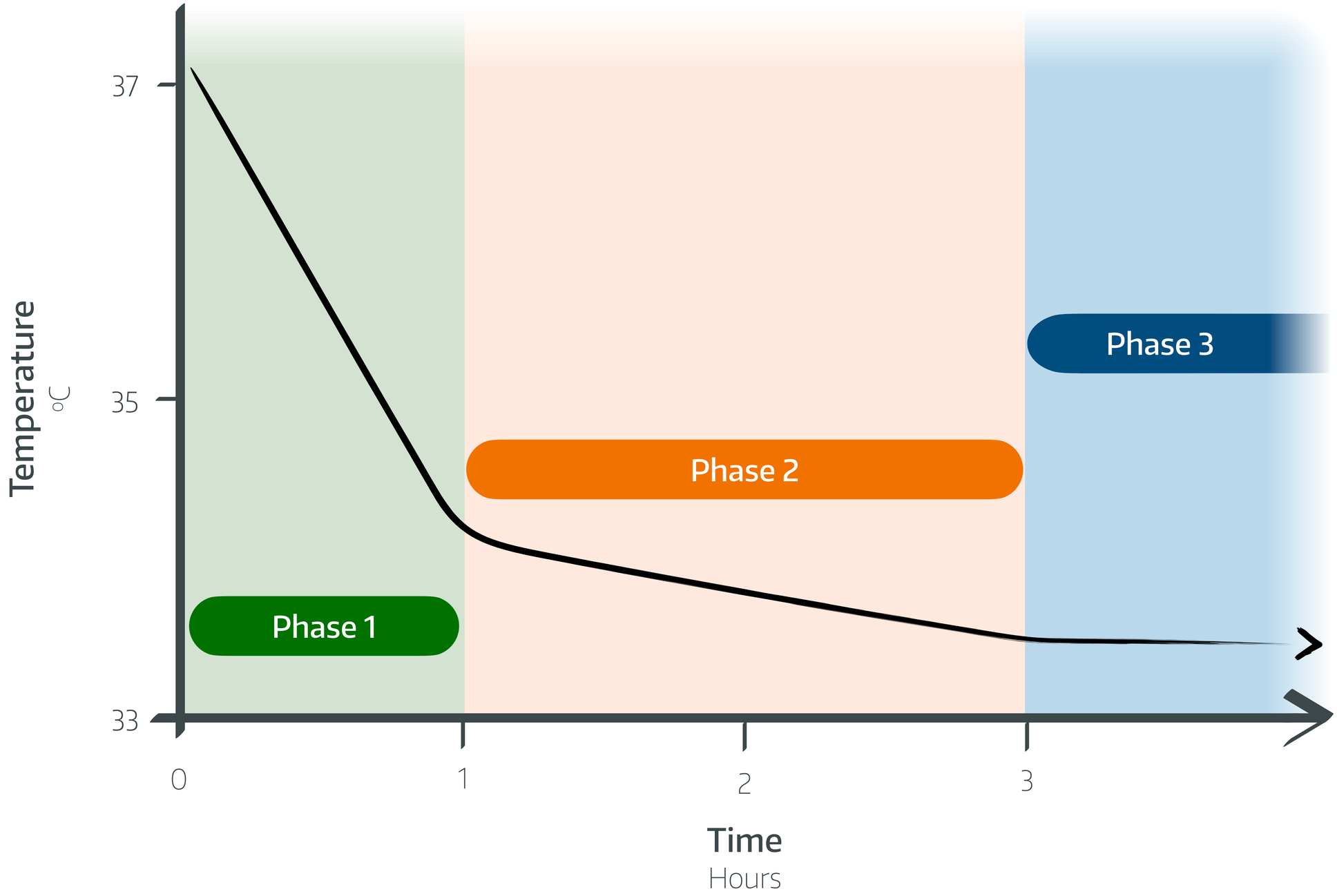
Pacemakers

Anti-bradycardia Functions			Additional Functions	
Paced Chamber	**Sensing Chamber**	**Response to Sensing**	**Rate Modulation / Programmability**	**Anti-tachycardia Functions**
O None	**O** None	**O** None	**O** None	**O** None
V Ventricle	**V** Ventricle	**T** Triggered	**P** Single Programmable	**P** Pacing
A Atrium	**A** Atrium	**I** Inhibited	**M** Multi-programmable	**S** Shock
D Dual	**D** Dual	**D** Dual	**R** Adaptive Rate Pacing	**D** Dual (Pacing & Shock or multi-site pacing)

Isotherm: Nitrous Oxide



Intraoperative Heat Loss



STATISTICS

Continuous Data

Normal Distribution

- 2 Groups
  - Paired → Paired T Test
  - Unpaired → T Test
- >2 Groups → ANOVA

Skewed Distribution

- 2 Groups
  - Paired → Wilcoxon Signed Rank Test
  - Unpaired → Mann-Whitney U Test
- >2 Groups → Kruskar-Wallis one way ANOVA

Binary / Discrete Data

2 Groups

- Paired → McNemar's Test
- Unpaired → > 75% of data points expected to be >5
  - Yes → Fisher's Exact Test
  - No → Chi Squared Test

>2 Groups