

SFL/M

Axial fan

Technical Documentation



Version 1.00

SMAY reserves the right to make changes to the document.

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1. INTRODUCTION

The purpose of this technical and operational documentation (DTR) is to familiarize the user with the purpose, design, principle of operation, assembly, periodic maintenance and operation of the product.

This Operation and Maintenance Manual corresponds to the technical condition of the device at the time of printing. The manufacturer reserves the right to introduce technical changes and changes in equipment of the device .

This manual belongs to the product and contains important instructions on the use of the device. They should also be observed when passing the product on to third parties.

The documentation should be kept for possible consultation, preferably near the fan.

Read this documentation in detail, install and use SFL/ M fans in accordance with the descriptions provided therein and compliance with all safety conditions, constitutes the basis for the proper and safe operation of the device.

It is assumed that work related to transport, assembly, installation connection and periodic inspections related to SFL/M fans, as well as maintenance and repairs are performed by **qualified personnel** or are supervised by authorized persons.

Qualified **personnel** is understood as persons who, on the basis of the training protocol, in view of their professional experience in the field of electromechanical devices, knowledge of relevant standards, documentation and regulations regarding safety and working conditions, have been authorized to carry out the necessary transport, assembly, installation and maintenance works, and are able to recognize possible threats and avoid them.

Warning symbols used in the documentation:



Danger!
Drawing attention to the threat to life and possible bodily injury.



Attention!
Drawing attention to possible destruction and damage to the installation.



Tip!
Recommendations and general comments.

ATTENTION:

The manufacturer reserves the right to make changes to the technical and operational documentation.

2. LEGAL REGULATIONS

SFL/M fans meet the requirements specified in:

- **2014/35/EU** Low Voltage Directive,
- **2014/30/EU** Electromagnetic Compatibility Directive,
- **2006/42/EC** Machinery Directive.

The following harmonized standards were used to assess the conformity of SFL/M fans:

- **PN-EN 60204-1:2010** Machinery safety. Electrical equipment of machines. Part 1 General requirements,
- **PN-EN 60335-1:2004 +A1:2005 +A12:2008 +A12:2009 +A14:2010** Household electrical appliances and similar - Operational safety - Part 1: General requirements,
- **PN-EN 60335-2-80:2007** Household and similar electrical appliances - Safety in use - Part 2-80: Particular requirements for fans,
- **PN-EN 953 +A1:2009** Machinery Safety – Guards – General requirements for the design and construction of fixed and movable guards.

3. GENERAL RULES FOR SAFE USE

When creating SFL/M fans, SMAY used the latest technology, which guarantees the highest level of safety.



A high level of operational safety can be achieved provided that all required safety measures are observed. The operator is obliged to plan these measures and enforce them.

The operator is obliged to ensure that:

- the fan is used for its intended purpose,
- the fan does not have any defects and its condition guarantees proper operation (pay attention to regular periodic inspections of safety equipment),
- the operating manual is available near the place where the fan is located and whether it is legible,
- the fan is operated and repaired only by qualified and authorized employees,
- no safety markings have been removed from the fan and whether they are legible.

In addition:

- Modification and tampering with the device is prohibited, as it may cause serious consequences for which the manufacturer is not responsible,
- the device requires the use of only original parts. The warranty does not cover any damage caused by the use of inappropriate materials or other accessories.

Incorrect use:

It is prohibited to use the fan in the following conditions posing specific hazards:

- operation with an unbalanced rotor, caused for example by accumulated dirt or icing,
- work with loose screw connections of individual components of the device,
- opening the terminal box while the motor is running ,
- use near flammable substances and materials,
- use with safety devices fully or partially removed or with modified safety devices,

The devices may be dangerous if they are used improperly by unqualified personnel or if they are used other than for their intended purpose.



Installation, connection of related installations, commissioning, operation and maintenance must be carried out in accordance with the regulations in force in the country where the device is installed.



The fan should be used in accordance with the technical and operational documentation and within specified performance limits.



It is recommended to use the assistance of Authorized SMAY Service Centers during assembly, installation, commissioning, repairs and maintenance. The documentation should be located near the device and easily accessible to services service.

It is very important to strictly follow the installation and maintenance instructions. If the fan requires additional instructions, these will be provided as separate supplemental information. If additional instructions are missing, please contact the SMAY technical department.

All detailed information about the delivered product is provided on its nameplate. In case of doubt, please contact the

SMAY technical department.

These instructions apply to SFL/M fans only and do not address any further requirements for the installation of additional covers or electrical insulation that may be necessary to comply with the design specifications.

All declarations made by SMAY regarding the installation and safety of the product are dependent on the use of the supplied devices in an installation that meets the requirements set out in the standards and directives applicable in the given plant.

Adequate access to the fan must be provided to facilitate maintenance.

The installer must ensure that the fan assembly is adequately supported using appropriate configurations, materials, and mounting brackets.

To minimize the risk of personal injury and equipment damage, the fan and its auxiliary equipment must be electrically and mechanically isolated before any work is performed.

The risk assessment should be carried out in accordance with applicable health and safety regulations and in accordance with specific plant requirements. Personal protective equipment must be worn/used in accordance with site safety requirements, including hearing protection (mandatory in environments where noise levels exceed 85 dBA), eye protection, finger protection, etc.

4. DEVICE PURPOSE

SFL/M axial fans are intended for domestic ventilation systems as supply or exhaust fans.

The fans are designed to move clean air in the appropriate direction, depending on the version. The devices are designed to work inside and outside buildings in vertical and horizontal working positions.

Detailed information about the unit supplied is provided on the product nameplate. Please check the nameplate of the CE marked product. If you are unsure about any detail, please contact Smay or its distributor for clarification.

The person performing the installation must check whether the fan is installed in accordance with the guidelines contained in the Operation and Maintenance Manual and with the use of appropriate cooperating elements, in which only tested and certified elements and materials are used.

The fans are designed to operate at a maximum ambient temperature of up to 55°C. The temperature of the transported medium cannot be higher than 55°C or lower than -20°C.

NOTE: Fans should not be used for:

- drying buildings,
- heat treatment of air.

5. TECHNICAL DESCRIPTION OF THE DEVICE

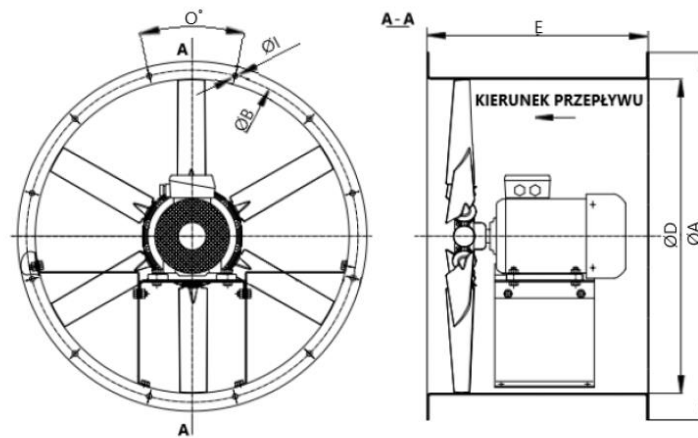
SFL/M fans are manufactured in the diameter range of 315 ÷ 1250 mm with powers of 0.55 kW ÷ 55 kW. They are always equipped with PTC sensors and can be specified with IE4 motors at the customer's request. The fan has been designed and adapted for continuous operation in the environment with the conditions prevailing at the installation site and is characterized by high resistance to mechanical, corrosion, thermal and humidity effects to which it will be exposed during operation. They can work in horizontal and vertical positions.

The fan is standardly made of black powder-coated steel sheet with a plastic or aluminum impeller. The design of the rotor allows the angle to be adjusted when stationary with the manufacturer's consent. It is designed to work with a frequency converter. Optionally, the fan can be made with galvanized or stainless steel static elements. The fans use high-efficiency three-phase 400V/50Hz motors. The motors are characterized by protection class IP55 and insulation class F.

The SFL/M fan is made in two variants:

- **SFL/M** with an impeller made of glass fiber reinforced polyamide,
- **SFLA/M** with aluminum rotor

The fan can work with standard accessories attached to it, such as mounting feet, vibration isolators, flexible connectors, inlet nozzles, protective nets, silencers, and return flaps. All pressure drops on accessories are automatically calculated for a specific model in the selection program. Additional technical data for individual types can be found in the selection cards.



Rysunek 1. SFL/M fan dimensions

Tabela 1. Standard dimensions of the SFL/M fan

rozmiar	ØD [mm]	ØA [mm]	ØB [mm]	ØE [mm]	ØI [mm]	n x O [-]
SFL/M 31	315	375	355	350	10	8x45°
SFL/M 35	355	435	395	395	10	8x45°
SFL/M 40	400	480	450	440	10	8x45°
SFL/M 45	450	530	500	455	12	8x45°
SFL/M 50	500	600	560	540	12	12x30°
SFL/M 56	560	660	620	560	12	12x30°
SFL/M 63	630	730	690	550	12	12x30°
SFL/M 63 B2	630	730	690	770	12	12x30°
SFL/M 71	710	810	770	600	12	16x22,5°
SFL/M 71 B2	710	810	770	770	12	16x22,5°
SFL/M 80	800	900	860	600	12	16x22,5°
SFL/M 90	900	1000	970	820	12	16x22,5°
SFL/M 100	1000	1100	1070	820	12	16x22,5°
SFL/M 112	1120	1220	1190	1000	12	16x22,5°
SFL/M 125	1250	1370	1320	1000	15	20x18°

6. COLLECTION AND INSPECTION OF GOODS

The receipt and inspection of the delivered fans should be carried out in accordance with the following guidelines:

1. When receiving the goods, please check all delivery documents against the products received before removing any packaging.
2. Packaging should be checked for obvious signs of damage or mishandling.
3. Goods must be transported/handled taking into account their size, weight, dimensions and center of gravity.
4. Some goods may be designed or packaged in such a way that their center of gravity is shifted. Where lifting operations are carried out, the receiving party is responsible for carrying out all necessary risk assessments using appropriate methods.
5. Where possible, packages should be marked in an informative way to show potential hazards, such as "Offset center of gravity", "Fragile" or a specific orientation during transport ("Top ↑").
6. After removing the packaging, check the goods for signs of damage.
7. Particular attention should be paid to the rotor, checking that it has not been damaged during transport. Check for contact between the impeller and the housing by turning the impeller by hand.
8. Check the insulation resistance between the phases and ground. If the resistance is lower than 10 MΩ, use the drying method. Insulation tests should not be performed on intrinsically safe thermistors and sensors.
9. In the case of products that have been galvanized - According to the PN-EN ISO 1461:2009 standard, the appearance of zinc oxide (white corrosion) does not constitute grounds for rejecting the product.
10. After receiving the goods, please check the instructions provided. Please follow the recommendations listed therein.
11. All supporting documentation should be kept with the fan or in a safe location in accordance with plant procedures.
12. Failure to follow the instructions provided herein may affect all warranty claims.

7. TRANSPORT AND STORAGE CONDITIONS

Mechanical damage to the fans should not be allowed, which may be caused by, for example, impacts or sudden dropping. During transport, fans should be packed in cardboard boxes and/or placed on pallets and protected against changing position and against weather conditions.

After each transport, a visual inspection of each fan should be performed.

Fans should be stored in closed rooms, providing protection against weather conditions, at a minimum temperature of +5°C.

If the product will not be installed immediately after receipt, remember the following rules:

1. The fan must be stored in a clean, dry area at a constant temperature, free from corrosive fumes, vibrations and dust.
2. anti-condensation heaters (if provided) of the motor must be powered if it is not possible to maintain a constant temperature.
3. A motor insulation test should be performed every 3 months. Check the insulation resistance between the phases and ground. If the resistance is lower than 10 MΩ, use the drying method.
4. The resistances between the windings should be balanced. This should be verified using appropriate equipment.
5. Insulation tests should not be performed on intrinsically safe thermistors and sensors.
6. The rotors should be rotated monthly to prevent grease from separating and damaging the bearings. Once rotation is complete, the rotor cannot return to the same position.
7. Fans stored for more than 2 years - Bearings and lubrication lines (if installed) should be flushed and filled with new grease to prevent possible damage to the bearings. When the fan is equipped with sealed, maintenance-free bearings, the entire bearing must be replaced before the unit is placed in service.

8. DEVICE INSTALLATION INSTRUCTIONS

Before installing the fans, check whether any damage to the delivered devices occurred during transport or storage. The installation site should be protected against access by unauthorized persons. Assembly work should be performed carefully and in accordance with occupational health and safety rules. The fan must be protected against the possibility of sucking in foreign parts. The location of the fan installation should be selected in such a way that it is easily accessible for service and maintenance purposes.

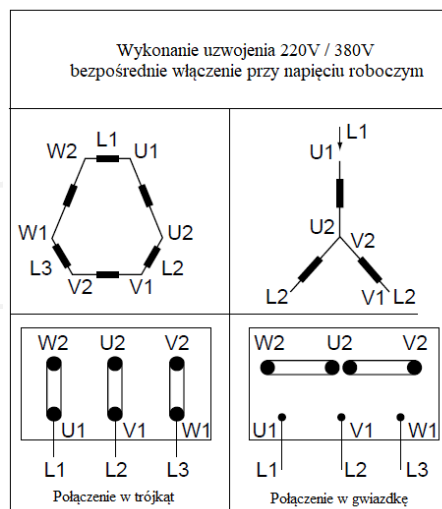
The following recommendations must be strictly followed:

1. The entire mechanical installation process must be carried out by competent personnel in accordance with current local statutory requirements.
2. The entire electrical installation process must be carried out by qualified and competent workers in accordance with current local statutory requirements.

3. The electrical installation must comply with the relevant standards and directives.
4. Cable glands and conduits should be positioned to prevent moisture from collecting on the gland gasket - the gland entry must not face vertically upwards.
5. In case of any doubts regarding the fan equipment, please contact the Smay technical department before installation.
6. The fan must be firmly mounted in the desired position appropriate to the application of the device. The air flow direction must be correct (in accordance with the information on the nameplate).
7. To ensure that the correct power supply (voltage, frequency and phase) is available, check the motor nameplate details. Incorrect power supply may lead to permanent damage to the fan motor.
8. The work should be carried out in accordance with the appropriate electrical diagram for a given facility.
9. Check that all necessary grounding connections have been made.
10. Appropriate connectors for electrical disconnection must be added to the wiring system in accordance with applicable wiring and electrical system regulations.
11. The impeller should be locked during installation to prevent the blades from rotating, which could result in personal injury.
12. An important element is the absence of foreign elements in the system and cables: nuts, bolts, cable trimmings, tools, etc. If a foreign body hits the rotor or electric cable, the fan will not be safe to use.
13. Visually check whether the gap between the blades and the housing is maintained and the impeller is properly aligned.

GUIDELINES FOR ELECTRICAL CONNECTION

The motor can be connected both in a star configuration at 400V mains and in a delta configuration at 230V mains. With both connection methods, the same current flows through the phase wire winding. The three beginnings (U1, V1, W1) and three ends (U2, V2, W2) of the winding are led to six terminals in the terminal box. There, the three main wires (L1, L2, L3) are always connected to the beginnings of the rods. If the ends of the rods (U2, V2, W2) are connected together in the terminal box, the motor is connected in a star configuration. In the case of a star configuration, the sum of the voltages and currents at the star point is zero, and the phase resistance depends on the phase voltage. The motor current is equal to the current in the phase wire winding. However, if the end of one stick is connected to the start of the next stick, the motor will be connected in a delta configuration. The phase resistance then depends on the mains voltage. The motor current results from the geometric sum of two phase currents (Fig.2.).



Rysunek 2. Electrical diagram of a delta-star connection

The electrical diagram shows the possibility of connecting the motor both in a star configuration with a mains voltage of 400V and in a triangle configuration with a voltage of 230V. The same amount of current flows through the phase wire winding in both cases, also for the new option with privileged voltage: 690V for star and 400V for delta. If the alphabetical order of terminal designations (U1, V1, W1, U2, V2, W2) coincides with the temporal sequence of phases, the motor should be installed in the right circuit. For reverse circulation, the two external wires must be swapped. According to VDE 0530, the terminal box must include a connection terminal for the protective conductor. Motors with a rated power above 100kW must additionally have a grounding terminal on the housing.

GUIDELINES FOR INSTALLATION OF FAN ACCESSORIES

Flexible connections/compensators

Flexible connectors enable mechanical isolation of the fan shafts from adjacent ducts.

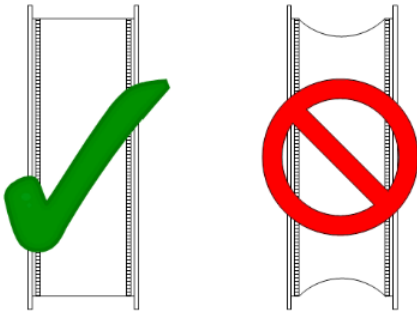
Flexible connections should not be used to compensate for poor channel fit.

Maximum allowable channel mismatch:

$< \varnothing 1000 \text{ mm} = 5 \text{ mm axially}$

$\geq \varnothing 1000 \text{ mm} = 10 \text{ mm axially}$

Flexible connections should not be stretched to the maximum and must not hang between the flange rings. If the connector is too long, cut it to the appropriate length.



Flexible connections should be installed in such a way that the entire length of the connection of the mating flanges is covered.



Flexible stubs are an element consisting of two counter-flanges, elastic fabric and mounting clamps and clamps. This design ensures proper operation and trouble-free installation and service/maintenance activities.



Flexible connections are a consumable element. Their condition should be checked each time during inspections. It is recommended to replace the spigot fabric immediately after detecting any discontinuities. Improper installation/operating conditions can have a major impact on accelerated wear of the elastic fabric.

Spring vibration isolators

Vibration isolators should be installed according to the following procedure:

1. The structure under the machine should be constructed in such a way as to create a rigid and relatively level base for each group of vibration isolators.
2. Check that the vibration isolators are the correct size.
3. Once the vibration isolators are in the correct position, the base of the machine should be leveled and supported with jacks or blocks so that it is just above the tops of the vibration isolators. Then match the mounting holes of the insulator and the machine.

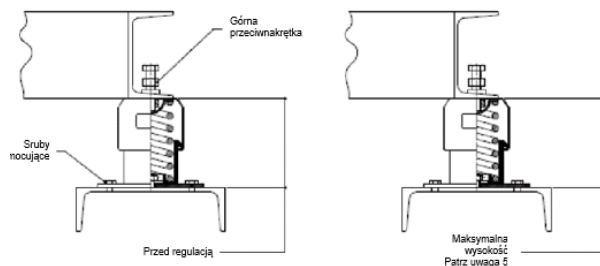
At this stage the mounting screws can be loosely inserted to maintain the position of the vibration isolators when finally lowering the machine base, however it is important that they do not stress the vibration isolators in any direction (the mounting screws are supplied by a third party).

4. Once the blocks are removed, the base of the machine can be carefully lowered, lowering it evenly over the entire supported area, transferring all of its weight to the vibration isolators.

Then insert the adjustment screws through the base of the machine into the holes in the vibration isolators. The screws must be of sufficient length to allow for adjustment.

5. After initial deflection, tighten the adjustment screw to raise the upper spring cover until the desired vibration isolator height is reached or the machine is fully level; see drawing

DO NOT adjust beyond the original deflection range obtained when the load was applied. If adjustment **is NOT** required, the adjustment screw must be turned in until spring pressure is felt before tightening the jam nut.



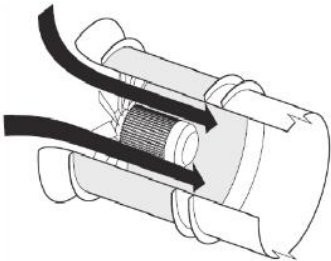
6. The mounting bolts and top insulator jam nuts should now be fully tightened.

7. Ribbed rubber base liners should be used whenever vibration isolators are mounted on concrete or other rough surfaces.
8. Please note that vibration isolators are not designed to compensate for angular misalignment, excessive horizontal forces, or tensile forces, and cannot be used in applications with tensile or shear loading.
9. a vibration isolator system can be severely reduced if the system is connected to rigid pipes, conduits, ducts or shafts. It is crucial that such external connections are as flexible as possible, not only to allow vibration to be transmitted through the connections and to allow the system freedom of movement, but also to avoid possible damage

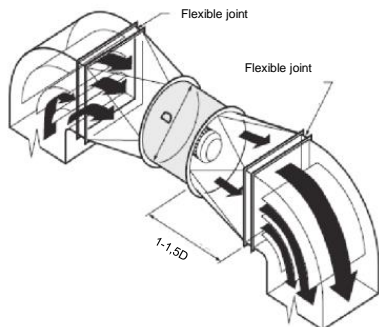
Adjacent channels and faders

Adjacent ducts and silencers should be adequately supported to avoid excessive loads on the fan housing/structure and accessories.

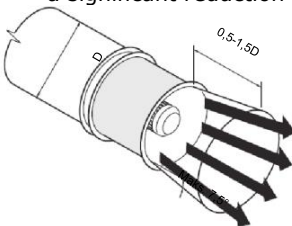
1. By installing a properly designed intake nozzle, the air flow to the rotor will be uniform and optimal operating efficiency will be achieved, with a minimum level of noise generated. The intake nozzle is an essential element of the fan in the case of installation with a free inlet (also applies to reverse operation), and its absence may significantly affect the level of vibrations and flow parameters.



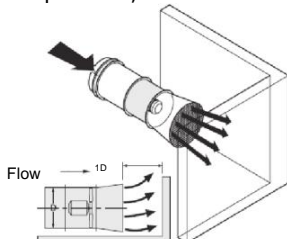
2. Transitions from square to round ducts and the presence of guide vanes in the elbows help to achieve a uniform air flow; however, this is a compromise solution, not ideal, when it is not possible to ensure optimal lengths of straight sections at the fan inlet = $2.5D$. The adapters can be screwed directly to the fan provided that they are sufficiently stiff.



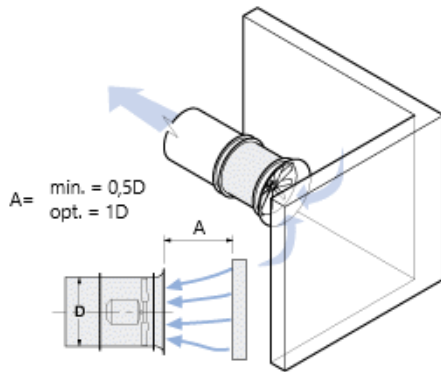
3. By using a properly designed exhaust diffuser, static pressure recovery in the diffuser will reduce the total dynamic pressure in the system. The internal angle of the diffuser cannot be greater than 15° . This configuration allows for a significant reduction in exhaust losses.



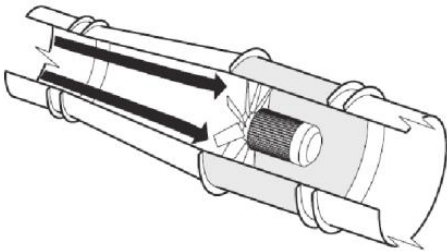
4. There should be a distance between the fan outlet and the nearest obstacle equal to at least one fan diameter, and if possible, a diffuser should be installed at the outlet.



5. An optimal distance between the fan inlet and the nearest obstacle should be ensured, equal to at least one fan diameter; even then, the fan capacity may be lower than the rated capacity. In the case of demanding installation places where there is not much space, such as expansion chambers, it is necessary to strictly observe the minimum distances of fan inlets from obstacles and other devices.

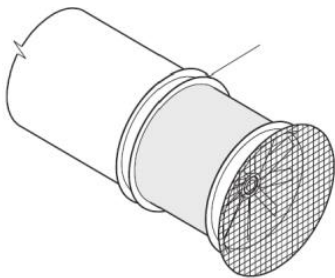


6. Whenever possible, avoid duct expansion into the axial fan inlet. If the transition is critical, its internal angle should not exceed 15°.



7. Open fan inlets should be equipped with appropriate covers. These guards must be designed to comply with local regulations and not only protect against possible injuries, but also reduce the risk of foreign objects entering the fan and causing damage.

Flexible joint



9. START-UP INSTRUCTIONS

1. Ensure that all electrical circuits are complete, tested and approved for use.
2. Make sure the local isolator is set to the ON position and that there are no obstructions or foreign objects in the fan ducts that could damage the impeller.
3. If the gap between the impeller and the casing is not symmetrical, and especially if there is obvious contact between the impeller and the casing, the impeller should be immediately re-aligned, maintaining equal gaps between the impeller blades and the casing.
4. Turn on the unit for a moment to confirm that the direction of rotation and air flow is correct.
5. Check that the current consumed by the fan (full load current FLC) does not exceed the value given on the nameplate.
6. After satisfactory test results, run the fan for another 30 minutes to check whether it operates smoothly and without failures. If no problems occur, the fan can be considered ready for use.
7. After all units have passed the procedure described above, the entire system should be tested in accordance with the control methodology.
8. The measurement protocol must be completed.
9. After completing the above procedure, the ventilation system should be considered ready for commissioning.
10. Information on troubleshooting and the fan commissioning log can be found in the annexes.

10. RULES OF PERIODIC SERVICING AND MAINTENANCE

Before starting any operation and maintenance work, please read this documentation. In particular, persons responsible for operating the device/system during operation and service have such an obligation. In the absence of trained personnel with specific technical skills, a current inspection of the devices should be performed by the SMAY Service or an Authorized SMAY Service.

Damage to SFL/M fans resulting from failure to comply with the guidelines contained in the documentation will not be subject to warranty repairs.

Any activities related to the replacement or modification of device components may only be performed by the SMAY Service, an Authorized SMAY Service, or with the consent of SMAY.

After installing SFL/M fans, inspections are recommended in accordance with the requirements specified in the annexes.

1. Inspections of ventilation devices should be carried out at regular intervals, no longer than 6 months.
2. If the devices are part of a larger security system, it is necessary to create a regular maintenance program specific to the facility. Such a plan must indicate a scope of work over specific periods that will be consistent with the requirements of the facility or application.
3. Before working on any part of the fan, check that the fan has been isolated locally.
4. Before working on the fan/motor unit, check that the impeller has stopped completely.
5. electrical components and connections must be checked and repaired as necessary, and then retested for functionality.
6. Check that no foreign objects or dirt that could negatively affect the unit's performance are attached to the fan assembly and that a suitable method is available to remove any foreign objects found inside. The fan and its accessories should be checked and cleaned as necessary.
7. Sealed motor bearings do not require maintenance. The service life of the L10 bearing is 20,000 hours. Bearings are a consumable element and their service life is largely influenced by operating conditions.
8. Fans with bearings requiring relubrication must be lubricated according to the instructions. The type and amount of grease and the intervals between operations are shown in the drawings and also in the form of a label on the fan housing. If not available, see engine manual. If it is safe to do so, apply lubricant while the fan is running. If this is not safe, apply half the grease, run the fan for 2 minutes, then apply the remaining grease. The life of an L10 bearing depends on the application, but is typically approximately 50,000 hours for bearings requiring relubrication.
9. Detailed information about the unit supplied is provided on the product nameplate. Please check the nameplate of the CE marked product. If you are unsure about any detail, please contact Smay.
10. The fan/motor assembly is designed for use in ambient temperatures from -20°C to +55°C, with humidity up to 80% in normal operation.

SPARE PARTS

1. Motor Bearings - It is recommended to replace the motor bearings after 20,000 hours or 5 years of use under normal environmental conditions, whichever occurs first.
2. Motors intended for use in hazardous areas and compliant with EN 12101-3 may only be repaired by authorized service technicians.
3. Flexible connectors - it is recommended to monitor their condition and replace them if the fabric is damaged.

FAN DISPOSAL

Please check that all packaging is disposed of in accordance with local regulations, taking into account its impact on the environment, through reuse or recycling.

Check that fans and auxiliary equipment are dismantled by competent persons and that materials are separated for recycling/reuse in accordance with local regulations.

The following elements can be separated for further processing by specialized recycling plants : - electrical cables, motor windings, motor/fan block, plastic elements, packaging materials, muffler filling, fan and motor housings.

11. TERMS OF WARRANTY

- a. The manufacturer provides a warranty for the delivered product for a period of 24 months from the date of sale or another period agreed in the contract. It is possible to extend the warranty, provided that a separate Maintenance and Service Agreement is signed between the manufacturer and the owner/manager of the facility.
- b. The basis for considering complaints is to submit a complaint within the warranty period within 7 days from the date of detection of the defect, to make the product available in the condition in which the defect was discovered, along with a detailed description of the technical problem and documents confirming the performance of all inspections and checks planned by the manufacturer. periodic/maintenance.
- c. The manufacturer undertakes to remove the defect within 2 business days from the date of receipt of the notification. The manufacturer undertakes to remove the defect within 21 business days from the date of receipt of the notification along with a complete set of documents, and if it is necessary to import materials or parts that are difficult to obtain, the repair will be carried out within the shortest technically justified time.
- d. The warranty period is extended by the duration of the repair.
- e. The warranty applies in the cases described in the GTC that is available at www.smay.pl

12. ATTACHMENTS

APPENDIX 1 – Maintenance schedule

For more demanding environments where vibration and shock are common, maintenance must be performed more frequently. If in doubt, please contact Smay. The activities should be performed at least as often as in the table below and are the basis for the proper operation of the device.

Maintenance schedule during operation - basic activities

Action	Frequency
Inspection of vibration isolators for corrosion and "deflection"	6 months
Checking the ground connection	6 months
Motor lubrication	Refer to the engine manual, assembly drawing or technical data
Lubricating the internal fan support unit (belt drive units only)	
Checking the backdraft damper and lubricating (with lithium grease) the pivot points after removing the plastic caps (counterweight damper only)	Each year
Checking the tightening of fasteners	Each year
Rotor inspection and cleaning	26,000 hours / 3 years
Removing dirt from the motor cooling fins	26,000 hours / 3 years
Checking the operation of anti-condensation heaters	26,000 hours / 3 years
Checking the uniformity of blade tip gap	Each year
Motor operating current control	Each year
Corrosion – remove with appropriate chemicals	26,000 hours / 3 years
Checking the housing seals	26,000 hours / 3 years
Disassembly of the non-return damper to check the fastening of all fasteners, replacement of all damaged rubber elements	3 years
Fan: check that all fasteners are secure, except the impeller screws.	Each year

Tightening torque values for fasteners are given in Annex V. Some fasteners are secured with Heico washers and have different tightening torque values.

Terminal box/housing maintenance schedule - basic activities

Action	Frequency
Check that the cover gasket is in place and not damaged	Whenever the case is opened
Check that the cover mounting screws are in place and secure	Whenever the case is closed
Check whether the mounting brackets are tightened and there are no signs of corrosion	Each year
Check the tightness of all cable glands	Each year
Check that all screws, brackets and clamps are securely attached	Whenever the case is opened
Check the casing for damage	Each year

Maintenance schedule during storage - basic activities

Action	Frequency
Rotating the motor shaft	Every month
Insulation test	3 months
Replacing grease (grease lines and bearings)	2 years
Replacing "permanently sealed" bearings	2 years

ANNEX II – Troubleshooting

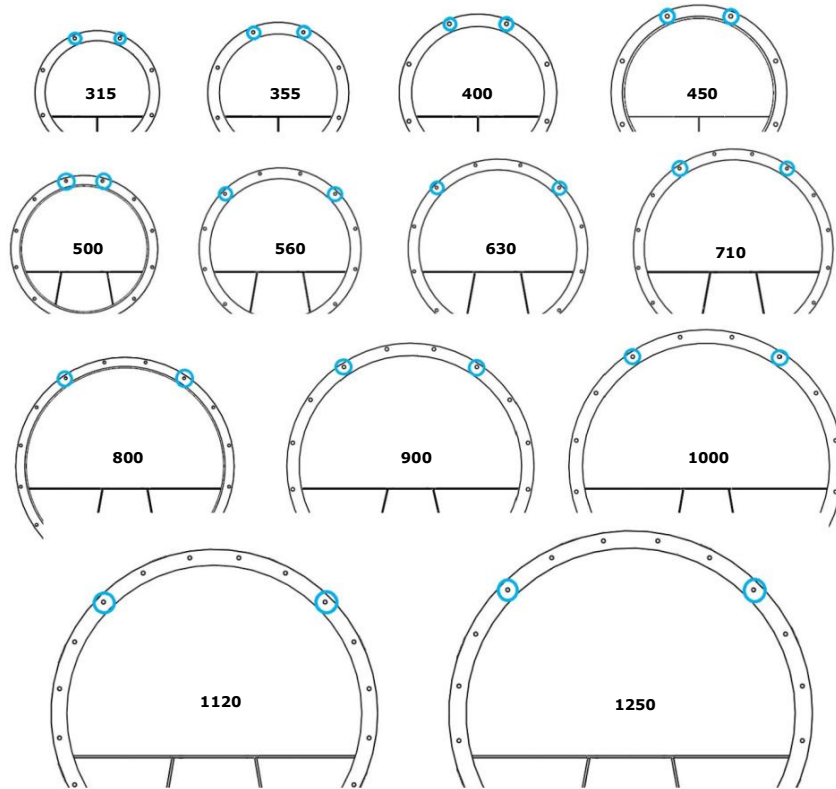
Observations	Potential causes	Comments
Vibrations during operation	Unbalanced rotor	Mechanical damage to the rotor. Uneven accumulation of dirt on the impeller. Hostile environment causing corrosion or deterioration of the impeller. Ice build-up in low temperature applications.
Vibrations during operation	Poor entry and/or exit conditions. Canal obstruction	Vibrations that may be caused by poorly designed ductwork.
Strong vibrations, pulsation, pumping	Aerodynamic stalling of a rotating rotor	System pressure too high resulting in blade breakage. The pressure losses are much higher than the design values and, as a consequence, the fan operates in an unstable part of the characteristic curve.
Ducts resonate	Organ pipe effect	The length of the channel is tuned to the aerodynamic forcing frequency, most often in the so-called blade frequency.
Vibrations coming from the engine	Uneven heating of the motor rotor causes unbalance	
Motor current too high / motor overheating	Load too high Insulation problem Motor ventilation blocked Clogged cooling fins Dust and oil ingress	Dust, oil and moisture will shorten the life of the motor insulation
A knocking or rumbling noise coming from the motor	Worn bearings	Excessive lubrication of bearings leads to very high temperatures, causing the lubricant to decompose and damage the bearing. The bearings have a service life specified by the manufacturer, which may be shortened when operating in difficult conditions.
When operating with an inverter, the fan vibrates at certain speed settings	The fan's operating frequency (forcing) may coincide with the natural frequency of the vibration isolator The fan may have resonant frequencies	You should lock these speeds on variable speed devices and move through them quickly
Performance too low	Incorrect direction of rotation. The operating point does not correspond to the design one (installation has too high resistance) Systemic effects Duct obstruction	

ANNEX III – Lifting and transport

Rotating single long case axial fans from resting vertical to horizontal orientation:

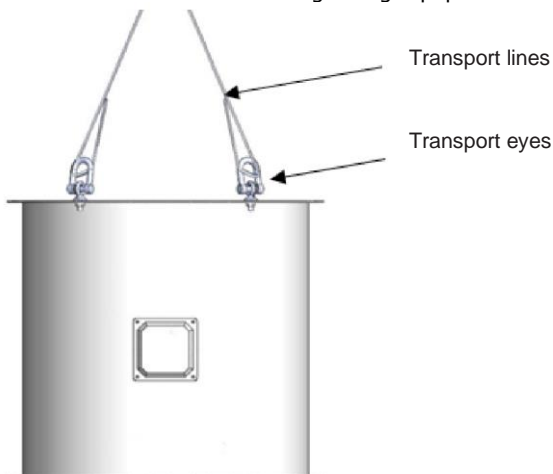
NOTE: - Responsibility for ensuring that suitable and adequate lifting equipment is available for each lifting operation and for ensuring that these operations are carried out safely rests with the plant foreman or persons responsible for lifting operations. All lifting should be individually assessed at the plant and carried out in accordance with applicable health and safety regulations.

1. Identifying lifting points when turning equipment:

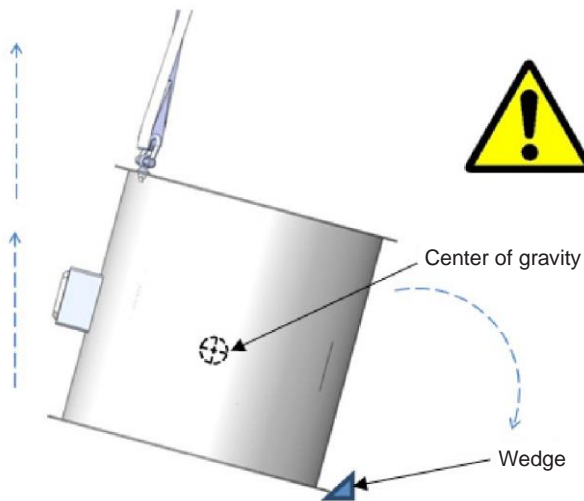


Straps, slings and buckles should be securely attached to lifting points.

Note: - The weight of the fan unit is given in the fan assembly drawing and in the shipping documentation. This weight should be used when selecting lifting equipment with the appropriate working load rating.



The unit should be lifted slowly and smoothly using a lifting device or other mechanical lifting device (as assessed by the plant).

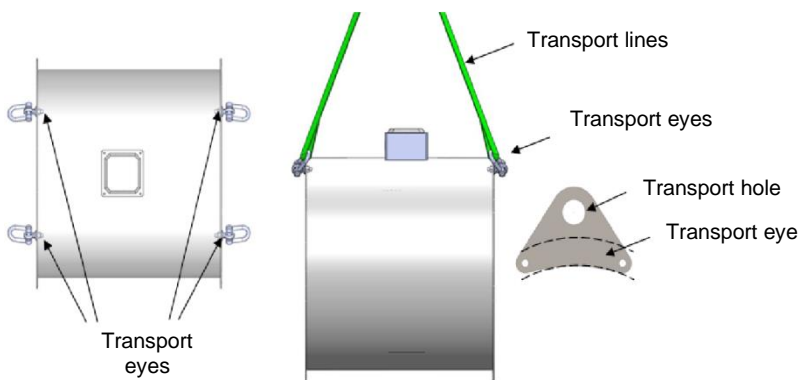


Be careful when rotating the fan as sudden weight shifts are possible.

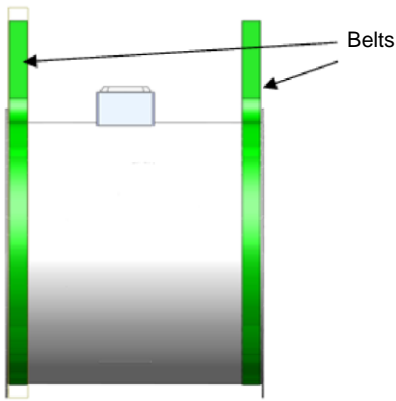
Once the unit is suspended from the straps, it can be slowly guided downwards, either by hand or using guide lines (as assessed by the plant), and brought into a horizontal position. The center of rotation should be wedged or secured to prevent the unit from slipping.

Lifting single axial fans with long casing from the horizontal rest position

Straps and buckles of sufficient load capacity must be securely attached to the equally spaced holes in the collar as shown in the illustration. This allows the load to be evenly distributed to all lifting points. If provided, lifting eyes must be used with buckles, belts and slings. Appropriate traverse beams should be used to minimize lateral stress on the lifting eyes. The manufacturer's recommendations regarding the angles of belts and buckles should be taken into account.

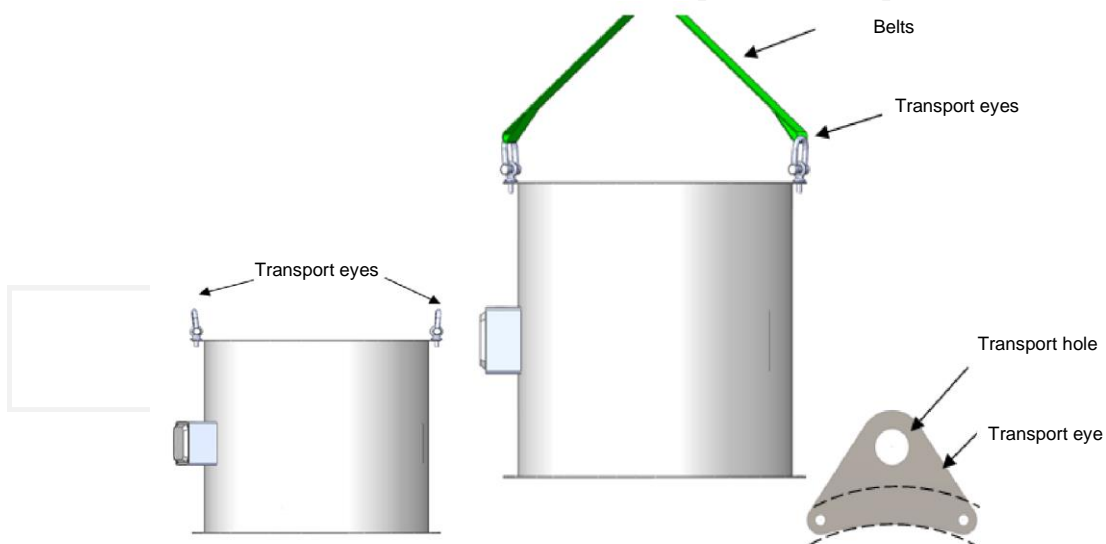


The belts can also be attached around the fan casing as shown below, ensuring the load is lifted evenly, using the appropriate load capacity calculation for the belts or slings and using a traverse beam.



Lifting single axial fans with long casing from the vertical rest position

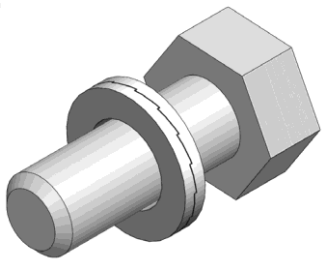
Straps and buckles of sufficient load capacity must be securely attached to the equally spaced holes in the collar as shown in the illustration. This allows the load to be evenly distributed to all lifting points. If provided, lifting eyes must be used with buckles, belts and slings. The manufacturer's recommendations regarding the angles of belts and buckles should be taken into account.



ANNEX IV - Bolt tightening torques

Screw size	Tightening torque (Nm)				
	Mild steel, galvanized			stainless steel	
	8.8	10.9	12.9	A2/A4-70	A4-80
M6	8	12	14	10.4	13.9
M8	21	29	34	25.5	33.9
M10	41	57	69	51	69
M12	71	100	120	88	117
M14	113	158	188	141	188
M16	171	244	291	218	291
M18	235	333	402	380	411
M20	333	470	564	439	586
M22	453	637	761	582	776
M24	577	812	974	724	966
FASTENERS WITH HEICO WEDGE WASHERS					
Screw size	8.8	10.9	12.9	A4-70	A4-80
M6	11	15	18	7	9
M8	25	36	42	17	22
M10	50	70	84	33	44
M12	85	121	145	56	75

Please note that Heico wedge washers are supplied in pairs. All key washers must be tightened correctly.



ANNEX V – Register of the fan's commissioning

Reference number:

Serial numbers:

Installation date:

Pre-installation check:
Do not perform insulation checks on inherently safe circuits and thermistors.

Checkpoints	Comments	
Damage during transport		
Damage to housing and ancillary equipment		
Damage to the wiring		
Properly tightened fasteners		
The gap between the blades and the housing is even		
Motor insulation check (windings and radiators)		MΩ
Motor resistance check (windings and radiators)		Ω
Correct cable connections		
No dust or foreign bodies		
Correct certification of power cables		
Correct belt tension - belt drives only		
Appropriate overload protection		
Correct height of "deflection" of vibration isolators		
Accessories properly attached and connected to the fan		
Other observations and reservations		

Post-installation inspection

Checkpoints	Comments	
The heaters turn on when stationary - if provided.		
Proper operation of the damper - if installed		
Measured currents at operating speed		
Vibration levels		mm/sec

**THE HANDOVER REGISTER SHOULD BE COMPLETELY COMPLETED AND SENT TO THE MANUFACTURER
THIS IS A DOCUMENT NECESSARY TO RESOLVE DEVICE WARRANTY ISSUES**

COMMENTS:

Legible signature of the person carrying out the work evaluation and measurements: _____

Date of assessment and measurements: _____

ANNEX VI – Periodic master operational inspection card

Model

Serial No.

 Year of production.....

Date of commencement of operation.....

MOTOR

LP	The checking aspect	RESULT	signature
1	Mounting the engine to the housing		
2	Testing of electrical parameters		
3	Checking the ground wire		
4	Checking noises accompanying engine operation		
5	Check the condition of mounting screws and tightening torques		
6	Inspection of cables and insulating material		
7	Insulation resistance test		
8	Vibration levels		
9	Checking the terminal box		

ROTOR

LP	The checking aspect	RESULT	signature
1	The degree of contamination of the rotor blades		
2	Checking the blade tip gap		
3	Mounting the rotor on the motor shaft		
4	Possible mechanical damage to the rotor		

CASING

LP	The checking aspect	RESULT	signature
1	Checking the mounting condition (housing-feet-structure)		
2	Overall condition of the housing (mechanical damage, corrosion, dirt)		
3	Tightening the fan mounting screws		
4	Checking the alignment of the housing with respect to the cables		
5	Attaching security elements (nets)		

ACCESSORIES

LP	The checking aspect	RESULT	signature
1	Checking the condition and deflection of vibration isolators		
2	Checking the condition of flexible connectors		
3	Checking the condition of connections to the fan, alignment		
4	Check the condition of other optional accessories and the quality of the connection with the fan or other elements		
5	Corrosion of elements		

COMMENTS:

 name and surname of the person performing

 the review date

ANNEX VII – MEASUREMENT PROTOCOL

After installing and starting the fan, no later than 6 weeks from the date of purchase [VAT invoice date], electrical measurements should be performed immediately, the report completed and sent to the following address:

SMAY Sp. z o. o

32-003 Podłęże

Podłęże 678

Completing the report and sending it to the indicated address is the basis for the warranty granted.

- 1) type :
- 2) serial number :
- 3) current :

After installing the fan, measure the current consumption after stabilizing its operation.

U1 [A]	V1 [A]	W1 [A]	U2 [A]	V2 [A]	W2 [A]

Comments :

Measurement date :

Name, surname and signature of the person performing the measurement:

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