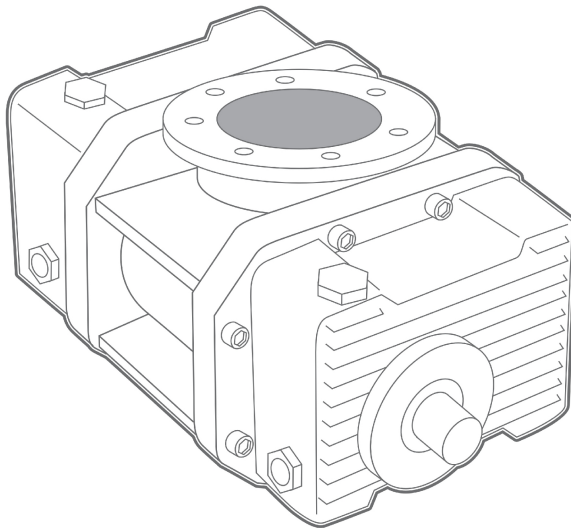




Technical Manual

ROTARY LOBES
SEM | SEM.BV | PRD



WARNING

1. Do not bang or drop during transport, with or without packaging.
2. Read the “technical manual” before installing and starting up the equipment.
3. The blower is not supplied with oil. Fill both the av+ar oil pans up to the middle of the sight glass before start-up.

EN

ORIGINAL MANUAL
MT-ER-SEM-EN

Revision 10
March 2023

WARNING

DO NOT BANG OR DROP DURING TRANSPORT, WITH OR WITHOUT PACKAGING.



READ THE “TECHNICAL MANUAL” BEFORE INSTALLING AND STARTING UP THE EQUIPMENT.

THE BLOWER IS NOT SUPPLIED WITH OIL. FILL BOTH THE AV+AR OIL PANS UP TO THE MIDDLE OF THE SIGHT GLASS BEFORE START-UP.

CAUTION



Stick the machine’s nameplate label on this page.

**PEGATINA DE
IDENTIFICACIÓN DE
LA MÁQUINA**



1.	GENERAL	1
1.1	GENERAL INTRODUCTION.....	1
1.2	COPYRIGHT.....	2
1.3	MACHINE IDENTIFICATION NAMEPLATE.....	2
1.4	AFTERSALES SERVICE	3
1.5	TERMS AND CONDITIONS	3
1.5.1	Warranty period	3
1.5.2	Disclaimer of Warranties.....	4
1.5.3	ATEX Equipment	4
1.5.4	Limitation of Liability	5
1.6	PERSONNEL TRAINING	5
1.7	USING THIS MANUAL	5
1.7.1	Abbreviations	6
1.7.2	Warning and Safety Indications	6
1.7.3	Illustrations	7
2.	SAFETY	8
2.1	SAFETY INSTRUCTIONS.....	8
2.1.1	General Safety Instructions	8
2.1.2	Safety Instructions for Machine Operation	9
2.1.3	Additional Instructions.....	11
2.2	EQUIPMENT FOR PERSONAL SAFETY	13
2.3	PERSONNEL TRAINING	16
2.4	SAFETY WITH CONSUMABLES	16
2.4.1	Used Oils.....	17
2.4.2	End of the Equipment Service life.....	17
3.	TECHNICAL SPECIFICATIONS.....	18
3.1	MACHINE IDENTIFICATION	18
3.2	MACHINE TECHNICAL SPECIFICATIONS.....	19
4.	DESCRIPTION AND MAINTENANCE	20
4.1	GENERAL DESCRIPTION	20
4.2	BLOWER GROUP AND EQUIPMENT COMPONENTS	21
4.2.1	Silencer Suction Filter	22
4.2.2	Blower Core.....	22
4.2.3	Transmission	25
4.2.4	Motor Drive.....	26
4.2.5	Silencer Discharge Bench	27



4.2.6 Pressure Valve/Vacuum Valve27

4.2.7 Flexible Sleeve30

4.2.8 Check Valve31

4.2.9 Unloading Starting Relief Valve33

4.2.10 Flexible Supports35

4.2.11 Clogging Detector35

4.2.12 Oil Level Indicator35

4.2.13 Manometer36

4.2.14 Sound Proofing Systems36

4.2.15 Cleaning System39

4.3 APPLICATIONS, USES AND REMAINING RISKS40

4.3.1 Applications40

4.3.2 Reasonably Predictable Misuse41

4.3.3 Remaining Risks42

5. INSTALLATION, COMMISSIONING AND OPERATION..... 43

5.1 GENERAL NOTES ON DELIVERY44

5.2 TRANSPORT AND HANDLING45

5.3 STORAGE46

5.4 SITE47

5.5 FOUNDATIONS AND FIXINGS47

5.6 ASSEMBLY48

5.7 ALIGNMENT AND TENSING OF PULLEYS AND BELTS51

5.7.1 Alignment and Tensing of Pulleys51

5.7.2 Tensing of Belts53

5.8 START-UP56

5.9 UNITS EQUIPPED WITH FREQUENCY CONVERTER58

6. MAINTENANCE AND INSPECTION 59

6.1 MAINTENANCE CONSIDERATIONS.....59

6.2 BASIC ROUTINE MAINTENANCE OPERATION FOR UNIT MAINTENANCE60

6.3 MAINTENANCE PLAN61

6.3.1 Maintenance Programme Standard61

6.3.2 Maintenance Programme High Temperatures (Temp. of Impulsed Fluid>85°C)
63

6.3.3 Maintenance Programme Highly Corrosive Fluids.....65

6.4 MAINTENANCE OPERATIONS67

6.4.1 Inspection, Cleaning and Change of Filter67

6.4.2 Clogging Detector68

6.4.3 Inside Cleaning of Blower Core68



6.4.4	Lubrication	71
6.5	PROLONGED PERIOD SHUTDOWN MAINTENANCE	78
7.	TROUBLESHOOTING	80
8.	ANNEXES	83
8.1	ELECTRIC MOTORS	83
8.1.1	Blower Starting Torque	84
8.2	ELECTRICAL SCHEMES	85
8.3	ASSEMBLY OF STANDARD SOUNDPROOFING CABIN DN 250-DN 300	86
8.4	ASSEMBLY OF ATEX SOUNDPROOFING CABIN DN 250-DN 300	89



1. GENERAL

1.1 GENERAL INTRODUCTION

This manual is related to the following machine: SEM rotary piston blower/depressor machine, manufactured by MAPNER.

Business name: MAQUINAS PNEUMATICAS ROTATIVAS XXI S.L.U. - NIF: B-75139675.

Address: Polígono Industrial Zamoka Oialume Bidea 21 20115 Astigarraga Guipúzcoa España.

This manual has been developed to warranty that personnel who are going to work with the machine have the complete instructions for using it correctly and preserving it

Therefore, this manual is intended for users and those responsible for the maintenance of the machine.

This copy is only valid for the machine which has been delivered with.

This manual is composed of 8 chapters in which the reader will find an overview of the machine, operating instructions and details of its components.

It features a chapter on Safety which contains all the rules to follow and warnings to keep in mind during assembly, transport and commissioning of the machine, along with a description of its security systems that work during operation.

Also, the manual shows detailed instructions for the emplacement, operation and maintenance of the machine, providing the operator and maintenance service with extensive information.

Lists of spare parts are included, indicating location and reference.

1.2 COPYRIGHT

This manual is property of:

MÁQUINAS PNEUMATICAS ROTATIVAS XXI S.L.U.

This manual is intended for the exclusive use of its customers or distributors and should not be transmitted to third parties without permission.

It is strictly prohibited to:

-) Reproduce
-) Disseminate
-) Divulge

Any of the documents included in this manual either in part or in their entirety, without the prior authorization from this company.

Due to continuous improvement and after a constant search for innovation and technological quality, this "technical Manual" is subject to revision. The latest version is available on the website www.mapner.com.

1.3 MACHINE IDENTIFICATION NAMEPLATE

CAUTION



The machine nameplate identification sticker must be attached to the first page, behind the cover of this manual.



1.4 AFTERSALES SERVICE

In case of this Manual has not enough information to solve problems, there is available for the client an Aftersales Technical Service, and all the special advice needed.

MAPNER (MAQUINAS PNEUMATICAS ROTATIVAS XXI S.L.U.)

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Polígono Industrial Zamoka - Oialume Bidea 21. 20115, Gipuzkoa. España, Europa

E-mail: soporte@mapner.com – Web page: www.mapner.com

1.5 TERMS AND CONDITIONS

The equipment manufactured by MAPNER is delivered to its customers after a rigorous verification of all its components, relevant tests and satisfactory tests of operation.

The warranty covers breakdowns caused by manufacturing or design defects, not including elements of normal wear. This guarantee obliges the replacement of the damaged part without charge, but does not include the labor necessary for its placement or the travel expenses that will be invoiced. The operation of the equipment must be done under the strict indications of the instruction manual that is delivered with it.

1.5.1 Warranty period

The warranty is established for a period of 12 months from the date of departure from our factory based on the following conditions:

1. MAPNER declines all responsibility and cancels the right to the warranty for any equipment whose operating conditions do not conform to those indicated in the contract / purchase and sale order and indicated on the accompanying feature plate. In the same way, it cancels the right to the guarantee if the equipment has been totally or partially dismantled without prior written authorization from MAPNER. MAPNER equipment is designed and manufactured to work with gaseous fluids.
2. MAPNER will not cover the guarantee of any incident arising from the entry of liquid fluids or solid bodies of any kind (water, condensates or any other non-gaseous fluid, dust or dirt).
3. The equipment must be sent to our factory along with the delivery note or the purchase invoice. The costs of shipping and those derived from its return to the customer will be assumed by him.

4. The customer undertakes to provide MAPNER with all the information necessary for a correct analysis of the incident, otherwise the manufacturer will have the right not to apply the guarantee. The client will inform in writing and in the shortest possible time of any dysfunction found, thus avoiding that the detected incidence is aggravated.
5. The customer shall not be entitled to postpone or delay any payment or to cancel any contract as a result of these defects. MAPNER will not assume any responsibility under the terms of this guarantee in case there is any outstanding payment related to the supply.
6. While the repair lasts, the warranty periods are suspended until the product is delivered. The guarantee does not have a new term, but the remaining term that remains to be fulfilled is activated.

1.5.2 Disclaimer of Warranties

7. Incorrect connections - inadequate power supply - unconnected protective elements - Corrosion of any kind - Lack or deficiencies of lubrication - Unauthorized repairs or modifications. · Accidental or intentional damage · Damage caused by natural phenomena or any vandalism that affects the equipment, will be outside the warranty.

1.5.3 ATEX Equipment

8. The repair or handling of ATEX equipment - intended for work in potentially explosive atmospheres - by personnel not expressly authorized by MAPNER is totally prohibited.
9. In the same way, it is forbidden to operate under conditions other than those indicated on the nameplate that accompanies the equipment and the non-strict following of the maintenance manual.
10. Failure to comply with the above will mean for the equipment the automatic loss of its ATEX certification, eliminating in case of incident all responsibility of the manufacturer.



1.5.4 Limitation of Liability

11. MAPNER's liability will in any case be limited to 100% of the amount of the material affected. MAPNER shall not be liable for indirect and consequential damages such as, but not limited to, business interruption, loss of profits, profits, contracts and/or production.

1.6 PERSONNEL TRAINING

The machine operator and the maintenance personnel must have a complete knowledge of its operation. In addition, the staff should be able to properly perform maintenance on the machine, in order to extend its life and increase the productivity by avoiding unnecessary stops.

Maintenance personnel of the machine must have accurate knowledge of mechanics, pneumatics, electricity, etc. to develop the maintenance and repair works. To this end, this staff must study the plans, schemes and documentation supplied with the machine, and what is indicated in this manual.

The staff must also learn about the operation of the whole machine unit.

1.7 USING THIS MANUAL

This manual, along its 8 chapters provides the information necessary for the maintenance of the SEM rotary piston blower/depressor machine.

Every page contains, in its header and footer, the information related to the machine type, chapter number, revision number and page number.

1.7.1 Abbreviations

Subsequently there is an explanation of the abbreviations used in this Manual:

SEM - Rotary Piston Blowers

SEM.BV. - Rotary Piston Vacuum Pump

GCA – Compact Group on Silent Bedplate

GC – Compact Group on Profile Bedplate

ARV – Compact Group, Driveshaft via Direct Drive or Reducer

AV – Side of the Blower where the transmission is located

AR – Rear side of the Blower

1.7.2 Warning and Safety Indications

All the indications in this manual that are accompanied by the following symbols are intended to emphasize important and relevant instructions with regard to safety of the machine, the operator or even the environment.

The definition of the above indications is:

WARNING



IF THIS WARNING IS NOT OBSERVED OR THE INSTRUCTIONS IT CONTAINS ARE NOT FOLLOWED CORRECTLY SERIOUS, EVEN FATAL, PERSONAL INJURY COULD BE CAUSED.

CAUTION



If this indication is not observed, or if the instructions featured therein are not correctly performed, machine components could suffer damage and/or destruction.

ENVIRONMENT



Description of procedures and features in which it is advised to consider the possible environment implications of certain actions or elections, mainly in the usage of products.

NOTE



This is information / an indication with which it is recommended to comply.

1.7.3 Illustrations

Throughout the manual, certain descriptions and lists are accompanied by illustrations or photographs of machine parts, and by diagrams. The drawings and diagrams of components and groups in this manual may be shown partially without their dimensions and in a simplified format. They are merely of an informative nature and have no contractual validity.

2. SAFETY

2.1 SAFETY INSTRUCTIONS

Every MAPNER machine has been manufactured in accordance with safety standards in design, manufacture and installation to avoid accidents during operation; however caution should be taken and some safety instructions should be observed.

These instructions should be used to supplement the accident prevention regulations applicable in each country or in the workshop.

2.1.1 General Safety Instructions

In conjunction with this instruction manual, general binding regulations should be observed and taken into account, as well as legal regulations and other measures to prevent accidents and to protect the environment.

WARNING



READ THE SERVICE INSTRUCTIONS MANUAL CAREFULLY BEFORE COMMISSIONING THE EQUIPMENT.

MANUFACTURER INSTRUCTIONS AND PREVENTION & SAFETY REGULATIONS INDICATED IN THE CURRENT LEGISLATION MUST BE STRICTLY FULFILLED.

WARNING



COMMISSIONING, HANDLING AND MAINTENANCE OF THE MACHINE MUST ONLY BE CARRIED OUT BY QUALIFIED PERSONNEL WITH EXPERIENCE OF BLOWER EQUIPMENT AND COMPONENTS.

WARNING



MACHINE ELEVATING OPERATIONS MUST BE CARRIED OUT ACCORDING TO THE APPLICABLE NATIONAL LAWS AND REGULATIONS.

2.1.2 Safety Instructions for Machine Operation

WARNING

THE USER MUST ENSURE THAT THE PERSONNEL WORKING ON THE MACHINE COMPLY WITH THE REGULATIONS AND THAT THEY DO NOT USE ANY TYPE OF WORK THAT AFFECTS SAFETY.

WARNING

THIS BLOWER MACHINE COMPLIES WITH EUROPEAN SAFETY STANDARDS. BECAUSE ACCIDENT RISKS EXIST, PLEASE FOLLOW THE FOLLOWING SAFETY WARNING INSTRUCTIONS SCRUPULOUSLY.

-)] Keep the body and clothing away from rotating elements, as well as from suction and discharge orifices.
-)] Ensure that the unit is correctly earthed.
-)] Before commissioning blower equipment fitted with a soundproofed cabin, completely close all panels or doors, as applicable. The cabin may only be opened when the equipment has been completely switched off and the start-up system locked against accidental connection.
-)] Do not let unauthorized or unqualified personnel make unacceptable modifications or repairs to the blower equipment (ref. point 1.6).
-)] On completion of any handling and servicing operations, before the start up, re-install all the protection and safety features originally supplied with the equipment. Additionally check the correct closing of the soundproofing cabin, if applicable.
-)] Service conditions must be kept within project operating parameters.
-)] Never work with the blower/depressor out of the limits of the foreseen service conditions.
-)] Ensure that all safety and control elements are correctly assembled and connected.
-)] Safety and protection devices cannot be removed when the machine is in operation.



- ⌋ Instruction and Safety Manuals of the accessories supplied with the blower/depressor must be considered and respected.
- ⌋ Before carrying out any operation using the equipment, stop the machine and disconnect the motor from the electric power supply. The equipment should also be isolated from the rest of the installation by means of the isolating valves.
- ⌋ The cleaning and degreasing of the machine must be carried out once the machine is totally cold and with non toxic liquids or mixtures. Some of these fluids could react violently with high temperatures.
- ⌋ The soundproofing cabin also acts as protection element, never open it while the machine is working, or allow unauthorized personnel access to the opening tools.
- ⌋ Do not start the machine up with the inlet and discharge orifices open, as danger can be created in the surrounding area.
- ⌋ In case that the supply solely includes the bare shaft, this manual includes the risks from the moment of its assembly in the blower group. It should be taken into account the trapping risks when manipulating the bare shaft during assembly operations.
- ⌋ When making the assembly of the equipment together with other machines to build a new machine or a joint of machines that work as a unit, its control category must be respected according to the risk evaluation of the group.
- ⌋ In any case, the control system must be at least PL c s/EN ISO 13849-1, and access to potential entrapment points must be prevented with safety systems (microswitches, etc.) conforming to said category.
- ⌋ The Emergency Stop system must be category 0 s/EN 60204-1, unless the equipment final design could justify a different category. To complete this information consult the instructions of the electric supplier or installer.
- ⌋ If the installation of a frequency converter is required, it must be communicated before the purchase of the electric motor.
- ⌋ Do not modify any part of the machine, any of its working conditions and always use spare parts or materials supplied by MAPNER.

2.1.3 Additional Instructions

In compliance with the Directive ATEX 2014/34/UE (Potentially Explosive Atmospheres), additional safety instructions are indicated to complete the general safety recommendations contained in the manual.



Figure 1. ATEX Certification and Potentially Explosive Atmosphere Indications.

WARNING



READ VERY CAREFULLY NEXT WARNINGS:

- ⌋ The equipment working in ATEX conditions must fulfil the characteristics included in the certification dossier under the custody of LABORATORIO OFICIAL J.M. MANDARIAGA.
- ⌋ ATEX certified equipment cannot conduct, in any case, potentially explosive atmospheres, whether they are caused by gas or by dust. (There is no explosive atmosphere, if there is not a mixture of an inflammable gas with Oxygen).
- ⌋ The equipment is intended to be used in a surrounding ATEX explosive atmosphere, but it is not designed to carry an explosive atmosphere inside.
- ⌋ Check and make sure the Ex classification of the machine working area is consistent with the category of the blower unit as stated on the relevant declaration or certificate. The end user has to determine the classification of said area before when placing the order.



-) Do not use the equipment without checking the estanqueity of the elements and the correct conduction of gases, to avoid the mixture between flammable gases and air, or other dangerous mixtures.
-) Before undertaking any work on or disassembly of the blower and ancillary equipment that make up the unit, allow it to cool down and to release all gas build-up from the circuit, and be alert to the possible formation of gas pockets. Equipment disassembling must be done by MAPNER's technical personnel.
-) Any repair or manipulation of ATEX equipment by personnel not authorized by MAPNER will mean the loss of the ATEX certification of the machine, and eliminates the responsibility of the manufacturer in the event of an incident.
-) To avoid damaging the gaskets present in the blower unit, do not use aggressive products to clean the different components.
-) Always use a temperature switch to limit the maximum operating temperature, see technical file of the equipment or contact MAPNER. Check the correct regulation of the Thermostat with respect to the required thermal class.
-) The equipment could generate hot points, so it must always be used with adequate thermal control, automatic disconnection must be programmed in case of temperature increase. The temperature control must comply with the ATEX II b1 s/EN 13463-6 requirements as a minimum to ensure control of the ignition source. Verify the correct regulation of the thermal control with respect to the required thermal class.
-) Before initial start-up, after a prolonged stop, breakdown or after carrying out maintenance on an ATEX unit, the inerting operation must be carried out inside the unit and its accessories before starting it up.

CAUTION



Read carefully next security cautions.

- J If you need to replace any parts of the machine, always use MAPNER original spares.
- J Avoid installing the blower unit in premises prone to dust concentration, where dust may pile up on the machine.
- J Check the inlet filter for good working condition, cleanness, and correct installation.
- J Under no circumstances shall the original operating parameters of the blower (inlet temperature, fluid composition, differential pressure, blower speed, etc.) be changed without MAPNER's previous approval in writing.
- J Test the pressure control valve and the safety elements (Thermostat, Pressure...) switch to verify that they work properly.
- J Check and suppress all stress and/or overload that the pipes connected to the inlet and discharge flanges may transmit to the blower unit.
- J Make sure the electric drive motors and the control and safety devices meet the requirements for the specified category of equipment with regard to the classification of the working area.
- J Do not use frequency inverters without verifying their compatibility with the motor in relation to the ATEX marking.
- J In equipment with ATEX classification, for safety reasons, always use original spare parts supplied by MAPNER.

2.2 EQUIPMENT FOR PERSONAL SAFETY

Maintenance personnel must use suitable clothing to avoid accidents. In particular, do not use ties, rings or chains that could get caught in moving parts of the machine. Long hair should be properly collected.

Avoid wearing loose garments when close to the machine in operation.

WARNING

THE SURFACE OF THE BLOWER CORE AND ELEMENTS LOCATED IN THE FLUID FLOW CAN REACH TEMPERATURES ABOVE 70°C. AFTER STOPPING THE MACHINE, WAIT UNTIL THEY HAVE COOLED DOWN.

WARNING

WHEN WORKING NEAR THE MACHINE, ESPECIALLY IN THE ABSENCE OF A SOUNDPROOFED CABIN, EAR PROTECTORS MUST BE USED.

When working near the machine, it must be considered that the Standard MAPNER equipment in normal working conditions overpass the acoustic pressure of 70 dB(A), and in some demanding conditions this value could reach the 110 dB (A) or even higher values. The mentioned valued must be taken into account together with the applicable legislation in order to select the necessary prevention and security actions for the personal that could be exposed to this sound level. The concrete real sound level value for each machine will be included in its technical offer. (*Acoustic Pressure Value, according ISO 2151:2004 \pm 2dB(A)).

Reference legislation: Directive 2003/10/EC of the European Parliament and of the Council of 6 February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise).

MAPNER is able to offer soundproofing elements to be installed together with the machine with the objective to reduce the produced sound level.

Indirect sources of noise that may exist in the facility and that could amplify the noise generated by the blower / depressants should also be taken into account.

In order to carry out the maintenance tasks safely, the equipment included in the risk assessment of the customer's plant must be used, as basic recommendation the following clothing could be indicated:






EQUIPMENT		UTILIZATION
Footwear		<p>Must be safety shoes with reinforced toe.</p> <p>If not used properly can result in feet crushing.</p>
Gloves		<p>Must be suitable for every type of work, such as work with sharp-edged items.</p> <p>Do not use gloves under warning of snagging.</p>
Helmet		<p>For works in which there is warning of head injuries, especially in assemblies or disassemblies, and in movement of heavy elements by means of a crane.</p>
Workwear		<p>For every work, the most appropriate clothing must be worn, avoiding garments that can generate a warning, such as snagging on mobile elements, being flammable, being uncomfortable to perform the required tasks, etc.</p>
Ear protection		<p>Earplugs or safety headphones can be used against the noise from the machine or its maintenance tasks.</p>

Table1 Equipment for Personal Safety.

2.3 PERSONNEL TRAINING

Only trained personnel should be employed and trained both in usage and in maintenance of the machine.

The responsibilities of the staff for installation, operation, and maintenance of the machine must be set out clearly. Thus, it must also be ensured that only the staff trained for each purpose can act on the machine.

Maintenance personnel of the machine must have accurate knowledge of mechanics, pneumatics, electricity, etc. to develop the maintenance and repair works. In addition, they must first be trained in the operation of the machine, its different parts and regular maintenance and common faults. This staff must study the plans, schemes and documentation supplied with the machine, and what is indicated in this manual.

A machine responsible must be designated, even for legal requirements, and he must have the capability to deny actions that compromise safety to third parties.

2.4 SAFETY WITH CONSUMABLES

Oils, greases, fluids and other chemicals used in the machine must meet legal regulations for environmental protection.

ENVIRONMENT



Produced waste can lead to environmental problems and must be managed correctly in accordance to local regulations.

2.4.1 Used Oils

Any industrial oil or lubricating substance, with mineral or synthetic base, is considered used oil when it has become unusable for its initial purpose.

ENVIRONMENT



Always store used oil in good condition, avoiding mixing with other waste, as well as with water or other oily waste.

ENVIRONMENT



Used oil must be stored in facilities that enable good and safety conservation until collection by the appropriate authorized agent.

2.4.2 End of the Equipment Service life

ENVIRONMENT



Once the equipment reaches the end of its service life it must be removed and managed in accordance with the valid legislation of the country where the withdrawal is made.

MAPNER guarantees that the composition of the equipment is 99% of the recoverable metallic materials and 1% of inert materials. In the case of bare shafts and benches it is 100% of recoverable metallic materials.

In any case, these components do not interact and do not harm the environment where the activity is generated.

A Certificate of Recyclability could be issued in case it is required by customer.

3. TECHNICAL SPECIFICATIONS

3.1 MACHINE IDENTIFICATION

CAUTION



For any correspondence, please always refer to the type and the machine Serial Number which are located on the Nameplate, or in label in section 1.3 of this Manual.

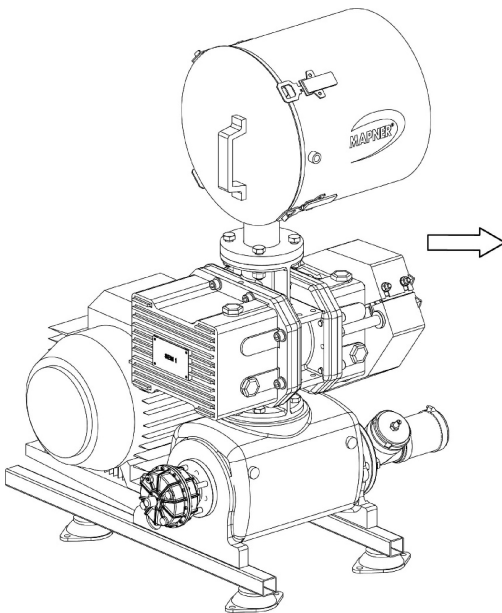


Figure 2. Machine Identification Nameplate

CAUTION



The nameplate and warning plates on the machine must never be removed.

If the nameplate is damaged or illegible, please ask MAPNER for replacement.



3.2 MACHINE TECHNICAL SPECIFICATIONS

TYPE	SEM (Rotatory Piston Blowers/Depressors)
Operations:	Suction and discharge of gaseous fluids
Suction pressure:	(see machine nameplate)
Discharge pressure:	(see machine nameplate)
Rotation speed:	(see machine nameplate)
Differential pressure:	(see machine nameplate)
Motor power:	(see machine nameplate)
Noise emission:	> 70 dB
Machine dimensions	(see dimensions drawing)

Table 2 Machine Technical Specifications.

4. DESCRIPTION AND MAINTENANCE

4.1 GENERAL DESCRIPTION

The rotary piston blower is basically made up of a stator inside which two symmetrical pistons are lodged in the form of a three-toothed gear and which rotate in opposite directions at a uniform speed.

The blower is designed to work with gaseous fluids, liquid fluid ingress is not allowed.

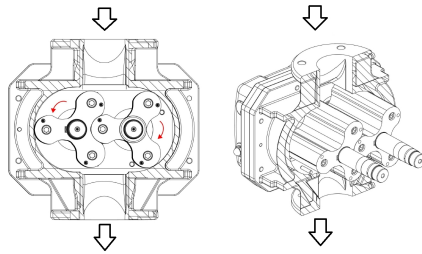


Figure 3. Blower Working.

The fluid to be conducted enters the chamber formed by the stator and pistons which rotate and therefore move it to the compression nozzle.

NOTE



The absence of friction between pistons means that it is not necessary to lubricate the compression chambers, which permits the delivery of completely oil free air. This is one of the main advantages and the most estimable feature in chemical processes, as well as in applications which require a minimum degree of pollution.

A drawing with the main parts of the blower is included next:

NOTE



The following image is for guidance only and might undergo variations from its initial configuration in any of its parts.

4.2 BLOWER GROUP AND EQUIPMENT COMPONENTS

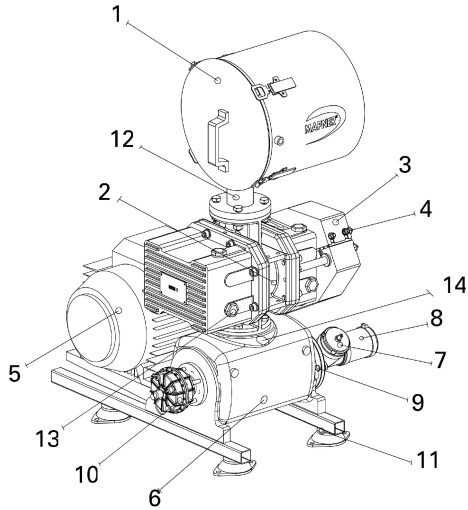


Figure 4. Blower Main Components.

1	Silencer suction filter	8	Flexible sleeve
2	Blower core	9	Anti-return valve
3	Transmission: Pulleys and Belts	10	Unloading valve
4	Transmission Protection	11	Flexible supports
5	Drive motor	12	Silting detector
6	Impulsion bedframe silencer	13	Oil level indicator
7	Pressure valve	14	Manometer

Table 3 Blower Group main Components.

4.2.1 Silencer Suction Filter

The GCA blower group includes a combination of filter and silencer and it is directly mounted on the blower core inlet flange.

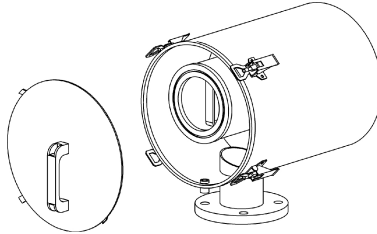


Figure 5. Silencer Suction Filter.

The cleaning and replacement of the filter element can be done easily.

In case of the SEM groups working in ATEX classified zones, suction filters are watertight, and the closure is made by gaskets and screws.

4.2.2 Blower Core

It is the main part of the group, where the rotary pistons are located.

The stator that forms the centre housing and the base that is friction bearing are made of high quality cast iron.

The external ribs are conveniently distributed so they prevent any structural deformation of the core blower, keeping the most demanding service conditions.

The machining of the components is carried out with great precision, to meet the tight tolerance, essential condition for maximum volumetric efficiency of the equipment.

The proper dynamic balancing of the part formed by piston and shaft allows reaching high rotation speeds.

Lubrication of the rotating elements is made by bubbling oil. In special cases it incorporates a lubrication injection.

Under normal conditions where the discharge temperature does not exceed 135°C, cooling by radiation is sufficient. In the case of extreme temperature and special conditions an additional cooling system must be added.

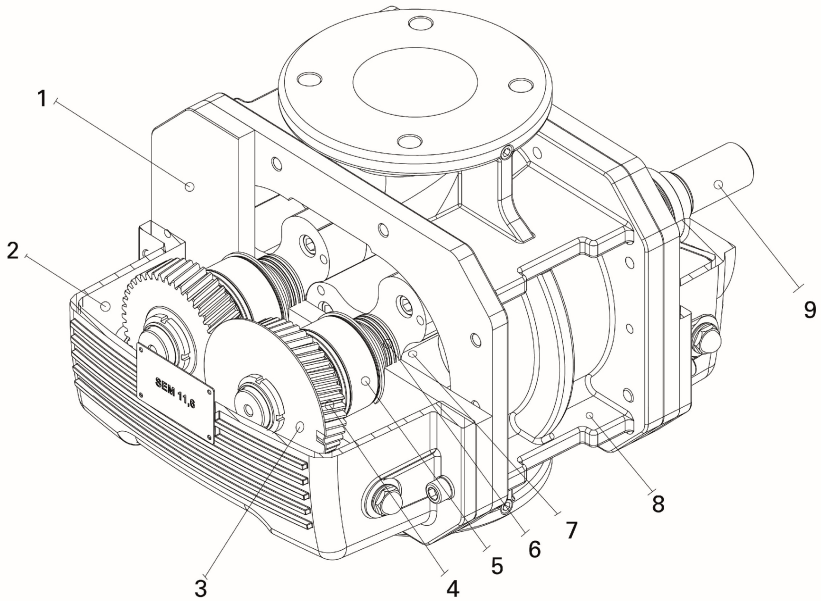


Figure 6. Components of the Core Blower.

1	Base	6	Segment
2	Cover	7	Piston
3	Lubrication gear	8	Stator
4	Gear	9	Shaft
5	Bearing	-	-

Table 4 Components of the Core Blower.

4.2.2.1 SYNCHRONIZATION GEARS

The gear couple is composed by DIN.867-6.1 tempered and rectified enveloping helical teathed gears which ensures a smooth operation, minimizing the friction and consequently the mechanical power absorbed.

Depending on the size of the machine, the fixing of the gears on the shaft is made by means of conical expandable elements or by hydraulic pressure, ensuring a perfect lock in any case.

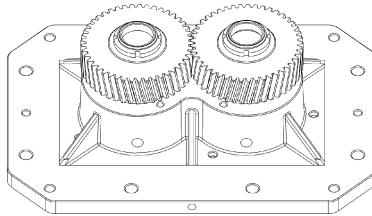


Figure 7. Synchronization Gears.

4.2.2.2 SEALING ELEMENTS

The integrated mechanical labyrinths seals and segments allow the isolation of the fluid chamber from the components of lubrication, avoiding any possibility of contamination of the conveyed fluid.

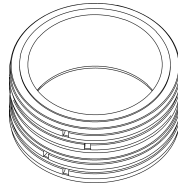


Figure 8. Labyrinths Seals and Segments.

The sealing of the free shaft is made by a rubbing lip seal on a detachable rectified bushing.

For specific fluids or gases, mechanical and special seals are used.

4.2.3 Transmission

Transmission of the GCA compact units is performed with pulleys and belts with an automatic tensioning device, which keeps constant belt tension and reduces the radial stress of the bearings.

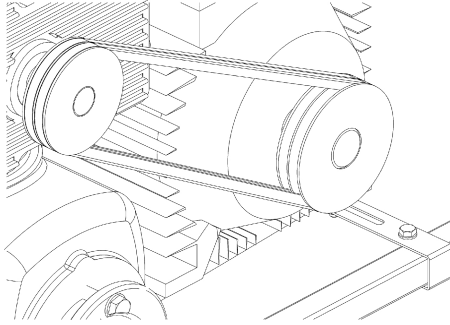


Figure 9. Transmission by Pulleys and Belts.

In the GC version, the transmission is also made through belts and pulleys, and the tensioning is done by means of slide rails.

The operation of the ARV groups is performed through flexible coupling or gearbox.

4.2.3.1 PROTECTION OF THE TRANSMISSION

On machines without soundproofing cabin the protection of the transmission is made by a metallic cover that covers the moving parts.

On machines with soundproofing cabin, this cabin carries out the protection of the transmission.

4.2.4 Motor Drive

For the driving, three phase electric motors are used, manufactured according to IEC standard. The other standards motors are often constructed according to B.3. and the standard protection is IP.55.

Electric motors with squirrel cage selected in the data table are valid for the following operating conditions:

-) Altitude above sea level ≤ 1000 m.
-) Room temperature ≤ 40 °C.

The starting current of the squirrel cage motor can reach a value of 6-7 times the rated current depending on the power.

On different conditions, correction coefficients must be applied after asking the motor manufacturer.

NOTE



Refer to Chapter 8 Annexes and Electric Motors and electric schemes and the Instruction Manual of Motor manufacturer.

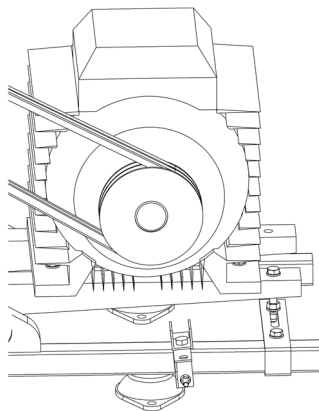


Figure 10. Drive Motor.

4.2.5 Silencer Discharge Bench

In GCA compact units, a reactive anti-pulsating all-metal and organic base silencer comprises the core support.

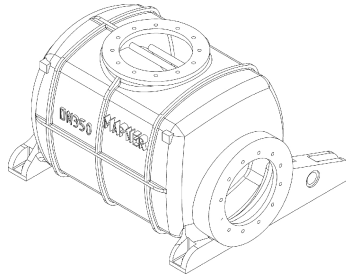


Figure 11. Silencer Discharge GCA.

The GC/ARV group is equipped with a tubular reactive-absorbent frame independent silencer. For vacuum working units and additional silencer is added in the discharge.

4.2.6 Pressure Valve/Vacuum Valve

This valve allows the evacuation of pressurized fluid overcoming the preset value of differential pressure.

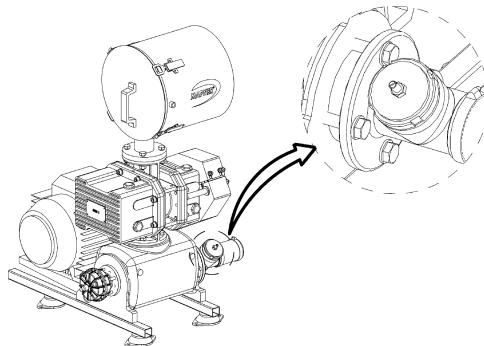


Figure 12. Safety Valve.

According to the blower size, operating conditions and type of transported fluid, an adequate pressure/vacuum valve has to be installed to protect the equipment from possible overloads.

CAUTION

This valve must not be used as a regulating device.

CAUTION

Clean the inset point area thoroughly and avoid stresses which may lead to the deformation of the valve components.

VN and BP valves are supplied as factory-preset. However, we recommend performing a final adjustment for the actual operating conditions after start-up. At the end notify MAPNER with the final regulation value.

If gas is the transported fluid, use valves with piped exhaust, calibrated and sealed depending on the required pressure. In this case alternatively electrical pressure switches could be installed.

In machines equipped with soundproofing cabin, the valve outlet is conducted to the outside by a flexible pipe.

CAUTION

Periodically check the correct operation of the relieve valves. These valves never must leak, in case that it occurs; it means that there is an incident that must be solved immediately.

PRESSURE OPERATION

OPERATION IN DEPRESSION

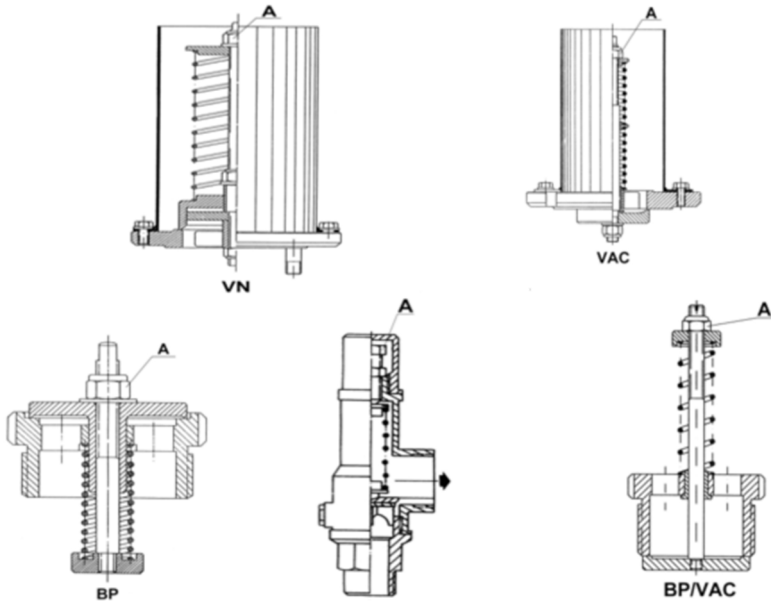


Figure 13. Safety Valve Operation.

Vacuum blowers are protected by means of VAC-BP/VAC vacuum-limiting valves. Vacuum valves are mounted on the equipment aspiration side and its function is to allow the entry of air to make the aspiration vacuum value could decrease when the maximum vacuum value is exceeded.

Readjusting or adapting the triggering value to the operating pressure is achieved by turning the regulating nut (A). Tighten the nut to increase the triggering pressure or loosen the nut to decrease the pressure.

The safety valve setting shall be 5% greater than the rated working pressure.

WARNING

WHEN CALIBRATING THE SAFETY VALVE, DO NOT INTRODUCE FINGERS OR OTHER OBJECTS INTO THE THREADS OF THE SPRING, SINCE THIS CAN CAUSE INJURY OR OBSTRUCT THE CORRECT FUNCTIONING OF THE VALVE.

WARNING

AIR EXITING THE VALVE CAN BE VERY HOT AND CAUSE PHYSICAL DAMAGES.

4.2.7 Flexible Sleeve

In the fluid impulsion an elastic sleeve with clamps ready for the fluid pipe is installed.

As an option, it can be replaced by a metal axial compensator. In case of ATEX units, these compensators are mandatory.

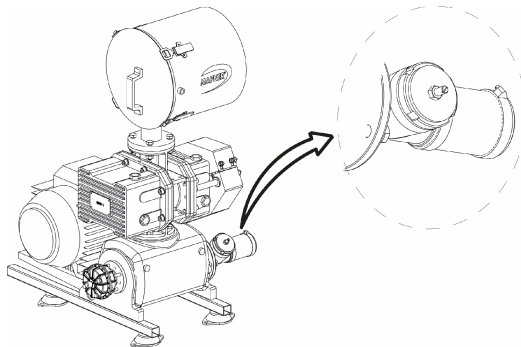


Figure 14. Sleeve for Fluid Impulsion.

4.2.8 Check Valve

It is a swing element, mounted in the output of pressurized fluid, which main function is to prevent compressed fluid and airborne particles in the discharge line from flowing back to the inside of the blower unit. Additionally, a check valve will impede that the back pressure of fluid inside the discharge line causes counter rotation of the machine when the blower is off.

CAUTION



These elements are not adequate to trap liquid fluids.

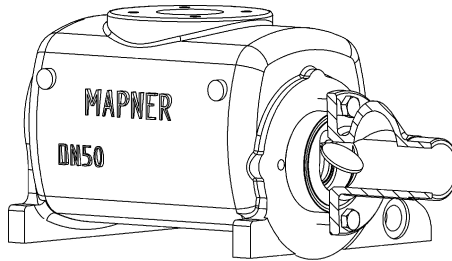


Figure 15. Check Valve.

The CP-B swing valves, designed for installation between flanges with very small interspaces, allow maximum port opening at minimum head loss.

CAUTION



Periodically check to see if the check valve is in good condition and works well. Under no circumstances should you try to start a blower unit if it is rotating in the opposite direction to that of the direction indicator due to the back pressure of the fluid.

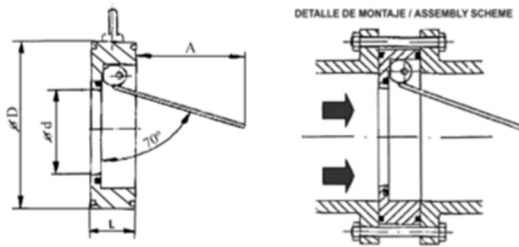


Figure 16. Check Valve.

DN	50	80	100	125	150	200	250	300	350
∅D	98	134	154	181	209	264	319	375	425
∅d	35	54	70	92	114	152	192	230	266
L	24	27	29	34	34	41	48	57	69
A	32	50	152	93	111	140	174	205	232

Table 5 Dimensions.

4.2.9 Unloading Starting Relief Valve

The unloading starting relief valve or CORLI automatic unloading starting valve is a device that permits the exit of air produced by the blower at the time of the start up.

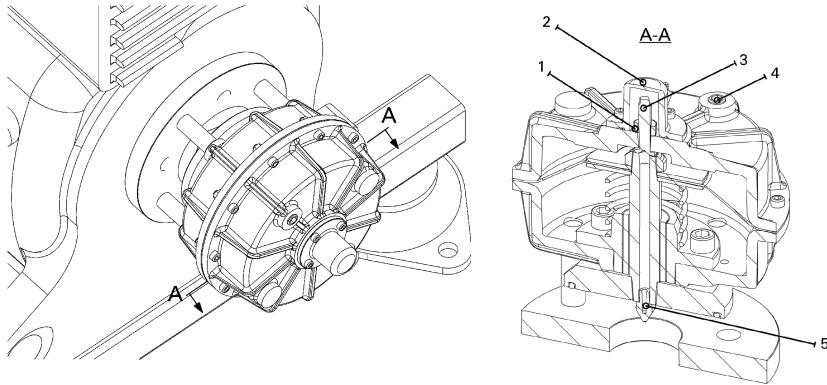


Figure 17. Starting Relief Valve.

At the starting stage of a motor-driven blower mounted on a pressurized line, a starting high current may be generated causing problems, essentially when starting is achieved through a star-delta connection.

The CORLI automatic unloading starting valve allows the starting of the blower unit driven by an electric motor with star-delta connection.

When the prime mover is a commutating-pole motor, it is necessary to install a CORLI relief system with solenoid valve (4).

CORLI valves operate automatically and are maintenance-free. However, check for correct sealing after setting-up.

CAUTION

Before working on the valve, always disconnect the drive motor.

WARNING

KEEP AWAY FROM THE VALVE IN OPERATION, SINCE IT ENTAILS A RISK OF LIMBS GETTING CAUGHT.

CAUTION

The CORLI valve must close immediately after the drive motor has reached its normal working speed.

To change or adjust the closing time, remove guard (2), loosen nut (1) and turn the regulating pin (3) to adjust the closing time.

-) Clockwise to reduce the closing time.
-) Anticlockwise to increase the closing time.

After setting the closing time, tighten the nut (1).

CAUTION

Defective sealing of the valve may be due to dirt build-up plugging the injector (5). Clean the injector with compressed air.

As for commutating-pole motors, it is necessary to apply the maximum possible closing time at low speed, in order to maintain the required closing margin at high speed.

In this event, there will be an electromagnetic valve actuated by a time relay, so that it remains open until switching over to high speed and closes when the system is at this speed level.

4.2.10 Flexible Supports

The blower unit rests on flexible supports attached to the basement. These elements absorb the vibrations generated by the blower.

4.2.11 Clogging Detector

It is a vacuum dial gauge that indicates the level of cleanliness or dirt of the filter.

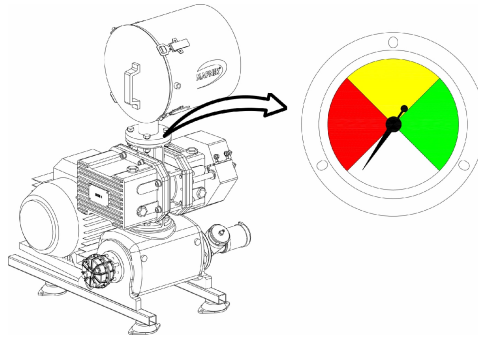


Figure 18. Clogging Detector.

4.2.12 Oil Level Indicator

Installed on each crankcase, they allow controlling the filling level of the lubricating oil.

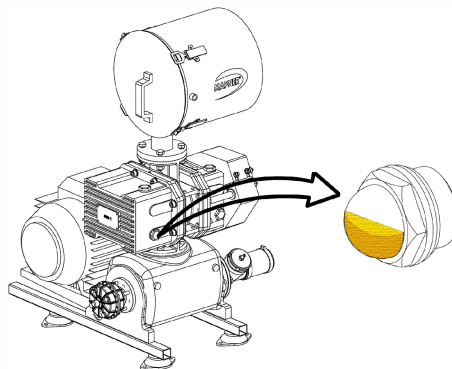


Figure 19. Oil Level Indicator.

4.2.13 Manometer

It is a measuring device that is mounted on the impulsion side of blower, with which the working pressure can be controlled.

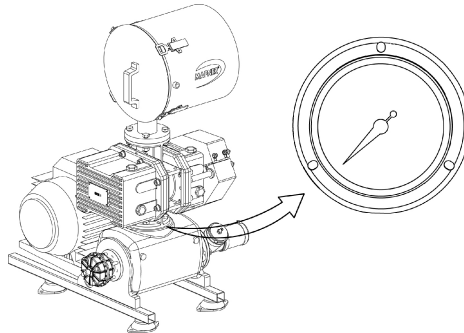


Figure 20. Manometer.

4.2.14 Sound Proofing Systems

The modular soundproofing cabins are made of galvanized plate panels. Inside ventilation is provided by a self-contained motor-driven fan integrated into the cabin.

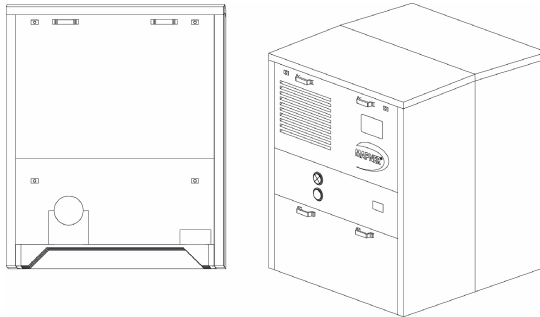


Figure 21. Sound Proofing Cabin.

At the same time, the acoustic cabin serves to protect the belt and pulley drive system. Consequently, it is essential that the panels or doors of the soundproofing cabin should be totally closed.

CAUTION



The closing / locking of the panels should be performed with the supplied tool. Access to this key should be permitted only to authorized personnel.

CAUTION



For any servicing of the blower unit, stop the equipment completely before opening the panels or access doors of the cabin.

The connection of the exhaust fan is made independently of the main drive motor. When a frequency converter is used, the speed regulation must not affect the exhaust fan motor.

To avoid overheating inside the cabin after stopping the blower unit, the exhaust fan must be kept operating for 6 to 10 minutes by means of a timer.

CAUTION



Do not remove the safety instruction labels affixed to the outside of the cabin.

4.2.14.1 VENTILATION OF SOUNDPROOFED GROUPS

Manufacturing features:

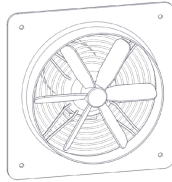


Figure 22. HC Flow Fan.

- Sheet steel support frame.
- Polyamide 6 fibreglass- reinforced impeller; dynamically balanced.
- Asynchronous motors, with squirrel-cage rotor with ball bearings.
- IP-55 Protection (IP-54 models 45-4M/H, 50-4M/H, 50-6M/H, 56-4M/L, 56-6M/H, 63-4M/L and 63-6M/H).
- Class F insulation. Standard models can operate at temperatures between -25°C $+60^{\circ}\text{C}$.
- Standard models supplied with three-phase 230/400V, 50 Hz.
- Motor support including protection guard, except in models 71, 80, 90 and 100 where the guard can be ordered as an accessory.
- Anticorrosive finish in polyester resin, polymerised at 190°C , prior degreasing, with phosphate-free nanotechnological treatment.
- On request is possible to supply executions of windings for voltages 230/400 V, 60 Hz; 254-280/ 440-480 V, 60 Hz or single phase 230 V 50 Hz.
- Equipment installed in hazardous areas classified as ATEX, must mount extraction fan that complies with ATEX Directive.

CAUTION

Voltage shifts (V) of over 10% can ONLY be permitted for short time intervals.

Cabinet type for GCA equipment	Fan Model	Motor power
	HC	kW
SEM.1-2-4	25-2T/H	0,09
SEM.6-8-10-11-11,5-11,6-11,7-12	31-2T/H	0,18
SEM.11,8-15-20-25-35-41(DN 200)-45	35-2T/H	0,37
SEM.41(DN250)-SEM.55-60-65-75-80-85	50-4T/H	0,55

Table 6 Technical Characteristics Standard Models.

CAUTION

For the connection for the extraction fan motor, follow the instructions given by extractor manufacturer.

4.2.15 Cleaning System

Sometimes the fluid going through the blowers or compressors can be dirty or be very corrosive. As a standard manufacturing the used materials are not designed for these corrosive environments. With the aim of lowering (never avoiding) this effect, we created the cleaning system. This system is used prior the shutdown of the machine to remove from the inside all dirtiness and the traces of the corrosive fluids to avoid the deterioration of the elements of the machine during this stop.

For more information on the operation of this system refer to 6.4.3.1.



4.3 APPLICATIONS, USES AND REMAINING RISKS

4.3.1 Applications

The proposed uses of this machine are listed below:

-) Paper manufacturing and processing industries.
-) Pneumatic conveyors.
-) Packing and conveyor facilities.
-) Textile industry.
-) Smoke and fine dust removal.
-) Suction cap lifters.
-) Fish farming.
-) Sewage treatment plants.
-) Water treatment.
-) Agricultural machinery.
-) Aquarium oxygenation.
-) Tobacco processing.
-) Electric and electronic industry.
-) Bottling plants.
-) Agitation process in galvanic treatments.
-) Desalination plants.
-) Other non-described applications, ask MAPNER.



4.3.2 Reasonably Predictable Misuse

The following misuse must be avoided:

-) Installation over uneven or irregular Surface.
-) Installation in the open without adequate protection.
-) Installation in a room without adequate ventilation.
-) Operation without oil filling.
-) A filling that exceeds the maximum oil level.
-) Usage of the eyebolts positioned on the cab roof for lifting the entire.
-) Not complying with the service data on the nameplate.
-) Not complying with the maintenance intervals.
-) Wrong direction of rotation.
-) Machine turn-on during maintenance tasks.
-) Motor wrong turn-on.
-) Operation at a pressure higher than the value indicated on the nameplate.
-) Operation at a speed different than indicated on the nameplate (If necessary, ask MAPNER).
-) Overcoming the final limit temperature.
-) Manipulating of any element of the equipment while working.
-) Operating without safety elements assembled.
-) Disassembling the safety elements with the machine on.
-) Working without elements that prevent the access to the moving parts, lobes, belts...
-) Use machine with potentially explosive fluids.



4.3.3 Remaining Risks

Please note that in any case some residual risks may remain:

-) Regarding the CORLI valve, although its closing speed minimizes entrapment risks, finger introduction in moving space must be avoided.
-) The blower is not a workstation so it may be a risk for people who remain long exposed to equipment noise.
-) There may be vibration.
-) Risks may arise depending on the characteristics of the driven gas.
-) Possible tipping of the equipment if its settlement is defective.
-) Pressure/Vacuum valve, possible risk of entrapment while acting.

5. INSTALLATION, COMMISSIONING AND OPERATION

WARNING



COMMISSIONING, HANDLING AND MAINTENANCE OF THE MACHINE MUST ONLY BE CARRIED OUT BY QUALIFIED PERSONNEL WITH EXPERIENCE OF BLOWER EQUIPMENT AND COMPONENTS.

WARNING



TO PERFORM COMMISSIONING, HANDLING AND MAINTENANCE OPERATIONS ALL THE INSTRUCTIONS AND SAFETY WARNINGS INCLUDED ON CHAPTER 3 SECURITY MUST BE CONSIDERED.

WARNING



BEFORE THE INITIAL START-UP, AFTER A PROLONGED STOP, BREAKDOWN OR AFTER CARRYING OUT MAINTENANCE ON AN ATEX EQUIPMENT, THE INERTING OPERATION MUST BE CARRIED OUT INSIDE THE EQUIPMENT AND ITS ACCESSORIES BEFORE ITS START-UP.

5.1 GENERAL NOTES ON DELIVERY

CAUTION



Avoid impacts and accidental fall when handling the machine either packed or unpacked.

Immediately upon receipt, please check that:

-) The packing is not damaged.
-) The goods supplied correspond to order specifications (check the delivery note):
 - Blower group.
 - Instruction manual (if it comes).
 - Optional accessories:
 - Suction filter for blowers.
 - In-line filter for exhausters.
 - Non return valve.
 - Etc.

CAUTION



MAPNER would not accept any responsibility for defects due to transport or lack of material not notified in writing during the 24 hours upon receipt.

The blower group with sound-proofed cabin should be transported on a pallet truck.

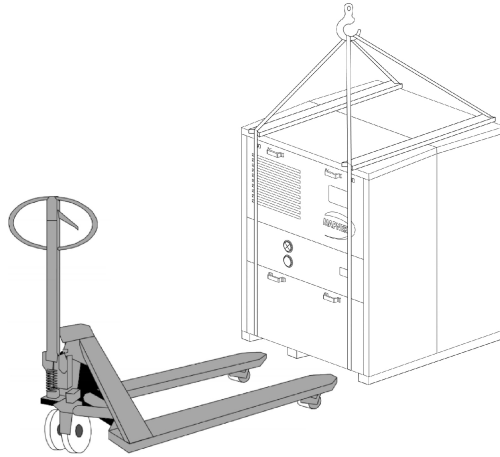


Figure 25. Cabin Transport by Slings with Pallet Truck.

CAUTION



The eyebolts on the cabin roof are only to be used for handling empty cabin. Do not use them to lift the complete unit.

5.3 STORAGE

Storage of blowers and blower groups is very important for its perfect preservation. A suitable site must be prepared for temporary storage of the groups. The site must be protected, clean, dry and free of any vibrations which could affect the machines. The transmission belts must be slackened during storage.

In cases of prolonged immobilization – over three (3) months in storage – the internal chambers must be protected with anti-corrosion oil, as must the piston surfaces and all machined components.

In addition the instructions indicated in section 6.5 of the manual, Prolonged stop maintenance must be followed.

CAUTION



Keep the suction and discharge flanges sealed until the equipment is assembled.

5.4 SITE

It is important to foresee a site with the correct conditions for the equipment, ensuring that the chosen location has minimum humidity and avoiding acid and saline atmospheres. It is recommended to install the equipment inside a closed room or area.

The room where the equipment is installed must be adequately ventilated, with forced ventilation, inlet and outlet grilles for air circulation. Avoid temperatures above 45°C.

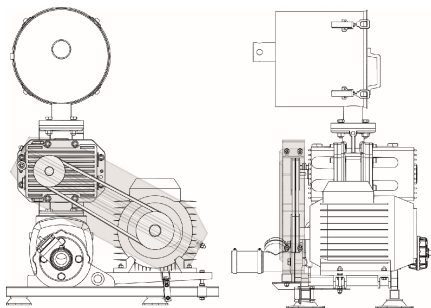


Figure 26. Site.

To facilitate maintenance operations and any possible work on the equipment, you should ensure that there is easy access to the room and enough space between units to carry out partial dismantling of components.

Ensure that there is a lifting system for any future manipulation of the machines or its elements.

When it is impossible to install equipment in a suitable room shall be protected from direct rain, sun, wind and dust. This would be the responsibility of the installer.

5.5 FOUNDATIONS AND FIXINGS

The structural specifications of the machine room will depend on the blower unit size, weight and construction type.

The dynamic stresses of rotary machines are very low, so no extra precautions need to be taken with respect to the reinforcement and composition of the concrete foundations, which will be carried out according to standard civil works criteria.

All packaging material must be removed from the blower unit before placing it on the bed.

The unit must rest on dry, clean and in a completely flat and level surface.

To compensate irregularities of the support surface and to avoid deformation of the frames, the unit must be levelled using steel wedges placed as necessary beneath the frame.



Figure 27. Fixings.

The unit will be fixed (when applicable) by using conical expansion devices, chemical anchoring, bolts, etc.

When using anchor bolts, the foundations be allowed time to set before final fixing of the unit.

5.6 ASSEMBLY

After final assembly, levelling and fixing of the unit check that the drive shaft rotates smoothly by hand. Any appreciable resistance indicates the torsion or deformation, or the presence of foreign bodies inside the compression chamber.

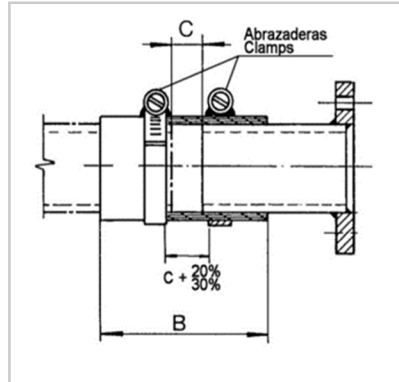
The material and size of the fluid piping depend on the type and flow rate of the fluid in question.

Before fitting the pipes, ensure that they are perfectly clean inside and check that there are no remains of welding, slag, rust, etc., which could come away and enter the fluid chamber. When piping is connected to the blower-depressor, you should fit a metal sieve for the first 25/30 hours in operation, removing it after said period.

The pipes are connected to the unit using an elastic sleeve or compensator. Pipe joints must not put the machine under mechanical stress, as this would lead to structural deformation of the blower core and possible blockage of moving parts.

Ensure that there is adequate support for fixing the pipes and all elements that could place a direct load on the units. Check that the blower turns freely after connecting all the pipes.

If tubular elastic MFT sleeves with clamps are used to connect the pipes, a gap not exceeding the following values must be kept between the ends of the pipes (measurement C):



$\leq 250 = 10 \text{ mm}$
 Size MFT
 $\geq 300 = 15 \text{ mm}$

Figure 28. Assembly Cotes.

Particular attention must be paid to correct alignment of the pipes with regard to the discharge manifold of the blower unit. The distance between the clamps, must not exceed in a 20-30% the tube distance C, (see scheme), they should be equidistant from the ends of the sleeve.

Purge valves must be fitted whenever the liquid in question can cause condensation in the piping.

After installation, it is important to be sure that there is no leak.

The heat radiated to the room through the outlet piping can cause a considerable rise in temperature. To avoid this, the pipes running through the area should be thermally insulated Application of said insulation reduces sound levels in the area.

WARNING



THE MOTORS MUST BE CONNECTED IN COMPLIANCE WITH CURRENT LEGISLATION AND MUST ONLY BE CONNECTED BY QUALIFIED ELECTRICIANS AUTHORISED TO CARRY OUT THE OPERATIONS REQUIRED.

CAUTION



Read carefully the Instruction Manual of the electric motor and follow its indications.

Check the specific service data listed inside the terminal box and on the attached service specifications plate.

3 ~ 132S-02						
IP55	Inc. cl.	F Δ/180 K	S1	FS1.00	AMB40°C	
V	Hz	kW	min ⁻¹	A	cos φ	
380 Δ	50	7.5	2910	14.5	0.90	
660 Y			2910	8.35	0.90	
400 Δ	50	7.5	2920	14.0	0.88	
690 Y			2920	8.12	0.88	
415 Δ	50	7.5	2925	13.8	0.86	
440 Δ			3500	14.1	0.90	
460 Δ	60	8.5	3505	13.7	0.88	
		W2 U2 V2	W2 U2 V2			
Δ	Y	U1 V1 W1	U1 V1 W1	L1 L2 L3		
		L1 L2 L3	L1 L2 L3			
		6308-ZZ	MOBIL POLYREX EM		86 kg	
		6207-ZZ				

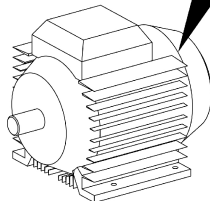


Figure 29. Cotas de Montaje.

The main motor power supply cable leaving a loop in order to allow the tilting movement of the motor and avoid deterioration due to cable breakage.

WARNING



WHEN THE INSTALLATIONS HAVE CENTRAL REMOTE ON-OFF SWITCHES, THERE MUST BE AN EMERGENCY STOP SWITCH NEAR THE BLOWER UNIT.

Depending on specific service conditions the blower units may incorporate complementary safety and control features - pressure switch, thermostat, differential contactor, hour counter, etc. When planning the installation users must thus plan the

connections of the units, as well as bearing in mind the safety instructions and recommendations contained in the technical documentation provided by the suppliers of said features.

Soundproofing cabins of some machine models are supplied disassembled, to mount them follow up the instructions indicated on the Annex 8.

After the cabin assembly flexible pipe for the fluid recirculation must be mounted.

5.7 ALIGNMENT AND TENSING OF PULLEYS AND BELTS

5.7.1 Alignment and Tensing of Pulleys

The pulleys should be aligned using a steel ruler, stretched string or electronic alignment device - whichever is available.

Acceptable deviation must not exceed an angular value of $1/3^\circ$. Incorrect alignment reduces useful belt life and accelerates deformation of the pulley grooves.

The parallelism will be correct as long as the string or ruler used touches pulley points A+B+C+D.

To gain access to the drive (belts and pulleys), disassemble the protective housing whenever appropriate.

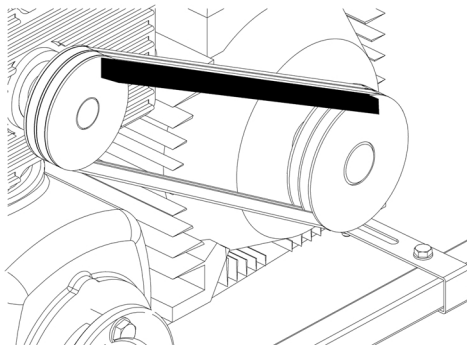


Figure 30. Alignment of Pulleys.

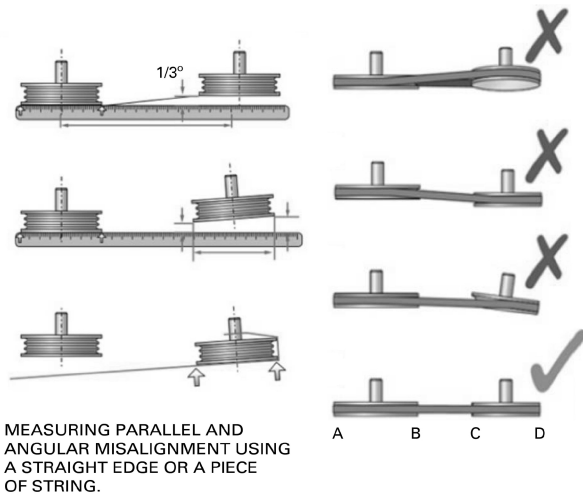


Figure 31. Alignment Values.

Pulleys used by the drive mechanism are fitted with a taper lock bushing that adapts to the corresponding shaft.

In case the alignment values are not valid, loosen the pulley shaft by loosening the hub bolts using an Allen wrench. Once loose, by means of a calibrated ruler, move it on the shaft until the pulley position is adequate to meet the above conditions. After placing it on the correct position the screws fixing the taper lock must be tightened.

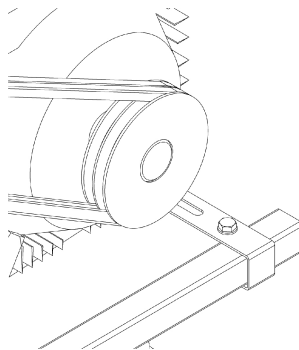


Figure 32. Pulley Adjusting.

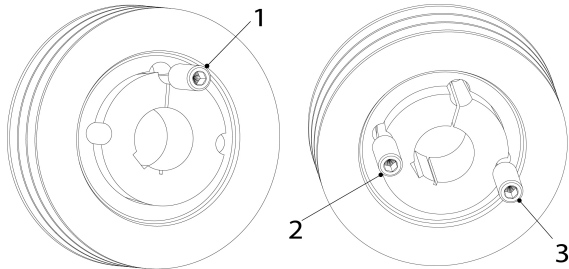


Figure 33. Pulley Assembly.

To fit, slip the slightly expanded taper lock bushing over the shaft and after alignment, lock it in position using the screws placed over the threaded holes on the pulley.

To remove it, loosen the aforementioned screws and insert them in the thread of the conical element, hitting the internal hub of the pulley lightly with a plastic hammer.

CAUTION



You should re-check the torque of the screws after the first 24 hours in operation.

WARNING



AS A PREVENTIVE MEASURE AGAINST ACCIDENTS, REMEMBER (WHERE APPLICABLE) TO INSTALL THE DRIVE PROTECTION HOUSING.

5.7.2 Tensing of Belts

When the operation is carried out on units fitted with tension rails, belt tension will be increased gradually, verifying the value by the sag tension system. Apply a perpendicular force to the middle of belt G, using a weight, strain gage or graduated spring showing the stress applied and verify the resulting sag, ensuring that it reaches the values shown on the following table.

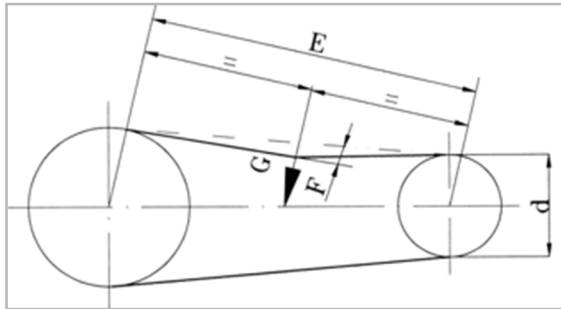


Figure 34. Tensing Values.

Section	Bending Strength (G) per belt (Kp)	Pulley diameter d (mm)	Sag each (F) 100mm from point E (mm)
SPZ	2,5	≥63-85	2
		>85-106	1,8
		>106-150	1,65
		>150	1,4
SPA	5	≥85-112	2,85
		>112-150	2,4
		>150-224	2,15
SPB	7,5	>224	2
		≥125-170	2
		>170-236	1,5
		>236-400	1,25
SPC	12,5	>400	1,15
		≥212-265	2
		>265-400	1,65
		>400-560	1,6
		>560	1,55

Table 7 Tensing Values.

After 24 hours in operation, the belts should be stretched once again, given that longitudinal stability is obtained and the profile adapts to the groove during this period. With GCA compact units, the belts are automatically tensed by means of tilting strips, meaning that no additional tensing is necessary.

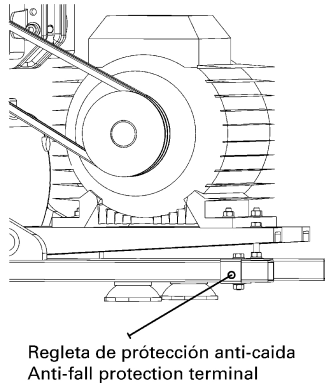


Figure 35. Tilting strips.

Generally speaking, the complete set of belts should be replaced in order to maintain uniform tension and load transmitted.

CAUTION



Do not tighten the anti-fall protection terminal.

5.8 START-UP

CAUTION



Before start-up, pour lubricating oil into the two (2) blower unit crankcases. Check that the drain plugs are 100% closed.

The specifications and amount of oil depend on the size of machine and are shown on the lubrication table (Refer to Lubrication section 6.4.4 on Maintenance Chapter).

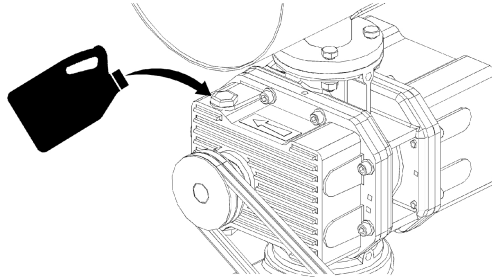


Figure 36. Oil Filling of the Crankcase.

When units are fitted with a speed reducer or multiplier, these components must be oiled. Follow the instructions of the specific Instruction Manual.

Ensure that all safety and control elements are correctly installed and connected.

Turn the blower gently by hand to ensure that it moves smoothly. If there is any difficulty, check the causes by verifying inside the core through the suction inlet.

Check that the position of the cut-off valves and the pipe connections comply with project specifications, ensuring that no fluid conduits are blocked.

Check the direction of rotation. This should correspond to that indicated by the arrow on the blower unit. The operation must be very brief (2 seconds), given that prolonged rotation in the wrong direction can cause serious damage.

Check pulley alignment. The pulleys are tensed automatically by the load of the drive motor (in GCA groups).

Check that there is no blockage on the aspiration side and that the filtering element is clean.



Check the correct assembly and fastening of the flexible pipe use for leaked fluid recirculation. In case of getting loose during machine operation it could damage the blower.

After all checks have been carried out, start-up can be initiated by switching on the electric motor for 25/30 seconds and then switching off to check that the blower core turns freely and stops smoothly.

It must be checked that there is no air/gas leak in the installation, any leak detected must be eliminated. Reset the pressure/vacuum valve if necessary, with previous authorization of MAPNER.

Switch the unit on again and check correct operation of the emergency stop switch, as well as the safety and control elements.

Check energy consumption in operating conditions and adjust the thermal protection devices.

All measurement and control equipment used should be calibrated and have the relevant calibration certificate issued by an agency accredited by ENAC or its equivalent.

5.9 UNITS EQUIPPED WITH FREQUENCY CONVERTER

CAUTION



Prior to defining the equipment purchase, the intention of installing a frequency converter must be reported.

The minimum acceptable frequency value is preset by MAPNER according to thermal operating conditions.

Working minimum frequency must not be lower than this minimum acceptable value during machine service.

The maximum frequency will be set according to the maximum acceptable speed of the motor and blower, as well as to the difference between the absorbed and the installed power.

The period of acceleration of the drive motor from a resting position to maximum speed will be less than 6 seconds.

The frequency converter will be sized to maintain service for a machine with constant load torque.

6. MAINTENANCE AND INSPECTION

6.1 MAINTENANCE CONSIDERATIONS

WARNING



ALL ROUTINE AND PREVENTIVE MAINTENANCE OPERATIONS ON THE MACHINES MUST BE CARRIED OUT BY QUALIFIED PERSONNEL.

THE INSTRUCTIONS AND WARNINGS LISTED ON CHAPTER 3 MUST BE CONSIDERED.

WARNING



BEFORE WORKING ON THE MACHINE, DISCONNECT THE UNIT FROM THE POWER SUPPLY, REMOVE THE FUSES AND WAIT FOR A SUFFICIENT TIME TO ALLOW THE COMPONENTS TO COOL DOWN BEFORE ACCESSING THE INTERNAL PARTS. USE APPROPRIATE PERSONAL PROTECTION EQUIPMENT. ADEQUATE PERSONAL PROTECTION EQUIPMENT MUST BE USED. THE EQUIPMENT SHOULD ALSO BE ISOLATED FROM THE REST OF THE INSTALLATION BY MEANS OF THE ISOLATING VALVES.

WARNING



BEFORE THE INITIAL START-UP, AFTER A PROLONGED STOPPAGE, BREAKDOWN OR AFTER CARRYING OUT MAINTENANCE ON AN ATEX EQUIPMENT, THE INERTING OPERATION MUST BE CARRIED OUT INSIDE THE EQUIPMENT AND ITS ACCESSORIES BEFORE ITS START-UP.

WARNING



ANY MANIPULATION WITH EQUIPMENT CLASSIFIED AS ATEX BY NON-MAPNER PERSONNEL INVALIDATES THE ATEX CERTIFICATION AND THE MANUFACTURER'S RESPONSIBILITY IN THE EVENT OF AN INCIDENT.

WARNING



FOR THE MAINTENANCE OF ATEX EQUIPMENT, AND FOR SAFETY REASONS, ORIGINAL SPARE PARTS SUPPLIED BY MAPNER MUST ALWAYS BE USED

The blower core has holes at the bottom of the crankcases and bases to avoid them becoming pressurized. A weak current of air permanently carries condensates out of the unit.

With conveying gas, said holes should be blocked or connected to suction by pipes.

Excessive amounts of oil in the crankcases can lead to lubricant leaking through said holes. This will stop when the correct oil level is reached.

CAUTION

To keep the blower group at rest for a long period of time, the corresponding maintenance indicated in section 7.5 Prolonged Stop Maintenance must be carried out.

6.2 BASIC ROUTINE MAINTENANCE OPERATION FOR UNIT MAINTENANCE

-) Visually check component parts.
-) Check suction filter.
-) Check lubricating oil level.
-) Check transmission system.
-) Check leak-tightness of oil compartments and fluid conduits; be sure that there is no leak.
-) Check safety valves.
-) Check the surge valve, if applicable.
-) Check service pressure.

Conservation operation intervals are shown in the Maintenance Plan. These intervals are indicative the will depend on the working conditions.

WARNING

IF ANY SIGNS OF BANGS OR DEFORMATION ARE DETECTED ON THE TRANSMISSION GUARD, IT SHOULD BE REPLACED IMMEDIATELY.



6.3 MAINTENANCE PLAN

6.3.1 Maintenance Programme Standard

Disconnect the machine from the electricity grid before carrying out any work on it. Not heeding this instruction can result in personal injury and damage to the machine								
<i>Remember that these maintenance intervals refer to standard working conditions. If there are any doubts as to the condition of a component, the component must be replaced, regardless of the interval period stated in this chart.</i>	First 24 hours	Weekly	First 500 hours. Max. 1 month	Every 1,000 hours. Max. 2 months	Every 2,000 hours. Max. 4 months	Every 4,000 hours. Max. 6 months	Every 8,000 hours. Max. 1 year	Every 20,000 hours. Max. 3 years
Tighten the screws and fittings again after the machine has cooled down, especially the taper locks on the shaft and pulley.	●							
OIL								
Check oil level and condition. Change the oil if there is any doubt as to its condition.	●	●						
Oil change (**).			●		● Mineral		● Synthetic	
TRANSMISSION								
Check belt condition, tension and alignment; correct or replace if necessary.	●		●			●		
Replace the transmission belts.							●	
FILTERS								
Check for filter clogging and clean or replace if necessary.		●						
Change the filter element.							●	
SEALS								
Check the condition of the shaft seal; replace if an oil leak is detected.				●				
OTHER								
Make sure there are no air or oil leaks.	●	●						
Check the pressure/vacuum valve.	●			●				
Clean the motor ventilation grilles, acoustic cabin and extractor.				●				
Check the check valve.							●	
Check the flexible hose.				●				
GENERAL MAINTENANCE								
Overall inspection of the blower core by MAPNER Technical Service staff. This inspection entails machine disassembly and replacing any parts that have undergone operating fatigue or wear.								●
MOTOR AND COMMERCIAL COMPONENTS	Follow the instructions and specific maintenance periods provided by each manufacturer.							
<p>** --If the equipment uses mineral oil, change it every 2,000 hours; if it uses synthetic oil, change it every 8,000 hours. CAUTION: The oil change intervals are an estimation; check the oil each week and change whenever necessary. MAPNER provides its customers with personalised maintenance contracts; please refer to soporte@mapner.com We recommend that a MAPNER technician carry out a general inspection of your equipment at least once a year. Always use original parts made by the manufacturer.</p>								
<p>For general maintenance at 20,000 hours of operation, send to: MAQUINAS PNEUMÁTICAS ROTATIVAS XXI S.L.U. Polígono Industrial Zamoka Oialume Bidea 21 20115 Astigarraga, Guipuzcoa Spain Tel: +34 943 335 100</p>								

CAUTION

The intervals of lubrication given here are estimative, they can change depending on the working conditions, replace the oil at the slightest doubt about its state.



No warranty will be accepted because of corrosion or lubrication problems.

Follow the maintenance manufacturer's instructions of the complementary elements supplied (Electric motor, refrigerators,...).



6.3.2 Maintenance Programme High Temperatures (Temp. of Impulsed Fluid>85°C)

Disconnect the machine from the electricity grid before carrying out any work on it. Not heeding this instruction can result in personal injury and damage to the machine								
<i>Remember that these maintenance intervals refer to standard working conditions. If there are any doubts as to the condition of a component, the component must be replaced, regardless of the interval period stated in this chart.</i>	First 24 hours	Weekly	First 250 hours. Max. 1 month	Every 1,000 hours. Max. 2 months	Every 2,000 hours. Max. 4 months	Every 4,000 hours. Max. 6 months	Every 8,000 hours. Max. 1 year	Every 10,000 hours. Max. 2 years
Tighten the screws and fittings again after the machine has cooled down, especially the taper locks on the shaft and pulley.	●							
OIL								
Check oil level and condition. Change the oil if there is any doubt as to its condition.	●	●						
Oil change (**).			●		●			
TRANSMISSION								
Check belt condition, tension and alignment; correct or replace if necessary.	●		●	●				
Replace the transmission belts.							●	
FILTERS								
Check for filter clogging and clean or replace if necessary.		●						
Change the filter element.						●		
SEALS								
Check the condition of the shaft seal; replace if an oil leak is detected.				●				
OTHER								
Make sure there are no air or oil leaks.	●	●						
Check all the valves.	●			●				
Clean the motor ventilation grilles, acoustic cabin and extractor.				●				
Check the check valve.					●			
Check the flexible hose.				●				
GENERAL MAINTENANCE								
Overall inspection of the blower core by MAPNER Technical Service staff. This inspection entails machine disassembly and replacing any parts that have undergone operating fatigue or wear.								●
MOTOR AND COMMERCIAL COMPONENTS	Follow the instructions and specific maintenance periods provided by each manufacturer.							
<p>** -- Always use synthetic oil.</p> <p>CAUTION: The oil change intervals are an estimation; check the oil each week and change whenever necessary.</p> <p>MAPNER provides its customers with personalised maintenance contracts; please refer to soporte@mapner.com</p> <p>We recommend that a MAPNER technician carry out a general inspection of your equipment at least once a year.</p> <p>Always use original parts made by the manufacturer.</p> <p>For general maintenance at 20,000 hours of operation, send to: MAQUINAS PNEUMÁTICAS ROTATIVAS XXI S.L.U. Polígono Industrial Zamoka Oialume Bidea 21 20115 Astigarraga, Guipuzcoa Spain Tel: +34 943 335 100</p>								

CAUTION



Always use synthetic oil.

Water in the inlet must be avoided and humidity must be reduced as much as possible, since this increases the corrosive effect.

CAUTION



Before each stop, cover the lobes and metallic elements with an anti-rust product while passing clean air by the equipment.

The intervals of lubrication given here are orientative, they can change depending on the working conditions, replace the oil at the slightest doubt about its state.

No warranty will be accepted because corrosion or lubrication problems.

Read and follow the maintenance manufacturer's instructions of the complementary elements supplied (Electric motor, refrigerators ...).



6.3.3 Maintenance Programme Highly Corrosive Fluids

Disconnect the machine from the electricity grid before carrying out any work on it. Not heeding this instruction can result in personal injury and damage to the machine								
	First 24 hours	Weekly	First 250 hours. Max. 1 month	Every 1,000 hours. Max. 2 months	Every 2,000 hours. Max. 4 months	Every 4,000 hours. Max. 6 months	Every 8,000 hours. Max. 1 year	Every 10,000 hours. Max. 2 years
<i>Remember that these maintenance intervals refer to standard working conditions. If there are any doubts as to the condition of a component, the component must be replaced, regardless of the interval period stated in this chart.</i>								
Tighten the screws and fittings again after the machine has cooled down, especially the taper locks on the shaft and pulley.	●							
OIL								
Check oil level and condition. Change the oil if there is any doubt as to its condition.	●	●						
Oil change (**).			●		●			
TRANSMISSION								
Check belt condition, tension and alignment; correct or replace if necessary.	●		●	●				
Replace the transmission belts.							●	
FILTERS								
Check for filter clogging and clean or replace if necessary.		●						
Change the filter element.						●		
SEALS								
Check the condition of the shaft seal; replace if an oil leak is detected.				●				
OTHER								
Make sure there are no air or oil leaks.	●	●						
Check all the valves.	●			●				
Clean the motor ventilation grilles, acoustic cabin and extractor.				●				
Check the check valve.					●			
Check the flexible hose.				●				
Cover the pistons and metal components that are in contact with the gas with a film of anti-corrosion product.		●						
Visual inspection of internal corrosion; contact MAPNER if corrosion is detected near the bearings.				●				
GENERAL MAINTENANCE								
Overall inspection of the blower core by MAPNER Technical Service staff. This inspection entails machine disassembly and replacing any parts that have undergone operating fatigue or wear.								●
MOTOR AND COMMERCIAL COMPONENTS	Follow the instructions and specific maintenance periods provided by each manufacturer.							
<p>** -- Always use synthetic oil. CAUTION: The oil change intervals are an estimation; check the oil each week and change whenever necessary. MAPNER provides its customers with personalised maintenance contracts; please refer to soporte@mapner.com We recommend that a MAPNER technician carry out a general inspection of your equipment at least once a year. Always use original parts made by the manufacturer.</p>								
<p><i>For general maintenance at 20,000 hours of operation, send to: MAQUINAS PNEUMÁTICAS ROTATIVAS XXI S.L.U. Polígono Industrial Zamaka Oialume Bidea 21 20115 Astigarraga, Guipuzcoa Spain Tel: +34 943 335 100</i></p>								

CAUTION

Always use synthetic oil with polyglycol base oil (See Lubrication table).

The intervals of lubrication given here are orientative, they can change depending on the working conditions, replace the oil at the slightest doubt about its state.



In case of accumulation of dirt or degradation inside the oil pan, open and clean it with degreaser.

No warranty will be accepted because corrosion or lubrication problems.

Polyglycol based oils cannot be mixed with mineral or PAO oils. In case of any doubt, clean perfectly the oil pans before using new oil.

Read and follow the maintenance manufacturer's instructions of the complementary elements supplied (Electric motor, refrigerators ...).

6.4 MAINTENANCE OPERATIONS

6.4.1 Inspection, Cleaning and Change of Filter

The combined filter-silencer has a noise-reducing compartment integrated into the unit.

Periodically check the filtering element and clean or change it as often as necessary.

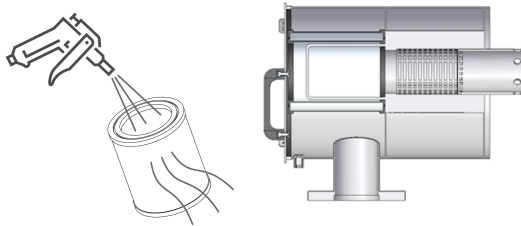


Figure 37. Filter Cleaning.

To remove the filtering element (4), open the pivoting shackles or bolts and remove the cover (1).

Clean the filtering element with a detergent and low-pressure air. If filled up with dirt, change it.

Clean the inside of the filter body and check the condition of sealing gasket (5).

WARNING



FLYING ELEMENTS MAY EXIST; ADEQUATE PERSONAL PROTECTION EQUIPMENT MUST BE USED.

6.4.2 Clogging Detector

To monitor the filter clogging level, it is recommended to install a dirt level indicator, vacuum dial gauge, differential manometric column, vacuum switch contactor, etc.

The maximum filter pressure value may not exceed 65mbar.

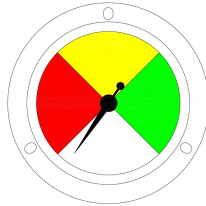


Figure 38. Clogging Detector.

6.4.3 Inside Cleaning of Blower Core

Product build-ups, if any, on the piston surface or the stator periphery will generate unusual noise and unbalances of the rotating parts.

If this case, and according to the type of deposits, an adequate product for their dissolution must be used: oil, gasoil, cleaning spray, superheated steam, etc.

In order to be able to check for scale and clean the equipment, you have to disassemble the inlet filter and discharge pipe.

After cleaning the blower core internally, it is necessary to change the lube oil in the oil sumps. Also, check the transparency of the oil level indicators.

6.4.3.1 CLEANING SYSTEM

When the working fluid contains much dirt or when it is highly corrosive, this dirtiness may accumulate inside the machine oxidizing its main elements. This phenomenon usually occurs when the machine is stopped. The cleaning system used before the shutdown, helps to mitigate, not to avoid, this effect. By introducing a cleaning antirust product, they could be removed the remains of the fluid conveyed by the blower and furthermore protects internal part generating a protective film.

To reduce this effect we recommend:

1. When possible (normally when the “fluid-air” mixture is not explosive): Before the stopping of the equipment clean air should be circulated across the blower. We can achieve this by using 3 way valves in the inlet and outlet of the blower. In this moment the circuit of the corrosive fluid has to be isolated.

WARNING



IT IS NECESSARY TO APPLY THE SECURITY MEASURES SO THAT WE AVOID RISKS IN THE INLET AND OUTLET. WE EVEN RECOMMEND THE USE A SILENCER IN THE OUTLET.

The circuit with pipes in the inlet and outlet will be done by the installer and never is a part of our scope of supply

2. Use of the cleaning system:

Once the first step (what explained above) is finished and while the equipment still moving, both valves of the cleaning system should be opened. In this moment the deposit of the oil gets pressurized and it forces the fluid into the inlet area.

The fluid is sprayed and cleans some of the dirty parts. The metallic parts get covered and in this way they are partially protected from the direct corrosive action.

We must be careful that we have oil in the oil tank when starting up the system.

In the case of not having any specific fluid against corrosion we could use a mixture of 50-50 oil-gasoil as a substitute. We have to have in mind the compatibility of both fluids (cleaning fluid and dirty fluid) anyway.

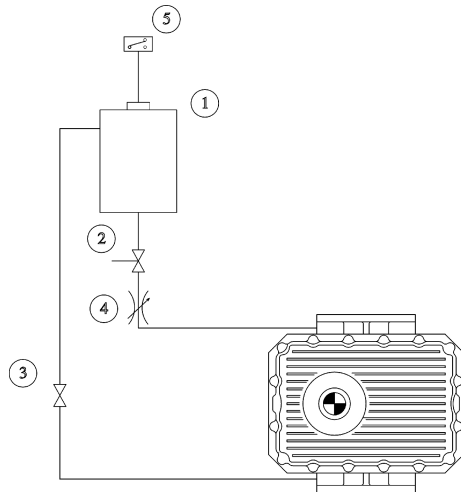


Figure 39. Cleaning System.

1	Cleaning mixture tank	4	Level switch (optional)
2	Valve (Electrovalve – optional)	5	Check the level of the mixture (optional)
3	Valve (Electrovalve – optional)	-	-

Table 8. Cleaning System.

The standard cleaning systems includes 2 manual valves and doesn't include the level detector for the tank.

In the case of automatization with electrovalves, we must use the oil level switch, so that the system doesn't get started without the product inside the tank.

Our warranty doesn't cover the damages that the development of the corrosion could cause to our products.

6.4.4 Lubrication

CAUTION

Blowers are supplied WITHOUT LUBE OIL.



Since both AV & AR oil sumps are independent, their filling and draining must be made separately.

Do not mix different brand and type of oils into the pans. If needed, first clean perfectly the pans

WARNING



CHECK THE SAFETY SHEET OF THE LUBRICATING OIL.

Using high quality lube oil is essential to get optimum performance from the blowers.

We recommend using MAPNER special oil for blowers or similar products which characteristics are indicated later on in this section.

Do not mix oils of different types and check that the oil you use contains antioxidants and antifoam additives.

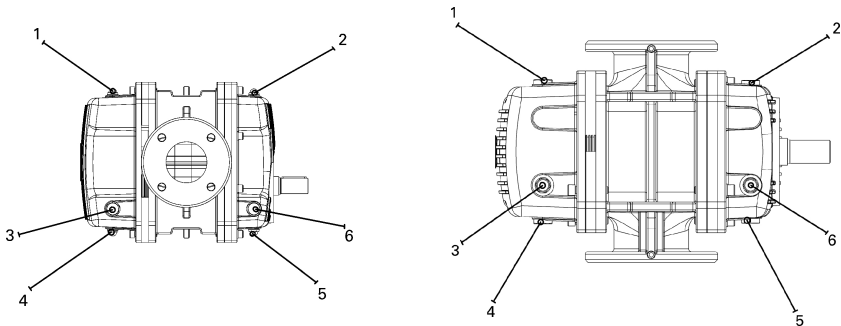


Figure 40. Lubrication.

1	AR oil sump filling plug	4	AR oil sump drain plug
2	AV oil sump filling plug	5	AV oil sump drain plug
3	Indicator, side AR	6	Indicator, side AV

Table 9. Lubrication.

Spare oil drums must be kept hermetically closed in order to prevent air moisture absorption.

With the machine at rest, the oil level must coincide with the centre of the indicator, figure 47.

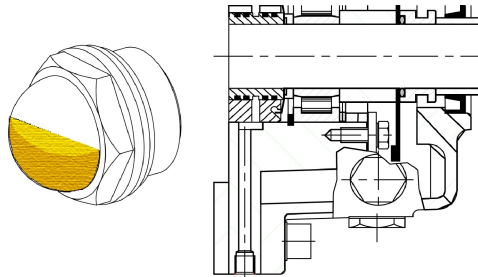


Figure 41. Oil Indicator.

Excess filling (over the a.m. level) will cause oil leakage through the lower overflow outlets and can generate an increase in the oil temperature.

Always make sure the drain plug (5) is perfectly tight and immediately change the O-ring gasket when it shows any small sign of damage or deformation.

ENVIROMENT



Used oil disposal must be carried out in accordance to local regulations.

Always drain and fill oil with the machine at rest and the oil sump depressurized.

Pay attention to the electric motor bearings grease. At ambient temperatures above to 40°C, relubrication must be done first than indicated and special greases must be used. Read carefully the motor manufacturer manual.

According to the operating conditions, the oils used in rotary piston blowers must keep their good lubricating properties under ambient conditions (room temp as high as 60°C) and at maximum discharge temperatures of 140°C.

We recommend using MAPNER lubrication oil, which is 100% synthetic fluid and polyalkylene glycol (PAG) base specially developed for use in blowing equipment subjected to high loads and where there may be significant temperature fluctuations. Because of its low coefficient of friction has excellent performance in the startup of the machine from its implementation allowing significant energy savings.



Figure 42. MAPNER Oil.

In case of using alternative oils, following recommendations must be considered.

For normal operating conditions, outlet fluid temperature ($T \leq 85^\circ\text{C}$), use mineral oils with a viscosity of ISO VG-150 according to DIN 51517 part III - CLP.

For high discharge temperatures ($T > 85^\circ\text{C}$), we recommend using synthetic oils PG/ISO VG-220, according to DIN 51517 part III CLP (Polyglycol base oils).

In the event that there may be contact of the air impulsed by the equipment with food products, oils approved according to USDA H1 certificates can be used.

In the case of blowers for the food industry, USDA H1 certified oils may be used.

Never should be mixed different types of oil, and, when changing mineral oil for synthetic, the carter must be cleaned perfectly first, check these issues with the oil supplier.

6.4.4.1 MINIMUM ADDITIVE (MINIMUM FEATURES):

-) Anti-wear additive and EP for gear boxes with roller bearings equipment.
-) Foam inhibitors.
-) Neutrality towards fluoride-propylene-methyl (Viton).
-) Detergents to solve deposits.
-) Oxidation resistance at high temperatures.

6.4.4.2 CLEANING PROCEDURE

Drain used oil completely while still is hot (It is important to empty it as best as possible).

Run the machine with the new oil for a maximum of 250 hours. Once this time is elapsed, empty sump totally and fill it with new oil. Used oil could be kept for future cleanup operations.

In case of oil degradation or when possible to access to the elements inside the crankcase, it is recommended to make a thorough cleaning manually using a solvent and then fill the sump with new oil. (For this operation use rags or paper that does not leave residue).

6.4.4.3 HIGH WORKING TEMPERATURES

Use Synthetic oil with a Poliglycol base.

CAUTION



Oil based in Poliglycol cannot be mixed with other types. Before using them, the oil pans must be perfectly cleaned. Otherwise, oil may deteriorate prematurely causing equipment failure.

6.4.4.4 WORKING WITH CORROSIVE, REACTIVE OR HIGH CONTENT ON OXYGEN GASES

Use PFPE type lubricants, as FOMBLIN Y45.

AVERAGE OIL CAPACITY OF THE OIL SUMPS (LITRES)

TYPE	FH MODEL			FV MODEL		
	AR	AV	AR+AV	AR	AV	AR+AV
1-2-4-6	0.55	0.34	0.89	0.85	0.55	1.4
8-10-11-11,5	0.86	0.53	1.39	1.35	0.8	2.15
11,6-11,7-11,8	1	0.7	1.7	1.4	0.9	2.3
12-15-20	3.3	1.9	5.2	4.3	2.4	6.7
SEM 25-35-40-41	3	1.9	4.9	5.5	3	8.5
45-55-60	-	-	-	10.9	6	16.9
65-75-80-85	-	-	-	21	13	34
90-100-125	-	-	-	30	20	50
200-250	-	-	-	80	50	130

Table 10 Oil capacity for each machine Table.

CAUTION



Check oil level and state, if any doubt about its state, change oil immediately.

The correct oil level in the equipment is the one in the middle of the visor place directly over the pan.

CAUTION



Oil level must be checked when the equipment stopped.

If level is higher than the indicated in the following picture, it would be a leak by the aerators and oil would be heated, this may cause premature degradation.

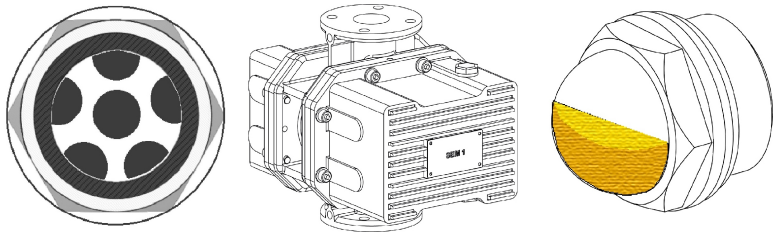


Figure 43. Oil Indicators

If level is too low, the equipment could not be lubricated properly and several damages may occur.

Because of oil viscosity, it is needed some time the oil stabilization in its correct level, by the end of the process put small quantities each time till having the correct level.

Oil quantities indicated in the above table are estimative; always keep the level in the middle of the visor. (When equipment is totally stopped)

Some devices have an oil level in the sound acoustic enclosure, outside, and other devices have visors in L:

-) Equipment's with the oil level in the sound acoustic enclosure, outside: It is important to know that this visor is only to know how the level is, but by checking it, it is impossible to know how is the state of the oil, because of that, oil must be checked in the internal visors.
-) The internal visors placed in L: it must be perfectly perpendicular to avoid incorrect level lectures. This perpendicular must be check before the start up of the equipment and each time we change the oil.

6.4.4.5 OIL CHANGE (MINERAL OR SYNTHETIC)

CAUTION



If there is any doubt about oil state, change it immediately.

To change the oil, pour it in a container opening the lower caps and then add the new oil by removing the top caps.

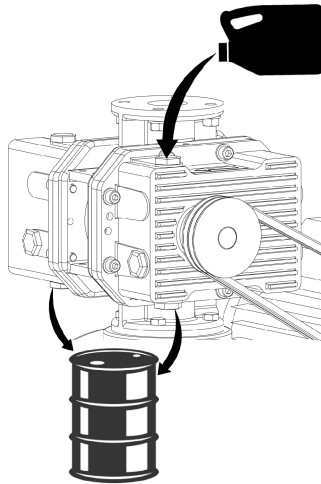


Figure 44. Oil Change.

CAUTION



Mineral or Polyalphaolefin (PAO) oils are mixable.

CAUTION



Oil based in Polyglycol (PAG) cannot be mixed with other types. Before using them, the oil pans must be perfectly cleaned. Otherwise, oil may deteriorate prematurely causing equipment failure.

ENVIROMENT



Used oil disposal must be carried out in accordance to local regulations.

The oil that it is going to be change must be totally purged when it is still heated. In case of having degradation or dirty deposits, the oil pans must be cleaned before using new oil.

WARNING



WEAR PROTECTIVE GLOVES TO AVOID BURNS DUE TO THE TEMPERATURE OF THE OIL.

For eventual topping up, only the same oil type must be used.

6.5 PROLONGED PERIOD SHUTDOWN MAINTENANCE

Firstly, empty the oil from the crankcases and fill with new lubricant.

ENVIROMENT



Used oil disposal must be carried out in accordance to local regulations.

Every month, turn over the machine for approximately 5 minutes in order to relubricate moving internal parts.

Protect external machined areas in damp environments.

In cases of prolonged immobilization – over three (3) months in storage – the internal chambers must be protected with anti-corrosion oil, as must the piston surfaces and all machined components.



The following operations must also be carried out:

-) Fill the lubrication crankcases (AV+AR) to reach halfway up the sight glass.
-) Protect the blower equipment with a plastic cover.
-) Block the inlet and discharge flanges.
-) Manually turn the machine shaft or drive pulley (each month).
-) Check the internal state of the blower core before final assembly.

In machines working with potentially oxidizing gases, before stopping the machine, a cleaning with an inert gas must be done in order to reduce this effect, after that the exposed surfaces must be protected with an antioxidant product.

At the time of restarting the machine, lubricating oil must be changed and the start up instructions given in the manual must be followed.

7. TROUBLESHOOTING

FAULT	POSSIBLE CAUSES	SOLUTION
<p>Overheating of the blower core.</p> 	<p>Increase in differential pressure</p> <p>Inlet filter clogged.</p> <p>Insufficient ventilation.</p> <p>Excess oil or inadequate viscosity.</p>	<p>Check operating pressure.</p> <p>Clean or change the filtering element.</p> <p>Verify the ventilation system.</p> <p>Check oil level and properties.</p>
<p>Unusual noise during the operation.</p> 	<p>Damaged bearings.</p> <p>Belt misalignment.</p> <p>Belts rubbing on the guard.</p> <p>Friction between pistons or with the stator.</p> <p>Dirt adhering to the pistons.</p> <p>Foreign bodies in the fluid chamber</p>	<p>Change them.</p> <p>Check and align correctly.</p> <p>Check and correct.</p> <p>Check for correct clearance.</p> <p>Clean</p> <p>Inspect and remove if any.</p>
<p>Leakage of lubricating oil or fluid to the outside of the blower core and inside of the fluid chamber.</p> 	<p>Excess oil in the oil sumps.</p> <p>Worn segments.</p> <p>Damaged seal.</p> <p>Loose drain plug or damaged gasket.</p> <p>Cracked indicator or damaged gasket.</p> <p>Leakage through installation connections.</p> <p>Leakage through the pressure / vacuum relief valve.</p>	<p>Check and reduce the oil level.</p> <p>Change them.</p> <p>Change it.</p> <p>Retighten the plug or change the sealing gasket.</p> <p>Replace as appropriate.</p> <p>Check and replace if required</p> <p>Check valves and working conditions.</p>

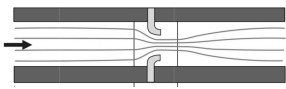

FAULT	POSSIBLE CAUSES	SOLUTION
<p data-bbox="176 399 420 422">Insufficient inlet flowrate.</p> 	<p data-bbox="498 247 739 319">The flowrate required for operation differs from the requested specification.</p> <p data-bbox="498 343 711 391">Air escape through the tubes.</p> <p data-bbox="498 406 632 430">Clogged filter.</p> <p data-bbox="498 454 711 502">Air escape through the machine at rest.</p> <p data-bbox="498 518 666 542">Insufficient speed.</p> <p data-bbox="498 558 627 582">Worn pistons.</p> <p data-bbox="498 606 733 678">Real working conditions different from the design values.</p>	<p data-bbox="767 247 946 319">Check the blower's performance characteristics.</p> <p data-bbox="767 343 968 391">Check for leaks in the pipes.</p> <p data-bbox="767 406 924 430">Clean or replace.</p> <p data-bbox="767 454 968 502">Check the non-return valves.</p> <p data-bbox="767 518 834 542">Check.</p> <p data-bbox="767 558 896 582">Change them.</p> <p data-bbox="767 606 980 654">Contact with MAPNER Technical Department.</p>
<p data-bbox="134 734 464 782">Energy consumption of drive motor too high.</p> 	<p data-bbox="498 702 733 774">The operating conditions do not conform to those specified in the order.</p> <p data-bbox="498 790 716 837">Incipient seizing due to mechanical friction.</p> <p data-bbox="498 861 722 909">Mechanical or electrical damage of the motor.</p> <p data-bbox="498 933 705 981">Voltage drop or phase shift in the mains.</p> <p data-bbox="498 1005 649 1045">Incorrect motor connection.</p>	<p data-bbox="767 710 879 734">Check data.</p> <p data-bbox="767 758 946 805">Inspect the blower core.</p> <p data-bbox="767 821 901 869">Overhaul by manufacturer.</p> <p data-bbox="767 893 924 965">Check the mains voltage on the terminals.</p> <p data-bbox="767 981 940 1037">Check and correct motor connection.</p>
<p data-bbox="140 1069 459 1117">Non rotating effect after stopping the blower.</p>	<p data-bbox="498 1069 694 1117">Non-return valve damaged or blocked.</p>	<p data-bbox="767 1069 974 1117">Check and change it if necessary.</p>

Table 11. Troubleshooting.

CAUTION



If you observe any trouble, stop the machine immediately, check for the possible causes and repair as appropriate.

Upon completion of the repair, check for free rotation of the drive shaft. Also check for correct operation after restarting the machine.

All the measurement and control equipment used must be calibrated and have the corresponding calibration certificate issued by an accredited body by ENAC or its equivalent.

8. ANNEXES

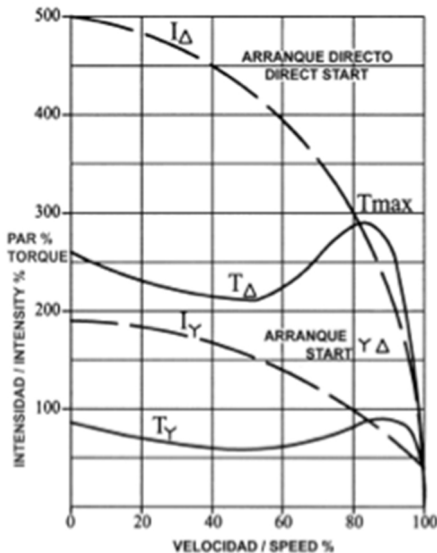
8.1 ELECTRIC MOTORS

The data show on the graphs and tables in this document are based on mean values received from different manufacturers.

In their standard design version, the motors are ready to operate at maximum room temperatures of up to 40°C and at a maximum height above sea level of 1000 meters. For operation at higher temperatures or heights, the following correction factors apply,

Using a frequency inverter may affect the motor performance adversely, to a variable extent according to the motor size and manufacturer.

MOTOR STARTING CHARACTERISTICS CURVE



T_{Δ} : Characteristics for delta starting

T_{γ} : Characteristics for Wye starting

T_{max} : Máximo torque

I_{Δ} : Current intensity on direct starting

Figure 45. Motor Starting Characteristics Curve.

Room temperature °C	30	40	45	50	55	60	65	70	75	80
Admissible output power as a percentage (%) of the rated power.	107	100	96.5	93	90	86.5	82	79	74	70

Table 12. Room Temperature.

* Requires special lubricant and shorter lubrication times.

Height above sea level (m).	1000	1500	2000	2500	3000	3500	4000
Admissible output power as a percentage (%) of the rated power.	100	96	92	88	84	80	76

Table 13. Height Above Sea Level.

8.1.1 Blower Starting Torque

Blower starting on load with a pressurized fluid pipeline demands maximum starting torque at a speed rating that may fluctuate between 25 and 30% of the rated speed.

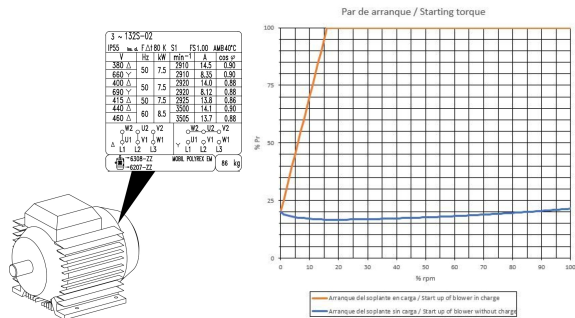


Figure 46. Blower Starting Torque.

Permissible number of motor starts:

-) Motors up to 90 Kw: 4 start per hour.
-) Motors from 110 Kw: 2 start per hour.

For additional information refer to supplier’s documentation.

8.2 ELECTRICAL SCHEMES

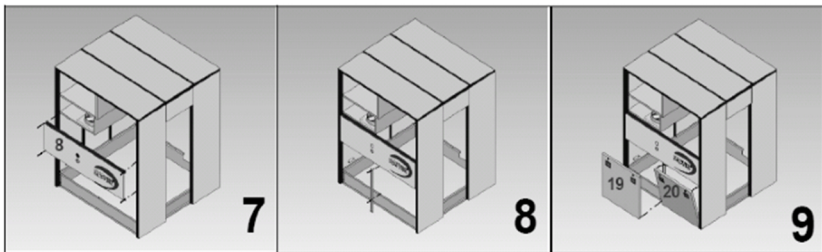
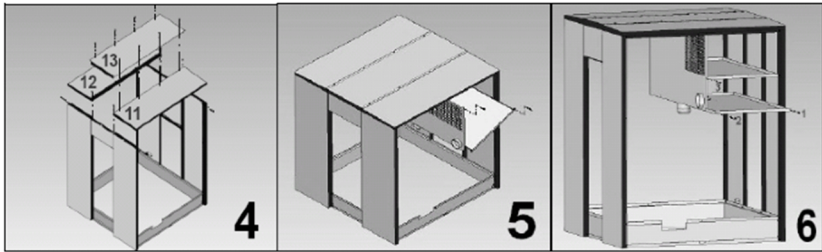
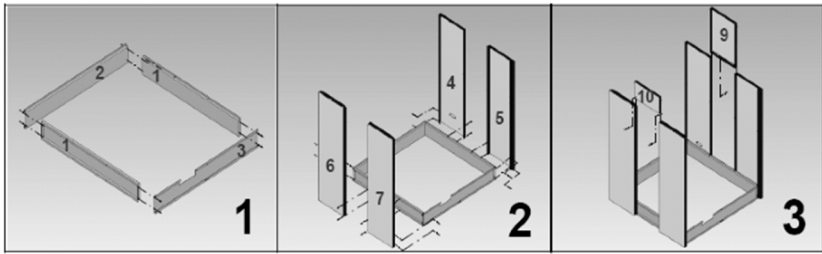
CAUTION

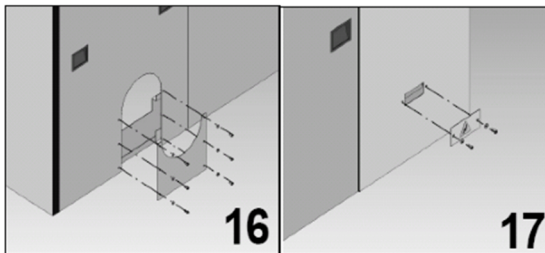
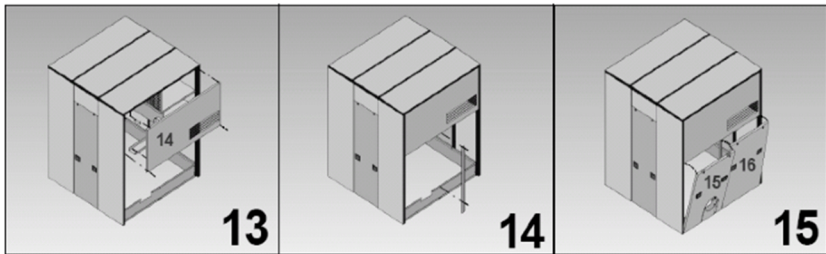
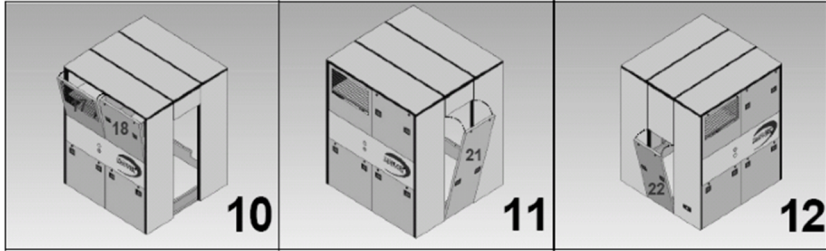


All the conductive parts of the equipment must be placed in such a way that a potential difference does not exist between them.

Refer to Motor manufacturer manual to check connection diagrams before connecting electric motors.

8.3 ASSEMBLY OF STANDARD SOUNDPROOFING CABIN DN 250-DN 300





On machines working in pressure conditions, mount the fluid recirculation flexible pipe. It must be connected in the outlet of the pressure valve and the outlet must be held and secured to the connection prepared on the extraction fan area.

CAUTION



The flexible pipe must remain completely fixed, in case of getting loose during machine operation it could damage the blower.

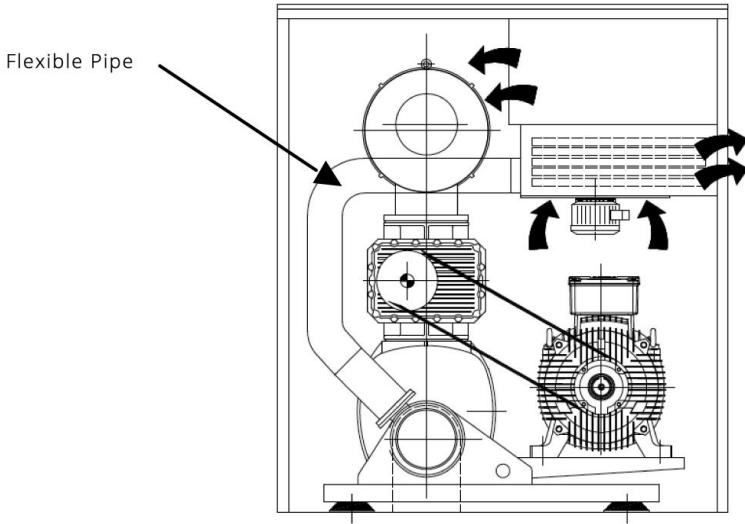


Figure 47. Recirculation of the Pressure Valve.

In machines which have external oil filling system, after mounting the cabin, oil tank should be assembled on the panel area enabled for that purpose. Additionally filling and emptying pipes must be connected.

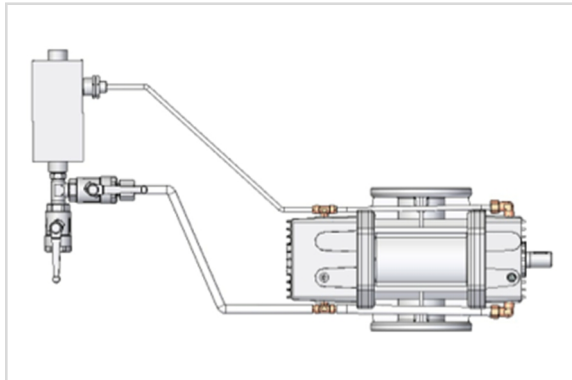
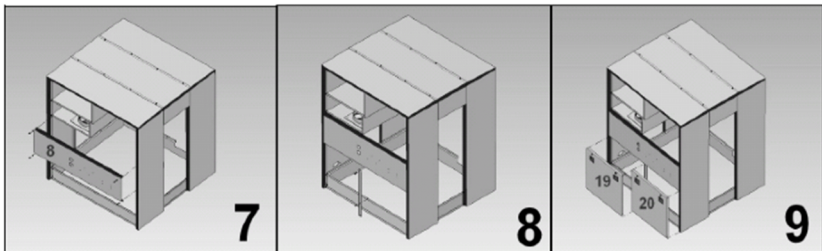
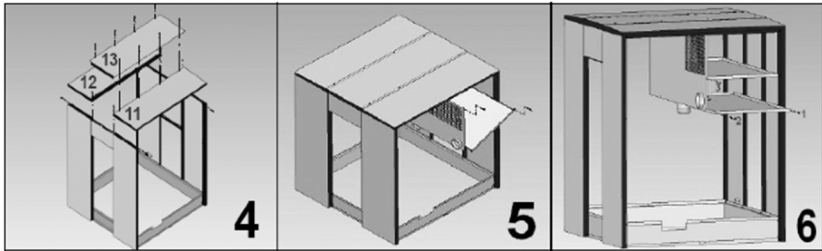
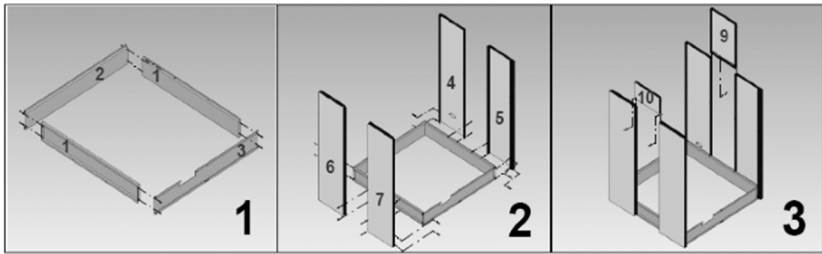
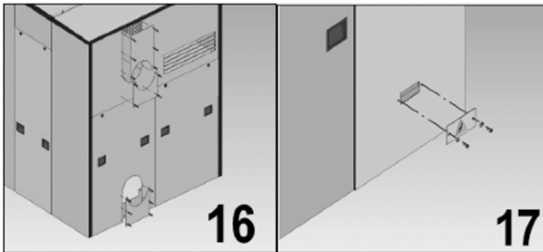
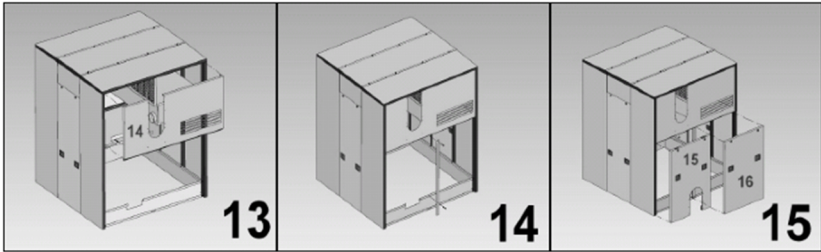
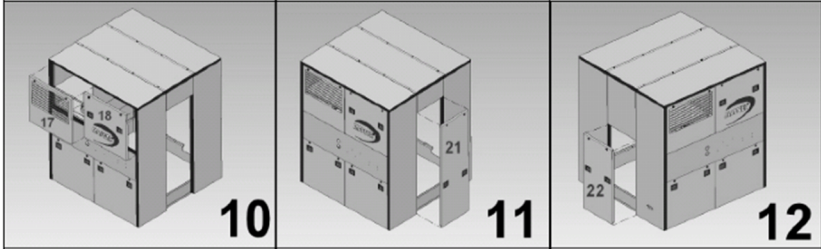


Figure 48. Oil Filling System.

8.4 ASSEMBLY OF ATEX SOUNDPROOFING CABIN DN 250-DN 300







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Certifications

