

<h1 style="margin: 0;">DIRECTLY DRIVEN RADIAL FANS</h1> <h2 style="margin: 0;">RFC AND RFE</h2> <h3 style="margin: 0;">Installation and Operating Instructions- Instructions for Use</h3>		No : <b>MPP - 10.12 EN</b>  Valid from : <b>03.03.2017</b>
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These Installation and Operating Instructions – Instructions for Use contain data for the installation, operation, maintenance and use of the RFC and RFE fans.

They do not give data for the electrical installation of the motor which is to be ensured by the customer in terms of its safety, installation and operation.

Data for the related air handling equipment must be contained in the project documentation. The operator must be provably acquainted with these Installation and Operating Instructions – Instructions for Use.

The fans manufactured by the company Alteko s.r.o., comply with the Commission Regulation (EU) no. 327/2011 implementing Directive of the European Parliament and Council 2009/125/EC.

#### RFC AND RFE FAN SURFACE FINISHES AVAILABLE

RFC or RFE ...-Z – Galvanized sheet (275g/m<sup>2</sup>)

RFC or RFE ...-E – The outer fan surfaces powder coated with a powder for galvanized sheet, RAL 7035 (light grey).

RFC ...-AKV1 – Chrome-nickel austenitic steel according to ČSN EN 10088-1 /2014 no. 1.4301, designated as X5CrNi18-10 (formerly according to ČSN: 17240, DIN 1.4301) – used for the pharmaceutical and food industries).

RFC ...-AKV2 – Chrome-nickel austenitic steel according to ČSN EN 10088-1 /2014 no. 1.4571, designated as X6CrNiMoTi17-12-2 (according to ČSN: 17348, formerly DIN 1.4571) – used for the chemical, textile and paper industries).

#### I. Use, Working Conditions and Safety

The RFC and RFE fans are not gastight and **must not be used to transport air containing solid particles of over 100 µm, aggressive substances (except for their stainless design according to the resistance of the steel used), abrasive impurities and fibrous or sticky particles.**

The RFC fans, including accessories, intended for an aggressive environment or for use in the chemical or food industry are available in the stainless design (chrome-nickel austenitic steel, designated as AKV1 or AKV2). The RFE fans are not produced in the stainless design as standard and are intended only for use in a normal environment, with no explosion danger.

Rubber vibration insulators are delivered for fans as standard for placing on a horizontal surface. The fans can only be placed on a vertical surface or suspended without vibration insulators and with respect to the weight of the fan (the load-bearing structure under the spiral casing). The vibration isolators must not be exposed to tensile stress and shearing stress.

For special applications, the fans designated as **RFC ...-H and HL and RFE ...-H and HL, see page 5**, are intended. These fans are available with all motors offered. The performance parameters are unchanged for the -H and -HL designs. The fans have a reinforced spiral casing structure, with the possibility of **attaching in the position with the vertical axis of impeller rotation. Design H** is intended especially for applications where the total weight of the fan acts on the suction flange. **Design HL** is equipped with legs with rubber springs for connecting to the vertical piping via a flexible insertion.

The speeds of the fans in the design for use in a normal environment (the air flow rate) can be controlled using speed controllers (frequency converters) with infinitely variable speed control, see the Types and weights of fans... pages 6-8. The converters that we deliver for our fans are programmed for the motor type concerned, especially with respect to its optimum noise parameters. **The fan motors cannot be voltage regulated!!!**

The decision on the location of the frequency converters and their drivers, if need be, is taken by the air handling equipment designer with respect to the operating, spatial, safety and noise conditions. The frequency converter must be regarded as a separate source of noise. The noise of the frequency converter is not included in the noise parameters of the fan. The use of the frequency converter may result in an increase in the acoustic pressure in the surroundings by up to 4 dB.

#### I.A – FOR THE FANS WORKING IN AN ORDINARY ATMOSPHERE (BNV)!

- 1a. The RFC and RFE fans are directly driven radial single inlet suction fans, designed for use in an **ordinary atmosphere (BNV)** according to ČSN EN 60079-10-1 / 2016.
- 2a. The temperature of air to be transported can be within the range of -30 °C to +85 °C. Due to electric motors, the ambient temperature can be within the range of -30 °C to +40 °C.
- 3a. If the fan is exposed to weather effects, the electric motor must be protected by a RFC-RFE-...-KM motor shelter (for RFC and RFE-...-H, use an SMO motor hood) which is available as accessories and must be ordered separately.
- 4a. When connecting the duct to the fan, **RFC-...PV and RFC-...PVS rubber duct connectors must be used**; with the exception of the inlet flange in the RFC-...-H and RFE ...-H fan versions, where the total weight of the fan can act on the inlet flange (mounted in the horizontal position). The flexible dust connectors are available as accessories and must be ordered separately.
- 5a. If no duct is connected to the fan outlet or inlet, the flange must be equipped with a protective screen (protection level IP 20 ČSN EN 60529 /2014) with the mesh size of 12.5 mm max. Fan inlet screens designated RFC-RFE-...-MS and also RFC-RFE-...-NA2 and RFC-RFE-...-H-NA3 outlet adapters are available as accessories and are to be ordered separately.
- 6a. The fan connection flanges comply with the ČSN EN 1505 /1999 standard.
- 7a. The installation, connection to the protective circuit, connection and all **electrical installation of the fans can only be carried out by a specialist**. The electrically conductive parts of the air handling equipment must be interconnected according to ČSN 33 2000-4-41 ed.2 /2010. The RFC and RFE fans **must not be started before a duct of the corresponding pressure loss is connected** to avoid any overloading of the electric motor (see the values of the stator currents indicated on the electric motor plate or in the table on pages 6-8 of these instructions). When checking, cleaning and repairing, the electric current must be cut off and switching it on must be locked for the duration of such work.
- 8a. The fan motors for a normal environment are fitted with **thermal contacts or thermistors** (PTC sensors) (for the terminal box diagram see page 9). Some motor types (smaller outputs) can be without a thermal contact and thermistors. When the thermal contacts (a contactor, a thermal over-current relay, etc.) or thermistors (a thermistor relay, a frequency converter, etc.) are connected correctly, the disconnection of the motor is ensured when overheated until the service engineer's intervention. The service engineer indicates and removes the defect. Protection using thermal contacts or thermistors is used only as an emergency function preventing the motor winding from being burnt when the standard protections fail. When the motor is disconnected due to overheating, the motor must be checked again and the air handling system control must be adjusted again. **The basic overload protection of a motor** is the connection of a frequency converter or a thermal over-current relay set to the nominal current of the motor or another suitable over-current protection. When a frequency converter is used, the thermal contact or thermistors are connected to the converter so that the motor is switched off when it is disconnected or when the resistance is increased (for the wiring diagram, see the "Controllers, condensation units and control accessories" and the installation instructions for frequency converters). In this case the motor is overload protected by a frequency converter that must be correctly set for this function. When a fan is delivered with a frequency converter from our company, this is ensured. **The motor must not be started and operated without the connection of appropriate protections.**
- 9a. Before putting the RFC and RFE fans into operation, the initial inspection must be carried out and an inspection report must be made. Installation and the initial inspection are to be ensured by the user.
 


For the duration of operation, it is necessary to carry out regular inspections of el. equipment in accordance with ČSN 33 1500 /2007.

## 1.B – FOR THE -Ex FANS WORKING IN A POTENTIALLY EXPLOSIVE ATMOSPHERE – ZONE 1 (Ex1), ZONE 2 (Ex2)

- 1b. The RFC-...Ex fans are directly driven radial low-pressure single inlet suction fans for use in Zone 1 (Ex1) and Zone 2 (Ex2) potentially explosive atmospheres, outside and inside the fan. They are designed as equipment of Group II, intended for use in an explosive atmosphere consisting of gases, vapours or mist according to ČSN EN 14986 /2007. They are designed for explosion group **II B** or **IIB+H2** according to ČSN EN 60079-10-1 ED.2 /2016 and for Category 2 or 3 in accordance with 20014/35/EC. They use protection by constructional safety 'c' in accordance with ČSN EN 13463-5 ed.2 /2012. The maximum surface temperature of a device is limited by the type of the electric motor used. See ČSN EN 13463-1 /2016.

### THE MARKING AND USE OF Ex FANS


#### -Ex1

- Zone 1, Zone 2:  **II 2 G c IIB+H2 T3 or II 2 G c IIB T3** (in the stainless version)

For electric motor types **1MA7... EEEx-II-T3**

**These cannot be controlled by a frequency converter.**

#### -Ex1-FM


- Zone 1, Zone 2:  **II 2 G c IIB+H2 T4 or II 2 G c IIB T4** (in the stainless version)

For electric motor types **1MJ6... EEEx-de-II-C-T4**

(equipped with PTC sensors)

**These can be controlled by a frequency converter.**

#### -Ex2-FM

- Zone 2:  **II 3 G c IIB+H2 T3 or II 3 G c IIB T3** (in the stainless version)

For electric motor types **1LA7... Z M73 EEEx-nA-II-T3**

(equipped with PTC sensors)

**These can be controlled by a frequency converter.**

On the basis of the certificate issued and the declaration of conformity for Siemens Ex motors, specified frequency converters (FM), (if indicated), set to the allowed range of the motor work region, must only be used to control the speed. The FMs must be placed outside the potentially explosive atmosphere.

We supply frequency converters for the fans according to the certification requirements of the manufacturer.

- 2b. The temperature of air to be transported can be within the range of -30 °C to +40 °C. Due to electric motors, the ambient temperature can be in the range of -20 °C to +40 °C.
- 3b. If the fan is exposed to weather effects, the electric motor must be protected by a RFC-RFE-... -KM motor shelter (for RFC-...-H, use an SMO motor hood) which is available as accessories and must be ordered separately.
- 4b. When connecting the duct to the fan, **RFC-...-PV-Ex1 and RFC-...-PVS-Ex1 flexible duct connectors must be used**, except for the inlet flange in the RFC-...Ex-H version where the total weight of the fan can act on the inlet flange (mounting in the horizontal position). Flexible duct connectors are available as accessories and must be ordered separately.
- 5b. If no duct is connected to the fan outlet or inlet, the flange must be equipped with a protective screen against the possibility of any intrusion of a solid foreign object (protection level IP 20 ČSN EN 60529 /2014) with the mesh size of 12.5 mm max. A fan inlet screen designated RFC-RFE-...-MS and also RFC-RFE-...-NA2 and RFC-RFE-...-H-NA3 outlet adapters are available as accessories and are to be ordered separately.
- 6b. The fan connection flanges comply with the ČSN EN 1505 /1999 standard.
- 7b. The installation, connection to the protective circuit, connection and all **electrical installation of the fan can only be carried out by a specialist**. The electrically conductive parts of the air handling equipment must be electrically interconnected according to ČSN 33 2000-4-41 ed.2 /2010. The RFC- ...Ex fans **must not be started before duct of the corresponding pressure loss is connected** to avoid the overloading of the electric motor (see the values of the stator currents indicated on the motor plate /The table on pages 6-8 of this regulation gives indicative currents for the design of a device /.
- 8b. The design of the RFC fans in the **Ex** version complies with the requirements of ČSN EN 14986 /2007. All the bolted connections inside the fan are secured against loosening; the minimum safe distances are kept for the rotating and the related fixed parts, or non-sparking materials are used. The **-Ex1** fan electric motors (no FM designation) **are equipped with neither thermal break contacts or PTC sensors**; they must be equipped with a breaker and motor overload protection. Use a thermal over-current relay set to the rated current of the motor or another suitable over-current protection to protect. When the over-current relay opens, the motor must be rechecked and the air handling system must be regulated again. The breaking characteristic of the breaker must be adjusted in such a way that the heating time  $t_E$ , belonging to particular groups of ignition, is not exceeded in the case of short-circuit running (i.e. when the motor is

stalled). If the motor protective circuit breaker is not in the explosion-proof version, it must be placed in a non-hazardous area.

The fans designated RFC-...-**Ex1-FM** and **Ex2-FM** can be used with a frequency converter. When a frequency converter is used, over-current protection is ensured by the frequency converter which must be set to the rated current of the motor and the **PTC sensors must be connected to** the frequency converter in such a way that the frequency converter is disconnected when the motor temperature rises excessively (for the circuit diagram see the "Controllers, condensing units and control accessories" catalogue and the installation instructions for the frequency converters).

If the fan is connected without a frequency converter, it is necessary to use a thermal over-current relay set to the rated current of the motor or another suitable over-current protection to protect the motor. Further, PTC sensors (thermistors) must be connected in such a way that they protect the motor when the motor temperature rises excessively (overloading). This protection is ensured by a suitable evaluating element, e.g. a thermistor relay. When the over-current relay or the thermistor relay opens, it is necessary to recheck the motor and to carry out the regulation of the air handling system again. The relevant provisions of ČSN EN 60079-14 ed.4 /2014 (Explosive atmospheres - Part 14: Electrical installations design, selection and erection) apply to the use of the motor in a potentially explosive atmosphere containing flammable vapours and gases.

- 9b. Before putting the RFC- ... Ex fans into operation, **the minimum clearance between the inlet mouth and the impeller must be checked** (see the table) and the initial inspection according to ČSN 33 2000-6 /2007 (Electrical engineering regulations. Electrical equipment and installations – Part 6: Inspection – Chapter 61: Initial inspection procedures). For the duration of operation, it is necessary to carry out regular inspections of el. equipment in accordance with ČSN 33 1500 /2007 (Electrical engineering regulations. Inspection and testing of electrical installations).

## II. Transport and storage

- The fans are delivered on EURO pallets. When moving, storing and installing the fans of sizes 500 and 630, the stool holes for suspending must be used. For the other fan sizes, both the motor and the stool or both the motor and the case must be gripped at the same time.
- Until the time of installation (including electrical connection) the customer must store the fans in covered and dry areas and protect them against mechanical damage and against chemical influences. Until the completion of installation, especially covering, tightening the bushings and the like, the fans must be protected against weather effects.

## III. Installation

- Anchoring the RFC and RFE fans to a horizontal surface or structure is carried out using bolts M8 (sizes 200, 250, 280, and 315) or M10 (sizes 355, 400, 500, and 630) and four rubber vibration insulators or if an RFC-RFE-PD base plate is used, which is to be ordered separately, to bolts M8 (sizes 200, 250, 280, and 315) or M10 (sizes 355, 400, 500, and 630) in a horizontal surface or structure. Anchoring the fans to a vertical surface or structure or suspending them is only possible after dismantling the insulators. The **RFC-...-H** and **RFE-...-H, HL fans are designed for horizontal installation** (the vertical axis of rotation of the impeller). Connecting the fan to a horizontal plate (duct and the like) is carried out using the inlet flange H respectively for the feet (HL).
- Before installation itself, the RFC and RFE fan outlets can be reset to five different positions shown in the figure on page 4. To reset, loosen completely eight bolted connections on the supporting plate of the set. Turn the case to the required position and retighten the bolts in the pressed-on nuts. When turning the case, it is necessary to avoid any damage to the impeller.
- Installing the fans with their inlet orifice to a vertical air conditioning duct so that the weight of the fan acts on the cover plate of the fan is not possible.**
- The air handling duct must be suspended separately in such a way that any excessive force must not act on the fan (rubber duct connectors).
- The installation, connection to the protective circuit, connection and all **electrical installation of the fans can only be carried out by a specialist**. The electrically conductive parts of the air handling equipment must be interconnected (**bonded**) according to ČSN 33 2000-4-41 ed.2 /2010. For using the fan in an explosive atmosphere, installation must be carried out according to ČSN EN 60079-14 ed. 4 /2014. Before putting the fan into operation, the motor insulation resistance must be measured by a specialized organization and a record must be made (the initial inspection report).
- When installing and handling the fan, such **protective equipment must be used** which can prevent any injury of the workers. For example, use protective gloves when handling the fan where sharp edges may occur. Use electrician's India-rubber gloves and suitable shoes when handling electrical parts and the like.

## IV. Putting into Operation

- Installation and putting into operation can only be carried out by a worker with special qualifications according to the applicable legislation.**

2. When putting into operation, the instructions stated in articles **1a** and **1b** must be observed, especially those relating to the ways of using and securing safety. Before starting the fan, it is necessary to check the connection of the electric motor, the execution of electrical installation, the condition of the bearings, the tightening of all bolts and nuts, and if the control flap valve is used, also the condition and operation of control. During trial operation, the direction of rotation of the impeller is checked according to the fan arrow.
3. The **RFC** and **RFE** fan electric motors in the ordinary atmosphere version are fitted with open thermal contacts or thermistors (PTC sensors) and when putting the fan into operation, these thermal contacts must be connected in such a way that they perform their protective function. The **-Ex1** fan electric motors **are** equipped with **neither thermal break contacts nor PTC sensors**; they must be equipped with a breaker and protection which is set to the rated current of the motor. The **-Ex1-FM** and **Ex2-FM** fan motors **are** equipped with **PTC sensors** and their speed (air flow rate) can be controlled by frequency converters (certified types). The PTC sensors (thermistors) of the motor must be connected in such a way that the heating time  $t_E$  cannot be exceeded and the supply of the motor is safely disconnected. If the motor breaking circuit is not in the explosion-proof version, it must be placed in a non-hazardous area. **The Alteko s.r.o. frequency converters delivered as standard cannot be placed in a potentially explosive area.**
4. When putting the fans into operation, **it is necessary to carry out the regulation of the amount of air to be transported by the fan** as follows:
  - Close the inlet or outlet flaps or reduce the air flow rate to a minimum in another suitable way.
  - Start the fan and check the direction of rotation of the impeller (marked with the direction plate on the case); if the direction of rotation is wrong, change over the motor (for the three-phase motor, exchange two phases).
  - Measure the stator currents successively at all phases for the whole time for which the regulation of the system is carried out.
  - Increase the air supply to the duct (by opening the flaps and the like) until the desired air flow rate is reached, but not longer than until the amount of the rated current of the motor indicated on the motor plate is reached.
  - Secure the flaps in this position or secure the control elements in another suitable way (secure to make it impossible to increase the air flow rate to exceed the values after regulation). If a frequency converter is used, the frequency can be read and this value can be set as the maximum frequency parameter.
5. If fan case vapour condensation is possible, it is necessary to drill a hole of approx. 5 mm at the lowest point of the case (unless this hole has already been made at the factory) or to ensure that condensate is drained in another way.
6. The name plate contains the product designation, the manufacturer, the performance parameters, the weight, the year of manufacture, and the machine serial number.

#### V. Operation and Maintenance

1. **A regular inspection** is carried out after a period which is to be determined by the user according to the operating conditions, the number of operating hours a day, and the like. However, it is carried out **not later than every six months**. After the fan is put into operation, it is necessary to check more frequently the load and temperature of the electric motor and the overall running of the fan at the beginning and to carry out the overall checking of the fan (retightening the bolt nuts and the like) after about the first 50 hours of operation.

2. Check the conditions and tightening of the rubber insulators, the tightness of the duct connection and the possibility of the normal vibration of the flexibly mounted fan. Further, check for the smooth running of the fan (measure mechanical vibration according to ČSN 12 3063 /1988 and ČSN 122011 /1990), the cleanliness of the electric motor, the temperature of the electric motor which must not exceed 70°C, the electrical installation, and further the cleanliness of the exchangers, the filters for clogging, and the condition of the impeller.
3. **Replace the bearings for the electric motors** according to the relevant regulations of the electric motor manufacturer. The life of the motor bearings used for the fans is **20 000 to 40 000 operating hours** based on the load of the motor. But the replacement of the bearings (or the lubricating grease) should be carried out not later than after three years with respect to the life of the lubricating grease in the bearings.
4. The fan must be immediately shut down and the failure must be checked and removed if any failure appears or the operating conditions do not meet the aforementioned limits.

#### VI. Life and Disposal

The expected life of the fan when the operation and maintenance conditions are observed is 10 years. The fan must be disposed according to the valid legislative standards at the time of disposal.

#### VII. Guarantee, service, and spare parts

1. The guarantee period is 24 months from the day of takeover of the fans, i.e. from the date indicated on the delivery note or on the guarantee card.
2. The guarantee and after-guarantee repairs and service of the RFC fans are provided by the company ALTEKO s.r.o. Hostomice pod Brdy.
3. The manufacturer supplies the following spare parts to order:
  - Electric motor.
  - Impeller with the hub.
  - Set with the balanced impeller (motor, supporting plate, and impeller).
  - Rubber insulators.

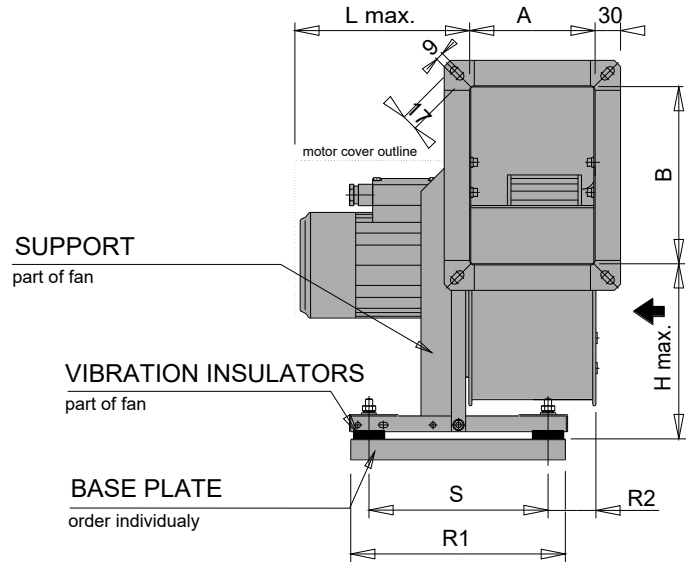
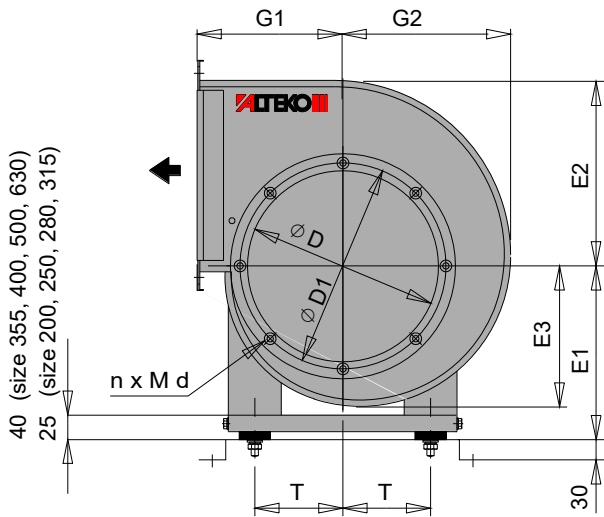
*The minimum clearance between the impeller and the inlet mouth for fans operating in a Zone 1 and/or Zone 2 potentially explosive atmospheres applies to RFC...Ex1; Ex1-FM; and Ex2-FM*

Fan type	Minimum clearance between the impeller and the inlet mouth	Maximum allowable fan speed
RFC 200-15...Ex	2 mm	1500 rpm
RFC 250-15...Ex	2,5 mm	1500 rpm
RFC 280-10...Ex	3 mm	1000 rpm
RFC 280-15...Ex	3 mm	1500 rpm
RFC 315-10...Ex	3,5 mm	1000 rpm
RFC 315-15...Ex	3,5 mm	1500 rpm
RFC 355-10...Ex	3,6 mm	1000 rpm
RFC 355-15...Ex	3,6 mm	1500 rpm
RFC 400-10...Ex	4 mm	1000 rpm
RFC 400-15...Ex	4 mm	1500 rpm
RFC 500-7...Ex	5 mm	750 rpm
RFC 500-10...Ex	5 mm	1000 rpm
RFC 630 7...Ex	7 mm	750 rpm
RFC 630-10...Ex	7 mm	1000 rpm

#### VIII. Possible failures

Failure	Failure Cause	Measure to Remove the Failure
1 - <b>The motor winding temperature has risen excessively.</b>	The motor is overloaded.	The air handling system must be regulated again, see Chap IV Art. 4.
2 - <b>The motor over-current protection stops.</b>		
3 - <b>The frequency converter stops.</b>		
4 - <b>The fan does not give the required delivery.</b>	There is a higher pressure loss in the duct.	Make regulation again, see Chap. IV. Art. 4. Examine the duct for clogging and the exchangers and filters for cleanliness.
	The direction of rotation of the impeller is wrong.	Exchange two phases.
	The fan delivery is wrongly selected.	Replace with a fan (set) with a higher delivery.
5 - <b>The motor bearing temperatures rise excessively.</b>	The bearing is faulty.	Replace the bearings.
6 - <b>Excessive fan vibrations.</b>	The impeller is unbalanced.	Clean and balance the impeller.
	The fan is wrongly attached.	Check and retighten the vibration insulator bolts, if need be.

**FAN RFC, RFE**



The "LEFT" type is shown

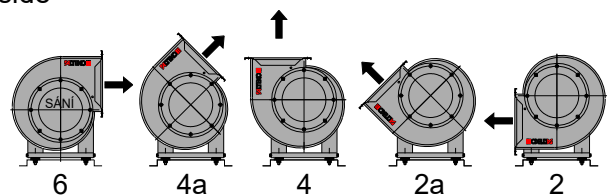
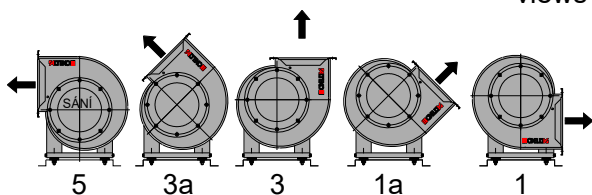
In version RFC 200-30A/1,5-3..DB The fan without support and insulators !

	A	B	D	D1	E1 min-max	E2	E3	G1	G2	H <sub>max</sub>	L <sub>max</sub>	L <sub>max</sub> Ext1-FM	R1	R2	S	T	n	d
RFC 200-...	140	200	200	230	205 - 245	205	160	165	185	245	240	300	241	57	200	98	8	6
RFC 250-...	180	250	250	285	250 - 315	260	200	205	230	315	240	300	291	78	250	122	8	6
RFC 280-...	200	280	280	315	275 - 350	290	220	230	260	345	315	360	326	84	285	135	8	6
RFC 315-...	225	315	315	350	305 - 385	320	245	255	290	385	315	360	341	115	300	150	12	8
RFC 355-...	250	355	355	390	360 - 450	365	280	285	330	450	345	420	400	121	340	165	12	8
RFC 400-...	280	400	400	445	390 - 490	405	310	320	365	490	365	400	460	126	400	190	12	8
RFC 500-...	355	500	500	545	490 - 615	505	390	405	455	615	545	560	575	196	505	233	16	8
RFC 630-...	450	630	630	680	610 - 760	635	490	580	505	765	650	650	805	200	730	290	16	8
RFE 200-30	140	200	200	230	205 - 245	205	160	165	185	245	240	-	241	57	200	98	8	6
RFE 250-30	180	250	250	285	250 - 315	260	200	205	230	315	240	-	291	78	250	122	8	6
RFE 280-30	200	280	280	315	275 - 350	290	220	230	260	345	315	-	326	84	285	135	8	6
RFE 315-30	225	315	315	350	305 - 385	320	245	255	290	385	315	-	341	115	300	150	12	8
RFE 355-30	250	355	355	390	360 - 450	365	280	285	330	450	345	-	400	121	340	165	12	8
RFE 400-15	280	400	400	445	390 - 490	405	310	320	365	490	365	-	460	126	400	190	12	8

"LEFT" type - L

"RIGHT" type - P

views of INLET side

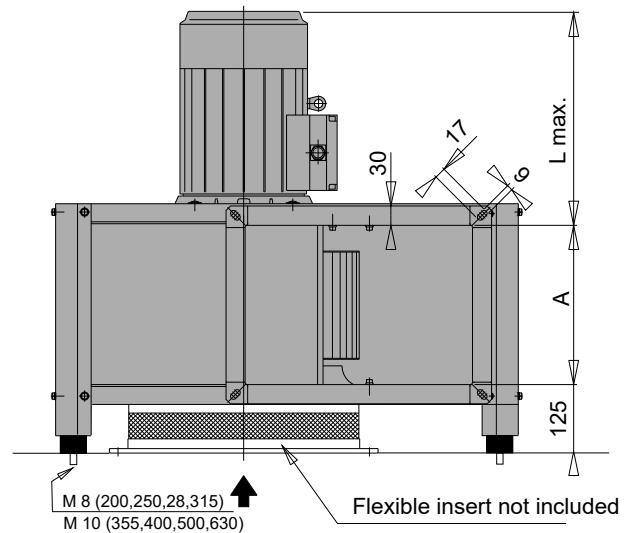
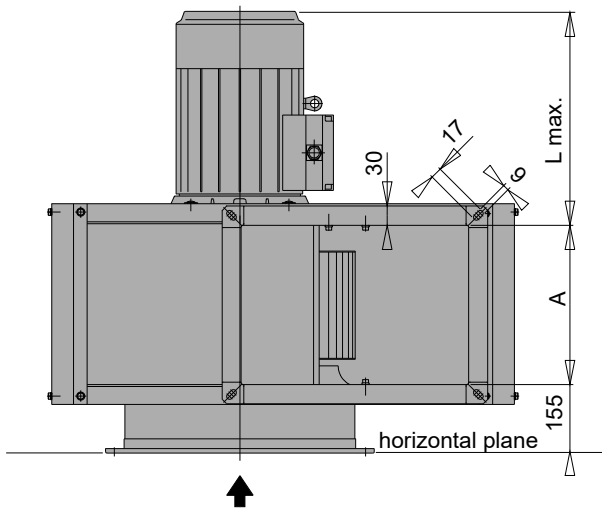
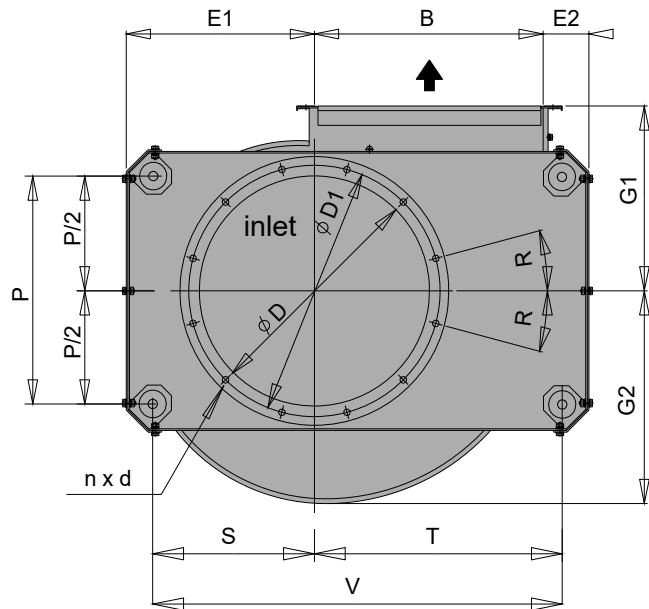
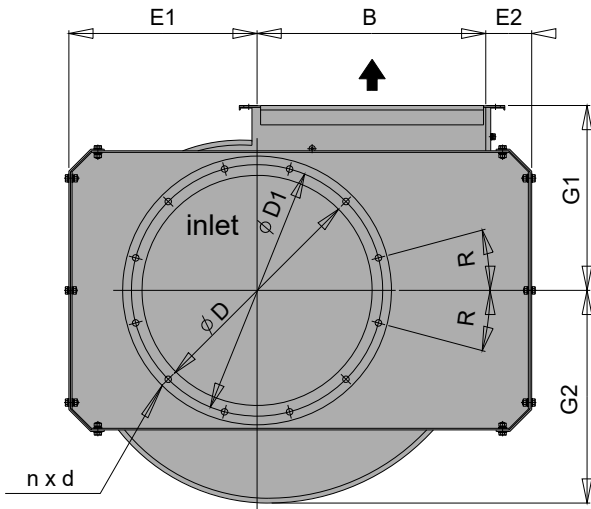


The fans are produced only in basic positions L5 and P6. Other positions can be set when entering into the manufacture or during installation by user.



FAN RFC - ...H  
FAN RFE - ...H

FAN RFE - ...HL  
FAN RFE - ...HL



The "LEFT" type is shown

marking fan	A	B	D	D1	E1	E2	G1	G2	L <sub>max</sub>	R	n	d	P	V	S	T
RFC(RFE) 200-...-H(-HL)	140	200	200	230	165	50	165	185	275	22,5°	8	8	222	365	142	224
RFC(RFE) 250-...-H(-HL)	180	250	250	285	200	50	205	230	275	22,5°	8	10	272	451	176	274
RFC(RFE) 280-...-H(-HL)	200	280	280	315	230	55	230	260	340	22,5°	8	10	298	508	200	307
RFC(RFE) 315-...-H(-HL)	225	315	315	350	260	70	255	290	340	15°	12	10	336	578	224	354
RFC(RFE) 355-...-H(-HL)	250	355	355	390	295	70	285	330	375	15°	12	10	368	648	257	391
RFC(RFE) 400-...-H(-HL)	280	400	400	445	320	80	320	365	375	15°	12	12	436	722	282	440
RFC 500-...-H(-HL)	355	500	500	545	410	100	405	455	545	11,25°	16	12	530	918	364	554
RFC 630-...-H(-HL)	450	630	630	680	515	115	580	505	610	11,25°	16	12	677	1177	467	709

CAUTION

- Performance parameters and electrical quantities of electric motors for all fans RFC (RFE) .....H are the same as fans RFC (RFE) in the basic version.

## Types and weights of fans, motors, frequency converters

size	DESIGNATION			motor output (W)	frame size	number of poles	minimal motor efficiency		voltage (V)	current (A)	rated speed (rpm)	degree of protection by motor	motor protection (used)	speed controller (frequency converter)	weight (kg)
	motor	position	surface finish				Ex	standard IE1 (%)							
RFC 200	15/0,25 - 3			250	71	4	61,9	74,0	400/230	0,70/1,21	1330	IP55	PTC*	*370W	13
	15/0,25 - 3			250	71	4	61,9	74,0	400/230	0,80/1,39	1310	IP55			15
	15/0,31 - 3			310	71	4	64,1	75,2	230***	1,00/1,73	1395	IP55	PTC	# 370W	13
	15/0,25 - 3			250	71	4	61,9	74,0	400/230	0,78/1,35	1325	IP55	PTC	*370W	30
	30A/1,5 - 3**			1500	90	2	77,2	81,3	400/230	3,26/5,65	2860	IP55	PTC*	*1,5KW	31
RFC 250	15/0,37 - 3			370	71	4	65,8	76,1	400/230	1,02/1,77	1330	IP55	PTC*	*370W	17
	15/0,37 - 3			370	71	4	65,8	76,1	400/230	1,10/1,91	1355	IP55			19
	15/0,31 - 3			310	71	4	64,1	75,2	230***	1,00/1,73	1395	IP55	PTC	# 370W	17
	15/0,37 - 3			370	71	4	65,8	76,1	400/230	1,13/1,96	1375	IP55	PTC	*370W	33
	10/0,55 - 3			550	80	6	67,5	74,0	400/230	1,70/2,94	890	IP55	PTC*	*750W	28
RFC 280	10/0,55 - 3			550	80	6	67,5	74,0	400/230	1,74/3,05	930	IP55			29
	10/0,45 - 3			450	80	6	65,8	72,7	230***	1,53/2,66	930	IP55	PTC	# 750W	28
	10/0,55 - 3			550	80	6	67,5	74,0	400/230	1,67/2,89	900	IP55	PTC	*750W	39
	15/1,5 - 3			1500	90	4	77,2	82,8	400/230	3,49/6,04	1400	IP55	PTC*	*1,5KW	28
	15/1,35 - 3			1350	90	4	76,5	82,3	400/230	3,10/5,37	1415	IP55			29
	15/1,25 - 3			1250	90	4	76,0	82,0	230***	3,00/5,20	1470	IP55	PTC	# 1,5KW	28
	15/1,5 - 3			1500	90	4	77,2	82,8	400/230	3,50/6,06	1420	IP55	PTC	*1,5KW	48
	10/1,1 - 3			1100	90	6	72,9	78,1	400/230	2,88/5,00	910	IP55	PTC*	*1,5KW	34
	10/0,95 - 3			950	90	6	71,9	77,3	400/230	2,60/4,50	915	IP55			35
	10/0,87 - 3			870	90	6	71,2	76,7	230***	2,60/4,50	935	IP55	PTC	# 1,1KW	34
RFC 315	10/1,1 - 3			1100	90	6	72,9	78,1	400/230	2,95/5,11	905	IP55	PTC	*1,5KW	51
	15/1,5 - 3			1500	90	4	77,2	82,8	400/230	3,49/6,04	1400	IP55	PTC*	*1,5KW	34
	15/1,35 - 3			1350	90	4	76,5	82,3	400/230	3,10/5,40	1415	IP55			35
	15/1,25 - 3			1250	90	4	76,0	82,0	230***	3,00/5,20	1470	IP55	PTC	# 1,5KW	34
	15/1,5 - 3			1500	90	4	77,2	82,8	400/230	3,50/6,06	1420	IP55	PTC	*1,5KW	54
	10/1,5 - 3			1500	100	6	75,2	79,8	400/230	3,72/6,44	940	IP55	PTC*	*1,5KW	54
	10/1,3 - 3			1300	100	6	74,2	79,0	400/230	3,35/5,80	935	IP55			54
	10/1,2 - 3			1200	100	6	73,6	78,6	400/230	3,55/6,15	940	IP55	PTC	# 1,5KW	54
	10/1,5 - 3			1500	100	6	75,2	79,8	400/230	4,00/6,93	930	IP55	PTC	*1,5KW	71
	10/2,2 - 3			2200	112	6	77,7	81,8	400/230	5,23/9,06	940	IP55	PTC*	*2,2KW	57
RFC 355	10/1,9 - 3			1900	112	6	76,8	81,1	400/230	4,70/8,14	940	IP55			57
	10/1,78 - 3			1780	112	6	76,3	80,7	230***	4,70/8,2	950	IP55	PTC	# 2,2KW	57
	10/2,2 - 3			2200	112	6	77,7	81,8	400/230	5,50/9,53	945	IP55	PTC	*2,2KW	84
	15/3 - 3			3000	100	4	81,5	85,5	400/230	6,40/11,09	1430	IP55	PTC*	*2,2KW	54
	15/2,5 - 3			2500	100	4	80,5	84,8	400/230	5,50/9,53	1415	IP55			54
	15/2,4 - 3			2400	100	4	80,2	84,7	230***	5,40/9,35	1430	IP55	PTC	# 3KW	54
	15/3 - 3			3000	100	4	81,5	85,5	400/230	6,60/11,43	1415	IP55	PTC	*2,2KW	77
	15A/4 - 3			4000	112	4	83,1	86,6	690/400	4,82/8,34	1435	IP55	PTC*	*4KW	61
	15A/5,6 - 3			3600	112	4	82,5	86,2	690/400	4,35/7,53	1435	IP55			59
	15A/3,3 - 3			3300	112	4	82,1	85,9	400	4,06/7,03	1450	IP55	PTC	## 4KW	61
	15A/4 - 3			4000	112	4	83,1	86,6	690/400	4,91/8,50	1435	IP55	PTC	*4KW	88
	15/4 - 3			4000	112	4	83,1	86,6	690/400	4,82/8,34	1435	IP55	PTC*	*4KW	61
	15/3,6 - 3			3600	112	4	82,5	86,2	690/400	4,35/7,53	1435	IP55			59
	15/3,3 - 3			3300	112	4	82,1	85,9	400	4,06/7,03	1450	IP55	PTC	## 4KW	61
	15/4 - 3			4000	112	4	83,1	86,6	690/400	4,91/8,50	1435	IP55	PTC	*4KW	88
15/4 - 3			4000	112	4	83,1	86,6	690/400	4,82/8,34	1435	IP55	PTC*	*4KW	61	
15/3,3 - 3			3300	112	4	82,1	85,9	400	4,06/7,03	1450	IP55	PTC	## 4KW	61	
15/4 - 3			4000	112	4	83,1	86,6	690/400	4,91/8,50	1435	IP55	PTC	*4KW	88	

## Types and weights of fans, motors, frequency converters

size	DESIGNATION			motor output (W)	frame size	number of poles	minimal motor efficiency		voltage (V)	current (A)	rated speed (rpm)	degree of protection by motor	motor protection (used)	speed controller (frequency converter)	weight (kg)
	motor	position	surface finish				Ex	standard IE1 (%)							
RFC 400	10/1,5 - 3			1.5	100	6	75.2	79.8	400/230	3.72 / 6.44	940	IP55	PTC*	*1,5kW	61
	10/1,3 - 3			1300	100	6	74.2	79.0	400/230	3.35 / 5.80	935	IP55			59
	10/1,2 - 3			1200	100	6	73.6	78.6	230***	3.55 / 6.15	940	IP55	PTC	# 1,5kW	61
	10/1,5 - 3			1500	100	6	75.2	79.8	400/230	4.00 / 6.93	930	IP55	PTC	*1,5kW	76
	10/2,2 - 3			2200	112	6	77.7	81.8	400/230	5.23 / 9.06	940	IP55	PTC*	*2,2kW	64
	10/1,9 - 3			1900	112	6	76.8	81.1	400/230	4.70 / 8.13	940	IP55			62
	10/1,78 - 3			1780	112	6	76.3	80.7	230***	4.70 / 8.2	950	IP55	PTC	# 2,2kW	64
	10/2,2 - 3			2200	112	6	77.7	81.8	400/230	5.50 / 9.53	945	IP55	PTC	*2,2kW	89
	15A/4 - 3			4000	112	4	83.1	86.6	690/400	4.82 / 8.34	1435	IP55	PTC*	*4kW	68
	15A/3,6 - 3			3600	112	4	82.5	86.2	690/400	4.35 / 7.50	1435	IP55			66
	15A/3,3 - 3			3300	112	4	82.1	85.9	400	7.00	1450	IP55	PTC	## 4kW	68
	15A/4 - 3			4000	112	4	83.1	86.6	690/400	4.91 / 8.50	1435	IP55	PTC	*4kW	95
	15/4 - 3			4000	112	4	83.1	86.6	690/400	4.82 / 8.34	1435	IP55	PTC*	*4kW	68
	15/3,6 - 3			3600	112	4	82.5	86.2	690/400	4.35 / 7.50	1435	IP55			66
	15/3,3 - 3			3300	112	4	82.1	85.9	400	7.00	1450	IP55	PTC	## 4kW	68
	15/4 - 3			4000	112	4	83.1	86.6	690/400	4.91 / 8.50	1435	IP55	PTC	*4kW	95
	15/5,5 - 3			5500	132	4	84.7	87.7	690/400	6.39 / 11.00	1440	IP55	PTC*	*5,5kW	74
	15A/7,5 - 3			7500	132	4	86.0	88.7	690/400	8.90 / 15.40	1440	IP55	PTC*	*7,5kW	86
	15A/6,8 - 3			6800	132	4	85.6	88.3	690/400	8.15 / 14.10	1445	IP55			90
	15A/6 - 3			6000	132	4	85.0	88.0	400	13.5	1460	IP55	PTC	## 7,5kW	86
15A/7,5 - 3			7500	132	4	86.0	88.7	690/400	8.67 / 15.00	1450	IP55	PTC	*7,5kW	122	
7A/3 - 3			3000	132	8	77.1	77.1	400/230	7.43 / 12.87	710	IP55	PTC*	*4kW	123	
7A/2,5 - 3			2500	132	8	76.1	76.1	230***	7.35 / 12.8	705	IP55	PTC	# 3kW	123	
7A/3 - 3			3000	132	8	76.1	76.1	400/230	7.90 / 13.68	700	IP55	PTC	*4kW	159	
7/4 - 3			4000	160	8	73.1	73.1	690/400	6.64 / 11.50	690	IP55	PTC*	*5,5kW	126	
10A/5,5 - 3			5500	132	6	83.1	86.0	690/400	6.99 / 12.10	960	IP55	PTC*	*7,5kW	128	
10A/4,8 - 3			4800	132	6	82.4	85.4	690/400	6.60 / 11.40	950	IP55			125	
10A/4,5 - 3			4500	132	6	82.0	85.2	400	11.70	960	IP55	PTC	## 5,5kW	128	
10A/5,5 - 3			5500	132	6	83.1	86.0	690/400	7.27 / 12.60	950	IP55	PTC	*7,5kW	166	
10/5,5 - 3			5500	132	6	83.1	86.0	690/400	6.99 / 12.10	960	IP55	PTC*	*7,5kW	128	
10/4,8 - 3			4800	132	6	82.4	85.4	690/400	6.60 / 11.40	950	IP55	PTC	## 5,5kW	125	
10/4,5 - 3			4500	132	6	82.0	85.2	400	11.70	960	IP55	PTC	## 5,5kW	128	
10/5,5 - 3			5500	132	6	83.1	86.0	690/400	7.27 / 12.60	950	IP55	PTC	*7,5kW	166	
10A/7,5 - 3			7500	160	6	84.7	87.2	690/400	9.41 / 16.30	970	IP55	PTC*	*11kW	150	
10A/6,6 - 3			6600	160	6	84.0	86.7	690/400	9.41 / 16.30	965	IP55			147	
10A/6,1 - 3			6100	160	6	83.6	86.4	400	16.00	970	IP55	PTC	## 7,5kW	150	
10A/7,5 - 3			7500	160	6	84.7	87.2	690/400	10.10 / 17.50	960	IP55	PTC	*11kW	208	
10/7,5 - 3			7500	160	6	84.7	87.2	690/400	9.41 / 16.30	970	IP55	PTC*	*11kW	147	
10/6,6 - 3			6600	160	6	84.0	86.7	690/400	9.41 / 16.30	965	IP55			147	
10/6,1 - 3			6100	160	6	83.6	86.4	400	16.00	970	IP55	PTC	## 7,5kW	150	
10/7,5 - 3			7500	160	6	84.7	87.2	690/400	10.10 / 17.50	960	IP55	PTC	*11kW	208	

## Types and weights of fans, motors, frequency converters

DESIGNATION		Ex	motor output (W)	frame size	number of poles	minimal motor efficiency		voltage (V)	current (A)	rated speed (rpm)	degree of protection by motor	motor protection (used)	speed controller (frequency converter)	weight (kg)
						standard IE1 (%)	increased IE2 (%)							
RFC 630	7A/11 - 3		11000	180	8	87 <sup>1)</sup>	87 <sup>1)</sup>	690 / 400	14,15 / 24,50	725	IP55	PTC*	*11kW	257
	7A/8,8 - 3	Ex2-FM	8800	180	8	85 <sup>1)</sup>	85 <sup>1)</sup>	400	20,60	730	IP55	PTC	## 11kW	257
	7A/11 - 3	Ex1-FM	11000	180	8	85,5 <sup>1)</sup>	85,5 <sup>1)</sup>	690 / 400	15,35 / 26,50	725	IP55	PTC	*11kW	314
	7/11 - 3		11000	180	8	87 <sup>1)</sup>	87 <sup>1)</sup>	690 / 400	14,15 / 24,50	725	IP55	PTC*	*11kW	257
	7/8,8 - 3	Ex2-FM	8800	180	8	85 <sup>1)</sup>	85 <sup>1)</sup>	400	20,60	730	IP55	PTC	## 11kW	257
	7/11 - 3	Ex1-FM	11000	180	8	85,5 <sup>1)</sup>	85,5 <sup>1)</sup>	690 / 400	15,35 / 26,50	725	IP55	PTC	*11kW	314
	10A/7,5 - 3		7500	160	6	84,7	87,2	690 / 400	9,41 / 16,30	970	IP55	PTC*	*11kW	197
	10A/6,6 - 3	Ex1	6600	160	6	84,0	86,7	690 / 400	9,41 / 16,30	965	IP55	PTC	## 7,5kW	194
	10A/6 - 3	Ex2-FM	6100	160	6	83,5	86,3	400	16	970	IP55	PTC	## 7,5kW	197
	10A/7,5 - 3	Ex1-FM	7500	160	6	84,7	87,2	690 / 400	10,12 / 17,50	960	IP55	PTC	*11kW	255
	10/7,5 - 3		7500	160	6	84,7	87,2	690 / 400	9,41 / 16,30	970	IP55	PTC*	*11kW	197
	10/6,6 - 3	Ex1	6600	160	6	84,0	86,7	690 / 400	9,41 / 16,30	965	IP55	PTC		194
	10/6 - 3	Ex2-FM	6100	160	6	83,5	86,3	400	16	970	IP55	PTC	## 7,5kW	197
	10/7,5 - 3	Ex1-FM	7500	160	6	84,7	87,2	690 / 400	10,12 / 17,50	960	IP55	PTC	*11kW	255
	10A/9,7 - 3	Ex1	9700	160	6	85,9	88,2	690 / 400	13,40 / 23,20	970	IP55	PTC*	*11kW	223
	10A/8,8 - 3	Ex2-FM	8800	160	6	85,3	87,8	400	22,5	960	IP55	PTC	## 11kW	223
	10A/11 - 3	Ex1-FM	11000	160	6	86,4	88,7	690 / 400	14,16 / 24,50	960	IP55	PTC	*11kW	288
	10/11 - 3		11000	160	6	86,4	88,7	690 / 400	13,40 / 23,20	970	IP55	PTC*	*11kW	223
10/9,7 - 3	Ex1	9700	160	6	85,9	88,2	690 / 400	13,40 / 23,20	970	IP55	PTC		223	
10/8,8 - 3	Ex2-FM	8800	160	6	85,3	87,8	400	22,5	960	IP55	PTC	## 11kW	223	
10/11 - 3	Ex1-FM	11000	160	6	86,4	88,7	690 / 400	14,16 / 24,50	960	IP55	PTC	*11kW	288	
RFE	200		250	63	2	61,9	69,9	400 / 230	0,66 / 1,15	2720	IP55	PTC*	*370W	12
	250		370	71	2	65,8	72,8	400 / 230	0,94 / 1,62	2740	IP55	PTC*	*370W	16
	280		750	80	2	72,1	77,4	400 / 230	1,72 / 3,00	2900	IP55	PTC*	*750W	24
	315		1100	80	2	75,0	79,6	400 / 230	2,42 / 4,20	2900	IP55	PTC*	*750W	29
	355		2200	90	2	79,7	83,2	400 / 230	4,59 / 7,95	2840	IP55	PTC*	*2,2kW	38
	400		550	80	4	69,4	78,1	400 / 230	1,41 / 2,45	1440	IP55	PTC*	*370W	43

The motors parameters to actual values may be different due to changes in the parameters of the motors manufacturer.

<sup>1)</sup> Commission regulation EU No 640/2009 is not valid for 8 poles motors

\*... PTC (thermistor) can be replaced with a thermal contact, extraordinarily without protection

\*\*... This fan is without support with rubber insulators (design-DB).

\*\*\*... 230V motor as standard (used with FM output, 3 x 230 V); 400 V if required by the customer (FM output, 3 x 400 V – atypical design)

... PTC - thermistor (PTC sensor)

... PTC - thermistor (PTC sensor)

... PTC - thermistor (PTC sensor)

size / motor speed / motor output (kW) - number of phases - position

200 to 630 7...synchr.speed 750 (rpm) 0,25 to 11 -3... motor outside 3-phase P...right-hand position

(impeller 10...synchr.speed 1000 (rpm) example: L...right-hand position

diameter in mm) 30...synchr.speed 1500 (rpm) 0,25 = 0,25kW

30...synchr.speed 3000 (rpm)

Ex1...version for use in potentially explosive atmospheres Ex - Zone 1 (SNV2), Zone 2 (SNV1) outside and inside

Ex1-FM...version for use in potentially explosive atmospheres Ex - Zone 1 (SNV2), Zone 2 (SNV1) outside and inside; including thermistors (PTC sensors)

Ex2-FM...version for use in potentially explosive atmospheres Ex - Zone 2 (SNV1) outside and inside; including thermistors (PTC sensors)

The recommended frequency converter :


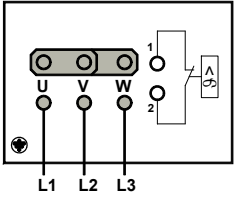

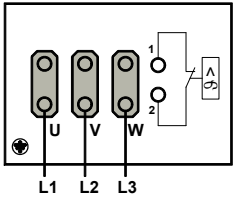

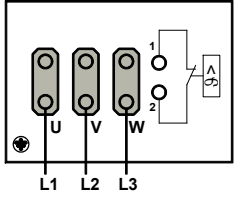

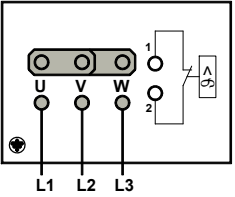

\* STARVERT (IC5-1F or IGS4-4); # SINAMICS G110; # MICROMASTER 420

to 3kW (including) - input 1x230V, output 3x230V; 4 to 11kW- input 3x400V, output 3x400V


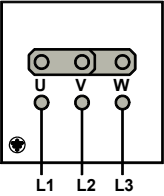

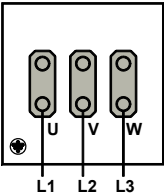

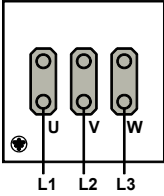

Note: Fan with frequency converter can have higher sound pressure to the surrounding area about 4 dB



**THE FANS FOR USE IN NORMAL /NON-EXPLOSIVE/ ATMOSPHERES AND  
THE FANS FOR USE IN POTENTIALLY EXPLOSIVE ATMOSPHERES - Ex1-FM and Ex2-FM**

MOTOR CONNECTIONS TERMINAL BLOCK 3PE ~ 400 V / 230 V / 50 Hz		MOTOR CONNECTIONS TERMINAL BLOCK 3PE ~ 690 V / 400 V / 50 Hz	
<p><i>CONNECTION WITH 3-PHASE FREQUENCY CONVERTER AND WITHOUT FREQUENCY CONVERTER</i></p> <p><b>3PE ~ 400 V</b> </p> 	<p><i>CONNECTION WITH 1-PHASE FREQUENCY CONVERTER</i></p> <p><b>3PE ~ 230 V</b> </p> 	<p><i>CONNECTION WITH 3-PHASE FREQUENCY CONVERTER AND WITHOUT FREQUENCY CONVERTER</i></p> <p><b>3PE ~ 400 V</b> </p> 	<p><b>3PE ~ 690 V</b> </p> 
<p> - THERMAL BREAK CONTACTS (The fans for normal area /non-explosive/) - THERMISTOR /PTC sensor/ (The fans for normal area /non-explosive/ or fans for use in potentially explosive atmospheres Ex1-FM and Ex2-FM)</p>			

**THE FANS FOR USE IN POTENTIALLY EXPLOSIVE ATMOSPHERES - Ex1**

MOTOR CONNECTIONS TERMINAL BLOCK 3PE ~ 400 V / 230 V / 50 Hz		MOTOR CONNECTIONS TERMINAL BLOCK 3PE ~ 690 V / 400 V / 50 Hz	
<p><b>3PE ~ 400 V</b> </p> 	<p><b>3PE ~ 230 V</b> </p> 	<p><b>3PE ~ 400 V</b> </p> 	<p><b>3PE ~ 690 V</b> </p> 