

Claims

1. A respiratory assistance apparatus comprising:
 - a flow generator configured to provide breathing gases to a patient, the breathing gases comprising supplemental oxygen provided from an oxygen source,
 - a controller configured to control an oxygen concentration of the breathing gases,
 - at least one sensor, the at least one sensor configured to provide a measurement indicative of a patient's blood oxygen concentration to the controller,
 - wherein the controller is configured determine a target oxygen concentration of the breathing gases,
 - wherein the controller is configured to calculate an estimated future value of the patient's blood oxygen concentration based on:
 - a difference between an initial oxygen concentration of the breathing gases and the target oxygen concentration of the breathing gases, and
 - the measurement indicative of the patient's blood oxygen concentration.
2. The respiratory assistance apparatus of claim 1, wherein the controller is configured to control the oxygen concentration of the breathing gases based on the target oxygen concentration.
3. The respiratory assistance apparatus of claim 1 or claim 2, wherein the estimated future value of the patient's blood oxygen concentration is further based on a time from when the controller controls the oxygen concentration of the breathing gases to the target oxygen concentration.
4. The respiratory assistance apparatus of any one of claims 1 to 3, wherein the controller is configured to receive an input, and based on the input determine the target oxygen concentration of the breathing gases.
5. The respiratory assistance apparatus of claim 4, wherein the input comprises a target oxygen concentration range comprising an upper target oxygen concentration, and a lower target oxygen concentration.
6. The respiratory assistance apparatus of any one of claims 1 to 5, wherein the controller is configured to compare said estimated future value of the patient's blood oxygen concentration with a blood oxygen concentration alarm range, and generate an alarm output if the estimated future value of the patient's blood oxygen concentration is not within said blood oxygen concentration alarm range, and wherein the blood oxygen concentration alarm range

comprises an upper blood oxygen concentration alarm threshold, and a lower blood oxygen concentration alarm threshold.

7. The respiratory assistance apparatus of any one of claims 1 to 5, wherein the controller is configured to generate an alarm output based on the estimated future value of the patient's blood oxygen concentration and a comparison with a blood oxygen concentration alarm threshold, and wherein the controller is configured to generate said alarm output if the estimated future value of the patient's blood oxygen concentration is above an upper blood oxygen concentration alarm threshold or below a lower blood oxygen concentration alarm threshold.
8. The respiratory assistance apparatus of claim 6 or claim 7, wherein the upper blood oxygen concentration alarm threshold and/or the lower blood oxygen concentration alarm threshold is/are determined based on a time from when the controller controls the oxygen concentration of the breathing gases to the target oxygen concentration.
9. The respiratory assistance apparatus of any one of claims 6 to 8, wherein the upper blood oxygen concentration alarm threshold and/or the lower blood oxygen concentration alarm threshold is/are determined based on an amount of a change in target oxygen concentration.
10. The respiratory assistance apparatus of any one of claims 6 to 8, wherein the upper blood oxygen concentration alarm threshold and/or the lower blood oxygen concentration alarm threshold is/are determined based on the target oxygen concentration
11. The respiratory assistance apparatus of any one of claims 6 to 10, wherein the upper blood oxygen concentration alarm threshold and/or the lower blood oxygen concentration alarm threshold is/are determined based on the current oxygen concentration of gases.
12. The respiratory assistance apparatus of any one of claims 6 to 11, wherein the upper blood oxygen concentration alarm threshold and/or the lower blood oxygen concentration alarm threshold is/are based on the target blood oxygen concentration.
13. The respiratory assistance apparatus of any one of claims 6 to 12, wherein the upper blood oxygen concentration alarm threshold is based on the difference between the target oxygen concentration and the or an upper target oxygen concentration.
14. The respiratory assistance apparatus of any one of claims 6 to 13, wherein the respiratory assistance apparatus, or an associated device, is configured to display the alarm output, or information associated with the alarm output.

15. The respiratory assistance apparatus of any one of claims 6 to 14, wherein the respiratory assistance apparatus, or the or an associated device is configured to display the estimated future value of the patient's blood oxygen concentration.
16. The respiratory assistance apparatus of any one of claims 1 to 15, wherein the estimated future value of the patient's blood oxygen concentration is based on an oxygen efficiency of the patient and/or a haemoglobin saturation function.
17. The respiratory assistance apparatus of any one of claims 1 to 16, wherein the oxygen efficiency of the patient is based on the measurement indicative of a patient's blood oxygen concentration divided by a measured oxygen concentration of the breathing gases.
18. The respiratory assistance apparatus of any one of claims 1 to 17, wherein the oxygen efficiency of the patient is received as an input.
19. The respiratory assistance apparatus of any one of claims 1 to 18, wherein the controller is configured to calculate the estimated future value of the patient's blood oxygen concentration based on stored breathing gases oxygen concentration data.
20. The respiratory assistance apparatus of claim 19, wherein stored breathing gases oxygen concentrations of the stored breathing gases oxygen concentration data are weighted based on an associated timestamp.