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## 1. Machine identification

### 1.1 Manufacturer's identification

<b>Manufacturer</b>	Rovatti A. & Figli Pompe S.p.a.
<b>Address</b>	42042 Fabbrico (Reggio Emilia) - Italy Tel. +39 0522 66 50 00 Fax + 39 0522 66 50 20 mail info@rovatti.it www.rovatti.it

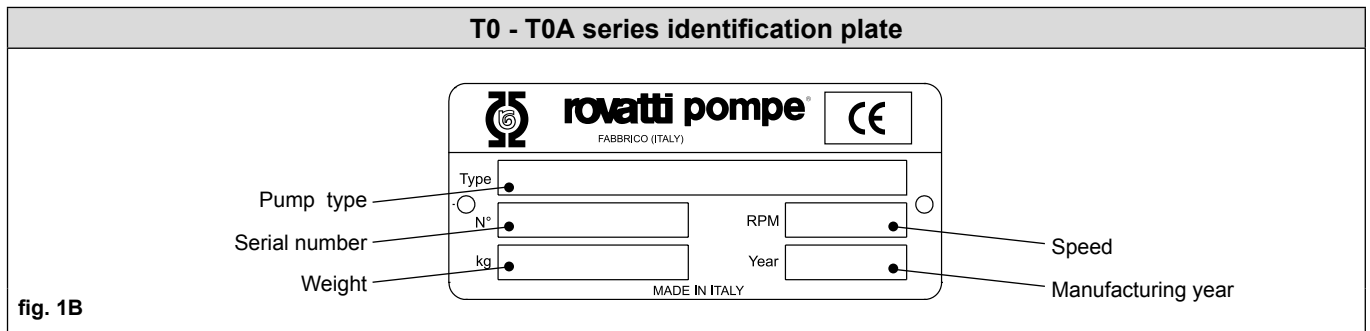
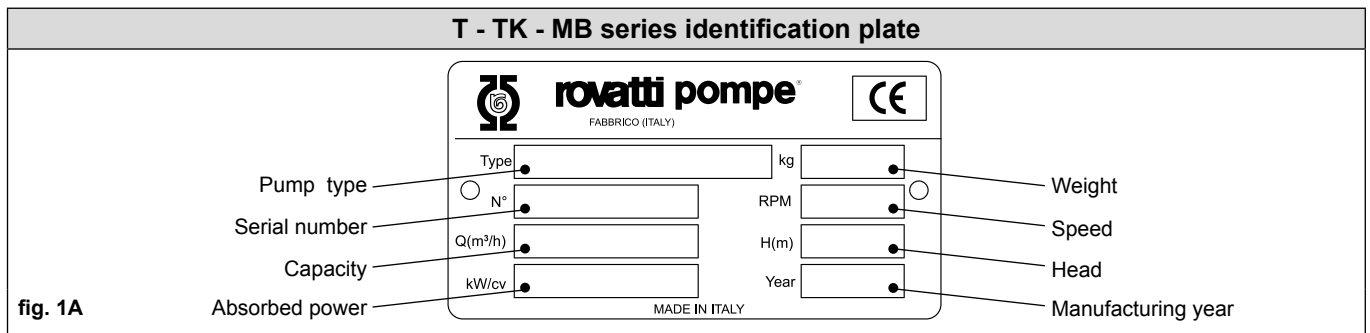
### 1.2 Identification

This manual describes the operating instructions relative to:

- Horizontal single-stage pumps with overgear **T** series;
- Horizontal multistage pumps with overgear **TK** series;
- Horizontal single-stage pumps with overgear **MB** series;
- Horizontal single-stage pumps with overgear **T0** series;
- Horizontal self-priming pumps with overgear **T0A** series.

### 1.3 Identification plate

All products described in this manual are provided with an identification plate (fig. 1A - 1B) reporting the characteristic data. In case of warranty claim, it's important to inform the manufacturer of all characteristic data.



## 2. Description of the manual

### 2.1 Introduction

The good functioning of the product, its reliability and life depend on the severe respect of the present prescriptions by the installer and the end user. Read carefully and take note of prescriptions, suggestions and indications necessary for a correct use.

### 2.2 Purpose of the manual

This manual has been prepared considering the needs of the user that bought our product. You can find topics and instructions illustrating the correct use of the product in order to maintain characteristics, functionality and quality of the product unchanged over the time. The instructions for use contained in the present manual refer to products in standard execution and functioning in normal conditions; therefore, for the use of a pump-motor unit, the present instructions must be integrated with the documentation provided by the motor/engine manufacturer. Keep this manual and any eventual further documentation in a suitable place on hand of operators when necessary.

### 2.3 Update procedure

The manual is subject to revisions and modifications by **Rovatti A. & Figli Pompe s.p.a.** without prior notice. Once updated, the manual in the new version will be supplied with the sold product.

### 3. Preliminary information




#### 3.1 Standard references

Horizontal single-stage pumps with overgear **T** series, horizontal multistage pumps with overgear **TK** series, horizontal single-stage pumps with overgear **MB** series, horizontal single-stage pumps with overgear **T0** series, and horizontal self-priming pumps with overgear **T0A** series have been designed and manufactured in compliance with:

<b>Machine Directive 2006/42/CE</b>
<b>Standard EN-ISO 12100</b>
<b>EN809</b>

#### 3.2 Simbology

Here below the symbols used in this manual to ensure safety for persons, machines and all electrical and mechanical equipment:

	<b>General danger</b>	The non observance of the prescription involves the risk of damages to persons and/or things
	<b>Electric danger</b>	The non observance of the prescription involves electric shock risk
	<b>Technical danger</b>	The non observance of the prescription involves the risk of technical damages to the product and/or to the installation

#### 3.3 General warnings



Operations reported in this manual, with particular reference to **transport, installation, electrical and mechanical connections, starting, maintenance or off-service operations** must be carried out by skilled personnel well experienced with the rules concerning safety of the working environment and who has taken vision and carefully verified the content of this manual and/or any other documentation enclosed to the product. It must also be considered and followed any more restrictive local regulations.

#### 3.4 Operators skills

Below are listed the operators skills:






<b>Generic operator</b>	Not skilled personnel, who can drive the machine using the controls on the push-button panel; simply re-start or re-set the machine after forced interruption.
<b>Mechanical maintener</b>	Skilled engineer who can drive the machine in normal conditions; operate on the mechanical components for setting, maintenance and repairs, if any. He's not allowed to operate on the electric system when live.
<b>Electrical maintener</b>	Skilled engineer who can drive the machine in normal conditions; make all electric operations necessary to setting, maintenance and repair. He can operate inside control and jack boxes, when live.
<b>Rovatti technical operator</b>	Skilled engineer. He's available for clients directly by Rovatti A. & Figli Pompe Spa or by one of their agent, when particularly difficult operations are required.

#### 3.5 Protective equipment required



During installation, maintenance or off-service operations all individual protective devices are necessary to operate in safety conditions (proper gloves, clothes, protection masks, etc.). To prevent accidents be sure that unauthorized persons cannot approaching or standing in dangerous areas.

### 3.6 Residual risks

  <b>Danger due to moving mechanical components</b>	<p>Hazard of getting caught and drawn into machine pinch points by loose clothing that become entangled. Pinch points are represented by all rotating or revolving parts and by power transmission apparatus. Follow lockout procedure before servicing. Do not operate without proper protective guards. Stay clear of the machine area while operating</p>
 <b>Danger due to edges and angles</b>	<p>Whenever possible we have provided for corner guards and eliminated protruding parts. Use proper protective guards, like gloves, eye-glasses etc. during maintenance and cleaning operations</p>
 <b>Danger due to electric hazard</b>	<p>The terminal block connecting the electric network to general panel remains live also when in stand-by for servicing operation. Before making any connection or maintenance on these parts disconnect electric power from network supply cable to the machine. We recommend to mount a disconnecting switch upstream in order to insulate the power supply, to ensure safety maintenance operations</p>
 <b>Danger due to thermal hazard</b>	<p>Thermal hazards on this type of machine are concentrated determined areas. While operating the temperature of these areas can reach and exceed 50° C. Avoid any direct contact with these components. Wait for complete cooling in order to prevent burns</p>

### 3.7 Prohibitions

In particular, employees must not:



- mount on the pump to prevent falls;
- remove or modify without authorization any security device, security signal or security control;
- perform operations on its own initiative that could compromise the safety of themselves or other operators;
- wear bracelets, rings and necklaces that can be hanged or dragged by moving parts, creating danger conditions;
- use the machinery if there is any malfunction;
- apply any precarious repairs.

### 3.8 Noise level

The acoustic pressure levels of the products, properly installed and functioning within the use limits foreseen in the relative technical catalog are reported on the annex.

### 3.9 Unintended and/or improper uses

Do not use the machine in the following conditions:



- waterless;
- without the protection grids properly installed;
- exceeding the limits specified on the identification plate;
- for pumping different liquids from those specified in the relative catalog.

Do not use the machine for different purposes than those specified in the relative product catalog. Any different use from those specified in the relative product catalog is to be considered improper and therefore potentially dangerous to the safety of workers, as well as to invalidate the contractual warranty.

### 3.10 Warranty

Warranty of the products are subject to **ROVATTI A. & FIGLI POMPE S.p.A. general sale conditions**. For more information about Rovatti terms and conditions, please visit "[www.rovatti.it](http://www.rovatti.it)". Warranty is recognized when all mechanical, hydraulic, electric norms and correct use indicated on the present manual are respected.

## 4. Description of the machine

### 4.1 Purpose of the machine

The machines described in this manual are widely used in livestock systems, filling tanks and reservoirs, irrigation systems, spraying systems and liquid transfer.

### 4.2 Use conditions

For all machines described in this manual it is necessary to respect the following use limits:

<b>Max pumped liquid temperature</b>	<b>60°C</b>
<b>Max. solids contents</b>	<b>40 g/m<sup>3</sup></b>
<b>Max running time with closed delivery (Q = 0)</b>	<b>1 min.</b>
<b>Max. suction pressure</b>	<b>9 bar</b>



The presence of abrasive substances causes wearing and premature deterioration of the internal components of the pump. The presence of pollutants, such as residues of hydrocarbon, solvents, detergents, natural gas, may cause heavy damages producing the blowing of the rubber components (bearings, wear rings) and even the consequent pump rotor locking.



In case of use in conditions different from the suggested ones or constructive modifications made without previous authorization, warranty foreseen in the general sale conditions will be no longer valid and the manufacturer will not be responsible of eventual damages caused to persons, animals or things.

### 4.3 General characteristics

Centrifugal pumps with overgear driven by PTO cardan shaft. Available with 3-point linkage or on 2-wheel trolley and suitable for all irrigation systems. A tested water circulation cooling device of the overgear (**T - TK series**) guarantees safety functioning in continuous working periods. The pumps described in this manual are suitable for pumping non-abrasive, chemically and mechanically non-aggressive waters.

### 4.4 Pumps identification

The pumps described in this manual are available in several versions, indicated by the designation of the pump:

Pump with overgear						
T			MB			
Version						
R			N			
Gearbox size						
2K	3K	4K	1	2	3	4
Nominal Ø suction port [mm] (for TK - TK Europa series)						
50		65		80		100
Nominal capacity in m <sup>3</sup> /h (for TK Europa series)						
90 ÷ 160						
Hydraulic size (for T series)						
40 ÷ 150						
Version (for T series)						
A						
Nominal Ø delivery port (for MB series)						
20			25			
Number of stages (for TK - TK Europa series)						
2			3			
Impeller size						
E	F	G	H	I	L	

**Example: T3K80-90/2G**

Pump with overgear	
T	
Drive type	
0	0F
Nominal Ø suction port [mm]	
50	
Self-priming version	
A	

**Example: T0-50A**

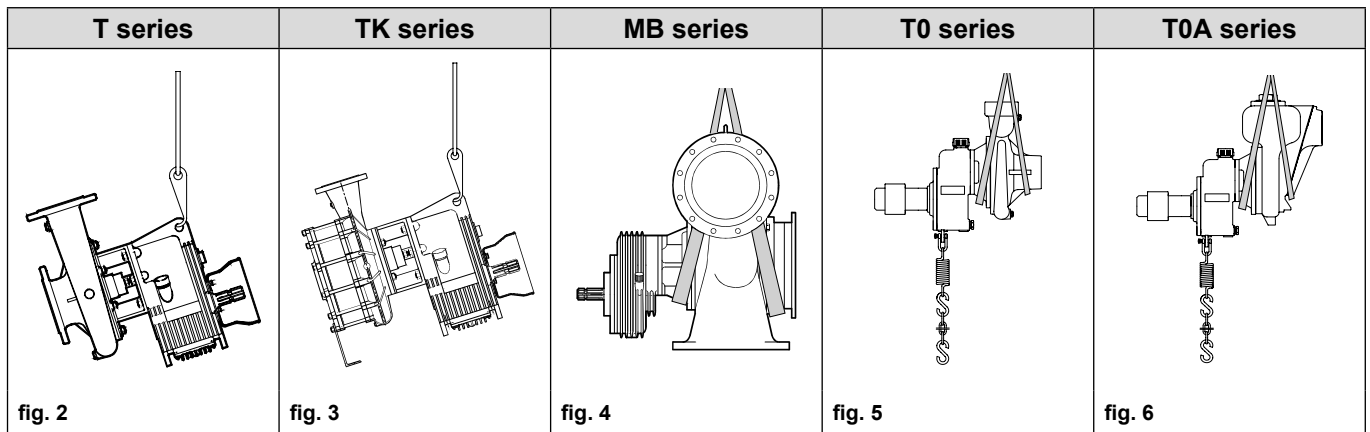
## 5. Transport, handling and storage

### 5.1 Transport and handling

When packed, the products described in this manual can be moved with a forklift but in case it is possible to move them even with a crane. Once unpacked, identify the weights of the product (detectable on the identification plates) and use the lifting hooks points **fig. 2 ÷ 6**.



To reduce risks during lifting and handling operations, be sure to operate in safety conditions checking that equipments are complying with safety norms and are suitable for the weights, dimensions and shape of the product. **Handle the product with protective gloves avoiding cut risks to hands. When lifting and placing the pump be sure of its stability before releasing the lifting equipment.**



### 5.2 Storage



The products described in this manual must be stored in covered and dry rooms. **In case of a long storage period (over 3 months) and/or storage in conditions with low ambient temperature, you should empty the pump (the water may freeze and cause serious damages) and protect it with special product against oxidation and rotate periodically by hand the shaft to avoid the possible locking of the same.**

### 5.3 Packing disposal

The products described in this manual are normally packed in wooden boxes that must be disposed as prescribed by the local regulations prevailing in the country in which the disposal occurs. For further informations contact the relevant authorities.

## 6. Installation

### 6.1 Inspections before installation

After receiving the product ensure that during transport it has not been damaged and that the data reported on the identification plate of the product correspond to the submitted order.



**Before installing the pump be sure that the rotating components rotate freely. Be sure that the support base is solid, regular and adequate to the pump weight (refer to the identification plate).**

### 6.2 Installation of T, TK, MB pump series



**Pump coupling must be performed only when tractor is off. Make sure that the tractor cannot be accidentally started accidentally. All T, TK, MB pumps can be either mounted on permanent stations or on mobile trolley.**



**The cardan shaft should be connected with an alignment angle less than 10° (fig. 7). Suction and delivery pipes must be correctly mounted and not subject to stress during pump operation.**

Ensure in suction that:

- NPSH available is 1 meter approx. higher than the NPSH requested by the pump and that friction losses in suction pipe, bends, foot valve and filter do not exceed 1 meter.
- Suction pipe has a diameter larger than the inlet of pump and that the horizontal section of the suction pipe does not exceed a gradient of 2%.
- All joints are perfectly airtight.
- Anchorages and supports to prevent damages and possible breakage of suction flange are properly secured.
- Foot valve is vertically positioned and equipped with adequate sized grid to protect against possible obstructions (free surface of filter must be minimum twice suction pipeline surface).
- The suction pipe has no narrow bends and diameter variations.

**Ensure in delivery that:**

- All pipes and fittings are adequately dimensioned to reduce pressure loss and to withstand the maximum operating pressure of the pump.
- A gate valve is fitted to regulate delivery flow.
- The suction pipe has not narrow bends and diameter variations.
- Anchorages and supports to prevent damages and possible breakage of delivery flange are properly secured.

**Typical installation**

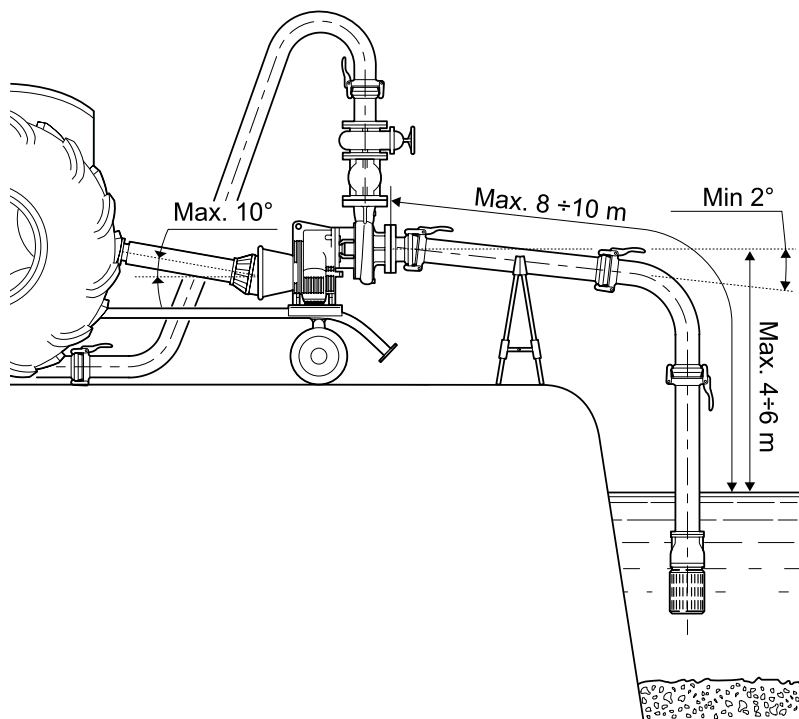


fig. 7

**6.3 Installation of T0, T0A pump series**



Pump coupling must be performed only when tractor is off. Make sure that the tractor cannot be accidentally started accidentally. All T0 and T0A pumps can be either mounted on permanent stations or on mobile trolley.



The cardan shaft should be connected with an alignment angle less than 10° (fig. 7). Suction and delivery pipes must be correctly mounted and not subject to stress during pump operation. Also refer to paragraph 6.2.

In T0F and T0FA execution (fig. 8) these pumps are fitted for direct coupling to the p.t.o. of tractors. For installation proceed as follows:

- Lift the pump until the p.t.o. is aligned with the pump coupling; slightly rotate the coupling to meet the splines and push the pump towards the p.t.o.
- Pull the coupling external ring towards the pump, overcoming the return spring resistance; now push the pump towards the p.t.o. to find the foreseen coupling position.
- Release the ring back to its original position. Check that installation is made correctly by pushing the pump forward and backward: the pump must remain firmly anchored to the p.t.o.
- The pump will result radially swinging on the p.t.o. Complete anchorage is made by hooking the two chains at the ends of the traverse anchor bar fixed on pump support. Chains prevent the pump to rotate further to the p.t.o. motion.
- To grant a firm anchorage it is important to find suitable points/positions on the tractor where chains can be hooked. On the other hand, chains shall be long enough to reach any anchorage point under or above the p.t.o.
- If anchorage points are under the p.t.o., the chain with the spring will be at the left of the pump. Of course, if anchorage points are above the p.t.o., the chain with the spring will be at the right of the pump.
- Use the accessories supplied with the pump (elbow, connection and foot valve) to connect the pipes.
- Refer to **paragraph 6.2**.



### Typical installation

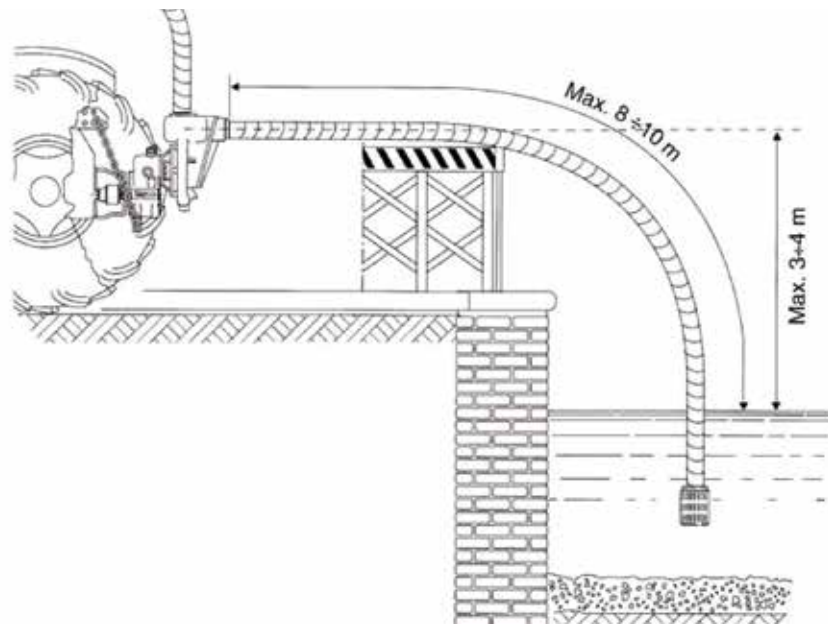


fig. 8

## 7. Starting

### 7.1 Preliminary information before starting



The starting must be performed by qualified and skilled personnel. The protection must cover all rotating components. Activate all security procedures and monitor the efficiency of the protections. Isolate the area within a radius of 2 metres and avoid access to unauthorized persons.



Never run the pump without water; dry functioning, even brief, can destroy the hydraulic components.

### 7.2 Lubrication



The pumps described in this manual are supplied without lubricating oil and **before starting it is necessary to proceed with oil filling. Refer to tab.1 for quantity and type of oil.**

### 7.3 Starting of T, TK, MB pump series

- Carefully fill the pump body and the suction pipes checking that no air is trapped inside. If possible turn the shaft manually maneuvering the coupling.
- Start the pump-motor unit with gate valve slightly open.
- With running pump gradually open the gate valve to obtain the desired operating performance.
- On pumps equipped with gland packing, make sure that the packing leaks approx. 20 to 60 drops per minute to allow adequate cooling and shaft lubrication. If necessary, adjust the flow slowly and progressively loosening or tightening the packing nuts (this adjustment must be performed with running pump). **Be careful not to touch moving parts.**



### 7.4 Starting of T0 pump series

- Carefully fill the pump body and the suction pipes checking that no air is trapped inside. If possible, turn the shaft manually maneuvering the coupling.
- Start the pump-motor unit with gate valve slightly open.
- With running pump gradually open the gate valve to obtain the desired operating performance.

### 7.5 Starting of T0A pump series

- These pumps could be used even without footvalve. Anyway, the use of a grid (with max. 10 mm mesh) is recommended.



- When starting for the first time, the pump body must be filled with water: use the port in the upper part of the pump body or the outlet. This operation is not required prior to following startings, because the built-in-check valve prevents the emptying of the delivery pipe and guarantees enough water for a correct priming. Time of priming may depend on rotation speed as well as on length and diameter of inlet pipe and can vary from few seconds to a few minutes.



The pump operation must stay within the limits and must take place without abnormal vibration and noise. Maintain the data provided on the operating plate. The use of the pump with different data may cause irreparable damage. After starting check again the alignment of the pumping units.

Pump	Europa range	Oil quantity [ml]	Oil type			
			Ambient temperature up to 35°C		Ambient temperature over 35°C and for heavy uses	
			Type	Gradation ISO	Type	Gradation ISO
T2K50/3		1450	SAE 80W/90	~140	SAE 85W/140	~375
T2K65/2		1450				
T3K65/2		2000				
T3K80/2		2000				
T3K80-90/2	•	2000				
TR3K100-120/2	•	2000				
TR3K100/160/2	•	2000				
TR4K100-120/2	•	2900				
TR4K100-160/2	•	2900				
T4K100/2		2900				
T1-40		1050				
T1-50		1050				
T1-65A		1050				
T1-80		1050				
T1-100		1050				
T2-40		1450				
T2-50		1450				
T2-65		1450				
T2-80		1450				
T2-85		1450				
T2-150		1450				
T3-80A		2000				
T3-100A		2000				
T3-110		2000				
T4-100		2900				
T4-110		2900				
T4-125		2900				
TR4-125		2900				
MBN20		550				
MB25		550				
T0-50		350				
T0F-50		350				
T0-50A		350				
T0F-50A		350				

tab. 1

## 8. Maintenance

### 8.1 Bearings lubrication

Provide oil replacement after the first 80 hours of operation. It is necessary to repeat this operation every 400 / 1000 operation hours. Provide oil replacement also in case of sudden oil lowering. For oil replacement refer to tab. 1.  
DON'T WASTE THE ENVIRONMENT WITH OUT OF USE OIL.



When the pump remains inactive for a long period (especially during cold season), drain out the water from the drainage plug in order to prevent freezing damages. It is advisable to protect the rotating internal parts with antirust oil (without solvent) and, when possible, rotate by hand the pump shaft.

## 9. Off service and demolition

In case of dismantling and demolition, the pump components are not so dangerous and do not require special precautions. In order to facilitate recycling, all materials composing electrical system and thermoplastic components shall be separated from the machine.

**INFORMATION TO USERS - under Article 13 of Law 25, July 2005, n° 151 "Implementation of Directives 2002/95/EC, 2002/96/EC and 2003/108/EC: Restriction of the use of certain Hazardous Substances in electrical and electronic equipment and Waste of Electrical and Electronic Equipment"**

Suitable separate collection, followed by decommissioned pump recycling, treatment and environmentally-sound disposal, helps to avoid possible negative effects on health and the environment and promotes re-use and/or recycling of the materials of which the equipment is made. Owners who dispose of the product illegally will be liable to the administrative penalties envisaged by the regulations in force. In case of off service and demolition, follow scrupulously the local antipollution norms. Proceed to the differentiated disposals according to the list of different materials composing the pumps in the standard version reported in the annex.

### DON'T WASTE THE ENVIRONMENT WITH OUT OF USE MATERIALS

## 10. Spare parts

In order to see spare parts tables or to order spare parts please refer to the spare parts catalog "Rovatti Spares Pro" available on [www.rovatti.it](http://www.rovatti.it).

## 11. Troubleshooting



It is important to always check that the installation complies with current regulations and that the operating conditions comply with the specifications for which the pump was purchased (refer to the identification plate fixed on the machine). The following is a diagram indicating the most frequent faults and their possible causes / remedies. For any further information contact the Rovatti Service Centres.

Faults	Possible causes	Remedies
<b>Blocked pump</b>	Moving parts rusted due to long period of non-use	Fill the pump with antirust oil, wait for few minutes and try to move by hand the pump shaft. Disassemble pump if necessary
	Foreign bodies inside the pump	Disassemble suction support or pump
	Breakage of some internal components	Disassemble the pump and replace parts
<b>Pump does not prime</b>	Pump body not totally filled	Provide to fill the pump
	Air inside the suction pipe	Check gaskets and connections
	Excessive suction head	Reduce the suction head
	Too low rotation speed	Increase the rotation speed
	Insufficient diameter of suction pipe	Replace the suction pipe
	Wrong rotation (pump driven by electric motor)	Invert the rotation
	Impellers and wear plate worn-out	Replace
	Pressure in delivery pipe	Breath air by the drainage cock
Increased water temperature in the pump body	Fill with cold water	
<b>Insufficient pressure and/or capacity</b>	Clogged suction grid	Wash and remove clogging
	Suction pipe reduces the section due to crushing depressure	Replace the suction pipe
	Rotation speed too low	Increase the rotation speed
	Excessive suction head	Reduce the suction level
	Impeller clogged by foreign body	Remove clogging. Disassemble pump if necessary
	Air inside the suction pipe	Check gaskets and connections
	Impellers and wear plate worn-out	Replace
<b>Pump is noisy and vibrates</b>	Functioning in cavitation	Find causes and reduce suction level if necessary
	Unbalanced moving parts: bearings or gears worn-out	Disassemble pump, check and replace
	Pump and pipes not securely fixed	Provide to fix the pump