

High-performance air cleaner TAC V+

- ✓ The original by TROTEC
- ✓ Known from the media
- ✓ Approved in hygiene concepts of the industry, administration and healthcare sector
- ✓ Used successfully in schools, health departments, ministries and hospitals

The solution for conquering aerosols, viruses and bacteria in the room air

- Effectiveness scientifically proven by leading German research institutes and universities
- HEPA filter class H14 (in compliance with EN 1822)
- FlowMatic for a constant volumetric flow / circulation rates
- The most silent air cleaner in its class
- Fully automatic 100 °C inactivation of viruses/bacteria
- Fully automatic filter regeneration
- Robust and stable for professional usage
- Made in Germany

**Better
protected
by effective
air purification**

All that you
need to know

Version 3

"If you run this system (TAC V+*) continuously, **no one will manage** to generate an aerosol concentration of an infectious level!"

*Note by TROTEC

Prof. Dr. Christian J. Kähler
University of the German Federal Armed Forces in Munich
Institute for Fluid Mechanics and Aerodynamics



Go directly to the studies:
Can mobile indoor air cleaners effectively reduce an indirect risk of SARS-Cov-2 infection by aerosols?

School education during the SARS-CoV-2 pandemic – Which concept is safe, feasible and environmentally sound?



der Bundeswehr
Universität München

Confirmed by leading scientists: The high-performance air purifier TAC V+ effectively reduces the aerosol, viral and bacterial load in the room air

THE PROBLEM:

In central Europe approx. 80–90% of the daily routine takes place in closed rooms. Now, if several people spend a longer period of time in a closed room, many aerosol particles are permanently produced by breathing, talking, singing, coughing and sneezing. These aerosol particles are emitted in a cloud-like fashion and may contain disease-causing viruses and bacteria. The invisible, highly infectious aerosol cloud can spread in the whole room within minutes and float there for hours. The continuous aerosol emission from the person infected makes this cloud increasingly dense over time, the virus and bacteria concentration steadily increasing.

The people in the room breathe in the airborne aerosol particles and are possibly infected with viruses and bacteria bound therein – even if normal mouth and nose mask are worn. Therefore it is possible, as has often already been the case, that a super-spreader infects many people with the virus within a short period of time even in large rooms over great distances.

NOTE: Even our high-performance air purifiers cannot prevent the risk of a possible direct droplet infection that is effected over a short distance by strong coughing, sneezing or loud conversations. In addition to using the air cleaner, **optimum all-round protection** is provided by airing at regular intervals, maintaining a sufficient distance to other people, wearing masks, or installing perspex partitions as well as regularly washing and disinfecting the hands. All these measures taken together offer the most effective infection protection. Please observe furthermore that the **CO₂ concentration in the room air is not considered an infection risk**, since there is no correlation between the CO₂ concentration and the viral and bacterial load. Even with a low CO₂ concentration there is a risk of infection.

THE SOLUTION:

With its large air volume and high fan performance, in a kind of "air roll effect" the high-performance air purifier TAC V+ quickly dilutes these aerosol clouds to a level that is no longer infectious and then filters out disease-causing viruses and bacteria from the room air to 99.995% by means of the H14 filter which complies with EN 1822.

If the device is applied correctly and if sufficiently dimensioned air volumes are used, the risk of an indirect virus infection by airborne aerosol particles is significantly reduced. This has been confirmed in several scientific studies from German institutes and universities.



Fields of application: Where can the TAC V+ be used?

Simply everywhere where people come together in their daily routine:

- ✓ Office and reception spaces
- ✓ Schools, nurseries
- ✓ Hotels, youth hostels
- ✓ Conference rooms, seminars
- ✓ Medical surgeries, waiting rooms
- ✓ Fitness studios, therapy rooms
- ✓ Yoga rooms, gymnastics halls
- ✓ Boutiques, shops, salons
- ✓ Restaurants, gastronomy sector, canteens
- ✓ Choir rooms, rehearsal rooms
- ✓ Event spaces, galleries
- ✓ Workshops, workspaces

At a glance: Convincing benefits of the TAC V+

■ Significantly increased health protection

The high-performance air purifier TAC V+ from TROTEC offers you, your employees, customers, clients, patients and pupils a high level of protection against indirect infection by aerosol particles. In addition to viruses and bacteria, also respirable and often harmful particulate matter (e.g. caused by road traffic) as well as pollen are reliably filtered from the room air.

■ A considerably higher degree of safety – scientifically tested and recommended

The efficiency of the air cleaner TAC V+ has been confirmed in several independent scientific studies from leading institutes.

■ Large clean air capacity and high pressure

Up to 2,400 m³/h of clean air filtered free from viruses and bacteria by a high fan performance for optimum air circulation, air flow and frequent air circulation. A proper air flow and routing are an absolute must when you want to ensure a high degree of safety. In particular the high maximum air flow rate (boost mode) is ideally suited for quick separation (short and intense filtration) in break periods or in the case of room changes.

■ Effective high-performance filtration with the maximum HEPA filter class certified in compliance with EN 1822

In the TAC V+ , fully encapsulated H14 metal lamellae high-temperature filters "made in Germany", specially developed for TROTEC, with flow-optimized high-tech filter material are used. Each quality filter is tested and certified individually.

■ Optional: Ultra-HighFlow filter

For 66 % more H14 air volume – with an energy consumption that is reduced by up to 40 % and a noise emission that lower by up to 8 %.

■ FlowMatic control: Constant circulation rates by a constant volumetric flow to provide for increased safety

The sensor-supported FlowMatic control in the TAC V+ works like the cruise control in the car: Even when coarse and fine dust increasingly pollute the filter you don't have to be concerned about a decreasing air flow rate or about values falling below the required circulation rates. The system performance is adapted continuously and dynamically, ensuring that the air volume target value once set is maintained at a constant level! For increased safety, longer filter lifetimes and a substantially higher system efficiency.

■ Unique: Thermal filter decontamination for more safety

Just like the airbag in the car - you hardly ever need it, but it's important that it's there! Reliable inactivation of the viruses and bacteria by heat (15 minutes at approx. 100 °C) provides an important added value where hygiene and safety are concerned. This is recommended by leading scientists to ensure safe continuous operation. Thermal filter decontamination is freely programmable and is effected in a fully automatic fashion, e.g. outside business hours or school hours. Due to the short treatment duration and the low energy input (altogether approx. 1 kWh), the room temperature does not increase.

■ Unique: Thermal filter regeneration for more hygiene

Automatic self-cleaning of the filter to provide for a longer filter lifetime and to prevent bacteria, mould, biofilm and the formation of odours resulting therefrom. The process of filter regeneration takes place at approx. 100 °C in parallel to the thermal decontamination process and is recommended from a scientific point of view, since most bacteria and microorganisms are only inactivated at a temperature of approx. 100 °C. To provide for longer filter lifetimes and an improved filter hygiene, and to prevent filter odour.

■ Fully automatic operation by flexible programming

Thanks to the fully programmable touch display, the TAC V+ can be adapted individually to your operating hours and rest periods, so that you no longer have to worry about anything.

■ Low noise emission

The most silent high-performance air purifier in relation to the air flow rate / device size.

■ Robust design for professional use

Extremely robust, stable and scratch-resistant metal housing. Specially designed for the use in environments where many people come together, work, play, learn or celebrate. Optionally also available as tamper-proof versions for schools, daycare centres, etc.

■ Great versatility

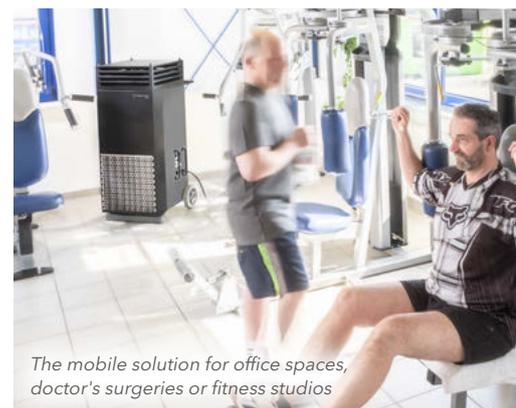
"Plug & Play" for mobile and stationary applications. Also suitable for the connection to existing air distribution systems.



Improved protection for children and teachers:
The TAC V+ filters the classroom air
in a primary school at Nettetal



More safety in the gastronomy sector:
The TAC V+ at OTTO GOURMET at Heinsberg



The mobile solution for office spaces,
doctor's surgeries or fitness studios



Physical health is the top priority: The TAC V+
in the Coworking-Space Rent24 in Berlin

There are major differences as regards the effect and performance which set the TAC V+ clearly apart from its competitors

Air cleaners work according to different operating principles. These for example include air filtration by HEPA filters, via plasma field or electrostatic charge. For this purpose, UV-C light and ion generators for disinfection are often mounted in the units. Such plasma field air cleaners, ionizers, etc. have also been part of our product range for many years. But are these "air cleaners" also suited to effectively filter aerosol particles from the room air and inactivate viruses, in order to reduce the risk of infection to a minimum?

Here are some excerpts from the Federal Environment Agency's statement (August 2020): "Infectious aerosols in interior spaces"

"The devices (air cleaners") should always be equipped with high efficiency filters (filter class H13 or H14 (EN 1822*)), since only these filters ensure effective reduction of viruses in the air. Fine filters of classes F7 to F9 (EN 779:2002*) like those used for instance in conventional interior ventilation systems with two filter stages are not sufficient for efficient virus reduction."

"Ionized air in itself is not effective where the reduction of viruses in the room air is concerned."

"It is not known to the Federal Environment Agency whether the air flow rate and the efficiency of the commercially available (UV-C*) devices are sufficient to ensure a sufficient or requested contribution to the protection against COVID-19 infections. UV-C radiation constitutes a health risk. For reasons of safety, the Federal Environment Agency therefore casts a critical eye over the use of these sources of radiation as UV-C lamps and in mobile air cleaners for non-commercial applications. For the use in private spaces such as flats, devices with UV technology can present a safety hazard, since, in most cases, no control opportunities are provided for these applications as far as proper application, maintenance and intended use are concerned."

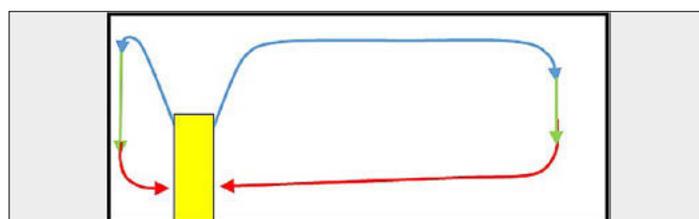
As can be seen from the Federal Environment Agency's statement, neither air cleaners with plasma field technology, electrostatic systems, ionizers, nor UV-C technology are recommended for the effective inactivation of viruses in the room air. Only the H13 and, even better, the H14 filter technology has been explicitly classified as effective by the Federal Environment Agency. This assessment corresponds to the premise defined by us beforehand on the basis of more than 25 years of experience in the field of air treatment, proving that only the HEPA high-performance filter technology with H14 filter standard is able to ensure reliable virus filtration. This type of filtration offers maximum certified safety with a high air volume. No other method than the HEPA high-performance filter

technology provides "as much clean air for quickly diluting the aerosol clouds" with increased safety for the optimum price/clean air ratio! With the H14 filter that is installed as standard, the TAC V+ already supplies a max. clean air performance of 2,200 m³/h (2,400 m³/h with an Ultra HighFlow filter). Commercially available air cleaners often only generate air flow rates of up to 500 m³/h, in most cases even much less, and no significant fan performance to establish an optimum air flow and air circulation. In particular the high air volumes at the boost level of the TAC V+ are ideally suited for quick separation (short and intense filtration) in break periods or in the case of room changes.

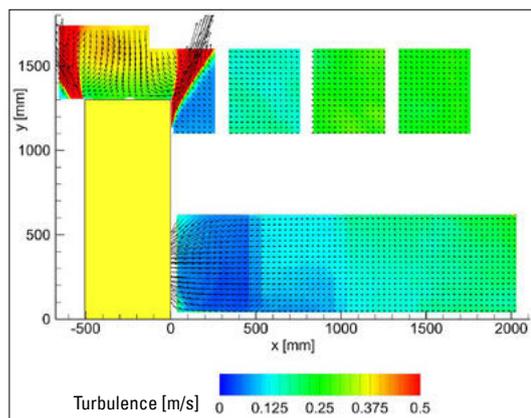
Without corresponding air volumes and a corresponding fan performance, effective air filtration cannot take place

Commercially available air cleaners usually have been developed for continuously purifying room air from particulate matter, odours and pollen and have not been designed to establish a strong air roll flow. However, establishing such a reliable air roll flow is of substantial importance when it comes to aerosol filtration. Infectious aerosol clouds must already be diluted and filtered out while they are building, as quickly as possible within a few minutes. This requires a sufficiently large air volume combined with a large circulation pressure capacity. The TAC V+ has been developed exactly for these requirements. For rooms containing a normal number of persons, scientists require a volumetric flow that is at least 6 times as high as the room volume. In the healthcare sector and everywhere where persons actively talk, sing or move, an air circulation rate per hour of at least 12 is requested, even better, 15 "air changes" per hour.

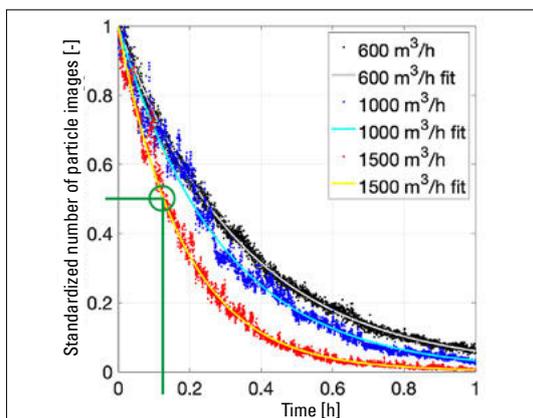
For instance, in order to effectively protect an office space with a normal occupancy rate and an area of 30 m², a minimum clean air volume of approx. 500 m³/h is required, a patients' waiting room of the same size already requires a clean air volume of at least 900 m³/h. If a space is occupied by a large number of people like for example in a call centre or waiting room, an additional clean air volume of 30 % has to be added to provide for a safe environment. These air volumes are not even achieved by most commercially available air cleaners in their highest performance level. And if so nevertheless, these cleaners must run at their highest fan power levels, resulting in a substantial noise impact that in most cases is unacceptable over longer periods of time.



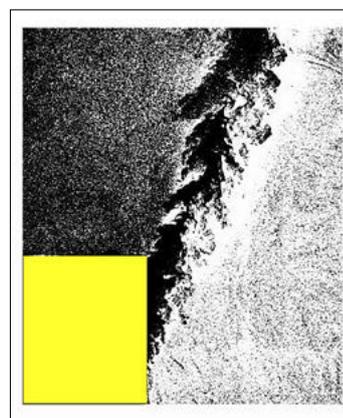
Simplified schematic representation of the room air flow in an empty room. In real life, the flow phenomena are three-dimensional. "



Turbulent flow motion of the TAC V+ in a time-averaged fashion "



You can see that the aerosol concentration can even be halved in rooms with an area of 80 m² within approx. 6 minutes depending on the volumetric flow. In the case of rooms with 20 m² the concentration is halved within approx. 3 minutes depending on the volumetric flow. "



Representation of the aerosol distribution in the emission area of the TAC V+ with a volumetric flow of 1,000 m³/h "

The TAC V+, though, just even utilizes 30–50 % of its maximum capacity at these air volumes. Although it is clearly a fan, it is in no way as noticeable as standard air cleaners at their highest level. With regard to the noise level and type of noise emission, they are worlds apart. See for yourself by letting the air cleaners run at the power stage specified by the circulation rates required. The noise pollution becomes even more unbearable if several of these small air cleaners have to be installed to achieve the circulation rates required.

Air change is air change, but it's not the same as air replacement***

This goes for every type of filter technology. When it comes to promises such as "air change rates are not relevant to us" or "our technology does not work according to the principle of air change rates" you should take an extremely critical position and rely on the pronounced scientific opinion: Air change is air change, or, to be correct, circulation rate is circulation rate, irrespective of the operating principle or filter principle (see statement issued by the Federal Environment Agency).

Standard air cleaners filter animal hair, pollen, odours and dust, however, they do not dilute infectious aerosol clouds within minutes.

These standard air cleaners, irrespective of the technique according to which they may be working, naturally also have their merit and during the time "before corona" were sold to conquer animal hair, pollen, fine dust or house dust. Therefore TROTEC's range of products also contains standard air cleaners for applications such as these. The task assigned to these devices is to "keep the room clean" and not to dilute aerosol clouds within a few minutes and completely filter out the room air. Therefore 1–3 air circulations per hour are actually sufficient, high air volumes and fan performances are not required for filtering out dust and pollen. But now exactly these devices are all of a sudden promoted as "virus filters" although for one thing they are neither provided with sufficient air volumes nor fan performance, and secondly, in most cases they are only equipped with E10, E11 or E12 filters. These standard air cleaners may be quite suitable for private use, though definitively not for professional use.

The filter class is the decisive factor, only H14 reliably filters out viruses

Therefore, in addition to the maximum air flow rate and pressure capacity, also always observe exactly which filter class is mounted in the device, since filter performances and filter classes are often suggested by fictitious marketing names which are absolutely not suitable for the purpose of virus filtration. In particular the classification "HEPA filter performance" is increasingly promoted by clever marketing although the filters in question are not real HEPA filters! (In this respect, please also view the filter comparison table on page 6.) Be very critical of the filter that is mounted in the device and especially observe up to which air volume this HEPA performance is actually certified. And this certification should be either EN 1822 or ISO 29463. Every quality air filter complying with EN or ISO must contain these data. The technical report of the Federal Institute for Occupational Safety and Health (BAUA) also expresses that virus filtration must at least involve the use of an H14 HEPA filter (EN 1822) (for this, please read the original excerpt in the info box on page 6).

This is about nothing less than your health, and the health of your customers, clients, employees, children, etc. Take a critical look at all filter data and also have the data confirmed by the vendor. Therefore be careful if no data with regard to the test standard

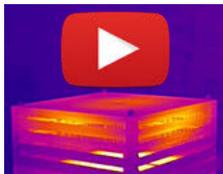
and filter efficiency is specified. Or also if testing has been carried out in accordance with any standards other than EN 1822 or ISO 29463, which are not recognized or certified in the EU. In addition, an individual testing certificate must be enclosed with each H13 or H14 filter. Currently many providers are jumping on the bandwagon, though, due to a too small air volume, fan performance, flow geometry and filter class (< H14), they do not offer a sufficient degree of safety. Not to mention the background noise of these fans when performing the circulation rates required.

Constant air volumes must also be complied with if the filter is increasingly polluted

In order to comply with the air change rate (or, to be more specific, the "circulation rate"****) requested by the hygiene concept, a constant volumetric flow throughout the whole operating lifetime is indispensable. However, the filter elements of every air cleaner are successively clogged over time by coarse and fine dust (e.g. caused by traffic load). This leads to an increasing resistance accompanied by a decreasing air flow rate. With the innovative FlowMatic control of the TAC V+ you no longer have to worry about a decreasing volumetric flow or circulation rates that fall below the values required. Just like with the cruise control of your car, the FlowMatic sensors capture the actual air flow rate values within the entire filter ladder and consecutively adapt the system performance dynamically. In this way, the air volume target value once set remains constant in every situation! This not only increases the filter lifetime and system efficiency, but also guarantees compliance with the circulation rates required by the corresponding hygiene concept. Air cleaners without a FlowMatic control are not able to constantly and reliably meet the requirements to comply with the circulation rates or air volumes required.

It's about safety. Therefore, rely on the original by TROTEC – the No. 1 for professional high-performance virus filters

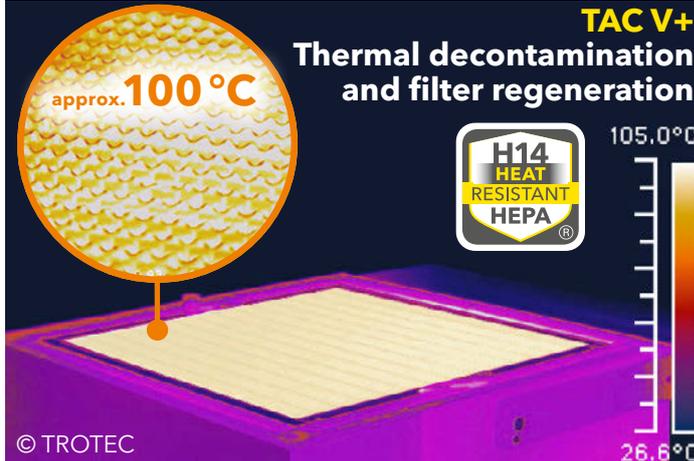
The efficiency of the TAC V+ has been fully confirmed in several scientific studies by leading German institutes. It is known from the media and is already successfully being used in schools, hospitals, ministries and leading companies. Only the TAC V+ offers professional filter decontamination and filter regeneration and has been developed explicitly for quick and reliable filtration of virus-carrying aerosol particles in interior spaces – 100 % – and 100 % "made in Germany".



Thermal decontamination in the video:
Infrared images show in which way the heat-resistant H14-HEPA filter of the air cleaner TAC V+ heats up to inactivate dangerous germs.



de.trotec.com/tacv-plus-video-thermodekon



TAC V+
Thermal decontamination and filter regeneration

approx. 100 °C

H14 HEAT RESISTANT HEPA

105.0 °C

26.6 °C

© TROTEC

The thermography image illustrates this: The heat-resistant H14 virus filter (certified in compliance with EN 1822) and the interior of the TAC V+ are heated to approx. 100 °C on a daily basis and prior to every filter change in order to destroy all bound viruses and bacteria. (Source: TROTEC)

Further information on the subjects of filters, filter quality and differences in performance can be found at uk.trotec.com/filter-know-how



High-performance filtration: H14 means maximum HEPA filter efficiency

The TAC V+ can "effectively separate" viruses

HEPA is not HEPA – it's the filter class that is relevant! There are various standards for high-efficiency particulate air filters. The most important one is ISO 29463, which is based on the EN 1822 filter standard. Only **H14-HEPA** and **ISO45H high-performance filters** like they are used in the TAC V+ can even filter the smallest aerosol particles carrying viruses (0.1–0.2 µm) from the room air, and this at a percentage of **99.995%**. Therefore, H14 filters complying with EN 1822 feature a filter performance that is ten times higher than H13 HEPA filters with 99.95%, and even a filter performance that is 1,000 times higher than E11-EPA standard air filters with only 95%, as they are used in most air cleaners!

Why does it have to be an H14-HEPA filter (EN 1822)?

For more information on this, please read an original excerpt from the **Technical Report on the subject of "Use of HEPA filters in interior ventilation systems..."** by the Federal Institute for Occupational Safety and Health (BAUA):

*"The HEPA filters should at least comply with class H14 in compliance with DIN EN 1822-1. On the basis of the risk assessment, it may also be possible to use H13 filters if there are special reasons, for example if **exclusively** bacteriological work is performed. In this example, an H13 filter is sufficient, since the separation rates of H13 and H14 filters in the size range bacteria do not differ significantly. **Significant differences of HEPA filters can be found in the MPPS range (Most Penetrating Particle Size) of the filters, which is approx. from 0.1-0.3 µm and for example corresponds to the size of most viruses.**"*

ATTENTION! Filters of classes E10, E11, E12 are not HEPA filters in accordance with EN1822, although they are often called HEPA filters in the advertising. The designation "HEPA" only applies to classes H13 and H14 or ISO35H and ISO45H.

When you buy filters, therefore always make sure that they are provided with the filter certificates approved in the EU. Here either the filter standard (ISO) or the filter class (EN) must be definitely indicated. Be careful with other filter standards or the statement that they are comparable to the EN or ISO standard.



Furthermore it must be defined up to which air flow rate this classification reaches. The filter may often indicate a max. air flow rate of 500 m³/h, however, in the next line you'll find H13-HEPA filter performance (as per EN1822) up to 280m³/h. If you then actuate the fan at its highest stage with 500m³/h to achieve the circulation rates required, the filter merely features an efficiency of class E10 with 85% or, in the best case, E11 with 95%, a typical sham. 99.995%, 99.95%, 95%? This may not sound like a lot, but exactly these 3 places after the decimal point make the big difference between E10, E11, H13 and H14 filters – up to 3,000%! Virus-carrying aerosol particles are extremely tiny. And "virus filters" are there to "filter out viruses".

This is why the TAC V+ not only filters out 100% of the large, medium-sized and small aerosol particles, but in particular also 99.995% of the smallest ones from the room air, which are even not filtered out by FFP2 and FFP3 respiratory masks.

Maximum safety is exclusively provided by an H14 filter complying with EN 1822!

In the table below we have compared the filtration efficiency of the different filter classes for you.

Comparison of the filter classes: From 100,000 particles/aerosol particles of the size most difficult to separate 0.1–0.3 µm (MPPS) the following number is not retained				
Filter standard, filter class*	Separation	Number of particles not separated	Lower filter performance than H14**	Explanation
E10 / –	≥ 85 %	15,000 of 100,000 particles	3,000 times** lower than H14	Only EPA classification, however, is often designated as HEPA
E11 / ISO15E	≥ 95 %	5,000 of 100,000 particles	1,000 times** lower than H14	
E12 / ISO25E	≥ 99.5 %	500 of 100,000 particles	100 times** lower than H14	
H13 / ISO35H ***	≥ 99.95 %	50 of 100,000 particles	10 times** lower than H14	Genuine HEPA with individual certificate
H14 / ISO45H ***	≥ 99.995 %	5 of 100,000 particles	Reference	Genuine HEPA with individual certificate
This maximum HEPA filter quality is used in the TAC V+ from TROTEC				
* In compliance with filter standard EN1822, filter class ISO29463		*** PLEASE NOTE: Each HEPA filter certified in accordance with EN or ISO standard must show the test standard (filter class), filter efficiency and max. air flow rate with the corresponding filter efficiency specified. In addition, an individual certificate must be enclosed with each filter, verifying the individual test of the corresponding filter with stamp and personal signature. All answers to questions regarding the issues of air filters, filter quality and differences in performance can be found at uk.trotec.com/filter-know-how		
** Interpretation EXAMPLE: An E10 filter features a filter performance that is 3,000 times lower than an H14 filter complying with EN 1822.				

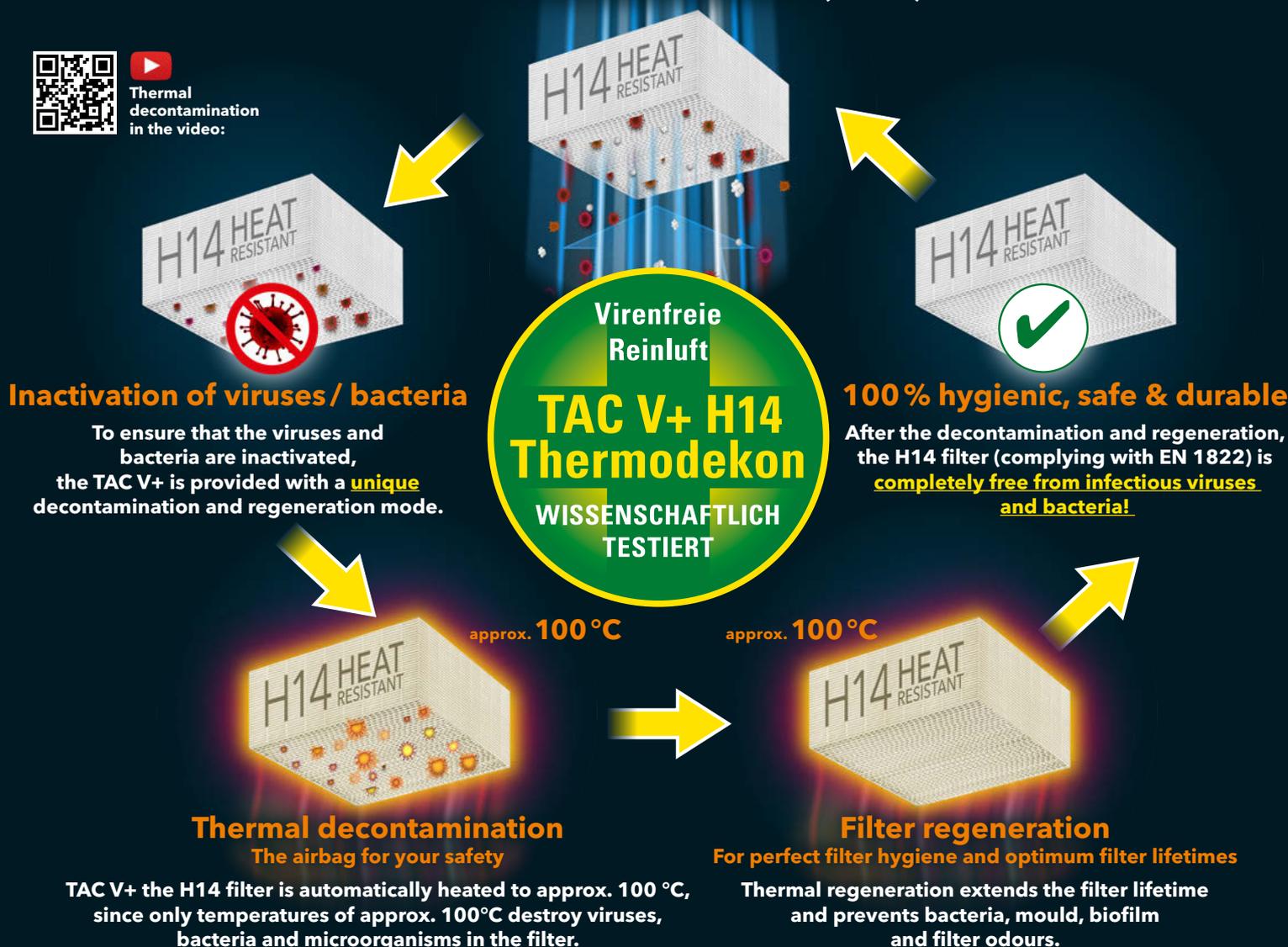
Exclusively available at TROTEC: Thermal decontamination and filter regeneration

Effective virus and bacteria filtration with the maximum HEPA filter class

In the course of air purification
viruses and bacteria are bound in the H14 filter (EN 1822).



Thermal
decontamination
in the video:



The TAC V+ offers what leading scientists require:

Scientific studies confirm the effectiveness of the unique filter decontamination and therefore explicitly request this filter technology to ensure effective virus and bacteria filtration: "To ensure that the room air cleaner always remains hygienically safe even in continuous operation, the H14 filter (EN 1822) should be heated to an approximate filter core temperature of 100 °C for about 15 minutes every day. This takes place in a freely adjustable and fully automatic fashion, e.g. outside office or teaching hours. Heating the filter to approx. 100 °C destroys the viruses in the filter and prevents the formation of bacteria, biofilm and fungi without harmful chemical additives or UV-C radiation", says Prof. Kähler from the University of the German Federal Armed Forces in Munich. With its automatic thermal decontamination the TAC V+ meets these requirements.

The advantages of this exclusive decontamination and regeneration technology from TROTEC:

- Separated viruses and bacteria are thermally destroyed in the filter. The exclusive added value with regard to safety and hygiene.
- The thermal filter decontamination is freely programmable and takes place in a fully automatic fashion, e.g. outside business or teaching hours. Due to the short treatment duration and the low energy input, the room temperature does not increase.
- The filter regeneration process constitutes a kind of self-cleaning function and guarantees a consistently high effectiveness of the special virus filter.
- The thermal regeneration cycle effects the evaporation of the liquid portion of the aerosol particles and actively prevents the development of bacteria biofilm and filter odours - since your health is our top priority!
- The filter's lifetime is extended by its regeneration function, allowing for significantly reduced maintenance intervals and lower operating costs..
- Thermal decontamination and filter regeneration at approx. 100 °C offers you more safety, hygiene and a long filter lifetime.

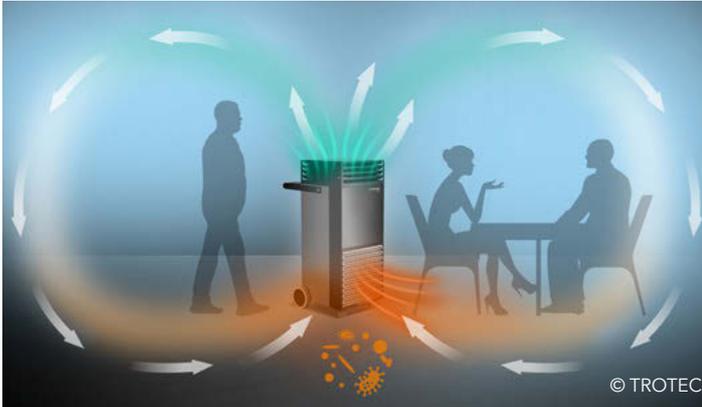
Large clean air capacity: A high performance for effective air purification

The TAC V+ has "the power to quickly dilute the room air"

Time is the most important factor for reducing the indirect risk of infection. And we're talking about the shortest time possible for quickly and effectively diluting the infectious aerosol accumulations, directly at their source, e.g. by a super-spreader. This requires large volumes of clean air and a high fan performance to establish an optimized flow geometry. The TAC V+ provides all this: With a large clean air volume, an optimum flow geometry and a fan performance that is more than high enough, a circulation flow is established in the room, ensuring that the virus concentration in the room air is first diluted and is then effectively filtered with

cleaned air within only a few minutes. Only circulation rates or air volumes that are sufficiently high minimize the risk of infection, this is scientifically proven.

Where the effective treatment of the risks of infection by aerosol particles is concerned, high circulation rates (**at least a factor of 6 or even more, if possible**) and therefore large volumes of cleaned air are indispensable – despite promises to the contrary made by other providers advertising "single to threefold air change rates" per hour as sufficient.



This is how the air purification process works

The room air that is contaminated with viruses is diluted and pushed towards the floor by means of a kind of "air roll effect". The TAC V+ draws in large volumes of the contaminated air near the floor. The clean, virus-filtered clean air is returned to the room towards the ceiling. This air cycle continuously keeps the breathing air much cleaner, especially at head height, than without filtration. The filtered, blown-out air in this process is not only free from viruses but also free from pollen and respirable particulate matter that is often harmful (e.g. caused by traffic load).

It's up to you to decide which safety level is suited best for your requirements:

The better the optimum airflow, the higher the air circulation and therefore the air change rate*, the lower is the concentration and the time the virus cloud stays in the room air, which also reduces the risk of infection. The circulation rate and the clean air volume at the same time determine the safety level within the room. Since even with an increased circulation rate, room air can never achieve a completely virus-free state if the room contains infected

persons – you can merely establish a mixture of filtered air and permanently generated virus-carrying aerosols.

Therefore the following applies: The higher the circulation rate and the more filtered air per person is generated, the more the virus concentration in the room air is diluted. This results in a decreasing risk of indirect infections.

Recommendations for air change or circulation rates* for different room sizes

Max. air volume flow for the respective filter class:

With an H14-HEPA filter integrated **as standard**
H14 up to 1,200 m³/h **H13** up to 1,800 m³/h **E12** up to 2,200 m³/h

With an **optional** Ultra-HighFlow-H14-HEPA filter
H14 up to 2,000 m³/h **H13** up to 2,400 m³/h

Filter efficiency class
 certified in compliance with DIN EN 1822

Recommended max. room size in m³

	Filter class H14		Filter class H13	
	standard	Ultra-HighFlow	standard	Ultra-HighFlow
Clean air zones with a circulation rate* of at least 12 times per hour e.g. in hospital wards, medical practices, waiting rooms With a high density of persons or high activity, a minimum circulation rate of 12 to 15 times* is recommended.	100 m ³ **	166 m ³ **	150 m ³ **	200 m ³ **
Clean air zones with a circulation rate* of at least 8 times per hour e.g. in therapy rooms, gymnastics rooms, bars, discotheques, marquees, call centres With a high density of persons or high activity, a minimum circulation rate of 8 to 10 times* is recommended.	150 m ³ **	250 m ³ **	255 m ³ ***	300 m ³ ***
Clean air zones with a circulation rate* of at least 6 times per hour e.g. in conference rooms, offices, business spaces, schools, daycare centres, restaurants, salons, workshops, fitness studios, choir rooms With a high density of persons or high activity, a minimum circulation rate of a factor of 8* is recommended.	200 m ³ **	333 m ³ **	300 m ³ ***	400 m ³ ***

* Air change is an established term in the field of ventilation technology, which, however, is misleading, since the technical and colloquial meanings do not comply with each other. The air change in the unit (1/h) specifies the multiple of the room volume that is supplied to the room per hour in the form of filtered or fresh air. In the field of displacement ventilation (e.g. air pump), this rate exactly corresponds to the multiple of the room volume, this, however, does not apply to mixing ventilation (room air cleaner, open windows, interior ventilation system), since air that has already been partly filtered/exchanged is filtered/exchanged again. With regard to the viral load in the room this means that room air cleaners, free ventilation and interior ventilation systems are not able to establish completely virus-free room air if persons infected continuously breathe out viruses into the room. The virus concentration is lower when the number of air changes is high, though. Therefore the risk of infection decreases with an increasing number of air changes. In this respect, it is not relevant whether the viruses are separated by room air cleaners (air circulation, circulation rate) or whether they are led out of the room through windows or by means of interior ventilation systems (air change, air change rate). But room air cleaners have the clear advantage that they are more beneficial as regards the energy consumption, and that they provide for a constant air change, irrespective of the wind/temperature conditions or of the window size. These data do not apply to rooms the volume of which is exceptionally large in relation to the number of persons, e.g. churches, exhibition halls, etc.

** If used actively and with a high density of persons these values may deviate. The above-mentioned data is based on scientific recommendations established on the basis of the current infection situation. Your specific room situation may possibly require higher or lower air change rates in the context of your individual hygiene concept. We're happy to be of service.

*** Generally, we recommend using the TAC V+ with its serial filter in H14 filter stages with a maximum 1,200 m³/hour, especially in rooms with a high density of persons, to ensure reliable separation of viruses and bacteria. Only with an explicit approval in specific hygiene concepts or for quick separation (short and intense filtration) during break times, operation can take place in H13 filter stages up to maximally 1,800 m³/hour. The maximum total air flow rate with the serial filter is 2,200 m³/hour with a filter efficiency of filter class E12. Compared to the serial filter, the optionally available Ultra-HighFlow filter helps to implement an increase of 66 % of H14 air volume with an electricity consumption that is 40 % lower.

Low-noise: Hard to believe, hard to be heard

The TAC V+ is an air cleaning revolution of the silent kind

When aerosol particles are separated or viruses and bacteria are filtered out, high circulation rates between 6 and 8 per hour are required, and in the medical sector even 12- to 15-fold circulation rates per hour. Without these large air circulation rates, spontaneously and permanently occurring infectious aerosol clouds cannot be diluted and filtered out safely and quickly.

Therefore, even in smaller rooms of 45 m² you already need clean air volumes from 700 m³/h to 1,500 m³/h, which requires a fan with a correspondingly high ventilation power. In particular, to establish an optimum air flow and air routing in the room. In addition to the flow geometry, filter efficiency and long filter lifetimes, however, an acceptable noise level, in spite of the large air volumes and the high fan performance, is desirable.

Therefore, low noise emission was a top priority when the TAC V+ was designed

For noise sensitive areas such as schools, offices or medical practices we recommend using the optional sound protection hood by means of which the sound level experienced subjectively can be again reduced by more than 50%! In workshops, packing stations or discotheques, etc. the use of the sound protection hood usually is not required.

When purchasing an air cleaner, observe the noise emission in the fan stage required for achieving the application-specific circulation rate or the air volume required!



Stable design, flexible installation Virus protection on the spot

The TAC V+ is flexible, mobile and can be used anywhere at any time

The extremely stable, robust and scratch-resistant metal housing was specially designed for the use in environments where many people come together, work, play, learn or celebrate. This makes it possible to use the TAC V+ without any installation effort anywhere it's needed.

In a flexible, mobile and modular fashion, the exact number of TAC V+ as requested by the hygiene concept can be provided. Variably adapted to the staff density, safety level, type of application, background noise, room size and room geometry. With its optionally available hose adapter, the TAC V+ can also be connected to existing air distribution systems.

Where the effective treatment of the risk of indirect infection by aerosol particles is concerned, high circulation rates and therefore large and flexibly adjustable volumes of clean air are indispensable, despite promises to the contrary made by other providers who advertise single to threefold circulation rates per hour as sufficient.

To meet these requirements, the virus air cleaner not only has to be able to provide corresponding volumes of clean air, but it must also be flexibly placeable directly in potential hazard zones to ensure effective air routing. The TAC V+ is also optionally available in tamper-proof design for the use in schools or daycare centres.

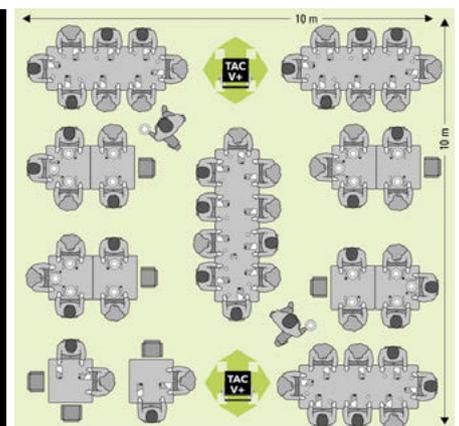
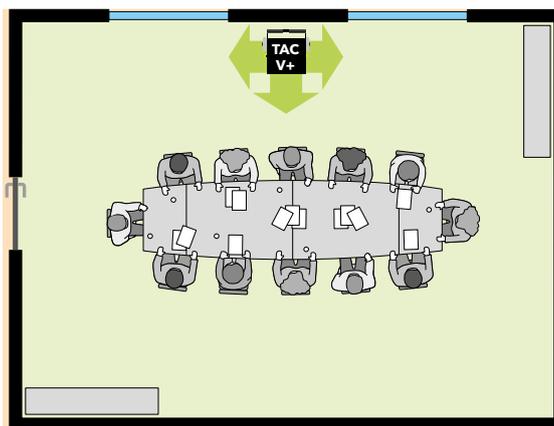
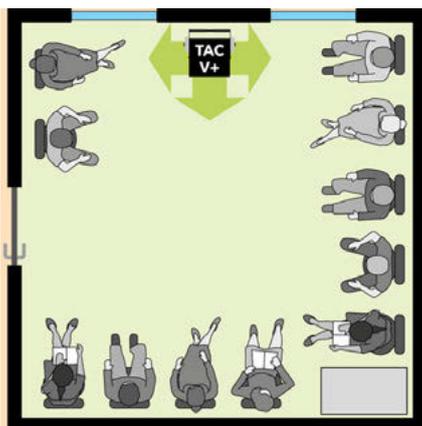
Scientifically proven:

Only sufficiently high circulation rates, adequate volumes of clean air per person and proper positioning of the devices with respect to the air flow and routing provide for a sufficient level of protection against a risk of indirect infection.

Installation in the waiting room of a medical practice

Installation in a conference room

Installation in a restaurant or canteen



Test results of the TAC V+: Scientifically proven effectiveness

Scientific studies by Prof. Dr. Kähler (University of the German Federal Armed Forces in Munich)

In the studies conducted by Prof. Dr. Christian Kähler at the Institute for Fluid Mechanics and Aerodynamics of the German Federal Armed Forces in Munich, the hazardous aerosols in the room air were rendered visible by means of high-power lasers. The air cleaner TAC V+ from TROTEC was used to perform some tests showing whether the aerosol concentration in poorly ventilated rooms can be reduced to a harmless level. His research findings show that dangerous aerosol concentrations even in medium-sized and large rooms can already be eliminated within only a few minutes by the use of the air cleaner TAC V+.

Excerpt from the study:

"Can mobile room air cleaners effectively reduce an indirect SARS-CoV-2 infection risk caused by aerosols?"

Christian J. Kähler, Thomas Fuchs, Rainer Hain

University of the German Federal Armed Forces in Munich

Institute for Fluid Mechanics and Aerodynamics

Werner-Heisenberg-Weg 39 · 85577 Neubiberg

Summary and conclusion:

"The quantitative measurement results show that, with the TROTEC TAC V+ room air cleaner tested, due to the large volume flow and the filter combination of class F7 + H14 (EN 1822*), aerosol concentrations even in rooms with a surface of 80 m² can be reduced by half within 6–15 minutes, depending on the volume flow. In the case of rooms with 20 m² the concentration is halved within approx. 3–5 minutes depending on the volumetric flow. Therefore the room air cleaner (TAC V+) makes it possible to easily maintain the aerosol concentration in small-sized to medium-sized rooms at a low level.

Even in a room of a length of 22 m, which is shaped like a corridor with more than 40 m² it was possible to halve the aerosol concentration within about 5 minutes with a maximum volumetric flow.

For larger rooms, rooms containing many objects, or very unfavourable geometries, it may be recommendable to use several room air cleaners in order to quickly filter all areas of the room. Due to the hazardous nature of the SARS-CoV-2 infection, from our point of view, the air change rate should at least achieve values from 6–8. In order to provide for filtration of the room air as effective as possible, the room air cleaner should be positioned at the longest room side in the centre, if possible. Furthermore, the ceiling area in the direction of the emissions should not be blocked by objects, if possible, since radiation of the wall rays will otherwise be interrupted, causing unfavourable vortex flows to establish in the room. In the case of unfavourable operating conditions the volumetric flow should be increased in order to ensure an adequate filter performance. We also recommend actuating the device in continuous operation and not intermittently, preventing an

Study for the use of the TAC V+ in schools

Prof. Dr. Kähler and his team have also performed a study on the use of mobile room air cleaners in schools. The result: Airing, maintaining a distance and wearing a mask are measures that are hardly feasible in winter. In contrast, the use of mobile high-performance air purifiers (in interaction with partition walls) is a realistic, and especially a safe possibility for protecting pupils and teachers. Read the complete study here:

To the study:

"School education during the SARS-CoV-2 pandemic – Which concept is safe, feasible and environmentally sound?"



increased virus concentration to establish in the room. The powerful room air cleaner with F7 + H14 (EN 1822*) filter combination can maintain the aerosol concentration in rooms of a small and medium size at a low level and therefore the indirect infection risk can be substantially reduced by these devices, even with closed windows and without suitable interior ventilation systems.

They are therefore perfectly suited, for instance, to provide for a constantly low virus load in classrooms, shops, waiting or treatment rooms, without having to think about opening windows and affecting the well-being in the room.

Furthermore, in contrast to free ventilation by means of windows they also ensure a true reduction of the virus load, something that free ventilation can often not guarantee. In addition and compared to room ventilation systems working without or only with a small proportion of fresh air, they also offer the benefit of ensuring that the viruses are actually filtered out and that they are not spread within the building through other channels. To prevent the room air cleaner from becoming a virus spreader, the H14 filter (EN 1822*) should be heated to approx. 100 °C every day for about 30 minutes by the device, in order to destroy the viruses in the filter and prevent the formation of biofilms, bacteria and fungi without using harmful chemical additives or UV-C radiation."

To the study:

"Can mobile indoor air cleaners effectively reduce an indirect risk of SARS-Cov-2 infection by aerosols?"



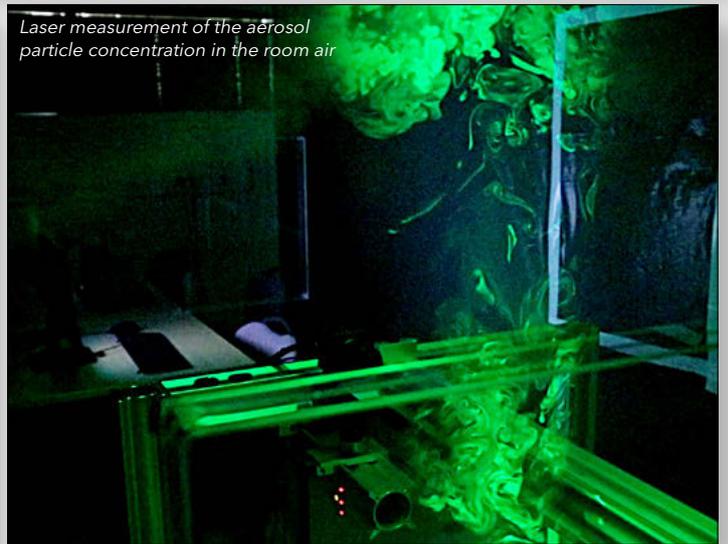
Panorama photo of the experimental space including the components for measuring the concentration



Prof. Dr. Kähler installing the test set-up with the TAC V+ from TROTEC



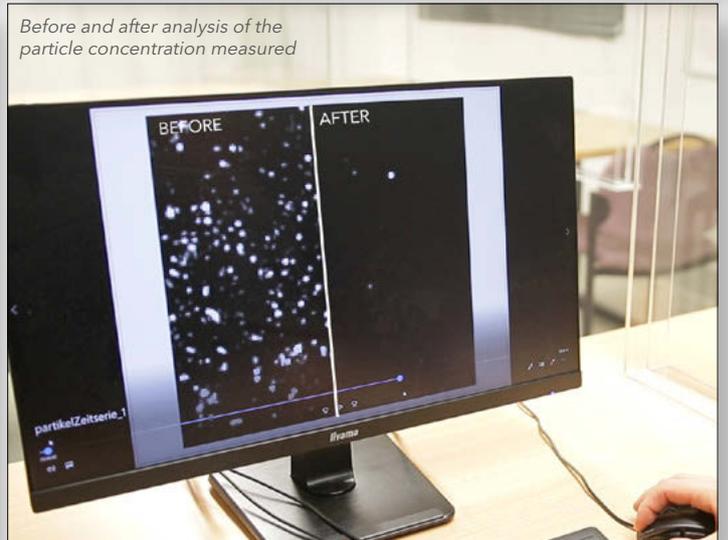
Laser measurement of the aerosol particle concentration in the room air



A classroom with acrylic glass partition walls is also part of the simulation



Before and after analysis of the particle concentration measured



The science programme "nano" reported on the efficacy study of the room air cleaner TAC V+ from TROTEC

During an interview in the science programme "nano" (Bayerischer Rundfunk (Bavarian Broadcasting, BR)) Prof. Dr. Kähler explains the functional principle of the innovative room air cleaner TAC V+, which was examined in the context of a study on room air cleaners.



Video
Directly to the TV report



de.trotec.com/tacv-plus-nano

360° infection protection: Only a combination of measures ensures reliable protection

* According to Dr. Thomas Voshhaar

Only approx. 20%* of the cases are direct infections caused by droplets or contact.

Protective measures against a droplet infection are for instance

- masks, visors
- partition walls
- maintaining a distance

An infection by contact can for example be prevented by

- maintaining a distance
- hygiene and disinfection



With approx. 80%, virus-loaded aerosol particles present * the largest source of infection.

Indirect infection by airborne aerosol particles can for instance be prevented by

- regular and sufficient airing

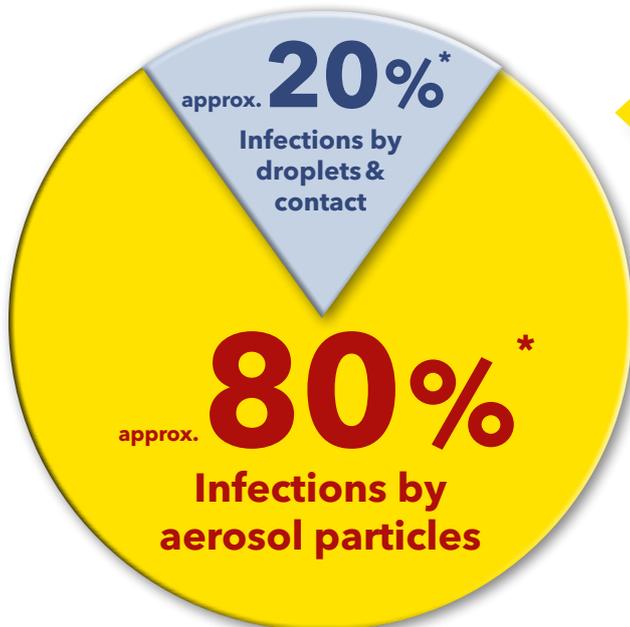
(This, however, is only effective if there is a considerable temperature difference between inside and outside, or if the wind is blowing outside the window.)

- **The high-performance air purification with H14-HEPA filters is the most effective possibility for offering protection against airborne viruses in interior spaces. We recommend using it especially in rooms where airing is not possible for physical or technical reasons** (e.g. because there is no difference in temperature, no wind is blowing, the room has no windows, or the windows cannot be opened. Due to draught and the risk of catching a cold, airing is furthermore often not desirable or unreasonable.)

The reduction of the aerosol and virus load in interior spaces by means of the high-performance air purifier TAC V+ is scientifically confirmed.

But please note that **only a combination of all measures** offers effective all-round protection against infections.

Direct paths of infection



Indirect paths of infection

Overall safety by combined measures:



Use in the schools



Use in restaurants



Use in supermarkets



Use in fitness studios





Air volume with H14 filter

Max. air volume Max. air volume in filter class (approx.)	Series: H14-HEPA filter: 2,200 m³/h H14 ≤ 1,200 m³/h H13 ≤ 1,800 m³/h E12 ≤ 2,200 m³/h
Max. air volume Max. air volume in filter class (approx.)	Optional: Ultra-HighFlow-H14-HEPA filter: 2,400 m³/h H14 ≤ 2,000 m³/h H13 ≤ 2,400 m³/h

For 66% more H14 air volume, 40% less energy consumption and up to 8% lower noise level

Possible clean air zone (room sizes)	Depending on the circulation rate per hour requested by the hygiene concept (LW/h) as well as the filter performance efficiency required (H14 or H13) [see table on page 8]
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Pre-filter	F7 (EN 779:2002) , ePM10 85 % (ISO 16890)
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High-temperature particulate air filter	TROTEC HEPA-H14 Heat Resistant (EN 1822) (optionally also as Ultra-HighFlow filter) (fully encapsulated H14 metal lamellae high-temperature filter) Each filter is tested and certified individually
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Filter change	Approx. 12–18 months (depending on the application and with regular thermal decontamination)
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Filter change indication F7 filters	Usage-related, sensor-controlled filter change indication of the F7 filter
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Filter change indication H14 filters	Usage-related, sensor-controlled filter change indication of the H14 filter
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FlowMatic control	Constant clean air volume flow, constant circulation rates also with increasing filter contamination. Air volume freely adjustable.
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Safety and filter hygiene: Thermal decontamination and reconditioning of the filter at approx. 100°C. 15 min. heating-up phase / 15 min. decon-phase (altogether 30 min.)	Time freely programmable , the thermal decontamination and filter regeneration process takes place fully automatically , usually in the night or outside business or teaching hours. Thermal decontamination and filter regeneration can be switched off temporarily or even constantly as required . Due to the short treatment duration (15 Min.) and the low energy input (altogether approx. 1.0 kWh per cycle), the room temperature does not increase by thermal decontamination.
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Mains connection / Ø power consumption	220–240 V 50 / 60 Hz 0.14 kW (with an air volume of 1,000 m³/h) 2.5 kW (short-term peak load, only during thermal decontamination)
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Connection plug	CEE 7/7, H07RN-F
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Exemplary total energy consumption (with 1,000 m³/h air volume)	Without thermal decontamination	Approx. 1.4 kWh with an operating time of 10 hours
	With thermal decontamination	Approx. 2.4 kWh with an operating time of 10 hours and 1 regeneration cycle of 30 minutes

Dimensions (L x W x H)	690 x 610 x 1,300 mm (incl. wheels and handle)
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Weight	89 kg (incl. filter)
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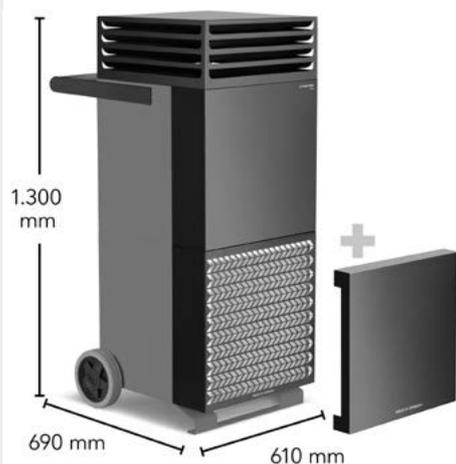
Optional accessories	Sound protection hood, flow stop cover, hose adapter, manipulation protection
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Sound level TAC V+

With serial filter HEPA-H14 Heat Resistant (EN 1822)	Air volume in m³/h						
	600	800	1,000	1,200	1,400	1,800	Max.
Without sound protection hood (approx.)	41 dB	46 dB	49 dB	51 dB	55 dB	60 dB	64 dB
With sound protection hood (approx.)	40 dB	44 dB	47 dB	50 dB	52 dB	57 dB	60 dB

With an optional Ultra-HighFlow filter HEPA-H14 Heat Resistant (EN 1822)	Air volume in m³/h						
	600	800	1,000	1,200	1,400	1,800	Max.
Without sound protection hood (approx.)	39 dB	43 dB	47 dB	50 dB	53 dB	57 dB	64 dB
With sound protection hood (approx.)	38 dB	41 dB	45 dB	48 dB	51 dB	55 dB	60 dB

Dimensions (incl. wheels and handle) / optional sound protection hood



Optional flow-stop cover, e.g. for wall installation



Pre-filter: F7 pleated filter



Virus filter: Series: HEPA-H14 Heat Resistant

Optional: Ultra-HighFlow-HEPA-H14 Heat Resistant
For 66% more H14 air volume, 40% less energy consumption and up to 8% lower noise level



Optional hose adapter



Colour variants TAC V+



Air quality measurement: Making poor room air values visible

Information with regard to CO₂ traffic lights, climate gauges, particulate matter, pollen and particle counters

TROTEC solutions not only allow you to generate clean air that is free from viruses, bacteria, particulate matter and pollen but also make the quality of the room air visible!

CO₂ traffic light, climate, particle and fine dust gauge for completely fresh room air: Our BQ air quality measuring devices indicate all important values at a glance.

The air quality monitor BQ30 should be an integral part of every classroom, waiting room, conference room and open-plan office, since this environmental monitoring station shows you 5 key values for a good room air quality at a glance: In addition to the CO₂ load and the climate data for temperature and relative humidity, the pollution with particulate matter is also displayed in particle size PM2.5 or PM10. The CO₂ load is an important indicator for ventilation measures, and the particle sizes for particulate matter determined not only include respirable and often harmful particulate matter (e.g. by traffic load), but also pollen – e.g. important to allergy sufferers!

CO₂ value as an indicator of air quality

In rooms with a large number of people, CO₂ traffic lights can serve as a rough guide to indicate good or poor air quality, since carbon dioxide (CO₂) is a reliable indicator of a poor air change. A CO₂ concentration of up to 1,000 ppm under normal conditions shows a hygienically sufficient air change. Already at a CO₂ value of 1,500 ppm, the ability to concentrate decreases noticeably, and headaches as well as fatigue or even drowsiness may be the result. With values above 1,000 ppm the room should be ventilated so that the values reach the range between 400–500 ppm again. CO₂ traffic lights can therefore reliably indicate whether, when, and in particular, for how long the room has to be ventilated.

IMPORTANT:

CO₂ values tell you nothing about the risk of infection!

The installation of CO₂ sensors does not mean that a CO₂ concentration lower than 1,000 ppm offers protection against an infection with SARS-CoV-2. The CO₂ concentration is not a measurand of the infection risk, since there is no correlation between the CO₂ concentration and a viral or bacterial load. Even with a low CO₂ concentration a risk of infection may be posed, for instance if infected persons enter a freshly aerated room.

In turn, however, CO₂ concentrations that are considerably or constantly higher than 1,000 ppm in schools, offices and private households indicate an insufficient ventilation management with a potentially increased risk of infection. This does not only apply to window ventilation, but also to the operation of ventilation systems. Apart from the CO₂ values and the pollution with particulate matter, which is often harmful, from a hygienic point of view and independently of SARS-CoV-2, also the right relative humidity level between 40 and 60% is important, on the one hand to prevent the mucous membranes from drying out when the air is too dry below 30% RH, and on the other hand, to prevent mould growth with a high relative room humidity above 60%. All this information can be found at a glance at the BQ30 room air monitor. Apart from the BQ30 you'll also find further professional air quality measuring devices such as the BQ20, PC200 or PC220 in the TROTEC range, which, in addition to room air control, can for example also be used to test filter systems.

CO₂ concentration and ventilation requirement

CO ₂ in ppm	Evaluation
6,000	CO ₂ concentration poses a health threat; load should only be there for a short time; further impairments occur
5,000	Max. workplace concentration; limited time for persons to stay, max. 8 hours a day
2,000	Indicator of an enhanced risk of infection due to an increased density of aerosol particles!
1,500	Max. guideline for interior spaces; headaches, fatigue and drowsiness may occur
1,000	Comfort level, still acceptable as regards air hygiene (as specified by Max von Pettenkofer)
500–800	CO ₂ concentration at harmless level for interior spaces
350–450	Fresh, natural ambient air

BQ30



Note on positioning:

Position the device as far away as possible from windows and doors. It is best to set it up where the air is at its poorest quality.

BQ20



PC200
PC220



Info centre: Here you can find more information on the TAC V+

Whether video or web – just scan it with your smartphone:



Product video

All infos on the TAC V+ in this video



uk.trotec.com/tacv-plus-video



Product website

The official website of the TAC V+



uk.trotec.com/tacv-plus

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Applications

sorted by areas of business



uk.trotec.com/tacv-plus-branches



Air cleaner-FAQ:

All answers to virus air filtration



uk.trotec.com/filter-know-how



References:

Satisfied customers are giving an account on the TAC V+



de.trotec.com/tacv-plus-kunden



Online shop

Just order the TAC V+ online



de.trotec.com/tacv-plus-shop



Video

Application reference in the catering trade



de.trotec.com/tacv-plus-otto



Video

Application reference in schools



de.trotec.com/tacv-plus-gymnasium

You are interested in our TAC V+?

Our air purification experts will be happy to be of service: Phone: +49 2452 962-730 • info@trotec.com

Or visit us at our TROTEC STORE at Heinsberg, Germany. Here you can experience the high-performance air purifier "live" in action and learn first-hand how the corona infection risk can almost be reduced to zero.

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