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## Purpose of the manual

The manufacturer has provided this manual to provide the operating instructions and the criteria to be complied with when installing, using and maintaining the pump identified by designation on the cover.

The manufacturer supplies the original instructions in Italian language.

The manufacturer may supply the original instructions in other languages in response to statutory or commercial requirements.

If the pump is sold, the seller must pass on this manual to the new owner along with the appliance.

The instructions are intended for the skilled, suitably trained operators who carry out the installation and routine maintenance procedures.

Refer to the table of contents for rapid access to the topics covered.

The manufacturer reserves the right to amend the manual without notice, unless the amendments refer to the pump's level of safety.

The purchaser must ensure that the installation is designed in accordance with the instructions in this manual, statutory requirements, and the relevant national and local regulations.

The technical instructions in this "Use and Installation Manual" are the property of the manufacturer and must be treated as confidential.

There may be differences between the illustrations and the pump's actual conformation, but any such differences will not affect the clarity of the instructions. If in doubt, request the necessary explanations from the manufacturer.

The symbols shown and described below are used to identify safety risks or important information.



### Danger - Warning

**Identifies information or procedures the failure to comply with which may constitute a serious threat to health and safety.**



### Caution

**Identifies information or procedures the failure to comply with which may constitute a threat to health and safety or cause damage.**



### Information

**Identifies useful and important information or procedures which should be borne in mind.**

## Pump and manufacturer identification

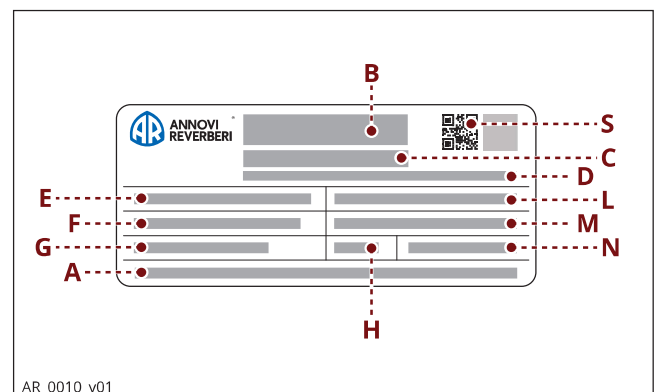
### Data plate

The data plate shown here, containing essential information for safe operation, is affixed to every pump.

- A)** Business name and manufacturer's address
- B)** Serial number barcode
- C)** Model
- D)** Serial number
- E)** Maximum delivery (l/min)
- F)** Maximum operating pressure (bar)
- G)** Maximum rpm
- H)** Maximum absorbed power (kW)
- L)** Maximum delivery (U.S. gpm)
- M)** Maximum pressure (psi)
- N)** Lubricant specifications
- S)** QR code

### Manufacturer's name and address

Annovi Reverberi S.p.A. - Via Martin Luther King, 3 - 41122 - Modena (MO) - Italia



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### After-Sales service procedures

To request after-sales service (in the event of a pump malfunction or failure, etc.) contact your nearest service centre or the manufacturer.

When requesting after-sales services, always state the pump's data plate data and the type of problem.

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### Disclaimer

The manufacturer accepts no liability arising from:

- incorrect installation;
- improper use of the pump;
- failure to service the pump;
- unauthorised modifications and/or repairs;
- use of non-original spare parts, or parts not specifically intended for the model.

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### Annexed documentation

The following documentation is issued to the Customer together with this manual:

- declaration of incorporation

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### Glossary

**Purchaser:** individual, organisation or company which has purchased the pump and intends to use it for the intended purposes.

**Training:** a phase necessary to transfer to the operators the knowledge needed for the correct, risk-free performance of operations.

**Installer:** authorised technician having the prerequisites and the specific skills required for the tasks involved in the installation of the pump and/or similar machinery and for the performance of the routine maintenance operations in conditions of safety, independently and without risk.

**Routine maintenance:** all operations required to keep the pump in good working order, to ensure a longer working life and maintain compliance with safety requirements. The manufacturer describes the maintenance procedures and intervals in this "Use and Installation Manual".

**Repairs:** all operations performed to conserve the pump's efficiency and operating characteristics. These procedures, required in the event of an unexpected malfunction, must only be carried out by a skilled technician. The information for the use of skilled repair technicians only is provided in the "Repairs Manual".

**Operator:** authorised person having the prerequisites, skills and information needed for use of the pump or the machine or plant on which the pump is installed, and for routine maintenance procedures.

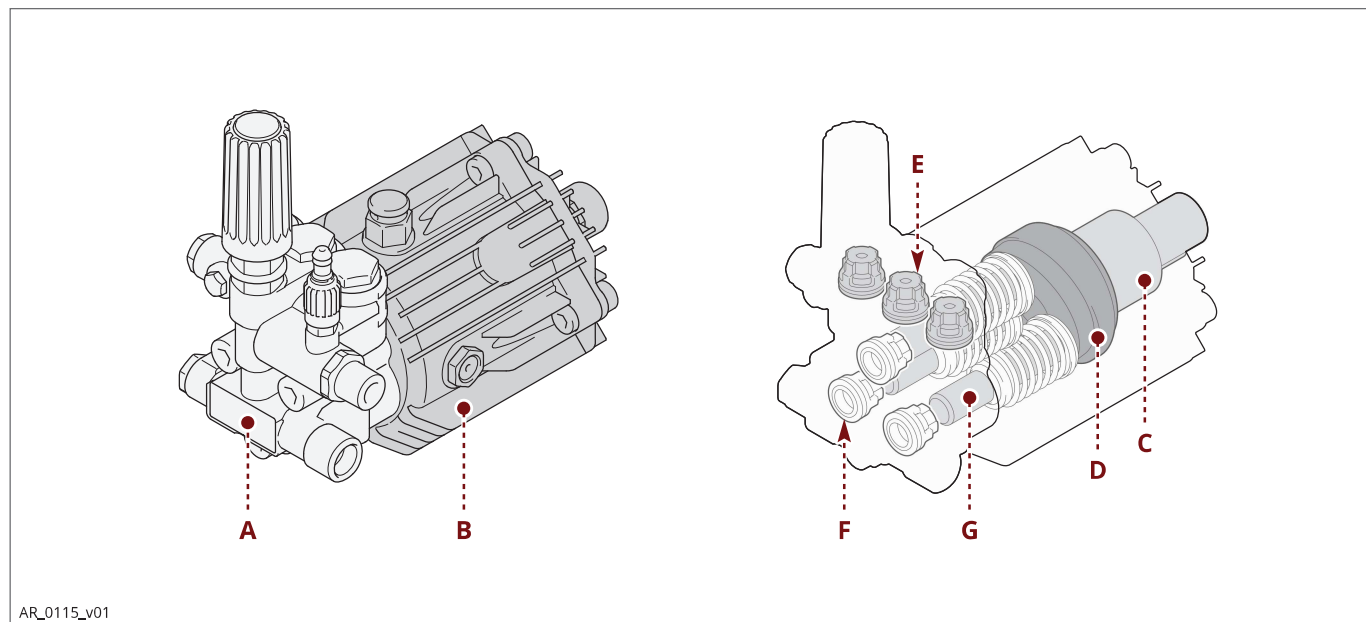
## General description

The pump is designed and constructed to pump and compress liquids at high pressure in industrial applications. The pumping action is provided by a series of axial pistons driven by a wobble plate keyed to the drive shaft.

When in operation, the pistons perform an axial stroke inside the head, where the intake and delivery ducts are fitted with valves which allow the liquid to pass in one direction only.

depending on version, the pump is equipped with a motive power source connection flange of varying shape and size (see "Overall Dimensions").

## Main components



- A) Head
- B) Pump body
- C) Drive shaft
- D) Wobble plate
- E) Delivery valve

- F) Intake valve
- G) Piston

## Intended uses

The pump is designed and built for incorporation in machinery and plants (machinery for washing raw materials, finished products, etc.).

The pump must be used in a manner appropriate to its technical data (see "Technical Data"), and must not be modified or improperly used.

## Misuses

**Do not** put the pump into service until the plant or machinery in which it is incorporated has been declared compliant with the relevant national and local legal requirements.

**Do not** use the pump in a potentially explosive atmosphere.

**Do not** use the pump for flammable, toxic or corrosive liquids, or those with unsuitable density. Do not take in liquids at temperatures higher than those specified in the technical data.

**Do not** use the pump for the supply of drinking water.

**Do not** use the pump on products for human consumption.

**Do not** use the pump on pharmaceutical products.



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### Residual risks

Even if the safety regulations and information provided in the manual are complied with, the residual risks described in the declaration of incorporation still apply when the pump is in operation.

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### Technical data

The technical and performance data are stated on the cover.

The pump's intake circuit must include a filter having capacity at least twice the pump's delivery rate, which must not cause restrictions or headlosses. The recommended degree of filtration is 70 mesh for clean and 140 mesh for recycled water.

Maximum intake vacuum - 0.25 bar, measured at the pump intake.

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### Overall dimensions

For overall dimensions and blow-up diagrams visit our website: [www.annovireverberi.it](http://www.annovireverberi.it)

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### Environmental operating limits

The pump operates correctly at an ambient temperature between 10 and 35 °C, with relative humidity of 80%.

## Declaration of incorporation

The illustration shows a copy of the declaration of incorporation, the original of which is issued by the manufacturer together with this manual.



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REVERBERI**  
The Power of Experience

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Cod. Fisc. 01523090353 - Part. IVA IT02207040367  
RAEE IT08020000003291  
E-Mail: infoar@annovireverberi.it

### DECLARATION OF INCORPORATION according to the Directive 2006/42/EC

Volumetric plunger pumps series for industrial high pressure pumping.

The technical documentation is filed at the company ANNOVI REVERBERI.

Reference to the harmonised standards: EN 809

DO NOT START UP THE PUMP BEFORE THAT THE MACHINE IN WHICH IT WILL BE INCORPORATED HAS BEEN STATED COMPLYING WITH THE DIRECTIVE'S DISPOSITIONS.

Complies with the following essential safety requirements specified in the Annex I of Dir. 2006/42/EC:  
1.1.2-1.1.3-1.1.5-1.3.1-1.3.2-1.3.3-1.3.4-1.5.4-1.7.1-1.7.2-1.7.4-1.7.4.1-1.7.4.2

Modena, 25/05/2021

name and title of legal representative

Reverberi Ing. Stefano



.....  
Managing Director

File: Quality Assurance

## Declaration of incorporation (for UK countries only)

The illustration shows a copy of the declaration of incorporation, the original of which is issued by the manufacturer together with this manual.



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according to the Supply of Machinery (Safety) Regulations 2008

Volumetric plunger pumps series for industrial high pressure pumping.

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1.1.2-1.1.3-1.1.5-1.3.1-1.3.2-1.3.3-1.3.4-1.5.4-1.7.1-1.7.2-1.7.4-1.7.4.1-1.7.4.2

Modena, 01/06/2021

name and title of legal representative

Reverberi Ing. Stefano



.....  
Managing Director

File: Quality Assurance



### General safety rules

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Most workplace accidents and injuries are caused by carelessness and failure to comply with common sense and safety rules.

In most cases, accidents can be avoided by predicting their possible causes and proceeding with the necessary care and attention.

A careful operator who follows the rules is the best guarantee against accidents.

Before installing and using the pump, the operators and other staff must read and understand the instructions in the manual provided and the details of the installation design.

Do not tamper with, disarm or bypass the safety devices as this may cause serious threats to health and safety.

Do not release pollutants into the environment.

Dispose of waste in accordance with statutory requirements.

Before performing any procedure, adopt appropriate safety measures in accordance with the relevant statutory occupational safety requirements and comply with the safety regulations in the manual.





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### Safety recommendations for handling and lifting

**Before starting the operations, organise the intended working area so that the materials can be lifted and handled in safety.**

**Unloading, loading, handling and lifting operations must be carried out by skilled, authorised, specifically trained staff.**

**During lifting and handling operations, the people not involved in the operations must remain at a safe distance.**

**For lifting, use hooks and ropes which are free from damage and appropriate for the load to be lifted.**

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### Packaging description and unpacking

Depending on the quantity of goods to be shipped and the place of destination, packages may be fixed on a pallet for easier lifting and handling.

The packaging normally consists of a wooden crate and pallet.

The packaging may be loaded straight onto the vehicle or placed inside a container.

The packaging may be marked with warning signs and information showing the way it should be positioned, the ambient conditions for storage, lifting points, etc.

Check the weight of the item on the packaging itself or on the transport documents to allow the use of suitable lifting equipment.

When unpacking, check that all components are present and intact. If items are missing or damaged, contact the dealer or manufacturer to agree the procedures to be followed.

The packaging material must be disposed of appropriately in accordance with the relevant statutory requirements.

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### Transport

The pump may be shipped by a variety of means of transport (road, rail, sea or air) depending on its destination. Secure the packaging firmly to the vehicle during transport, to prevent random movement.

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### Storage

In the event of a lengthy period out of use, place the pump (in its packaging if possible, or otherwise protected) under cover, protected from the weather.

Do not store in places where the ambient conditions might impair the pump's operating condition over time.

## Safety recommendations for installation

Take all possible precautions to allow the pump to be installed in a safe, risk-free manner.

All installation phases must be taken into consideration when designing the machinery or plant in which the pump is to be installed.

The design must consider all mounting points, the means of transmission of the energy sources, and the protective and safety devices required by the relevant regulations to prevent the risk of injury.

During the design phase, include a device to cut out the motive power source automatically if the water at the delivery port remains pressurised for a relatively long period of time.

## Mounting the pump

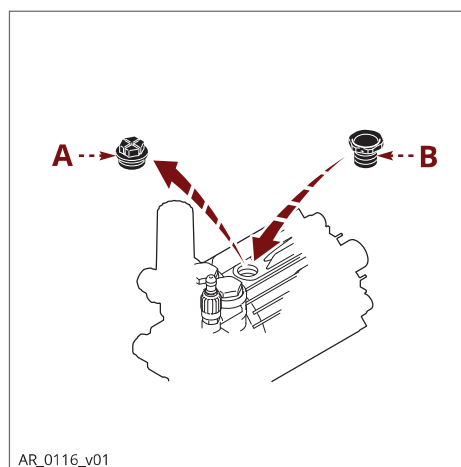
The pump is coupled directly to the flange of the motive power source .

The motive power source coupling flange must have a flat, tooled surface.

Depending on the model, the pump may be mounted either horizontal or vertical.

Do not install a pump horizontal if it is intended for vertical mounting, or vice-versa (see mounting instructions in the annexes).

Replace the cap **(A)** used for shipment (if fitted) with the cap **(B)** provided.



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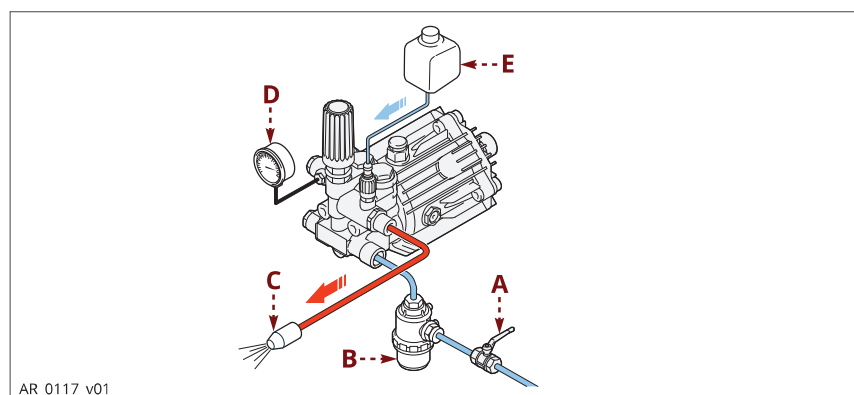
## Water supply connection

The pump's water supply connection can be made in one of the ways listed below.

- Connection to the mains water supply.
- Connection to a tank (gravity-feed).
- Connection to an external pump (force-feed).

The following requirements must be met for all types of connection.

- 1) The pump must be supplied by means of a crush-proof hose of suitable diameter for the pump's intake connection (see "Technical Data").
- 2) There must be no restrictions or kinks in the hose.
- 3) A suitable filter must be installed at the pump intake (see "Technical Data").
- 4) All connections between the unions and the intake line must be sealed to prevent the pump from sucking in air.
- 5) The connections and pipes must be suitable for the operating pressure and the pump delivery rate, and must comply with the relevant regulations.
- 6) The water supply source must have a flow rate twice the pump's rated delivery rate and a pressure of 2 - 3 bar.



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- A)** Shut-off valve
- B)** Intake filter
- C)** Nozzle
- D)** Pressure gauge (optional)
- E)** Additive tank

## Safety recommendations for use

Before start-up, the operator must perform the necessary safety checks.

Before starting up the pump check that the water supply hose is connected properly; use of the pump without water will damage it.

In the event of leaks from the pressurised pipes, stop the pump at once and remove the cause of the leak.

Do not operate the pump above the limits set by the manufacturer to increase its performance.

If the system is to be shut down with ambient temperatures close to 0 °C, run the pump without water for 10 seconds with the end of the delivery pipeline open to empty the system and pump of water and prevent ice from forming.

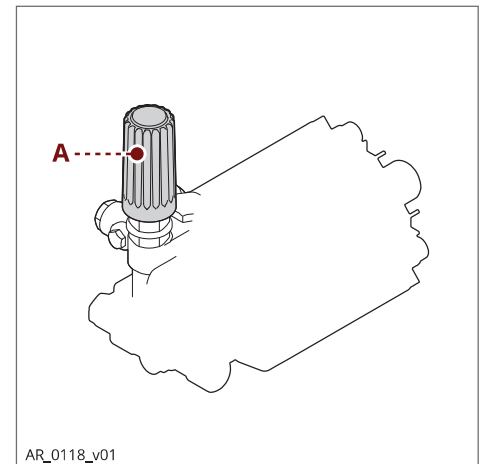
## Starting and stopping the pump

### To start the pump, proceed as described below.

- 1) Turn on the water supply.
- 2) Start up the motive power source to operate the pump.  
For easier starting in models with pressure regulator, operate the knob **(A)** to start up the pump with no pressure present.  
Wait for the motive power source to reach the correct running speed and then turn the knob to pressurise the pump to the normal working pressure.  
For easier starting in models without pressure regulator, turn on the pressurised water delivery device.

### To stop the pump, proceed as described below.

- 1) Stop the motive power source to stop the pump.
- 2) Turn off the water supply.
- 3) Turn on the pressurised water delivery device to discharge the residual pressure from the pump.



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**Safety recommendations for maintenance**

**Before doing any maintenance work, depressurise the water system and isolate the pump from all energy sources.**

**When the jobs are done, before restarting the pump, check that no tools, rags or other materials have been left close to moving parts or in hazardous zones.**

**Replace any excessively worn components with original parts and use the lubricants recommended by the manufacturer.**

**Dispose of the worn-out components and lubricants in accordance with the relevant statutory requirements.**

**Carry out the routine maintenance procedures specified by the manufacturer to keep the pump safe and performing well.**

Scheduled service table			
Frequency	Component	Procedure	Reference
Every working day	Filter	Inspect filter cartridge	See "Inspecting the filter"
	Pump	Oil level check	See "Checking the oil level"
Every 50 working hours	Pump	Inspect mounting	See "Inspecting the pump mounting"
	Pipes and connections	Inspection	See "Inspecting the connections and pipes"
Every 100 working hours or every year	Pump	Oil change	See "Changing the oil"
<b>(1)</b> This interval refers to the first oil change only			

**Table of lubricants**

The pump is delivered complete with oil, with the characteristics stated on the data plate.

When topping up the oil, use an oil suitable for conditions in the operating environment (see recommendations provided in the annexes and see "Environmental operating limits").

The correct lubricating oil viscosity depends on the external temperature.

Comparison table of lubricants		
Oil used for filling in factory	ENI	MOBIL
SAE 75W90	BLASIA SX 150	SHC 629
SAE W90	BLASIA 220	MOBIL GEAR 600 XP 220

## Inspecting the pump mounting

Check that the pump's fixing screws have not become loose.

If necessary, tighten them with the driving torque stated in the installation design.

## Inspecting the connections and pipes

### - Inspect the connections for leaks.

Leaks can normally be dealt with by tightening the connections properly.

If leaks from the intake pipeline connections are noticed, the seals must be repaired.

### - Inspect the hoses.

If the pipes show signs of aging, breakage, swelling, rubbing, etc., they must be replaced.

## Inspecting the Filter

### - Inspect the filter cartridge.

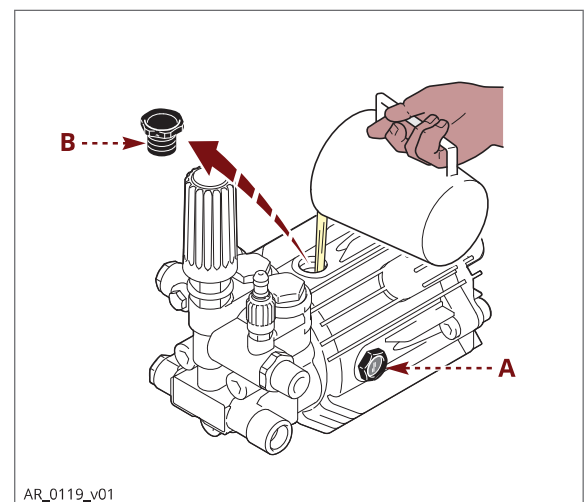
If the filter cartridge is fouled or damaged, refer to the filter manufacturer's instructions for details of how to restore the filter cartridge to its original filtering condition.

## Checking the oil level

- Pumps designed for vertical installation (see mounting instructions in the annexes) have lifetime lubrication
- For the pumps designed for horizontal installation (see mounting instructions in the annexes), check the amount of oil through the level gauge (A), if present.
- If present, if necessary, top up with oil with the characteristics specified in the "Lubricants table".

### To top up with oil proceed as described below.

- 1) Unscrew the plug (B) and pour oil in until it is halfway up the level gauge (A).
- 2) Screw on the plug (B).





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### **Lengthy pump lay-offs**

If the pump is to be unused for a long time, proceed as described below.

- 1) Run the pump with clean water for a few minutes.
- 2) Operate the pump without water for 10 seconds with the end of the delivery pipeline open to empty the pump and the delivery circuit and prevent scaling.
- 3) Flush the pump with water and solvents authorised by the relevant laws.
- 4) Dry the pump with a pressurised air jet.
- 5) Protect the pump from weather.

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### **Putting the pump back into service**

Before putting the pump back into service after a long period out of use, check the oil level and the tightness of the mounting screws.

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### **Scrapping the pump**

The pump must be scrapped by skilled staff, in compliance with the statutory requirements on occupational safety. The dismantled components must be sorted by the type of materials from which they are made. Do not dump pollutants such as seals and lubricants in the environment.

Dispose of them in accordance with statutory requirements with regard to waste disposal and recycling.



The information provided is intended to provide guidance on how to deal with malfunctions which may occur during use.

Some of these procedures may be carried out by skilled staff, while others have to be performed at specialised service centres since they require the use of specific equipment as well as detailed knowledge of repair operations.

Problem	Cause	Remedy
Pump does not reach the specified pressures	Pump sucking air	Restore the tightness of the intake line
	Intake flow rate insufficient	Increase the size of the intake pipelines
		Remove any kinks from the pipes
		Increase the filter capacity or clean the filter cartridge
		Increase the rpm to the rated speed
	Worn intake and delivery valves	Replace the valves <b>(1)</b>
	By-pass valve seat worn	Replace the valve
	Worn gaskets	Replace the gaskets <b>(1)</b>
Irregular variations in pressure	Unsuitable, worn nozzle	Replace nozzle
	Worn intake and delivery valves	Replace the valves <b>(1)</b>
	Valves blocked by dirt	Clean the valves <b>(1)</b>
	Air being sucked into system	Restore the tightness of the intake pipeline connections
Vibrations on pipes	Worn gaskets	Replace the gaskets <b>(1)</b>
	Valves jammed	Replace the valves <b>(1)</b>
	By-pass valve malfunction	Replace the by-pass valve
	Pump sucking air	Restore the tightness of the intake line
<b>(1)</b> Operations which must be carried out at an authorised service centre		



Problem	Cause	Remedy
Pressure drop	Nozzle worn	Replace nozzle
	Worn intake and/or delivery valves	Replace the valves <b>(1)</b>
	Valves blocked by dirt	Clean the valves <b>(1)</b>
	By-pass valve seat worn	Replace the valve
	Worn gaskets	Replace the gaskets <b>(1)</b>
Pump noisy	Air being sucked into system	Restore the tightness of the intake pipeline connections
	Intake and/or delivery valve springs broken or collapsed	Replace the valves <b>(1)</b>
	Valves blocked by dirt	Clean the valves <b>(1)</b>
	Worn bearings	Replace the bearings <b>(1)</b>
	Intake liquid temperature too high	Reduce liquid temperature
Pump overheating	High pump operating pressure	Reduce the pressure to the rated values
Water in oil	Guide piston gaskets worn	Replace the gaskets <b>(1)</b>
	Worn gaskets	Replace the gaskets <b>(1)</b>
Oil leaks from dump lines underneath the pump	Worn gaskets	Replace the gaskets <b>(1)</b>
	Worn pistons	Replace the gaskets <b>(1)</b>
Oil leaks from dump lines underneath the pump	Guide piston gaskets worn	Replace the gaskets <b>(1)</b>
<b>(1)</b> Operations which must be carried out at an authorised service centre		