



## Notes for use and maintenance

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# 1 INTRODUCTION

## 1.1 Purpose

This manual is part and parcel of the technical documentation that **must** accompany the product.

Keep the manual as a single, whole copy, taking special care as to the environment where it is kept, whether it is a printed copy or the original on magnetic support/disk, without making any corrections, cancellations, abrasions and/or anything else that may hinder the clear reading of its contents and without making any amendment whatsoever to the contents.

Keep the manual to hand for operators and maintenance personnel and anyone else who may need to consult it if carrying out interventions on the fan, on a part of it and/or near to it.

**Show the manual clearly and fully to all operators, maintenance personnel and anyone else who may need to consult it when carrying out interventions on the fan, on a part of it or near to it.**

Before using the fan read the users' manual carefully, all the instructions for use are intended to safeguard your physical safety.

In addition to protecting you and your investment, the information contained herein indicates the most suitable way to use the fan correctly as foreseen by the manufacturer.

The booklet covers three functions: as a tool for the operator, as a technical commercial reference for the Customer and as an internal company document for the company Ilmed Ventilazione Industriale.

This documentation is part and parcel of the machine and must accompany it each time it is sold or moved within the company.




The text, the pictures and the diagrams contained in the manual are the exclusive property of the company Ilmed Ventilazione Industriale.

No part of the manual can be duplicated, copied or transmitted in any form or by any electronic, mechanical or photographic means without express permission from the company.

This manual will only be updated and/or a new review or version of this manual will only be written when the machine functions are modified.

## 1.2 Safety symbols

Some information of particular importance may be preceded by the following symbols:

	DANGER: shows situations that may cause injury or damage to people.
	DANGER: live electrical parts.
	WARNING: shows important indications of particular general interest

## 2 GENERAL DETAILS

### 2.1 Manufacturing details of the centrifugal fans

Centrifugal fans are machines that relay power to a fluid that passes through them under the form of pressure and flow.

The Fans made by Ilmed Ventilazione Industriale can be divided according to the pressure in the fans into:

- high pressure
- medium pressure
- low pressure

They can be divided according to type of fluid in fans into:

- clean air
- dusty air
- transport of material

They can be divided according to the material with which the fans are made of:

- carbon steel
- stainless steel AISI 304, 316
- steel resistant to high temperatures and mechanical wear.



**WARNING:** The maximum rotation speed of the fan refers to machinery built with standard material (Fe 360). The use of stainless steel reduces the maximum rotation speed by about 10%.

The anti-spark fans are built according to AMCA Standard 99-0401-86 type C regulations.

### 2.2 Position of motors

Ilmed Ventilazione uses the position of motors with belt drives indicated in diagram Figure 2.1. as standard

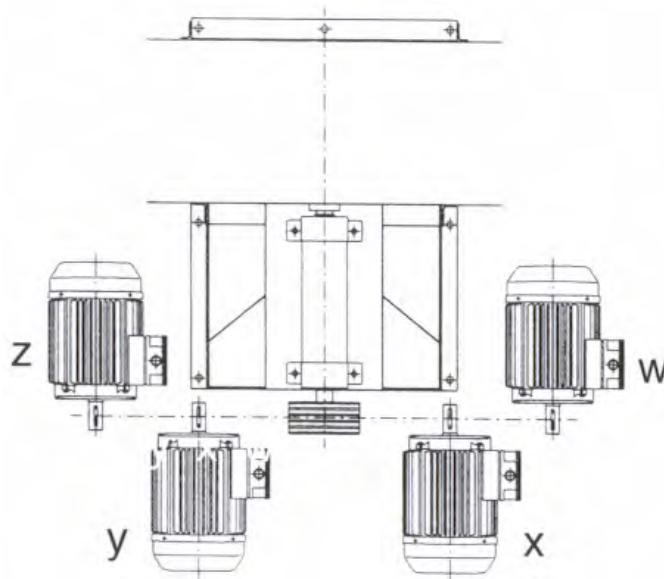


Figure 2.1 Position of motors

### 2.2.1 Direction

The direction of a fan, seen from the opposite side from the suction mouth, is referred to with the letters LG if rotation is anti-clockwise and RD is rotation is clockwise.

The rotation angle is expressed in degrees and is measured between the axis of the throw head and the perpendicular line at the support base.

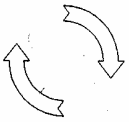
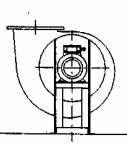
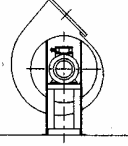
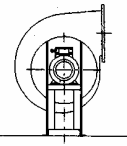
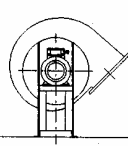
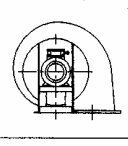
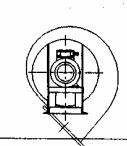
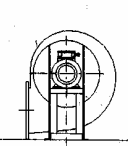
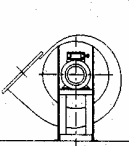
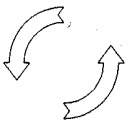
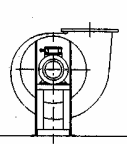
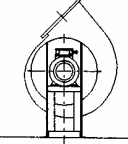
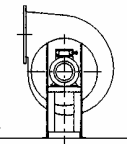
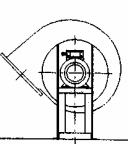
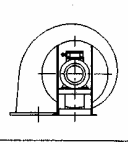
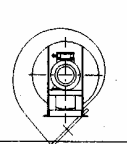
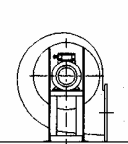
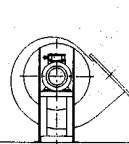
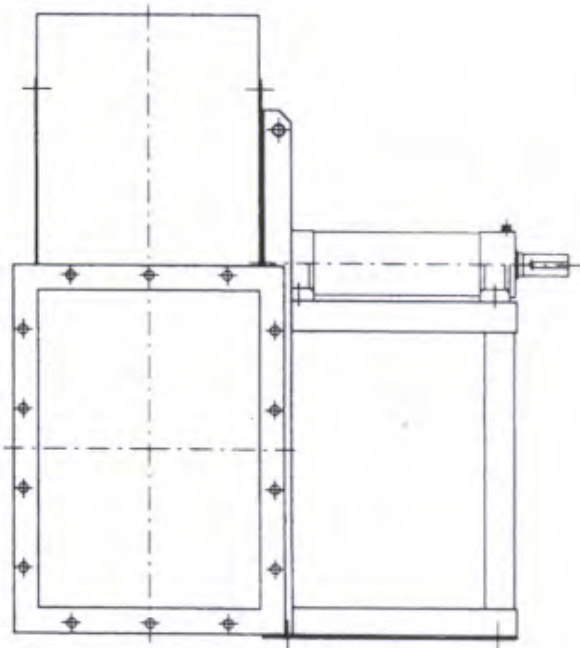
RD	0°	45°	90°	135°	180°	225°	270°	315°
								
								
LG	0°	45°	90°	135°	180°	225°	270°	315°

Figure 2.2 Angles of rotation

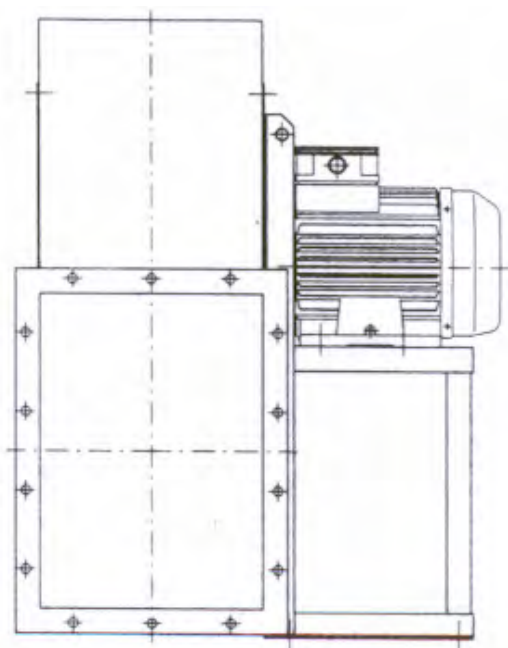
### 2.3 Standard arrangements

ARRANGEMENT 1



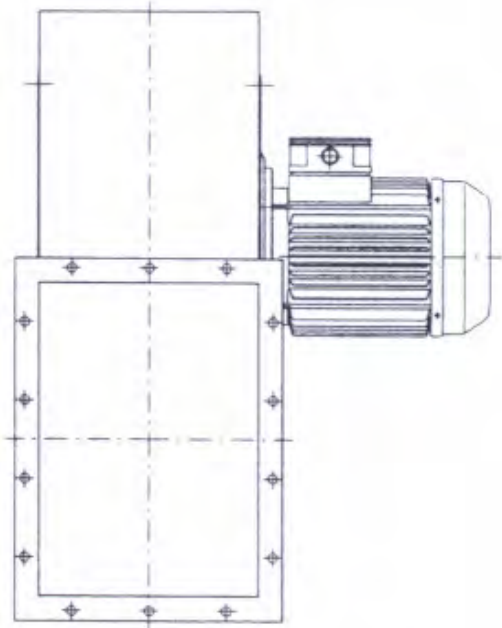
Belt coupling, wheel mounted on support shaft.  
Support held by seat.

ARRANGEMENT 4



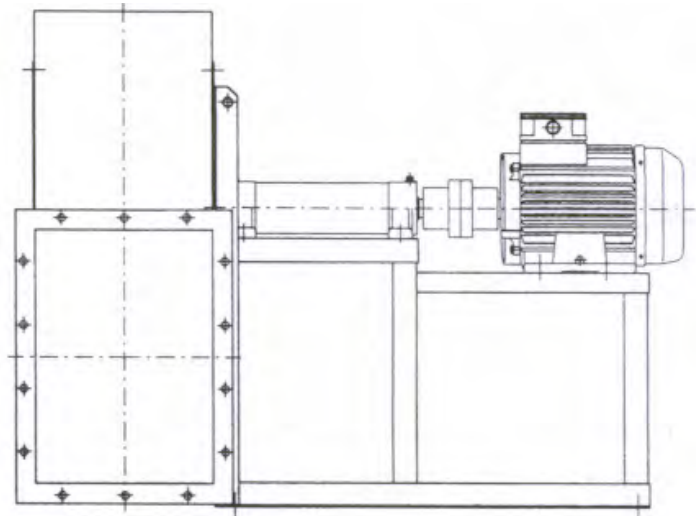
Direct coupling, wheel mounted on motor shaft.  
Motor held by seat.

**ARRANGEMENT 5**



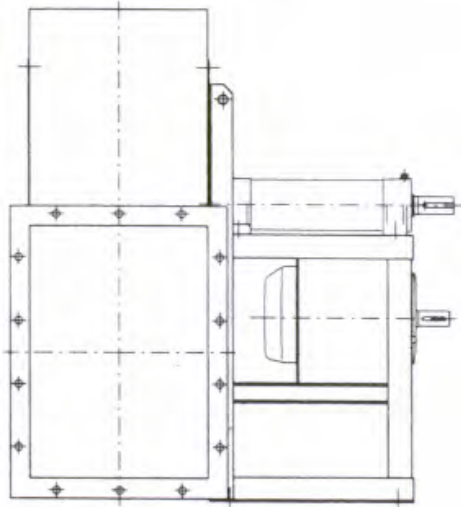
Direct coupling, wheel mounted on flanged motor shaft and held by case.

**ARRANGEMENT 8**



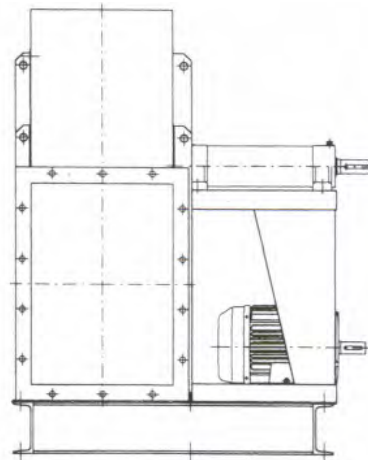
Jointed coupling, wheel mounted on support shaft linked to motor via a joint, all supported by the seat.

**ARRANGEMENT 9**



Belt coupling, same as arrangement 1 with motor mounted on side of seat in position "W"<sup>1</sup> or "Z"<sup>1</sup>.

**ARRANGEMENT 12**



Belt coupling same as arrangement 1 with fan and motor mounted on base. Position of motor "W" or "Z" and on occasion position "X" or "Y".

<sup>1</sup> See Figure 2.1.

## 2.4 Fan Identification

The plate is the only means of identifying the fan acknowledged by the manufacturer and must remain intact over the years. In Figure 2.3 an example of the ID plate that can be found on the fan is shown.



Figure 2.3 Identification plate



### 3 NOTES AND MAIN SAFETY INDICATIONS

#### 3.1 Installation



The fans can be installed using four different connections to the pipes, according to UNI 10615 regulations:

- Type A : free suction and free throw;
- Type B : free suction and throw connected to pipe;
- Type C : suction connected to pipe and free throw;
- Type D: suction and throw connected to pipe.

**If not otherwise specified in the supply contract, Ilmed Ventilazione Industriale supplies its fans according to type D above.**

The protections, installed on the fan, must be compatible with the connection to the pipe, as follows:

- Installation type A: fixed guards installed on suction and throw;
- Installation type B: guard only installed on suction;
- Installation type C: guard only installed on throw;
- Installation type D: no fixed guard installed on suction and throw.

The fan user or installer must ensure that the pipes system is equipped with guards that are compliant with the connection of the work pipes, as follows:

- Installation type A: no guard;
- Installation type B: guard mounted on pipe to throw;
- Installation type C: guard mounted on pipe to suction;
- Installation type D: guard mounted on both pipe to suction and to throw.



**WARNING: as Ilmed Ventilazione Industriale have no way of knowing the type of installation that will be used by the installer, the latter or the customer must carry out a risk analysis depending on the type of installation selected.**

**Check the efficiency of all the guards regularly; in the event of damage or breakage, replace immediately.**

**Even when a fan is not attached to the power supply, the rotating parts can still move due to air that passes through the fan from natural causes or from a flow of air induced by a fan that is in another part of the connected pipes system. Non-authorized opening of the inspection hatch which the fan may have or the removal of the connection pipe, while the fan is working can cause injury as a result of being dragged into the fan or through contact with a moving part of the fan such as the fan wheel.**

It is the responsibility of whoever carries out installation to ensure that there is adequate protection against the risk of accidental contact with moving parts.

### 3.2 Risks caused by improper use

It is highly recommended that the instructions contained in the following booklet are observed during the use and functioning of the machine, adding to and completing them with other knowledge that you may have regarding the position of the machine the environmental circumstances of the place and any other information that may in some way be considered necessary for this purpose.

- **It is necessary to abide by the safety instructions shown on the machine and in the manual, to maintain the safety devices installed in a state of effectiveness and to use the machine according to the uses foreseen and indicated by the manufacturer.**
- Ignoring the safety instructions and/or improper use of the machine may give rise to the risk of accident to yourself or to other people.
- The instructions or warning are not intended to replace the current safety laws, but are to integrate them and to encourage observance.
- We recommend that the maintenance programme as described in this manual is followed.
- Note: warnings alone do not eliminate danger!
- **Before starting up the machine, read this manual carefully, applying all the instructions and recommendations for safety contained herein. Inform other involved in using the machine of the contents.**
- **Do not place hands, arms or any other part of the body near to the moving parts. It is forbidden to reach parts of the body beyond the protection structures. The use of any means that can increase natural accessibility is forbidden.**
- When searching for the cause of any breakdown or fault on the machine, follow all the precautions set out in the Manual that can prevent any damage to people or things.
- **On completion of any extraordinary intervention that has required the removal of the guards, barriers or other protection, replace them, making sure that they are positioned correctly and effectively.**
- Before beginning any work process, concentrate on what you are about to do. Keep your concentration level and reflexes alert: these are essential conditions for the operator.
- Before beginning any work process make sure that the guards and safety devices or signal and control devices are in a good condition and operational.
- If the operator should feel ill or weak, even slightly, something which may cause his concentration to drop, he should avoid starting up the machine and inform the plant manager.
- Staff should never act with such carelessness that their actions or omissions may compromise the observance of the basic safety rules aimed at protecting the workers. In particular, even for maintenance work or when the machine is at a standstill, the staff must NEVER enter (with all or a part of the body) the danger zones marked and/or acknowledged as such.
- **It is absolutely prohibited to neutralise, remove, modify or make any safety, protection or control device anywhere on the main machine or the device ineffective.**
- All protection and safety devices must be maintained in perfect working condition. The plates showing indications and recommendations and danger must be kept in place and completely effective.


- Remember to tighten all screws, bolts and locknuts of each mechanical part that is adjusted or tuned.
- **Before using the machine, it is necessary to control the perfect wholeness of all the protection devices.**
- A non-authorized operator must **not** eliminate any defects or irregularities in the functioning of the machines and/or alter the type of functioning and installation.
- The fan may only be used for the functions indicated in the general characteristics of this manual: any other use is considered to be improper.
- **It is completely forbidden to wear wide, baggy clothing: it may become entangled in the moving parts of the machine.**
- If required by current safety laws in the country where the machine is being installed, the operator must wear the accident-prevention clothing foreseen such as, for example, glasses, gloves, suitable shoes etc. (IPD). Other additional safety equipment may be requested by the company's Internal Safety manager.
- Keep the work area clean and tidy. Untidy areas and environments may help to cause accidents or the imperfect functioning of the machine.
- **The minimum installation distances, set out in the Manual, must always be respected in order to guarantee the correct functioning of the machine, without further risks. A mistaken position could compromise the correct functioning of the fan.**
- Check that the vibration level of the fan is always monitored by qualified personnel and that any cause of malfunction and irregular vibrations are eliminated (incorrect installation position, dirt, etc).

### 3.3 Other risks connected with the fans

The specific risks of the machine are generally linked to the moving parts that can be completely protected at the design and construction phase or guarded locally using specific devices. Access to moving parts of the machine is limited by fixed protections that are placed so as not to cause further danger. Shields are also placed in particular areas of the machines and removable shields that have the same purpose as the fixed ones.

On the basis of his own experience, the manufacturer believes that the dangers listed hereunder may occur, depending on the functioning state of the machine:

The specific dangers set out here below are those deriving from the mechanical aspects of the fan.

	<p><b>A person may suffer injury as a result of:</b></p> <ul style="list-style-type: none"> <li><b>a) being dragged between a moving part and a fixed part, e.g. a fan wheel and an fixed part of the fan;</b></li> <li><b>b) being dragged into the fan due to air flow suction with consequent contact with the shaft or the wheel;</b></li> <li><b>c) danger of shearing for the operator who tries to remove the fixed protection shields;</b></li> <li><b>d) abrasion and/or shearing due to objects that may be thrown at the operator: any object that may accidentally fall into the fan mouth may come out of the pushing part of the mouth;</b></li> <li><b>e) contact with fan surfaces that are have dangerous temperatures, e.g. exceeding + 50 °C;</b></li> <li><b>f) high speed of the wheel that may cause breakage of machine parts with possible projection of parts of the wheel;</b></li> <li><b>g) deformation of the fan due to air suction with temperatures exceeding those set out;</b></li> <li><b>h) excessively low temperatures (- 15 °C) that may make the material that the fan is made from fragile, thus causing breakage;</b></li> <li><b>i) excess noise caused by the type of machinery. Use IPD and any suitable measure from the current laws in the country of installation.</b></li> </ul>
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### 3.3.1 Specific risks during maintenance

Read this section carefully before carrying out maintenance work on the machine: this will ensure greater safety conditions for the staff in charge, greater reliability of the interventions carried out and of the fan when functioning further to maintenance.



We recommend that any irregularities, interventions, spare parts and anything else that may be useful to remember should be written down in a register.

The safety rules during maintenance of the machine must take the following into account:

- Do not intervene for repairs, maintenance and replacement of worn or damaged mechanical parts. Maintenance must be carried out by qualified staff that have been trained to carry out these operations.
- During maintenance, the machine must be cordoned off and identified with signs carrying the wording "MACHINE UNDER MAINTENANCE".
- During maintenance it is necessary to use individual protection devices (IPD) such as gloves, and accident-proof shoes, in addition to provisions made by the current laws in force.
- After maintenance operations that have involved the removal of safety devices it is necessary to restore them and check their correct working with trials on the machinery.
- Create a suitable work environment fitted with any necessary equipment and with no dangerous combinations.
- Clean each reassembled piece carefully, degrease or lubricate depending on the destination of each piece.
- Check the wholeness and correct functioning of all safety devices, and guards on the machine weekly; this work must be carried out by qualified personnel.
- During maintenance and cleaning of the fan wheel pay particular attention to the rotation of the wheel, it may cause entanglement and shearing with the fixed parts of the casing.
- Even when a fan is not attached to the power supply, the rotating parts can still move due to air that passes through the fan from natural causes or from a flow of air induced by a fan that is in another part of the connected pipes system, or due to the wheel that must still come to a complete standstill. **In this case too there is a risk of entanglement and shearing with the fixed parts of the casing.**



#### **WARNING: IT IS ABSOLUTELY FORBIDDEN TO:**

- **Carry out any type of maintenance without having checked that the fan wheel is actually still.**
- **Proceed with any type of maintenance of the fan (including lubrication) without having first unplugged the fan from the general power supply.**
- **Clean the fan during functioning.**
- **Open the guards or the inspection hatches of the fan while the fan is functioning.**

**The residual risks as explained above, in spite of the profuse effort by the designers, may not completely cover the entire use of the machine. Any user who identifies potential risks that have not been previously defined must immediately inform the safety manager and other machine users.**

### 3.4 Environmental limits of use of machine

Environment	Industrial with controlled conditions, according to current laws in force.
External environmental working temperature	from 0 °C to + 40 °C
Environmental storage temperature	from -20 °C to + 55 °C
Maximum humidity	80%, with no formation of condensation
Electromagnetic disturbances	Electromagnetic fields within limits, according to current laws and rules of good technique
Dust, steam, smoke and other pollutants	Concentrations within the limits, according to current laws and rules of good technique
Atmospheric discharges	Check the need to protect the electrical installations against atmospheric discharges (CEI 11-1 sez.3)

## 4 TRANSPORTATION, STORAGE, ASSEMBLY AND INSTALLATION

Lifting and moving the fan may create dangerous situations for the people exposed to the machine. Therefore it is recommended that the instructions supplied by Ilmed Ventilazione Industriale are followed and the suitable equipment is used.

Installation and assembly must only be carried out by specialised technicians.

### 4.1 Acceptance



NB: IF THERE ARE ANY SIGNS OF DAMAGE BEFORE OR AFTER OPENING OF THE PACKAGING, IT IS NECESSARY TO INFORM THE TRANSPORTER IMMEDIATELY AND RETURN THE GOODS TO THE ILMED VENTILAZIONE INDUSTRIALE PREMISES, WHO IS NOT TO BE HELD RESPONSIBLE FOR DAMAGES WHICH OCCURRED DURING TRANSPORTATION.

## 4.2 Transportation and lifting

### 4.2.1 Lifting and moving with chains

Lifting may create dangerous situations for the people exposed to the machinery. Therefore, we **RECOMMEND** that the instructions provided by Ilmed Ventilazione Industriale in this manual are followed and to use suitable, controlled equipment.



**WARNING:** CHECK THE CORRELATION BETWEEN THE PULLING ANGLE AND THE CAPACITY TABLE SUPPLIED BY THE MANUFACTURER OF THE ROPES, CHAINS OR BANKS AND USE LIFTING MEANS THAT ARE ADEQUATE FOR THE WEIGHT OF THE FAN TO BE LIFTED, WHICH IS SHOWN ON THE IDENTIFICATION PLATE.

THE CUSTOMER IS RESPONSIBLE FOR THE SELECTION OF THE EQUIPMENT AND THE ROPES, BANDS OR CHAINS THOUGHT TO BE SUITABLE FOR THE FUNCTION AND THEIR CAPACITY; SAFE TRANSPORTATION OF THE MACHINE MUST BE GUARANTEED. CHECK THE OVERALL WEIGHT OF THE FAN ON THE ID PLATE.

BEFORE LIFTING THE MACHINE, CHECK THAT THE ROPE IS NOT LYING ON DELICATE PARTS OF THE MACHINE.

AFTER ANY MOVEMENT OF THE MACHINE, CHECK THE STATE OF THE DRIVE PARTS AND ALL THE EXPOSED PARTS OF THE MACHINE.

Therefore, we recommend that the machine should be lifted and moved with extreme care, checking that the lifting points do not cause damage to the machine.

For lifting the machine the 2 lifting points shown in Figure 4.1 must be used.

Only use the points foreseen for lifting of the fan, distributing the load uniformly.



Figure 4.1 Lifting points



**WARNING:** avoid causing deformation of the fan during movement. Take extreme care!

It is forbidden to lift the fan from the ringbolt installed on the motor. (see Figure 4.2).



Figure 4.2 Wrong lifting

#### 4.2.2 Lifting with forklift truck onto pallets

It is possible to lift the machine with a forklift truck.

During movement of the machine, to avoid tipping, we recommend that:

- The ends of the forks should come out at least 10 cm from the bulk of the pallet.
- Any brusque or sudden movements should be avoided that may cause the fan to tip over.



THE EXAMPLES SHOWN ARE PURELY FOR EXAMPLE PURPOSES, AS IT IS NOT POSSIBLE TO DETERMINE ALL THE CONFIGURATIONS WITH WHICH IT IS POSSIBLE TO LIFT OR MOVE THE FAN BEFOREHAND

#### 4.3 Storage

After factory trials, the machine is prepared for shipment, packaged and protected as agreed in the contract.

During packaging, all the parts that may move are blocked.

If the machine is allocated to be kept in a warehouse, it is recommended that the suitable precautions be taken to avoid corrosion of the parts, with particular care for the mechanical and electrical parts . Protect the fan from rain, humidity, and dust, and cover the supports, the propeller shaft and the motors.

Make regular checks to verify the good state of the fan and manually rotate the wheel once a month to avoid deformation of the bearings.

After a prolonged period of storage grease the bearings as described in the chapter Maintenance.

STORAGE TEMPERATURE : from - 25°C to + 55°C

RELATIVE HUMIDITY, NO CONDENSATION : from 5% to 90%

## 4.4 Assembly

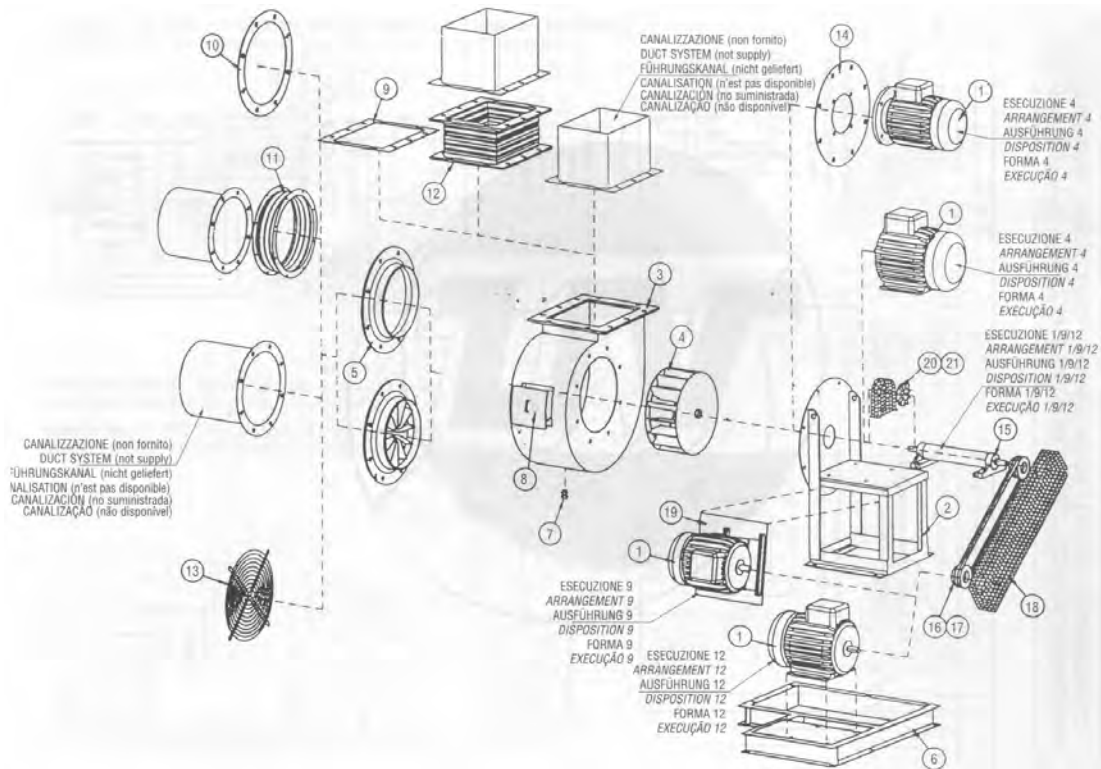


Figure 4.3 Exploded view

No.	Description	
1	Motor	
2	Seating (motor-support seat)	
3	Fan case	
4	Fan wheel	
5	Suction nozzle	
5a	Nozzle with rectifier	
6	Base (basic frame)	
7	Exhaust plug	R
8	Inspection hatch	
9	Pressing flange	R
10	Suction flange	R
11	Anti-vibration suction joint	R
12	Anti-vibration pressing joint	R
13	Protection on suction	R
14	Motor-holder Disk	
15	bearing	
16	Drive belt	
17	Belt pulley	
18	Drive belt guard	
19	Bell tightening pulley slot	
20	Cooling fan	
21	Fan Protection mesh	

R : indicates an optional component.





**NB: FOR ASSEMBLY OF FANS IN ALL ARRANGEMENTS, REFER TO THE EXPLODED VIEW IN FIGURE 4.3.**

#### 4.4.1 Centrifuge with belt drive in arrangement 1

To assemble the fan with the belt drive in arrangement 1, carry out the following operations:

1. Place the bearing 15 on the seating 2 without blocking it firmly.
2. Mount the fan wheel 4 on the bearing, fixing it with the top washer.
3. If not already welded to the seating, assemble the case 3 fixing it with bolts, and maintaining the direction.
4. Install the nozzle 5 if it is not already a part of the case.
5. Place the bearing so that the fan wheel axis is correctly aligned.



**WARNING: PAY PARTICULAR ATTENTION TO THESE OPERATIONS: AN INCORRECT ALIGNMENT WILL CAUSE THE WHEEL TO CATCH AGAINST THE NOZZLE AND THE FLUID MECHANICAL PERFORMANCE OF THE FAN CANNOT BE GUARANTEED.**

6. Fix the bearing in the set position.

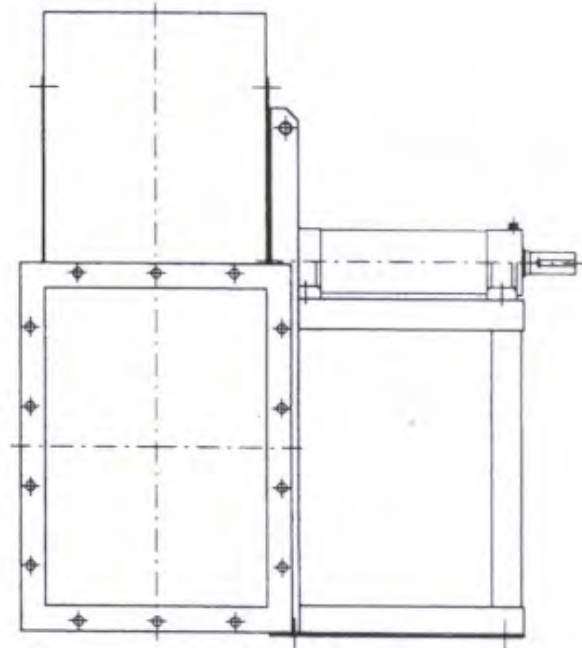


Figure 4.4 Arrangement 1

Belt coupling, wheel mounted on bearing shaft. Bearing mounted on seat.



**NB: IN THE EVENT THAT THE CUSTOMER CALCULATES THE DRIVE, CONTACT ILMED VENTILAZIONE TO BE GIVEN THE DATA (MINIMUM DIAMETER) OF THE PULLEY TO BE MOUNTED ON THE BEARING. IF THE WRONG PULLEY IS MOUNTED, THIS MAY CAUSE OVERLOADING OF THE BEARINGS AND THE FAN WILL STOP WORKING.**

#### 4.4.2 Centrifuge with direct drive in arrangements 4 and 5

To assemble the direct drive fan in arrangement 4 or 5, carry out the following operations:

1. Place the motor 1 on the seat 2 in arrangement 4 or on the disk 14 in arrangement 5, without blocking it firmly.
2. Mount the wheel 4 on the motor, fixing it with the top washer.
3. If it is not already welded to the seat, mount the case 3 fixing it with bolts, and maintaining the direction (only in arrangement 4).
4. Install the nozzle 5 if it is not already part of the case.
5. Place the motor so that the fan wheel axis is correctly aligned.



**WARNING:** PAY PARTICULAR ATTENTION TO THESE OPERATIONS: AN INCORRECT ALIGNMENT MAY CAUSE THE WHEEL TO TOUCH THE NOZZLE AND THE FLUID MECHANICAL PERFORMANCE OF THE FAN CANNOT BE GUARANTEED.

6. Fix the motor in the set position.



**NB:** IF THE FANS ARE MADE FOR HOT GASES, A COOLING FAN 20 IS INSTALLED ON THE HUB OF THE WHEEL WITH CORRESPONDING GUARD 21.

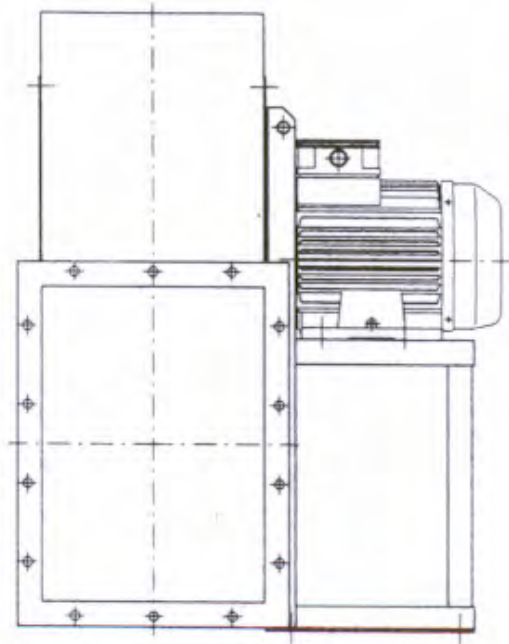


Figure 4.5 Arrangement 4

Direct coupling, wheel mounted on motor shaft supported by seat.

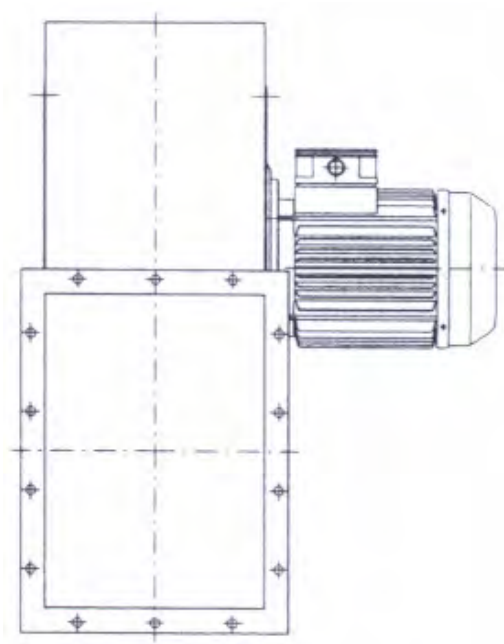


Figure 4.6 Arrangement 5

Direct coupling, wheel mounted on flanged motor shaft and supported by case.

### 4.4.3 Centrifuge with jointed drive in arrangement 8

To assemble the jointed drive fan in arrangement 8, carry out the following operations:

1. Place the bearing 15 on the seat 2 without blocking it firmly.
2. Install the wheel 4 on the bearing fixing it with the top washer.
3. If not already welded to the seat, mount the case 3 fixing it with bolts, and maintaining the direction.
4. Install the nozzle 5 if it is not already part of the case.
5. Adjust the bearing so that the fan wheel axis is correctly aligned.



**WARNING:** PAY SPECIAL ATTENTION TO THESE OPERATIONS: AN INCORRECT ALIGNMENT MAY CAUSE THE WHEEL TO TOUCH THE NOZZLE AND THE FLUID MECHANICAL PERFORMANCE OF THE FAN CANNOT BE GUARANTEED.

6. Fix the bearing in the set position.
7. Install the semi-coupling on the bearing side.
8. Install the semi-coupling on the motor side.
9. Place the motor so that the axis of the motor is correctly aligned with that of the bearing.
10. Check the alignment between the motor and the coupling.
11. Fix the motor on the seat after alignment is achieved.
12. Install the coupling guard.

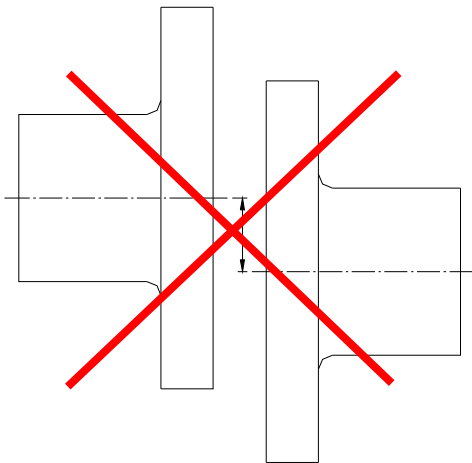


Figure 4.7 Parallel misalignment

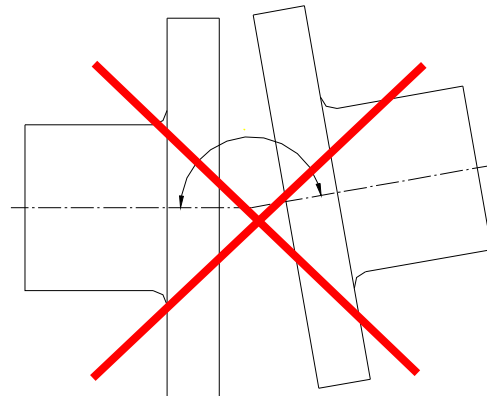


Figure 4.8 Angular misalignment

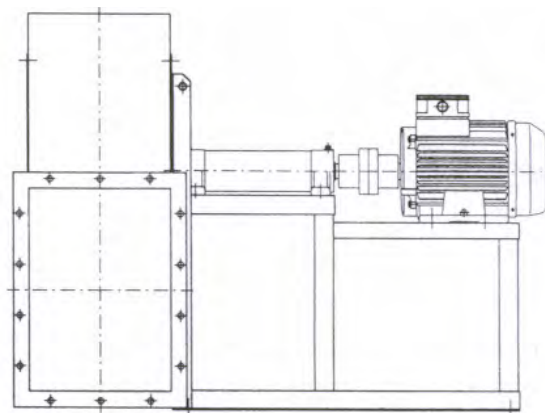


Figure 4.9 Arrangement 8

Jointed coupling, wheel mounted on bearing shaft linked to the motor by a coupling, all mounted on the seat.

#### 4.4.4 Centrifuge with belt drive in arrangement 9

To assemble the fan with belt drive in arrangement 9, carry out the following operations:

1. Repeat the phases of arrangement 1.
2. Fix the belt tightening pulley slot 19 on the side of the seat.
3. Place the motor 1 on the belt tightening pulley slot blocking it.
4. Mount the pulleys 17 and the drive belts 16.
5. Adjust the motor into the desired position and block it after the correct alignment has been achieved and the belts have been correctly tightened.
6. Install the belt guard.

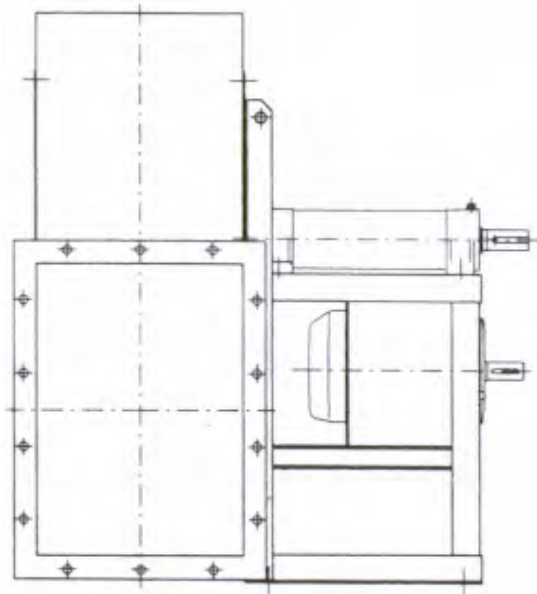


Figure 4.10 Arrangement 9

Belt coupling, equal to arrangement 1 with motor mounted on the side of the seat in the position "W" or "Z"

## 4.5 Centrifuge with belt drive in arrangement 12

To assemble the fan with direct drive in arrangement 12, carry out the following operations:

1. Repeat the stages of arrangement 1.
2. Fix the belt tightening pulley slot 19 to the base 6.
3. Place the motor 1 on the belt tightening pulley slot without blocking it firmly.
4. Mount the pulleys 17 and the drive belts 16.
5. Adjust the motor into the desired position and block it firmly after it has been correctly aligned and the belts have been tightened correctly.
6. Fix the motor into the set position.
7. Install the belt guards.

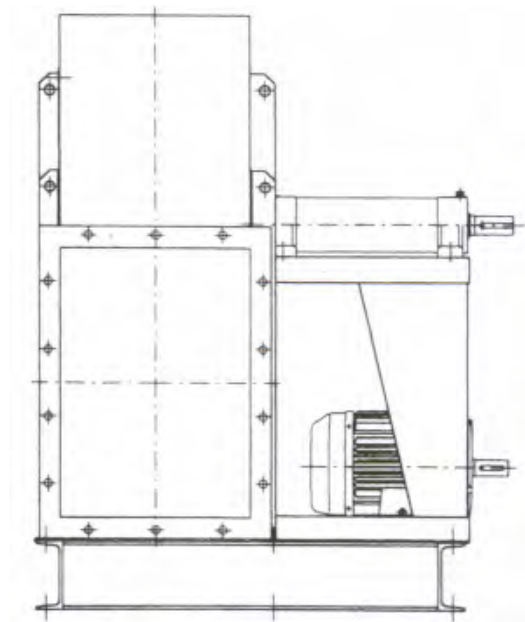


Figure 4.11 Arrangement 12

Belt coupling equal to arrangement 1 with fan and motor mounted on base. Position of motor "W" or "Z" and in on rare occasions positions "X" or "Y".

## 4.6 Installation

After having moved the fan it is necessary to prepare a flat base, preferably in concrete, that is perfectly levelled and which is suitable for supporting the fan's weight.

The support base must be designed to resist static and dynamic loads and the functional vibrations that the fan generates.

Anti-vibration elements can be chosen on consultation with the manufacturer.

**i** THE VIBRATIONS FROM THE FAN DEPEND LARGELY ON THE WAY IN WHICH THE FAN IS ANCHORED TO THE SUPPORT BASE AND ON THE CONNECTIONS TO THE SUCTION AND THROW PIPES.

THE USE OF ANTI-VIBRATION PIPE CONNECTION JOINTS IS RECOMMENDED TO MINIMIZE THE SPREAD OF VIBRATIONS WHILE THE FAN IS SWITCHED ON.

**!** PAY EXTREME ATTENTION THAT THE INSTALLED JOINTS ARE PERFECTLY ALIGNED WITH EACH OTHER AND THAT THERE IS NEITHER A PARALLEL NOR ANGULAR MISALIGNMENT.

WARNING: CHECK THAT THE DISTANCE BETWEEN THE FAN AND THE PIPES DOES NOT CAUSE CRUSHING OR TIGHTENING THAT WILL CAUSE THE JOINT TO BREAK.

**i** NB: CHECK THE AXIAL CLEARANCE AND THE ANGULAR AND PARALLEL ALIGNMENT OF THE ANTI-VIBRATION JOINTS REGULARLY ACCORDING TO THE FAN'S WORKING CONDITIONS.

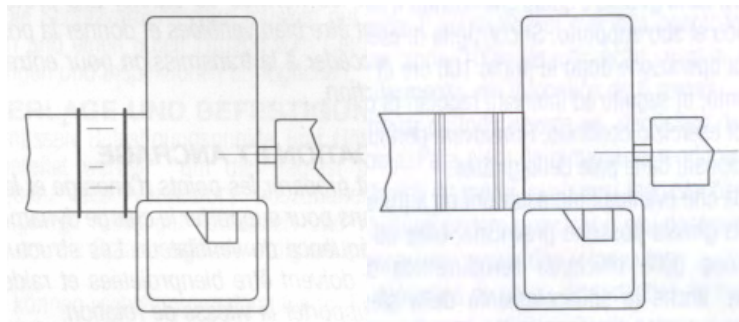


Figure 4.12 Correct position

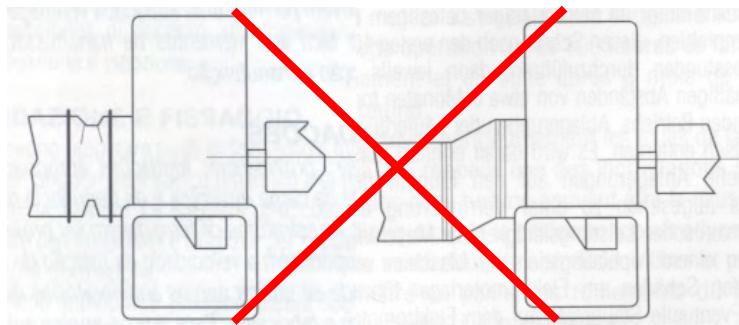


Figure 4.13 Incorrect position

The preparatory work is the responsibility of the customer (e.g. arrangement of power supply, etc..).

**!** ALL INSTALLATION WORK MUST BE CARRIED OUT ONLY AND EXCLUSIVELY BY QUALIFIED, AUTHORISED PERSONNEL, EQUIPPED WITH SUITABLE EQUIPMENT

### 4.6.1 Minimum positioning distances

In the event that the fan functions with the suction head free, it is recommended (for the correct entrance of fluid into the suction head) that it be positioned at a minimum distance from walls or other machinery that is at least 3 times the diameter of the fan suction head or twice the diameter of the pipes.

## 4.7 Electrical connections

The electrical power line of the fan must have the foreseen, appropriate power.

**WARNING:** Connection to the electrical network must be carried out by qualified personnel and it must be remembered that the customer is responsible for all the electrical power supply up to the point of the motor terminal board.

The customer must foresee all safety conditions needed for the “earthing” of the fan that must be compliant with the current laws in force in the country where the fan is installed.

**Warning: carry out earth connections before any other connection.**

**Before installation/starting up it is necessary to check that the power supply network’s characteristics match the electrical motor’s data indicated on the plate.**

**WARNING:** the machine requires an electrical power that varies according to the type of motor installed in the fan. Refer to the information on the motor ID plate.

the machine’s line cable must be connected to an electrical panel that has been made according to the current laws in the country of use and which of course, protects the machine from overloads and short circuits. It will be the customer’s responsibility to arrange for an electrical knife switch near the fan so that the staff in charge of maintenance has direct control over the fan’s power supply.



**WARNING:** IT IS THE CUSTOMER’S AND/OR THE ELECTRICAL INSTALLER’S RESPONSIBILITY TO SIZE AND CHOOSE THE DEVICES AND CABLES TO BE USED FOR THE FAN’S ELECTRICAL CONNECTIONS, DEPENDING ON THE MOTOR INSTALLED AND THE ORIGINAL POWER SUPPLY.

WORK ON THE ELECTRICAL PART MUST BE CARRIED OUT WITH THE FAN AT A STANDSTILL, DISCONNECTED FROM THE ELECTRICAL POWER SUPPLY NETWORK.

## 4.8 Single pole connection plan

<i>Connection plans for three-phase motors with 2-4-6-8 poles. Terminal board with 6 terminals</i>	
Figure 4.14 triangular connection	Figure 4.15 star-shaped connection
<i>FOR ELECTRICAL MOTORS WITH DUAL POLARITY REFER TO THE ELECTRICAL PLANS INCLUDED INSIDE THE TERMINAL BOARD BOX</i>	

## 4.9 Connection to pipes

While connecting the fan to the pipes, check that the parts are correctly aligned and that there are no obstructions due to seals or flexible parts. The weight of the pipes must not weigh on the fan.

In agreement with the space available in the installation site, we recommend that (in order to guarantee the correct entrance of fluid into the suction head) a straight stretch at least twice the length of the pipe’s diameter be prepared for the fans with the suction connected to a pipe.

## 5 CHECKS TO CARRY OUT BEFORE AND AFTER START UP

### 5.1 Preliminary checks

The machine is controlled and inspected at our site.

After transportation, for the first start up it is necessary to:

1. Visually inspect the machine.
2. Check that all the electrical and mechanical connections have been completed.
3. Check that the safety devices are working.
4. Check that all nuts and bolts have been tightened.
5. Check that all the rotating parts are free and can turn freely.
6. Check that there are no foreign objects, dust or dirt inside the case and the pipes.
7. Check that the rotation direction of the wheel corresponds to the one indicated on the arrow fixed to the side of the casing (controls side). If the wheel should turn in the opposite direction, change over any two-phase connections of the power line (see section on electrical connections).



WARNING: ALL INSTALLATION AND START UP WORK MUST BE CARRIED OUT BY QUALIFIED, AUTHORISED STAFF

Start up the fans with the air lock closed, when present. Once the standard rotation speed has been reached, open the air lock gradually.

### 5.2 Checks to be carried out while running

Check that the motor current does not exceed the full load current written on the motor's ID plate. If this occurs, **stop the fan immediately and contact the manufacturer.**

After a first trial start up, stop the fan and wait for the machine to cool down.

After the fan has been running for an hour, check that all the bolts and belts are tight and check the temperature of the bearings.



## 6 WORKING FAULTS AND THEIR CAUSES

The table below contains the main problems found on the fans.

PROBLEM	CAUSE	SOLUTION
Power input to the motor is higher than that on the ID plate.	<ul style="list-style-type: none"> <li>Flow rate higher than that on plate/project.</li> <li>Rotation speed is higher than design speed.</li> </ul>	<ul style="list-style-type: none"> <li>Check the actual performance of fan.</li> <li>Check the drive parts.</li> </ul>
Vibrations on fan	<ul style="list-style-type: none"> <li>Installation not correct.</li> </ul>	<ul style="list-style-type: none"> <li>Check the position of the machine and the anchorage to the support base.</li> </ul>
	<ul style="list-style-type: none"> <li>Presence of a butterfly valve in suction.</li> </ul>	<ul style="list-style-type: none"> <li>Check the valve or move it to a different position.</li> </ul>
	<ul style="list-style-type: none"> <li>Fluid mechanical instability of fan.</li> </ul>	<ul style="list-style-type: none"> <li>Change the flow rate that passes through the fan, by moving system valves.</li> <li>Incorrect installation.</li> </ul>
	<ul style="list-style-type: none"> <li>Presence of foreign matter or build-up of dust inside the wheel.</li> </ul>	<ul style="list-style-type: none"> <li>Inspect and clean fan.</li> </ul>
	<ul style="list-style-type: none"> <li>Corrosive liquid that damages the structure.</li> </ul>	<ul style="list-style-type: none"> <li>Replace damaged parts.</li> </ul>
	<ul style="list-style-type: none"> <li>Wheel worn due to abrasive material.</li> </ul>	<ul style="list-style-type: none"> <li>Replace the wheel.</li> </ul>
Abnormal noise or temperature of the bearings	<ul style="list-style-type: none"> <li>Vibrations.</li> </ul>	<ul style="list-style-type: none"> <li>See above</li> </ul>
	<ul style="list-style-type: none"> <li>Incorrect lubrication.</li> </ul>	<ul style="list-style-type: none"> <li>See chapter on maintenance and lubrication.</li> </ul>
	<ul style="list-style-type: none"> <li>Excessive wear.</li> </ul>	<ul style="list-style-type: none"> <li>Replace bearings with those shown in Table 8.1.</li> </ul>

## 7 MAINTENANCE

A regular maintenance of the fan is necessary for a normal and correct function and a longer duration of the machine.

Read this section carefully before carrying out maintenance work on the fan: this will ensure greater safety for the staff involved and greater reliability of the interventions carried out.



WARNING: ALL MAINTENANCE OPERATIONS MUST BE CARRIED OUT WITH THE ELECTRICAL AND PNEUMATIC KNIFE SWITCH AT "0" AND LOCKED WITH A PADLOCK; THE KEYS MUST BE KEPT BY THE MAINTENANCE MANAGER SO THAT NOBODY CAN ACCIDENTALLY START UP THE MACHINE.

MAINTENANCE WORK MUST ONLY BE CARRIED OUT BY QUALIFIED STAFF AUTHORISED BY THE FACTORY'S TECHNICAL DEPARTMENT FOR THIS TASK.

We advise that all faults, interventions, spare parts and anything else that may be relevant to be noted in a register.

Safety rules during maintenance must take into account that:

- Maintenance must only be carried out by qualified staff trained to carry out these actions.
- During maintenance the machine must be cordoned off and identified with signs carrying the wording "MACHINE UNDER MAINTENANCE".
- During any maintenance or cleaning operations, the general knife switch must be in the open contact positions (position "0" or "Off"). The maintenance manager must have a team of people on hand, in order to ensure absolute coordination and maximum safety of the people exposed to danger. All personnel that start maintenance work must be in full visual view to notify of any danger.
- During maintenance phases, individual protection devices (IPD) such as gloves and accident-proof shoes must be worn, in addition to any provisions of the current laws in force.
- It is forbidden to use baggy or jutting clothing that could get entangled in the fan.
- After maintenance work that has required the removal of safety devices it is necessary to restore them and to check that they function correctly with a trial run of the fan.

EACH ASSEMBLY OR DISASSEMBLY OPERATION REQUIRES COMPULSORILY:

A) ABSOLUTE CERTAINTY THAT THE FAN IS AT A STANDSTILL, DISCONNECTED AND ISOLATED FROM ELECTRICAL POWER SUPPLY.

B) A WORK ENVIRONMENT THAT IS SUITABLY EQUIPPED WITH ALL NECESSARY EQUIPMENT AND WITHOUT ANY DANGEROUS COMBINATIONS.

C) CAREFUL CLEANING OF EACH REASSEMBLED PIECE, DEGREASING AND LUBRICATION DEPENDING ON THE ALLOCATION OF THE PIECE.



WARNING: ANY MOVEMENT OF PARTS THAT MUST BE DISCONNECTED OR REMOVED FROM THE MACHINE MUST BE CARRIED OUT WITH SUITABLE TRANSPORTATION MEANS.

## 7.1 Lubrication of bearings

WARNING: the frequency of lubrication of the bearings depends on the rotation speed, the temperatures and the type of bearing.

Check and respect the lubrication frequency indicated by the bearing manufacturer.

Check the correct functioning and suitable lubrication of the bearings at least one a month, with particular attention to the bearings that work at high temperatures.

For lubrication frequency, refer to Table 8.1.

<b><u>Grease to used for support bearings</u></b>	
<b>Normal temperatures</b>	<b>High temperatures</b>
LGEP 2/1 SKF HIGH LOAD or equivalent	LGHQ 3/1 SKF HIGH TEMPERATURE or equivalent



NB: NORMALLY THE BEARINGS OF THE MOTORS ARE ALL LONG-LIFE LUBRICATED AND DO NOT REQUIRE MAINTENANCE.

## 7.2 Tightening and cleaning of the belts

Check the tightening of the belts after about the first 8 hours and thereafter at regular working intervals. If necessary, restore the correct stress by pulling on the specific belt tightening pulleys 1 and on the fixing screws 2 of the motor on the slot shown in the photo.

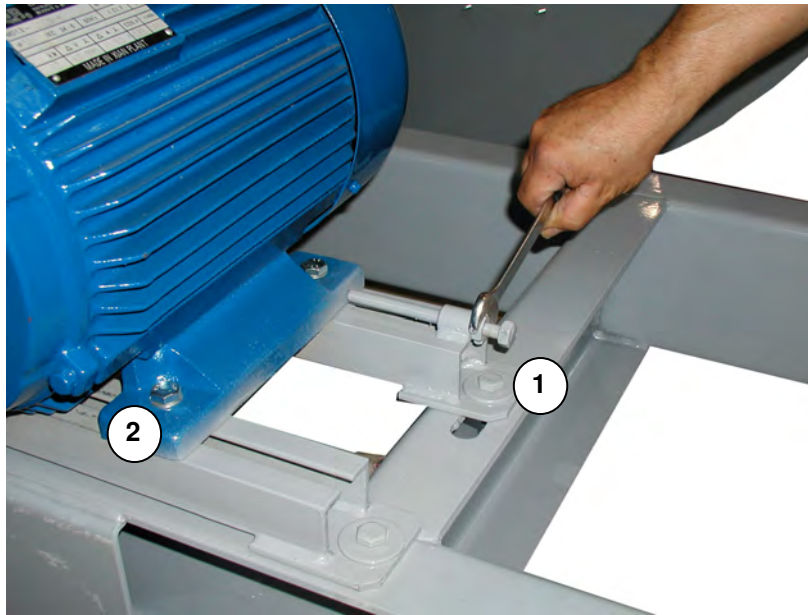
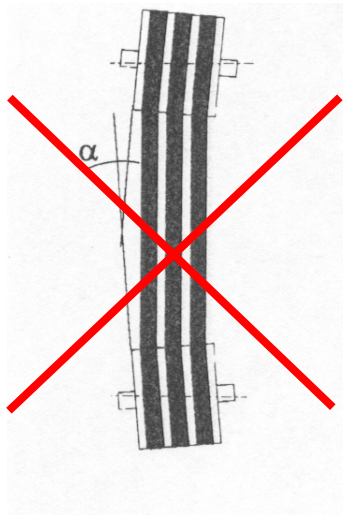


Figure 7.1 belt stress

Replace the belts completely when they are so worn that the drive will not function correctly or if they have slipped more than 4-5%. The wearing of the belts can depend on many factors including environmental ones, the number of hours they have been used, the amount and type of start-ups, the diameter of the pulleys. Please refer to data and recommendations declared by the belt manufacturers.

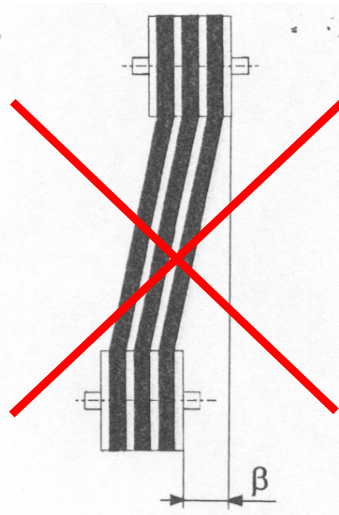
The cleaning of dirty belts must not be carried out using petrol or benzene solvents or with abrasive or cutting objects.

Check the correct alignment of the belts.



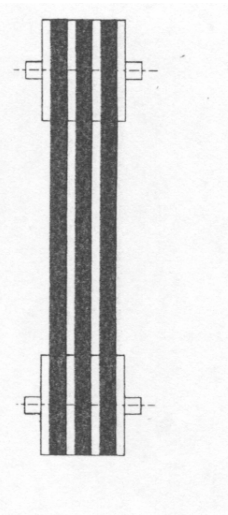
Alberi non paralleli

Shafts not parallel



Alberi paralleli, pulegge non allineate

Shafts parallel, pulleys not aligned



Montaggio corretto

Correct assembly

### **7.3 Cleaning**

Inspect the clean state of the fan, the electric motor and the wheel regularly. The frequency with which cleaning should be carried out depends on the real working conditions and the environment in which the fan is installed.

Remove any deposits on the wheel blades regularly.

**WARNING:** any scaling or deposits on the blades may cause the fan to become unbalanced, with consequent failure of the electrical motor bearings or support bearings and the possible sudden breakage of the wheel.

Any deposits of dust on the electrical motor can reduce the dispersion of heat and thus cooling

### **7.4 Nuts and bolts**

After the first 100 hours of work, check that the bolts and screws are correctly tightened, especially the nuts and bolts that have undergone high loads (e.g. bearing supports). Thereafter, check them every 1000 hours.

## 8 DISASSEMBLY and REMOVAL



ALL DISASSEMBLY AND REASSEMBLY OPERATIONS INDICATED BELOW MUST ONLY BE CARRIED OUT BY QUALIFIED AND AUTHORISED PERSONNEL.

WARNING: EACH DISASSEMBLY AND REASSEMBLY OPERATION MUST BE CARRIED OUT WITH:

- A) THE ABSOLUTE CERTAINTY THAT THE FAN IS AT A STANDSTILL; REMOVE VOLTAGE AT THE CONTROL PANEL USING THE KNIFE SWITCH AND PLACE A PADLOCK ON IT THAT MUST BE HANDED OVER TO THE MAINTENANCE MANAGER.
- B) CREATE A WORK ENVIRONMENT THAT IS SUITABLY EQUIPPED WITH ALL THE NECESSARY EQUIPMENT AND THAT HAS NO DANGEROUS COMBINATIONS.
- C) CLEAN EACH REASSEMBLED PIECE CAREFULLY, DEGREASE AND LUBRICATE DEPENDING ON THE DESTINATION OF THE PIECE.

### 8.1 Suction nozzle

Remove the nozzle after having unscrewed the nozzle's locking nuts from the fan case.

### 8.2 Case

For all revolving fans, unscrew the case's locking nuts from the seat disk or the motor holder.

For no revolving fans with a whole case, it is not possible to disassemble.

Some constructions may foresee the case divided into two or more parts connected by nuts and bolts.

### 8.3 Fan wheel

Disassemble the nozzle and, where possible, the fan case.

To disassemble the wheel, remove the locking screw and use a suitably-sized extractor.

a support system for the wheel should be arranged before completing removal.

### 8.4 Pulleys

The pulleys installed on the drive fans are "taper lock" pulleys. They can be disassembled by removing the locking screws.

## 8.5 Supports

### 8.5.1 Monobloc Supports

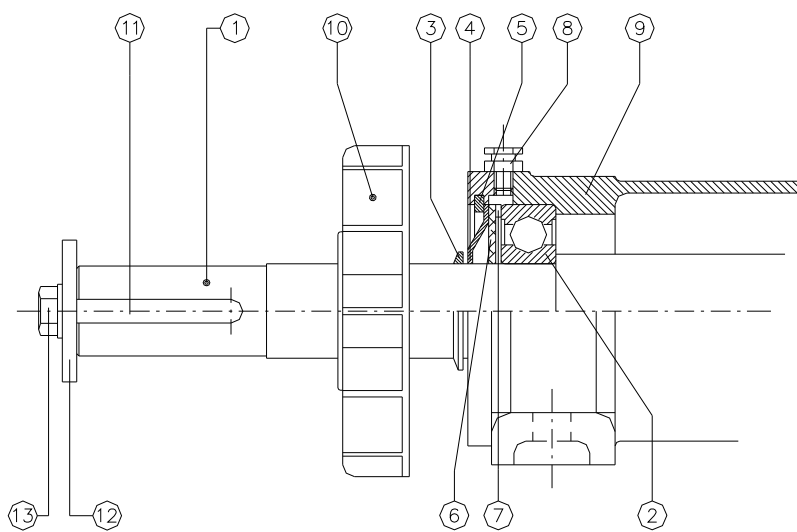
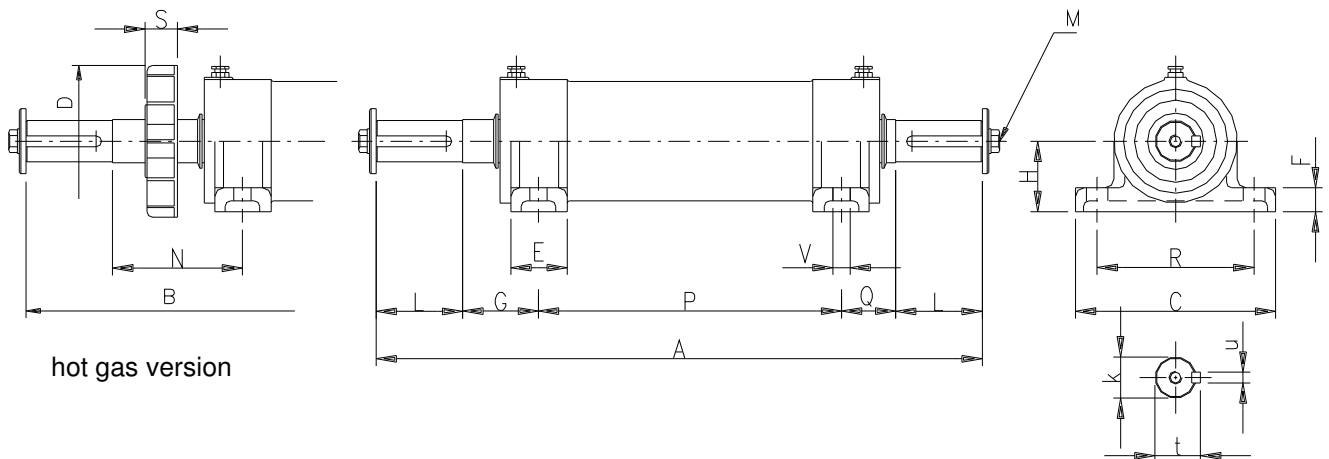
For hot gas versions the support has a cooling fan.

To replace support bearings.

- Remove the locking screws from the seat support.
- Extract cooling fan 10, if present.

For both ends of the support:

- Remove the V ring 3.
- Remove the locking snap ring 5.
- Remove the cover 4.
- Replace the bearing 2.
- Replace all pieces, paying attention to the insertion of the preloaded spring 6.



N°	Description
1	shaft
2	bearing
3	V ring
4	Cover
5	Snap ring
6	Preloaded spring
7	spacer
8	Grease cup
9	casing
10	Cooling fan
11	tab
12	Lock washer
13	Locking screw



### 8.5.2 SNL type support

The bearings of this support can be replaced by removing both the supports from the side of the pulley, without having to disassemble the wheel.

- Remove the upper part of the support by unscrewing the locking screws.

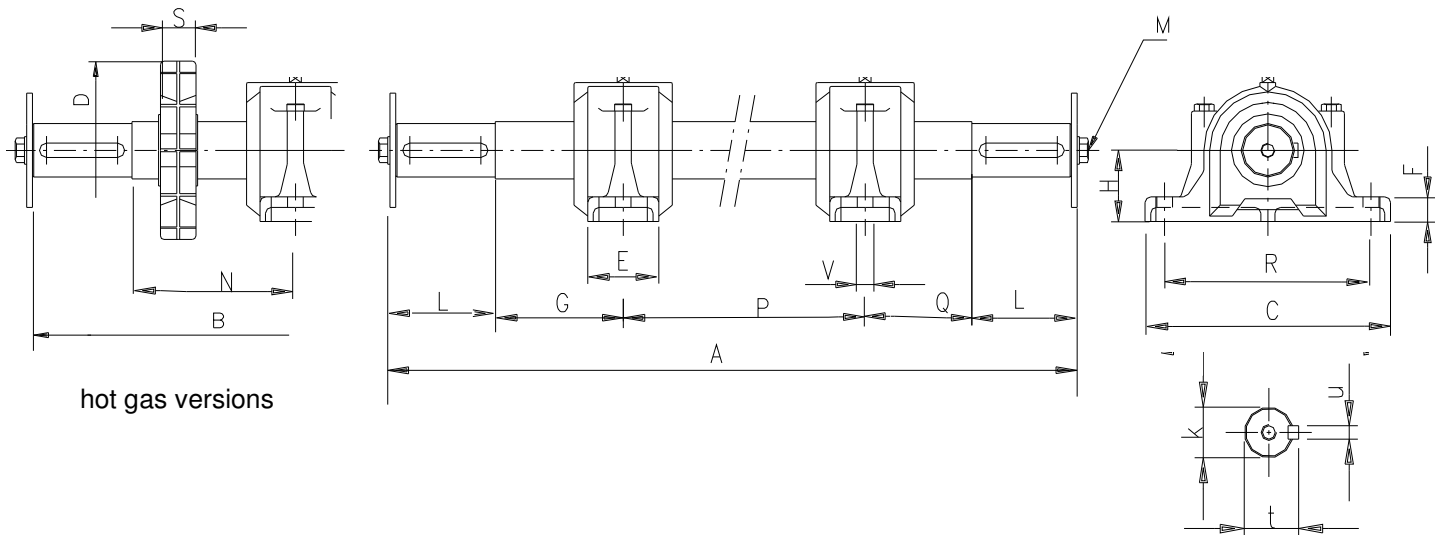


**WARNING: AS THE WHEEL IS OVERHANGING, IT MUST BE COUNTERBALANCED CORRECTLY.**

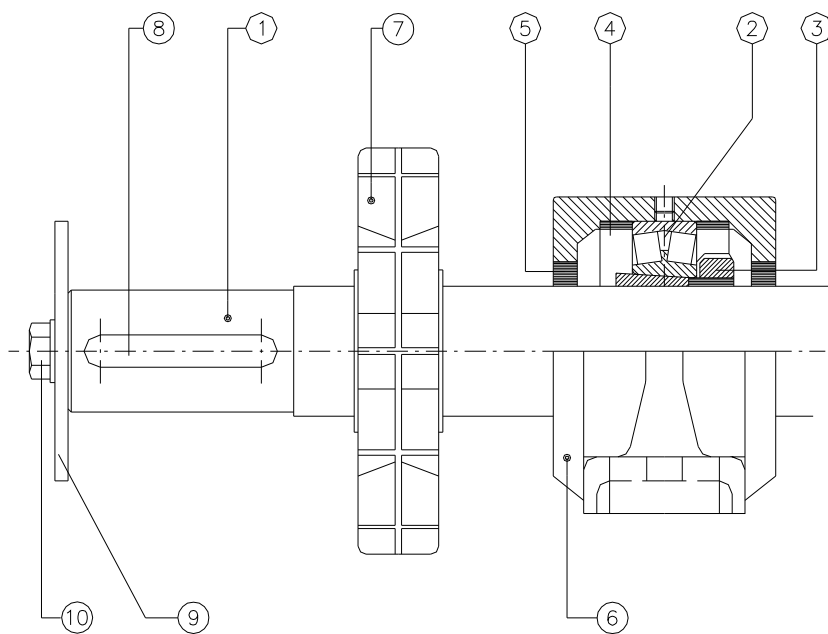
- Loosen the drive bush 3 with the specific pin wrench.
- Remove the bearing and replace it, after possibly removing the casing 6.
- Reassemble all parts, paying particular attention to restore any stop rings.



**WARNING: AFTER ASSEMBLY, CHECK THE CORRECT INTERNAL CLEARANCE OF THE BEARING USING A THICKNESS GAUGE.**



hot gas versions



N°	Description
1	Shaft
2	Roller bearing
3	Drive bush
4	Stop ring
5	Guard
6	Casing
7	Cooling fan
8	Tab
9	Lock washer
10	Locking screw

Table 8.1 lubrication frequency in hours

Type	Bearing	Rotations/min. pulley side – lubricating frequency in hours														Grease gr
		400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6500		
SUPP. MON. 20	6304 - Z	33000	28000	25000	22000	19000	16000	14000	12000	10000	8500	6600	5100	3900	5,5	
SUPP. MON. 25	6305 - Z	30000	26000	23000	21000	18500	16500	13500	11500	9600	8000	6300	4900	3800	6	
SUPP. MON. 30	6306 - Z	27000	25000	22000	20000	18000	15000	13000	10500	8500	6500	5000	3800	2900	7	
SUPP. MON. 30 L	6306 - Z															
SUPP. MON. 40	6308 - Z	25000	22000	20000	17500	15500	13500	11000	9000	7000	5500	4000	2900	2000	10	
SUPP. MON. 40 L	6308 - Z															
SUPP. MON. 45	6309 - Z	24500	22500	19500	17000	14500	12500	10500	9600	7700	5000	3550	2500		13	
SUPP. MON. 45 L	6309 - Z															
SUPP. MON. 50	6310 - Z	24000	23000	19000	16000	14000	12000	10000	8000	6000	4500	3300			15	
SUPP. MON. 50 L	6310 - Z															
SUPP. MON. 55 L	6311 - Z	23000	21500	18000	15500	13500	11500	9300	7300	5500	4100	3000			18	
SUPP. MON. 60 L	6312 - Z	22000	20000	17000	15000	13000	11000	8800	6800	5000	3600	2600			20	
SYT 70	22214 EK	6800	5000	4000	3000	2250	1600	1100	700	440	280				25	
SYT 75	22215 EK	6300	4800	3600	2700	2000	1450	980							30	
SNL 518	C 2218-K 22218-EK	5800	4500	3200	2400	1800	1300	850	550						35	
SNH 518	22218 EK	5800	4500	3200	2400	1800	1300	850							35	
SNH 520	C 2220-K 22220-EK	5300	4000	3000	2200	1500	1000	700	450						45	
SNH 522	C 2222-K 22222-EK	4900	3700	2700	2000	1400	980	640							55	
SNH 524	22224 EK	4000	3000	2300	1600	1200	900	600							65	

NB.: Frequency valid for bearing temperatures up to 70 °C. Reduce frequency for higher temperatures .

Table 8.2 Overall size of supports

Type	Size						Drilling						End of shaft					Cooling fan		Weight Kg
	A	B	C	E	F	H	G	N	P	Q	R	V	k	L	t	u	M	D	S	
SUPP.MON.20	310	360	125	35	15	40	50	100	140	40	90	10	19k6	40	21,5	6	8x20	100	30	5,5
SUPP.MON.25	400	450	160	36	18	50	60	110	200	40	125	12	24k6	50	27	8	8x20	100	30	7
SUPP.MON.30	420	470	160	36	18	50	60	110	200	40	125	12	28k6	60	31	8	8x20	100	30	8,5
SUPP.MON.30L	610	660	160	36	18	50	50	100	390	50	125	12	28k6	60	31	8	8x20	100	30	12
SUPP.MON.40	560	610	185	50	20	65	70	120	280	50	145	14	38k6	80	41	10	12x30	140	30	16
SUPP.MON.40L	730	780	185	50	20	65	70	120	450	50	145	14	38k6	80	41	10	12x30	140	30	19
SUPP.MON.45	700	750	200	65	23	75	75	125	345	60	155	16	42k6	110	45	12	16x40	140	30	24
SUPP.MON.45L	760	810	200	65	23	75	80	130	400	60	155	16	42k6	110	45	12	16x40	140	30	27
SUPP.MON.50	710	760	200	65	23	75	85	135	345	60	155	16	48k6	110	51,5	14	16x40	140	30	27
SUPP.MON.50L	760	810	200	65	23	75	80	130	400	60	155	16	48k6	110	51,5	14	16x40	140	30	30
SUPP.MON.55L	850	900	240	70	27	90	100	150	450	80	180	20	48k6	110	51,5	14	16x40	140	30	41
SUPP.MON.60L	900	950	240	70	27	90	125	175	450	105	180	20	55k6	110	59,5	16	18x50	200	50	51
SYT 70	995	955	315	90	32	95	115	115	485	115	260	22	65j6	140	69	18	20x45	250	31	53
SYT 70 EMPU-EARU-ETRU 1000	1100	1150	315	90	32	95	137	187	550	133	260	22	65h7	140	69,5	18	20x50	250	31	56
SYT 75 ETRU 1120	1225	1275	320	90	32	95	160	210	650	135	260	22	70h9	140	75	20	20x50	250	31	66
SNL 518	1180	1180	345	100	35	100	125	125	650	125	290	22	75j6	140	79,5	20	20x45	250	31	88
SNL 518 ETRU 1250	1260	1310	345	100	35	100	180	230	650	150	290	22	75	140	80	20	20x50	250	31	95
SNL 520	1260	1260	380	110	40	112	135	135	640	145	320	26	80j6	170	85	22	20x45	250	31	120
SNL 522	1420	1420	410	120	45	125	150	150	770	160	350	26	90j6	170	95	25	20x45	250	31	155
SNL 524	1550	1550	410	120	45	140	150	150	820	160	350	26	100j6	210	106	28	20x45	250	31	190
SNL 524 ETRU 1400	1350	1400	410	120	45	140	190	240	650	170	350	26	80	170	85,5	22	20x50	250	31	160
SNL 524 (A) ETRU 1600	1500	1550	410	120	45	140	190	240	800	170	350	26	90	170	95,5	25	20x50	250	31	170
SNL 524 (B) ETRU 1800	1620	1670	410	120	45	140	190	240	800	210	305	26	100	210	106	28	20x50	250	31	180

Table 8.3 Use of supports

Type	Bearing	Range of use					
		ECBU/R	EMPU/R	EARU/R	ETRU/R	TMU/R	VCTL/R
SUPP. MON. 25	6305 - Z	230 - 240 - 300 350 - 351 380 - 400	311	340 - 370			
SUPP. MON. 30	6306 - Z	260 - 301 - 381 - 401 - 440	343 - 381	380 - 400			
SUPP. MON. 30 L	6306 - Z	302 441 470					460
SUPP. MON. 40	6308 - Z	442 - 471	419 - 440 464 - 508 623 cl.1	440 460 480			500 - 560 (1)
SUPP. MON. 40 L	6308 - Z				400 - 450	630	
SUPP. MON. 45	6309 - Z	472	565				
			686cl.1 720cl.1	500 - 530			680
SUPP. MON. 45 L	6309 - Z		762 cl.1		500 - 560		
SUPP. MON. 50	6310 - Z		623 cl.2				
SUPP. MON. 50 L	6310 - Z		686cl.2-720cl.2 762cl.2-800cl.1 900 cl.1	560 580 630	630 710 800		
SUPP. MON. 55 L	6311 - Z			710		670 700 750	
SUPP. MON. 60 L	6312 - Z		800cl.2 900cl.2	800 - 900	900	800 835 836	
SYT 70	22214 EK		1000	1000	1000		
SYT 75	22215 EK				1120		
SNH 518	22218 EK				1250		
SNH 524	22224 EK				1400		
SNH 524 (A)	22224 EK				1600		
SNH 524 (B)	22224 EK				1800		

Table 8.4 Use of supports

Type	Bearing	Range of use						
		BB	BC	MA	MB	MD	AB	TC
SUPP. MON. 20	6304 – Z	220-250	250	250	250			
SUPP. MON. 25	6305 – Z	280-310	280-310	280-310	280-310			
SUPP. MON. 30 L	6306 – Z	350	350	350	350		400	
SUPP. MON. 40 L	6308 – Z	400-450	400-450	400-450	400-450	400-450	450-500	630
SUPP. MON. 45 L	6309 – Z	500	500	500	500	500	560	
SUPP. MON. 50 L	6310 – Z	560-630	560-630	560-630	560-630	560-630	630	
SUPP. MON. 55 L	6311 – Z	710	710	710	710	710	710	670-700-750
SUPP. MON. 60 L	6312 – Z	800-900	800-900	800-900	800-900	800-900	800	800-835-855
SYT 70	22214 EK	1000	1000	1000	1000	1000	900	
SNL 518	C 2218-K 22218-EK		1120-1250	1120-1250	1120-1250	1120-1250		
SNL 520	C 2220-K 22220-EK		1400	1400	1400	1400		
SNL 522	C 2222-K 22222-EK		1600	1600	1600	1600		
SNH 524	22224-EK		1800-2000	1800-2000	1800-2000	1800-2000		

Table 8.5 Max. rotations permitted for fan arr. 9-12

**MAX. ROTATIONS PERMITTED FOR FAN ARR. 9-12**

Series	Max/min rotations permitted	Series	Max/min rotations permitted	Series	Max/min rotations permitted
EMPU 311 CL1	3150	ECBU 230	3550	EARU 340	4500
EMPU 343 CL1	3150	ECBU 240	3550	EARU 370	4000
EMPU 381 CL1/2	2500/3350	ECBU 250	3150	EARU 380	4000
EMPU 419 CL1/2	2250/3000	ECBU 260	3150	EARU 400	4000
EMPU 440 CL1/2	2250/3000	ECBU 300/1/2	2000/3150/3150	EARU 440	3550
EMPU 464 CL1/2	2000/3000	ECBU 350/1	1120/2500	EARU 460	3550
EMPU 508 CL1/2	1800/3000	ECBU 380/1	1250/2250	EARU 480	3150
EMPU 565 CL1/2	1600/2500	ECBU 400/1	1120/2250	EARU 500	3150
EMPU 623 CL1/2	1600/2000	ECBU 440/1/2	1400/1400/2000	EARU 530	3150
EMPU 686 CL1/2	1400/1800	ECBU 470/1/2	1120/1600/1800	EARU 560	2800
EMPU 720 CL1/2	1250/1600			EARU 580	2800
EMPU 762 CL1/2	1250/1600			EARU 630	2500
EMPU 800 CL1/2	1250/1600			EARU 710	2250
EMPU 900 CL1/2	1120/1400			EARU 800	2000
EMPU 1000 CL1/2	950/1250			EARU 900	1800
				EARU 1000	1600

Series	Max/min rotations permitted	Series	Max/min rotations permitted	Series	Max/min rotations permitted
ETRU 400	4500	TMU 630	2000	VCTL 460	2800
ETRU 450	4000	TMU 670	2000	VCTL 500	2500
ETRU 500	4000	TMU 700	2000	VCTL 560	2240
ETRU 560	3550	TMU 750	1800	VCTL 680	2000
ETRU 630	3150	TMU 800	1800		
ETRU 710	2800	TMU 835	1800		
ETRU 800	2500	TMU 836	1600		
ETRU 900	2240				
ETRU 1000	2000				
ETRU 1120	1800				
ETRU 1250	1600				
ETRU 1400	1400				
ETRU 1600	1250				

Table 8.6 Max. rotations permitted for fan arr.9-12

**MAX. ROTATIONS PERMITTED FOR FAN ARR. 9-12**

Series	Max/min rotations permitted	Series	Max/min rotations permitted	Series	Max/min rotations permitted	Series	Max/min rotations permitted
BB 220	3750	BC 250	6000	MA 250	6300	MB 250	5600
BB 250	3350	BC 280	5300	MA 280	5600	MB 280	5600
BB 280	3000	BC 310	4750	MA 310	5000	MB 310	5000
BB 310	2650	BC 350	4250	MA 350	4500	MB 350	5000
BB 350	2360	BC 400	3750	MA 400	4000	MB 400	4500
BB 400	2120	BC 450	3350	MA 450	3550	MB 450	4500
BB 450	1900	BC 500	3000	MA 500	3150	MB 500	4000
BB 500	1700	BC 560	2650	MA 560	2800	MB 560	3550
BB 560	1500	BC 630	2360	MA 630	2500	MB 630	3150
BB 630	1320	BC 710	2120	MA 710	2250	MB 710	2800
BB 710	1180	BC 800	1900	MA 800	2000	MB 800	2500
BB 800	1060	BC 900	1700	MA 900	1800	MB 900	2240
BB 900	950	BC 1000	1500	MA 1000	1600	MB 1000	2000
BB 1000	850	BC 1120	1320	MA 1120	1400	MB 1120	1800
		BC 1250	1180	MA 1250	1250	MB 1250	1600
		BC 1400	1060	MA 1400	1120	MB 1400	1400
		BC 1600	950	MA 1600	1000	MB 1600	1250
		BC 1800	850	MA 1800	900	MB 1800	1120
		BC 2000	750	MA 2000	800	MB 2000	1000

Series	Max/min rotations permitted	Series	Max/min rotations permitted	Series	Max/min rotations permitted
MD 400	5600	AB 400	5000	TC 630	2000
MD 450	5000	AB 450	4500	TC 670	2000
MD 500	4500	AB 500	4500	TC 700	2000
MD 560	4000	AB 560	4000	TC 750	1800
MD 630	3550	AB 630	4000	TC 800	1800
MD 710	3150	AB 710	3550	TC 835	1800
MD 800	2800	AB 800	3550	TC 855	1600
MD 900	2500	AB 900	3150		
MD 1000	2240	AB 1000	2800		
MD 1120	2000				
MD 1250	1800				
MD 1400	1600				
MD 1600	1400				
MD 1800	1250				
MD 2000	1120				

## 9 DISMANTLING OF THE FAN

At the end of its life cycle, the company that uses the fan must proceed with its demolition, planning for the emptying of the lubricating fluids and the general cleaning of the various elements and then, the separation of the parts that make up the fans. The various materials must be separated, for example: the electric motors (copper winding), the metal items (steel structural items etc) and then separate disposal must be carried out.

## 10 TECHNICAL ATTACHMENTS

### 10.1 Tightening moments for nuts and bolts

The moments M in the table are valid in the following conditions:

- Hexagonal-head screws, type UNI 5737, cheese-headed screws types UNI 5931 and UNI 6107, in normal supply conditions.
- The tightening moment is presumed to be applied slowly with torque wrenches.

While the preload values remain the same, the tightening moments must vary as shown in the following cases:

- Reduced by 10% for oiled zinc screws
- Reduced by 10% if tightening is carried out by electric impulse drivers.

#### 10.1.1 Tightening moments M for ISO metric threaded screws

d x step mm	Sr mm <sup>2</sup>	8.8	
		M	Nm
6 x 1	20,1	10,4	
7 x 1	28,9	17,2	
8 x 1,25	36,6	25	
10 x 1,5	58	50	
12 x 1,75	84,3	86	
14 x 2	115	137	
16 x 2	157	214	
18 x 2,5	192	306	
20 x 2,5	245	432	
22 x 2,5	303	592	
24 x 3	353	744	
27 x 3	459	1100	
30 x 3,5	561	1500	