

# Thermal Dilution Technology

## HVT100 Endovascular Flowmeter Principle of Operation

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The HVT100 Endovascular Flowmeter and ReoCath® Flow Catheter system (Fig. 2) uses classical dilution-based equations for flow measurements adapted to the unique hemodynamic conditions that exist within an arterio-venous (AV) access.

Intra-access blood flow measurements obtained using the HVT100 Endovascular Flowmeter are based upon the following equation:

$$Q = k (T_b - T_i) V / S - 0.5 V / t$$

Where:

- Q = intra-access blood flow;
- k = a coefficient related to the thermal properties of blood, saline = 1.08
- T<sub>b</sub> = temperature of the blood prior to injection;
- T<sub>i</sub> = temperature of injected saline;
- V = volume of injected saline (10 mL);
- S = the area under the temperature-time dilution curve resulting from the mixing of blood and injected saline;
- t = width of the dilution curve at 50% height (Fig. 1).

The expression (0.5V/t) is an average expected increase in blood flow due to the saline injection.

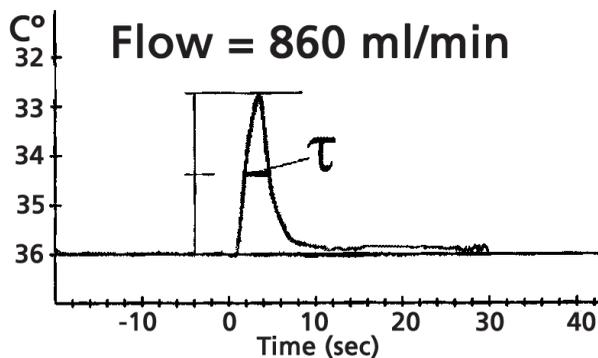


Fig. 1: Example of thermal dilution curve generated by the change in temperature between isotonic saline injected into the AV access and the diluted temperature registered by the catheter thermistor within the access.

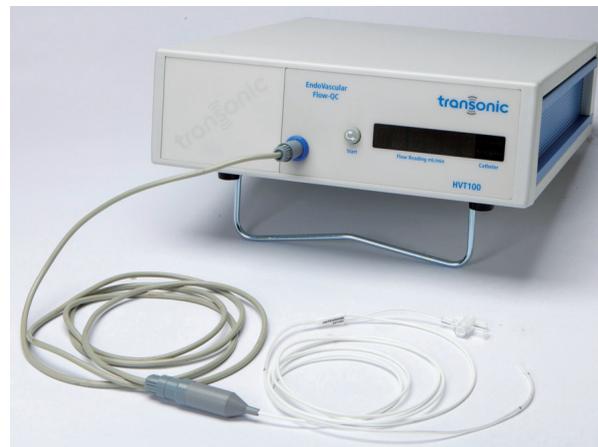
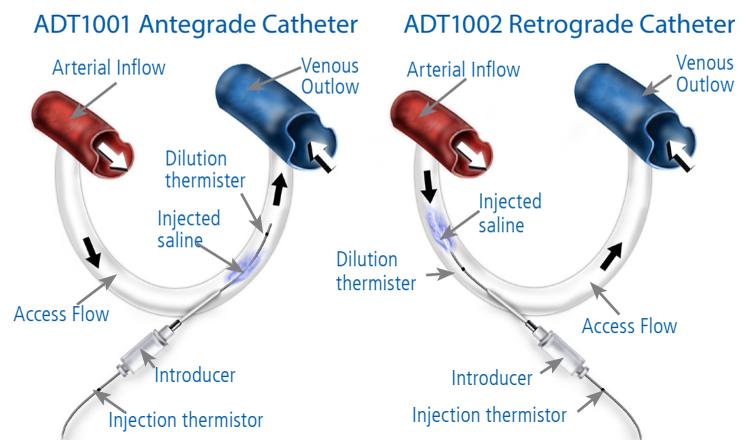


Fig. 2: HVT100 Endovascular Flowmeter, extension cable and ReoCath® Antegrade Catheter.

The HVT100 Endovascular Flowmeter & ReoCath® Flow Catheters measure intragraft blood flow in the arteriovenous (AV) vascular access to provide quantitative information about access functionality during an interventional procedure.



The left ADT1001 antegrade catheter (6F, 35 cm length) inserts into an AV access in the same direction as access flow. After injected saline is released from the catheter, a dilution thermistor, downstream at the catheter tip, measures the temperature of blood, diluted by the injected saline. The right ADT1002 retrograde catheter (6F, 48 cm length) is inserted into an AV access against the direction of access flow. After injected saline is released from the tip of the catheter, a proximal dilution thermistor measures the temperature of the saline-diluted blood. Classic dilution equations are used to extrapolate blood flow in mL/min from the temperature changes between the saline measured by injection thermistors and the saline-diluted blood measured by the dilution thermistors.