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1. General Rules

1.1 Use of the Manual

- A copy of this manual should be distributed and made available to all operators dealing with ventilator installation, operation and maintenance, in order to operate in compliance with the instructions indicated on this manual.
- This manual is an integrating part of the ventilator. All reproduction and distribution rights of this manual and its attachments are reserved.
- It is forbidden to remove parts, tear pages from or modify this manual.
- Give this manual to any new user or owner of the ventilator.
- Do not to damage this manual during its use.
- Keep this manual in cool and dry areas.

1.2 Conventions

- ◆ **All texts about safety are written in red.**
- ◆ **All warning messages are written in red and signaled by the following message:**



1.3 Identification Data

- The Limited Company Mistral Aspiratori-Ventilatori S.r.l. is identified as ventilator Manufacturer, in compliance with all Legislation in force.
- A special adhesive label applied on the ventilator indicates the information required for CE stamp and is reproduced in the Section 1.6.5 of this manual.
- The CE stamp and its compliance declarations certify that the ventilator complies with the European Union regulations in force.
- If the label is accidentally damaged or removed from its location, the User must replace it and inform the Manufacturer.

1.4 Technical Assistance

- ◆ All maintenance activities not described in this manual should be considered as extraordinary maintenance activities, and, therefore, they must be executed by qualified personnel indicated by Mistral

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Fax.: +39-0362560792

<http://www.mistral-asp-vent.com>

e-mail: mistral@mistral-asp-vent.com

1.5 General Safety Notices

- ◆ The following rules and recommendations correspond to the safety legislation in force; therefore, they are substantially based upon the respect of these safety rules.
- ◆ Mistral will not be responsible for any damage to people and/or things caused by the non-respect of safety rules in force and of the instructions indicated hereafter.
- ◆ Therefore, all operators must respect and implement the following instructions and carefully follow all accident prevention rules of the country where the ventilator is installed and used.
- ◆ Safety guards must not be removed, unless there is an absolute need for routine or extraordinary maintenance interventions.
- ◆ If safety guards are removed, all safety measures required must be applied to clearly highlight any potential hazard.
- ◆ The safety guards that have been removed must be immediately re-installed as soon as the reasons for their temporary removal are no longer valid.
- ◆ During all routine and extraordinary maintenance interventions, the ventilator must be off and power supply disconnected.
- ◆ To avoid the risk of ventilator being accidentally turned on during maintenance interventions, warning signs should be put on electrical panels and/or control panels, saying:

<p>WARNING: CONTROL NOT AVAILABLE FOR MAINTENANCE ACTIVITIES IN PROCESS</p>
--

- Before connecting the power supply cable to the motor terminal strip, check line tension to make sure it corresponds to the value indicated on the motor information plate.
- **All ventilator transportation, installation, use, routine and extraordinary maintenance activities must be executed by specialized and properly trained operators only.**
- **A SPECIALIZED AND PROPERLY TRAINED OPERATOR is a person who, after receiving proper and indispensable instructions, is authorized and charged by the ventilator owner with the responsibility for all operations required for the installation and/or use of the ventilator or the system where it is installed.**
- **All maintenance operators should wear suitable safety clothing and, most of all, cannot wear fluttering clothes or clothes which can be caught in moving parts.**



WARNING

- ◆ **The ventilator cannot be used for other purposes than those suggested and corresponding to its destination, without previous agreement from Mistral.**

1.6 Safety Signs Installed around the Equipment

1.6.1 Use

- Always be very careful and observe all indications on the signs, labels and plates on the ventilator.
- They must be immediately replaced, if they are worn-out and instructions cannot be read any longer or if they have accidentally been removed or fallen.
- Any removal, although it is accidental, of warning signs must be considered as a safety guard removal; therefore, it must comply with the rules indicated in section 1.5 above.

1.6.2 Danger Signs



WATCH YOUR HANDS (ref. A, figure 1):
1 sign on drive belt guard.



POWER SUPPLY (ref. B, figure 1):
1 sign on motor terminal box

1.6.3 Prohibition Signs




DO NOT REMOVE SAFETY DEVICES AND GUARDS (ref. C, figure 1):
1 sign on drive belt guard

1.6.4 Obligation Signs



FAN WHEEL ROTATION DIRECTION (ref. D, fig. 1):
1 sign on ventilator box or stamp on identification label

1.6.5 Identification Signs

 mistral aspiratori ventilatori srl		20030 BARLASSINA (MI) Via Capuana, 33/35	
		Tel. 0362/542040 Fax 0362/560792	
MOD.	<input type="text"/>	OR.	<input type="text"/>
Qv	<input type="text"/> m ³ /sec	ps	<input type="text"/> pa
Pv	<input type="text"/> kW inst.	ng	<input type="text"/> g/1'
MATR.	<input type="text"/>	Lw	<input type="text"/> dB(A)

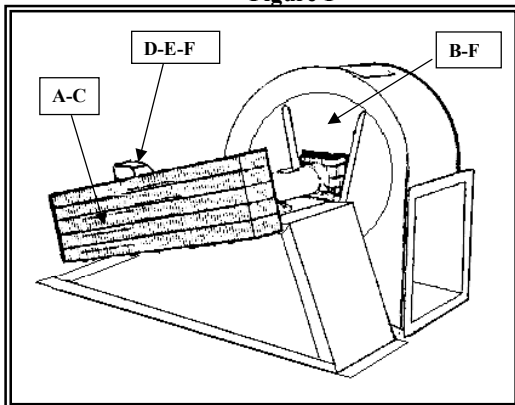
IDENTIFICATION PLATE (ref. E, figure 1):
1 plate on ventilator box

  mistral aspiratori ventilatori srl	Mod.	<input type="text"/>
	Anno	<input type="text"/>

CE STAMP PLATE (ref. E, figure 1):
1 plate on ventilator box

ELECTRICAL DATA IDENTIFICATION PLATE (ref. F, figure 1):
1 plate on electrical motor, according to motor type and brand name.

Figure 1



1.7 Noise

- Noise strength values indicated on catalogues have been obtained through the measuring methods indicated in ISO 3744 regulations. For the use of noise strength values, refer to “Technical Notes” section of Mistral manual, where a sound pressure calculation example has been developed.
- However, the values indicated on catalogues cannot refer to operation conditions, the presence of accessories and environmental conditions different from test room conditions which should be considered during system design stage.
- Check that noise level respects limit values provided for by the legislation in the destination country. Therefore, the use of proper protections, if required, is recommended for operators (such as, noise-proof earphones or earplugs), if noise level is higher than allowed limits.

1.8 References

- ◆ For all weight, size and performance technical data, refer to specifications and any technical drawings supplied during order stage.

1.9 Warranty

- A 12 (twelve) month warranty includes all ventilator parts, unless otherwise specified, and spare parts replacement and labour for all equipment shipped to Manufacturer plant, **Carriage Paid**.
- If the user does not respect maintenance rules, the manufacturer will not be responsible for any problem or fault on ventilator.
- For any intervention during warranty period, all travelling expenses will be paid by the customer, according to tariffs in force.
- The warranty immediately expires in case of continuous misuse, improper use or alteration of ventilator.
- All drive belts are excluded from warranty, since they are normally worn out by use:

2. Handling and Transportation

2.1 Notice

- **The ventilator must always be disconnected from any power supply and its moving part suitably locked during transportation, handling and stocking activities.**
- **The User will make sure that all handling operations are implemented by observing all safety regulations in force.**

2.2 Reception

- All ventilators are carefully checked before shipment. Upon receipt, packaging and packed material must be checked for any damage. In case of damage, report any problem to the transporter, responsible for any damage during transportation.

2.3 Handling

- Some ventilator models may be equipped, according to their weight and size, with suitable lifting and handling components (shown in the figures) or eyebolts, by making sure that lifting equipment capacity is chosen according to ventilator weight.
- Handling operations must be very careful, avoiding any equipment knocks which may damage the ventilator and hinder its regular operation.
- In handling the equipment with fork lifts, observe allowed speed and slopes.
- Never leave transportation means with load lifted.

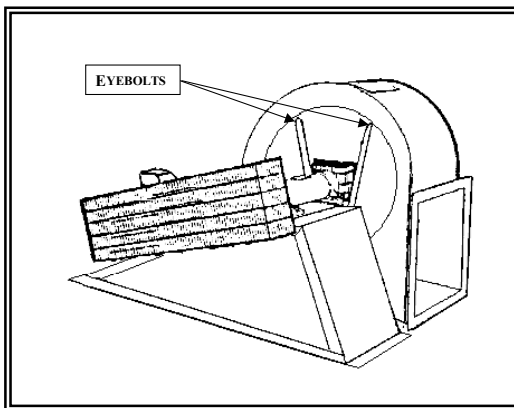


Figure 2

2.4 Transportation

- If ventilator needs to be transported with special transportation means (by sea, plane), it must be packed and protected with suitable systems to avoid any damage caused by knocks or atmospheric agents. All moving parts should be properly anchored.

2.5 Ventilator Inactivity

- If ventilator is stored or left aside for a long time, its uncovered metal parts must be properly cleaned and protected with oil or grease, to avoid any oxidation. The ventilator should also be covered with a sheet and kept in a dry and sheltered place.

- Close all vacuum and delivery inlets with paper or plastic sheets to prevent animals, dust and other materials from entering the ventilator.
- The electrical terminal strip must be disconnected from power line.
- Loosen drive belt tighteners.
- In case of start-up, follow the instructions of Section 3.

3. Installation

3.1 Notice

Before installing the ventilator, proceed with the following checks:

- Check that the floor structure is suitable to hold ventilator weight. The foundations should preferably be made of reinforced concrete and their minimum weight should be about twice the total static weight. If the equipment is laid on metallic structures, check that they are properly stiff. **It is anyhow advisable to install the equipment with proper vibration-damping brackets.**
- Check proper leveling of the supporting structure or foundations, in order to prevent any misalignment and vibration during equipment operation.
- The ventilator should be positioned by ensuring free access to the equipment for all required routine and extraordinary maintenance activities.
- When the dimensions and characteristics of equipment room are established, the air flow necessary during ventilator operation should be considered; therefore, sufficient air circulation should be guaranteed to ensure that equipment room is sufficiently aerated and safe for operators.
- Room lights should allow perfect visibility of ventilator.

3.2 Ventilator Positioning

- To install the ventilator in its housing, use the holes purposely created on the base.
- If required, use the special vibration-damping brackets.



WARNING

- **If vacuum and delivery inlets are not canalized, install protection grids.**
- If the orientation angle set during choice stage needs to be modified, all required interventions can be performed according to the instructions of Section 5.2.

3.3 Power Supply Connection

- The electrical safety of this ventilator is guaranteed only when it is properly connected to an effective grounding system, in compliance with electrical safety legislation. Therefore, this fundamental safety requirement must be checked and, for

any doubt, ask professionally qualified personnel to carry out an accurate check of the whole power supply system. The Manufacturer will not be responsible for any damage caused by no ventilator grounding.

- **The ventilator motor should be connected to power supply line by observing the legislation in force and using the special terminal strip on the motor.**
- Check power installed on ventilator (Ref. Motor electrical information label) and install a suitable thermal switch to protect the motor.



WARNING

- **Check power tension and frequency and, subsequently, the phase order.**

4. Use of Ventilator

4.1 Notice

Operators responsible for ventilator use and maintenance must be properly trained and wear the proper safety clothes and safety devices required.

4.2 Checks

Before starting the ventilator, the operators responsible for its operation should perform the following checks:

1. Check that there is no foreign material inside the fan wheel, in the ventilator box and in vacuum and delivery conduits, if present.
2. Check that all ventilator and junction bolts are properly tightened.
3. Check that drive belt guards are properly installed.
4. Check that all drive belts are properly tensioned (Ref. Section 5.6).
5. Check that all physical and chemical features (density, temperature, composition, etc.) of the fluid in the ventilator and/or environmental conditions (altitude, humidity, temperature, etc.) comply with the specifications established during order definition stage.

4.3 Start-up

1. Start the motor.
2. Check that rotation direction corresponds to the direction indicated on the information plate. If they do not correspond, the ventilator air flow would be too low and motor power input would be lower than what is established by characteristic curves.
3. If rotation direction is reversed, stop the motor, turn power off on the control panel and reverse two phases in the terminal strip. Re-start the motor by checking the rotation direction.

4. Check that the power input value of the electrical motor is not higher than the value indicated on the motor information plate. If the ventilator flow is higher than the capacity allowed, the motor will be overloaded and a flow adjusting device should be installed on the equipment (e.g.: shutter on free inlets) and its calibration will allow to bring power value to the information plate nominal value.
5. Leave the ventilator running for about one hour.
6. Check that all bolts are properly tightened, and check bearing and motor temperature.
7. After a few running hours, check proper tensioning of drive belts (Ref. Section 5.6).

5. Installation and Maintenance

5.1 Notice

- **All maintenance activities must be performed when the ventilator is not running and power supply is turned off.**
- **Observe periodical maintenance activities indicated for maintenance interventions.**
- **To ensure a perfect operation, any components must be replaced with original spare parts only.**
- **In any case, personnel responsible for operation, maintenance, cleaning, etc. must carefully observe safety rules in force in the country where the ventilator is installed.**

5.2 Installation

Before beginning with the installation or starting the equipment, when it is supplied already assembled, check the condition of the block and its lubrication, of the fan wheel and of all components in general. After about 6 running hours, check belt tension, after they have adapted on pulley races (see Section 5.6). All complete assemblies supplied need only to be installed on foundations (see Section 3). When the ventilator is shipped disassembled, all parts where the position has not been clearly indicated should be marked again to facilitate their installation. Installation stages are as follows:

1 Shipment Crate Positioning

The crate must be laid on the foundation in such a way that no tension or deformation is created when its bolts are tightened, by applying some supporting blocks under its bearing points, where required.

2 Chair Positioning (if it is separated from the crate)

Follow the procedure used for crate positioning.

3 Support Positioning

All ventilators are equipped with the following fan wheel supports:

- Block supports with ball and roller bearings with built-in shaft.

- Upright supports with ball or roller floating bearings, horizontally split into two parts.

For the installation of the bearings on the shaft, observe the following general rules:

- For upright supports with ball or roller bearings, install the bearings in the right position on the shaft without tightening them, place the lower support part on the chair, by positioning the tightening bolts and leave them loose, place the shaft in such a way as to allow the bearing to settle in its housing on the support, tighten the bearings and remember to check - with a thickness gauge - the residual slack between the rollers and the upper part of the ring during conical bushes tightening, and tighten the supports to the chair.
- Caps of supports split in two are not interchangeable; therefore their position must not be reversed, and the bearing must have the right radial slack when the bolts are tightened (not pre-loaded).

4 Installation of Fan Wheel on the Shaft

Before starting installation, remove any burr from the shaft with a smooth file or an emery cloth, put the key in its slot, push the fan wheel up to its final location, tighten the fan wheel bolt only after its final alignment.

5 Installation of Vacuum Inlet (if required)

The inlet should be tightened between the crate side and vacuum conduit flange. Do not tighten bolts completely.

6 Shaft Leveling

Check shaft perpendicularity compared to the crate and its leveling. Check the right distance between the fan wheel and the inlet: the right positioning is obtained by lifting and slightly moving the supports. All bearings are self-aligning; however, for a perfect ventilator operation and perfect gasket sealing, shafts need to be sufficiently centered in support housings. When shaft leveling is checked, completely tighten all foundation, support base and cap bolts, as well as all bolts of crate connection in two halves.

7 Installation Stages

Operation sequence may need to be changed for some special conditions; however, experience shows that the previous procedure is the fastest one.

The ventilator has now been completely installed with the shaft perpendicular to the crate and on level, with all support and foundation bolts tightened. The right fan wheel positioning in relation to the inlet can also be done remembering that the inlet can be moved both horizontally and vertically. Tighten the bolts by manually and slowly turning the fan wheel, and make sure that it does not touch any vacuum inlet area.

In ventilators with independent chairs operating at high temperature, keep the slack between the inlet lower part and the fan wheel counter disk as low as

possible. Vacuum and delivery conduits should always be equipped with a vibration-damping coupling.

8 Drive Belt Installation

- For trapezoidal belt drive, check pulley alignment with a ruler placed along pulley faces and tighten them.

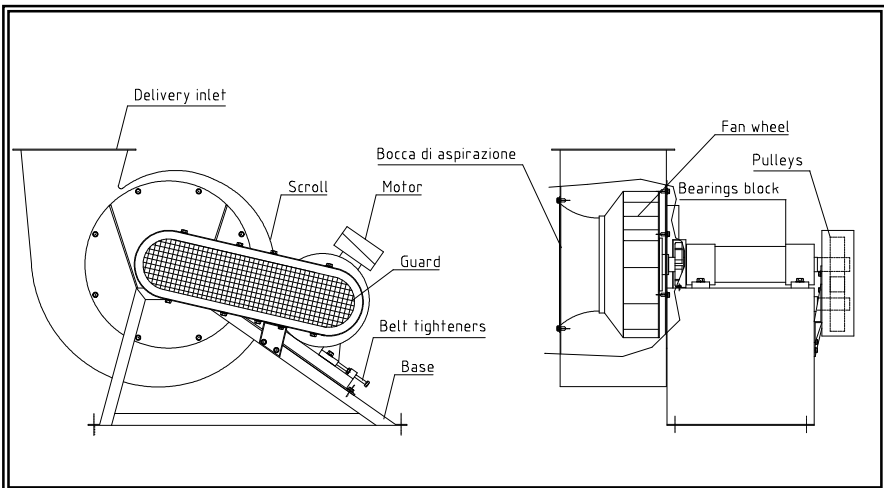
The motor shaft must be perfectly horizontal and parallel with the ventilator shaft. Do not force belts with a lever to avoid the risk of cutting the fibers of their internal structure.

For belt tensioning, see Section 5.6.

- For drive by means of a flexible coupling, alignment must be re-checked before start-up if it was adjusted at our plant, since the chair may have been bent when foundation bolts were tightened. If the ventilator conveys fluids at temperatures higher than 200°C, it is advisable to install the motor half-coupling higher than 0.1-0.25 mm compared to the ventilator.

When the ventilator reaches its standard temperature, the supports chair will be expanded and the coupling will be perfectly aligned. This operation must not be executed when the supports and motor are installed on a common steel chair, otherwise independent chairs, supports and motors are supplied.

Figura 3



5.3 Maintenance During Running in

These maintenance activities must be performed weekly during the first operation weeks, in order to check the real maintenance intervention frequency, according to operation hours and the kind of circulating fluid (presence of lubricating oil, grease, powders etc.

which may reduce fan wheel performances or cause vibrations by settling of fan wheel blades):

- 1 Lubrication of block bearings with grease
- 2 Cleaning of fan wheel blades, cleaning of motor, cleaning of filters and of filter-holders, if present.
- 3 Check of drive belt tensioning

5.4 Regular Maintenance

After the first operation weeks, according to the indications given from the operations described

at Section 5.2, it will be necessary to establish an operation maintenance calendar.

5.5 Maintenance of Fan Wheel

For fan wheel maintenance, the following instructions are recommended:

- Inspect the fan wheel from the inspection manhole cover, if present, otherwise provide for the possibility to enter the fan wheel from the vacuum inlet.
- For cleaning activities, use a wet cloth dampened with water or detergent. Do not use solvents which would damage the paint.
- Do not use water jets.
- Scrape off the scale from the fan wheel with a compressed air jet and remove the resulting scale with a vacuum cleaner.
- If necessary, disassemble the fan wheel, loosen the head screw and remove the fan wheel from the motor shaft with an extractor. Do not use a hammer to remove the fan wheel from the motor shaft nor separate the fan wheel from its boss, since a new assembly balancing process will be required. When the fan wheel is re-assembled, check the slack between the fan wheel and vacuum inlet very carefully.

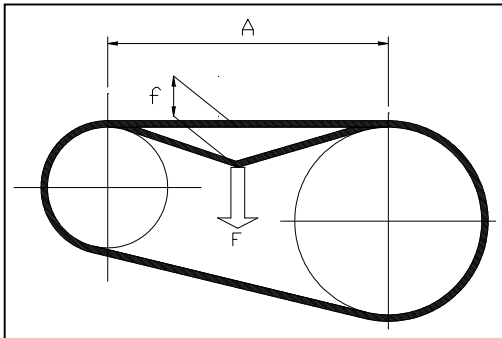
5.6 Drive Belt Tensioning

For drive belts tensioning, follow this procedure:

1. Remove the guard.
2. Check the belt tensioning, by applying a force as per relevant figures, to obtain an arrow $f = 16 \text{ mm}$ for every section $A = 1000 \text{ mm}$.
3. If required, tighten or loosen the motor tensioning screws.
4. Turn the adjusting screw to tighten the belts.
5. Block the motor.
6. Check the tension as described.
7. Re-install the guard.

To replace the belts, follow this procedure:

8. Remove the guard.
9. Loosen the motor tensioning screws and reduce the clearance between centers of motor pulley and ventilator.
10. Replace all belts.
11. Turn the adjusting screw to tighten the belts.
12. Block the motor.
13. Re-install the guard.



	D [mm]	F [kg]
SPZ	67÷95	1.0÷1.5
	100÷140	1.5÷2.0
SPA	100÷132	2.0÷2.7
	140÷200	2.8÷3.5
SPB	160÷224	3.5÷5.1
	236÷315	5.1÷5.5
SPC	224÷355	6.1÷9.4
	375÷500	9.2÷12.2

5.7 Maintenance of Motor

Electrical motors that are not equipped with external oilers do not need any regular lubrication, since they are equipped with permanently lubricated watertight bearings.

Electrical motors with external oilers need a regular lubrication: in this case, refer to motor user's manual.

5.8 Extraordinary Maintenance

Maintenance interventions not described in this manual should be considered as extraordinary maintenance and must be performed by specialized personnel, usually indicated by the Manufacturer.

6. Spare Parts

For spare part orders, get in contact directly with the Manufacturer, indicating all ventilator identification data.

The user should not need to keep a stock of spare parts, except for drive belts and any special parts defined in the order.

7. Analysis of Residual Risks

7.1 Analysis of Residual Risks

When the ventilators are produced, all manufacturing criteria and legislation on guards and safety protection devices are carefully considered; however, some hazards may yet be possible. The purpose of this section is to remind the operator about the possible hazards which may arise in special situations.

1. Usually, the electrical motors used are not equipped with braking devices. Therefore, it is recommended to be extremely careful with coasting of fan wheel and drive components during maintenance activities; it is also advisable to wait long enough until the ventilator stops completely, before any intervention is performed.
2. Drive belt guards and manholes are tightened in their locations with bolts. During maintenance, the ventilator may start rotating when these protection devices have been removed. **Therefore, the operator must be warned that it is ABSOLUTELY FORBIDDEN TO START VENTILATOR ROTATION if its guards are not in place.**
3. It is recommended to take all precautions required, such as precise procedures and proper individual protection devices, if the circulating fluid creates special hazards, which must be evaluated by the user.

8. Operation Faults

8.1 Operation Faults and their Causes

FAULTS	CAUSES
Insufficient flow	<ul style="list-style-type: none"> - Fan wheel partially obstructed - Low rotation speed - Pressure higher than plate specifications - Fan wheel installed up-side-down - Rotation direction reversed
Insufficient pressure	<ul style="list-style-type: none"> - Low rotation speed - Capacity higher than plate specifications - Specific weight lower than expected - Fan wheel installed up-side-down - Rotation direction reversed
Pressure drop after an operation period	<ul style="list-style-type: none"> - Leaking delivery and vacuum pipes - Leaking ventilator box seal
Excessive power input	<ul style="list-style-type: none"> - Rotation speed too high - Pressure lower than plate specifications with capacity higher than plate specifications - Excessive fluid specific weight
Mechanical defects	<ul style="list-style-type: none"> - Fan wheel unbalanced because of wear or dust deposit - Fan wheel rubs on ventilator box because of strain provoked by pressure unloaded by pipes on ventilator inlets - Bearing faults caused by fan wheel unbalance (fan wheel side) or excessive belt pulling or pulley unbalance (drive side) or bearing intrinsic faults.

9. Equipment Disabling and Disposal

9.1 Equipment Disabling

- If it is decided to stop using the ventilator, it is recommended to disable it by removing its electrical motor, its fan wheel and block.
- It is recommended to make sure that hazardous parts, such as drive belts, cannot create dangers.

9.2 Equipment Disposal

- Divide the various materials according to disposal types and rules.
- Materials must be collected in special containers, classified, labeled and disposed according to the legislation in force in the destination country, by resorting to specialized Companies, if required.
- Do not throw waste of any kind in natural environment.