Fan Section (code EFA-FD/FR)

The EFA-FD/FR fan section is a unit section with built-in fan with vertical outlet for use as a supply air or extract air fan in ventilation systems together with other functional sections in the Flexomix series.

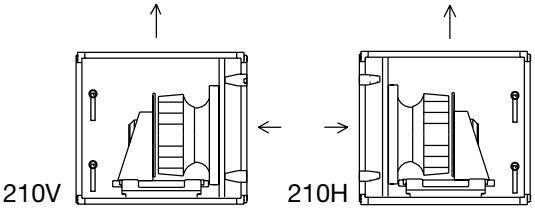
Design

- **EFA-FD** with direct-driven fan (code **ELFD**). The direct-driven fan is supplied with any of the following types of motor:
  - Motor including mounted frequency inverter.
  - Motor to efficiency class eff1, for connection to an external frequency inverter.
  - Motor to efficiency class eff2, for connection to an external frequency inverter.
- **EFA-FR** with belt-driven fan (code **ELFR**). The belt-driven fan is available in two versions:
  - ELFR-FB belt-driven centrifugal fan with, casing, forward-curved blades.
  - ELFR-BB belt-driven centrifugal fan with, casing, backward-curved blades (sizes 150-950).
- To facilitate servicing, the fan and motor unit are withdrawable from the casing.
- To adequately cool the motor, the air temperature should not exceed 50 ˚C.
- The fan and motor are very effectively vibration-isolated from the casing with a vibration attenuated outlet spigot and rubber mountings sized to suit the fan's operating conditions. Normal resonance frequency is 7–10 Hz.
- The standard outlet of the fan section is equipped with an end connection.
- The design of some of the components in the fan system do not conform to corrosion resistance class C4.

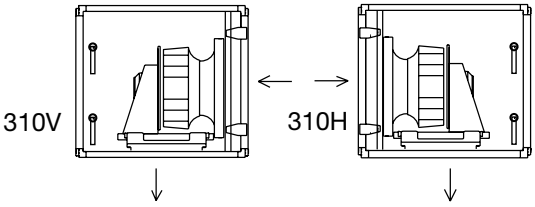
Other information is available under the Functional Fittings tab, Direct-driven Fan (code ELFD) and Belt-driven Fan (code ELFR).

Configuration EFA-FD

ELFD-060 – 950

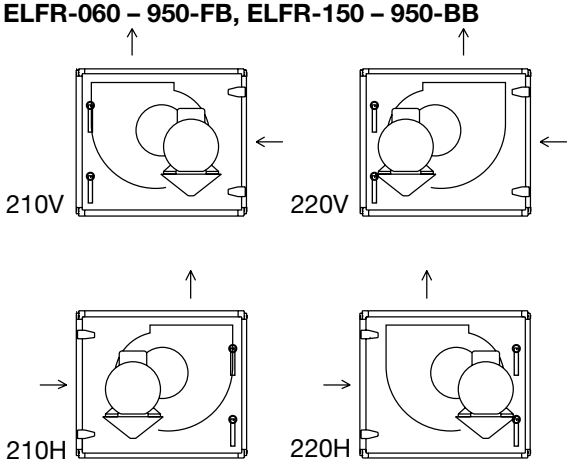


ELFD-060 – 190

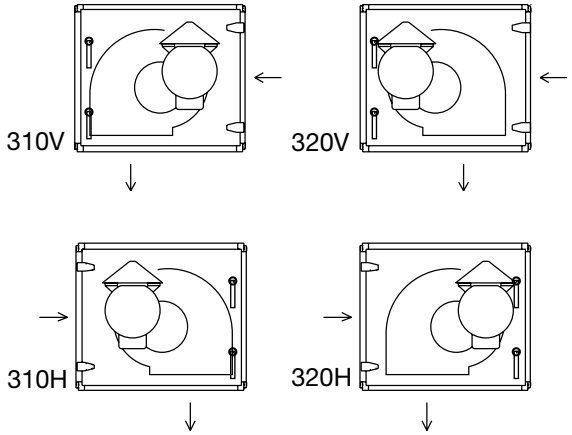


Configuration EFA-FR

ELFR-060 – 950-FB, ELFR-150 – 950-BB



ELFR-060 – 190-FB, ELFR-150 – 190-BB



Accessories for the fan section

Outlet:

- Connection frame, small (code MIET-AF-01-a). For fan section EFA-FR with belt-driven fan (code ELFR).
- Connection frame, large (code EMMT-02-a-1)
- Flexible connection, small (code MIET-AF-02-a). For fan section EFA-FR with belt-driven fan (code ELFR)
- Flexible connection, large (code EMMT-03-a-1)

Inlet:

- Connection frame, large (code EMMT-02-a-1)
- Connection frame, maximal (code EMMT-02-a-2)

See also section: Accessories.

Accessories for the EFA-FD

- Steel spring anti vibration mountings (sizes 360–950) (code MIET-FD-03-a-d)
- Flow meter, manometer type (code MIET-AF-09-d-DD)
- Flow meter, electronic (code MIET-AF-10)

See also section: Accessories.

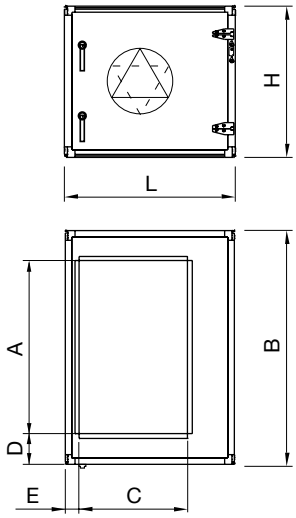
Accessories for the EFA-FR

- Steel spring anti vibration mountings (sizes 150–600) (code MIET-AF-03-a)
- Measurement tappings for flow meter excl. meter (for ELFR-FB), (code MIET-AF-08-d-FB)
- Flow meter, manometer type (for ELFR-FB), (code MIET-AF-09-d-FB)
- Flow meter, manometer type (for ELFR-BB), (code MIET-AF-09-d-BB)
- Flow meter, electronic (code MIET-AF-10)

See also section: Accessories.

Dimensions and Weights

EFA-FD Fan section with ELFD fan

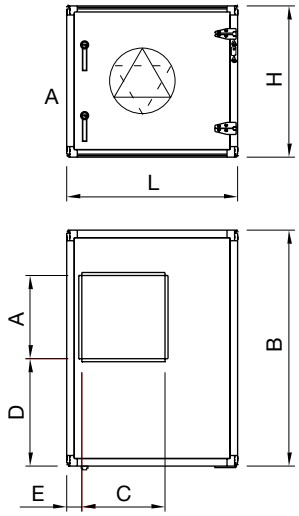


Size -aaa-	Impeller size -bbb-	Dimensions (mm)							Total wgt. (kg)* incl. max motor	Max motor size to IEC
		L	B	H	A	C	D	E		
060	025	630	850	440	500	300	175	165	65	71
100	028	630	980	505	700	300	140	205	80	80
150	035	780	1080	695	800	500	140	100	120	90
190	040	930	1360	695	1000	500	180	250	160	100
240	050	930	1360	805	1000	600	180	100	180	100
300	050	930	1580	805	1200	600	190	100	195	100
360	050	1080	1580	990	1200	800	190	100	225	100
360	056	1080	1580	990	1200	800	190	100	240	112
480	056	1230	1950	990	1400	800	275	100	250	100
480	063	1230	1950	990	1400	800	275	100	340	132
600	063	1230	2160	1095	1600	800	280	100	350	132
600	071	1380	2160	1095	1600	800	280	100	375	132
740	071	1420	2480	1240	2000	900	240	170	475	132
740	080	1570	2480	1240	2000	900	240	170	560	160
750	071	1420	2020	1370	1600	1000	210	50	455	132
750	080	1570	2020	1370	1600	1000	210	120	540	160
850	071	1420	2560	1370	2200	1000	180	50	505	132
850	080	1570	2560	1370	2200	1000	180	120	595	160
950	080	1570	2020	1660	1600	1200	210	50	575	160
950	090	1870	2020	1660	1600	1200	210	315	790	200

* The specified weight refers to a casing with standard insulation. For calculating the weight of casings with insulation to fire resistance class EI30, use the IV Produkt Designer product selection software.

Dimensions and Weights

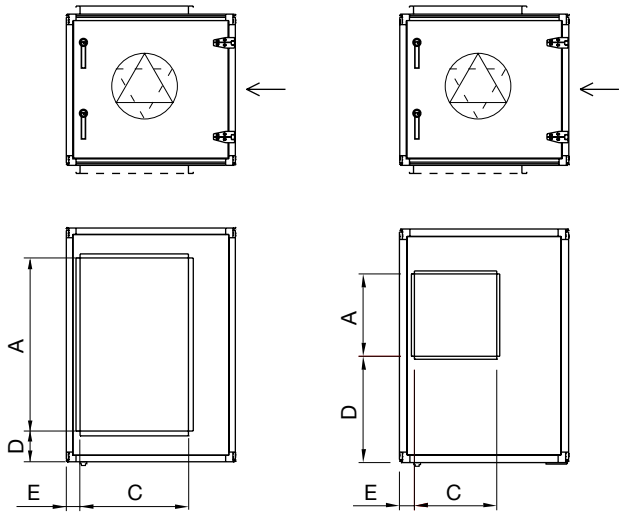
EFA-FR fan section with ELFR fan



Size -aaa-	Impeller size -bbb-	Dimensions (mm)								Total wgt. (kg)* incl. max motor		Max motor size to IEC
		L	B	H	A	C	D	E V.210 & 310	E V.220 & 320	ELFR-FB	ELFR-BB	
060	016	630	850	440	230	230	380	80	320	65	–	80
100	020	630	980	505	280	280	480	65	285	100	–	100
150	028	780	1080	695	385	385	490	65	330	135	140	112
190	028	930	1360	695	385	385	700	65	480	155	160	112
240	035	930	1360	805	475	475	550	75	380	220	225	132
300	035	930	1580	805	475	475	730	75	380	235	240	132
360	040	1230	1580	990	530	530	730	95	605	280	285	132
480	045	1230	1950	990	570	570	780	210	450	385	390	160
600	050	1230	2160	1095	640	640	780	255	335	435	445	160
740	050	1420	2480	1240	640	640	920	424	356	510	515	160
740	056	1570	2480	1240	720	720	880	130	719	575	585	180M
750	056	1570	2020	1370	720	720	899	130	719	555	565	180M
750	063	2020	2020	1370	806	806	607	143	1070	615	635	180
850	056	1570	2560	1370	720	720	920	130	719	600	610	180M
850	063	1720	2560	1370	806	806	877	131	782	625	645	180M
950	063	2020	2020	1660	806	806	607	144	1070	645	665	180
950	071	2170	2020	1660	903	903	558	233	1033	705	715	180

* The specified weight refers to a casing with standard insulation. For calculating the weight of casings with insulation to fire resistance class EI30, use the IV Produkt Designer product selection software.

Outlet connection frame, dimensions



For EFA-FD fan section *For EFA-FR fan section*

For inlet connection frames, see the EMMT-02.

Connection frame for EFA-FD fan sections

Size -aaa-	Impeller size -bbb-	Large frame, EMMT-02, dimensions (mm)			
		A	C	D	E
060	016	500	300	175	165
100	020	700	300	140	205
150	028	800	500	140	100
190	028	1000	500	180	250
240	035	1000	600	180	100
300	035	1200	600	190	100
360	040	1200	800	190	100
480	045	1400	800	275	100
600	050	1600	800	280	100
740	050	2000	900	240	170
740	056	2000	900	240	170
750	056	1600	1000	210	50
750	063	1600	1000	210	120
850	056	2200	1000	180	50
850	063	2200	1000	180	120
950	063	1600	1200	210	50
950	071	1600	1200	210	315

Connection frame for EFA-FR fan sections

Size -aaa-	Impeller size -bbb-	Small frame, MIET-AF-01, dimensions (mm)					Large frame, EMMT-02, dimensions (mm)				
		A	C	D	E V.210 & 310	E V.220 & 320	A	C	D	E V.210 & 310	E V.220 & 320
060	016	300	300	345	65	265	500	300	175	65	265
100	020	300	300	470	65	265	700	300	140	65	265
150	028	500	500	430	65	215	800	500	140	65	215
190	028	500	500	640	65	365	1000	500	180	65	365
240	035	600	600	485	65	265	1000	600	180	65	265
300	035	600	600	665	65	265	1200	600	190	65	265
360	040	800	800	595	65	365	1200	800	190	65	365
480	045	800	800	665	200	230	1400	800	275	200	230
600	050	800	800	665	200	230	1600	800	280	200	230
740	050	900	900	790	170	355	2000	900	240	170	355
740	056	900	900	790	130	540	2000	900	240	130	540
750	056	1000	1000	760	130	440	1600	1000	210	130	440
750	063	1000	1000	510	140	875	1600	1000	210	140	875
850	056	1000	1000	780	130	440	2200	1000	180	130	440
850	063	1000	1000	780	130	590	2200	1000	180	130	590
950	063	1200	1200	410	140	675	1600	1200	210	140	675
950	071	1200	1200	410	230	735	1600	1200	210	230	735

Operation and Maintenance Instructions

Fan

General

The function of the fan is to transport air through the system, i.e. the fan must overcome the air stream resistance present in air diffusers and grilles, the ducting and the air handling unit.
The fan speed is adjusted to provide the correct airflow. If the fan generates a lower airflow, this may disturb ventilation system performance.
If the supply airflow is too low, there will be imbalance in the system and this may cause draught problems. If the ventilation capacity is too low, this may contribute to poor room climate. If the extract airflow is too low, poor ventilation capacity will result. Imbalance can also lead to damp air being pressed out into the building structure. An excessively low extract airflow causes increased power consumption if a means of heat recovery is installed.
The reason why the fan impels too little air may be that the v-belts are slipping. This may also be due to the effect of dust deposits on the impeller blades.
If a centrifugal fan rotates in the wrong direction, the air will flow in the correct direction but with reduced capacity. The direction of fan rotation may have been changed as a result of electrical installations. The direction of rotation should therefore be checked.

Measures

N.B.! Before beginning work, switch off the air handling unit from its switch and then turn the safety isolating switch to the 0 position.
If the unit has double motors, there may be two switches.

1. Fan

What to check

Check that the fan impeller rotates easily, is in balance and does not vibrate, and that the impellers are securely seated on their shafts and that they have not shifted sideways toward the inlet cones. Imbalance may be due to dust deposits on or damage to the impeller blades.
Check by listening to hear whether any damage has arisen in the bearings. Place a screwdriver, or the like, against the bearing housing and listen with your ear against the screwdriver handle. Normally you should hear only a humming sound. If you hear a squeaking sound, the bearings need to be lubricated. A scraping sound indicates that foreign particles have penetrated the bearing. A regular metallic noise indicates that the bearing is damaged. In both these cases the bearings should be replaced by new ones.

The fan impeller, bearing housing and motors are mounted on a vibration-isolated base plate with anti-vibration mountings.
Check that the mountings are firmly secured and are intact.
Inspect the safety guards, flexible connection, mounting bolts and suspension devices, anti-vibration mountings and base frame/stand.
Check that the impellers are clean, free of dust deposits.
Check tht the belt pulley mounting bolts are tight.

Cleaning

Wipe the fan impeller blades clean to remove possible dust deposits. For this, you can use a mixture of Toluene and denatured alcohol (2:1) or white spirit if required. Do not use kerosene since it can cause rust to form on surfaces.
Then vacuum clean the air handling unit to prevent dust from being discharged out into the duct system.
Clean the fan casing in the same way as the impellers.
Check that the enclosures and inlet cones are correctly secured.

Lubrication

If the fan bearing blocks are fitted with lubricators, lubricate if required with SKF ALFA LUBE LG MT2 grease. In other cases, the bearings are permanently lubricated and normally do not require additional lubrication.

2. Belt Drive

Inspection

Check that the drive belts are not worn, broken, dried out or damaged in any way. If the belts are damaged, they must be replaced. If more than one belt must be replaced, you must replace all the belts. Check that the belts are correctly tensioned. Excessive tensioning can cause the bearings to overheat and can overload the motor. Too loose tension will cause the belts to slip and become quickly worn.

To replace or tension the belts

Tension the belts by moving the motor by means of the tensioning bolts of the motor base plate. Do not force the belts over the pulley, first release the tensioning bolts.
When changing belts, check that the pulley grooves are not worn.

Use a ruler to check that the belt pulleys are parallel and that their grooves are in alignment, *see Fig 2*.
Note that new belts should be re-tensioned after about 14 days.

Fig. 2

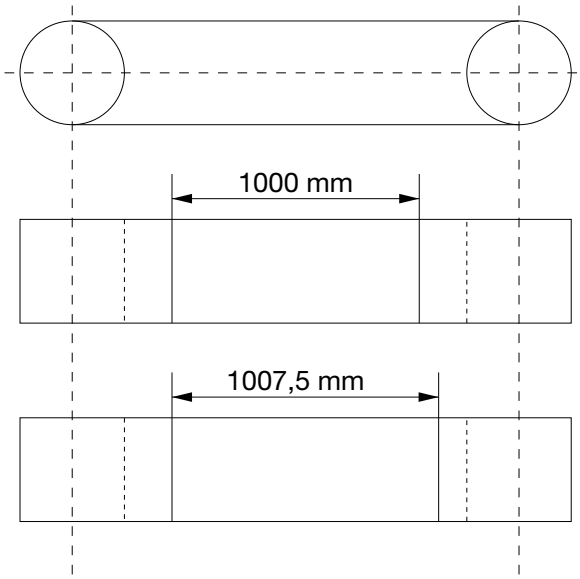
To adjust belt tension

To tension Poly-V belts (Ribbed belts)

Break-in

Poly-V belts must be correctly tensioned to achieve the best useful life. Insufficient or excessive belt tension will shorten, the belts' useful life. We recommend the stretching method which is simple and does not require special tools.

1. Lay the belt in the pulley grooves without tensioning them.
2. Draw two lines across the backside at a distance of approx. 80% of the distance between the centres (or one metre if the distance between the centres is long).
3. Increase the distance between the two lines by 0.5 to 0.75% by tensioning the belts (provides 5 to 7.5 mm at a distance of 1000 mm between the shaft centres).
4. Operate the fan under load for approx. 10 minutes.
5. Check the belt tension by measuring the distance between the lines and adjust if necessary.



Tensioning distance for Poly-V belts

Distance between the marks		
Before tensioning, mm	After tensioning, mm	
	min	max
100	100.5	100.8
150	150.8	151.1
200	201.0	201.5
250	251.3	251.9
300	301.5	302.3
350	351.8	352.6
400	402.0	403.0
450	452.3	453.4
500	502.5	503.8
600	603.0	604.5
700	703.5	705.3
800	804.0	806.0
900	904.5	906.8
1000	1005.0	1007.5

To adjust narrow V-belt tension

Breaking-in

New belts should be tensioned so that the necessary deflection force (see Fig. 3) corresponds so much as possible to the higher table value P in the table below.
Check the belt tension after 50 hours of operation.
80% of the natural belt stretching occurs within the first 15 hours of operation.

Check correct belt tension as follows:

1. Measure the distance between the shaft centres (A)
2. Measure the force required to achieve 16 mm belt deflection, reckoned per metre distance between the shaft centres, perpendicular to the direction of belt movement and approximately in the middle between the belt pulleys.
3. Increase the belt tension if the force is less than P in the table or vice versa.

Correct belt tension can be checked as follows:

1. Measure the distance between the shaft centres.
2. Measure the force required to achieve 16 mm belt deflection, distance between the shaft centres, perpendicular to the direction of belt movement and approximately in the middle between the belt pulleys.
3. Increase the belt tension if the force is less than P in the table or vice versa.
4. Recommended belt tensioning: 0.8 × P_{max}.

Belt profile	Deflection P for a rise of 16 mm/m distance between shafts	
	Small pulley diameter, dy	P Newton (N)
SPZ	67-95 100-140	10-15 12-20
SPB	160-224 236-315	35-50 50-65
SPC	224-355 375-560	60-90 90-120

3. Motor

f) Inspection

Listen to the bearings. If the bearing is OK you'll hear a slight humming. A squeak indicates that the bearing has too little lubrication. A scraping or thumping sound indicates that the balls or their races are damaged. Damaged bearing must be replaced.
Check that the motor mounts are intact and that the mounting bolts are tightened.

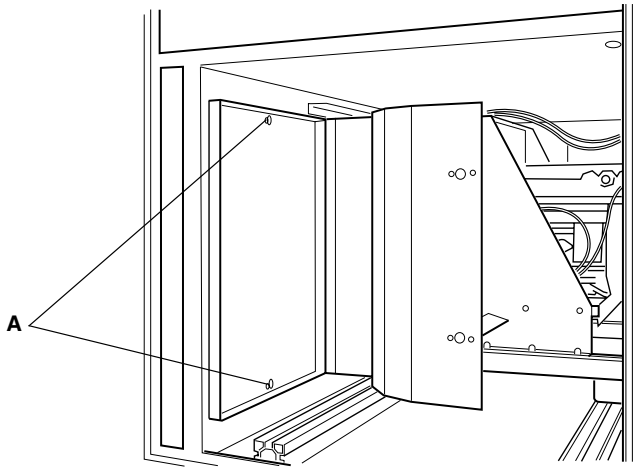
g) Cleaning

Keep the motor clean and free from dust, dirt and oil. Wipe with a cloth. Use white spirit to remove hard-to-remove dirt.
Thick layers of dirt may cause internal overheating if they inhibit cooling of the stator.

h) Lubrication

Motors equipped with lubricators should be lubricated once every 750th service hour. Otherwise no lubrication other than packing in bearings, whenever replacing bearings. Suitable grease: SKF C65.

Fan



Fan unit

What to check

1. Back off the bolts, item A, and withdraw the fan units (fan and motor are mounted on rails).
2. Check that the impellers rotate easily, are in balance and do not vibrate. Imbalance may be due to dust deposits or damages to the impeller blades.
3. Check that the impellers are well secured on their shafts and that they have not shifted sideways toward the inlet cones.
4. Fan and motor mounted on a stand are mounted on rubber anti-vibration mountings. Check that the mountings are secured and are intact.
5. Check the mounting bolts and the suspension devices and stand.
6. Check that the impellers are clean and free of deposits of dust particles.
7. Refit the fan units.
8. Check the airflows by measuring Δp in the connections for flow measurement. Δp is used for obtaining the airflow in a chart on the unit. Read the pressure difference Δp on the measurement tube. Plot Δp in the chart on the air handling unit, to the relevant unit size and read the flow.

Cleaning

1. Follow items 1-6 under *What to check*.
2. Wipe the impeller blades clean to remove possible dust deposits. Use an environment-friendly degreasing agent. You should not use kerosene since this is likely to cause rust.
3. The vacuum clean in a way that the dust will not be blown out into the duct system.
4. Clean other parts in the same way as the impeller. Check that the inlet cones are secured in place.
5. Follow items 7-8 under *What to check*.

Motor

What to check

1. Follow items 1-6 under *Fan, What to check*.
2. Check that the motor mounts are intact and that the mounting bolts have been tightened.
3. Listen to the bearings. If the bearings are OK you'll hear a humming sound. A scraping or thumping sound may indicate that the bearings are damaged. Servicing is then required.
4. Follow items 7-8 under *Fan, What to check*.

Cleaning

Follow items 1-6 under *Fan, What to check*.

Keep the motors and control units free from dust, dirt and oil. Clean surfaces with a cloth. If surfaces are heavily fouled, use an environment-friendly degreasing agent as a solvent, for instance. Thick layers of dirt may cause internal overheating if they inhibit cooling of the stator.

Follow items 7-8 under *Fan, What to check*.

In the event of an alarm initiated from a motor with built-in frequency inverter, reset the frequency inverter by de-energizing the motor for at least 45 seconds. Check the voltage and that the air handling unit is correctly installed. Then restart the motor.