



INSTRUCTIONS AND USER MANUAL

- DIRECT MOTOR AXIAL FANS: "VHD"
- DIRECT MOTOR AXIAL TRANSMISSION FANS: "VHT"
- DIRECT MOTOR LOW PRESSURE CENTRIFUGAL FANS: "VCBPD"
- LOW PRESSURE CENTRIFUGAL TRANSMISSION FANS: "VCBPT"
- DIRECT MOTOR MIDDLE AND HIGH PRESSURE CENTRIFUGAL FANS: "VCMAPD"
- MIDDLE AND HIGH PRESSURE TRANSMISSION CENTRIFUGAL FANS: "VCMAPT"
- "VHCDTE" AXIAL OR CENTRIFUGAL ROOF FANS

DO NOT INSTALL THE FAN WITHOUT READING THESE INSTRUCTIONS. KEEP THEM FOR FUTURE OPERATING QUESTIONS AND/OR MAINTENANCE.

EC COMPLIANCE AND CORRECT USE OF THE FAN

All fans comply with the EC regulation (MACHINES)2006/42/CE (former 98/37/CE) as well as the security regulation for low pressure materials 2006/95/CE (former 73/23/EC). Each particular range also complies with more specific rules and regulations required.

Regulations:

UNE-EN ISO 12100-1	Machine safety. Basic concepts, general principles for design. Part 1: Basic terminology, methodology.
UNE-EN ISO 12100-2	Machine safety. Basic concepts, general principles for design. Part 2: Technical principles (ISO 12100-2:2003).
EN ISO 13857	Machine safety. Safety distances in order to prevent reaching dangerous zones with the upper and lower limbs (ISO 13857:2008)
ISO 13852	Machine safety. Safety distances in order to impede reaching dangerous zones with the upper limbs.
UNE 100250 (ISO12499)	Industrial fans. fans mechanical safety
ISO 3744	Acoustics. Determination of the sound capacity level
ISO 1940-1	Mechanical vibrations. Balancing quality
ISO 10816-1	Mechanical vibrations. Evaluation of the machine vibrations

All the applications in general in which any electronic speed regulator is required with the fan, must be previously comply with the directives 2006/95/EC (Low Voltage), 2006/42/EC (Machinery), 2009/125/EC* (Ecodesign). To increase security when maintaining the fan, LINDAB suggests the installation of maintenance switches of OFF/ON and SECURITY with manual disconnection.

IMPORTANT: THIS PARTICULAR FAN CANNOT BE THE MOST APPROPRIATE FOR THE INSTALLING SECURITY REQUIREMENTS. THEREFORE WE STRONGLY SUGGEST THAT THE SPECIFIC CHARACTERISTICS ARE VERIFIED AND COMPLY WITH ALL THE REQUIREMENTS BEFORE INSTALLATION.

APPLICATIONS

The requirements and characteristics of each fan model are determined in each case by the rules and regulations established either locally or in general depending on the application in particular. Therefore in some cases determinate units of a model may not be suitable for certain applications and can be modified in order to meet the special characteristics of its purpose. For example, **the units aimed to be installed in explosive or fire risk environments must comply with the ATEX 94/9/EC regulation and therefore must incorporate some sort of protection system established by the law. The units aimed for the ventilation of emergency services in case of fire must be homologated according to the UNE EN12101- 3/2002 regulation and comply with the CTE-2006.D.C.89/106EEC (old CPI96) rule.** Also other common characteristics such as: high working temperature, corrosive environments, etc. can also require a special modification in order to guarantee the correct functioning. **THE LABEL OF THE FAN WILL ALWAYS SPECIFY ANY SPECIFIC MODIFICATION OR PURPOSE. OTHERWISE PLEASE CONTACT LINDAB.**

The chosen model fan can never be used to convey another gas with different composition or temperature other than LINDAB specifications, nor work in different environment conditions than the specified.

RECEPTION and verification of the FAN

The fans are sent correctly packaged and the delivery is always at client's risk and account. Therefore, it is advised that when the merchandise is received it is carefully examined to check no damage or missing pieces have occurred during transportation. Any claims regarding transportation must be done immediately by the client directly to the transport agency or insurance company

TRANSPORTATION AND STORING

The transport agency and intermediaries that have been involved in the process of transportation and storing until final destination are liable for any damages incurred during this process. They should also be responsible for all the necessary paperwork involved to attend and solve with the client all the damages incurred not covered by the manufacturer's guarantee.

Any hits or bumps can damage the most sensible components of the fan like the bearings, motors, transmission (only VHT, VCMAPT, and VCMAPT), or the rotating pieces like the turbines or propellers (elements that can be deformed or stuck resulting in their unbalancing).

While being stored until later installation, the protection must be guaranteed against: dust, rain, UV rays (direct exposing to sun), high atmospheric humidity, and sudden changes of temperature. These harmful agents are the main cause of sudden deterioration of the fan as they can damage it by rusting the components and deteriorating the coatings.

It is advised to always handle with care and according to each model of fan depending of the detailed orientation graphs. All fans depending on the weight and constructive characteristics will be supplied in individual boxes or pallets. In addition they can also have some anchoring points strategically located for easier manipulation with a crane or a pulley block.

QUALITY CONTROL

FUNCTIONING: All fans before delivery are submitted to an electric security and functioning test. Hence if the fan has not suffered any damage during transportation and is installed correctly following these instructions, the correct functioning is assured.

BALANCING: The rotating element "propeller or turbine" of the fan has dynamically balanced and may experience some residual unbalancing within the accepted tolerances according to the regulations ISO1940-1 and ISO10816-1, quality Q 2.5 or Q 6.3 depending on the models. Still it is advised to verify before installing it by manually rotating such element and check that no friction or any bumps or deformation appear due to transportation damage. **Do not install nor turn on the fan if any damage is visible, check first with our technical department**

PRODUCT GUARANTEE

LINDAB will always supply the requested fan and in accordance to all specifications that the service or installation requires. Therefore, all elements used in the chosen model are only suitable for the working conditions specified by the client in the purchase order.

IMPORTANT: LINDAB is exempt of any responsibility of any possible accident caused by the wrong manipulation of the fan and/or for non-compliance of all the warning and security regulations detailed in this manual.

GUARANTEE PERIOD: The fans are guaranteed for 1 year after the purchasing date (keep the invoice). Such period will expire even if the fan has not been installed nor used immediately after its acquisition at LINDAB

The guarantee will not be valid if there is any damage or breakdown of the fan or third parties affected by wrong use or inadequate purpose, normal worn out, overcharge or any external manipulation not done by LINDAB technical dept. The obligation inherent in this guarantee is limited to the replacement of defective parts previously examined by our specialists.

Maintenance, possible modifications and repairing services of the fan must always be done by trained specialists. During the guarantee period of the fan, repairing can only be done under previous consent from LINDAB and by authorised shops and staff. LINDAB WILL ALWAYS DETERMINE WHERE ANY REPAIRING SHOULD BE DONE ON FANS THAT STILL HAVE A VALID GUARANTEE AS WELL AS THE TRANSPORT AGENCY USED FOR THE MOVING IF NEEDED. THIS GUARANTEE DOES NOT COVER THE TRANSPORT COSTS OF ANY SMALL FANS TO THE SUGGESTED TECHNICAL SERVICE.

NON CONFORMITY RETURNS: Returns of non conformity material will only be accepted whenever there is an administrative error, change or supplying mistake, if previously agreed by our commercial dept or SALES REPRESENTATIVE and also the return form is filled accordingly. The transport agency will be determined and agreed by LINDAB. No return will be accepted without the form filled.

NEW MATERIAL RETURNS: If there is a mistake from the client's side, a 25% depreciation will be applied on the new material returned. The transport costs will be assumed by the client.

INSTALLATION AND START UP OF THE FAN

VERIFICATION: In fans that are directly installed on the roof or wall, or those which use a supporting system or any additional structure, should be levelled correctly horizontally and vertically. In horizontal bases such base should be flat and levelled, and in cases where there is a concrete base it should be perfectly flat. In addition all the supports should be checked so they are the most suitable ones and have enough strength to hold the weight of the fan as well as its inertia when starting up. In the case of VHCDTE roof fans, special attention should be placed on reinforcing the charging point of the fan and make sure that the waterproof property is not affected by the vibrations.

The normal vibrations caused while functioning depend mainly on the rigidity degree of the structural element where the fan is placed.

In this sense, it is highly recommended that in those models that there is this possibility, elastic shock absorbers should be installed (either made with rubber or springs) to avoid transmission of vibrations and noises, keeping the fan in a floating position. To complete correctly this insulation with the rest of the conducting installation, elastic joints should be placed in the suctioning inlet and outlet of the fan. With this system the unit should be isolated correctly, but always making sure such elements may not affect the compliance of security regulations.

For rigid instalments on concrete bases or walls that are not correctly aligned, never force the fan's structure by tightening the screws. Beforehand small strips of aluminium sheets, washers, or fast cement should be placed in the gaps to fill the space ensuring the correct support of the fan.

ONLY FOR TRANSMISSION FANS groups VHT, VCBPT and VCMAPT: the motor and transmission shafts connected to the propeller or turbine must be always completely parallel. Likewise the pulleys must be aligned so none sticks out more than another causing the forcing of one belt. This requirement can be tested by using a simple metallic ruler with a minimum length equal to the centre points of the shafts and leaning one end against the front part of one of the pulleys while comparing the position of the other pulley. In the market there are laser machines that can make the alignment easier. The belt tension should be the adequate, any excess charge can damage the bearings.

ELECTRICAL CONNECTION AND INSTALLATION: Each model fan has a connection drawing inside the terminal box. The feeding cable connection should be done inside such terminal box of the motor or fan. It is important that the feeding lines and other components used in the installation meet the requirements of the valid regulations of industrial installations. ("Low pressure electrical regulation") and that the protection system are in accordance to the power of the fan (Motor protection system, differential protection, wiring limit and ground system). For motors over 7.5 HP (5.5Kw) is also suggested to perform a timed limit relay start up or control it electronically so no excess consumption peaks occur and ensure a smooth start up. Some fan models with heavy turbines (VCMAPD and VCMAPT groups specially the AA and MB P/R ranges) require a long period of starting up. In these cases it is mandatory a controlled start up. With the other centrifugal medium and high pressure models, a simple lock gate or regulation valve should be enough so long as they are closed during start up in order to reduce the consumption. Other fan models with little power like the HJPA ranges there is a direct connection cable only, in these cases a homologated connection box should be placed close to the fan and never leave any unconnected cables.

Specially in BD fans of the VCBPD group and in some indicated models the connection should be done by using always the thermal protection inside the motor (SEE MAINTENANCE OF THE FAN SECTION)

TENSION AND FREQUENCY: The motor feeding connection must be done according to the tension and frequency indicated in the fan's plate. Some differences ($\pm 5\%$) can be allowed in the power circuit. If the connection cannot keep this level there is a high risk of burning the motor. Therefore, ensure the selected disposition of Y-2 corresponds to the tension of the power circuit and use a tester to check besides the tension the frequency as well.

CONSUMPTION: Control that the consumption (A) once installed in the fan does not exceed the conditions specified in the fan's plate. The capacity of the fan and the installation charge should be correctly adjusted (SEE START UP SECTION). In case of non compliance please consult the manufacturer.

GROUND SYSTEM: According to the current legislations the fan is a Class I and it is mandatory that the ground system is connected, it can be found inside the connection box of the motor or the fan. Once connected, it is advised to check that the tolerance between the external conductor and the housing of the fan does not exceed 0.12.

ENVIRONMENTAL CONDITIONS: Verify the thermal class of the motor in its plate. All motors supplied inside a LINDAB fan are usually class F, but there can be exceptions. **Independently of the thermal class of the motor, it is advised not to exceed 40°C environment temperature around the refrigerating air of the motor and the humidity should not be over 60% in order to guarantee the correct refrigeration of the motor and extend its life. The maximum circulating air temperature should be between 40° and 55° for the models that have the motor placed within the air flow and about 130°C for those models that the motor is not in contact with the air flow (some models come equipped with a refrigerating rotor within the motor's shaft which allow working in higher environmental temperatures). It is always advised to check carefully all the information of the technical catalogue where a summary of all ranges and models are explained in detail. For other applications which can require a special characteristic, always check first the technical data of the fan and in case of doubt or further explanations contact directly the manufacturer.**

DIRECTION OF THE ROTATION: It is indicated by the arrow on the housing. To change the direction in one or two speed three-phase motors simply exchange the phases. In single phase motors, the direction can only be changed in some models, check the technical data in each case.

NOISE LEVEL: Depending on the model of the fan, its power, size and revolutions the noise level can oscillate between 37 and 100 dB (A). The noise level in each model is

specified in the technical characteristics. If the fan does not comply with the maximum allowed levels of noise where it has been installed, alternative solutions must be studied in order to reduce it, either by using silencers, soundproof boxes or barriers.

CONNECTION TO THE DUCT INSTALLATION: In the cases where the fan should be connected to a duct network for air distribution, it should be connected to the corresponding suctioning inlet and outlet with adapting flanges accepted by the manufacturer. It is advised to use elastic joints together with such flanges whenever possible (both accessories should be purchased aside from the fan). In addition, centrifugal fans of the VCMAPD and VCMAPT groups are recommended to use elastic buffers, SEE INSTALLATION AND START UP SECTION. In case the flanges are connected directly make sure stress and tensions do not appear and damage the fan. Under no circumstances the fan should support the duct system weight; it should have its own separate supporting system. It is also advised to leave a part of the duct system detachable on both sides to facilitate access to both inlet and outlet and the space left once the flanges are removed is enough so the operator can easily reach inside the fan. In the cases of axial fans (VHD and VHT) no reductions in the ducts will be applied keeping the minimum nominal diameter of the fan.

PROTECTION AGAINST UNVOLUNTARY ACCIDENT: For all fan models, LINDAB can provide protection accessories against rotating bodies (impeller and propeller) like stipulated in the EN ISO 13857:2008 regulation. The installer or final user should request and assemble such protection elements to guard any openings left in the fan after being installed. **IMPORTANT: the impeller and propeller could not be visible when rotating under poor illuminating conditions.**

START UP: Once all previous measures are done and in case of not encountering any problems, the fan can be started up. But before doing the first start up it is advised to check again and directly that there is no friction with any rotating element because maybe when being installed the fan could be forced or damaged. Also double check no external element or left over material from the installation is inside the fan or its ducts.

The first start up should be short time wise and aimed for checking only that the direction is in accordance to the specifications and to check no strange noises or frictions appear. In case the direction of the rotation is wrong the connection should be changed as previously indicated. In the second start up, the fan should be allowed to reach the maximum nominal speed once finished the controlled start-up. If regulating doors are used, open them so the fan can adapt to the required installation conditions.

IMPORTANT: AT THIS MOMENT IS WHEN A STRICT REAL CONSUMPTION CONTROL SHOULD BE DONE WITH A HOOK-ON METER, AND CHECKING IT DOES NOT EXCEED THE NOMINAL CONSUMPTION "In" SPECIFIED IN THE PLATE FOR THE WORKING USE OF THE FAN. IN CASE IT EXCEEDS THE CONSUMPTION IMMEDIATELY STOP THE FAN.

An excessive consumption could be caused by a possible defect of the fan, motor, friction, or an electrical connection error, **but the main cause usually is a wrong adaptation of the installation due to excess or faulty charge.** If the fan is an axial fan VHD and VHT chances are that an element obstructs excessively the air flow. On the contrary, if the problem appears in a centrifugal fan of VCBPD, VCBPT, VCMAPD and VCMAPT groups, the air flow should be obstructed with the regulating door if existing or by placing any element that can obstruct partly the suctioning inlet. In this latest case, amongst anything check that no elements are loose that can be suctioned inside the fan. Once readjusted the installation check again that the consumption is within the range. After this readjustment is achieved, the fan should be started up and work correctly without any problems.

MAINTENANCE OF THE FAN

It is recommended a complete check up of the fan and its installation after the first 24 hours after start up, by electronically disconnecting it from the network in order to avoid accidents. WE SUGGEST USAGE OF SECURITY SWITCHES specially made for this purpose. Review that no element has been loosened and especially for the transmission groups VHT, VCBPT and VCMAPT retighten all elements: pulleys, tensors, motor base support, shafts, etc. Also check the motor bearings and transmissions by manually rotating the impeller or propeller. If any odd noise or problem occurs check with the manufacturer.

In installations where the fan is usually not operating, periodically inspect the fan maximum every 6 months. Checking all components keep the initial state and no signs of stiffness appear or noises in the bearings. It is also advised a complete start up and working at least 1 hour.

IMPORTANT: All models of the BD (VCCPD) range and other indicated models, have a thermal protector that can temporarily make the motor stop.

Therefore do not access to the fan without previously disconnecting it from the network. In three-phase models such protection activates the contactor circuit of the electrical installation.

CONSIDERATIONS DURING REVISIONS: The following are some points to be taken into account during a revision to guarantee correct functioning of the fan:

1. The functioning of the fan must be smooth and free of vibrations.
2. The ampere consumption (A) should be measured with a hook-on meter or multimeter can never exceed the nominal consumption "In(A)" specified in the motor's plate.
3. All screwed elements must be checked that they have not been loosened. In the transmission fans groups VHT, VCBPT and VCMAPT review that the pulleys are tight and the good state of the belts. The belts should work regularly and without jolts, they tend to expand through time and specially the first weeks of functioning. That's the reason why they should be readjusted making sure that the gear shifts are still aligned after the tightening.
In transmissions with more than one belt, the complete set will be replaced, never mix used and new belts.
4. In applications where the fan works in a high dust or greasy air environment, the blades of the impeller or propeller can be unbalanced due to the accumulation of particles and consequently damage the bearings. Therefore, cleaning of the rotating element must be done periodically using the maintenance stops or whenever the fan vibrates or does not work correctly. Never leave the dust inside the fan.
5. In other applications where there is abrasive accumulation of dust the propeller can be worn out, as well as centrifugal fans used in material transportation (VCMAPD or VCMAPT groups with flat blade impellers). These worn out pieces should be replaced in case of unbalancing.
6. Those fans stored or not functioning for periods of two or more years, it is recommended a full revision of the bearings. Before start up the bearings should be replaced in case they are rusty, or dried grease and in bad condition.

CLEANING: The correct attention, maintenance and cleaning of all installed elements must be done periodically by the installation responsible. **Avoid accumulations of dirt, dust, grease, etc,... main cause of fires and their expansion.**

GREASING: depending on the element of the fan different instructions for the greasing should be followed:

1. The bearings of the electrical motors should not need any maintenance, nonetheless it is advised not to exceed the limit hours established by the manufacturer of the motor (15.000 to 20.000h depending of the brand name) and under these circumstances replace them.
2. The transmission groups of the axial fans HH and HHP and the bearings used in the centrifugal range BV, also do not need greasing but they should be replaced every 10.000 to 15.000h depending on the temperature conditions and humidity of the circulating air.
3. The self-aligning bearing supports type NP used in the VCBPT and VCMAPT groups and specially in those reinforced models have external greasers, if not they are prepared for their installation. In these cases such bearings do not need either maintenance as they are sealed bearings. But if the working conditions are extreme their life can be extended by greasing them every 500 to 1000 hours of working time. It is very important never mix grease with different chemical compositions and viscosities.

