Range of products

Filter Systems and accessories

FUCHS Umwelttechnik
clean air solutions

KFS

KFS – the little one with the big performance

- Very compact and integrable into machinery equipment
- High quality suction fan for continuous operation
- Automatic filter monitoring via differential pressure
- Suitable for 19“ rack mounting

Extraction unit	A	B	C	D
KFS	30–80	230/50–60	100	250x250x400

A Air Volume max. (m³/h)
B Power Input (kW)
C Engine power (W)
D Dimensions (mm)

Applications:

- Small welding and marking lasers
- Soldering fumes
- Adhesive vapours

KKF

FUCHS Umwelttechnik
clean air solutions

KKF – compact and versatile

- High filter capacity through multistage filter combinations
- Different fans installable, depending on the application
- KKF can be dismantled without tools for transportation

Extraction unit	A	B	C	D	E	F	G	H
KKF	30–320	6300–21000	230/50–60	0,45–1,20	58–67	380x380x625	ca. 30	LED

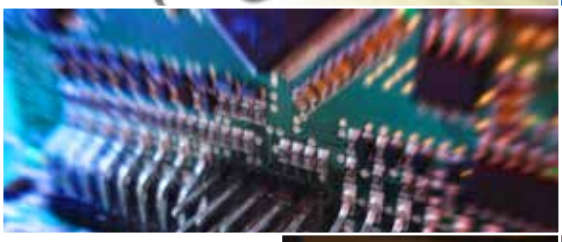
A Air Volume max. (m³/h)
B Vacuum max. (Pa)
C Supply Voltage (V/Hz)
D Power Input (kW)
E Sound Pressure Level 1m (dBA)
F Dimensions (mm)
G Weight w/o Filters (kg)
H Control Board (LED/Display)

Applications:

- Small marking lasers with little emissions
- Small welding applications
- Soldering fumes/ SMD production
- Solvents/adhesive vapours

KFS KKF TKFD MKF INR IF INR20 TKFVA MKFVA VA2PF01 INRVA IFVA INRVABE3 TKFVAG

TKFD



TKFD – comparable performance as the MKF but even more compact

- High filter capacity through integrated preliminary separator
- Ideal in confined spaces - installable under work tops or integratable in machines

Extraction unit	A	B	C	D	E	F	G	H
TKFD	30–335	6300–21000	230/50–60	0,45–1,20	56–67	490x380x620	ca. 30	LED/Display

A Air Volume max. (m³/h)
B Vacuum max. (Pa)
C Supply Voltage (V/Hz)
D Power Input (kW)
E Sound Pressure Level 1m (dBA)
F Dimensions (mm)
G Weight w/o Filters (kg)
H Control Board (LED/Display)

Applications:

- Marking lasers
- Small welding applications
- Small laser trimming (foils, synthetic material)
- Soldering fumes/SMD production
- Fine particles/fumes
- Solvents/adhesive vapours

MKF

FUCHS Umwelttechnik
clean air solutions

MKF – the classic filter unit from the Fuchs Umwelttechnik range

- Compact and versatile
- High filter capacity through multistage filter combinations
- Different fans installable, depending on the application
- MKF can be dismantled without tools for transportation.

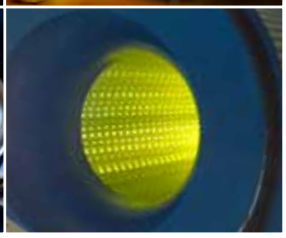
Extraction unit	A	B	C	D	E	F	G	H
MKF	30–625	3600–21000	230/50–60	0,40–1,30	57–67	660x380x825	ca. 32	LED/Display

A Air Volume max. (m³/h)
B Vacuum max. (Pa)
C Supply Voltage (V/Hz)
D Power Input (kW)
E Sound Pressure Level 1m (dBA)
F Dimensions (mm)
G Weight w/o Filters (kg)
H Control Board (LED/Display)

Applications:

- Marking lasers
- Welding/Cutting applications
- Soldering fumes/multiple workplaces
- Fine particles/fumes
- Solvent vapours

TKFVA



TKFVA – preliminary separator in a compact size

- For the preliminary separation of large dust volumes
- Extremely compact
- High filter capacity, additional capacity rapidly implementable if required
- Special clamping system optimises seal tightness
- Operator and maintenance friendly

Extraction unit	A	B	C	D	E	F	H
TKFVA103	280	7700	230/50–60	0,55	62	750x400x1205	LED
TKFVA108	200	21000	230/50–60	0,95	62	750x400x1205	LED

A Air Volume max. (m³/h)
B Vacuum max. (Pa)
C Supply Voltage (V/Hz)
D Power Input (kW)
E Sound Pressure Level 1m (dBA)
F Dimensions (mm)
G Weight w/o Filters (kg)
H Control Board (LED/Display)

Applications:

- Small welding, cutting and marking lasers
- for dry fumes from metal processing

MKFVA

FUCHS Umwelttechnik
clean air solutions

MKFVA – no dust, no fumes – the midsize preliminary separator

- For the preliminary separation of large dust volumes
- Compact dimensions
- High filter capacity, additional capacity easily implementable if required
- Special clamping system optimises seal tightness
- Operator and maintenance friendly

Extraction unit	A	B	C	D	E	F	H
MKFVA320	320	11000	230/50–60	1,30	65	700x660x1450	LED
MKFVA380	380	16700	400/50-60	1,20	64	700x660x1450	LED

A Air Volume max. (m³/h)
B Vacuum max. (Pa)
C Supply Voltage (V/Hz)
D Power Input (kW)
E Sound Pressure Level 1m (dBA)
F Dimensions (mm)
G Weight w/o Filters (kg)
H Control Board (LED/Display)

Applications:

- Welding lasers
- Cutting lasers
- Central extraction

VA2PF01

VA2PF01 – the new pre-separation module

- The new development of the VA2PF01 pre-filter module for filtration of dust emissions in different applications represents an extension to out pre-separation module portfolio.
- Large volumes of the emissions can be handled simply here by the automatic filtration function and the contamination-free removal in polythene bags.
- The flow-optimised air stream at the two filter cartridges of dust class M creates a high efficiency and degree of filtration.
- The device is delivered ready for connection to an existing extraction and filtering unit and can be put into operation immediately.

Technical data

VA2PF01	Connection values: Current: 230V/50Hz
	Compressed air: 5 bar
	Filter equipment: 2 filter cartridges with 6 square metre filter area Controlled filtration time
	Extraction connections: 2 x 50 mm standard width
	Dimensions (LxWxH): 700x450x1400 mm

Applications:

- Small welding-cutting and labelling lasers for dry fumes, e.g. from metals
- Process dusts

INR

FUCHS Umwelttechnik
clean air solutions

INR – the large filter capacity is achieved by a multistage filter combination

- With integrated preliminary separator
- Also designed to handle oil or emulsion mist
- Different fans are possible depending on the application.
- INR can be easily installed anywhere since the filtered air remains in the room – this dispenses with installation of waste air ducts, minimises costs and increases health safety and environmental protection.
- INR can be dismantled without tools for transportation.

Extraction unit	A	B	C	D	E	F	H
INRTW270	100–320	12500	230/50–60	1,20	59	680x590x970	Display
INRTW540	100–640	12500	230/50–60	2,40	65	680x590x970	Display
INRM0810	810	2200	400V/50	0,55	58	680x590x970	Display

A Air Volume max. (m³/h)
B Vacuum max. (Pa)
C Supply Voltage (V/Hz)
D Power Input (kW)
E Sound Pressure Level 1m (dBA)
F Dimensions (mm)
G Weight w/o Filters (kg)
H Control Board (LED/Display)

Applications:

- Marking and engraving lasers
- Cutting and welding lasers
- Soldering and welding fumes
- Fine particles/fumes
- Solvents and adhesive vapours
- Oil mist, emulsion mist

IF

IF – for 1, 2 or more extraction points

- Very low noise
- Suitable for one or several extraction points
- Different fans are possible depending on the application.
- The very large filter capacity is achieved by a multistage filter combination.
- Range of different air flow rates
- The filtered air can be recirculated in the room – this dispenses with installation of waste air ducts, minimises costs and increases health safety and environmental protection.
- Ideal for the rapid equipping of existing workplaces

Applications:

- Marking and engraving lasers
- Cutting and welding lasers
- Soldering and welding fumes
- Fine particles and fumes
- Solvents and adhesive vapours
- Oil mist, emulsion mist

Extraction unit	A	B	C	D	E	F	G	H
IF1300.1	1270	2730	400/50	0,75	56	700x845x1700	135	LED bargraph display
IF1700.1	1700	2910	400/50	1,1	58	700x845x1700	138	LED bargraph display
IF2400.1	2400	3640	400/50	2,2	67	700x845x1700	145	LED bargraph display
IF0900.1	900	9500	230/50-60	2,6	71	700x845x1700	119	LED bargraph display

A Luftmenge max. ohne FA (m³/h)
B Unterdruck max. freiblasend (Pa)
C elektr. Anschluss (V/Hz)
D elektr. Leistung (kW)
E Schalldruckpegel 1m (dBA)
F Abmessungen (mm)
G Gewicht ohne FA (kg)
H Steuerung mit LED/Display

INR20

FUCHS Umwelttechnik
clean air solutions

INR20 – for mobile or stationary applications

- Very low noise
- With integrated preliminary separation system
- Also designed to handle oil or emulsion mist
- Different air flow rates
- Very high quality standard, not only for sporadic applications but also for continuous duty
- The filtered air can be recirculated in the room – this dispenses with installation of waste air ducts, minimises costs and increases health safety and environmental protection.
- Highly suitable for one or several extraction points

Applications:

- Marking and engraving lasers
- Cutting and welding lasers
- Soldering and welding fumes
- Fine particles; fumes
- Solvents and adhesive vapours
- Oil mist, emulsion mist

Extraction unit	A	B	C	D	E	F	G	H
INR20450	100-450	9500	230/50-60	1,3	61	660x670x2100	120	LED bargraph display
INR20900	100-900	9500	230/50-60	2,6	64	660x670x2100	126	LED bargraph display
INR21000	100-1000	5100	400/50	1,1	62	660x920x2100	135	LED bargraph display
INR21700	1700	2910	400/50	1,1	58	660x920x2100	138	LED bargraph display
INR22400	2400	3640	400/50	2,2	67	660x920x2100	145	LED bargraph display

A Air Volume max. (m³/h)
B Vacuum max. (Pa)
C Supply Voltage (V/Hz)
D Power Input (kW)
E Sound Pressure Level 1m (dBA)
F Dimensions (mm)
G Weight w/o Filters (kg)
H Control Board (LED/Display)

INRVA

INRVA – the XL-size preliminary separator

- For the preliminary separation of extra large dust volumes
- Compact dimensions
- High filter capacity, additional capacity easily implementable if required
- Special clamping system optimises seal tightness
- Operator and maintenance friendly

Applications:

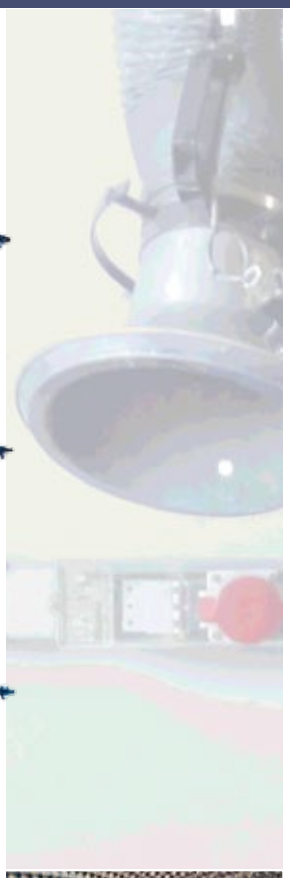
- Dust separation
- Cutting and welding lasers
- Welding fumes

Extraction unit	A	B	C	D	E	F	H
INRVA05	1680	16000	400V/50 or 230/50–60	1,2 – 4,0	67	900x660x2220	Display
INRVA10	2500	12500	400V/50 or 230/50–60	1,2 – 7,5	70	1200x660x2500	Display

A Air Volume max. (m³/h)
B Vacuum max. (Pa)
C Supply Voltage (V/Hz)
D Power Input (kW)
E Sound Pressure Level 1m (dBA)
F Dimensions (mm)
G Weight w/o Filters (kg)
H Control Board (LED/Display)

IFVA

FUCHS Umwelttechnik
clean air solutions



IFVA – the big XXL-size preliminary separator

- For the preliminary separation of very large dust volumes
- High efficiency despite compact dimensions
- High filter capacity, easy to expand with additional capacity
- Special clamping system optimises seal tightness
- Operator and maintenance friendly

Applications:

- Dust separation
- Cutting and welding lasers
- Welding fumes

Extraction unit	A	B	C	D	E	F	H
IF VA	2800	8600	400V/50 or 230/50–60	2,2 – 5,0	69	1480x950x3900	Display

A Air Volume max. (m³/h)
B Vacuum max. (Pa)
C Supply Voltage (V/Hz)
D Power Input (kW)
E Sound Pressure Level 1m (dBA)
F Dimensions (mm)
G Weight w/o Filters (kg)
H Control Board (LED/Display)

INRVABE3

INRVABE3
to dust air flow

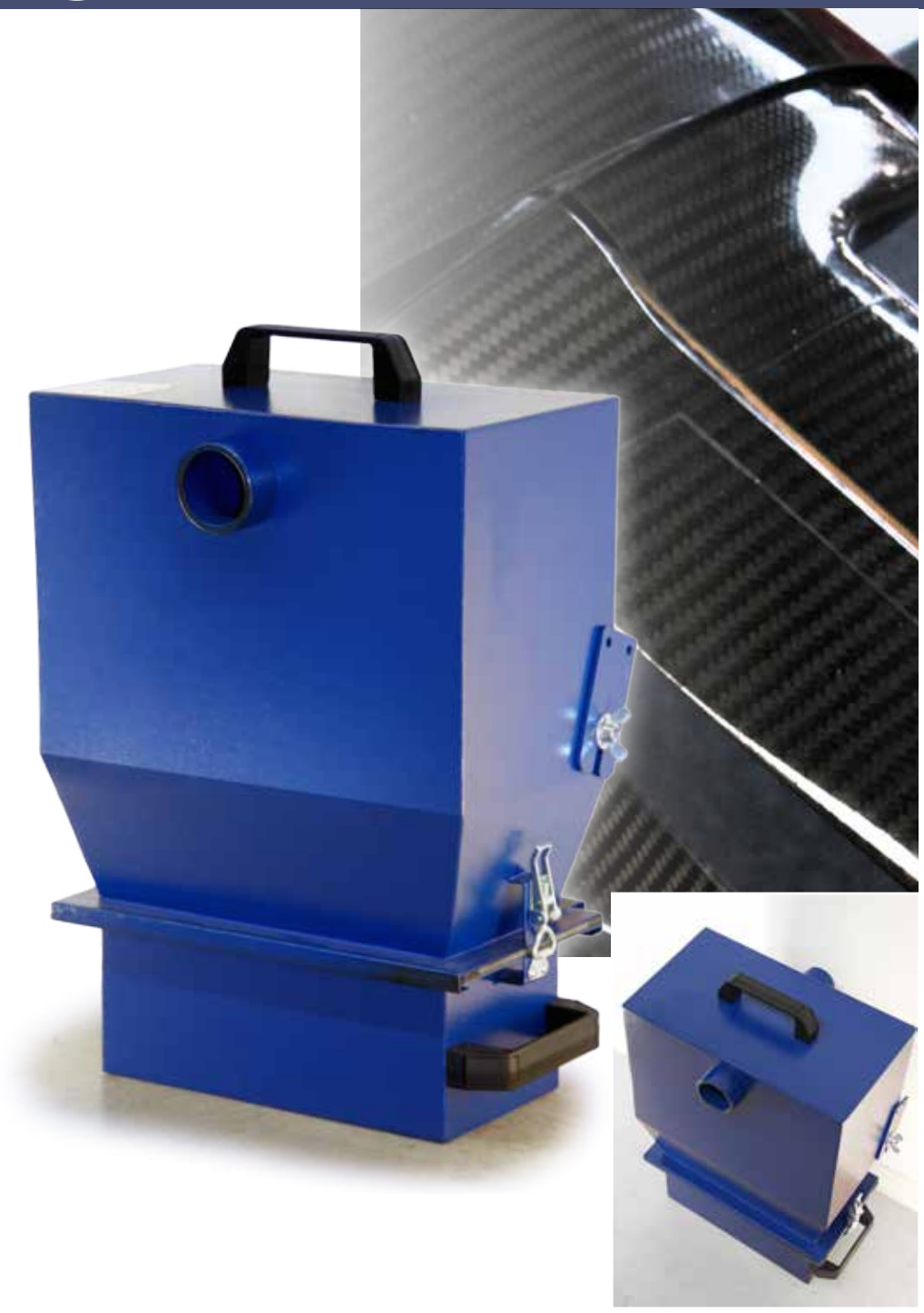
- Dusting systems with electropneumatic controller fitted to filtering device type MKFV and INRV
- To dust air flow to support cleanability of filter cartridges or to reduce the combustion class
- A dusting pulse is initiated after each cleaning operation.
- The auxiliary filtering agent is blown-into the air flow and onto the filter elements.
- Including 60 ltr. dust tank
- Simple filling by loading the complete 25 kg bag into the container
- Depending on the application, various dusting media can be used.

Applications:

- Laser welding
- Laser cutting
- Laser labelling
- Laser sintering
- Welding
- Plasma cutting

TKFVAG

FUCHS Umwelttechnik
clean air solutions



TKFVAG
for coarse particles

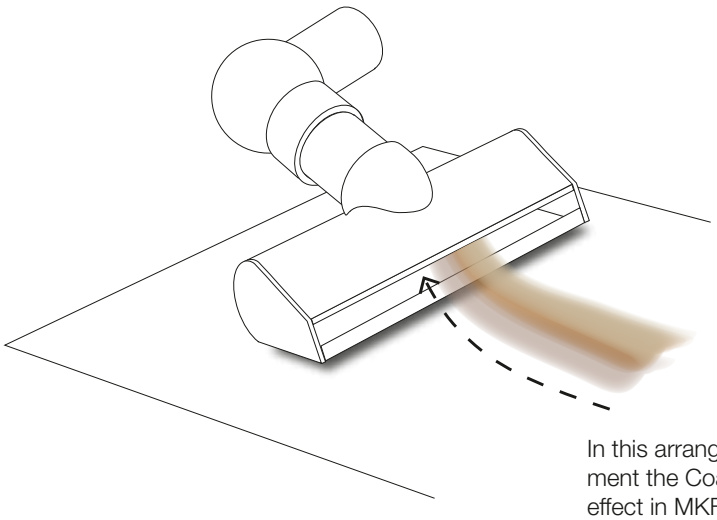
- Compact pre-separator module for extraction of separation of coarse particles >1 mm with removable collection vessel for volume flow rates up to 450 m³/h
- Adaptable or retrofittable to all TKFD and MKF units
- With the exception of MKF102P

Applications:

- Milling, grinding, turning
- Part and dust separation
- Coarse and fine particle separation

Technical data:	
TKFVAG-01	Volume flow rates up to 450 m³/h
	Dimensions: L x W x H in mm: 230 x 300 x 530
	Connection: NW50
	Weight: approx. 10kg

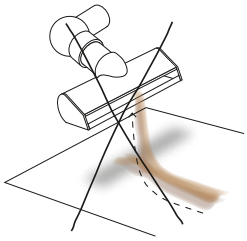
The Coanda Effekt



In this arrangement the Coanda effect in MKF SD is ideally exploited (top).

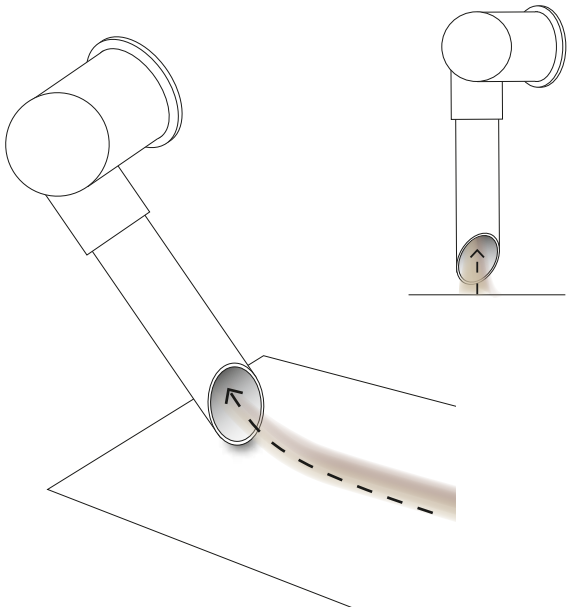
Close to a flat surface – The coanda effect is utilized by such positions.

The nozzle slit is almost without effect when it is hanging free in the air (right).



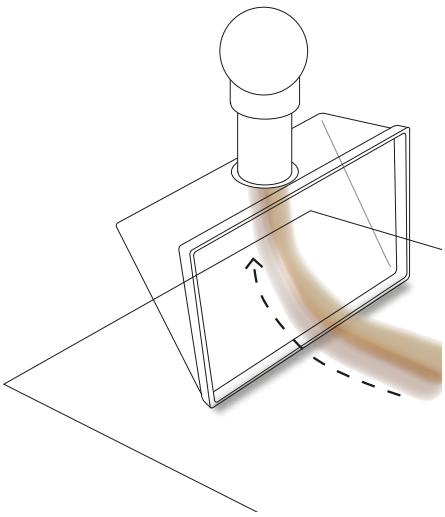
The Coanda Effekt

When the extractor opening is positioned close to a flat surface, it has a limited capacity to extract excess room air that is unsoiled by fumes or vapor. As a result, a vacuum builds up between the surface and the extracted air. This is why the air tries to “adhere“ to the surface. This is a type of ejector effect which is called the Coanda or adhesion effect. The distance between the place where soiling takes place and the extraction shield can be lengthened by utilizing this effect.



The tubular nozzle should be positioned tight to the surface (left).

The Coanda effect is ideal in the MKF AH in this arrangement.



Suction Nozzles

Effective extraction needs suitable collection

- Precisely accurate, central, wide or as extraction cabinet
- Sophisticated aero dynamics and optimal flow combined with simulation software are essential for developing perfect collection systems
- Extraction nozzles, extraction unit and extraction power need to be harmonized

MKF RSDF

MKF RSDR

MKF SD15

MKF SD 20

MKF SD35

Extraction Accessories

MKF AB

MKF SD10

Extraction arm diam. 50 or 75 for table mounting with tubular nozzle

MKF TK

Extraction arm diam. 50 or 75 for ceiling mounting with round suction nozzle

MKF TR

MKF AH

Extraction arm diam. 50 or 75 for wall mounting with funnel shaped nozzle

AS AH 002

MKF RD

MKF MH 300

Transparent pipe with slid MKF ARR

MKF APL1

LSKWS

FUCHS Umwelttechnik
clean air solutions

Laser protection enclosures LSKWS

- As a system partner of machine building industry in the area of laser processing, Fuchs-Umwelttechnik has developped the modular laser protection enclosures type LSK.
- The main focus lies on guidelines for safety of laser products (DIN EN 60825-4) and BG regulations for the prevention of accidents (BGV-B2).
- Due to the complete housing the laser protection enclosures serve to shield off effective radiation and secondary radiation, which may occur in laser material processing.
- Laser protaction enclosures are made of high quality, powder-coated sheet steel and aluminium profiles.
- Due to optimized utilisation of streaming technology the air pollutants will effectively be captured and exhausted out of the enclosure.
- The laser protection enclosure is connected to the extraction and filtering device via interface.
- Due to the use of top quality standard parts, Fuchs laser protection enclosures can easily be automated and also be certified for the application.

Technical data	
LSKWS	Suitable for laser classes: 3–4
	Dimensions in mm (l x w x h): 1100 x 850 x 2000 mm (custom-built)
	Working height:1000 mm (individually adaptable)
	Extraction connection:1 x NW 50 mm

Applications:

- All laser machining processes
- Automation
- Mechanical engineering
- Tool making

THE LEGISLATOR DEMANDS

The Hazardous Substances Ordinance (GefStoffV), basic legislative framework

Duty to investigate
According to section16, the employer must perform investigations to ascertain if hazardous substances are present in the workplace. Welding fumes, soldering fumes and fumes arising from laser use must always be considered to be hazardous, the same applying to solvent vapours and vapours released by plastics.
General duty of protection
The "general duty of protection" referred to in section17 is the legal duty of the employer to take the necessary measures to meet currently valid health and safety regulations in the workplace.
Duty to monitor
There is no completely reliable way of preventing the release of one or more hazardous substances into the air at the workplace when welding, cutting and related procedures are being performed; this also applies to laser emissions, solder fumes and solvent vapours.

Section 18 "Duty to monitor" requires the employer to determine whether concentrations are below the WPL (workplace limit) or the TRK (technical guide concentration) or whether the trigger threshold has been exceeded.
Priority of safety measures
Section 19 "Priority of safety measures", after taking into account the state of the art for the measures to reduce or eliminate hazards, gives the following priorities:

- Work-process design to prevent the release of hazardous substances
- Detection of hazardous substances in the areas where they arise
- Ventilation measures
- Personal safety equipment

Regulations relating to recycled air

General requirements
Section 4 Ventilation equipment, par. 2 of UVV VBG 15 states: Extracted air may only be returned to work and traffic areas after adequate removal of substances that are hazardous to health. According to the instructions that specify how this requirement is to be implemented, "adequate removal" is defined to be a concentration that does not exceed ¼ of the WPL (workplace limit).

Recycled air in relation to carcinogens and other emissions
If welding fumes contain carcinogenic components, say, nickel compounds or chromates, and it is not possible to release exhaust air directly into the open air for operational reasons, the requirements stated in TRGS560 "Technical regulations relating to hazardous substances – recycled air containing carcinogens" must be fully complied with. Consequently, the concentration of hazardous substances in the recycled, cleaned air shall not exceed a tenth of the TRK.
Tips on implementation
Operators can use both mobile dust removers and systems under central control to comply with regulations.
Only a regime of regular checks can ensure that extraction systems for hazardous substances are operating effectively in the long term. Factory legislation stipulates annual inspection by an authorised inspector which must be documented in a log book. The legislative basis for the approval authority for waste air extraction

German federal immissions legislation

Total dust
Emissions in the form of dust in waste gas shall not exceed a concentration of 0.05 g/m³
- at a mass flow rate greater than 500 g/h nor a concentration of 0.15 g/m³

Inorganic substances in dust form
The inorganic substances in dust form referred to below shall in total not exceed the following outgoing air concentrations by mass even if several substances from the same class or classes II and III are present:
Class II:
Cobalt and its compounds, indicated by “Co”, nickel and its compounds, indicated by “Ni”, at a
- mass flow rate of 5 g/h or more than 0.001 g/m³

Class III:
Chromium and its compounds, indicated by “Cr”, at a
- mass flow rate of 25 g/h or more than 0.005 g/m³

Hazard assessment
Technical directive on hazardous substances (TRGS)
If it is not possible to guarantee the absence of hazardous substances at WPL or TRK levels in the workplace, then, according to TRGS 402 “Determination and assessment of concentrations of hazardous substances in the air at the workplace”, the concentration of the hazardous substances must be determined and assessed. This is done by means of workplace analyses and, if necessary, by control measurements.
Data on the time and space distribution of the hazardous substances is used to determine whether the limits have been met. This information is derived from measurements in the workplace or from reliable calculations. The following can be used to obtain this information:
- Results already obtained from one’s own measurements or empirical data from third parties
- Measurement results obtained from comparable systems or activities
- Reliable calculations

Terminology

WPL
(workplace limit)
The purpose of workplace limit values is to safeguard the health of workers at the workplace. They are defined as the maximum permissible concentration of a substance (gas, vapour or suspension) that will not lead to health impairments in the long-term.
TRK value
(technical guide concentration)
The Committee on Hazardous Substances instituted by the Federal Ministry for Employment and Social Security specifies TRK values for carcinogens and suspected carcinogens for which no WPL value exists. The risk of impairments to health is reduced by observing TRK-values, but does not mean that no health risk exists. WPL and TRK values are listed in TRGS 900 and are re-issued annually. WPL and TRK values are referred to as “air limits”.
Trigger threshold
The trigger threshold is exceeded, if it cannot be demonstrated that the air limit is met. In the case of split air limits, the lower value applies, if special stipulations have not been made (TRGS). If the trigger threshold has been exceeded, additional measures must be taken to safeguard health, e.g. medical examination at the workplace (GefStoffV).

Extracting hazardous substances directly at the point of origin and efficiently filtering them with our compact filter devices.
As our extraction systems are precisely tailored to requirements, effective hazardous substance removal is possible
Technical and economic advantages:
- Smaller pipe diameters and short pipe lengths mean minimal installation costs
- Compact modular design and efficient measuring elements can be designed individually and are easy to use
- Hazardous substances are eliminated well before they can be inhaled by the user
- Great acceptance by users ensures a high level of effectiveness
- Minimal costs resulting from reduced intake of fresh air (reduction in heating costs).

FILTER TECHNOLOGY FOR LASER EMISSIONS – TESTED BY THE HANNOVER LASER CENTRE

The company Fuchs Umwelttechnik GmbH has set itself the task of continuously investing in the further development of extraction and filter technology. This means that our filtering equipment is constantly being further developed and improved in all areas. It also means that filtering equipment which has been further developed must be put to the test again and again in order to ensure that it fulfils the legally stipulated safety and quality requirements. These are the criteria we set ourselves!

For this reason, Fuchs Umwelttechnik has its equipment regularly tested by the Hannover Laser Centre. These series of tests are designed to show how high the separation power of Fuchs Umwelttechnik filtering equipment is. After all, this separation power, specific to the filtering equipment, is the guarantee that the filtering equipment is safe to use in all situations specified.

The filtering equipment and high-quality filter technology must suit each other. This means that the filters inserted into the equipment must fit precisely and sit tightly in the housing to prevent leakages. If this is not the case, the result can be disastrous: the pollutants, which should actually be filtered out, will leak out into the exhaust air. This is very dangerous because the pollutant danger is concealed. In such cases, however, the service life of the filters used is very high – considerably higher than in “leak-proof” filter/housing combinations. A false saving!

The following summary shows the separation power of Fuchs Umwelttechnik filtering equipment.

The laser was chosen as the emission source because the emissions caused by inscription, welding or cutting lasers, for example, are composed of very fine particles and gases.

Plastic foils and chrome nickel metal were treated by the laser. The resulting emissions were extracted and filtered by our equipment.

All the tests are practice-oriented, i.e. inscribing, removing and cutting were the methods used. In the following pages, you can learn about the impressive results of these tests.

1. Inscribing acrylate foil by laser beam

Filter MKF 103 in combination with pre-separation system MKFVA 10

Summary of the results

The tests conducted to determine the features of the emissions caused by inscribing acrylate foil material by means of laser beams show a wide range of different emission components. Apart from the numerous substances with different chemical and physical features, the fineness of the resulting particle emissions places heavy demands on the filter technology.

The filter MKF 103 / MKFVA 10 from Fuchs Umwelttechnik GmbH was used to separate the emissions caused when acrylate foil is inscribed by laser. The filtration efficiency achieved by this filter on the acrylate foil not only meets all statutory requirements and limits but also exceeds them by a considerable margin.

The tests on the loss of pressure caused when high particle elements are separated, show that the filter elements used achieve a high separation power. However, the strongly adhesive features of the particle emissions caused by the laser treatment of plastic materials, in combination with the fine-grained nature of the particles, lead to a constant, almost linear rise in the loss of pressure.

The separation of gaseous compounds, possessing different chemical and physical features, places heavy demands on the adsorption processes.

The tests on the adsorption behaviour of a model substance show how suitable the activated carbon filter elements from Fuchs Umwelttechnik GmbH are in efficiently cleaning gaseous emissions caused by the laser treatment of plastic materials. Even at high pressure (approx. 8200 mg MMA/m3) and high flow speeds (>8m/s), **a separation or adsorption of >99.99% is achieved until such time as the breakthrough phase is reached**. In the case of the model substance under examination (MMA), the breakthrough phase starts when the load rate reaches approx. 58% (in relation to the saturation loading) or approx. 192 mg MMA/g activated carbon.

Evaluation of the results

The results of the analysis of the emissions caused when acrylate foils are inscribed by laser show that different hydrocarbon compounds are formed. Particle-shaped components (aerosols) represent the main proportion of the emissions.
They account for 89.44% of the total emission released (mass difference of treated and untreated material).

In regard to inscribing acrylate foils by laser, a maximum emission source strength was tested using the laser parameters selected.

The microscopic examinations of the particle emissions show that the particles have a distinct tendency to agglomerate.
The average aerodynamical particle diameter is 0.22 µm; the inhalable fraction is therefore 80.99%.

The particle separation power for emissions caused by inscribing acrylate foil by laser is η = 100%.

This applies to all particle size fractions examined.

The separation power for odorous substance emissions is 97%. The strength of the total emission source during the laser inscription test represents relatively low pressure for the filter system used. In test phase 2, model exhaust air currents are used in order to determine the criteria for the filter service life and the separation power when the the particle pressure is high.

When evaluating the results obtained, it should be borne in mind that these apply exclusively to the foil material examined using the given process parameters.

2. Laser beam treatment of Cr/Ni steel material

Summary of the results

The test to determine the efficiency of the filter MKF 103 / MKFVA 10 from Fuchs Umwelttechnik GmbH is carried out using a laser beam cutting process. For this purpose, Cr/Ni steel plates with a material strength of 5 mm are treated with a CO_2 laser at an average power of 3 kW and a feed speed of 0,48 m/min.

The test shows that the filter separates a total of 99.72% of the particle emissions.

The distribution of raw gas particles during the cutting process examined possesses 2 maxima between the fractions 0,06 – 0,13 µm and 5,7 – 11,3 µm. Because of the cutting power of the filter, there is only one maximum between the fraction 0,021 – 0,042 µm during the distribution of pure gas particles.

For the fine grain fraction <0,021 µm, the filter separates 90,42% of the particle emissions examined. The separation rate of all fractions > 0,042 µm is higher than 98 %, for the particle fractions > 0,18 µm it is higher than 99,99%.

The REM pictures used to test the consistency and morphology of the particle emissions show that the particles have a slight tendency to agglomerate or stick together. A tendency towards the creation of a stable filter sludge is to be observed. This is caused by the relatively high proportion of very fine aprticles.

Please ask for the complete report of the Hannover Laser Centre. We will be pleased to send it to you.

FILTRATION EFFICIENCY FOR SMOKE AND FINE DUST

Particle filtration efficiency	Suspended matter filter
Category Class S	H14 in compliance with new DIN EN1822
Filtration efficiency	99.995% as per DIN EN1822 (99.999% as per previous DIN 24184)
Particle size distribution	0.021 – 0.3 µm
Types of pollutant Filters	fungi, spores, toxic fumes and dust
WPL (workplace limit) replaces MWC value (maximum workplace concentration)	Employment market-orientated Are less than 5% of the permissible dropped below as prescribed by the legislator
Quality certificates for **Fuchs Umwelttechnik suspended matter filter**	Laserzentrum (Laser Centre) Hannover examination report, BIA test certificate, test report by Werkarztzentrum Westfalen Mitte (Central Westphalia Factory Clinic). Detailed report is available on request

Filter classification in accordance with DIN EN 779:2012 and EN 1822:2011

Pre-filter

	Filter class	Average separation factor A_m in relation to test dust in %	Average efficiency E_m for particles with 0.4 µm in %	Old filter class	Average separation factor in %
coarse dust	G1	$50 \leq A_m < 65$	–	G1	50 < 65
	G2	$65 \leq A_m < 80$	–	G2	65 – 80
	G3	$80 \leq A_m < 90$	–	G3	80 – 90
	G4	$90 \leq A_m$	–	G4	90 – 95
fine dust	M5	–	$40 \leq E_m < 60$	F5	96 – 98
	M6	–	$60 \leq E_m < 80$	F6	97 – 98
	F7	–	$80 \leq E_m < 90$	F7	98 – 99
	F8	–	$90 \leq E_m < 95$	F8	98,5 – 99
	F9	–	$95 \leq E_m$	F9	99 – 99,5
		EN 779:2012 Currently valid standard		DIN EN 779 / DIN 24 185 Outdated standards	

Average separation factor: The filter is weighed before and after dust absorption. The dust mass in the filter and the applied mass are set in relation and the average separation factor is calculated.

Average efficiency: A synthetic droplet aerosol is applied to the filter element between the individual dust loading stages and the number of particles concentrations before and after the filter are measured. The efficiency is calculated from the difference between the two concentrations at a particle size of 0.4 µm.

Floating dust

Filter class	Separation factor in %	Old filter class	Separation factor in %
E 10	≥ 85	H 10	≥ 85
E 11	≥ 95	H 11	≥ 95
E 12	≥ 99,5	H 12	≥ 99,5
H 13	≥ 99,95	H 13	≥ 99,95
H 14	≥ 99,995	H 14	≥ 99,995
U 15	≥ 99,9995	U 15	≥ 99,9995
U 16	≥ 99,99995	U 16	≥ 99,99995
U 17	≥ 99,999995	U 17	≥ 99,999995
EN 1822:2012 Currently valid standard		DIN EN 1822:1998 Outdated standards	

E = EPA Efficient Particulate Air filter
H = HEPA High Efficiency Particulate Air filter
U = ULPA Ultra Low Penetration Air filter

Zertifikat
Nr. **IFA 1605002**
vom 11.04.2016

IFA
Institut für Arbeitsschutz der
Deutschen Gesetzlichen Unfallversicherung
Prüf- und Zertifizierungsstelle im DGUV Test

DGUV Test - Zertifikat

Name und Anschrift des Zertifikatsinhabers: (Auftraggeber)	Fuchs Umwelttechnik Produktions- und Vertriebs-GmbH Gassenäcker 35 - 39 89195 Steinberg
Produktbezeichnung:	**mobiles Schweißrauchabsauggerät**
Typ:	MKF320.1
Prüfgrundlage:	DIN EN ISO 15012-1: (08/2013) DIN EN ISO 15012-1: (03/2005) Abschn. 6.1, 6.3 bis 6.7, 7 und 8
Zugehöriger Prüfbericht:	201620427/1140 vom 11.04.2016, IFA - Sankt Augustin
Weitere Angaben:	Die bestimmungsgemäße Verwendung des Gerätes ist das Abscheiden von Schweißrauchen. Das Gerät erfüllt die Anforderungen der Schweißrauch-abscheideklasse W3. Unter Berücksichtigung der TRGS 560 darf gemäß TRGS 528 die gereinigte Abluft des Gerätes in den Arbeitsbereich zurückgeführt werden.

Das geprüfte Baumuster entspricht der oben angegebenen Prüfgrundlage.
Der Zertifikatsinhaber ist berechtigt, das umseitig abgebildete DGUV Test-Zeichen an den mit dem geprüften Baumuster übereinstimmenden Produkten sofern zutreffend mit dem oben genannten Zeichenzusatz anzubringen.
Dieses Zertifikat einschließlich der Berechtigung zur Anbringung des DGUV Test-Zeichens ist gültig bis: **15.11.2020**
Weiteres über die Gültigkeit, eine Gültigkeitsverlängerung und andere Bedingungen regelt die Prüf- und Zertifizierungsordnung.

Dr. rer. nat. Peter Pasztkiewicz
Leiter der Prüf- und Zertifizierungsstelle

Dipl.-Ing. Anke Goebel
Fachbaubeamtin

Zertifikat
Nr. **IFA 1605003**
vom 11.04.2016

IFA
Institut für Arbeitsschutz der
Deutschen Gesetzlichen Unfallversicherung
Prüf- und Zertifizierungsstelle im DGUV Test

DGUV Test - Zertifikat

Name und Anschrift des Zertifikatsinhabers: (Auftraggeber)	Fuchs Umwelttechnik Produktions- und Vertriebs-GmbH Gassenäcker 35 - 39 89195 Steinberg
Produktbezeichnung:	**mobiles Schweißrauchabsauggerät**
Typ:	KKF320L
Prüfgrundlage:	DIN EN ISO 15012-1: (08/2013) DIN EN ISO 15012-1: (03/2005) Abschn. 6.1, 6.3 bis 6.7, 7 und 8
Zugehöriger Prüfbericht:	201620428/1140 vom 11.04.2016, IFA - Sankt Augustin
Weitere Angaben:	Die bestimmungsgemäße Verwendung des Gerätes ist das Abscheiden von Schweißrauchen. Das Gerät erfüllt die Anforderungen der Schweißrauch-abscheideklasse W3. Unter Berücksichtigung der TRGS 560 darf gemäß TRGS 528 die gereinigte Abluft des Gerätes in den Arbeitsbereich zurückgeführt werden.

Das geprüfte Baumuster entspricht der oben angegebenen Prüfgrundlage.
Der Zertifikatsinhaber ist berechtigt, das umseitig abgebildete DGUV Test-Zeichen an den mit dem geprüften Baumuster übereinstimmenden Produkten sofern zutreffend mit dem oben genannten Zeichenzusatz anzubringen.
Dieses Zertifikat einschließlich der Berechtigung zur Anbringung des DGUV Test-Zeichens ist gültig bis: **15.11.2020**
Weiteres über die Gültigkeit, eine Gültigkeitsverlängerung und andere Bedingungen regelt die Prüf- und Zertifizierungsordnung.

Dr. rer. nat. Peter Pasztkiewicz
Leiter der Prüf- und Zertifizierungsstelle

Dipl.-Ing. Anke Goebel
Fachbaubeamtin

Zertifikat
Nr. **IFA 1605004**
vom 11.04.2016

IFA
Institut für Arbeitsschutz der Deutschen Gesetzlichen Unfallversicherung
Prüf- und Zertifizierungsstelle im DGUV Test

DGUV Test - Zertifikat

Name und Anschrift des Zertifikatsinhabers: (Auftraggeber)	Fuchs Umwelttechnik Produktions- und Vertriebs-GmbH Gassenäcker 35 - 39 89195 Steinberg
Produktbezeichnung:	**mobiles Schweißrauchabsauggerät**
Typ:	TKFD320.1
Prüfgrundlage:	DIN EN ISO 15012-1: (08/2013) DIN EN ISO 15012-1: (03/2005) Abschn. 6.1, 6.3 bis 6.7, 7 und 8
Zugehöriger Prüfbericht:	201620429/1140 vom 11.04.2016, IFA - Sankt Augustin
Weitere Angaben:	Die bestimmungsgemäße Verwendung des Gerätes ist das Abscheiden von Schweißrauchen. Das Gerät erfüllt die Anforderungen der Schweißrauchabscheideklasse W3. Unter Berücksichtigung der TRGS 560 darf gemäß TRGS 528 die gereinigte Abluft des Gerätes in den Arbeitsbereich zurückgeführt werden.

Das geprüfte Baumuster entspricht der oben angegebenen Prüfgrundlage.
Der Zertifikatsinhaber ist berechtigt, das umseitig abgebildete DGUV Test-Zeichen an den mit dem geprüften Baumuster übereinstimmenden Produkten sofern zutreffend mit dem oben genannten Zeichenzusatz anzubringen.
Dieses Zertifikat einschließlich der Berechtigung zur Anbringung des DGUV Test-Zeichens ist gültig bis: **15.11.2020**

Weiteres über die Gültigkeit, eine Gültigkeitsverlängerung und andere Bedingungen regelt die Prüf- und Zertifizierungsordnung.

Dr. rer. nat. Peter Paszkiewicz
Leiter der Prüf- und Zertifizierungsstelle

Dipl.-Ing. Arno Goebel
Fachbereichsleiter

PZ608
02.16

Rückseite der DGUV Test Prüfbescheinigung

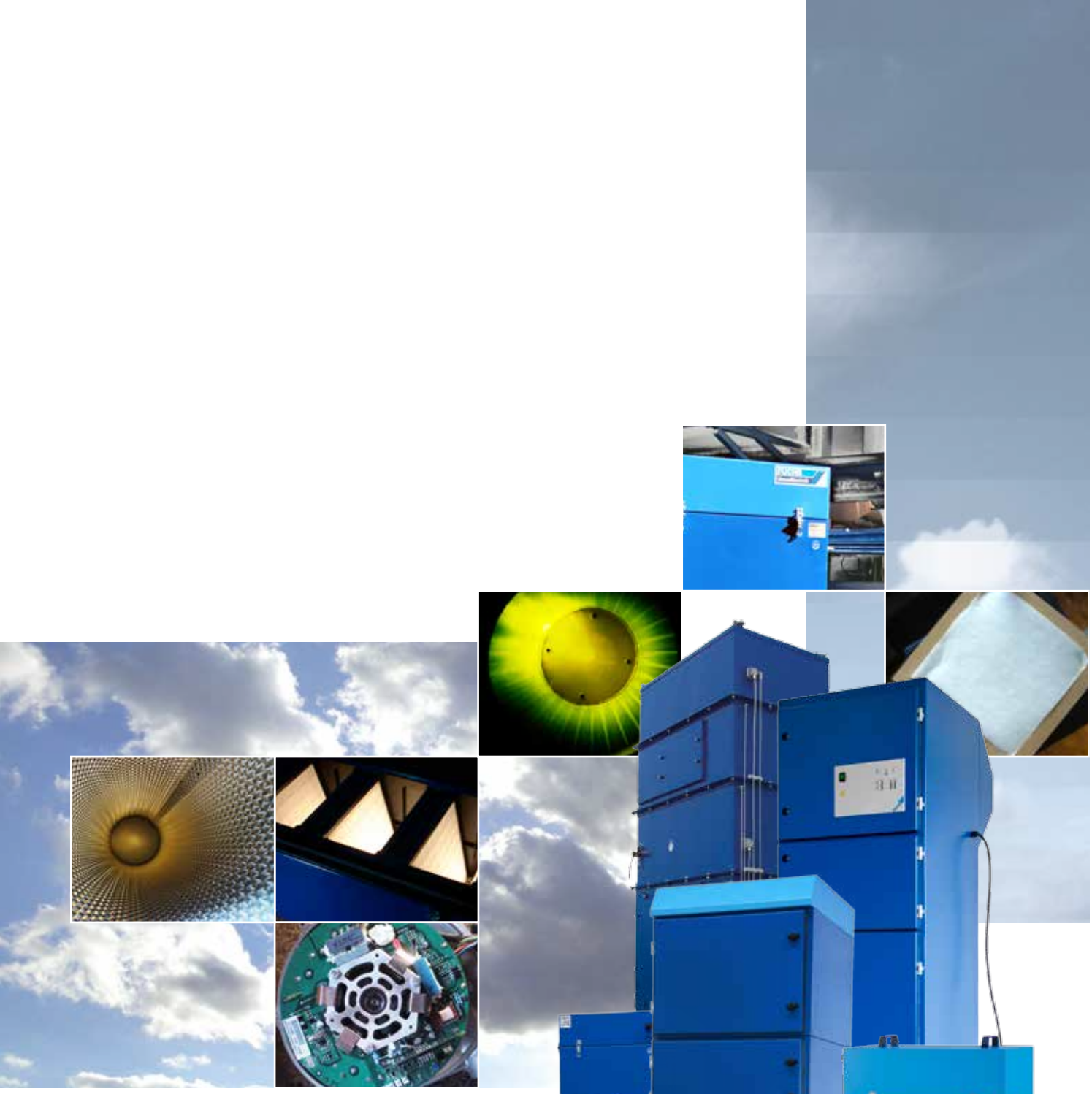
DGUV Test-Zeichen

DGUV Test
IFA.... 1)
Sicherheit geprüft
tested safety

1) Bescheinigungs-Nummer

Das DGUV Test-Zeichen ist gegebenenfalls mit einem Zeichenzusatz entsprechend den Angaben auf dem Zertifikat zu versehen. Bei Zertifikaten mit ergänzenden Zusätzen weicht das Aussehen von dem Muster ab.

PZ606
09.10



FUCHS Umwelttechnik
Produktions- und Vertriebs-GmbH
Gassenäcker 35–38
D-89195 Steinberg
Germany

Phone: +49 (0) 73 46 / 96 14-0
Fax: +49 (0) 73 46 / 84 22
info@fuchs-umwelttechnik.com
www.fuchs-umwelttechnik.com

FUCHS Umwelttechnik
clean air solutions