CLAIMS

1. A dialysis unit including:

a dialysate flow circuit including a dialyzer and an ultra-filtration pump; and

a field programmable gate array that monitors an amount of ultrafiltration fluid withdrawn from a patient during a dialysis treatment by the dialysis unit by setting a given register to a first value and increasing the value of the register by a first incremental value for every pump stroke of the ultra-filtration pump and decreasing the value of the register by a second incremental value for each pre-determined increment of time, wherein the field programmable gate array enters a fail-safe state if the value of the register exceeds a pre-determined maximum value.

2. The dialysis unit of claim 1, wherein said field programmable gate array is configured to monitor a pre-treatment ultrafiltration volume, and wherein said dialysis unit further comprises an automatic computer processing unit that is configured to assign a nominal ultrafiltration pump rate to the field programmable gate array, operate the ultra-filtration pump at a pre-determined rate above the nominal ultrafiltration pump rate, and verify that the field programmable gate array enters the fail-safe state prior to the start of the dialysis treatment.

3. The dialysis unit of claim 1, wherein the pre-determined maximum value is fixed or programmable.

4. The dialysis unit of claim 1, wherein the field programmable gate array is configured to also enter the fail-safe state if the value of the register decreases to zero from the first value.

5. A dialysis unit including:

a dialysate flow circuit including a dialyzer; and

an automatic computer processing unit that verifies before a start of a treatment that a safety system mediated by a field programmable gate array (FPGA) is operating properly by exposing sensors in fluid paths in the dialysis unit to temperatures or conductivities that are outside pre-determined permissible ranges of values, and

confirming that the FPGA safety system enters a fail-safe state in response to the temperatures or conductivities outside the predetermined permissible ranges of values, wherein the computer processing unit resets the FPGA after verifying that the safety system is operating properly by writing to one or more registers in the FPGA within a pre-determined interval of time.

6. The dialysis unit of claim 5, wherein the automatic computer processing unit is configured to perform said verification before a patient is connected to the dialysis unit, and wherein the automatic computer processing unit is configured to set a status indicating that the patient is connected to the dialysis unit while performing the step of exposing sensors in fluid paths in the dialysis unit to temperatures or conductivities that are outside pre-determined permissible ranges of values.

7. The dialysis unit of claim 5, wherein the automatic computer processing unit is configured to command the pumping of dialysate heated to a temperature of about 42 degrees Celsius while performing the step of exposing sensors in fluid paths in the dialysis unit to temperatures or conductivities that are outside pre-determined permissible ranges of values.