

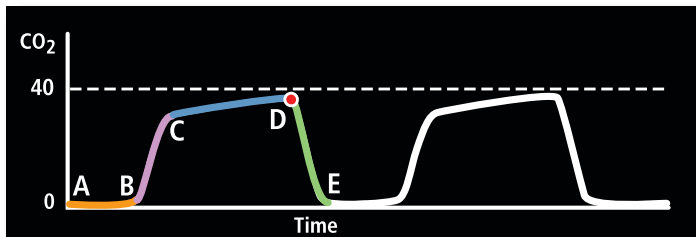
A Quick Reference Guide to Waveform Capnography



COVIDIEN

positive results for life™

Normal Waveform¹



A-B: Baseline period of no CO₂, end of inhalation

B-C: Rapid rise in CO₂, early exhalation

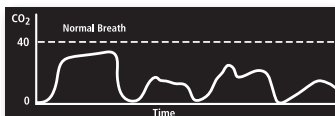
D: Alveolar plateau, end of expiration, end tidal CO₂ (etCO₂)

D-E: Inhalation

Abnormal Waveforms¹

FOR INTUBATED AND NON-INTUBATED* PATIENTS

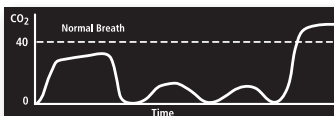
Always check function of equipment and follow your institutional protocols



Partial airway obstruction (partial loss of waveform)

Possible Causes (Non-intubated):
Airway collapse/blockage, secretions in the airway.

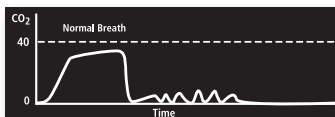
Possible Causes (Intubated):
Secretions in the airway, ETT misplaced in hypopharynx, partially kinked ETT, air leak from uncuffed ETT.



Hypoventilation with shallow breathing

Possible Causes (Non-intubated):
Ineffective tidal volume due to sedation, opioids, or other respiratory depressive medications.

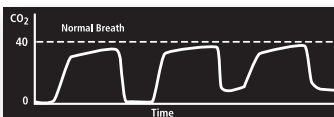
Possible Causes (Intubated):
Ineffective tidal volume.



Apnea (loss of waveform)

Possible Causes (Non-intubated):
Sedation, opioids, or other respiratory depressive medications, kinked or displaced sampling line.

Possible Causes (Intubated):
Dislodged ETT, ETT misplaced in hypopharynx, complete airway obstruction.



Rebreathing of CO₂

Possible Causes (Non-intubated):
Insufficient oxygen flow, shallow breathing, not clearing dead space, or drape over face.

Possible Causes (Intubated):
Faulty exhalation valve, dead space in ventilator circuit.

*Apnea-Sat Alert feature not indicated for use on intubated patients.

1. Gravenstein, J.S., et al. Capnography, Cambridge University Press, 2004, 2011.



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Troubleshooting

Alert Message	Action
No Breath	<ul style="list-style-type: none">• Check patient status• Check connection and positioning of patient sampling line
FilterLine Disconnected	<ul style="list-style-type: none">• Ensure patient sampling line is correctly connected to the monitor. Do not overtighten.
Clear FilterLine	<ul style="list-style-type: none">• Check patient sampling line for kinks or fluids
Blockage	<ul style="list-style-type: none">• Check patient sampling line for kinks• Disconnect and reconnect patient sampling line• If blockage cannot be cleared, replace patient sampling line
Calibration Required	<ul style="list-style-type: none">• Calibrate according to manufacturer's recommendations

Technical Problem	Action
Monitor will not turn on	<ul style="list-style-type: none">• Check A/C connection• Ensure on/off switch is on• Ensure battery is inserted correctly• Replace or recharge battery or connect to AC power
No waveform on screen	<ul style="list-style-type: none">• Check patient status• Check position of patient sampling line• Ensure patient sampling line is correctly connected to monitor. Do not overtighten.• Check for proper scale of waveform



Integrated Pulmonary Index™ (IPI)

IPI

The IPI algorithm incorporates four real-time respiratory measurements into a single number that represents an inclusive respiratory profile.



End-tidal CO₂ (etCO₂)
Respiratory Rate (RR)
Pulse Oximetry (SpO₂)
Pulse Rate (PR)

IPI

IPI is displayed on a scale from 1 to 10, with 10 indicating a normal respiratory status. To aid in monitoring patients over time, IPI is captured and analyzed to show upward and downward trends.

IPI	Patient Status
10	Normal
8-9	Within normal range
7	Close to normal range; requires attention
5-6	Requires attention and may require intervention
3-4	Requires intervention
1-2	Requires immediate intervention

Apnea-Sat Alert

Apnea-Sat Alert*

Apnea-Sat Alert is a software algorithm that tracks and reports apneas per hour (A/hr), based on the capnography data and the oxygen desaturation index, which is calculated using pulse oximetry data.



Apneas per hour and Oxygen Desaturation Display



Asterisk indicates apnea count has exceeded set threshold during the last 12 hours and clinician should view trend data.

The oxygen desaturation index (ODI) is the number of dips per hour in SpO_2 , 4 percent or lower from baseline with a return to baseline in 240 seconds or less.

*Capnostream 20p patient monitor must be equipped with optional Apnea-Sat Alert software.