BiP

COVID-19 SPECIFIC EMERGENCY VENTILATOR

LUCA

BiP

NEW VENTILATOR SYSTEM FOR COVID-19 PATIENTS

THINKING AHEAD
FEMTONICS
MICROSCOPY

- invented by Femtonics and Semmelweis University, Hungary, supported by the Ministry of Innovation
- named after the daughter of our Technical project manager, Imre Székely
- a ventilator for the treatment of respiratory insufficiency caused by COVID-19
- for a large number of patients can be ventilated simultaneously
- supports both controlled and assisted breathing modes
- provides respiratory support appropriate for the patient's condition at different stages of the disease

Department of Anesthesiology and Intensive Therapy
Semmelweis University

Levels of the development

January 2020 → July 2020

LUCA ventilator

- supports spontaneous breathing initiation
- capable of continuous operation for several weeks
- capable of operation from the internal battery for a minimum of 8 hours in the event of a power failure
- the amount of oxygen allotted for the patient is sufficient to operate the machine, so it is as economical as possible in terms of oxygen consumption
- critical medical components are substituted by high-quality mass-produced components from other industries that meet the safety requirements employed in the healthcare industry

Ventilation modes

LUCA MODEL 3

- Pressure Controlled Ventilation (PCV): in a controlled flow system an inspiratory trigger function provides synchronous ventilation
- Coming soon: Automated pressure control mode with volume target (PCV-Vt)
- Pressure Supported Ventilation (PSV): beyond the expiratory trigger sensitivity the backup respiration rate, the minimum and the maximum of inspiratory time are adjustable
- Coming soon: Automated pressure support mode with volume target (PSV-Vt)
- Manual PEEP control

LUCA MODEL 4

- Pressure Controlled Ventilation (PCV): in a closed flow system an inspiratory trigger function provides synchronous ventilation
- Automated pressure control mode with volume target (PCV-Vt)
- Pressure Supported Ventilation (PSV): beyond the expiratory trigger sensitivity the backup respiration rate, the minimum and the maximum of inspiratory time are adjustable
- Automated pressure support mode with volume target (PSV-Vt)
- Volume-controlled ventilation (VCV)
- Mouth-piece mode to enhance deep sigh breathes for volume therapy (IPPB)
- Machine controlled PEEP
- BiPAP ventilation

LUCA

BiP

Ventilation modes

- Inspiratory pressure
  - the inspiratory pressure can be adjusted on a wide scale to achieve the respiratory volume, the inspiratory pressure is limited to 35 cmH_2O by default, which can be further increased if necessary
  - the positive end-expiratory pressure (PEEP) is in the range of 3-20 cmH2O and it is continuously adjustable
- Inspiratory time
  - the Inspiratory to Expiratory ratio (I:E) can be adjusted on a wide scale based on the inspiratory time and number of breaths, which usually range from 1:3 - 1:1 but can be widened as needed
  - the inspiratory time can be set with an accuracy of 0.5-3 sec 0.1 sec
- Respiratory rate
  - provides 5 to 50 breaths per minute, adjustable in 1 / min increments
- Tidal volume (V_t)
  - adjustable from 300 to 3000 ml in 50 ml increments

LUCA

BiP

Technical details

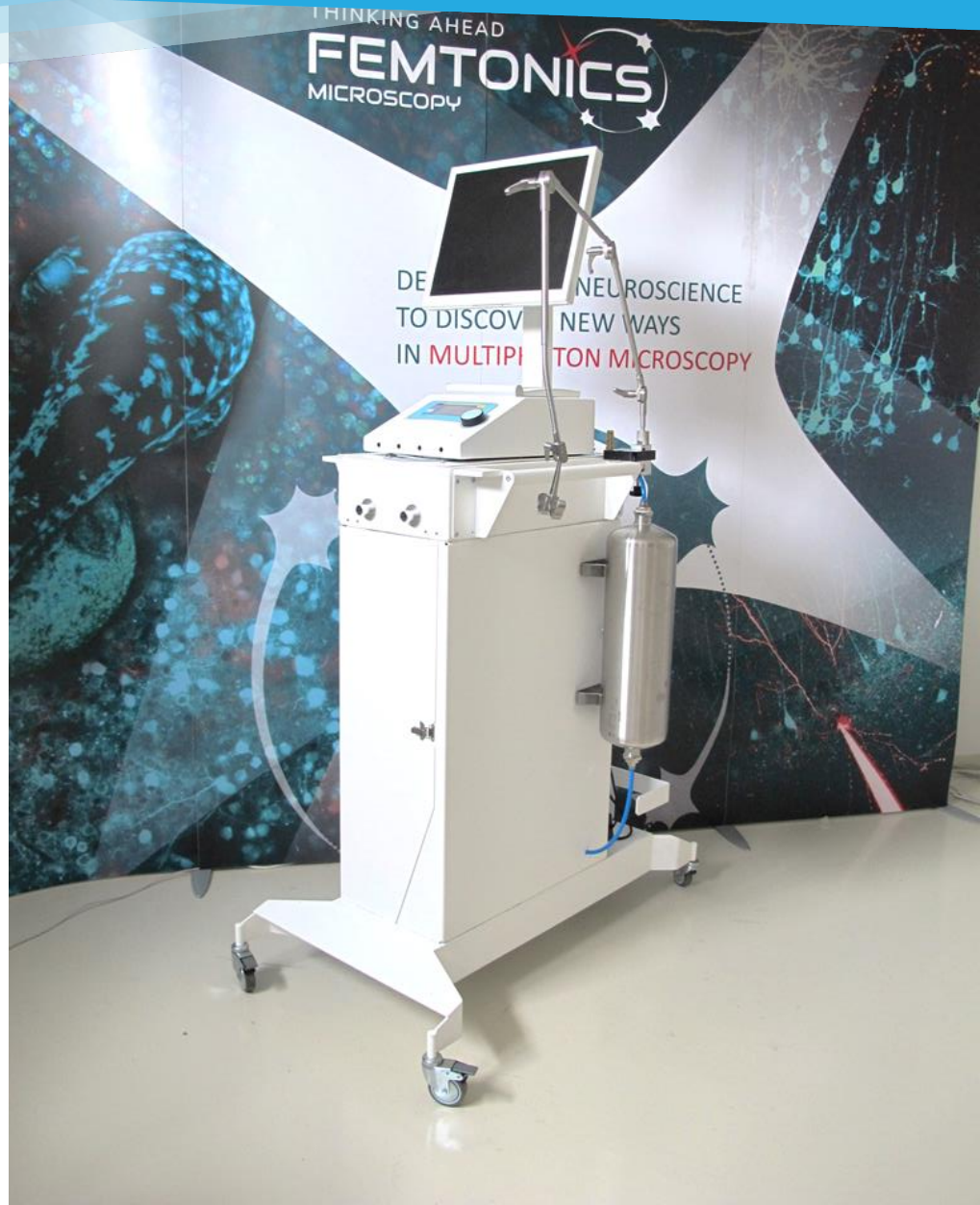
- Usage
  - log can be saved to an SD card
  - user-friendly interface
  - multi-level safety sound and light indication
  - can be connected to the system via a laptop’s USB port, to query log files and evaluate flow functions
  - a large display is connectable to evaluate respiration curves
- Filters
  - many types of filters can be used
  - in the case of a large filter, even a smaller pore size can be used than the coronavirus’s size (~ 120 nm) at low air resistance, the increased surface area ensures a longer service life
  - the control system detects the value of filter saturation via pressure sensors, and predicts the need to replace the filter days before a required replacement

LUCA

BiP

Technical details

- Gas supply and electricity
  - all gas connections and hoses comply with regulations
  - can be connected to the wall oxygen supply and Medical Air wall piping
  - can be connected to 110-240 V mains



Important milestone in the clinical trials

- success in the treatment of patients
- meets the pre-set parameters accurately
- supports spontaneous breathing
- the preparations for serial production can now begin

CONTACT US

BIONIKAI INNOVÁCIÓS PARK Ltd.
59 Tuzolto street, Budapest
Hungary H-1094
info@luca-bip.eu
info@femtonics.eu