Claims

We claim:

1. An intracardiac blood pump system comprising:

a pump comprising a housing and a rotor disposed within the housing;

an elongate multi-lumen catheter having a proximal end, a distal end and a central lumen, wherein the distal end is adjacent the housing;

a compartment comprising a first opening and one or more side ports, the first opening of the compartment connected to the proximal end of the elongate multi-lumen catheter, the one or more side ports of the compartment located proximal of the first opening of the compartment;

at least one electronic element within the compartment;

a first lumen of the elongate multi-lumen catheter configured to carry liquid from an external source through the one or more side ports of the compartment and through the first opening of the compartment to the distal end of the elongate multi-lumen catheter;

a conduit extending through an interface between the compartment and the elongate multi-lumen catheter, the conduit comprising a first end located proximal of the first opening and a second end located distal of the first opening, the conduit configured to carry gas from the first end of the conduit through the first opening of the compartment to the second end of the conduit, the second end of the conduit being in fluid communication with the central lumen of the elongate multi-lumen catheter; and

a filter disposed within the conduit, wherein the filter is configured to prevent egress of the liquid from the elongate multi-lumen catheter into the compartment.

2. The intracardiac blood pump system of claim 1, wherein the filter is configured to allow flow of the gas from the first end of the conduit through the second end of the conduit and into the elongate multi-lumen catheter, while preventing egress of the liquid from the elongate multi-lumen catheter into the compartment.

3. The intracardiac blood pump system of claim 2, wherein the first lumen passes through the compartment and wherein the filter is configured to prevent a leak of liquid from the central lumen passing through the conduit and reaching the compartment.

4. The intracardiac blood pump system of claim 3, wherein the filter is located proximal of the first opening of the compartment.

5. The intracardiac blood pump system of claim 3, wherein the filter is located distal of the first opening of the compartment.

6. The intracardiac blood pump system of claim 3, wherein the filter extends across the first opening of the compartment.

7. The intracardiac blood pump system of claim 6, wherein a portion of the filter extends within the compartment.

8. The intracardiac blood pump system of claim 7, wherein the liquid comprises purge fluid and the purge fluid flows through the first lumen to the rotor to provide a barrier against blood ingress into the housing.

9. The intracardiac blood pump system of claim 1, wherein the liquid comprises at least one of: blood, saline, purge fluid, heparin and glucose.

10. The intracardiac blood pump system of claim 1, wherein the filter self-seals when exposed to liquid.

11. The intracardiac blood pump system of claim 10, wherein the filter is gas-permeable prior to liquid exposure.

12. The intracardiac blood pump system of claim 11, wherein the filter comprises a hydrogel adhered to pore walls of a porous substrate.

13. The intracardiac blood pump system of claim 12, wherein the porous substrate comprises at least one of: fibers, granules, or powder.

14. The intracardiac blood pump system of claim 1, wherein the at least one electronic element comprises at least one of: a circuit board, a wire, a soldered or surface mounted electrical connection, a resistor, a capacitor, an inductor, copper electrical connections, a memory, a pressure transducer, and a pressure sensor.

15. The intracardiac blood pump system of claim 1, wherein the gas carried by the conduit is sterilization gas.

16. The intracardiac blood pump system of claim 1, further comprising a connector at the first opening between the compartment and the elongate multi-lumen catheter, wherein the first lumen and the filter pass through the connector.

17. The intracardiac blood pump system of claim 16, wherein the connector has an inner volume and the filter fills at least 50 percent of the inner volume of the connector.

18. The intracardiac blood pump system of claim 1, wherein the filter is sized and shaped to fit within the conduit.

19. The intracardiac blood pump system of claim 18, wherein the filter is shaped as a frustum or a narrow cylinder.

20. The intracardiac blood pump system of claim 1, wherein the first lumen is within the central lumen.