



CLEAN AIR. SAVE ENERGY.

Your expert for energy-efficient exhaust air filtration.
Innovative environmental technology for over 50 years.



ULTRAVENT[®] M

The modular filter system

Multifunctional. Powerful. Energy-saving.



CLEAN AIR. SAVE ENERGY.



Dear customers and KMA partners,

Good air quality for employees and the environment is gaining increasing importance for companies. At the same time, modern solutions for capturing emissions and recovering process heat offer enormous potential for optimising energy consumption. In this way, costs can be sustainably reduced and the carbon footprint demonstrably lowered. For manufacturing companies it is crucial that the environmental technology used is reliable, low-maintenance and economical.

At KMA Umwelttechnik, we made these requirements our mission 50 years ago: to clean exhaust air effectively and save energy through user-friendly and economical technology.

The ULTRAVENT® M is the modular system of the proven ULTRAVENT® product line. The functional modules of the universal filter system for exhaust air filtration and heat recovery can be combined as required and used in a wide range of industries and processes. With special process modules for the effective separation of smoke, odours and volatile substances ("Volatile Organic Compounds" VOC) as well as highly efficient heat exchangers, the ULTRAVENT® M offers custom-fit solutions for a wide range of applications.

We are proud that many leading companies in various industries worldwide already rely on our products.

We look forward to supporting you with our experienced team and innovative solutions.

Your managing directors of KMA Umwelttechnik GmbH

Christian Kurtsiefer, Stefan Kurtsiefer und Dr. Holger Wagner

M for modular.

ULTRAVENT® M - the adaptable procedural system
for your application



Our solution for your exhaust air for configuration tailored to your needs

Exhaust gases and pollutants in the air are as different as their respective processes. Thanks to our many years of experience in exhaust air filtration we can **meet the specific requirements for your application**. The **individual configuration** of your exhaust air filter system depends on the air volume, the pollutant concentration and the respective properties of the pollutants in your exhaust air. In addition, our solution takes the **emissions specifications for clean air quality and the heat of the exhaust air** into account. For more energy efficiency, the ULTRAVENT® M offers the possibility of recovering and utilising valuable process heat. Thanks to its powerful functional modules, the ULTRAVENT® M has an optimal solution ready for all challenges of modern exhaust air treatment.

Powerful functional modules for every challenge

The ULTRAVENT® M consists of functional components which, **as standardised modular components, can be flexibly configured according to its requirements**. The modular design allows a scalable and integrated solution suitable for any application. Depending on the equipment, ULTRAVENT® M contains an **electrostatic precipitator** for highly efficient particle separation. In addition, the system can be equipped **with intelligent heat exchanger technology** for powerful recovery of valuable process heat. For the effective separation of VOC and odours, KMA offers additional solutions with **UV light modules** and **activated carbon**.

€ Energy-efficient environmental technology for lower operating costs

Reduce your energy costs and CO₂ emissions by over 90% compared to thermal post-combustion (TNV). The ULTRAVENT® M filters the exhaust air **sustainably without afterburning** and thus completely without the use of fossil fuels. In addition, the economical operation of the electrostatic particle filter module **contributes to the ULTRAVENT® M's low energy consumption**. At the same time, the use of the long-life filter cells is **ecologically and economically more sustainable**. Unlike mechanical filters they do not have to be renewed and discarded at additional cost. On top of that, the integration of **high-performance heat exchanger modules** allows effective recovery of process energy from the exhaust air with further significant energy savings. In this way, the energy-efficient KMA environmental technology combines tangible cost advantages with a verifiably improved ecological footprint.

Unique integrated cleaning system for all functional modules

Thanks to the integrated automatic KMA cleaning system (Cleaning in Place "CIP"), the **ULTRAVENT® M is powerful, reliable and low-maintenance**. The unique technology of the KMA CIP allows **all relevant functional components to be cleaned automatically in place** - from the energy-efficient heat exchanger modules to the electrostatic particle filter and the odour-neutralising UV light modules. In addition, through e.g. optional automatic waste water management or automatic dosing of the cleaning agent, the service comfort for the user of the filter system can be increased. Our cleaning system convinces customers worldwide and minimises undesired downtimes of the production plant.

Our solution for your exhaust air

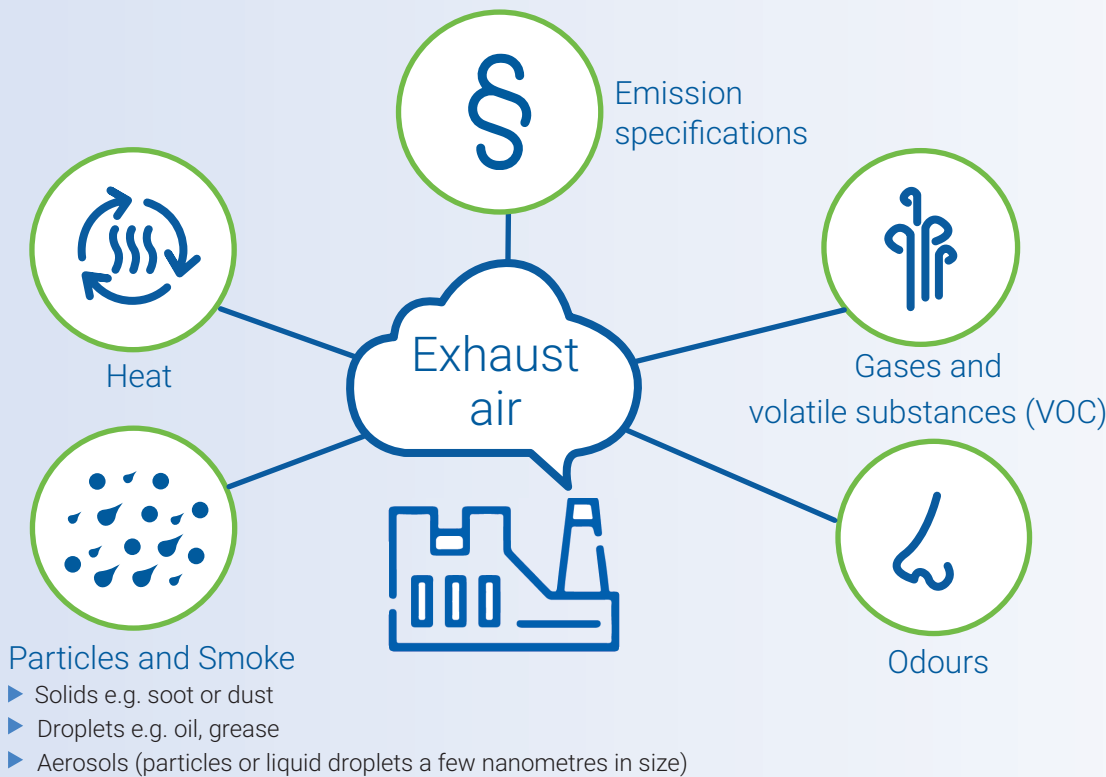
for configuration tailored to your needs

The **specific requirements for the exhaust air filtration process vary** depending on the industry and production process. Our modular process modules can be combined in many ways and can be configured individually. Depending on the requirements, the ULTRAVENT® M enables the separation of particles and odours, VOC and the recuperation of heat from the exhaust air.

The design of the needs-based process technology is essentially determined by the physical and chemical pollutant properties such as aggregate state, particle size and shape as well as the occurring pollutant concentration. In addition, the solution concept for sustainable exhaust air filtration also takes the **relevant emission specifications for clean air quality** as well as the **humidity and heat of the exhaust air** into account.

Flexibly select the process modules and equipment options that best suit your specific application and exhaust air requirements and **benefit from the wide range of solutions offered by the powerful ULTRAVENT® M filter system.**

KMA's consultants will be happy to support you in selecting the right function modules and configuration of your filter system based on an individual design.



Your exhaust air

Our solution modules

Our solution

Connection to air ducts



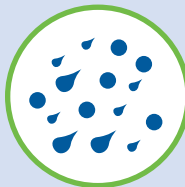
Gases and volatile substances

Activated carbon
Adsorption of VOC



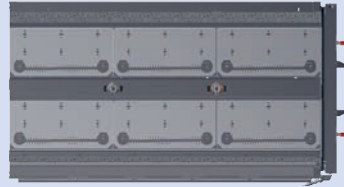
Odours

UV light
Generation of ozone and photo-oxidation



Particles and Smoke

Electrostatic filter
Effective separation of particles



Heat

Heat exchanger
Recovery of exhaust heat, condensation of VOC



Floor modules and cleaning tanks
Automatic Cleaning in Place "CIP" systems



Our solution for your exhaust air

for configuration tailored to your needs

Options and designs

The full range of process stages is offered in modules from 5.000 to 20.000 m³/h. The combination of several filter systems offers solutions for higher exhaust air volumes. The depth of the filter system depends on the exhaust air filter capacity. (refer to table below) The choice of modular process stages determines the height of the ULTRAVENT® M. Thanks to its compact design, the ULTRAVENT® M measures a universal width of 2000 mm.



ULTRAVENT® M 5000

ULTRAVENT® M 10000

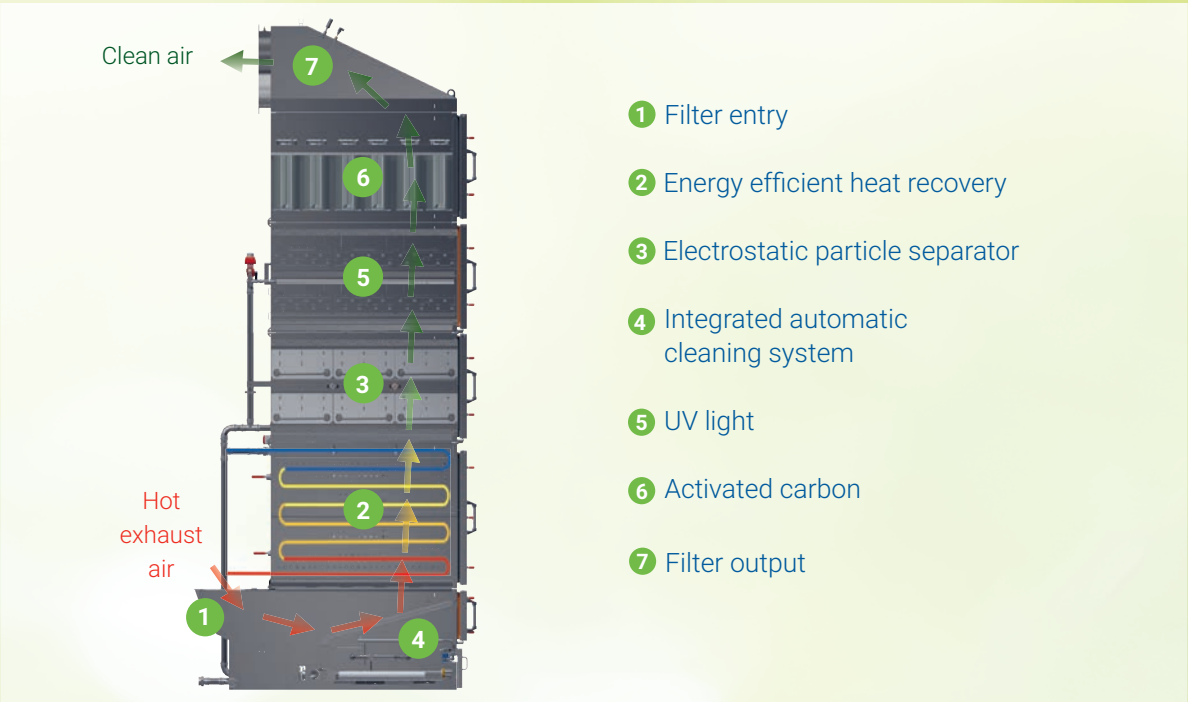
ULTRAVENT® M 15000

ULTRAVENT® M 20000

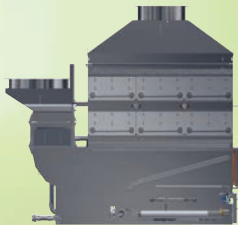


Filter Type	Recommended operating volume	Number of filter cells per filter stage	Width	Depth	Height
ULTRAVENT® M 5000	5.000 m³/h		2000 mm	1500 mm	depends
ULTRAVENT® M 10000	10.000 m³/h		2000 mm	1750 mm	depends
ULTRAVENT® M 15000	15.000 m³/h		2000 mm	2300 mm	depends
ULTRAVENT® M 20000	20.000 m³/h		2000 mm	2800 mm	depends

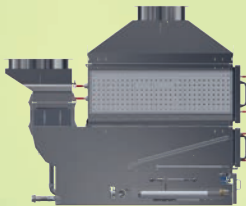
Operating principle and example configurations



Only particle separation
ULTRAVENT® M (EE)



Only heat recovery
ULTRAVENT® M (WW)



Heat recovery + particle separation
ULTRAVENT® M (WW/EE)



Heat recovery + particle separation + odour separation
ULTRAVENT® M (WE/L/K)



Powerful functional modules

for every challenge

Electrostatic particle separation

Industrial manufacturing processes generate dust, smoke, sticky and greasy emissions as well as very fine oil mists. Many emissions are harmful to the environment and health.

The ULTRAVENT® M ensures best air quality with the help of electrostatic high voltage: The ionisation electrode generates a strong electric field with a **very low energy input**. This generates the ionisation for the particles that need to be separated. Due to the **electrostatic forces**, the charged particles are directed to the collector plates.

Liquid components drip off from there and collect in a water tank at the bottom, while sticky and viscous substances remain on the plates and are effectively removed by the **integrated automatic cleaning system**.

For long-lasting operation, all parts of the ULTRAVENT® M are made of **robust stainless steel and aluminium**. The ionisation profiles of the filter cells are also made of durable stainless steel. The insulators are made of durable ceramic instead of frequently used plastic.



Particles and Smoke

Integrated heat recovery

In industrial production processes, considerable amounts of the valuable heat energy contained in the exhaust air are often lost via the chimney.

In times of high energy prices and increased requirements for energy efficiency and climate protection, such **unused energy potentials** offer significant operating cost advantages for manufacturing companies in every industry. In particular, energy-intensive processes with high exhaust air temperatures can **optimise the energy efficiency of your production facilities, building heating or downstream processes**. At lower temperature levels, the targeted use of highly efficient heat pumps supports the effectiveness of heat recovery through improved heat transfer and increased efficiency.

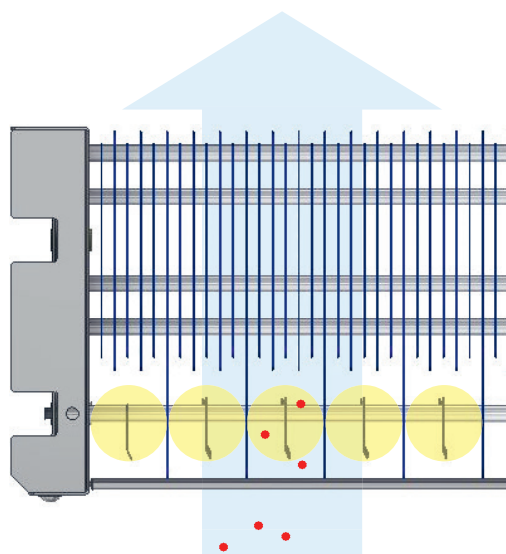
For a sustainable improvement of the ecological footprint, KMA provides **individual solution proposals for sensible utilisation options** of the recovered energy.



Heat

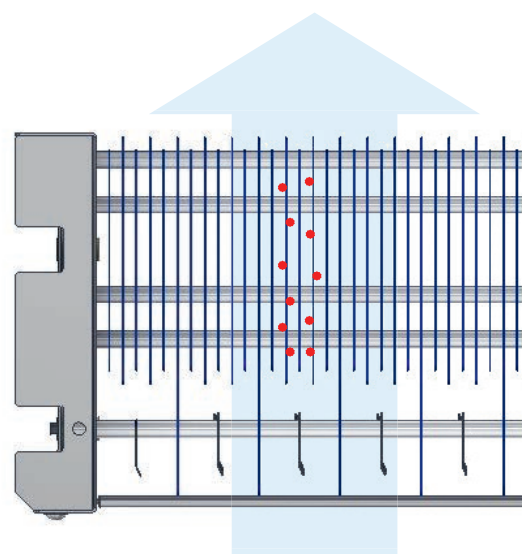
1. Ionisation

High voltage at ionisation electrode generates an electric field in which passing particles are charged.



2. Separation

Grounded collector plates attract passing particles and retain them with minimal air resistance.



In the ULTRAVENT® M, KMA enables the integration of high-performance air-water heat exchangers for the effective recovery of thermal process energy from the production exhaust air.

The **plate-fin heat exchanger extracts the process heat from the exhaust air flowing through and transfers it to a liquid carrier medium (e.g. glycol)**. The ULTRAVENT® M achieves its high efficiency of heat transfer through the increased exchange surface between the warm exhaust air and the flowing carrier medium. In the process, the air flows through a multitude of multi-stage fins or fin packages that are connected to the fine ducts through which the carrier medium flows. The **enlargement of the exchange surface achieved in this way provides the best conditions for the high efficiency of the heat exchanger**. Depending on the application, the heat exchangers can be operated with water or with glycol as the liquid medium.

For **constant efficiency**, the heat exchangers **are optimised for the integrated automatic cleaning system** of the ULTRAVENT® M system. This way, pollutant deposits on the fins can be cleaned and the efficiency maintained. In addition, KMA offers the possibility to equip the single-stage or two-stage heat exchanger with its own nozzle sticks for integrated cleaning inside the heat exchanger housing.

Your advantages at a glance:

- ✓ Effective recovery of process heat from the exhaust air reduces energy costs and CO₂ emissions
- ✓ Consistently high performance thanks to integrated automatic cleaning
- ✓ Effective exhaust air filtration without inefficient mixing of room air
- ✓ Condensation of gaseous substances to remove VOC and odours
- ✓ Combination with heat pumps possible for increased efficiency and holistic heating concepts

Powerful functional modules

for every challenge

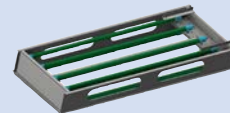
UV light

Companies are obliged to clean their contaminated production exhaust air before it is released back into the environment. In particular, the **effective separation of odour emissions** is required for an **operating permit** by the responsible authorities as well as for a **good relationship with the neighbourhood**. **Conventional processes such as thermal afterburning** have to be operated at high temperatures above 750 degrees Celsius with **enormously high energy consumption** in order to meet the emission standards.

The UV light module of the ULTRAVENT® M is an **energy-saving and environmentally friendly solution to break down odours and filter the exhaust air**. In combination with natural oxygen (O₂), UV light generates highly reactive radicals and ozone. This can oxidise many **intensely smelling molecules** and achieve a significant improvement in the odour situation. The UV light tubes are moisture-resistant and suitable for use in conjunction with the automatic cleaning system. After the UV light module, an ULTRAVENT® M carbon module or a separate carbon adsorber can be used to bind volatile substances and to break down any remaining ozone.



Odours



Activated carbon

In order to separate the gases and volatile substances carried in the exhaust air, the so-called VOC (Volatile Organic Compounds), ULTRAVENT® M offers various carbon filters for use as required.

The carbon filter offers a remedy for non-liquid adsorbable substances with low moisture and particle loads.

By integrating an activated carbon filter with fine coke, VOC, many odours, gases and vapours can be adsorbed highly effectively. The **odorous substances and air molecules accumulate on the porous activated coke surface** and are thus removed from the exhaust air.

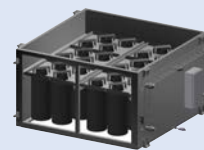
Alternatively, the process chain of the ULTRAVENT® M can be effectively supplemented for the **absorption of odours and VOC** with a **cylindrical storage charcoal tower**, which is installed on the roof or outside the production hall.

In addition, KMA offers **horizontal flow carbon filters as a space-saving solution for indoor installation**.

Good pre-treatment of the exhaust air is important: aerosols and dusts must be separated before the carbon filter.



Gases and
volatile
substances



+ Optional equipment available:

- ▶ Integrated bypass
- ▶ Collecting trays
- ▶ Condensate management (automatic outlet valve for condensate/oil drain)
- ▶ Pre-separator for particles (cyclone impact separator)
- ▶ Fan and frequency converter
- ▶ Steam heat exchanger/electric heating coils for drying the exhaust air for subsequent process stages
- ▶ Automatic waste water management with feed pump
- ▶ Separate cleaning tank
- ▶ Optional belt filter to separate solids from the cleaning water
- ▶ Automatic dosing of the cleaning agent



Intelligent Control

Rely on the **high-quality components in the ULTRAVENT® M and the extensive standard equipment** for control and connectivity of our environmental technology.

A modern control system has a great influence on the user-friendliness, economic efficiency and integration of your plant. KMA also offers complete solutions to operate your plant process-safely and efficiently.

The ULTRAVENT® M is equipped with the **modern SIEMENS PLC S7 with comfortable operation via a 7" touch display as standard**.

The Siemens S7 enables the permanent monitoring and protocolling of all filter functions, the control of the automatic integrated cleaning and the synchronisation of the connected filter system with the production plant. Thus, in addition to monitoring the connected media it allows convenient programming of the CIP cleaning times, wash water temperatures and many other parameters.

Advantages of extensive integration

- ▶ Simple parameterisation
- ▶ Interface to other control units



System standard:
Siemens PLC S7 and touch panel
including Ethernet/Profinet interface

Utilise your digitalisation potential

The integration of modern environmental technology into the system environment of production plants and relevant IT systems is indispensable nowadays. Via the PLC control unit, we offer not only simple and secure management for the ULTRAVENT® M, but also additional functions such as **remote diagnostics and remote maintenance**.

Ethernet/Profinet interfaces are available as a **standard feature** in the ULTRAVENT® M. Additional PN/PN couplers for connection to Profinet networks are optionally available.



Safety first

We attach great importance to safety functions.

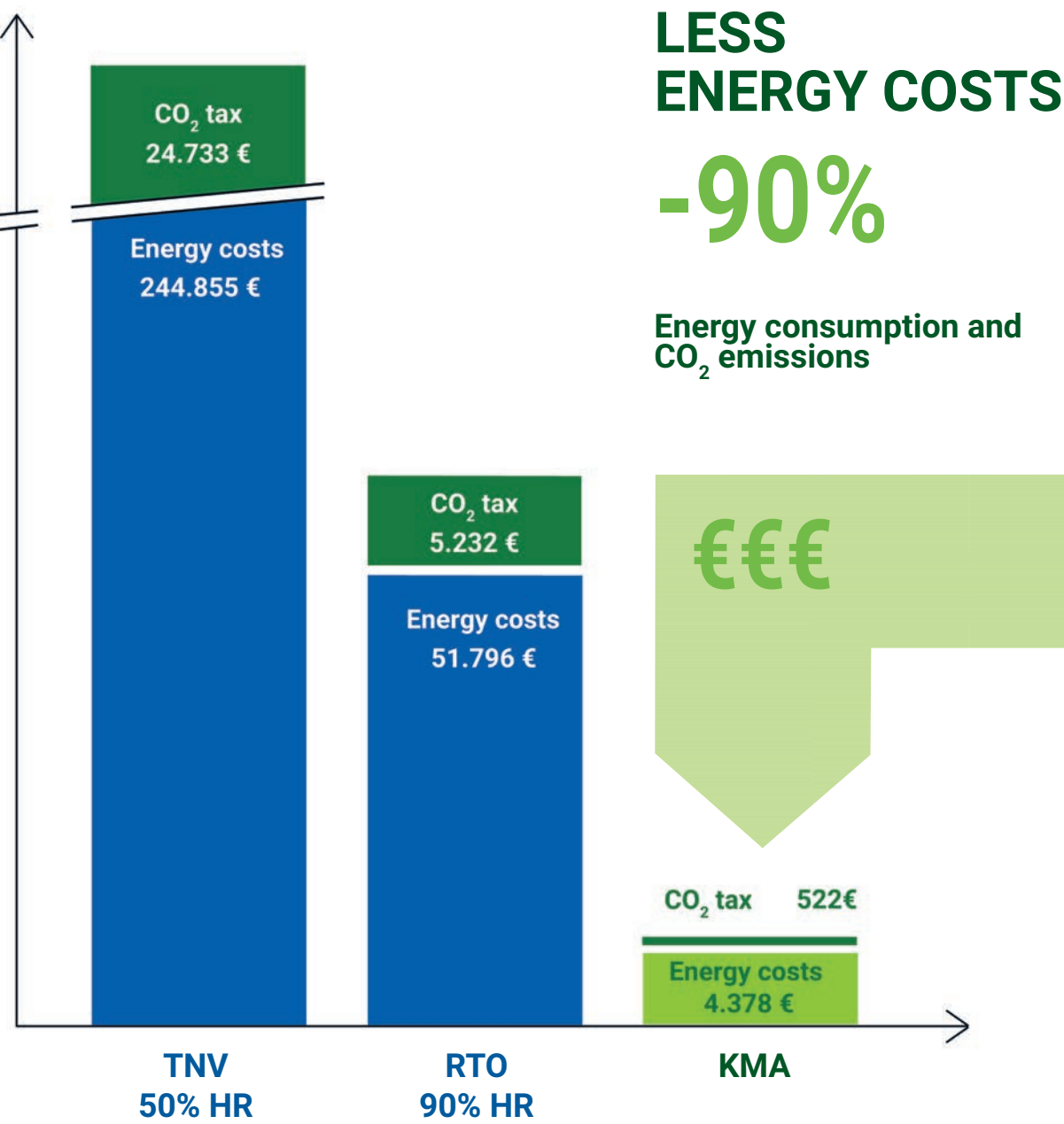
The standard monitoring system integrated into the PLC constantly monitors the temperature at the system inlet. Depending on design, the ULTRAVENT® M offers various monitoring systems for temperatures and air flows. If the air temperatures exceed defined values, the filter system switches off automatically, if necessary. The ULTRAVENT® M has a safety shutdown and mechanical grounding when the filter door is opened as series standard. In addition, our proprietary high voltage modules are designed to switch off the high voltage of the filter system extremely quickly.

Further safety features are integrated in the high-voltage module as standard. An active fire extinguishing system is optionally available.

€ Energy-efficient environmental technology

for lower operating costs

The ecological and economic business climate for manufacturing companies is getting tougher: **Rising energy prices, successive additional costs for CO₂ emissions** as well as **clearly formulated requirements for sustainable production sites** by end customers pose major challenges. The ULTRAVENT® M offers an environmental solution for many industrial applications and combines innovation and efficiency. **Operating costs are significantly reduced**, contributing to a sustainable and economical operation.



Calculation basis:

- ▶ Exhaust air volume: 5,000 m³/hour
- ▶ Operating time: 5,760 hours/year
- ▶ Gas price: 9 cents/kWh
- ▶ EU CO₂ tax: 40 €/tons | 2024
- ▶ Practical example from plastics processing industry

Our solution for your exhaust air without post-combustion



In contrast to the energy-intensive method of **thermal post-combustion (TNV)** for the separation of odours and VOC, the **ULTRAVENT® M cleans the exhaust air completely without afterburning, thus achieving tangible energy-saving potentials.** The use of modern environmental technology enables high savings in energy costs and promotes **decoupling from rising gas prices** as well as impending supply shortages of energy sources.

The principle of TNV is based on the complete combustion of the organic carbon compounds in the exhaust air to H₂O and CO₂. In particular, **compliance with CO limits requires TNV operation with high exhaust air temperatures of over 750 °C in order to adequately separate emissions and odours.** The permissible limit values for the purified exhaust air can be achieved, but at the expense of the environment and operating costs: The **supply of fossil fuels required for these high temperatures consumes immense natural resources and releases secondary emissions such as CO₂ and NO_x.**

The modular exhaust air filtration process of the **ULTRAVENT® M** filters the exhaust air entirely without afterburning and thus consumes **significantly less energy than a TNV.** This is clearly reflected in the **operating costs** and the **life cycle assessment** in a comparison of the process technology.

Minimal energy consumption through energy-efficient particle separation



Compared to a mechanical filtration process, the **energy saving** from using the efficient ULTRAVENT® M is **over 80%.** Due to its unique design, the electrostatic filter is **optimised for low air resistance and minimal pressure loss.** The **extremely economical operation of the electrostatic particle filter from 0.1 kW at 5.000 m³/h to 0.4 kW at 20.000 m³/h** exhaust air filter capacity contributes to the ULTRAVENT® M's efficient energy consumption. In a combined solution with a UV light module and downstream catalyst carbon stage, the efficient filter separation and ionisation of the particles ensures **additional low energy consumption of the downstream process stages.** The performance of the fan is determined by the piping routes.

Alternative methods such as **mechanical filters** typically combine several stages of filter elements with increasing fineness. In this process, **high air resistance leads to high energy consumption of the fan.** Due to the lack of cleaning, mechanical filters quickly become clogged with oily and sticky exhaust air. The necessary replacement of the filter elements increases the operating costs. While mechanical filters need to be changed regularly, **our electrostatic filter cells, heat exchangers and UV light modules are sustainable and long-lasting thanks to automatic cleaning.** This reduces operating costs and the ecological footprint through less waste.

Intelligent heat recovery for lower energy costs



The **competitiveness of producing companies** today is also determined by how well they succeed in implementing **effective measures to reduce energy consumption and CO₂ emissions.**

By **effectively recovering process heat from the exhaust air**, the ULTRAVENT® M not only **saves considerable energy costs, but also reduces the associated CO₂ emissions**, which are being taxed at successively higher rates (EU CO₂ tax 2024: 40€/t CO₂; EU CO₂ tax 2025: 55€/t CO₂).

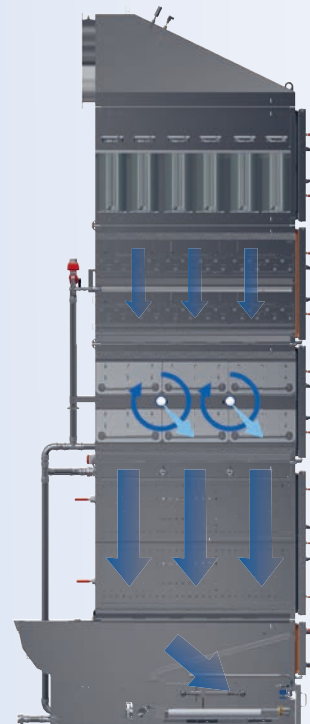
In order to improve the customer's own energy efficiency, **needs-based energy utilisation offers many possible uses:** The use of process heat for subsequent production processes, efficient ventilation and the reduction of heating or cooling energy consumption represent central starting points for **measures to increase energy efficiency.** **A reduction in energy costs and CO₂ emissions thus pays off twice through intelligent heat recovery.**



Unique integrated cleaning system for all functional modules

Many of our customers already have experience with the cleaning of electrostatic precipitator cells and heat exchangers. This work is dirty, tedious and time-consuming. With automatic Cleaning in Place „CIP“, the KMA ULTRAVENT® M **relieves the maintenance personnel, reduces the cleaning effort to a minimum and protects the technology** from wear and tear.

Similar to a common household dishwasher, the integrated cleaning system offers a choice of different programs. **The filter cells, the heat exchanger and the UV light are cleaned automatically within the filter system**, thus minimising undesirable downtimes of the production plant. The cleaning system has been evolved over many years and it achieves a unique effectiveness whilst conserving resources.



Depending on the configuration, it is possible to **equip each function module with its own nozzle stick**.



Shared wash tank

Two adjacent ULTRAVENT® M units can share an integrated cleaning tank and pump

+ Central cleaning tank with belt filter

The effective solution in case of heavy soiling for one or multiple ULTRAVENT® M units:

- ▶ Continuous filtration of the returning water
- ▶ Automatic discharge of the separated material
- ▶ Avoids clogging in the cleaning system and reduces maintenance effort

✓ Strong and proven

The complete cleaning of the inside of the filter is achieved by **spraying the filter cells and insulators with hot water under pressure**. Thanks to the special **rotating nozzle system** and the powerful water jet, the KMA CIP system is leading in terms of comfort and result. The wash water can be used several times, depending on the degree of contamination.

✓ Configurable and convenient

Our continuously improved cleaning system is **fully programmable** and thus adapts seamlessly to your production processes. **Optional features include automatic dosing of the cleaning agent** and an **automatic water change**. Preheating of the wash water during active filter operation can shorten the cleaning time. Thus, the cleaning system is **ready to start immediately with no lead time on request**. Additional functions, such as the automatic water drain valve, minimise the time required by maintenance personnel.

The four success factors for high-performance cleaning systems

The KMA cleaning system offers various programming options depending on the application and can be easily adapted to the situation using the selected configuration options on the filter operating unit. Time, thermal, chemical and mechanical forces interact during cleaning.

Main cleaning program:

In the main cleaning program, the filter cells are cleaned thoroughly on site with water (e.g. for one hour). The desired cleaning time of the main cleaning program can be set individually.

Short cleaning program:

Service times at the production plant can be used to clean the filter cells in a shortened intermediate cleaning cycle of 10 minutes. This option bridges or extends the time period until the next main cleaning.



1. Ideal temperature:

The cleaning water is heated by electrical heating to approx. 80 °C. Contaminants are dissolved better in the hot water. Preheating of the wash water during active filter operation is possible.



2. Effective use of chemicals:

A cleaning agent in low concentration is added to the cleaning water. The correct cleaning solution is ensured by an automatic dosing system. The cleaning agent dissolves oily and greasy deposits.



3. Strong mechanical cleaning:

The hot cleaning mixture is injected into the filter cells via rotating spray bars with a hard water jet. More than 140 nozzles per spray bar systematically reach every area of the filter cell. After the cleaning process, the floating oil phase is skimmed off and depending on the degree of contamination, the water can be reused for further cleaning.



4. Time well spent:

In less than 30 seconds, 300 litres of wash water are circulated through the filter cells per cycle. The water runs back into the cleaning tank and is continuously circulated through the system by the cleaning pump for a period of approx. 1 hour. In the case of the ULTRAVENT® 15000 to 20000, for example, around 40,000 litres per hour are flushed through the filter by two nozzle assemblies.



CLEAN AIR. SAVE ENERGY.



Are you interested in the ULTRAVENT® M?
Please feel free to contact us.

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