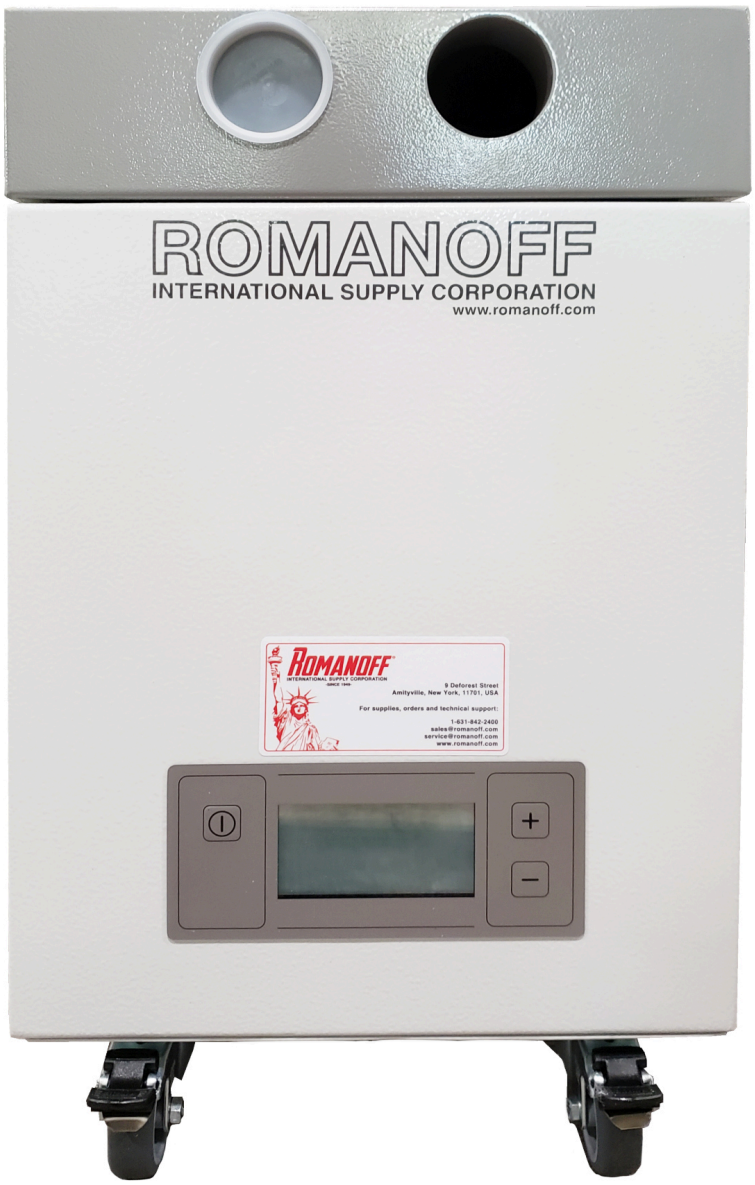
ROMANOFF
INTERNATIONAL SUPPLY CORPORATION

SKU: RE-1000-7

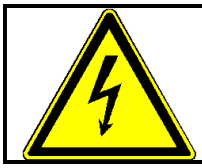
Adjustable Speed Dust Vacuum



1. Safety Instructions

Think about your own safety and read the safety instructions!

1.1 Symbols Used

	**Danger!** Indicates imminent danger due to electrical hazards.

	**Warning!** Death, serious personal injury or considerable damage to property can occur if the appropriate precautions are not taken.

	**Caution!** Minor bodily injury can occur if the appropriate precautions are not taken.

	Attention! An undesirable result may occur if the appropriate precautions are not taken.

	Caution! Damage to property can occur if the appropriate precautions are not taken.

1.2 Safety Instructions

	**Caution!** This machine must not be used by persons (including children) with reduced physical, sensory or mental abilities or lack of experience and knowledge.

	**Warning!**When using electrical equipment, the following basic safety measures must be observed for protection against electric shock, injury and fire hazards:

Please read and follow these instructions before using the equipment!

- Keep the operating and maintenance manual in a safe place.
- If the device is used contrary to the procedure described in chapter Safety instructions and chapter Intended use, the protection supported by the device may be impaired.
- The equipment is designed for indoor use only.
- The equipment including its original packaging must not be exposed to weather. This applies during operation and for transport.
- Use the equipment only for the extraction of dust and smoke!
- Do not use the equipment for the extraction of burning or glowing matter!
- For extraction with spark-generating processes, use an effective spark extinguisher or spark arrestor. (i.e.: TBH ATEX spark extinguisher or FA10, FA20)
- Do not use the equipment for extracting highly flammable or explosive gases.
- Do not use the equipment for extracting aggressive substances, explosive dusts and aluminium grinding dust.
- Do not use the equipment for the extraction of any type of liquids. (Exception: Equipment of the OEN series, see Intended Use)
- When liquids or foam leak out, the equipment must be switched off immediately and disconnected from mains. (Only for equipment of the OEN series)
- Regularly check the liquids collection tank and the filling-level monitoring device. (Only for equipment of the OEN series)
- Protect the power cable from heat, moisture, oil and sharp edges.
- The device should be set up so that it is not difficult to operate the separating device.
- Observe the permissible supply voltage (see note on the type plate).
- Use only original spare parts.
- Use only original spare filters.
- Do not operate the equipment without filter.
- Even a single missing filter or filter equipment can also lead to a loss of filtration performance.
- Before opening the equipment or carrying out maintenance or cleaning work, disconnect the mains plug!
- The outlet opening may not be covered off or blocked.
- Any cooling-air intakes and outlets may not be covered off or blocked.
- Always make sure that the equipment stands securely.
- Use only the provided crane eyelets! Make sure to observe the enclosed brief instructions.
- In case of technical problems, please contact the manufacturer or your specialist dealer!
- When extracting carcinogenic, harmful or environmentally hazardous substances, the national regulations for health and safety at work must be observed (in Germany for example: TRGS 560)
- When extracting welding or laser smoke from nickel- or chrome-containing materials and other carcinogenic metals, the national regulations for health and safety at work must be observed (in Germany for example: TRGS 528).

Personal Safety Equipment

For all types of work on used filters, filter housings, pipes, hoses, extraction elements and other parts that come into contact with the extracted media:

- Observe local factory regulations!
- Respiratory protection: Half mask according to FFP-3 compliant with EN149 (unless otherwise specified)
- Rubber gloves

- Safety goggles
- Depending on the hazardous nature of the substances, a protective suit should also be worn.

2. Description

dust vacuum and filter systems are intended for commercial use, for example in schools, universities, factories, laboratories, etc.

2.1 Intended Use of the LN, GL, BF, RF, DF, TFS, FP and FPV Series

The extraction and filter systems of the LN, GL, BF, RF, DF, TFS, FP and FPV series are intended for the extraction of dust and smoke.

They may not be used for the extraction of burning or glowing substances, highly flammable or explosive gases, aggressive media, explosive dusts and aluminium grinding dust, or for the extraction of liquids of any type.

2.1.1 Intended Use to W3, DIN EN ISO 15012-1 / -4 , Dust Category H, DIN EN ISO 60335-2-69 AA

Filter and extraction systems with W3 label are suitable for welding work and related processes or if smoke containing KMR materials is expected (e.g. when welding high-alloy steels or welding additives with more than 5% (Cr, Ni)). (except gouging and grinding).

dust vacuum filter and extraction systems are also designed for extraction with automated laser welding processes, laser marking processes, laser cutting processes or similar and are not intended for use in conjunction with hand-held torches (e.g. MIG MAG or TIG welding equipment).

For extraction of glowing particles and sparks, an effective spark trap or spark suppression device must be installed upstream of the extraction and filter system.

2.1.2 Notes on W3 (ISO 15012) and Dust Category H (EN 60335-2-69 AA)

Systems for extraction from welding processes or similar processes, which, for example, fall under (DE) TRGS528 or TRGS560, must be labelled "W3" in accordance with DIN EN ISO 15012 and meet the separation degree "H" in accordance with EN60335-2.

dust vacuum filter and extraction systems with "W3" label meet these requirements.

Exhaust-air Conductance (into the Open) & Dust Suspension

Depending on the application, it must be checked whether exhaust-air conductance (into the open) is possible/necessary. However, recirculation operation (independent of filters/approvals/manufacturers) is only permitted if the extraction and filter system is operated at different locations and exhaust air operation (into open) - for operational reasons - is not possible or proportionate (see TRGS560, Section 3). A few substances, according to GefStoffV, are generally excluded from recirculation operation due to their high hazard (see TRGS560, Section 3) - but must nevertheless be filtered before discharged to the open.

During installation, care must be taken to ensure that the outflowing air, when being recirculated into the hall, can not whirl up any dust/deposits from floors or other surfaces. For this purpose, as an example, the air outlet plate can be turned or the air can be conducted directed with a 90° elbow.

Please also observe the notes in section: “Use of Piping and Hoses“.

Extraction

When designing/planning extraction elements according to standard, the manufacturer's specifications must be observed. A minimum air velocity of 0.4m/s (see 15012-2) must be achieved during extraction. For designing/planning, the minimum volume flow rate in the most unfavourable condition (filter saturated) of the filter and extraction system are required.

Examples:

Filter and extraction system	Min. extraction capacity*	Max. extraction capacity	Remark
TFS 500	250m³/h	400 m³/h	RMS values
TFS 1000	500m³/h	850 m³/h	RMS values

*for up to 75% saturated filter (the warning: „Filter change required“ is indicated)

Please also observe the notes in sections: “Use of Extraction Elements”, “Use of Piping and Hoses” & “Filter Monitoring”.

The examples apply for the TFS series. As a rule, dust vacuum filter and extraction systems are operated in combination with a closed laser system. In this case, this laser system records, controls and signals the combination of laser system and extraction.

To achieve the protection targets of the standards DIN EN 15012, 60335 -2-69 AA, the overall system must be designed according to the following procedure:

- Determination of the required volume flow with 0.4m/s flow velocity at the extraction point plus 30% air volume (see section 8.2)
- Dimensioning of pipes and hose lines according to the flow velocities (see section 7.5)
- Ensuring the extraction capacity at the extraction point (see paragraph “Monitoring of the Extraction Capacity“ below).
- Ensuring of the signalling (see paragraph “Signalisierung“ below).
- Maintenance, filter replacement and disposal, in particular the disposal of used filter elements in airtight packaging, in accordance with the provisions of this Operating and Maintenance Manual.

Monitoring of the Extraction Capacity

Options for monitoring the extraction capacity

- Use of a volume flow monitoring device in the hose or pipe in conjunction with a dust vacuum signal module. Please refer to the section: ”Monitoring the Extraction Capacity at the Extraction Location“.
- Use of a volume flow monitoring device in the hose or pipe which is evaluated by the process control system and stops the process in the event of an error.

- Monitoring of the extraction capacity in a closed compartment with controlled air supply, for example via a vacuum sensor, which is evaluated by the process control system and stops the process in the event of an error.
- When using piping which can only be separated from the system with tools, it is alternatively sufficient to determine the proper function of the filter and extraction system via the signals of the INSPIRE interface, as far as the pipeline is subject to regular inspection (weekly). Please also observe the notes in section: “INSPIRE interface“.

Signalling

- Use of the dust vacuum signal module for visual and acoustic signalling of the system status.
  Please also observe the notes in section: “Signalling of the Extraction and Filter System“ & “Dust Vacuum Signal Module“.
- Evaluation of the filter and extraction system status via the process control system. In this case, the signalling of errors is taken over by the primary control system and must comply with the requirements of ISO 15012 & EN 60335-2-69 AA.

2.2 Operation Principle of the Extraction Systems of the LN, GL, BF, RF, DF, CR, TFS Series

Area of Application

Sticky and moist dusts, e.g. laser emissions, soldering fumes, solvent and adhesive vapours

Functional Principle

The air containing pollutants is drawn in/extracted via the extraction device (hood, hose) and fed into the filter unit by means of a pipe, flexible hose or an extraction arm. Here, the pollutant particles are filtered out according to their filter class in the various filter stages The cleaned air is then either returned to the work area or to the outside via a pipe, depending on the application.

2.3 Filter Types Used

Depending on the model (see technical data), the extraction and filter system is equipped with different exchangeable pre-filters in different filter classes. The filters used are, for example:

Saturation or Storage Filters

The storage capacity of regular filter media results from the amount of particles (or in the case of molecular filters, gases) they can absorb. As soon as all free spaces of the filter are filled with foreign substances, the further use (exception: molecular filter) will lead to an increase in pressure. This increase in pressure leads to a reduction in the air volume flow and a filter change becomes necessary.

Pre-filters of Saturation-filter Systems

- Filter mats (F5)
- Pocket filters (M5)
- Z-line filters (M6)
- Z-line panel filters (F7)
- MP-Tec filters (F7)

- SafeLine filter (F7 resp. F9)
- Oil mist filter cartridge (F9)

The pre-filter protects the downstream particle filter and thus considerably increases the service life of the system. Depending on the system type, the changing of the pre-filter is displayed separately (individual filter monitoring).

Main Filters of Saturation-filter Systems

- Particle filter (99.95%, H13)
- Particle filter (99.995%, H14)

The main filter ensures that more than 99.95% (particulate filter H13), 99.995% (particulate filter H14) or 95% (filter cartridge of dust category M) of the extracted smoke and dust particles remain in the filter (according to DIN EN 1822). This also applies if the filter insert is completely or partially saturated. With increasing saturation of the filter, however, the extraction capacity of the filter unit decreases.

Figure 1: Examples for saturation filters: Filter mat & pocket filter (left), particle filter (right).

Cleanable Filters

Certain filter designs and filter media allow for the filter medium to be cleaned, through which it can be returned into functional condition. The cleaning takes place using compressed air or by mechanical methods (vibration, shaking, wiping/stripping off). For optimum filter life and cleanability, TBH uses experienced, folded filter cartridges.

Pre-filters of Filter-cartridge Systems

- Filter cartridges (95%, dust category M)

In filter-cartridge systems, only one filter stage is installed as standard. This usually is a filter cartridge.

Main Filters of Filter-cartridge Systems

- Filter cartridges (95%, dust category M) (In this case, the filter cartridge is the only filter used (FP 150 and FP 200 series without particle filter, FPV 202)
- Particle filters (99.95%, H13) (See main filter of saturation filter systems)
- Particle filters (99.995%, H14) (See main filter of saturation filter systems)

Filter-cartridge systems can be protected with a downstream particle filter in addition to the filter cartridge. In these cases, the particulate filter becomes the main filter and the filter cartridge becomes the pre-filter.

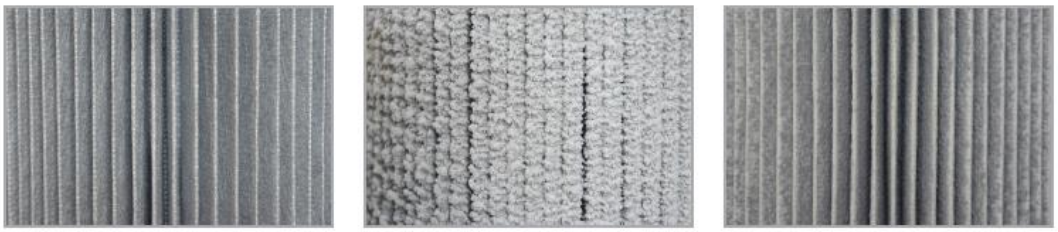


Figure 2: Comparison: New filter cartridge, filter cartridge in use, filter cartridge after cleaning with compressed air

Activated Carbon Filter

The service life of the activated carbon filter depends strongly on the respective operating conditions and can therefore not be predicted. In case of odour nuisance or if it starts to smell, the saturation of the activated carbon filter is reached and it must be changed. The activated carbon filter is not monitored via the filter-saturation indicator.

Figure 3: Example of an activated carbon filter

Molecular Sieve, Operating Principle:

In order to eliminate or minimize gaseous pollutants or unpleasant odours which can arise during the most diverse production processes, it makes sense to work with molecular sieves, such as activated carbon. Due to formation of finest pores and capillary systems, the surface area is up to 1500 m² per gram of activated carbon. This results in a very good degree of adsorption and a high storage capability, which leads to long service lives.

Figure 4: Activated carbon pellets, BAC granules, mixture of activated carbon & BAC

3. Warranty Notes

Beyond the legal warranty claims, TBH GmbH grants 2 years from date of purchase or:

System	Warranty Scope
BF 9 RF 9 DF 9	600 h or 2 years (whatever takes place earlier)
BF 5 BF 100-1200- series LN 200- series TFS 500 OEN 150/155 FP 130/150 FP 213 LN 615	5000 h or 2 years (whatever takes place earlier)
BF 10 RF 10 / 230 DF 10 / 230 GL 200- series GL-Desk- series CR-GL- series TFS 1000 OEN 250/710 FP 211 LN 610	10,000 h or 2 years (whatever takes place earlier)
FPV100, 202 DT series	2 years

of warranty on all material damages that cannot be attributed to improper use, normal wear and tear or incorrect operation.

Cyclone separators, their dust containers and attachments are excluded from warranty and guarantee as these are wear parts.

PLEASE NOTE

Opening the motor unit or repair attempts by persons not authorized by the manufacturer shall invalidate any warranty claims whatsoever.

The extraction system complies with the requirements of the applicable European and national directives.

A CE declaration of conformity is enclosed with the Operating and Maintenance Manual. This declaration loses its validity if any changes, which have not been agreed in writing with the manufacturer, are carried out.

The manufacturer shall not accept any responsibility for consequential losses or damage resulting from use of this equipment contrary to the instructions in the Operating and Maintenance Manual.

4. Operating, Environmental, Storage and Transport Conditions

Warning! In environments where dust, smoke, oil or other liquid emissions are present in the air, such emissions can enter the equipment through the bypass ventilation or other equipment openings, and damage the equipment.

Operating, Environmental, Storage and Transport Conditions		
Storage and transport temperature	°C	-25 to +55 (max. 70°C / 24 h)
Operating temperature	°C	5 to 40
Relative humidity, max.	%	80 without condensation Harmful effects due to occasional condensation are avoided by special bypass ventilation Use in wet locations is not allowed
Use		Only indoors, no excessive dust pollution of the ambient air Pollution degree 2
Height above sea level, max.	M	2000
Operation	-	The system's extraction capacity can vary by ±10%
Mains supply voltage	-	+/- 10% Overvoltage category II
Noise level	dB(A)	Noise levels are according to the standard requirement machine-related information and differ fundamentally from workplace measurements! Measurements are made: - In full equipment - With 2.5m hose to intake / exhaust - Measurement according to hemispherical shell - ½" machine noise measuring device

	-	If the system is not permanently supplied with Run Signal (pin 7+8) via interface, it may switch to standby mode in the event of an error - The system can easily be switched back to run via the front film.
	-	When using the RS232 interface, an EMC tested adapter must be used to ensure correct function.

5. Transport Notes

The filter unit is delivered completely packed on a pallet, on which it can be safely further transported. Transport must be carried out using a suitable transport means (forklift truck, pallet truck, etc.). The packaging must not be loaded with any additional weight.

- The packaging must not be exposed to environmental influences.
- Transport and storage temperature: -25 to +55°C (max. 70°C / 24 h)
- When loading, the center of gravity of the packaging unit must be observed.

5.1 Packaging Notes for Customers

When transporting on without original packaging or with modified original packaging, it must be ensured that the system is optimally secured and protected against damage. The corresponding safety regulations must be observed.

- Before packing, make sure that the modules of the systems fit exactly on top of each other and are tensioned hand-tight.
- Place the system upright on a suitable pallet.
- Make sure the system stands securely on the pallet. The use of spacer blocks to keep the wheels of the system aloft is recommended. Also ensure that no moisture or objects can damage the system from below.
- Firstly, secure the modules against slipping among each other, e.g. using corner profiles made of cardboard and tensioning straps.
- Then, use suitable cushioning material and a firm outer packaging, e.g. sturdy cardboard. The minimum pad thickness should be 2.5 cm. When the system has been repacked, make sure that it is tightly seated in the new packaging.
- Securely strap/tension the system components on the pallet.
- It is mandatory to label the pallet as follows ("do not transport horizontally", "no further loading from above", etc.).

	The system may not be transported being laid down (only upright), as this can cause damage to housings, filters and motors.

5.2 Use of Crane Eyelets

The following points must be observed when using the crane-eyelet attachments:

- Use only the provided TBH crane eyelets!
- The fastening of the load must take place as described in the quick reference guide supplied with the crane eyelets.

	**Warning!** It is mandatory to observe the safety instructions in the quick reference guide enclosed with the TBH crane eyelets.

6. Technical Data BF Series, RF10, DF10

BF 5

TECHNICAL DATA	UNIT	STANDARD	A
Air volume flow with free air delivery	m³/h	max. 130	max. 130
Effective air volume flow	m³/h	20-100	20-100
Max. static pressure	Pa	1900	1900
Voltage	V	100-240	100-240
Frequency	Hz	50/60	50/60
Motor output	kW	0.04	0.04
Class of protection	-	1	1
Drive type	-	Continuous running	Continuous running
Sound level	db(A)	approx. 58	approx. 58
Serial interface	Sub-D	25-pin	25-pin
Weight	Kg	approx. 17	approx. 17
Dimensions (HxWxD)	Mm	315x300x300	315x300x300
2 stage filter, particle filter H13 + activated carbon		✓	-
Active carbon	L	-	5.5
Intake sleeve NW 50	Quantity	2	2
Color of filter housing	RAL	7035	7035
Color of lid	RAL	7037	7037

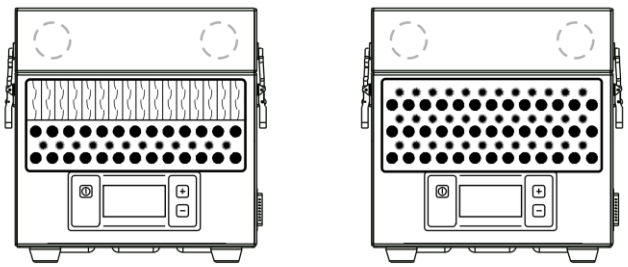


Figure 5: Filter versions BF 5, BF 5 A

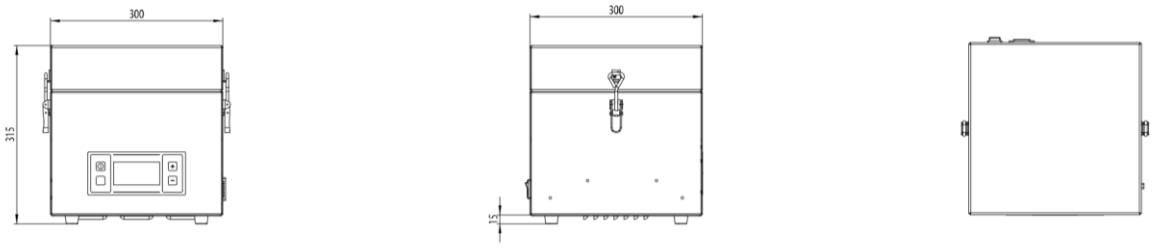


Figure 6: Dimensions BF 5

BF 9

TECHNICAL DATA	UNIT	STANDARD
Air volume flow with free air delivery	m³/h	max. 220
Effective air volume flow	m³/h	20-200
Max. static pressure	Pa	14000
Voltage	V	120/230
Frequency	Hz	50/60
Motor output	kW	0.7
Class of protection	-	1
Drive type	-	Carbon running
Sound level	db(A)	approx. 64
Serial interface	Sub-D	25-pin
Weight	Kg	approx. 24
Dimensions (HxWxD)	Mm	510x300x300
Pre-filter mat		✓
2 stage filter, particle filter H13 + activated carbon		✓
Intake sleeve NW 50	Quantity	2
Color of filter housing	RAL	7035
Color of lid	RAL	7037

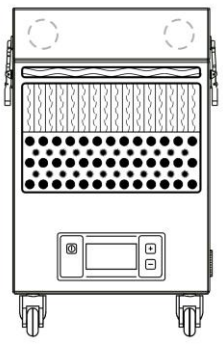


Figure 7: Filter version BF 9

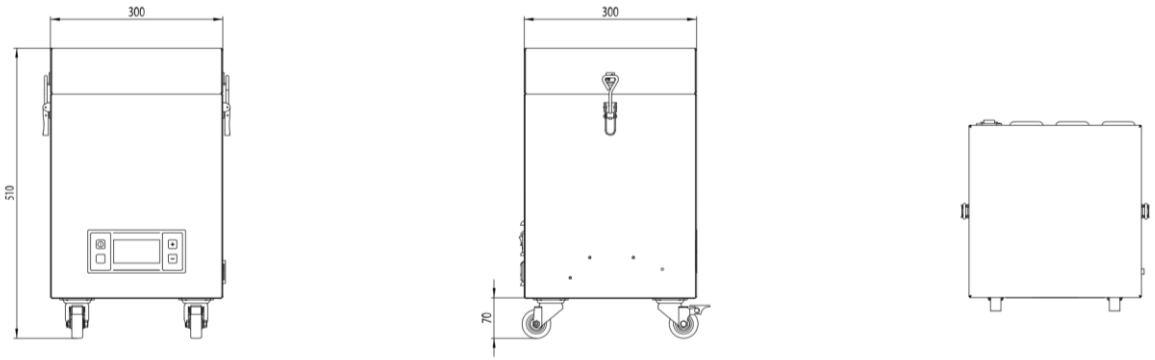


Figure 8: Dimensions BF 9

BF 10

TECHNICAL DATA	UNIT	STANDARD	A	ZA
Air volume flow with free air delivery	m³/h	max. 250	max. 250	max. 250
Effective air volume flow	m³/h	20-200	20-200	20-200
Max. static pressure	Pa	6000	6000	6000
Voltage	V	100-240	100-240	100-240
Frequency	Hz	50/60	50/60	50/60
Motor output	kW	0.6	0.6	0.6
Class of protection	-	1		
Drive type	-	Continuous running	Continuous running	Continuous running
Sound level	db(A)	approx. 62	approx. 62	approx. 62
Serial interface	Sub-D	25-pin	25-pin	25-pin
Weight	Kg	approx. 24	approx. 24	approx. 24
Dimensions (HxWxD)	Mm	510x300x300	510x300x300	510x300x300
Pre-filter mat		✓	✓	-
Pre-filter M6		-	-	✓
2 stage filter, particle filter H13 + activated carbon, large		✓	-	-
2 stage filter, particle filter H13 + activated carbon, small		-	-	✓
Active carbon	L	-	12	-
Intake sleeve NW 50	Quantity	2	2	2
Color of filter housing	RAL	7035	7035	7035
Color of lid	RAL	7037	7037	7037

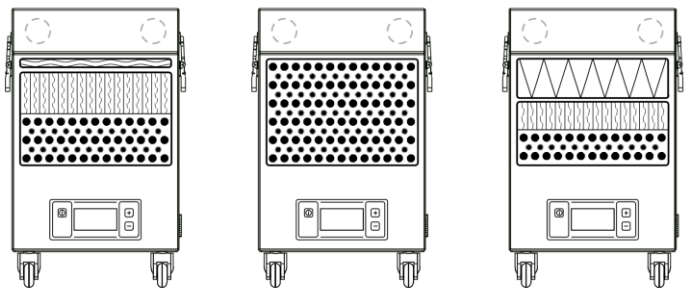


Figure 9: Filter versions BF 10, BF 10 A, BF 10 ZA

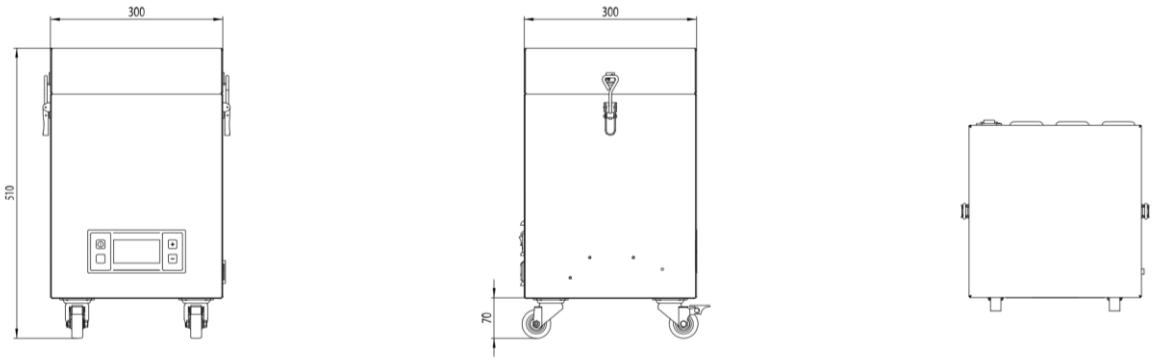


Figure 10: Dimensions BF 10, BF 10 A, BF 10 ZA

BF 100 BF 200 BF 1000 BF 1200

TECHNICAL DATA	UNIT	100	200	1000	1200
Air volume flow with free air delivery	m³/h	max. 280	max. 280	max. 280	max. 280
Effective air volume flow	m³/h	30-230	30-230	30-230	30-230
Max. static pressure	Pa	11000	11000	11000	11000
Voltage	V	100-240	100-240	100-240	100-240
Frequency	Hz	50/60	50/60	50/60	50/60
Motor output	kW	1.1	1.1	1.1	1.1
Class of protection	-	1	1	1	1
Drive type	-	Continuous running	Continuous running	Continuous running	Continuous running
Sound level	db(A)	approx. 59	approx. 59	approx. 59	approx. 59
Serial interface	Sub-D	25-pin	25-pin	25-pin	25-pin
Weight	Kg	approx. 40	approx. 40	approx. 70	approx. 55
Dimensions (HxWxD)	Mm	700x350x350	700x350x350	750x350x655	1025x350x350
Filter mat M5		✓	-	✓	-
Z-LinepanelPLUS F7		-	✓	-	✓
Particle filter H13		✓	✓	✓	✓
Activated carbon filter	L	10	18	26	45
Intake sleeve NW 50	Quantity	2	2	2	2
Intake sleeve NW 80	Quantity	1	1	1	1
Color of filter housing	RAL	7035	7035	7035	7035
Color of lid	RAL	7037	7037	7037	7037

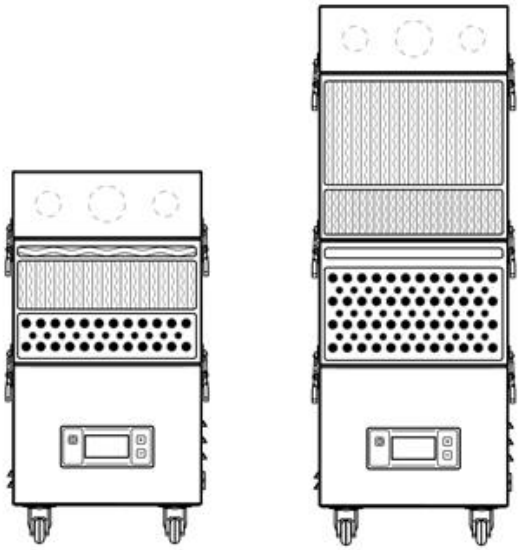


Figure 11: Filter versions: BF 100, BF 1000, BF 200, BF 1200

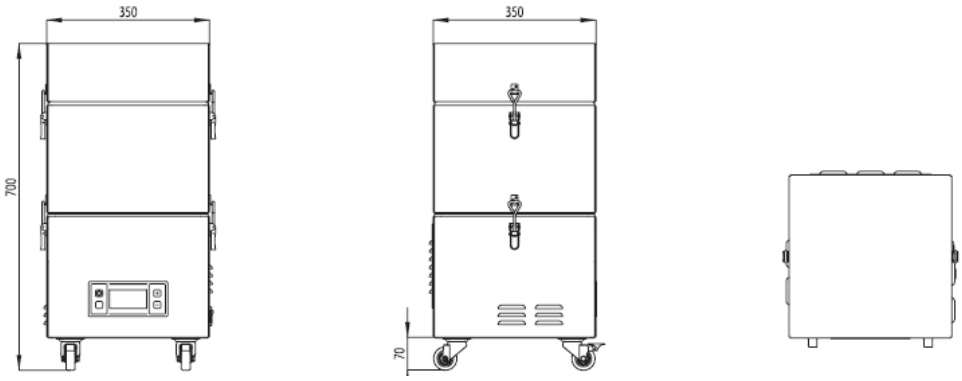


Figure 12: Dimensions: BF 100

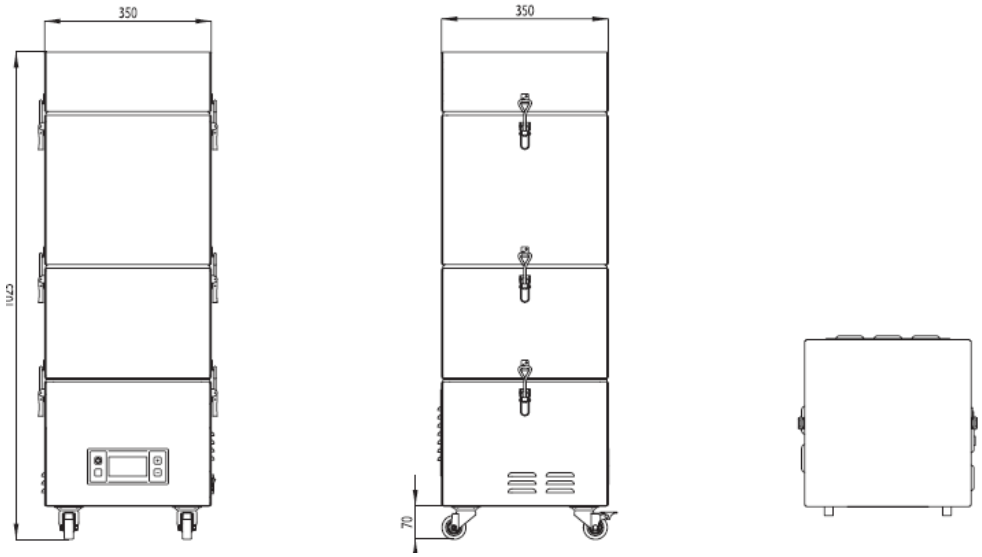


Figure 13: Dimensions: BF 200

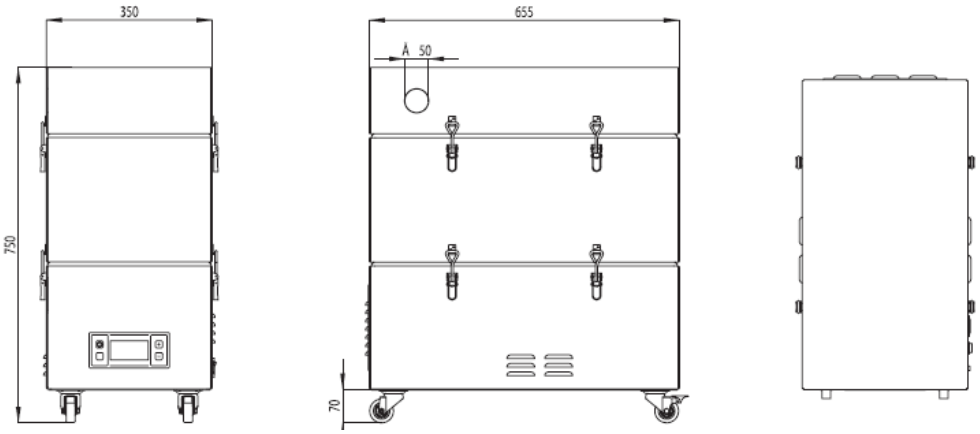


Figure 14: Dimensions: BF 1000

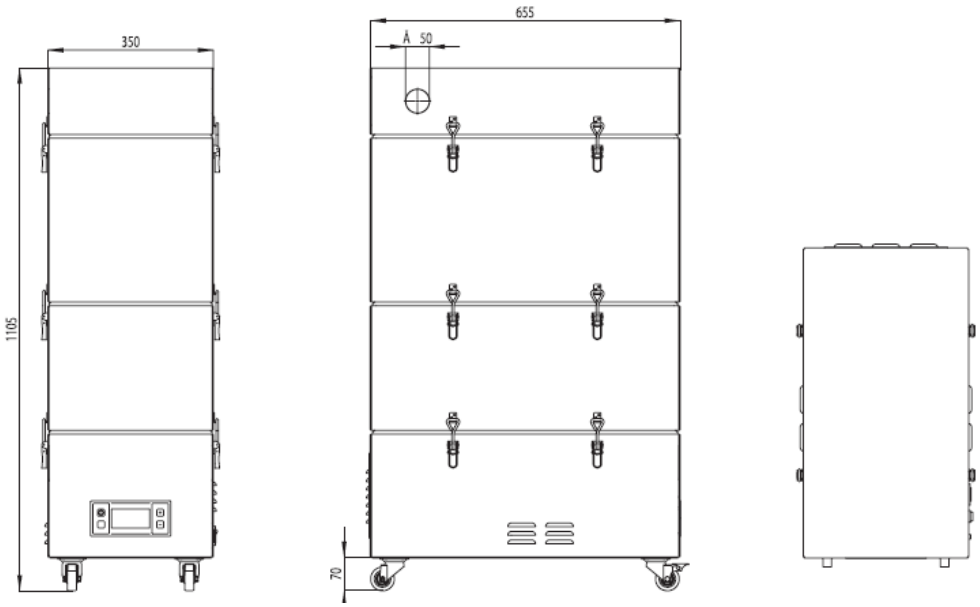


Figure 15: Dimensions: BF 1200

RF 10, DF 10

TECHNICAL DATA	UNIT	RF 10	DF 10
Air volume flow with free air delivery	m³/h	max. 250	max. 250
Effective air volume flow	m³/h	20-200	20-200
Max. static pressure	Pa	6000	6000
Voltage	V	100-240	100-240
Frequency	Hz	50/60	50/60
Motor output	kW	0.6	0.6
Class of protection	-	1	
Drive type	-	Continuous running	Continuous running
Sound level	db(A)	approx. 62	approx. 64
Serial interface	Sub-D	25-pin	25-pin
Weight	Kg	approx. 24	approx. 24
Dimensions (HxWxD)	Mm	510x300x300	510x300x300
Pre-filter mat		✓	✓
Pre-filter M6		-	-
2 stage filter, particle filter H13 + activated carbon, large		✓	-
2 stage filter, particle filter H13 + activated carbon, small		-	-
Active carbon	L	-	12
Intake	-	Perforated top cover	Extraction arm
Color of filter housing	RAL	7035	7035
Color of lid	RAL	7037	7037

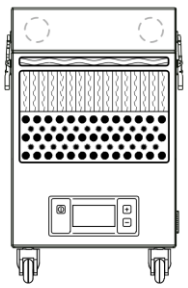


Figure 16: Filter versions RF 10, DF 10

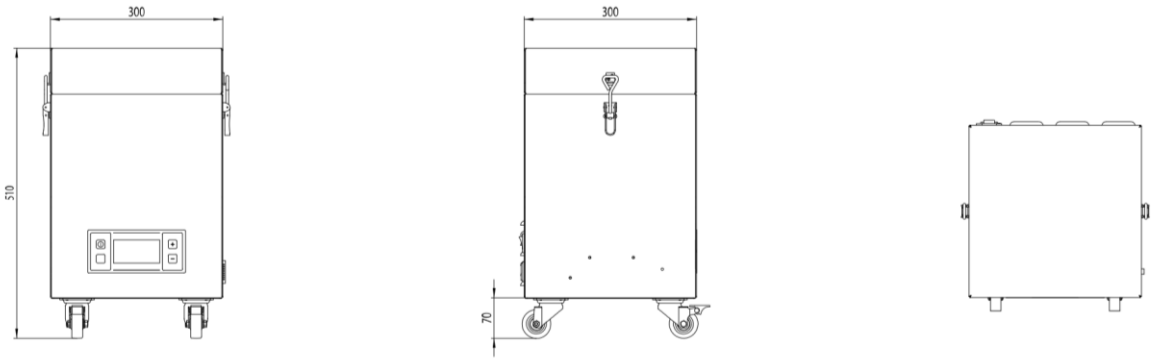


Figure 17: Dimensions RF 10, DF 10

7. Installation and Starting of Operation

A large number of pollutants and particle sizes are produced in the various machining processes of modern industry. A dust vacuum and filter system is used to remove particles from their source, e.g. to protect the lens of a laser, but also to avoid health hazards for employees on site.

Due to the modular design of the systems, it is possible to adapt the filter equipment to the specific application. To ensure effective filtering, the tightness of the filter modules as well as the hose connections and extraction elements must be ensured already during the installation of the system on site.

When using a molecular filter (activated carbon filter), its suitability for the application and regular inspection must be ensured.

7.1 Unpacking

The extraction and filter system is usually delivered on a pallet and is secured with belts and additional fastening means, depending on the size of the system.

Warning! It is mandatory to observe the notes in the Transport section.

Pallet

- Firstly, set the pallet on a level, suitable surface.
- Now loosen the belts and any other attached fastening aids.
- Afterwards, remove the transparent foil.
- Depending on system size and filter equipment, the systems can be packed differently. Smaller systems are packed in a cardboard box. Larger systems are packed with two cardboard boxes pushed into each other.

Packaging in a cardboard box

- Now, carefully open the cardboard box on the top side; be careful with sharp knives or similar to avoid damaging the surface of the system.
- Turn the system carefully with the top side down (Caution! Do not damage the surface). Depending on the weight of the system, have a sufficient number of helpers available.
- Pull the cardboard off and remove the styrofoam parts.
- The system can now be placed back on the castors.

Packaging in double cardboard box

- Firstly, pull of the top cardboard box.
- You can now lift the system out of the bottom cardboard box or carefully cut the box open and slide the system out.
- Finally, remove the styrofoam parts.

Please also note

- Depending on the size and weight of the system, have enough helpers close by and/or use suitable lifting equipment and aids.
- Dispose of the packaging in accordance with the applicable regulations.

7.2 Unpacking Large System of the LN 600, FP 200, FPV 100-200, GL 20-30, TFS 1000, OEN 250/700 and DT Series

Systems of the FP210-215, FPV200-202, LN600 and OEN 250/700 series are delivered without cardboard, secured on a pallet.

- Firstly, set the pallet on a level, suitable surface.
- Now loosen the belts and any other attached fastening aids.
- Afterwards, remove the transparent foil and protective cardboard boxes.
- Carefully lift the system from the pallet.
- It is mandatory to observe the correct securing of the system to the load-fastening equipment.
- Caution! Depending on the size and weight of the system, have a sufficient number of helpers available.
- Dispose of the packaging in accordance with the applicable regulations.

Warning! Use only original TBH crane eyelets; observe enclosed safety instructions!

7.3 Checking and Alignment of the Modules

dust vacuum and filter systems have a modular design. In general, they consist of a motor module with control system, and one to three filter modules as well as a lid module.

For systems equipped with buckles/clasps, check the following after unpacking:

- Are individual modules shifted against each other?
- Are the toggle fasteners tensioned or loose? When being tensioned, the toggle fasteners should press the corresponding seal approx. 2-4 mm together.
- Pay attention not to press the toggle fasteners too excessively together, as this could damage the seals.
- Check all seals for damage such as scrapes, cracks, pressure marks or similar.
- Check all differential-pressure nipples for damage such as breakage, bending/kinking, blockage or similar.

7.4 Setting Up the System

- Firstly, follow the steps in the section "Unpacking".
- Set up the system on a clean, level surface (observe the information in section: “Operating, Environmental, Storage and Transport Conditions”)
- The ambient air may not have a too high a dust load, as otherwise the turbine can become soiled/contaminated via the bypass openings. Please contact your country representative if in doubt.
- Secure the system (e.g. apply the wheel/castor brake or affix the FP200 series to the ground using forklift feet), please pay particular attention to the safe position of the system when using superstructures with a large lever arm (e.g. extraction elements installed on the systems) and install additional securing means (ground anchors or similar) in case of doubt. Always observe the operating regulations at the set-up location.
- the ventilation slots of the bypass cooling system may not be covered off.
- Connect the remote control cable to the interface, as required (see section 8)
- For devices of the FPV series, the appropriately dimensioned extraction and filter system must be connected downstream.

7.5 Use of Piping and Hoses

For air-side connection of dust vacuum and filter systems, you can use all standard hoses with diameters of 44-250 mm.

Depending on the inner diameter, appropriate adapter pieces must be used.

In addition, dust vacuum systems can be connected using standard ventilation pipe systems.

During installation, pay attention to the following:

- Observe firm and tight seating of hoses or piping to the extraction system; if in doubt, secure hoses or pipes with hose clamps, screws or other suitable means.
- Hoses generally have a high air resistance and should therefore be kept as short as possible.
- Conduct/lay hoses as straight as possible, without bends, kinks or sagging, as otherwise dust deposits, high air resistance and increased wear can occur.
- When selecting hoses and piping, pay attention to their chemical and thermal resistance. These must be suitable for the operators process. The temperature range for hoses is usually between 40 and 70C°.
- For spark-generating processes, plastic hoses should not be used without a spark arrestor or spark extinguisher installed upstream of the hose.
- Do not extract flames into hoses.
- A reference value of 15m/s is recommended for the flow velocity. Please observe Abbildung 18.

	If the hoses are unsuitable, defective or loose, harmful substances can make their way into the ambient air.

	Especially in laser processes with smoke and nano dusts as emissions, deposits in hoses, pipes and on extraction elements cannot be completely avoided. These deposits can become loose and leak out, e.g. when the hose is changed.

	Check hoses, pipes and sensing or extraction elements regularly for damage, contamination and wear. Replace or clean these as required.

	When connecting pipes and hoses, make sure that the mechanical or electrical safety as well as the stability of the dust vacuum and filter system or its accessories are not impaired.

If mechanical modifications are made to a dust vacuum and filter system, e.g. drill holes for fastening purposes, any and all guarantee, warranty or liability on behalf of TBH shall expire.

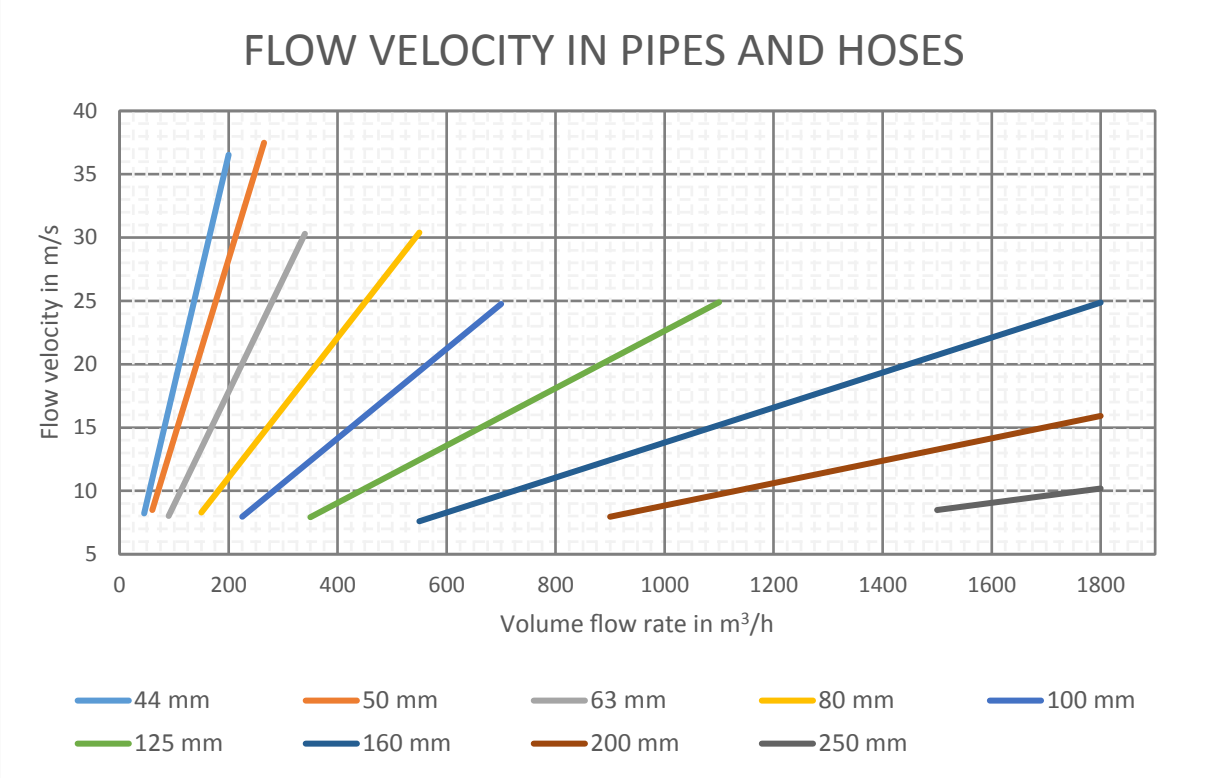


Figure 18: Flow Velocities in Piping and Hoses

Extraction / Piping Diameter (mm)	Industrial Dust >20 m/s	Particulate Matter / Smoke 16 m/s	Gas Molecules >10 m/s
50	140 m³/h	115 m³/h	70 m³/h
63	225 m³/h	180 m³/h	110 m³/h
80	360 m³/h	290 m³/h	180 m³/h
100	565 m³/h	450 m³/h	280 m³/h
125	880 m³/h	710 m³/h	440 m³/h
160	1450 m³/h	1160 m³/h	720 m³/h
200	2260 m³/h	1810 m³/h	1130 m³/h
250	3530 m³/h	2830 m³/h	1770 m³/h

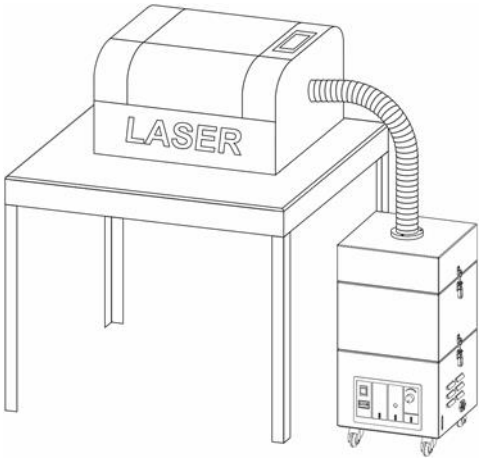


Figure 19: Connection example of an LN230 extraction and filter system to a table laser

7.6 Fixed Piping / Installation

- Your local representative will gladly support you with planning the piping using hoses or spiral ducts. This will ensure that all required parts are ordered.
- The tightness of the piping etc. must be ensured in order to prevent potentially dangerous substances from escaping.
- If the filters are not inserted until after installation, care must be taken to ensure that they are seated correctly (are all seals well pressed?).

7.7 Use of Extraction Elements

Basically, all types of extraction elements, e.g. extraction arms, hoods, nozzles, enclosures, laser cabins, etc., can be used with the aid of a hose or a pipeline in combination with a dust vacuum extraction and filter system.

	No extraction elements may be used that impair the mechanical or electrical safety as well as the stability of the dust vacuum and filter system or their accessories.

	If mechanical modifications are made to a dust vacuum and filter system, e.g. drill holes for fastening purposes, any and all guarantee, warranty or liability on behalf of TBH shall expire.

When selecting an extraction element, it must be observed that it is suitable of extracting all emissions being emitted from the emission source.

- The extraction element should be mounted as close as possible to the emission source.
- The extraction element should enclose the emission source as closely as possible.
- The extraction element must be matched to the extraction power of the extraction system and the emission type of the target process.

	Especially in laser processes with smoke and nano dusts as emissions, deposits in hoses, pipes and on extraction elements cannot be completely avoided. These deposits can become loose and leak out, e.g. when the hose is changed.

	Check hoses, pipes and sensing or extraction elements regularly for damage, contamination and wear. Replace or clean these as required.

For transport reasons, extraction elements or extraction arms are usually delivered disassembled along with the system. Please firstly check if all parts have been delivered and not been damaged during transport.

	To avoid overheating of the filter and extraction system, fresh air may also have to be supplied for cooling (temperature at the intake max. 40°C).

Enclosed Laser Compartment

- Provide for sufficient air supply to avoid negative pressure within the compartment (slots, holes opposite to the extraction connection).
- Guide airflow as laminar as possible over a smooth surface (e.g. work table).
- Dimension the airflow rate of the filter and extraction system such that no smoke can escape from the compartment, but at least 0.4 m/s within the laser compartment.

Partially Sealed-off Laser Compartment

- Partially open systems require a higher airflow dimensioning than for enclosed systems. It is necessary to install the extraction as close as possible to the emission source (e.g. suction nozzle, flat shield or similar) to avoid losses. If required, the extraction nozzle must be moved along with the laser flame.
- Dimension the airflow rate of the filter and extraction system such that no smoke can escape from the laser compartment.

Extraction Arm Mounted on Extraction and Filter System

- If not already pre-installed at the factory, the mounting flange and the bracket must first be mounted on the system. For this, remove the system lid from the extraction system (to avoid damaging the filters during installation). When mounting on to an FP150 system, please observe that chips may fall into the electronics. Please contact your country representative. if in doubt.
- The extraction arm can now be attached to the mounting flange.
- Please observe sufficient stability of the system, incl. the mounted extraction arm (due to the lever) - additional securing devices may be necessary (ground anchors, etc.).
- Please observe that if the extraction capacity of the extraction arm is too high, there may be whistling noises at the extraction tip. In this case, please reduce the system's extraction capacity by turning it back somewhat.

Figure 20: dust vacuum and filter system with pre-mounted extraction arm

Extraction Arm Mounted to Work Table

- To mount an extraction arm on a work table, please first mount the table holder at the desired location.
- The mounting flange can now be fastened to the table holder.
- The extraction arm can now be attached to the mounting flange.

Figure 21: Extraction arm for table installation

7.8 Connection to Mains Supply

Warning! This is protection class 1 equipment and requires connection to the protective conductor. For connection to the mains supply, the enclosed or an identical, approved mains cable must therefore be used.

- The filter unit is supplied with connecting cable and plug.
- The unit may only be connected to the voltage ranges indicated on the type plate.
- The unit uses powerful motors which can draw up to 12 times the starting current. If in doubt, use circuit breakers with a slow tripping characteristic.
- Make sure the unit's power switch is turned off.
- Connect the unit to the mains supply (mains cable must remain accessible).
- Use the "On/Off" switch to switch the unit on or off.

7.9 Connection to Compressed Air

- The respective compressed air supply must be connected to filter cartridge systems.

Make sure that the systems are not connected to a compressed air supply without a pressure control unit. Excessively high supply pressures can lead to cracks in the system housing.

FP130/150/FP150 Dental	**FP210-215, FPV200-202**
1.5 - 2 bar	3 – 4 bar
Dry and oil-free compressed air; external supply with an approved compressed air hose. The air flow (l/min) of the compressor must fill the compressed-air tank within approx. 3 seconds. ▯ FP130/150: min 10 l/s ▯ FP200 series, FPV202: min. 20 l/s	

Table: Compressed-air supply of filter cartridge systems of the FP series

The compressed air tank of the filter and extraction system does not fall under the pressure equipment directive (<50L * bar) and is therefore not subject to an annual maintenance requirement.

7.10 Starting of Operation

- Firstly, carry out the steps according to section "Installation and Starting of Operation".
- Check the stability of the system and the piping.
- Check that the individual system modules are correctly seated and braced.
- Check if all system filters are correctly installed.

- Check the correct mains connection, the 400 V mains supply must have a neutral conductor (as the system operates with 230V control voltage); observe rotating field upon connecting.
- Switch on the system with the power switch.
- The display on the front panel starts with a slight delay.
- The system starts automatically. When the interface is used, its signal is dominant.
- The turbine respectively the ventilator speed can now be changed via the +/- button or via the interface.

8. Monitoring Devices

8.1 System Behavior in Case of Errors

As standard, all dust vacuum and filter systems are configured such that in case of an error:

- The system is stopped (can be changed via customer-specific parameterization)
- The display indicates the respective error: Filter error, speed error and temperature error.
- An acoustic warning in the form of a beep occurs.
- The INSPIRE interface sets the potential-free signal 'group error'.
- The INSPIRE control electronics stores the occurred error in the message memory.
- Additionally, the dust vacuum signal module can be used to visualize the system status.

8.2 Filter Monitoring

All dust vacuum and filter systems are equipped with a filter monitoring system. This system operates on the principle of differential pressure monitoring. In this, the pressure upstream and downstream of the filter elements is measured. The difference between these two values provides the current filter differential pressure.

When air flows through a new filter element, it already generates a low differential pressure. This initial differential pressure is characteristic of an extraction and filter system and is determined, among other things, by the characteristic curve of the blower being used.

When the filters become saturated, their differential pressure increases and the extraction capacity of the extraction and filter system decreases. With dust vacuum and filter systems, the maximum permissible loss of extraction power caused by the saturated filters is 30%.

The current filter status is graphically processed by the dust vacuum INSPIRE control electronics and
indicated on the system display. The system differentiates between the filter pre-warning stage at 75% of the maximum filter saturation and the filter error at 100% of the maximum filter saturation.

This does not apply for systems of the DT series: Here, the differential pressure is output by an analog measuring instrument

8.3 Speed Monitoring, Blower

dust vacuum and filter systems (except BF9 and DT series) are equipped with blower speed monitoring. The current fan speed is continuously determined via several Hall sensors.

If the blower speed falls below a minimum value, for example due to an electronic or mechanical defect, or overheating of the motor winding, the INSPIRE control electronics registers this and triggers the speed error.

8.4 Temperature Monitoring, Control Electronics

The INSPIRE control electronics also have a temperature sensor which monitors the temperature in the turbine housing and thus protects the system from damage caused by overheating. If the parameterized maximum temperature is exceeded, the temperature error is automatically set.

8.5 Signalling of the Extraction and Filter System

Several options are available for monitoring dust vacuum and filter systems:

- The operating statuses run and standby, the filter status, the filter warning and the error types filter error, speed error and temperature error can be read off the INSPIRE display. In addition, the error types are acoustically supported by a warning tone.
- The filter warning signals as well as filter errors, speed errors and temperature errors can be accessed externally via potential-free contacts at the INSPIRE interface as standard. Application example: Integration of the extraction and filter system in a fully automated process, e.g. laser welding with evaluation of the system status.
- The dust vacuum signal module can be used.

8.6 Dust Vacuum Signal Module

In addition, the dust vacuum signal module can be used to ensure a clear acoustic and visual status detection of the extraction and filter system. Application example: Use of the system as a mobile welding-fume extraction system.

It signals the following statuses:

Signal Color	Meaning
Green	System OK
Yellow	Check / replace filter
	Set air flow rate has been fallen below
Yellow + red	System error - System failure
	Acoustic signal output

Figure 22: Dust vacuum signal module

8.7 Monitoring of Fixed Hoses and Piping

In extraction elements, hoses and pipes which are mechanically connected to the extraction and filter system and can only be released by the use of tools, the volume flow does not have to be monitored separately when the extraction and filter system is designed as follows:

- Minimum required volume flow when the filter saturation is reached (to be determined by the operator) x 1.3 = required nominal volume flow.
- Dimensioning of the diameter of pipes and hoses to a flow velocity of approx. 15m/s (see also section “Use of Piping and Hoses“)

8.8 Monitoring the Extraction Capacity at the Extraction Location

For monitoring the extraction capacity at the extraction point when using not-permanently affixed hoses and pipes, which can be released on one side, the use of an additional volume flow monitoring system (see accessories catalog) is suggested. It should be mounted as

close as possible to the extraction location, ideally even firmly connected to the extraction element.

It is recommended to evaluate the volume flow monitoring separately via a PLC or other suitable control or signalling device assigned to the process. Alternatively, the signal module can also be used to evaluate and signal the volume flow monitoring.

9. Operation of a dust vacuum and Filter System

The extraction and filter system may only be used for extracting the substances described in this manual. The condition of the filters must be checked regularly during operation.

9.1 Functions of the INSPIRE Control Electronics

FUNCTION	BF series RF10, DF10	LN 200 series GL series RF230, DF230 GL Desk series OEN 150 series	TFS series LN 600 series OEN 250 / 710	FP 150 series FP 200 series	FPV 200 series
Filter cleaning individually adjustable				✓	✓
Parameterization of special functions		✓	✓	✓	✓
Error memory improves coordination between customer and service		✓	✓	✓	✓
Individual filter monitoring of prefilter and main filter with status indication			✓		
Common filter monitoring of all installed filters	✓	✓			✓
Filter monitoring of additional (optional) particle filter possible				✓	
Ergonomic color display	✓	✓	✓	✓	✓

9.2 Operating Elements, INSPIRE Control Electronics, Saturation Filter Systems

Thanks to the indication of all important functions of the extraction and filter system via the ergonomic color display, operating our systems is uncomplicated and intuitive, allowing the intentional omission of menu navigation.

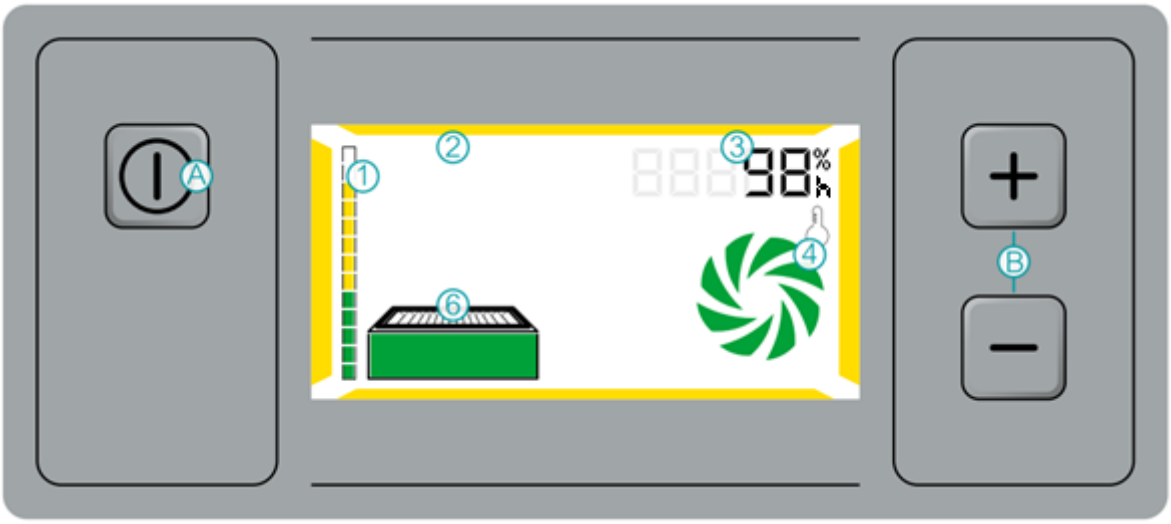


Figure 23: Operating elements, INSPIRE control electronics, saturation filter systems

A) Start/Stop button
B) Manual speed control
1) Filter-saturation indication
2) System status indication
3) Power setting/hour meter indication
4) Temperature and turbine error indication
5) Filter-cleaning-active indication
6) Filter status indication

Pos. Description

A) The system is switched on with the Run/Standby button

(The unit switch must be set to ON)

1) The status of the filters can be easily monitored via the filter-saturation indication.

The total filter saturation of all installed filters is displayed together.

6) The filter status indication shows quickly and easily which filter has to be changed (number of filters depends on the system).

5) Filter cleaning activated (actuation depends on filter cleaning, only on systems with filter cartridge)

C) Button for manual filter-cleaning actuation (only on systems with filter cartridge)

9.3 Operation via Interface

	The system can be remote controlled. The following functions are available: • Indication „Filter saturated“ • Switch-over between Run/Standby • Speed control
	The system can be controlled via the interface. For details on the interface assignment, please refer to section: “INSPIRE interface”. The following functions are available: • Filter full/ Filter full, inverted • Run/Standby • Speed monitoring • Temperature indication • External speed control • Group error

	• Actuation of filter cleaning (For function scope of your system, refer to interface options)

9.4 Functions of the INSPIRE Interface

FUNCTION	BF series RF10, DF10	LN 200 series GL series RF230, DF230 GL Desk series OEN 150 series	TFS series LN 600 series OEN 250 / 710	FP 150 series FP 200 series	FPV 200 series
Filter full	✓	✓	✓	✓	✓
Run/Standby	✓	✓	✓	✓	
External speed control		✓	✓	✓	
Speed indication		✓	✓	✓	
Temperature indication		✓	✓	✓	✓
Group error		✓	✓	✓	✓
Control of filter cleaning				✓	✓
Parameterization access		✓	✓	✓	✓
Message memory		✓	✓	✓	✓
Data logger		✓	✓	✓	✓

9.5 Inspire Interface, Sub D 25 on BF Series

Attention! For all relay contacts a max. contact load of 40V/1A applies.

Subject to technical changes. No liability shall be assumed for damage due to incorrect interpretation or incorrect wiring. For any questions, please contact your respective sales partner.

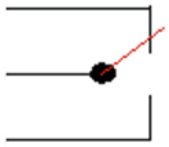
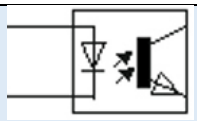
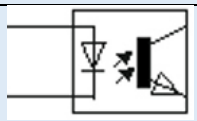
Interface Sub-D25		Signal	Description
Pin 1		free	
Pin 2		free	
Pin 3		free	
Pin 4		Pre-warning stage, filter full, inverted (NC contact)	- Pre-warning that filter is saturated to approx. 75% - Relay contacts
Pin 5		Pre-warning stage, filter full (shared contact)	
Pin 6		Pre-warning Stage, filter full (NO contact)	
Pin 7		Run/Standby	- Switch-over between Run / Standby mode - Apply 12-30 V DC potential (polarity not relevant) - Only active if jumper pins 9+10 are closed
Pin 8		Run/Standby	
Pin 9		Jumper Run/Standby	- Determines the switch-on state of the system - Open: Run mode - Shut: Standby mode - Requirement for control via pins 7+8
Pin 10		Jumper Run/Standby	
Pin 11		free	
Pin 12		free	
Pin 13		free	
Pin 14		free	
Pin 15		free	
Pin 16		free	
Pin 17		free	
Pin 18		free	
Pin 19		free	
Pin 20		free	
Pin 21		free	
Pin 22		free	
Pin 23		free	
Pin 24		free	
Pin 25		free	

Figure 24: Interface assignment, INSPIRE control electronics, systems of the BF series

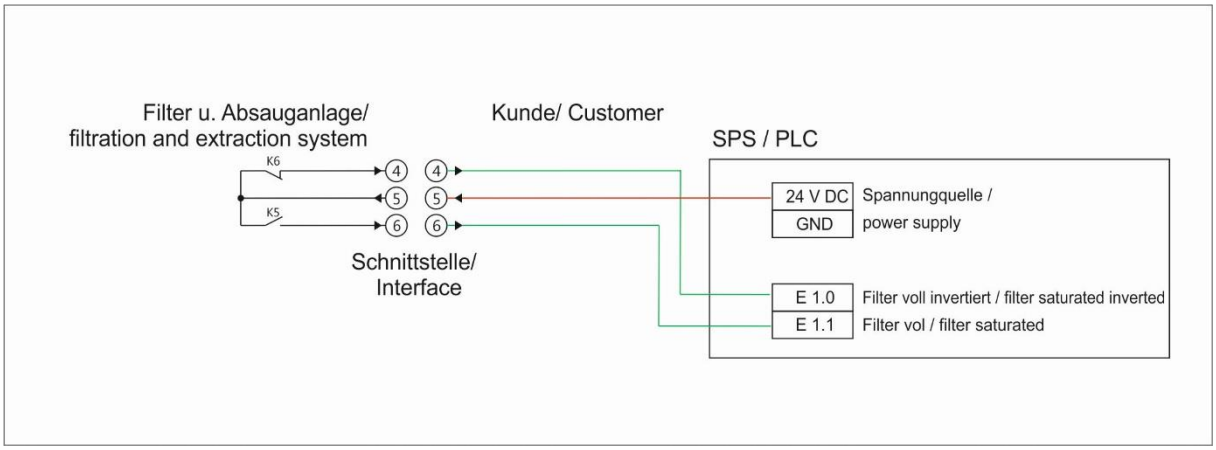
Pre-warning Stage, Filter Full Output

The "Filter full" output on the INSPIRE interface informs the user of the system that the maximum filter saturation, at which the filters must be replaced, will soon be reached. This warning occurs at 75% of the maximum filter saturation of the extraction and filter system, and thus gives the user sufficient time to prepare for the filter change. For systems equipped with filter cartridges and filter cleaning module, automatic differential-pressure filter cleaning is additionally started when 75% of the maximum filter saturation is reached.

The filter-full warning is designed as an alternating relay contact. This provides for an opening and a closing contact. If the INSPIRE internal supply voltage or the 220V / 120V supply voltage is lost, the relay automatically returns to its initial state.

As an example, the filter-full warning can be used:

- Prepare the filter change.
- To initiate an order for replacement filters.
- For automated processes, to pause the process at the next opportunity to change the filters or start the filter cleaning.
- To let the parent process run out for automated processes, and start the filter system.

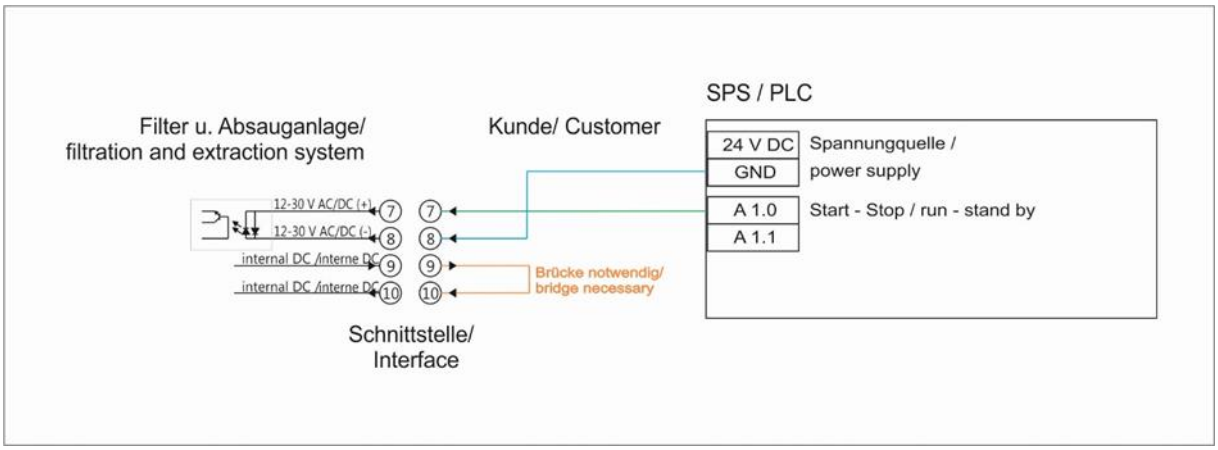


Start/Stop Input

The start/stop input is used to externally switch the status of the extraction and filter system from stop (standby) to start (run). If an external 24 V signal level is applied to pins 07 and 08, the system is in run mode (motor running, system extracts, display lights up green). After the external 24 V signal level drops (no pulse), the system switches back to standby mode (motor is off, display flashes turquoise).

The contact is a 24V input which is protected against polarity reversal and transmits a galvanically isolated signal to the INSPIRE electronics via an optocoupler. As long as a 24 V signal level is present at the start/stop input, start/stop signals from the start/stop button of the front film are ignored.

RS232 commands can overwrite the signal level of the start/stop signal; the electronics then switch to run or standby mode although the signal level is still present or is no longer present. The system may not be controlled simultaneously via external control signals such as start/stop and RS232, as otherwise it falls into undefined states and a reset (switch off and then on again or software reset) must be carried out.



Run/Standby Jumper

The Run/Standby jumper is used to define the initial mode of the extraction and filter systems. It is designed as a bridge in the plug between pins 09 and 10 of the interface connection cable on the side of the extraction and filter system. In order to exclude errors in the operation of the system, it is not recommended to realize the jumper on the terminal strip of the target system.

If it is desired that the extraction and filter system starts directly in run mode after switching on at the mains switch, i.e. starts immediately with extracting, then pins 09 and 10 are not connected. If it is desired that the extraction and filter system starts directly in standby mode after switching on at the mains switch, i.e. does not start with extracting, then pins 09 and 10 must be connected.

10. Maintenance

Danger! The replacement of turbines or electrical components may only be carried out through authorized specialist personnel. Units with continuous-rotor motors are maintenance-free.

dust vacuum and filter systems are offered with four different motor concepts.

- Brush-type motors (only BF 9)
- EC brushless turbines
- EC brushless blowers
- IEC ATEX motor (only DT series)

The brush-type turbine is used wherever a cost-efficient solution is required and the daily operating time of the system is rather short.

Brushless turbines are the most common motors. They provide maintenance-free continuous operation and high vacuum at reasonable costs.

EC brushless blowers provide high air capacity at low energy consumption and low noise emissions.

10.1 Maintenance of Motors

For filter units with brush-type motor, it must be replaced after approx. 600-1000 operating hours (the maximum operating hours that can be achieved vary depending on the application). This is shown by the automatic shut-off of the turbine. A message is not shown on the display.

All other dust vacuum engine concepts are 100% maintenance-free.

10.2 Cleaning the Unit

Caution! For cleaning of the unit, appropriate protective equipment must be worn to avoid contamination with substances that may be hazardous to health.

- Before cleaning, the unit must always be switched off and the mains plug removed.
- The unit's housing is coated with a resistant varnish. A damp cloth and a household cleaning agent are sufficient for cleaning.
- Do not use solvents!

Units of the CR series or standard systems in stainless steel can also be cleaned with disinfectant and alcohol in accordance with the specified cleaning instructions.

- Pay attention that cleaning water does not enter into the electrical parts and the ventilation slots.
- When loosening filter modules to clean the system, make sure that the seals are not damaged and that the seals fit properly when the system is put back into operation.
- Dry everything well with a cloth.

Caution! Do not clean the saturation filter! Tapping out or blowing out with compressed air leads to the destruction of the filter medium; pollutants make their way into the room air.

(Exception: Filter cartridges in units of the FP series - These can be cleaned using the built-in automatic filter cleaning.

10.3 Filter Display, BF, RF, DF, LN, GL, CR, OEN150-Series

Caution! The individual filter stages must be checked regularly (at least once per week) and replaced if necessary to ensure constant extraction capacity and prevent system damage.

Caution! Replace filters only with the extraction switched off and wearing protective clothing!

Please observe:

- Particle filters may not be cleaned, these must be replaced!
- Activated carbon/BAC filters must be checked and changed regularly; they are not displayed in the filter monitoring of the system - Replacement recommendation: at least 1x per year.

Filter-saturation Indicator

Shows the filter saturation of all installed filter stages in the system together.

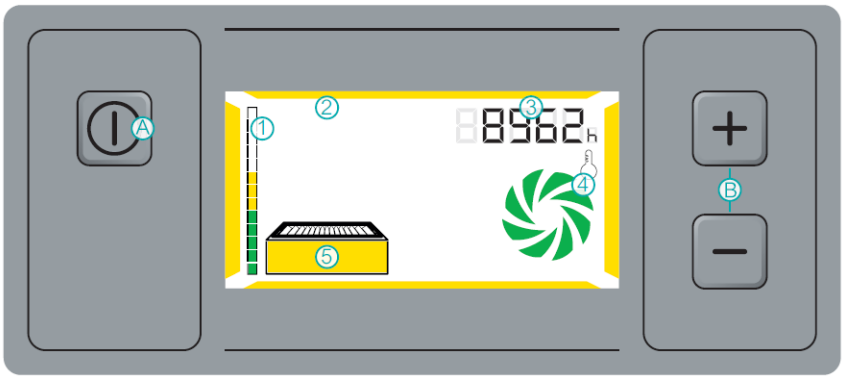


Figure 25: Filter display, INSPIRE control electronics for BF, GL, LN, OEN series

Filter-saturation indicator (item 1):	
Green	All filters OK.
Yellow	Check filter status indications (item 5) - reorder individual filters if necessary "Filter full" message via interface as soon as the last yellow stage is reached
Red	Max. filter saturation reached - System switches off - Replace filter

Filter Status Indication

Shows the filter saturation of all installed filter stages in the system together (no separate monitoring as for example with the TFS series)

Filter-saturation indicator (item 5):	
Green	All filters OK.
Yellow	Reorder filters; replace, as required.
Red	Max. filter saturation reached - System switches off - Replace filter

Note RF10, DF10, BF9 Set-D, BF10 Set-D

In general, filters are changed according to the filter status displays described above.

The following recommendation applies to filter and suction systems used in medicine, aesthetics and dental, regardless of the filter status display:

Interval	
Weekly	Replace pre-filter mat
Half-yearly	Replace main filter

The exchange takes place regardless of the filter status display for the following reasons:

- Possible contamination of the filter with viruses and the growth of fungi and bacteria on the surface. Biological contamination cannot be monitored via the filter display.
- Saturation of the activated carbon with process gases and their aging (even with a low pollutant content). This cannot be monitored via the filter display.

10.4 Filter Replacement, BF, RF, DF, LN200, GL200, OEN150 Series

Caution! All work described in the area of filter replacement may only be carried out with suitable protective equipment!

Caution! The individual filter stages must be checked regularly (at least once per week) and replaced if necessary to ensure constant extraction capacity and prevent system damage.

	Particle filters may not be cleaned, these must be replaced!

	**Caution!** Depending on the weight of the modules to be removed, lifting aids or several persons are required for the work!

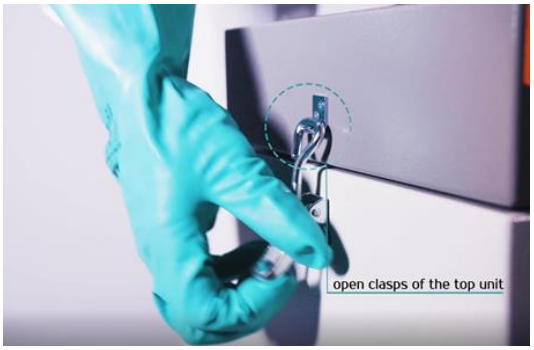
	**Warning!** The removed filters must be packed dust-tight and disposed of in accordance with local regulations!

Procedure for replacing filters:

- Switch off the system at the unit switch, pull the mains plug and secure against being switched on again.
- Remove the system lid (apply caution with any connected hoses).
- Remove filter.
- Inspect filters and replace saturated filters with new original filters, as required.
- Pack saturated filters air-tight in dust bags (article no. see section “Spare Parts” and dispose of, observing internal disposal and transport regulations.
- Put on system lid and close toggle fasteners.
- Check tight seating of hose connection.
- Connect the mains plug and switch unit on.

If it is necessary to remove the filter modules, make sure that the differential pressure nipples are not damaged and that the filter modules are correctly fitted.

Figure 26: Filter replacement, BF, LN 200, GL 200, OEN 150 Series



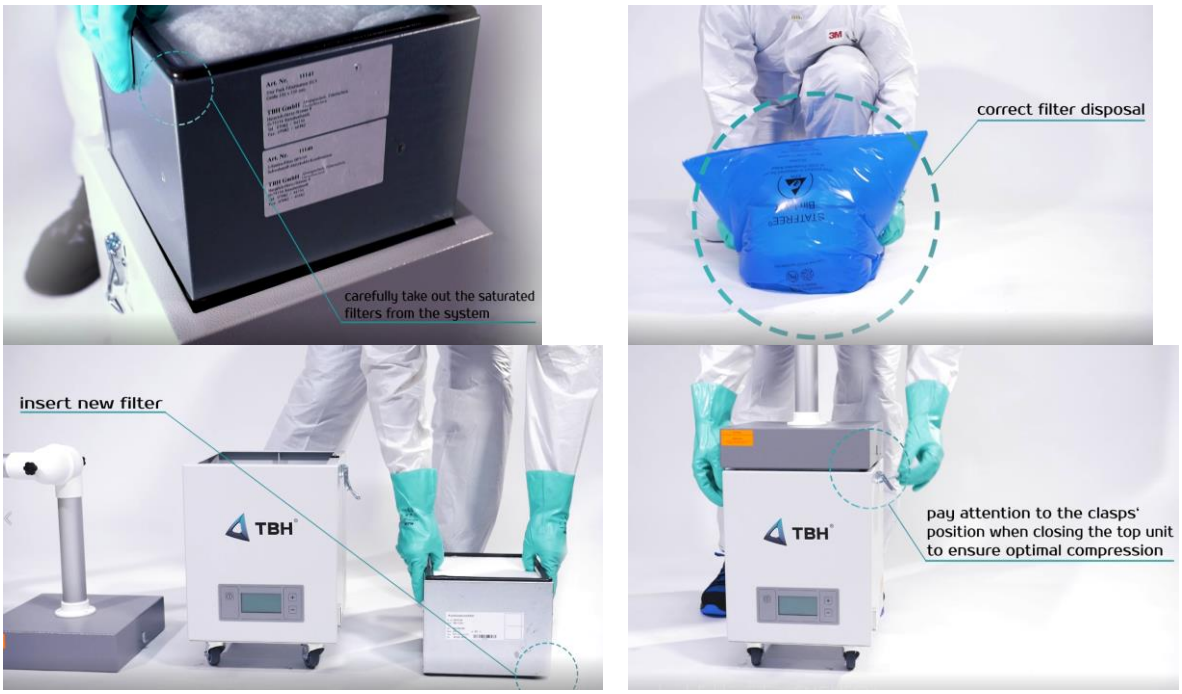


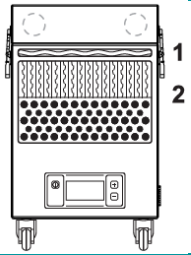
Figure 27: Filter replacement, BF9 Set-D, BF10 Set-D, RF10, DF10

11. Spare Parts and Spare Filters, BF, RF, DF Series

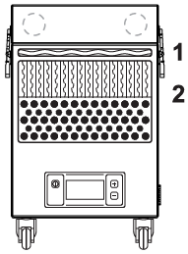
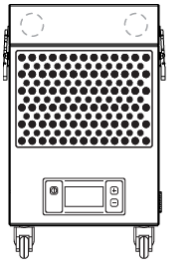
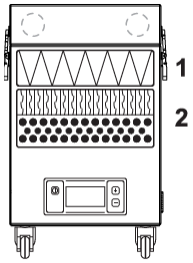
Designation	Art. No.	BF 5	BF 9	BF 10 RF 10 DF 10	BF100 BF200	BF1000 BF1200
Power cable 120 V, USA	11809	✓	✓	✓	✓	✓
Power cable 230V, DE	11693	✓	✓	✓	✓	✓
Power cable 230V, UK	11813	✓	✓	✓	✓	✓
Power cable 230V, IT	11805	✓	✓	✓	✓	✓
Power cable 230V, CH	11816	✓	✓	✓	✓	✓
Front film, saturation-filter systems	16176	✓	✓	✓	✓	✓
On/Off unit switch	11678	✓	✓	✓	✓	✓
Unit plug with fuse compartment	12705	✓	✓	✓	✓	✓
Rep.set turbine 100-240V, 1.1 kW with holding plate and seals	16825	-	-	-	✓	✓
Radial blower 24 VDC	15158	✓	-	-	-	-
Radial blower 100-240 V, 0.6 kW	15769	-	-	✓	-	-
Brush-type turbine, 120 V, 1.1 kW	15722	-	✓	-	-	-
Brush-type turbine, 230V, 1.1 kW	15721	-	✓	-	-	-
Phase-angle control	16596	-	✓	-	-	-
Control PCB 100-240 V*	16227	✓	✓	✓	✓	✓
Fuse 6.3AT / 250V	11881	✓	-	✓	-	-
Fuse 10AT / 250V	11910	-	✓	-	✓	✓

*To ensure that the replacement PCB is delivered correctly parameterized for your application/plant, the machine number must be stated when ordering. Subsequent (non-factory) settings made by the customer are lost.

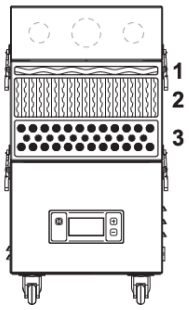
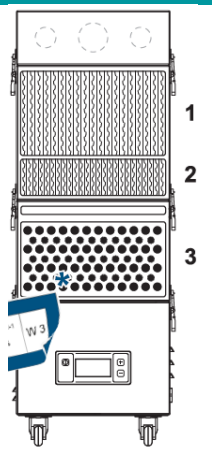
Spare filters BF5, BF9

	BF 5	BF 5 A	BF 9
			
Pre-filter mat	-	-	❶11141
2-stage filter (Particle filter + activated carbon filter	❶15119	-	❷11140
Active carbon filter	-	❷15715	-

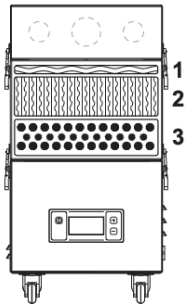
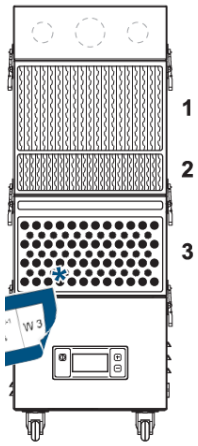
Spare Filters BF10, RF10, DF10

	Standard	A	ZA
			
Pre-filter mat	❶11141	-	-
Z-Line filter	-	-	❶15976
2-stage filter (Particle filter + activated carbon filter	❷11140	-	❷15119
Active carbon filter	-	❶11143	-

Spare filters BF100R, BF200R

	BF 100 R	BF 200 R
		
Pre-filter mat	❶10040	-
Z-LinepanelPlus filter	-	❶16199
Particle filter	❷10013	❷10013
Active carbon filter/BAC filter	❸10004	❸10007

Spare Filters BF1000R, BF1200R

	BF 1000 R	BF 1200 R
		
Pre-filter mat	❶10001	-
Z-LinepanelPlus filter	-	❶16360
Particle filter	❷10009	❷10009
Active carbon filter/BAC filter	❸10046	❸12052

12. Troubleshooting and Correction

Warning! In case of malfunctions, never open the turbine module! Danger of electric shock!

Malfunction:

- In case of a malfunction, check the indications on the front film.
- Switch off the system at the unit switch and stop the production process.
- Now, disconnect the system from mains.
- Check the filters and fuses of the system and replace them if necessary.
- Use the quick diagnosis or contact your sales partner if the problem persists.

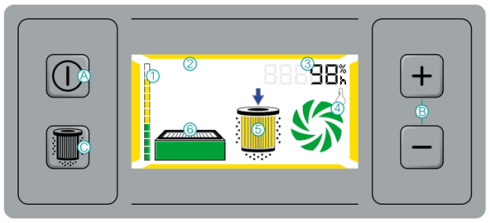
Accident:

- Firstly, remove the injured person from the danger area.
- Switch off the system at the unit switch and stop the production process.
- Now, disconnect the system from mains.
- In case of an accident, follow the company-internal instructions; these always have priority.
- Observe your company-physician's instructions for handling the extracted substances.

12.1 Quick Diagnosis

	Problem	Cause	Corrective Action
1	System does not start, no display on the front film	Power cable not plugged in	Plug in the power cable
		Fuses not inserted or defective	Check fuses and replace if necessary
		No voltage on the socket being used	Check fuses
		Power switch in Off position	Switch power switch ON
		Incorrect mains voltage	Check mains voltage
		Three-phase mains without neutral conductor	Check mains connection
2	System does not start, warning signal audible, turbine error lights up	Turbine failure / malfunction	Switch off the system and contact the manufacturer or national representative
	Filter saturation indicator lights up (green+yellow+red)	Filter fully saturated	Using the filter status indicator (depending on the system type), decide which filter needs to be changed and reorder replacement filters
	Error Temperature lights up	Temperature problem	Switch off the system and let it cool down. Check ambient temperature and extraction hose (blocked, length/cross section), restart the system, contact the manufacturer or national representative if the error occurs again.
3	System does not start, Run/Standby button flashes	System is in standby	Press the Run/Standby button
		Interface incorrectly wired **Attention! Interface partly only optionally available!**	Check interface Pin 7 = + Pin 8 = - For bridge between pin 9 and pin 10, the remote control has priority, switch system to Run via remote control
4	System is running, yellow warning flashing, filter saturation indicator lights up (green+yellow)	Filter partially saturated (depending on the system type, the affected filter is also displayed in yellow)	Green area - Filter saturation OK Yellow area - Re-order replacement filter Red area - Filter completely saturated - replace
5	Speed cannot be changed on the system	Remote control connected, external speed control (pin 14,15)	External speed control has priority over manually set speed on unit

		Attention! Interface partly only optionally available!	
6	Speed cannot be changed via the interface	Speed setting at the system has priority **Attention! Interface partly only optionally available!**	External speed control has priority over manually set speed on unit
7	No/little extraction capacity, filter saturation indicator does not indicate filter change	Extraction line blocked, defective, bent or not mounted	Clean or replace the extraction line.
		Extraction capacity not set correctly	Increase extraction capacity at speed controller (front) or remote control
		Motor / control system defective	Contact country representative
8	System runs unstable or vibrates strongly	Motor bearing defective	Replace motor or contact country representative
		Contamination on the impeller of motor	Check filters for leaks. Contact country representative if necessary



A	Run/Standby button	6	Filter Status Indication
C	Button for manual activation of filter cleaning (only on systems with filter cartridge)	Green:	Filter OK
		Yellow:	Check filter status indications (item 6) - Re-order filters if necessary
		Red:	Max. filter saturation reached - System switches off - Check filter status indications (item 6)
B	Extraction-capacity control	5	Filter cleaning status message (only on systems with filter cartridges)
1	Filter saturation indication (shows the filter saturation of all filters installed in the system)	4	Indication of error message Motor / Temperature
		3	Indication of capacity setting/hour meter
		2	Signalling of system error

Only FP 130/150

10	System does not dedust	Filter differential pressure not yet reached	In differential pressure monitoring mode, the system is in the green range or at the beginning of the yellow range; everything is OK.
		No compressed air on the line or compressed air line not connected	Check pressure or connect compressed air line: 1.5 - 2 bar
		Dedusting module not connected	Connect the dedusting cleaning cable to the socket below the interface.
		Dedusting module defective	Check cable and solenoid valve for damage; contact your country representative if necessary

		Incorrect dedusting settings	The customer can make individual configurations via the interface; if changes have been made here - check plausibility of settings.
11	System cleans permanently at short intervals	Filter cartridges heavily contaminated / Service life exhausted	The system tries to reduce the differential pressure of the filter cartridge with several dedusting cycles; if this fails, the filter is completely saturated and must be replaced.
12	System dedusts in very short intervals and then switches off	Filter service life exhausted / Filter completely saturated / no longer cleanable	If a set number of dedusting attempts is exceeded, the filter is completely saturated → Replace filter cartridges!!!
13	Dust escapes from filter housing	Dust container not installed	Open service door and install dust container
		Leakages at the dust container	Open service door and check seals; is dust container correctly braced?
Only FPV202			
14	System does not dedust	System not switched on	Switch on the system at the power switch
		No compressed air on the line or compressed air line not connected	Check pressure or connect compressed air line: max. 4 bar

13. Disposal / Decommissioning

The extraction of filtrates leads to contamination of the extraction and filter system and the extraction equipment with hazardous particles.

When the extraction and filter system is put out of operation, it must be ensured that the system itself and any contaminated attachments are safely dismantled and disposed of.

Please also observe the safety instructions in the section 'Filter Changing'!

When disposing of the extraction and filter system and the extraction equipment, it must be observed that the entire filter equipment is hazardous waste, which must be disposed of in accordance with local regulations. Depending on the contamination in the system and the extraction elements themselves, these must also be disposed of as hazardous waste.

When transporting, all safety instructions in the section 'Transport' must be observed.