

CLAIMS

1. A humidifier liquid chamber or a humidifier liquid chamber manifold comprising:
 - first and second base unit connection ports for connecting to a breathing assistance apparatus base unit, the base unit connection ports defining respective axes;
 - wherein the base unit connection ports are substantially parallel to each other and are separated by a port separation distance between the axes;
 - wherein at least one of the base unit connection ports has a sealing depth defined by a portion of the port that is configured to overlap with a complementary chamber connection port of the base unit, wherein a ratio of the sealing depth to port separation distance is more than about 0.25.
2. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 1, wherein the ratio of the sealing depth to port separation distance is more than about 0.25 and up to about 0.7.
3. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 2, wherein the ratio of the sealing depth to port separation distance is between about 0.3 and about 0.7.
4. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 3, wherein the ratio of the sealing depth to port separation distance is about 0.475.
5. The humidifier liquid chamber or humidifier liquid chamber manifold according to any one of claims 1 to 4, wherein the sealing depth is more than about 10 mm.
6. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 5, wherein the sealing depth is more than about 10 mm and up to about 16 mm.
7. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 5, wherein the sealing depth is more than about 12 mm.

8. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 7, wherein the sealing depth is more than about 12 mm and up to about 16 mm.
9. The humidifier liquid chamber or humidifier liquid chamber manifold according to any one of claims 1 to 8, wherein said at least one of the base unit connection ports is configured to seal with at least two seals on the complementary chamber connection port.
10. The humidifier liquid chamber or humidifier liquid chamber manifold according to any one of claims 1 to 9, wherein the base unit connection ports each have an exterior face, and wherein the exterior faces are substantially planar and are substantially perpendicular to the axes.
11. The humidifier liquid chamber manifold according to any one of claims 1 to 10, comprising first and second manifold-to-chamber connection ports for connecting to a humidifier liquid chamber, wherein the first manifold-to-chamber connection port is in fluid communication with the first base unit connection port, and wherein the second manifold-to-chamber connection port is in fluid communication with the second base unit connection port.
12. The humidifier liquid chamber manifold according to claim 11, wherein a first conduit extends between and fluidly connects the first manifold-to-chamber connection port and the first base unit connection port, and wherein a second conduit extends between and fluidly connects the second manifold-to-chamber connection port and the second base unit connection port.
13. The humidifier liquid chamber manifold according to claim 11 or 12, wherein the axes of the first and second base unit connection ports are configured to be in a substantially horizontal orientation when the humidifier liquid chamber manifold is in use.
14. The humidifier liquid chamber manifold according to claim 13, wherein axes of the first and second manifold-to-chamber connection ports are configured to be in a substantially vertical orientation when the humidifier liquid chamber manifold is in use.

15. The humidifier liquid chamber manifold according to any one of claims 10 to 14, comprising an auxiliary port that is in communication with an interior of the humidifier liquid chamber manifold.
16. The humidifier liquid chamber manifold according to any one of claims 10 to 15, comprising a conduit clip to engage with a liquid conduit for delivering liquid to a humidifier liquid chamber.
17. The humidifier liquid chamber manifold according to any one of claims 10 to 16, that is integrally formed as part of a humidifier liquid chamber.
18. The humidifier liquid chamber or humidifier liquid chamber manifold according to any one of claims 1 to 17, wherein the port separation distance is between about 35 mm and about 45 mm.
19. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 18, wherein the port separation distance is between about 38 mm and about 42 mm.
20. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 19, wherein the port separation distance is about 40 mm +/- 0.6mm.
21. The humidifier liquid chamber according to any one of claims 1 to 10 or 18 to 20, comprising flow tubes extending into the humidifier liquid chamber from the first and second base unit connection ports.
22. The humidifier liquid chamber according to claim 21, wherein each flow tube comprises an opening at or adjacent an end of the flow tube that is distal from the respective base unit connection port, wherein the opening is configured to direct flow and is spaced from a wall of the humidifier liquid chamber.
23. The humidifier liquid chamber according to claim 22, wherein the opening in each flow tube faces a roof of the humidifier liquid chamber.
24. The humidifier liquid chamber according to claim 22 or 23, comprising a baffle in the interior of the humidifier liquid chamber and between the openings of the flow tubes.

25. The humidifier liquid chamber according to claim 24, wherein the baffle extends downward from a roof of the humidifier liquid chamber and terminates above a maximum liquid fill level of the humidifier liquid chamber.
26. The humidifier liquid chamber according to claim 25, wherein a distance between a bottom edge of the baffle and the maximum liquid fill level is between about 5 mm and about 15 mm.
27. The humidifier liquid chamber according to claim 24, wherein the baffle extends downward from a roof of the humidifier liquid chamber and terminates at or below a maximum liquid fill level of the humidifier liquid chamber.
28. The humidifier liquid chamber according to any one of claims 24 to 27, wherein a roof of the humidifier liquid chamber is sloped so as to be substantially non-horizontal in use.
29. The humidifier liquid chamber according to claim 28, wherein at least one of the roof, the baffle, and wall(s) of the humidifier liquid chamber are configured to direct gases exiting the opening of the flow tube associated with the first base unit connection port toward and over a surface of liquid in the humidifier liquid chamber.
30. The humidifier liquid chamber according to claim 29 when dependent on claim 25 or 26, comprising substantially no deadspace in the humidifier liquid chamber in use.
31. The humidifier liquid chamber according to any one of claims 21 to 30, wherein each flow tube comprises a liquid drainage aperture at or adjacent an end of the flow tube that is distal from the respective base unit connection port.
32. The humidifier liquid chamber according to any one of claims 21 to 31, wherein each flow tube comprises a gas bleed aperture in an upper surface of the flow tube.
33. The humidifier liquid chamber according to any one of claims 1 to 10 or 18 to 32, comprising a step in the humidifier liquid chamber.
34. The humidifier liquid chamber according to claim 33, wherein a base of the step is located at least partly below the first and second base unit connection ports.

35. The humidifier liquid chamber according to claim 33 or 34 when dependent on any one of claims 24 to 29, wherein the baffle extends from a rear of the humidifier liquid chamber to a substantially vertical face of the step.

36. The humidifier liquid chamber according to claim 33 or 34 when dependent on any one of claims 24 to 29, wherein the baffle extends from a rear of the humidifier liquid chamber towards a substantially vertical face of the step, and terminates proximal to a central axis of the humidifier liquid chamber.

37. The humidifier liquid chamber according to any one of claims 1 to 10 or 18 to 36, wherein the humidifier liquid chamber has a substantially cylindrical shape.

38. The humidifier liquid chamber according to claim 37, wherein the humidifier liquid chamber tapers towards a centre of the humidifier liquid chamber from a base of the humidifier liquid chamber to a top of the humidifier liquid chamber.

39. The humidifier liquid chamber according to any one of claims 1 to 10 or 18 to 38, comprising a heat conductive base.

40. The humidifier liquid chamber according to claim 38 or 39, wherein the base of the humidifier liquid chamber is removable from a body of the humidifier liquid chamber.

41. The humidifier liquid chamber according to claim 40, comprising one or more base removal features to assist with removing the base of the humidifier liquid chamber from the body of the humidifier liquid chamber.

42. The humidifier liquid chamber according to claim 41, wherein the one or more base removal features is/are located between a lower flange of the body of the humidifier liquid chamber and an outwardly extending flange of the base of the humidifier liquid chamber.

43. The humidifier liquid chamber according to claim 42, wherein the one or more base removal features comprises a slot.

44. The humidifier liquid chamber according to any one of claims 1 to 10 or 18 to 43, comprising a shoulder between the first and second base unit connection ports.

45. The humidifier liquid chamber according to claim 44, wherein the shoulder extends beyond exterior faces of the first and second base unit connection ports.
46. The humidifier liquid chamber or humidifier liquid chamber manifold according to any one of claims 1 to 45, wherein one of the base unit connection ports is an inlet port and the other of the base unit connection ports is an outlet port.
47. A humidifier liquid chamber or a humidifier liquid chamber manifold comprising:
first and second base unit connection ports for connecting to a breathing assistance apparatus base unit;
wherein the base unit connection ports are substantially parallel to each other;
wherein each of the base unit connection ports comprises at least two sealing portions configured to form at least two seals with a portion of the breathing assistance apparatus base unit when connected to the breathing assistance apparatus base unit.
48. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 47, wherein the two sealing portions are separated by a distance of about 5 mm to about 7 mm.
49. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 48, wherein the two sealing portions are separated by a distance of about 5.5 mm to about 6.5 mm.
50. The humidifier liquid chamber or humidifier liquid chamber manifold according to any one of claims 47 to 49, wherein each base unit connection port comprises an internal taper such that the base unit connection port narrows from a terminal end of the port towards an opposite end of the base unit connection port.
51. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 50, wherein an inner diameter of a first one of the sealing portions proximal to the terminal end of the base unit connection port is about 0 mm to about 0.6 mm greater than an inner diameter of a second one of the sealing portions distal the terminal end of the base unit connection port.

52. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 51, wherein the inner diameter of the first one of the sealing portions is less than about 25.6 mm.
53. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 52, wherein the inner diameter of the second one of the sealing portions is less than about 25.4 mm.
54. The humidifier liquid chamber according to any one of claims 47 to 53, wherein each base unit connection port comprises a central axis that is at least about 85 mm above a lower surface of a body of the humidifier liquid chamber.
55. The humidifier liquid chamber according to claim 54, wherein the central axes of the base unit connection ports are at least about 88 mm above the lower surface of the body of the humidifier liquid chamber.
56. The humidifier liquid chamber according to claim 54 or 55, wherein the lower surface is defined by an upper edge of a lower flange of the body of the humidifier liquid chamber.
57. The humidifier liquid chamber according to claim 56, wherein the lower flange is configured to engage with one or more retaining features in a breathing assistance apparatus base unit to assist with retaining the humidifier liquid chamber in engagement with the breathing assistance apparatus base unit.
58. The humidifier liquid chamber or humidifier liquid chamber manifold according to any one of claims 47 to 57, wherein each base unit connection port is cylindrical.
59. The humidifier liquid chamber or humidifier liquid chamber manifold according to any one of claims 47 to 58, wherein each base unit connection port is configured to receive a complementary port of a breathing assistance apparatus base unit.
60. The humidifier liquid chamber according to any one of claims 47 to 59, comprising flow tubes extending into the humidifier liquid chamber from the first and second base unit connection ports.

61. The humidifier liquid chamber according to claim 60, comprising a baffle in the interior of the humidifier liquid chamber and between openings of the flow tubes.
62. The humidifier liquid chamber according to claim 61, wherein the baffle extends downward from a roof of the humidifier liquid chamber and terminates above a maximum liquid fill level of the humidifier liquid chamber.
63. The humidifier liquid chamber according to claim 61, wherein the baffle extends downward from a roof of the humidifier liquid chamber and terminates at or below a maximum liquid fill level of the humidifier liquid chamber.
64. The humidifier liquid chamber according to any one of claims 61 to 63, wherein a roof of the humidifier liquid chamber is sloped so as to be substantially non-horizontal in use.
65. The humidifier liquid chamber according to claim 64, wherein at least one of the roof, the baffle, and wall(s) of the humidifier liquid chamber are configured to direct gases exiting the opening of the flow tube associated with the first base unit connection port toward and over a surface of liquid in the humidifier liquid chamber.
66. The humidifier liquid chamber according to any one of claims 47 to 65, comprising a step in the humidifier liquid chamber.
67. The humidifier liquid chamber according to claim 66, wherein a base of the step is located at least partly below the first and second base unit connection ports.
68. The humidifier liquid chamber according to claim 66 or 67 when dependent on any one of claims 61 to 65, wherein the baffle extends from a rear of the humidifier liquid chamber towards a substantially vertical face of the step, and terminates proximal to a central axis of the humidifier liquid chamber.
69. The humidifier liquid chamber according to claim 68, wherein a distance between a forward edge of the baffle and the substantially vertical face of the step is at least about 20 mm.
70. The humidifier liquid chamber or humidifier liquid chamber manifold according to any one of claims 47 to 69, wherein the first and second base unit

connection ports define respective axes, and wherein the first and second base unit connection ports are separated by a port separation distance between the axes, and wherein the port separation distance is between about 35 mm and about 45 mm.

71. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 70, wherein the port separation distance is between about 38 mm and about 42 mm.

72. The humidifier liquid chamber or humidifier liquid chamber manifold according to claim 71, wherein the port separation distance is about 40 mm +/- 0.6mm