

**Battioni
Pagani
Pompe S.p.A.**

COMPANY
WITH QUALITY SYSTEM
CERTIFIED BY DNV
=ISO 9001/2000=

GB



Serie

***MEC, SE, TL,
STAR, AGRI***

***INSTRUCTION MANUAL FOR USE
AND MAINTENANCE***

INTRODUCTION

The Exhausters/Compressors of the MEC series have been designed and constructed in compliance with EEC safety regulations and have been assessed for risks according to standard EN 1050; in particular they are in conformity with directive 98/37/CE and subsequent modifications and additions.

This manual contains the Declaration of Conformity with the above-mentioned directive and all the instructions necessary for users and plant constructors to use our products in safety; therefore this manual must always be kept in the vicinity of the Exhauster/Compressor.

The instructions contained in this manual must be read carefully before carrying out any operation with or on the Exhauster/Compressor.



This danger symbol in the manual means that important safety instructions are given. This information is destined primarily for the operator whose responsibility it is not only to comply with them personally, but also to ensure compliance by other persons exposed to the connected risks.

The descriptions and illustrations in this manual are purely indicative.

The manufacturer reserves the right to make any type of change to this manual at any time.

GUARANTEE

At the moment of receiving the Exhauster/Compressor check that it is complete with all its parts.

Any anomalies or missing parts must be notified within 8 days of receipt of the product.

The Supplier guarantees that the product sold is free from defects and undertakes to repair or, by final decision, to replace the faulty parts only if the defects are clearly attributed to the manufacturing process or to the materials used. In any case the costs of labour, travel and transport, and any customs expenses shall be paid by the Purchaser. The vendor is not obliged to pay damages except in the case of fraud or grave offence. All parts subject to normal wear are excluded from the guarantee. The guarantee will cease to be valid if:

- the faults reported are the result of accidents or obvious carelessness or negligence on the part of the Purchaser,
- the parts have been modified, repaired or fitted by persons not authorised by the vendor,
- the failures and breakages have been caused by use that is unsuitable or heavier than that provided for by the vendor,
- the Purchaser has failed to make the payments as agreed by contract.

The Purchaser loses his/her right to the guarantee if he/she fails to report the defects to the vendor within 8 days of discovery, making an exception to article 1512 of the Italian Civil Code. The Vendor reserves the right to make changes or improvements to his/her products without being obliged to make the same changes or improvements to the units already produced and/or delivered previously. The Vendor is not responsible for accidents or for the effects of accidents to people or property due to defective materials and/or workmanship.

BATTIONI PAGANI POMPE S.p.A.

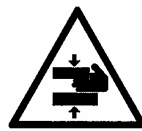
OBLIGATORY SAFETY SIGNS TO BE DISPLAYED IN THE WORK PLACE AND IN THE VICINITY OF THE EXHAUSTER/COMPRESSOR



Moving parts



High temperature



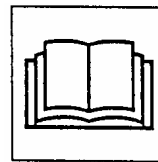
Danger of crushing



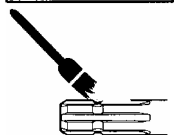
Individual means of protection that it is obligatory to use



Do not enter the working area of the moving cardan shaft. Avoid wearing work clothes with parts or flaps that could get hooked up



Read this manual before starting to use the Exhauster/Compressor



Maintenance to be carried out



Direction of rotation of the handle to select suction or compression phases



CONDITIONS AND LIMITS OF USE – LIST OF DANGERS

In the Common Market countries, the installation must comply with directive 89/392/CE and subsequent modifications, while in the other countries it must comply with the safety regulations of the country.

This Exhauster/Compressor has been designed to create a vacuum or pressure inside a tank connected to it.

Under no circumstances must liquids, dust or any kind of solid matter enter the Exhauster/Compressor because they could cause it to break. Therefore it is necessary to equip the system with safety valves.



The use of the Exhauster/Compressor for any purpose other than that specified above is absolutely forbidden, not provided for by the manufacturer and therefore highly dangerous.

Do not use the Exhauster/Compressor to handle flammable and/or explosive liquids and materials or for materials that give off flammable gasses.

Never remove the guards fitted on the Exhauster/Compressor and always check their efficiency every time the machine is used.

Any work on the machine must be carried out while it is not running.

Failure to comply with the instructions given in this manual may lead to the following dangers:

- Danger of being crushed by the Exhauster/Compressor mass during handling and transport;
- Danger of getting entangled in the shaft transmission parts if the necessary guards are removed;
- Heat dangers due to the temperatures that can be reached by the Exhauster/Compressor;
- Acoustic danger due to the noise generated and to failure to use personal means of protection;
- Danger to operator's hands during testing with suction and delivery tubes detached from the pump;
- Danger of abrasion from the shaft of the hydraulic pump support if the Exhauster/Compressor is operated with the hydraulic pump removed.

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GENERAL INFORMATION

1 - VERSIONS OF THE EXHAUSTER/COMPRESSOR

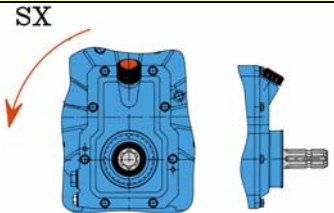
The Exhausters/Compressors can be supplied in the following versions:

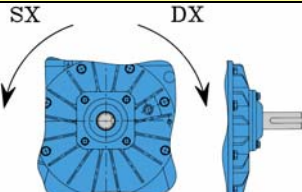
SERIE	M	MA	P	D	H	K	KA	G	GA
MEC 1000/1600	O	-	O	-	-	-	-	-	-
MEC 2/3/4000	O	-	O	O	O	-	-	O	O
MEC 5/6.5/8000	O	-	O	O	O	-	-	O	O
TL 5000/6000	O	-	-	-	-	-	-	-	-
SE 6500/8000	O	-	O	O	O	O	-	-	-
SE 10/12000	O	-	O	O	O	O	-	O	O
STAR 60-72-84	O	O	O	O	O	O	O	O	O
AGRI 60-72-84	O	O	O	O	O	O	O	O	O

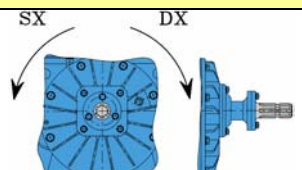
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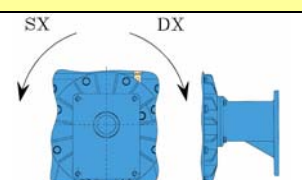
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Table 1

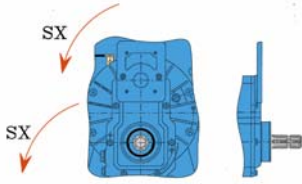
.../ M VERSION-.../MA VERSION (with gearbox)	
<p>Anticlock wise</p> <p>As series</p> 	<ul style="list-style-type: none"> • ... / M the power take-off is actuated through a cardan shaft at 540 r.p.m. This version can be recognised by the gearbox placed at the front of the Exhauster/Compressor and by the identification plate. • ... / MA the power take-off is actuated through a cardan shaft at 1200 r.p.m. This version can be recognised by the gearbox placed at the front of the Exhauster/Compressor, by the identification plate and by the punching placed on the upper part of the gearbox.

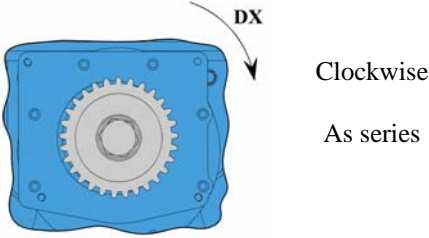
.../ P VERSION (for pulley application)	
<p>Anticlock wise</p> <p>On request</p> 	<p>Clock wise</p> <p>As series</p> <ul style="list-style-type: none"> • ... / P the power take-off is actuated through a pulley and belts. This version can be recognised by the cylindrical shaft with key of the power take off and by the plate, .../P pulley application.

.../ D VERSION (direct drive)	
<p>Anticlock wise</p> <p>As series</p> 	<p>Clock wise</p> <p>On request</p> <ul style="list-style-type: none"> • ... / D the power take-off is actuated through a cardan shaft directly connected to the splined hub. This version can be recognised by the splined hub placed at the front of the Exhauster/Compressor and by the identification plate, .../D direct drive

.../H VERSION (for hydraulic drive)	
<p>Anticlock wise</p> <p>On request</p> 	<p>Clock wise</p> <p>As series</p> <ul style="list-style-type: none"> • ... / H the power take-off is actuated through a gears hydraulic motor. This version can be recognised by the hydraulic motor support placed at the front and by the identification plate, .../H hydraulic drive.



.../ K VERSION –.../KA VERSION (with gearbox and hydraulic pump support)	
<p>Anticlock wise</p> <p>As series</p> 	<ul style="list-style-type: none"> • ... / K the power take-off is actuated through a cardan shaft at 540 rpm and is designed to actuate an hydraulic pump of group 2 or group 3. This version can be recognised by the hydraulic pump support and by the identification plate. • ... / KA the power take-off is actuated through a cardan shaft at 1200 rpm and is designed to actuate an hydraulic pump of group 2 or group 3. This version can be recognised by the hydraulic pump support, by the identification plate and by the punching placed on the upper part of the gearbox.
<p>Versions... /K and ... /KA have been designed so that they can be used to actuate the hydraulic accessories (gate valves, draft tube, support base etc.) on the tank car because in many cases the hydraulic pump on the tractor does not have sufficient oil flow rate for all the movements. With this application all the work may be carried out from the tractor cabin by operating only one distributor</p>	

.../ G VERSION –.../GA VERSION (application for GARDA or LEDRA)	
 <p>Clockwise</p> <p>As series</p>	<ul style="list-style-type: none"> • ... / G version of Exhauster/Compressor that is applied on the GARDA or the LEDRA group; it cannot be used on its own. This version can be recognised by the external pinion placed at the front of the Exhauster/Compressor and by the identification plate. • ... / GA version of Exhauster/Compressor that is applied on the GARDA or the LEDRA group at 1000 rpm; it cannot be used on its own. This version can be recognised by the external pinion placed at the front of the Exhauster/Compressor and by the identification plate.

All the versions of the STAR and AGRI series of Exhausters/Compressors can be supplied with back tank in cast iron (versions /MV, /MAV, /PV, /DV, /HV, /KV /KAV) or with extractable side tank in sheet metal (versions /MF, /MAF, /PF, /DF, /HF, /KF, /KAF).

INSTRUCTIONS FOR USE AND MAINTENANCE

2 - PACKAGING, STORAGE, HANDLING AND TRANSPORT

2.1 PACKAGING

The Exhausters/Compressors are supplied without packaging. On request the following packaging can be used:

- wooden base and shrink-wrap;
- wooden cases and shrink-wrap for shipment by sea or air.

2.2 STORAGE

In order to preserve the Exhauster/Compressor correctly, it must be stored:

- under cover, sheltered from adverse weather conditions;
- resting horizontally on its four feet.

The Exhausters/Compressors are lubricated during testing at our factory with special oil that ensures lubrication of the various internal components for approx. 6 months.

In the event of subsequent storage it is advisable to wash the inside of the body with oil and diesel oil (as stated on this manual).

2.3 HANDLING AND TRANSPORT

Mass of Exhauster/Compressor: (see technical sheet).



The Exhauster/Compressor should be:

- *Harnessed by means of metal hooks inserted in the hole for gripping, or a sling;*
- *Lifted with a hoisting truck (if on pallet), bridge crane, or crane.*

The Exhauster/Compressor is supplied with a guard that is in compliance with EC directives. This guard should be fitted on by the fitter using the four screws supplied.

3 - ASSEMBLY, FITTING, INSTALLATION, DISASSEMBLY, RE-FITTING

The procedures concerning Exhausters/Compressors versions .../G and .../GA are given in the GARDA/LEDRA group instructions.

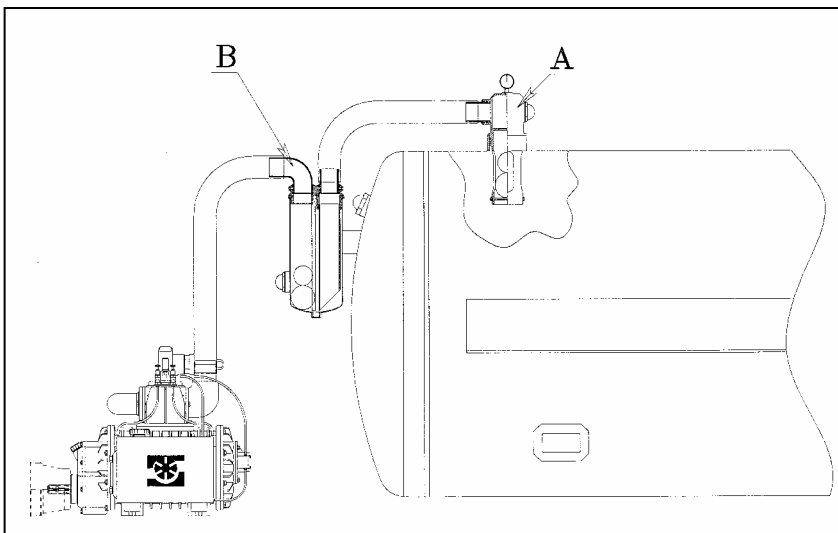


When carrying out maintenance operations, inspections, checks and repairs you are advised to wear the individual means of protection listed in this manual.



All maintenance operations, inspections, checks and repairs should be carried out with the greatest care and with the tractor not running and the power take-off disconnected.

3.1 INSTALLATION DRAFT



It is essential to prevent sewage from entering the Exhauster / Compressor. The entrance of sewage would cause the so-called "water hammer" causing the blades and consequently the rotor to break.

It is therefore necessary to equip the system with an overflow valve, "A", and a safety overflow valve, "B", between the Exhauster/Compressor and the tank (see Figure 1)

Figure 1



3.2 DOUBLE OUTLET INSTALLATION DRAFT

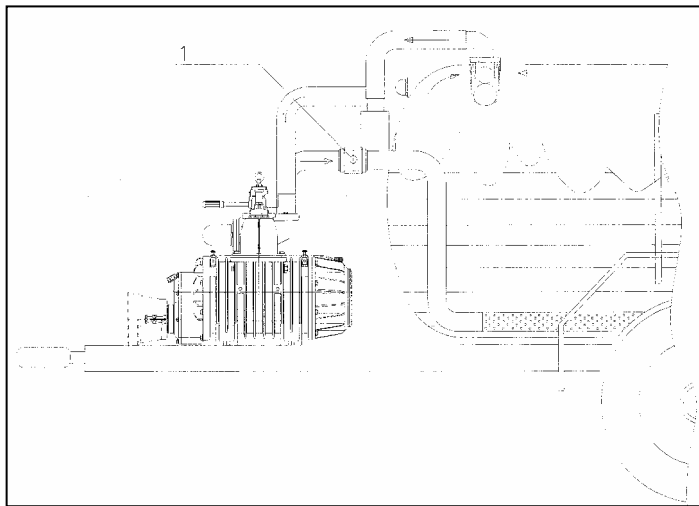


Figure 2

The Exhauster/Compressor can be used as a mixer by fitting, on request, a double outlet on the manifold (see Figure 2). In this case there will be the intake of a normal Exhauster/Compressor, but a perforated tube placed inside the tank car must be used for the compression. When the handle is positioned on the compression phase, the air will be forced out through the holes in the tube so causing mixing of the previously loaded sewage. (Never exceed the maximum working absolute pressure of 2,5 bar equal to 1,5 relative bar.



With this system, a check valve (1) must be fitted on the delivery tube to prevent the transfer of sewage inside the Exhauster/Compressor.

3.3 ASSEMBLY AND FITTING - INSTALLATION

The Exhauster/Compressor should be assembled and installed using the following procedure:

- 1) Assemble the Exhauster/Compressor horizontally with its feet facing downwards. The assembly position on the vehicle should be easy to access and be protected. A 5° maximum longitudinal slope of the Exhauster/Compressor with respect to the horizontal plane must not be exceeded.
- 2) Bolt the Exhauster/Compressor using screws and nuts passing through the specially provided slots or holes in the feet;
- 3-M) To install the .../M version Exhauster/Compressor, connect the cardan shaft at 540 r.p.m. of the tractor to the P.T.O. shaft of the Exhauster/Compressor.



The maximum slope allowed for the cardan shaft is 15°. On no account must this slope be exceeded. With cardan shaft equipped with special joint it is possible to get an higher slope (apply the supplier of cardan shaft).

3-P) To install the .../P version Exhauster/Compressor, attach a driven pulley to the P.T.O. shaft and fix it with the special screw located on the front of the shaft. The driven pulley may be fitted directly on the cylindrical shaft if the radial load is brought close to the bearing. Never transfer axial loads. Then connect the driven pulley to the driving pulley with the correct length of driving belts. The number and type of belts must be calculated according to the power to be transferred to the Exhauster/Compressor. When this operation has been completed, the necessary guard must be installed to isolate the driving parts (pulleys and belts) and prevent access to them by the operators.



The tension of the belts should be such that when they are stretched they can be stretched further by approx. 2 cm. A belt tension exceeding this may cause breakage of the shaft.

3-D) To install the .../D version Exhauster/Compressor, connect the cardan shaft at 1000 rpm of the tractor to the P.T.O. shaft of the Exhauster/Compressor.



The maximum slope allowed for the cardan shaft is 15°. On no account must this slope be exceeded. With cardan shaft equipped with special joint it is possible to get an higher slope (apply the supplier of cardan shaft).

3-H) To install the .../H version Exhauster/Compressor, attach an hydraulic motor (flanging European unification - Group 3,5 for MEC series and Group 4 for STAR, AGRI and SE series) to the power take-off shaft and fix it, using special screws, to the cast iron support located at the front.

4) Then connect the intake/compression pipe of the tank car to the Exhauster/Compressor tightening it to the adjustable elbow using metal clamping bands in relation to the diameter of the pipe.

3.4 DISINSTALLATON

The Exhauster/Compressor should be disinstalled using the following procedure:

- | | | | |
|-------------------------------|-------------------------------|-------------------------------|-----------------------|
| .../M-K | .../P | .../D | .../H |
| 1) stop the power take-off of | 1) stop the power take-off of | 1) stop the power take-off of | 1) stop the hydraulic |
- 14 / VI

- | | | | |
|--|------------------------------|--|---|
| the tractor; | the tractor; | the tractor; | system; |
| 2) remove the cardan shaft from the power take-off of the Exhauster/Compressor | 2) remove the driving belts; | 2) remove the cardan shaft from the power take-off of the Exhauster/Compressor | 2) remove the hydraulic connections to the motor; |
- 3) remove the connecting pipe that joins the Exhauster/Compressor to the tank car, by loosening the metal band and sliding the pipe from the adjustable elbow;
 - 4) remove any hydraulic connections;
 - 5) remove the clamping screws and disinstall the Exhauster/Compressor.

3.5 DISASSEMBLY

3.5.1 Back disassembly

MEC series

- 1) Remove the back cover or the lubrication pump (together with the connector joint) from the flange;
- 2) Remove the screws from the back flange;
- 3) Use two screws for screwing into the threaded extraction holes until the flange is removed;

TL series

- 1) Empty out the oil tank using the oil drain plug;
- 2) Remove the oil tank by unscrewing the clamping screws;
- 3) Disconnect pipes of the oil pump and disassemble it unscrewing the screws;
- 4) Unscrew the clamping screws of the rear flange on the pump body and remove the flange by using 2 screws as extractor;

SE, STAR - AGRI /V (with rear cast iron oil tank)

1. Remove the tank cover and the lubrication pump (together with the connector joint) from the back tank;
2. Remove the screws from the back tank;
3. Use two screws for screwing into the threaded extraction holes until the tank is removed;

STAR - AGRI /F (with rear flange and extractable side sheet oil tank)

1. Close the oil cock placet on the tank
2. Remove the back cover with the lubrication pump (together with the connector joint) from the flange;
3. Remove the screws from the back flange;
4. Use two screws for screwing into the threaded extraction holes until the flange is removed;

3.5.2 Front disassembly

.../M-K

- 1) Unscrew the screws of the gearbox cover;
- 2) Use two screws for screwing into the threaded extraction holes until the cover is removed;
- 3) Remove the gear with splined shaft using an extractor if necessary;
- 4) For the pinion: unscrew the self-locking nut, use an extractor;
- 5) Slide the rotor from the body together with the gearbox;

.../P

- 1) Remove the driven pulley and the key;
- 2) Disassemble the front cover from the flange;
- 3) Remove the screws from the front flange;
- 4) Slide the rotor from the body;

.../D

- 1) Remove the flange with splined shaft;
- 2) Remove the sleeve with transmission flange and key
- 3) Disassemble the front cover from the flange;
- 4) Remove the clamping screw from the splined hub;
- 5) Slide the splined hub from the rotor shaft;
- 6) Remove the screws from the front flange;
- 7) Slide the rotor from the body;

.../H

- 1) Disassemble the hydraulic motor from its support;
- 2) Remove the hydraulic motor support;
- 3) Remove the clamping screw located inside the sleeve and then slide the sleeve out;
- 4) Remove the screws from the front flange;
- 5) Slide the rotor from the body;

3.6 RE-FITTING – RE-INSTALLATION

IMPORTANT: Before proceeding with any re-fitting, replace the gaskets of the opened parts.

3.6.1 Re-fitting of the back

MEC series

- 1) Remove the bearing and the spacer from the back flange;
- 2) Replace the flange gasket;
- 3) Bring the back flange up to the pump body, aligning it with the clamping holes;
- 4) Insert the 6 clamping screws in the holes and tighten them;
- 5) Fit the bearing on the flange using a drift;
- 6) Insert the spacer;
- 7) Re-fit the back cover or the lubrication pump (together with the connector joint) on the flange.



TL series

- 1) Remove the bearing and the spacer from the back flange;
- 2) Replace the flange gasket;
- 3) Bring the back flange up to the pump body, aligning it with the clamping holes;
- 4) Insert the 6 clamping screws in the holes and tighten them;
- 5) Fit the bearing on the flange using a drift;
- 6) Insert the spacer;
- 7) Re-fit the back cover or the lubrication pump (together with the connector joint) on the flange.

SE, STAR - AGRI /V (with rear cast iron oil tank)

1. Remove the bearing from the back tank;
2. Replace the pump body gasket;
3. Bring the back tank up to the pump body, aligning it with the clamping holes;
4. Insert the clamping screws in the holes and tighten them;
5. Fit the bearing on the tank using a drift;
6. Put back the tank cover and the lubrication pump (together with the connector joint) on the back tank;
7. Fill up the oil tank with oil for lubrication;

STAR - AGRI /F (with rear flange and extractable side sheet oil tank)

1. Remove the bearing from the back flange;
2. Replace the pump body gasket;
3. Bring the back flange up to the pump body, aligning it with the clamping holes;
4. Insert the clamping screws in the holes and tighten them;
5. Fit the bearing on the flange using a drift;
6. Put back the back cover and the lubrication pump (together with the connector joint) on the back flange;
7. Open the cock placed on the side tank

3.6.2 Re-fitting of the manifold (except TL series)

- 1) Replace the manifold gasket;
- 2) Position the manifold on the pump body;
- 3) Tighten the clamping screws of the manifold.

3.6.3 Re-fitting of the front

<i>.../M-K</i>	<i>.../P</i>	<i>.../D</i>	<i>.../H</i>
1) Replace the flange gasket;	1) Remove the bearing and the spacer;	1) Remove the bearing and the spacer;	1) Remove the bearing and the spacer;
2) Fix the gearbox to the body with screws;	2) Replace the flange gasket;	2) Replace the flange gasket;	2) Replace the flange gasket;
3) Fit the pinion to the shaft;	3) Bring the front flange up to the pump body, aligning it with the clamping holes;	3) Bring the front flange up to the pump body, aligning it with the clamping holes;	3) Bring the front flange up to the pump body, aligning it with the clamping holes;
4) Fit the spacer (only MEC series)	4) Insert the clamping screws in the holes and tighten them;	4) Insert the clamping screws in the holes and tighten them;	4) Insert the 6 clamping screws in the holes and tighten them;
5) Fit the self-locking nut for fixing the pinion;	5) Fit the bearing on the flange using a drift;	5) Fit the bearing on the flange using a drift;	5) Fit the bearing on the flange using a drift;
6) Insert the gear in the bearing seat;	6) Insert the spacer (only MEC series);	6) Insert the spacer;	6) Insert the spacer;
7) Fit the gearbox cover;	7) Put the front cover back on the flange.	7) Put the front cover back on the flange.	7) Put the transmission sleeve back on the rotor pin;
8) Fill up the gearbox with oil;		8) Re-fit the splined hub;	8) Re-fit the hydraulic motor support;

To re-install proceed as for the first installation.

3.7 CORRECT POSITIONING OF REVERSING GEAR

To position the reversing gear correctly, follow the procedure below:

1. remove the handle (MEC series) or the reversing selector;
2. remove the manifold cover;
3. check that the flat part of the reversing gear is positioned at 45° to the power take-off;
4. re-fit the manifold cover and the handle (MEC series) or the reversing selector.

4 - HYDRAULIC DRAFT (.../H VERSION)

The hydraulic system required for the operation of Exhauster/Compressor .../H is schematized in **Figure 3** and the technical characteristics of the hydraulic motor are shown in **Table 2**. The splining of the hydraulic motor is of type DIN 5482 - Z=23 for STAR, SE and AGRI series and of type DIN 5482 - Z =20 for MEC series.

		<table border="1"> <thead> <tr> <th>Exhauster Compressor</th> <th>Hydraulic motor</th> <th>Flow rate</th> <th>Rpm</th> <th>Pressure</th> <th>Transmitted power</th> </tr> </thead> <tbody> <tr> <td><i>MEC 2000 / H</i></td> <td>KM 30.51</td> <td>75 l/min</td> <td>1400</td> <td>87 bar</td> <td>8,2 kW</td> </tr> <tr> <td><i>MEC 3000 / H</i></td> <td>KM 30.51</td> <td>75 l/min</td> <td>1400</td> <td>135 bar</td> <td>12,5 kW</td> </tr> <tr> <td><i>MEC 4000 / H</i></td> <td>KM 30.51</td> <td>75 l/min</td> <td>1400</td> <td>160 bar</td> <td>15 kW</td> </tr> <tr> <td><i>MEC 5000 / H</i></td> <td>KM 30.61</td> <td>90 l/min</td> <td>1400</td> <td>170 bar</td> <td>19 kW</td> </tr> <tr> <td><i>MEC 6500 / H</i></td> <td>KM 30.61</td> <td>90 l/min</td> <td>1400</td> <td>200 bar</td> <td>22 kW</td> </tr> <tr> <td><i>MEC 8000 / H</i></td> <td>KM 30.73</td> <td>107 l/min</td> <td>1400</td> <td>195 bar</td> <td>26 kW</td> </tr> <tr> <td><i>STAR - AGRI 60 / H</i></td> <td>KM 40.109</td> <td>137 l/min</td> <td>1200</td> <td>175 bar</td> <td>30 kW</td> </tr> <tr> <td><i>STAR - AGRI 72 / H</i></td> <td>KM 40.109</td> <td>137 l/min</td> <td>1200</td> <td>193 bar</td> <td>33 kW</td> </tr> <tr> <td><i>STAR - AGRI 84 / H</i></td> <td>KM 40.109</td> <td>137 l/min</td> <td>1200</td> <td>216 bar</td> <td>37 kW</td> </tr> <tr> <td><i>4 Hydraulic motor support</i></td> <td><i>8 Over-pressure valve</i></td> <td><i>SE 6500 / H</i></td> <td>KM 40.73</td> <td>107 l/min</td> <td>1400</td> <td>158 bar</td> <td>21 kW</td> </tr> <tr> <td><i>5 Hydraulic motor</i></td> <td><i>9 Hydraulic pump</i></td> <td><i>SE 8000 / H</i></td> <td>KM 40.73</td> <td>107 l/min</td> <td>1400</td> <td>173 bar</td> <td>23 kW</td> </tr> <tr> <td><i>6 Radiator</i></td> <td><i>10 Oil Tank</i></td> <td><i>SE 10000 / H</i></td> <td>KM 40.109</td> <td>137 l/min</td> <td>1400</td> <td>175 bar</td> <td>30 kW</td> </tr> <tr> <td><i>7 Distributor</i></td> <td><i>11 Oil Filter</i></td> <td><i>SE 12000 / H</i></td> <td>KM 40.109</td> <td>137 l/min</td> <td>1400</td> <td>193 bar</td> <td>33 kW</td> </tr> </tbody> </table>	Exhauster Compressor	Hydraulic motor	Flow rate	Rpm	Pressure	Transmitted power	<i>MEC 2000 / H</i>	KM 30.51	75 l/min	1400	87 bar	8,2 kW	<i>MEC 3000 / H</i>	KM 30.51	75 l/min	1400	135 bar	12,5 kW	<i>MEC 4000 / H</i>	KM 30.51	75 l/min	1400	160 bar	15 kW	<i>MEC 5000 / H</i>	KM 30.61	90 l/min	1400	170 bar	19 kW	<i>MEC 6500 / H</i>	KM 30.61	90 l/min	1400	200 bar	22 kW	<i>MEC 8000 / H</i>	KM 30.73	107 l/min	1400	195 bar	26 kW	<i>STAR - AGRI 60 / H</i>	KM 40.109	137 l/min	1200	175 bar	30 kW	<i>STAR - AGRI 72 / H</i>	KM 40.109	137 l/min	1200	193 bar	33 kW	<i>STAR - AGRI 84 / H</i>	KM 40.109	137 l/min	1200	216 bar	37 kW	<i>4 Hydraulic motor support</i>	<i>8 Over-pressure valve</i>	<i>SE 6500 / H</i>	KM 40.73	107 l/min	1400	158 bar	21 kW	<i>5 Hydraulic motor</i>	<i>9 Hydraulic pump</i>	<i>SE 8000 / H</i>	KM 40.73	107 l/min	1400	173 bar	23 kW	<i>6 Radiator</i>	<i>10 Oil Tank</i>	<i>SE 10000 / H</i>	KM 40.109	137 l/min	1400	175 bar	30 kW	<i>7 Distributor</i>	<i>11 Oil Filter</i>	<i>SE 12000 / H</i>	KM 40.109	137 l/min	1400	193 bar	33 kW
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Figure 3

Table 2

4.1 HYDRAULIC MOTOR INSTALLATION INSTRUCTION

Pump. The direction of rotation of single-acting pumps must be the same as that of the drive shaft. Check that the coupling flange correctly aligns the transmission shaft and the pumps shaft. Flexible couplings should be used (never rigid fittings) which will not generate an axial or radial load on the pump shaft. **Motor.** The direction of rotation of single-acting motors must match circuit connections. Check that the coupling flange correctly aligns the user shaft and the motor shaft. Flexible couplings should be used (never rigid fittings) which will not generate an axial or radial load on the motor shaft. **TANK.** Tank capacity must be sufficient for the system's operating conditions (~ 3 times the amount of oil in circulation) to avoid overheating of the fluid. A heat exchanger should be installed if necessary. The intake and return lines in the tank must be spaced apart (by inserting a vertical divider) to prevent the return-line oil from being taken up again immediately.

LINES. The lines must have a major diameter which is at least as large as the diameter of motor or pump ports, and must be perfectly sealed. To reduce loss of load, the lines should be as short as possible, reducing the sources of hydraulic resistance (elbow, throttling, gate valves, etc.) to a minimum. A length of flexible tubing is recommended to reduce the transmission of vibrations. All return lines must end below the minimum oil level, to prevent foaming. Before connecting the lines, remove any plugs and make sure that the lines are perfectly clean.

FILTERS. We recommend filtering the entire system flow rate. Filters should be fitted as indicated in the first pages of the catalogue. Only coarse filters are recommended for pump intake. **HYDRAULIC FLUID.** Use hydraulic fluid conforming to ISO/DIN standards, having viscosity as specified in the first pages of the catalogue. Avoid using mixtures of different oils which could result in decomposition and reduction of the oil's lubricating power.

STARTING UP. Check that all circuit connections are exact and that the entire system is completely clean. Insert the oil in the tank, using a filter. Bleed the circuit to assist in filling. Set the pressure relief valves to the lowest possible setting. Turn on the system for a few moments at minimum speed, then bleed the circuit again and check the level of oil in the tank. If the difference between pump or motor temperature and fluid temperature exceeds 10 °C, rapidly switch the system on and off to heat it up gradually. Then gradually increase the pressure and speed of rotation until the pre-set operating levels as specified in the catalogue are attained. **PERIODICAL CHECKS – MAINTENANCE** Keep the outside surface clean especially in the area of the drive shaft seal. In fact, abrasive powder can accelerate wear on the seal and cause leakage. Replace filters regularly to keep the fluid clean. The oil level must be checked and replaced periodically dependig on the system's operating conditions.



5 - START-UP

5.1 OPERATION WITHOUT OVER-PRESSURE VALVE (ONLY MEC SERIES)



Before starting the Exhauster/Compressor make sure that the hole in the manifold cover made for the over-pressure valve is closed with a cover.

5.2 DIRECTION OF ROTATION



Before starting the Exhauster/Compressor make sure that the P.T.O. shaft turns freely and that the direction of rotation is the same as the one indicated by the arrow.

Never turn the Exhauster/Compressor in the direction of rotation opposite to the one for which it has been prepared (indicated by the arrow) as this could damage some components as well as prevent the operation of the Exhauster/Compressor. If it is necessary to reverse the direction of rotation, apply to the supplier of the machine.

6 - SET-UP OF THE LUBRIFICATION SYSTEM

Three different types of lubrication have been developed for the Exhausters/Compressors (see Figure 4).

6.1 NORMAL LUBRICATION

Lubrication occurs during the intake phase only. The vacuum created in the Exhauster/Compressor sucks oil from the tank. In the compression phase lubrication occurs with the residue of oil from the preceding phase. Normal lubrication is available only for models MEC 1000 and MEC 1600 that are manufactured with only this type of lubrication.

6.2 FORCED LUBRICATION

Lubrication occurs in both the intake phase and the compression phase through a gear pump placed at the back and actuated by the rotor shaft. The gear pump sucks oil from the tank and sends it to the manually adjusted metering tap. Excess oil returns to the tank through a tube connecting the tap to the tank. Forced lubrication is available as standard feature on models MEC 2/3/4 5/6.5/8000, SE, STAR, AGRI and TL.

6.3 AUTOMATIC LUBRICATION

With this system lubrication occurs in both the intake phase and the compression phase by means of a piston metering pump with adjustable flow rate placed at the back and actuated by the rotor. The oil is injected directly into the Exhauster/Compressor, eliminating manual adjustment and saving a considerable amount of oil. Automatic lubrication is supplied, on request, on models MEC 2/3/4/5/6.5/8000, STAR, AGRI, SE and TL.

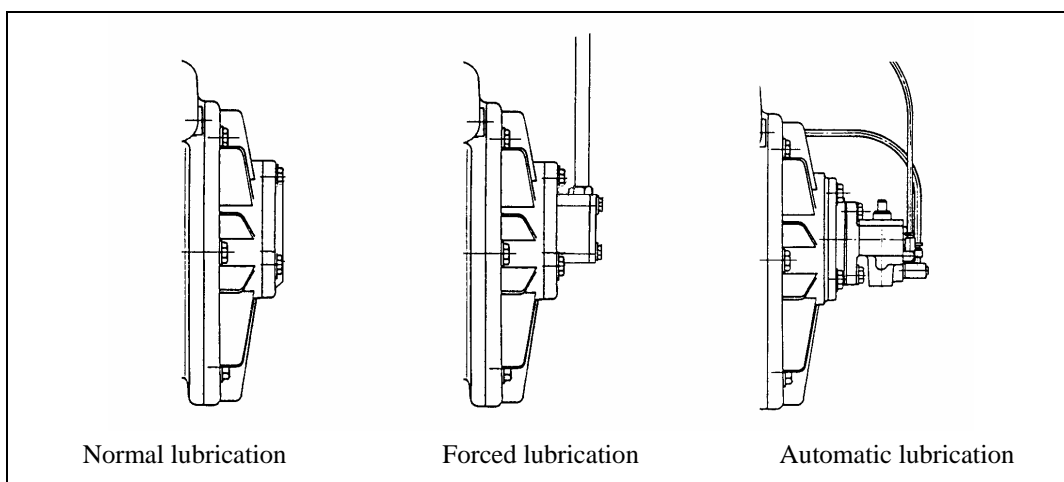


Figure 4

6.4 OIL TO USE

The Exhauster/Compressor is supplied without lubrication oil inside the tank and the gearbox (if exist). Put on the tank the lubrication oil as per Table 3.

Comparative table of main makes of oil for Exhausters/Compressors		
	OIL TANK	GEARBOX
International mark	ISO VG 100	ISO VG 460
REINACH	VER 17	BIVISCOLINA 350
ESSO	NUTO H 100	NUTRAY 460
AGIP	ACER 100	BLASIA 460
MOBIL	DTE OIL EVI	DTE OIL HH
SHELL	VUTREA 100	VITREA 460
CASTROL	MAGNA 100	CRESTA V
IP	HYDRUS 100	HYDRUS 460
BP	CS 100	CS 460
FUCHS	AUSCOM 100	ERPOL EP 460

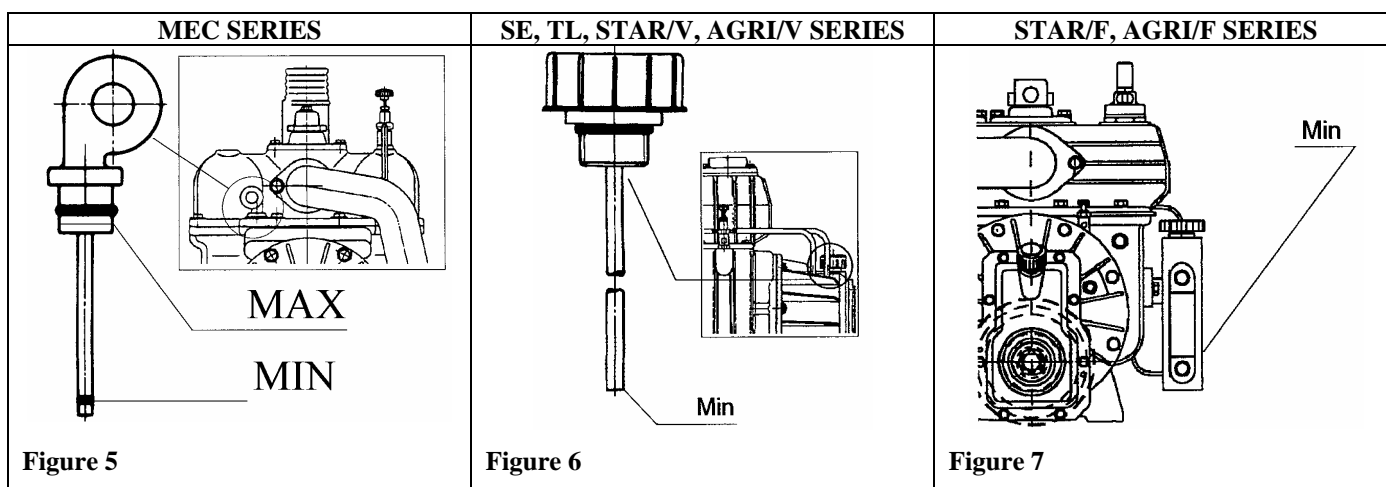
Table 3

Comparative table of main makes of vaseline oil (can be used for food use) for Exhausters/Compressors	
	Oil Tank
REINACH	AL
ESSO	MARCOL 172
AGIP	OBI 10
SHELL	ONDINA OIL 32
VALVOLINE	WHITE ENOS FU

Table 4

ATTENTION: Ecological oil may be used provided it has the same characteristics as the recommended mineral oil. Do not use hydraulic or detergent oil for lubrication.

6.5 OIL LEVEL



MEC series

For internal lubrication, the minimum oil level is indicated by the notch at the lower end of the level rod (see Figure 5) located on the manifold and consequently the maximum level will be reached when the tank is full.

SE, STAR/V, AGRI/V series

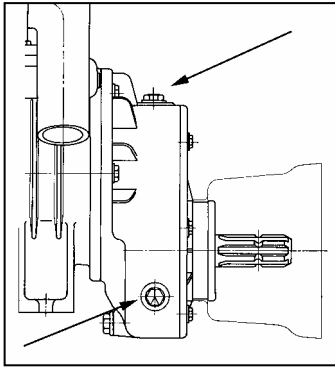
For internal lubrication, the minimum oil level is indicated by the total length of the plug with level rod (see Figure 6) situated in the back tank and the maximum level will be reached with a full tank.

STAR/F, AGRI/F series

For internal lubrication, the minimum oil level is indicated by the lower notch on the indicator placed at the side of the external tank (see Figure 7) and the maximum level will be reached with a full tank

Oil tank capacity [l]								
MEC 1000	MEC 1600	MEC 2000	MEC 3000	MEC 4000	MEC 5000	MEC 6500	MEC 8000	TL
0,6	0,7	1,0	1,2	1,5	2,5	3,1	3,8	2,8
SE 6500/8000			SE 10/12000 STAR-AGRI /V			SE 10/12000 STAR-AGRI /F		
3,1			3,7			4,3		

Tabella 5



M – MA – K – KA VERSIONS: the gearbox has an oil loading plug at the top of the gearbox and an oil level plug (see Figure 8), placed on the side of the gearbox to allow the level to be checked
To ensure correct lubrication, the oil should always be visible in the oil level.

Figure 8

6.6 QUANTITY OF LUBRICATION OIL

When the Exhauster/Compressor is running, check that the quantity of oil indicated in Table 6 is dripping from the special regulator tap. These quantities are valid for both Forced and Automatic Lubrication.

When necessary, add only unused clean oil to the tank.

.../M – MA – K – KA VERSIONS: make the first oil change in the gearbox after approx. 100 working hours and subsequent changes approx. every 300 working hours.

MODEL	Drop/min
MEC 1000	20 - 25
MEC 1600	20 - 25
MEC 2000	25 - 30
MEC 3000	25 - 30
MEC 4000	25 - 30
MEC 5000	30 - 40
MEC 6500	40 - 50
MEC 8000	40 - 50

MODELLO	Drop/min for one tap
TL 5000	30 - 40
TL 6000	40 - 50
SE 6500	20 - 25
SE 8000	25 - 30
SE 10000	30 - 40
SE 12000	35 - 45

MODELLO	Drop/min for one tap
STAR 60	30 - 40
STAR 72	35 - 45
STAR 84	40 - 50
AGRI 60	30 - 40
AGRI 72	35 - 45
AGRI 84	40 - 50

Table 6

6.7 REGULATION FOR LUBRICATING OIL

To adjust the dripping of oil in the Exhauster/Compressor with forced lubrication, turn the regulator ring nut "A" after loosening ring nut "B".

Tighten ring nut "B" again when adjustment has been completed.

The adjustment of oil delivery, in automatic lubrication, is carried out at our factory during final testing of the Exhauster/Compressor.

If, for any reason, a different setting is required proceed as follows: remove pin cover "B" (see Figure 10), loosen lock nut "C" and then turn regulator pin "A".

By rotating clockwise lower oil delivery is obtained (-), and by rotating anticlockwise higher oil delivery is obtained (+). When adjustment has been completed tighten lock nut "C" and screw cover "B" back on.

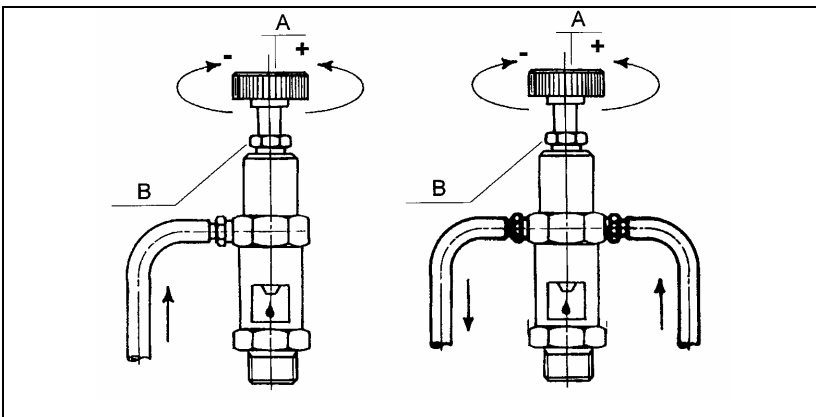


Figure 9

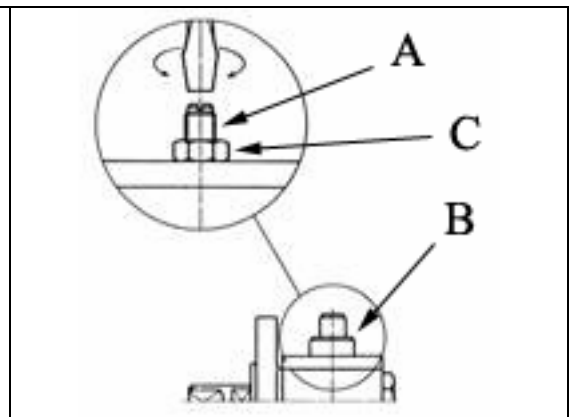


Figure 10

7 - OVERPRESSURE AND VACUUM ADJUSTMENT VALVES

The following diagram describes the valves as series (O), on demand (X) and not available (-) for each model of Exauster/Compressor.

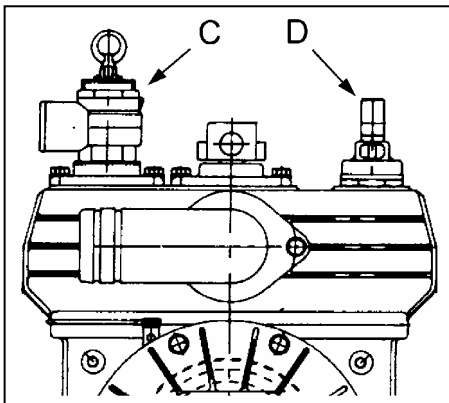
	<u>VACUUM ADJUSTMENT VALVE 1" 1/2</u>	<u>OVER PRESSURE VALVE 1" 1/4</u>	<u>OVER PRESSURE VALVE 1" 1/2</u>	<u>OVER PRESSURE VALVE 2"</u>
MEC 1000/1600	-	-	-	-
MEC 2/3/4000	-	X	-	-
MEC 5/6.5/8000	X	-	X	-
TL 5000/6000	-	-	X	-
SE 6.5/8000	-	-	X	-
SE 10/12000	O	-	-	X
STAR 60/72/84	O	-	-	X
AGRI 60/72/84	O	-	-	X

O = As series

X = on request

- = Not available

Tabella 7



Pressure: the maximum allowed pressure is 2,5 absolute bar (1,5 relative bar).

In order to avoid exceeding this value or to obtain a lower max pressure, an overpressure valve, "C", must be applied that is of a size capable of discharging the excess air delivery.

Vacuum: too high a vacuum may cause ovality and waviness of the body or breaking of the blades.

It is therefore advisable to use a vacuum regulator valve, "D". These valves may be fitted on the manifold cover or on manifold of the Exhausters/Compressors.

Figura 11

The regulation of the valves is done by acting on the throttle placed on the valve same (overpressure valve) or action on nut and locknut (vacuum adjustment valve).

8 - TESTING AND RUNNING IN

8.1 TESTING



In order to test the Exauster/Compressor check the preceding points, using a workbench if necessary. Make sure that the P.T.O. shaft turns freely and that the direction of rotation is the same as the one indicated by the arrow.



If operation of the pump is checked without it being connected to the suction/delivery tubes there will be danger to operators' hands due to access to the inside of the discharge elbow. In this situation there is also the danger that foreign bodies will be sucked into the machine.

Check that the position of the handle is correct and test that the Exauster/Compressor exhausts or compresses.

8.2 RUNNING IN

The running in period for the Exauster/Compressor is 50 working hours.



9 - START, OPERATION, STOP

9.1 START

The Exhauster/Compressor does not have a start button. Therefore to start it just transmit the motion to the power take-off (P.T.O.). The way this is done depends on the version of Exhauster/Compressor. Before starting make sure that the Exhauster/Compressor is supplied with oil for internal lubrication (and lubrication of gearbox in versions .../M-MA and .../K-KA).



Before starting the Exhauster/Compressor, make sure that the guards on all the moving parts are in place and efficient. Any damaged or missing components must be replaced and installed correctly before using the transmission.

For .../M-MA, K-KA, D version clean and grease the power take off before to install the cardan transmission.

9.2 OPERATION



Do not use the Exhauster/Compressor at pressures, temperatures, times higher than those indicated in Table 8. During use do not exceed the speed and power limits set in this manual. Do not overload the machine or suddenly engage the P.T.O.

Check the following operating parameters.

PARAMETER		WORKING RATE	MAXIMUM RATE
Revs .../M-K	[rpm]	400-450	600
Revs .../MA, P, D, H, KA	[rpm]	1000	1200
Pressure	[bar]	0.5 – 1	1.5
Vacuum	[%]	80 %	95 %
Temperature	[°C]	60 – 70	90
Time	[min]	3-5	6-8

Table 8



Failure to comply with the instructions given in this manual may be dangerous for the user health or may damage the Exhauster/Compressor. If density of material to suck is high, dilute or mix the material same. The working time should be such that the maximum temperature is never reached. Prolonged operation without interruption may cause damage to the blades as well as overheating.

9.3 STOP

To stop the Exhauster/Compressor, stop the engine and disconnect the P.T.O. in order to prevent accidental operation of it.

9.4 CONTROLS

A handle, located at the top of the manifold, is provided for the control of intake and compression phases. This can be operated manually. To state in which direction the handle has to be turned to select suction or compression phase, follow the instructions given by the manufacturer of the installation.



Selection of the intake or compression phase with the handle must be made with the Exhauster/Compressor not operating.

9.5 PROTECTIVE DEVICES



The Exhauster/Compressor, when being installed on a machine, must be equipped with a protective device to isolate the moving parts and prevent access to them by the operators.

.../M-MA, K, KA and D versions (except MEC 2/3/4000 D) are equipped with a **CE plastic protective device**. It insulates and protects of P.T.O. shaft during moving

9.6 INDIVIDUAL MEANS OF PROTECTION TO BE USED



When operating the Exhauster/Compressor, it is necessary to use the individual means of protection prescribed by the Manufacturer of the machine on which the Exhauster/Compressor has been installed.

10 - TROUBLESHOOTING

<i>PROBLEM</i>	<i>CAUSE</i>	<i>REMEDY</i>
Little vacuum or pressure	Blades are worn	Replace blades
	Some blades jammed in rotor	Disassemble Exhauster/ Compressor, clean and wash rotor, blades, and body
	Air infiltration or leakage from system	Eliminate infiltrations
	Undulated cylinder	Smooth or replace the body
	Reversing gear badly positioned	Remove reversing gear and position it correctly
Overheating	Flange assembly too tight	Add a gasket to the back flange
	Excessive pressure	Reduce pressure
	Excessive rate of revs	Reduce rate of revs
	Excessive operating time	Reduce operating time
	Blades too long	Trim blades to correct size
Lack of lubrication	Check oil level in tank, oil pump operation, setting of oil tap	
Beating against external surface	Rate of revs too low	Increase rate of revs
	Vacuum too high	Reduce vacuum
Sewage comes out of discharge elbow	Malfunctioning of valves	Check valves
Smoke comes out of discharge elbow	Excessive lubrication	Adjust lubrication
No circulation of lubricating oil (for versions with automatic lubrication)	Air intake at pipe fittings	Replace pipe fittings
	Lubrication tube badly inserted in pipe fittings	Insert lubrication tube correctly
	Air in oil pump chamber	Fill pump chamber with oil
P.T.O. does not rotate	Broken blade	Replace blade (check if rotor pin is bent)
	Foreign body in Exhauster / Compressor	Remove foreign body
No suction / no compression	Handle incorrectly positioned	Position handle correctly
	Reversing gear incorrectly positioned	Position reversing gear correctly
	Exhauster/Compressor rotates in wrong direction	Reverse direction of rotation
	All blades jammed	Disassemble Exhauster/Compressor, clean and wash blades, rotor and body
	Blades protrude from the rotor slots anomalously	Disassemble Exhauster/Compressor, clean and wash blades, rotor and body
	Rubber ball closes overflow valve	Increase passage of air inside valve



11 - MAINTENANCE, INSPECTIONS AND CHECKS, REPAIRS, TECHNICAL ASSISTANCE



When carrying out maintenance operations, inspections, checks or repairs it is advisable to wear the individual protective devices listed in this manual.



All maintenance operations, inspections, checks and repairs must be carried out with the greatest care and with the Exhauster/Compressor off and the P.T.O. disconnected.

11.1 CLEANING

11.1.1 Washing of the body

If sewage enters the Exhauster/Compressor, the inside of the body must be washed immediately, by making it suck in diesel or fuel oil through the discharge elbow with the Exhauster/Compressor in compression phase. After this operation make it suck in oil. The same operation should be carried out when the Exhauster/Compressor has to remain inactive for a long time. In this case, disconnect the suction and delivery tube connected to the valves and hermetically seal the manifold cover because the gasses that form inside the tank would pass into the Exhauster/Compressor and cause the inside of the body to rust and this in turn could cause the blades to break when the system is re-started.

In order to avoid rust formation, do not use water.

If the body is washed after it is disassembled, it is advisable to carry out a preliminary wash with detergents (e.g. thinners) before carrying out the above operation.

11.1.2 Washing of oil tank

Wash the oil tank at least once a year. Remove the manifold, and then wash it using solvents.

11.1.3 Washing and cleaning of valves

Wash and clean the valves at least once a month. Remove the valves, then wash them with water or, if necessary, non-corrosive detergents.

11.2 CHECKING OF VALVES

Regularly check that all the valves, for both overflow and pressure/vacuum, are still working efficiently.

11.3 INSPECTION AND REPLACEMENT OF BLADES

11.3.1 General information on blades

Three material type of blades are fitted on Exhausters/Compressors. The following Tabella 10 describes what kind of material is fitted for each series.

SERIES	FII BLADES (coton and resin)	AR 600 P BLADES (special material)	EM 4300 BLADES (special material)
MEC	O	X	-
TL	O	X	-
SE	O	X	-
STAR	O	X	-
AGRI	-	-	O

O = As series

X = On request

- = Not available

Tabella 10

Blades in FII material are suitable for no-strong uses, for short and not frequent periods.

Blades in ARP material are made of a special material suitable for strong uses and for Exhausters/Compressors used in agricultural field. These blades offer an excellent resistance to wear and mechanical and thermal stress. These are suitable for more frequent uses and to suck thick sewages. They are recommended for installation with frequent uses even during the same day.

Blades in EM material are made of a material suitable for very strong uses and for exhausters/compressors used in industrial field. This material guarantee an excellent resistance to wear and mechanical and thermal stress.

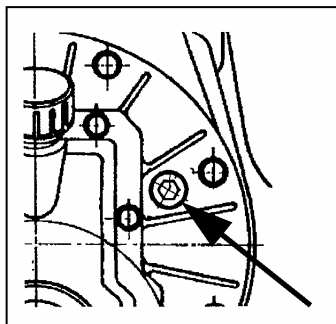
Apart from normal wear, it may be necessary to replace the blades following incorrect use of the Exhauster/Compressor. The most frequent causes come from heat, lack of lubrication, entrance of sewage, high pressure or vacuum, formation of rust inside the body due to prolonged inactivity.

Too high heat causes bubbles to form on the surface of the blades so increasing their thickness and preventing them from coming out freely from the rotor slots.

Lack of lubrication means the blades are completely dry like the inside of the pump. This increases their fragility and causes them to break lengthways.

The same type of breakage can be caused by entrance of sewage or by a too high working pressure.

A too high vacuum causes the blades to beat against the cylinder with consequent damage to the outside of the blades. Moreover, the lining becomes wavy.



11.3.2 Inspection of blades

To check the state of wear of the blades in the Exhauster/Compressor proceed as follows:

- remove the threaded inspection plug (see Figure 12);
- turn the rotor until a blade is aligned with the inspection hole;
- measure the distance between the external surface of the rotor and the external side of the blade;
- if this distance is greater than 10-15% of the original height of the blade (Table 11), replace the complete set of blades.

Figure 12

IMPORTANT: Before inserting the new blades, carefully check their size and, if necessary, shorten them until they are the same length as the rotor (see Table 11)

11.3.3 Replacement of blades

- 1) Check that there is sufficient space at the back of the Exhauster/Compressor to be able to work easily; if there is not, the Exhauster/Compressor should be taken off its support beforehand;
- 2) Remove the back
- 3) Extract the blades from the rotor;
- 4) Replace the blades;
- 5) Clean the Exhauster/Compressor.
- 6) Re-fit the back of the Exhauster/Compressor

11.3.4 Blade dimensions

MODEL	BLADES NUMBER	BLADES SIZE
MEC 1000	5	120x36x6,3
MEC 1600	5	190x36x6,3
MEC 2000	7	180x41x6,3
MEC 3000	7	240x41x6,3
MEC 4000	7	300x41x6,3
MEC 5000	7	300x46,5x6,3
MEC 6500	7	370x46,5x6,3
MEC 8000	7	450x46,5x6,3
TL 5000	7	260x48x6,3
TL 6000	7	320x48x6,3

MODEL	BLADES NUMBER	BLADES SIZE
SE 6500	6	280x60x7,5
SE 8000	6	330x60x7,5
SE 10000	6	350x70x7,5
SE 12000	6	400x70x7,5
STAR 60	6	350x70x7,5
STAR 72	6	400x70x7,5
STAR 84	6	480x70x7,5
AGRI 60	6	350x70x4,7
AGRI 72	6	400x70x4,7
AGRI 84	6	480x70x4,7

Table 11

11.4 REPLACEMENT OF RUBBER BALL

- Unscrew and raise the valve-holder cover (SE, AGRI and STAR series) or the manifold (MEC series);
- Replace the rubber ball;
- Re-fit the valve-holder cover (SE, AGRI and STAR series) or the manifold (MEC series).

11.5 REPLACEMENT OF GEARS (VERSION /M AND /K)

- Unscrew the screws of the gearbox cover;
- Use two screws for screwing into the threaded extraction holes until the cover is removed;
- Take out the gear with splined shaft using an extractor if necessary;
- For the pinion: unscrew the self-locking nut, use an extractor.

11.6 TECHNICAL ASSISTANCE

Contact the supplier of the complete system for technical assistance or supply of accessories and spare parts.



11.7 REGULAR SERVICING

<i>SERVICING TO BE CARRIED OUT</i>	<i>HOW TO PROCEED</i>	<i>FREQUENCY</i>
Check oil circulation	Inspect the level sight glasses	Once a day
Check oil level in tank	Use the oil level on outside of tank	Once a week
Check wear of blades	Remove threaded plug	Every 600 working hours
Check that the over-pressure and vacuum regulator valves are working correctly	Remove valves	Once a week
Wash oil tank	Remove tank	Once a year
Wash body internally	Put in oil + diesel oil (after washing lubricate with oil only)	Whenever sewage enters or when inactive for a long time
Wash lubrication pump	Use a brush and compressed air	Once a year or for prolonged inactivity
Check that the overflow valves are working correctly	Remove valves	Once a month
Lubricate the power take-off (versions M and D)	Oil the P.T.O. with a brush and lubricating oil	Once a month
Wash and clean the valves	Remove valves	Once a month

12 - PUTTING OUT OF SERVICE AND DEMOLITION

Before demolishing the Exhauster/Compressor the following materials should be separated:

- lubricating oil;
- parts in rubber and plastic;
- parts in cast iron and steel;

and disposed of correctly.

Do not discard the Exhauster/Compressor in the environment.

For disposal of the lubricating oil make use of specialised treatment services.