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PIANO NAZIONALE
DI RIPRESA E RESILIENZA



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IBD Biorespira: an efficient non invasive high flow generator designed during COVID19 pandemic

Alan Fabbri - UNIBO

Kenyatta University
Nairobi
11/02/2026



Outline



Reverse Innovation



Design of Biorespira



Maintenance



Functional and Safety Tests

If a solution is not affordable
it's not a solution

DEVI PRASAD SHETTY

Cardio Surgeon

ibd

«Reverse» or «frugal» innovation overturns the way to think about the design of medical devices



Opposite of “glocalization”



Creates new markets in western countries



Needs of emerging markets



«From value for money to value for many»
(Vijay Govindarajan)



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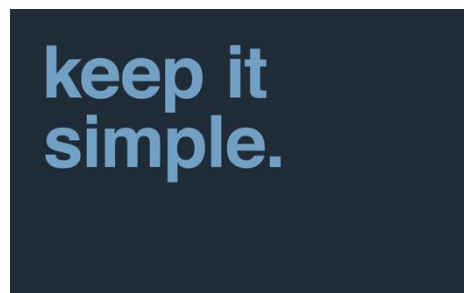
Reverse Innovation is based on 4 pillars



Affordability



Robustness



Ease to use



Flexibility



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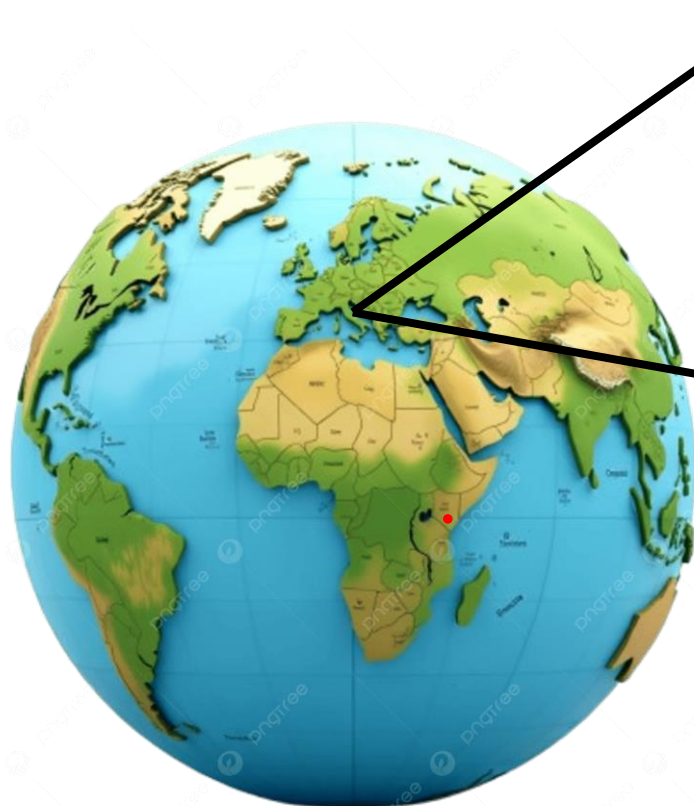


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IBD is a Small-Medium Biomedical Enterprise based in Forlì (Italy)



IBD
Headquarters



IBD Lab



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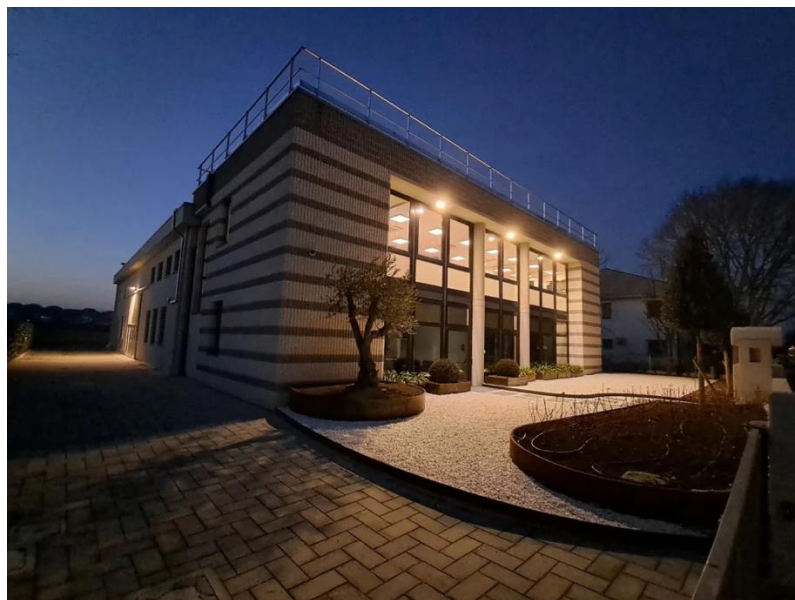


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IBD was founded in 2014 as a start-up by Corrado Ghidini and Andrea Visotti inspired by reverse innovation principles



IBD Headquarters



Corrado Ghidini
MD
CEO



Andrea Visotti
MSc BioEng
R&D Manager

Biorespira

A High Flow
generator to
alleviate the burden
on ICUs





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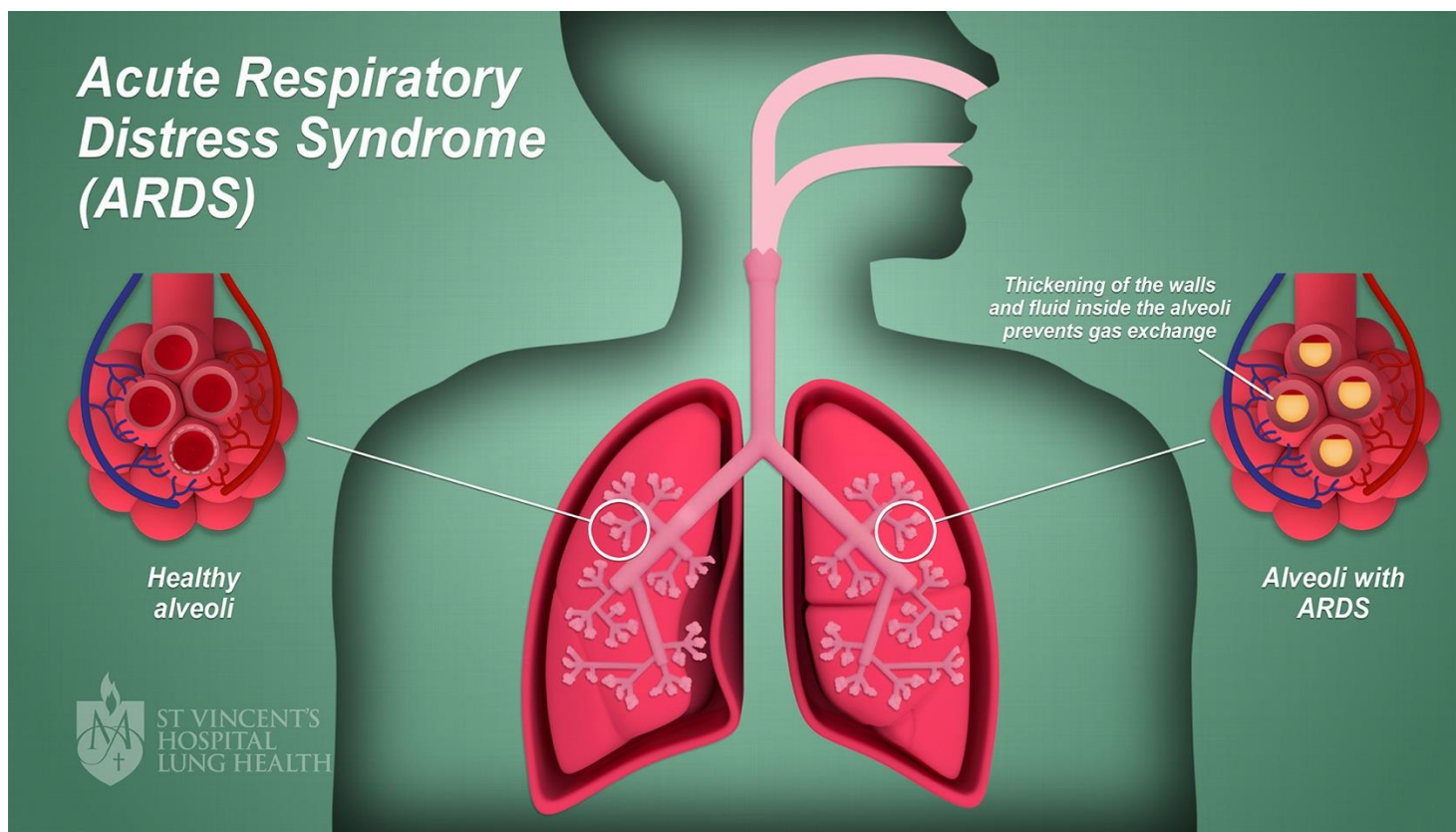


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Acute Respiratory Distress Syndrome (ARDS) is a major complication of COVID-19



**Thickening of walls
+
Fluid in the alveoli**

Reduced gas exchange

**High intubation rate
High mortality**



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Non Invasive Ventilation (NIV) is a first line approach in less ill patients with ARDS



Nasal Cannulae

High Flow Oxygen Therapy (HFOT)



Face Mask

Continuous Positive Airway Pressure (CPAP)



Helmet

Continuous Positive Airway Pressure (CPAP) improves oxygenation and reduces intubation rate



Helmet is the best option
in case of COVID19



Venturi/ Blender



Intensive care unit ventilators



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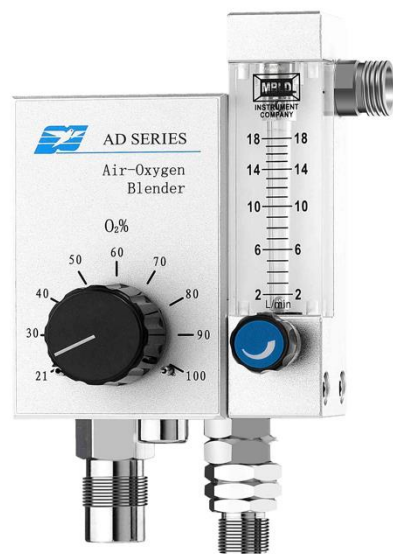


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Venturi systems and blenders need high demand of oxygen



Venturi/ Blender

- + Cheap
- + Out of ICUs
- No closed loop control of flow and FiO_2
- No accurate FiO_2
- High demand of O_2



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Intensive care unit ventilators should be employed for severe ARDS cases



An ICU ventilator

- Expensive
- Prone to CO₂ rebreathing in CPAP mode



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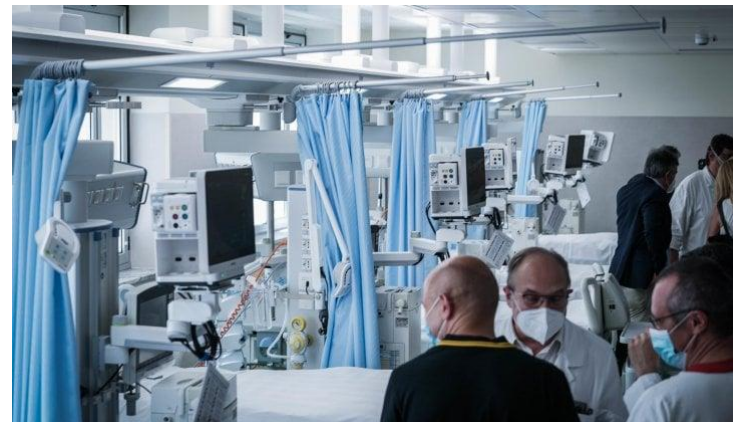


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Reduce O₂ consumption, relief ICU burden and stop spreading out of SARS-cov2 is crucial



Biorespira is a high flow generator with a built-in turbine that monitors patient's parameters



For **adult patients** (>40 Kg) that breath spontaneously

Built in **turbine** allows:

a fine control of flow
an efficient O2 delivery
10-120 lpm/ 21-100% O₂



Patient parameters:

SpO2
Pulse rate
Respiratory rate





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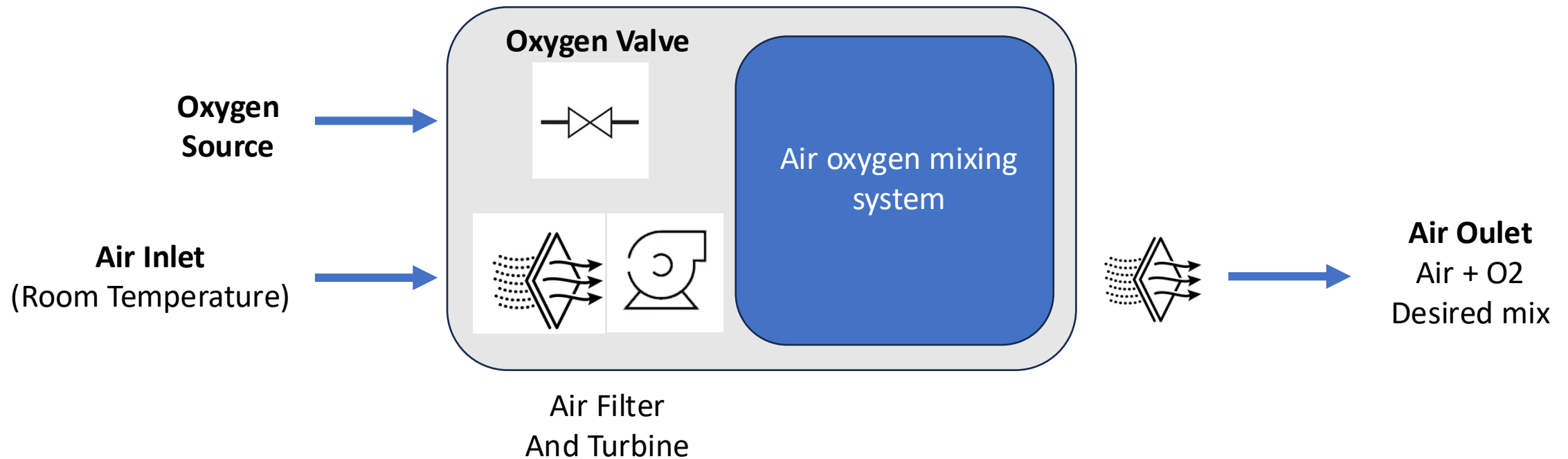


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Biorespira is a high flow generator with a built-in turbine that allows an efficient O₂ delivery



Biorespira delivers both HFOT and CPAP with STANDARD patient interfaces



Humidifier



Nasal Cannulae



HFOT



PEEP valve

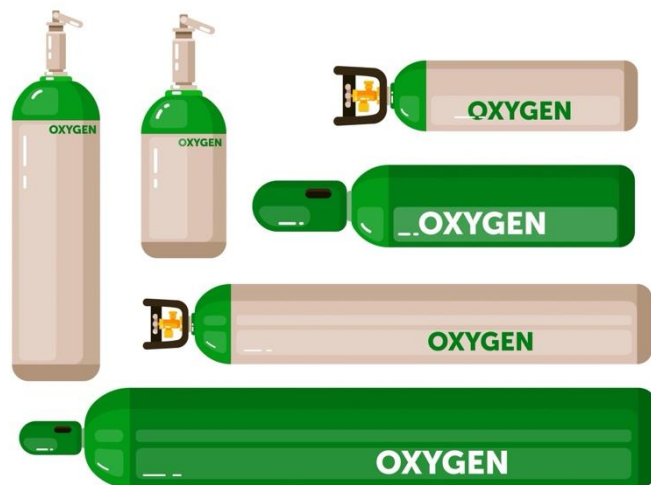


Helmet/Face Mask



CPAP

Biorespira works with O2 tanks, O2 concentrators and hospital O2 system



O₂ Tanks

O₂ concentrator

Hospital O₂ system

Suitable for homecare





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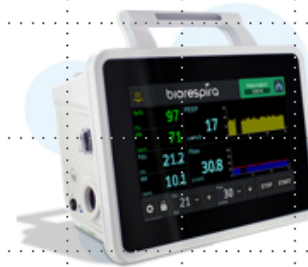
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**Biorespira is CE marked
and currently on the
market**

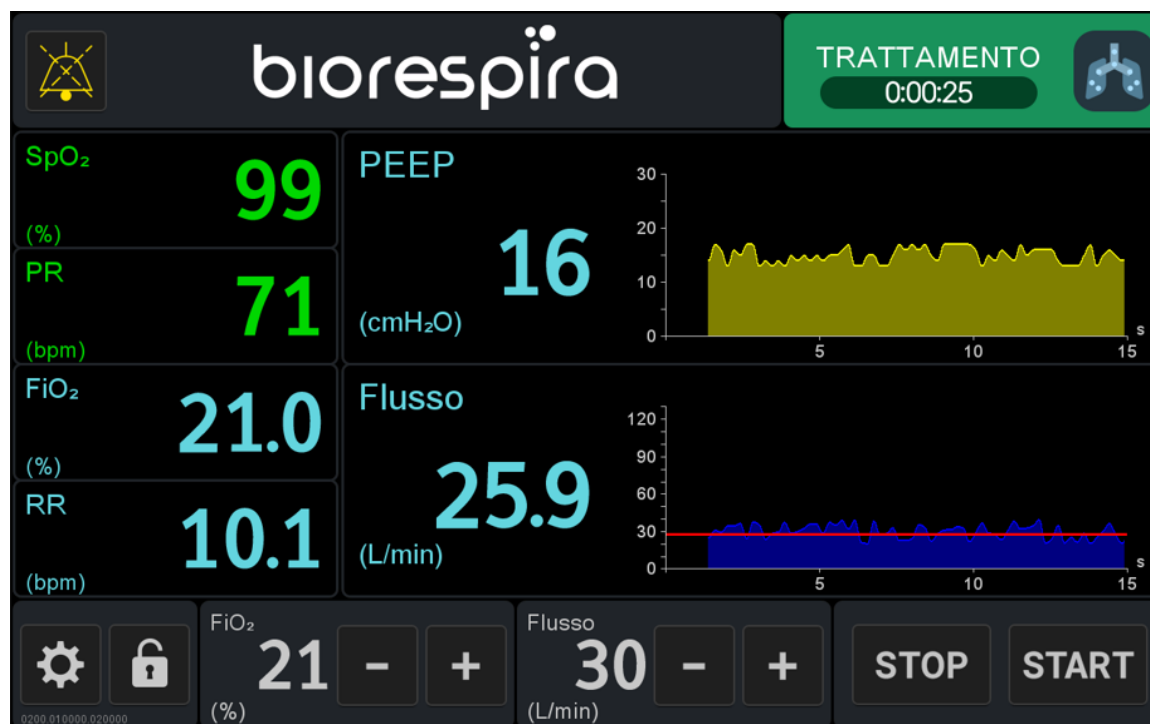
CE



**Let's take a quick
look at the user
interface**



Graphical user interface allows the operator to set the therapy and monitor the patient



10" capacitive
Monitor

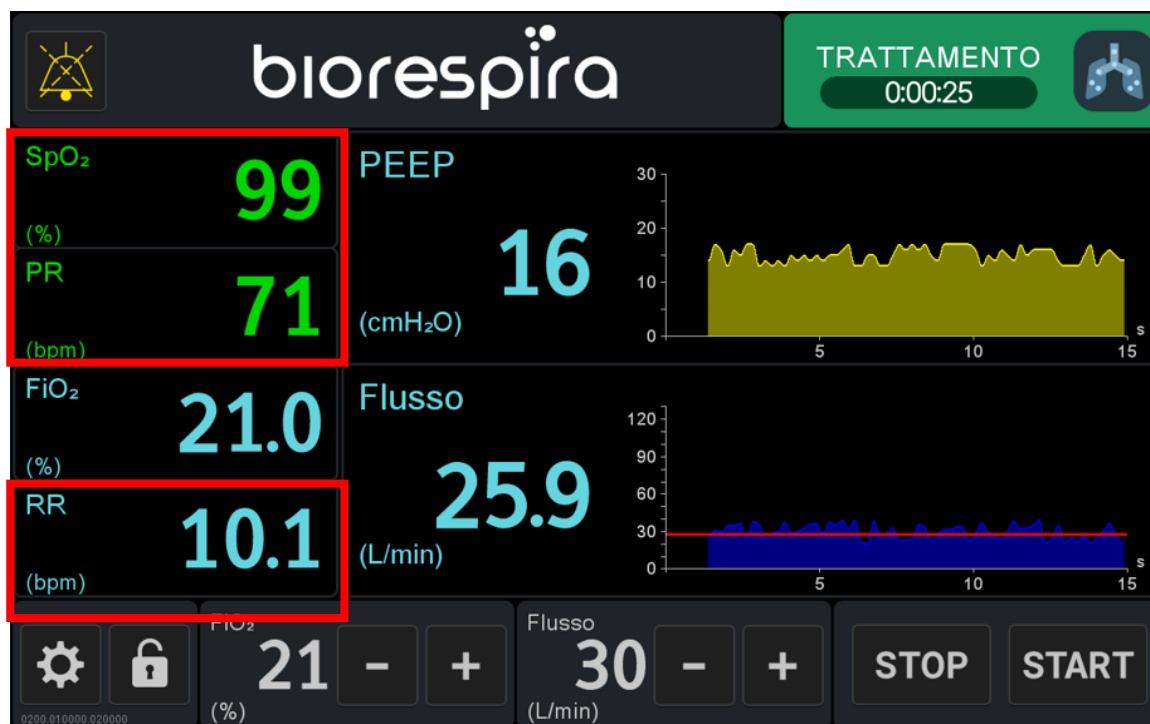
Patient and therapy
status
Available at a glance

Graphical user interface allows the operator to set the therapy and monitor the patient

SpO₂
Pulse Rate

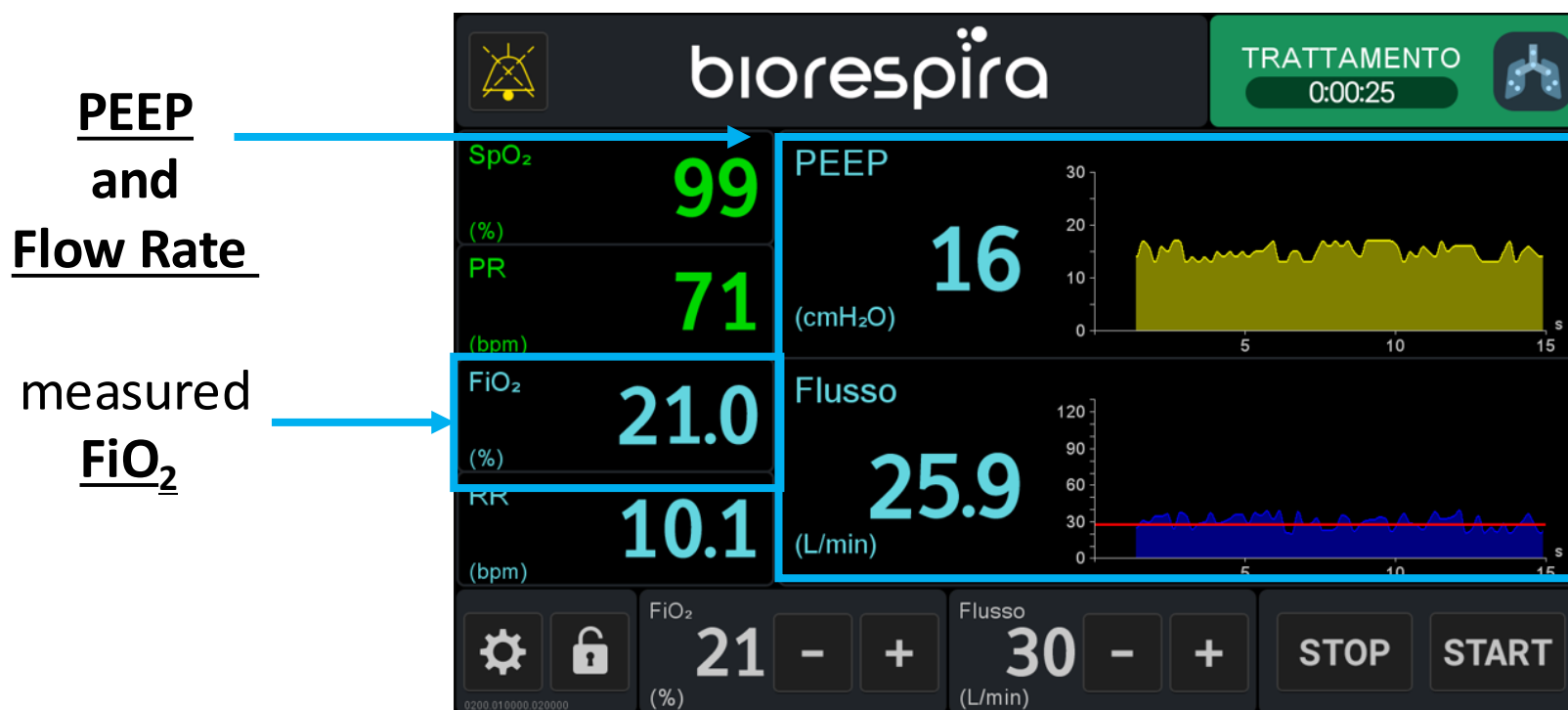


Respiratory Rate



Patient Monitor

Graphical user interface allows the operator to set the therapy and monitor the patient



Therapy Monitor



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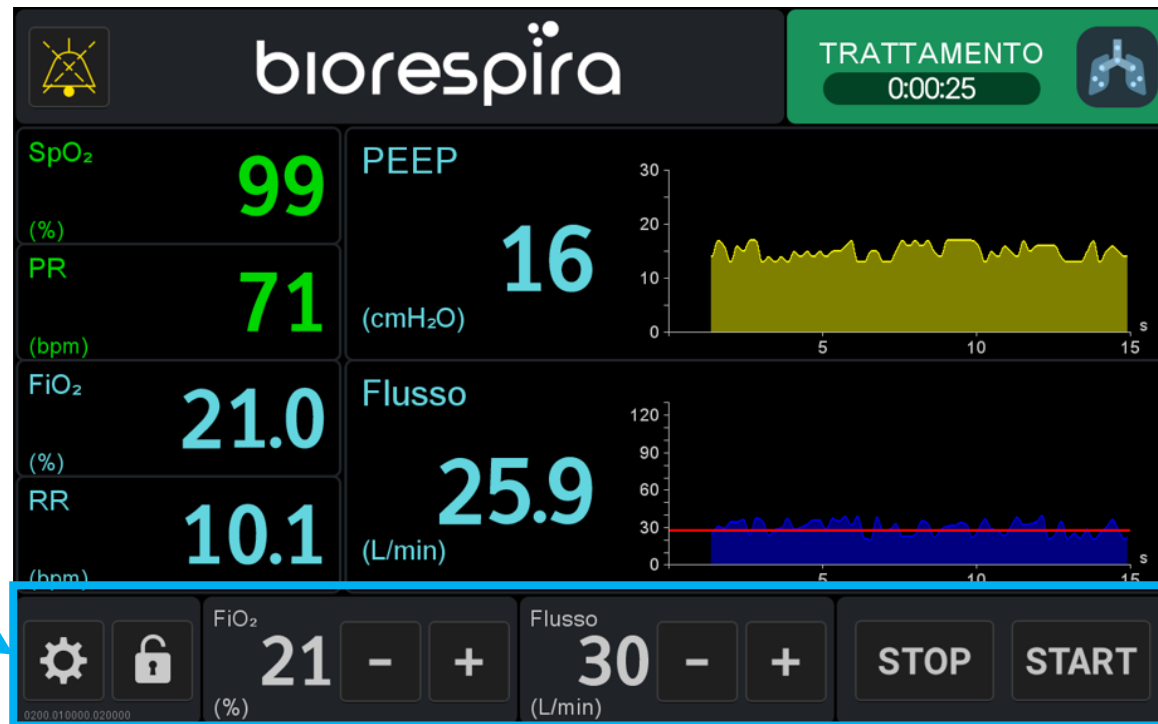


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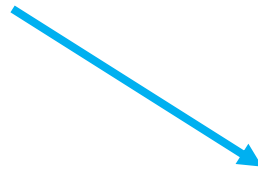


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Graphical user interface allows the operator to set the therapy and monitor the patient

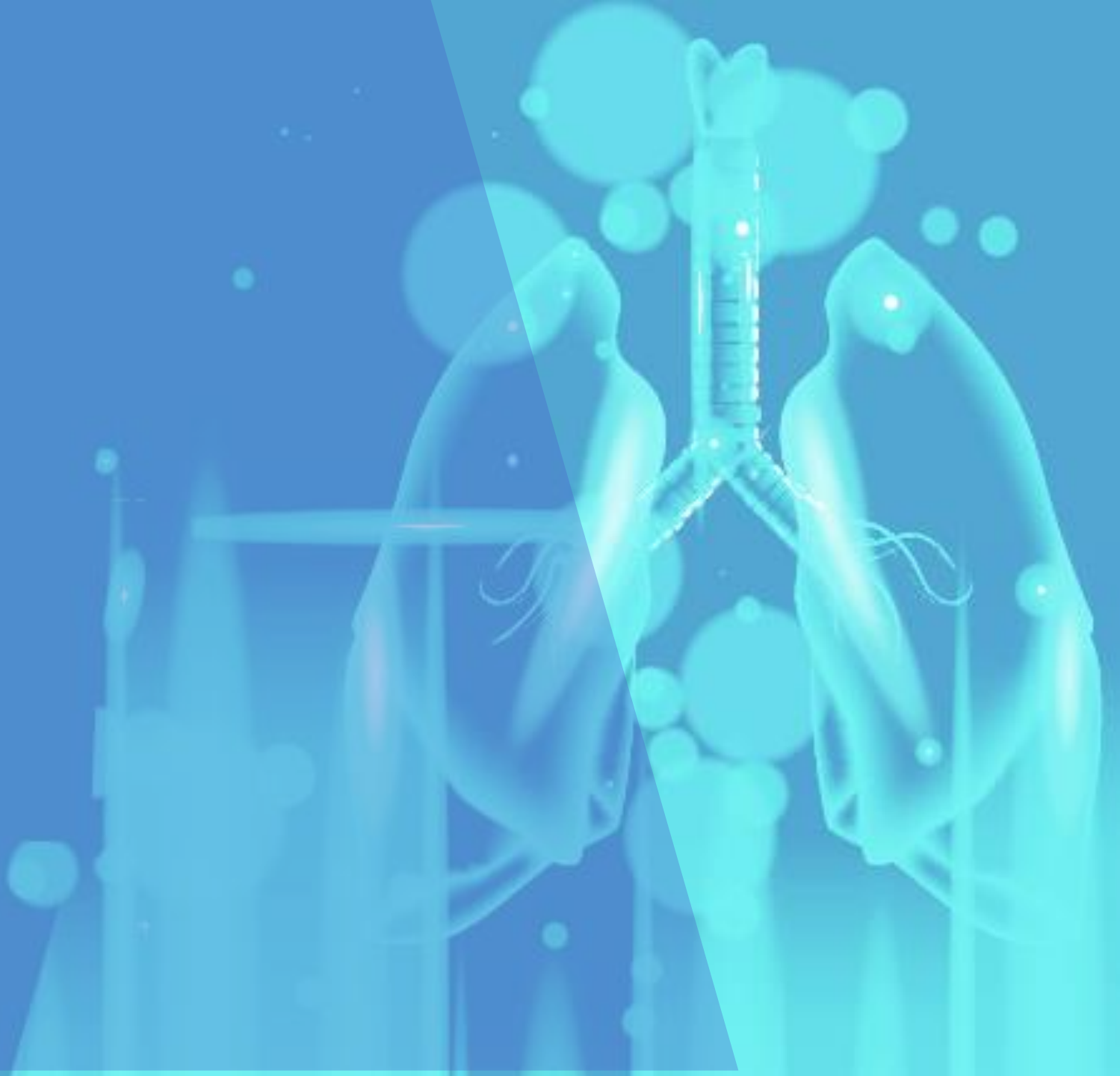


FiO₂ and Flow
Touch Control



Therapy Setting

Periodic and Corrective Maintenance



Periodic maintenance includes control, visual inspection and cleaning by the operator

| Operation | How often | | | | |
|--|-----------|--------|---------|------------------|--------|
| | Daily | Weekly | Monthly | Every six months | Yearly |
| Visual inspection | X | | | | |
| Check the power adapter Is working properly | | X | | | |
| Antidust filter change | | | X | | |



Main device

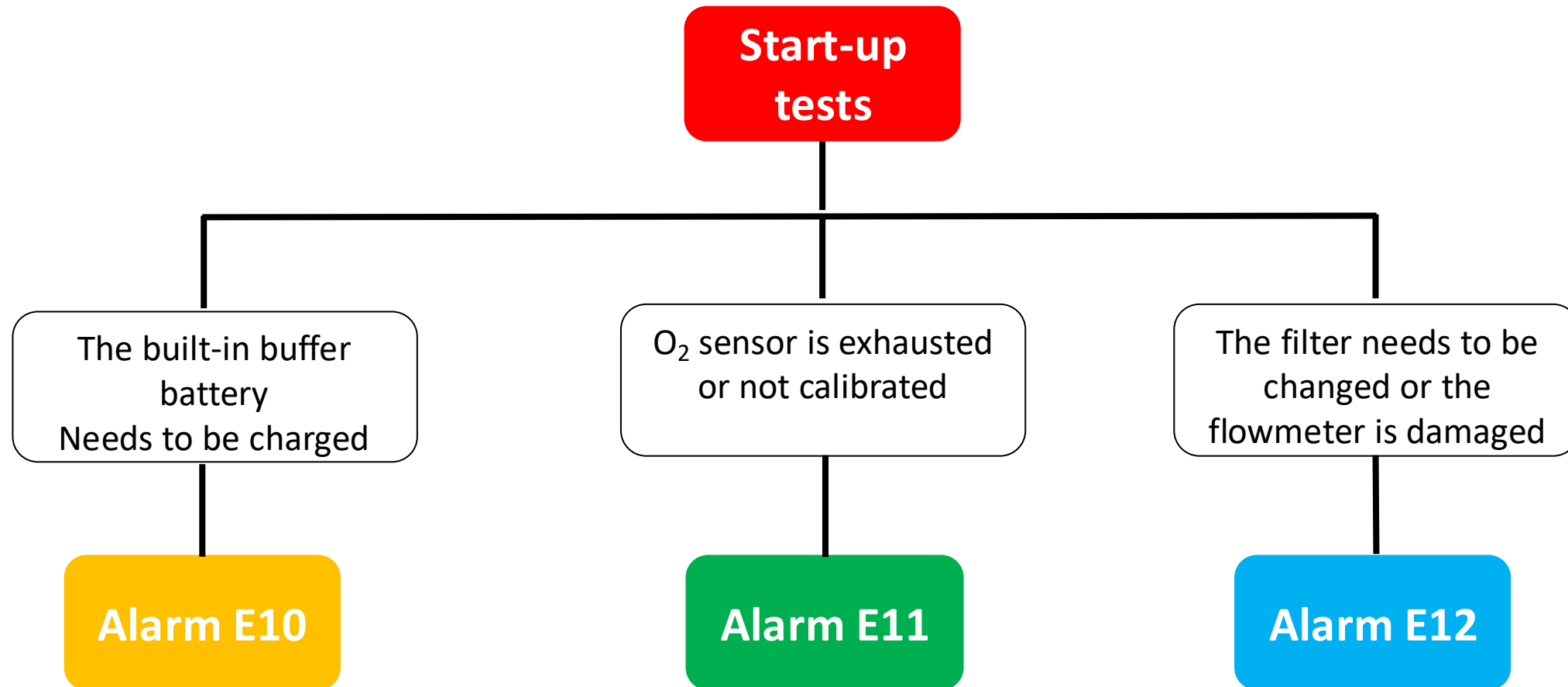


Pulsoximeter probe

Cleaning with soft tissue and alcohol/hypochlorite only



Self-tests are crucial for corrective maintenance



Performance And Safety Tests





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Performance Tests are carried out downstream the calibration of the O₂ sensor



Gas flow analyser

Oxygen Delivery

Pressure measurement

Flow measurement



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Performance Tests are carried out downstream the calibration of the O₂ sensor



SpO₂ Tester

SpO₂

Pulse Rate



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Electrical Safety Tests are carried out to check the presence of dangerous leak currents



Electrical Safety Analyzer

Normal Polarity
Reverse Polarity

Single Fault Conditions

Electrical Safety Tests are carried out to check the presence of dangerous leak currents



Electrical Safety Analyzer

Tested Parts

Flow outlet

Oxymeter

Touchscreen

Accepted values: $< 40 \mu\text{A}$

Take home messages



Reverse Innovation

Affordability

Robustness

Ease to use

Flexibility



Biorespira

Flexible and Efficient

Enhances sub intensive care units

Easy to use

For hospital and homecare

If a solution is not affordable
it's not a solution

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<https://www.ibdbiomed.com/>