

35. A method of pumping liquid comprising the steps of:

- sensing changes in the strain in a conduit carrying the liquid to be measured;
- pumping liquid through the conduit in a manner that causes strain related to the flow of liquid under the control of the pump;
- counting the number of pump cycles;
- measuring an amount of liquid pumped to a predetermined point;
- the step of sensing changes in the strain including the steps of: continuously sensing first pulses as the liquid moves through the conduit; sensing an increase in the amplitude of the first pulses indicating liquid is approaching the pump; and counting second pulses during the time the first pulses are at a higher amplitude.

36. A method according to claim 35 further including the step of:

- determining the first presence of higher amplitude first pulses;
- sensing gaps in the first pulses;
- counting second pulses between the start of pulses and the gap; and if said counted pulses between the start of pulses and the gap exceed a predetermined number of pulses, adding a count of pulses.

37. A method according to claim 36 in which the step of adding a count of pulses includes the step of adding a count of pulses controlled by a sensor which detects cycles of the pump directly from the pump.

38. A method according to claim 37 including the steps of:

- counting cycles of the pump as the pump pumps in a forward direction;
- detecting when liquid approaches the pump;
- using said number of cycles of the pump between the time it begins pumping liquid through the conduit to the pump until it senses a change in amplitude indicating liquid approaching the pump and using said count to obtain an indication of the head of pressure;
- using the indication of a head of pressure to access statistical data indicating the amount of pumping necessary to pump a predetermined amount of sample;
- pumping a number of cycles sufficient to deposit the predetermined amount of liquid in a container and then reversing the direction of pumping.

39. A method according to claim 34 further including the step of:

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- determining the first presence of higher amplitude pulses;
- sensing gaps in the pulses;
- counting pulses between the start of pulses and the gap; and
- adding certain of said count of pulses.

40. A method according to claim 39 in which the step of adding a count of pulses includes the step of adding a count of pulses controlled by a sensor which detects cycles of the pump directly from the pump.

41. A method according to claim 40 including the steps of:

- counting cycles of the pump as the pump pumps in a forward direction;
- detecting when liquid approaches the pump;
- using said number of cycles of the pump between the time it begins pumping liquid through the conduit to the pump until it senses a change in amplitude indicating liquid approaching the pump and using said count to obtain an indication of the head of pressure;
- using the indication of a head of pressure to access statistical data indicating the amount of pumping necessary to pump a predetermined amount of sample;
- pumping a number of cycles sufficient to deposit the predetermined amount of liquid in a container and then reversing the direction of pumping.

42. A method according to claim 41 in which the step of adding a count of pulses includes the step of adding a count of pulses controlled by a sensor which detects cycles of the pump directly from the pump.

43. A method according to claim 42 including the steps of:

- counting cycles of the pump as the pump pumps in a forward direction;
- detecting when liquid approaches the pump;
- using said number of cycles of the pump between the time it begins pumping liquid through the conduit to the pump until it senses a change in amplitude indicating liquid approaching the pump and using said count to obtain an indication of the head of pressure;
- using the indication of a head of pressure to access statistical data indicating the amount of pumping necessary to pump a predetermined amount of sample;
- pumping a number of cycles sufficient to deposit the predetermined amount of liquid in a container and then reversing the direction of pumping.

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