



FFU 12/12 with additional heat exchanger and prefilter frame

## Description

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Fan Filter Units (FFUs) are used in many fields of application in order to reduce the concentration of particles in cleanroom facilities or parts of it. The fan filter units will be supplied ready for plug-in and are suitable for the use in cleanrooms with turbulent air flows or laminar flows up to class 3 according to DIN EN ISO 14644-1. They can be installed in any Lindner Reinraumtechnik cleanroom ceilings.

Fan filter units draw air in through a top-mounted prefilter or chiller when needed and blow out air through a high-grade filter into the cleanroom.

This fan filter unit is built up by a self-supporting casing made of aluminium. Supplied with plastic foam lining or mineral fibre mats for sound absorbing depending on their field of application.

The fans are electronically commutated (EC) giving them an extremely high energy efficiency. An interface at the drive unit allows that the fan filter units can be integrated into a network from where they can be controlled and monitored via a central control unit.

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**Technical Basic Equipment**

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Casing	<p>Torsion-free, self-supporting, tight and easy to decontaminate construction made of clean aluminium sheets.</p> <p>The sound absorbing material for the pharmaceutical, medical and food industry is a plastic foam lining, which has a good sound absorption coefficient. Wiping-proof through a sound transparent skin finish. Density: approx. 9 kg/m<sup>3</sup>, reaction to fire according to DIN 4102 B1.</p> <p>For non-pharmaceutical areas, surface technology and microelectronics industries is the sound absorbing material glass or mineral fibre mats with non-woven fabric making it abrasion-proof. Very high sound absorption coefficient. Density: approx. 60 kg/m<sup>3</sup>, reaction to fire according to DIN 4102 A2 (glass fibre) or A1 (mineral fibre).</p> <p>There are two nozzles on top where the testing probe for the aerosol supply and the fittings for measuring of the raw air can be connected to measure the leakage of the filter. Furthermore the latter nozzle can also be used for controlling the filter pressure difference.</p> <p>Grip mounts make the transport and installation of the fan filter units easier.</p>
Particle Filter	<p>Filter frame consisting of aluminium profiles, easy to decontaminate and resistant to disinfectants. An expanded metal mesh protects the filter medium for being damaged.</p> <p>H14 filter according to DIN EN 1822 are hydrophobic micro glass fibre papers laid in narrow, V-shaped pleats. Due to the great filter surface a lower initial pressure drop is possible. This saves energy costs and prolongates the lifetime of the filter reducing also the operating costs. A scan test report is delivered by the manufacturer.</p> <p>Depending on type of fan filter unit and from which side the filters should be changed from below (cleanroom side) or from above (ceiling void), the sealing between filter and casing is carried out as a dry or fluid seal.</p>
Fan	<p>External rotor motor. Electronically commutated DC motor with integrated electronic for communication in a data network via data bus protocol.</p> <p>Plastic blade wheel in extremely low-noise design with backward curved blades.</p>

## Options

Casing	<p>Available options:</p> <ul style="list-style-type: none"> <li>• Stainless steel</li> <li>• Zinc-electroplated steel</li> <li>• Colours accord. to NCS or RAL</li> <li>• Anodised aluminium</li> </ul>
Particle Filters	<p>Optionally to H14 filters, superior grade glass fibre filters from U15 up to U17 are possible. Glass fibre filters applied in high temperature areas are supplied with separators made of aluminium.</p> <p>Instead of glass fibre filters teflon filters can be applied.</p>
Fans	<p>Alternatively, the fan control unit can be activated by a 0-10VDC signal sent directly from a control cabinet or via a 10k<math>\Omega</math> preset-potentiometer in form of a simple rotary knob in the immediate vicinity of the unit.</p> <p>Blade wheels also available in aluminium.</p>
Prefilter	<p>For a prefiltering of the air, a filter frame can be mounted on the fan intake to receive a changeable prefilter. The filter classes here are G4, F7 or F9.</p>
Heat exchanger	<p>The installation of an heat exchanger on the intake side of the unit is possible if the air must be conditioned to temperatures needed. The sensitive (free from condensate) cooling capacity to be provided can be regarding the flow rate maximal 7 kW in process areas with a 12/12 fan filter unit. From a physiological point of view a much smaller capacity of approx. 2 kW should be pursued for common rooms and workplaces.</p> <p>However, heating capacities can be significantly higher.</p>
Diffusors	<p>To obtain a better distribution (specially of the cooled air), perforated metal plates can be fixed below the units to the ceiling grid in the cleanroom. The air then will be partly diverted horizontally.</p>
Ducting interface	<p>If the units should be connected to a ductwork of an existing air handling system or to an own air circulation net, the unions of the 12/12 and 12/06 fan filter units should have a size of 400 x 400 mm or <math>\varnothing</math>400 mm and 300 mm with 06/06 units.</p>
EX-Protection	<p>Explosion-proof fan filter units are possible, but need to be clarified in detail at an early stage.</p>

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**Control System**

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EC-Technology	<p>Each motor has a commutating unit changing a single phase 230 V AC voltage into a lower DC voltage. Simultaneously the revolution speed will be compared with the set rotation speed and if needed adjusted.</p> <p>The set rotation speed can be adjusted via a data bus protocol or in another case via a 0-10-VDC-signal.</p> <p>If the data bus protocol is applied, the fan filter units will be provided with an unique address and thus can be later on easily identified by a linear configured network via this address.</p> <p>If the 0-10-VDC-signal is applied, each fan filter unit will be directly connected via a separate cable with the outputs of the control cabinet.</p>
Simple operating units	<p>With one control and monitoring unit 200 fan filter units can be controlled via one network. For controlling fan filter units in groups (for example per room or production line), several fan filter units can be connected to logical groups (max. 8 groups) independently from the addressing or wiring sequences.</p> <p>Via digital inputs at the control and monitoring unit (for example emergency stop, night setback, starting signal) an intervention from external is possible.</p> <p>Analog inputs allow the regulation of single fan filter units or groups of it if speed and pressure sensors are connected and assigned.</p> <p>An internal clock allows a closed day and night operation.</p> <p>Interferences will be monitored via a red LED and on the display and if available transferred to a higher-level GLT as omnibus fault message.</p>
Central PC / GLT	<p>If a higher number of fan filter units should be controlled or a graphical diagram of the total unit is required, the EC-technology offers the possibility to do these work via a PC.</p> <p>The measuring and control technology offers unlimited possibilities and can be configured as requested by the planner and user.</p>

**Installation options**

Filter change	Filter seal type	Ceiling type	drawing
from above	Dry seal ▶ Direct mounting	Crossdata 55A	k37877
		Line 55A until 2023	k32631
		Line 55A2 from 2023	k153331
		Line 80S, Typ 2	k117541
		Line 100S, Typ 2	k117532
from room side	Dry seal ▶ Support bracket	Crossdata 55A	k49040
		Line 55A until 2023	k49041
		Line 55A2 from 2023	k153389
	Fluiddichtung ▶ RSC-Rahmen	Crossdata 55A	k73396
		Line 55A until 2023	k73395
		Line 55A2 from 2023	k153383
		Line 80S, Typ 2	k73399
	Fluid seal ▶ Support bracket ▶ RSC-Frame	Line 100S, Typ2	k117537
		Crossdata 55A	k86551
		Line 55A until 2023	k116760
	Line 55A2 from 2023	k155957	

**Technical data FFU 12/12**

Length x Width (unit) *	1080 - 1162 mm x 1080 - 1162 mm
* note: The dimensions depend on the type of installation in the ceiling grid	
Height (without filter)	350 mm
Air flow rate with 0,45 m/s	1.830 – 2.218 m <sup>3</sup> /h
Weight	46 kg

Filter class	H14
Length x Width (Filter) *	1055 - 1170 mm x 1055 - 1170 mm
* note: The dimensions depend on the type of installation in the ceiling grid	
Height with dry seal	110 mm
Filtration efficiency	99,995 % (mpps)
Initial pressure loss	100 Pa

Nominal voltage	230 V
Voltage range	200 - 277 VAC
Frequency	50/60 Hz
Frame size rotor	400 mm

**Fan (ebmbus)**

Revolving speed	max. 1.280 min <sup>-1</sup>
Pressure reserve at 0,45 m/s	170 Pa
Power input (starting at)	max. 340 W
Current consumption	1,7 A

**Fan (modbus)**

Revolving speed	max. 1.450 min <sup>-1</sup>
Pressure reserve at 0,45 m/s	260 Pa
Power input (starting at)	max. 500 W
Current consumption	1,7 A

**Technical data FFU 12/06**

Length x Width (unit) *	1080 - 1162 mm x 480 - 562 mm
* note: The dimensions depend on the type of installation in the ceiling grid	
Height (without filter)	350 mm
Air flow rate with 0,45 m/s	778 – 1.080 m <sup>3</sup> /h
Weight	26 kg

Filter class	H14
Length x Width (Filter) *	1055 - 1170 mm x 455 - 570 mm
* note: The dimensions depend on the type of installation in the ceiling grid	
Height with dry seal	110 mm
Filtration efficiency	99,995 % (mpps)
Initial pressure loss	100 Pa

Nominal voltage	230 V
Voltage range	200 - 277 VAC
Frequency	50/60 Hz
Frame size rotor	310 mm

**Fan (ebmbus)**

Revolving speed	max. 2.100 min <sup>-1</sup>
Pressure reserve at 0,45 m/s	440 Pa
Power input (starting at)	max. 410 W
Current consumption	1,7 A

**Fan (modbus)**

Revolving speed	max. 2.250 min <sup>-1</sup>
Pressure reserve at 0,45 m/s	500 Pa
Power input (starting at)	max. 500 W
Current consumption	1,7 A

**Technical data FFU 06/06**

Length x Width (unit) *	480 - 562 mm x 480 - 562 mm
* note: The dimensions depend on the type of installation in the ceiling grid	
Height (without filter)	350 mm
Air flow rate with 0,45 m/s	355 - 526 m <sup>3</sup> /h
Weight	21 kg

Filter class	H14
Length x Width (Filter)	455 - 570 mm x 455 - 570 mm
* note: The dimensions depend on the type of installation in the ceiling grid	
Height with dry seal	110 mm
Filtration efficiency	99,995 % (mpps)
Initial pressure loss	100 Pa

Nominal voltage	230 V
Voltage range	200 - 277 VAC
Frequency	50/60 Hz
Frame size rotor	250 mm

**Fan (ebmbus)**

Revolving speed	max. 3.100 min <sup>-1</sup>
Pressure reserve at 0,45 m/s	570 Pa
Power input (starting at)	max. 310 W
Current consumption	1,7 A

**Fan (modbus)**

Revolving speed	max. 3.600 min <sup>-1</sup>
Pressure reserve at 0,45 m/s	820 Pa
Power input (starting at)	max. 480 W
Current consumption	1,7 A

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