# T400-Series Technical Note

## Unique Features of Transit-time Ultrasound Flow Measurement Technology

### ULTRASOUND TRANSIT-TIME TECHNOLOGY

- Full-flow illumination
- Dual-crystal reflective ultrasonic pathway
- Alternating upstream-downstream pulse-catch mode of operation
- Validated Flow Values - in vitro & in vivo

### SYSTEM SOPHISTICATION

- Precalibrated Flowsensors for vessels from 0.25 - 32 mm diameter; and from 1/8" - 1" ID tubing
- Fully automated system. The Meter identifies the Probe size and calibration factor, & adjusts the Meter's flow ranges and gain automatically.
- Built-in diagnostic circuitry and display identifies malfunctioning Flowsensors.

### DIFFERENCES FROM ELECTROMAGNETIC

- Excellent zero stability – no need to occlude (clamp) vessel or graft to get true zero
- No electrical interference from other apparatus or from ambient electrical noise
- Directly measures volume rate of flow. Does not derive volume flow from separate estimates of average velocity across a chord or inside vessel cross-sectional area. Does not assume rotational symmetry of flow profile.
- No tight fit needed for electrogenesis; therefore is not subject to artifacts in flow sensitivity when Probe motion disrupts uniform electrical contact
- Nonconstrictive Perivascular Probe construction – minimizes danger of vessel spasm
- No electrical contact needed with vessel, tube or flowing liquid.
- Insensitive to Hematocrit – measures flow in all fluids; is not dependent upon presence of electrically charged molecules
- Measures flow in liquids other than blood
- No heat artifacts: Probe power dissipation ≤ 5.0 mW

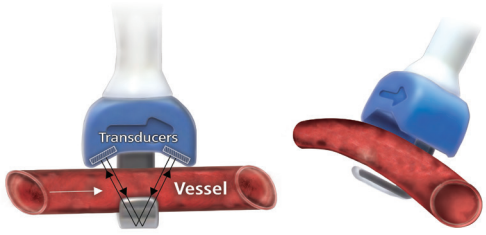


Fig. 1: Schematic views of a Transonic® perivascular ultrasonic transit-time Flowprobe. Using wide beam illumination, two transducers pass ultrasonic signals back and forth, alternately intersecting the flowing liquid in upstream and downstream directions. The Flowmeter derives an accurate measure of the "transit time" it takes for the wave of ultrasound to travel from one transducer to the other The difference between the upstream and downstream integrated transit times is a measure of volume flow rather than velocity.

### DIFFERENCES FROM DOPPLER

- Directly measures volume rate of flow. Does not derive volume flow from separate estimates of average velocity across a chord and inside vessel cross-sectional area.
- Directly measures axial component of flow. Does not derive such a measure from off-axis flow component. Insensitive to vessel Probe alignment and flow turbulence.
- Measures flow in all fluids; not dependent on particulate matter to measure flow.

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