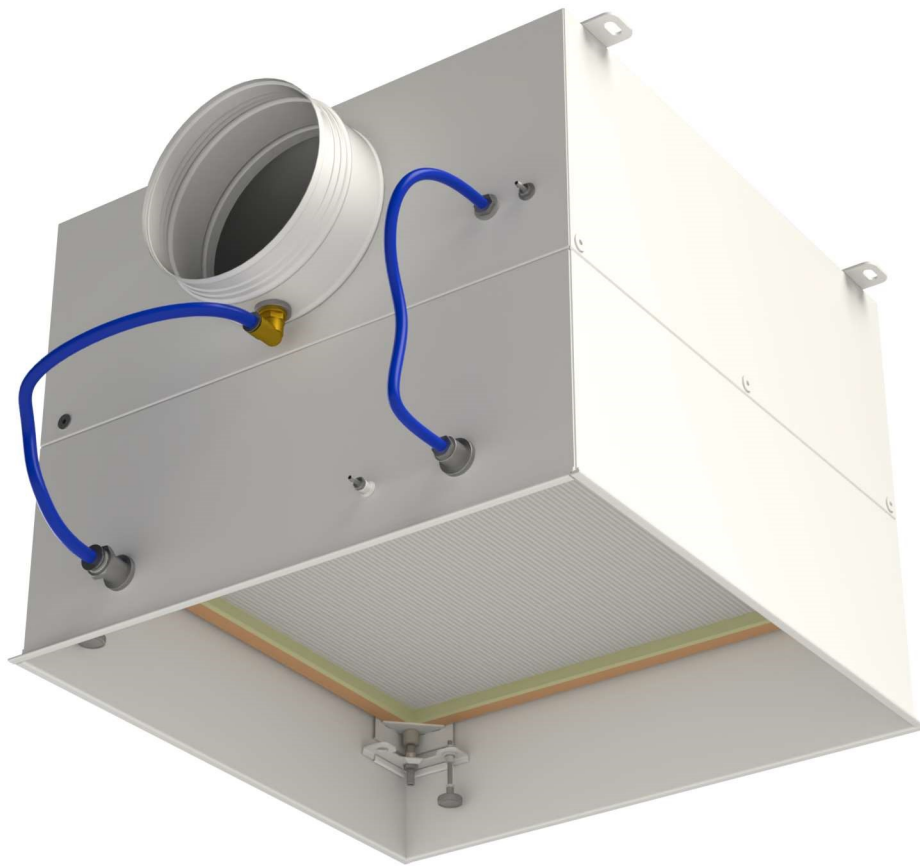




Particle filter box FKU



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Particle filter box FKU

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Particle filter box FKU

Description

The particle filter box, type FKU for installation of filter cells with rubber seal has been particularly developed for use in clean-rooms required by the pharmaceutical, electronic, precision mechanical and optical industries in hospitals and laboratories. The integrated particle filter (to DIN EN 1822) removes particles, radioactive dust, mist, bacteria, viruses, etc., from the supply or return air. This ensures that the incoming and outgoing air flows are extremely clean and germ-free.

The filter cell along with the rubber seal is mounted in the box by the filter pressure device such that the rubber seal is pressed in at the filter cell.

The filter box type FKU consists of electrolytically galvanised sheet steel painted to RAL 9010 (white) with a round connection spigot for hose connection while the type FKU-Q-... has a rectangular pipe with connection flange. A filter pressure device in the filter box ensures a safe seal. As a standard feature, a differential pressure and aerosol monitoring device (-D1) is integrated into the particle filter box.

Optionally, the particle filter boxes (except type FKU-Q-...) are additionally equipped with a shut-off damper sealing air-tight. With the type FKU-H-...-M001-..., this shut-off damper can be adjusted manually from below after the air diffuser is removed. The actuation of the FKU-...-Exxx-... with electrical actuator takes place via an actuator OPEN/CLOSED 24 V with or without spring return.

Leakage at closed damper blade according to DIN EN 1751, class 4, at a duct pressure of up to 1000 Pa.

Attention:

We would like to point out that we supply the filter boxes with integrated spacers for fitting the filter clamps and the diffuser assembly pole brace. This makes it possible to fit the diffuser without additional expense, even when the filter has not yet been inserted into the filter box.

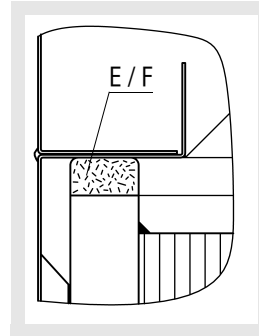
The assembly of the air diffusers is effected via magnetic fastening. This allows the air diffusers to be easily taken off for filter replacement and decontamination without requiring tools. The following ceiling diffusers in supply and return air models are suitable to be fitted to the particle filter box type FKU:

FDQJ and FPIL. Magnetic fastening is generally not possible for FPIL and for diffusers made of aluminium and stainless steel. These diffusers are mounted via central fastening (-VM).

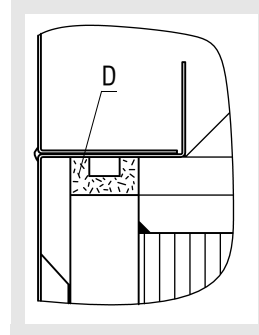
If required, the suitable particle filters can be included in the delivery.

Rubber seal on particle filter (for safe sealing)

without seal leakage monitoring system



with seal leakage monitoring system



E = Continuous seal (standard, PU-foamed)

D = U-profile seal

F = Flat seal (EPDM)

Leakage seal monitoring test for terminal filters from H 13 through leakage test according to DIN EN ISO 14644 and VDI 2083.

The filter boxes in stainless steel design 1.4301 are delivered together with the diffuser FDQJ made of stainless steel. FPIL is not available in connection with particle filter boxes made of stainless steel.

Particle filter box FKU

Construction

Filter box

- electrolytically galvanised sheet steel (-SB)
- painted inside and outside, RAL colour 9010 (white) (-9010)
- painted inside and outside, colour can be freely selected (- xxxx)
- Stainless steel V2A (-V2-0000, at an extra charge)

shut-off damper

- Galvanised sheet steel (only available for -SB)
- Stainless steel V2A, 1.4301 (only available for -V2)

Differential pressure device/aerosol monitoring device (-D1)

- with measuring spigot inside the box, for hose connection with an outer diameter of 10 mm

Model

FKU-H-...-M000-... - with horizontal, round connection spigot, without shut-off damper

FKU-H-...-M001-... - with horizontal, round connection spigot and manually adjustable shut-off damper.

Leakage at closed damper blade according to DIN EN 1751, class 4, at a duct pressure of up to 1000 Pa.

FKU-H-...-Exxx-... - with horizontal, round connection spigot and electrically (OPEN/CLOSED actuator) adjustable shut-off damper with/without spring return.

Leakage at closed damper blade according to DIN EN 1751, class 4, at a duct pressure of up to 1000 Pa.

FKU-V-...-M000-... - with vertical, round connection spigot, without shut-off damper

FKU-V-...-M001-... - with vertical, round connection spigot and manually adjustable shut-off damper.

Leakage at closed damper blade according to DIN EN 1751, class 4, at a duct pressure of up to 1000 Pa.

FKU-Q-... - with horizontal, rectangular spigot, with connection flange

FKU-...-Z-... - supply air

FKU-...-A-... - return air

Filter boxes for air diffusers:

(must be ordered separately)

FKU-...-41-... - for ceiling swirl diffuser FDQJ-...

FKU-...-42-... - for ceiling impulse diffuser FPIL-...

For description of diffusers, see pages 12+13.

Accessories

Seal leakage monitoring system (-P1)

- inside the box, for particle filters with U seal only.

Differential pressure device / aerosol monitoring device

- With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with 2 measuring spigots on the box outside, for a hose with an inner diameter of 4 mm (-D2).
- With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with 2 measuring spigots on the box outside, for a hose with an inner diameter of 4 mm and aerosol feeding device in the spigot of the box inside (-D3).
- With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with aerosol feeding device in the spigot of the box inside (-D4).
- With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with aerosol feeding device in the spigot on the outside (-D5).
- With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with 2 measuring spigots on the box outside, for a hose with an inner diameter of 4 mm and aerosol connection from the box inside to the on-site connection (-D6).

Differential pressure transducer (-U1)

- only available in connection with differential pressure / aerosol monitoring devices (-D2, -D3 and -D6).
- supplied loose or optionally mounted to box outside

Rubber lip seal (-GD1)

- Special rubber (not for FKU-Q)

Particle filter (FIL-...)

- Filter frame H=75 mm
- UDS (-1, standard)/UXS (-2) made of MDF wood. Without handle cover (-G0, standard) or with double-sided handle protection (-G1, at an extra charge).
- UXA (-3), made of aluminium. With double-sided handle protection (-G1).
- Rubber seal on filter housing either with continuous seal (-E, standard), U-profile seal (-D) or flat seal (-F).
- Filter classes for fine dust ISO ePM 10 \geq 70% to ISO ePM 1 \geq 90% (-F07 to -F09) / HEPA H13 (-H13, \geq 99,95%) / HEPA H14 (-H14, \geq 99,995%).
- Filter checked by means of oil thread test (-O, standard) or scan test (-S, at an extra charge) according to DIN EN 1822.
- Temperature-resistant up to 80°C. Filter wrapped in film

Antibacterial coating

- without coating (-AB0, standard)
- with coating (-AB1, at an extra charge)

Particle filter box FKU

Fastening

Magnetic fastening (-MB)

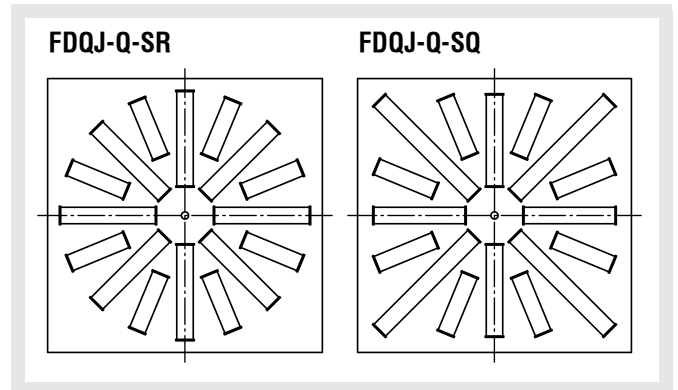
- only available for NW 400-650
- only available as sheet steel model (-SB)
- only available for ceiling diffuser FDQJ-...-SB (standard).
- not available for ceiling diffuser FPIL.

Concealed mounting (-VM)

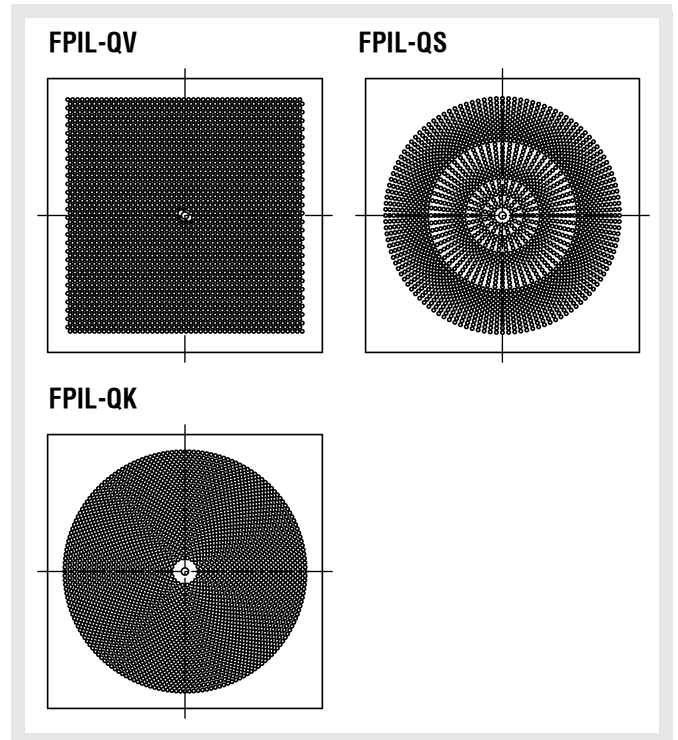
- pole brace fastening
- Standard for ceiling diffuser FDQJ-...-AL/-V2, FDQJ-...-SB at an extra charge.
- Standard for ceiling diffuser FPIL.

Ceiling diffuser selection

Ceiling swirl diffuser FDQJ (-41)



Ceiling impulse diffuser FPIL (-42)

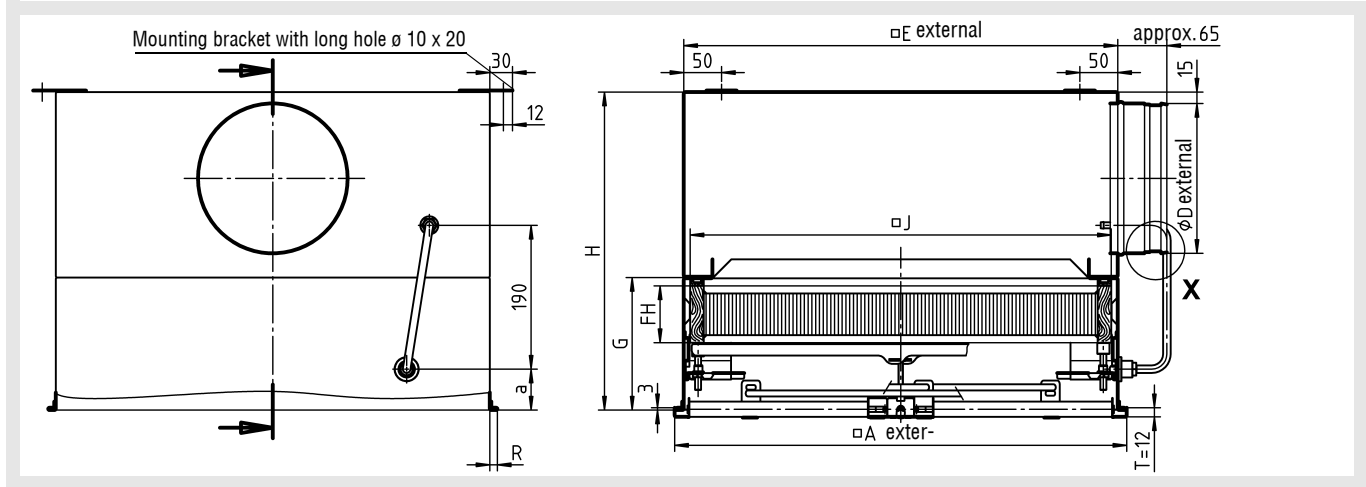


Particle filter box FKU

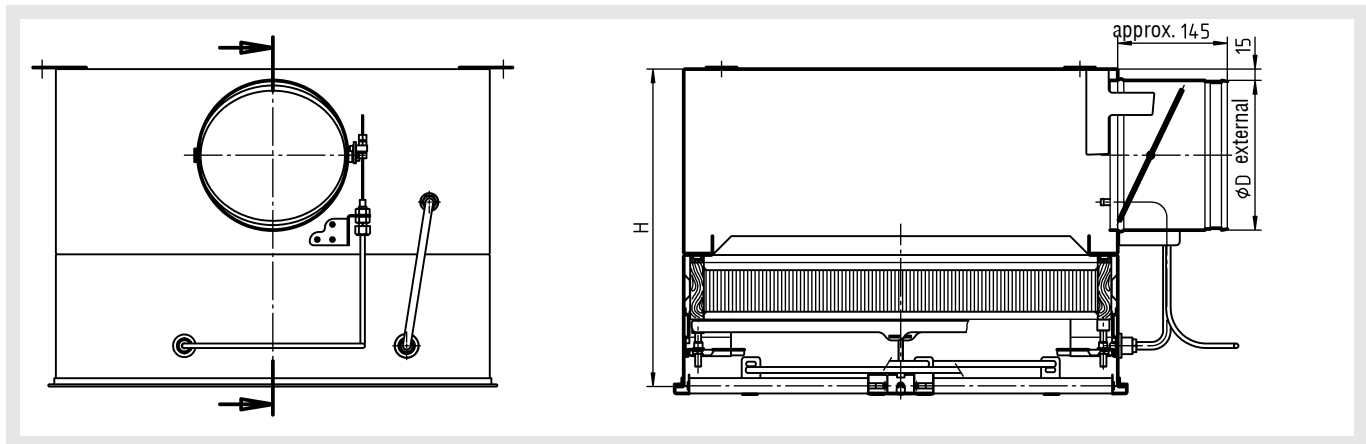
Models and dimensions

Dimensions

FKU-H-...-M000-D1-...-P0-...



FKU-H-...-M001-D1-...-P0-...



Available sizes

NW	Filter dimensions		□ A	øD	□ E	R	FDQJ-Z / FDQJ-A (supply air / return air)			FPIL-A (return air)			FPIL-Z (supply air)		
	□ J	FH					H	G	a	H	G	a	H	G	a
400	357	75	398	148	374	10	370	175	54	370	175	54	410	215	94
500	457	75	498	158	474	10	380	175	54	380	175	54	420	215	94
600	557	75	598	198	574	10	420	175	54	420	175	54	460	215	94
625	575	75	623	198	592	12	420	175	54	420	175	54	460	215	94
650	610	75	648	248	627	10	470	175	54	470	175	54	510	215	94
800	754	75	798	248	771	13,5	470	175	54	-	-	-	-	-	-

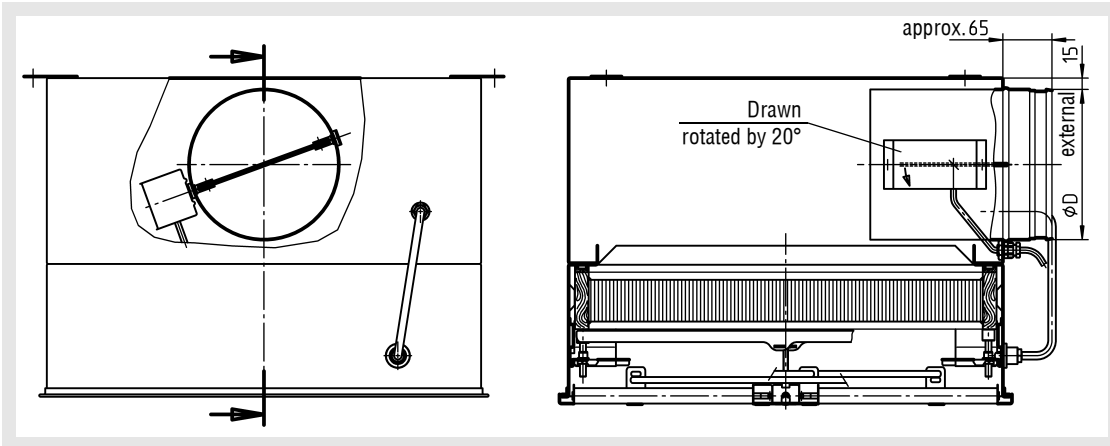
Air diffusers for NW 650 consist of a 650x650 mm faceplate having a drill pattern of size 600.

For seal leakage monitoring system/differential pressure device/aerosol monitoring device, see page 10.

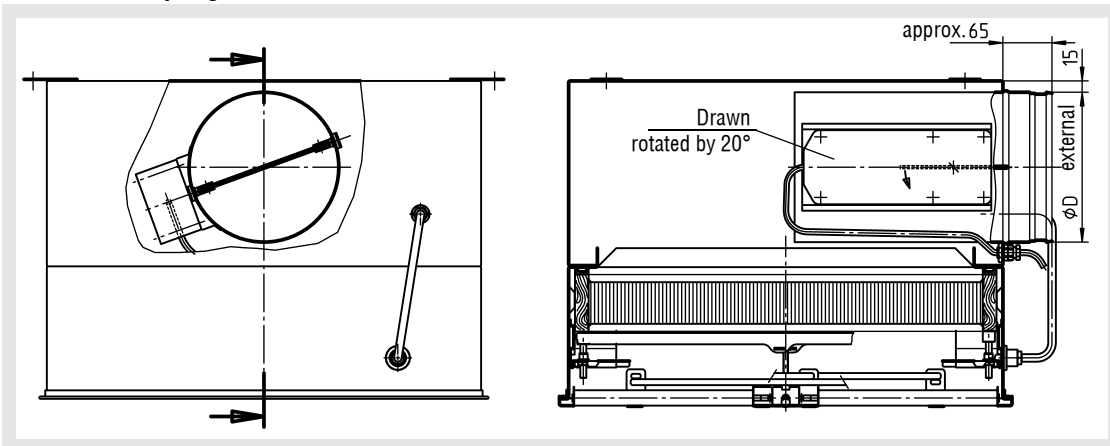
Particle filter box FKU

FKU-H-...-Exxx-D1-...-P0-...

Actuator without spring return



Actuator with spring return

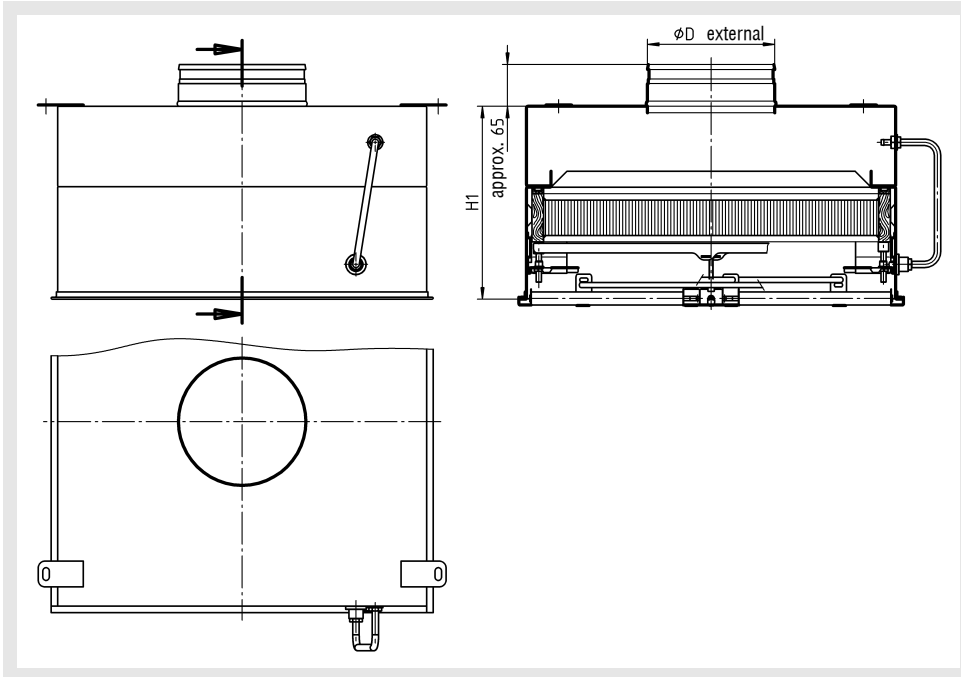


Attention!

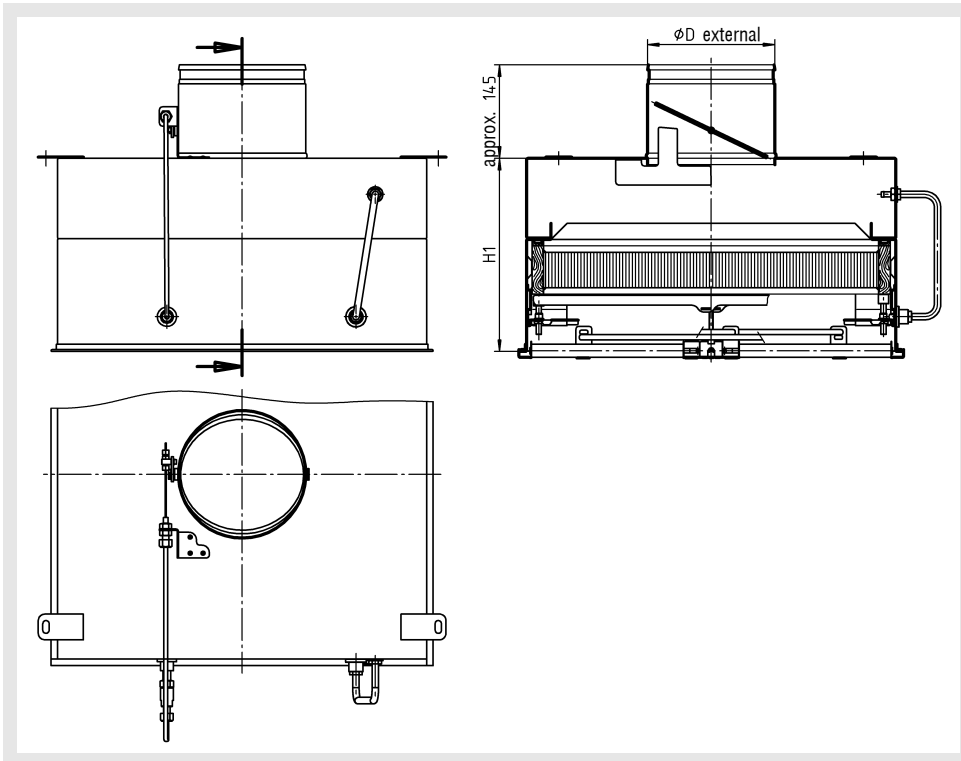
With the FKU-V model, the actuator cannot be mounted to the shut-off damper!

Particle filter box FKU

FKU-V-...-M000-D1-...-P0-...



FKU-V-...-M001-D1-...-P0-...

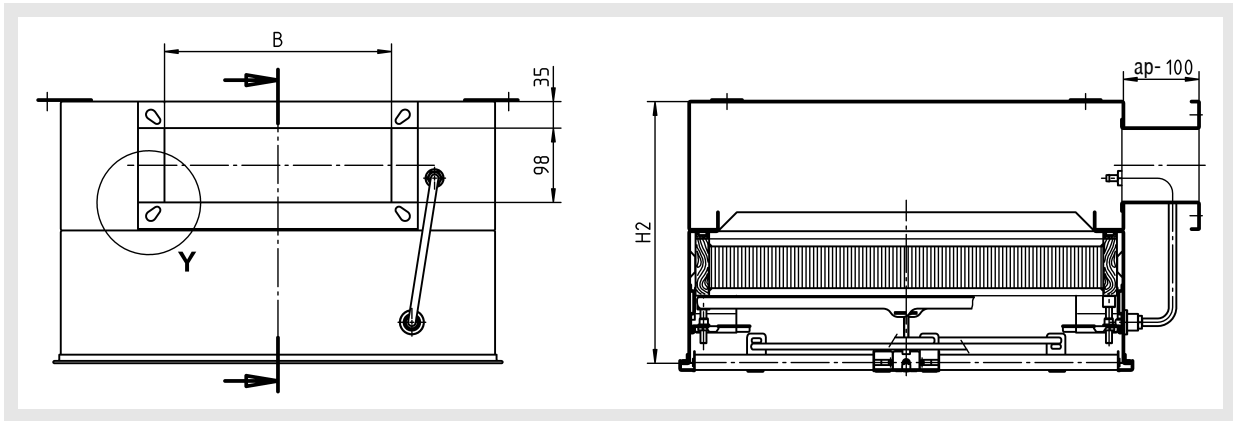


Available sizes

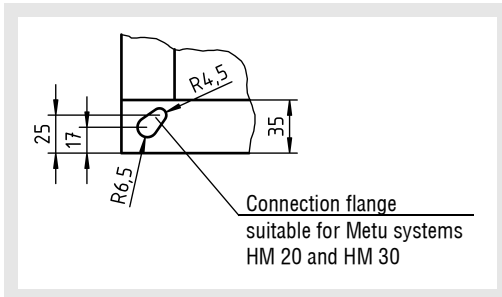
NW	H1		
	FDQJ-Z / FDQJ-A (supply air / return air)	FPIL-A (return air)	FPIL-Z (supply air)
400-650	300	300	340
800	300	-	-

Particle filter box FKU

FKU-Q-...-D1-P0-...



Detail Y



Available sizes

NW	B	H2		
		FDQJ-Z / FDQJ-A (supply air / return air)	FPIL-A (return air)	FPIL-Z (supply air)
400	200	345	345	385
500	250			
600	300			
625	300			
650	300			
800	500	-	-	-

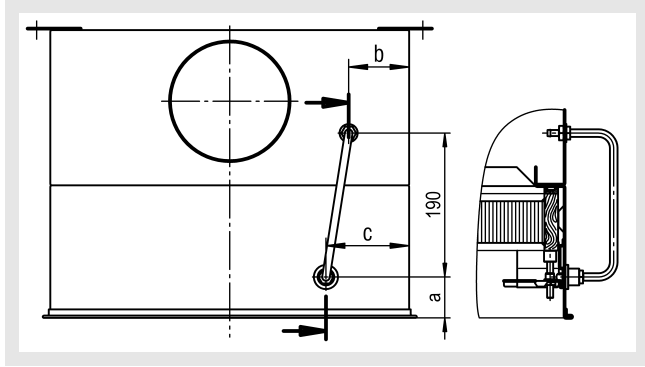
Particle filter box FKU

Differential pressure device / aerosol monitoring device

applies to models -H and -V

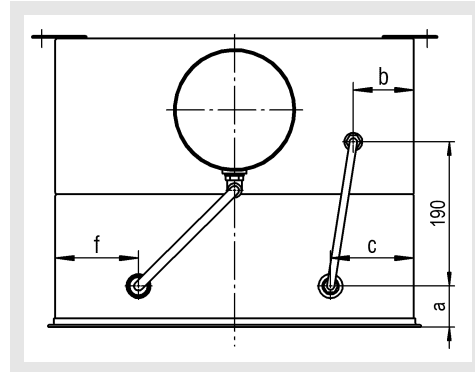
FKU-...-D1 (standard)

With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm.



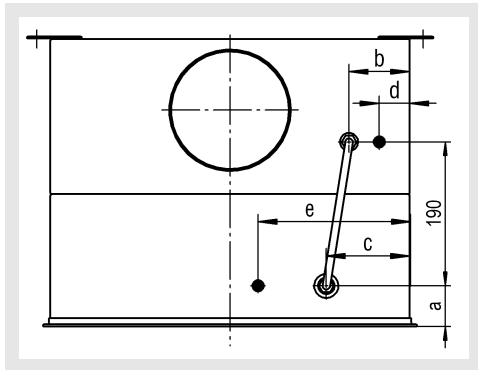
FKU-...-D4 (at an extra charge)

With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with aerosol feeding device in the spigot of the box inside.



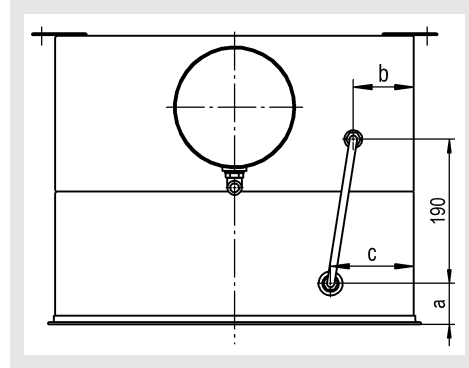
FKU-...-D2 (at an extra charge)

With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with 2 measuring spigots on the box outside, for a hose with an inner diameter of 4 mm.



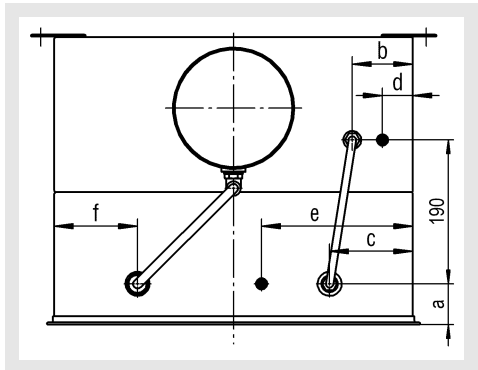
FKU-...-D5 (at an extra charge)

With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with aerosol feeding device in the spigot on the outside.



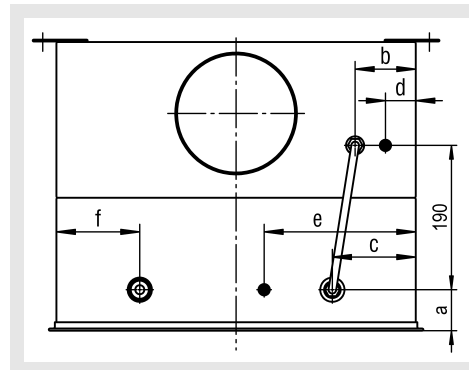
FKU-...-D3 (at an extra charge)

With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with 2 measuring spigots on the box outside, for a hose with an inner diameter of 4 mm and aerosol feeding device in the spigot of the box inside.



FKU-...-D6 (at an extra charge)

With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with 2 measuring spigots on the box outside, for a hose with an inner diameter of 4 mm and aerosol connection from the box inside to the on-site connection.



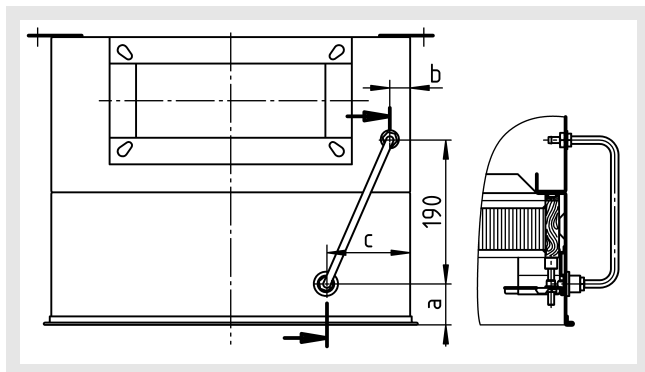
NW	b	c	d	e	f
400	90	120	50	180	147
500-650	80	110	40	200	110
800	80	80	40	290	80

Particle filter box FKU

Differential pressure device / aerosol monitoring device
applies to model -Q

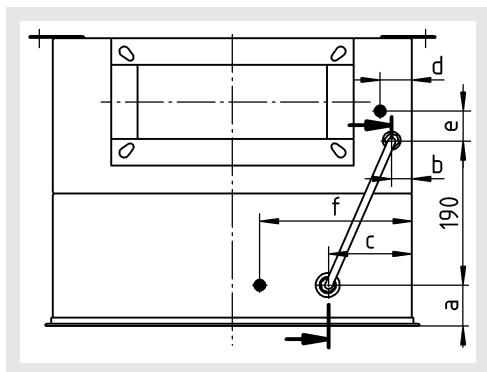
FKU-...-D1 (standard)

With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm.



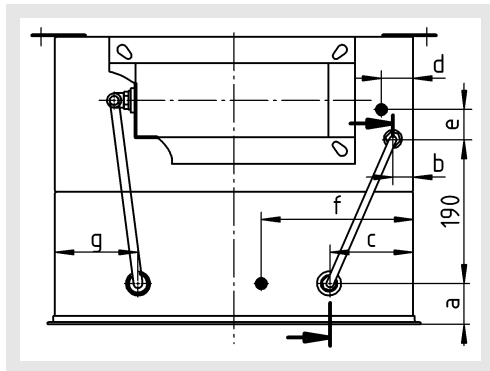
FKU-...-D2 (at an extra charge)

With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with 2 measuring spigots on the box outside, for a hose with an inner diameter of 4 mm.



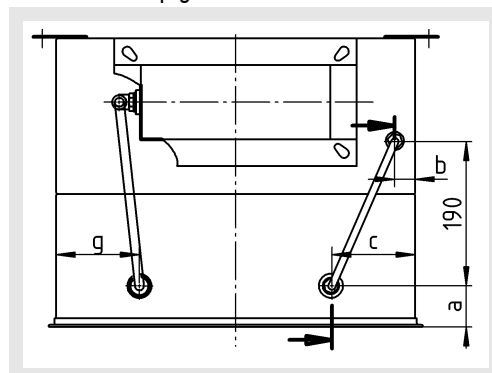
FKU-...-D3 (at an extra charge)

With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with 2 measuring spigots on the box outside, for a hose with an inner diameter of 4 mm and aerosol feeding device in the spigot of the box inside.



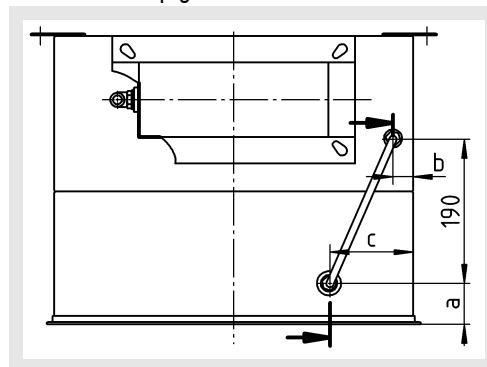
FKU-...-D4 (at an extra charge)

With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with aerosol feeding device in the spigot of the box inside.



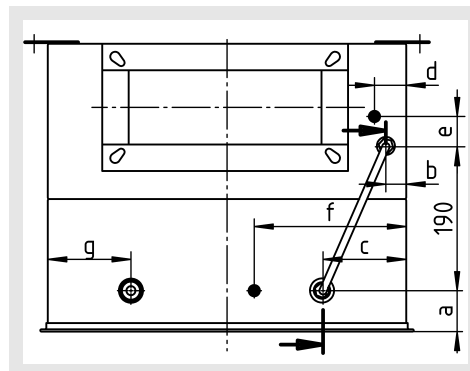
FKU-...-D5 (at an extra charge)

With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with aerosol feeding device in the spigot on the outside.



FKU-...-D6 (at an extra charge)

With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with 2 measuring spigots on the box outside, for a hose with an inner diameter of 4 mm and aerosol connection from the box inside to the on-site connection.



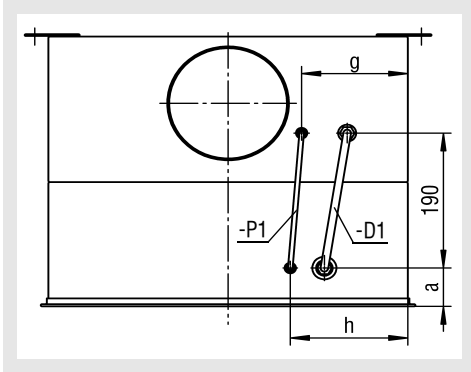
NW	b	c	d	e	f	g
400	62	120	27	-	180	147
500-650	27	110	42	40	200	110
800	23	80	38	40	290	80

Particle filter box FKU

Tight seal test

FKU-...-P1 for model -H and -V (at an extra charge)

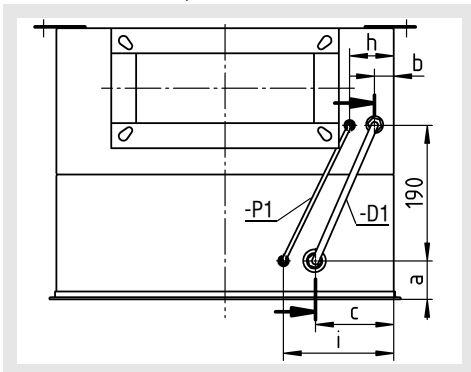
Seal leakage monitoring system inside the box (only for particle filters with U seal).



NW	g	h
400	294	264
500-650	140	155
800	140	

FKU-...-P1 for model -Q (at an extra charge)

Seal leakage monitoring system inside the box (only for particle filters with U seal).



NW	h	i	c
400	312	264	90
500-650	62	155	140
800	58	140	144

Available sizes

NW	a		
	FDQJ-Z / FDQJ-A (supply air / return air)	FPIL-A (return air)	FPIL-Z (supply air)
400-650	54	54	94
800	54	-	-

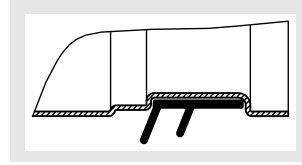
Accessories - dimensions

(at an extra charge)

Rubber lip seal (-GD1)

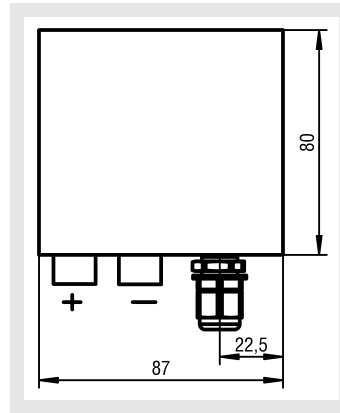
Detail X

not for model FKU-Q-...!



Differential pressure transducer (-U1)

Only available in connection with differential pressure / aerosol monitoring devices (-D2, -D3 and -D6). Supplied loose or optionally mounted to box outside.



- Output: 0 - 20 mA
- 24 V AC/DC
- 1 relays

Particle filter box FKU

Ceiling diffusers

The diffusers FDQJ and FPIL are models especially designed for filter boxes. These diffusers can only be used with the corresponding filter boxes. Their ventilation characteristics are identical to those of the standard air diffusers DQJ-... and PIL-...

Ceiling swirl diffuser FDQJ (-41)

Construction

Faceplate

- Sheet steel (-SB)
 - painted to the RAL colour 9010 (white) (-9010)
 - painted to a different RAL colour (-xxxx)
- Stainless steel V2A (-V2-0000) (only possible with concealed mounting)
- Natural colour anodised aluminium (-AL-ELOX) (only possible with concealed mounting)

Blades

- made of plastic
 - similar to RAL colour 9005 (black) (-L9005)
 - similar to RAL colour 9006 (grey) (-L9006)
 - similar to RAL colour 9010 (white) (-L9010)
- Painted aluminium, RAL colour can be freely selected (-Axxxx) (subsequent adjustment of blades not possible)

Blade fixing

- Painted sheet steel (with -SB/-AL model)
- Stainless steel V2A, 1.4301 (with -V2 model)

Blade holder

- Aluminium ducts / plastic for -V2

Pole brace fastening (only with concealed mounting)

- Plastic / stainless steel for -V2

Pole brace holder (only with concealed mounting)

- Galvanised sheet steel / stainless steel for -V2

concealed mounting pole brace (only with concealed mounting)

- Aluminium / stainless steel for -V2

Antibacterial coating

- without coating (-AB0, standard)
- with coating (-AB1)

Model

- FDQJ-Q-... - Square faceplate
- ...-SR-... - with circular blade pattern
- ...-SQ-... - with square blade pattern
- ...-Z-...-PS-... - for supply air, with continuous blades
- ...-A-...-PO-... - for return air, without blades
- Nominal size - NW 400 to 800
- Drill pattern:
- ...-000 - not reduced (standard)
- ...-310 to 600 - reduced drill pattern

Fastening

Magnetic fastening (-MB), with safety cable

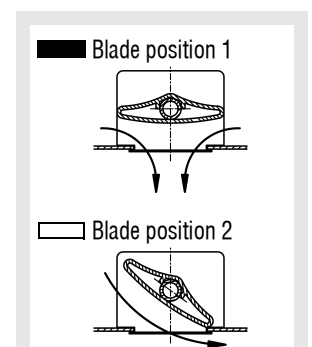
- Standard for sheet steel model (-SB), available for NW 400-650. Not possible for aluminium (-AL) and stainless steel (-V2) models.
- only possible for installation below the ceiling

Concealed mounting (-VM)

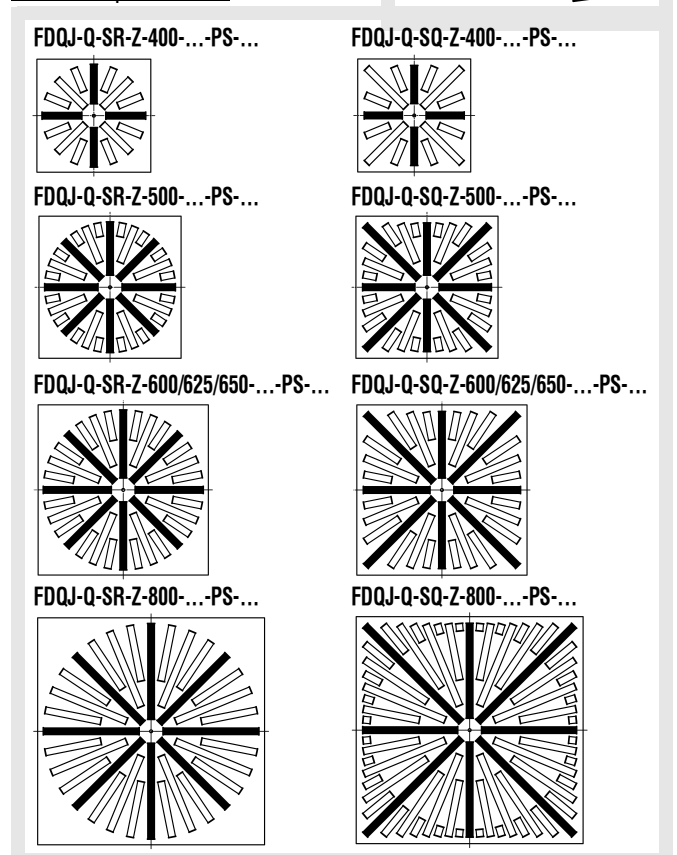
- Pole brace fastening, by means of a M6 cylinder screw (according to DIN EN ISO 4762) at the particle filter box
- Standard for aluminium (-AL) and stainless steel (-V2) model, available in NW 400-650, for sheet steel (-SB) model available in NW 400-800.

Air throw pattern

- “A” : all blades in position 2.
- “B” : blades in positions 1+2, preset by manufacturer
- “C” : without blades (standard for return air)
- “V” : all blades in position 1 (heating mode only)



Air throw pattern "B":



Particle filter box FKU

Ceiling impulse diffuser FPIL (-42)

Construction

Faceplate

- perforated sheet steel (-SB)
- painted to the RAL colour 9010 (white) (-9010)
- painted to a different RAL colour (-xxxx)
- natural colour anodised perforated aluminium (-AL-ELOX)
- only available for PIL-...-QV-... model

baffle plate

- Sheet steel painted to RAL 9005 (black), only for supply air model

Funnel

- Sheet steel painted to RAL 9005 (black), only for supply air model

Antibacterial coating

- without coating (-AB0, standard)
- with coating (-AB1)

Model

- FPIL-N-... - for standard air volumes, supply air and return air
- FPIL-G-... - for large air volumes, only for supply air
- ...-QV-... - square faceplate, drill pattern V (offset perforations) (standard)
- ...-QS-... - square faceplate, drill pattern S (star-shaped perforations, not available for aluminium model)
- ...-QK-... - square faceplate, drill pattern K (circular perforations, not available for aluminium model)
- ...-Z-... - for supply air:
- ...-A-... - for return air (not available for FPIL-G)
- Nominal size - NW 400 to 650
- Drill pattern:
- ...-000 - not reduced (standard)
- ...-310 to 500 - reduced drill pattern

Fastening

Concealed mounting (-VM)

- Pole brace fastening, by means of a M6 cylinder screw (according to DIN EN ISO 4762) at the particle filter box

Particle filter box FKU

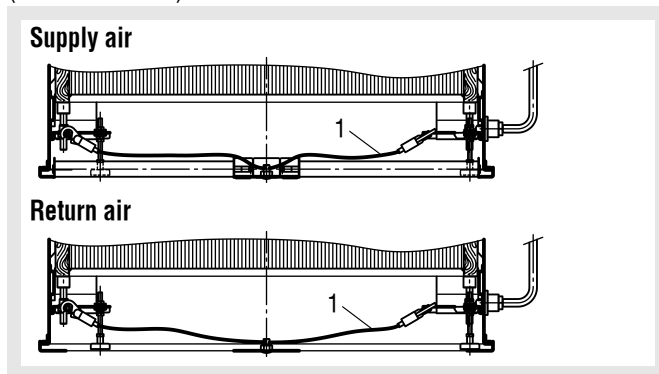
Fastening methods

Magnetic fastening (-MB)

With safety cable, only available for NW 400-650, only available for FDQJ-...-SB, only possible for installation below the ceiling.

Ceiling swirl diffuser FDQJ-...-MB

(NW 400 to 650)



1 = Safety cable

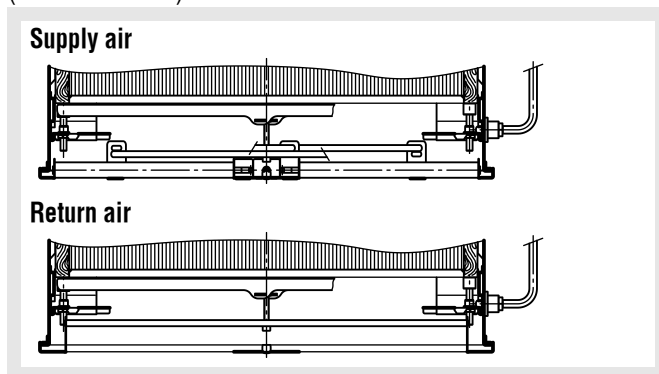
Concealed mounting (-VM)

In concealed mounting, the diffuser is fixed to the particle filter box by means of a pole brace and an M6 cylinder head screw (according to DIN EN ISO 4762).

Attention: The max. torque of the fastening screw is 0.4 Nm

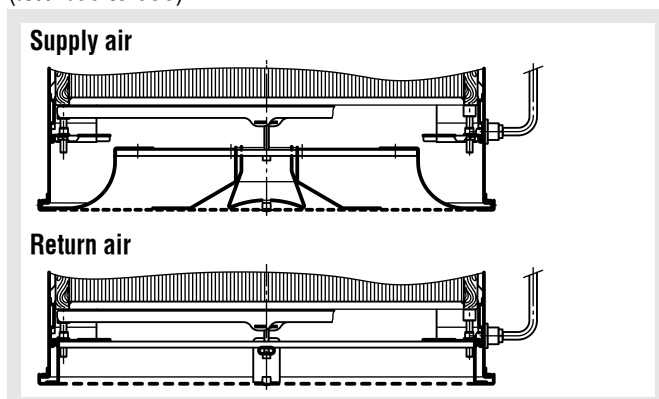
Ceiling swirl diffuser FDQJ-...-VM

(NW 400 to 800)



Ceiling impulse diffuser FPIL-...-VM

(NW 400 to 650)

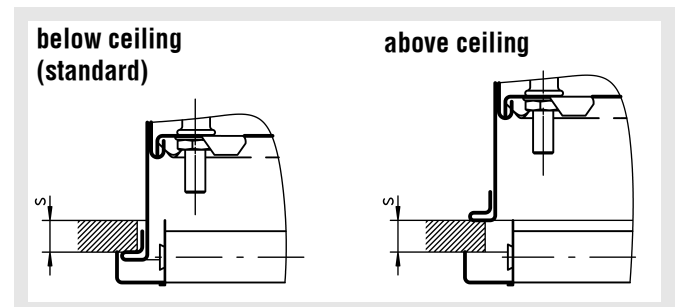


Installation and maintenance

Attention:

Please note that the O-rings (seals) of the bulkhead stuffing box may dry out over the months. Once the O-rings have dried out, the hoses can only be inserted, applying higher force. A common method of reoiling these bulkhead stuffing boxes is to impregnate a cloth with a universal oil, for example from Ballistol, and wipe it across the hose, before inserting it. This small amount is sufficient to make the bulkhead stuffing boxes running smoothly again.

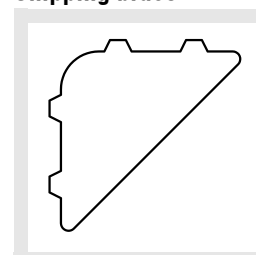
Installation situation



Attention:

In case of installation above the ceiling, you have to specify the thickness of the ceiling "s".

Shipping brace



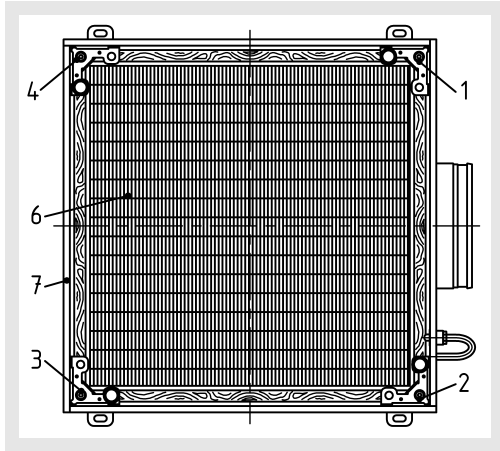
Attention! Before the particle filter unit can be inserted, the shipping brace clamped by means of the filter clamps must be removed!

Particle filter box FKU

Installation (filter installation Instructions)

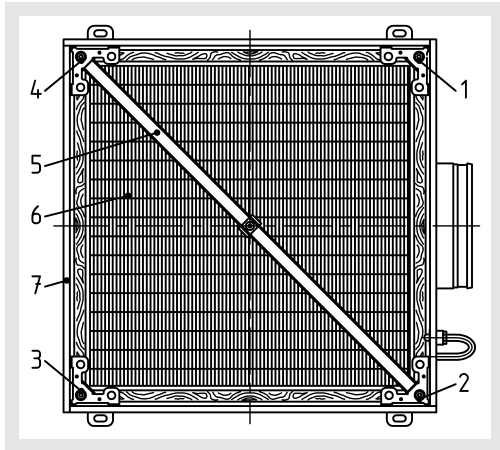
Diffusers with magnetic fastening (-MB)

NW 400-650 (NW 800 not available)

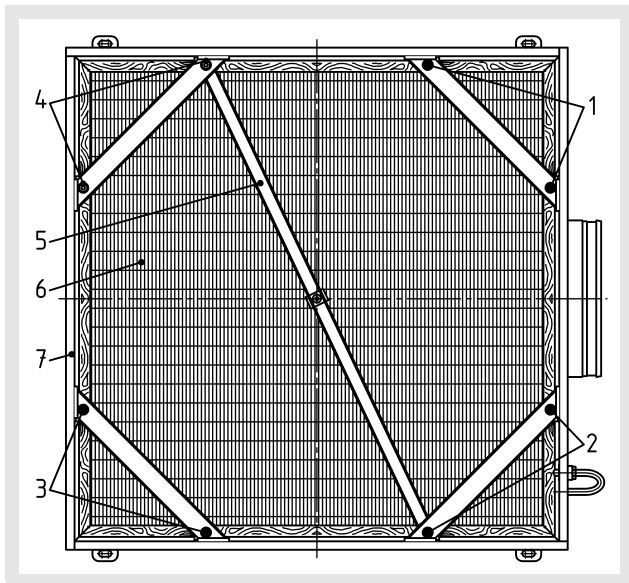


Diffusers with pole brace fastening (-VM)

NW 400-650



NW 800



With built-in spacers for fixing the filter clamps.

Installation description

Loosen filter clamps (pos. 4) and remove them along with shipping brace. Press the particle filter unit (pos. 6) with the sealing rubber (see page 3) pointing upwards into the filter housing (pos. 7). Take care that the filter material is not irreparably damaged. The filter unit can be easily locked using two diagonal filter clamps (pos. 1 and 3). Next, the VM pole brace (pos. 5, for -VM only) must be inserted and fastened using the other two filter clamps (pos. 2 and 4). Care must be taken that the filter clamps are at first tightened only slightly cross-wise (e.g. in the sequence filter clamps 1, 3, 2, 4). After tightening the filter clamps slightly, they can be tightened properly, again cross-wise and evenly until the filter unit has a tight fit. Make sure that the filter clamps are tightened to 4 Nm maximum.

If required, a seal leakage test can be carried out before mounting the air diffusers.

Dismounting

In case of concealed mounting (-VM), unscrew the air diffuser (in case of magnetic fastening (-MB), insert your hands into the air diffuser slots and remove the unit). Loosen the filter clamps, remove the VM pole brace. Take out the particle filter units downwards.

Attention:

The particle filter cell may fall out of the filter housing when the filter clamps are removed!

Maintenance

In addition to keeping machines and equipment clean, the maintenance of the filters is especially important. A constant control of the filters is as essential as changing them when the maximum allowed particle absorption has been reached. The inspection must take place at short enough intervals to allow faults that have occurred or become apparent to be eliminated in time. The necessary intervals are set depending on the local conditions. The measured variable for the particle intake of the filter is the pressure difference. This is why a differential pressure measuring device must be attached to each filter stage to monitor its operating condition. Periodical repetitions of the seal leakage test should be ordered at regular intervals (at least once a year) by the operator/owner.

The filter is changed upon reaching the final resistance, which is set in advance when designing the ventilator capacity of the ventilation system. The final resistance is normally twice the starting resistance.

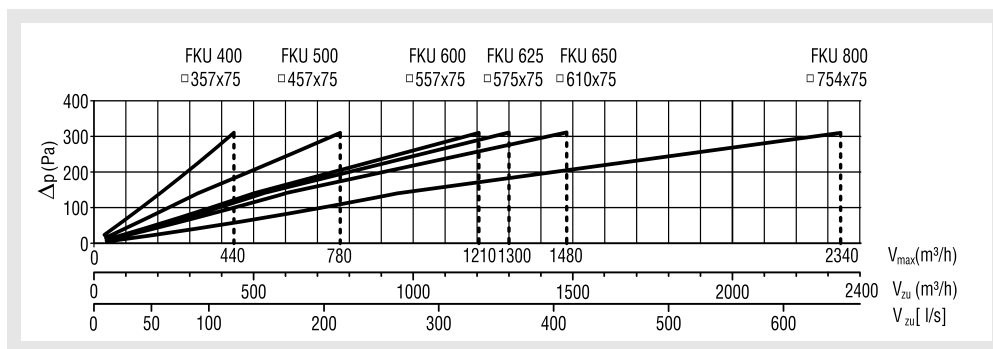
Particle filter box FKU

Technical data

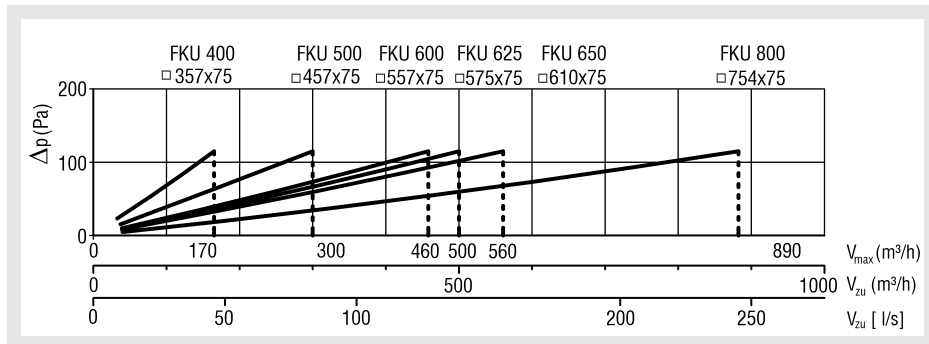
Pressure loss UDS filter

NW	Width x Height x Depth [mm]	V_{nenn} / pressure difference [m ³ /h / Pa]	
		FIL-FKU...-1-H13-...	FIL-FKU...-1-H14-...
400	357 x 357 x 75	170/115	170/115
500	457 x 457 x 75	300/115	300/115
600	557 x 557 x 75	460/115	460/115
625	575 x 575 x 75	500/115	500/115
650	610 x 610 x 75	560/115	560/115
800	754 x 754 x 75	890/115	890/115

FIL-FKU...-1-H13-...



FIL-FKU...-1-H14-...



Filter class according to DIN EN 1822

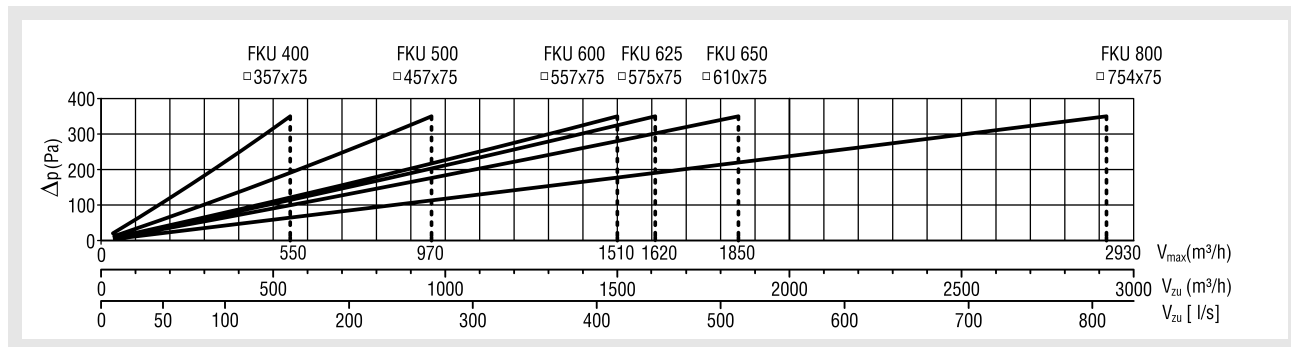
- Allowed final pressure: max. 500 Pa
- Filtration efficiency in MPPS: H13 = $\geq 99,95\%$
H14 = $\geq 99,995\%$

Particle filter box FKU

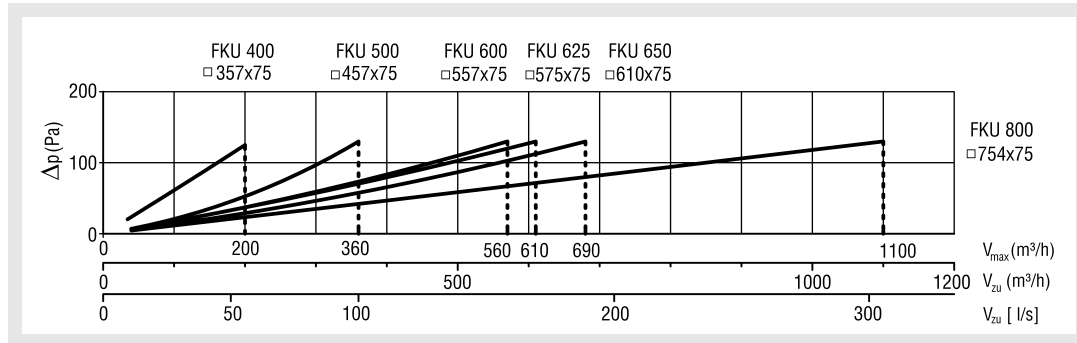
Pressure loss UXS filter

NW	Width x Height x Depth [mm]	V_{nenn} / pressure difference [m ³ /h / Pa]	
		FIL-FKU...-2-H13-...	FIL-FKU...-2-H14-...
400	357 x 357 x 75	170 / 100	170 / 100
500	457 x 457 x 75	300 / 100	300 / 100
600	557 x 557 x 75	460 / 100	460 / 100
625	575 x 575 x 75	500 / 100	500 / 100
650	610 x 610 x 75	560 / 100	560 / 100
800	754 x 754 x 75	890 / 100	890 / 100

FIL-FKU...-2-H13-...



FIL-FKU...-2-H14-...



Filter class according to DIN EN 1822

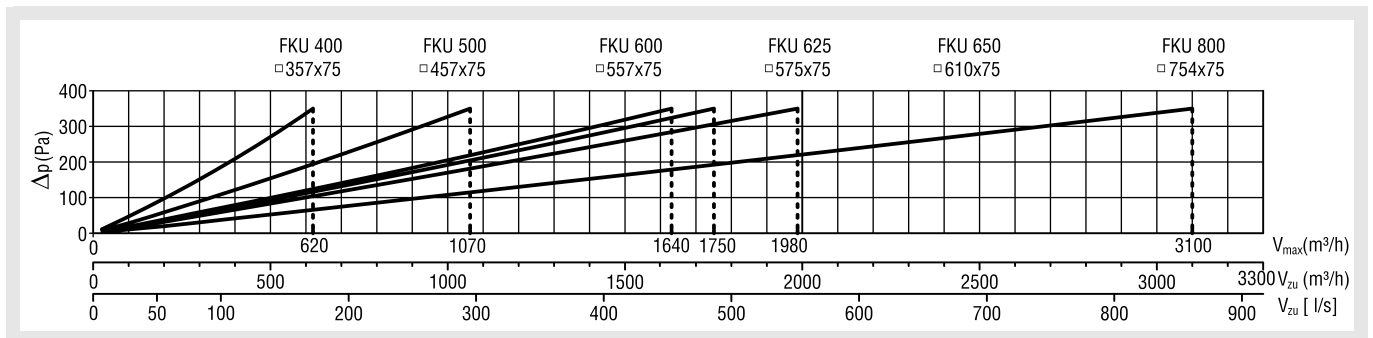
- Allowed final pressure: max. 500 Pa
- Filtration efficiency in MPPS: H13 = $\geq 99,95\%$
H14 = $\geq 99,995\%$

Particle filter box FKU

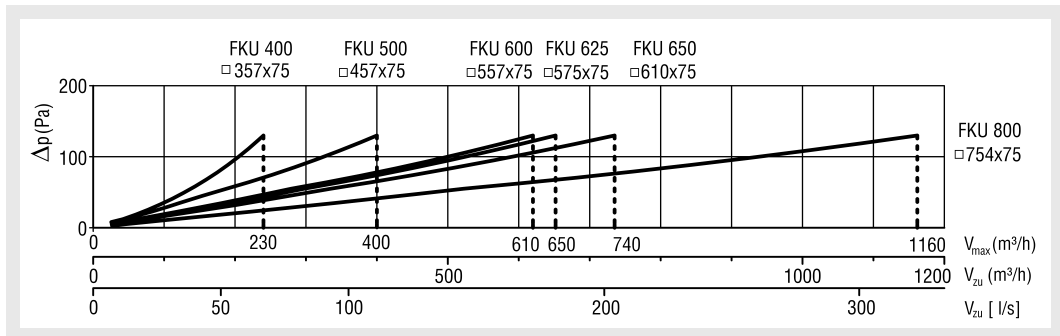
Pressure loss UXA filter

NW	Width x Height x Depth [mm]	V_{neff} / pressure difference [m ³ /h / Pa]	
		FIL-FKU...-3-H13-...	FIL-FKU...-3-H14-...
400	357 x 357 x 75	190 / 100	190 / 100
500	457 x 457 x 75	325 / 100	325 / 100
600	557 x 557 x 75	500 / 100	500 / 100
625	575 x 575 x 75	530 / 100	530 / 100
650	610 x 610 x 75	600 / 100	600 / 100
800	754 x 754 x 75	960 / 100	960 / 100

FIL-FKU...-3-H13-...



FIL-FKU...-3-H14-...



Filter class according to DIN EN 1822

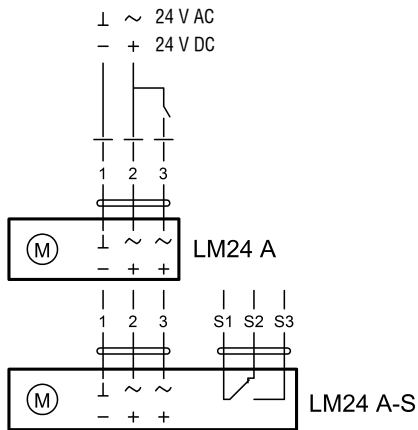
- Allowed final pressure: max. 500 Pa
- Filtration efficiency in MPPS:
 - H13 = $\geq 99,95\%$
 - H14 = $\geq 99,995\%$

Particle filter box FKU

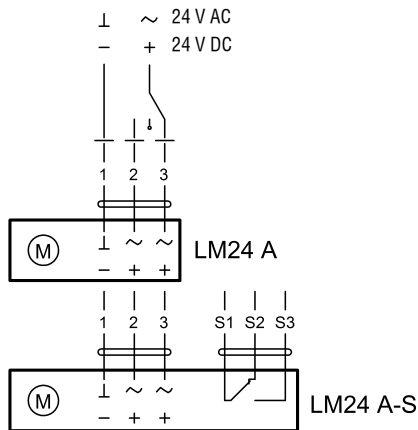
Circuit diagram

Connection diagram LM24A (-E001)/LM24A-S (-E030)

OPEN/CLOSED control



3-point control

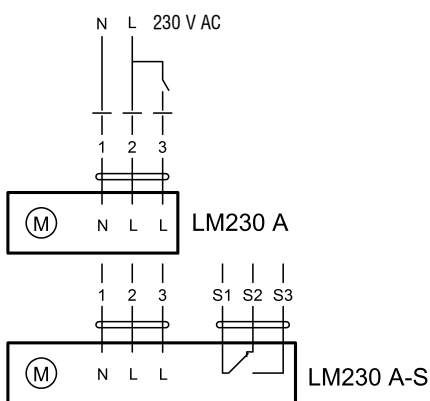


Attention!

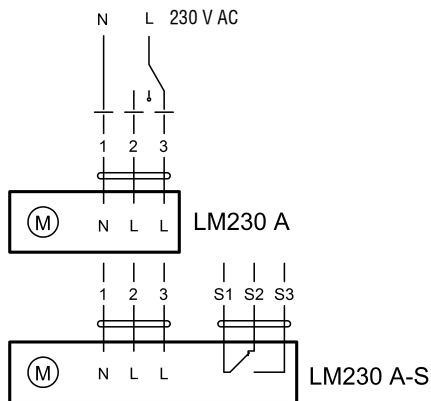
- Connection via safety transformer.
- Parallel connection of further drives is possible. Observe specifications.

Connection diagram LM230A (-E002) / LM230A-S (-E031)

OPEN/CLOSED control



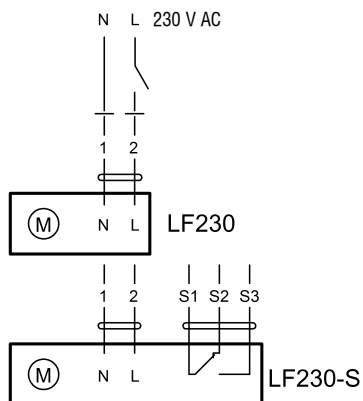
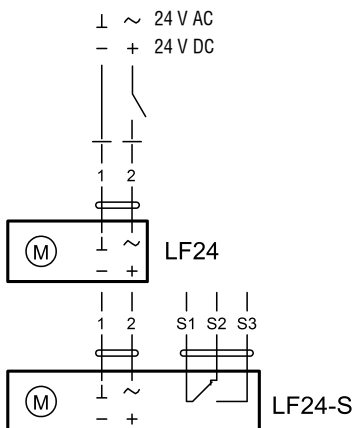
3-point control



Attention!

- Mains voltage connected!
- Parallel connection of further drives is possible. Observe specifications.

Connection diagram LF24 (-E021)/LF24-S (-E037) / LF230 (-E020) / LF230-S (-E036)



Attention!

- Connection via safety transformer.
- Parallel connection of further drives is possible. Observe specifications.

Particle filter box FKU

Technical data of actuators

LM24A (-E001) / LM24A-S (-E030) (make Belimo)

Rated voltage:	AC/DC 24 V, 50/60 Hz
Functional range:	AC19.2...28.8 V / DC19.2...28.8 V
Power consumption:	- Operation: 1 W - Idle position: 0.2 W
Dimensioning:	1.5 VA
Torque:	min. 5 Nm
Running time:	150 s
Sound power level:	35 dB (A)
Protection class:	III Safety extra low voltage / II protective insulation
Degree of protection:	IP54 in all mounting positions
EMC:	CE according to 2004/108/EC

LM230A (-E002) / LM230A-S (-E031) (make Belimo)

Rated voltage:	AC 230 V, 50/60 Hz
Functional range:	AC 85...264 V
Power consumption:	- Operation: 1.5 W - Idle position: 0.5 W
Dimensioning:	3.5 VA
Torque:	min. 5 Nm
Running time:	150 s
Sound power level:	35 dB (A)
Protection class:	II protective insulation
Degree of protection:	IP54 in all mounting positions
EMC:	CE according to 2004/108/EC
Low voltage directive:	CE according to 2006/95/EC

LF24 (-E021) / LF24-S (-E037) (make Belimo)

Rated voltage:	AC/DC 24 V, 50/60 Hz
Functional range:	AC 19.2...28.8 V / DC 21.6...28.8 V
Power consumption:	- running: 5 W - holding: 2.5 W
Dimensioning:	7 VA
Torque:	-Motor: min. 4 Nm -Spring return: min. 4 Nm
Running time:	-Motor: 40...75 s (0...4 Nm) -Spring return: 20 s (60 s at -30°C)
Sound power level:	-Motor: 50 dB (A) -Spring return: 62 dB (A)
Protection class:	III Safety extra low voltage
Degree of protection:	IP54
EMC:	CE according to 2004/108/EC
Low voltage directive:	CE according to 2006/95/EC

LF230 (-E020) / LF230-S (-E036) (make Belimo)

Rated voltage:	AC 230 V, 50/60 Hz
Functional range:	AC 198...264 V
Power consumption:	- running: 5 W - holding: 3 W
Dimensioning:	7 VA
Torque:	-Motor: min. 4 Nm -Spring return: min. 4 Nm
Running time:	-Motor: 40...75 s (0...4 Nm) -Spring return: 20 s (-20...50°C)
Sound power level:	-Motor: 50 dB (A) -Spring return: 62 dB (A)
Protection class:	II protective insulation
Degree of protection:	IP54
EMC:	CE according to 2004/108/EC
Low voltage directive:	CE according to 2006/95/EC

Auxiliary switch for LM24A-S / LM230A-S / LF24-S / LF230-S

- 1 EPU, 1 mA...3 (0.5) A, AC 250 V adjustable 0...100%

Legend

V_{ZU}	(m ³ /h) [l/s]	= Supply air volume
V_{Nenn}	(m ³ /h)	= Nominal volumetric flow
Δp	(Pa)	= Pressure difference
H13	(-)	= Filter class H13
H14	(-)	= Filter class H14

Particle filter box FKU

Order code FKU

01	02	03	04	05	06
Type	Connection	Air diffuser	Type of air	Nominal size	Mounting
Example					
FKU	-H	-41	-Z	-500	-MB

07	08	09	10	11	12
Material	Paint	Antibacterial coating	shut-off damper	Differential pressure/ Aerosol monitoring device	Differential pressure transducer
-SB	-9010	-AB0	-M000	-D1	-U0

13	14	15	16
Tight seal test	Rubber lip seal	Box dimensions	Spigot diameter
-P1	-GD1	-KHS	-SDS

Sample

FKU-H-41-Z-500-MB-SB-9010-AB0-M000-D1-U0-P1-GD1-KHS-SDS

Particle filter box type FKU | horizontal with round spigot | for air diffuser FDQJ | supply air | NW500 | magnetic fastening | sheet steel | painted to RAL9010 | without antibacterial coating | without shut-off damper | with differential pressure / aerosol monitoring device inside | without differential pressure transducer | with seal leakage test | with rubber lip seal | standard height of plenum box | standard spigot diameter

Order details

01 - Type

FKU = Particle filter box type FKU
(with rubber seal)

02 - Connection

H = horizontal with round spigot (standard)
Q = horizontal with rectangular spigot and connection
flange
V = vertical with round spigot

03 - Air diffuser (must be ordered separately)

41 = Ceiling swirl diffuser FDQJ-...
42 = Ceiling impulse diffuser FPIL-...

04 - Type of air

Z = Supply air
A = Return air

05 - Nominal size

400 = NW 400
500 = NW 500
600 = NW 600
625 = NW 625
650 = NW 650
800 = NW 800 (only possible for FDQJ-...-VM)

06 - Mounting

MB = magnetic fastening (only available for NW 400-650,
only available as -SB model, only available for ceiling
swirl diffuser FDQJ-...-SB (standard), not available for
diffuser FPIL.)
VM = concealed mounting (standard for FDQJ-...-AL/-V2,
FDQJ-...-SB at an extra charge, standard for FPIL.)

07 - Material

SB = electrolytically galvanised sheet steel (standard)
V2 = Stainless steel V2A, 1.4301

08 - Paint

0000 = without paint (standard for -V2, not possible
for -SB)
9010 = painted inside and outside, RAL colour white
(only available for -SB model, standard for -SB)
xxxx = painted inside and outside, RAL colour can be freely
selected
(only available for -SB model)

09 - Antibacterial coating

AB0 = Without antibacterial coating (standard)
AB1 = with antibacterial coating

Particle filter box FKU

10 - Shut-off damper

- M000 = without shut-off damper (standard)
 - M001 = with manually adjustable shut-off damper with cable (only available for FKU-H / -V)
 - E001 = with electrically adjustable shut-off damper, 24 V, 3-point
 - E030 = with electrically adjustable shut-off damper, 24 V, 3-point, with one limit switch
 - E002 = with electrically adjustable shut-off damper, 230 V, 3-point
 - E031 = with electrically adjustable shut-off damper, 230 V, 3-point, with one limit switch.
 - E021 = with electrically adjustable shut-off damper, 24 V, 3-point, spring return actuator.
 - E037 = with electrically adjustable shut-off damper, 24 V, 3-point, spring return actuator, with one limit switch.
 - E020 = with electrically adjustable shut-off damper, 230 V, 3-point, spring return actuator.
 - E036 = with electrically adjustable shut-off damper, 230 V, 3-point, spring return actuator, with one limit switch.
- Exxx model only available for FKU-H.

11 - Differential pressure / aerosol monitoring device

- D1 = Differential pressure/aerosol test device with measuring spigot inside the box, for hose connection with an outer diameter of 10 mm (standard).
- D2 = Differential pressure/aerosol monitoring device with measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with 2 measuring spigots on the box outside, for a hose with an inner diameter of 4 mm.
- D3 = Differential pressure/aerosol monitoring device with measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with 2 measuring spigots on the box outside, for a hose with an inner diameter of 4 mm and aerosol feeding device in the spigot of the box inside.
- D4 = Differential pressure/aerosol monitoring device with measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with aerosol feeding device in the spigot of the box inside.
- D5 = Differential pressure/aerosol monitoring device with measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with aerosol feeding device in the spigot on the outside (only connection at the spigot).
- D6 = With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with 2 measuring spigots on the box outside, for a hose with an inner diameter of 4 mm and aerosol connection from the box inside to the on-site connection.

12 - Differential pressure transducer

- U0 = without differential pressure transducer (standard)
- U1 = with differential pressure transducer (only available in connection with differential pressure / aerosol monitoring devices (-D2, -D3 and -D6))

13 - Tight seal test

- P0 = without tight seal test (standard)
- P1 = with seal leakage test (only possible for particle filter with U-profile seal -D)

14 - Rubber lip seal

- GD0 = without rubber lip seal at the connection spigot (standard)
- GD1 = with rubber lip seal at the connection spigot (only available for FKU-H / -V)

15 - Box dimensions

- KHS = Height of plenum box standard
- xxx = height of box in mm (minimum height = spigot diameter + 222 mm, for FKU-V-...-M001-... G + 110 mm, for FPIL-...-Z-... spigot diameter + 262 mm)

16 - Spigot diameter

- SDS = spigot diameter (standard)
- xxx = spigot diameter in mm (for spigot diameter > than standard only possible with higher plenum box, maximum height of box = 580mm)

Particle filter box FKU

Order code FDQJ

01	02	03	04	05	06	07
Type	Model	Blade pattern	Air throw	Nominal size	Material	Paint
Example						
FDQJ	-Q	-SR	-Z	-500	-SB	-9010

08	09	10	11	12	13
Drill pattern reduced	Blades	Blade colour	Air throw pattern	Mounting	Antibacterial coating
-000	-PS	L9005	-B	-MB	-AB0

Sample

FDQJ-Q-SR-Z-500-SB-9010-000-PS-L9005-B-MB-AB0

Ceiling swirl diffuser for filter box type FDQJ | square faceplate | circular blade pattern | supply air | NW500 | sheet steel | painted to RAL9010 | drill pattern not reduced | continuous blades | blades made of plastic similar to RAL9005 (black) | air throw pattern B | with magnetic fastening | without antibacterial coating

Order details

01 - Type

FDQJ = Ceiling swirl diffuser for filter box type FDQJ

02 - Model

Q = Square faceplate

03 - Blade pattern

SR = circular blade pattern

SQ = square blade pattern

04 - Air throw

Z = Supply air

A = Return air (without blades)

05 - Nominal size

400 = NW 400

500 = NW 500

600 = NW 600

625 = NW 625

650 = NW 650

800 = NW 800

06 - Material

SB = Painted sheet steel

V2 = Stainless steel (V2A, 1.4301, only available with VM)

AL = Aluminium (only available with VM)

07 - Paint

0000 = without paint (standard for -V2, not possible for -SB)

9010 = RAL colour white (standard for -SB, only available for -SB available)

xxxx = RAL colour can be freely selected (only available for -SB)

ELOX = natural colour anodised (only available for -AL)

08 - Drill pattern reduced

000 = Drill pattern not reduced (standard)

310 = reduced drill pattern 310 - (NW > 310)

400 = reduced drill pattern 400 - (NW > 400)

500 = reduced drill pattern 500 - (NW > 500)

600 = reduced drill pattern 600 - (NW > 600)

09 - Blades

PS = Continuous blades (only for supply air)

P0 = without blades (only for return air)

10 - Blade colour

L9005 = Blades made of plastic similar to RAL 9005 (black)

L9006 = Blades made of plastic similar to RAL9006 (grey)

L9010 = Blades made of plastic similar to RAL9010 (white)

Axxxx = Painted aluminium blades, RAL colour can be freely selected (subsequent adjustment of blades not possible)

00000 = without blades (standard for return air)

11 - Air throw pattern

A = all blades in position 2

B = blades in positions 1+2, set ex works

C = without blades (standard for return air)

V = all blades in position 1 (heating mode only)

12 - Mounting

MB = Magnetic fastening, with safety cable, only available as sheet steel model, only available for NW 400-650, only possible for installation below the ceiling.

VM = Concealed mounting (standard for aluminium and stainless steel model, available in NW 400-650, for sheet steel model available in NW 400-800)

13 - Antibacterial coating

AB0 = Without antibacterial coating (standard)

AB1 = with antibacterial coating

Particle filter box FKU

Order code FPIL

01	02	03	04	05
Type	Air volume	Model	Air throw	Nominal size
Example				
FPIL	-N	-QV	-Z	-500

06	07	08	09	10
Material	Paint	Drill pattern reduced	Mounting	Antibacterial coating
-SB	-9010	-000	-VM	-AB0

Sample

FPIL-N-QV-Z-500-SB-9010-000-VM-AB0

Ceiling impulse diffuser for filter box type FPIL | for normal air volume | square faceplate, drill pattern V (standard) | supply air | NW500 | sheet steel | painted to RAL9010 | drill pattern not reduced | with concealed mounting | without antibacterial coating

Order details

01 - Type

FPIL = Ceiling impulse diffuser for filter box type FPIL

02 - Air volume

N = for normal air volume (supply air and return air)

G = for large air volume (only for supply air)

03 - Model

QV = Square faceplate, drill pattern V (standard)

QS = Square faceplate, drill pattern S (not available for -AL)

QK = Square faceplate, drill pattern K (not available for -AL)

04 - Air throw

Z = Supply air

A = Return air (not available for FPIL-G, without funnel)

05 - Nominal size

400 = NW 400

500 = NW 500

600 = NW 600

625 = NW 625

650 = NW 650

06 - Material

SB = perforated sheet steel (standard)

AL = perforated aluminium (only available for FPIL-...-QV-...)

07 - Paint

9010 = RAL colour white (standard)

xxxx = RAL colour can be freely selected

ELOX = natural colour anodised (only available for -AL)

08 - Drill pattern reduced

000 = Drill pattern not reduced (standard)

310 = reduced drill pattern 310 (NW > 310)

400 = reduced drill pattern 400 (NW > 400)

500 = reduced drill pattern 500 (NW > 500)

09 - Mounting

VM = Concealed mounting (standard)

10 - Antibacterial coating

AB0 = Without antibacterial coating (standard)

AB1 = with antibacterial coating

Particle filter box FKU

Order code filter for FKU

01	02	03	04	05	06	07
Type	Filter size	Filter frame	Filter class	Filter seal	Handle cover	Filter test
Example						
FIL	-FKU600	-2	-H13	-E	-G0	-0

Sample

FIL-FKU600-2-H13-E-G0-0

Particle filter for filter box | Size 557x557x75 for FKU600 | UXS with wooden frame | Filter class H13 | with continuous seal | without handle cover | checked oil thread test

Order details

01 - Type

FIL = Particle filter for filter box

02 - Filter size

- FKU400 = Size 357 x 357 x 75 -
Filter for filter box FKU 400
- FKU500 = Size 457 x 457 x 75 -
Filter for filter box FKU 500
- FKU600 = Size 557 x 557 x 75 -
Filter for filter box FKU 600
- FKU625 = Size 575 x 575 x 75 -
Filter for filter box FKU 625
- FKU650 = Size 610 x 610 x 75 -
Filter for filter box FKU 650
- FKU800 = Size 754 x 754 x 75 -
Filter for filter box FKU 800

03 - Filter frame

- 1 = UDS with MDF wooden frame (standard)
- 2 = UXS with MDF wooden frame
- 3 = UXA with aluminium frame

04 - Filter class

- F07 = Fine dust filter ISO ePM10 \geq 70%
- F08 = Fine dust filter ISO ePM1 \geq 70%
- F09 = Fine dust filter ISO ePM1 \geq 90%
- H13 = filter class H13 (HEPA)
- H14 = filter class H14 (HEPA)

05 - Filter seal

- E = with continuous seal (standard) (seal leakage test P1 **not possible**)
- D = with U-profile seal (seal leakage test P1 possible)
- F = with flat seal (seal leakage test P1 **not possible**)

06 - Handle cover

- G0 = without handle cover
- G1 = with double-sided handle cover (standard for UXA)

07 - Filter test

- 0 = checked oil thread test (standard), according to DIN EN 1822
- S = checked scan test, according to DIN EN 1822

Particle filter box FKU

Specification texts FKU

Particle filter box with safely sealing pressure device and sealing device for installation of filter cells with rubber seal. With horizontal, round connection spigot. With integrated differential pressure/aerosol test device with measuring spigot inside the box, for hose connection with an outer diameter of 10 mm (-D1).

Without shut-off damper and without seal leakage test.

Product: SCHAKO type **FKU-H-...-M000-D1-...-P0-...**

- with horizontal, round connection spigot and manually adjustable sealing shut-off damper. Leakage at closed damper blade according to DIN EN 1751, class 4, at a duct pressure of up to 1000 Pa. Without seal leakage test.

With integrated differential pressure/aerosol test device with measuring spigot inside the box, for hose connection with an outer diameter of 10 mm (-D1). Without seal leakage test.

Product: SCHAKO type **FKU-H-...-M001-D1-...-P0-...**

- with horizontal, round connection spigot and electrically (OPEN/CLOSED actuator) adjustable sealing shut-off damper (with and without spring return).

Leakage at closed damper blade according to DIN EN 1751, class 4, at a duct pressure of up to 1000 Pa.

With integrated differential pressure/aerosol test device with measuring spigot inside the box, for hose connection with an outer diameter of 10 mm (-D1). Without seal leakage test.

Product: SCHAKO type **FKU-H-...-Exxx-D1-...-P0-...**

- with vertical, round connection spigot With integrated differential pressure/aerosol test device with measuring spigot inside the box, for hose connection with an outer diameter of 10 mm (-D1). Without shut-off damper and without seal leakage test.

Product: SCHAKO type **FKU-V-...-M000-D1-...-P0-...**

- with vertical, round connection spigot and manually adjustable sealing shut-off damper. Leakage at closed damper blade according to DIN EN 1751, class 4, at a duct pressure of up to 1000 Pa.

With integrated differential pressure/aerosol test device with measuring spigot inside the box, for hose connection with an outer diameter of 10 mm (-D1). Without seal leakage test.

Product: SCHAKO type **FKU-V-...-M001-D1-...-P0-...**

- with horizontal, rectangular connection spigot, with connection flange. With integrated differential pressure/aerosol test device with measuring spigot inside the box, for hose connection with an outer diameter of 10 mm (-D1). Without shut-off damper and without seal leakage test.

Product: SCHAKO type **FKU-Q-...-M000-D1-...-P0-...**

Type of air:

- Supply air (-Z)
- Return air (-A)

Material:

- Filter box made of electrolytically galvanised sheet steel (-SB) (standard)
 - painted inside and outside, RAL colour white (-9010) (standard)
 - painted inside and outside, RAL colour can be freely selected (-xxxx)
- Filter box made of stainless steel V2A (-V2-0000)

Antibacterial coating:

- without coating (-AB0, standard)
- with coating (-AB1)

Mounting:

- with magnetic fastening (-MB) (only available for NW 400-650, only available as -SB model, only available for ceiling swirl diffuser FDQJ-...-SB [standard], not available for diffusers FPIL)
- concealed mounting (-VM) (standard for FDQJ-...-AL/-V2, FDQJ-...-SB at an extra charge, standard for FPIL)

Box dimensions:

- Standard height of box (-KHS)
- Height of box mm (-xxx, always with 3 digits) (minimum height = spigot diameter + 222 mm, for FKU-V-...-M001-... G + 110 mm, for FPIL-...-Z-... spigot diameter + 262 mm)

Spigot diameter:

- Standard spigot diameter (-SDS)
- Spigot diameter mm (-xxx, always with 3 digits) (for spigot diameter > than standard only possible with higher plenum box, maximum height of box = 580 mm)

Diffusers (for supply air and return air):

- Ceiling swirl diffuser FDQJ-... (-41)
- Ceiling impulse diffuser FPIL-... (-42)

Particle filter box FKU

Accessories (at an extra charge):

- Seal leakage monitoring system (-P1)
 - inside the box, only possible for particle filter with U-profile seal (-D).
- Differential pressure / aerosol monitoring device
 - With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with 2 measuring spigots on the box outside, for a hose with an inner diameter of 4 mm (-D2).
 - With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with 2 measuring spigots on the box outside, for a hose with an inner diameter of 4 mm and aerosol feeding device in the spigot of the box inside (-D3).
 - With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with aerosol feeding device in the spigot of the box inside (-D4).
 - With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with aerosol feeding device in the spigot on the outside (-D5).
 - With measuring spigot inside the box, for hose connection with an outer diameter of 10 mm. Additionally with 2 measuring spigots on the box outside, for a hose with an inner diameter of 4 mm and aerosol connection from the box inside to the on-site connection (-D6).
- Differential pressure transducer (-U1)
 - only available in connection with differential pressure / aerosol monitoring devices (-D2, -D3 and -D6).
 - supplied loose or optionally mounted to box outside
- Rubber lip seal (-GD1),
 - made of special rubber (only available for FKU-H / -V)
- Particle filter (FIL-...)
 - Filter frame H=75 mm
 - UDS (-1, standard)/UXS (-2) made of MDF wood. Without handle cover (-G0, standard) or with double-sided handle protection (-G1, at an extra charge).
 - UXA (-3), made of aluminium. With double-sided handle protection (-G1).
 - Rubber seal on filter housing either with continuous seal (-E, standard), U-profile seal (-D) or flat seal (-F).
 - Filter classes for fine dust ISO ePM 10 \geq 70% to ISO ePM 1 \geq 90% (-F07 to -F09) / HEPA H13 (-H13, \geq 99,95%) / HEPA H14 (-H14, \geq 99,995%).
 - Filter checked by means of oil thread test (-O, standard) or scan test (-S, at an extra charge) according to DIN EN 1822.
 - Temperature-resistant up to 80°C. Filter wrapped in film

Specification texts diffusers

(for supply air and return air)

Ceiling swirl diffuser FDQJ (-41)

Ceiling swirl diffuser type FDQJ-..., particularly suitable for installation in comfort rooms with high number of air changes, for clean rooms (in connection with particle filter boxes) and for VAV systems with variable volumetric flows (between 40-100%). Cooling and heating modes are possible.

With square faceplate, with radial blade pattern. For supply air, with central pivoting, aerodynamic radially arranged continuous air deflection blades in support blade profile sections made of plastic in a colour similar to RAL 9005 (-L9005, black, standard), similar to RAL 9006 (-L9006, grey), similar to RAL 9010 (-L9010, white) or made of aluminium painted to a RAL colour which can be freely selected (-Axxxx, subsequent adjustment of blades not possible). Each blade is adjustable from the diffuser faceplate without using any special device, without dismantling the diffuser. Free cross-section, resistance and sound power level remain constant in all blade positions.

TÜV inspected according to VDI 6022 Sheets 1+2 as well as DIN 1946 Sheet 2.

Product: SCHAKO type **FDQJ-Q-SR-Z-...-PS-...**

- With square faceplate, square blade pattern. For supply air, with central pivoting, aerodynamic radially arranged continuous air deflection blades in support blade profile sections made of plastic in a colour similar to RAL 9005 (-L9005, black, standard), similar to RAL 9006 (-L9006, grey), similar to RAL 9010 (-L9010, white) or made of aluminium painted to a RAL colour which can be freely selected (-Axxxx, subsequent adjustment of blades not possible).

TÜV inspected according to VDI 6022 Sheets 1+2 as well as DIN 1946 Sheet 2.

Product: SCHAKO type **FDQJ-Q-SQ-Z-...-PS-...**

- With square faceplate, with radial blade pattern. For return air, without air deflection blades.

TÜV inspected according to VDI 6022 Sheets 1+2 as well as DIN 1946 Sheet 2.

Product: SCHAKO type **FDQJ-Q-SR-A-...-PO-...**

- With square faceplate, square blade pattern. For return air, without air deflection blades.

TÜV inspected according to VDI 6022 Sheets 1+2 as well as DIN 1946 Sheet 2.

Product: SCHAKO type **FDQJ-Q-SQ-A-...-PO-...**

Nominal sizes: NW 400 to 800

Drill pattern:

- not reduced (-000, standard)
- reduced drill pattern:
 - drill pattern 310 (-310, NW >310)
 - drill pattern 400 (-400, NW >400)
 - drill pattern 500 (-500, NW >500)
 - drill pattern 600 (-500, NW >600)

Particle filter box FKU

- Faceplate made of:
 - Sheet steel (-SB)
 - painted to the RAL colour 9010 (white) (-9010)
 - painted to a different RAL colour (-xxxx)
 - Stainless steel V2A (-V2-0000) (only possible with concealed mounting)
 - Natural colour anodised aluminium (-AL-ELOX) (only possible with concealed mounting)
- Antibacterial coating:
 - without coating (-AB0, standard)
 - with coating (-AB1)
- Air throw pattern:
 - for supply air model:
 - "A" (-A), all blades in position 2
 - "B" (-B), blades in positions 1+2, preset ex works
 - "V" (-V), all blades in position 1 (heating mode only)
 - for return air model:
 - "C" (-C), without blades
- Mounting:
 - Magnetic fastening (-MB), with safety cable.
 - Standard for sheet steel model (-SB), available for NW 400-650. Not possible for aluminium (-AL) and stainless steel (-V2) models. Only possible for installation below the ceiling.
 - Concealed mounting (-VM)
 - Standard for aluminium (-AL) and stainless steel (-V2) model, available in NW 400-650, for sheet steel (-SB) model available in NW 400-800.
 - Pole brace fastening, by means of a M6 cylinder screw (according to DIN EN ISO 4762) to the particle filter box.

Ceiling impulse diffuser FPIL (-42)

Square ceiling impulse diffuser FPIL-... for **normal** air volumes, for installation in supply and exhaust air systems in clean rooms, operating theatres and comfort rooms up to a height of 4 m.

Consisting of an easy-to-clean perforated square faceplate, **drill pattern V** (offset perforations). For **supply air** with a baffle plate and a sheet steel air guide funnel painted to RAL 9005 (black). It is fastened using concealed mounting (-VM) by means of a central fastening screw. TÜV inspected according to VDI 6022 Sheets 1+2, as well as DIN 1946 Sheet 2.

Product: SCHAKO **type FPIL-N-QV-Z-...**

- **Supply air**, for **large** air volumes.
Product: SCHAKO **type FPIL-G-QV-Z-...**
- **Return air** (without baffle plate and without air guide funnel), for **normal** air volumes.
Product: SCHAKO **type FPIL-N-QV-A-...**
- **Supply air**, for **normal** air volumes, **drill pattern S** (star-shaped perforations, not possible in aluminium).
Product: SCHAKO **type FPIL-N-QS-Z-...**
- **Supply air**, for **large** air volumes.
Product: SCHAKO **type FPIL-G-QS-Z-...**
- **Return air** (without baffle plate and without air guide funnel), for **normal** air volumes.
Product: SCHAKO **type FPIL-N-QS-A-...**
- **Supply air**, for **normal** air volumes, **drill pattern K** (circular perforations, not possible in aluminium).
Product: SCHAKO **type FPIL-N-QK-Z-...**
- **Supply air**, for **large** air volumes.
Product: SCHAKO **type FPIL-G-QK-Z-...**
- **Return air** (without baffle plate and without air guide funnel), for **normal** air volumes.
Product: SCHAKO **type FPIL-N-QK-A-...**

Nominal sizes: NW 400 to 650

Drill pattern:

- not reduced (-000, standard)
- reduced drill pattern:
 - drill pattern 310 (-310, NW >310)
 - drill pattern 400 (-400, NW >400)
 - drill pattern 500 (-500, NW >500)

- Faceplate made of:
 - perforated sheet steel (-SB)
 - painted to the RAL colour 9010 (white) (-9010)
 - painted to a different RAL colour (-xxxx)
 - natural colour anodised perforated aluminium (-AL-ELOX) (only available for PIL-...-QV-... model)
- Antibacterial coating:
 - without coating (-AB0, standard)
 - with coating (-AB1)