CLAIMS:

1. A system for enumerating a concentration of a microorganism in a liquid sample, the system comprising:

   a filtration medium having an inlet for receiving the liquid sample and an outlet for removing a filtered liquid sample from the filtration medium;

   a differential pressure sensor having a first port connected to the inlet of the filtration medium and a second port connected to the outlet of the filtration medium, whereby the differential pressure sensor is configured to measure a pressure difference between the inlet and outlet of the filtration medium over a period;

   a computing module communicatively connected to the differential pressure sensor, the computing module being configured to enumerate the concentration of the microorganism in the liquid sample based on the measured pressure difference over the period and a pre-generated calibration model.

2. The system according to claim 1, whereby the calibration model was pre-generated using a calibration module that was configured to record differential pressure measurements between the inlet and outlet of the filtration medium, record measured concentrations of the microorganism associated with the differential pressure measurements, and determine a curve fitting equation for the calibration model based on the recorded measured concentrations of the microorganism and their associated differential pressure measurements.

3. The system according to claim 1, whereby the calibration model was pre-generated using a calibration module which was configured to record measured concentrations of the microorganism, record termination time measurements associated with the measured concentrations of the microorganism, and determine a curve fitting equation for the calibration model based on the recorded measured concentrations of the microorganism and their associated recorded termination time measurements, whereby each of the termination time measurements is defined as a time required for a concentration of the microorganism to achieve a threshold value of a normalized hydraulic resistance, whereby the normalized hydraulic resistance is based on time-dependent hydraulic resistance of a measured concentration of the microorganism and on a steady-state hydraulic resistance of the filtration medium.

4. The system according to claim 3, whereby the curve fitting equation is defined by an equivalent electric circuit based numerical model comprising a parallel circuit arrangement of a total of N

number of resistors, wherein each resistor is defined as a resistance of a pore of the filtration medium.

5. The system according to claim 2, whereby when the curve fitting equation is determined, the calibration module is further configured to:

identify a blind-zone in the measurements, where the blind-zone is defined as a set of measurements whereby the recorded differential pressure measurements between the inlet and outlet of the filtration medium does not increase when the associated measured concentrations of the microorganism increases; and

removing the set of measurement associated with the blind-zone from the measurements used to determine the curve fitting equation for the calibration model.

6. The system according to claim 1, whereby the period comprises any time-period between 30 seconds and 20 minutes.

7. A computing module for enumerating a concentration of a microorganism in a liquid sample, the computing module comprising:

a processing unit; and

a non-transitory media readable by the processing unit, the media storing instructions that when executed by the processing unit, causes the processing unit to:

receive a measured pressure difference between an inlet and an outlet of a filtration medium when the liquid sample is infused through the inlet and outlet of the filtration medium over a period; and

enumerate the concentration of the microorganism in the liquid sample based on the received measured pressure difference and a pre-generated calibration model.

8. The computing module according to claim 7, wherein the non-transitory media further comprises instructions for directing the processing unit to:

receive the pre-generated calibration model, whereby the calibration model was pre-generated using a calibration module that was configured to obtain recorded differential pressure measurements between the inlet and outlet of the filtration medium, obtain recorded concentrations of the microorganism associated with the obtained recorded differential pressure measurements, and determine a curve fitting equation for the calibration model based on the obtained recorded concentrations of the microorganism and their associated recorded differential pressure measurements.

9. The computing module according to claim 7, wherein the non-transitory media further comprises instructions for directing the processing unit to:

receive the pre-generated calibration model, whereby the calibration model was pre-generated using a calibration module that was configured to obtain recorded concentrations of the microorganism, obtain recorded termination time measurements associated with the obtained recorded concentrations of the microorganism, and determine a curve fitting equation for the calibration model based on the obtained recorded concentrations of the microorganism and their associated recorded termination time measurements, whereby each of the termination time measurements is defined as a time required for a concentration of the microorganism to achieve a threshold value of a normalized hydraulic resistance, whereby the normalized hydraulic resistance is based on time-dependent hydraulic resistance of a measured concentration of the microorganism and on a steady-state hydraulic resistance of the filtration medium.

10. The computing module according to according to claim 9, whereby the curve fitting equation is defined by an equivalent electric circuit based numerical model comprising a parallel circuit arrangement of a total of N number of resistors, wherein each resistor is defined as a resistance of a pore of the filtration medium.

11. The computing module according to claim 8, wherein the instructions to determine a curve fitting equation for the calibration model further comprises instructions for directing the processing unit to:

identify a blind-zone in the obtained recorded measurements, where the blind-zone is defined as a set of recorded measurements whereby the recorded differential pressure measurements between the inlet and outlet of the filtration medium does not increase when the associated recorded concentrations of the microorganism increases; and

removing the set of recorded measurement associated with the blind-zone from the recorded measurements used to determine the curve fitting equation for the calibration model.

12. A method for enumerating a concentration of a microorganism in a liquid sample, the method comprising:

infusing the liquid sample through an inlet and an outlet of a filtration medium over a period;

measuring, using a differential pressure sensor having sensor ports communicatively coupled to the inlet and outlet of the filtration medium, a pressure difference between the inlet and outlet of the filtration medium;

enumerating, using a computing module communicatively connected to the differential pressure sensor, the concentration of the microorganism in the liquid sample based on the measured pressure difference over the period and a pre-generated calibration model.

13. The method according to claim 12, whereby when the calibration model was pre-generated, the pre-generation of the calibration model comprises the steps of using a calibration module to:

record differential pressure measurements between the inlet and outlet of the filtration medium;

record measured concentrations of the microorganism associated with the differential pressure measurements; and

determine a curve fitting equation for the calibration model based on the recorded measured concentrations of the microorganism and their associated differential pressure measurements.

14. The method according to claim 12, whereby when the calibration model was pre-generated, the pre-generation of the calibration model comprising the steps of using a calibration module to:

record measured concentrations of the microorganism;

record termination time measurements associated with the measured concentrations of the microorganism; and

determine a curve fitting equation for the calibration model based on the recorded measured concentrations of the microorganism and their associated recorded termination time measurements, whereby each of the termination time measurements is defined as a time required for a concentration of the microorganism to achieve a threshold value of a normalized hydraulic resistance, whereby the normalized hydraulic resistance is based on time-dependent hydraulic resistance of a measured concentration of the microorganism and on a steady-state hydraulic resistance of the filtration medium.

15. The method according to claim 14, whereby the curve fitting equation is defined by an equivalent electric circuit based numerical model comprising a parallel circuit arrangement of a total of N number of resistors, wherein each resistor is defined as a resistance of a pore of the filtration medium.

16. The method according to claim 13, whereby when the curve fitting equation is determined, the method further comprises the steps of using the calibration module to:

identify a blind-zone in the measurements, where the blind-zone is defined as a set of measurements whereby the recorded differential pressure measurements between the inlet and outlet of the filtration medium does not increase when the associated measured concentrations of the microorganism increases; and

remove the set of measurement associated with the blind-zone from the measurements used to determine the curve fitting equation for the calibration model.

17. The method according to claim 12, whereby the period comprises any time-period between 30 seconds and 20 minutes.