




ErP
2013 2015

INSTRUCTION MANUAL

Centrifugal and Axial Fans



	Translation of the ORIGINAL INSTRUCTIONS		
	Code	Emission	Revision
	CM14088	05.04.24	03



euroventilatori

THE AIR TAKES SHAPE

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ErP 2009/125/CE - ENERGY RELATED PRODUCTS

Regulations

The Ecodesign Directive 2005/32/EC, introduced on 6 July 2005 as “Energy-using Products” Directive (EuP), aims at providing a common regulatory framework for establishing the requirements for eco-designing products without negative impacts on health, safety and product functionality.

Initially applied only to products that use and produce energy, it has been replaced by Directive 2009/125/EC that broadens its field of application to all energy-related products (“Energy-related Products” - ErP) as a result of the strategic plan “20-20-20”, through which the European Union set as targets a 20% reduction of greenhouse gas emissions, a 20% increase of energy savings at end-uses and a 20% increase of energy consumption from renewable sources by 2020.

It is important to emphasize that the ErP Directive and the relevant European Regulation No. 327/2011 take into account the whole of the fan, from the inverter power supply (when it is included in the calculation of the target yield) to the motor and the impeller. In this case, it is irrelevant whether the fan operates as a single unit or whether it is included as a component in another assembly or production process.

The Regulation lays down detailed rules for the application of this Directive in relation to fans with electric input power ranging between 125 W and 500 kW and it sets forth that, starting:

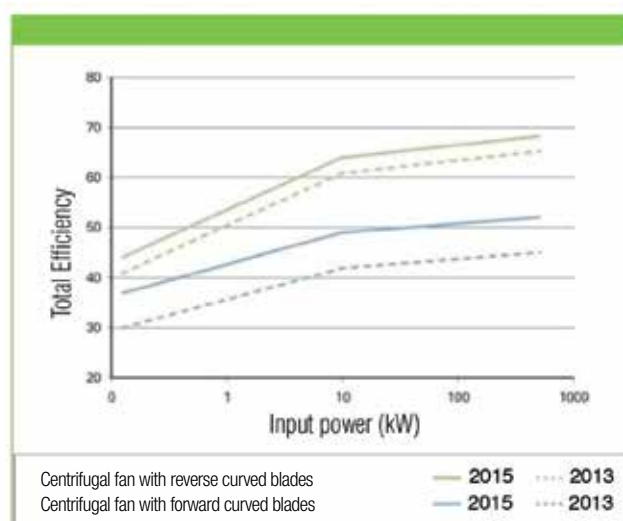
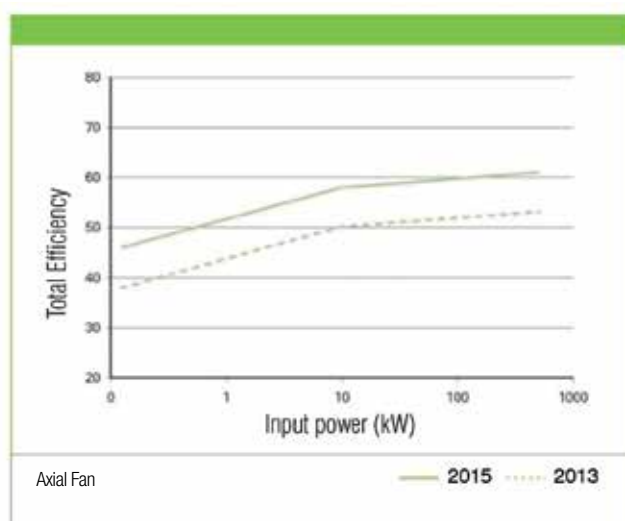
From 2 January 2013, fans cannot have an energy efficiency lower than that specified in Annex I, Section 1, Table 2.

From 2 January 2015, fans cannot have an energy efficiency lower than that specified in Annex I, Section 2, Table 2.

The European Regulation defines the formulas used to calculate the minimum efficiency (η_{target}) for each fan; this procedure takes into account the different power ranges for each type of fan. The efficiency degree “N” is a constant in the calculation of the target efficiency whose value will increase starting from 2015 compared with that specified for 2013.

It follows that all European manufacturers and importers of fans will not be able to trade on the European market fans that do not reach the target efficiency level set by the European Regulation 327/2011.

Here below there are the curves of target energy efficiency and the formulas with which they are calculated, both were clearly defined by the European legislator.



Axial Fan	2015	2013
Centrifugal Fan with reversed blades	2015	2013
Centrifugal fan with forward curved blades	2015	2013

Fan type	Measurement category	Efficiency category	Power range P in kW	Target energy efficiency	Efficiency degree N 1st phase 01.2013	Efficiency degree N 2nd phase 01.2015
Axial fan	B	Total	$0,125 \leq P \leq 10$	$\eta_{\text{target}} = 2,74 \cdot \ln(P) - 6,33 + N$	50	58
			$10 \leq P \leq 500$	$\eta_{\text{target}} = 0,78 \cdot \ln(P) - 1,88 + N$		
Centrifugal fan with forward curved blades	B	Total	$0,125 \leq P \leq 10$	$\eta_{\text{target}} = 2,74 \cdot \ln(P) - 6,33 + N$	42	49
			$10 \leq P \leq 500$	$\eta_{\text{target}} = 0,78 \cdot \ln(P) - 1,88 + N$		
Centrifugal fan with backward blades	B	Total	$0,125 \leq P \leq 10$	$\eta_{\text{target}} = 4,56 \cdot \ln(P) - 10,5 + N$	61	64
			$10 \leq P \leq 500$	$\eta_{\text{target}} = 1,1 \cdot \ln(P) - 2,6 + N$		

Exceptions to the rule

The European Regulation 327/2011 does not apply to fans which are designed to operate:

- In potentially explosive atmospheres (see 2014/34/EU).
- With circulating gas operating temperatures above 100 °C.
- With ambient operating temperature of the motor - if positioned outside the gas flow - above 65 °C.
- With average annual temperature of the circulating gas and/or motor ambient operating temperature, below -40 °C.
- Only in cases of emergency, for short periods (see Regulation (EU) no. 305/2011).
- With a supply voltage of > 1000 VAC or > 1500 VDC.
- In toxic, highly corrosive or flammable environments or in environments with abrasive substances.

The specifications for energy efficiency do not apply also to fans designed to operate:

- With optimal energy efficiency at 8000 rpm or higher.
- In applications in which the "specific ratio" is greater than 1.11.
- For the transport of non-gaseous substances in industrial applications.



1- CE DECLARATION AND MARKING

1.1- Copy of the Declaration of CE conformity (fan with electric motor)



Sede Legale - Amministrativa - Stabilimento :
Euroventilatori International Srl
Via Risorgimento, 90 - 36070 S. Pietro Mussolino (VI) Italy
Tel. +39 0444/472472 r.a. - Fax +39 0444/472415
Cod. Fisc. e P.IVA IT 03038290247 R.E.A. 294035 - M V0052642 Capitale Sociale € 2.060.000,00 i.v.
www.euroventilatori-int.it - info@euroventilatori-int.it

EC CONFORMITY DECLARATION

The manufacturer Euroventilatori International S.r.l. hereby declares that the industrial fan:

CODE: YEAR OF PRODUCTION: SERIAL NO.:

TYPE:

fulfils all the relevant provisions of the Directives:

2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery, and amending Directive 95/16/EC

2009/125/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products

COMMISSION REGULATION (EU) No 327/2011 of 30 March 2011 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 kW

2014/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits

and furthermore declares that the following harmonised standards has been applied:

UNI EN ISO 12100: 2010 Sicurezza del macchinario: Concetti fondamentali, principi generali di progettazione - Parte 1: Terminologia di base, metodologia

UNI EN ISO 13857: 2008 Sicurezza del macchinario: Distanze di sicurezza per impedire il raggiungimento di zone pericolose con gli arti superiori e inferiori

and the following standards:

UNI EN ISO 13349:2011 Ventilatori - Vocabolario e definizioni delle categorie

UNI EN ISO 12499:2009 Ventilatori industriali - Sicurezza meccanica dei ventilatori - Ripari

The person authorised to compile the technical file is:

Stefano Sartori
via Risorgimento, 90
36070 - San Pietro Mussolino (VI) - Italia

San Pietro Mussolino, on

Signature
Technical Manager
Stefano Sartori

CE2017EN.00

1.3- CE Marking

CE marking certifies the conformity of the machine with the essential safety and health requirements set forth by the European Directives mentioned on the Declaration of CE Conformity.

It consists of two types of adhesive aluminum black screen printed plates (STANDARD and ATEX), which bear the machine data in English. Usually it is applied on the base of the fan or in a well visible position.

1.3.1- STANDARD rating plate (FIG. 1)

The "STANDARD" plate (FIG. 1) applied on all fans not complying with the ATEX Directive, bears the following data in legible and indelible way:

- PLACE, NAME AND ADDRESS OF THE MANUF
- CE MARKING
- 2009/125/EC DIRECTIVE (Ecodesign of energy-related products)
- ErP - REGULATION (EU) 327/2011 (Energy related Products)
- YEAR OF CONSTRUCTION
- TYPE OF FAN (series and model)
- SERIAL NUMBER
- FAN SPEED (r/min - number of revolutions per minute)
- CHARACTERISTICS OF THE ELECTRIC MOTOR: Type, poles, power (kW), frequency (Hz)
- FLOW RATE (m³/min)
- TOTAL PRESSURE (kgf/ m²)
- TEMPERATURE OF THE FLUID (°C)
- FAN SPECIFIC RATIO
- FAN OVERALL EFFICIENCY
- FAN EFFICIENCY DEGREE AT MAXIMUM EFFICIENCY
- MEASUREMENT CATEGORY
- EFFICIENCY CATEGORY
- POSSIBLE PRESENCE OF THE SPEED VARIATOR IN THE CALCULATION OF THE FAN EFFICIENCY (YES - NO)

Euroventilatori International Srl via Risorgimento 90 - S. Pietro Mussolino 36070 Vicenza - Italy / +39 0444 472472			
Constr.Year	<input type="text"/>	INDUSTRIAL FAN	
Fan Type	<input type="text"/>		
Serial No.	<input type="text"/>	F.Speed	<input type="text"/> r/min
Motor Type	<input type="text"/>	Poles	<input type="text"/> kW <input type="text"/> Hz
Flow Rate	<input type="text"/> m ³ /min		
Tot.Press.	<input type="text"/> kgf/m ²		
Fluid temp.	<input type="text"/> T/ <input type="text"/> °C	Specific.Ratio	<input type="text"/>
Eff. ηe	<input type="text"/>	Eff. N	<input type="text"/> Measure Cat. <input type="text"/>
Eff. Cat.	<input type="text"/>	Frequency Converter	Yes <input type="checkbox"/> No <input type="checkbox"/>
www.euroventilatori.com		TA2017.00	

FIG. 1 (STANDARD rating plate)



1.3.2- ATEX rating plate (FIG. 2)

The “ATEX” plate (FIG. 2) applied on all fans complying with the ATEX Directive, bears the following data in legible and indelible way in English:

- THE MANUFACTURER'S DETAILS
- THE MARKING
- THE LOGO THAT IDENTIFIES ATEX PRODUCTS
- THE FAN TYPE/CODE
- THE YEAR OF MANUFACTURING
- THE SERIAL NUMBER
- THE GROUP (II = surface industries)
- THE PRODUCT CATEGORY (2 or 3)
- THE TYPE OF ATMOSPHERE (G= gas; D= dust)
- SYMBOL EX H WHICH MEANS ATEX NON -ELECTRICAL EQUIPMENT
- THE GROUP OF GASES (IIA, IIB o IIB+H2) AND/OR OF DUSTS (IIIA, IIIB, IIIC)
- THE PROTECTION LEVEL OF THE EQUIPMENT (Ga, Gb, Gc for gases and/or Da, Db, Dc for dusts)
- THE TEMPERATURE CLASS (T1 - T6 or Tmax)
- MOTOR DATA OUTPUT, POLES AND FREQUENCY
- ADMISSIBLE FLUID TEMPERATURE AND AMBIENT TEMPERATURE
- FAN RANGE, DELIVERY AND TOTAL PRESSURE
- FAN ROTATIONAL SPEED
- REFERENCE TO THE TECHNICAL DOSSIER








 euroventilatori			
Euroventilatori International Srl via Risorgimento 90 - S. Pietro Mussolino 36070 Vicenza - Italy / +39 0444 472472			
Industrial Fan Type			
Constr. Year		Serial No.	
  II		Ex h	
  II		Ex h	
Motor Type		Poles	kW
Fluid temp.	°C	Amb. temp.	°C
Flow rate	m ³ /s		
Tot. Pressure	Pa		
Fan Speed	r/min	Ref. Tech. File	
www.euroventilatori.com		TA2017EX.00	

FIG. 2 (ATEX rating plate)



2- GENERAL

2.1- Importance of the manual



⚠ CAUTION

BEFORE USING THE INVOLVED MACHINE, THE AUTHORIZED OPERATORS (S. PAR. 2.2.2) MUST COMPULSORILY READ AND UNDERSTAND THIS MANUAL IN ALL ITS PARTS.

This instruction manual was drawn up according to the directions of the European Directives in order to assure an easy and correct understanding of the contents by the operators entrusted with the use and maintenance of the involved machine. If, despite the attention paid by the Manufacturer in drawing up this document, the above mentioned operators should have any doubts concerning the understanding of the document, in order to avoid misinterpretations that may jeopardize safety, they are kindly requested to promptly ask for correct explanations and information to the Manufacturer.

Before using the involved machine, the authorized operators must compulsorily read and understand this instruction manual in all its parts and strictly follow the instructions herein described in order to assure one's own safety and that of others, attain better machine performance, and assure maximum efficiency and duration of all machine components.

This manual shall be available for the authorized operators at any time and shall always be well stored and protected close to the machine.



⚠ CAUTION

THIS MANUAL SHALL ALWAYS BE AVAILABLE FOR THE AUTHORIZED OPERATORS AND SHALL ALWAYS BE CLOSE TO THE MACHINE, WELL STORED AND PROTECTED.

IN CASE OF TRANSFER OF THE MACHINE TO ANOTHER USER, THIS MANUAL SHALL BE COMPULSORILY HANDED OUT TOGETHER WITH THE MACHINE.









THE MANUFACTURER SHALL NOT BE MADE LIABLE FOR ANY DAMAGES TO PEOPLE, ANIMALS AND/OR THINGS CAUSED BY THE INOBSERVANCE OF THE INSTRUCTIONS AND WARNINGS HEREIN CONTAINED.

THIS MANUAL COMPLIES WITH THE STATE OF THE ART OF TECHNOLOGY AT THE TIME OF THE TRADING OF THE MACHINE AND SHALL NOT BE CONSIDERED INAPPROPRIATE ONLY BECAUSE IT MAY BE UPDATED LATER ON, DUE TO NEW EXPERIENCES.

IN CASE OF LOSS OR DETERIORATION OF THE MANUAL, REQUEST A COPY TO THE MANUFACTURER, SPECIFYING THE DOCUMENT IDENTIFICATION DATA: CODE, ISSUE DATE AND REVISION INDEX (SEE COVER).



2.2- Reading hints ()

Bold text	It highlights some meaningful sentences in the text.
<i>Italic text</i>	It highlights the captions of figures and tables.
	Generic hazard sign: It highlights hazards for the health and safety of the operators and/or the risk of damaging the machine or causing the malfunctioning of the same.
	Generic mandatory sign: It indicates a prescription (obligation to perform an action).
	Generic prohibition sign: It highlights the prohibition to perform an action.
	EX hazard warning sign: It highlights the risk of explosion.
	Crossed-out wheeled bin: It highlights the prohibition to throw away electric and electronic equipment (WEEE) in usual collection bins.
	⚠ DANGER IT HIGHLIGHTS A HAZARD WITH A HIGH LEVEL OF RISK, WHICH, IF NOT AVOIDED, LEADS TO DEATH OR SERIOUS INJURIES.
	⚠ WARNING IT HIGHLIGHTS A HAZARD WITH A MEDIUM LEVEL OF RISK, WHICH, IF NOT AVOIDED, MAY LEAD TO DEATH OR SERIOUS INJURIES.
	⚠ CAUTION IT HIGHLIGHTS A HAZARD WITH A LOW LEVEL OF RISK, WHICH, IF NOT AVOIDED, MAY LEAD TO MINOR AND NOT SERIOUS INJURIES.
FRAMED TEXT IN CAPITAL LETTERS FOCUSES THE ATTENTION OF THE USER ON THE WARNINGS CONTAINED IN THIS MANUAL.	

TAB. 1 (Reading hints)



2.2.1- Status of “switched off machine”

Before performing any maintenance and/or adjustment works on the machine, it is compulsory to disconnect all energy sources and make sure that the machine is actually stopped and cannot be started expectedly.
It is mandatory to padlock the main electrical disconnect switch and possibly display a warning sign (E.g. Do not touch: maintenance work in progress).







2.2.2- Authorized operators

**⚠ WARNING**

THE AUTHORIZED OPERATORS SHALL PERFORM ON THE MACHINE EXCLUSIVELY THE INTERVENTIONS BELONGING TO THEIR SPECIFIC AREA OF COMPETENCE.

BEFORE PERFORMING ANY INTERVENTION ON THE MACHINE, THE AUTHORIZED PEOPLE SHALL MAKE SURE TO BE IN SUCH A MENTAL AND PHYSICAL CONDITION AS TO ASSURE THE OBSERVANCE OF SAFETY CONDITIONS AT ANY TIME.

This technical manual is intended exclusively for the authorized operators entrusted with the use and maintenance of the machine according to the specific technical-professional skills required by the type of works. The symbols given here below are to be found at the beginning of a chapter and/or paragraph and indicate the operator involved by the covered topic.

	ENTRUSTED OPERATOR This is a qualified and professionally trained operator who is authorized, in compliance with the laws in force in the country of use, to perform exclusively the start, use, tooling, setting (compulsorily with enabled protections and switched off machine) and switching off of the machine in absolute compliance with the instructions contained in this manual, being provided with the personal protective equipment (PPE) set forth by par. 6.4 .
	OPERATOR ENTRUSTED WITH HANDLING This is a qualified and professionally trained operator who is authorized, in compliance with the laws in force in the country of use, to use fork lift trucks, bridge cranes or cranes to safely transport, handle, unpack the machine and/or parts of the same, being provided with the personal protective equipment (PPE) set forth by par. 6.4 .
	MECHANIC / HYDRAULIC / PNEUMATIC MAINTENANCE TECHNICIAN This is a qualified technician authorized to perform exclusively works on mechanic / hydraulic / pneumatic parts in order to carry out adjustment, maintenance and/or repairing works, even with disabled protections (upon authorization by the Supervisor) in full compliance with the instructions contained in this manual or in any other specific document supplied exclusively by the Manufacturer, being provided with the personal protective equipment (PPE) set forth by par. 6.4 .
	ELECTRIC MAINTENANCE TECHNICIAN This is a qualified technician (electrician meeting the technical and professional requirements required by the regulations in force), authorized to perform exclusively works on electric parts in order to carry out adjustment, maintenance and/or repairing works, even on live equipment and with disabled protections (upon authorization by the Supervisor) in full compliance with the instructions contained in this manual or in any other specific document supplied exclusively by the Manufacturer, being provided with the personal protective equipment (PPE) set forth by par. 6.4 .
	SUPERVISOR This is a person who, due to his/her professional skills and within the limits of hierarchical and functional powers suitable for the nature his/her role, supervises working activities and assures the implementation of received directions, checking that they are properly carried out by the workers and performing a functional initiative power.
	MANUFACTURER'S TECHNICIAN This is a qualified technician made available by the Manufacturer and/or by the authorized dealer to carry out the required technical service, as well as routine and extraordinary maintenance interventions and/or works not described in this manual requiring a specific knowledge of the machine, being provided with the personal protective equipment (PPE) set forth by par. 6.4 .

TAB. 2 (Authorized operators)



2.3- Abbreviations (TAB. 3)

TAB. 3 lists some abbreviations used in this manual.

ca.	Circa	mm	Millimeters
chap.	Chapter	No.	Number
PPE	Personal Protective Equipment	p.	Page
R	Right	par.	Paragraph
etc.	Etcetera	Pos.	Position
EN	European Norm	Q.ty	Quantity
e.g.	Example given	Ref.	Reference
FIG.	Figure(s)	s	Seconds
h	hour(s)	L	Left
MAX.	Maximum	TAB.	Table
MIN.	Minimum	s.	See
min	Minutes	Ø	Diameter

TAB. 3 (Abbreviations)

2.4- Reserved rights

The reserved rights on this instruction manual are property of the Manufacturer.

Any information (text, drawing, diagrams, etc.) herein contained is reserved. Not any part of this manual may be reproduced or distributed (completely or partially) by any reproduction means (photocopies, microfilm or other means) without prior written authorization by the Manufacturer.

All trademarks are property of their respective owners.

2.5- Warranty

EUROVENTILATORI INTERNATIONAL SRL grants a warranty of **12 (twelve)** months from the commissioning date, but not going beyond 18 (eighteen) months from the delivery date.

Once this term has elapsed, the warranty becomes void also if the equipment was not commissioned for any reason whatsoever.

In case of defects, provided they do not depend on assembly errors imputable to the customer or third parties, wrong use of materials, lack of or improper maintenance, natural tear and wear, damages caused by unskillfulness or negligence of the buyer or by transport, incorrect storage of materials, lack of immediate adoption by the customer of measures to tackle any malfunction, overloads with respect to the contractual limits, unauthorized interventions, tampering performed by the customer or upon its request, accident or force majeure, EUROVENTILATORI INTERNATIONAL SRL shall repair or replace possible defective parts **at its premises** in the shortest time, free of charge, during the warranty period. If such repairing does not take place at the premises of EUROVENTILATORI INTERNATIONAL SRL, all additional or correlated expenses shall be at customer's charge.

Repairing or replacement works shall be performed provided that the customer is fulfilling its obligations at that time.

The customer shall not refrain from the fulfillment of its obligations in all cases in which this warranty is invoked.

The customer acknowledges that, except for mandatory limits set forth by the law, any liability of EUROVENTILATORI INTERNATIONAL SRL is excluded in case of damages resulting from any failure to perform, as well as from direct and indirect damages arising from any vices, including but not limited to the actual damage and lost profits caused by standstill of the premises where the material is intended to operate.

For the parts of the sold material that were subject to sub-supply to EUROVENTILATORI INTERNATIONAL SRL, the liability of this latter shall not in any case be greater than the one that the manufacturer itself has towards EUROVENTILATORI INTERNATIONAL SRL.

EUROVENTILATORI INTERNATIONAL SRL shall be exempted and the customer shall hold it harmless, except for mandatory limits set forth by the law, against any contractual or extra-contractual responsibilities for any direct or indirect damages resulting from supplies, the use of products, as well as from the repairing or replacement of the same.

The term for the repairing or replacement of the defective products shall be agreed upon by EUROVENTILATORI INTERNATIONAL SRL and the customer.

The shipment of any product, alleged to be defective, from the customer to EUROVENTILATORI INTERNATIONAL SRL and thereafter from EUROVENTILATORI INTERNATIONAL SRL to the customer shall be carried out at customer's risk, who shall provide for a suitable coverage by means of insurance. Repaired or replaced products shall travel at customer's expense and risk.

Any complaint on a shipment shall not affect the rest of the supply.

The products replaced by EUROVENTILATORI INTERNATIONAL SRL shall become property of the same.

The customer undertakes to stipulate in all contractual relations involving also the materials supplied by EUROVENTILATORI INTERNATIONAL SRL a clause limiting the responsibility of EUROVENTILATORI INTERNATIONAL SRL that shall be essentially the same provided for in this clause. Moreover, the customer undertakes to indemnify and hold EUROVENTILATORI INTERNATIONAL SRL harmless against any claim for damages brought about against EUROVENTILATORI INTERNATIONAL SRL, assuming the full and exclusive responsibility for the further circulation of the materials supplied by EUROVENTILATORI INTERNATIONAL SRL.



2.6- Manufacturer

Name	Euroventilatori International SRL
Address	Via Risorgimento, 90 - 36070 San Pietro Mussolino (VI) Italy
Telephone	+39 0444 472472
Fax	+39 0444 472450- 15- 18
E-mail	info@euroventilatori-int.it
Website	www.euroventilatori-int.it

2.7- Dealer

To be filled in by the Dealer.

Name	
Address	
Telephone	
Fax	
E-mail	
Website	
Stamp	

2.8- Support Center

To be filled in by the Support Center.

Name	
Address	
Telephone	
Fax	
E-mail	
Website	
Stamp	



3- TECHNICAL DESCRIPTION

3.1- Name

The involved machine has the following name:

INDUSTRIAL FAN

3.2- Description of the machine

The industrial fan (hereinafter referred to as fan) is a turbo operating machine receiving mechanical energy and using it, by means of a bladed impeller, to keep a continuous flow of air or other gases passing through the same, providing a work per mass unit not greater than 25 kJ/kg (UNI EN ISO 13349).

- **Radial fan (centrifugal):** fan where the fluid meets the impeller in the axial direction with it and the leaves it in a direction perpendicular to the axis. The blades: **negative** where the fluid is processed with the rear and convex part (EU-EUM-MPR-TR-BT-BPRD-APR.-APR.D); **positive** where the fluid is processed with the front and concave part (BP-TPA-TQ-TF-TG-AP-EUK); **radial** or straight: where the fluid is processed indistinctly with the rear or front part, if there are no blade reinforcements on one or the other part (TTRC-TH) (**FIG. 3**).

- **Axial fan:** fan where the fluid meets and leaves the impeller along cylindrical surfaces coaxial with it.

The blades: **WITH WINGED PROFILE** obtained by aluminum die casting (EVF-EVP-EVC-EVL-EVT).

Air Flow A: Which means that the Air flow goes from the motor (support) to the impeller.

Air Flow B: Which means that the Air flow goes from the impeller to the motor (support).

Air Flow U: Which means that the Air Flow goes down up.

Air Flow D: Which means that the Air Flow goes top down (**s. par. 3.6.5**).

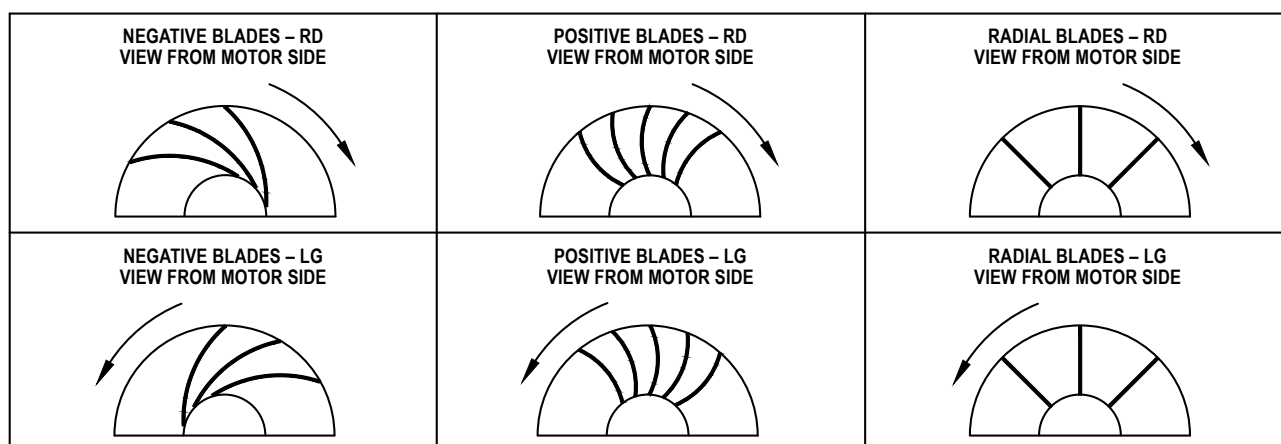


FIG. 3a Centrifugal fan impeller

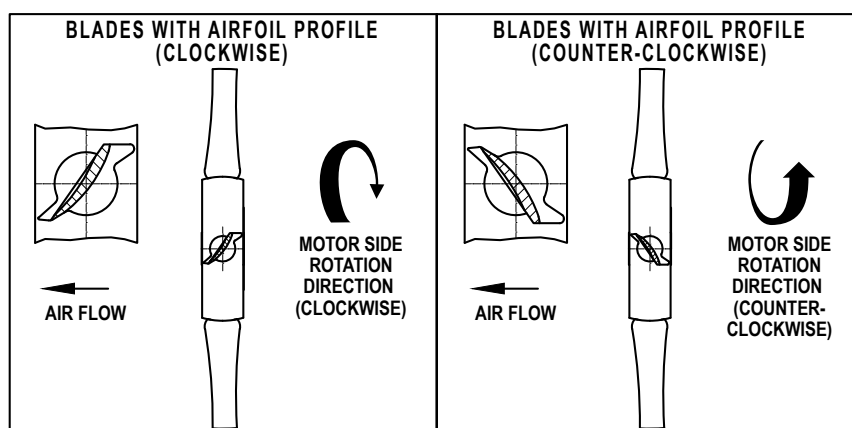


FIG. 3b Axial fan impeller

FIG. 3 (Description of the machine)



3.3- Classification ()

Fans are classified based on the maximum deliverable pressure trend, the flow in the impeller, and the drive system.

Based on the maximum deliverable **pressure**, fans are classified as **high pressure**, **medium pressure** and **low pressure** fans.

Considering the **trend of the flow** in the impeller, they can be classified as **centrifugal** or **axial**.

Centrifugal fans are fans in which air enters the impeller with a direction that is essentially axial and leaves the same with a direction that is perpendicular to the axis. A specific configuration is the **double stage** one.

Axial fans are fans in which air enters and leaves the impeller along essentially cylindrical surfaces coaxial with the fan itself.

Based on the drive system, fans can be subdivided into fans with **belt drive** and fans **directly coupled with an internal electric motor**. A specific direct coupling system is the one with flexible joint (**N8**).

Pressure	HIGH PRESSURE				MEDIUM PRESSURE		LOW PRESSURE			
Drive system	Direct		Belt	Direct N8	Direct	Belt	Direct		Belt	
Executions	4/5		1/9/12	8	4/5	1/9/12	4	4/5	1/9	1/9/12
Flow trend	Centrifugal		Centrifugal		Centrifugal		Axial	Centrifugal	Axial	Centrifugal
		Double stage								
Series	APE	APRED	APEc	APRF/N8	EU	EUC	EVP	BP	EVc	BPRc
	APF	APRFD	APFc	APRG/N8	EUM	EUMc	EVF	BPR		BPc
	APG	APRGD	APGc	APRH/N8	MPR	TRc	EVL	BT		BPRDc (*)
	APRF		APRFc	APRI/N8	TR	TTRc	EVT			
	APRG		APRGc	APRL/N8	TPA	TFc				
	APRH		APRHc		TQ	TGc				
	APRI		APRIc		TF	THc				
	APRL		APRLc		TG	MPRc				
					TH	EUKc				
					EUK					

(*) Arrangement 6, 19, 18

TAB. 4 (Fan classification)

3.4- Model Identification

Identify one's own model is very important since it allows searching for the related instructions and information in this manual. The abbreviation of the model is given on the CE marking plate applied on the fan and/or stated on the Declaration of CE Conformity.



⚠ DANGER

MODEL IDENTIFICATION OF FANS COMPLYING WITH THE ATEX 2014/34/EU DIRECTIVE IS GIVEN ON THE CE MARKING PLATE (FIG. 2) APPLIED ON THE FAN AND STATED ON THE DECLARATION OF CE CONFORMITY AND IS CHARACTERIZED BY THE "EX" SYMBOL.

3.5- Technical data

Data on air noise and the weight of the main components of the fan are given also in **chap. 13**.

All other technical data concerning each fan model are given on the "paper catalogs" (that can be requested to the Manufacturer or to the Authorized Dealer) and on the "technical data sheets" that can be displayed and printed from the website **www.euroventilatori-int.it**.

To display and print the technical data sheet related to a specific fan model, proceed as follows:



- 1) Connect to the website mentioned above;
- 2) Select the wished language;
- 3) Select the item "products";
- 4) Select the "category" and the "series"; the following will appear:
 - V (m^3/h)
 - Pt (kg/m^2)
 - Drive type (direct or indirect)
 - Use (detailed description of the drawn in fluid type and of the destination of use)
 - Temperature of the drawn in fluid ($^{\circ}\text{C}$)
 - Fan and impeller image
- 5) Select the "model" - the following will appear:
 - Flow rate ($\text{m}^3/\text{min.}$ or m^3/s or m^3/h)
 - Suction pressure Pa (kg/m^2)
 - Pressing pressure Pa (kg/m^2)
 - Installed electric motor (type)
 - Installed power (kW)
 - Rotation speed (rpm)
 - Fluid type
 - Suction flange (\varnothing mm)
 - Pressing flange (\varnothing mm)
 - Weight with electric motor (kg)
 - PD2 (kgm^2)
 - Any other data (e.g. swinging)
 - Interactive graph (diagram with load curves)
 - Specific technical drawing with overall dimensions in DWG and DXF digital formats (Password Protected Area).

3.5.1- Characteristic data

The basic data characterizing the fan are the following ones:

- **Volumetric flow rate:** This is the fluid volume that passes through the fan in a given period of time, in a second (m^3/s), in one minute (m^3/min), in an hour (m^3/h);
- **Static pressure:** This is the energy that the impeller supplies to overcome the resistance opposed by the circuit to the passage of fluid (it is measured in mm water column or Pascal = Pa);
- **Dynamic pressure:** This is the energy featured by the fluid due to the speed impressed by the impeller at the outlet of the discharge end of the fan (it is measured in mm water column or Pascal);
- **Total pressure:** This is the algebraic sum of the static pressure and of the dynamic pressure (it is measured in mm water column or Pascal);
- **Rotation speed:** This is the speed of the impeller and is measured in revolutions per minute (rpm);
- **Yield:** This is the percentage ratio between the energy that the fan is able to convey to the fluid and the energy supplied by the motor to the impeller, depending on the impeller shape;
- **Absorbed power:** This is the required power (supplied by the motor) to the fan for its operation - it is measured in kW;
- **Motor rating plate power:** This is the rated power that the motor can provide; it must always be greater than the power absorbed by the fan - it is measured in kW;
- **Sound Pressure Level:** This is the energy which propagates in the ear that generates the vibration of the eardrum, in other words it is the noise level of the fan and is assessed in dB(A) (decibel) according to scale A (scale that allows assessing the impact of noise on human ear in relation to the frequency of the same);
- **Sound power:** This is the index of the emission of acoustic energy and it is an inherent and invariant feature of a sound source. Sound power is expressed in Watts.



3.6- Name of the main components

3.6.1- Direct drive Execution ()

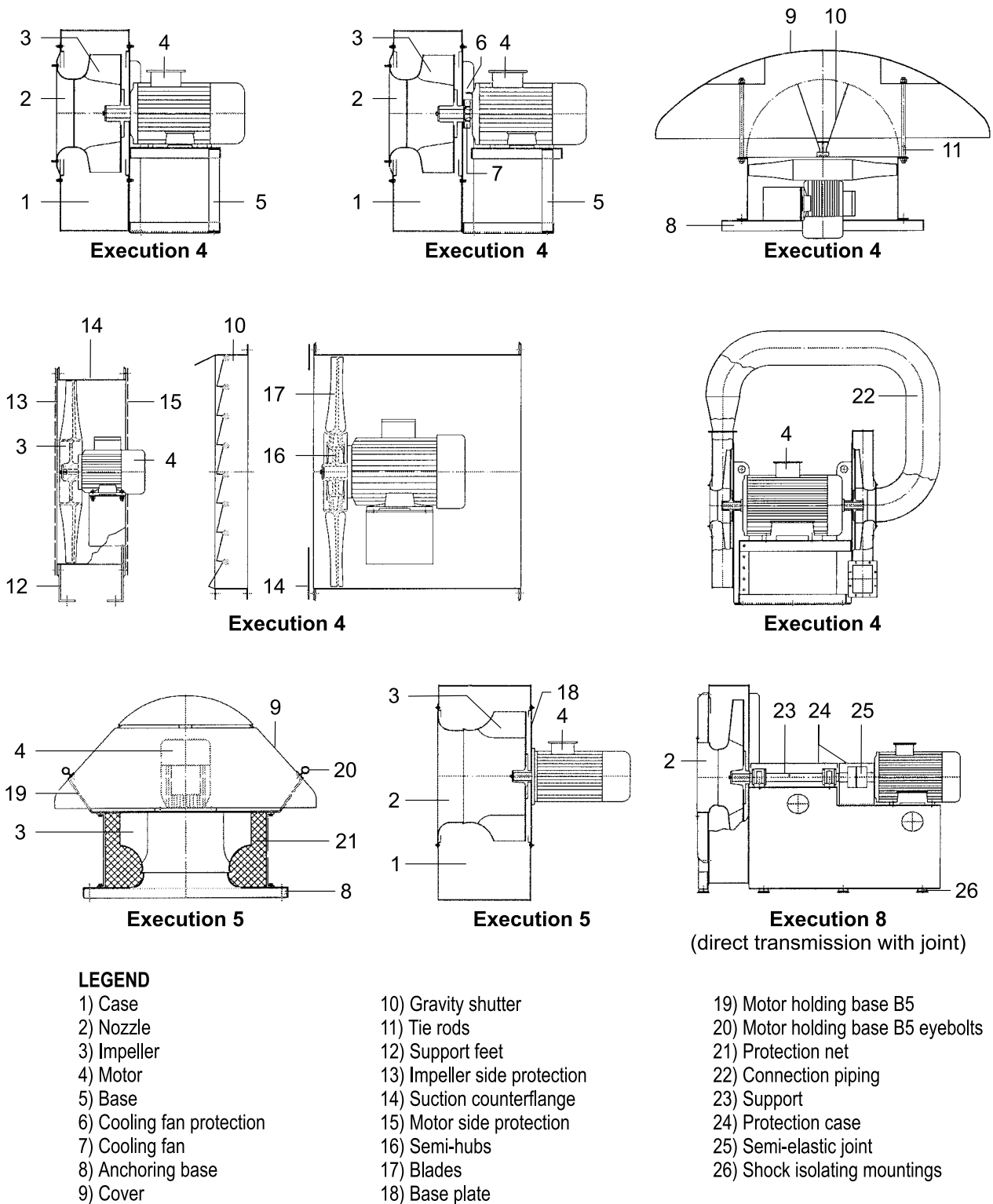


FIG. 4 (Direct drive Execution)



3.6.2- Indirect drive Execution (FIG. 5)

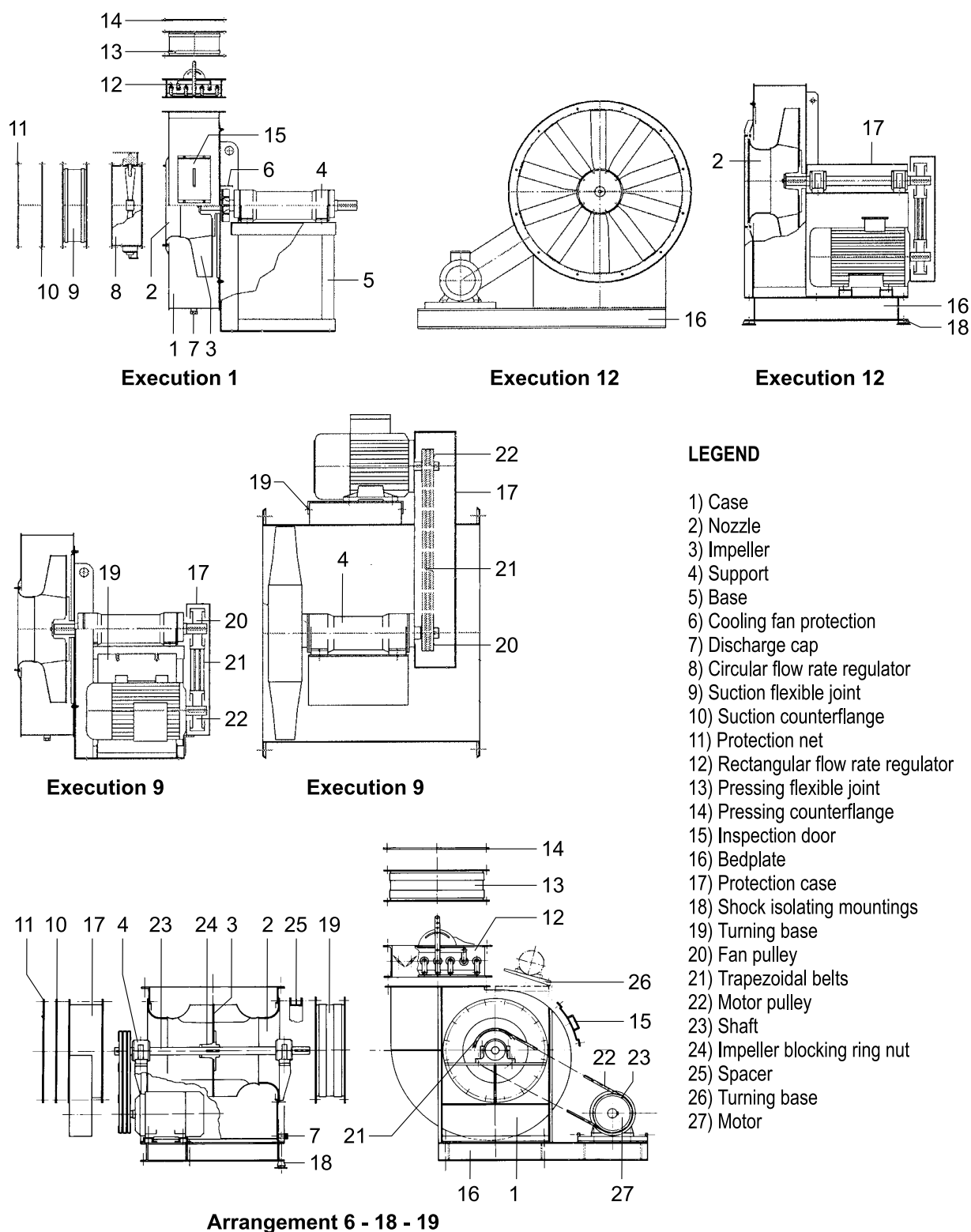


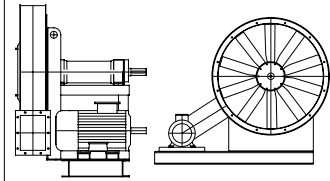
FIG. 5 (Indirect drive execution)



3.6.3- Construction Executions (and)

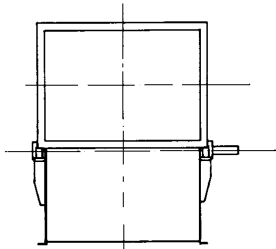
	<p>EXECUTION 1 Belt drive. Cantilever fitted impeller. Support mounted on base out of the air circuit. MAX. air temperature 90 °C without cooling fan; 350 °C with cooling fan.</p>
	<p>EXECUTION 4 Direct drive. Impeller directly fitted on the electric motor shaft which is supported by the base. MAX. air temperature 80 °C; with cooling fan 150 °C (for axial fans - MAX. air temperature 70 °C).</p>
	<p>EXECUTION 5 Direct drive. Impeller directly fitted on the flanged electric motor shaft which is supported by the case. MAX. air temperature 80 °C.</p>
	<p>EXECUTION 8 Coupling by means of a flexible joint. Cantilever fitted impeller. Support assembled on base out of the air circuit. Air temperature 90 °C without cooling fan; 350 °C with cooling fan. Single base for fan electric motor-support.</p>
	<p>EXECUTION 9 Belt drive. As per Execution 1, with electric motor supported by the side wall of the base. MAX. air temperature: 90 °C without cooling fan; 350 °C with cooling fan. Position of the electric motor W or Z (for axial fans - MAX. air temperature 70 °C).</p>

FIG. 6 (Construction executions)



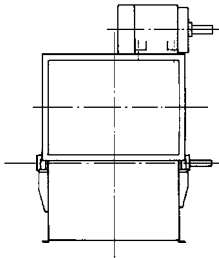
EXECUTION 12

Belt drive. As per Execution 1, with both fan and electric motor supported by the foundation frame.
MAX. air temperature: 90 °C without cooling fan; 350 °C with cooling fan. Position of the electric motor W or Z (exceptionally X or Y) (for axial fans - MAX. air temperature 70 °C).



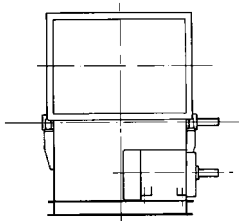
ARRANGEMENT 6

Belt drive. Impeller fitted among supports, mounted on suction pipe segments within the air circuit.
MAX. air temperature 40 °C; with bearings clearance C3 MAX. 80 °C.



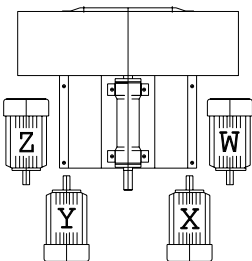
ARRANGEMENT 19

Belt drive. As per arrangement 6, with electric motor on base supported by case.
MAX. air temperature 40 °C; with bearings clearance C3 MAX. 80 °C.



ARRANGEMENT 18

Belt drive. As per arrangement 6, with both fan and electric motor supported by the foundation frame.
MAX. air temperature 40 °C; with bearings clearance C3 MAX. 80 °C.



Plan view of the positions of belt drive motors.

FIG. 7 (Construction executions)



3.6.4- Orientations

The centrifugal fans are mounted according to 16 orientation positions (8 clockwise RD and 8 counter-clockwise LG).

The rotation direction is defined by an observer positioned on the transmission side (motor).

RD orientations, LG 180 and 225 are only possible with appropriate constructive adjustments (s. FIG. 8).

For the indirect transmission execution, standard motor positions are adopted as FIG. 9.

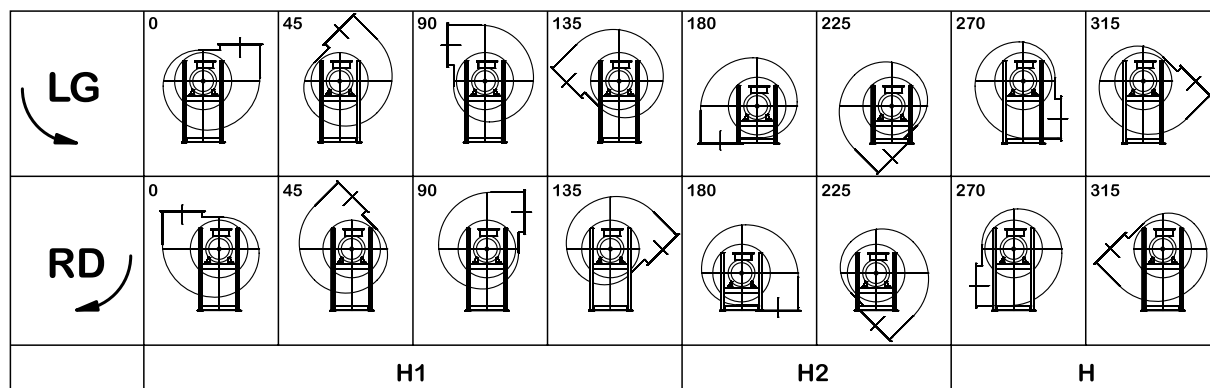


FIG. 8 (Orientation)

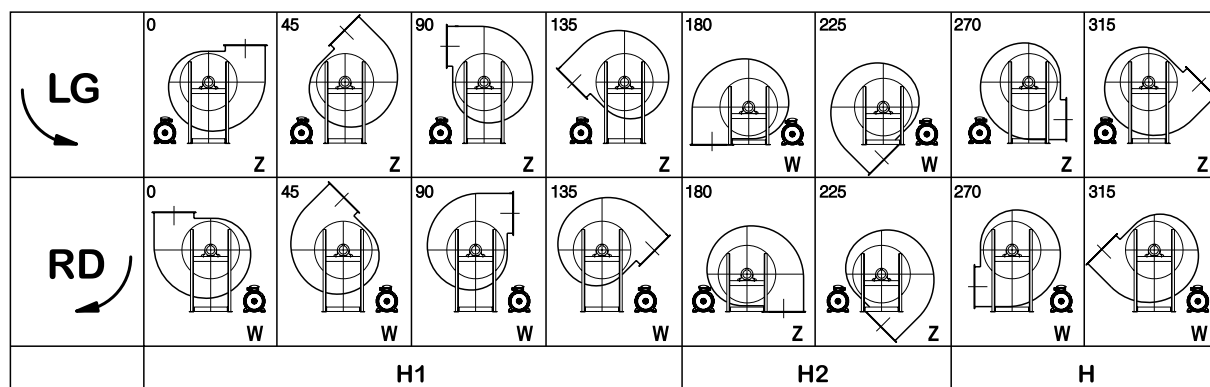


FIG. 9 (Orientation with standard motor positions)

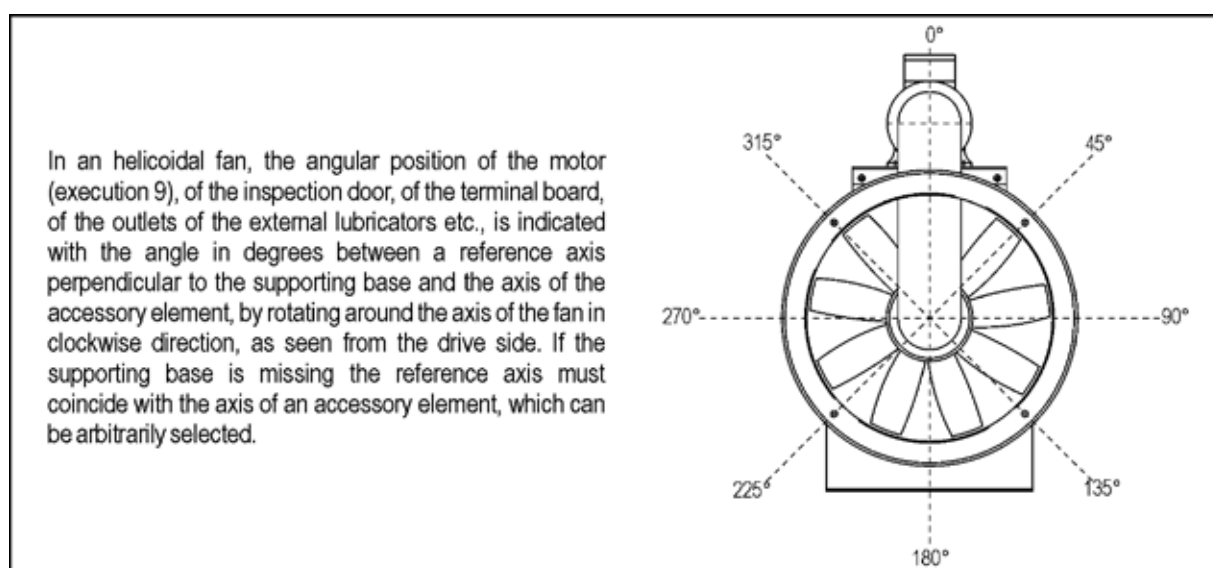
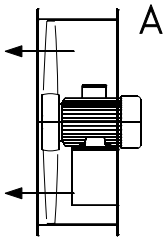
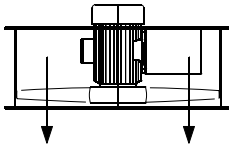
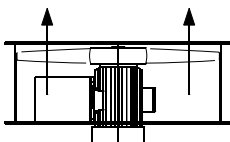
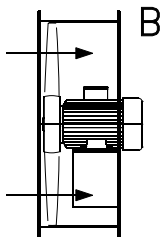
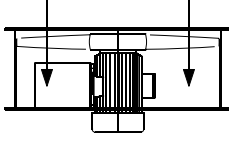
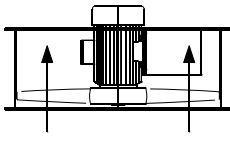


FIG. 10 (Motor position on axial fan)



3.6.5- Motor position on axial fan

Position of the motor with reference to the air flow direction.

	HORIZONTAL AXIS	VERTICAL AXIS	
			
A = Flow from motor to impeller B = Flow from impeller to motor U = Flow from the bottom upwards D = Flow from top downwards			

TAB. 5 (Air Flows)

3.7- Intended use of the machine ()

This machine was designed and manufactured for the following use.

FIELD OF USE	Industrial sector.
PLACE OF USE	Indoor and outdoor, in a sufficiently illuminated place, complying with the law regulations concerning safety in force in the country of use concerning safety and occupational health. The fan has to be installed on a leveled, horizontal floor or vibration-proof surface assuring stability with reference to the weight and overall dimensions (s. par. 3.5). Moreover, it has to be connected to a piping system equipped with suitable mechanical safety guards in compliance with the provisions of the standard EN ISO 12499:2009 and with all safety devices required by the safety regulations in force. For the fans with ATEX Execution (check the plate on the same - s. FIG. 2) refer to chap. 9.
INTENDED USE	Keep a continuous flow of air or other gases passing through the fans. For the detailed use of the individual models refer to par. 13.1.
OPERATORS ENTRUSTED WITH USE	Just one authorized operator meeting the technical and professional requirements described under par. 2.2.2.

TAB. 6 (Intended use of the machine)



3.8- Energy sources

The fan is driven by an electric motor whose features are given in the instruction manual supplied by the manufacturer of the same.

3.9- Used products (TAB. 7)



⚠ WARNING

IT IS STRICTLY FORBIDDEN TO USE OTHER PRODUCTS THAN THOSE GIVEN IN TAB. 7.

Before using the products listed in the following table, it is compulsory to thoroughly read and understand the related technical data sheets supplied by the producers.

PRODUCT	USE	FEATURES
GREASE	Greasing of the support bearings.	Grease type SHELL ALBIDA GREASE RL2 (or equivalent): drop point at 260 °C (IP132/ASTM D566), penetration at 25 °C -0.1 mm (IP50/ASTM D217), kinematic viscosity (IP71/ASTM D445): at 40 °C=100 cSt - at 100 °C=11.3 cSt.

TAB. 7 (Used products)

3.10- Reasonably foreseeable improper use

The reasonably foreseeable improper use involves using the machine in a manner that was not forecast by the manufacturer, but that may result from a readily predictable human behavior.

This machine was designed and manufactured exclusively for the intended use described under **par. 3.7**; therefore, any other use is absolutely forbidden in order to assure the safety of the authorized operators and the efficiency of the machine, at any time.



⚠ DANGER

IT IS STRICTLY FORBIDDEN TO COMMISSION THE FAN NOT CONFORMING WITH THE ATEX DIRECTIVE 2014/34/EU (MARKED WITH THE SYMBOL "EX" - S. PAR. 3.4) IN ENVIRONMENTS WITH POTENTIALLY EXPLOSIVE ATMOSPHERE AND/OR IN PRESENCE OF COMBUSTIBLE DUSTS (ES.: WOOD DUST, FLOURS, SUGAR AND GRAINS).

⚠ DANGER

IT IS STRICTLY FORBIDDEN TO USE THE MACHINE FOR IMPROPER USES, OTHER THAN THE INTENDED USE SET FORTH BY THE MANUFACTURER (S. PAR. 3.7).

IT IS FORBIDDEN TO COMMISSION THE FAN BEFORE HAVING COMPLETED THE CORRECT INSTALLATION (INSTALLING ALSO ANY GUARDS AS REQUIRED BY STANDARD EN ISO 12499:2009).

IT IS FORBIDDEN TO USE THE FAN WITH NON-GASEOUS FLUIDS OR FLUIDS WITH CHARACTERISTICS DIFFERING FROM THOSE DEFINED IN THE ORDER, AS THIS MAY CAUSE STRUCTURAL DAMAGE TO THE FAN WITH POSSIBLE DAMAGE TO PEOPLE AND/OR THINGS.



IT IS FORBIDDEN TO USE THE FAN INSIDE ANY TYPE OF PLANTS SUBJECT TO ANY PRESSURE (PRESENT OR EVEN PARTIALLY GENERATED BY THE FAN) GREATER THAN 1.2 TIMES THE STANDARD ATMOSPHERIC PRESSURE AS IT MAY CAUSE STRUCTURAL DAMAGES TO THE FAN WITH POSSIBLE DAMAGE TO PEOPLE AND/OR THINGS.

IT IS FORBIDDEN TO USE THE FAN INSIDE CHEMICAL PLANTS WHERE THE PROCESSED FLUID IS HIGHLY CORROSIVE FOR THE MATERIALS USED FOR MANUFACTURING THE FAN, OR IN THE PRESENCE OF HIGHLY TOXIC FLUID WHERE THE CONSTRUCTION METHODS OF THE CASE AND THE TYPES OF USED GASKETS ARE NOT SUITABLE FOR THE APPLICATION, AS THE FAN COULD BE SUBJECT TO STRUCTURAL DAMAGES RESULTING IN POSSIBLE DAMAGES TO PEOPLE AND/OR THINGS.

IT IS FORBIDDEN TO USE THE FAN SYSTEMS FOR APPLICATIONS IN THE MINING INDUSTRY AND WITH UNDERGROUND INSTALLATIONS AS THIS COULD RESULT IN ADDITIONAL RISKS NOT ASSESSED WHILE CONSIDERING THE USE OF THE FAN ABOVE THE GROUND LEVEL, AS WELL AS IN POSSIBLE DAMAGES TO PEOPLE AND/OR PROPERTY.

**⚠ DANGER**

IN ORDER TO PREVENT IMPROPER AND UNEXPECTED USES OF THE FAN, BEFORE INSTALLATION IT IS ALWAYS MANDATORY TO PERFORM A THOROUGH RISK ASSESSMENT TO IDENTIFY THE HAZARDS, AS WELL AS ESTIMATE AND MINIMIZE RISKS. THE PROCEDURES FOR CONDUCTING THE RISK ASSESSMENT ARE DESCRIBED, IN THE MACHINERY DIRECTIVE (ANNEX I), AND ALSO IN THE EN EN ISO 12100:2010 STANDARDS. THE RISK ASSESSMENT DOCUMENTATION SHALL BE KEPT FOR FUTURE REFERENCE BY THE PERSON WHO PERFORMED THE INSTALLATION AND COMMISSIONING OF THE FAN.

THE MANUFACTURER CANNOT BE MADE LIABLE FOR DAMAGES TO PEOPLE, ANIMAL AND THINGS RESULTING FROM IMPROPER AND UNEXPECTED USES OF THE FAN.

⚠ CAUTION

THE MANUFACTURER SHALL NOT BE MADE LIABLE FOR ANY DAMAGES TO PEOPLE, ANIMALS AND/OR THINGS CAUSED BY THE INOBSERVANCE OF THE INSTRUCTIONS AND WARNINGS HEREIN DESCRIBED.

4- TRANSPORT AND HANDLING**4.1- Transport and handling of the machine**

The machine is transported to the customer by means of a “specialized shipping company”, which, using own personnel and means suitable for the use, shall take care of the packaging, lifting, loading, transport and unloading operations according to the involved type of transport (by land, by sea or by air) in compliance with the regulations in force.

**⚠ WARNING**

BEFORE HANDLING THE PACKAGE IT IS COMPULSORY TO READ AND UNDERSTAND THE INSTRUCTION LEAFLET APPLIED TO THE SAME (S. PAR. 13.4).

THE MANUFACTURER CANNOT BE MADE LIABLE FOR DAMAGES TO PEOPLE, ANIMAL AND THINGS RESULTING FROM THE INOBSERVANCE OF THESE INSTRUCTIONS.

**⚠ DANGER**

IT IS COMPULSORY TO USE SUITABLE MEANS (ROPES, SLINGS, CHAINS, CRANES, FORK LIFT TRUCK, ETC.) IN COMPLIANCE WITH THE REGULATIONS IN FORCE ON SAFETY, USING THE ANCHORING POINTS IDENTIFIED BY THE SIGN SHOWN IN FIG. 11.

THE CUSTOMER (EMPLOYER) SHALL MAKE SURE THAT ITS OWN EMPLOYEES ARE NOT TO BE FOUND FOR ANY REASON WHATSOEVER WITHIN THE TRANSPORT AND HANDLING OPERATION RANGE, OUTSIDE OR INSIDE THE WORK ENVIRONMENT IN WHICH THE FAN IS GOING TO BE INSTALLED.

**⚠ CAUTION**

THE MANUAL HANDLING OF SMALL SIZE FANS (UP TO 25 kg) SHALL OCCUR IN COMPLIANCE WITH THE REGULATIONS CONCERNING THE “MANUAL HANDLING OF LOADS” IN ORDER TO AVOID UNFAVORABLE ERGONOMIC CONDITIONS THAT MAY INVOLVE THE RISK OF BACK AND LUMBAR INJURIES (S. PAR. 13.3).

**4.2- How to lift the fan (FIG. 11)**

It is necessary to use the suitable holes created on the fan (usually on the stringers on the base s. FIG. 11) and highlighted by means of suitable signs. It is recommended to use a chain sling with 2 or more arms, which shall be selected by the operator entrusted with the handling after analyzing the size and mass of the fan to be lifted and finding the right symmetry degree for a suitable lifting - apply the 818-6:2000+A1:2008 standard. Make sure that the arms that are not used are folded and attached to reduce the risk that they may start swinging and get caught and, therefore, interfere during the lifting phase.

Before using the sling always inspect it to detect any wear or damage.

Make sure the hooks always support the load in balanced manner; avoid head loading, which is very dangerous.

The tips of the hooks should always be facing outwards FIG. 11.

For the execution 4, make sure never to use the eyebolts on the motor.

Before lifting the equipment, make sure that the fan is free and is not blocked by other connections or constraints.



Make sure to keep your hands and body away from the chains. Now, you are ready to perform the lifting that shall always occur in a very slow and controlled manner so that the fan takes the desired position (see ISO 12480-3: 2016).

In some cases (especially for big fans), it is often difficult to find the right symmetrical balance; rely on qualified and skilled personnel. To lift fans on wooden crate, please read carefully the instructions and procedures for managing the mass and center of gravity outside of the crate.

**⚠ DANGER**

IT IS PROHIBITED TO USE THE EYEBOLT ON THE MOTOR TO LIFT THE FAN.

**⚠ WARNING**

IT IS MANDATORY TO FOLLOW THE INSTRUCTIONS GIVEN ON THE INSTRUCTION LEAFLET FOR THE HANDLING OF THE PACKAGE, APPLIED EXTERNALLY.

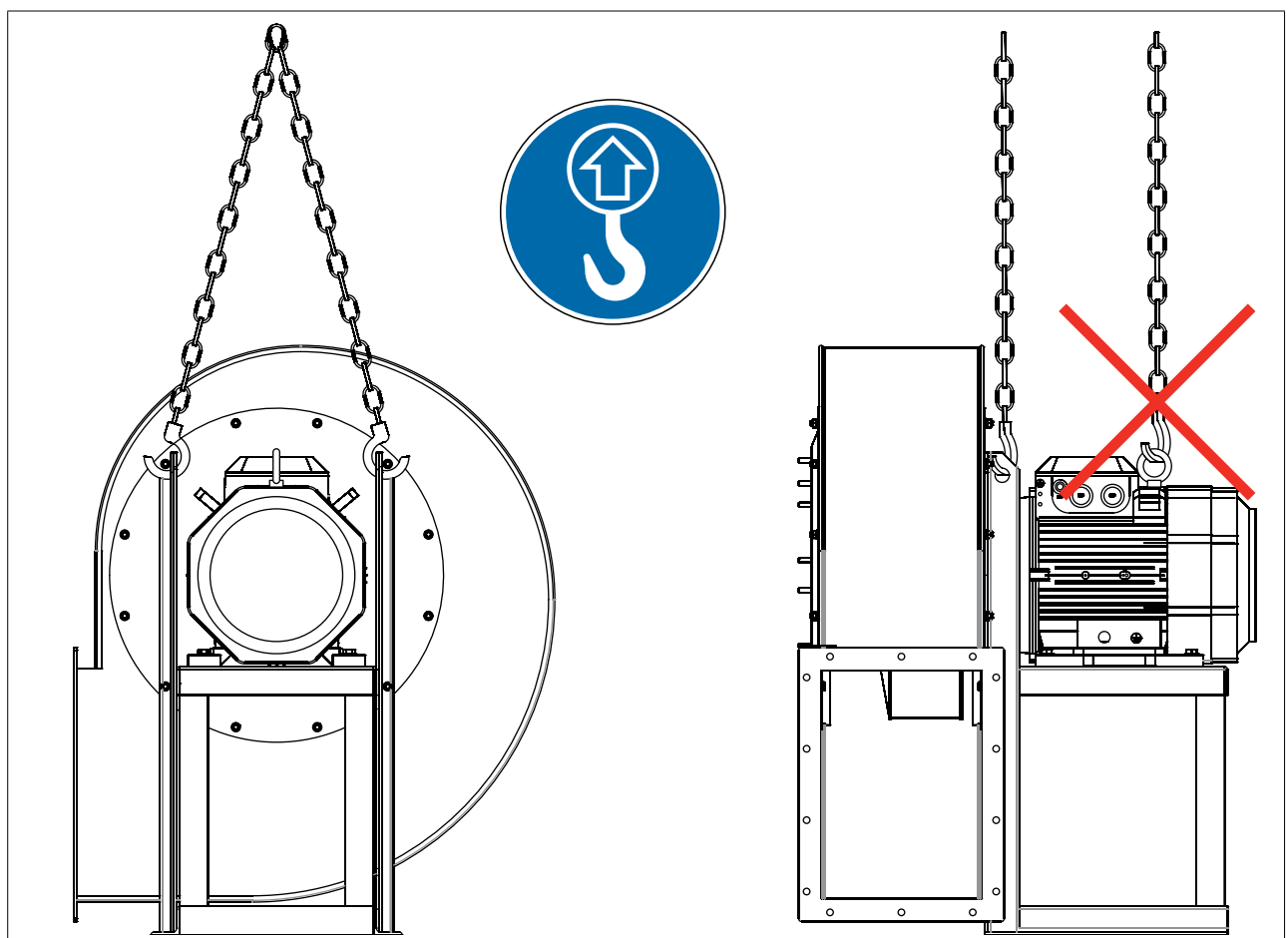


FIG. 11 (Anchoring points for lifting the fan)



4.3- Packaging (FIG. 12)

According to the model and technical construction features of the fan different types of packaging are used:

CENTRIFUGAL FANS

Direct drive (welded/fastened or screwed case)

The components are supplied disassembled as follows:

- 1) Nozzle (FIG. 12 - Ref. 1).
- 2) Intermediate cardboard (or wood for heavy models).
- 3) Case (with seal) (FIG. 12 - Ref. 2).
- 4) Impeller (FIG. 12 - Ref. 3).



5) (Covering) cardboard.

6) Base (**FIG. 12 - Ref. 4**) and screw bag.

(In large size fans, the base is directly welded to the case).

Indirect drive (belt drive):

a) Naked shaft: fully mounted without electric motor.

b) Fan with drive (electric motor supplied by the customer, pulleys, belts, cases and/or protection nets).

DOUBLE STAGE CENTRIFUGAL FANS (APR.D)

Direct drive - the fan is always supplied assembled:

a) With electric motor.

b) Without electric motor, with iron shaft acting as electric motor shaft.

Indirect drive - the fan is always supplied assembled with spare belts already inserted in the protection case:

a) With electric motor.

b) Without electric motor, with iron shaft acting as shaft.

CENTRIFUGAL FANS N8

Direct drive - the fan is always supplied assembled with semi-elastic joint:

a) With electric motor.

b) Without electric motor with naked shaft with semi-elastic joint.

DOUBLE SUCTION CENTRIFUGAL FANS (BPRD)

Indirect drive - the fan is always supplied assembled:

a) With electric motor.

b) Without electric motor with naked shaft.

AXIAL FANS

Direct drive:

a) Disassembled:

1) Drum.

2) Impeller protected by cardboard or anti-scratch material.

b) Assembled with electric motor and any protections as per customer's request (suction net, delivery net, fiberglass cover with square fastening base for the model EVT).

Indirect drive (belt drive):

a) Naked shaft: fully mounted without electric motor.

b) Fan with drive (electric motor supplied by the customer, pulleys, belts, cases and/or protection nets).

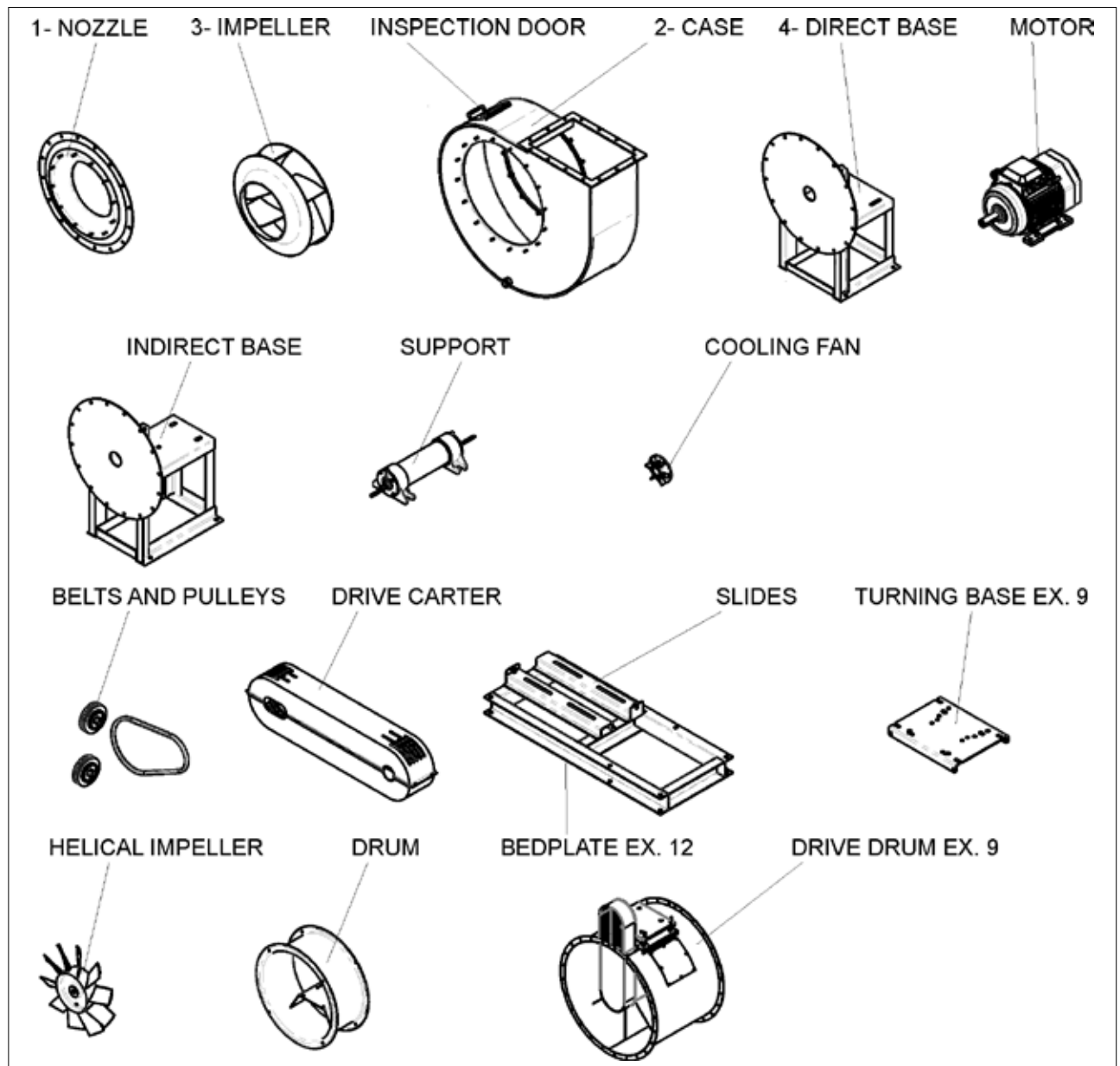


FIG. 12 (Centrifugal and axial fans)

UPON REQUEST, FANS THAT ARE USUALLY SUPPLIED ASSEMBLED CAN BE DELIVERED NOT ASSEMBLED. THE MANUFACTURER CANNOT BE MADE LIABLE FOR DAMAGES TO PEOPLE, ANIMALS AND THINGS RESULTING FROM THE WRONG ASSEMBLY OF THE FAN.

UPON REQUEST, ALSO THE ELECTRIC MOTOR CAN BE SUPPLIED. FOR THE HANDLING, REFER TO THE MANUAL SUPPLIED BY THE MANUFACTURER OF THE ELECTRIC MOTOR.



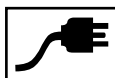
4.4- Unpacking

After having positioned the package on the ground, on a flat surface assuring its stability, unpack the fan according to the different types of packaging shown in **par. 4.3**.



⚠ CAUTION

IT IS RECOMMENDED TO DISPOSE OF THE PACKAGING SEPARATING THE DIFFERENT TYPES OF MATERIALS IN FULL COMPLIANCE WITH THE LAWS IN FORCE IN THE COUNTRY OF USE.



5- INSTALLATION



5.1- General warnings



WARNING

AUTHORIZED OPERATORS ARE NOT ALLOWED TO LEAVE THE MACHINE UNATTENDED DURING INSTALLATION PROCEDURES UNLESS THEY HAVE PREVIOUSLY DONE THE FOLLOWING:

- **DELIMITING AND SIGNALING THE AREA INVOLVED BY THE INSTALLATION OPERATIONS;**
- **TAKING ALL STEPS AIMING AT AVOIDING THE SUDDEN STARTING OF THE MACHINE OR OF PARTS OF THE SAME ALSO WITH MACHINE DISCONNECTED FROM POWER SUPPLY.**



WARNING

IT IS COMPULSORY TO OBSERVE THE PROCEDURES FOR THE ASSEMBLY / DISASSEMBLY AND CONNECTION OF THE COMPONENTS DESCRIBED IN THIS CHAPTER.

THE MANUAL HANDLING OF THE DISASSEMBLED COMPONENTS SHALL OCCUR IN COMPLIANCE WITH THE REGULATIONS IN FORCE CONCERNING THE "MANUAL HANDLING OF LOADS" IN ORDER TO AVOID UNFAVORABLE ERGONOMIC CONDITIONS THAT MAY INVOLVE THE RISK OF BACK AND LUMBAR INJURIES.



5.2- Assembly of the fan

WARNING

BEFORE ASSEMBLING THE FAN, THE AUTHORIZED OPERATORS SHALL COMPULSORILY PERFORM THE CHECKS GIVEN IN TAB. 8 (PAGE 30).

WHEN HANDLING THE FAN AND ITS COMPONENTS COMPULSORILY FOLLOW THE WARNINGS GIVEN IN PAR. 4.1.

FOR FANS COMPLYING WITH THE ATEX DIRECTIVE 2014/34/EU, INSTALLATION SHALL COMPULSORILY BE CARRIED OUT BY A QUALIFIED TECHNICIAN IN COMPLIANCE WITH THE PROVISIONS OF THE LAWS IN FORCE ON THE MATTER.



CAUTION

THE MANUFACTURER SHALL NOT BE MADE LIABLE FOR ANY DAMAGES TO PEOPLE, ANIMALS AND/OR THINGS CAUSED BY THE INOBSERVANCE OF THE INSTRUCTIONS AND WARNINGS HEREIN DESCRIBED.

Only when the fan is supplied disassembled, assemble the components as described in the following paragraphs.



5.2.1- Checks before assembly (TAB. 8 and FIG. 13)

Before assembling the fan, perform the checks given in **TAB. 8**.

1	Make sure that the fan has not been subject to damages during transport.
2	Make sure that the case and the impeller correspond to the requested fan type.
3	For the models supplied assembled, verify the correct orientation of the case (0°, 45°, 90°...) and the correct impeller rotation direction (LG = counter-clockwise RD = clockwise) that may be identified by an adhesive label (arrow - see FIG. 33) applied externally. N.B. The correct orientation of the case has to be verified in the "Orientation table" given in the related "paper catalogs" (see an example in FIG. 13). The identification of the impeller rotation direction has to be verified looking at the same from the electric motor side.
4	Make sure that the electric motor (supplied by the customer) to be installed in the fan has the same technical constructive and performance features stated upon order.
5	Make sure that the electric motor fastening holes to the bedplate of the base match the fastening holes of the electric motor to be installed on the fan (conventional center-to-center distances shown in the manual supplied by the manufacturer of the electric motor).
6	Make sure that the impeller hole has a diameter corresponding to the electric motor shaft.
7	Make sure that the height of the electric motor axis (FIG. 16 - Ref. h) corresponds to the height of the base hole of the upper base side.
8	Make sure that the measure H or H1 or H2 is the requested one (s. FIG. 16 - Ref. H - H1 - H2 and given in the "Orientation" table, in the "paper catalogs", on the page "Overall dimensions and weights" or on the website - see example FIG. 13).
9	If the fan complies with the ATEX Directive check the features under chap. 9 .

TAB. 8 (Checks before assembling)

	0	45	90	135	180	225	270	315
LG								
RD								
	H1				H2		H	

FIG. 13 (Orientation)



5.3- Installation (UNI EN ISO 13349)

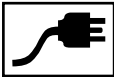
Types of fan installations considering the arrangement of the piping:

Installation type A: installation with free suction and delivery. It requires the use of adequate guards (protection net) on both the suction and delivery side. Suction net as per catalog and price list (see catalog for the dimensions). Discharge net not included in the catalog and price list (upon request only).

Installation type B: installation with free suction and delivery connected to piping. It requires the use of adequate guards (protection net) only on the suction side. Suction net as per catalog and price list (see catalog for the dimensions).

Installation type C: installation with suction connected to piping and free delivery. It requires the use of adequate guards (protection net) only on the discharge side. Discharge net not included in the catalog and price list (upon request only).

Installation type D: installation with suction and delivery connected to piping. It does not require the use of adequate guards (protection net). The use of anti-vibration joints is recommended to avoid any misalignment problems and to prevent any propagation of vibrations.



The type of anti-vibration joint to be selected ultimately depends on two variables: the temperature and type of drawn in fluid.

For clean air: **type 1** PVC fabric for temperature $\leq 80\text{ }^{\circ}\text{C}$; **type 1** fiberglass compound fabric for temperature ranging from $> 80\text{ }^{\circ}\text{C}$ to $350\text{ }^{\circ}\text{C}$.

For dusty air: **type 2** PVC fabric for temperature $\leq 80\text{ }^{\circ}\text{C}$ with anti-wear strip; **type 2** fiberglass compound fabric for temperature ranging from $> 80\text{ }^{\circ}\text{C}$ to $350\text{ }^{\circ}\text{C}$ with anti-wear strip.



⚠ DANGER

USUALLY THE FAN IS SUPPLIED FOR INSTALLATION TYPE D (THEREFORE, WITHOUT GUARDS). THE CUSTOMER SHALL COMPULSORILY PERFORM A RISK ANALYSIS TO ASSESS WHICH ARE THE GUARDS TO BE INSTALLED PURSUANT TO EN ISO 12499:2009, ACCORDING TO THE TYPE OF INSTALLATION.

5.3.1- Positioning (FIG. 14 and FIG. 15)

To assure a correct inlet of the fluid in the suction equipment provide for the following:

- For fans with suction connected to piping, make sure that there is a straight pipe segment equal to 2,5 times the impeller diameter (d).
- For fans with free suction, make sure that there is a fully free area with access not allowed to people equal to 1,5 times the impeller diameter (d).

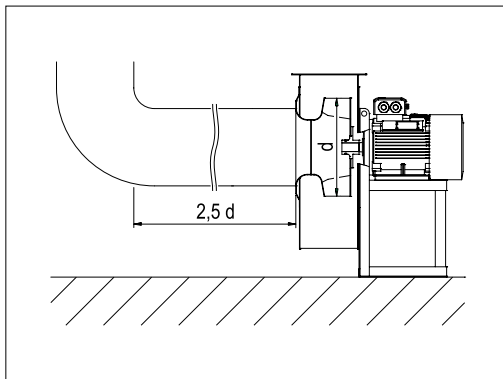


FIG. 14 (Piping connection)

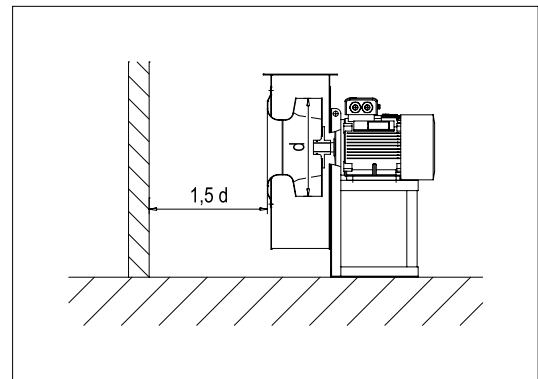


FIG. 15 (Free suction)

5.4- Assembling the direct drive fan

5.4.1- Assembling the electric motor on the base (FIG. 16)



⚠ CAUTION

THE ELECTRIC MOTOR MUST COMPULSORILY HAVE THE SAME TECHNICAL CONSTRUCTIVE AND PERFORMANCE FEATURES STATED ON THE ORDER. THE MANUFACTURER CANNOT BE MADE LIABLE FOR DAMAGES TO PEOPLE, ANIMALS AND THINGS RESULTING FROM THE INOBSERVANCE OF THE OBLIGATION MENTIONED ABOVE.

- 1) Place the electric motor (FIG. 16 - Ref. 1) on the base bedplate (FIG. 16 - Ref. 2) inserting the electric motor shaft (FIG. 16 - Ref. 3) in the base hole;
- 2) Verify that the hole and the electric motor shaft are coaxial and make sure that the height of the electric motor shaft leaning on the base matches the height of the case hole from the base bedplate (FIG. 16 - Ref. h);
- 3) Fasten the electric motor to the base screwing the proper screws.

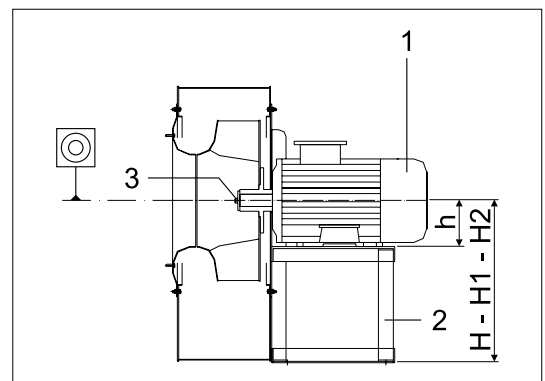


FIG. 16 (Assembling the motor on the base)



5.4.2- Assembling and disassembling the “simple suction” and “axial” impeller (FIG. 17÷FIG. 20)



⚠ WARNING

THE PPE FORECAST BY THE MANUFACTURER SHALL COMPULSORILY BE USED (S. PAR. 6.4).

To perform the assembly proceed as follows:

- 1) Insert the impeller (**FIG. 21 - Ref. 1**) on the electric motor shaft (**FIG. 21 - Ref. 2**). For impellers of a given weight, we suggest to screw to the electric motor shaft a support pole with a diameter lower than that of the electric motor shaft, insert the impeller, push it manually up to the shaft and then unscrew the pole. It is recommended to support the impeller by hanging it to a hoist, using ropes or chains suitable for the weight, until its complete insertion;
- 2) Insert the screw with a protection washer and screw the nut on the screw in order to push the impeller against the shoulder and fasten it (**s. FIG. 17**).

N.B. For the axial fans, verify the correct direction positioning of the impeller (see assembling instructions FIG. 19 and FIG. 20).

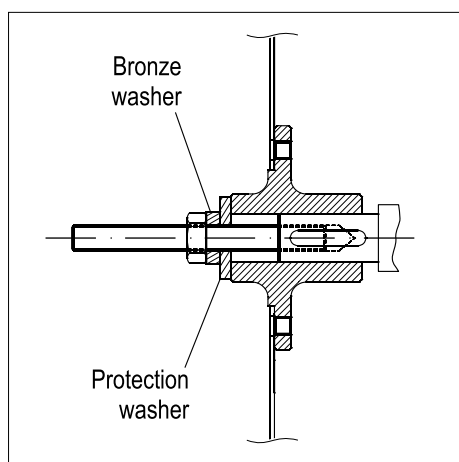


FIG. 17 (Assembling)

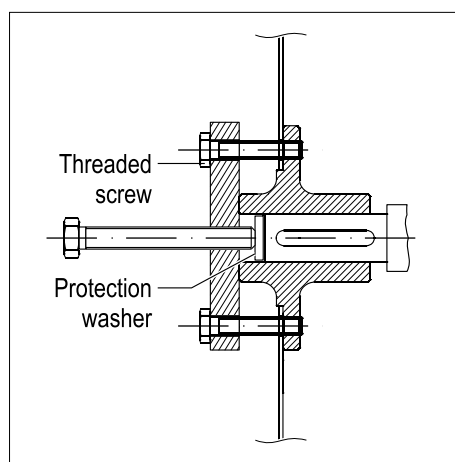


FIG. 18 (Disassembling)

To perform the disassembling proceed as follows (**s. FIG. 18**):

- 1) Remove the screw and the washer that blocks the shaft;
- 2) On the end of the shaft, interpose a protection washer made of sheet metal; then, using the extractor, remove the impeller from the shaft. For impellers of a given weight, it is recommended to support them by hanging it them to a hoist, using ropes or chains suitable for the weight, until its complete extraction.

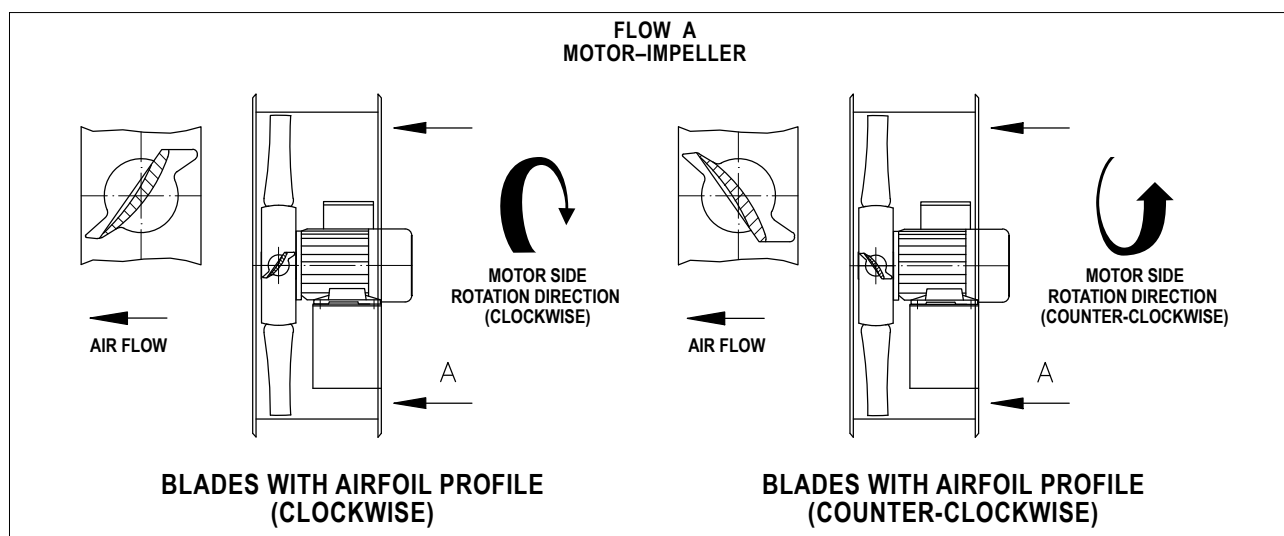


FIG. 19 (Flow "A")

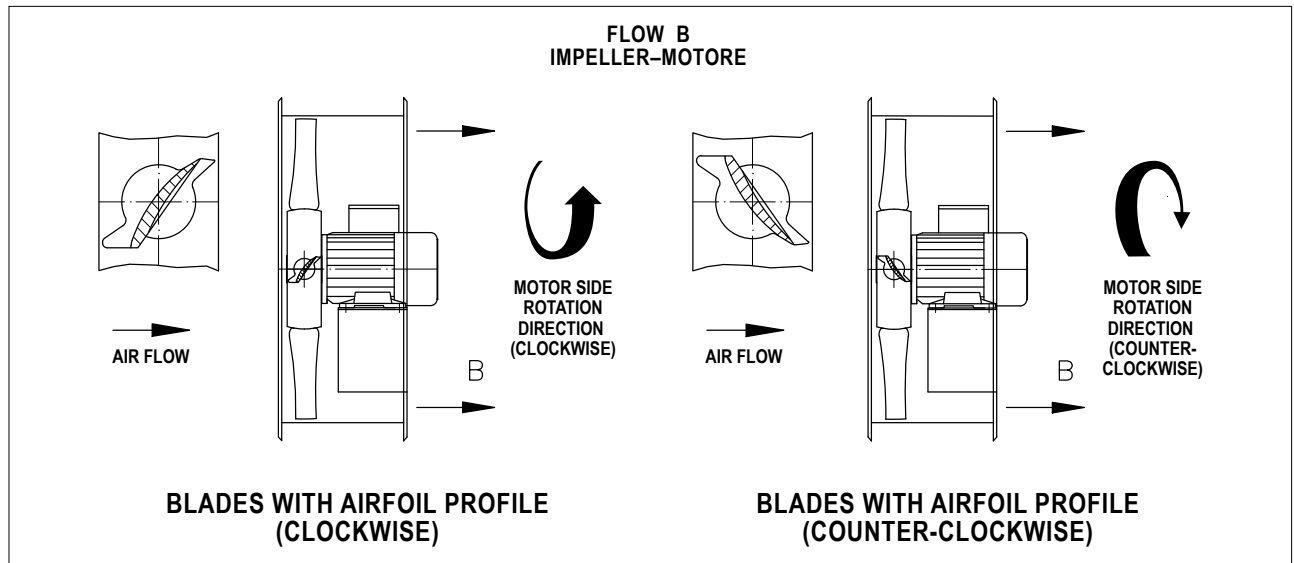


FIG. 20 (Flow "B")

Up to D=900mm Impellers, the airfoil profile (see Par. 3.3.2 Fig. 3b) is always clockwise. For Impellers with D=1000mm or more it may be counter-clockwise too. Please see figure No. 19 and 20 to assemble correctly.

5.4.3- Assembling the base case (FIG. 21)

In large size fans, the base is directly welded to the case; while in the medium / small ones, the case (FIG. 21 - Ref. 3) has to be fastened to the base (FIG. 21 - Ref. 4) by means of bolts. It is compulsorily to fasten the case to the base according to the orientation required upon order (FIG. 13).

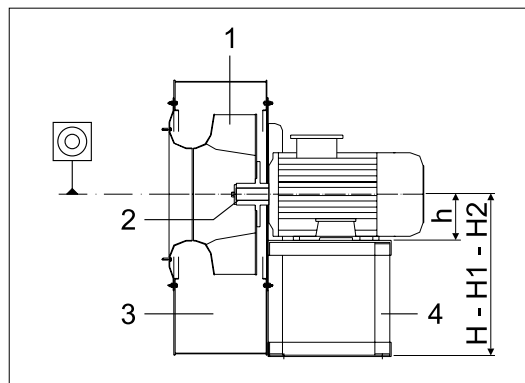
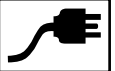


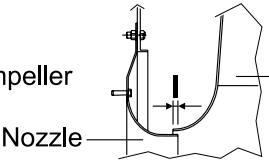
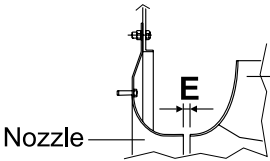
FIG. 21 (Assembling the base case)

5.4.4- Assembling the nozzle (TAB. 9)

If the nozzle is not welded to the case or is not a single cast with the case, perform the assembly as follows:

- 1) Lean the nozzle on the case on the opposite side of the electric motor, moving the tightest inlet close to the impeller;
- 2) Let the fastening holes match;
- 3) Make sure that there is the right distance or partial insertion (according to the fan model) between nozzle and impeller (s. TAB. 9);
- 4) Manually verify the centering / coaxiality between the impeller and the nozzle. If they are not centered go back to par. 5.4.1 to repeat the correct assembly of the fan;
- 5) Screw the suitable nuts.



<div></div>				
IMPELLER TYPE	IMPELLER Ø (mm)	MEASURE “I” (mm)	IMPELLER Ø (mm)	MEASURE “E” (mm)
APE - APF - APG - APRF - APRG - APRH MPR	Up to 500 562 to 900 1000 to 1400 1400 to 2000	3/5 5/7 6/12 12/15	/	/
APRI - APRL - TR - EU - EUM	/	/	Up to 500 560 to 900 1000 to 1400 1400 to 2000	3/5 5/8 8/14 15/18
EUK	Up to 2000	0/10	/	/
BP	Up to 1000	0/5	/	3/6
BPR	Up to 2000	1/4	/	/
TF - TG - TQ - TH - TPA - TPAL - TTR	Fans with open blades: impeller hub flush with base plate			
Measures subject to verification and changes, from case to case according to the type of fan.				

TAB. 9 (Distances between nozzle and impeller)



5.5- Assembling the double stage fan (Execution 4)

While assembling the double stage fan, it is necessary to verify also that the two impellers are coaxial.
For further information, contact the technical department.



5.6- Assembling the indirect drive fan ()

The type of support used for the indirect drive is identified by the following codes:

PIPE SUPPORT	FEATURES	EXAMPLE GIVEN
A	Normal support	50 A 48
B	Support with cooling fan	50 B 48
AL	Normal support with long shaft	50 AL 48
AR	Normal support and roller bearing (pulley side)	50 AR 48
BR	Support with cooling fan and roller bearing (pulley side)	50 BR 48
ALR	Normal support with long shaft and roller bearing (pulley side)	50 ALR 48
DETACHED SUPPORT	FEATURES	EXAMPLE GIVEN
SN	Normal support	SN 518
SN B	Support with cooling fan	SN 518 B

TAB. 9 (Supports)

5.6.1- Assembling the indirect drive fan with pipe support (35A/B 28 - 40A/B 38...) (FIG. 22 and)

If the fan is supplied disassembled, perform the same assembly of the direct drive fans, only, instead of the electric motor there is the support.
If the fan is supplied assembled with support, perform drive assembly pursuant to **par. 5.6.3**.

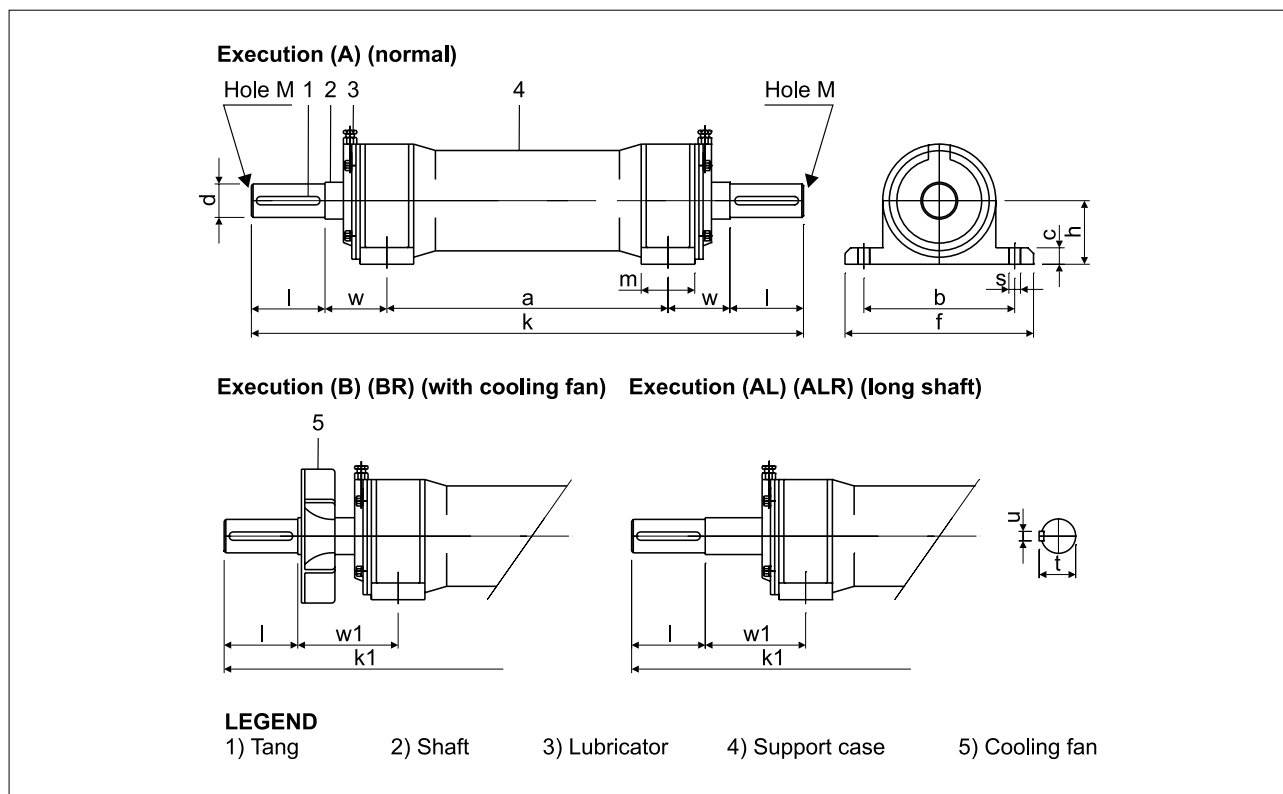
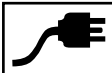


FIG. 22 (Assembling indirect drive fan with pipe support)

SUPPORT TYPE		DIMENSIONS (mm)																BEARINGS		WEIGHT			
		Housing											Shaft projection					Impeller side	Pulley	kg			
		a	b	c	f	h	m	s	w	w1	k	k1	d	toll.	l	u	t				M		
20	A	125	85	8	110	40	30	8X12	30	/	245	/	14	J6	30	5	16	5	6304 Z	6304 Z	4		
20	A	140	90	15	125	40	35	15	40-50	/	310	/	19	K6	40	6	22	8	6304 Z	6304 Z	4,5		
	AL - B									40-100	/	360											
25	A	200	120	18	160	50	36	18	40-60	/	400	/	24		50	8	31		8	6305 Z	6305 Z	7	
	AL - B									40-100	/	450											
35	A	305	160	20	200	70	55	15	75	/	574	/	28	J6	60		8	31		8	6307 Z	6307 Z	21
	AL - B								/	115	/	614											
40	A	305	160	20	200	70	55	15	75	/	614	/	38	K6	80	10		41	10		6308 Z	6308 Z	23
	AL - B								/	115	/	654											
45	A	375	180	22	230	80	65	18	79	/	752	/	42		K6	12	45	12		6309 Z	6309 Z	32	
	AL - B								/	119	/	792											
50	A	375	180	22	230	80	65	18	79	/	752	/	48	K6		14	51,5		12	6310 Z	6310 Z	35	
	AL - B								/	119	/	792											
50	AR	375	180	22	230	80	65	18	79	/	752	/	48		K6	14	51,5	12		6310 Z	NU 310 ECP	35	
	ALR - BR								/	119	/	792											
55	A	420	200	25	260	95	80	20	91	/	822	/	48	110		14	51,5		12	6311 Z	6311 Z	50	
	AL - B								/	151	/	882											
55	AR	420	200	25	260	95	80	20	91	/	822	/	48		110	14	51,5	12		6311 Z	NU 311 ECP	50	
	ALR - BR								/	151	/	882											
60	A	420	200	25	260	95	80	20	91	/	822	/	55	M6		16	59		14	6312 Z	6312 Z	52	
	AL - B								/	151	/	882											
60	AR	420	200	25	260	95	80	20	91	/	822	/	55		M6	16	59	14		6312 Z	NU 312 ECP	52	
	ALR - BR								/	151	/	882											

TAB. 10 (Technical data of pipe supports)



5.6.2- Assembling indirect drive fan with detached supports (SNL 515 - 516 ...) (FIG. 23/ and FIG. 24/)

The general, not detailed, assembling sequence for the support is outlined here below.

The qualified operator is responsible for the good operation and safety of the fan.

- 1) Fasten the lower part of the supports to the upper base side;
- 2) Insert the bearings in the shaft;
- 3) Lean the shaft with the bearings in the suitable seats of the supports;
- 4) Assemble the gaskets;
- 5) Close the fixing collars to block the bearings;
- 6) Close the supports by screwing the upper part (shells);
- 7) Assemble the fan as if the support were the electric motor in the direct drive solution i.e. according to the centering and coaxiality features given in **par. 5.4.1**. For large size fans, before assembling the impeller, make sure to have weight on the opposite side of the support so as to balance the weight of the impeller and avoid bumps and/or damages to the support shaft;
- 8) Remove the two upper shells of the supports and fasten the bearings to the electric motor shaft pulling the ring nut. To verify the correct assembly, with suitable thickness meters (e.g. SKF) (**FIG. 23**), check that the residual clearance complies with the tolerance as per ;
- 9) Grease the bearings as described under **par. 8.1.2**;
- 10) Close the supports screwing the upper shells;
- 11) Double check the centering by rotating the impeller manually in order to verify that it can rotate smoothly without rubbing the case walls or the nozzle.

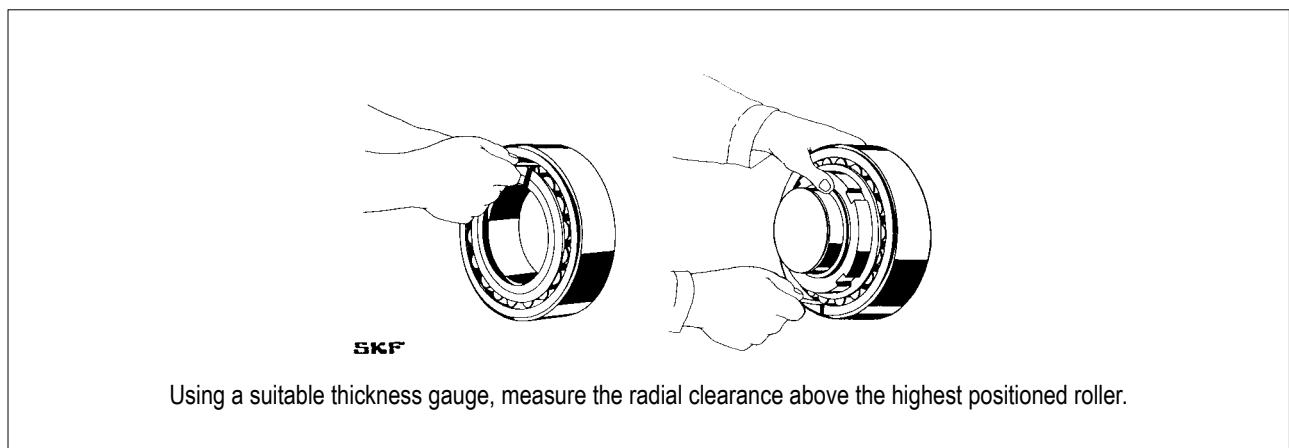


FIG. 23 (Verification of the correct assembly)

BEARING	RADIAL CLEARANCE REDUCTION (mm)	MINIMUM RESIDUAL CLEARANCE AFTER ASSEMBLY (mm)
22209 EK	0,025 to 0,030	0,020
22210 EK	0,025 to 0,030	0,020
22211 EK	0,030 to 0,040	0,025
22212 EK	0,030 to 0,040	0,025
22213 EK	0,030 to 0,040	0,025
22215 EK	0,040 to 0,050	0,025
22216 EK	0,040 to 0,050	0,025
22217 EK	0,045 to 0,060	0,035
22218 EK	0,045 to 0,060	0,035
22220 EK	0,045 to 0,060	0,035
22222 EK	0,050 to 0,070	0,050
22224 EK	0,050 to 0,070	0,050

TAB. 11 (Residual clearance)

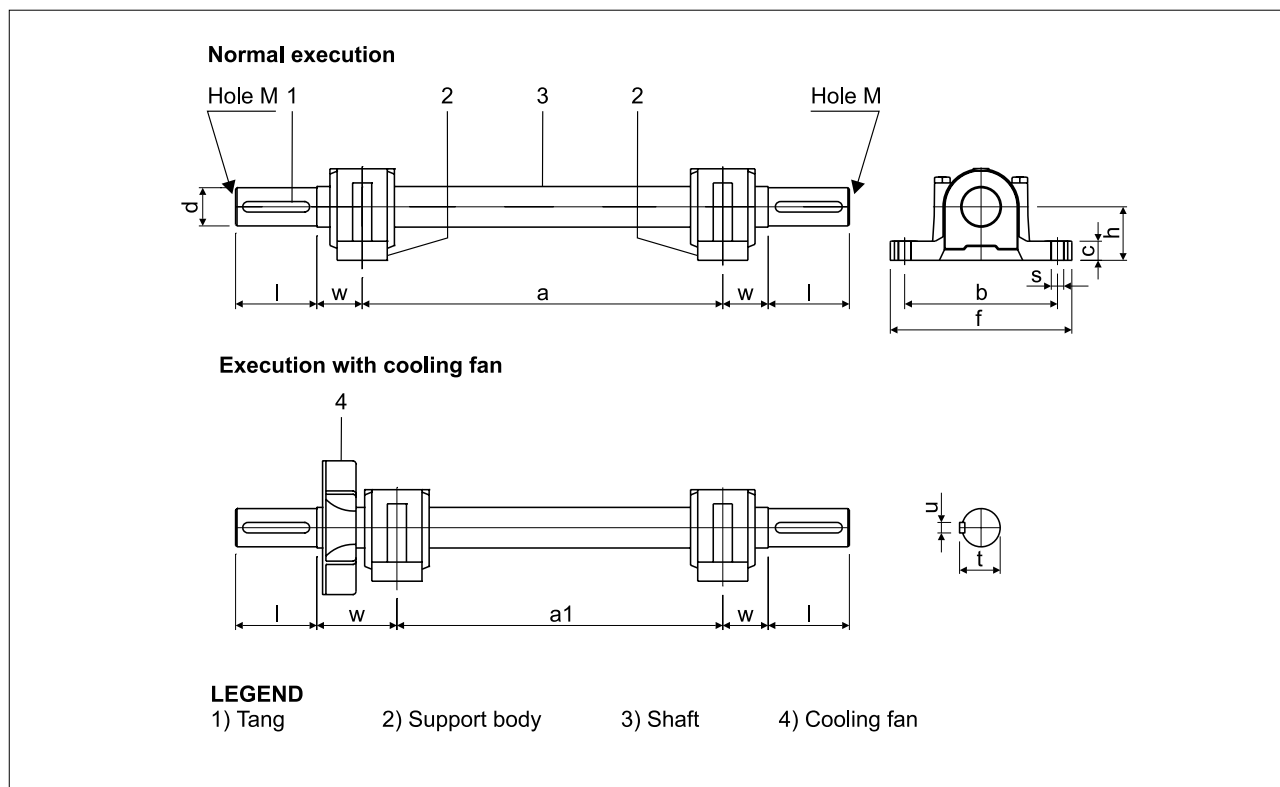
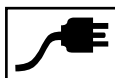


FIG. 24 (Assembling indirect drive fan with detached supports)

SUPPORT TYPE		DIMENSIONS (mm)																	BEARINGS		WEIGHT	
		Housing											Shaft projection						Impeller side	Pulley side	kg	
		a	a1	b	c	f	h	m	s	w	w1	k	d	toll.	l	u	t	M				
SNL	513	535	/	230	30	275	80	80	18	70	/	895	55	m6	110	16	59	14	22213 EK	22213 EK	35	
	513 B		475							130												
	515	560	/	260	32	280	95	90	22		/	990	60		140	18	64	16	22215 EK	22215 EK	42	
	515 B		500							135			65				69					
	516	650	/	290	35	315	100	100	26		/	1080	70		20	74,5	18		22216 EK	22216 EK	52	
	516 B		500							135								62				
	517	725	/	320	40	320	112	110	26		/	1180	75		170	22	79,5	85	22217 EK	22217 EK	62	
	517 B		590							135												
	518	755	/	320	40	345	100	100	26	87,5	/	1285	80		170	22	85	20		22218 EK	22218 EK	76
	518 B		650							162,5												
	520	905*	/	350	45	380	125	120	26	95	/	1450*	90		170*	25	95	20		22220 EK	22220 EK	108
	520 B		680							170												
	522*	855*	/	350	45	410	140	120	26	102,5	/	1435*	100		190*	28	106			22222 EK	22222 EK	150
	522 B*		830*							177,5												
	524*	855*	/	350	45	410	140	120	26	100	/	1435*	100		190*	28	106			22224 EK	22224 EK	170
	524 B*		755*							200												
N.B. For fans series BPRc, measures are subject to changes due to transport needs.																						

N.B. For fans series BPRc, measures are subject to changes due to transport needs.

TAB. 12 (Technical data of detached supports)



5.6.3- Assembling the electric motor (Execution 12 - 9 Arrangement 18 - 19) (FIG. 25)



⚠ CAUTION

THE ELECTRIC MOTOR MUST COMPULSORILY HAVE THE SAME TECHNICAL CONSTRUCTIVE AND PERFORMANCE FEATURES STATED ON THE ORDER. THE MANUFACTURER CANNOT BE MADE LIABLE FOR DAMAGES TO PEOPLE, ANIMALS AND THINGS RESULTING FROM THE INOBSERVANCE OF THE OBLIGATION MENTIONED ABOVE.

The electric motor mounted on the bedplate (Execution 12 - Arrangement 18) or in the turning base (Execution 9 - Arrangement 19) are almost always supplied by the manufacturer. In case of axial fans, the turning base is supplied together with the fan.

- **In case of Execution 12 - Arrangement 18:** The bedplate is supplied with or without belt tensioning slides. In all cases, the electric motor has to be positioned on such slides and screwed with bolts, assuring its best stability. Each slide is equipped with suitable tie rods (threaded rods), which screwed to the ends and leaning on the electric motor feet will allow tensioning the related belts.
- **In case of Execution 9 - Arrangement 19:** The turning base is always supplied with suitable fastening joints and related tie rods (threaded rods). In case of axial fans, after having screwed the electric motor on the turning base, the tensioning will be easy and intuitive. In case of centrifugal fans, the turning base is welded on the base side through proper joints that acting as pivot allow the oscillation to the turning bases with related belt tensioning (in this case, it is advisable to refer to the technical department for further details).

Always make sure that the electric motor is perfectly aligned and perpendicular to the belts.

After having screwed the electric motor, the correct assembly of the pulleys has to be performed (see assembling instructions FIG. 25).

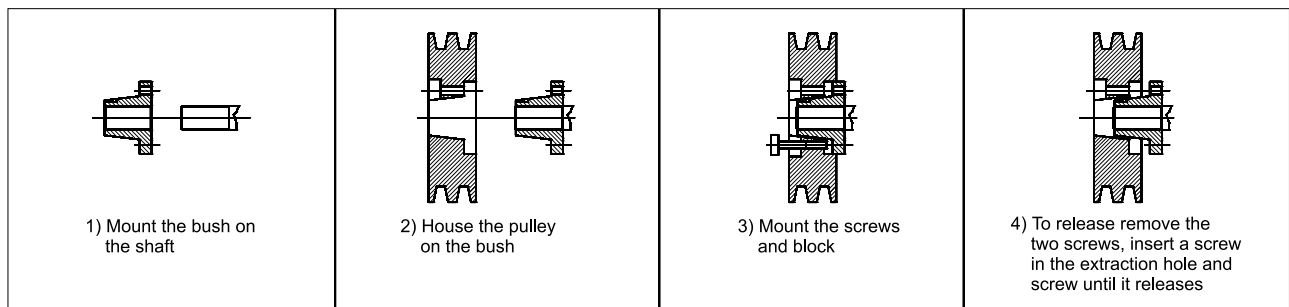


FIG. 25 (Assembling the pulleys)



⚠ CAUTION

BEFORE DEFINITELY BLOCKING THE PULLEYS, CHECK THE PARALLELISM BETWEEN TWO SHAFTS WITH A LINER OR ROD PLACED ALONG THE SIDE OF THE PULLEYS.

FOR USEFUL HINTS CONCERNING THE ASSEMBLY OF THE PULLEYS, REFER TO THE TECHNICAL DEPARTMENT OF THE MANUFACTURER.

5.6.4- Assembling the belts (FIG. 26 and TAB. 14)

Insert the belts in the suitable pulleys and check the belt tensioning as follows (FIG. 26):

- 1) Measure the "T" segment;
- 2) For each belt, using a dynamometer, apply at half "T" a perpendicular force "F" able to result in an arrow "F" of 1,5 mm for each 100 mm of "T";
- 3) Compare the value "F" supplied by the dynamometer with the values of "F¹" and "F²" of TAB. 14.
 - If F is lower than F¹ it is necessary stretch the belt.
 - If F is greater than F² the belt is too stretched.

N.B. In the transmission running-in period, a fast decrease of tensioning occurs. Therefore, it is necessary to check the tensioning at least after 8/16 hours of operation.

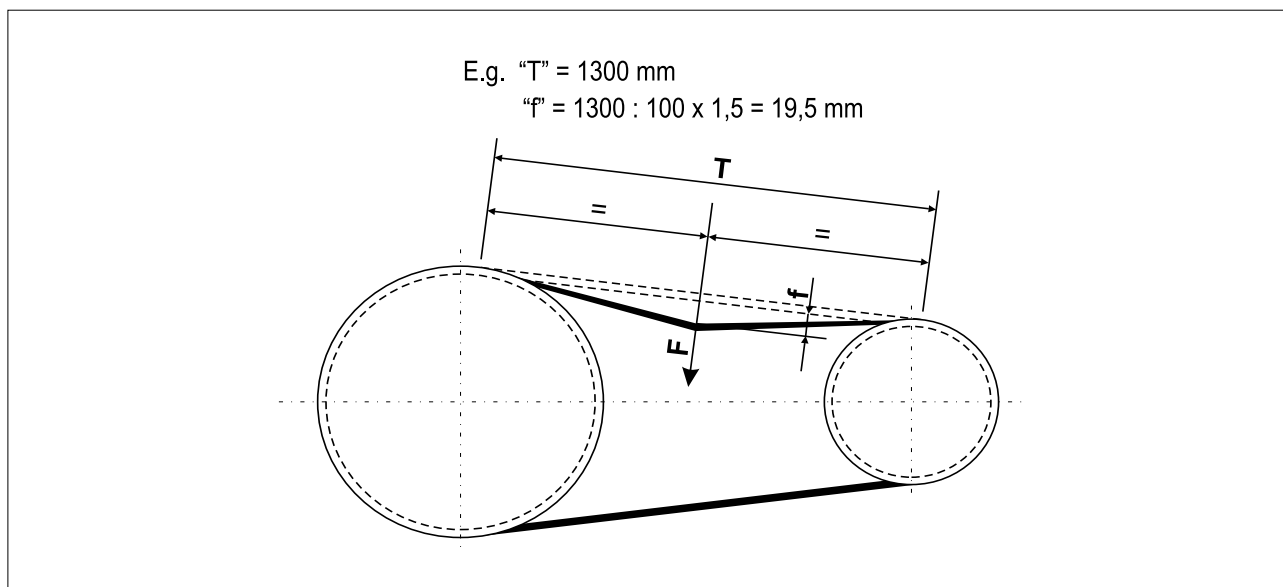
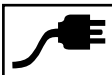


FIG. 26 (Belt tensioning)

⚠ CAUTION

MAKE SURE THAT THE BELTS ARE ALIGNED AND PERFECTLY PERPENDICULAR TO THE ELECTRIC MOTOR SHAFT AND TO THE SUPPORT.

FOR USEFUL HINTS CONCERNING THE ASSEMBLY OF THE BELTS, REFER TO THE TECHNICAL DEPARTMENT OF THE MANUFACTURER.

BELT SECTION	SMALLER PULLEY EXTERNAL DIAMETER (mm)	SMALLER PULLEY rpm	MINIMUM F ¹ NEWTON	MAXIMUM F ² NEWTON
SPZ	50 ÷ 90	1200 ÷ 5000	10	15
	100 ÷ 150	900 ÷ 1800	20	30
	155 ÷ 180	600 ÷ 1200	25	35
SPA	90 ÷ 145	900 ÷ 1800	25	35
	150 ÷ 195	600 ÷ 1200	30	45
	200 ÷ 250	400 ÷ 900	35	50
SPB	170 ÷ 235	900 ÷ 1800	35	45
	250 ÷ 320	600 ÷ 1500	40	60
	330 ÷ 400	400 ÷ 900	45	65
SPC	250 ÷ 320	900 ÷ 1800	70	100
	330 ÷ 400	600 ÷ 1200	80	115
	440 ÷ 520	400 ÷ 900	90	130

TAB. 13 (Belt tensioning)



5.6.5- Assembling the coupling joint

In centrifugal fans N8, it is necessary to mount the semi-elastic coupling joint connecting the electric motor shaft with the impeller support.

The joint consists of a female part and a male part. The female part of the joint is installed with a plug to the support, while the male part is installed on the electric motor shaft.

5.6.5.1- Alignment and centering of the coupling joint (FIG. 27, FIG. 28 and TAB. 15)

Make sure that the alignment of the coupling joint is correct, both in terms of parallelism and of centering; proceed as follows:

RADIAL CENTERING (FIG. 27)

- 1) Measure Cr ;
- 2) Add shim plates under the electric motor feet and bring this measure back into the range given in **TAB. 15**.

ANGULAR CENTERING (FIG. 28)

- 1) Measure a and b in at least 4 points and determine the maximum $b-a$ change;
- 2) Bring it back into the range given in **TAB. 15**.

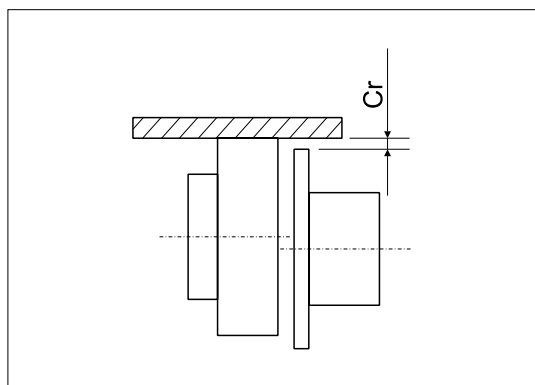


FIG. 27 (Alignment and centering of the coupling joint)

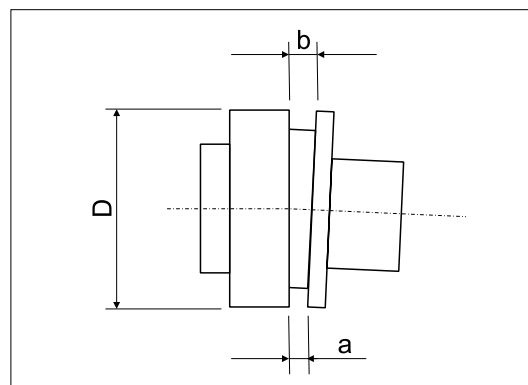
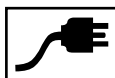


FIG. 28 (Alignment and centering of the coupling joint)

D (mm)	80	100	125	140	160	180	200	225	250	315	350	400
Cr (mm)	0,4	0,4	0,4	0,5	0,6	0,6	0,7	0,8	0,8	1	1	1,2
b-a (mm)	0,7	0,8	0,9	1	1,2	1,4	1,4	1,6	1,8	2,2	2,4	2,8

TAB. 14 (Alignment and centering of the coupling joint)



5.6.6- Assembling the protection case



⚠ DANGER

ON THE DRIVE ASSEMBLY IT IS COMPULSORY TO INSTALL PROTECTION CASES AND/OR PROTECTION NETS COMPLYING WITH THE PROVISIONS OF THE STANDARD EN ISO 12499-2009 TO PREVENT ACCIDENTAL CONTACT WITH THE MOVING PARTS.

USUALLY THE FAN IS SUPPLIED FOR INSTALLATION TYPE D (THEREFORE, WITHOUT GUARDS). THE CUSTOMER SHALL COMPULSORILY PERFORM A RISK ANALYSIS TO ASSESS, ACCORDING TO THE TYPE OF INSTALLATION (S. PAR. 5.3), WHICH ARE THE GUARDS TO BE INSTALLED PURSUANT TO EN ISO 12499:2009.



⚠ CAUTION

THE MANUFACTURER CANNOT BE MADE LIABLE FOR DAMAGES TO PEOPLE, ANIMALS AND THINGS RESULTING FROM THE INOBSERVANCE OF THE OBLIGATION MENTIONED ABOVE.

According to the fan model and drive type, the protection case is fastened to the fixed part (e.g. base, bedplate) through L-brackets and positioned in such a way that it does not touch any mechanic moving parts. The (disassembled) protection cases may be requested also to the manufacturer, informing the same of the pulley center-to-center distance.

5.6.7- Assembling double suction fans (Execution 6 - 18 - 19)

Most double suction fans are supplied assembled.

If they are supplied disassembled, for their correct assembly, refer to the technical department of the manufacturer.



5.7- Anchoring of the fan (foundations)

Fan anchoring does not require any special foundations, just prepare a suitable and well leveled surface to withstand the fan loads (static and dynamic, see site). The supporting base must be flat and horizontal to prevent the twisting and misalignment of the supports (if necessary, place metal shims to assure perfect grip to the floor).

Use the specially prepared fastening points (holes) on the top surface (see catalog drawings with overall dimensions), making sure that the tightening of the bolts does not deform the fan structure. It is always advisable to avoid additional causes of vibration using shock isolating mountings and anti-vibration expansion joints supplied as per Euroventilatori catalog. If the fan is to be installed on overhead structures, the customer is responsible for analyzing and verifying the structure itself and any static and dynamic loads of the fans.



⚠ WARNING

ACCORDING TO THE TYPE OF FAN TO BE INSTALLED AND THE TYPE OF LEANING SURFACE, IT IS COMPULSORY TO ASK THE MANUFACTURER FOR THE INSTRUCTIONS CONCERNING A CORRECT ANCHORING.



5.8- Electric connection to the electric motor terminal board (FIG. 29 and FIG. 30)

ELECTRIC MOTOR VOLTAGE 230/400 V

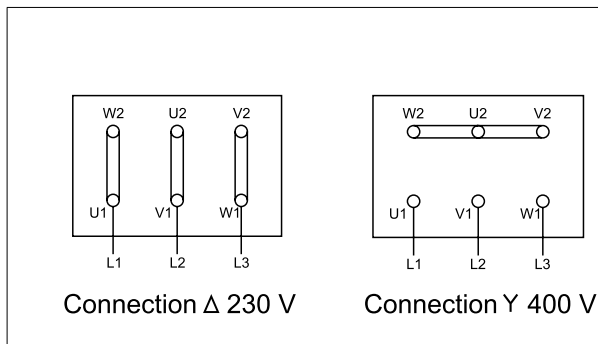


FIG. 29 (230/400 V electric motor)

ELECTRIC MOTOR VOLTAGE 400/690 V

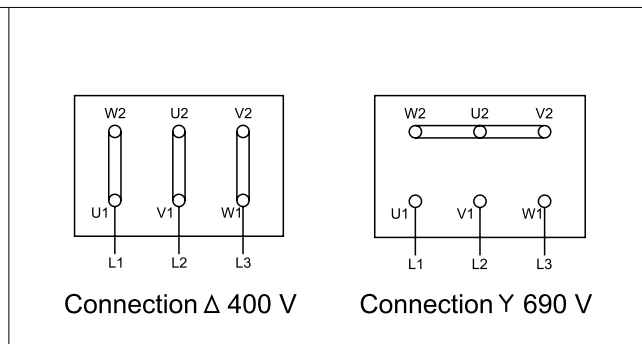


FIG. 30 (400/690 V electric motor)



⚠ CAUTION

THE WRONG CONNECTION MAY RESULT IN THE DEFINITIVE DAMAGING OF THE ELECTRIC MOTOR.

5.8.1- Electric equipment (FIG. 31)

The electric equipment shall include: fuses with overload and voltage drop protections selected according to the actual start time and full load current.

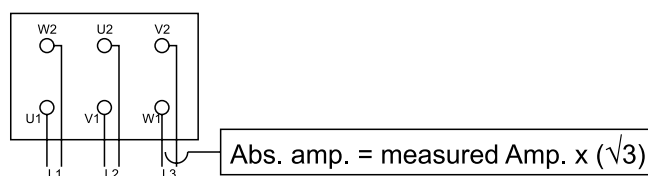
⚠ DANGER

THE ELECTRIC CONNECTION OF THE FAN AND GROUNDING CONNECTION TO THE MAINS SHALL BE COMPULSORILY CARRIED OUT BY A QUALIFIED ELECTRICIAN MEETING THE TECHNICAL AND PROFESSIONAL REQUIREMENTS SET FORTH BY THE REGULATIONS IN FORCE.

IT IS COMPULSORY TO INSTALL UPSTREAM OF THE POWER SUPPLY LINE A SUITABLE CIRCUIT BREAKER WITH 30 mA DIFFERENTIAL PROTECTION COORDINATE WITH THE GROUNDING SYSTEM.

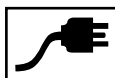
THE CUSTOMER IS RESPONSIBLE FOR THE ELECTRIC CONNECTION TO THE CONTROL AND COMMAND PANEL. THE MANUFACTURER CANNOT BE MADE LIABLE FOR DAMAGES TO PEOPLE, ANIMALS AND THINGS.

THE MAIN POWER SUPPLY SWITCH SHALL COMPLY WITH THE DIRECTIVES 2014/35/EU (LOW VOLTAGE) AND 2014/30/EU (ELECTROMAGNETIC COMPATIBILITY) AND WITH THE STANDARD EN 60204-1:2016.



To the commutator Y Δ

FIG. 31 (Electric equipment)



5.9- Connection to the suction system



DANGER

FOR FANS COMPLYING WITH THE ATEX DIRECTIVE 2014/34/EU, INSTALLATION SHALL COMPULSORILY BE CARRIED OUT BY A QUALIFIED TECHNICIAN IN COMPLIANCE WITH THE PROVISIONS OF THE LAWS IN FORCE ON THE MATTER.

THE CUSTOMER IS RESPONSIBLE FOR THE CONNECTION OF THE FAN TO THE EXISTING SUCTION SYSTEM. THE MANUFACTURER CANNOT BE MADE LIABLE FOR DAMAGES TO PEOPLE, ANIMALS AND THINGS.



DANGER

IT IS ABSOLUTELY FORBIDDEN TO USE AIR PIPES (EXTENSIONS) AND FITTINGS NOT SUITABLE AND NOT COMPLYING WITH THE REGULATIONS IN FORCE.

IT IS STRICTLY FORBIDDEN TO COMMISSION THE FAN BEFORE HAVING CONNECTED THE SAME PROPERLY TO THE EXISTING SUCTION SYSTEM.

IT IS FORBIDDEN TO COMMISSION THE FAN BEFORE THE SUCTION SYSTEM, IN WHICH IT WILL BE INCORPORATED, IS DECLARED TO BE COMPLYING WITH THE PROVISIONS OF THE APPLIED DIRECTIVE.



6- SAFETY

6.1- Guards and protection devices ()

With reference to and to comply with the standards and regulations in force, the adopted guards and protection devices are listed here below:

REF.	DEVICE	DESCRIPTION
1	DRIVE PROTECTION CASE (IF PRESENT)	This is a shaped sheet metal protection positioned over the drive area. It is used to prevent access to the dangerous zone.
2	COOLING FAN PROTECTION CASE (IF PRESENT)	This is a shaped sheet metal protection positioned over the cooling fan. It is used to prevent access to the dangerous zone.
3	SUPPORT PROTECTION CASE	This is a shaped sheet metal protection positioned over the electric motor shaft. It is used to prevent access to the dangerous zone.
4	AIR SUCTION INLET PROTECTION NETS (UPON REQUEST)	This is a net positioned externally to the air suction inlets. It is used to prevent access of foreign bodies into the fan.
5	VIBRATION SENSORS (UPON REQUEST)	These are sensors positioned in the support, detecting strong vibrations and sending an impulse to any available warning device. Installed on fans positioned in environments with great pressure changes, it is used to safeguard the fan and prevent its possible failure.
6	INTERLOCKED GUARD (IF PRESENT)	Guard associated with an interlocking device and a guard locking device so that, together with the machine control system, the following functions are carried out: <ul style="list-style-type: none"> • the hazardous machine functions "covered" by the guard cannot be performed until the guard is closed and locked; • the guard remains closed and locked until the risk caused by the hazardous machine functions "covered" by the guard is over; • when the guard is closed and locked, the hazardous machine functions "covered" by the guard itself can be performed (the closing and locking of the guard do not trigger the performance of the hazardous machine functions).
7	"EMERGENCY STOP" BUTTON (IF INSTALLED)	It is a red mushroom-head with self-retention system and release by rotation, which stops the fan by disconnecting power supply.

TAB. 15 (Safety devices)



DANGER

IT IS COMPULSORY TO CHECK THE GOOD OPERATION OF ALL SAFETY DEVICES INSTALLED IN THE FAN AT ANY TIME.
IT IS COMPULSORY TO PROMPTLY REPLACE ANY MALFUNCTIONING AND/OR DAMAGED SAFETY DEVICES.



DANGER

IT IS STRICTLY FORBIDDEN TO REPLACE ANY SAFETY DEVICE OR ANY OF ITS COMPONENTS WITH NON ORIGINAL SPARE PARTS.
IT IS STRICTLY FORBIDDEN TO TAMPER, BYPASS AND/OR REMOVE ANY SAFETY DEVICE AVAILABLE IN THE FAN.



6.2- Residual risks

The authorized operators are hereby informed that the potential residual risks described here below do persist, despite all technical and constructive measures implemented by the manufacturer to make the fan safe.



DANGER

TO MINIMIZE EXPOSURE TO RESIDUAL RISK, IT IS COMPULSORY TO OBSERVE THE SAFETY SIGNS (S. PAR. 6.3) AND WEAR THE PERSONAL PROTECTIVE EQUIPMENT (S. PAR. 6.4) DESCRIBED IN THIS MANUAL.



RESIDUAL RISK NO. 1

THERE IS THE RISK OF BURNING DUE TO ACCIDENTAL CONTACT WITH THE ELECTRIC MOTOR OR WITH THE SUPPORT PROTECTION CASE, WHICH AFTER PROLONGED USE OF THE FAN MAY REACH HIGH TEMPERATURES.

IT IS COMPULSORY TO WEAR THE INDICATED PPE (S. PAR. 6.4) AND WAIT FOR THE FAN TO COOL DOWN, BEFORE PERFORMING ANY WORK ON THE SAME.



RESIDUAL RISK NO. 2

THERE IS THE RISK OF INJURY AFTER CONTACT WITH THE MOVING PARTS, ALSO WITH SWITCHED OFF FAN, IF THE AUTHORIZED OPERATOR DOES NOT COMPLY WITH THE INSTRUCTIONS CONTAINED IN THIS MANUAL AND, IN DETAIL, DURING MAINTENANCE WORKS.

IT IS COMPULSORY TO WEAR THE INDICATED PPE (S. PAR. 6.4) AND COMPLY WITH THE MAINTENANCE PROCEDURES (S. CHAP. 8) DESCRIBED IN THIS MANUAL.



RESIDUAL RISK NO. 3

THERE IS THE RISK OF STRONG VIBRATIONS DURING FAN OPERATION IF THE AUTHORIZED OPERATOR DOES NOT COMPLY WITH THE INSTRUCTIONS CONTAINED IN THIS MANUAL.

IT IS COMPULSORY TO COMPLY WITH THE ASSEMBLY AND INSTALLATION PROCEDURES DESCRIBED IN THIS MANUAL (S. CHAP. 5).



RESIDUAL RISK NO. 4

THERE IS THE RISK OF INJURIES DUE TO CRUSHING AGAINST THE SUCTION PROTECTION NET IF THE AUTHORIZED OPERATOR DOES NOT COMPLY WITH THE INSTRUCTIONS CONTAINED IN THIS MANUAL AND IS DRAGGED AGAINST THE NET BY THE SUCTION AIR.

IT IS COMPULSORY TO COMPLY WITH THE PROCEDURES DESCRIBED IN THIS MANUAL AND AVOID GETTING CLOSE TO THE FAN SUCTION AREA WHEN THE FAN IS WORKING.



RESIDUAL RISK NO. 5

OPERATORS MAY BE EXPOSED TO NOISE. FANS ARE A SOURCE OF NOISE. IN ACCORDANCE WITH THE REGULATIONS IN FORCE, THE EMPLOYER SHALL MANDATORY ASSESS THE EXPOSURE OF AUTHORIZED OPERATORS TO SOURCES OF NOISE PRESENT AT THE PLACE OF INSTALLATION OF THE FAN.

IF THE NOISE VALUE EXCEEDS 80 dB(A), IT IS COMPULSORY TO USE SUITABLE EARMUFFS (S. PAR. 6.4). WITH NOISE VALUES ≥ 100 dB(A) OPERATORS WITH EARMUFFS CAN GET CLOSER TO THE FAN ONLY WHEN IT IS OFF.



6.3- Safety and indication signs (FIG. 32 and FIG. 33 and TAB. 17 and)

The used safety and descriptive signs consist of adhesive labels (s. FIG. 32 and FIG. 33) applied externally on the fan. The meaning of each signal is shown in TAB. 17 and .

The signs comply with ISO 3864-2: 2016, UNI EN ISO 7010:2017.



WARNING

IT IS COMPULSORY TO KEEP THE SAFETY SIGNS CLEAN IN ORDER TO ASSURE A CLEAR VISIBILITY OF THE SAME.

IT IS MANDATORY TO REPLACE THE DETERIORATED SAFETY SIGNS REQUESTING THEM FROM THE MANUFACTURER (THE SPARE PART CODE IS GIVEN ON THE LABEL - E.G. COD.001.70X105.0414).



WARNING

IT IS STRICTLY FORBIDDEN TO REMOVE AND/OR DAMAGE THE SAFETY SIGNS APPLIED BY THE MANUFACTURER.



FIG. 32 (Labels safety signs)



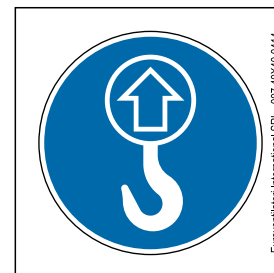
EUV euroventilatori

Euroventilatori International Srl
via Risorgimento 90 - S. Pietro Mussolino
36070 Vicenza - Italy / +39 0444 472472
www.euroventilatori.com

AVVERTENZA / WARNING / AVVERTISSEMENT / ADVERTENCIA

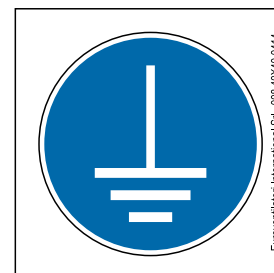
	IT	Aprire solamente con ventilatore fermo (OFF)	
	DE	Nur bei stillstand öffnen (OFF)	
	EN	Open only at stop (OFF)	
	FR	Ouvrir seulement apres arret (OFF)	
	ES	Abierto solo con ventilador detenido (OFF)	

Euroventilatori International Srl - 002-40X0,0414



EUV euroventilatori

Euroventilatori International Srl
via Risorgimento 90 - S. Pietro Mussolino
36070 Vicenza - Italy / +39 0444 472472
www.euroventilatori.com



**ATTENZIONE / VORSICHT
CAUTION / ATTENTION / ATENCIÓN**

	IT	Ventilatore con ventolina spandicalore per il trasporto di fluidi con elevate temperature
	DE	Ventilatoren Hitzeverteiler für den Transport von Fluids mit hohen Temperaturen
	EN	Fan equipped with cooling fan for fluid transport at high temperatures
	FR	Ventilateur avec turbine de refroidissement pour le transport de fluides à températures élevées
	ES	Ventilador con turbina de refrigeración para el transporte de fluidos con temperaturas elevadas

Euroventilatori International Srl - 005-39X0,0414



EUV euroventilatori

Euroventilatori International Srl
via Risorgimento 90 - S. Pietro Mussolino
36070 Vicenza - Italy / +39 0444 472472
www.euroventilatori.com

**ATTENZIONE / VORSICHT
CAUTION / ATTENTION / ATENCIÓN**

Flusso aria Air flow	Rotazione ORARIA Vista da lato trasmissione Rotation CLOCKWISE To see on the transmission side

Euroventilatori International Srl - 006-76X0,0414



FIG. 33 (Labels safety signs)



Sign	Meaning	Sign	Meaning
	ELECTRIC CURRENT HAZARD (When the fan is connected to the mains, current leakages and accidental direct contacts with the electric components may occur).		DO NOT GET ON THE FAN (It is prohibited to get on the fan or any of its parts for any reason whatsoever).
	DANGER: AUTOMATIC START (According to the type of electrical connection and control logic, the fan may start automatically unexpectedly).		DO NOT REMOVE THE GUARDS WHEN THE FAN IS WORKING (ON) (It is forbidden to remove, tamper or bypass the protections and devices installed on the fan when this latter is ON).
	DANGER: HOT SURFACE (During operation and just after the switching off, accidental contacts may occur close to the case and the support resulting in scalds and/or burns).		OBLIGATION: READ THE MANUAL (It is compulsory to thoroughly read and understand this manual in all its parts).
	DANGER: IMPELLER MOVING ALSO WITH DISCONNECTED POWER SUPPLY (When the fan is off, the air entering through the inlets and passing through the fan may cause the impeller to rotate).		OBLIGATION: BEFORE PERFORMING ANY INTERVENTION, DISCONNECT POWER SUPPLY (Before performing any work on the fan, it is compulsory to disconnect the power supply and make sure the fan is in "machine off" conditions (s. par. 2.2.1).
	FINGER CRUSHING AND/OR CUTTING DANGER (During routine maintenance close to the impeller and drive equipment, accidental contacts may occur resulting in finger crushing and/or cutting).		OBLIGATION: CHECK THE EFFICIENCY OF GUARDS (It is compulsory to periodically check that the guards are undamaged and efficient).
	UNAUTHORIZED PERSONS ARE NOT ALLOWED TO TOUCH (Unauthorized persons are not allowed to control the fan in any way).		OBLIGATION: REMOVE THE PROTECTIONS ONLY WHEN THE FAN IS STOPPED (OFF) (It is mandatory to remove the protections only when the fan is off and to wait for any hot parts to cool down).
	DO NOT INSERT HANDS (It is prohibited to put one's hands into the fan for any reason whatsoever).		OBLIGATION: OPEN ONLY WHEN THE FAN IS STOPPED (OFF) (It is compulsory to open the door only when the fan is switched off and stopped).
	DO NOT OPEN WITH FAN WHEN IT IS WORKING (It is forbidden to open the inspection door when the fan is ON).		OBLIGATION: LIFTING POINT USING A CRANE (It is compulsory to lift the fan by hooking it on the points marked by the sign).

TAB. 16 (Meaning of the signals)

TAB. 17 (Meaning of the signals)

The use of Personal Protective Equipment (PPE) is mandatory to comply with the laws on safety and occupational health in force in the country of use of the fan. Both the employer and the authorized operators have to know and comply with the obligations and duties set forth by the above mentioned regulations.



THE PPE FORECAST BY THE MANUFACTURER SHALL COMPULSORILY BE USED (S.TAB. 19).

TAB. 18 (Personal Protective Equipment)



7- USE AND OPERATION



7.1- Checks before switching on (TAB. 20)



⚠ WARNING

BEFORE SWITCHING ON THE FAN, THE AUTHORIZED OPERATORS SHALL COMPULSORILY PERFORM THE CHECKS GIVEN IN TAB. 20.

1	Make sure that there are not any unauthorized people close to the fan.
2	Make sure that the safety devices are not damaged and are properly installed and operating (s. par. 6.1).
3	Make sure there is the right type of blade (s. par. 3.2).
4	Make sure that the fan is properly positioned (s. chap. 5).
5	Make sure that the bearings are lubricated (s. par. 8.1.2).
6	Make sure that the bolts of the impeller, supports and electric motor are tightened (s. par. 8.1).
7	Make sure that all parts can rotate smoothly (s. par. 8.1).
8	Make sure you have thoroughly read and understood the "Instruction Manual" in all its parts.

TAB. 19 (Checks before switching on)



7.2- Switching on the fan

⚠ WARNING

THE AUTHORIZED OPERATORS MAY SWITCH ON THE FAN ONLY AFTER HAVING COMPULSORILY PERFORMED THE CHECKS DESCRIBED IN PAR. 7.1.

SWITCH ON THE FAN IN COMPLIANCE WITH THE INSTRUCTIONS GIVEN BY THE MANUFACTURER OF THE SYSTEM WHERE THE FAN HAS BEEN INSTALLED.



⚠ WARNING

TO AVOID OVERLOADING THE ELECTRIC MOTOR, IT IS RECOMMENDED TO SWITCH ON RADIAL FANS WITH CLOSED GATE OR FLOW RATE REGULATOR; FOR AXIAL ONES IT SHALL INSTEAD BE OPEN. IT IS ADVISABLE TO USE REGULATIONS VALVE ON THE SUCTION SIDE ("DAPÒ" VALVES): PRESSING REGULATORS OFTEN CAUSE REMARKABLE PRESSURE LOSSES AND ANNOYING TURBULENCES THAT RESULT IN VIBRATIONS AND NOISE IN THE CIRCUIT. IN CASE OF AUTOMATIC OPERATION OF THE VALVES, IT IS RECOMMENDED TO CAREFULLY CONTROL THE OPENING TIME (IN CASE OF HIGH PRESSURE, A TOO LOW TIME MAY RESULT IN VIBRATIONS AND PHENOMENA SUCH AS "FLUID HAMMER", WHICH ARE HARMFUL FOR THE MECHANICS OF THE FAN).

Turn the main electric switch to **pos. "I (ON)"** and follow the instructions provided by the installer who performed the electrical connection of the fan and realized the control panel.



7.3- Checks after switching on ()



⚠ WARNING

AFTER SWITCHING ON THE FAN, THE AUTHORIZED OPERATORS SHALL COMPULSORILY PERFORM THE CHECKS GIVEN IN .

1	Make sure that the impeller rotation direction complies with the one given by the arrow (adhesive applied externally on the fan - s. par. 6.3).
2	Make sure that the fan does not show any vibrations. Check vibrations according to ISO 14694:2003/Amd 1:2010. Recommended vibration limits in mm/s RMS: good/acceptable $\leq 7,1$; alarm $> 7,1 \div 9$; stop > 9 . Recommended measuring points: on the supports of the fan, in perpendicular direction to the rotation axis on the horizontal or vertical plane (close to the bearings). It is recommended to install vibration sensors (upon request).
3	Make sure that the temperature of the bearings at fan full range operation is regular (at 20 °C ambient temperature, the temperature of the supports must reach maximum 70 °C). Caution! It should be noted that, during the first hours of operation, a temperature value higher than the one indicated may be detected; it will later stabilize at a lower value. Temperature limits in °C: good/acceptable ≤ 70 ; alarm $> 70 \div 100$; stop > 120 . Measuring point: outer ring of the bearing, regardless of the ambient temperature. It is recommended to install temperature sensors (upon request).
4	Make sure that the temperature of the bearings at fan maximum operation standard is fine.
5	After some working hours make sure that the bolts are properly tightened (s. par. 8.1).
6	Check the belt tensioning (if present s. par. 5.6.4).
7	Check the absorption, by means of an ammeter, measuring it on one of the three line conductors (L1, L2, L3) upstream of the commutator; should this not be possible, measure it on any conductor of the terminal board multiplying the value by 1,73 ($\sqrt{3}$) (s. FIG. 31).

TAB. 20 (Checks before switching on)



7.4- Switching off the fan



- 1) Turn off the fan according to the instructions provided by the installer who performed the electrical connection and realized the electrical panel.
- 2) Set the main electric switch to **Pos. "0-OFF"**.



⚠ WARNING

BEFORE RESTARTING THE FAN, WAIT FOR THE ELECTRIC MOTOR TO COOL DOWN.



7.5- Emergency stop (TAB. 22)

The fan emergency stop can take place by pressing the “Emergency stop” button installed in the electrical system or bringing the main electric switch to **pos. “O (OFF)”** as shown in **FIG. 31**.



In order to avoid situation of imminent or future hazard, the authorized operators must compulsorily perform the operations described in **TAB. 22**.

1	Press the “ Emergency Stop ” button installed in the electrical system or turn the main electric switch to pos. “O (OFF)” .
2	Immediately notify the emergency to the Supervisor.

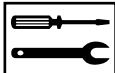
TAB. 21 (Emergency stop)



7.6- Switching on after an emergency stop

Only and exclusively after having removed the causes of the emergency and having carefully checked that the same have not resulted in any damages and/or malfunctions of the fan, with the consent of the Supervisor switch on the fan as described in **par. 7.2**.





8- MAINTENANCE



8.1- Routine maintenance (FIG. 34)

It includes all works carried out to preserve the fan working conditions and operation capability by means of different type of interventions (adjustments, visual checks, cleaning, etc.) carried out by the authorized maintenance technician according to the set frequency (s. TAB. 23).



⚠ DANGER

THE AUTHORIZED OPERATORS ARE NOT ALLOWED TO LEAVE THE FAN UNATTENDED DURING MAINTENANCE WORKS.



⚠ DANGER

THE AUTHORIZED OPERATORS SHALL PERFORM EXCLUSIVELY THE WORKS ENTRUSTED TO THE SAME (S. PAR. 2.2.2) AND SUBJECT TO THE CONSENT OF THE SUPERVISOR.

ROUTINE MAINTENANCE TABLE		
FREQUENCY	INTERVENTION POINT	INTERVENTION TYPE
<p>It depends on the fan use, on the place of installation and on the conveyed material.</p> <p>It requires further information from the technical department of the manufacturer. (s.).</p>	Case - Nozzle and Impeller	Internal cleaning of all parts in contact with suction air. With OFF fan, removal from the nozzle or inspection door of any scaling and/or deposit of material using compressed air (it is advisable to re-balance the impeller - s. par. 5.4.2 or par. 5.6.2).
		Visual check of welds.
		Visual check of tear and wear, above all for impellers conveying abrasive powders (causing fan vibrations); replacement, if necessary (since this may jeopardize good operation) (s. par. 8.2 for disassembling and par. 5.4.2 for assembling). N.B. Avoid separating the hub from the impeller. This is useless and will surely jeopardize balancing.
		Check that all parts can rotate smoothly.
	Pulleys	Clean the grooves with a dry cloth and check the alignment; if necessary, adjust.
	Belts	Clean each side of the belts with a dry cloth; check the tensioning (s. par. 5.6.4).
	Coupling joint	Visual check and, if necessary, alignment and centering (s. par. 5.6.5.1).
	Rubber raw plugs of the coupling joint	Check the tear and wear (s. FIG. 34); if necessary, replace.
	Supports	Check the quantity and layer of grease and, if necessary, lubricate (s. par. 8.1.2).
	Machine bolts	Check the correct tightening of all bolts.

TAB. 22 (Routine maintenance)

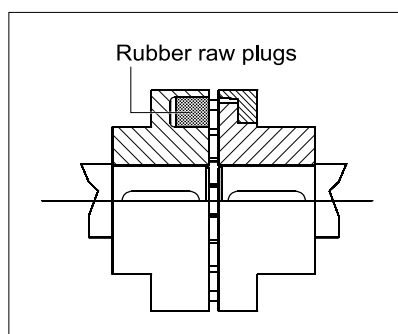
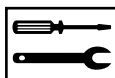


FIG. 34 (Rubber raw plugs)

**8.1.1- Scheduled maintenance works**

SCHEDULED MAINTENANCE INTERVALS DEPENDING ON SERVICE SEVERITY			
SEVERITY / FREQUENCY			ANALYSIS OF THE SEVERITY - TO BE CARRIED OUT BY THE CUSTOMER DURING THE OPERATIONAL PHASE
High	Medium	Low	
FOR ALL FANS			
3 months	6 months	12 months	Verify the perfect condition of all guards and signs.
2 months	4 months	8 months	Check the proper tightness of all bolts and nuts, especially in case of cyclic temperature changes.
1 month	3 months	6 months	Check the impeller for defects due to wear and corrosion.
1 month	6 months	12 months	Make sure the impeller is clean.
1 month	6 months	12 months	Make sure that there are no dangerous vibrations.
2 months	8 months	12 months	Make sure that noise it not abnormal.
2 months	6 months	12 months	Check the lubrication of the motor bearings.
2 months	6 months	12 months	Check the electrical operation parameters of the motor and of the installed servomotors.
1 month	6 months	12 months	Check that the filter is clean (if present).
3 months	6 months	12 months	Verify the perfect state of all installed accessories.
IN ADDITION, FOR FANS WITH BELT DRIVE			
1 month	3 months	6 months	Check the stretching and the state of wear of the belts.
See the tables of par. 8.1.2 lubrication intervals			Check the lubrication of the bearings.
1 month	3 months	6 months	Check the temperature of the supports containing the bearings. After an initial rise due to the running in, the temperature value must remain stable over time.
IN ADDITION, FOR FANS WITH FLEXIBLE JOINT DRIVE			
1 month	6 months	12 months	Check the alignment and wear of the joint pieces s. FIG. 34 .

TAB. 23 (Scheduled Maintenance)**8.1.2- Lubricating the support (bearings) (TAB. 25÷TAB. 27)**

According to the type of bearing and its diameter, the width of the ring and the number of rpm of the electric motor, it is possible to calculate the quantity of grease **SHELL ALBIDA GREASE RL2** (or equivalent - s. **par. 3.9**) to use for lubricating the support, as well as the greasing frequency.

To determine the quantity of grease, the following formula is useful:

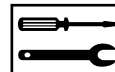
$$G = 0,005 \times D \times B$$

G = quantity of grease in grams

D = external diameter of the bearing in mm

B = width of the ring in mm

As for the frequency, see **TAB. 25**, **TAB. 26** and **TAB. 27**.

**⚠ CAUTION**

N.B. AN EXCESSIVE QUANTITY OF GREASE RESULTS IN THE OVERHEATING OF THE BEARING; THEREFORE, OBSERVE THE LUBRICATION FREQUENCY AND QUANTITY OF GREASE (S. TAB. 25, TAB. 26 AND TAB. 27).

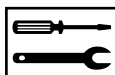
FOR USEFUL HINTS REFER TO THE TECHNICAL DEPARTMENT OF THE MANUFACTURER. FOR INDIRECT DRIVE FAN SUPPLIED ASSEMBLED, THE BEARING IS WARRANTED FOR A LIFE DURATION OF 20,000 ÷ 30,000 HOURS.

QUANTITY (g) OF GREASE UPON FIRST FILLING

Pipe support	Detached support					
	SN 509	SN 510	SN 511	SN 512	SN 513	SN 515
Fill the bearing completely free support space only partially	60	70	100	155	185	250
	SN 516	SN 517	SN 518	SN 520	SN 522	SN 524
	285	325	420	615	860	1020

N.B. For the lubrication frequency and grease quantity for motor bearings and for the periodical replacement refer to and check with the manual of the manufacturer of the electric motor. It shall be remarked that usually the installed bearings up to M160 size are already greased for their entire life-cycle and, therefore, they do not require any lubrication.

TAB. 24 (First filling)



QUANTITY OF GREASE FOR PIPE SUPPORTS - FOLLOWING FILLINGS

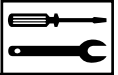
Pipe support	Impeller side bearing	RPM				Grease quantity (g)	Pipe support	Pulley side bearing	RPM				Grease quantity (g)
		1000	2000	3000	4000				1000	2000	3000	4000	
		Greasing frequency (hours)							Greasing frequency (hours)				
20 A-AL 14	6304 Z	14000	8000	5000	4000	3,9	20 A-AL 14	6304 Z	14000	8000	5000	4000	3,9
20 B 14						20 B 14							
20 A-AL 19						20 A-AL 19							
20 B 19						20 B 19							
25 A-AL 24	6305 Z	12500	6200	4000	3100	5,3	25 A-AL 24	6305 Z	12500	6200	4000	3100	5,3
25 B 24						25 B 24							
35 A-AL 28	6307 Z	11000	5500	3500	2750	8	35 A-AL 28	6307 Z	11000	5500	3500	2750	8
35 B 28						35 B 28							
40 A-AL 38	6308 Z	9900	5000	3100	2450	10	40 A-AL 38	6308 Z	9900	5000	3100	2450	10
40 B 38						40 B 38							
45 A-AL 42	6309 Z	8800	4400	2800	2200	12	45 A-AL 42	6309 Z	8800	4400	2800	2200	12
45 B 42						45 B 42							
50 A-AL 48	6310 Z	7800	4000	2500	2000	15	50 A-AL 48	6310 Z	7800	4000	2500	2000	15
50 B 48							50 B 48						
50 AR-ALR 48							50 AR-ALR 48	NU 310 ECP	3900	2000	1250	1000	
50 BR 48							50 BR 48						
55 A-AL 48	6311 Z	7000	3500	2200	1750	17,5	55 A-AL 48	6311 Z	7000	3500	2200	1750	17,5
55 B 48							55 B 48						
55 AR-ALR 48							55 AR-ALR 48	NU 311 ECP	3500	1750	1100		
55 BR 48							55 BR 48						
60 A-AL 55	6312 Z	6200	3100	2000	/	20,5	60 A-AL 55	6312 Z	6200	3100	2000	/	20,5
60 B 55							60 B 55						
60 AR-ALR 55							60 AR-ALR 55	NU 312 ECP	3100	1550	1000		
60 BR 55							60 BR 55						

TAB. 25 (Following fillings of pipe supports)

QUANTITY OF GREASE FOR DETACHED SUPPORTS - FOLLOWING FILLINGS

Detached support	Impeller side bearing	RPM				Grease quantity (g)	Detached support	Pulley side bearing	RPM				Grease quantity (g)
		1000	2000	3000	4000				1000	2000	3000	4000	
		Greasing frequency (hours)							Greasing frequency (hours)				
SN 509	22209 EK	3500	1500	1000	680	10	SN 509	22209 EK	3500	1500	1000	680	10
SN 510	22210 EK	3350	1300	930	650	11	SN 510	22210 EK	3350	1300	930	650	11
SN 511	22211 EK	3200	1250	850	600	13	SN 511	22211 EK	3200	1250	850	600	13
SN 512	22212 EK	2950	1200	810	580	18	SN 512	22212 EK	2950	1200	810	580	18
SN 513	22213 EK	3100	1250	850	680	19	SN 513	22213 EK	3100	1250	850	680	19
SN 515	22215 EK	2900	1180	780	560	20	SN 515	22215 EK	2900	1180	780	560	20
SN 516	22216 EK	2750	1100	750	480	23	SN 516	22216 EK	2750	1100	750	480	23
SN 517	22217 EK	2600	1050	700	300	27	SN 517	22217 EK	2600	1050	700	300	27
SN 518	22218 EK	2450	1000	600	/	32	SN 518	22218 EK	2450	1000	600	/	32
SN 520	22220 EK	2200	900	350	/	41	SN 520	22220 EK	2200	900	350	/	41
SN 522	22222 EK	2000	800	/	/	52	SN 522	22222 EK	2000	800	/	/	52
SN 524	22224 EK	1700	650	/	/	62	SN 524	22224 EK	1700	650	/	/	62

TAB. 26 (Following fillings of detached supports)



N.B. Greasing frequency and quantity of grease in (g) calculated according to SKF rules (see SKF use and maintenance manual).

N.B. In the case of dusty, humid and corrosive environments or of high temperature, decrease the lubrication frequency by 30%÷40%.



8.2- Disassembly

For disassembling the fan, proceed as follows:

- **Nozzle:** unscrew and remove the nuts fastening it to the case;
- **Case:** only for swinging fans, unscrew and remove the nuts fastening it to the base. (For large size fans, the case is welded to the base);
- **Impeller in simple suction and double stage fans:** unscrew and remove the bolt locking the impeller on the shaft and carefully extract it in order to prevent it from falling, which may cause deformations that will jeopardize the balancing;
- **Impeller in double suction fans (exec. 6 - 18 - 19):** loosen the tie rods and remove the belts. Unscrew and remove the bolts tightening the supports and the nuts blocking the nozzles. Remove the impeller together with the shaft and supports. Disassemble the supports and remove the impeller blocking ring nut;
- **Single-block support:** loosen the grain and remove the cooling fan, if any. Unscrew the tightening screws and remove the upper shells.
Remove the shaft with the two bearings from the case. Remove the two bearings using the extractor;
- **Pipe support:** loosen the grain and remove the cooling fan, if any. Unscrew the tightening screws and remove the upper and lower shells. Unscrew the fixing collars of the bearings. Straighten the tooth of the safety washer and unscrew the ring nut.
Remove the traction bush and extract the bearing.

For the other parts of the fan (protection case, electric motor, etc.), disassembling will be easy and intuitive.



⚠ CAUTION

IT IS FORBIDDEN TO USE HAMMERS OR OTHER TOOLS TO ASSEMBLE AND DISASSEMBLE BEARINGS, PULLEYS, SEMI-ELASTIC COUPLING JOINTS, ETC. BY DOING SO THE EFFICIENCY OF THESE PARTS MAY BE JEOPARDIZED.



8.3- Extraordinary maintenance

It includes all works carried out to preserve the fan working conditions and operation capability by means of different type of interventions (adjustments, replacements, etc.) carried out exclusively by the technicians of the manufacturer according to the set frequency or in case of failure or wear.



The reliability of the components is guaranteed by an internal production analysis process and by the observance of maintenance works and intervals recommended in this manual and by the scheduled maintenance recommended in .

It should be noted that the theoretical life of the bearings normally ranges between 25.000 ÷ 30.000 hours of work; for belts it is usually around 25.000 hours, after which replacement is recommended. For safety reasons it is advisable to replace the guards every 3 - 4 years. Under standard conditions (2 cycles of continuous work for 16 hours), replace the impeller after about 40.000 hours of work. When working under severe temperature or transport conditions reduce this value (refer to our technical department).

An impeller, also when featuring 0 hours of work, kept in storage for over 10 years must be inspected for integrity and balance.



9- ATEX FANS

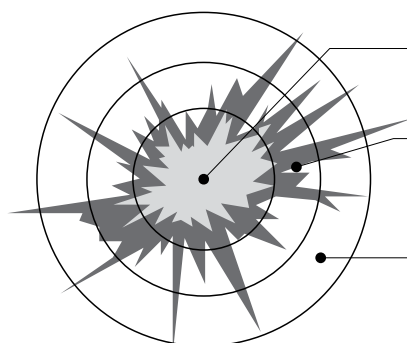
9.1- General warnings ()

⚠ DANGER

CAUTION: THE CHOICE TO INSTALL A FAN COMPLYING OR NOT COMPLYING WITH THE ATEX DIRECTIVE 2014/34/UE IS UP TO THE CUSTOMER WHO SHALL BE LIABLE FOR THIS CHOICE.

BEFORE INSTALLING THE FAN, IT IS COMPULSORY TO:

- 1) ASSESS THE RISKS OF THE ENVIRONMENT WHERE IT WILL BE INSTALLED;
- 2) IDENTIFY THE TYPE OF HAZARDOUS ATMOSPHERE PRESENT IN THE ENVIRONMENT (GAS OR POWDER);
- 3) DEFINE THE ZONES (S.):
 - IF THE ATMOSPHERE IS GASEOUS, THE ZONES ARE CLASSIFIED FROM 0 TO 2 (FROM HIGH TO LOW RISK OF EXPLOSION);
 - IF THE ATMOSPHERE IS DUSTY, THE ZONES ARE CLASSIFIED FROM 20 TO 22 (FROM HIGH TO LOW RISK OF EXPLOSION);
- 4) DEFINE THE PRODUCT CATEGORY (1 - 2 - 3) (SEE DIRECTIVE 99/92/EC);
- 5) CHECK THAT THE DATA BORNE ON THE FAN RATING PLATE DO MATCH.



Zone 0 / 20

Permanent presence of explosive atmosphere.

Zone 1 / 21

Accidental presence of explosive atmosphere during normal operation.

Zone 2 / 22

Presence of explosive atmosphere only in case of accident, but not during normal operation.

ZONE	ATMOSPHERE	ASSEMBLY	CATEGORY	PROTECTION METHOD	TEMPERATURE CLASS or Tmax
1	Gas	II	2G	c	T1 ÷ T6
2	Gas	II	3G	c	T1 ÷ T6
21	Powders	II	2D	c	T125 or >
22	Powders	II	3D	c	T125 or >

TAB. 27 (ATEX Zones)

9.2- Constructive features

The fan complying with the ATEX Directive 2014/34/EU feature construction solutions suitable to avoid the production of sparks caused by friction between the rotating part and the fixed one.

The features that we indicate here below will be subject to verification before assembling the fan:

- 1) Copper bands between nozzle and impeller;
- 2) Copper rings;
 - Between the case and the electric motor shaft;
 - (Only in indirect drive fans) between pulleys and protection case;
- 3) (Only in indirect drive fans) Complying belts;
- 4) (Only in fans kW>11) Welded case;
- 5) Grounding (detached parts);
- 6) (Only in axial fans) Copper bands on drum and smaller aluminum impeller.

N.B. Make sure that the CE marking plate matches the one shown in par. 1.3.



9.3- Fan / electric motor combination (TAB. 28 and TAB. 29)

According to the classification of the environment in which the fan is installed, the Directive 99/92/EC indicates the suitable fan and electric motor (s. TAB. 28 and TAB. 29):

Explosive atmosphere	Zone	Risk occurrence	Category	
			Fan	Motor
Gas	1	Occasionally	Cat. 2G	Cat. 2G (Ex d, Ex e, Ex de)
	2	Short period only	Cat. 3G	Cat. 3G (Ex nA)

TAB. 28 (Electric motor for Gas Zone)

Explosive atmosphere	Zone	Risk occurrence	Category	
			Fan	Motor
Dust	21	Occasionally	Cat. 2D	Cat. 2D * (DIP - IP55/IP65)
	22	Short period only	Cat. 3D	Cat. 3D * (DIP - IP55/IP65)

* In presence of conductive dust, an IP6X product is required.

TAB. 29 (Electric motor for Dust Zone)

9.4- Precautions for ATEX fans



DANGER

CAUTION: SINCE DUSTS ARE A POTENTIAL CAUSE OF EXPLOSION OR FLAMMABILITY AFTER PRIMING, IT IS NECESSARY TO KEEP THE FAN WELL CLEANED. AVOID THE DEPOSIT OF MORE THAN 5 mm OF DUST, PROGRAMMING THE ROUTINE MAINTENANCE OF THE FAN ACCORDING TO THE USE, PLACE OF INSTALLATION AND MATERIAL CONVEYED BY THE FAN. FOR FANS INTENDED TO CONVEY FLUIDS PERIODICALLY CHECK THE DISTANCES BETWEEN MOVING AND FIXED PARTS, KEEPING THEM FREE FROM ANY DEPOSITS THAT MAY CAUSE SPARKS.

9.5- Annexes

Refer to the Annex "FANS FOR POTENTIALLY EXPLOSIVE ENVIRONMENTS" for the installation, use, and maintenance of ATEX fans (SAXMI017).



10- DECOMMISSIONING



10.1- Storage

If upon delivery the fan is not installed and is not going to be used for long time, it is necessary to store it in a safe environment, with a suitable temperature and humidity, as well as to protect it against dust.



In detail, cover the bearings, shafts and electric motor. Periodically check the fan and, in case of roller bearings, let it rotate by hand every week.

Do not store it close to machines producing vibrations.



10.2- Demolition

Upon demolition of the fan, compulsorily comply with the provisions of the regulations in force.



Separate the parts making up the fan according to the different construction materials (plastic, copper, iron, etc.).



⚠ CAUTION

ALL COMPONENTS OF THE FAN MUST COMPULSORILY BE IDENTIFIED PURSUANT TO THE DEFINITIONS OF THE "EWC CODES" (EUROPEAN WASTE CATALOGUE) AND DISPOSED OF ENTRUSTING SPECIALIZED AND AUTHORIZED COMPANIES, IN ABSOLUTE COMPLIANCE WITH THE REGULATIONS IN FORCE IN THE COUNTRY OF DEMOLITION OF THE FAN.



⚠ CAUTION

THE WASTE ELECTRIC AND ELECTRONIC EQUIPMENT (WEEE) HAVE TO BE DISPOSED OF IN ABSOLUTE COMPLIANCE WITH THE REGULATIONS IN FORCE IN THE COUNTRY OF DEMOLITION OF THE FAN.



11- SPARE PARTS

11.1- General warnings



WARNING

ORIGINAL SPARE PARTS FOR ANY REPLACEMENT HAVE TO BE REQUESTED ONLY FROM THE MANUFACTURER OR THE AUTHORIZED DEALER.



DANGER

IT IS ABSOLUTELY FORBIDDEN TO REPLACE ANY FAN COMPONENT WITH NOT ORIGINAL SPARE PARTS.

12- TROUBLESHOOTING (÷TAB. 34)

12.1- Troubleshooting

, , and **TAB. 34** outline a series of situations that may occur during the use of the fan.



⚠ DANGER

THE AUTHORIZED OPERATORS SHALL PERFORM EXCLUSIVELY THE WORKS ENTRUSTED TO THE SAME (S. PAR. 2.2.2) AND SUBJECT TO THE CONSENT OF THE SUPERVISOR.

ANOMALIES	CAUSES	TROUBLESHOOTING
Insufficient air flow rate	At normal rotation speed, it is accompanied by a power reduction for radial fans, especially for those with forward curved blades or radial output blades. Power absorption is less influenced in case of radial fans with reverse blades and, in some special application cases, it may slightly increase.	
	Wrong rotation of the electric motor.	Check the electric motor rotation direction.
	Wrong impeller rotation.	Check the impeller rotation direction. A radial fan rotating in reverse direction pushes in any case air in the circuit. Handy tip: If it is possible to see only a few mm of the shaft let the end of a ruler drop on the shaft. The side where it is projected indicates the rotation direction.
	Decrease the belt rotation and/or sliding speed.	Check the rotation speed and the belt tensioning and cleaning.
	Excessive pressure drop in the circuit due to the following reasons.	Select a straight section of the air channel where the turbulence coming from upstream is minimal - preferably upstream of the fan - and using the Pitot tube establish the air flow rate that is available at that time. Measure the static suction and delivery pressure values properly. The algebraic difference gives the static pressure of the fan. If the fan flow rate is low and the pressure is equal to or greater than the design one, the greater fault is to be found more likely in the circuit than in the fan. Check the circuit sections to establish the points where these drops are excessive. This can be done by checking the static or total pressure in strategical points of the circuit.
	Gates badly set.	Set the gates.
	Two or more very near curves, obstructions or section changes or sharp deviations.	Modify moving section changes far from one another and making deviations less sharp.
	The inlet or diffusion grid is excessively tight.	Replace the inlet or diffusion grid.
	A filter is overloaded.	Clean the filter.
	Accumulation of foreign bodies inside the piping.	Clean the piping.
	Turbulence.	Provide the plant with rectifiers.
	Turbulence due to a narrowing.	Provide the plant with rectifiers.
	Straight air relief channel whose length is less than 2,5 times its diameter.	Modify the channel.

TAB. 30 (Anomalies 1)



ANOMALIES	CAUSES	TROUBLESHOOTING
Insufficient air flow rate	Anomalies in and/or at the fan due to the following reasons.	If both values of flow rate and pressure are low, the main fault is likely to be found in the fan and in its closest connections, although circuit errors may also affect this situation. After having checked that the rotation direction of the electric motor and of the impeller is right, proceed with the other checks as follows.
	Presence of dirt or foreign bodies in the impeller.	Clean the impeller.
	Clogging in the connection channels and flexible joints.	Clean the channels.
	Whirling current at suction in the same impeller rotation direction.	Mount an anti-turbulence device (e.g. a simple air separating sheet metal in the suction hood).
	Sudden enlargement of the delivery piping.	Modify the delivery piping.
	Air type more or less cold and with more or less pressure compared to the calculated data.	Verify and analyze the calculations and design and/or operation temperature.
Excessive air flow rate (excessive pressure drop in the circuit)	At nominal rotation speed, it causes an excessive consumption for the radial fans with forward curved blades. Power absorption increases for fans with radial output blades and for the fans with reverse blades. Power can be slightly reduced for some axial fans or radial fans with reverse blades. The exceeding flow rate value can provide an indication concerning the cause, for example up to values 10 % higher than the design values, it may indicate an "excessive estimate of the circuit pressure drop". A remarkably higher difference may indicate a major problem in the circuit. Proceed systematically.	
	Wrong impeller rotation.	Check the impeller rotation direction and its orientation.
	High electric motor rotation speed.	Check the electric motor rotation speed.
	Pulley size wrong.	Check the diameter of the pulleys and the transmission ratio.
	Gates and registers not properly positioned.	Properly position gates and registers.
	Aeratic circuit components not installed.	Install and verify the circuit components.
	Air leaks at the testing point or in the masonry channels.	Check and close air leaks at the testing point or in the masonry channels.
	Bypass gates not perfectly closed.	Close the bypass gates.
	Unbalancing among fans working in parallel.	Find the right balancing among fans working in parallel.
	Excessive estimate of the circuit pressure drop.	Calculate the estimate of circuit pressure drop (verify design calculations) and decrease the revolutions of the fan and/or shutter the gates or valves, if any.

TAB. 31 (Anomalies 2)

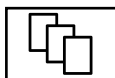
ANOMALIES	CAUSES	TROUBLESHOOTING
Excessive power absorption	A radial impeller with forward curved blades, an impeller with radial output blades is conveying too much air.	Shutter the suction inlet / Mount an impeller with different blades.
	A radial impeller with reverse curved blades rotating in reverse direction or an impeller with wrong rotation direction rotating properly.	Verify the impeller rotation direction and/or orientation.
	A pre-rotation of the air at suction in opposite direction to the fan rotation one.	Check and re-position the suction hood or verify the fan suction.
	A short pitch axial fan or an axial impeller working with excessive pressure.	Mount a different impeller or one with a long pitch.
	An alternating current electric motor rotating below its usual rotation speed due to defects in the windings or in the starting; or low power voltage.	Check electric motor voltage or replace it.
	Faults in the electric motor and/or connection.	Verify the connection and/or replace the electric motor.
Faulty start	Excessive power absorption.	Check power absorption.
	Reduced power supply voltage.	Check power supply voltage.
	Max. relay unsuitable for starting conditions.	Replace the max. relay with a suitable one.
	Fault of the electric motor resulting in a decrease of its peak features.	Replace the electric motor.
	Inadequate evaluation of the moment of inertia of fan rotating parts with reference to the selected electric motor and its type of start.	Mount an electric motor with greater flow rate and check friction on mechanical parts.
	Start voltage too low.	Check power supply voltage.
Air pulses	An axial fan working in the initial area of its operation feature under stall conditions.	Check the check and/or piping.
	Most of the other type of fans working close to null flow rate conditions.	Check the piping and fan revolutions.
	Fluctuations of the fan in parallel arrangement.	Optimize the connection piping.
	Clogging or bad connection at suction creates instable conditions at air inlet (e.g. vortex).	Remove any clogging and/or bad connections.
	Alternating disconnection and re-connection of the flow to the walls of a divergent channel.	Verify the circuit.

TAB. 32 (Anomalies 3)



ANOMALIES	CAUSES	TROUBLESHOOTING
Noise	In general, all fans generate more or less noise; this is a problem only when such noise level becomes unacceptable. It can be generated as noise due to air, the mechanical parts or pick-up noise or to a combination of these three. Noise due to air can increase due to clogging close to the fan suction or delivery. More often, noise is due to a wrong selection of the fan. This latter condition can be solved only by replacing the fan with a quieter one (usually having a grater diameter and lower speed) or by applying soundproofing systems (insulation, soundproof booths).	
Mechanical noise	Friction of moving parts.	Check the impeller movement and, if necessary, clean it.
	Wrong selection of bearings.	Replace the bearings.
	Sheet metal vibrations (protections).	Check the tightening of the sheet metals (protections). Reinforce the structure.
Electric noise	Eccentricity between electric motor and stator.	Verify, check and/or replace the electric motor.
	Faults or porosity in the rotor die casts.	
	Vibrations in winding.	
Vibrations	Vibrations at an unacceptable level may result from unbalances or unsuitable support structure or by a combination of the two. When the natural frequency of a support structure is close to the one of the fan rotation speed, no balancing, even when accurate, can avoid vibrations. It is possible to reinforce the structure or appreciably modify its natural resonance frequency (e.g. by adding weights). In case of excessive unbalancing, refer to the fan manufacturer or to an expert in vibrations (often it is necessary to re-balance the impeller). It is advisable to install anti-vibration devices and/or vibration control/alarm systems.	
	Unbalances.	Check the machine balancing, its anchoring to the support surface. (In case of excessive unbalancing, refer to the manufacturer).
	Support structure unsuitable.	Reinforce the structure or appreciably modify its natural resonance frequency using suitable weights.
	Impeller unbalanced.	Re-balance the impeller.

TAB. 33 (Anomalies 4)



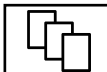
13- ANNEXES

13.1- Intended use for the different models

**⚠ DANGER**

CAUTION: BESIDES THE INTENDED USE, FOR EACH MODEL IT IS COMPULSORY TO KNOW AND COMPLY WITH THE INTENDED USE (S. PAR. 3.7) AND KNOW THE REASONABLY FORESEEABLE IMPROPER USE (S. PAR. 3.10), COMMON TO ALL MODELS.

Series	APE, APF, APG, APRF, APRG, APRH, APRI, APRL
INTENDED USE	<p>Suction of even very dusty air. Used for pneumatic conveyances; in cement factories; for feeding air for cupolas; in foundries and oil burners; in mills; in pasta making factories; in chemical, iron and steel processing factories; where small flow rates with medium and high pressures are required. The temperature of the drawn in fluid must not exceed 80 °C and 150 °C with cooling fan.</p>
Series	APEc, APFc, APGc, APRFc, APRGc, APRHc, APRIc, APRLc
INTENDED USE	<p>Suction of even very dusty air. Used for pneumatic conveyances; in cement factories; for feeding air for cupolas; in foundries and oil burners; in mills; in pasta making factories; in chemical, iron and steel processing factories; where small flow rates with medium and high pressures are required. The temperature of the drawn in fluid must not exceed 90 °C without cooling fan. For temperatures of the conveyed fluid higher than 90 °C and up to 350 °C, a small heat stopping fan is fitted to the shaft between support and auger; besides, the fan is painted with a special aluminum paint suitable for high temperatures.</p>
Series	APRF/N8, APRG/N8, APRH/N8, APRI/N8, APRL/N8
INTENDED USE	<p>Suction of even very dusty air. Used for pneumatic conveyances; in cement factories; for feeding air for cupolas; in foundries and oil burners; in mills; in pasta making factories; in chemical, iron and steel processing factories; where small flow rates with medium and high pressures are required. The temperature of the drawn in fluid must not exceed 90 °C and 350 °C with cooling fan.</p>
Series	APRED, APRFD, APRGD
INTENDED USE	<p>Suction of clean and dusty air. Used for providing oxygen to impure waters; for pneumatic conveyances; in cement factories; in mills; in pasta making factories; in dye works (for quick drying wool); in ceramic factories (for the pneumatic cleaning of the rooms); in chemical, iron and steel processing factories; where small and medium flow rates with very high pressure are required. The temperature of the drawn in fluid must not exceed 80 °C.</p>
Series	EU, EUM, EUK, MPR, TR
INTENDED USE	<p>Suction of very dusty air containing various types of suspended materials. Used in carpentry shops for transporting saw dust and wooden chips, excluding fibrous materials, in mechanical processing factories for drawing in metal chips and burrs; for pneumatic transports in cement factories, ceramic factories, mills, fodder factories, tanneries, foundries, in textile and chemical factories and, in general, for all those applications where it is necessary to convey harmful air with low and medium pressure. Maximum air temperature: 80 °C without cooling fan and 150 °C with cooling fan. For higher temperatures, it is necessary to modify the construction of the fan.</p>



Series	EUC
INTENDED USE	<p>Suction of dusts, fumes, granulates, sawdust or wood shavings of minimum size and materials in general mixed with air, excluding fibrous materials.</p> <p>Used in carpentry shops, mechanical processing factories, cement factories, ceramic factories, tanneries, foundries, in milling and chemical factories, and for all those applications where it is necessary to convey harmful air with MAX. temperature of 90 °C.</p> <p>For temperatures higher than 90 °C and up to 350 °C, a small heat stopping fan is fitted to the shaft between support and auger; besides, the fan is painted with a special aluminum paint suitable for high temperatures.</p>

Series	EUMc
INTENDED USE	<p>Used in drying plants, pneumatic transports, fume extraction, forced draught in the chimneys, transport of granulates and sawdust mixed with air, excluding fibrous materials.</p> <p>Used in carpentry shops, mechanical processing factories, cement factories, ceramic factories, tanneries, foundries, in milling and chemical factories, and for all those applications where it is necessary to convey harmful air with MAX. temperature of 90 °C.</p> <p>For temperatures higher than 90 °C and up to 350 °C, a small heat stopping fan is fitted to the shaft between support and auger; besides, the fan is painted with a special aluminum paint suitable for high temperatures.</p>

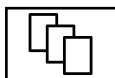
Series	TF, TG, TH
INTENDED USE	<p>Suction of very dusty air containing various types of suspended materials.</p> <p>Used in carpentry shops for transporting sawdust and wood shavings; in tanneries for conveying skin trimmings and shaving; in bookbinding factories for conveying paper trimmings; in textile factories for transporting waste and long fibers; in plastics processing factories for transporting granulates and nylon trimmings; for loading solid fuels in boilers; as paper tearing device; etc.</p> <p>For a maximum air temperature of 80 °C.</p>

Series	TPA, TQ
INTENDED USE	<p>Suction of very dusty air containing various types of suspended materials.</p> <p>Used in carpentry shops for conveying sawdust and wood shavings; in tanneries for transporting skin trimmings and shaving; in plastics processing factories for transporting granulates.</p> <p>The temperature of the drawn in fluid must not exceed 80 °C.</p>

Series	TTRc
INTENDED USE	<p>Suction of wood shavings, paper trimmings and fibrous materials.</p> <p>Used in carpentry shops, tanneries, bookbinding factories and paper mills.</p>

Series	TRc, EUKc
INTENDED USE	<p>Suction of dusts, fumes, granulates, sawdust or wood shavings of minimum size and materials in general mixed with air, excluding fibrous materials.</p> <p>Used in carpentry shops, mechanical processing factories, cement factories, ceramic factories, tanneries, foundries, milling and chemical factories, and for all those applications where it is necessary to convey harmful air with MAX. temperature of 90 °C.</p> <p>For temperatures higher than 90 °C and up to 350 °C, a small heat stopping fan is fitted to the shaft between support and auger; besides, the fan is painted with a special aluminum paint suitable for high temperatures.</p>

Series	TFc, TGc, THc
INTENDED USE	<p>Suction of very dusty air containing various types of suspended materials.</p> <p>Used in carpentry shops for transporting sawdust and wood shavings; in tanneries for conveying skin trimmings and shaving; in bookbinding factories for conveying paper trimmings; in textile factories for transporting waste and long fibers; in plastics processing factories for transporting granulates and nylon trimmings; for loading solid fuels in boilers; as paper tearing device; etc.</p> <p>For maximum air temperature of 90 °C (250 °C with cooling fan).</p>



Series	MPRc
INTENDED USE	Suction of very dusty air containing various types of suspended materials. Used in carpentry shops for transporting sawdust and wooden shavings, excluding fibrous materials , in mechanical processing factories for drawing in metal chips and burrs; for pneumatic transports in cement factories, ceramic factories, mills, fodder factories, tanneries, foundries, in textile and chemical factories and, in general, for all those applications where it is necessary to convey harmful air with low and medium pressure. The temperature of the drawn in fluid must not exceed 90 °C (350 °C with cooling fan).

Series	BP, BPR, BT
INTENDED USE	Suction of clean or slightly dusty air. Used in ventilation, air conditioning, drying, and cooling systems; systems with mechanical draught and for eliminating noxious gases. The temperature of the conveyed fluid must not exceed 80 °C and 150 °C with cooling fan. For higher temperatures, it is necessary to modify the construction of the fan.

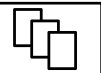
Series	BPC, BPRc
INTENDED USE	Suction of clean or slightly dusty air. Used for ventilation systems in stables, mines and tunnels. Suction of stale air; welding fumes; vapors from solvents tanks and paints from painting booths; aeration of silos and warehouses; cooling of plastics, textiles, glass plates, dried fodder, cereals, paper, paints, wood; elimination of fumes and noxious gases. For a MAX. air temperature of 90 °C with low pressure. For a conveyed fluid temperature greater than 90 °C and up to 350 °C, a heat stopping fan is fitted on the shaft between support and auger.

Series	BPRDc
INTENDED USE	Suction of great volumes of clean or slightly dusty air. Used in the suction of stale air; vapors from solvents and noxious gases; ventilation of fodder and cereals in silos and warehouses; drying of ceramic, bricks; etc. For a MAX. air, gas, and fume temperature of 80 °C with low pressure.

Series	EVP, EVF, EVL
INTENDED USE	Suction of fume, as well as of stale, dusty and humid air in foundries, cement factories, paper mills, and carpentry shops. Ventilation of public rooms; drying of paper, wool, pasta, bricks; in association with radiators, heaters, cooling towers, etc. and, in general, where it is necessary to transport big volumes of air with low pressures. Working temperature - MIN. -20 °C, MAX. +60 °C.

Series	EVc
INTENDED USE	Suction of fume, as well as of stale, dusty and humid air. Used in painting booths where it offers a considerable safety guarantee against the danger of fire due to the particular construction with impeller made of anti-spark material and electric motor anchored externally to the fan. Working temperature - MIN. -20 °C, MAX. +70 °C.

Series	EVT
INTENDED USE	Suction of stale air, fume, and vapors of environments. Used for ventilating workshops, foundries, cement factories tanneries, carpentry shops, as well as chemical, mechanical and steel processing factories; where the suction of big air volumes at low pressure is required. Working temperature - MIN. -20 °C, MAX. +60 °C.



13.2- Air noise (TAB. 35÷TAB. 45)

The following tables show the data related to air noise of the various fan models.

13.2.1- Noise: general information (Ref. EN ISO 3744, EN ISO 3746 and ISO 13347-1-2-3-4:2004) (securities TAB. 35 ÷ TAB. 45)

Sound power level L_{WA}

It is the average value of the sound power level in dB(A) (weighted value according to the scale A) radiated into the environment by the fan through the inlet and outlet ducts. The value refers to air conveyed with a density of 1,226 kg/m³, at the maximum allowable rotation speed of the impeller and during operation at the optimal curve point.

It is assumed that the fan is placed in a free field or, in any case, in an area featuring such dimensions as not to cause appreciable reflections, and leaning on a flat and rigid surface.

Moreover, the value of the background noise of the installation environment is deemed neglectable.

Sound pressure level L_{pA}

It is the average of the temporal average values of the sound pressure radiated into the environment by the fan through the inlet and outlet ducts. The pressure values are recorded on the measurement surface enveloping the fan (parallelepiped measurement surface).

Experimentally, acoustic pressure measurements are obtained by 8 microphone stations located on the reference surface at a height equal to the fan rotation axis (**FIG. 35**).

The pressure value is expressed in dB(A) (weighted value according to the scale A).

The value refers to air conveyed with a density of 1,226 kg/m³, at the maximum allowable rotation speed of the impeller and during operation at the optimal curve point.

The given values refer to a measuring distance of one meter.

It is assumed that the fan is placed in a free field or, in any case, in an area featuring such dimensions as not to cause appreciable reflections, and leaning on a flat and rigid surface.

The value of the background noise of the installation environment is deemed neglectable.

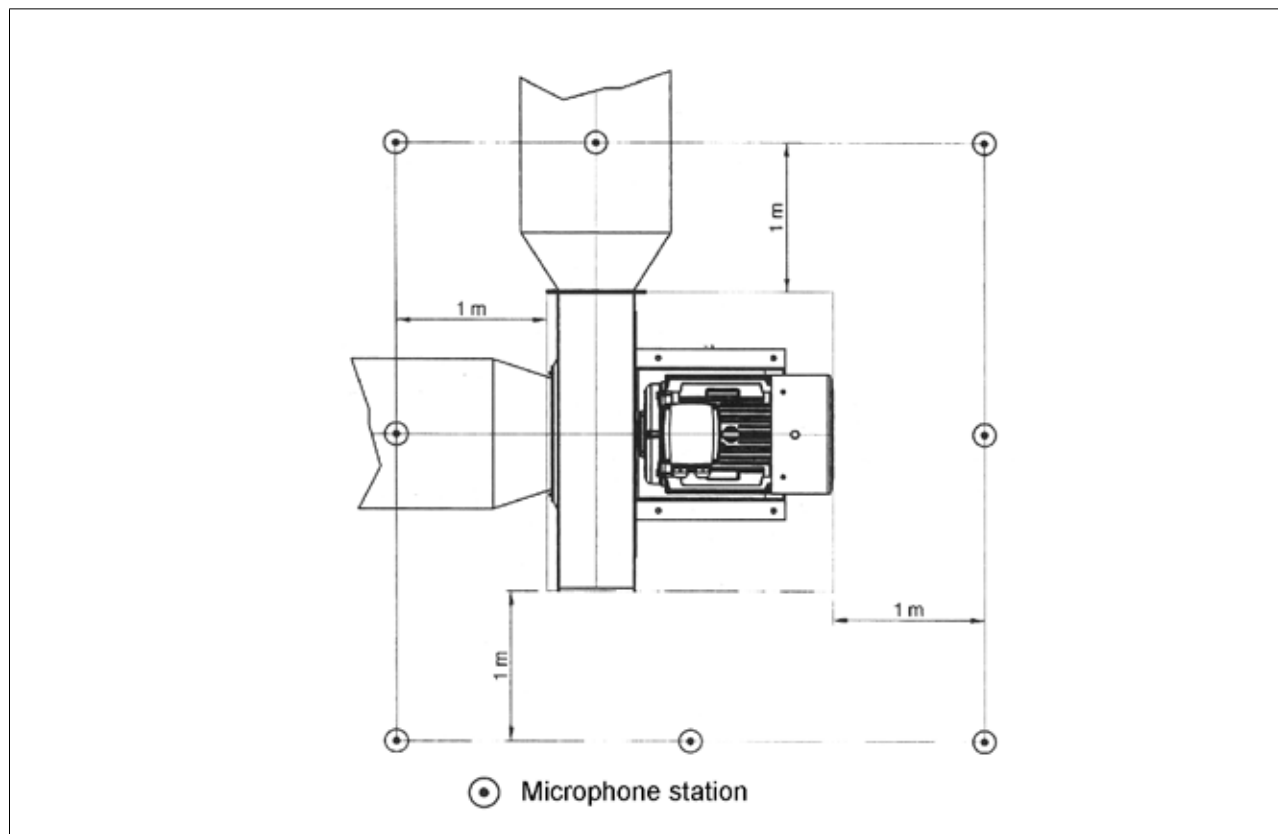
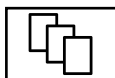


FIG. 35 (Aircraft noise)



Legend:			
✓ =	dB(A) ≤ 80	Lp =	weighted sound pressure level at output A at the places of work
• =	80 < dB(A) ≤ 90	Lw =	weighted sound power level A issued by the machine
X =	dB(A) > 90		

		High pressure, direct drive centrifugal fans - Series:															
Electric motor	Model	APE		APF		APG		APRF		APRG		APRH		APRI		APRL	
		Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw
2 poles	351/2	✓	•														
	401/2	✓	•														
	451/2	✓	•														
	501/2	✓	•	✓	X	•	X			•	X						
	561/2	✓	•	•	X	•	X			•	X	•	X				
	631/2	✓	X	•	X	•	X	•	X	•	X	X	X	X	X	X	X
	711/2	✓	X	•	X	•	X	•	X	•	X	X	X	X	X	X	X
	801/2	•	X	•	X	X	X	•	X	X	X	X	X	X	X	X	X
	901/2	•	X	X	X	X	X	•	X	X	X	X	X	X	X		
	1001/2							X	X	X	X	X	X	X	X		
	1121/2							X	X	X	X						
4 poles	631/2											✓	•				
	711/2											✓	•	✓	X		
	801/2							✓	•	✓	X	✓	X	•	X		
	901/2							✓	•	✓	X	✓	X	•	X		
	1001/2							✓	X	•	X	•	X	•	X		
	1121/2							✓	X	•	X						

TAB. 34 (Centrifugal fans - models APE, APF, APG, APRF, APRG, APRH, APRI, APRL)

		High pressure, double stage, direct drive centrifugal fans - Series:					
Model		APRED		APRFD		APRGD	
		Lp	Lw	Lp	Lw	Lp	Lw
631/2		•	X	•	X		
711/2		•	X	•	X		
801/2		•	X	•	X		
901/2		•	X	X	X	X	X
1001/2		X	X	X	X	X	X
1121/2		X	X	X	X		

TAB. 35 (Centrifugal fans - models APRED, APRFD, APRGD)

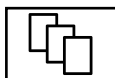


High pressure, belt drive centrifugal fans - Series:																
Model	APEc		APFc		APGc		APRFc		APRGc		APRHc		APRIc		APRLc	
	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw
351/2	✓	X														
401/2	•	X														
451/2	•	X														
501/2	•	X	•	X	•	X			•	X						
561/2	•	X	•	X	•	X			X	X	X	X				
631/2	•	X	•	X	X	X	•	X	X	X	X	X	X	X	X	X
711/2	•	X	X	X	X	X	•	X	X	X	X	X	X	X	X	X
801/2	X	X	•	X	X	X	•	X	X	X	X	X	X	X	X	X
901/2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1001/2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1121/2					X	X	X	X	X	X	X	X	X	X	X	X
1251/2							X	X	X	X	X	X	X	X	X	X
1401/2							X	X	X	X	X	X	X	X	X	X
1601/2							X	X	X	X	X	X	X	X	X	X
1801/2							X	X	X	X	X	X	X	X	X	X

TAB. 36 (Centrifugal fans - models APEc, APFc, APGc, APRFc, APRGc, APRHc, APRIc, APRLc)

High pressure centrifugal fans, with direct coupling by joint (N8) - Series:											
Electric motor	Model	APRF		APRG		APRH		APRI		APRL	
		Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw
4 poles	1001/2									•	X
	1121/2	✓	X	✓	X	•	X	•	X	•	X
	1251/2	✓	X	•	X	•	X	•	X	•	X
	1401/2	•	X	•	X	•	X	X	X	X	X
	1601/2	•	X	X	X	X	X	X	X	X	X
	1801/2	•	X	X	X	X	X	X	X		
6 poles	1401/2									•	X
	1601/2									•	X
	1801/2									X	X

TAB. 37 (Centrifugal fans - models APRF/N8, APRG/N8, APRH/N8, APRI/N8, APRL/N8)



		Medium pressure, direct drive centrifugal fans - Series:																			
Electric motor	Model	EU		EUM		EUK		MPR		TR		TPA		TQ		TF		TG		TH	
		Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw
2 poles	221/2	✓	✓									✓	•								
	251/2	✓	✓									✓	•								
	281/2	✓	•									✓	•								
	311/2	✓	•	✓	•	✓	•					✓	X								
	351/2	✓	•	✓	•	✓	•	✓	•			✓	X								
	401/2	✓	X	✓	X	✓	•	✓	•	✓	•	•	X					✓	•	•	X
	451/2	•	X	✓	X	✓	•	✓	•	✓	•	•	X					•	X	•	X
	501/2	•	X	•	X	•	X	✓	X	✓	•					•	X	•	X	•	X
	561/2	•	X	•	X	•	X	•	X	✓	X					•	X	•	X	•	X
	631/2			•	X	•	X			•	X					•	X	X	X	X	X
	711/2					X	X									X	X	X	X		
	801/2					X	X									X	X	X	X		
4 poles	561/2					✓	•														
	631/2	✓	•	✓	•	✓	•			✓	•			✓	•					✓	X
	711/2	✓	•	✓	•	•	X			✓	•			✓	X					✓	X
	801/2	✓	X	✓	X	•	X			✓	•			✓	X	✓	X	•	X	•	X
	901/2	•	X	✓	X	•	X			✓	X			•	X	•	X	•	X	•	X
	1001/2	•	X	•	X	•	X			•	X					•	X	•	X	•	X
	1121/2	•	X	•	X	X	X			•	X							X	X	X	X
	1251/2			•	X	X	X			•	X										
	1401/2					X	X			X	X										
6 poles	1121/2			•	X	•	X														
	1251/2					•	X														
	1401/2					•	X														

TAB. 38 (Centrifugal fans - models EU, EUM, EUK, MPR, TR, TPA, TQ, TF, TG, TH)

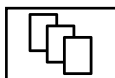


Model	Medium pressure, belt drive centrifugal fans - Series:																	
	EUc		EUMc		EUKc		TRc		TTRc		TFc		TGc		THc		MPRc	
	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw
221/2	✓	•																
251/2	✓	•																
281/2	✓	X																
311/2	•	X	✓	X	•	X												
351/2	•	X	✓	X	•	X											✓	X
401/2	•	X	•	X	•	X	•	X					•	X	•	X	•	X
451/2	•	X	•	X	•	X	•	X					•	X	•	X	•	X
501/2	•	X	•	X	•	X	•	X			•	X	•	X	•	X	•	X
561/2	•	X	•	X	•	X	•	X	•	X	•	X	X	X	•	X	•	X
631/2	•	X	•	X	X	X	•	X	•	X	•	X	•	X	•	X		
711/2	•	X	•	X	X	X	•	X	X	X	•	X	•	X	X	X		
801/2	•	X	•	X	X	X	•	X	X	X	•	X	•	X	X	X		
901/2	•	X	•	X	X	X	•	X	X	X	•	X	X	X	X	X		
1001/2	•	X	•	X	X	X	•	X	X	X	X	X	X	X	X	X		
1121/2	•	X	X	X	X	X	•	X	X	X			X	X	X	X		
1251/2	•	X	X	X	X	X	X	X	X	X								
1401/2	•	X	X	X	X	X	X	X	X	X								
1601/2	•	X	X	X	X	X	X	X	X	X								
1801/2	X	X	X	X	X	X	X	X										
2001/2	X	X	X	X	X	X	X	X										

TAB. 39 (Centrifugal fans - models EUc, EUMc, EUKc, TRc, TTRc, TFc, TGc, THc, MPRc)

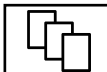
Model	Low pressure, belt drive axial fans - Series:	
	EVc	
	Lp	Lw
400	✓	X
500	•	X
630	✓	X
710	•	X
800	•	X
900	•	X
1000	•	X
1120	•	X
1250	•	X
1400	•	X

TAB. 40 (Axial fans models EVc)



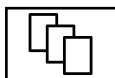
Electric motor	Model	Low pressure, direct drive axial fans - Series:					
		EVP-EVF-EVL (HZ 50)		EVP-EVF-EVL (HZ 60)		EVT	
		Lp	Lw	Lp	Lw	Lp	Lw
2 poles	315	✓	•	•	X		
	355	✓	•	•	X		
	400	✓	X	•	X		
	450	•	X				
	500	•	X				
	560	•	X				
	630	X	X				
4 poles	315	✓	✓	✓	✓		
	355	✓	✓	✓	•		
	400	✓	✓	✓	•		
	450	✓	•	✓	•		
	500	✓	•	✓	•		
	560	✓	•	✓	X	✓	•
	630	✓	•	✓	X	✓	•
	710	✓	•	•	X	✓	•
	800	✓	X	•	X	✓	X
	900	•	X	•	X		
	1000	•	X				
	1120	•	X				
6 poles	630	✓	•	✓	•	✓	•
	710	✓	•	✓	•	✓	•
	800	✓	•	✓	X	✓	•
	900	✓	•	✓	X	✓	•
	1000	✓	•	•	X	✓	•
	1120	✓	X	•	X		
	1250	•	X				
	1400	•	X				
8 poles	1120	✓	•	•	X		
	1250	✓	X	•	X		
	1400	✓	X	•	X		

TAB. 41 (Axial fans models EVP, EVF, EVL, EVT)



Electric motor	Model	Low pressure, direct drive centrifugal fans - Series:					
		BP		BPR		BT	
		Lp	Lw	Lp	Lw	Lp	Lw
2 poles	161	✓	✓				
	201	✓	•				
	221	✓	X				
	251	•	X				
	281						
	311						
	351			✓	X		
	401			✓	X		
	451			•	X		
	501			•	X		
4 poles	161	✓	✓				
	201	✓	✓				
	221	✓	✓				
	251	✓	✓				
	281	✓	✓				
	311	✓	•				
	351	✓	•	✓	✓	✓	✓
	401	✓	X	✓	•	✓	•
	451	•	X	✓	•	✓	•
	501	•	X	✓	•	✓	•
	561			✓	•	✓	X
	631			✓	X	✓	•
	711			✓	X		
	801			•	X		
	901			•	X		
	1001			•	X		

TAB. 42 (Centrifugal fans - models BP, BPR, BT)



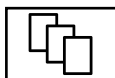
		Low pressure, direct drive centrifugal fans - Series:					
Electric motor	Model	BP		BPR		BT	
		Lp	Lw	Lp	Lw	Lp	Lw
6 poles	311	✓	✓				
	351	✓	✓				
	401	✓	•				
	451	✓	X				
	501	✓	•	✓	✓	✓	✓
	561			✓	✓	✓	•
	632			✓	•	✓	•
	711			✓	•		
	801			✓	X		
	901			✓	X		
	1001			✓	X		
	1121			•	X		
	1251			•	X		
	1401			•	X		
8 poles	631					✓	✓

TAB. 43 (Centrifugal fans - models BP, BPR, BT)



Model	Low pressure, belt drive centrifugal fans - Series:					
	BPRc		BPc		BPRDc	
	Lp	Lw	Lp	Lw	Lp	Lw
251/2			✓			
281/2			✓			
311/2			✓	•		
351/2			✓	•		
401/2	•	X	✓	•		
451/2	•	X	✓	•		
501/2	•	X	•	•	•	X
561/2	•	X	✓	•	•	X
631/2	•	X	•	X	•	X
711/2	•	X	•	X	•	X
801/2	•	X	•	X	•	X
901/2	•	X	•	X	•	X
1001/2	•	X	•	X	•	X
1121/2	•	X			•	X
1251/2	X	X			•	X
1401/2	X	X			•	X
1601/2	X	X				
1801/2	•	X				
2001/2	•	X				

TAB. 44 (Centrifugal fans - models BPc, BPRc, BPRDc)

**13.3- Weights (TAB. 46÷TAB. 63)**

<i>Legend:</i>				
✓ =	≤ 25 kg	C = Case	Su = Support	Bal = Lower BT base
• =	25 < kg ≤ 75	G = Impeller	V = Fan	BaS = Upper BT base
O =	75 < kg ≤ 150	S = Base	K = Case xcing device	R = BT net
x =	kg > 150	B = Cone	Cv = PVC cover	= Welded case - pressed cone

		High pressure, direct drive centrifugal fans - Series:																			
Electric motor	Model	APE				APF					APG					APRF					
		C	G	S	V	C	G	S	B	V	C	G	S	B	V	C	G	S	B	V	
2 poles	351/2	✓	✓	✓	✓																
	401/2	✓	✓	✓	✓																
	451/2	✓	✓	✓	•																
	501/2	✓	✓	✓	•	✓	✓	✓		•	✓	✓	✓		•						
	561/2	✓	✓	✓	•	•	✓	✓		•	•	•	✓		O						
	631/2	✓	✓	✓	•	•	•	✓		•	•	•	✓		X	•	•	✓		O	
	711/2	•	•	✓	O	•	•	✓		O	O	O	•		X	•	•	✓		O	
	801/2	•	•	•	O	O	O	•		X	O	O	•		X	O	O	•		X	
	901/2	•	•	•	X	O	X	•	•	X	X	X	•	•	X	O	O	•	•	X	
	1001/2															X	X	•	•	X	
	1121/2															X	X	O	•	X	
4 poles	631/2																				
	711/2																				
	801/2															•	•	✓		X	
	901/2															O	O	•	•	X	
	1001/2															O	X	•	•	X	
	1121/2															X	X	O	•	X	

TAB. 45 (Centrifugal fans - models APE, APF, APG, APRF)

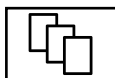


		High pressure, direct drive centrifugal fans - Series:																			
Electric motor	Model	APRG					APRH					APRI					APRL				
		C	G	S	B	V	C	G	S	B	V	C	G	S	B	V	C	G	S	B	V
2 poles	351/2																				
	401/2																				
	451/2																				
	501/2	✓	✓	✓		•															
	561/2	•	✓	✓		•	•	•	✓		○										
	631/2	•	•	✓		○	•	•	✓		○	○	•	•		×	○	○	•	•	×
	711/2	○	•	•		×	○	○	•		×	○	○	•		×	○	×	•	•	×
	801/2	○	○	•		×	○	○	•		×	○	○	•		×	×	×	○	•	×
	901/2	○	×	•	•	×	○	×	•	•	×	○	×	•	•	×					
	1001/2	×	×	○	•	×	○	×	•	•	×	×	×	○	•	×					
	1121/2	×	×	○	•	×															
4 poles	631/2						•	•	✓		×										
	711/2						○	•	✓		×	○	•	✓		×					
	801/2	○	○	•		×	○	○	•		×	○	○	•		×					
	901/2	○	○	•	•	×	○	○	•	•	×	○	○	•	•	×					
	1001/2	○	×	•	•	×	○	×	•	•	×	×	×	○	•	×					
	1121/2	×	×	○	•	×															

TAB. 46 (Centrifugal fans - models APRG, APRH, APRI, APRL)

		High pressure, double stage, direct drive centrifugal fans - Series:																											
Model	APRED									APRFD									APRGD										
	C1	C2	G1	G2	B1	B2	S	T	V	C1	C2	G1	G2	B1	B2	S	T	V	C1	C2	G1	G2	B1	B2	S	T	V		
631/2	•	•	✓	✓			•	✓	X	•	•	•	•			•	•	X											
711/2	•	•	•	•			•	•	X	○	○	•	•			○	•	X											
801/2	•	•	•	•			○	•	X	○	○	○	○			○	○	X											
901/2	○	○	•	•	✓	✓	○	•	X	X	X	○	○	✓	✓	X	○	X	X	X	X	X	•	•	X	X	X	X	
1001/2	○	○	○	○	✓	✓	X	○	X	X	X	X	X	•	•	X	X	X	X	X	X	X	•	•	X	X	X	X	
1121/2	X	X	X	X	•	•	X	X	X	X	X	X	X	•	•	X	X	X											

TAB. 47 (Centrifugal fans - models APRED, APRFD, APRGD)

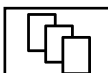


Model	High pressure, belt drive centrifugal fans - Series:																							
	APEc						APFc						APGc						APRFc					
	C	G	S	B	Su	V	C	G	S	B	Su	V	C	G	S	B	Su	V	C	G	S	B	Su	V
351/2	✓	✓	✓		✓	•																		
401/2	✓	✓	✓		✓	•																		
451/2	✓	✓	✓		✓	•																		
501/2	✓	✓	✓		✓	•	✓	✓	✓		✓	•	•	•	✓		✓	O						
561/2	✓	✓	✓		✓	•	✓	✓	✓		✓	O	•	•	✓		•	O						
631/2	✓	✓	✓		✓	•	•	•	✓		✓	O	•	•	✓		•	X	•	•	✓		✓	O
711/2	•	✓	✓		✓	O	•	•	✓		•	X	O	•	✓		•	X	•	•	✓		✓	O
801/2	•	•	✓		✓	O	O	•			•	X	O	O	•		•	X	•	•	✓		•	X
901/2	•	•	✓		•	X	O	O	•	•	•	X	O	O	•	•	•	X	O	O	•	✓	•	X
1001/2	•	O	•	✓	•	X	O	X	•	•	•	X	X	X		•	•	X	O	O	•	•	•	X
1121/2													X	X		•	•	X	X	X	•	•	•	X
1251/2																			X	X	O	•	•	X
1401/2																			X	X		O	•	X
1601/2																			X	X		O	•	X
1801/2																			X	X		O	•	X

TAB. 48 (Centrifugal fans - models APEc, APFc, APGc, APRFc)

Model	High pressure, belt drive centrifugal fans - Series:																							
	APRGc						APRHc						APRIc						APRLc					
	C	G	S	B	Su	V	C	G	S	B	Su	V	C	G	S	B	Su	V	C	G	S	B	Su	V
351/2																								
401/2																								
451/2																								
501/2	•	✓	✓		✓	O																		
561/2	•	•	✓		✓	O	•	•	✓		•	O												
631/2	•	•	✓		•	O	•	•	✓		•	X	•	•	✓		•	X	•	•	•	✓	•	X
711/2	•	•	✓		•	X	O	•			•	X	O	O	•		•	X	O	O	•	✓	•	X
801/2	O	•	•		•	X	O	O	•		•	X	O	O	•	•	•	X	O	O	•	•	•	X
901/2	O	O	•	•	•	X	O	O	•	•	•	X	O	X	•	•	•	X	X	X		•	•	X
1001/2	X	X		•	•	X	X	X		•	•	X	X	X		•	•	X	X	X		•	•	X
1121/2	X	X		•	•	X	X	X		•	•	X	X	X		•	•	X	X	X		•	•	X
1251/2	X	X		•	•	X	X	X		O	O	X	X	X		O	O	X	X	X		O	O	X
1401/2	X	X		O	O	X	X	X		O	O	X	X	X		O	O	X	X	X		O	O	X
1601/2	X	X		O	O	X	X	X		O	O	X	X	X		X	O	X	X	X		X	O	X
1801/2	X	X		X	O	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X

TAB. 49 (Centrifugal fans - models APRGc, APRHc, APRIc, APRLc)

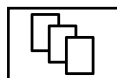


		High pressure centrifugal fans, with direct coupling by joint (N8) - Series:																								
Electric motor	Model	APRF					APRG					APRH					APRI					APRL				
		C	G	B	Su	V	C	G	B	Su	V	C	G	B	Su	V	C	G	B	Su	V	C	G	B	Su	V
4 poles	1001/2																					X	X	O	•	X
	1121/2	X	X	O	•	X	X	X	O	•	X	X	X	O	•	X	X	X	O	•	X	X	X	O	•	X
	1251/2	X	X	O	•	X	X	X	O	•	X	X	X	O	•	X	X	X	O	•	X	X	X	X	•	X
	1401/2	X	X	O	•	X	X	X	O	•	X	X	X	O	•	X	X	X	X	•	X	X	X	X	O	X
	1601/2	X	X	X	•	X	X	X	X	•	X	X	X	X	O	X	X	X	X	O	X	X	X	X	O	X
	1801/2	X	X	X	•	X	X	X	X	O	X	X	X	X	O	X	X	X	X	O	X					
6 poles	1401/2																					X	X	X	O	X
	1601/2																					X	X	X	O	X
	1801/2																					X	X	X	O	X

TAB. 50 (Centrifugal fans - models APRF/N8, APRG/N8, APRH/N8, APRI/N8, APRL/N8)

		Medium pressure, direct drive centrifugal fans - Series:																								
	Model	EU					EUM					EUK					MPR					TR				
		C	G	S	B	V	C	G	S	B	V	C	G	S	B	V	C	G	S	B	V	C	G	S	B	V
2 poles	221/2	✓	✓	✓	✓	✓																				
	251/2	✓	✓	✓	✓	✓																				
	281/2	✓	✓	✓	✓	✓																				
	311/2	✓	✓	✓	✓	•	✓	✓	✓	✓	•	✓	✓	✓	✓	•										
	351/2	✓	✓	✓	✓	•	✓	✓	✓	✓	•	✓	✓	✓	✓	•	✓	✓	✓	✓	✓					
	401/2	✓	✓	✓	✓	•	✓	✓	✓	✓	•	✓	✓	✓	✓	•	✓	✓	✓	✓	•	✓	✓	✓	✓	•
	451/2	✓	•	✓	✓	•	•	•	✓	✓	O	•	•	✓	✓	O	✓	✓	✓	✓	•	✓	•	✓	✓	•
	501/2	•	•	✓	✓	O	•	•	✓	✓	O	•	•	✓	✓	O	✓	✓	✓	✓	•	•	•	✓	✓	O
	561/2	•	•	✓	✓	O	•	•	✓	✓	O	•	•	✓	✓	O	•	•	✓	✓	O	•	•	✓	✓	O
	631/2						•	O	•	✓	X	•	O	•	✓	O						•	•	✓	✓	O
4 poles	561/2											•	•	✓	✓	O										
	631/2	•	•	✓	✓	O	•	•	•	✓	X	•	•	•	✓	X						•	•	✓	✓	O
	711/2	O	O	•	✓	X	O	O	•	✓	X	O	O	•	✓	X						O	O	•	•	X
	801/2	X	O		•	X	X	O		•	X	X	O		•	X						X	O		•	X
	901/2	X	O		•	X	X	X		•	X	X	O		•	X						X	X		•	X
	1001/2	X	O		•	X	X	X		•	X	X	X		•	X						X	X		•	X
	1121/2	X	O		O	X	X	X		•	X	X	X		•	X						X	X		O	X
	1251/2						X	X		O	X	X	X		O	X						X	X		O	X
	1401/2						X	X		O	X											X	X		O	X
6 poles	1121/2											X	X		•	X										
	1251/2											X	X		O	X										
	1401/2											X	X		O	X										

TAB. 51 (Centrifugal fans - models EU, EUM, EUK, MPR, TR)



		Medium pressure, direct drive centrifugal fans - Series:																					
Electric motor	Model	BP					BPR					BT						TPA					
		C	G	S	B	V	C	G	S	B	V	Cv	Bal	BaS	G	R	V	C	G	S	B	V	
2 poles	161/2	✓	✓	✓	✓	✓																	
	201/2	✓	✓	✓	✓	✓																	
	221/2	✓	✓	✓	✓	✓												✓	✓	✓	✓	✓	
	251/2	✓	✓	✓	✓	•												✓	✓	✓	✓	✓	
	281/2																	✓	✓	✓	✓	✓	
	311/2																	✓	✓	✓	✓		•
	351/2						✓	✓	✓	✓	•							✓	✓	✓	✓		•
	401/2						✓	•	✓	✓	•							✓	✓	✓	✓		•
	451/2						•	•	✓	✓	O							✓	•	✓	✓		•
	501/2						•	•	✓	✓	O												
4 poles	161/2	✓	✓	✓	✓	✓																	
	201/2	✓	✓	✓	✓	✓																	
	221/2	✓	✓	✓	✓	✓																	
	251/2	✓	✓	✓	✓	✓																	
	281/2	✓	✓	✓	✓	•																	
	311/2	✓	✓	✓	✓	•																	
	351/2	✓	✓	✓	✓	•	✓	✓	✓	✓	•	✓	✓	✓	✓	✓	•						
	401/2	✓	✓	✓	✓	•	✓	✓	✓	✓	•	✓	✓	✓	✓	✓	•						
	451/2	•	•	✓	✓	O	✓	•	✓	✓	•	✓	✓	✓	✓	✓	•						
	501/2	•	•	✓	✓	O	•	•	✓	✓	O	✓	✓	✓	✓	✓	•						
	561/2						•	•	✓	✓	O	✓	✓	✓	•	✓	•						
	631/2						•	•	✓	✓	O												
	711/2						O	O			•	X											
	801/2						O	O			•	X											
	901/2						X	X			•	X											
	1001/2						X	X			•	X											

TAB. 52 (Centrifugal fans - models BP, BPR, BT, TPA)

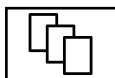


		Medium pressure, direct drive centrifugal fans - Series:																				
Electric motor	Model	BP					BPR					BT						TPA				
		C	G	S	B	V	C	G	S	B	V	Cv	Bal	BaS	G	R	V	C	G	S	B	V
6 poles	311/2	✓	✓	✓	✓	•																
	351/2	✓	✓	✓	✓	•																
	401/2	✓	✓	✓	✓	•																
	451/2	•	•	✓	✓	•																
	501/2	•	•	✓	✓	O	•	•	✓	✓	O	✓	✓	✓	✓	✓	•					
	561/2	•	•	✓	✓	O	•	•	✓	✓	O	✓	✓	✓	•	✓	•					
	632/2						•	•	✓	✓	O	✓	✓	✓	•	✓	O					
	711/2						O	O	•	✓	X											
	801/2						O	O	•	•	X											
	901/2						X	X		•	X											
	1001/2						X	X		•	X											
	1121/2						X	X		O	X											
	1251/2						X	X		O	X											
	1401/2						X	X		O	X											
8 poles	631/2											✓	✓	✓	•	✓	O					

TAB. 53 (Centrifugal fans - models BP, BPR, BT, TPA)

		Medium pressure, direct drive centrifugal fans - Series:																			
Electric motor	Model	TQ					TF					TG					TH				
		C	G	S	B	V	C	G	S	B	V	C	G	S	B	V	C	G	S	B	V
2 poles	401/2											✓	✓	✓		•	✓	✓	✓	✓	•
	451/2											✓	✓	✓		•	✓	•	✓	✓	•
	501/2						✓	✓	✓		•	•	✓	✓		•	•	•	✓	✓	O
	561/2						•	•	✓		•	•	•	✓		O	•	•	✓	✓	O
	631/2						•	•	✓		O	•	•	✓		O	•	O	•	✓	X
	711/2						•	•	✓		O	•	•	✓		X					
	801/2						•	•	✓		X	O	O	•		X					
4 poles	631/2	•	•	✓	✓	O											•	•	✓	✓	X
	711/2	•	•	✓	✓	O											O	O		✓	X
	801/2	•	•	•	✓	X	•	•	✓		O	•	•	✓		X	O	O		•	X
	901/2	O	O	•	✓	X	•	O	•	✓	X	O	O	•	✓	X	X	X		•	X
	1001/2						O	O	•	•	X	O	O	•	•	X	X	X		•	X
	1121/2											O	O	•	•	X	X	X		•	X

TAB. 54 (Centrifugal fans - models TQ, TF, TG, TH)



	Medium pressure, belt drive centrifugal fans - Series:																	
Model	EUc						EUMc						TRc					
	C	G	S	B	Su	V	C	G	S	B	Su	V	C	G	S	B	Su	V
221/2	✓	✓	✓	✓	✓	✓												
251/2	✓	✓	✓	✓	✓	✓												
281/2	✓	✓	✓	✓	✓	•												
311/2	✓	✓	✓	✓	✓	•	✓	✓	✓	✓	✓	•						
351/2	✓	✓	✓	✓	✓	•	✓	✓	✓	✓	✓	•						
401/2	✓	•	✓	✓	✓	O	✓	✓	✓	✓	✓	O	✓	✓	✓	✓	✓	•
451/2	•	•	✓	✓	✓	O	✓	•	✓	✓	✓	O	✓	✓	✓	✓	✓	O
501/2	•	•	✓	✓	•	O	•	•	✓	✓	•	O	•	•	✓	✓	•	O
561/2	•	•	✓	✓	•	X	•	•	✓	✓	•	O	•	•	✓	✓	•	X
631/2	•	•	✓	✓	•	X	•	•	•	✓	•	X	•	•	✓	✓	•	X
711/2	O	O		•	•	X	O	O		✓	•	X	O	O		•	•	X
801/2	X	O		•	•	X	X	O		•	•	X	O	O		•	•	X
901/2	X	X		•	•	X	X	X		•	•	X	X	O		•	•	X
1001/2	X	X		•	•	X	X	X		•	•	X	X	X		•	•	X
1121/2	X	X		O	•	X	X	X		•	•	X	X	X		O	•	X
1251/2	X	X		O	•	X	X	X		O	O	X	X	X		O	O	X
1401/2	X	X		O	O	X	X	X		O	O	X	X	X		O	O	X
1601/2	X	X		X	O	X	X	X		X	O	X	X	X		X	O	X
1801/2	X	X		X	O	X	X	X		X	X	X	X	X		X	X	X
2001/2	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X

TAB. 55 (Centrifugal fans - models EUc, EUMc, TRc)

	Medium pressure, belt drive centrifugal fans - Series:																	
Model	TTRc						TFc						TGc					
	C	G	S	B	Su	V	C	G	S	B	Su	V	C	G	S	B	Su	V
401/2													✓	✓	✓		✓	•
451/2													✓	✓	✓		✓	•
501/2							✓	✓	✓		✓	•	•	✓	✓		✓	•
561/2	•	•	✓	✓	•	X	•	✓	✓		✓	O	•	•	✓		•	O
631/2	•	•	✓	✓	•	X	•	•	✓		✓	O	•	•	✓		•	O
711/2	O	O		•	•	X	•	•	✓		•	O	•	•	✓		•	X
801/2	X	O		•	•	X	•	•	✓		•	X	O	•	•		•	X
901/2	X	X		•	•	X	O	O	•	•	•	X	O	O	•	•	•	X
1001/2	X	X		•	•	X	O	O	•	•	•	X	X	X	•	•	•	X
1121/2	X	X		O	•	X							X	X	•	•	•	X
1251/2	X	X		O	O	X												
1401/2	X	X		O	O	X												
1601/2	X	X		X	O	X												

TAB. 56 (Centrifugal fans - models TTRc, TFc, TGc)



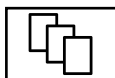
Medium pressure, belt drive centrifugal fans - Series:																		
Model	THc						BPRc						BPc					
	C	G	S	B	Su	V	C	G	S	B	Su	V	C	G	S	B	Su	V
221/2																		
251/2													✓	✓	✓	✓	✓	•
281/2													✓	✓	✓	✓	✓	•
311/2													✓	✓	✓	✓	✓	•
351/2													✓	✓	✓	✓	✓	•
401/2	✓	✓	✓	✓	✓	O	✓	✓	✓	✓	✓	O	✓	✓	✓	✓	✓	O
451/2	✓	•	✓	✓	✓	O	✓	•	✓	✓	✓	O	•	•	✓	✓	✓	O
501/2	•	•	✓	✓	•	O	•	•	✓	✓	•	O	•	•	✓	✓	•	O
561/2	•	•	✓	✓	•	X	•	•	✓	✓	•	X	•	•	✓	✓	•	X
631/2	•	•	✓	✓	•	X	•	•	•	✓	•	X	•	•	✓	✓	•	X
711/2	O	O		•	•	X	O	O	•	✓	•	X	O	O	•	•	•	X
801/2	X	O		•	•	X	O	O	•	•	•	X	O	O	•	•	•	X
901/2	X	X		•	•	X	X	X		•	•	X	X	X		•	•	X
1001/2	X	X		•	•	X	X	X		•	•	X	X	X		•	•	X
1121/2	X	X		O	•	X	X	X		O	•	X						
1251/2							X	X		O	•	X						
1401/2							X	X		O	O	X						
1601/2							X	X		X	O	X						
1801/2							X	X		X	O	X						
2001/2							X	X		X	X	X						

Model	EUKc					
	C	G	S	B	Su	V
221/2						
251/2						
281/2						
311/2	✓	✓	✓	✓	✓	•
351/2	✓	✓	✓	✓	✓	•
401/2	✓	✓	✓	✓	✓	O
451/2	✓	•	✓	✓	✓	O
501/2	•	•	✓	✓	•	O
561/2	•	•	✓	✓	•	O
631/2	•	•	•	✓	•	X
711/2	O	O		✓	•	X
801/2	X	O		•	•	X
901/2	X	X		•	•	X
1001/2	X	X		•	•	X
1121/2	X	X		•	•	X
1251/2	X	X		O	O	X
1401/2	X	X		O	O	X
1601/2	X	X		X	O	X
1801/2	X	X		X	X	X
2001/2	X	X		X	X	X

TAB. 57 (Centrifugal fans - models THc, BPRc, BPc, EUKc)

Low pressure, belt drive axial fans - Series:				
Model	EVc			
	T	G	Su	V
400	✓	✓	✓	✓
500	✓	✓	✓	•
630	•	✓	✓	•
710	•	✓	✓	O
800	•	✓	✓	O
900	O	•	✓	O
1000	O	•	•	X
1120	O	•	•	X
1250	X	•	•	X
1400	X	•	•	X

TAB. 58 (Axial fans models EVc)



		Low pressure, direct drive axial fans - Series:																							
Electric motor	Model	EVP HZ 50			EVF HZ 50			EVL HZ 50			EVP HZ 60			EVF HZ 60			EVL HZ 60			EVT					
		T	G	V	T	G	V	T	G	V	T	G	V	T	G	V	T	G	V	T	G	Cv	Ba	V	
2 poles	315	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	355	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	400	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	450				✓	✓	✓	✓	✓	•															
	500				✓	✓	•	✓	✓	•															
	560				•	✓	•	•	•	•															
	630				•	•	•	•	•	O															
4 poles	315	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	355	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	400	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	450	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	500	✓	✓	✓	✓	✓	✓	✓	✓	•	✓	✓	✓	✓	✓	✓	✓	✓	•						
	560				✓	✓	✓	✓	✓	•				✓	✓	✓	✓	✓	•	✓	✓	✓	✓	•	
	630				✓	✓	•	✓	✓	•				✓	✓	•	•	✓	•	✓	✓	✓	✓	•	
	710				•	✓	•	•	•	•				•	✓	•	•	•	O	✓	✓	✓	✓	•	
	800				•	•	O	•	•	O				•	•	O	•	•	O	•	✓	✓	✓	✓	•
	900				•	•	O	O	•	O				O	•	X	O	O	X						
	1000				O	•	O	O	O	X															
	1120				O	O	X	X	O	X															
6 poles	630				✓	✓	✓	✓	✓	•				✓	✓	✓	✓	✓	•	✓	✓	✓	✓	•	
	710				•	✓	•	✓	✓	•				•	✓	•	•	•	•	✓	✓	✓	✓	•	
	800				•	✓	•	•	•	O				•	•	•	•	•	O	✓	✓	✓	✓	•	
	900				•	•	O	•	•	O				•	•	O	O	•	X	•	✓	✓	✓	O	
	1000				•	•	O	O	•	X				O	•	O	O	•	X	•	•	✓	✓	O	
	1120				O	•	X	O	O	X				O	•	X	O	O	X						
	1250				O	O	X	X	O	X															
	1400				X	O	X	X	X	X															
8 poles	1120				O	•	O	O	•	X				O	•	X	O	O	X						
	1250				O	O	X	X	O	X				O	O	X	X	O	X						
	1400				X	O	X	X	X	X				X	O	X	X	X	X						

TAB. 59 (Axial fans - models EVP, EVF, EVL, EVT)

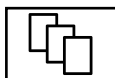


		Low pressure, direct drive centrifugal fans - Series:															
Electric motor	Model	BP					BPR					BT					
		C	G	S	B	V	C	G	S	B	V	Cv	Bal	BaS	G	R	V
2 poles	161/2	✓	✓	✓	✓	✓											
	201/2	✓	✓	✓	✓	✓											
	221/2	✓	✓	✓	✓	✓											
	251/2	✓	✓	✓	✓	•											
	281/2																
	311/2																
	351/2						✓	✓	✓	✓	•						
	401/2						✓	•	✓	✓	•						
	451/2						•	•	✓	✓	O						
	501/2						•	•	✓	✓	O						

TAB. 60 (Centrifugal fans - models BP, BPR, BT)

	Low pressure, belt drive centrifugal fans - Series:																			
Electric motor	BPRc						BPc						BPRDc							
	C	G	S	B	Su	V	C	G	S	B	Su	V	C	G	K1	K2	B1	B2	Su	V
251/2							✓	✓	✓	✓	✓	•								
281/2							✓	✓	✓	✓	✓	•								
311/2							✓	✓	✓	✓	✓	•								
351/2							✓	✓	✓	✓	✓	•								
401/2	✓	✓	✓	✓	✓	O	✓	✓	✓	✓	✓	O								
451/2	✓	•	✓	✓	✓	O	•	•	✓	✓	✓	O								
501/2	•	•	✓	✓	•	O	•	•	✓	✓	•	O	•	•	✓	•	✓	✓	•	X
561/2	•	•	✓	✓	•	X	•	•	✓	✓	•	X	•	•	✓	•	✓	✓	•	X
631/2	•	•	•	✓	•	X	•	•	✓	✓	•	X	O	O	✓	•	✓	✓	•	X
711/2	O	O	•	✓	•	X	O	O	•	•	•	X	O	O	•	•	✓	✓	O	X
801/2	O	O	•	•	•	X	O	O	•	•	•	X	X	X	•	•	✓	✓	O	X
901/2	X	X		•	•	X	X	X		•	•	X	X	X	•	O	•	•	O	X
1001/2	X	X		•	•	X	X	X		•	•	X	X	X	•	O	•	•	O	X
1121/2	X	X		O	•	X							X	X	O	X	•	•	O	X
1251/2	X	X		O	•	X							X	X	O	X	•	•	X	X
1401/2	X	X		O	O	X							X	X	X	X	O	O	X	X
1601/2	X	X		X	O	X														
1801/2	X	X		X	O	X														
2001/2	X	X		X	X	X														

TAB. 61 (Centrifugal fans - models BPRc, BPc, BPRDc)



		Low pressure, direct drive centrifugal fans - Series:															
Electric motor	Model	BP					BPR					BT					
		C	G	S	B	V	C	G	S	B	V	Cv	Bal	BaS	G	R	V
4 poles	161/2	✓	✓	✓	✓	✓											
	201/2	✓	✓	✓	✓	✓											
	221/2	✓	✓	✓	✓	✓											
	251/2	✓	✓	✓	✓	✓											
	281/2	✓	✓	✓	✓	•											
	311/2	✓	✓	✓	✓	•											
	351/2	✓	✓	✓	✓	•	✓	✓	✓	✓	•	✓	✓	✓	✓	✓	•
	401/2	✓	✓	✓	✓	•	✓	✓	✓	✓	•	✓	✓	✓	✓	✓	•
	451/2	•	•	✓	✓	O	✓	•	✓	✓	•	✓	✓	✓	✓	✓	•
	501/2	•	•	✓	✓	O	•	•	✓	✓	O	✓	✓	✓	✓	✓	•
	561/2						•	•	✓	✓	O	✓	✓	✓	•	✓	•
	631/2						•	•	✓	✓	O						
	711/2						O	O		•	X						
	801/2						O	O		•	X						
	901/2						X	X		•	X						
	1001/2						X	X		•	X						
6 poles	311/2	✓	✓	✓	✓	•											
	351/2	✓	✓	✓	✓	•											
	401/2	✓	✓	✓	✓	•											
	451/2	•	•	✓	✓	•											
	501/2	•	•	✓	✓	O	•	•	✓	✓	O	✓	✓	✓	✓	✓	•
	561/2	•	•	✓	✓	O	•	•	✓	✓	O	✓	✓	✓	•	✓	•
	632/2						•	•	✓	✓	O	✓	✓	✓	•	✓	O
	711/2						O	O	•	✓	X						
	801/2						O	O	•	•	X						
	901/2						X	X		•	X						
	1001/2						X	X		•	X						
	1121/2						X	X		O	X						
	1251/2						X	X		O	X						
	1401/2						X	X		O	X						
8 poles	631/2											✓	✓	✓	•	✓	O

TAB. 62 (Centrifugal fans - models BP, BPR, BT)



13.4- Instructions for handling the packaging

The instructions for handling the package are represented by an adhesive label applied outside the packaging (s. FIG. 36).

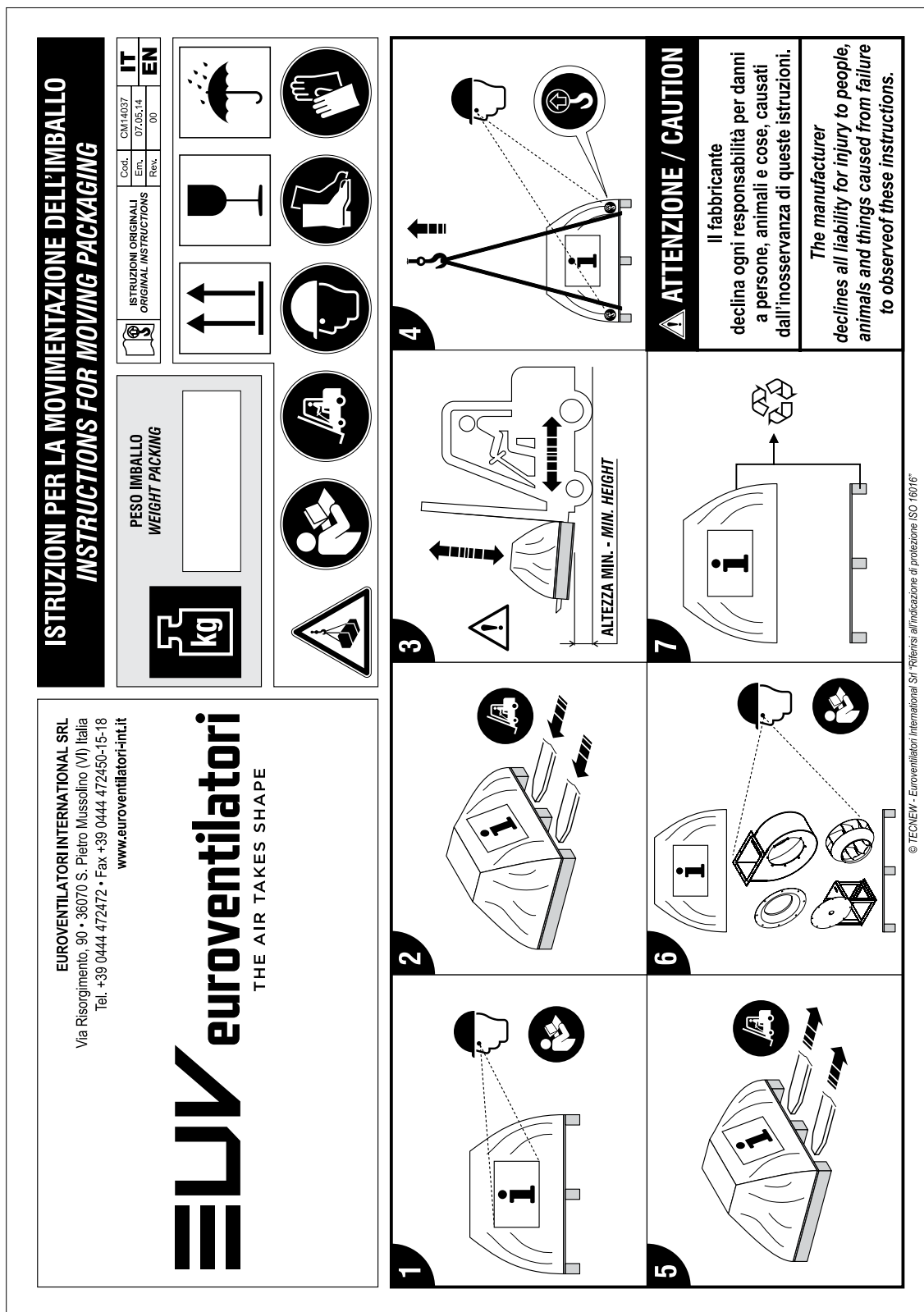


FIG. 36 (Instructions for handling the packaging)



Euroventilatori International Srl

36070 S. Pietro Mussolino (VI) Italy
Via Risorgimento 90
+39 0444 472472
info@euroventilatori.com

Company subject to management and coordination by Stelfin Srl

euroventilatori.com