

# Roof fans TFC 225-560 S/P

Operation and Maintenance Instructions

GB

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# 1 EU Declaration of conformity

## Manufacturer



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hereby confirms that the following products:

Roof fans TFC 225-560 S/P

*(The declaration applies only to product in the condition it was delivered in and installed in the facility in accordance with the included installation instructions. The insurance does not cover components that are added or actions carried out subsequently on the product)*

Comply with all applicable requirements in the following directives and regulations

Machinery Directive 2006/42/EC

Low Voltage Directive 2014/35/EU

EMC Directive 2014/30/EU

Ecodesign Directive 2009/125/EC

327/2011 Requirements for fans

1253/2014 Requirements for ventilation units

The following harmonized standards are applied in applicable parts:

EN ISO 12100:2010	Safety of machinery – General principles for design – Risk assessment and risk reduction.
EN 13857	Safety of machinery – Safety distances to prevent hazard zones being reached by upper or lower limbs.
EN 60 335-1	Household and similar electrical appliances – Safety Part 1: General requirements.
EN 60 335-2-80	Household and similar electrical appliances – Safety – Part 2-80: Particular requirements for fans.
EN 62233	Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure.
EN 50 106:2007	Safety of household and similar appliances – Particular rules for routine tests referring to appliances under the scope of EN 60 335-1 and EN 60967.
EN 60529	Degrees of protection provided by enclosures (IP Code).
EN 60 204-1	Safety of machinery – Electrical equipment of machines – Part 1: General requirements
EN 61000-6-2	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments.
EN 61000-6-3	Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standards for residential, commercial and light-industrial environments.

The complete technical documentation is available.

Skinnskatteberg, 09-05-2016

Mats Sándor  
Technical Director

## 2 Warnings

The following admonitions will be presented in the different sections of the document:



### **Danger**

Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.



### **Warning**

Indicates a potentially hazardous situation that may result in minor or moderate injuries.



### **Caution**

Indicates a risk of damaging the product or prevent optimal operation.

### **Important**

- This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved.
- Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

## 3 Product information

### 3.1 General

This installation manual concerns Roof fans TFC 225, TFC 280, TFC 355, TFC 450, TFC 500 and TFC 560 manufactured by Systemair Sverige AB.

The S-fans are delivered with potentiometer, 0-10 V. The integrated potentiometer is factory preset to 10 V. This value can be changed manually to obtain a different motor rpm/fan performance. Fan performance charts for this purpose are shown in the table by voltage steps (chapter 3.2.2). An external potentiometer can be connected if necessary. If so the internal potentiometer needs to be disconnected from the connection terminals. It is also possible to use an external pressure meter to set the desired airflow using the K-factor table (chapter 4.3).

The P-fans are regulated with a built in differential pressure and airflow controller. The fans are delivered with VAV control – Variable Air Volume but can be converted to CAV – Constant Air Volume (see chapter 4.2).

This manual consists of basic information and recommendations concerning the design, installation, start-up and operation, to ensure a proper fail-free operation of the unit. The key to proper and safe operating of the unit is to read this manual thoroughly, use the unit according to given guidelines and follow all safety requirements.

The TFC 225-560 S/P are intended for transportation of air in air handling systems. The fans are meant for use in ducted systems and should always be duct connected on the inlet side. No moving parts shall be accessible after installation. TFC 225-560 S/P roof fans are adapted to continuous operation.

Roof fans are exclusively intended for extract air applications.



#### Danger

- The fans are not to be used in hazardous environments or connected to flue ducts.
- The appliance must be connected to a mains circuit breaker in the fixed installation.
- Switch power off (all-pole circuit breaker) before servicing or maintenance, and make sure the impeller has come to standstill.
- Make sure protection grid has been installed (EN ISO 13857), no moving parts shall be accessible after installation.
- Do not remove, short-circuit or disconnect safety accessories (i.e. motor protection, safety grille).



#### Warning

- The fans can have sharp edges and corners which may cause injuries. Be careful when opening the fans, the motor assembled on the motor bracket is relatively heavy.

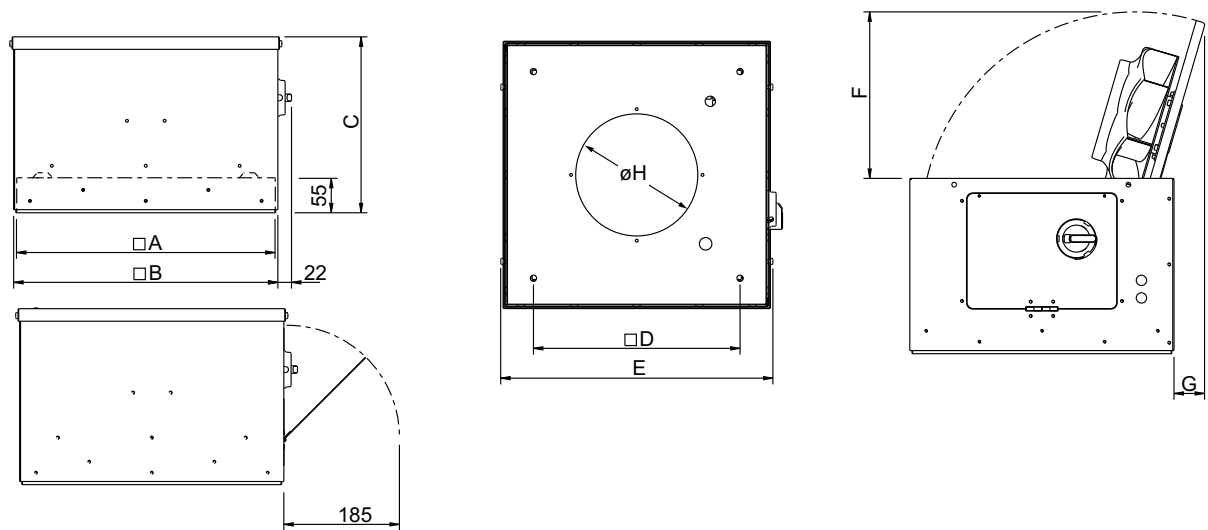


#### Caution

- Take precautions to prevent the back flow of exhaust gases from flues from other appliances installed in the same room, which are fired by gas or other fuels.
- This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

## 3.2 Technical data

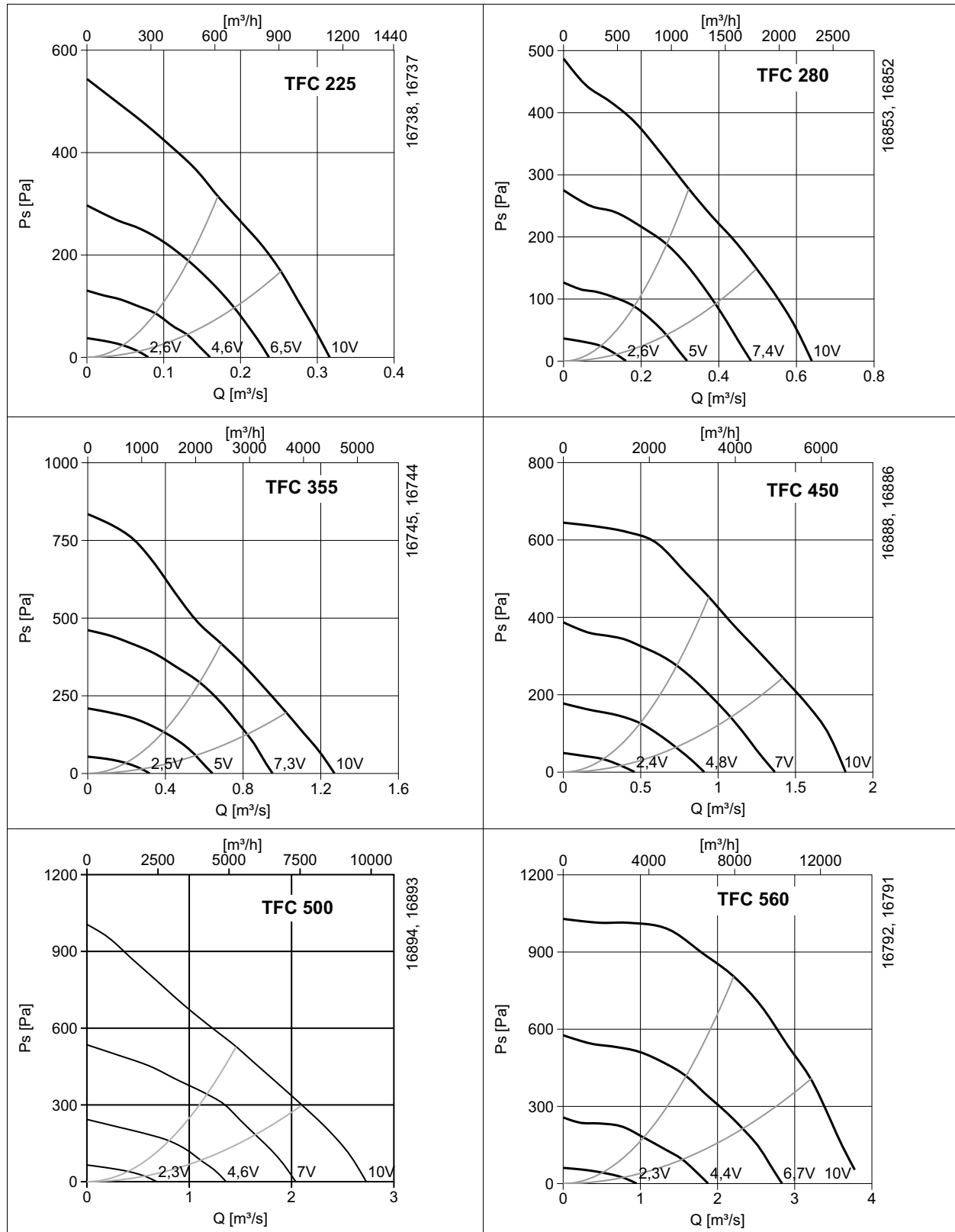
### 3.2.1 Dimensions and weight



Model	□A	□B	C	□D	E	F	G	$\varnothing H$	Weight, kg
TFC 225	413	422	281	330	435	266	49	195	12,4
TFC 280	514	523	333	450	535	368	86	245	17,1
TFC 355	618	627	376	535	637	491	150	300	27,5
TFC 450	728	737	417	655	747	602	176	375	35,4
TFC 500	924	934	531	840	946	695	200	400	60,8
TFC 560	924	934	531	840	946	744	279	470	74

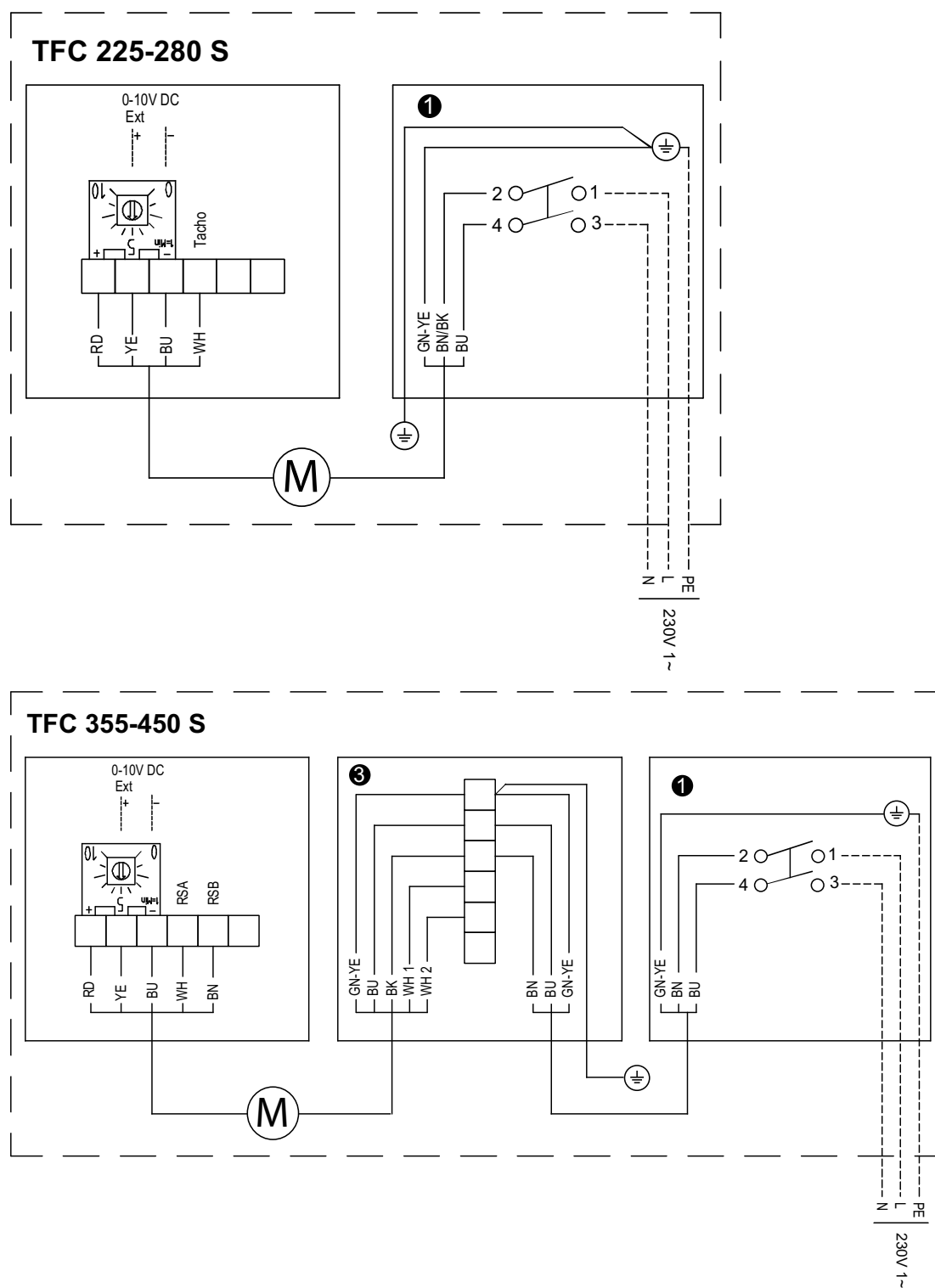


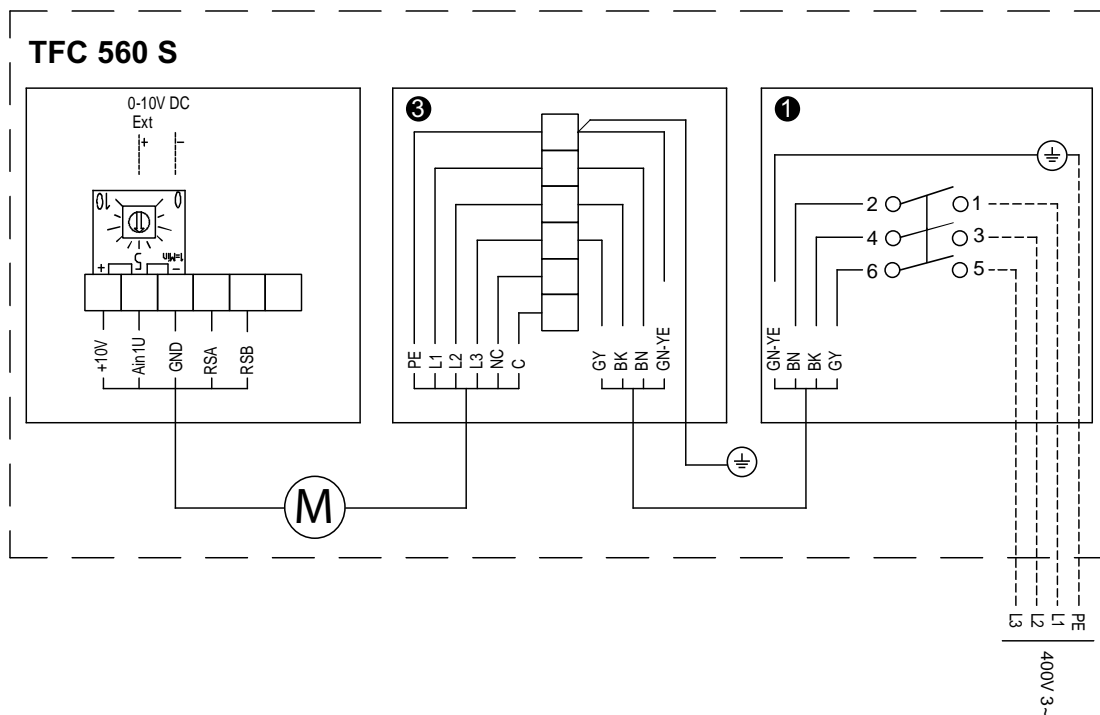
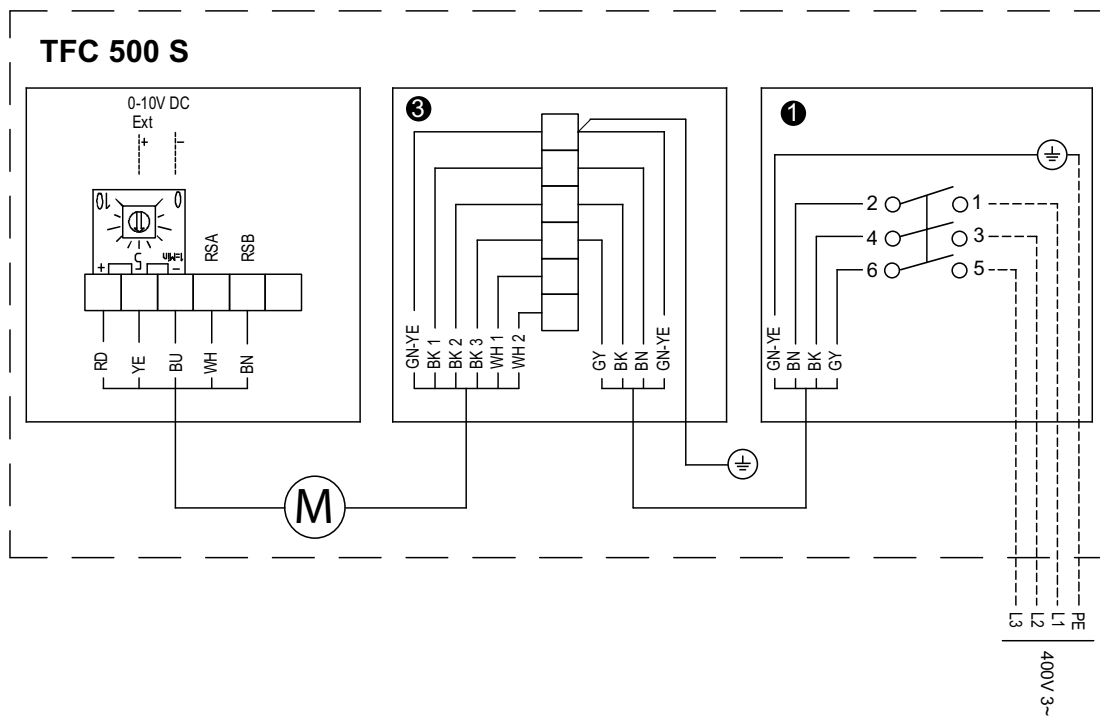
### 3.2.2 Performance



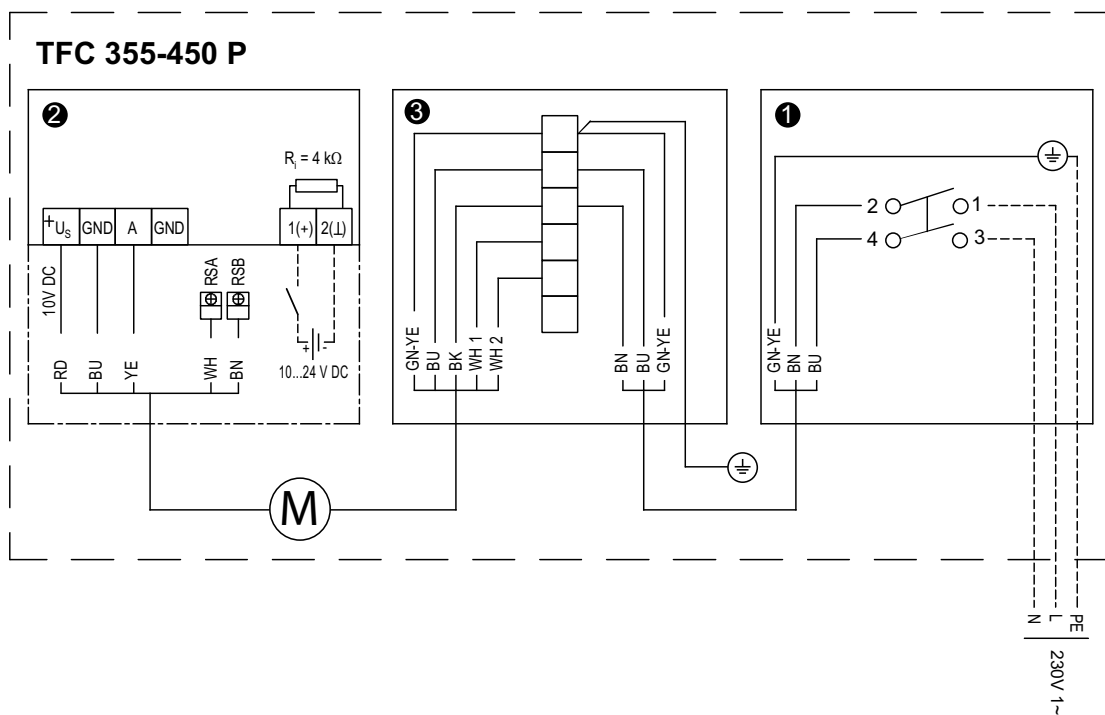
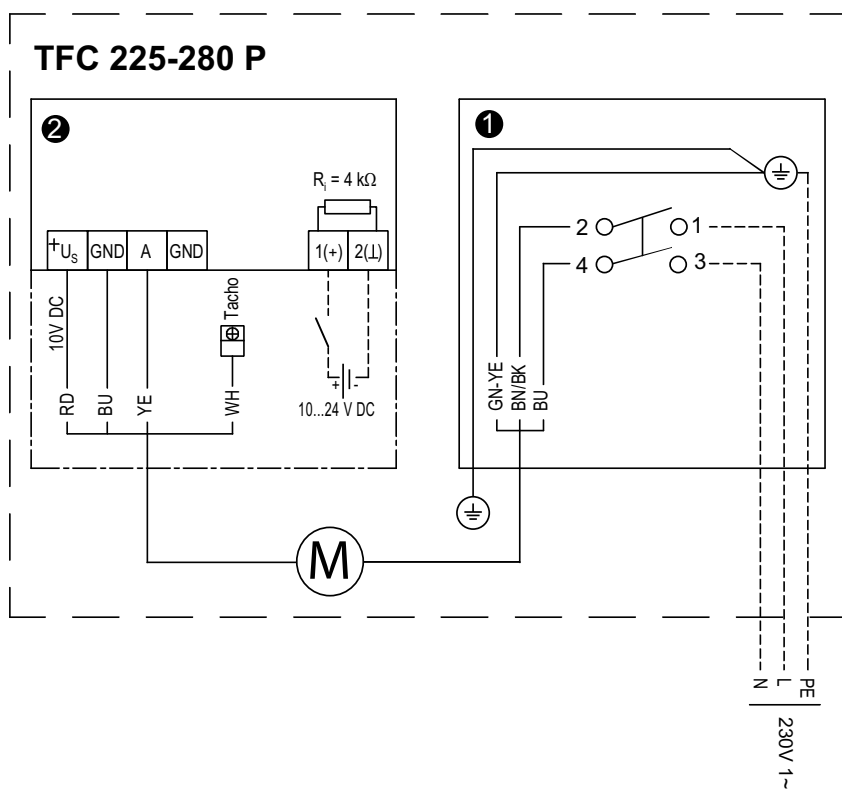
### 3.2.3 Wiring diagram

Modbus communication is possible from TFC 355, see wiring diagram.





Ext = External





①	Safety switch
RD	Red
YE	Yellow
BU	Blue
WH	White

2	Fan control
GN	Green
BN	Brown
GY	Gray
BK	Black

<b>3</b>	Alarm
NC/WH1	Alarm output
C/WH2	Normally closed

<b>Switch-over contact enables:</b>		
Voltage off		Setpoint 1 active
Voltage on		Setpoint 2 active

### 3.2.4 Residual current devices

Only universal (type B, B+) RCD protective devices are permitted.

Like frequency inverters, RCD protective devices cannot provide personal safety while operating the device, pulse charge currents from the capacitors in the integrated EMC filter lead to the RCD protective device triggering without delay.

We recommend residual current devices with a trigger threshold of 300mA and delay triggering. (super-resistant, characteristic K)

## 3.3 Transportation and storage

All fans are packaged at the factory to withstand normal transport handling. When handling the goods use suitable lifting equipment in order to avoid damage to fans and personnel. Avoid blows and shock loads. Store the fans in a dry place protected from weather and dirt until final installation.



### Warning

- The unit is heavy. Be careful during transport and installation. Risk of injury through pinching. Use protective clothing.
- Do not lift the fans by the connecting cable, connection box, motor bracket, impeller or inlet cone.

## 4 Installation



### Danger

- Make sure that the mains supply to the unit is disconnected before performing any maintenance or electrical work!
- All electrical connections must be carried out by an authorized installer and in accordance with local rules and regulations.

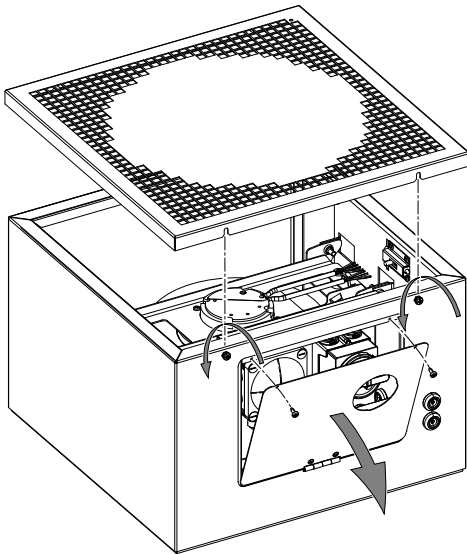


### Warning

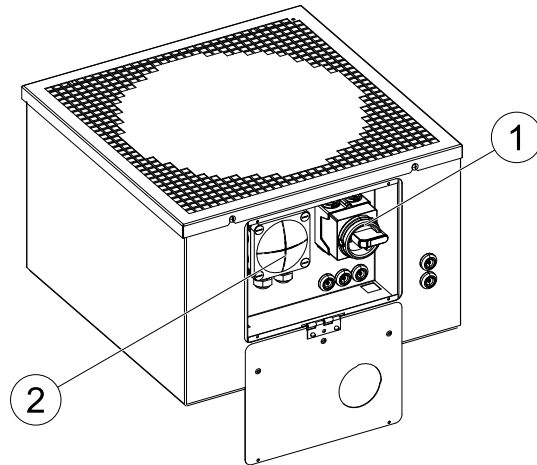
- The units electrical connection to the mains supply must be preceded by an all pole circuit breaker with a minimum 3 mm gap.
- Do not lift the fans by the connecting cable, connection box, motor bracket, impeller or inlet cone.
- Do not block or cover the drainage gap around the bottom of the fan.

The fan should be installed horizontally. Make sure the assembly of the fan is firmly fixed and stable. The fans must be installed to ensure that service and maintenance can be performed easily and safely. Disturbing noise can be reduced by installing silencers (available as an accessory). Electrical connections are made according to the wiring diagram in the terminal box, markings on terminal blocks or on cable. All 3 phase fans are delivered from factory in 400 V 3~ connection.

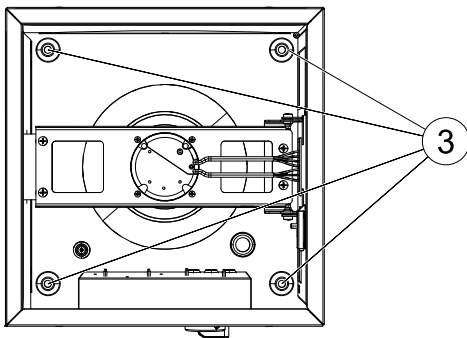
## 4.1 Installing the fans



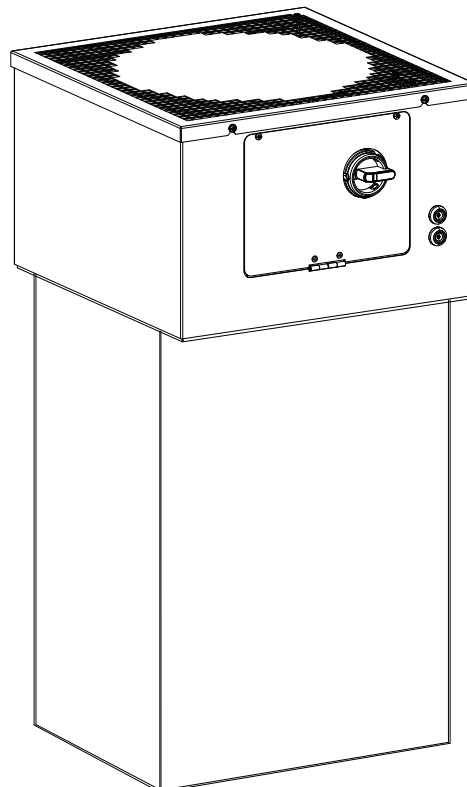
**Figure 1**  
Loosen the screws to open the lid to reach the motor. Unscrew the two screws to open the lid to the electrical compartment.



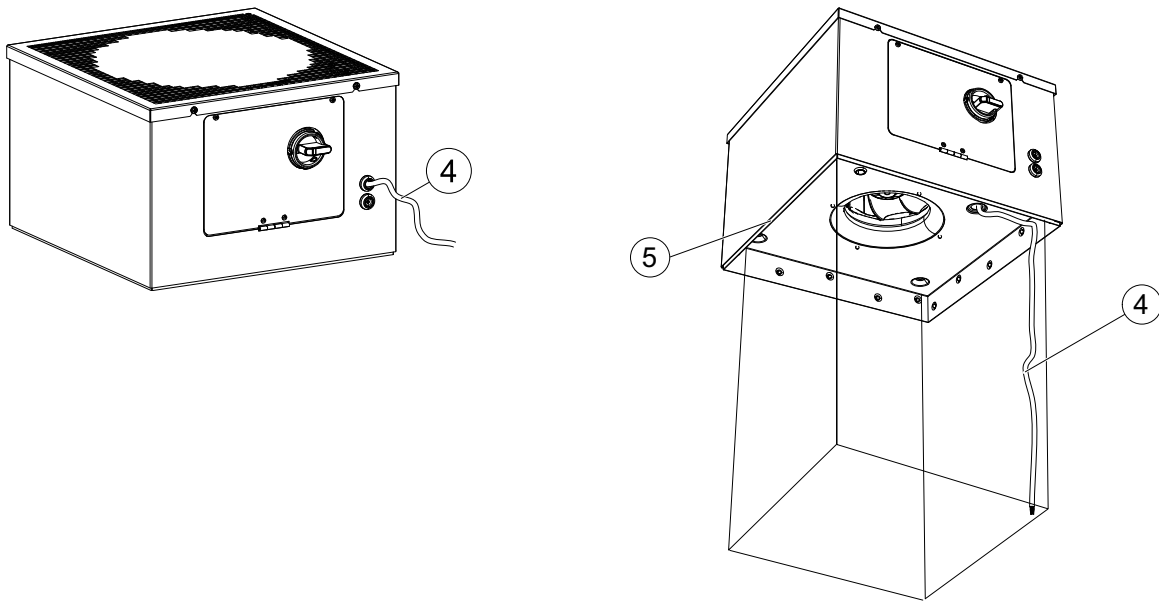
**Figure 2**  
Connect the mains supply to the lockable safety switch (1). Image show S-controller (2). The hinges on the hatch to the electrical compartment prevents the hatch from falling down.



**Figure 3**  
Possible to mount the TFC with suitable roof curb (optional), using the holes in the bottom of the fan (3).



**Figure 4**  
TFC mounted on roof curb.



**Figure 5**

Mains supply (4) can be run through the cable glands beside the electrical compartment or inside a roof curb, if used.



**Note:**

Don't cover this gap (5). It is for drainage if water enters the fan.

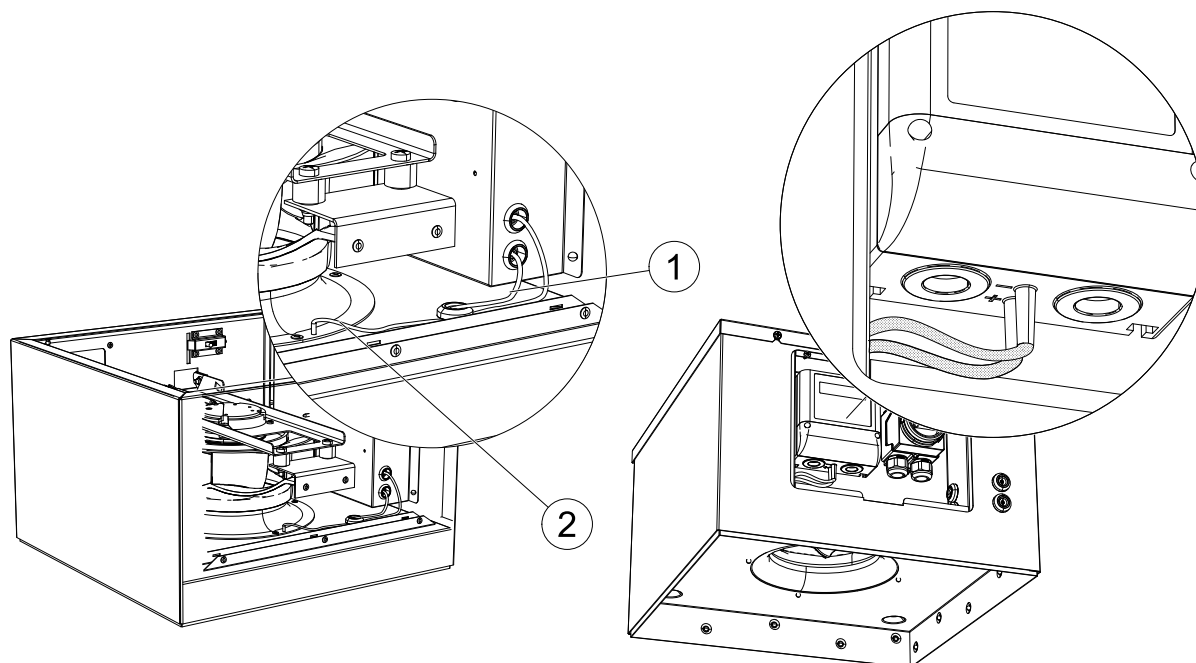


## 4.2 Change from VAV to CAV

TFC 225 -TFC 560 are delivered as VAV- fans. The tubing is connected to - (minus) inlet on the controller.

All fans are also prepared with tubing for CAV (Constant air volume). The tubing is attached along the side of the casing and loosely inserted in the electrical compartment. Change the function to CAV by replacing the connection to the controller, the tubing from the bottom of the fan (1) to + (plus) inlet and the tubing from the cone (2) to - (minus).

The tubing from the cone is labelled with blue tape.



In BASE SETUP 5.01 in table 1, set the K-factor (see chapter 4.3). In SETTINGS, adjust the airflow for Setpoint 1, Setpoint 2 and Pband (nominal airflow x 2 recommended).

## 4.3 K-factor

Use the following equation to calculate the requested setting:

$$q = k \cdot \sqrt{p}$$

q = airflow [m<sup>3</sup>/h]

k = k-factor

p = tuning pressure [Pa]

Model	K-factor
TFC 225	57
TFC 280	79
TFC 355	134
TFC 450	212
TFC 500	289
TFC 560	554

## 4.4 Commissioning



### Danger

- All electrical connections must be carried out by an authorized installer and in accordance with local rules and regulations.

#### Before initial operation, check the following:

- Electrical connection has been properly completed.
- Protective earth has been connected.
- Safety devices in place (protection grid).
- Leftover installation materials and foreign materials have been removed from the casing.

#### Testing the installation:

- Adjustment may be required in the electrical compartment during test (i.e. changing of the potentiometer), however during operation the lid must be closed.

#### When putting into operation, check the following:

- Connection data corresponds to the specifications on the nameplate: Maximum voltage +6%, -10%, according to IEC 38. Rated current must not be exceeded with more than 5% at rated voltage.
- The direction of rotation should correspond to direction-of-rotation arrow (3 phase).
- Smoothness of motor operation, (no abnormal noises).

Sound levels exceeding 70 dB(A) may occur depending on size (see [www.systemair.com](http://www.systemair.com) for detailed information).

## 4.5 Alarm output

The fan motor has built in protection for locked rotor, which implies that the motor tries to restart with a pre-programmed interval whenever it senses that the rotor is standing still. When the blockage is removed the fan will start up by itself without any further measures. At high motor temperatures the current will be cut from the motor. It can then only be restarted by manually disconnecting the mains supply to the fan for couple of minutes.

TFC 225 and TFC 280 has **Tacho output**

The tacho output is an open collector output. Connect a pull up resistor to a DC voltage – make sure that the current does not exceed 10mA.


5 Control panel

5.1 Operating the control panel

Multipurpose LC display and keyboard

100 Pa Δp	Display show the actual and desired values Display show menu text
P	Program key and open menu
▼	Menu selection, reduce value
▲	Menu selection, increase value
▼+▲	ESC-key combination, Escape = leave menu

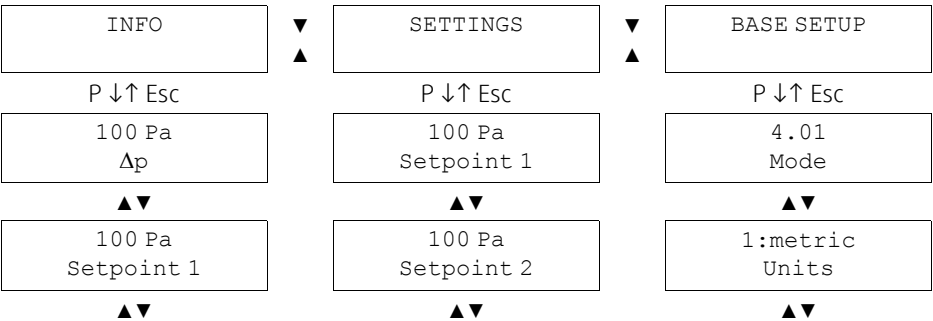
Messages on the display

!	Exceeding measuring range
	Moon symbol = Adjustment for Setpoint 2 active

100 Pa Δp	Display after turning on the voltage supply. Switch over between actual value display and "INFO" with the key shortcut for Escape (Esc = ▼+▲)	Info
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Selection of the menu group (e.g. BASE SETUP) to the right through the ▼-key, to the left through the ▲-key. You can go to the menu items in the menu groups (e.g. mode) by using the P key. Use the arrow keys to move up and down within the menu group. To make adjustments, press the P key after selecting the menu item. If the previously set value starts to flash, it can be adjusted with the ▼ + ▲ keys and then saved with the P key. To exit the menu without making any changes, use the "Esc" short-key, i.e., the originally set values remain.

For more detailed information see table 1.



**Select operation mode**

Marked area indicates factory setting.

Mode	Function
4.00	Pressure sensor output 0...10 V proportional to measuring range.
4.01	<b>Factory preset</b> Pressure controller (PID): Output 0...10 V depending on adjusted setpoint and measured actual value.
5.00	Air volume sensor: Output 0...10 V proportional to measuring range (depending on setting for K-factor).
5.01	Air volume controller (PID): Output 0...10 V depending on adjusted setpoint and measured actual value

**Table 1 Parameter table**

Parameter	Display/Factory setting				Function
Mode	4.00	4.01	5.00	5.01	Mode
INFO					Information
$\Delta p$	0 Pa	0 Pa	-	-	Different actual value for differential pressure
qV	-	-	0 m <sup>3</sup> /h	0 m <sup>3</sup> /h	Display actual value for airflow
Setpoint 1	-	100 Pa	-	1185 m <sup>3</sup> /h	Display active Setpoint
Range qV	-	-	2371 m <sup>3</sup> /h	2371 m <sup>3</sup> /h	Air volume measuring range depending on sensor measuring range and K-factor
Uout	0.0 V	9.9 V	0.0 V	9.9 V	Magnitude of the output voltage 0...10 V
UNIcon	1.00	1.00	1.00	1.00	Software version
$\Delta p$	-	-	0 Pa	0 Pa	Display actual value for volume measurement

SETTING 4.01 + 5.01					Setting
Setpoint 1	-	100 Pa	-	1185 m <sup>3</sup> /h	Setpoint 1 <sup>1</sup>
Setpoint 2	-	200 Pa	-	1185 m <sup>3</sup> /h	Setpoint 2 <sup>1, 2</sup> (Active if voltage at terminals 1, 2)
Pband	-	250 Pa	-	1185 m <sup>3</sup> /h	Pband <sup>1, 2</sup>
Min. Uout	-	0.0 V	-	0.0 V	Min output voltage: 0.0...10.0 V (priority over "Max. Uout")
Parameter	Display/factory setting				Function
Max. Uout	-	10.0 V	-	10.0 V	Max. output voltage: 10.0...0.0 V

<sup>1</sup> Setting range 4.01: 0...100 % sensor measuring range, 5.01: 0...Max. Range qV (depending on K-factor and sensor measuring range).

<sup>2</sup> Small value = quick regulation, great value = slow regulation, high stability.

BASE SETUP					Base setup
Mode	4.00	4.01	5.00	5.01	Mode
Units	metric: Pa, m <sup>3</sup> /h, K-factor				SI units or Imperial units (US)
Measuring range	<b>1: 0...1000 Pa</b> 2: 0...500 Pa 3: 0...300 Pa 4: 0...200 Pa				<b>PCA1000D2</b> Adjustable measuring range
K-factor (K-factor US)	-	-	75	75	Nozzle coefficient (K-factor) see chapter 4.3
Autozero	OFF => ON				Automatic "0" offset
Offset	0 Pa				Sensor offset (automatically when "Autozero") Setting range: +/- 1000 Pa

## 6 Maintenance

### 6.1 Important



#### Danger

- Make sure that the mains supply to the unit is disconnected before performing any maintenance or electrical work!
- Fan impeller has come to a complete standstill.
- Should the supply cable be damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard
- The unit is heavy. Be careful during transport and installation. Risk of injury through pinching. Use protective clothing.
- Do not lift the fans by the connecting cable, connection box, motor bracket, impeller or inlet cone.

### 6.2 Maintenance intervals

The fan should be cleaned when necessary, at least once a year to avoid imbalance and unnecessary damage to the bearings. The fan bearings are maintenance free and should only be replaced if damaged. Do not use a high-pressure cleaner (steam jet) when cleaning the fan. Ensure that the fan impeller's balance weights are not moved or the fan impeller distorted. Listen for abnormal operating noise.

### 6.3 Cleaning the fan



#### Warning

- Make sure that the mains supply to the unit is disconnected before performing any maintenance or electrical work!
- Fan impeller has come to a complete standstill.
- The unit is heavy. Make sure that the motor bracket attach to the lock to prevent the motor to fall down during maintenance.



#### Danger

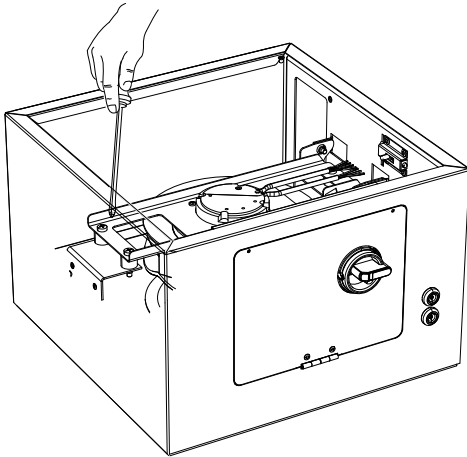
- Make sure that the motor does not fall down.



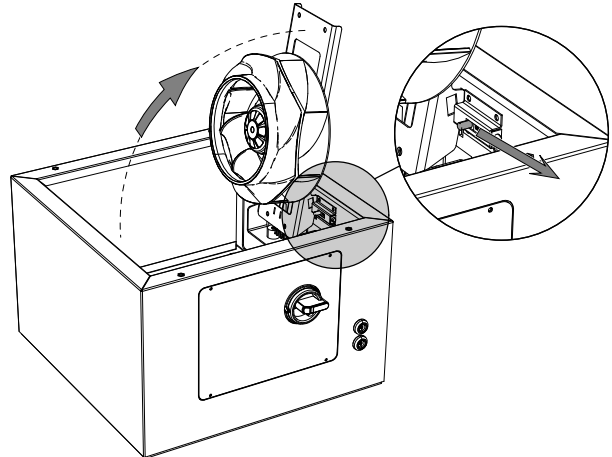
#### Caution

- Beware of sharp edges during maintenance, use protective gloves. Risk of injury through pinching.

Loosen the M5 screws to open the lid (chapter 4.1.)



Unscrew the motor bracket's two screws.



Lift the motor up by holding the motor bracket's handle, keep fingers away from the back of the hinge. Make sure that the motor bracket attach to the lock to prevent the motor from falling down during maintenance.  
After maintenance, release the lock, using the handle to bring the motor down. Fasten the motor bracket with the screws.



**Note:**

TFC 225 and TFC 280 has no handle, hold the motor bracket to lift the motor.

## 7 Troubleshooting

The following applies in case the fan has stopped:

- Try to restart the fan by cutting the power a couple of minutes.
- Ensure that the impeller is not locked. Disconnect the power supply, remove any obstacles. Check that the fan starts after reconnecting the current. Should the fan not start please contact your place of purchase.



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