

## 1 GENERAL INFORMATION

### NOTE

The instructions included in this document must be followed at all times to guarantee the correct installation, operation and maintenance of the fan. The personnel in charge of installing, operating or servicing the fan must take the said instructions into account at all times. The guarantee will be void if the said instructions are not followed.

### WARNING

Fans are specially designed for use in dangerous areas and comply with official regulations related to the risks of explosion. The equipment might not operate correctly if the corresponding operation instructions are not followed, the equipment is not correctly connected or is modified with no prior authorization, even in the case of minor modifications.

Only qualified personnel who understand the regulations related to the risk of explosion can handle this type fans.

All of SODECA's fans, including the complete line of accessories, have been manufactured with the most rigorous manufacturing processes, quality systems and quality assurance procedures.

The fan project structure, testing, manufacturing and control activities comply with CEE regulations, in particular, with current safety regulations. In addition, the materials and standardised components used to manufacture the fans of SODECA comply with the aforesaid standards and are covered by the corresponding quality certificates.

The design and manufacturing processes of the different Series of Fans and "Ex" Exhaust Fans of SODECA have taken into account the appropriate regulations and Risk Elimination instructions, in order to comply with the Essential Safety and Health Requirements (*Requisitos Esenciales de Seguridad y Salud, RESS*).

Whenever allowed by the configuration and manufacturing process, SODECA incorporates the most appropriate Safety devices directly. If this is not possible at the factory, due to specific assembly or application conditions, all additional Safety accessories are available and can be installed before starting the equipment.

Said accessories will cover the concept of residual risks described in the regulations.

However, SODECA has a complete line of ACCESSORIES which can be assembled to protect parts of the fan that could represent a potential danger to users or other personnel. A full description and reference of the said ACCESSORIES is included in the GENERAL CATALOGUE of SODECA.

SODECA recommends the installation of MAINTENANCE SWITCHES as a high safety accessory (appropriate for use in potentially explosive environments, in accordance with Directive ATEX 94/4/CE), with manual disconnection, allowing safe maintenance activities.

## 2 CONFORMITY

The fans manufactured by SODECA can be used in potentially explosive environments. Said fans have the CE mark in the plate of characteristics and comply with the following:

- ATEX 94/9/CE Directive.
- 98/37/CE Machinery Directive.
- Including the following standards:
  - EN 13463-1; Non-electrical equipment, used in potentially explosive environments.
  - EN 1127-1; Explosive environments. Prevention and protection against explosions.
  - EN ISO 12100-1; Machinery safety. Basic concepts.
  - EN ISO 12100-2; Machinery safety. Basic concepts.
  - EN 294; Machinery safety. Safety distance to avoid touching dangerous areas with the top limbs.

- ISO 13852; Machinery safety. Safety distance to avoid touching dangerous areas with the top limbs.
- UNE 100250; (ISO 12499) Industrial fans. Mechanical safety of fans.
- ISO 3744; Acoustics. Determination of sound power levels.
- ISO 1940-1; Mechanical vibration. Balancing quality.
- ISO 10816-1; Mechanical vibration. Evaluation of machine vibrations.

## 2.1 Validity

These instructions are valid for the fans manufactured by SODECA, with the construction required to operate in potentially explosive environments (Ex II 2 G/D c).

## 2.2 Previous verifications

When the data included in the standard technical information has been verified, it would be advisable to check the requirements related to methods of protection in explosive environments, for example:

- a) Group of gases
- b) Type of temperature

Temperature class	Ignition temperature for gas / steam °C	Maximum temperature allowed in the equipment °C
T1	>450	450
T2	>300 <450	300
T3	>200 <300	200
T4	>135 <200	135
T5	>100 <135	100
T6	> 85 <100	85

Table 1

Take into account that the motors that are coupled to fans are certified and classified in groups, which are determined in accordance with the gas or dust in the environment, or the marking temperature, which is calculated with a room temperature of 40°C.

The room temperature must not go below -20°C.

## 3 INSTALLATION

### 3.1 Commissioning

#### 3.1.1 Reception verification

The packaging must not show any signs of incorrect handling at reception. Perform a visual inspection of the fan to make sure that it has not been damaged during transport and that the damage does not affect the correct operation. If external damage is observed, report it to the carrier and the Commercial Department of SODECA.

Turn the propeller or turbine manually. There should be no unwanted stress or tension.

Check the model to ensure its characteristics correspond to those included in the delivery note.

Check all information in the plate of characteristics of the fan, including category and type of protection, as well as ensuring the motor plate marks comply with those of the electrical installation, voltage, frequency, etc.

All fans manufactured by SODECA are verified and tested after being assembled.  
(Check all accessories to ensure they are in good condition, if applicable).

## 3.2 Handling

### 3.2.1 Transport

The fans are supplied in carton or wooden packages, to avoid damaging the equipment.

### 3.2.2 Conservation and storage

The fan must be stored inside a warehouse, in dry environments with no vibrations or dust.

### 3.2.3 Lifting

Only use the appropriate lifting eyebolts to lift the fan, unless stated otherwise in the lifting instructions received separately.

## 3.3 Installation

All certification-related values described in the plates of characteristics must be carefully checked, in order to ensure the protection of the fan, electrical motor, environment and area are compatible with the equipment.

Standards EN 1127-1 (Prevention and protection against explosions) and EN 13463-1 (Non-electrical equipment used in potentially explosive environments) must be observed.

### NOTE

The instruction manual of the motor's manufacturer is included in each fan. The following indications must be observed:

- Ground connection.
- Connection of the power supply cable and terminals, in compliance with EN 60204-1.
- Use of certified stuffing boxes for increased safety and fireproof motors, with the adequate IP protection.

The fans manufactured by SODECA have been specially designed to allow easy assembly on walls, ceilings, pipes, support bases and machines, among others. However, the fan can only be installed in the installation positions requested to the manufacturer.

Ensure the fan is not deformed mechanically during installation.

The location, arrangement and dimensions of fixing drills are standardised and are designed to offer the level of safety and stability required.

The fan must be firmly fixed to the support structure with screws and washers, using the drills in the envelope frame (helicoidal) or support or suction inlets and discharge outlets (centrifugal).

Fixing bolts which have not been properly tightened will produce harmful noises and vibrations.

### WARNING

Ensure there are no unwanted particles in the frame and conduits before starting the fan, including any loose elements that could be dragged by the flow of air and cause damage.

The following points must be taken into account for the correct assembly of the equipment:

- a. Follow the general safety instructions during installation.
- b. Observe the correct location measures with no interference.
- c. Distance between fixing holes must match that of the fan.
- d. The screws used will have the correct dimensions, quality and resistance required to support the load of the fan.
- e. Use the appropriate tools and follow the correct assembly instructions to avoid overcharging the fan.
- f. (Do not block the motors ventilation when external ventilation systems are used).

**WARNING**

Rotating parts of the fan (mainly propellers and turbines) are *VERY DANGEROUS* elements.

The propeller or turbine must rotate freely with no added tension after the mechanical assembly.

The fan can only operate at the voltage described in the motor's plate of characteristics.

All electrical characteristics included on the plate must comply with the power supply network characteristics, voltage (V) and frequency (Hz).

The equipment can be connected after the first test has been carried out, in compliance with the instructions of the low voltage regulations.

- a. The correct cable section (mm<sup>2</sup>) with the corresponding motor power and consumption (A) will be used.
- b. Disassemble the top cover of the motor terminal box and prepare the arrangement of the said terminals, as required for a correct connection. Layouts and diagrams must be observed at all times when connecting the terminals.
- c. The motor terminal box will always include a diagram of connections.
- d. The motor's power supply will be disconnected during these operations. After connecting the motor with the power supply disconnected, the terminals will be checked to verify they are correctly tightened, with the adequate grounding connection ⊕ (earth).
- e. The power supply cable must not have any sort of interferences or be in contact with the rotating parts of the fan or mobile connections.
- f. Connect the fan to the power supply and start it, verify the correct rotation direction and check the level of consumption (intensity A), which should be correct and equivalent to the nominal intensity of the motor. See instructions to change the rotation direction.

**WARNING**

Disconnect the electrical motor of the fan before checking or handling the equipment and wait until the propeller or turbine has stopped.

The risk of an explosive environment at work should be avoided at all times.

**NOTE**

The following must be verified after the first hour of operation:

- Motor consumption (A),
- fixing and tightening of fixing screws, and,
- tightening and alignment of transmission belts.

**3.4 Safety issues**

The fan is not a complex piece of equipment, therefore, its installation or application is generally not complicated.

However, the fans manufactured to work under potentially explosive environments require special attention. Said units must be installed and used by qualified personnel who understand the national safety regulations and legislation.

The safety equipment required to prevent accidents during installation and operation must be used, in accordance with local regulations.

**3.5 Important information**

- Do not rest or climb on the fan.
- The lifting eyebolts must only be used to lift the fan. Said eyebolts must not be used when the fan is fixed to other units.

## 4 SERVICING

### WARNING

The servicing activities will only be carried out after it has been turned off.

Fans have a functional design and robust construction. Therefore, they do not require much servicing activities for a correct operation.

The metallic parts are protected against rust with a rustproof paint finish (free from steel rust) and are dried at a temperature of 200°C in a furnace after the degreasing and phosphate coating process.

A series of external agents require the observance of a set of precautions to obtain the best performance of the rotating equipment.

### 4.1 Motor

The motor must be clean at all times, since large quantities of dust particles between the cooling fins or air inlets can overheat the motor.

The connections of the terminal box should be checked (in case they can be easily accessed) to verify the correct tension of the bolts and screws.

### 4.2 Propellers and turbines

The propellers and turbines are balanced dynamically in accordance with the following standard: ISO 1940-1 and quality level Q6,3.

A high level of vibration should be avoided at all times. The best method to define the variations encountered in the smooth operation of the equipment is the measurement of the mechanical vibrations in bearings and drive motors. The safest method to define the said vibrations is the comparison of values measured throughout a long period of time. If there is a big variation in the values, the possible causes should be studied, for example: dirt in the propeller or turbine. In this case, the said elements should be cleaned and the unit should be balanced again.

The propellers and turbines should be cleaned periodically, since the dust and residues deposited in its blades or fins decrease the performance and progressively unbalance the equipment, which affects the operation.

Check for any unwanted interference caused by dust or residues between the rotating element (propeller or turbine) and fixed or enveloping parts of the motor.

These operations must be carried out with the correct equipment. A standardised extraction device should be used to disassemble the propeller or turbine. Specific tools should be used to change bearings, ensuring the axis or bearing covers are not damaged.

### 4.3 Bearings

To avoid early faults and stops, each bearing should be checked regularly. Avoid the presence of unwanted elements, dirt and humidity.

In delicate machines, control the detection of noise and temperature increases, which might result in serious operation problems.

**WARNING**

Fans with a re-greasing system must include a warning label to inform potential users of the type of grease used when the machine is filled for the first time. The use of the same type of grease is recommended for subsequent maintenance lubrication activities.

**4.3.1 Constantly lubricated bearings**

Said bearings do not require further lubrication and are easily identified because they do not have any sort of greasing holes.

**4.3.2 Single block support with re-lubrication device**

Single block supports with re-lubrication devices (inlets at both sides of the support) include regulating disks which remove the old grease during the re-lubrication process, storing said grease in an interior section of the support. The temperature of the bearing support area increases during this process, due to accumulated grease. When excess grease has been removed through the regulating disk, the temperature will return to the normal operating temperature. Old grease can be removed throughout long periods of time with the replacement of bearings.

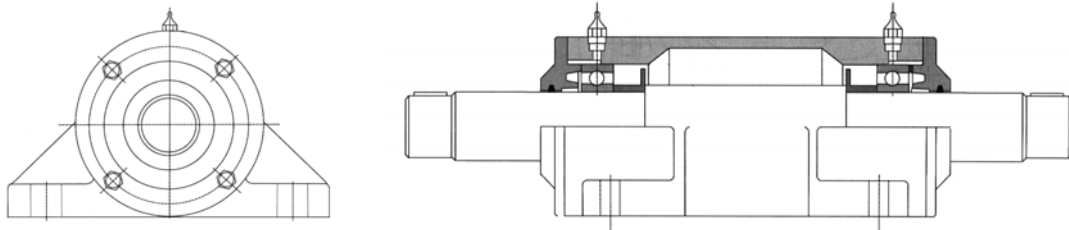


Fig.1

**4.3.3 Split foot support with re-lubrication device**

The bearing is supplied from the factory with an initial capacity of 2/3. The re-lubrication limit must be checked. Otherwise, excess grease will be present in the system and the temperature will increase above standard levels.

If the box is almost full after several re-lubrication procedures, change the grease. The top cover of the box has to be disassembled and the old grease is removed without damaging the bearing bodies. New grease will be pressed manually with a wooden spatula in the intermediate spaces of bearing bodies.

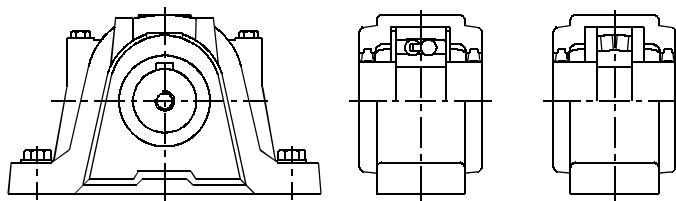


Fig.2

**NOTE**

Clean grease must be used with no unwanted elements or particles.

**4.4 Pulleys and belts**

**4.4.1 Pulley alignment**

We recommend revising the correct alignment and assembly of pulleys. Misaligned pulleys will have a shorter working life. The main misalignment causes are the following:

- Pulleys are not installed correctly in the axes.
- The axes, driving body and actuator are no parallel.
- Pulleys are tilted below the correct assembly parameters.

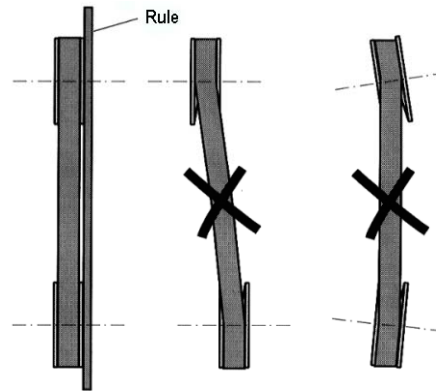


Fig.3

A rule is required to inspect the alignment. Align the rule along the outer face of both pulleys, as shown in the diagram. Misalignment will be shown in the form of a gap between the outer face and rule. This method is reliable when the distance between the outer face and the border of the gap is identical for both pulleys.

#### 4.4.2 Trapezoidal belt transmission

Pulleys are slackened after some time, especially during the first operating phase. Therefore, regular checkups and retightening procedures are required.

The "ideal" tension is the lowest tension with which the pulley does not slide through the transmission when operating at its full capacity. Excessive tension increases the load of bearings (with the danger of causing damage to the bearings), whereas a low tension will cause the belt to slip, creak and cause unwanted wear.

The belts can be tightened again with a parallel motor movement over the tightening rails or by lifting the motor support plate. The pulleys of the trapezoidal belt must be correctly aligned (See Pulley Alignment).

The correct tension of the trapezoidal belt will be calculated with the deflection stress and distance, with the help of a dynamometer or surface tension meter.

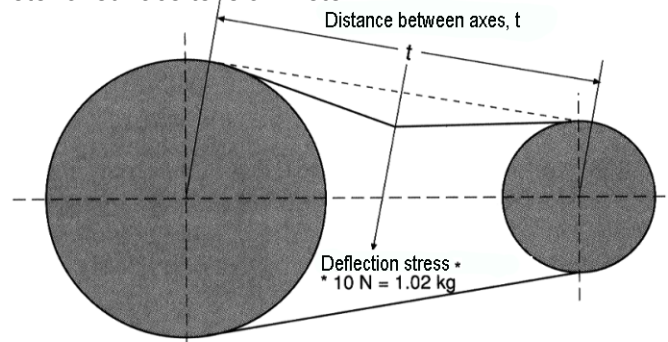


Fig.4

Change the belts in groups (with equal length) whenever required. Individual belts should not be changed. Belts should be firmly placed with no violent or forced actions, avoiding any damage to the belts.

#### 4.4.3 Trapezoidal belt tightening

New belts should be adjusted during the commissioning phase with a deflection stress of 1/3 above the maximum recommended stress, frequently revising the tension after the initial period. Subsequent tightening procedures should observe the values included in Table 2.

Procedure:

- Measure the tightening length (see the t distance in Fig.4).
- Place the surface tension meter perpendicularly in the centre of the tension length, as shown in Fig 5. Firmly tighten to bend the belt 1 mm for every 100 mm of tension length. Read the bending distance from the top part of the belt, with a rule above the belts to ensure accurate readings.

- The deflection stress exerted must be within the recommended values shown in Table 2, if the values are below the minimum deflection stress, tighten the belts. If the values exceed the maximum deflection stress, the system is too tight and the belts must be loosened.

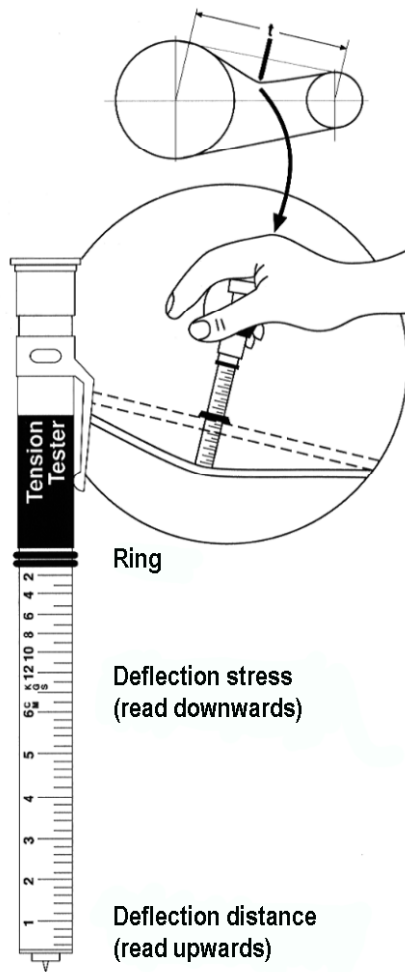


Fig.5

Profile	Diameter of the minor pulley (mm)	Recommended deflection stress <sup>(1)</sup> (N)	
		minimum	maximum
XPZ	56 - 63	7	11
	60 - 63	8	13
	67 - 71	9	14
	75 - 80	10	15
	85 - 95	11	16
	100 - 125	13	19
XPA	132 - 180	16	24
	80 - 125	18	27
XPA	132 - 200	22	31
	XPB	112 - 118	24
125 - 140		27	41
150 - 170		30	47
180 - 200		36	53
212 - 280		38	55
300 - 400		41	64
SPZ	56 - 67	7	10
	75 - 71	8	11
	75 - 80	9	13
	85 - 95	10	15
	100 - 125	12	17
SPA	132 - 180	13	19
	80 - 95	12	16
	100 - 125	14	21
	132 - 200	19	28
SPB	212 - 250	20	30
	112 - 150	23	36
	160 - 200	29	44
SPB	212 - 280	36	50
	300 - 400	38	58
	SPC	180 - 236	40
250 - 355		51	75
375 - 530		60	90

Table 2

- We recommend the following tightening intervals:
  - 1<sup>st</sup> test: 2 to 3 hours after start-up.
  - 2<sup>nd</sup> test: 8 to 12 hours after start-up.
  - 3<sup>rd</sup> test: 1 week after start-up, and subsequent tests, depending on the operating conditions.

#### 4.5 Spare parts

The following steps will be taken into account when a part has to be replaced:

- a. Standardised parts: purchased in specialised shops, taking into account the references, characteristics and dimensions.
- b. Spare parts: supplied upon request.
- c. When the fan is assembled, follow the same procedures and instructions described in the installation section.

#### NOTE

The engineering department of SODECA will answer all of your questions related to the installation.

<sup>(1)</sup> These recommendations are valid for normal applications