

## INTRODUCTION

The Battioni Pagani® Rotary blades vacuum pump series have been designed and constructed in compliance with EEC safety regulations and have been assessed for risks according to standard UNI EN ISO 12100:2010; in particular they are in conformity with directive 2006/42/EC and subsequent modifications and additions.

The pump in question is configured as defined in the Machinery Directive 2006/42/EC as machine and therefore has CE marking on the identification label. It is however specified, in relation to its use and to the supply that takes into account the installation on the buyer behalf (without motive force) that Battioni Pagani® disclaims any liability due to noncompliance with the requirements listed in the use and maintenance manual.

This manual contains the EC Declaration of Conformity of the machinery 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 Rotary blades vacuum pump. The instructions contained in this manual must be read carefully before carrying out any operation with or on the pump.



*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..

## WARRANTY

At the moment of receiving the Rotary blades vacuum pump 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 goods sold are immune from imperfections and it is mandatory, where these imperfections are clearly attributable to the manufacturing process and the materials use, to repair it or, based on their final decision, to replace defective pieces. In any case the costs of labour, travel and transport, and any customs expenses shall be paid by the Purchaser. The seller is not responsible for compensating any damages except in case of fraud or serious fault. Any parts that are subject to normal wear are excluded from the warranty. Any warranty terminates if:

- any defects found are a result of accidents or obvious neglect or negligence on the part of the Purchaser,
- parts have been modified, repaired or installed by persons that were not authorised by the seller,
- malfunctions and breakdown were caused by non-suitable use or being subject to stress exceeding the limits set forth by the seller.
- when the Purchaser has not punctually complied with contractual payment obligations.

The Purchaser terminates any warranty rights if any imperfections are not communicated to the seller within 8 days from when they are discovered, according to art. 1512 of C.C. The Seller reserves the right to change or improve their product without having an obligation to carry out those changes or improvements on units that were previously produced and/or delivered. The Seller is not liable for accidents or effects of accidents cause to persons or property as a result of material and/or manufacturing defects.

Thank you for choosing Battioni Pagani®.

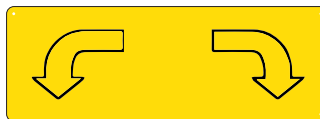
***Battioni Pagani®***



## OBLIGATORY SAFETY SIGNS TO BE DISPLAYED IN THE WORK PLACE AND AROUND THE ROTARY BLADES VACUUM PUMP



**PERSONAL  
PROTECTIVE EQUIPMENT THE  
USE OF WHICH IS MANDATORY**



**INDICATION OF HANDLE ROTATION DIRECTION  
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 2006/42/EC and subsequent modifications, while in the other countries it must comply with the country's safety regulations.

This Rotary blades vacuum pump 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 Rotary blades vacuum pump because they could cause it to break. Therefore it is necessary to equip the system with safety valves.*

*The use of the Rotary blades vacuum pump 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 Rotary blades vacuum pump to handle flammable and/or explosive liquids or for materials that give off flammable gasses.*

*Do not use the Rotary blades vacuum pump in potentially explosive atmospheres.*

*Never remove the guards fitted on the Rotary blades vacuum pump 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 Rotary blades vacuum pump 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 Rotary blades vacuum pump;
- 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 Rotary blades vacuum pump is operated with the hydraulic pump removed;
- Danger of projection of liquid and solid materials due to a heavy breakage of the Rotary blades vacuum pump;

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## GENERAL INFORMATION

### 1.0 - ROTARY BLADES VACUUM PUMP VERSIONS

The Rotary blades vacuum pump can be supplied in the following versions:

SERIES	M	MA	P	D	H	G	GA	K	KA
WPT 480/600/720	0	0	0	0	0	0	0	-	-
KPS 490/550/670	0	0	0	0	0	0	0	0	0
KTS-C 840/960/1080	0	0	0	0	0	0	0	-	-
KTM 1200/1500	-	-	0	0	0	-	-	-	-
KTM 1800/2300	-	-	0	0	0	-	-	-	-
WSM 2700/3300	-	-	0	-	-	-	-	-	-

- Non disponibile    0 Disponibile

#### .../M VERSION .../MA VERSION (WITH GEARBOX)

LEFT  
ROTATION



- ... / M the power take-off is actuated through the cardanic shaft at 540 rpm. This version can be recognised by the gearbox placed at the front of the Rotary blades vacuum pump, by the identification plate.
- ... / MA the power take-off is actuated with a cardan shaft at 1000 r.p.m. This version can be recognised by the gearbox placed at the front of the Rotary blades vacuum pump, by the identification plate and by the stamping placed on the gearbox cover.

#### .../P VERSION (FOR PULLEY APPLICATION)

RIGHT  
ROTATION



LEFT  
ROTATION  
ON REQUEST

- ... / P the power take-off is actuated through 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)

LEFT  
ROTATION



RIGHT  
ROTATION  
ON REQUEST

- ... / 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 Rotary blades vacuum pump and by the identification plate, ... / D = direct drive. Resting horizontally on its four feet..

#### .../H VERSION (FOR HYDRAULIC DRIVE)





RIGHT  
ROTATION



LEFT  
ROTATION  
ON  
REQUEST  
(WITHOUT  
MOTOR)

- ... / 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.



.../G VERSION –.../GA VERSION (ROTARY BLADES VACUUM PUMP FOR GARDA GROUP)	
<p><b>RIGHT ROTATION</b></p>  	<ul style="list-style-type: none"> <li>• ... / G versione della pompa per vuoto rotativa a palette che è applicato sul gruppo GARDA o gruppo LEDRA; non è possibile utilizzarlo singolarmente. La versione è riconoscibile dal pignone esterno posto nella parte anteriore e dalla targhetta d'identificazione, ... / G = applicazione per GARDA o LEDRA.</li> <li>• ... / GA versione della pompa per vuoto rotativa a palette che è sul gruppo GARDA o gruppo LEDRA a 1000 giri; non è possibile utilizzarlo singolarmente. La versione è riconoscibile dal pignone esterno posto nella parte anteriore e dalla targhetta d'identificazione, GA = applicazione per GARDA o LEDRA a 1000 giri.</li> </ul>
.../ K VERSION .../KA VERSION (WITH GEARBOX AND HYDRAULIC PUMP SUPPORT)	
<p><b>LEFT ROTATION</b></p>  	<p>/ K the PTO is driven by means of a cardan shaft at 540 rpm and it is designed to drive a pump unit 2 or unit 3. The version is recognisable by the hydraulic pump support and the identification plate.</p> <ul style="list-style-type: none"> <li>• ... / KA the PTO is driven by means of a cardan shaft at 1000 rpm and it is designed to drive a pump unit 2 or unit 3. The version is recognisable by the hydraulic pump support, by the identification plate and by the punching placed on the upper part of the box.</li> </ul>

## 1.1 - IDENTIFICATION LABEL

Each Rotary blades vacuum pump is provided with an identification plate, where is indicated:

- Rotary blades vacuum pump model
- serial number
- year of production
- relative maximum pressure
- maximum vacuum
- Maximum power consumption
- maximum speed
- maximum capacity
- CE marking
- pump weight

### IDENTIFICATION LABEL WITH PAINTING PROTECTIVE FILM



*Each identification label is protected by a special light blue film to be removed once painted. This film has been introduced to ensure the above mentioned data traceability and to not lose your warranty.*

## USE AND MAINTENANCE INSTRUCTIONS

### 2.0 - PACKAGING, STORAGE, HANDLING AND TRANSPORT

#### 2.1 - PACKAGING

The Rotary blades vacuum pumps 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

For a proper conservation of the Rotary blades vacuum pump, it must be stored:

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

The Rotary blades vacuum pumps are lubricated during testing at our factory with special oil that ensures lubrication of the various internal components for approximately 6 month. In the event of extended periods storage it is advisable to wash the inside of the pump body with oil and diesel oil (as reported in this manual).

#### 2.3 - HANDLING AND TRANSPORT

Rotary blades vacuum pump mass: (see attached technical data).



**Warning!** Do not move the KPS using the 4 eyebolts filter cover but only and exclusively for the eye bolts on the body.



The Rotary blades vacuum pump should be:

- Strapped with metal hooks to be inserted in the gripping hole, or with a band;
- Lifted with a hoisting truck (if on pallet), bridge crane, or crane.



Rotary blades vacuum pump is supplied with a guard that is in compliance with EC directives. This guard should be fitted on by the fitter using the screws supplied.

### 3.0 - ASSEMBLY, FITTING, INSTALLATION, DISASSEMBLY, RE-FITTING

The procedures concerning Rotary blades vacuum pump versions .../G .../GA ... are given in the GARDA/LEDRA group manual.



When carrying out maintenance operations, inspection and check, repairs, it is advisable to wear the individual protection devices listed in this manual.



All maintenance operations, inspections and checks, repairs must be carried out with the greatest attention and with the Rotary blades vacuum pump off and with the power take-off disconnected.

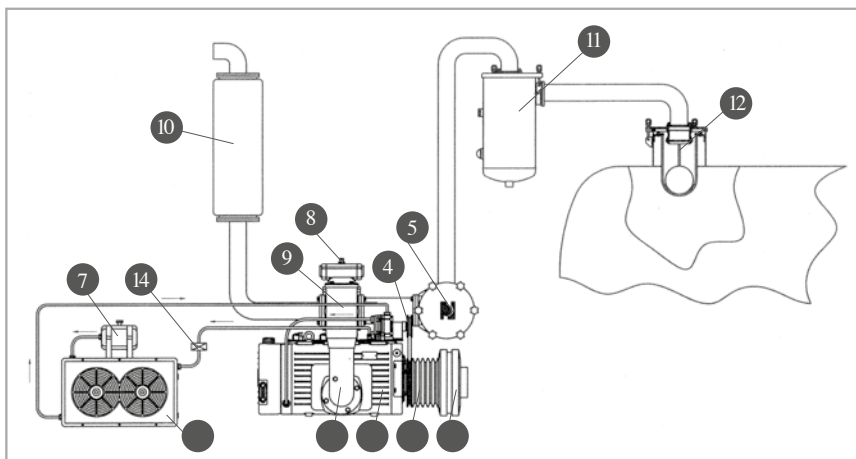


It is essential to prevent sewage from entering Rotary blades vacuum pump.

The entrance of sewage would cause the blades and consequently the rotor to break.

It is therefore necessary to equip the system with an overflow valve "12" and a safety overflow valve "11" between the Rotary blades vacuum pump and the tank-cart (see Figure 1).

#### 3.1 - INSTALLATION DRAFT

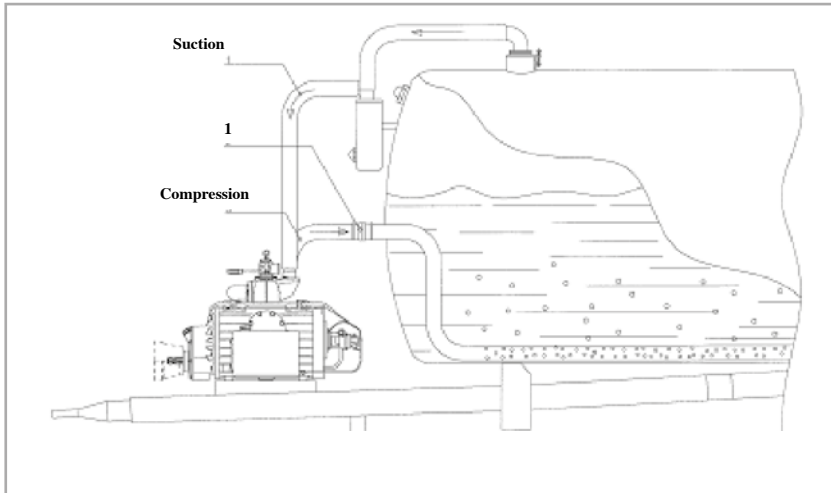


- 1 Rotary blades vacuum pump
- 2 Side manifold with check valve
- 3 Pulley
- 4 Cooling pump
- 5 Suction filter
- 6 Radiator
- 7 Feed Tank
- 8 Pneumatic rotating cylinder
- 9 4 way cock
- 10 Silencer
- 11 Secondary valve
- 12 Primary valve
- 13 Pneumatic clutch
- 14 Hand wheel cock

Figure 1



### 3.2 - DOUBLE OUTLET INSTALLATION DRAFT



The Rotary blades vacuum pump 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 a normal Rotary blades vacuum pump for the intake but a perforated tube must be placed inside the tank-cart 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 a mixing of the previously loaded sewage. (Never exceed the maximum working absolute pressure of 2,5 bar) equal to 1,5 relative bar.

Figure 2



**With this system, a check valve (1) must be fitted on the delivery tube to prevent the transfer of sewage inside the Rotary blades vacuum pump.**

### 3.3 - ASSEMBLY AND MOUNTING - INSTALLATION

The Rotary blades vacuum pump should be assembled and installed using the following procedure:

- 1) Assemble the Rotary blades vacuum pump in horizontally with its feet facing downwards. The assembly position on the vehicle should be easy to access and protected. It is necessary to foresee enough space for suction and delivery hoses. A 5° maximum longitudinal slope of the Rotary blades vacuum pump with respect to the horizontal plane must not be exceeded.
- 2) Bolt the Rotary blades vacuum pump using screws and nuts passing through the specially provided slots or holes in the feet;
- 3-M) To install .../M- version, connect the tractor's cardan shaft at 540 rpm to the Rotary blades vacuum pump power take-off shaft.



**Don't exceed the maximum slope allowed for the cardan shaft**

- 3-MA-KA) To install the Rotary blades vacuum pump MA-KA version, connect the tractor's cardan shaft at 1000 rpm to the Rotary blades vacuum pump power take-off shaft.



**Don't exceed the maximum slope allowed for the cardan shaft**

- 3-D) To install the Rotary blades vacuum pump .../ D version, connect the tractor's cardan shaft at 1000 rpm to the Rotary blades vacuum pump power take-off shaft.



**Don't exceed the maximum slope allowed for the cardan shaft**

- 3-H) To install the Rotary blades vacuum pump H-HFR version, fit a hydraulic motor (fringing SAE/C 4 holes – ANSI 127-4 or SAE/C 2 holes – ANSI 127-4 for KTS and KTM series, for WPT series European flange) on the power take-off shaft and fastening it, using special screws, to the support located at the front part.

- 3-P) To install the Rotary blades vacuum pump .../P version, attach a driven pulley to the power take-off shaft and fasten it with



the special screw located on the front of the shaft. The driven pulley may be fitted directly on the cylindrical shaft trying to bring the radial load close to the bearing. Never transfer axial loads. Then connect the driven pulley to the driving pulley with the correct length of transmission belts. The number and the type must be calculated according to the power to be transferred to the Rotary blades vacuum pump. When this operation has been completed, the necessary guard must be installed to isolate the transmission parts (pulley and belts) and prevent operator access to them.



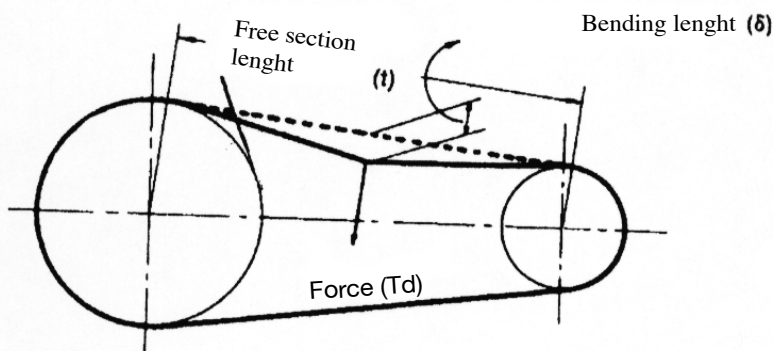
*The tension of the belts should be such that when they are tend they can be stretched further by approximately 2 cm. An exceeding belt tension may cause the breakage of the shaft.*

- The ideal tension is the lowest tension at which the belt does not slip under maximum load conditions.
- Check tension frequently during the first 24/48 hours of running in.
- A over tension reduces the belt and the bearing life.
- Keep belts free from extraneous materials that may cause slippage.
- Periodically check the transmission. Tend it when it slips.

To control a conventional transmission tension, use the following procedure:

- Measure the length of free section,  $t$ .
- At the center of the free section ( $t$ ) apply a force (perpendicular to the free section) as needed to flex the belt 1.6 mm by 100 mm length of the free section. For example, the flexion of a 1000 mm free section will be 16 mm.
- Compare the applied force, measured with a tensiometer, with the values given in the table. If the force is between the “min. strength” values of the transmission is under tension. If the force exceeds the “maximum force” value, the transmission is tenser than it should be.

However, a new transmission can be initial stretched twice the value of “min. strength” to allow normal tension adjustment while operating.



Section	Force	
	Min	Max
	Kg.	Kg.
A	0,68	1,02
B	1,58	2,38
C	2,93	4,75
D	5,77	8,61
E	9,60	14,30

### WPT, KTS, KPS SERIES

Then connect the Intake/Compression pipe of the tank to the Rotary blades vacuum pump tightening it to the adjustable elbow using metal camping bands in relation to the diameter of the pipe.

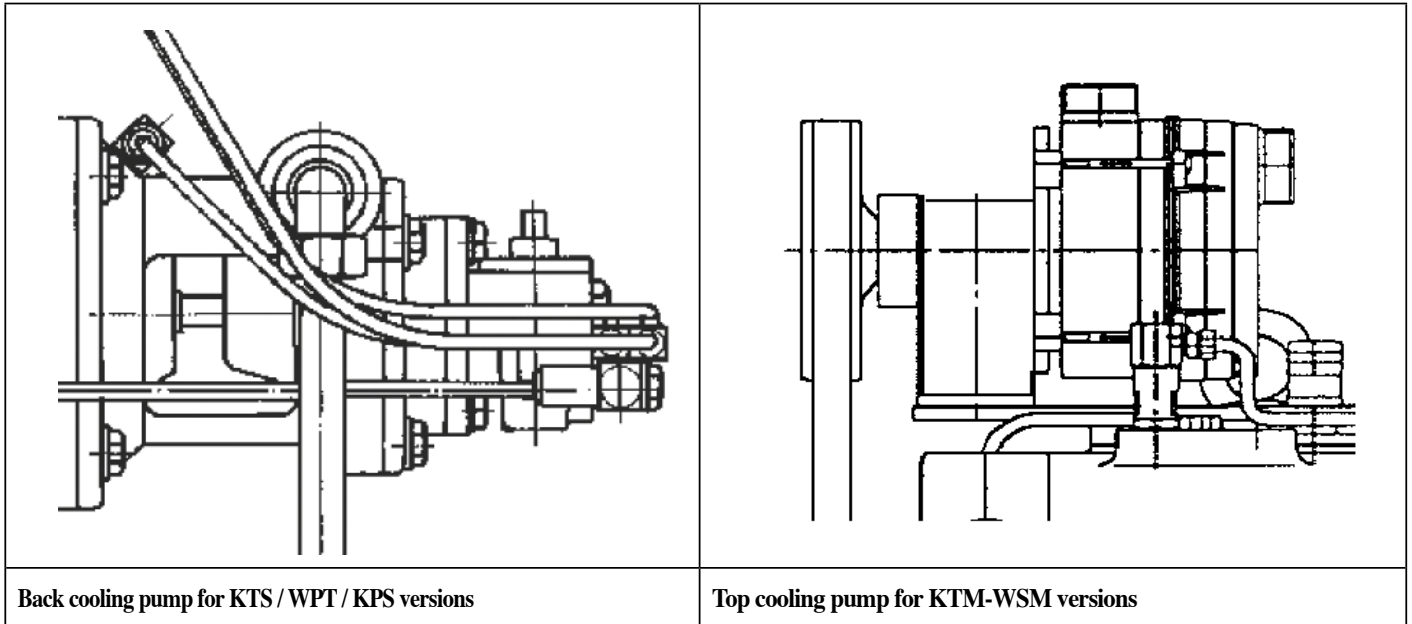
### KTM, WSM SERIES

Install the suction conduit, connecting it to the suction passage of the Rotary blades vacuum pump by means of flange DIN 100/PN 16 for KTS and KTM 1200-1500 versions and DN 150/PN16 for KTM 1800-2300 and WSM, so that it rises towards the vehicle. It is also advisable to fit, at the lowest point, a safety container with discharge tap for the evacuation of condensation, to prevent the formation of rust inside the body. The containers for condensation discharge should be checked especially when external temperatures are low as ice may form.

Then install the delivery conduit, connecting it to the delivery passage of the Rotary blades vacuum pump by means of flange DIN 100/PN 16 for KTS and KTM 1200-1500 versions and DN 150/PN16 for KTM 1800-2300 and WSM. Also for this installation, it is advisable to fit, at the lowest point, a safety container with discharge tap for the evacuation of condensation.



### 3.4 - COOLING SYSTEM



#### 3.4.1 - GENERAL INFORMATION

The Rotary blades vacuum pump KTS / KPS are equipped with a water pump directly operated by the rotor shaft together with the automatic lubrication pump and has a flow rate approximately of 30 l/min.

All KTM / WSM Rotary blades vacuum pump are equipped with a water pump required for the cooling liquid circulation. The water pump provided has two rotation directions and a flow rate of approximately 60 l/min, it is mounted on the upper part KTM / WSM, directly operated by the rotor shaft, through pulleys and in the rear part.



*The maximum temperature of the water in the cooling system must not exceed 60-65°C.  
It should be noted that the Rotary blades vacuum pump performance improves when the working temperature decrease.*

#### 3.4.2 - COOLING CIRCUIT

To completely fill the cooling circuit it is necessary to unscrew the iron plug placed on the top of the pump body and put in water through the feed tank until it overflows from the previously mentioned hole.



*Warning! The KPS series has two vents on the body for removal of the bags of air in the phase of the cooling system filling. During this phase to vent the air. At the end make sure to close the vents.*

#### 3.4.3 - COOLING CIRCUIT WITH RADIATOR AND ELECTRIC FAN

The circuit with radiator and electric fan (can be supplied with 12-V or 24-V power supply) is described below. This circuit is to be preferred for prolonged continuous use. The characteristics of this circuit are shown on Table 2.

#### 3.4.4 - THERMOSTAT

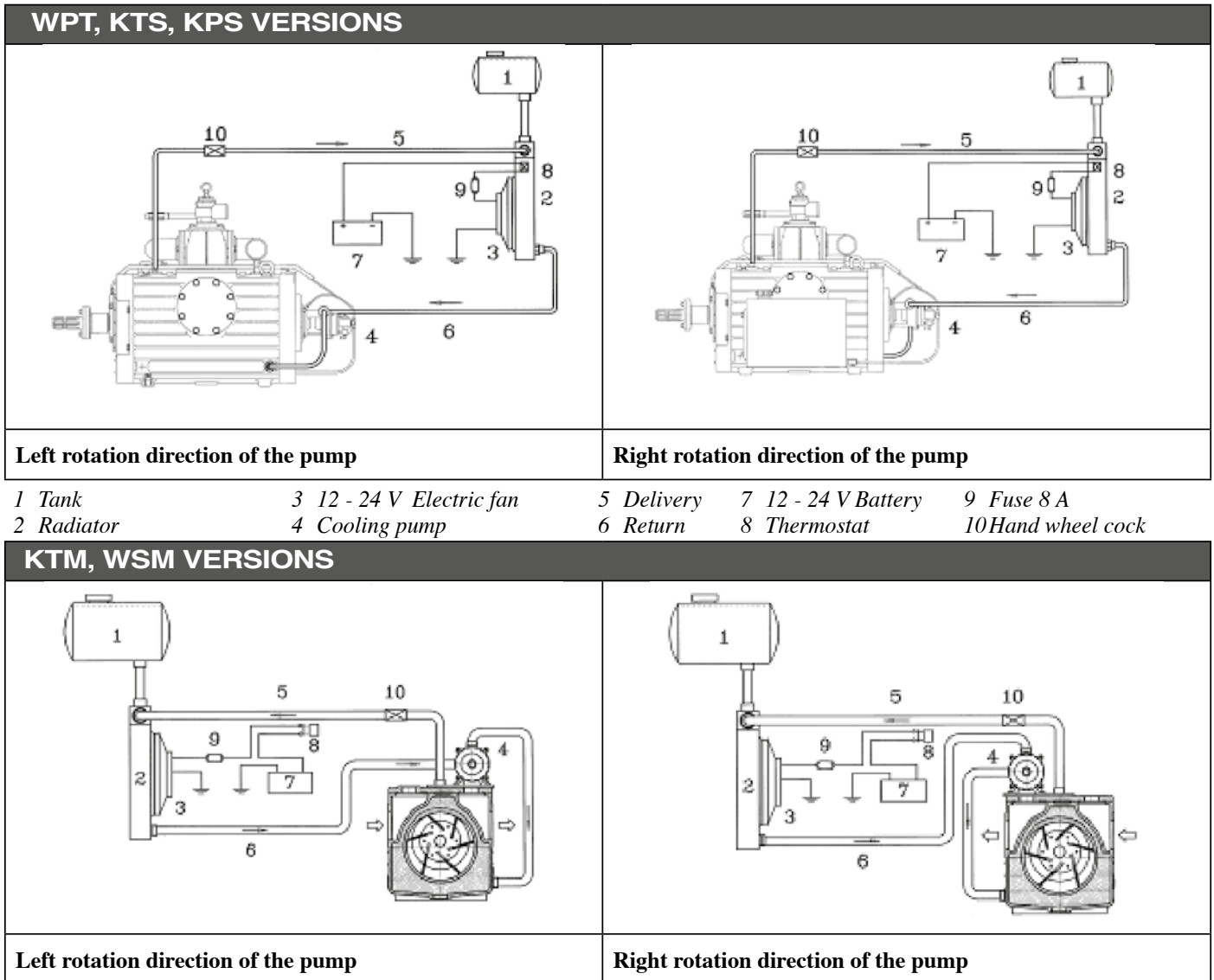
The cooling circuit can be fitted with a thermostat that, after being calibrated, allows the electric fan to work automatically when the maximum temperature is reached.

### 3.4.5 - INSTRUCTIONS



- Always put antifreeze liquid in the cooling circuit, at the rate recommended by the suppliers.
- Fill the cooling circuit completely, putting in water through the feed tank.
- Make sure that there is no air in the circuit, as this would hinder the water circulation prevent cooling.
- In the event of failure or malfunctioning of the cooling circuit, the working time must be reduced.

### 3.4.6 - DIAGRAM OF THE COOLING CIRCUIT WITH RADIATOR AND ELECTRIC FAN



**Attention!**  
The KPS series features two plugs (right image).  
If possible, protect the area and do not transit or stop in the moving or hot pump area.





Aspirator Compressor	Water pump flow rate [ l/min ]	Pump speed Water [ rpm ]	Water tank content	Pipes Diameter [ " ]	Heat to be dissipated [ kJ/h ]
WPT	12	1000	20	½"	63.000
KTS	30	1000	40	¾"	63.000
KPS	30	1000	20	¾"	63.000
KTM 1200	60	2000	25	¾"	63.000
KTM 1500	60	2000	27	¾"	63.000
KTM 1800	60	2000	62	¾"	63.000
KTM 2300	60	2000	75	¾"	63.000
WSM 2700 - 3300	60	2000	60	1"	120.000

Table 2

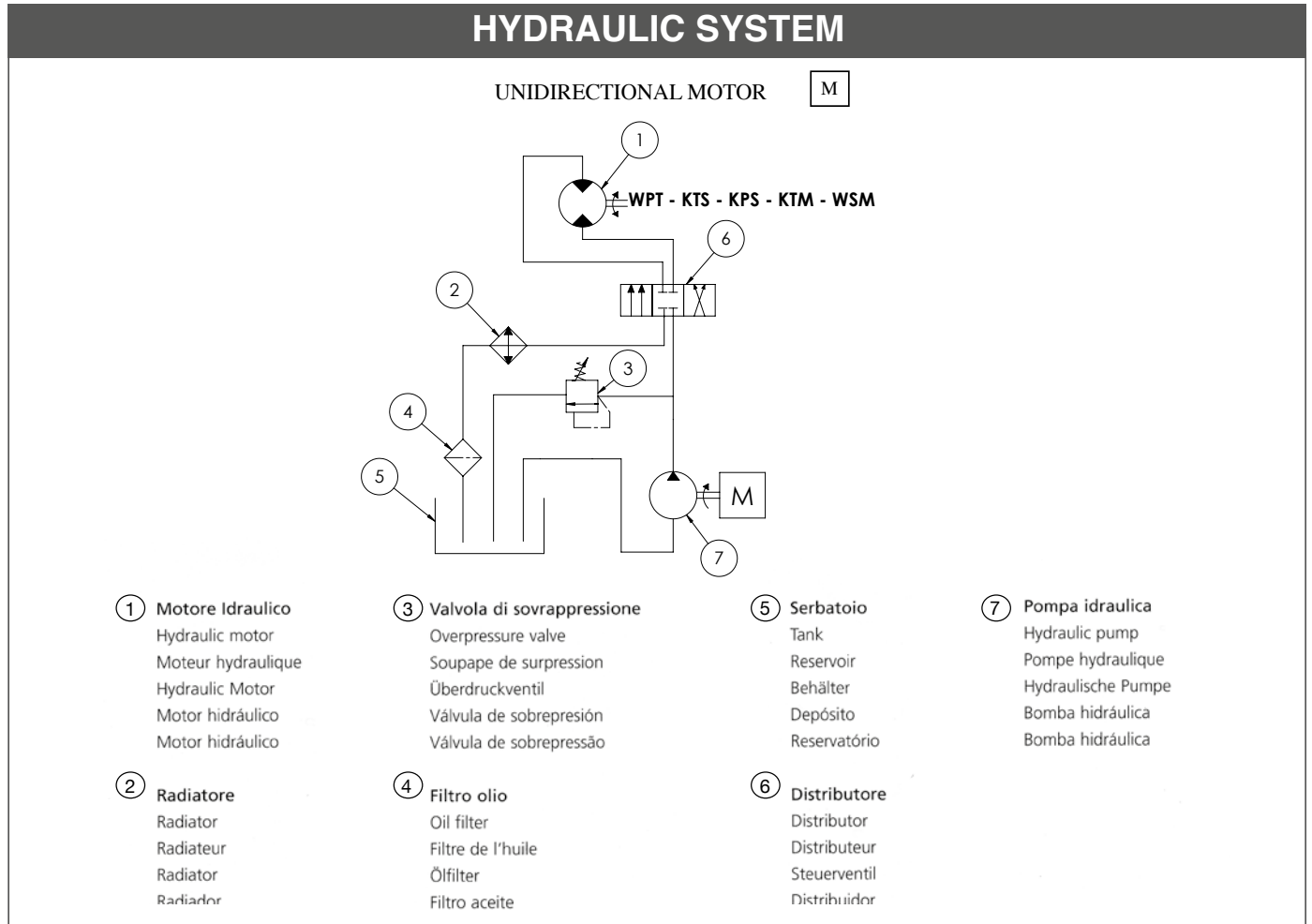
### 3.5 - HYDRAULIC DIAGRAM (H VERSION)

The hydraulic system required for the operation of the Rotary blades vacuum pump .../H is schematized in the version with unidirectional and bi-directional motor shown below and the technical characteristics of the hydraulic motor in table 1.

The splining of the hydraulic motor is of type SAE 16/32" D.P. for KTS and KTM series, Z=23 DIN 5482-Z23 for WPT series. 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.

### 3.6 - HYDRAULIC MOTOR USE AND MAINTENANCE INSTRUCTIONS

Make sure, with unidirectional motors, that the rotation direction is consistent with the circuit connections. Check that the coupling flange correctly aligns the user shaft and 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 immediate re-suction of the return-line oil.

**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. 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.

**FILTERS:** We recommend filtering the entire system flow rate.

**HYDRAULIC FLUID:** Use hydraulic fluid conforming to ISO/DIN standards. Avoid using mixtures of different oils which could result in decomposition and reduction of the oil's lubricating power.

**DRAIN HOLE:** On bi-directional motors with drain hole, the hole has to be connected to the oil tank through a hose of at least 22 mm of diameter. To avoid the forming of foam inside the tank, the hose has to be connected under the minimum level.

**STARTING UP:** Check that all circuit connections are exact and that the entire system is completely clean. Insert the oil in the tank, always 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. Replace filters regularly to keep the fluid clean. The oil **level** must be checked and replaced periodically depending on the system's operating conditions.

**PROBLEMS SOLUTIONS:** If the circuit is open (that is, if oil tank and not the pump is placed downstream of the engine) if the engine remains in rotation with the engine off there would not be overpressure, but cavitation. To solve the problem use a one-way valve which with calibration takes back the oil, or part of, from the engine outlet to its intake in order to prevent the engine pumping air.

- If the circuit is closed, in fact there could be overpressure. To solve the problem either place an overpressure valve, as recommended in the attached plant diagram, or a calibrated one-way valve that partly bypasses the engine. Compared to the first solution, the latter is cheaper and less invasive on an existing system because it does not require an additional hole in the tank.

HYDRAULIC MOTORS								
Rotary blades vacuum pump	Hydraulic motor	Maximum operating pressure	Capacity	No. rpms	Pressure	Maximum pressure hydraulic system	Trans. Power	Torque
WPT 480/H	KM 40.87-SO	1,5 bar	107 l/min	1200	210 bar	280 bar	31 kW	255 Nm
WPT 600/H	KM 40.87-SO	1,5 bar	107 l/min	1200	237 bar	280 bar	35 kW	287 Nm
WPT 720/H	KM 40.87-SO	1,5 bar	107 l/min	1200	264 bar	280 bar	39 kW	320 Nm
KTS 840/H	KM 40.109-SO-SAE	1,5 bar	134,7 l/min	1200	189 bar	250 bar	35 kW	288 Nm
KTS 960/H	KM 40.109-SO-SAE	1,5 bar	134,7 l/min	1200	221 bar	250 bar	41 kW	337 Nm
KTS 1080/H	KM 40.109-SO-SAE	1,5 bar	134,7 l/min	1200	250 bar	250 bar	47 kW	381 Nm
KPS 490/H	KM 40.87-SO	1.5 bar	125 l/min	1400	198 bar	280 bar	34 kW	232 Nm
KPS 550/H	KM 40.87-SO	1.5 bar	125 l/min	1400	232 bar	280 bar	40 kW	278 Nm
KPS 670/H	KM 40.87-SO	1.5 bar	125 l/min	1400	261 bar	280 bar	45 kW	307 Nm
KTM 1200/H	MF M5 100	1,5 bar	123,7 l/min	1200	334 bar	400 bar	57 kW	468 Nm
KTM 1500/H	MF M5 100	1,4 bar	123,7 l/min	1200	400 bar	400 bar	68 kW	560 Nm
KTM 1800/H	MF M5 100	1,3 bar	123,7 l/min	1200	400 bar	400 bar	68 kW	560 Nm
KTM 2300/H	MF M5 100	1 bar	123,7 l/min	1200	400 bar	400 bar	68 kW	560 Nm

Table 1

### 3.7 - UNINSTALLATION

The Rotary blades vacuum pump should be uninstalled using the following procedure:

.../M - MA	.../P	.../D
1) stop the power tractor take-off;	1) stop the tractor power take-off;	1) stop the tractor power take-off;
2) remove the cardanic shaft from the Rotary blades vacuum pump power take-off;	2) remove the transmission belts;	2) remove the cardanic shaft from the Rotary blades vacuum pump power take-off;
3) remove the tube connecting the Rotary blades vacuum pump to the tank-cart, loosening the metal clamp and slipping the tube from the sleeve;	3) remove the tube connecting the Rotary blades vacuum pump to the tank-cart, loosening the metal clamp and slipping the tube from the sleeve;	3) remove the tube connecting the Rotary blades vacuum pump to the tank-cart, loosening the metal clamp and slipping the tube from the sleeve;
4) remove any hydraulic connection;	4) remove any hydraulic connection;	4) remove any hydraulic connection;
5) remove the fastening screws and uninstall the rotary blades vacuum pump.	5) remove the fastening screws and uninstall the rotary blades vacuum pump.	5) remove the fastening screws and uninstall the rotary blades vacuum pump.

.../H	.../G - GA	.../K - KA
1) stop the hydraulic system;	1) stop the power take-off of the tractor	1) stop the power take-off of the tractor
2) remove the hydraulic connections to the motor;	2) disconnect the cardan shaft from the PTO of the Garda or Ledra unit.	2) remove the cardan shaft from PTO of the rotary vacuum vane pump;
3) remove the tube connecting the Rotary blades vacuum pump to the tank-cart, loosening the metal clamp and slipping the tube from the sleeve;	3) remove the connection pipe, which connects the rotary vacuum vane pump to the liquid trailer, loosening the metal clamp and removing the pipe from the sleeve;	3) remove the connection pipe, which connects the rotary vacuum vane pump to the liquid trailer, loosening the metal clamp and removing the pipe from the sleeve;
4) remove any hydraulic connection;	4) remove any hydraulic connections; remove connection pipes between centrifuge or high pressure pump and system	4) remove any hydraulic connections;
5) remove the fastening screws and uninstall the rotary blades vacuum pump.	5) remove the fixing screws and uninstall the rotary vacuum vane pump	5) remove the fixing screws and uninstall the rotary vacuum vane pump

### 3.8 - DISASSEMBLY

#### 3.8.1 - BACK PART DISASSEMBLY

WPT / KTS SERIES	KTM / WSM SERIES
<ol style="list-style-type: none"> <li>1) disconnect the lubrication pump delivery tubes, by pressing the quick clamping hooks and at the same time sliding the tube from the connecting piece;</li> <li>2) disconnect the cooling pump tubes (if present)</li> <li>3) remove the back cover with the cooling pump and the lubrication pump from the back flange;</li> <li>4) remove the connector joint;</li> <li>5) remove the back flange by unscrewing the screws that fix it to the pump body;</li> <li>6) use two screws to screw into the threaded extraction holes (if present) until the flange is removed;</li> </ol>	<ol style="list-style-type: none"> <li>1) remove the lubricating oil from the tank through the drain plug;</li> <li>2) remove the oil tank by unscrewing the back screws that fasten the tank to the back flange;</li> <li>3) disconnect the lubrication pump delivery tubes, by pressing the quick clamping hooks and at the same time sliding the tube from the connecting piece;</li> <li>4) remove the back cover together with the lubrication pump by unscrewing the screws that fix it to the flange;</li> <li>5) take the lubrication pump off the back cover by unscrewing the clamping screws;</li> <li>6) remove the connector joint;</li> <li>7) remove the back flange by unscrewing the screws that fix it to the pump body;</li> </ol>

#### KPS SERIES

1. Close the oil tap on the tank;
2. Disassemble the back cover with the lubrication pump (together with the connection joint) from the flange;
3. Remove the screws from the rear flange and the Seeger ring in front of the bearing;
4. Use two screws to screw into the threaded extraction holes until the flange is removed;

#### 3.8.2 - FRONT PART DISASSEMBLY

When the disassembly operations require to take off the front or back flange, first it is necessary to empty out the Rotary blades vacuum pump of the cooling liquid by unscrewing the 2" cap placed at the bottom of the body and then turn upside down the Rotary blades vacuum pump (for series WPT, WSM, KTS, KPS).

.../M - MA	.../P	.../D
1) unscrew the screws of the gearbox cover;	1) slide the pulley off the front pin;	1) remove the guard by unscrewing the clamping screws (if present);
2) use two screws for screwing into the threaded extraction holes until the cover is removed;	2) remove the lubrication tube by unscrewing it from the connecting piece placed on the front cover;	2) remove the splined hub by unscrewing the clamping screws;
3) remove the gear with shaft with an extractor if necessary;	3) remove the front cover by unscrewing the clamping screws;	3) remove the flanged sleeve with the ring by unscrewing the top screw;
4) unscrew the self-locking nut at the top of the pinion, with an extractor;	4) remove the front flange by unscrewing the screws that fix it to the body;	4) remove the driven pulley (if present);
5) unscrew the screws fastening the gearbox to the gearbox coupling flange;		5) remove the lubrication tube by unscrewing it from the connecting piece placed on the front cover;
6) remove the gearbox;		6) remove the front cover by unscrewing the clamping screws;
7) KTS SERIES: unscrew the screws fastening the gearbox coupling flange to the pump body and remove it;		7) remove the front flange by unscrewing the screws that fix it to the body;

.../H	.../G - GA	.../K - KA
1) take the hydraulic motor off its support;	1) disassemble the rotary vacuum vane pump from the Garda or Ledra unit;	1) remove the hydraulic pump;
2) remove the hydraulic motor support by unscrewing the clamping screws;	2) loosen the locknut on the head of the pinion;	2) use two screws to be screwed in the threaded holes of extraction as long as the cover is removed;
3) slide the transmission sleeve from the front pin after removing the clamping screw placed inside it;	3) disassemble shaft pinion using a puller if possible;	3) remove the gear shaft with possibly using an extractor;



4) remove the lubrication tube by unscrewing it from the connecting piece placed on the connecting flange of the hydraulic motor support;	4) use two screws to screw into the threaded extraction holes until the cover is removed;	4) use two screws to screw into the threaded extraction holes until the cover is removed;
5) remove the connecting flange of the hydraulic motor support by unscrewing the clamping screws;	5) remove the multiplier box;	5) remove the multiplier box;
6) remove the front flange by unscrewing the screws that fix it to the body;	6) KTS SERIES: unscrew the fixing screws of the pump body of the multiplier coupling flange and remove it;	6) KTS SERIES: unscrew the fixing screws of the pump body of the multiplier coupling flange and remove it;

- 8) KTM, KTS, WSM SERIES: unscrew the six clamping screws of the back pin of the rotor;  
9) KTM, KTS, WSM SERIES: use two screws for screwing into the threaded extraction holes until the cover is removed;

### 3.9 - RE-FITTING – RE-INSTALLATION



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

#### 3.9.1 - FRONT PART RE-FITTING

##### KTM, KTS, WSM SERIES

- 1) Insert the front pin in its seat in the rotor, being careful to avoid putting the front pin in the place of the back one and fix it with screws;  
2) Replace the front flange gasket;

.../M - MA	.../P	.../D
3) bring the gearbox coupling flange up to the pump body, positioning it with the dowel pins supplied, in alignment with the clamping holes;	3) bring the front flange up to the pump body, positioning it with the dowel pins supplied, in alignment with the clamping holes;	3) bring the front flange up to the pump body, positioning it with the dowel pins supplied, in alignment with the clamping holes;
4) tighten the clamping screws of the gearbox coupling flange to the body with a torque setting of 80 Nm;	4) tighten the clamping screws of the front flange to the body with a torque setting of 80 Nm;	4) tighten the clamping screws of the front flange to the body with a torque setting of 80 Nm;
5) remove the dowel pins;	5) remove the dowel pins;	5) remove the dowel pins;
6) fix the gearbox to the coupling flange with screws;	6) attach the front cover to the flange with clamping screws;	6) attach the front cover to the flange with clamping screws;
7) fit pinion to the rotor pin;	7) connect the lubrication tube by screwing it to the connecting piece placed on the front cover;	7) connect the lubrication tube by screwing it to the connecting piece placed on the front cover;
8) fit the self-locking nut for fixing the pinion;	8) Insert the pulleys on the front pin, fixing it with the key;	8) Insert the conducting pulley (if present) on the front pin, fixing it with the key;
9) insert the gear in the bearing seat;		9) Fix the transmission sleeve with the ring by tightening the top screw;
10) replace the gearbox cover gasket;		10) Fix the splined hub by tightening the relevant screws;
11) fix the gearbox cover;		11) Insert the guard and tighten the screws (if present);

.../H	.../G - GA
3) bring the front flange up to the pump body, positioning it with the dowel pins supplied, in alignment with the clamping holes;	3) move the multiplier coupling flange close to the pump body, positioning it, using dowel pins supplied, at the fixing holes;
4) tighten the clamping screws of the front flange to the body with a torque setting of 80 Nm;	4) tighten the fixing screws of the multiplier coupling flange to the in body with tightening torque equal to <b>80 Nm</b> ;
5) remove the dowel pins;	5) remove the centering pins;
6) fix the connecting flange of the hydraulic motor support to the front flange with screws;	6) fix the multiplier box to the coupling flange with <b>screws</b> ;
7) connect the lubrication tube by screwing it to the connecting piece placed on the hydraulic motor support coupling flange;	7) assemble the pinion of the rotor pin;



8) fix the hydraulic motor transmission coupling to the anterior pin by the screw located inside the pin;	8) assemble the locknut to fasten the pinion;
9) Fix hydraulic motor support to the coupling flange;	9) put the gear into the bearing housing;
10) Mount the hydraulic motor on its support with screws;	10) replace box cover gasket;
	11) assemble multiplier box cover;

<b>KPS SERIES</b>			
<b>.../M - MA .../G - GA .../K - KA</b>	<b>.../P</b>	<b>.../D</b>	<b>.../H</b>
1) Disassemble the Seeger ring.	1) Disassemble the Seeger ring.	1) Disassemble the Seeger ring.	1) Disassemble the Seeger ring.
2) Disassemble the bearing	2) Disassemble the bearing	2) Disassemble the bearing	2) Disassemble the bearing
3) Replace flange gasket;	3) Replace flange gasket;	3) Replace flange gasket;	3) Replace flange gasket;
4) Insert the cotter pins included in the body	5) Fasten the multiplier box to the body by means of screws tightened at 45 ÷ 55 Nm	4) Insert the cotter pins included in the body	4) Insert the cotter pins included in the body
5) Fasten the multiplier box to the body by means of screws tightened at 45 ÷ 55 Nm	5) Fasten the flange to the body by means of screws tightened at 45 ÷ 55 Nm	5) Fasten the flange to the body by means of screws tightened at 45 ÷ 55 Nm	5) Fasten the flange to the body by means of screws tightened at 45 ÷ 55 Nm
6) Assemble the bearing on the multiplier box by using a buffer and insert the compensating ring and insert the Seeger ring;	6) Assemble the bearing on the flange by using a buffer and insert the compensating ring and insert the Seeger ring;	6) Assemble the bearing on the flange by using a buffer and insert the compensating ring and insert the Seeger ring;	6) Assemble the bearing on the flange by using a buffer and insert the compensating ring and insert the Seeger ring;
7) Insert the spacer and assemble the pinion on the shaft	7) Reassemble the front cover on the flange.	7) Reassemble the front cover on the flange.	7) Reassemble the hydraulic motor support.
8) Assemble the fastening locknut of the pinion;	8) Remove the centring pins from the body	8) Reassemble the shrunk-on	8) Remove the centring pins from the body.
9) Insert the gear in the bearing housing		9) Remove the centring pins from the body.	
10) Assemble the box cover;			
11) Fill the multiplier box with oil up to the level.			
12) Remove the centring pins from the body.			

**WPT SERIES**

1) Replace the front flange gasket;

<b>.../M - MA</b>	<b>.../P</b>	<b>.../D</b>
2) fix the gearbox to the coupling flange with screws;	2) bring the front flange up to the pump body, positioning it in alignment with the clamping holes;	2) bring the front flange up to the pump body, positioning it in alignment with the clamping holes;
3) fit pinion to the rotor pin;	3) tighten the clamping screws of the front flange to the body;	3) tighten the clamping screws of the front flange to the body;
4) fit the self-locking nut for fixing the pinion;	4) attach the front cover to the flange with clamping screws;	4) attach the front cover to the flange with clamping screws;
5) insert the gear in the bearing seat;	5) connect the lubrication tube by screwing it to the connecting piece placed on the front cover;	5) connect the lubrication tube by screwing it to the connecting piece placed on the front cover;
6) replace the gearbox cover gasket;	6) insert the pulleys on the front pin, fixing them with the key;	
7) fix the gearbox cover;		



.../H	.../G - GA
2) remove the pins;	2) fix the coupling flange with screws;
3) bring the front flange up to the pump body, positioning it in alignment with the clamping holes;	3) assemble the pinion of the rotor pin;
4) tighten the clamping screws of the front flange to the body;	4) assemble the locknut to fasten the pinion;
5) connect the lubrication tube by screwing it to the connecting piece placed on the front cover;	
6) fix the hydraulic motor transmission coupling to the anterior pin by the screw located inside the pin;	
7) fix the hydraulic motor support to the connecting flange;	
8) fit the hydraulic motor to the hydraulic motor support by screws;	

### 3.9.2 - DISASSEMBLY OF THE BACK

#### WPT SERIES

- 1) replace the back flange gasket;
- 2) bring the back flange up to the pump body, positioning it in alignment with the clamping holes;
- 3) tighten the clamping screws of the back flange to the body;
- 4) fit the bearing to the flange with an assembly pad;
- 5) position the connector joint in its seat in the rotor pin;
- 6) attach the lubrication pump to the back cover (or to the cooling pump in versions with water cooling system, preceded by the spacer) and fasten with two screws;
- 7) insert the lubrication (or cooling) pump shaft in the connector joint;
- 8) tighten the four screws that fix the cover to the back flange;
- 9) connect the delivery tubes of the lubrication pump, inserting them in the connecting piece and pressing then until the quick clamping hooks snaps;
- 10) fit the lateral tank support at the pump body;
- 11) attach the feeding tube from the later tank to the lubrication pump;

#### KPS SERIES

- 1) Remove the bearing from the rear flange;
- 2) Insert in the pump body the two centring pins
- 3) Replace the flange gasket;
- 4) Move the rear flange close to the pump body, aligning it with the holes of the two pins;
- 5) Insert the 6 new clamping screws in the slotted holes and tighten with 45 ÷ 55 Nm;
- 6) Assemble the bearing on the flange by using a hammer;
- 7) Insert the Seeger ring in the rear pin with the compensation ring;
- 8) Disassemble the back cover or the lubrication pump (together with the connection joint) on the flange;
- 9) Remove the centering pins.

#### KTS, KTM, WSM SERIES

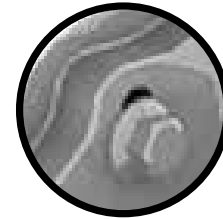
- 1) Insert the front pin in its seat on the rotor, being careful to avoid putting the front pin in place of the back one and fasten it with screws;
- 2) replace the back flange gasket;
- 3) bring the back flange up to the pump body, positioning it with dowel pins (supplied) in alignment with the clamping holes;
- 4) tighten the clamping screws on holes with a torque setting of 80 Nm;
- 5) remove the dowel pins;
- 6) position the connector joint in its seat in the rotor pin;

KTS VERSION	KTM VERSION
<ol style="list-style-type: none"> <li>1) attach the lubrication pump to the cooling pump and fasten it with screws;</li> <li>2) insert the cooling pump shaft in the connector joint;</li> <li>3) tighten the screws that fasten the cover to the back flange;</li> <li>4) connect the lubrication pump delivery tubes, inserting them in the connecting piece and pressing then until the quick clamping hooks snap;</li> <li>5) fit the lateral tank support at the pump body;</li> <li>6) insert the lubrication pump shaft in the connector joint;</li> <li>7) put lubricating oil in the tank through the oil fill plug;</li> </ol>	<ol style="list-style-type: none"> <li>1) attach the lubrication pump to the back cover and fasten it with two screws;</li> <li>2) insert the lubrication pump shaft in the connector joint;</li> <li>3) tighten the screws that fasten the cover to the back flange;</li> <li>4) connect the lubrication pump delivery tubes, inserting them in the pipe fittings;</li> <li>5) mount the back tank and tighten the screws that fasten the tank to the flange;</li> <li>6) put lubricating oil in the tank through the oil fill plug;</li> </ol>



*The KTS/KTM/KPS pump is equipped with a system that allows the flange to slide, avoiding breakages due to foreign bodies entry between the rotor and body. (Except G-GA version)*

*To benefit of this system it is important to respect the following indications: Before starting the pump, verify that the rotor has not accidentally lowered.*



Slotting Flange

### 3.9.3 - MANIFOLD RE-FTTING

WPT SERIES	KTS SERIES
<ol style="list-style-type: none"> <li>1) replace the manifold gasket;</li> <li>2) place the manifold on the pump body aligning the manifold screws holes with the body threaded holes;</li> <li>3) tighten the screw located under the reversing gear;</li> <li>4) tighten the screws of the manifold;</li> <li>5) insert the rubber ball on its seat;</li> <li>6) fit the valve cover tightening the screws;</li> <li>7) put the reversing gear in checking that the flat part of the reversing gear is positioned at 90° to the power take-off;</li> <li>8) put the spring on the reversing gear;</li> <li>9) apply the manifold cover gasket;</li> <li>10) place the manifold cover and fasten it with screws;</li> <li>11) insert the selector;</li> <li>12) screw the handle pin on the selector;</li> <li>13) fit the discharge elbow.</li> </ol>	<ol style="list-style-type: none"> <li>1) replace the manifold gasket;</li> <li>2) place the manifold on the pump body;</li> <li>3) tighten the manifold fastening screws;</li> <li>4) insert the rubber ball on its seat;</li> <li>5) fit the valve cover tightening the screws;</li> <li>6) put the reversing gear in checking that the flat part of the reversing gear is positioned at 90° to the power take-off;</li> <li>7) put the spring on the reversing gear;</li> <li>8) apply the manifold cover gasket;</li> <li>9) place the manifold cover and fasten it with screws;</li> <li>10) insert the selector;</li> <li>11) screw the handle pin on the selector;</li> <li>12) fit the discharge elbow.</li> </ol>

KPS SERIES	KTM / WSM SERIES
<ol style="list-style-type: none"> <li>1) Replace the manifold gasket;</li> <li>2) Place the manifold on the pump body;</li> <li>3) Tighten the fastening screws of the manifold;</li> <li>4) Insert the cone;</li> <li>5) Assemble the spring on the cone;</li> <li>6) Assemble the spacer on the cone spring;</li> <li>7) Replace the O-ring on the manifold cover;</li> <li>8) Place the manifold cover on the manifold;</li> <li>9) Tighten the fastening screws of the manifold cover;</li> <li>10) Assemble the oil retainer into the manifold cover housing;</li> <li>11) Assemble the handle and tighten it with the appropriate screw;</li> <li>12) Assemble the filter cartridge;</li> <li>13) Replace the O-ring on the filter cover;</li> <li>14) Place the filter cover on the manifold;</li> <li>15) Tighten the fastening screws of the filter cover;</li> </ol>	<ol style="list-style-type: none"> <li>1) fit the oil check lights;</li> <li>2) fit the lubrication copper tubes;</li> <li>3) fit the connectors;</li> <li>4) fit the cooling pump complete kit (if present);</li> </ol>

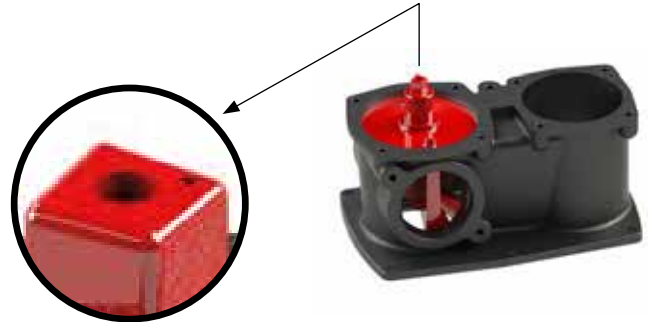
To re-install proceed as for the first installation.



### 3.9.4 - CORRECT POSITIONING OF THE INVERTER CONE KPS

For correct positioning of the cone inverter, proceed as follows:

1. remove the handle;
2. disassemble the manifold cover;
3. make sure that the label of the cone is placed as in the attached picture;
4. reassemble the manifold cover;
5. reassemble the handle



## 4.0 - START UP - TUNING

### 4.1 - FUNCTIONING WITHOUT OVERPRESSURE VALVE



*Before starting the Rotary blades vacuum pump make sure that the overpressure valve hole in the manifold is closed with a plug if the overpressure and vacuum adjustment valve is present and functioning. If not equipped in the specific hole on the Rotary blades vacuum pump, insert a plug to close the hole.*

### 4.2 - ROTATION DIRECTION



*Before starting the Rotary blades vacuum pump make sure that the power take-off (PTO) shaft turns freely and that the rotation direction is the same as the one indicated by the arrow.*

Never turn the Rotary blades vacuum pump opposite the set rotation direction (indicated by the arrow) as this could damage some components as well as preventing the Rotary blades vacuum pump full efficiency.

## 5.0 - LUBRICATION SYSTEM AND LUBRICATION OIL ADJUSTMENT

All the Rotary blades vacuum pumps are supplied with an Automatic Lubrication pump. With this system, the pump is lubricated both during the intake and the compression phase by a 4 ways gear pump with adjustable flow rate for WPT, KTS and KTM 1200-1500 series and by a 6 ways piston pump for KTM 1800-2300 and WSM 2700-3300 series, placed on the back and actuated by the rotor. Oil is injected both on the bearings and inside the Rotary blades vacuum pump without manual adjustment and saving a considerable amount of oil.

### 5.1 - AUTOMATIC LUBRICATION

With this system, the pump is lubricated both during the intake and the compression phase by a piston pump with adjustable flow rate, placed on the back and actuated by the rotor. Oil is injected directly in the pump, eliminating manual adjustment and saving a considerable amount of oil.

### 5.2 - OIL TO USE

The Rotary blades vacuum pumps are supplied **WITHOUT** lubrication oil inside the tank. Battioni Pagani<sup>®</sup> **RECOMMENDS** the use of BATTIONI PAGANI<sup>®</sup> “**VACUUM PUMP OIL**” for the internal lubrication as it ensures:

- Excellent resistance to oxidation
- Strong anti-rust properties
- Excellent antifoam qualities
- Operating temperature between - 5 °C and 160 °C

IN ABSENCE OF VACUUM PUMP OIL USE ONLY NEW MINERAL OIL ISO VG 100 (SAE 30)

### 5.2.1 - NEVER UTILIZE THE FOLLOWING TYPES OF OIL:



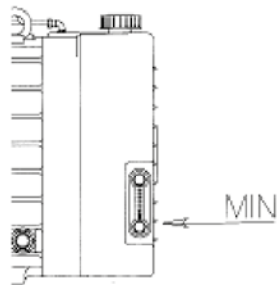

*TRANSMISSION OIL - USED OIL - HYDRAULIC OIL - VEGETABLE OIL  
GEAR OIL - BREAKS OIL.*

### 5.2.2 - GEARBOX OIL

All pumps version M-MA-K-KA (with gearbox) are provided with gear lubricating oil inside the gearbox.  
If the oil inside the gearbox needs changing, use ISO VG 460 oil.

### 5.3 - OIL LEVEL

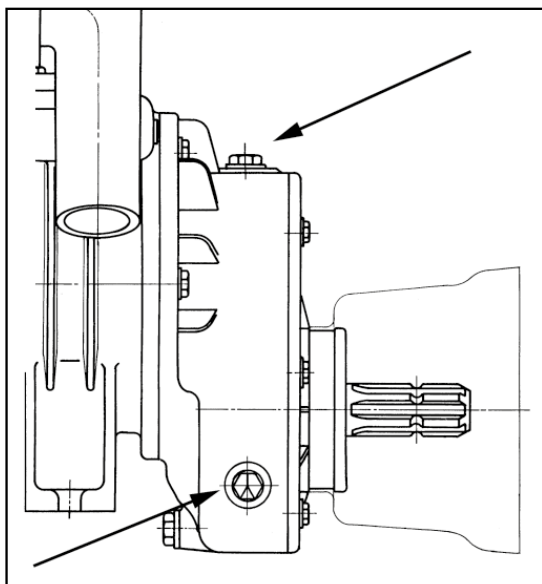
The Rotary blades vacuum pump is supplied WITHOUT lubrication oil inside the tank. Put into the tank lubrication oil type ISO VG 100 and into the gearbox oil type ISO VG 460. For food use it is possible to use vaseline oil with same characteristics of recommended mineral oils.

	
<p>Figure 4</p>	<p>Figure 5</p>
<p><b>KTM / WSM</b></p>	<p><b>KTS / KPS / WPT</b></p>

**KTM / WSM SERIES:** The minimum and maximum levels are indicated by the vertical level indicator placed on either side of the tank. The oil temperature and Rotary blades vacuum pump overheating can be controlled by a thermometer inside the level indicators (see Figure 4).

**WPT, KTS, KPS SERIES:** The minimum and maximum oil levels are indicated by indicator placed on the tank (see Figure 5 and Figure 6) or by the level rod (see Figure 7).

OIL TANK CAPACITY [l]						
WPT	KTS	KPS	KTM 1200-1500	KTM 1800-2300	WSM 2700	WSM 3300
6,5	6,5	6,5	10	14	8,3	8,3



**.../M .../MA .../K .../KA VERSIONS:** the gearbox is supplied with an oil loading plug and an oil level plug at the top of the gearbox (see figure 8), placed on the front 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



MODELS	OIL QUANTITY [g/h]
WPT 480	120
WPT 600	140
WPT 720	140
KTS 840	140
KTS 960	180
KTS 1080	240
KPS 490	140
KPS 550	180
KPS 670	240
KTM 1200	240
KTM 1500	240
KTM 1800	320
KTM 2300	320
WSM 2700	320
WSM 3300	320

### 5.4 - LUBRICATING OIL QUANTITY

During the Rotary blades vacuum pump operations check that amount of oil indicated in table 3 drops from the regulating cock. These amounts are valid for the Automatic Lubrication. When necessary to add in the tank, put only new and clean oil.

**VERSIONE .../M-MA .../K-KA:** the first gearbox oil change is to be done after about 100 hours of actual work; the following changes can be done every 300 hours of actual work.

Where provision is a particularly intense operation is recommended to increase the oil consumption of 8-10%.

The Table 3 summarizes the oil consumption for each model.

Table 3

### 5.5 - LUBRICATING OIL ADJUSTMENT

The adjustment of oil delivery, in automatic lubrication, is carried out at our factory during the final testing of the Rotary blades vacuum pump. If for any reason a different setting is required proceed as follows: remove pin cover (see Figure 9), loosen lock nut "C" and then turn regulator pin "A". By rotating clockwise the oil delivery will be lower (-), by rotating anticlockwise the oil delivery will be higher (+). When adjustment has been completed tighten lock nut "C" and screw back the cover.

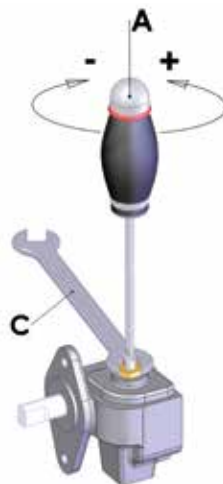


Figure 9

**KTM 1800 - 2300, WSM 2700 - 3300.**

If a different setting is required proceed as follows:

- Unscrew oil filling plug located on oil tank;
- If oil inside oil tank covers the lubrication pump, reduce oil level to half tank by unscrewing oil discharge plug;
- Push a screwdriver into the filling oil plug hole and adjust the oil flow;
- Turn the screw clockwise to increase the oil flow;
- Turn the screw anticlockwise to decrease the oil flow (see Figure 10) (this operation must be done for all the lubrication pump pistons);
- Remove the screwdriver and close the plug.

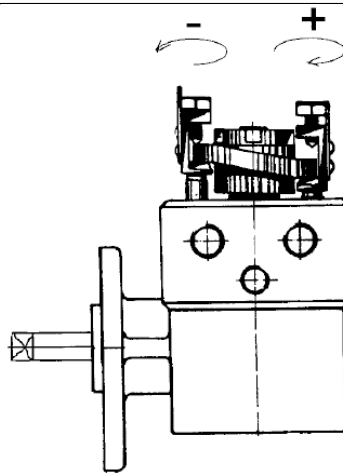


Figure 10

**Automatic lubrication pump**  
**KTM 1800 - 2300, WSM 2700 - 3300.**

## 6.0 - OVERPRESSURE VALVES AND VACUUM ADJUSTMENT VALVES

The following diagram describes the valves as series (O), on demand (X) and not available (-) for each model of Rotary blades vacuum pump.

	VALVOLA REGOLAZIONE VUOTO 1" 1/2	VALVOLA SOVRAPRESSIONE 2"	VALVOLA SOVRAPRESSIONE 2" 1/2
WPT	O	O	-
KTS	O	-	O
KPS	X	-	-
KTM	-	-	-
WSM	-	-	-

O = As standard

X = On request

- = Not available

Table 4

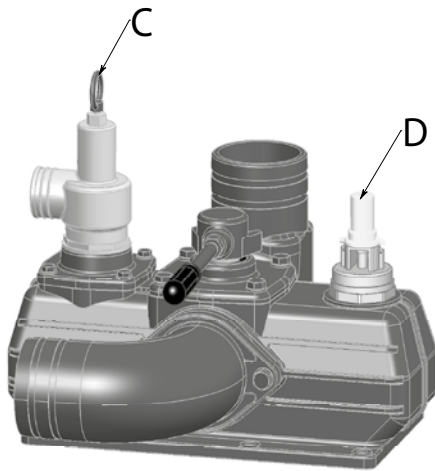


Figure 11



**Attention:** The system must **ALWAYS** be equipped with a vacuum adjustment valve (set at -0.80 bar) and a overpressure valve (set at 1 bar).

**Pressure:** the maximum pressure allowed 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, of a size capable of discharging the excess air delivery. Working pressure 2 absolute bar (1 relative bar).

**Vacuum:** a too high 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”. The abovementioned valves can be mounted on the pumps manifold or on the manifold cover. The working vacuum grade is -0.80 bar.

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

## 6.1 - SHOVEL VALVE (KPS)

The shovel valve located on the suction line, allows to keep the vacuum created in the tank during loading operations. The valve also allows to maintain the pressure in the tank during unloading; this avoids losing pressure during handling at the end of the field when the PTO is disconnected.

The valve also avoids in case of sudden stops of the cardan shaft that the rotor of the pump places in counter rotation the hydraulic PTO of the tractor.

## 6.2 - INTEGRATED AIR FILTER (KPS)

The cartridge air filter (STAINLESS STEEL wire mesh) is integrated into the manifold and works both in vacuum mode and under pressure, preventing foreign objects from entering into the pump body.

By unscrewing the 4 M10 screws on the manifold, it is possible to access the filter cartridge, which must be cleaned regularly with water or gasoline, blowing it with compressed air. Failure to clean the filter may determine pump overheating and poor performance.



## 7.0 - TESTING AND RUNNING IN

### 7.1 - TESTING

All the Battioni Pagani<sup>®</sup> Rotary blades vacuum pumps are tested before delivery at our factory.



*In order to test the Rotary blades vacuum pump check the preceding points, using a workbench if necessary. Make sure that the power take-off (PTO) shaft turns freely and that the direction of rotation is the same as the one indicated by the arrow.*



*In order to test the Rotary blades vacuum pump check the preceding points, using a workbench if necessary. Make sure that the power take-off (PTO) shaft turns freely and that the direction of rotation is the same as the one indicated by the arrow.*

### 7.2 - RUNNING IN

The running in period for the Rotary blades vacuum pump is 30 working hours, during which the functioning parameters must be reduced by 20%.



## 8.0 - START, OPERATION, STOP

### 8.1 - START

The Rotary blades vacuum pump does not have a start button. Therefore to start it up just transmit motion to the power take-off in a different way according to the Rotary blades vacuum pump version. Make sure, before the start up, that the Rotary blades vacuum pump is supplied with lubricating oil in the internal part (and in the gearbox for M and MA, K and KA versions).



**Before starting the Rotary blades vacuum pump make sure that the guards on all the moving parts are in place and efficient. Any damaged or missing components must be replaced or installed correctly before using the transmission.**

**In M, MA, D clean and grease the power take-off before installing the cardanic transmission.**

### 8.2 - OPERATION



**Do not use the Rotary blades vacuum pump at pressure higher than those indicated in the table 5. During use do not exceed the speed and power limits set in this manual. Avoid overloads and under-load functioning of the power take-off.**

Check the following operating parameters.

PARAMETER		WORKING RATE	WORKING RATE
Speed M, G, K	[rpm]	450-500	600
Speed P, D, H	[rpm]	1000 (1200 for KPS)	1200 (1400 for KPS)
Speed WSM 2700 - 3300 P	[rpm]	800	1000
Speed MA, GA, KA	[rpm]	800	1000
Pressure	[bar]	0,5 – 1	1,5
Vacuum	[%]	80 %	95 %
Cylinder external temperature compression side	[°C]	60 – 70	100

Table 5

SOUND PRESSURE LEVEL LpA (dB)														
WPT480	WPT600	WPT720	KTS840	KTS960	KTS1080	KPS 490	KPS 550	KPS 670	KTM1200	KTM1500	KTM1800	KTM2300	WSM2700	WSM3300
70	72	74	74	75	75	75	78	79	76	76	77	77	78	79

Rotary blades vacuum pump noise level at 60% vacuum with silencer at a distance of 7 m in open field conditions.



**Failure to comply with the instructions given in this manual may be dangerous for the user health or may damage the Rotary blades vacuum pump . If the material to be sucked density is high, dilute or mix the material. 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.**



### 8.3 - STOP

To stop the Rotary blades vacuum pump, stop the engine and disconnect the power take-off in order to prevent its accidental operation.

### 8.4 - CONTROLS DEVICES

To control the intake and compression phases there is a handle, placed on the upper side of the manifold and can be used manually. To determine in which way turn the handle to select the intake or compression phases follow the instructions provided by the system manufacturer. In case of gear blocking lift the handle with a lever.



*The intake or compression selection made with the handle must be operated with the Rotary blades vacuum pump not running.*

### 8.5 - PROTECTIVE DEVICES



*The Rotary blades vacuum pump, when being installed on a machine, must be equipped with a protective device to isolate the moving parts of the transmission and prevent access to them by the operators.*

M, MA, K, KA, D versions are equipped with a CE marked plastic protective device. It insulates and protect of power take-off shaft when in motion.



*It is necessary to protect the Rotary blades vacuum pump to avoid the remote danger of materials projection in case of heavy breakage.*

### 8.6 - PERSONAL PROTECTIVE EQUIPMENT TO BE USED



*When operating the Rotary blades vacuum pump, the personal protection equipment prescribed by the machine manufacturer on which the pump is installed is to be used.*

## 9.0 - TROUBLESHOOTING

PROBLEM	CAUSE	REMEDY
Little vacuum or pressure	Blades are worn	Replace blades
	Some blades jammed in rotor	Disassemble the Rotary blades vacuum pump, clean and wash the rotor, blades, body
	Air infiltration or leakage from system	Eliminate infiltrations
	Undulated cylinder	Smooth or replace the body
	The cartridge filter is dirty	Follow the cleaning procedure
	Reversing gear misplaced	Remove reversing gear and position it correctly
	Crash protection system (flange down) enabling see section 3.9.2	Lift the flanges and tighten the flange screws with 55 Nm
Overheating	Excessive pressure	Reduce pressure
	Excessive revs rate	Reduce revs rate
	The cartridge filter is dirty	Follow the cleaning procedure
	Excessive operating time	Reduce operating time
	Blades too long	Trim blades to correct size
	Lack of lubrication	Check oil level in tank, the oil pump correct functioning, the oil cock regulation
	Cooling system insufficient	Adjust cooling system
Beating against external surface	Revs rate too low	Increase revs rate
	Lubricating oil quantity too high/low and not appropriate	Clean Rotary blades vacuum pump and replace oil
Sewage output from the discharge curve	Malfunctioning of valves	Check valves
Smoke comes out of discharge tube	Excessive lubrication	Adjust lubrication
Water leaks from blanking caps or fittings	Insufficient tightening	Tighten until there is no more leakage
No lubricating oil circulation (for automatic lubrication versions)	Air intake at pipe fittings	Replace pipe fittings
	Lubrication tube badly inserted in pipe fittings	Insert lubrication tube correctly
	The oil pump chamber contains air	Full the pump chamber with oil
Power take-off does not rotate	Broken blade	Replace blades (check if rotor pin is bent)
	A foreign body has entered the Rotary blades vacuum pump	Remove foreign body
No suction/no compression	The handle is badly positioned	Position the handle correctly
	The reversing gear is badly positioned	Position the reversing gear correctly
	Rotary blades pump runs backwards	Reverse direction of rotation
	All blades jammed	Disassemble the pump, clean and wash blades, rotor and body
	Blades protrude from rotor slots anomalously	Disassemble the pump, clean and wash blades, rotor and body
	The rubber ball closes the overflow valve	Increase passage of air inside valve
	[KPS] The plate is locked	Unscrew the cap or vacuum adjustment valve where present placed on the filter cover and move the plate downward until releasing or unlocking it
Handle blocking	Pump fills up of extraneous liquid	Disassemble and clean with diesel
	Inactivity	Lift the handle with a lever



## 10.0 - MAINTENANCE, INSPECTIONS AND CHECKS, REPAIRS, TECHNICAL ASSISTANCE



*When carrying out maintenance operations, inspection and checks, repairs, it is advisable to wear the individual protection devices listed in this manual.*



*All maintenance operations, inspections and checks, repairs must be carried out with the greatest attention and with the Rotary blades vacuum pump off and with the power take-off disconnected.*

### 10.1 - CLEANING

#### 10.1.1 - BODY WASHING

If sewage enters the Rotary blades vacuum pump, the inside of the body must be washed immediately, by making it suck in diesel or fuel oil through the suction pipe with the Rotary blades vacuum pump in compression phase. After this operation make it suck in oil. The same operation should be carried out when the Rotary blades vacuum pump has to remain inactive for a long time. In this case it is necessary to disconnect the suction and delivery tube connected to the valves and seal the manifold lid because the gases that forms inside the tank, pouring in the Rotary blades vacuum pump, cause rust inside the body, which can cause breakage of the blades when the machinery is restarted.

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 detergent (e.g. thinner).

#### 10.1.2 - FLUSHING KIT (KPS)

There is a 1/4Gas hole on the intake manifold (closed by a dowel on the standard version), where it is possible to inject diesel fuel to clean the pump. An optional kit will be provided with plastic tank and tap to place on the tank for such operation. Lacking the kit, just remove the 1" 1/2Gas cap on the manifold and input the diesel fuel from the top hole, causing it to fall out from the output curve.

#### 10.1.3 - OIL TANK WASHING

Wash the oil tank at least once a year with appropriate detergent.

#### 10.1.4 - VALVES WASHING AND CLEANING

Wash and clean the valves at least once a month, unscrewing them from the Rotary blades vacuum pump and cleaning them with water or non-corrosive detergents.

### 10.2 - VALVES CHECKING

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

### 10.3 - BLADES GENERALITIES

All the Rotary blades vacuum pumps are fitted with special blades. These blades have optimum mechanical characteristic and considerable resistance to heat and prolonged use.

A part for normal wear, it may be necessary to replace the blades due to incorrect use of the Rotary blades vacuum pump. The most frequent causes are heat, lack of lubrication, excessive wear, sewage entrance, high pressure or vacuum, or formation of rust inside the body due to prolonged inactivity.

Too high heat causes bubbles to form on the surface of the blades, increasing their thickness and preventing them from coming out freely from the rotor slots; the layer of material of which the blade is made may also come apart. Lack of lubrication means the blades are completely dry like the inside 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 or by an excessive wear. 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.

### 10.3.1 - BLADES INSPECTION



**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 9).

#### 10.3.1.1 - BLADES INSPECTION WPT - KTS - M - MA

To check the state of wear of the blades in the Rotary blades vacuum pump proceed as follows:

- Remove the threaded inspection plug;
- Turn the rotor until a blade is aligned with the inspection hole;
- Compare the pallet height with the rotor circumference;
- Replace the complete set of blades when the height is below the circumference of the rotor of 10-15%.



#### 10.3.1.2 - BLADE INSPECTION KPS

- To check the wear of the palettes on the rotary vacuum vane pump proceed as follows:
- Compare the height of the pallet with the control circumference indicated on the rotor;
- Replace the complete set of palettes when the height is below the control circumference indicated on the rotor.

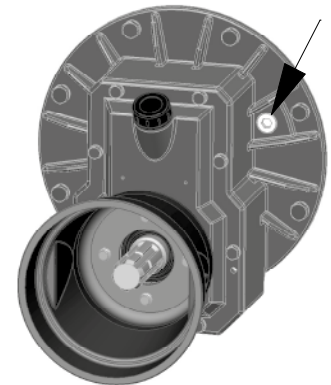
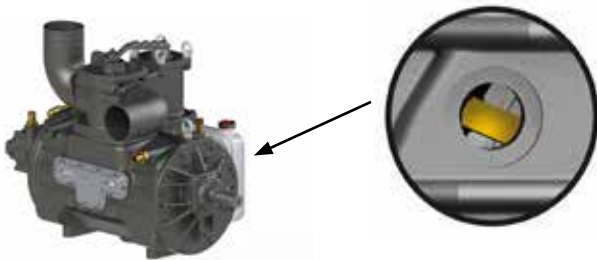


Figure 11

#### 10.3.1.3 - BLADES INSPECTION WPT

To check the state of wear of the blades in the Rotary blades vacuum pump proceed as follows:

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

#### 10.3.1.4 - BLADES INSPECTION KTS, KTM, WSM

To check the state of wear of the blades in the Rotary blades vacuum pump proceed as follows:

- 1) remove the threaded plug with a spanner;
- 2) insert a rod in the inspection hole ( $\varnothing$  6 mm max, length 135 mm);
- 3) rest one end of the rod against the rotor;
- 4) mark the rod at the level of the inspection hole;
- 5) turn the rotor until a blade is aligned with the inspection hole;
- 6) Insert the rod in the blade slot;
- 7) mark the rod again at the level of the inspection hole (see Figure 14);
- 8) measure the distance between the two marks on the rod;
- 9) if this distance is greater than 10-15% of the original height of the blade (see Table 9), replace the complete set of blades;
- 10) screw on the threaded plug to close the inspection hole.

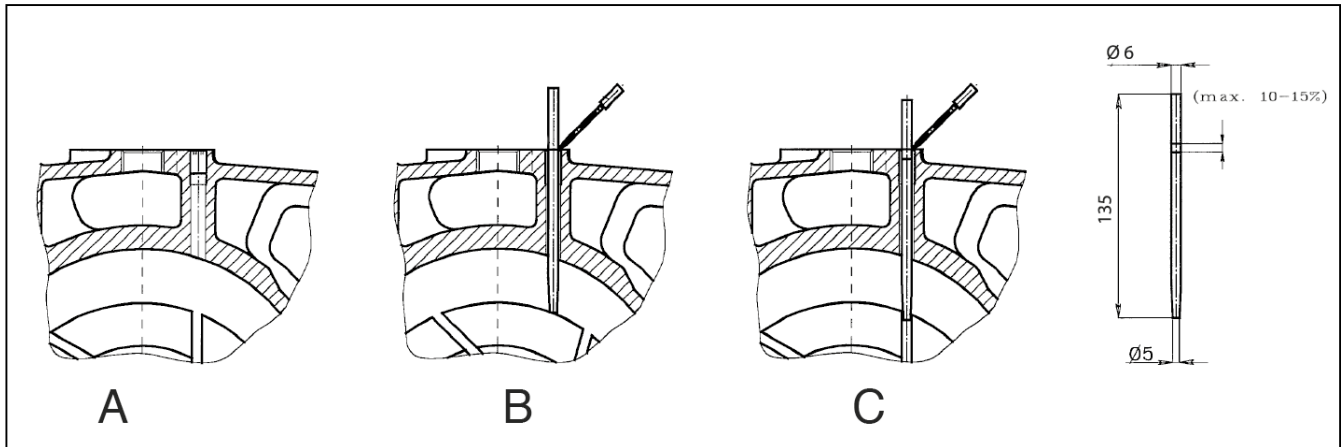


Figure 14

### 10.3.2 - BLADES REPLACEMENT

1. Check that there is sufficient space at the back of the Rotary blades vacuum pump to be able to work easily; if there is not, the Rotary blades vacuum pump should be taken off its support beforehand;
2. Remove the back;
3. Extract the blades from the rotor;
4. Clean the Rotary blades vacuum pump;
5. Replace the blades and the gaskets and the oil seals of the rear flange;
6. Re-fit the back of the Rotary blades vacuum pump.
7. Use only Battioni Pagani® e original spare parts



*Request the Rotary blades pump revision kit containing in a single blister pack: Original Battioni Pagani® blades, gaskets and oil seals.*

### 10.3.3 - BLADES DIMENSION

MODEL	NUMBER OF BLADES	BLADES SIZE
WPT 480	6	300x73x7,5
WPT 600	6	400x73x7,5
WPT 720	6	500x73x7,5
KTS 840	6	500x80x6,7
KTS 960	6	570x80x6,7
KTS 1080	6	640x80x6,7
KPS 490	5	460x60x6,5

MODEL	NUMBER OF BLADES	BLADES SIZE
KPS 550	5	410x82,5x7,5
KPS 670	5	500x82,5x7,5
KTM 1200	6	529x98x7,5
KTM 1500	6	639x98x7,5
KTM 1800	6	555x125x7,5
KTM 2300	6	650x125x7,5
WSM 2700	6	678x128x7,5
WSM 3300	6	828x128x7,5

Table 9



**IMPORTANT:** Make sure that the blades received for replacement are of less or equal length to the nominal size shown in Table 9.

### 10.4 - RUBBER BALL REPLACEMENT

1. Unscrew and lift the valve holder lid (WPT and KTS series)
2. Replace the rubber ball;
3. Close the valve holder lid (WPT and KTS series)

### 10.5 - GEARS REPLACEMENT (M-MA, K-KA VERSIONS)

1. Unscrew the screws of the gearbox cover;
2. Use two screws to screw into the threaded extraction holes until the cover is removed;
3. Take out the gear with splined shaft using an extractor if necessary;
4. For the pinion: unscrew the self-locking nut, use an extractor or a press.

### 10.6 - TECHNICAL SUPPORT

Contact Battioni Pagani<sup>®</sup> authorized distributors for technical assistance or accessories and spare parts supply.

### 10.7 - REGULAR SERVICING

SERVICING TO BE CARRIED OUT	HOW TO PROCEED	FREQUENCY
Check oil circulation	View the control lights	Once a day
Check / clean the filter cartridge	<ul style="list-style-type: none"> <li>• Open the filter cover on the collector through the 4 eyebolts;</li> <li>• remove the cartridge;</li> <li>• clean with water and / or compressed air preventing the dirt from falling inside the collector</li> <li>• move the plate to verify proper operation</li> <li>• reassemble all parts</li> </ul>	Once a week
Check oil level in tank	Use the oil level outside the tank	Once a week
Check that the over-pressure and vacuum regulator valves are working correctly	Remove valves	Once a month
Check that the overflow valves are working correctly	Remove valves	Once a month
Lubricate power take-off (M - MA - K - KA - D)	Oil Power take-off with brush and lubricating oil	Once a month
Wash and clean the valves	Remove valves	Once a month
Check wear of blades	Remove threaded plug	Every 300 working hours
Wash oil tank	Remove tank	Once a year
Wash body internally	Cleaning with "Flushing Kit", enter "Flushing Fluid" (after washing only lubricate) and dispose of the products and the cleaning residues adhered to the rules laid down for oil chemicals	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



## **11.0 - PUTTING OUT OF SERVICE AND DEMOLITION**

Before demolishing the Rotary blades vacuum pump 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 Rotary blades vacuum pump in the environment.

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