CLAIMS

What is claimed is:

1. A fluid filtration system comprising:

a workstation, the workstation including a cabinet;

a pump, the pump supported by the cabinet and adapted to selectively produce a flow of fluid;

a first single use filter, the first single use filter removably mounted to the workstation, the first single use filter having an upstream end and a downstream end;

a second single use filter, the second single use filter removably mounted to the workstation, the second single use filter having an upstream end and a downstream end;

a fluid supply conduit, the upstream end of the first single use filter being in fluid communication with the pump via the fluid supply conduit, the fluid supply conduit including a first vent junction and a fluid supply valve, the fluid supply valve disposed between the first vent junction and the pump;

a serial filter conduit, the downstream end of the first single use filter being in fluid communication with the upstream end of the second single use filter via the serial filter conduit, the serial filter conduit including a second vent junction and a serial filter valve, the serial filter valve disposed between the downstream end of the first single use filter and the second vent junction;

a first vent conduit, the first vent conduit being in fluid communication with the first vent junction of the fluid supply conduit such that the upstream end of the first single use filter is in fluid communication with the first vent conduit via the first vent junction, the first vent conduit including a first outlet, a first liquid sensor, and a first vent valve, the first liquid sensor disposed between the first vent junction and the first outlet, the first vent valve disposed between the first liquid sensor and the first outlet, the first liquid sensor configured to generate a first liquid detection signal in response to detecting liquid in the first vent conduit;

a second vent conduit, the second vent conduit being in fluid communication with the second vent junction of the serial filter conduit such that the upstream end of the second single use filter is in fluid communication with the second vent conduit via the second vent junction, the second vent conduit including a second outlet, a second liquid sensor, and a second vent valve, the second liquid sensor disposed between the second vent junction and the second outlet, the second vent valve disposed between the second liquid sensor and the second outlet, the second liquid sensor configured to generate a second liquid detection signal in response to detecting liquid in the second vent conduit;

a control unit, the control unit in electrical communication with the first and second liquid sensors to receive the first and second liquid detection signals respectively therefrom, the control unit including a processor and a non-transitory computer readable medium bearing a filter conditioning program containing a filter priming module, the processor arranged with the computer readable medium to execute the filter conditioning program, the processor being configured to perform a priming operation on the first and second single use filters based upon instructions from the filter priming module.

2. The fluid filtration system according to claim 1, wherein the serial filter conduit includes a tailpiece section and a riser section, the tailpiece section descending from the downstream end of the first single use filter to a point below the upstream end of the second single use filter, and the riser section ascending from the tailpiece section to the upstream end of the second single use filter.

3. The fluid filtration system according to claim 2, wherein the first and second single use filters are a first size, and the tailpiece comprises a first tailpiece, the system further comprising:

a third single use filter and a fourth single use filter, the third and fourth single use filters being a second size, the second size being taller than the first size, the third and fourth single use filters being adapted to be removably mounted to the workstation in place of the first and second single use filters, respectively;

a second tailpiece, the second tailpiece being shorter than the first tailpiece in an amount sufficient to accommodate the taller second size of the third single use filter.

4. The fluid filtration system according to any one of claim 1 to claim 3, wherein the filter priming module is configured to perform the following steps when executed by the processor:

open the fluid supply valve to open the fluid supply conduit,

open the serial filter valve to open the serial filter conduit,

operate the pump to deliver the flow of fluid to the upstream end of the second single use filter such that gas in the serial filter conduit is displaced to the second vent conduit,

cease operation of the pump in response to the cessation of receiving the second liquid detection signal in response to detecting no liquid in the second vent conduit at the location of the second liquid sensor.

5. The fluid filtration system according to claim 4, wherein the filter priming module, when executed by the processor, is configured to prime the second single use filter after ceasing operation of the pump in response to detecting no liquid at the second liquid sensor.

6. The fluid filtration system according to claim 5, wherein the filter priming module is configured to perform, when executed by the processor, the following steps as part of priming the second single use filter after ceasing operation of the pump in response to detecting no liquid at the second liquid sensor:

open the fluid supply valve to open the fluid supply conduit,

open the serial filter valve to open the serial filter conduit,

open the second vent valve to open the second vent conduit,

operate the pump to deliver the flow of fluid to the upstream end of the second single use filter such that gas upstream of the upstream end of the second single use filter is displaced to the second vent conduit,

cease operation of the pump and/or close the second vent valve in response to receiving the second liquid detection signal.

7. The fluid filtration system according to claim 5 or claim 6, further comprising:

a discharge conduit, the discharge conduit being in fluid communication with the downstream end of the second single use filter, the discharge conduit including a first outlet and a second outlet and a first outlet valve and a second outlet valve respectively associated with the first outlet and the second outlet, the first outlet adapted for fluid connection to a product container and the second outlet adapted for fluid connection to a waste repository.

8. The fluid filtration system according claim 7, wherein the filter priming module is configured to perform the following steps as part of priming the second single use filter when executed by the processor:

close the second vent valve in response to receiving the second liquid detection signal,

operate the pump to deliver the flow of fluid to the second single use filter such that the flow of fluid passes through the second single use filter and the discharge conduit and out of the second outlet.

9. The fluid filtration system according to claim 5 or claim 6, wherein the filter priming module is configured to perform the following steps as part of the priming operation when executed by the processor:

open the fluid supply valve to open the fluid supply conduit,

open the first vent valve to open the first vent conduit,

operate the pump to deliver the flow of fluid to the upstream end of the first single use filter such that gas in the fluid supply conduit is displaced to the first vent conduit,

cease operation of the pump and/or close the first vent valve in response to receiving the first liquid detection signal.

10. The fluid filtration system according to claim 9, further comprising:

a discharge conduit, the discharge conduit being in fluid communication with the downstream end of the second single use filter, the discharge conduit including a first outlet and a second outlet and a first outlet valve and a second outlet valve respectively associated with the first outlet and the second outlet, the first outlet adapted for fluid connection to a product container and the second outlet adapted for fluid connection to a waste repository;

wherein the filter priming module is configured to perform the following steps as part of the priming operation when executed by the processor:

close the first outlet valve to occlude the first outlet,

open the second outlet valve to open the second outlet,

close the first vent valve in response to receiving the liquid detection signal,

operate the pump to deliver the flow of fluid to the first single use filter such that the flow of fluid passes through the first single use filter and the discharge conduit and out of the second outlet.

11. The fluid filtration system according to any one of claim 1 to claim 10, wherein the fluid supply conduit includes a pressure sensor, the pressure sensor disposed upstream of the first single use filter between the pump and the first junction.

12. A fluid filtration system comprising:

a first single use filter and a second single use filter, each having an upstream end and a downstream end;

a fluid supply conduit, the upstream end of the first single use filter being in fluid communication with the fluid supply conduit, the fluid supply conduit including a first vent junction and a fluid supply valve, the first vent junction disposed between the fluid supply valve and the upstream end of the first single use filter;

a serial filter conduit, the downstream end of the first single use filter being in fluid communication with the upstream end of the second single use filter via the serial filter conduit, the serial filter conduit including a second vent junction and a serial filter valve, the serial filter valve is disposed between the downstream end of the first single use filter and the second vent junction, the second vent junction disposed between the serial filter valve and the upstream end of the second single use filter;

a first vent conduit, the first vent conduit being in fluid communication with the first vent junction of the fluid supply conduit such that the upstream end of the first single use filter is in fluid communication with the first vent conduit via the first vent junction;

a second vent conduit, the second vent conduit being in fluid communication with the second vent junction of the serial filter conduit such that the upstream end of the second single use filter is in fluid communication with the second vent conduit via the second vent junction, the second vent conduit including a second vent liquid sensor, the second vent liquid sensor configured to generate a second liquid detection signal in response to detecting liquid in the second vent conduit;

a control unit, the control unit in electrical communication with the second vent liquid sensor to receive the second liquid detection signal therefrom, the control unit including a processor and a non-transitory computer readable medium bearing a filter conditioning program containing a filter priming module, the processor arranged with the computer readable medium to execute the filter conditioning program, the processor being configured to perform a priming operation on the first and second single use filters based upon instructions from the filter priming module.

13. The fluid filtration system according claim 12, wherein the second vent conduit includes a second vent outlet and a second vent valve, the second vent liquid sensor disposed between the second vent junction and the second vent outlet, the second vent valve disposed between the second vent liquid sensor and the second vent outlet.

14. The fluid filtration system according claim 13, wherein the first vent conduit includes a first vent outlet, a first vent liquid sensor, and a first vent valve, the first vent liquid sensor disposed between the first vent junction and the first vent outlet, the first vent valve disposed between the first vent liquid sensor and the first vent outlet, the first vent liquid sensor configured to generate a first liquid detection signal in response to detecting liquid in the first vent conduit, and wherein the control unit is in electrical communication with the first vent liquid sensor to receive the first liquid detection signal therefrom.

15. The fluid filtration system according to any one of claim 12 to claim 14, wherein at least one of the fluid supply conduit and the serial filter conduit includes a pressure sensor.

16. The fluid filtration system according to any one of claim 12 to claim 15, further comprising:

a discharge conduit, the discharge conduit being in fluid communication with the downstream end of the second single use filter, the discharge conduit including a first outlet and a second outlet and a first outlet valve and a second outlet valve respectively associated with the first outlet and the second outlet, the first outlet adapted for fluid connection to a product container and the second outlet adapted for fluid connection to a waste repository.

17. A method of conditioning a fluid filtration system according to any one of claim 1 to claim 11, the method comprising:

removably mounting a first single use filter and a second single use filter to a workstation, the workstation including a cabinet;

fluidly connecting an upstream end of the first single use filter to a pump via a fluid supply conduit, the pump supported by the cabinet, the fluid supply conduit including a first vent junction and a fluid supply valve, the fluid supply valve disposed between the first vent junction and the pump;

fluidly connecting a downstream end of the first single use filter to an upstream end of the second single use filter to via a serial filter conduit, the serial filter conduit including a second vent junction and a serial filter valve, the serial filter valve disposed between the downstream end of the first single use filter and the second vent junction;

opening the fluid supply valve to open the fluid supply conduit;

opening the serial filter valve to open the serial filter conduit;

operating the pump to deliver the flow of fluid toward the upstream end of the second single use filter such that gas in the serial filter conduit is displaced to a second vent conduit via the second vent junction;

ceasing operation of the pump in response to the cessation of receiving the second liquid detection signal in response to detecting no liquid in the second vent conduit at a predetermined location.

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

opening the fluid supply valve to open the fluid supply conduit;

opening the serial filter valve to open the serial filter conduit;

opening a second vent valve to open the second vent conduit;

operating the pump to deliver the flow of fluid to the upstream end of the second single use filter such that gas upstream of the upstream end of the second single use filter is displaced to the second vent conduit,

ceasing operation of the pump and/or closing the second vent valve in response to detecting liquid in the second vent conduit at the predetermined location.

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

closing the second vent valve in response to detecting liquid in the second vent conduit at the predetermined location;

operating the pump to deliver the flow of fluid to the second single use filter such that the flow of fluid passes through the second single use filter into a discharge conduit and out of an outlet thereof.

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

opening the fluid supply valve to open the fluid supply conduit;

opening the first vent valve to open a first vent conduit in fluid communication with the first vent junction;

operating the pump to deliver the flow of fluid to the upstream end of the first single use filter such that gas in the fluid supply conduit is displaced to the first vent conduit via the first vent junction;

ceasing operation of the pump and/or closing the first vent valve in response to detecting liquid in the first vent conduit at a predetermined location.