KMA ULTRAVENT® heat recovery and air filtration systems:

- High separation
- Energy efficient
- Reduction of operation costs
- Short payback period
Clean air at the workplace

With KMA ULTRAVENT® cleaning the air and recovering the heat

The exhaust air from stenter machines is highly polluted with dust, oily mist and aerosols. At the same time, the exhausted air contains significant amounts of valuable heat energy. Nowadays, the textile industry is confronted with strict regulations in terms of occupational health and safety as well as environmental protection. KMA ULTRAVENT® exhaust air filter systems accommodate these requirements already: they are suitable for separation of oily, greasy or pasty aerosols from the exhaust air and are characterised by high separation efficiency, durability and very low energy consumption. Due to the integrated heat recovery technology, the textile manufactory can also handle ambitious goals for improving its carbon footprint and put high amounts of energy savings into practice.

KMA ULTRAVENT® - flexible and modular

A compact system – two goals

The application of an exhaust air filter system is pursuing two goals:

1) First, the exhaust air should be cleaned before being led into the atmosphere, to avoid nuisances and the emission of pollutants

2) On the other hand, the waste heat should be recovered and used for follow up processes. For example for heating the supply air in the winter period or the washing water for the dyeing mill

The oily particles contained in the exhaust air get discharged and deposited by a drainage outlet.

Filter sizes and modules

KMA ULTRAVENT® systems are available in three sizes with a filter exhaust air capacity of 10,000, 15,000, 20,000 and 30,000m³ / h. For larger exhaust air volumes two or more KMA systems can be easily connected to each other.

The KMA exhaust air systems are assembled on a modular system, which combines several system’s components. Therefore ULTRAVENT® system allows a precise adaptation to the needs of the stenter. According to the customer’s request each system can be equipped with several heat exchanger modules. Thus, a KMA exhaust air system with three heat exchanger modules and two electrostatic filter stages is a common example. Depending on the quantity of equipped module elements the height of the KMA system varies. With a fully equipped KMA ULTRAVENT® the maximum height can be up to 4.4 m.

Is there only a low ceiling height, the KMA system can be supplied in a tandem design.

The KMA standard design is the tower variant. Here, the module units are placed one above the other, so that the housing can reach a height of up to 4.4 m.
Heat recovery

With KMA ULTRAVENT® the valuable waste heat is energy efficiently reused. The integrated heat exchangers in ULTRAVENT® enable a recovery of the process heat. The recovered heat is used for follow-up processes. The recovered heat can be used to heat the supply air (for example: for the stenter frame) and / or to heat up water (for example: for the washing water in the dyeing mill).

Generally, the recovery potential is very large and can result in payback period of the entire system of less than two years! Here, environmental sustainability is linked in an ideal way with increasing profitability.

Example of use:
The amount of savings that can be achieved by using a KMA ULTRAVENT® system can be demonstrated by looking at a practical example. A customer has a stenter frame (6 fields) with an exhaust air volume of 20,000 m³/h and 5,000 operating hours per year. The average air temperature is 100°C and the average outdoor temperature is around 20°C. The recovered energy is used for heating up supply air as well as water. By using market gas prices, the savings potential is:

<table>
<thead>
<tr>
<th>Heat recovery potential</th>
<th>513 kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saved energy costs per hour</td>
<td>13,14 €</td>
</tr>
<tr>
<td>Saved energy costs per year</td>
<td>65,676,21 €</td>
</tr>
</tbody>
</table>

Payback period less than 2 years

Energy savings at a glance

KMA ULTRAVENT® comes with a programmable intelligent controller, which also controls the filter cleaning in addition to the extensive monitoring of all filter functions. A forwarding of all relevant information to a central control system or integration in a remote maintenance system is possible (optionally).
ULTRAVENT® systems – the individual modules

ULTRAVENT® Modules

KMA ULTRAVENT® systems can be equipped with various modular components for the separation of smoke and aerosols and can be used at stenter frames and for the recovery of waste heat. All housing parts are made in durable stainless steel.

Pre-filtration – lint separation

Processing rough materials from coarsely woven fibers usually create high amounts of lint ball particles. Here, a pre-filtration of the exhaust air is an imperative. Therefore, KMA offers in this case a lint filter. This consists of robust stainless steel wire mesh elements. The special shaping of the wire allows for a high separating capacity for coarse dust particles, for example lint balls.

Particle filtration and oil recovery by high-performance electrostatic precipitators

ULTRAVENT® electrostatic filter cells assure the highly effective separation of smoke, dust and fine mist. The filter cells are characterised by the particularly robust design: frame, electrode and carrying bars made of stainless steel, collector plates optionally in aluminum or stainless steel, insulators in oil-resistant ceramics and an optimised design for the separation of liquid or viscous substances. These features make sure that the electrostatic filter is an economical and durable filter medium for many applications.

Often two categories of contaminants are captured in the electrostatic collection cell. One kind of the filtered substances is liquid, drips off the collection plates, and is collected in a recuperation tank. Here, the oil released during the process can be recovered and reused. The second type forms a greasy or solid deposit on the filter surface. Unsuitable filter types can quickly plug and become ineffective, leading to excessive costs associated with filter replacement and disposal. However, electrostatic precipitators never obstruct the air flow through the exhaust system.

Provided exclusively supply air is heated, a cross-flow heat exchanger in the air-to-air operation mode can be used. The regular cleaning is carried out by the automatic washing system of ULTRAVENT® here as well.

Heat recovery by highly efficient heat exchanger

By integrating a heat exchanger in the ULTRAVENT® filter system a recovery of the process heat is made possible, in addition to the air purification. The recovered heat from the exhaust air heat can be used afterwards for follow up processes (e.g. water or air heating). The immediate installation of the heat exchanger next to the filter zone allows regular cleaning by the automatic filter cleaning system.

Low maintenance by automatic filter cleaning system (CIP)

An automatic filter cleaning system is available for ULTRAVENT® emission control systems. It is suitable for cleaning all integrated filter media such as electrostatic collection cells or heat exchanger units. The automatic ULTRAVENT® washing system is unmatched in terms of comfort and cleaning results – due to its movable nozzle bar that moves back and forth above the collection cells during the filter washing process. It allows the regular and labour-saving cleaning of the filter cells and thus ensures minimal maintenance requirements. The intelligent control of the cleaning system simultaneously reduces the consumption of water and of purifying agents. In the standard version the washing water is heated up by steam. Alternatively, the wash water can be electrically heated.
Programmable Controllers – PLC

A programmable control (Siemens S7 1500) monitors all the filter functions and controls the flow rates of the heat transfer fluid inside the heat exchanger depending on exhaust air temperature, volume and further target parameters. The display shows the actual heat recovery (current yield in kW) and the accumulated value of the recovered energy. The safety monitoring integrated in the PLC permanently controls the temperature at the inlet of the system and switches automatically to bypass operation in case of excessive temperature in the stenter frame. Simultaneously a signal will be given (e.g. to start the extinguishing process). Furthermore, the PLC controls the CIP cleaning system and enables the comfortable programming of cleaning intervals, washing water temperature and many more parameters. All operation data is stored for a long period and can be provided if required (e.g. in the course of an ISO 14000 management). The comfortable touch display offers an intuitive operator guidance. A traffic light system (green-yellow-red) shows the current operating status of all the components. The forwarding of all relevant information to a central control system or integration in a remote maintenance system via profinet is possible. The system is equipped with an air-conditioned control cabinet from Rittal.

Additional options

Fire protection by fire extinguishing systems

ULTRAVENT® systems can optionally be equipped with fire sensors and fire extinguishing systems if there is a risk of fire. In case of fire, the system ensures that the filter device will be flooded with an extinguishing gas. As a result, further damage to the equipment can be avoided.

Ventilators

KMA uses vacuum UV tubes in moisture-resistant design. Due to the intense light treatment odorous VOC molecules are chemically oxidised. The result is a significant improvement in the odour situation.

UV light for odour abatement

For odour problems the KMA filter system can be equipped by an integrated UV light module for energy-efficient odour abatement. For this,

The benefits of KMA ULTRAVENT® at a glance:

- Highly efficient separation of oil smoke and dust - ensures high standards of environmental protection
- Low energy consumption
- Innovative heat recovery system (integrated) and the possibility of oil recovery (hence low payback period)
- Automatic filter cleaning system (integrated)
- Filter replacement is not required
- Robust components (stainless steel housing) and no wearing parts
- Available in different capacity sizes
- Optional: highly efficient odour abatement
- Optional: integrated fire protection system
A UV 20000, equipped with lint pre-filter, double electric filter and double heat exchanger. The recovered heat is used both for heating process water and supply air.

Two UV 20000 for an exhaust air volume of 40,000 m³/h fitted on a stenter frame. The filter systems are equipped with double electric filter and double heat exchanger. The recovered heat is used both for heating process water and supply air.

Two UV 15000 for an exhaust air volume of 30,000 m³/h fitted beside of a stenter frame. KMA ULTRAVENT® filter systems can be installed above the stenter - or beside the machine, if there is no space available above.

KMA UV tandem design for an exhaust air volume of 20,000 m³/h.