LUCA

COVID-19 specific emergency ventilator

The LUCA ventilator system
• 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
• the device has been designed and manufactured within the European Union (Hungary), from high-quality components produced and quality checked in the EU
• the operation of the ventilator can be learned remotely within 5 minutes
• Support: ventilator accessory replacement is available, complete ventilator change can be possible also (subject of individual agreement)

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

Based on the recently accumulated clinical experience with COVID-19, intubation and mechanical ventilation may last for several weeks in severe cases that require mechanical ventilation, significantly increasing the need for intensive care capacity and, consequently, the number of ventilators required. The number of ventilators currently available may be less than what is needed, so ventilators that are simple but can provide complete mechanical ventilation could be the solution for a large number of patients ventilated simultaneously. A larger proportion of newly deployed machines should be able to support both controlled and assisted breathing modes, thus providing respiratory support appropriate for the patient's condition at different stages of the disease.

LUCA is an invasive, fully enclosed ventilator developed for assist-control ventilation, that can provide adequate support for patients during a period lasting from days to weeks. The device is compact, robust, standing or rolling on the floor, and can be placed close to the patient's bed. A heat and moisture exchange virus filter is placed between the machine and the patient, and a separate virus filter has been installed between the two limbs of the breathing circuit and the machine. In addition, the exhaled air is discharged through a special high-performance virus filter that effectively protects the medical staff working in its surroundings. All parts in contact with the patient's exhaled air can be sterilized or disposed of. The setting of the parameters can be performed by a user-friendly interface, which allows the device to be easily operated by users who are less proficient in ventilation.

INVENTED BY

THINKING AHEAD
FEMTONICS

Department of Anesthesiology and Intensive Therapy
Semmelweis University

VENTILATION FEATURES

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

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 cmH_2O 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 (Vt)

• adjustable from 300 to 3000 ml in 50 ml increments

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
• integrated breathing circuit flow sensors: no need for external sensors, which pose a risk to the healthcare staff

Filters

• many types of filters can be used
• in the case of a large filter, even a smaller permeable particle size can be used than the coronavirus (~ 120 nm) at low air resistance, and the increased surface area of the 5-stage filtration system ensures a longer service life
• the filters do not need to be replaced on a patient-by-patient basis, work for months, depending on the intensity of use
• the control system detects the value of filter saturation via high-precision pressure sensors, predicts the need to replace the filter days before a required replacement and sends notifications in several steps

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

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