
**trimatec**

Ventilators for
challenging environments

# Medical standards and industrial robustness combined

## trimatec develops ventilators for use in almost any environment

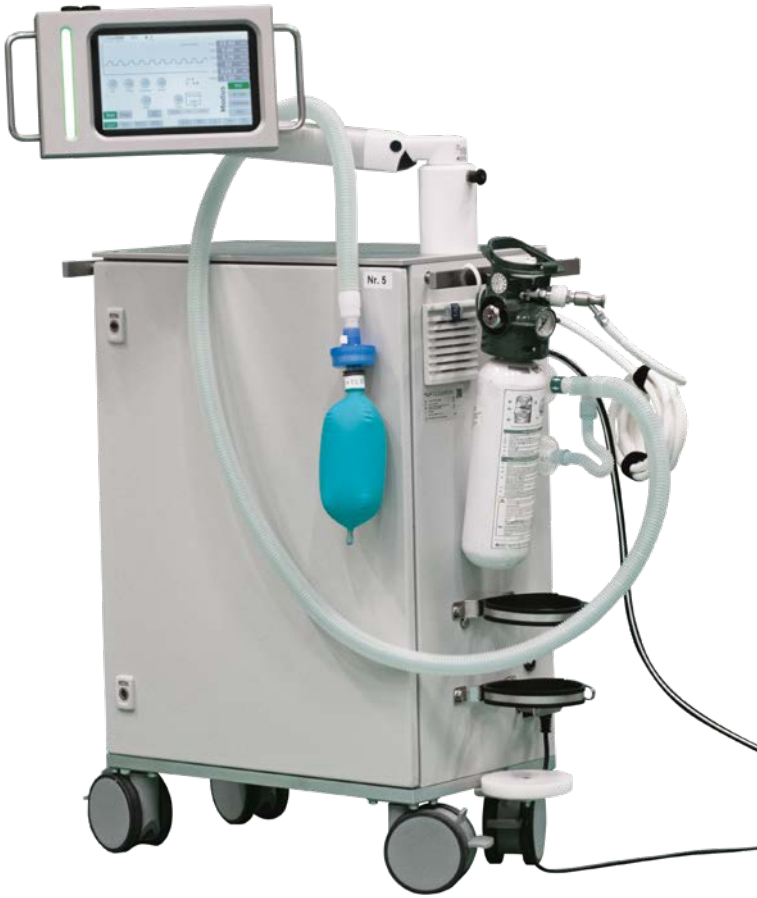
**Founded in 2001, trimatec specializes in the development and manufacture of special machines. The Ingolstadt-based company also offers programming and on-site integration of their systems. Their product range includes solutions for feeding and assembly, welding and laser marking as well as robotics and quality control. Since 2020, trimatec has been offering a new product that stands out from its industrial portfolio: LifesafAIR® – an intensive care ventilator.**

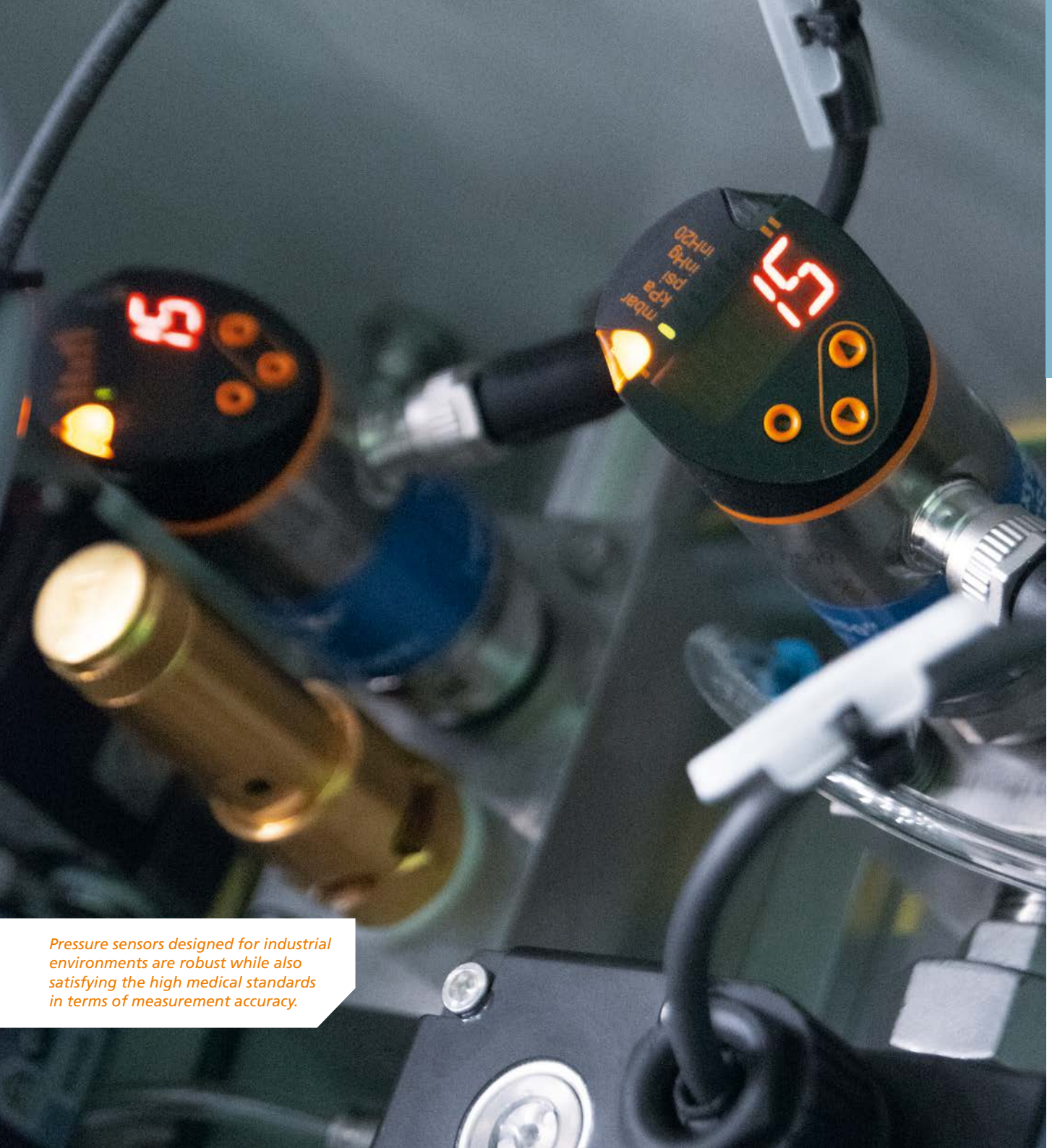
LifesafAIR® was developed at the beginning of the Coronavirus pandemic. During the hackathon "#WirVsVirus" initiated by the German Government, the idea was born to develop an easy-to-build ventilator to ensure sufficient ventilator capacities for the increasing number of COVID-19 patients needing breathing support.

"In the process, we quickly realised that the flow diagram of a ventilator is very similar to that of a pneumatics control in industrial machinery," says trimatec CEO **Lothar Schmidmayr.** "The only difference being the higher precision of the medical equipment – but we were convinced that we could also design such a device using industrial components."

### Industry meets medicine – a winning combination

And that is exactly what happened: The industrial components used by trimatec to develop the medical device included controllers, proportional valves, pressure reducers and pressure as well as flow sensors. trimatec initially developed the ventilator alone and later with the support of the Bavarian State Government, which was convinced of the project: It arranged the first contact with the purchasing department of a global company, which from then on supported trimatec with the procurement of the components required to quickly build the devices in case of an emergency.





*Pressure sensors designed for industrial environments are robust while also satisfying the high medical standards in terms of measurement accuracy.*

> *With measuring accuracies in the millibar range, ifm's sensors meet the high requirements imposed on sensors used in the sensitive medical field of ventilation.*

## Certified biocompatibility

In the ventilator, the oxygen passes through two areas: Unused oxygen flows to the patient through the inspiratory block for ventilation. The exhaled oxygen is released through the expiratory block. To ensure reliable ventilation, the pressure of both oxygen flows must be permanently monitored. trimatec chose ifm's pressure sensors for both blocks. In the inspiratory block, the pressure sensors PN2594 and PN2599 designed for industrial applications are used.

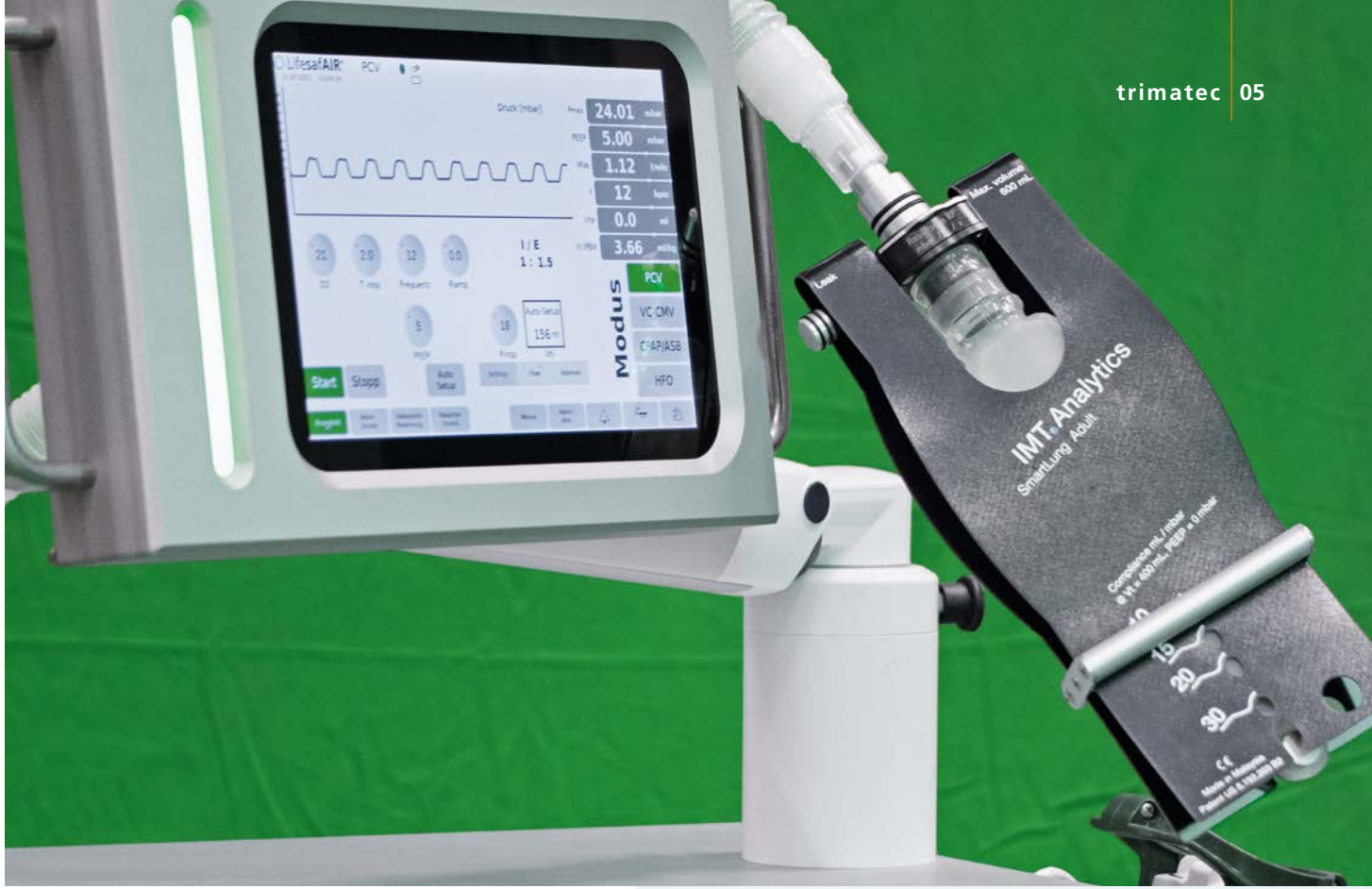
"With measuring accuracies in the millibar range, they meet the high requirements imposed on sensors used in the sensitive medical field of ventilation," says **Schmidmayr**. "What the sensors did not provide by default was a biocompatibility certificate to ISO18562-2. Specially intended for medical equipment, this certificate ensures that a device or its components, in this case the sensors, do not emit particles into the oxygen during operation."

Eventually, the certification was issued by a UL accredited testing laboratory following thorough testing.

## Autoclave stress test passed

For the expiratory block, the PM1506 was chosen – a sensor especially designed for the food industry.

"In this section of the ventilator, regular sterilization of the components is paramount, e.g. to reliably eliminate viruses that might be contaminating the device and thus prevent infections. This is particularly necessary when the ventilator is to be used on a new patient," explains **Lothar Schmidmayr.**




*After each use, the LifesafAIR® must be thoroughly sterilized. Thanks to its simple design, this only requires basic technical knowledge.*

To ensure that the sensor permanently withstands this process without damage, it was thermally sterilized 100 times in an autoclave.
"With the support of ifm, we successfully passed this test as well, which meant that the way for using all three sensors was paved."

## Easy to operate and maintain

Although there was no need to deploy the LifesafAIR® in Germany after the first wave subsided, trimatec continued to drive forward the development of the device and its control software.
"In a short time, we had created a ventilator that, according to one of the anaesthetists supporting us, covers 99% of the typical use cases of a ventilator," says **Schmidmayr**. "And while we were and continue to be fortunate in this country to have sufficient ventilator capacities, the situation is different in other countries."
Especially in developing and emerging countries, where the infrastructure and skills needed to maintain complex medical equipment are often in short supply, trimatec wants to provide a solution.
"The LifesafAIR® is designed in such a way that almost anyone with basic technical knowledge can maintain and prepare it for re-use," says **Schmidmayr**. "In addition, videos of all procedures, from changing the battery to preparing the ventilation components for sterilization, can be accessed from the device display. And, if need be, we can connect remotely and provide support."

## High-performance industrial components

Another crucial feature rooted in the industrial past of the creators: "The LifesafAIR® is extremely robust – this was proven in the mandatory TÜV test."
The device passed the vibration test during operation, thus even exceeding the requirements. The LifesafAIR® also withstood current peaks of up to 2,000 volts and the EMC test without any damage. In addition, it offers protection rating IP 53.
"Our device may not impress with the most sophisticated design, but rather with its high durability, which ensures reliable operation in almost any conceivable application scenario," says **Schmidmayr**. "When designing our ventilator, we consistently followed the principle of Form Follows Function."

## Conclusion:

With its precise pressure sensors that meet the high requirements for use in ventilators, ifm provides relevant components for trimatec's LifesafAIR®. On top of its importance during the coronavirus pandemic, this innovative device based on industrial components could play an important role in patient care – at any location in the world.