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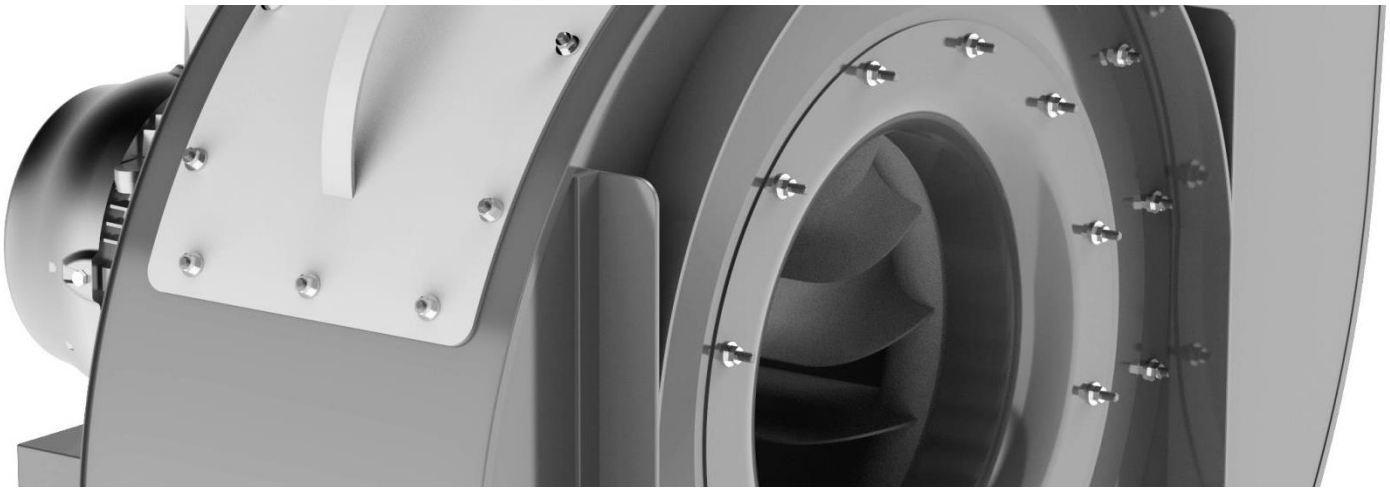
General manual fans



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All the information in this manual must be carefully read and understood. Pay particular attention to the operating standards with ATTENTION signals as their non observance can cause damage to the persons and/or machine.

Remark:
Save this manual for possible future references. We reserve the right to improve or modify manual or products and fittings with any obligation to update previous productions and manuals.

Note: the directives quoted in this manual are available in the following agencies:

EU-guidelines CEE/EEC Community Directives: UEO, rue de la Lai 200/b - 1049, Brussel/ Belgium
Adapted guidelines EN/EN Harmonised Directives: CEN, rue de Stassart 36/b - 1050 Brussel Belgium
Norm UNI/UNI Directives: UNI, via Battistotti Sassi 11/b - 20133 Milano / Italy
Norm CEI-IEC/CEI-IEC Directives: CEi, viale Monza 259 - 20216 Milano / Italy
Tables ANIMA-COAER/ANIMA-COAER tables: ANIMA; Via Battistotti Sassi 11b-20133 Milano / Italy

1.0 GENERAL INFORMATION – INCOMING INSPECTION

These instructions apply to production fans. Each fan is verified and balanced before shipment. The identification of the fan is made according to the data label sticked on the fan casing and declarations. Our fans are guaranteed by law. Warranty starts from the date of delivery and covers all the faults recognized to the manufacturing quality or material defects. For any evidence of damage discovered upon receipt of goods, report them to the carrier and contact us; we are not liable for the damages occurred during transport. Do not use or repair damaged fans, you can loose warranty. The range of our fans is complete of protection fittings (guards),in conformity with directive UNI EN ISO 12499 (see technical sheet) except when they are destined to ducting, frames, plants. It is therefore a user responsibility to arrange for such structures to fulfil as a protection towards the dangerous components. We decline any liability for damages to persons or things for the absence of such protection devices. In order to protect the staff responsible of maintenance, the user must supply the fan with the necessary electrical insulation devices: lockable multipolar switches (according to low EN 60947-3). These fittings are available on request. Our fans are not fitted with active safety functions as they must be installed in plants that check supply and control and drive. Check the conformity of the fan with the order (arrangement, rotation, power and polarity of the installed motor, fittings etc.). Check the presence and correct tightening of the bolts and nuts (TAB.1). We don't accept any returns of non-complying fans after installation. We refuse any responsibility for damages due to improper use and/or the non-observance of the instructions quoted in this manual.

1.1 DESTINATION OF USE (SEE TECHNICAL CATALOGUES)

The standard Ventinet fans are designed and manufactured to exhaust gaseous fluids mainly of clean air, not abrasive, neither explosive nor corrosive and for indoor installation. There are specific type suitable to convey air and dusts. Plastic and stainless steel fans are, in some cases, suitable to convey some corrosive gases. Any other use has to be considered improper and not allowed.

Attention:
In the respect of the machine directive 2006/42/CE the fan is a PARTLY COMPLETED MACHINE, it is not CE marked and come with DECLARATION OF INCORPORATION.

Only for a few series and particular applications, in the respect of the machine directive 2006/42/CE, in case of the fan is required CE marked it must be provided complete of:
- protection guards to prevent the access to the fan inlet and outlet
- control panel

And it will come with DECLARATION OF CONFORMITY.

In case the fan is installed in a more complex system, protection devices may be absent or be removed, if the requirements of the MACHINE directive are guaranteed by the system itself. Guards may also have the duty to prevent the entrance in the fan of foreign objects.

ATTENTION: The presence of guards not completely exclude the possible access and ejection of foreign objects by the fan. In the event that dangerous bodies or particles may be mixed up with air treated, user must carry out an overall assessment of the risk that take into exam the possible sizes; in case the section of the guard issued as standard was not sufficient to guarantee the minimum safety requirements, user must carry out all the necessary precautions to avoid any residual risk.

ATTENTION: The air flow characteristic quoted on the catalogues represent the fan performance without any fitting; these graphs do not consider the bigger losses due to the protection guards, flexible joints, valves, silencers and others. All the losses, including the ones due to the protection guards, shall be evaluated on design stage as function of velocity, air density, temperature and any other factor contributing to modify the impact in the system.

2.0 PURPOSE AND USE OF THE MANUAL

Purpose of this manual is to allow the installation and safe use of our fans; therefore all the instructions quoted must be read, followed and applied peremptorily and completely before to start any operation. Manual has to be considered as a part of the fan and must be stored up for future reference for the duration of the fan itself. Furthermore these recommendations do not represent the sole procedures to reach safety; every operation carried out, such as for example displacement, installation and maintenance, require particular cares guaranteed only by skilled staff adequately trained. Following the instructions to use the fans must be ensured the conformity to all the relevant directives, laws, norms in force in the place of installation.

NOTE: Skilled staff is the one having specific technical competence in the sector of components of ventilation and electrical systems for industrial

ATTENTION: This manual applies to the fans described on chapter 5.0.

ATTENTION: This manual doesn't apply to the fans for use in hazardous atmospheres with explosion (ATEX) and fire risks. We therefore recommend user to verify accurately that the exhausted fluid doesn't come from a zone with presence of explosive atmosphere by powders, gas, vapors, fogs, liquids and flammable products. In this case the standard fans cannot be installed. For information contact Ventinet.

ATEX

For Atex certified fans, the Atex appendix must be consulted.

With regard to Smoke and Heat Exhaust certified fans, the relevant appendix must be consulted.

ATTENTION: In case the information quoted in this manual is not clear contact our technical office before to intervene.

3.0 GENERAL SAFETY INFORMATION

- Safety protections as guards and barriers, together with everything to fulfill as protection from dangerous components as ducting, shelters, components and parts of machines or systems, don't have to be removed except for absolute necessity of intervention of ordinary or extraordinary maintenance.
- In case of removal of protections, all the safety measures shall be adopted to put in evidence all possible hazard.
- The removed protections shall be restored immediately when the reasons of the temporarily removal terminate.
- All the interventions of ordinary and extraordinary maintenance must be carried out with fan stopped and main voltage switched off. Put the proper devices into effect to avoid the danger of accidental connections.
- It is forbidden to make the fan operate at temperatures and R.P.M. higher than those fixed and in any case for the direct driven fans at top speed higher than motor rated speed (except different specifications: 50Hz).
- Before connecting the electric power supply to the motor terminal box, check if the line voltage and frequency correspond to those specified on the motor rating plate or in default of this, on the product rating plate.
- Always pay the maximum attention and specially comply with the directions on the signals and labels placed on the fan. With the passing of time, if they become unreadable or if they accidentally come off, replace them immediately.

4.0 RESIDUAL RISKS AND RISKS DUE TO IMPROPER USES

4.1 RESIDUAL RISKS

During the working and immediately after the stop the following residual risks may occur:

- Dangers to rotating parts (for the partly completed machine).
- Dragging caused by members in motion (for the partly completed machine).
- Dragging caused by the fan intake.
- Throwing of an object entered inside the fan through the outlet.
- Danger of burnings and burns due to over-temperature on the fan external surfaces.
- Danger of throws for breakings due to excessive vibrations, over-speed, over-temperature.
- Risk due to the impeller inertia, therefore when the command of STOP is given, the impeller continues its rotation for some time.
- Risk due to the fact that the impeller could start rotating because of airflows.

4.2 RISKS DUE TO IMPROPER USES

- Never introduce hands or other parts of the body near members in motion.
- Don't introduce hands or other parts of the body over the guards (protections).
- Don't remove, eliminate or modify the guards (protections).
- Don't remove, eliminate or modify possible control devices.
- Don't operate the fan in atmospheres different than those scheduled (for ex. in areas at fire and explosion risk).
- It is forbidden to non-authorized operators to carry out any kind of intervention on the fan.
- Restore the protection systems before starting up again the fan, after the interventions that required their removal.
- Keep all protection systems in perfect efficiency.
- Keep all safety and directions plates on the fan in good conditions.
- Staff carrying out any kind of intervention on the fan must be provided with the necessary individual protection devices.
- Don't wear cumbersome clothes.
- Don't get in contact with fans destined to the conveyance of fluid at high temperatures till safety conditions subsist.

5.0 DESCRIPTION AND TECHNICAL SPECIFICATIONS OF FANS DEFINITION OF FAN

The fan, because of the rotation of the impeller, causes a vacuum which sucks up fluid (air) inside the conveyor and throw it to the outlet. The fan is always composed of a rotating part (impeller / wheel), of a static part (casing, volute, conveyor) in which the fluid conveyance takes place and of an electric motor, coupled with the rotating part directly or indirectly through a belt drive.

5.1.0 AXIAL FANS

The characteristic of the axial fans is to be axially crossed by the airflow with a scheme of "direct crossing". Performance is suitable for high or medium capacities and medium or low pressures. Performance of every single fan is quoted in the technical catalogues. Our standard axial fans are suitable for transporting clean air with a temperature between -20°C and + 50°C and with a humidity of up to 80%. In addition to the standard versions, there are options for deviating temperatures. In particular the smoke exhaust fans of the HT series
according to the directive EN 12101-3 can operate in case of fire emergency at high temperatures for a given period of time for ex. 400°C – 2h, 300°C 1h etc.
Those specifications are quoted in the catalogue or technical sheets and they have to be peremptorily consulted in order to identify the suitability of the fan to convey the fluid treated by the system which the fan itself is destined. Construction of helical fans are basically of two typologies:

5.1.1. Ducted axial fans: composed by an impeller and motor assembled in a cylindrical casing; drive is given directly by the motor (direct drive) or by mean of pulleys and belts (belt drive).

5.1.2. Wall or roof axial fans: with impeller and motors directly coupled, mounted on a panel, ring or roof base.

5.2.0 CENTRIFUGAL FANS (OR RADIAL FANS)

In centrifugal fans air enters the impeller axially and is delivered radially in the volute. Performance is suitable for medium or low capacities and medium high pressures. Performance of every single fan is quoted in the technical catalogues. Our standard range of centrifugal fans are suitable for transporting clean air with a temperature between -20°C and +80°C and high temperatures (HT versions), as well as air mixed with dust or solid parts of different sizes (specific types). In addition to the standard versions, there are options for deviating temperatures. Such specifications are quoted in the catalogues or technical sheets, to be peremptorily consulted in order to identify the suitability of the fan to convey the fluid treated by the system which the fan itself is destined.

5.2.1 Forward curved blade and radial blade fans must always operating connected with ducts or apparatus that create a resistance to limit the capacity till the values of absorbed current (ampere - A) are in line with the motor rating plate. In case the resistance of the system is lower than calculated, the fan will performance an higher air delivery and could be subjected to overload with risk of break down.

5.2.2. Backward curved blade fans can also operate in systems having lower resistances than those calculated with lower risks of motor overloads, as they have the advantage not to increase very much the air delivery while the resistance of the system is decreasing. For all centrifugal fans we always recommend to install a volume shutter in the system to be set during the start up of the system.

ATTENTION: In case of installations in environments with presence of aggressive substances, only special material versions (techno-polymers, stainless steels, aluminum)or treatments (hot dip galvanizing etc.) must be used.

ATTENTION: When the fan is designed to operate in case of fire emergency to exhaust high temperature smoke, our series HT according to directive EN 12101-3, the suitability maximum temperature/ maximum time is specified in the data label. After operation in real emergency, the complete fan unit must be removed, repaired or conveniently eliminated and replaced if necessary.

ATTENTION: The noise level of our fans expressed in dB(A) are obtained through readings in free field at top efficiency, with ducted inlet and outlet and they are quoted in the catalogues and technical sheets in which the values above 80 dB(A) are boldface highlighted. User could detect levels of noise differing from those given in function of the environmental installation. We always recommend to isolate the fan, from the ground and ducting, with A.V. mounts and joints. It is a user responsibility the safeguard of the health of the staff in the respect of the norm D. lgs. 81/08 and following modif.(*). To this purpose suitable fittings are available on demand.

(*) National rules on protection of health and safety in the workplace.

6.0 TRANSPORT AND DISPLACEMENT (FIG. 4)

- Fans are packed in carton boxes or secured on pallets. Ventinet is responsible only until the load. Transport must be effected in complete safety and it is responsibility of the carrier to secure the goods in appropriate manner. In any case fan must travel indoor and protected by the atmospheric agents. In case of transport in environmental conditions particularly unfavorable as for example, the travel in vessel or on ruined roads or lifting by crane to reach overhead installation sites, lapses by Ventinet any form of guarantee on the transmission components, especially bearings and supports.
- The position of transport of the unit must be respected, it is absolutely forbidden to stack up, overturn or rotate packages and to apply loads not provided by the manufacturer.
- For handling use appropriate means according to the Italian D. Lgs. 81/08 and subsequent modifications (*); during the operations of unpacking and storage do not use the catching points on the motor (they only serve to handle the motor), nor on impeller or protection guards.
  For the handling only use the catching points given for the lifting distributing uniformly the load (Fig. 4). The weight of each fan is quoted in technical catalogues.
- The maximum hand lifting is specified in the Italian D. Lgs. 81/08 and subsequent modifications (*); it is generally acceptable a weight of 25 kg below the shoulder but above the ground level.
- Avoid rotations of the bust with the load. In hand lifting use the legs and not the back.
- Before moving or lifting the fan, make sure to use a means of adequate carrying capacity. Take a great care on handling, avoiding collisions that could damage the external painting of the fan and could also affect its correct working. For the lifting use a rope crane, by means of tie rods of appropriate length and quantity, by inserting the hooks in the appropriate slits on the structures of fans, or by opting for a band of soft material, or for lifter. Verify that the forks are of greater length of the size of the pallet to be raised. Never leave the load suspended.

(*) National rules on protection of health and safety in the workplace.

6.1 STORAGE

In case of storage keep the fan housebound and indoor, protected by the weather, dust, moisture and chemical agents (in order to avoid corrosion phenomenon),far from machines that can produce vibration (the bearings of fan would suffer the same type of stress). If the fan is devoid of packing and the inlet and outlet were free, they must be closed with a plastic protective film, to prevent the entry of dirt, foreign objects, animals etc.
Avoid the fan would suffer hits

IT IS ABSOLUTELY FORBIDDEN TO STACK UP, OVERTURN OR ROTATE PACKAGES AND TO APPLY LOADS NOT PROVIDED BY THE MANUFACTURER.

Note: periodically check the resistance isolation between phases and between winding and the frame.

Note: It is essential to prevent that the impeller of fans stands still for long periods, both during the storage and during the manufacturing of the system in which the fan will be installed. During these periods fan must be periodically monitored by hand rotating monthly the impeller (approximately 100 r.p.m.), to avoid damages of the bearings. Ventinet is not liable for damages to the transmission members due to the fan prolonged inactivity.

ATTENTION: A long storage, even if correct, reduces the lubricant power of grease that must be checked each year. In addition at start-up, check the status of gaskets and belts that may have been deteriorated due to inactivity. The resistance isolation must be maintained at values higher than 10 mega ohm. In the presence of lower values, it is necessary to dry following appropriate procedures and turning to competent and authorized staff. Weight of every single fan is quoted in the technical catalogues. The temperature range admitted for storage is -20°C +50°C and relative humidity not higher than 80%.

Note: Always respect the instructions quoted in the use and maintenance manual of the specific electric motor.

7.0 PLACE AND CONDITIONS OF INSTALLATION

It is recommended that the supporting surface is flat and dimensioned to support the stress due to the load (weight), that the fan is put on anti-vibration mounts and connected to the system by means of flexible joints that reduce the own vibrations of the fan. The support base and the fixing must take place in the specific points by paying particular attention not to warp the frame.
The systems connected must be supported separately and they must be coaxial with the fan inlet and outlet so to avoid to stress the fan itself with unnecessary tensions that could warp the frame. The fan should be positioned in a way to ensure a surrounding area sufficient to guarantee the interventions of assembly, cleaning, maintenance, etc.
Provide at the necessary safety distance, a barrier that prevents involuntary approaching to the non ducted inlet and outlet of the fans.
Before installing the fans on the roof (roof fans and others), make sure that the roof is sufficiently robust and rigid to withstand the weight of the fan itself, the load of snow and possible further weight applied during the installation. It is always recommended to install the roof fan in a flat position. If this is not possible, the slope of cover must not exceed 10%. In order to ensure a proper functioning of the fan, it is recommended to maintain some distances, such as:
• 1, 5 times the diameter of the impeller as distance from a wall for free inlet or outlet extractions;
• 2, 5 times the diameter of the impeller as distance of the first curve from the fan inlet or outlet;
The same applies for inlet or outlet canalizations. We furthermore remind that it is a good rule for the curves to maintain a minimum radius of internal curvature equal to the diameter of the duct.
Ventilation ducts shall be such as not to create excessive overpressures of the conveyed air (installation in accordance with ISO standards 5801 and 5802).
Installer and/or end-user must provide the opportune means to ventilate the motor, when suitable heat exchange can't be guaranteed or in case of use by frequency converters. The lack of a suitable cooling shall prejudice the motor features up to cause its fault; consequently, in this case, lapses any form of guarantee by Ventinet and motor supplier.

7.1 INSTALLATION

ATTENTION: INSTALLATION SHOULD BE CARRIED OUT BY QUALIFIED STAFF.
Following in this manual we will indicates by the caption "put the fan in security" the following operations:
• Make sure that the fan is disconnected from all the electrical powers.
• Make sure that all the members in motion are completely in still position.
• Wait for the possible internal and external temperature, for the high temperature fans, has reached a value not dangerous to the touch.
• Ensure to illuminate correctly the area surrounding the fan (as by D.lgs 81/08 and subsequent modifications (*)).
• Block mechanically all parts in movement.

For any operation to be carried out on fan, operators must be fitted with the appropriate protection devices (DPI): safety shoes, protective clothing, helmets, gloves, masks etc. (as by D. Lgs. 81/08 and subsequent modifications (*)).During the operations of unpacking and storage do not use the catching points on the motor (they only serve to handle the motor), nor on impeller or protection guards. Only use the catching points given (see chapter 6.0 of this manual).Verify the absence of points of corrosion. Check that the impeller has not suffered hits or deformation during the handling, it is well fixed to the rotation shaft, no foreign matter interfere with the impeller itself and it rotates freely on its
axis. We recommend foundations preferably of reinforced concrete, suitable to bear the static and dynamic load, with a minimum weight which should be equal to four times the weight of the rotary mass (around twice the total static weight of the fan). In the case of installation on steel structures, it is essential that they are adequately rigid and have their minimum natural frequency more than 50%

of the fan speed. A correct leveling of foundations or support frames and their strength are fundamental to prevent vibrations. Intending to avoid the spread of vibrations, we recommend the application, in appropriate points between the fan and its interfaces (floor and ducting), absorbing fittings as shock-absorbers and flexible joints. Shock-absorbers should not be completely crushed (compressed) and should withstand a base frame of the fan (and not individual elements).For axial fans fix firmly to the flanges and/or brackets (feet). For centrifugal fans to the motor supports, basements, flanges, by mean of screws of suitable diameter and correct tightening (TABLE 1), using all the fastening holes provided. In centrifugal fans flanged in arrangement 5, for weight more than 250kg, is necessary to provide some shock-absorber supports that support the casing in order to relieve part of the weight of the inlet, avoiding rubbing with the impeller. In case of use of motors equipped with drain plug, it must be located at the lowest point of the motor at installation completed. Discharge plug must be definitely removed in case of condensation due to high temperature variations or humidity, or periodically removed to allow the drainage of possible condensation.

ATTENTION: When the access to inlet and outlet (rotating parts in motion) is not ducted or protected by any other means, it is necessary to install a protection guard according to UNI EN ISO 12499 and subsequent (fitting provided on request). Failing to install the protection guards may be cause of serious accidents. Ventinet does not know the final use of the fan, it is therefore up to the user to protect the uncovered dangerous parts of the fan with guards, grids, switches, barriers, ducting, frames, components, part of machinery or systems.

ATTENTION: In proximity of fans for high temperatures (series HT) it is necessary to provide indications to avoid the contact with hot surfaces.

ATTENTION: Fan outlet must not flows in areas with presence of people or animals, in order to avoid that objects or impurities, also of small dimensions, can be projected at high speed and cause injury.

(*) National rules on protection of health and safety in the workplace.

8.0 ELECTRICAL CONNECTION

ATTENTION: THE ELECTRICAL CONNECTIONS MUST BE CARRIED OUT BY STAFF QUALIFIED AND INSTRUCTED ON STANDARD EN 60204-1.

Note: Always use the specific use and maintenance manual of the electric motor that will be authoritative (apply in any case all the technical requirements according to EN 60204-1).In order to provide instructions of a general nature we recommend the following:
The electric plant (that must provide protection against overloads to safeguard the motor by mean of suitable switch), the components and the connection to fan, must comply with the standard EN 60204-1. The ordinary electrical plant is not suitable for operation in area at risk of explosion (ATEX), nor to power the smoke exhaust fans for use in fire emergency (series HT). The HT series requires an independent, safety electrical plant, with automatic activation in case of fire and to use cables and components suitable for the expected temperatures (according to the specific rules).

8.1 Check that the data of voltage, frequency and electrical phases, quoted on the motor rating plate or in the absence of this on the fan plate, correspond to those of the feeding line.
8.2 Provide a multi-polar lockable service switch in the immediate proximity of fan, to protect the staff responsible of the maintenance.
8.3 Provide a system to protect the motor and prevent harmful overheating.
8.4 Provide a protection against the over currents of the electric motor according to EN 60204-1, for ex. by mean of magneto-thermal relay.
8.5 Use powering cables with sections suitable to the full load current of the motor, according to EN60204-1, in order to avoid overheating and voltage drops during start-up.
8.6 Make the wiring following the diagram quoted on the motor plate and/or included in the terminal box. In FIG.1 are quoted the most common types of wiring for electric motors. Do not connect motor if there are doubts about the interpretation of electric wiring or, in the absence of any connection diagram, consult the manufacturer. Always use, at least from 5, 5kw and above, unless different requirements, systems enabling gradual start-up of the motor, e.g. through soft-starters or where it is possible through delta-star switch.
8.7 Tighten the nuts of terminals on the lugs of the power cables with torque (Nm) indicated in the table below.

Terminal	M4	M5	M6	MB	M10	M12	M14	M16
Steel	2	3,2	5	10	20	35	50	65
Brass	1	2	3	6	12	20	35	50

Do not interpose washers and/or nuts between the motor lugs and those of powering cables.

8.8 Ground the fan and the electric motor.
8.9 Check and possibly identify the presence of auxiliary equipment (for example thermal protections or heaters), correctly follow the wiring diagram and apply as indicated in the matrix of connection and consult the use and maintenance manual of the motor.

ATTENTION:

- For the use of thermal protections, provide the appropriate steps to avoid dangers of a sudden undesired restarting. The condensation heaters must have a separate line feeding. THEY DON'T HAVE TO BE FEEDED WHILE MOTOR IS OPERATING.
- Variable speed applications are not allowed, if not expressly agreed in phase of order with the manufacturer. Anyway are not admitted speeds different than the nominal rotation speeds according to EN 60204-1.
- IMPORTANT : For motors intended for smoke extraction in case of fire (HT), the frequency converter (inverter) and the thermal protection (PTC) must be by-passed in case of emergency smoke extraction.

- If agreed with the manufacturer a range of speed that can become a source of danger, must be provided a protection against the over-speeds of the electric motor according to EN 60204-1
- Asynchronous motors controlled through the frequency converter (inverter) in any case, must not operate to a number of Hz higher than given (usually 50Hz) and shall not fall under the half the nominal number of Hz.
- For synchronous motors (EC series) refer to the specifications and maximum RPM reported on the name plate.

8.10 USE IN COMBINATION WITH FREQUENCY CONVERTER

In case of frequency converter (inverter) use, it is necessary to install a load reactor (dV/dt filter) or a sinusoidal filter in order to protect the motor from voltage peaks/variations.

The installation of the inverter or of any controlling drivers, eventually provided together with the machine, must comply, together with the electrical and mechanical safety requirements, with the current standards for electromagnetic compatibility (EMC-EN61800). Among the necessary measures there could be the need for shielded cables, the installation of EMC filters and cable glands, the check for the installation distances between motor and drives and the check of the earthing.
Without this protection this can cause damage to the motor and bearings. There are more factors that influence this, for example the settings.

NOTE: Always follow the instructions in the controller's specific operating and maintenance manual.

For centrifugal fans, we recommend using PTC's in the motor for protection (thermal). With axial fans, this is not always necessary (but recommended), because the motor is mounted in the air stream, which provides additional cooling for the motor.

9.0 START-UP

ATTENTION: START-UP MUST BE CARRIED OUT BY QUALIFIED STAFF

Note: When access to inlet and outlet (rotating parts in motion) is not ducted or protected by any other
means, must be installed a protection guard according to norm UNI EN ISO 12499 and subsequent (fitting provided on request).

Note: User should arrange to interface the fan with the necessary controls of start/stop and protection while observing the regulations in force (EN 60204-1).

9.1.0 OPERATIONS TO CARRY OUT BEFORE START-UP:
9.1.1 Verification of tightening of all bolts and nuts (see Table 1), with particular regard to the head screws for locking the impeller, of the motor to structure, pulleys and protections. Verify alignment of pulleys and belts and the proper draught of the belts (see FIG.2).

9.1.2 Check the free rotation of the impeller and the absence of skidding, rotating it by hand. Ensure absence of foreign objects in fan.

9.1.3 Verify the position of any shutters or volume dampers: open position for the axial fans, closed for the centrifugal fans (during start-ups it prevents dangerous overloads of the motor).

9.1.4 Check the proper lubrication of the rotating parts and eventual inspection doors to be closed.

9.1.5 Check the insulation resistance between phases and phases and heart. Must be, with winding at 25°C, higher than 10 MΩ. Lower values normally indicates the presence of humidity in windings. In this case DON'T PROCEED and ensure to dry, having recourse to a specialized and authorized workshop.

ATTENTION: NEVER TOUCH THE TERMINALS DURING AND IMMEDIATELY AFTER MEASUREMENT AS THEY ARE UNDER VOLTAGE.

9.1.6 Note down the direction of rotation of the impeller (showed by a special arrow placed on the product or on the blades of the impeller itself) and the values of maximum absorbed current (indication placed on the motor or and/or fan plate).

Note: In case of non conforming values, before proceeding correct the anomaly and repeat the verification.

9.1.7 Verify the correct grounding.

9.2.0 OPERATIONS TO CARRY OUT IMMEDIATELY AFTER START-UP:

9.2.1 Verify that the direction and the speed of rotation are in accordance with those given (indications on the product). In the case in which the direction of rotation had to change, after removing the electric power and put the fan in security, proceed in the following ways:
a- In the case of three-phase motor is sufficient to reverse two electrical phases.
b- In the case of single-phase motor follow the wiring diagram indicated.

9.2.2 Verify that the absorbed current does not exceed the value quoted on the motor or fan rating plate. To detect a reliable measurement consider a reasonable time of stabilization. In star/delta connection the reading must be effected upstream the switch; if this is not possible, note down the current of phase on any one of the six leads to the terminal box and multiply that value for 1.73. Avoid consecutive starts of the motor; this involves continuous overloads that overheat the electrical parts. Before re-starting cool down adequately.

ATTENTION: If after verifications non conforming values are detected DON'T PROCEED, remove the power supply and contact the manufacturer.

9.3.0 OPERATIONS TO BE CARRIED OUT AFTER A FEW HOURS FROM START-UP:

9.3.1 After few hours of operation check:

1 that vibrations haven't loose the tightening of all bolts and nuts. If necessary repeat the tightening.
2 that the correct tensioning of the belts and their alignment is not modified. If necessary to restore (FIG.2).
3 that abnormal rubbings didn't occur. If necessary to restore.

9.3.2 Verify by thermometer, that the temperature of the bearings is regular, a momentary temperature increase followed by next fall is considered normal. The temperature to interest is at running speed.

9.3.3 Check, through vibrometer, that the vibrations are not excessive according to GRAPH 1.

ATTENTION: If after verifications non conforming values are detected DON'T PROCEED, remove the power supply and contact the manufacturer.

10.0 ROUTINE MAINTENANCE, INSPECTION AND CLEANING

ATTENTION: MAINTENANCE BY NON-QUALIFIED STAFF IS PROHIBITED. BEFORE CARRY OUT ANY MAINTENANCE OPERATION, INSPECTION AND/OR CLEANING ENSURE THAT THE FAN IS NOT AND CANNOT ACCIDENTALLY BE ELECTRICALLY POWERED AND THAT THE IMPELLER IS STOPPED AND LOCKED. PUT THE FAN IN SECURITY. DURING MAINTENANCE OR INSPECTION WE RECOMMEND TO WEAR SUITABLE CLOTHES ACCORDING TO THE STANDARDS OF INDIVIDUAL SAFETY AND TO USE PROTECTION DEVICES! IN CASE OF FANS THAT OPERATE WITH HAZARDOUS FLUIDS, CORROSIVE ETC. USE SUITABLE PROTECTION DEVICES (AS BY D. LGS 81/08 AND SUBSEQUENT MODIFICATIONS).

Note: User shall select for the products suitable to the cleaning stages according to the type of plant and the safety data sheet of the product transported. In case of harmful and toxic products, the liquid waste should be conveyed in a suitable closed tank and disposed according to the safety data sheet of the product;

Note: At the end of the operations of maintenance ensure that no foreign objects remained inside the fan.
Fans are machines relatively simple to maintain but require regular interventions to keep their efficiency and prevent damage to people and things.

ATTENTION: The periodic maintenance of fan is of fundamental importance to hold the safety functions of the equipment. User is therefore required to observe faithfully the procedures of maintenance described in this chapter and the necessary periodicity(see TAB.2).

Note: It is essential to prevent that the fan impeller remains in still position for long periods. During this time, it is necessary to check each month the fan by rotating by hand the impeller for at least 100 rounds, to avoid the damage of bearings.

10.1 VISUAL INSPECTION

To avoid malfunctions that could become dangerous, it is necessary that the fan is visually inspected with the periodicity indicated in TAB.2.
The frequency of inspections must be increased by the severity of the conditions of use and by the working environment.
Check the general conditions of fan (carrying structure, impeller, etc.) and of the protection elements (guards, grids, etc.) verifying the integrity, cleanliness, lack of oxidation, etc. It is necessary that there are not leakages from gaskets that in this case should be replaced.

10.2 CONTROL OF MINIMUM DISTANCES

To each maintenance operation is necessary to ensure that the interstices between the moving parts and fixed parts remain unchanged or anyway such as to avoid any possible contact between the parties during operation. In the case of reductions in the interstices the causes could be the following:

- some screws may have loosed because, during normal operation, the fan generates vibrations that can interfere with the preservation of correct tightening of the bolts, therefore it may be necessary a realignment and new tightening;
- fan may be strained therefore it would be necessary to replace some component or the whole structure.

10.3 CLEANING OF THE VOLUTE (CONVEYOR, CASING)

Clean the internal parts by eliminating any foreign object, verify the state of the welding. Verify the absence of dust deposits, rust and other corrosion or weakening phenomena, should it not be the case replace the component.

10.4 CLEANING OF THE IMPELLER

We recommend to constantly check the state of cleanliness of the impeller. Clean taking care to remove any trace of dirt and deposit, causes of corrosion and/or unbalance. The eventual lying of material, dust, grease etc. on the impeller leads to the unbalance with the consequential damage to the electric motor or members of transmission.
For the cleaning use a cloth moistened with water or non-abrasive nor corrosive detergents that could damage the painting. Do not use water jets. Clean the deposits on impeller with a jet of compressed air and eliminate the waste produced. In case of extraction of abrasive dust or air rich of corrosive substances, vibrations can depend on wearing of the impeller itself or by its unbalance. The values of balancing rate are specified in GRAPH4. In the case it is impossible to restore the impeller to the initial conditions, replace it with original spare parts.

10.5 CLEANING OF THE MOTOR

The motor must always be kept clean in a way that it shows not traces of dust, dirt or other impurities. Verify regularly that operates without vibrations or abnormal noise, that the access of the ventilation circuit: motor back cover (if present) is not obstructed, with the consequent possibility of overheating of windings. See also the instructions given by the manufacturer of the motor, included in its manual instructions.

Note: At the end of the cleaning make sure that no foreign objects are left inside the fan.

10.6 CONTROL OF BOLTS AND NUTS

Verify the presence of oxidation that could compromise the functionality; replace with spare parts having the same characteristics and tighten systematically. Check the tightening of all the fixing elements of: motor, impeller, conveyor, protections, supports, brackets, flanges, joints etc. For the correct tightening view TAB.1.

10.7 CONTROL OF VIBRATIONS

By mean of vibrometer carry out the control of the vibrations. Refer to the norm ISO 14694: 2003 for what concerning the vibration limit values. It indicates not to exceed the value of 5, 6 mm/s for powers less than 3,7kW and 3,5 mm/s over the 3,7kW.
If, during the general inspection, carried out in the times required by the summary TAB. 2 of the programmed maintenance operations, excessive vibration is detected, analyze the possible causes and intervene. Fan should not have a degenerative performance, in this case, check that installation has been carried out properly as described. Bearings could be worn (20000 hours operation in optimal working conditions observing the correct lubrication intervals, the suitable applied loads and the choice of original materials or compatible). Impeller could be unbalanced (replace it with original spare part or re-balance according to ISO 1940/1 degree G=6. 3).

10.8 LUBRICATION

Most of the electric motors used by Ventinet provide lubricate for life watertight bearings. The life depends on the conditions of effective working (number of starts etc.) and the environmental conditions of use (temperature, the presence of powder etc.).
In general all the bearings of our fans if properly used are designed to guarantee 20000 hours of operation in continuous service, in environment and ideal conditions. In any case we recommend the replacement after four years maximum, using spare parts having the same characteristics as the original. It is possible to identify the bearings reading the letters stamped on the side of the bearings ring. The motor bearings of F400/300/200 HT series for fire emergency must be replaced every 8500 hours.

LUBRICATION INTERVALS
For some bearings requiring a periodic lubrication, see the grease to be used in the table above GRAPH 2.
See the lubrication intervals in GRAPH 2, in function of the speed of rotation "n" and diameter "d" of the shaft. The diagram is valid for bearings of horizontal shafts and normal loads. It shall apply to grease of good quality specific for bearings, at temperature, measured on the external ring of the bearing itself, which does not exceed the 70°C. We recommended to halve the intervals of lubrication for every 15°C of increase of the bearing working temperature, reminding that in case of dusty, wet hot and corrosive environment, the above mentioned interval of lubrication must be suitably reduced. Furthermore maximum/minimum admissible temperature must be observed by the type of greased used. Grease should be introduced through the nipples, previously cleaned, having cautiousness to rotate slowly the shaft during this operation, without exceeding the quantity to avoid overheating; The quantity of grease to introduce may be determined by the formula:

G = 0,005 x D x B where: G = Quantity of grease D = External diameter of the bearing in mm B = Ring width in mm

Note: NEVER MIX GREASES WITH DIFFERENT THICKENERS

10.9 CONTROL OF PULLEYS (IF PRESENT)

Make sure that the alignment has remained correct (using a ruler that should lean uniformly on the external surface of both the pulleys) and possibly correct it. Clean with care all the races, check the wear and in case replace with a type having the same characteristics of the original.

10.10 CONTROL OF BELTS (IS PRESENT)

Clean every side with products that do not damage the blend of the belt. Check the wear that must be symmetrical on the two sides. If it should be necessary to replace a single belt also replace the others at the same time, using spare parts with the same characteristics of the original. Restore the tension following the procedure described in the method of tensioning (FIG.2).

11.0 DISASSEMBLY AND RE-ASSEMBLY OF THE FAN

ATTENTION: BEFORE CARRY OUT ANY OPERATION, ENSURE THAT THE FAN IS IN SAFETY CONDITIONS, THAT IS NOT AND CANNOT ACCIDENTALLY BE ELECTRICALLY POWERED AND THAT THE IMPELLER IS STOPPED AND LOCKED. DISASSEMBLY AND RELEVANT ASSEMBLY ARE OPERATIONS OF EXTRAORDINARY MAINTENANCE, THEY MUST BE CARRIED OUT BY QUALIFIED STAFF PROVIDED OF SUITABLE EQUIPMENT.

Note: DURING THE ASSEMBLY TIGHTEN CORRECTLY AS FROM TAB.1.

11.1 INLET CONE

Unscrew the nuts or bolts fixing the inlet nozzle to the side of the casing paying attention to the sealing gasket for the versions where it is provided. For the mounting proceed in the opposite way

11.2 AXIAL FAN IMPELLER

To access to the motor and the impeller could be necessary to remove the complete fan from its arrangement of normal operation. Pay particular attention in disassembling the impeller, never use the blades of the same as catching points, unscrew the head screw of the motor shaft and pull it out with special extractor, in case of conical bush follow the instructions in FIG. 3. Pay particular attention also to the impeller assembly; after having assembled it to the motor shaft, taking care not to damage the motor bearings with unacceptable beatings on the hub of the impeller, tighten adequately the head screw of the motor shaft and restore the original position of the impeller inside the casing or inlet nozzle. Take good care to maintain equidistance between the blade tips and the internal diameter of the casing or inlet nozzle. Tighten properly all the screws fixing the motor to its support. For the dismantling and mounting of pulleys see FIG. 3 having cautiousness, before to definitively block the pulleys, to check the alignment with a ruler leaning on the outer side of both the pulleys.

ATTENTION: When the operations are completed restore the fan in its arrangement of normal operation with all the original safety equipment (guard, protection grids, etc.) and proceed as described in chapter 9.0 START-UP.

11.3 CENTRIFUGAL FAN IMPELLER

After removing the inlet nozzle and where possible the casing, remove the screw and the washer blocking the impeller to the shaft. Interpose at the end shaft one protection washer in plate then, by mean of a special extractor, pull off the impeller from the shaft.

ATTENTION: Set up appropriate supports for the impeller itself according to its weight. For the mounting put the impeller in front of the shaft, then screw the nut on the screw of the relevant extractor in a way to push the impeller against the shoulder. Restore the original position of the impeller verifying the equidistance and the absence of friction. Tighten correctly. Restore the safety devices and restart as chapter 9.

11.4 ATTENTION FOR ALL THE AXIAL AND CENTRIFUGAL IMPELLERS

Pay particular attention on the handling of large impellers and provide supports in the exit before to complete extraction.
It is possible that oxide is formed between the impeller hub and the shaft. This can create difficulties on extracting the impeller. If so inject some deoxidizer in the space and wait for a few hours before to try again to extract the impeller. For the mounting proceed in the opposite way:

- lubricate adequately shaft and bore.
- place the impeller on the shaft considering that the coupling must not be forced, but shall occur with the only thrust of the blocking screw.
- In case of difficulties check that everything is well cleaned and burrs or dents are not there. It is strictly prohibited to grind.

A dent or a drop even if they have no apparent deformations cause unbalance. With the passing of the time, vibrations higher than those accepted or tolerated may cause the collapse of the structure.
In this case the re-balancing of the impeller becomes necessary. This operation may be performed by sending the impeller to Ventinet that will provide if possible, to repair it or in case to replace.
If the buyer or whoever on behalf of him decides to carry out the balancing in other centers, the parameters to be followed are those of graph1. In case of structural problems arising on the impeller as cracks, wear or permanent deformations such to avoid any reparation, proceed with the scrapping and replacement of the impeller itself with original spare part.

11.5 CASING

In the adjustable versions the volute is fixed with bolts to the disk of the motor support, so for the dismantling unscrew the relevant nuts. For the fans of certain sizes or for special uses casing is directly welded on the fan carrying structure; in this case the disassembly of the volute is not possible. For the mounting proceed in opposite way.

11.6 PULLEYS (IF PRESENT)

For the dismantling and mounting of pulleys see FIG. 3 having cautiousness, before to definitively block the pulleys, to check the alignment with a ruler leaning on the outer side of both the pulleys.

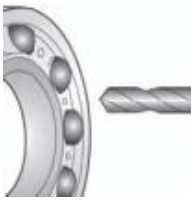
11.7 BELTS (IF PRESENT)

Because of the natural wear we recommend to replace the belts with variable frequency according to the conditions of use. Before removing the belts, first take away the protective belt guard, then remove the motor locking screws and act on the adjustment tie-rods to reduce the distance between motor and fan pulley.
At this point replace with belts with the same characteristics. Acting on the adjustment screw drive back the motor and carry out the tensioning of the belts as explained in FIG. 2, then block the motor on the slides. Verify alignment of pulleys with a ruler leaning on the outer side of both. Re-assemble the guard and vigorously block the bolts (TAB.1).

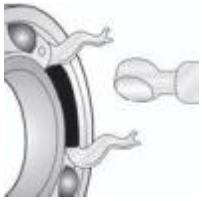
11.8 BEARINGS

Disassembly: This principle of extraction destructive is essential when it is not possible to use traditional extractors to be used for ball bearings with cage. According to the diameter of the ball of the bearing, there is a couple of inserts appropriate (see drawing). Working principle:

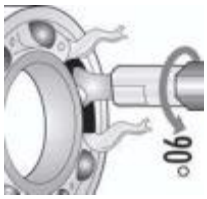
1- Drill two holes diametrically opposite.



2- Enlarge the edges of the cage of bearing..



3-fit the two suitable inserts, rotate them of 90° and crews on tie-rods.



Mounting: assemble the bearings in clean environment. Check also the cleaning of housings, shafts and other elements. Check the size and the precision of shape of all components in contact with the bearing.
Remove the protective from the surface of the hole and from the outer diameter of bearing. If necessary heat the ring inside ball bearing, never using a free flame nor overcoming a temperature of 125°C.
Push the bearing along the shaft until it leans against his shoulder and keep it pressed until it is tight. Assemble the fixing device. Check that the shaft or the outer ring can be rotated without difficulty. If the bearing must be lubricated with oil, make sure to use suitable oil and correct quantity. If it is a bearing to be lubricated with grease, introduce the grease and fill it completely. If the bearing is mounted at the same time on the shaft and housing, may be necessary to introduce the grease before.

ATTENTION: The radial ball bearings and roller bearings must be mounted forcedly on the shaft and with transition fit on the external shroud; to assess the correctness of coupling the residual radial play is settled with thickness gauges. To measure the play, use a thickness gauge, from 0, 03 mm. Carry out the measurement between the outer ring and a discharged roller (drawing 1 and 2 in TAB. 3). Before measuring, the bearing must be rotate to ensure that the rollers find a correct position. TAB. 3 shows the values of radial play before assembly, the reduction values usually necessary and the residual minimum play.

11.9 MONOBLOCK

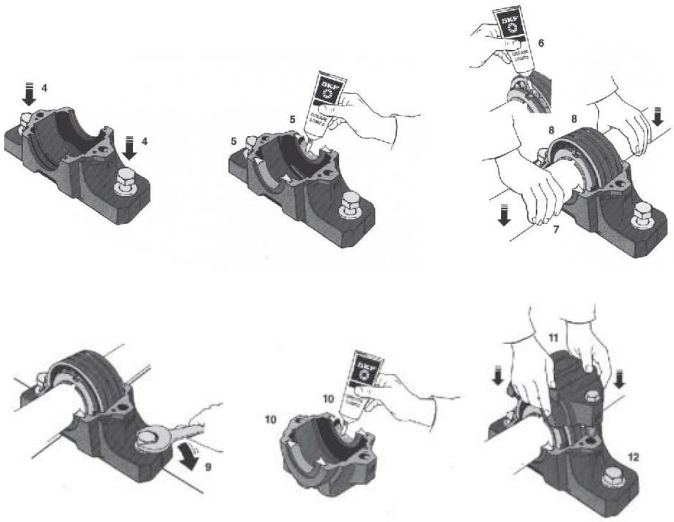
Useful life of bearings must be considered between the 20000 and 40000 hours of operation, such duration depends on application, environment and working temperature. Ventinet recommends to replace always the whole monobloc because during the extraction of the old bearings, which are forcedly mounted on the shaft and have transition fit on the external shroud, could occur cracks or deformation, also not visible, on the shaft or on the frame of the monobloc. The non perfect surface finishing, may not permit a proper alignment of the bearings, generating unacceptable vibrations and noise.

11.10 SUPPORTS

The bearings placed inside the supports are mounted on draw bushes, see the following mounting indications:

- ensure that the working environment is clean.
- verify that the support roughness is at least 12,5 micron, the tolerance of planarity IT7, for
- minors needs also IT8 may be enough.
- place the support base on the supporting surface, entering the bolts without tightening.
- insert the sealing semi-rings in the proper slots of the base, fill the space between the two edges with grease and insert a cover instead of the semi-ring if the support is mounted on the shaft end.
- mount the bearing on the draw bush. Fill the bearing completely with grease, the remaining

part of the recommended quantity should be introduced on the bearing sides.
- put shaft and bearing on the base.
- place the stop rings, if necessary, in the sides of bearing.
- align the supporting base with care. The vertical signs on the base of the centre line of the various sides help the work. Tight the fixing bolts slightly.
- fix the other sealing semi-rings in the respective slots of the hood and fill the space between the edges with grease.
- place the hood on its base and tighten the screws with the following torques:
  M12-80Nm / M16-150Nm / M20-200Nm.
  Cap and base are not interchangeable one with another
- deeply tight the fixing bolts M12-90Nm / M16-220Nm / M20-430Nm / M24-750Nm.



11.11 MOTOR

Before to provide to disassemble and replace the motor is important to understand the reason of the failure and arrange for a resolution. To replace the motor proceed as below indicated:
- put the fan in safety conditions.
- electrically disconnect the motor checking the wiring (only qualified staff can take care of disconnection and later connection).
- disassembly the fan parts necessary to remove the motor from the impeller.
- assembly the new motor (check before that the characteristics are equivalent to the previous).
- align the impeller in case of direct driven arrangement or align transmissions and couplings for belt driven or coupling arrangements.
- Proceed with start up phases as for chapter 9.0 START-UP.

ATTENTION: At the end of each maintenance assembling operation restore in original position all the safety equipment removed, verify the correct tightening of all nuts and screws (TAB.1), ensure of the absence of foreign objects inside the fan and proceed as described in chapter 9.0 START-UP.

12.0 DISPOSAL

When the fan ends its working-life, final user or whoever on behalf of him must ensure the disposal of it in authorized waste collection centers.
Carrying out such operation, keep separate the electrical components from those mechanicals, discharge and collect lubricants, separate the different materials e.g. plastic, steel, copper, aluminum, filling materials for silencers. Then all materials will be disposed in a separate refuse collection according to the local rules and provisions. Fan components and materials are specified in technical catalogues.
Motor main components are: steel, copper, cast-iron, aluminum, plastic.

13.0 DEFECTS AND MALFUNCTIONING (ANALYSIS)

DON'T FORGET THAT IF A VENTILATION PLANT DOESN'T WORK PROPERLY THERE COULD BE MORE THAN A REASON. SEARCH FOR AND REMOVE SYSTEMATICALLY EVERY POSSIBLE CAUSE.

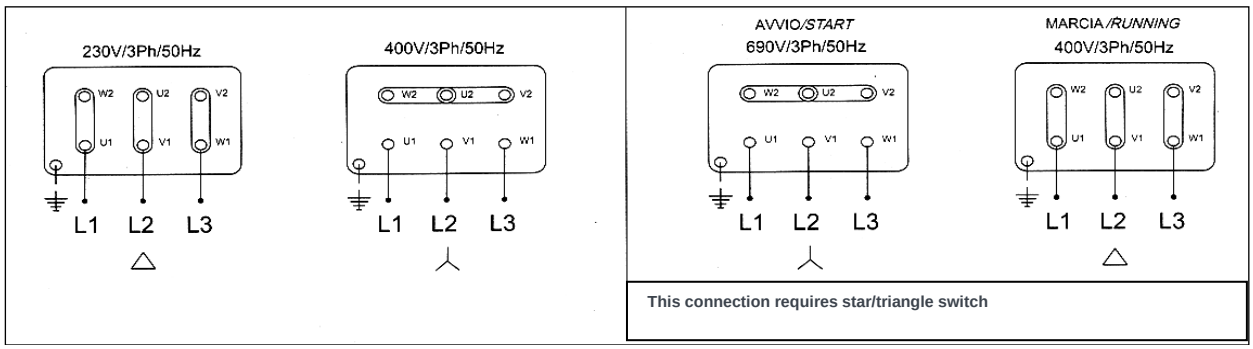
Some aeraulic defects, causes and possible remedies:

NR.	DEFECTS	CAUSES	REMEDIES
13.1	Difficult Starting	Reduced power voltage.	Check the motor plate data.
		Insufficient motor pickup torque.	Close the dampers up to reaching of the full speed (not valid for axial fans). In case replace with a more powerful motor.
		Fuses not suitable for start-up conditions.	Replace them.
		Inadequate evaluation of the fan inertia and coupling components.	Recalculate the moments of inertia and, if necessary, equip the fan with a new motor drive.
		Excessive power absorption.	See 13.2.
		Wrong electrical connection	Check the electrical connection
13.2	Absorbed power higher than fan and/ or motor plate	Excessive rotation speed.	Replace motor and pulleys and/ or re-designation of the system.
		Air density higher than design data.	See above.
		Axial: fan operates with excessive pressure drop (resistance)compared to that of design. Centrifugal: fan operates with lower pressure drop (resistance) compared to that of design.	Redefine the system and or replace the fan.
		Motor works under its usual speed of rotation.	Check the power voltage and in case correct it. Check defects in the winding and repair or replace.
13.3	Insufficient air delivery.	Clogged piping and/ or obstructed suction points.	Clean piping and hoods, check the dampers.
		Insufficient rotational speed.	Check the power voltage; check the motor speed. Check the belt drive rate, and the belts do not slip.
		Working pressure higher than design.	Design error; replace the motor and/or belts and pulleys, replace and/or adapt the circuit.
		Dirty impeller.	Clean the impeller.
		Impeller assembled on reverse.	Replace the impeller.
		Reverse rotation direction.	Check motor connection.
		Overloaded filter (dirty).	Clean or replace the filter.
		Turbulence in the same direction of rotation of the wheel.	Install air flow straightening.
		Changes in section, sharp and close curves, sudden expansions or curves not allowing the normal recovery of the outlet dynamic pressure.	Design error; modify or replace the circuit.
13.4	Excessive air flow. At nominal speed it is cause of an excessive absorbed power for centrifugal fans with forward curved blades and radial blades.	Excessive rotation speed.	Check the voltage. Check the belt drive rate. Check the motor speed.
		Excessive evaluation of the circuit pressure drop.	Set the damper down and/ or slow down the fan speed to the required performances.
		Wrong direction of rotation of the impeller (only for centrifugal roof fans)	Check the direction of rotation. The impeller of a centrifugal backward curved blade roof fan running in opposite direction, acts as it is a forward curved blade giving too much airflow, absorbing also too much power. In this case restore the correct direction of rotation.
13.5	Insufficient pressure.	Insufficient rotational speed.	See 13.3
		Reverse rotation direction.	See 13.3
		Impeller assembled on reverse	See 13.3
		Airflow higher than design values because of an error in the circuit dimensioning and/ or air temperature different from design values.	Change of the belt drive rate and/ or replace the fan, correct or replace the system.
		Wheel damaged	Check the wheel and in case replace with original spare part.
13.6	Air pulsation	Centrifugal fan operating close to conditions of zero capacity.	Re-design the system or replace the fan.
		Instability of the suction flow, or obstruction or bad connection of suction causing unsteady conditions (vortex).	Re-design the inlet introducing deflectors, clean or restore of inlet.
		Instability of the airflow in presence of vortex. The flow alternately touches or is detached from divergent duct walls	Redesign the system or replace the fan.

13.7	*Fall in performances after a satisfactory operating period.*	*Leakage in the upstream system and/ or upstream fan.* *Leakage in gaskets.* *Wheel damaged.*	*Check the system and restore the original conditions.* *Replace the gaskets.* *Check the wheel and if necessary replace it with original spare part.*
13.8	*Excessive noise. Generally, all fans produce noise but it should be reduced only if it is unacceptable. Noise may be cause by air, mechanical components, electrical hum or a combination of them. Noise produced by air may be increased because of obstructions near the fan inlet and outlet.* *Noise is commonly due to a wrong fan selection or wrong installation.*	*High number of revolutions to get the required performances.* *Installation in echoing area.* *Rubbing of the wheel in the casing.* *Unbalance of impeller and rubbing on the Casing* *Wear of bearings.* *Induction noise caused by inverter.* *Eccentricity between rotor and stator.*	*Use soundproof cabinets and/ or silencers;* *Select for a bigger machine with the same performances or a machine with lower r.p.m.* *Move the fan or use soundproof cabinets.* *Check the assembly position of wheel and piping, in case restore correctly.* *Check the balance of impeller and assembly position.* *Check the conditions of bearings; if necessary lubricate or replace.* *Set up the inverter correctly.* *Check the concentricity; replace it. Check the manual of the electric motor.*
13.9	*Excessive vibrations.*	*Unbalances in the rotating parts.* *Inadequate support structure: having natural frequency close to the one corresponding to the fan rotational speed.* *Loosen screw connections.* *Wear of bearings.*	*Check the impeller balancing. Check the alignment of transmission and conditions of belts and pulleys.* *Changer the natural frequency of the support adding extra weight.* *Tight the screws.* *Check the conditions of bearings (in particular the hermetic type).*

FIG. 1 MOST COMMON WIRING DIAGRAMS

MOTORS RATED 230/400V *MOTORS RATED 400/690V*

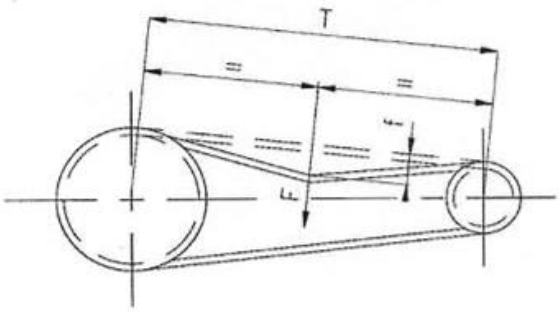


NOTE: Once the fan is started, proceed with the control operations as described in the points 9.2 and 9.3 of this manual. In case of malfunctioning, switch the fan off immediately, repeat the mentioned operations and if the problem is still there please contact your dealer.

FIG. 2 THENSIONING METHOD

To check the tension of the belt transmission, it is recommended to keep the following procedure:
1) Measure span T;
2) By means of a dynamometer, for each belt apply at the middle of the span length T a perpendicular force F capable of producing a deflection f of 1.5 mm for every 100mm of T;
3) Compare the F value given by the dynamometer with F1 and F2 values, as specified in table.
If F < F1 it will be necessary to tension the belt.
If F > F2 the belt is tensioned more than necessary.
A rapid decrease in tension takes place during the running-in period of new transmissions. Therefore it is necessary to tension new belts in such a way that the deflection force F, to give f displacement on T, is 1.3 times the value F2 indicated in the table. It is necessary to check the value of F frequently during the initial hours of operation.

Remark: Table refers to drives with ratios up to 4.



Es.: T = 1000 mm $f = \frac{1000}{100} \cdot 1{,}5 = 15$ mm

Example

Belt Section	*Minor pulley ext. diameter mm*	*RPM minor pulley*	F1 MIN N	F2 MAX N
Z	40 ÷ 55	2500 ÷ 5000	5,0	6,5
	60 ÷ 75	1500 ÷ 3800	7,5	10,0
	80 ÷ 95	1000 ÷ 2800	8,5	10,5
	100÷ 110	900 ÷ 1500	9,0	13,0
A	50 ÷ 65	1900 ÷ 3800	7,5	10,0
	70 ÷ 90	1300 ÷ 2800	11,0	16,0
	95 ÷ 120	1000 ÷ 1700	13,5	20,0
	125 ÷ 190	600 ÷ 1000	17,0	24,0
B	95 ÷ 110	1000 ÷ 2500	18,0	25,0
	115 ÷ 140	800 ÷ 2000	21,0	31,0
	150 ÷ 200	600 ÷ 1500	25,0	36,0
	210 ÷ 250	400 ÷ 1200	27,0	40,0
C	140 ÷ 230	600 ÷ 1500	37,0	53,0
	240 ÷ 430	400 ÷ 1000	49,0	70,0
D	230 ÷ 400	400 ÷ 1000	74,0	107,0
	420 ÷ 580	250 ÷ 700	104,0	152,0
E	360 ÷ 520	300 ÷ 1000	120,0	170,0
	540 ÷ 950	200 ÷ 500	160,0	230,0

FIG. 3 DISASSEMBLY AND ASSEMBLY PULLEYS

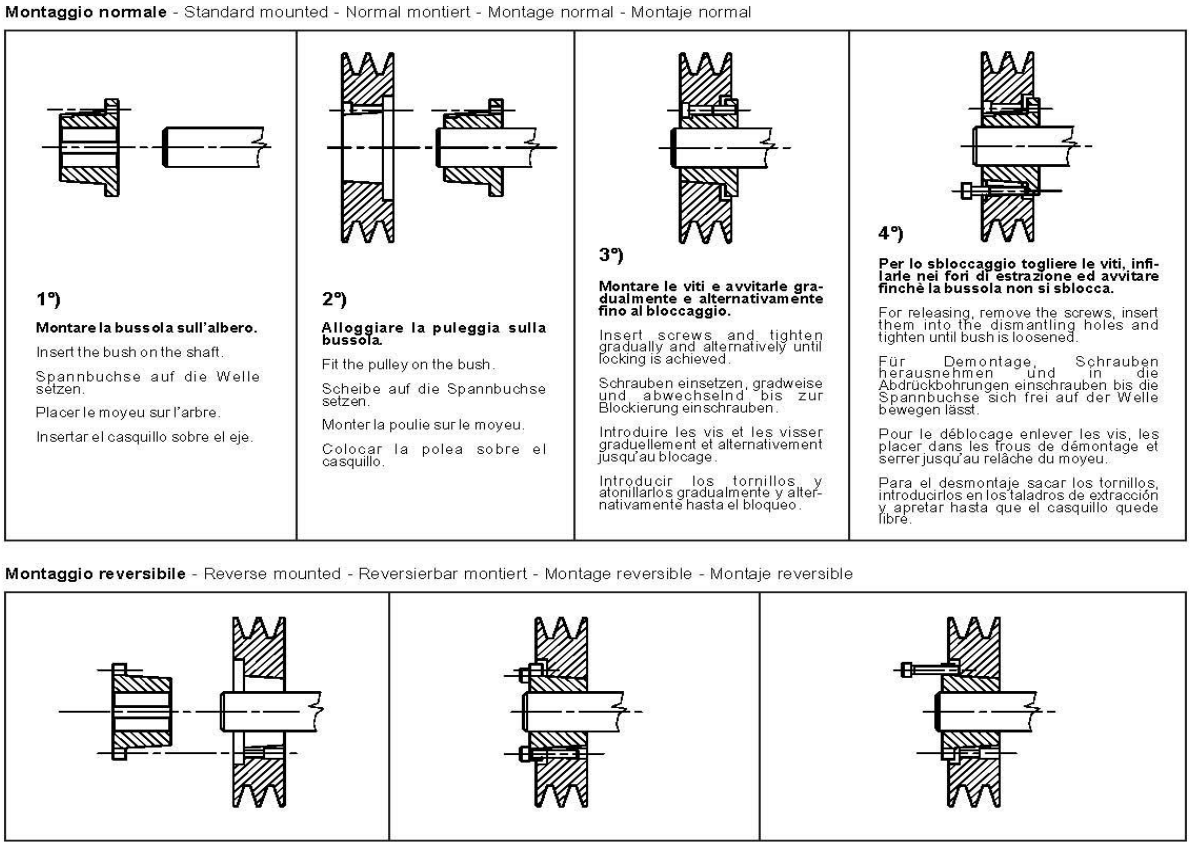


Table 4

Note: Wheels are balanced according to ISO 1940/1, particular balancing degree G 6.3.

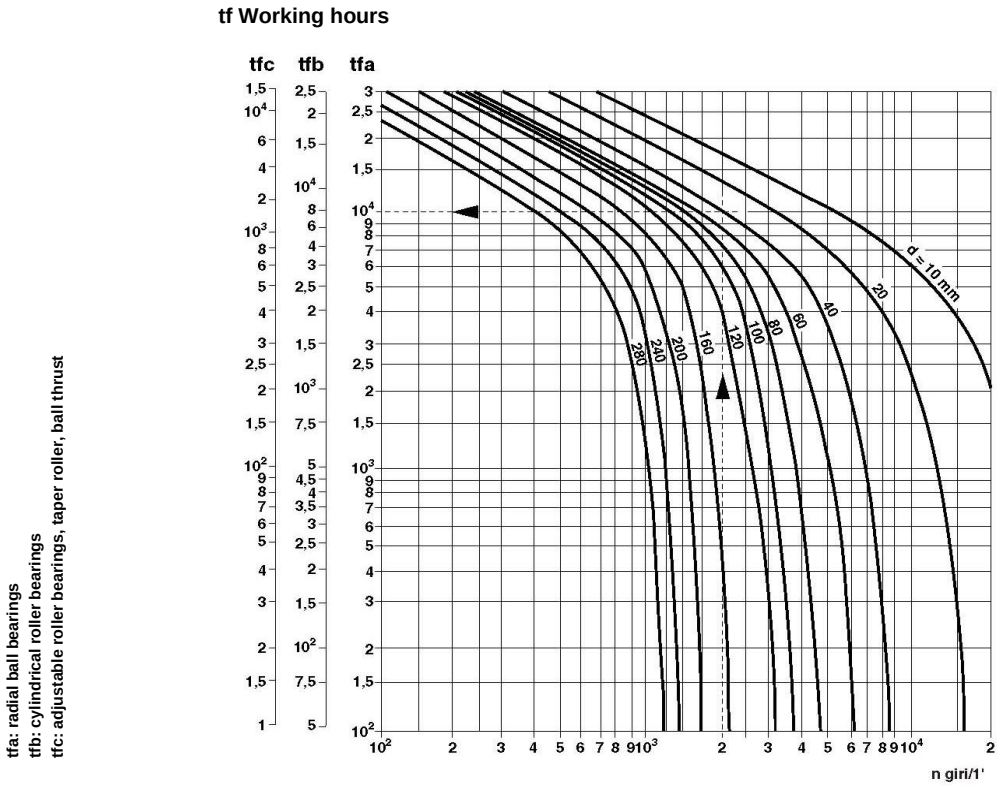
RPM	*TOLLERABLE RESIDUAL ECCENTRICY et in µm (micron)*
300	200
600	100
950	63
1500	40
3000	20
6000	10

balancing tolerance: **et** = 10 x G / RPM/1000 = µm (Micrometer)

Table 5 INTERVALS OF LUBRICATION/ WORKING HOURS

Type of grease (Thickening) *Recommended operation temperature range*	*From °C*	*To °C*
Standard operation: LGEP 2 – EP polyvalent grease – Complex lithium/ mineral oil	-20	+110
High temperature operation: LGHB 2 – EP high viscous grease – Calcium sulphonate complex/ mineral oil	-20	+150
Low temperature operation: LGLT 2 – Lithium soap/ ester oil	-55	+110

Graph 2



Example: a radial ball bearing with an hole diameter (d) of 40mm, turns at 2000 RPM (n). The operating temperature changes between 60°C and 70°C. Draw a vertical line from the value 2x103 on the diagram X-axis to the curve d=40 mm.
Draw an horizontal line from the intersection to the Y-axis corresponding to the radial ball bearings (tfa). A value of 104 is obtained representing the lubrification interval (hours).

FIG.4 TRANSPORT AND INSTALLATION

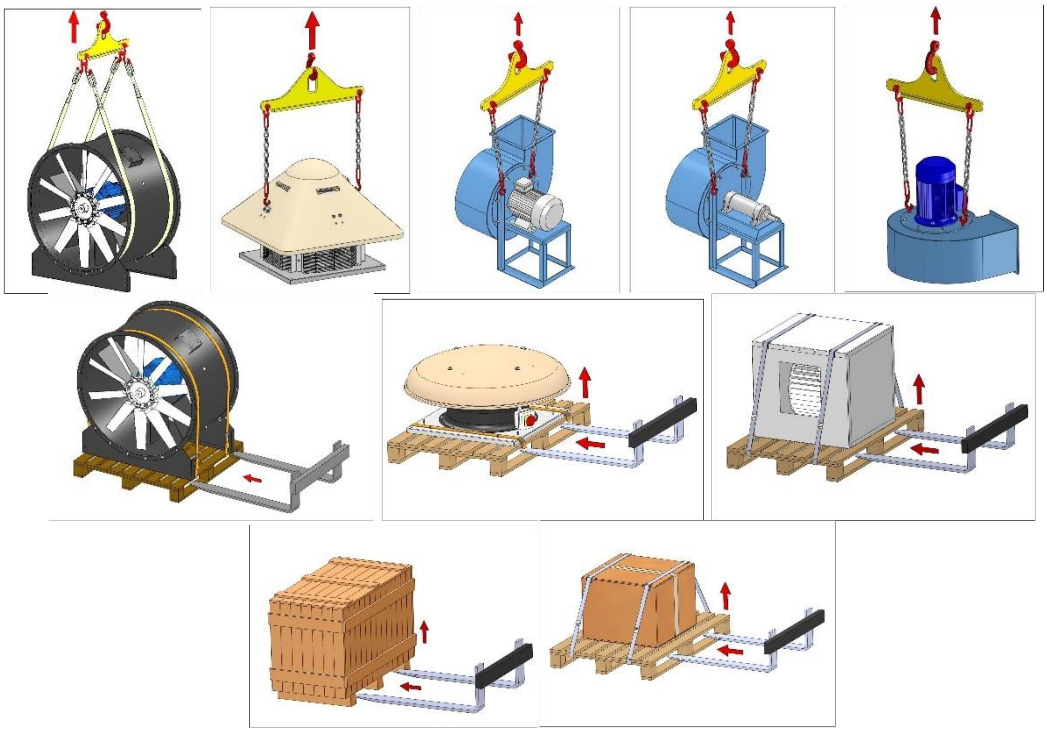


TABLE 1 TIGHTENING TORQUE FOR SCREWS WITH METRIC THREAD

Diameter x pitch	Tightening torque (Nm) screws 8.8
3 x 0,5	1,5
4 x 0,7	3,1
5 x 0,8	6
6 x 1	10,4
8 x 1,25	25
10 x 1,5	50
12 x 1,75	85
14 x 2	135
16 x 2	205
18 x 2,5	283
20 x 2,5	430
24 x 3	745
30 x 3,5	1500

The tightening torque should be applied slowly and constantly with dynamometric wrenches, these values should be decreased by 10% in case of oiled or greased screws and if impact screwdrivers are used.

TABLE 3 BEARINGS **DETERMINATION OF THE RESIDUAL RADIAL PLAY (MEASURES IN mm) C3**

Bearing hole		Radial reduction play		Minimum residual play after assembly	
Over	To	min.	max.		
30	40	0.020	0.025	0.025	 1
40	50	0.025	0.030	0.030	
50	65	0.030	0.040	0.035	
65	80	0.040	0.050	0.040	
80	100	0.045	0.060	0.050	2
100	120	0.050	0.070	0.065	

TABLE 2: SUMMARY TABLE OF PROGRAMMED MAINTENANCE OPERATIONS (CHAPTER 10)

PERIODICAL CHECKS					
TYPE OF CONTROL OR MAINTENANCE	METHODE	INTERVAL	CONTROL DATE AND MAINTENANCE RESPONSIBLE		
GENERAL CONTROL OF FAN CONDITION	VISUAL OR MANUAL	WEEKLY (SEE NOTE A)			
CONTROL OF MINIMUM DISTANCES	VISUAL	300 HOURS			
CLEANING	MANUAL	150 HOURS (SEE TABLE 1)			
CONTROL OF JOINTS, GASKETS, SEALS, SHUTTERS CONDITIONS	VISUAL	150 HOURS			
VIBROMETRIC CONTROL	INSTRUMENTAL	150 HOURS (SEE NOTE C)			
LUBRIFICATION	MANUAL	SEE GRAPH 2			
BELT TENSIONING	MANUAL	300 HOURS (SEE FIG. 2)			
CHANGE OF BEARINGS	MANUAL	20000 HOURS (SEE NOTE D) 8500 HOURS FOR F400 MOTORS (400°C 2H)FOR SMOKE FIRE			

NOTE A - During the usual weekly check, take care of possible sensitive increases in the vibrations compared to the previous starting of the machine, in this case see the cap.14: troubleshooting. The usual weekly check includes also a quick inspection from the above mentioned parts

NOTE B - The cleaning intervals are strictly linked to the kind of the fluid transported and its composition. Thus the final user shall fix a cleaning interval so that the rotor is always perfectly clean (heaps of materials on rotating parts cause unbalance) and heaps of material on fixed parts of motors and fans.

NOTE C - Consider automatic systems of detection of vibrations.

NOTE D – This is the life time which the bearings were designed for, but for external reasons such as vibrations higher than the standard even for short periods, the replacement should occur in shorter periods, too. After their life cycle, even if they do not show problems, the replacement of the bearings is suggested.

SYMBOLS AND PICTOGRAMS

It indicates the presence of the use and maintenance manual to be consulted compulsorily.

It indicates the airflow and the direction of rotation of the impeller.

It indicates the position for grounding connection.

Use rope lifters putting hooks in the holes arranged on the fan.

No removing protections and no approaching when not authorized.

No operating on moving parts.

It indicates the presence of live parts inside the case on which the label is sticked.

Dangerous temperatures.

ATTENTION

CHECKLIST COMMISSIONING Ventinet fans:

CHECK AT DELIVEY
- □ NO TRANSPORT DAMAGE OR MANUFACTURING ERRORS
  REPORT DAMAGE CAUSED BY TRANSPORT DIRECTLY AT THE TRANSPORTER & VENTINET B.V.

CHECK DURING INSTALLATION
- □ ALL BOLTS AND NUTS ARE PRESENT AND TIGHTENED
- □ MAKE SURE THE IMPELLER IS RUNNING FREE (NOT HITTING)
- □ IF PRESENT CHECK THE POSITION OF VALVES AND / OR FLOW CONTROLLERS (OPEN FOR AXIAL / CLOSED FOR CENTIFUGAL FANS)□
- □ CORRECT LUBRICATION OF ROTATING PARTS, IF NECESSARY
- □ ALL INSPECTION DOORS ARE CLOSED
- □ CHECK RESISTANCE BETWEEN PHASE & PHASE /MASS > 100 AT 25 °C
- □ CHECK CORRECT GROUNDING FOR MOTOR & FAN

CHECK DIRECT AFTER START-UP
- □ CHECK THE CORRECT DIRECTION OF THE FAN
- □ MEASURE THE CURRENTS ON ALL PHASES (3x WITH 3-PHASE MOTORS)

CHECK A COUPLE OF HOURS AFTER START-UP
- □ ALL CONNECTIONS ARE STILL FIXED
- □ THE MOTOR IS NOT TOO WARM
- □ THE FAN HAS MINIMUM VIBRATION

MEASURED CURRENT DURING START-UP

MEASURED ON . . . . . HZ AND . . . . . VOLT.

SERIALNUMBER CHECKED MOTOR: . . . . . .

PHASE 1: . . . . . .

PHASE 2: . . . . . .

PHASE 3: . . . . . .

OTHER NOTES:

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Ventinet B.V. is not liable or bound by warranty if the above checks have not been carried out when the fan is commissioned.

DECLARATION OF INCORPORATION OF PARTLY COMPLETED MACHINERY
(in the context of the Machinery Directive 2006/42/EC and following amendments)

Declaration

The undersigned declares under his own responsibility that:

- The partly completed machinery in object conforms to the requirements of directives 2006/42/EC and following modifications.
- The product also complies with the Low Voltage Directive 2014/35/EU and the Electromagnetic Compatibility Direction 2014/30/EU with regard to the electrical components.
- It is not allowed to operate the partly completed machinery object of this declaration, before the machine in which it will incorporated is declared in conformity to the requirements of the directive 2006/42/EC
- The partly completed machinery in object responds to the essential safety requirements of the Annex 1 :
  1 .1 . 1 - 1 . 1 . 2 - 1.1.3 - 1.1.5 - 1.3.1 - 1.3.4 - 1.5.1 - 1.5.4 - 1.5.5 -1.5.8 - 1.5.9 1.5.13 -1.6.1 - 1.6.5 - 1.7.1 - 1.7.2 - 1.7.3 - 1.7.4 - 1.7.4.1 -1.7.4.2 - 1.7.4.3
- The technical file in conformity of Annex VII B has been drawn up.

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INDENTIFICATION STICKER FAN

Ventinet B.V.
Autorised signature :

Waalwijk 4 januari 2023

Antoon Maes