

Extraction and Air Filter Systems for Die Casting Machines



KMA ULTRAVENT® air extraction and filtration systems:

- ✓ High separation
- ✓ Energy efficient
- ✓ Recirculating and exhaust air mode
- ✓ Reduction of operating costs



Clean air at the workplace

Exhaust air purification with KMA ULTRAVENT®

Nowadays, foundries are confronted with strict regulations in terms of occupational health and safety as well as environmental protection. Additionally, the climate protection wins more and more attention as well as becoming a third objective in industry. The reason for this purpose is that companies are increasingly involved in international future actions for reducing CO₂ emissions.

KMA ULTRAVENT® exhaust filter systems accommodate these requirements already: they are suitable for the 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 – which can be combined with high-efficiency heat pump if necessary - the foundry can also handle ambitious goals for improving its carbon footprint and put energy savings up to 70-80 % into practice compared to conventional exhaust air technology.

Reducing costs – in recirculating or exhaust air mode

ULTRAVENT® exhaust air filter systems allow the purification of the indoor air in energy-saving manner: High energy efficiency can be achieved in a recirculating air mode as well as in an exhaust air mode. Exhaust air blowers and excessive heat loss can be avoided during the heating period by the recirculating air mode, because the filtered air is returned to the working place. During the exhaust air mode, however, large amounts of energy can be recovered and be used for follow-up processes through the installation of a highly efficient heat recovery system. In both cases, the total energy consumption of conventional exhaust ventilation systems decreases up to 80 % by using ULTRAVENT® air filtration technology. In addition, buildings and machines stay clean – resulting in lower maintenance and cleaning costs.

Centralised or decentralised?

KMA ULTRAVENT® filtration systems allow centralised or decentralised extraction concepts. In the decentralised extraction concept each machine is equipped with a KMA exhaust air filtration system. Here, no expensive and complex exhaust pipes are required and the operation remains flexible, if there is any planning about future machine enhancements.

In a centralised extraction concept several machines are connected to a single filtration system. The investment costs for a centralised filter are usually lower than for several smaller filter systems. However, the cost of pipelines must be taken into account.

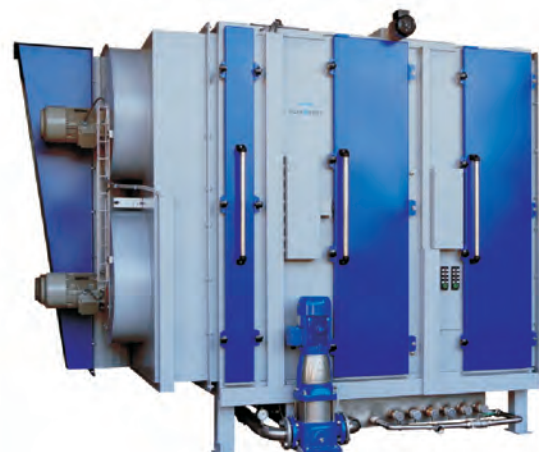


Operating with ULTRAVENT® exhaust air filters in the recirculating air mode exhaust air blowers and excessive heat loss can be avoided during heating period

Flexible and modular

ULTRAVENT® exhaust air filtration systems are designed modular and flexible: Depending on the type of emission ULTRAVENT® can be equipped with demisters, electrostatic filter units, heat exchangers as well as heat pumps. Retrofit kits for subsequent modifications are available as well.

KMA ULTRAVENT® has a wide range of standardised, modular hoods. The modular system allows here for individual adaptations at the site of operation as well. KMA ULTRAVENT® exhaust filtration systems are available in different sizes. The module sizes are staggered and aimed at the exhaust air volume, which needs to be purified. The largest module unit has an air capacity of 30,000 m³/h. ULTRAVENT® systems are characterised by a compact design. At higher air quantities, two or more filter modules are simply connected side by side.



The largest ULTRAVENT® module unit has an air capacity of 30,000 m³/h

Energy consumption for exhaust air purification



KMA ULTRAVENT® filters are characterised by the following features:

- Cost-effective operation through wear-resistant filters and low energy consumption
- Minimised maintenance due to highly effective automatic filter cleaning
- Flexibility through a modular system with many different sizes
- Durability: filter housing and collection cells are made from stainless steel on request

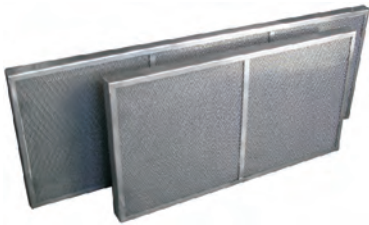
ULTRAVENT® systems - flexible and cost efficient

The ULTRAVENT® modules

The 6 module components for separating smoke, dust, mist and fumes at die casting machines, as well as recovering process heat for subsequent processes.

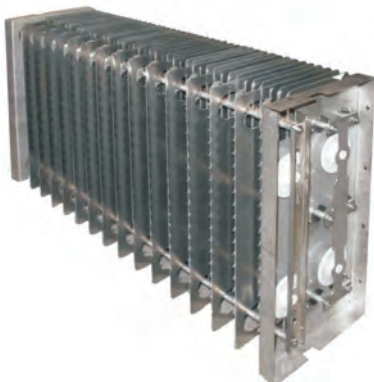
Demister

ULTRAVENT® demister units consist of robust 25 mm or 50 mm thick stainless steel mesh wire elements. This wire is held in position by expanded metal mesh, both on the incoming and outgoing side of the gas flow. The special shaping of the wire allows for a high separating capacity for aerosols, droplets and mist. The units can be washed for cleaning. Changing the demister elements is not necessary.



Electrostatic precipitator

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. The oil separated here can often be reused. The second type forms a greasy, oily or encrusted 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.

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. At low air temperatures, the heat recovery can be optimised by a combination with the highly efficient KMA Ambitherm® heat pump. 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.



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 demisters, 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 require-

ments. The intelligent control of the washing system simultaneously reduces the consumption of water and of purifying agents.



Fire protection and fire extinguishing systems

ULTRAVENT® systems are widely used on machines which represent a certain fire hazard. All KMA systems are available with fire sensors and fire extinguishing systems as an option. 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.



PLC - programmable controllers

ULTRAVENT® emission control systems are available with either contactor control or PLC. The PLC option is recommended when using the CIP cleaning device or in case of connection to a central monitoring system.

Siemens S7 is used as the standard PLC at KMA. It allows the permanent monitoring and logging of all filter functions. It also enables the monitoring of connected media (e.g. electricity, if applicable: water or compressed air for filter cleaning). If the CIP cleaning system is part of the filter unit, the PLC allows for the convenient programming of cleaning time, temperature of washing water and more.

In addition, the PLC allows the connection of the filter system to central control systems (BMS) and remote monitoring / service routines, which is an important aspect of ISO 14001 certification.

Extraction devices and additional options

Tailor-made fume extraction devices

The fume collection near the source of emission is crucial for the air quality in the production hall. However, it is essential that this does not hinder the production process. Therefore, the proven KMA ULTRAVENT® module system offers for each die casting machine the correct fitting extraction device to meet all production requirements anytime.

Extraction hoods

For heavy-duty machines ULTRAVENT® extraction hoods are available in one and two-piece versions. If required, the regular or space-saving telescopic hoods can be moved aside, sliding on rails. The movement is carried out either manually or by a hood motor drive. Thus, an entirely free crane access for die change or servicing of the die machine is ensured anytime.

Due to the special hood design inside the hood (deflector plates) even strong and intermittent fume emissions can be securely collected and removed. Flow baffle plates ensure that the main air suction effect is focussing on the emission-critical areas of the hood's bottom edges.

Air curtain system

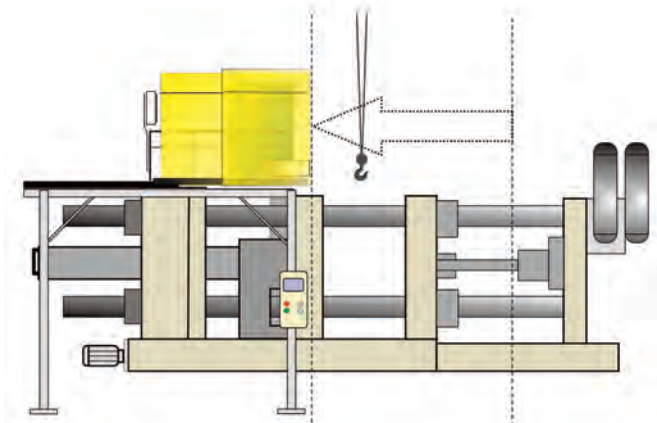
Air curtain systems are used where limited space or other obstructions at the workstation will hinder the installation of extraction hoods. The KMA air curtain system consists of two elements: the blower unit that is attached to one end of the machine, generating an entirely adjustable horizontal air current above the source of emission. The second element is the extraction unit placed at the opposite end, receiving the air current including the contaminated air stream from the machine.

Air curtain systems usually require a higher extraction capacity than a comparable hood, because they do not have the possibility of buffering thermally rising fumes. However air curtains offer the advantage that the working area is not covered or obstructed by a suction device.

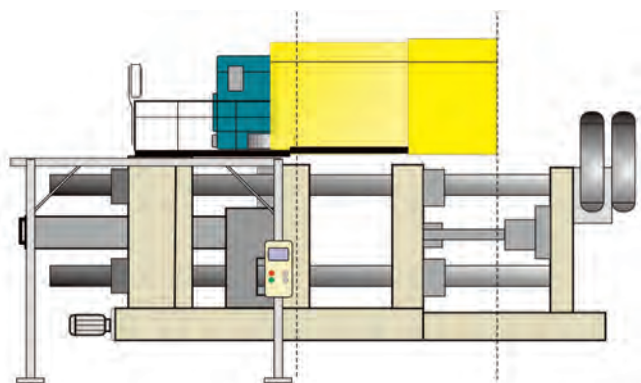


Large potential savings due to frequency converters (FC)

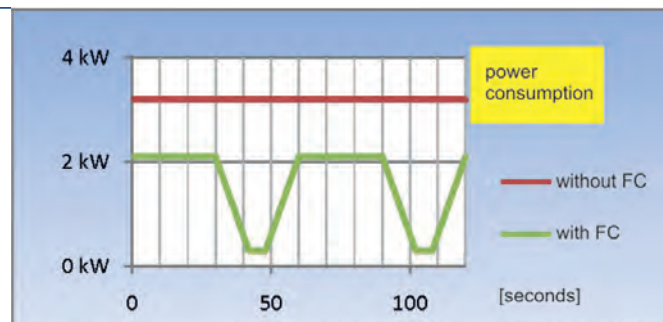
Air movement in production processes is a major consumer of energy. Blowers without a frequency converter (FC) run constantly at 100% capacity. Dampers control the air flow and thereby consume energy. The ECO+ technology offered by KMA represents an alternative with maximum energy efficiency. ULTRAVENT® ECO+ systems are equipped with a frequency converter for fan speed control. Thus, the speed can be adjusted according to requirements. Even a small reduction in speed leads to significant energy savings. In case of connection to the control of the manufacturing machine, a permanent speed adjustment is possible. The result often is an additional energy cost savings potential of up to 50 %.



Fume extraction hood, **open** for free access



Fume extraction hood, **closed** and in operation



When using a FC the ventilator performance can be optimally adapted to maximum requirements and machine cycles. The better the adaptation of the fan speed to the air extraction capacity, the greater the savings in power consumption.

Heat recovery

Provided that the purified air is to be conducted outdoors, the ULTRAVENT® filtration system can be upgraded by heat exchanger cells.

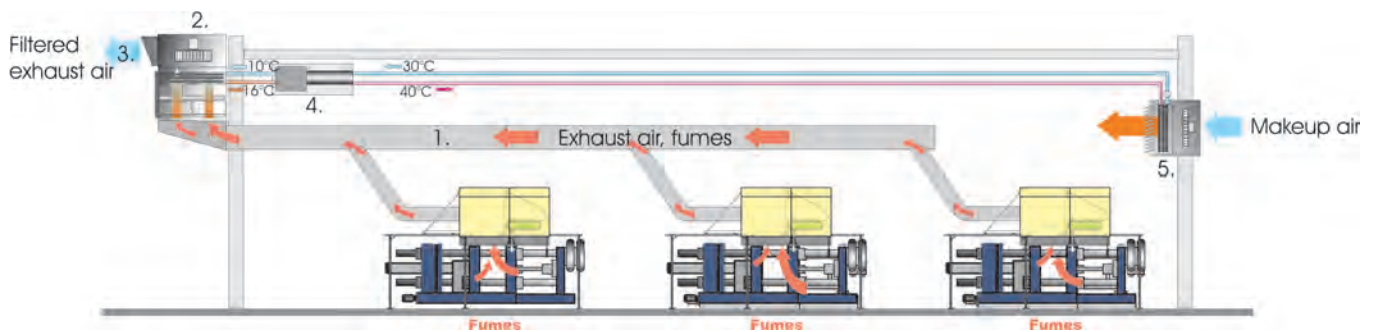
Fin tube heat exchanger

The warm exhaust air from the machines is lead to a central ULTRAVENT® filter system with integrated fin tube heat exchanger. Finned heat exchangers consist of a plurality of fins, which are bound to the core tubes by pressed on. Fin tube heat exchangers work on the gas-/ liquid-principle. Here, the heat-conducting fluid flows - in the form of brine or cold agent - through the core tubes, while the gas or the hot exhaust air flows between the fins. The heated fluid is supplied for heating the supply air. Finned heat exchangers are efficient and can achieve good efficiencies due to the good heat transfer and large surfaces. The constantly high efficiency of the heat exchanger is secured by the use of the automatic ULTRAVENT® cleaning system.

Optionally with high-efficiency heat pump

At low temperature-process the efficiency can be increased by the integration of an Ambitherm® heat pump and the process heat can be generated from 30 °C to 60 °C (e. g. for heating up inlet air or domestic hot water). The Ambitherm® system ensures a direct transfer of the energy to the follow up process without a buffer tank. The coefficient of performance (COP > 6) is significantly higher than many comparable systems. The result: an extremely economical operation.

Exhaust air filtration in WINTER: economic heating of the hall with waste heat

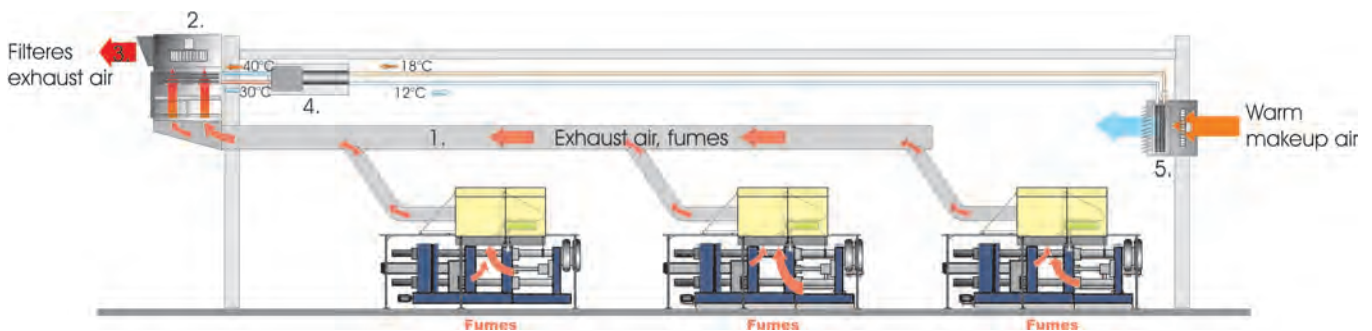


Exhaust air filtration with heat recovery and heat pump:

1. Fumes from die casting machines; 2. central filter with precipitator and heat exchanger; 3. The purified and cooled exhaust air flows outdoors; 4. The heat pump generates hot water (40 °C) for heating; 5. Makeup air passes through an air heat exchanger - where it is heated up - into the hall

*Example data

Exhaust air filtration in SUMMER: cooling of makeup air with exhaust air



Exhaust air filtration with makeup air cooling and heat pump:

1. Fumes from die casting machines; 2. central filter with precipitator and heat exchanger; 3. The purified and heated exhaust air flows outdoors; 4. The heat pump generates cool water (12 °C) for cooling; 5. Makeup air passes through an air heat exchanger - where it is cooled down - into the hall

*Example data

Quality generates satisfaction - worldwide



Decentralised ULTRAVENT® (UV-II) exhaust air filtration system with two-part extraction hood and double electrostatic precipitator (India)



UV-II 15000 and UV-II 10000, each equipped with double electrostatic precipitators (Thailand)



ULTRAVENT® extraction hoods above large-scale machines, which are connected to a centralised filtration system (South Korea)



With KMA ULTRAVENT® exhaust air filtration systems foundries assure the legislations concerning occupational safety and environmental protection (Germany)



One-part hood with specially-made doors (left side) to extend spray robot during hood movement (Germany)



Several small-size die casting machines equipped with two-part extraction hoods and ULTRAVENT® exhaust air filters (Portugal)

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