Getting Started

1. Switch **Power On** (rear of unit).

2. Connect probe to patient interface cable.

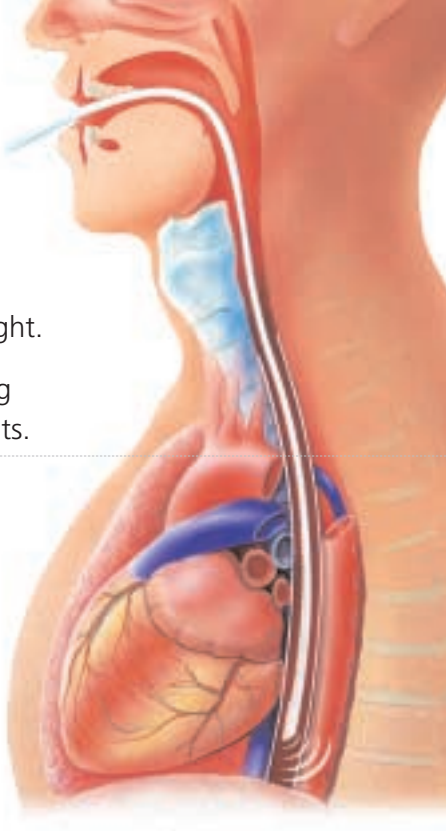
3. Use large **Control Knob** to dial in patient age. Press to enter. Repeat process for weight and height.

4. Check and press **Accept Data.** Refer to Operating Handbook if patient data exceeds nomogram limits.

5. Apply water-based lubricant to probe tip and insert into esophagus.*

6. For adults, advance probe gently until incisors are midway between 35 and 40cm depth markings. If resistance is encountered, remove probe immediately.*

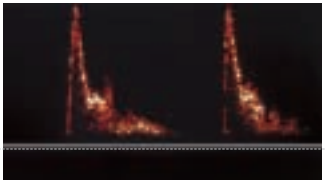
*Refer to Esophageal Probe packaging for detailed instructions.



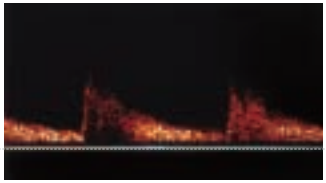
Locate the Descending Aortic Waveform

7. Use of audio is recommended when locating the CardioQ signal. Adjust **Volume Knob** as appropriate.

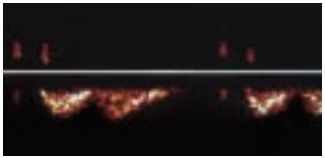
8. Adjust probe depth and rotation.



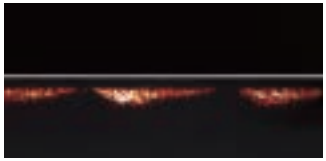
Pulmonary Artery.
Probe too high. Ensure that depth markers are near teeth level.



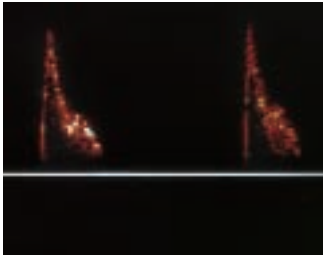
Celiac Axis.
Probe too low.



Intracardiac.
Correct depth or slightly high. Rotate probe and/or increase depth slightly.

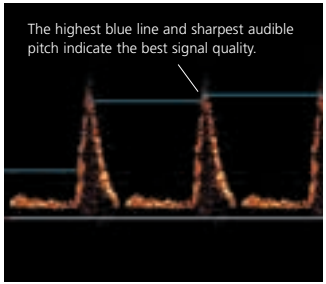


Azygos Vein.
Correct depth or slightly low. Rotate probe and/or decrease depth slightly.



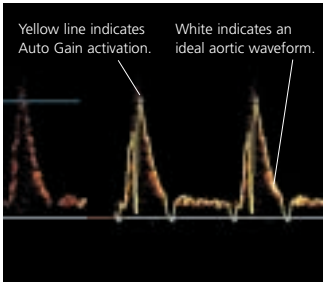
Descending Aorta.
Correct placement.

Optimize the Waveform



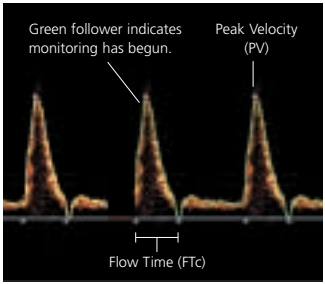
9. Activate **Peak Velocity Display.**

The highest blue line and peak with sharpest audible pitch indicate the best signal.



10. Activate **Auto Gain.**

Yellow confirms Auto Gain activation. White confirms optimized signal.



11. Monitoring Begins.

Green confirms start of monitoring.

Hemodynamic Parameters*

CO	Cardiac Output	*Liters of blood pumped per minute (l/min)*
SV	Stroke Volume	*Blood volume ejected during each systolic phase (ml)*
FTc	Flow Time Corrected	*Systolic flow time corrected for heart rate (m/sec)*
PV	Peak Velocity	*Peak velocity of blood flow in systolic phase (cm/sec)*
SD	Stroke Distance	*Distance a column of blood moves through the aorta during each systolic phase (cm)*
MD	Minute Distance	*Distance a column of blood moves through the aorta per minute (cm). MD = SD x HR; linear cardiac output*
HR	Heart Rate	*Beats per minute (bpm)*
CI	Cardiac Index	*Cardiac output normalized for body surface area (l/min/m^2)*
MA	Mean Acceleration	*Average acceleration of blood from start of systole to detected peak velocity (cm/sec^2)*
SVR	Systemic Vascular Resistance	*Resistance left heart pumps against; afterload; note: external pressure data required*

*Refer to the Operating Handbook for additional hemodynamic parameters provided by the CardioQ.

Special Operating Features

• Number of Cycles per Calculation

To change cycle setting: While in the Run Mode, press **Set Up,** then press **Cycles.** Rotate large **Control Knob,** make cycle selection, and press **Control Knob** to enter. Press again to return to Run Mode. If interference due to use of high-energy electrosurgical equipment prevents calculation, reduce cycle setting to maximize data capture.

• Setting the Signal Filter

Begin probe focusing and monitoring with **Filter Off.** To help reduce artifacts and/or signal interference, initiate filter by displaying **Probe Focus** screen. Press **Filter On.** Press again for **Filter Off.***

• Storing a Waveform/Snap Function

While in the **View Trend** screen, press **Freeze.** Rotate large **Control Knob** to place the desired section under the red Snap Window bar. Press **Take Snap.** View up to 5 recorded waveform images.

*Refer to the CardioQ Operating Handbook for additional information.

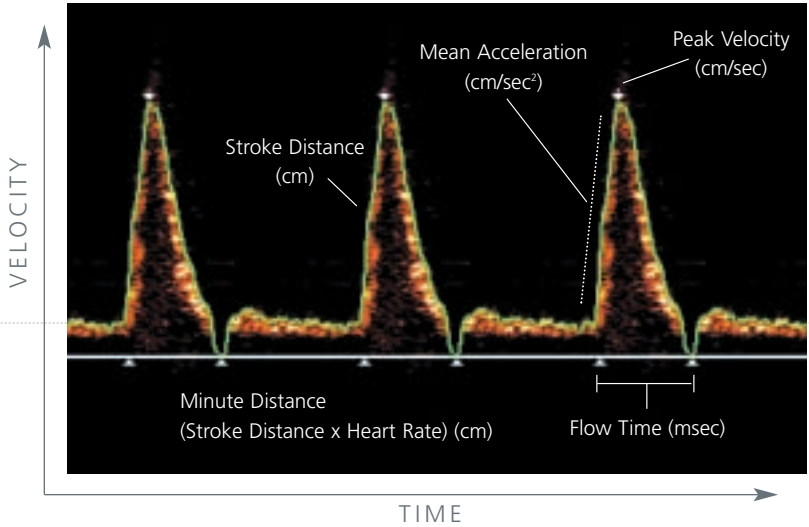
CardioQ

Quick Reference Guide*

Interpreting Results

*Refer to the CardioQ Operating Handbook for complete instructions.

The CardioQ Waveform



The **Green Line** (called the "Follower") indicates the Velocity/Time envelope the monitor uses to make calculations. The **White Arrows** indicate time and velocity values used for CardioQ calculations.

Normal Ranges*

Corrected Flow Time (FTc)

330 – 360 milliseconds

Peak Velocity (PV)[1,2]

20 years	**90 – 120 cm/sec**
30 years	85 – 115 cm/sec
40 years	80 – 110 cm/sec
50 years	**70 – 100 cm/sec**
60 years	60 – 90 cm/sec
70 years	**50 – 80 cm/sec**
80 years	40 – 70 cm/sec
90 years	30 – 60 cm/sec

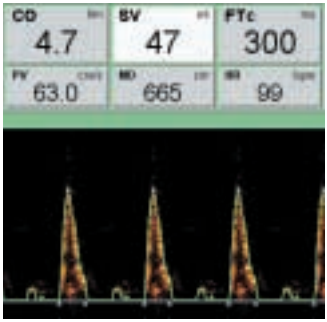
*Note: Normal Ranges should not be confused with a Physiological Target.

1 Singer, M. Esophageal Doppler Monitoring of aortic blood flow: beat-by-beat cardiac output monitoring. ***International Anesthesiology Clinics*** 1993; Vol. 31, No. 3; 99 – 125. Normal range values appear in bold.

2 Gardin, JM, Davidson DM, Rohan MK, et al. Relationship between age, body size, gender, and blood pressure and Doppler flow measurements in the aorta and pulmonary artery. ***Am Heart J*** 1987; 113; 101 – 109. Extrapolated values do not appear in bold.

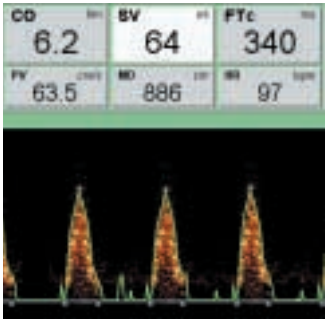
Interpret the Waveform

The waveform base, displayed as FTc (systolic flow time corrected for heart rate) is an index of preload. Waveform height, which appears as PV (Peak Velocity) is an index of contractility. Concurrent shifts in FTc and PV values indicate changes in afterload.

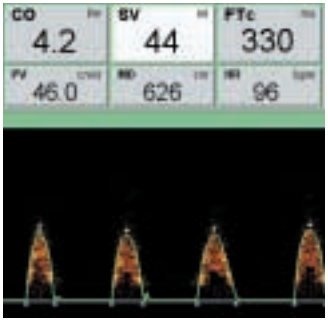


Hypovolemia. *Narrowed waveform base, decreased corrected flow time.*

FLUID

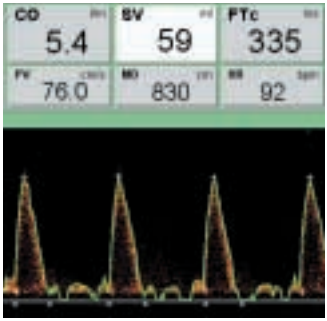


Fluid Repletion. *Waveform base widens, corrected flow time increases.*

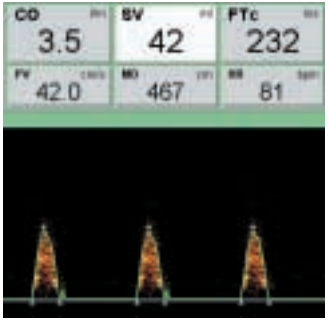


Left Ventricular Failure. *Reduced waveform height, low peak velocity.*

INOTROPE

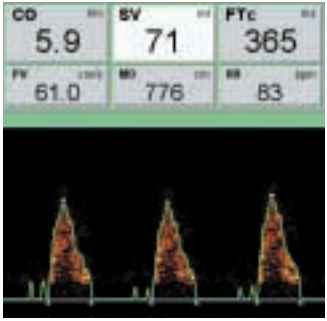


After Inotrope. *Increased waveform height, increased peak velocity.*



High SVR/Afterload. *Reduced waveform height, narrowed waveform base.*

VASODILATE

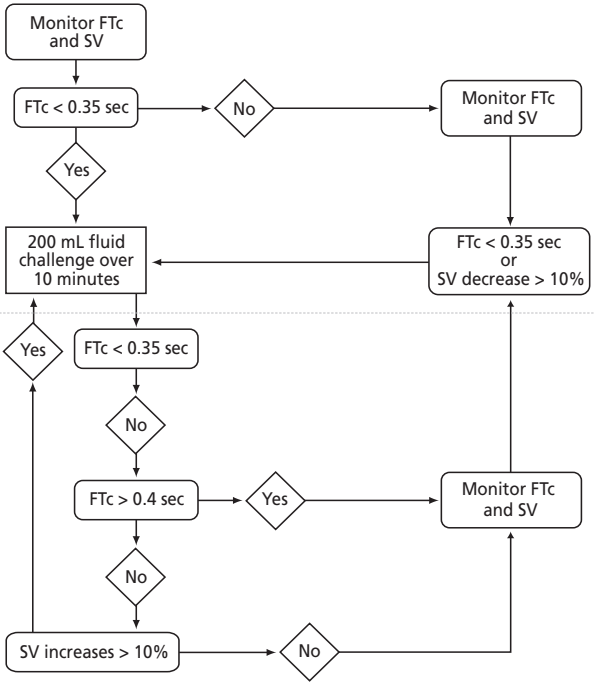


Reduced SVR/Afterload. *Increased peak velocity, increased flow time.*

Interpret the Waveform

Fluid Management

Typically, optimization is achieved through the use of a fluid management algorithm. Protocols of this type use the effects of therapy to help guide further interventions and have been utilized extensively in outcome studies with Deltex Esophageal Doppler Monitors.[1]



*Note: Normal Ranges should not be confused with a Physiological Target.

1 Gan, T.J. The Esophageal Doppler as an Alternative to the Pulmonary Artery Catheter. ***Current Opinion in Critical Care***; 2000; 6: 214 – 221.

CardioQ

Quick Reference Guide*

Operating Instructions

*Refer to the CardioQ Operating Handbook for complete instructions.