CLAIMS

1. A buffer management system comprising:

a set of concentrated buffer solutions;

an inline dilution skid, the inline dilution skid including a single use manifold, the single use manifold including a water for injection (WFI) inlet port, a plurality of buffer inlet ports and a buffer characteristic sensor in fluid communication with each one of the buffer inlet ports, the plurality of buffer inlet ports in respective fluid communication with a different one of the set of concentrated buffer solutions, the buffer characteristic sensor configured to detect a value of a buffer characteristic of a fluid passing therethrough and to generate a buffer characteristic signal indicative of the sensed value for the buffer characteristic, wherein the buffer characteristic sensor comprises at least one of a conductivity sensor and a pH sensor;

a control unit, the control unit including a processor, a non-transitory computer readable medium bearing a buffer management program, and a data storage device in operable arrangement with the processor, the processor being in electrical communication with the buffer characteristic sensor to receive the buffer characteristic signal therefrom, the processor programmed with the buffer management program, the buffer management program having an identification module configured to identify automatically the concentrated buffer solution entering the manifold via one of the buffer inlet ports and passing through the manifold based upon the buffer characteristic signal.

2. The buffer management system according to claim 1, wherein the data storage device includes buffer solution characteristic data for a plurality of buffer recipes, and the identification module of the buffer management program is configured to identify the concentrated buffer solution passing through the manifold by analyzing the buffer characteristic signal to determine one of the buffer recipes most closely matching the buffer characteristic signal.

3. The buffer management system according to claim 2, wherein the control unit includes a human machine interface (HMI), and wherein the buffer management program includes a recipe manager module configured to store buffer solution characteristic data for at least one buffer recipe in the data storage device for use by the identification module.

4. The buffer management system according to any one of claim 1 to claim 3, wherein the buffer characteristic sensor, the buffer characteristic, and the buffer characteristic signal respectively comprise a first buffer characteristic sensor, a first buffer characteristic, and a first buffer characteristic signal, and wherein the single use manifold includes a second buffer characteristic sensor, the second buffer characteristic sensor configured to detect a value of a second buffer characteristic of the fluid passing therethrough and to generate a second buffer characteristic signal indicative of the sensed value for the second buffer characteristic, the second buffer characteristic being different form the first buffer characteristic, wherein the buffer recipes stored in the data storage device each includes buffer solution characteristic data for the first buffer characteristic and the second buffer characteristic, and wherein the identification module of the buffer management program is configured to identify the concentrated buffer solution passing through the manifold based upon the values of both the first buffer characteristic signal and the second buffer characteristic sensor.

5. The buffer management system according to claim 4, wherein the first buffer characteristic and the second buffer characteristic respectively comprise conductivity and pH.

6. The buffer management system according to any one of claim 1 to claim 5, wherein the identification module of the buffer management program is configured to sequentially draw concentrated buffer solution through each one of the buffer inlet ports to identify which one of the set of concentrated buffer solutions is connected to which one of the buffer inlet ports.

7. The buffer management system according to claim 6, wherein the identification module of the buffer management program is configured to store in the data storage device the identity of the concentrated buffer solution fluidly connected to each one of the buffer inlet ports.

8. The buffer management system according to any one of claim 1 to claim 7, wherein the manifold includes a plurality of buffer discharge ports, the buffer management system further comprising:

a plurality of biocontainers, the plurality of biocontainers corresponding to the number of the set of concentrated buffer solutions, the plurality of buffer discharge ports in respective fluid communication with a different one of the plurality of biocontainers;

a plurality of fill level sensors, the plurality of fill level sensors respectively associated with one of the plurality of biocontainers, each fill level sensor configured to configured to detect the amount of material within the biocontainer and to generate a fill level signal indicative of the detected amount of material, each of the fill level sensors in electrical communication with the control unit to transmit the respective fill level signal thereto;

wherein the identification module of the buffer management program is configured to identify automatically the biocontainer with which each one of the buffer discharge ports is in fluid communication based upon the change of the fill level signal therefrom.

9. The buffer management system according to claim 8, wherein the identification module of the buffer management program is configured to sequentially discharge fluid through each one of the buffer discharge ports to identify which one of the biocontainers is connected to which one of the buffer discharge ports.

10. The buffer management system according to claim 9, wherein the identification module of the buffer management program is configured to store in the data storage device the identity of the biocontainer fluidly connected to each one of the buffer discharge ports.

11. The buffer management system according to any one of claim 8 to claim 10, further comprising:

a bioprocessing unit, the bioprocessing unit including a plurality of unit inlet ports in respective fluid communication with the plurality of biocontainers;

wherein the identification module of the buffer management program is configured to identify automatically the unit inlet port with which each one of the biocontainers is in fluid communication based upon the change of the fill level signal therefrom.

12. The buffer management system according to claim 10, wherein the identification module of the buffer management program is configured to store in the data storage device the identity of the biocontainer fluidly connected to each one of the unit inlet ports of the bioprocessing unit.

13. A method of using a buffer management system according to any one of claim 1 to claim 12, the method comprising:

drawing an amount of one of a set of concentrated buffer solutions into a first buffer inlet port of a plurality of buffer inlet ports of a manifold;

sensing, in the manifold, a buffer characteristic of the concentrated buffer solution;

transmitting a buffer characteristic signal indicative of a value for the sensed buffer characteristic to a control unit;

using the control unit to identify the concentrated buffer solution entering the manifold via the first buffer inlet port based upon the buffer characteristic signal.

14. The method according to claim 13, further comprising:

loading buffer solution characteristic data for a plurality of buffer recipes in a data storage device;

wherein the control unit identifies the concentrated buffer solution passing through the manifold by analyzing the buffer characteristic signal to determine one of the buffer recipes in the storage device most closely matching the buffer characteristic signal.

15. The method according to claim 13 or claim 14, wherein the buffer characteristic and the buffer characteristic signal respectively comprise a first buffer characteristic and a first buffer characteristic signal, the method further comprising:

sensing, in the manifold, a second buffer characteristic of the concentrated buffer solution, the second buffer characteristic different form the first buffer characteristic;

transmitting a second buffer characteristic signal indicative of a value for the sensed second buffer characteristic to the control unit;

wherein the control unit identifies the concentrated buffer solution entering the manifold via the first buffer inlet port based upon the first buffer characteristic signal and the second buffer characteristic signal.

16. The method according to claim 15, wherein the first buffer characteristic and the second buffer characteristic respectively comprise conductivity and pH.

17. The method according to claim 14, further comprising:

sequentially drawing an amount of a respective one other of the set of concentrated buffer solutions into each one of the other of the plurality of buffer inlet ports of the manifold;

sequentially sensing, in the manifold, the buffer characteristic of the respective one other of the set of concentrated buffer solutions;

sequentially transmitting the buffer characteristic signal indicative of the value for the sensed buffer characteristic of the respective one other of the set of concentrated buffer solutions to the control unit;

sequentially using the control unit to identify the respective one other of the set of concentrated buffer solutions entering the manifold via the other of the plurality of buffer inlet ports of the manifold based upon the buffer characteristic signal;

storing in the data storage device the identity of the concentrated buffer solution fluidly connected to each one of the buffer inlet ports.

18. A method of using a buffer management system according to any one of claim 1 to claim 12, the method comprising:

discharging an amount of liquid from a first buffer discharge port of a plurality of buffer discharge ports of a manifold into one of a plurality of biocontainers, the plurality of buffer discharge ports in respective fluid communication with a different one of the plurality of biocontainers;

respectively sensing an amount of material stored within each one of the plurality of biocontainers;

respectively transmitting to a control unit a fill level signal indicative of a value for the amount of material sensed within each one of the plurality of biocontainers;

using the control unit to identify the biocontainer with which the first buffer discharge port is in fluid communication based upon the change of the fill level signal therefrom.

19. The method according to claim 18, further comprising:

sequentially discharge fluid through each one of the buffer discharge ports;

sequentially using the control unit to identify the biocontainer with which each one of the buffer discharge ports is in fluid communication based upon the change of the fill level signal therefrom;

storing in the data storage device the identity of the biocontainer fluidly connected to each one of the buffer discharge ports.

20. The method according to claim 19, further comprising:

sequentially discharging an amount of liquid from each one of the biocontainers into a respective one of a plurality of unit inlet ports of a bioprocessing unit, the plurality of biocontainers in respective fluid communication with a different one of the unit inlet ports of the bioprocessing unit;

sequentially using the control unit to identify the biocontainer with which each one of the unit inlet ports is in fluid communication based upon the change of the fill level signal therefrom.