Technology Offer

# Ultracompact medical ventilation system - Ref.-No.: 0901-6012-WT

**The invention relates to a new, ultracompact non-invasive medical ventilation system. The BIPAP (Biphasic Positive Airway Pressure) ventilation unit, of size and weight of a tennis ball, is easy to handle and allows low-budget mass production. It can be powered by a rechargeable battery-pack – a great advantage in case of mobile use or damaged/unstable infrastructure leading to frequent blackouts. These benefits, certainly also valuable for stationary use, are achieved implementing a bidirectional airway between the radial blowers and a respiratory mask leading to a non-blocking, always open system with a low dead volume and operable without safety valves. Two sensors and an interface for readout enable control loops for a comfortable measurement and adjustment of all necessary parameters (like the oxygen saturation) as well as an optional admixture of therapeutic measures. In case of a power failure, the system still serves as an FFP3 mask.**
**Besides disclosing the technical implementation, also the controlling system for the radial blowers is described.**

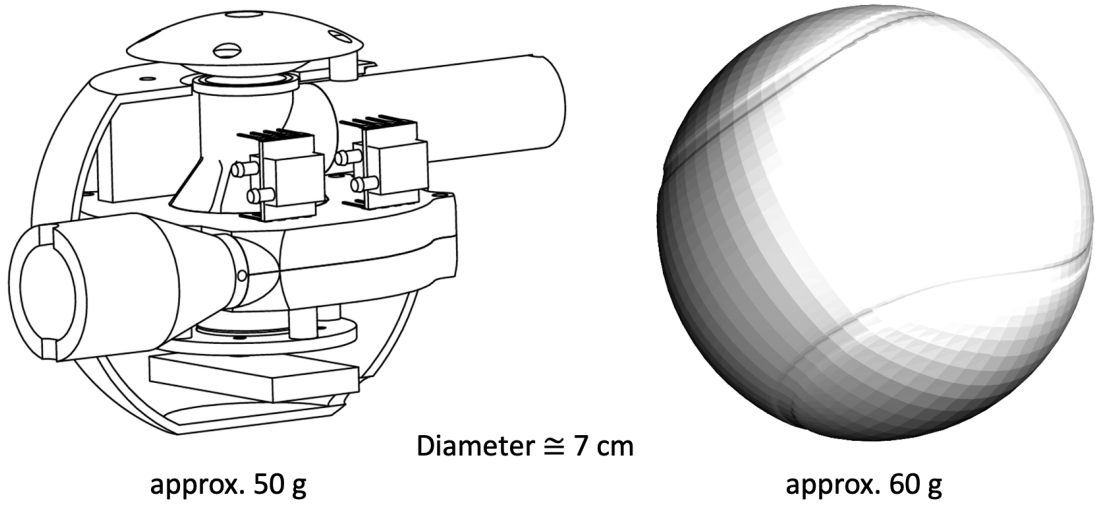


Fig.1 Comparison of the ventilation unit (left hand side) with a tennis ball.

## Background

A variety of non-invasive artificial ventilation systems is known. Most of these devices are based on the BIPAP system which uses two different pressure levels to enable/support inhalation and exhalation. Common to all current solutions is a high complexity due to extended valve systems. This high complexity is not only reflected in high product prices but also a hindrance for an easy and straight forward security monitoring. In addition, only specially trained stuff is able to handle the devices correctly.

## Technology

A new ventilation system has been designed to overcome the aforementioned shortcomings. The miniaturized system of spherical shape (cf. Fig.1) has diameter of ≈ 7cm and a typical mass of 50g. Its housing hosts as a central unit, radial blowers (1), and is equipped with an on/off switch and interface functions. Besides plug-in connectors, also Blue Tooth connections are available. In Fig. 1, (2) marks the air inlet, while (3) denotes the air outlet where a respiratory mask and a filter can be attached. The whole ventilation duct between (2) and (3) is bidirectional, and this construction allows a low dead volume. In case of increased pressure during exhalation phases, the valves (4) automatically open.


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The sensors (5) are capable of measuring the pressure and flux. Together with the steering unit (6), a steering control of the radial blowers can be established.
The power consumption of the system is around 12 W. Assuming the ventilation system is driven by a rechargeable power-pack with typically 10.000 mAh and a voltage of 12V, this translates to an operation time of ≈ 10 h.

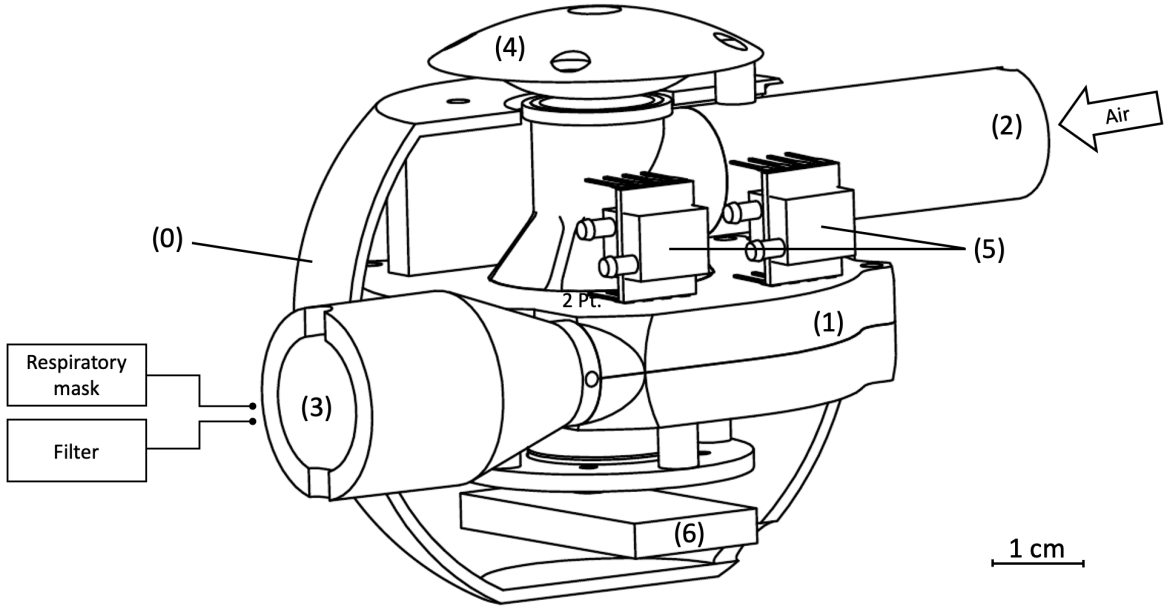


Fig. 1: 3D cut of the ventilation system. (0) housing, (1) radial blowers, (2) air inlet, (3) air outlet, (4) valves for the case of increased pressure during exhalation phases, (5) sensors and (6) steering unit.

## Advantages

- Low-budget
- Low power consumption
- Lightweight
- Easy to handle
- Open system without physical safety issues
- Low dead volume
- System/radiation blowers: Non-blocking, no safety valves

## Applications

- Patients lacking access to a health care system
- Mobile groups/vehicles
- Hospitals in regions with damaged or “weak” infrastructure (leading to frequent blackouts)
- Standby for high standard hospitals in case of pandemic

## Patent Information

DPMA, PCT

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