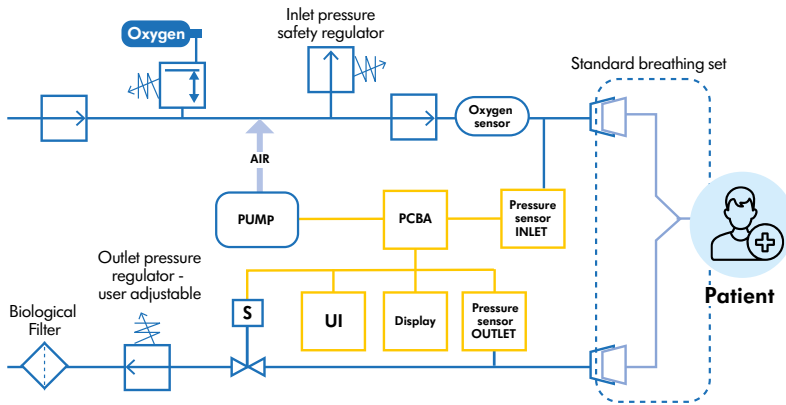


Can our breast pump become a ventilator?

We started by creating a schematic how this could principally look.



From a technology perspective, yes – a vacuum pump can be turned into a compressor

Breast pumps can be “reversed” to turn suction into airflow, generating 3-5L/min. Under this hypothesis, our engineers analysed the different components of a ventilator and created a possible product architecture.

Can this be used to treat patients with COVID-19?

In order to answer this question, we need to differentiate between low-flow or non-invasive devices and mechanical ventilators used in the ICU.

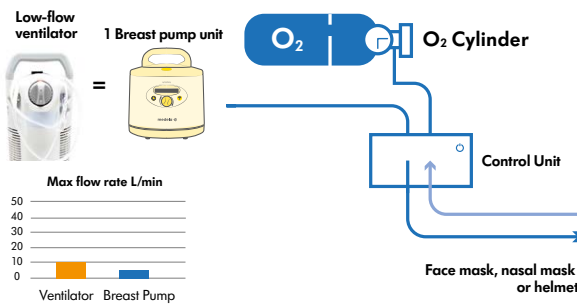
Low-flow respiratory assistance

- Patients are conscious and can breathe independently, not indicated for patients with severe symptoms
- Used to increase oxygen intake in the lungs
- Administered by positive pressure via face mask, nasal mask or helmet
- Used in care institutions, at home or in hospital



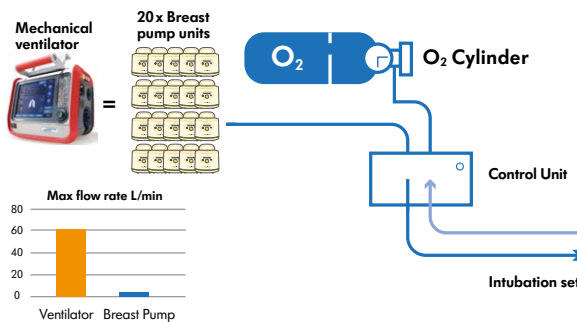
Mechanical Ventilation

- For patients with severely impaired lung function used in ICU (5% of cases, independent breathing no longer possible)
- Used to continue to supply organs with sufficient oxygen
- Highly sophisticated, critical device with high flow rates (60L/min), sensors, alarm functions and safety mechanisms
- Experienced use of the equipment is required



Low-flow respiratory assistance could be provided by a modified breast pump

The airflow provided by a modified breast pump is sufficient in many cases to operate a low-flow respiratory assistance.



However, mechanical ventilation would require up to 20 breast pumps to ensure sufficient airflow

Mechanical ventilation requires particularly high level of airflow (around 60L/min) to replicate full respiratory function, including the opening of the lungs and sufficient oxygen exchange. Especially COVID-19 patients require very high flow and oxygen due to the severity of the disease. In order to provide sufficient airflow, you would need the equivalent approx. 20 breast pumps. Further a sophisticated set of alarms and controls are essential to avoid harming the patient.

CONCLUSION: Breast pumps are not suitable to substitute mechanical ventilators for critical COVID-19 patients in the ICU.

The airflow produced by a modified breast pump could potentially be suitable for low-flow respiratory assistance devices.



How does Medela support the COVID-19 fight?

Our mobile airway suction pumps with disposable virus filter and fluid collection systems are currently in critical demand for endotracheal suction of intubated COVID-19 patients on a ventilator. We are focusing all our efforts on tripling our production capacity to support COVID-19 patients in the ICUs.