Metering Tubes Technology and Benefits

Introduction:

The HemaTrue™ Veterinary Hematology System from Heska incorporates Metering Tube technology to improve precision in measurement of the amount of prepared sample analyzed. By improving the precision of the analyzed sample volume, overall system performance is greatly enhanced. Metering Tube technology offers significant performance improvements over time-based techniques used in a wide variety of hematology systems.

Background:

The system prepares a diluted sample for measurement by taking the precisely measured volume of blood from the Shear Valve assembly and diluting it with a much larger volume of diluent: HemaTrue™ Diluent Reagent for RBC/PLT determination and HemaTrue™ Lysing Reagent for WBC/HGB determination, in the RBC/PLT and WBC/HGB dilution chambers, respectively. HGB is measured photometrically in the WBC chamber.

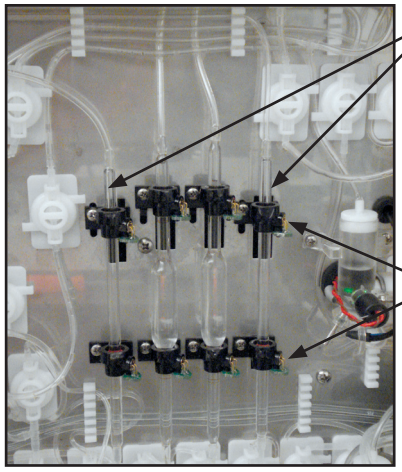
Within each dilution chamber resides a glass orifice, an opening precisely engineered to a fixed diameter. The system applies pressure on top of the counting chamber which pushes the prepared sample through the orifice. Each cell that passes through the orifice with the dilution fluid is counted by the impedance method.

The calculation algorithm in hematology systems relies on a fixed volume of fluid for accurate calculation of patient results. If the orifice is partially occluded by protein deposits from patient blood samples or by clots introduced into the system, less fluid passes through to be analyzed and the results are inaccurate. Most in-hospital impedance-based systems use a time-based method to allow for fluid to pass for analysis. These systems make an ***assumption*** that if the system waits for **x** seconds, **y** amount of fluid will pass, based on an orifice opening of pre-determined size. As a result of variables that may affect the amount of fluid analyzed per time, reproducibility and accuracy may be irregularly influenced (or altered) in time-based measurement methods.

The HemaTrue™ system utilizes Metering Tubes to ***actually measure*** how much prepared sample passes through the orifice for analysis. The resulting calculation is significantly more reliable and accurate.

How It Works:

Two Metering Tubes, one for the RBC/PLT channel and the other for the WBC channel, are located between the counting chambers on the right side of the instrument. They appear as two long, thin, vertical glass straws held in by two black metal blocks. Each of the blocks is actually an optical level sensor, which detects when a meniscus passes through the sensor.



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At the start of the analytical process, pressure is applied and prepared sample is pushed through the orifice. The analyzed stream coming through the orifice passes through the Metering Tubes. As the level of fluid rises in the tube, the first optical sensor detects the meniscus and starts the counting process (Diagram 1). As measurement continues, the level of fluid continues to rise (Diagram 2) until the meniscus reaches the top sensor (Diagram 3), which ends the counting process. Hematology systems without metering tubes assume that the required volume of prepared sample will be drawn through the orifice within a specified time. However, if the orifice is partially occluded, less volume will pass to be analyzed in the allotted time, resulting in inaccurate calculation of the final result.

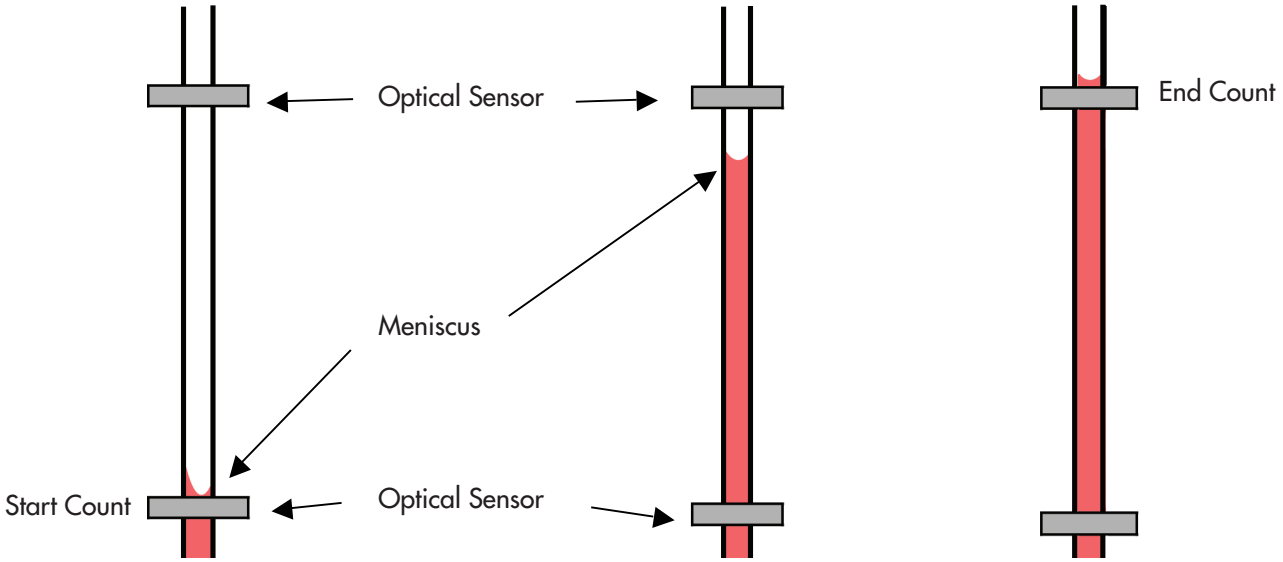

Diagram 1 Diagram 2 Diagram 3

Discussion:

In the HemaTrue™ system, the volume of prepared sample measured by the two sensors in each metering tube remains constant, regardless of the amount of time required for the volume to pass from the start sensor to the end sensor. Therefore, the calculation performed to obtain the result is based on an accurate prepared sample volume.

If an orifice in a counting chamber is partially occluded, the length of time required for the liquid to rise from the start sensor to the end sensor will be longer than normal, but the correct volume will be measured regardless.

The HemaTrue™ system monitors the time it takes the prepared blood sample to pass between the start and the stop optical sensors during the measurement cycle. In the event that the time exceeds a preset limit, the system triggers automated maintenance, which performs a back flush to clean itself. If necessary, it will perform an automatic "burn" cycle, which pulses high current across the orifice to "burn off" any protein build-up.

For questions or further assistance,
please call Heska's Technical Support Services at **1-800-GO HESKA, option 3.**

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