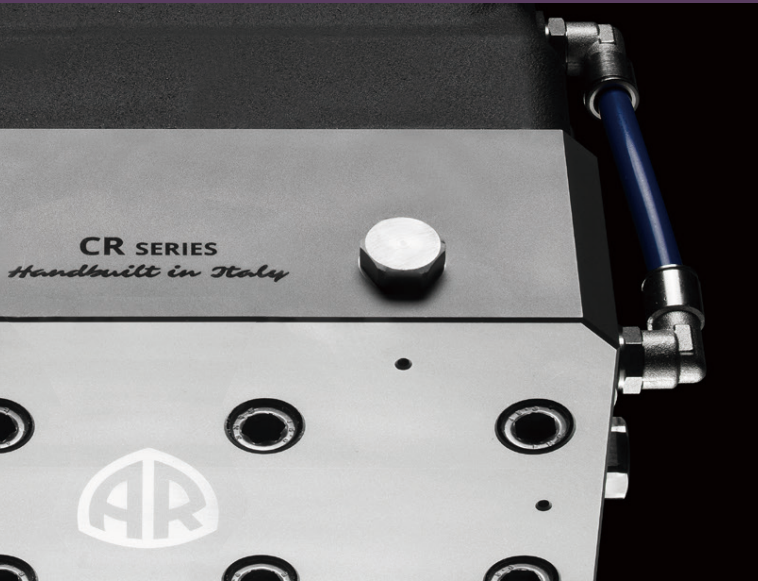
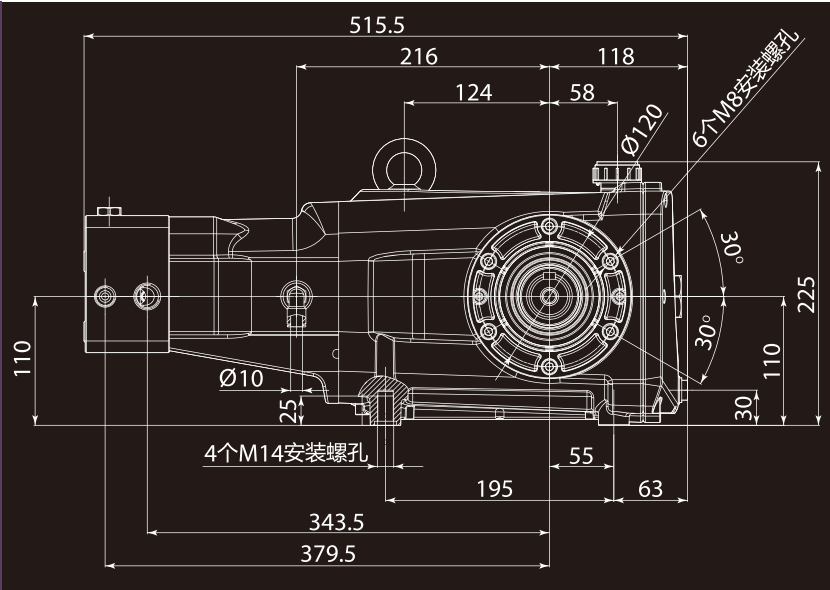




Est. 1958  
MODENA, ITALY

# INSTRUCTION MANUAL 产品使用手册



**Technical and Performance Data - 技术和性能数据**

Pump series 水泵系列	Model 型号	Oil type 润滑油型号	Oil q.ty 油量	Max. intake liquid temperature 最高进水温度
-	-	-	kg	°C
418	CR	SAE 15W40	3.10	40



# LANGUAGE INDEX

Indice Lingue

语言目录

<b>3</b>	-----	ENGLISH
<b>21</b>	-----	中文



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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

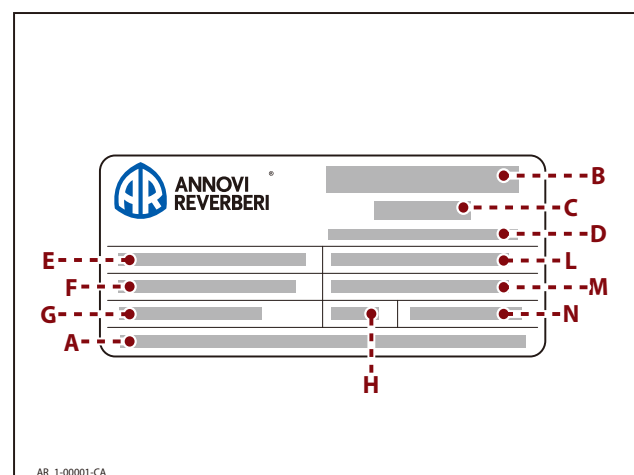
Identifies useful and important information or procedures which should be borne in mind.

## 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



### Manufacturer's name and address

Annovi Reverberi Spa  
Via Martin Luther King, 3  
41122 Modena (MO) - Italy



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## After-Sales service procedures

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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

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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

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

- Declaration of incorporation of the pump in accordance with directive 2006/42/EC.

---

## Glossary

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

**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.

**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.

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

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## General description

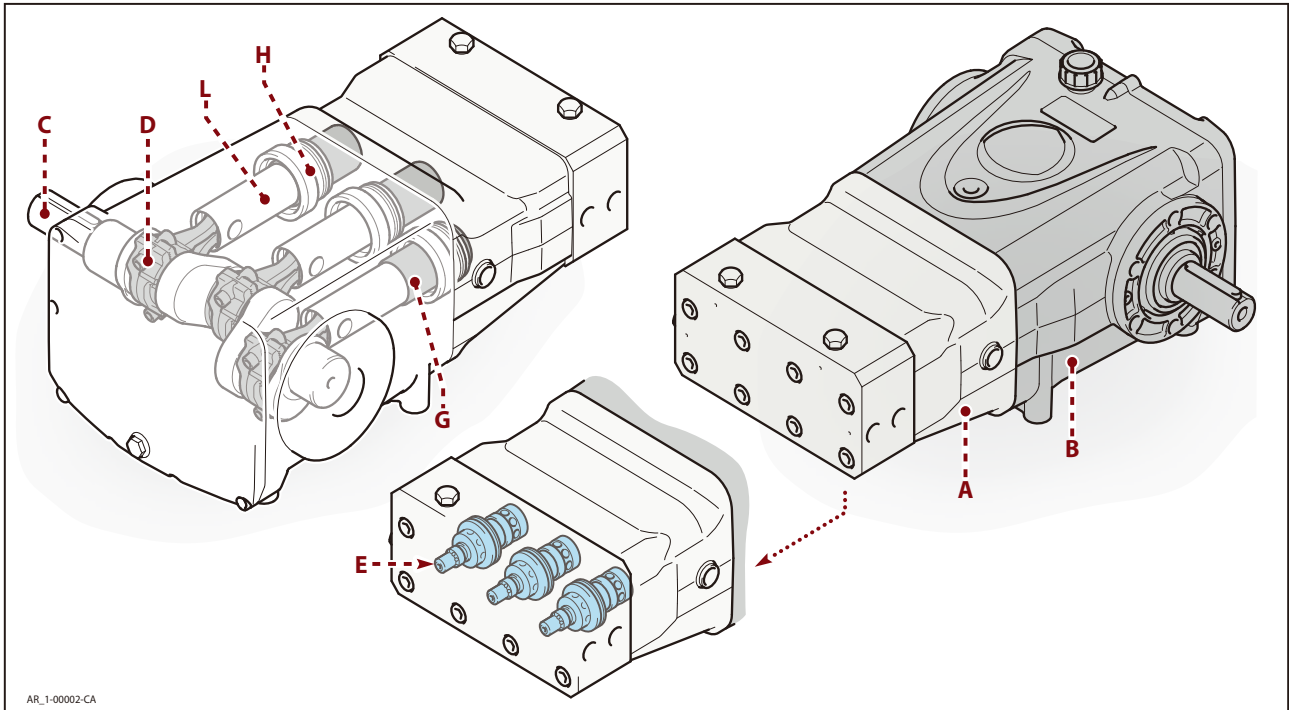
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The pump is designed and constructed to pump and compress liquids at high pressure in industrial applications.

The pumping action is provided by a series of pistons connected to the drive shaft by connecting-rods.

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.

**Main components**



- A) Head
- B) Pump body
- C) Crankshaft
- D) Connecting-rod
- E) Valve
- G) Piston
- H) Piston guide
- L) Guide piston

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**Intended uses**

The pump is designed and built for incorporation in machinery and plant systems (construction machinery, machinery used to strip paint from building walls, machinery for washing raw materials, finished products, road washing 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

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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

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The technical and performance data are stated on the cover.

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## Overall dimensions

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The illustrations showing the overall dimensions are provided in the annexes.

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## Environmental operating limits

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The machine operates correctly at an ambient temperature between 10 and 35 °C.

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## Declaration of incorporation

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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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**ANNOVI  
REVERBERI**  
The Power of Experience

### DECLARATION OF INCORPORATION

(Ann. IIB. DIR. 2006/42/EC)

#### THE MANUFACTURER

**ANNOVI REVERBERI S.p.A.**

**Via Martin Luther King, 3 41122 Modena (ITALY)**

#### DECLARES THAT THE PARTLY COMPLETED MACHINERY

**HIGH PRESSURE PUMP  
SERIAL NUMBER: XXXX  
YEAR OF CONSTRUCTION: XXXX**

Complies with the following applied essential requirements:

(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)

Conforms to harmonised standards: UNI EN 809 : 2009.

The relevant technical documentation has been compiled in compliance with annex VIII and we hereby undertake to transmit, in response to a reasoned request by the national authorities, relevant information on the partly completed machinery.

#### FORBIDS

The putting into service of the aforesaid partly completed machinery until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of Directive 2006/42/EC.

The person authorised to compile the relevant technical documentation:  
Stefano Reverberi, c/o Annovi Reverberi S.p.a. via Martin Luther King, 3

Modena  
18/05/2017

The Manufacturer  
**Stefano Reverberi**  
Managing Director





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## 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.**



## HANDLING AND TRANSPORT INSTRUCTIONS

### 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.

### Packaging description and unpacking



#### Danger - Warning

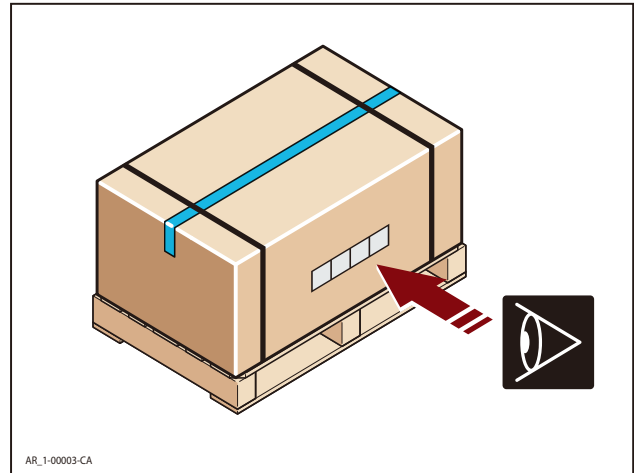
**Do not stack the packages, as they are not built to withstand such treatment.**

Packaging normally consists of a cardboard box fastened to a pallet.

The packaging carries all the information needed to safely load and unload the materials.

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

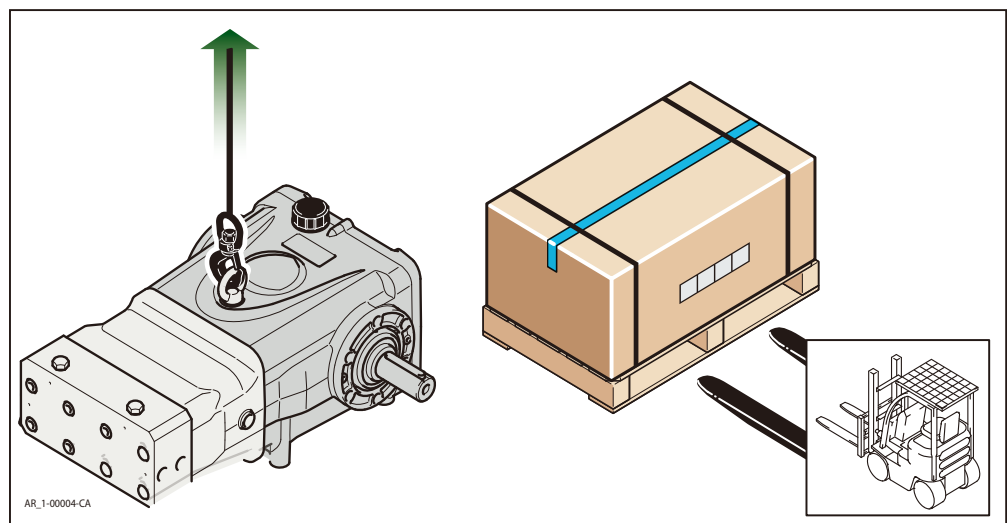
The pump may be shipped by a variety of means of transport (road, rail, sea or air) depending on its destination.

Secure the packaging firmly to the vehicle during transport, to prevent random movement.

### Handling and lifting

Always use a suitable lifting device when handling the packaging, as seen in the diagram.

Lift the pump using the relative eye-bolt.



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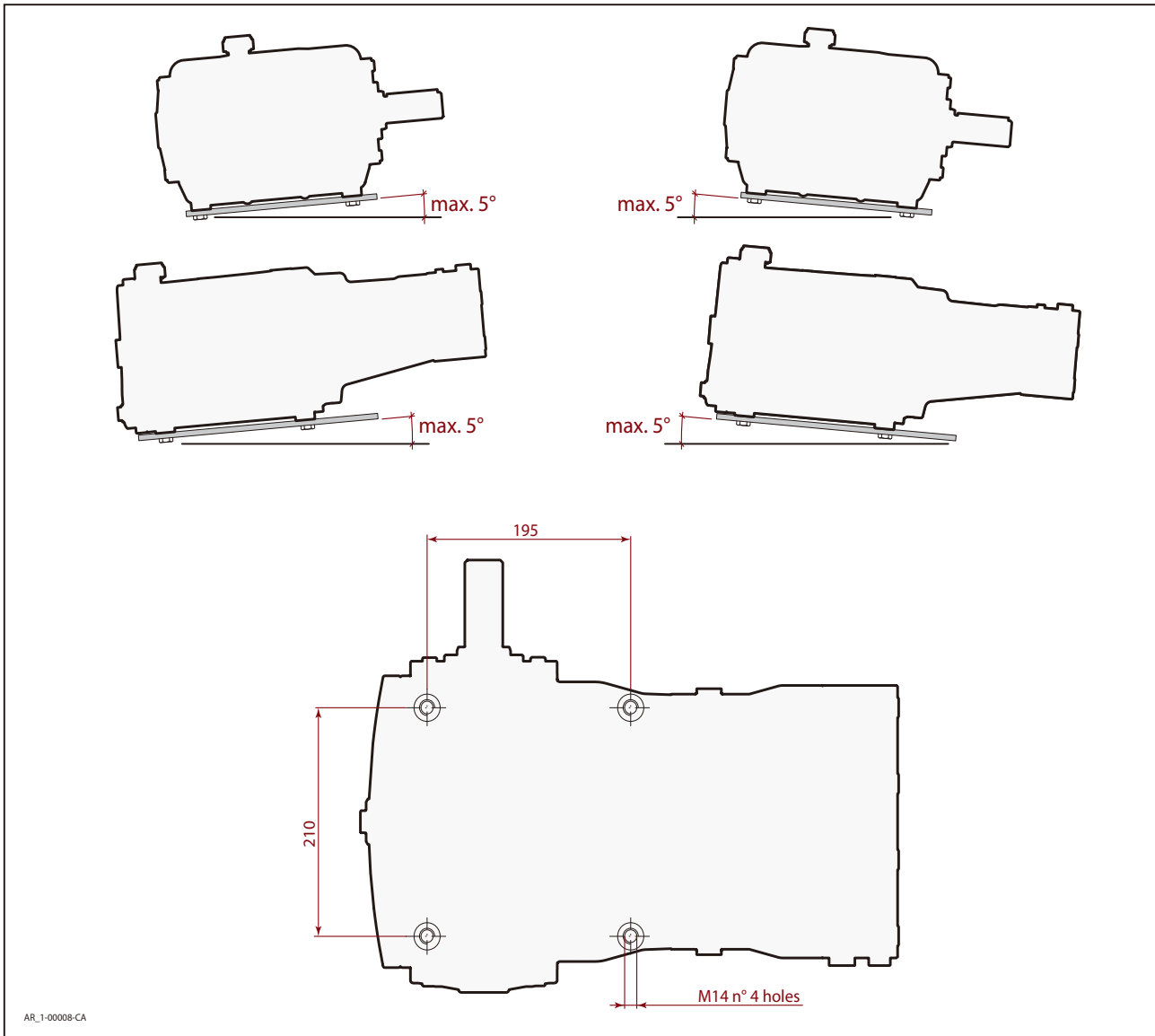
## **Storage**

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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.

The illustration shows the maximum permitted pump installation angle beyond which proper lubrication of the crank mechanism is not ensured.



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## General guidelines on 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 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) To ensure operating safety install a relief valve (bypass valve) suitable for the pump's technical data and with a suitable setting downstream of the pump.
- 7) The relief valve dump line must never be connected to the pump intake line.
- 8) Install a pressure damper downstream of the pump to minimise the water hammer effect in the delivery pipeline.



## Connection to the mains water supply

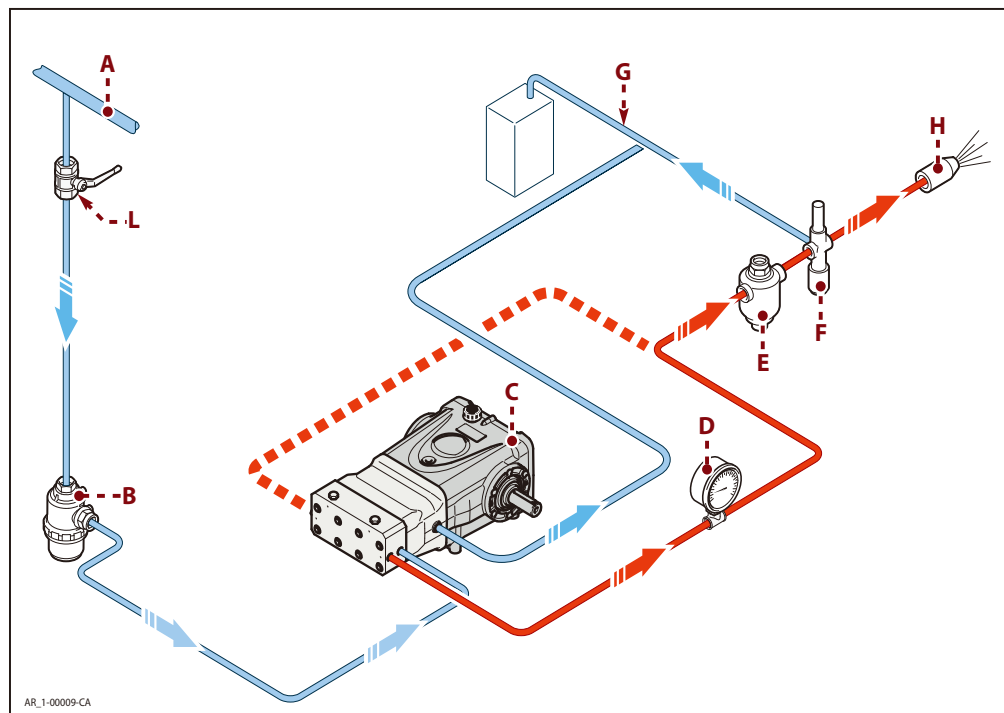
The connection must comply with the recommendations provided.

1) The mains water system must have a flow rate twice the pump's rated delivery rate and a pressure of 2 - 3 bar.

2) Adopt all the precautions described in the "General guidelines on water connections" section.

The following is a simplified illustration of the layout for connection of the pump to the mains water supply.

- A) Mains water supply
- B) Intake filter
- C) High pressure pump
- D) Pressure gauge
- E) Pressure damper
- F) Relief valve (by-pass valve)
- G) Dump pipeline
- H) Nozzle
- L) Shut-off valve





# INSTALLATION INSTRUCTIONS

## Connection to an auxiliary pump (force-feed)

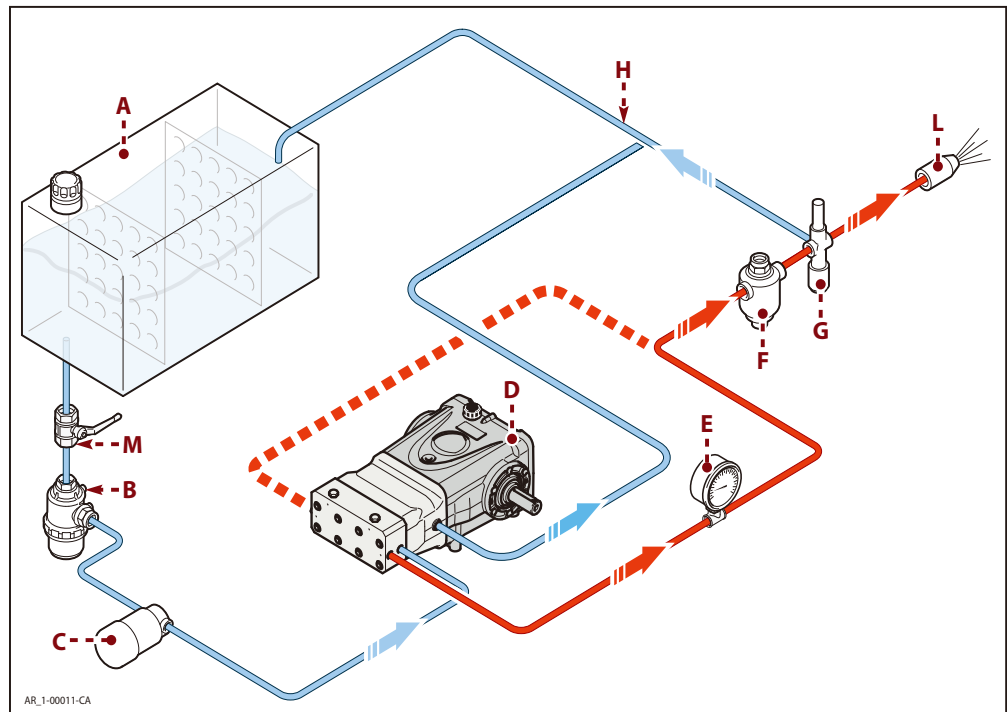
The connection must comply with the recommendations provided.

1) The auxiliary pump must have a flow rate twice the high pressure pump's rated delivery rate and an operating pressure of 2 - 3 bar.

2) Adopt all the precautions described in the "General guidelines on water connections" section.

The following is a simplified illustration of the layout for connection of the pump to an auxiliary pump.

- A)** Tank
- C)** Intake filter
- )** Auxiliary pump
- D)** High pressure pump
- E)** Pressure gauge
- F)** Pressure damper
- )** Pressure damper
- G)** Relief valve (by-pass valve)
- H)** Dump pipeline
- )** Nozzle
- M)** Shut-off valve



### Safety recommendations for use

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

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.

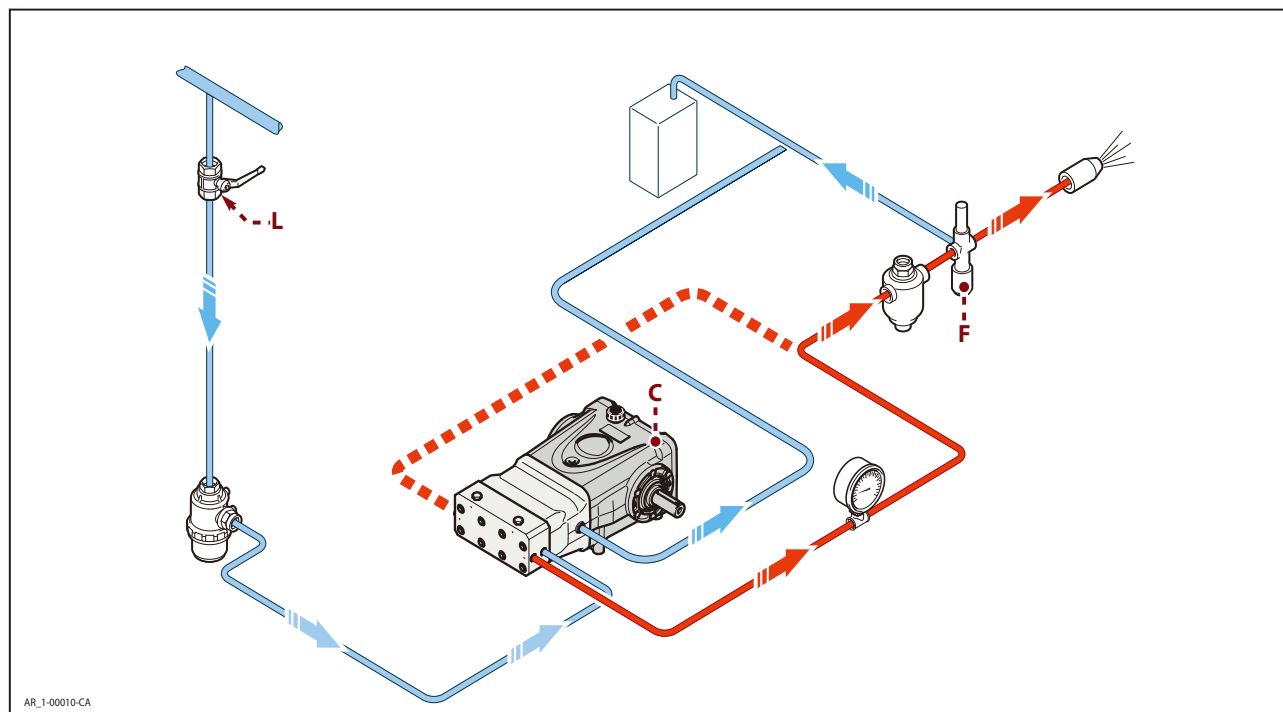
### Starting and stopping the pump when supplied by the mains water system

To start the pump, proceed as described below.

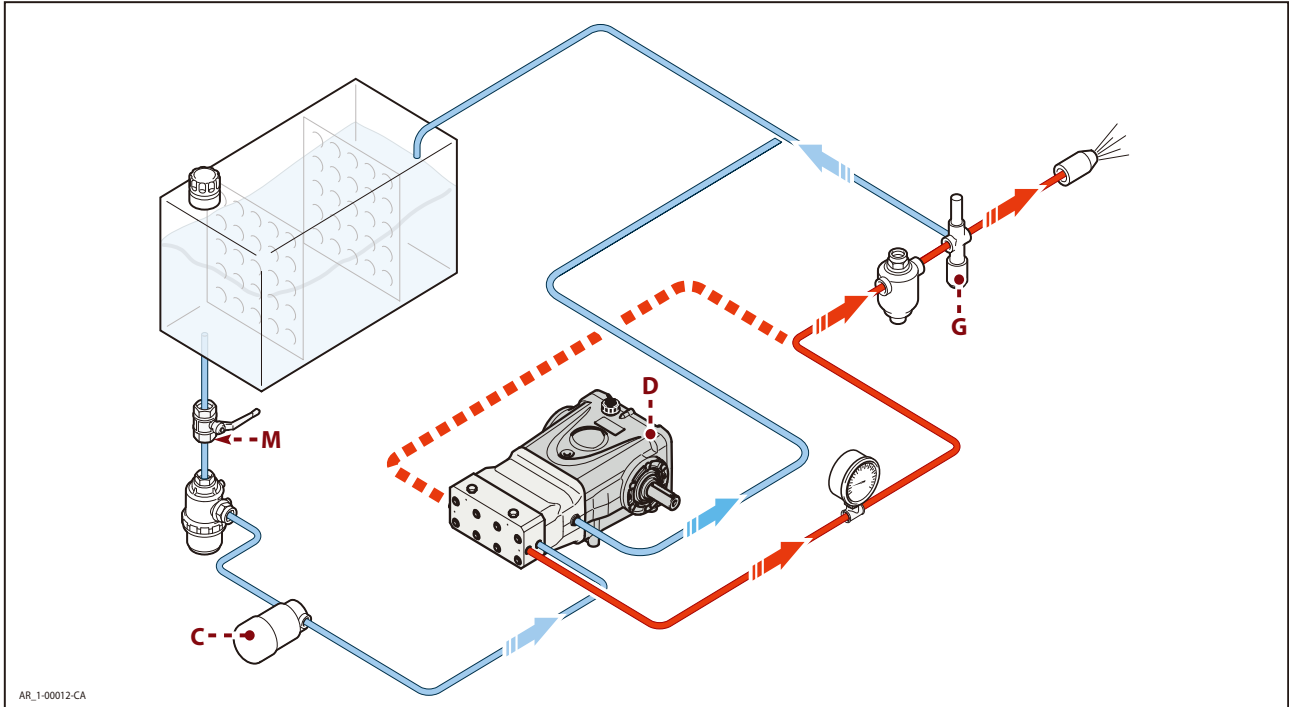
- 1) Open the shut-off valve (L).
- 2) Open the by-pass valve (F) to depressurise the delivery pipeline.
- 3) Start the pump and run it for a few minutes with no pressure.
- 4) Adjust the by-pass valve (F) to obtain the pump's operating pressure.

To stop the pump, proceed as described below.

- 1) Open the by-pass valve (F) to discharge the pressure.
- 2) Stop the pump.
- 3) Close the shut-off valve (L).



## Starting and stopping the pump when supplied by an auxiliary pump



To start the pump, proceed as described below.

- 1) Open the shut-off valve (**M**).
- 2) Open the by-pass valve (**G**) to depressurise the delivery pipeline.
- 3) Start the auxiliary pump (**C**).
- 4) Start the pump (**D**) and run it for a few minutes with no pressure.
- 5) Adjust the by-pass valve (**G**) to obtain the pump's operating pressure.

To stop the pump, proceed as described below.

- 1) Open the by-pass valve (**G**) to discharge the pressure.
- 2) Stop the pump (**D**).
- 3) Stop the auxiliary pump (**C**).
- 4) Close the shut-off valve (**M**).





## 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	Connection of pump to power source (pulley, belt, coupling)	Inspection	
	Pump	Inspect mounting	See "Inspecting the pump mounting"
	Pipes and connections	Inspection	See "Inspecting the connections and pipes"
	Pump	Oil change (1)	See "Changing the oil"
Every 500 working hours or every year	Pump	Oil change	See "Changing the oil"
Every 500 working hours	Pump gaskets	Replacement	Contact an authorised service centre
	Valves	Replacement	Contact an authorised service centre

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(1) 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 changing 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 30	i-SIGMA MONOGRADE 30 i-SIGMA UNIVERSAL DL 15W40	DELVAC SUPER 1400 15W40

## 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.

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## Inspecting the filter

- **Inspect the filter cartridge.**

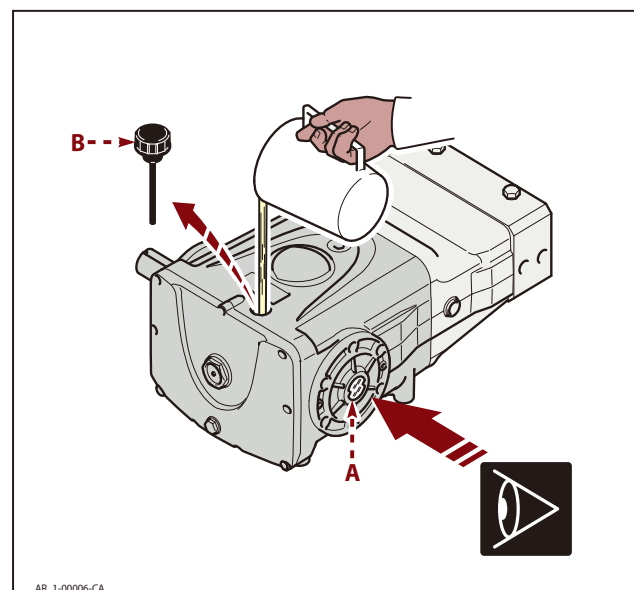
If the filter cartridge is fouled or damaged, refer to the filter manufacturer’s instructions for details of how to restore the filter cartridge to its original filtering condition.

## Checking the oil level

- Check the oil with the pump level and cold.
- Check the amount of oil through the level gauge (A).
- If necessary, top up with oil with the characteristics specified in the “Comparison table of lubricants”.

To top up with oil proceed as described below.

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



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## Changing the oil

**Position the machine in which the pump is incorporated perfectly level, with the pump slightly warm.**

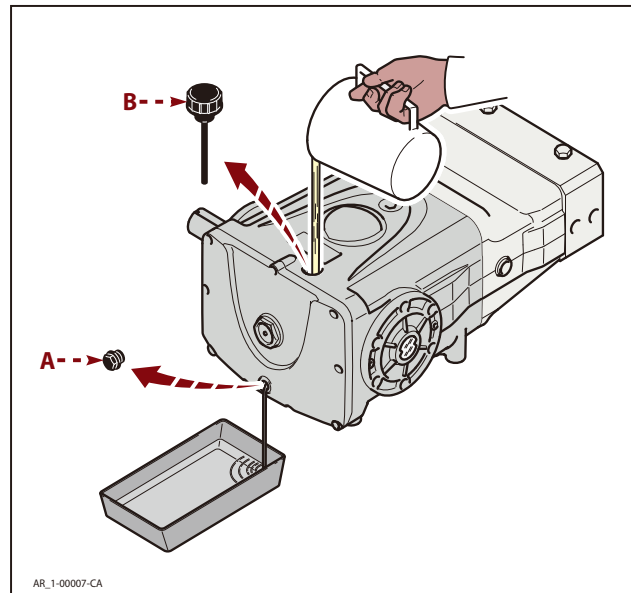
**Do not release oil into the environment.**

**Dispose of spent oil in accordance with statutory requirements.**

To change the oil, proceed as described below.

- 1) Position a receptacle of suitable capacity to collect the spent oil.
- 2) Unscrew the drain plug (A) and allow all the oil to flow out.
- 3) Screw on the drain plug (A).
- 4) Unscrew the filler plug (B).
- 5) Pour in the fresh oil through the filler hole until the correct level is reached (see "Checking the oil level").
- 6) Screw on the filler plug (B).

**Each time the oil is changed, unscrew and clean the drain plug (A) fitted with magnets to collect the ferrous residue generated by the moving pump.**



## 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.

## 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 pol-

lutants 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	
<b>Pump does not reach the specified pressures</b>	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 (1)	
	By-pass valve seat worn	Replace the valves	
	Worn gaskets	Replace the gaskets (1)	
Unsuitable, worn nozzle	Replace nozzle		
<b>Irregular variations in pressure</b>	Worn intake and delivery valves	Replace the valves (1)	
	Valves blocked by dirt	Clean the valves (1)	
	Air being sucked into system	Restore the tightness of the intake pipeline connection	
	Worn gaskets	Replace the gaskets (1)	
<b>Vibrations on pipes</b>	Valves jammed	Replace the valves (1)	
	By-pass valve malfunction	Replace the by-pass valve	
	By-pass valve dump line too small	Increase size of by-pass valve dump line	
	Pressure damper flat	Restore pressure damper to correct inflation pressure	
	Pump sucking air	Restore the tightness of the intake line	
<b>Pressure drop</b>	Nozzle worn	Replace nozzle	
	Worn intake and/or delivery valves	Replace the valves (1)	
	Valves blocked by dirt	Clean the valves (1)	
	By-pass valve seat worn	Replace the valve	
	Worn gaskets	Replace the gaskets (1)	
<b>Pump noisy</b>	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 (1)	
	Valves blocked by dirt	Clean the valves (1)	
	Worn bearings	Replace the bearings (1)	
	Intake liquid temperature too high	Reduce liquid temperature	

(1) Operations which must be carried out at an authorised service centre



Problem	Cause	Remedy
<b>Pump overheating</b>	High pump operating pressure	Reduce the pressure to the rated values
	Drive belts too taut	Restore correct belt tension
	Pulley or drive coupling alignment poor	Restore the correct alignment
<b>Water in oil</b>	Guide piston gaskets worn	Replace the gaskets (1)
	High humidity percentage in air	Change the oil twice as often (than stated in "Routine maintenance" table)
	Worn gaskets	Replace the gaskets (1)
<b>Liquid leaks from dump lines underneath the pump</b>	Worn gaskets	Replace the gaskets (1)
	Worn pistons	Replace the pistons (1)
<b>Oil leaks from dump lines underneath the pump</b>	Guide piston gaskets worn	Replace the gaskets (1)

(1) Operations which must be carried out at an authorised service centre



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## 手册用途

本手册提供了泵的安装、使用和维护操作该泵的指南和标准。

制造商最初提供的是英文版的使用说明。

根据法律规定或市场需要, 制造商也会提供其他语言版本的说明书。

如果出售该泵, 卖方必须将该手册和泵一同提供给新用户。

手册中的说明主要是供经过培训的、熟练的操作员进行安装和日常保养操作时参照使用。

制造商有权对手册内容进行修改。除非涉及泵的安全性能, 否则修改内容不做另行通知。

买方必须确保按照本手册的说明、法律规定以及相关的国家或地区规定进行安装。

“产品使用手册”中的技术说明、知识产权属于制造商所有, 用户必须保密。

该手册中的图解可能存在与泵的实际结构有所不同的情况, 但这并不影响使用说明的准确性。如有疑问, 请咨询制造商。

下面列出了关于安全风险或重要信息的符号和说明:



### 危险 - 警告

如未按照标识符号提示的相关信息或规定进行操作, 可能会对健康和安全造成严重威胁。



### 小心 - 注意

如未按照标识符号提示的相关信息或规定进行操作, 可能会对健康和安全造成威胁或损害。



### 信息

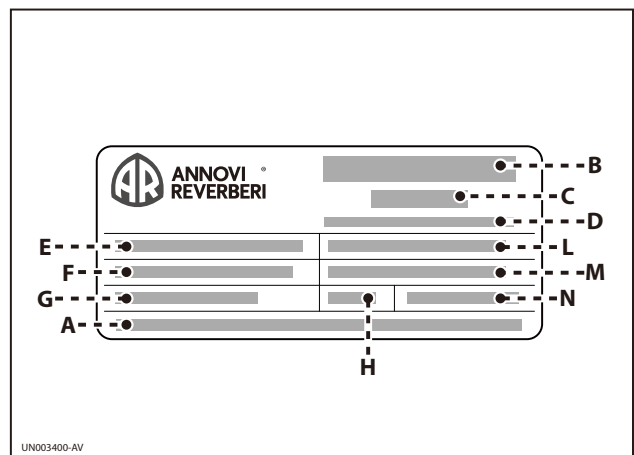
需要注意的重要信息或规定。

## 泵和制造商标识

### 参数铭牌

此处所示的铭牌包含安全操作的重要信息, 每个泵上面都附有该标牌。

- A) 制造商的名称及地址
- B) 序列号及条形码
- C) 型号
- D) 序列号
- E) 最大流量 (l/min)
- F) 最大压力 (bar)
- G) 最高转速
- H) 最大功率 (kW)
- L) 最大流量 (U.S. gpm)
- M) 最大压力 (psi)
- N) 润滑油参数



### 制造商

Annovi Reverberi Spa  
Via Martin Luther King, 3  
41122 Modena (MO) - Italy



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### 售后服务

当您需要售后服务时（泵出现故障），请联系就近的服务中心或制造商。  
当申请售后服务时，一定要向维修人员说明泵的参数铭牌内容和问题类型。

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### 免责条款

如有以下情形，制造商免于承担责任：

- 不正确的安装；
- 不合理的使用泵；
- 缺乏合理维护的泵；
- 未经授权的改装或维修；
- 未使用原装配件，或使用的配件与该型号的泵不匹配；

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### 附加文件

以下文件和本手册一同交付给客户：  
-该泵的企业声明符合2006/42/EC规范

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### 术语表

**买方：**因特定目的购买和使用该泵的个人、组织或公司。

**日常维护：**日常维护是指维持泵的正常运转所需的各种操作，以确保该泵符合安全要求、并且具有更长的使用寿命。制造商在《产品使用手册》中介绍了维护保养的流程和间隔时间。

**维修：**保持泵的工作效率和正常运转所需的各种操作。发生意外故障时，必须由熟练的技术人员进行维修操作。相关具体内容请参见《维修手册》。

**安装人员：**具备相关资质和技能的授权技术人员，能够安全、独立地安装该泵或类似机械以及进行日常维护操作。

**操作员：**具备相关资质和技能的授权人员，了解泵或泵所在的设备、工厂的操作流程，以及日常的维护流程。

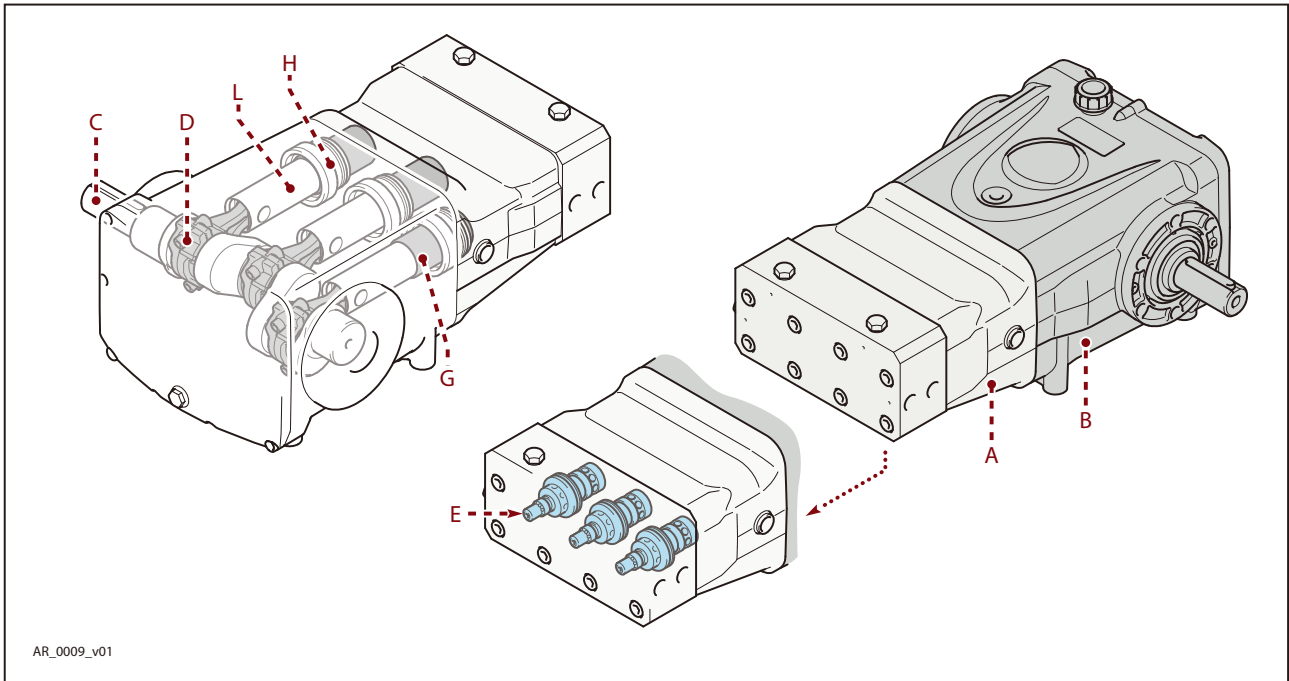
**培训：**操作员为学习正确、安全地操作知识而必需经历的培训过程。

---

### 简介

AR高压柱塞泵采用先进的工业设计理念。主要工作原理是当泵运转时，曲轴通过连杆带动柱塞运动，使柱塞在泵头内部产生轴向冲程，加上进出水单向阀，使泵头内液体能够快速地向一个方向传送。





- A) 泵头
- B) 泵体
- C) 曲轴
- D) 曲轴连杆
- E) 单向阀
- G) 柱塞
- H) 柱塞环和水封
- L) 柱塞连杆

### 主要用途

该泵设计为机械的部件, 可用于组装成套设备 (例如组装成某些用于冲洗原材料或成品的设备) 。  
该泵的使用必须与其技术参数相适应 (参见“技术参数”), 不得进行改装或不恰当地使用。

### 使用限制

- 除非车间或泵所要安装的机械符合相关国家或当地的法律规定, 否则不得安装使用该泵。
- 不要在易爆气体环境中使用该泵。
- 不要使用该泵泵送易燃、有毒、腐蚀性的液体、或此类高浓度的危险化学品试剂。
- 不要使用该泵泵送温度高于规定技术参数的液体。
- 不要使用该泵泵送饮用水。
- 不要使用该泵泵送食品。
- 不要使用该泵泵送药剂产品。



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### 残余风险

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即使按照该手册中的安全规定和信息进行操作，在使用该泵的过程中仍然存在该声明中所述的残余风险。

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### 技术参数

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技术和性能参数请见封二。

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### 外形尺寸

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附录中的图解标示出了该泵的整体外形尺寸。

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### 操作条件

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该泵需要在10-35°C的环境温度和80%的相对湿度下进行操作。



公司声明

下图是制造商出版本手册时出具的公司声明的副本，制造商会将其与该手册一同交付给买方。

	<p><b>ANNOVI REVERBERI</b> The Power of Experience</p>	<p><b>ANNOVI REVERBERI S.p.A.</b> Via Martin Luther King 3 41122 Modena Tel. +39 059.414.411 (r.a.) Fax +39 059.253.505 Export Dept. Fax +39 059.251.126 Cod. Fisc. 01523090353 - Part. IVA IT02207040367 RAEE IT0802000003291 E-Mail: infoar@annovireverberi.it</p>
	<hr/> <p align="center"><b>DECLARATION OF INCORPORATION</b> according to the Supply of Machinery (Safety) Regulations 2008</p>	
<p>Volumetric plunger pumps series for industrial high pressure pumping.</p>		
<p>The technical documentation is filed at the company ANNOVI REVERBERI.</p>		
<p>Reference to the harmonised standards: UNI EN 809</p>		
<p>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.</p>		
<p>Complies with the following essential safety requirements specified in the Part 1 – Annex I of the Supply of Machinery (Safety) Regulations 2008: 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</p>		
<p>Modena, 01/06/2021</p>	<p>name and title of legal representative</p> <p>Reverberi Ing. Stefano</p>  <p>..... Managing Director</p>	
<p>File: Quality Assurance</p> <hr/>		



### 基本安全准则

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多数工作场所的事故和人身伤害, 通常是由于粗心、不了解操作常识或不遵守安全规定而导致的。

一般来说, 事先预估操作可能导致的后果, 小心谨慎地进行操作, 多数事故都是可以避免的。

只有操作员遵守操作规程, 才会避免事故的发生。

在安装和使用泵之前, 操作员和其他工作人员必须阅读并理解手册中的说明以及安装设计的相关细节。

不得擅自改装、拆除安全装置, 否则会对人身安全造成严重威胁。

不要将污染物直接排放到自然环境中。

严格按照相关法律规定处理废物。

在进行任何操作之前, 要根据法律规定的职业安全要求, 采用适当的安全防护措施, 并遵守手册中的安全规定。

## 搬运和起吊注意事项

在进行操作之前，清理工作区域，以便安全地起吊和搬运设备。  
 泵的装卸、搬运和起吊必须由经过专门培训的、技能熟练的授权人员来操作。  
 在进行起吊和搬运操作时，非工作人员必须保持安全的距离。  
 起吊时要使用符合载荷要求的、完好的吊钩和绳索。

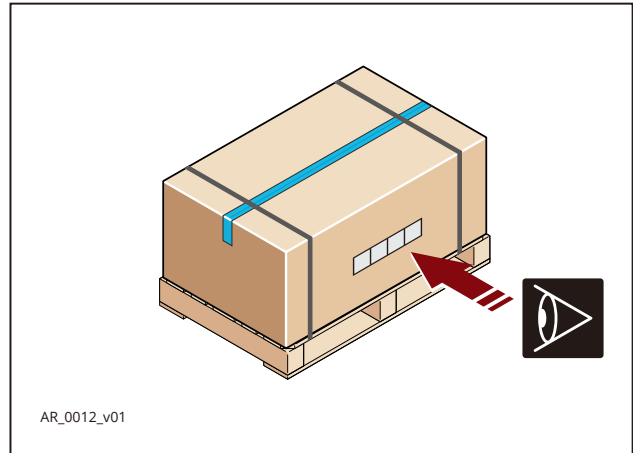
## 包装说明和拆包装



### 危险 - 警告

不要将内含水泵的包装箱上下罗列摆放，包装箱顶部支撑不住水泵的重量。

通常是用纸箱包装，以便于进行安全运输。  
 根据货物的数量和运送的目的地，包装的货品可能需要固定到托盘上，以便于进行起吊和搬运。  
 检查运货单据上物品的重量，选择合适的起吊设备。  
 拆包装时，检查所有零部件是否完好或缺损。如有缺失或损坏，请联系经销商或制造商。  
 必须根据相关法律规定处理包装材料。



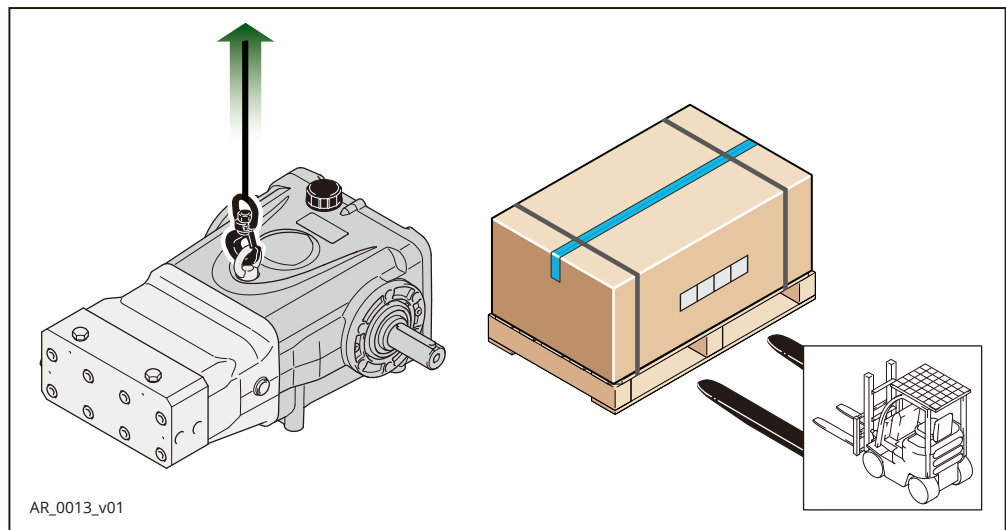
## 运输

根据运送的目的地不同，泵的运输可以选择不同的方式（公路、铁路、海运或空运等）。在运输过程中，要将装箱的产品在运输车上固定好，避免晃动。

## 搬运和起吊

如图示，搬运产品时需使用合适的设备（例如叉车）。

使用吊钩和绳索起吊水泵。





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### 储存

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如果长时间不使用, 可以将泵遮盖保存起来, 避免受天气影响 (尽可能封装或采取其他保护措施)。  
不要将泵长时间放置在可能损害泵正常运行的环境中。  
制造商在交付该泵时, 提供自交付之日起有效期为1个月的防腐蚀处理。



## 安装注意事项

尽可能采取防范措施, 使泵在安全、无风险的方式下安装。

在设计需要安装该泵的机器或车间时, 必须考虑到所有的安装步骤。

安装设计必须考虑到所有的安装点、动力驱动方式、以及相关法规要求的安全保护装置, 以免造成人身伤害。

## 安装

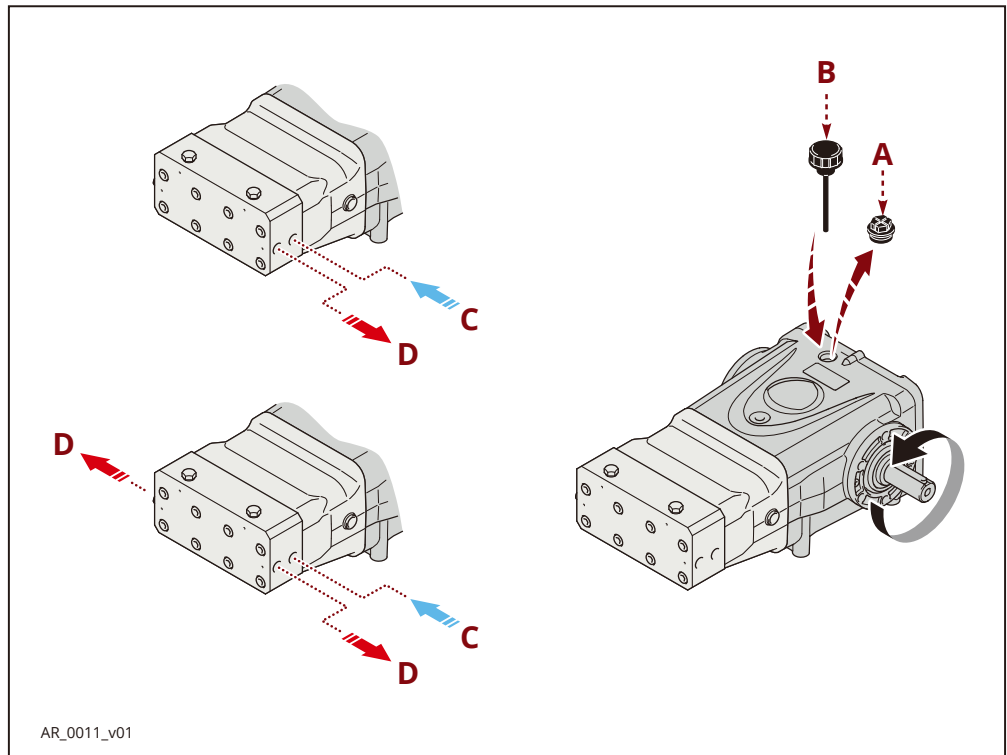
泵和动力装置之间的连接可以使用皮带轮、弹性联轴器或是直接通过法兰连接。

曲轴旋转的方向见下图。

供水系统需要连接到泵左侧或右侧的进水口 (见下图)。只能将泵与经过过滤的清洁水源连接到一起。拧下各端口上的螺塞。根据连接需要, 不用的端口用螺栓拧紧。

在让泵开始运转前, 必须用随机附送的呼吸嘴油尺(B)将运输途中使用的临时油塞堵头(A)更换下来。

- A) 临时油塞
- B) 呼吸嘴油尺
- C) 进水口
- D) 出水口



AR\_0011\_v01

中文

## 泵的安装固定

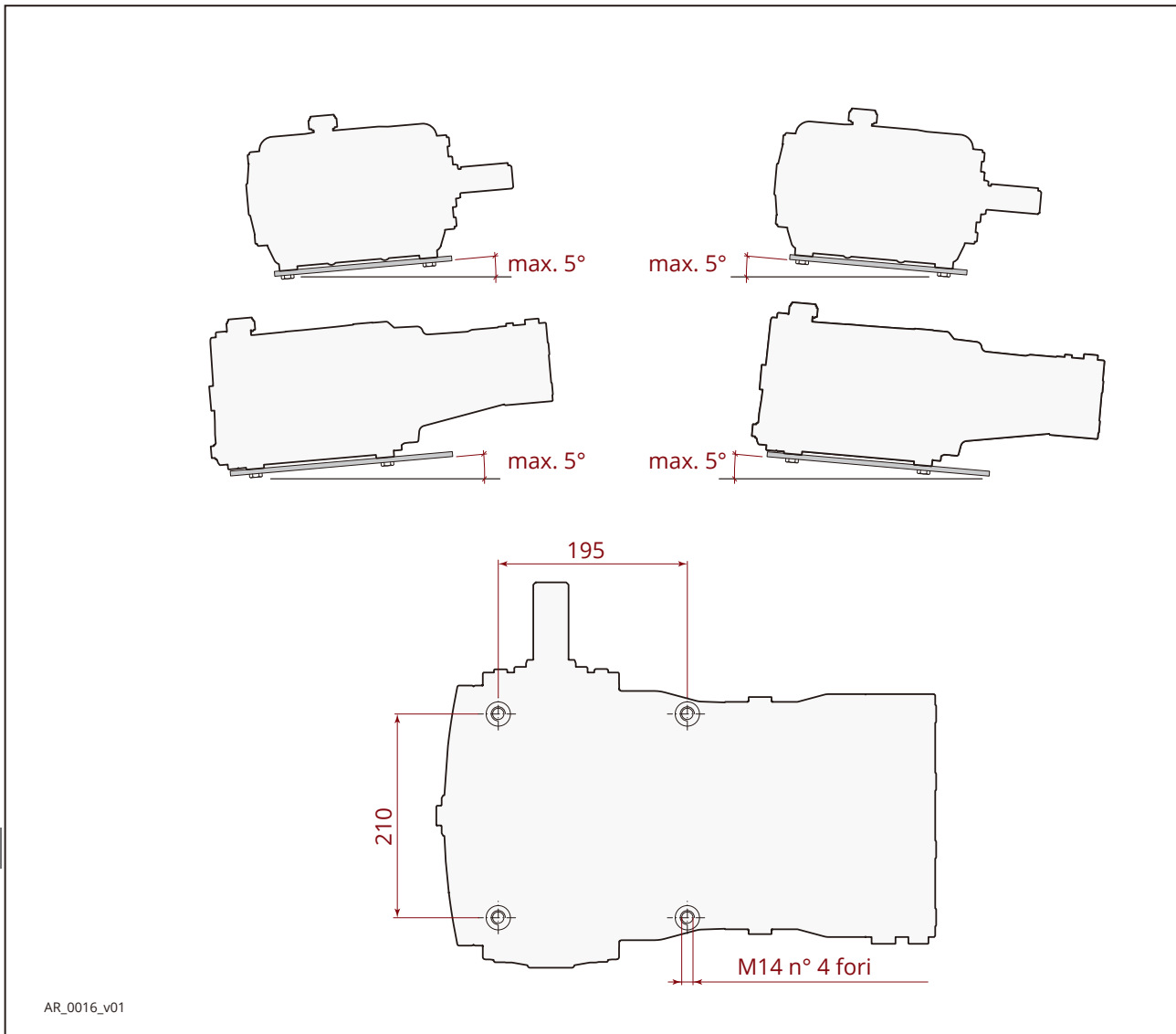
必须在水平表面安装该泵, 安装表面不能有凸凹的现象, 而且泵与安装面之间不得有活动部件。

通过泵体上的安装孔安装合适尺寸的螺丝, 将泵固定好。



## 安装说明

下图显示的是安装时的最大允许角度。超过这一角度，曲轴系统的润滑将得不到保证。



中文

AR\_0016\_v01

### 供水系统连接指南

泵的进水连接可以按照下面的方法进行操作:

- 连接到主供水管道
- 连接到增压泵 (增压泵供水)

各种连接都必须符合以下要求:

- 1) 泵的进水口连接处必须使用直径合适的抗压软管。(见“技术参数”)
- 2) 软管一定要保持通畅无弯曲、无扭结。
- 3) 泵的进水口处必须安装合适的过滤器。(见“技术参数”)
- 4) 所有接头和进水管之间的连接处必须做好密封处理, 以防止泵吸入空气。
- 5) 所有水管和接头都必须与泵的运行压力和输出流量相匹配, 而且必须符合相关规定。
- 6) 为了确保运行安全, 要选择合适的、与泵参数相匹配的调压阀安装在泵的出水口处, 并且要设置相关的回水系统。
- 7) 一定不要将调压阀的回水管与泵的进水管相连。一定要避免调压阀的回水管路直接连到泵的进水供水系统。
- 8) 在泵的回水系统安装相应的减压装置以最大程度的减少水压对水管的冲击损害。





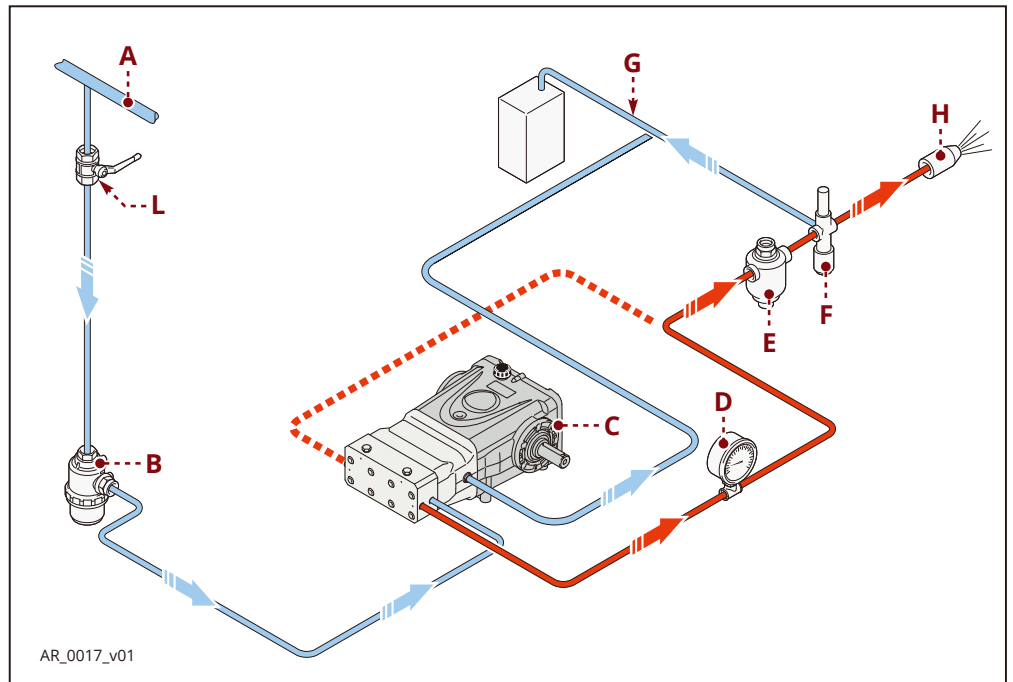
## 连接主供水管道

供水管的连接必须参照推荐的规范进行操作:

- 1) 主供水管系统的流量必须是泵的正常流量的两倍，压力为2-3 bar。
- 2) 采取“供水系统连接指南”中介绍的所有预防措施。

下面是泵与主供水管连接的简单图解。

- A) 主供水管
- B) 进水口过滤器
- C) 高压泵
- D) 压力表
- E) 储能器
- F) 调压阀
- G) 排水管
- H) 喷嘴
- L) 主供水管开关



## 连接增压泵 (增压泵供水)

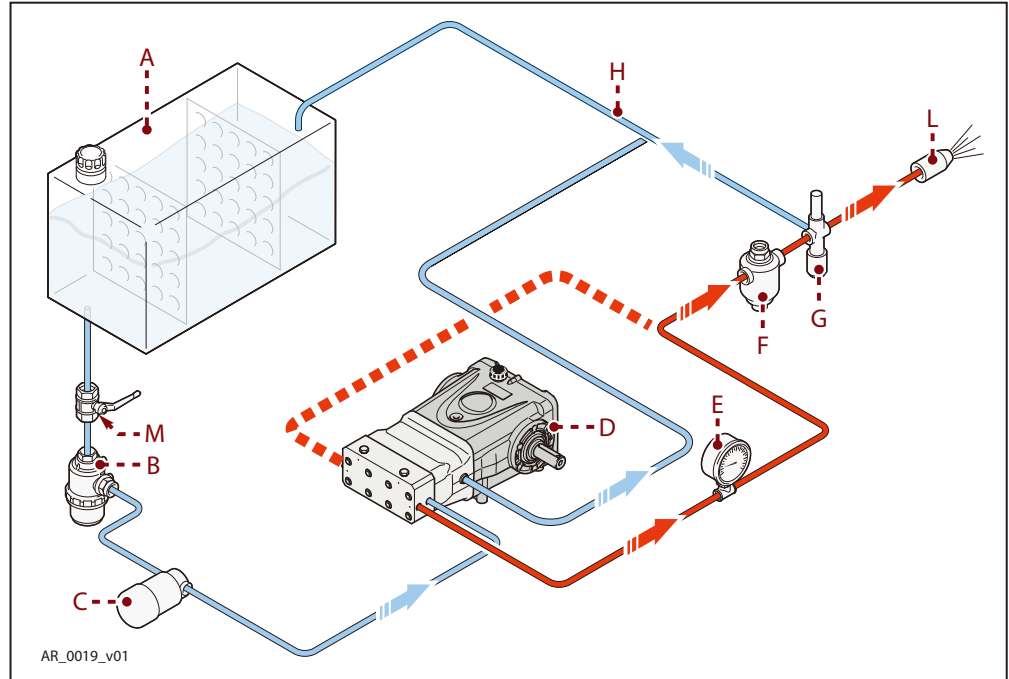
连接必须参照推荐的规范进行操作。

1) 增压泵的流量必须是高压泵正常工作流量的两倍，运行压力为2-3 bar。

2) 采取“供水系统连接指南”中介绍的所有预防措施。

下面是泵与增压泵连接的简单图解。

- A) 水箱
- B) 进水口过滤器
- C) 增压泵
- D) 高压泵
- E) 压力表
- F) 储能器
- G) 调压阀
- H) 回水管
- L) 喷嘴
- M) 主供水管开关



## 使用注意事项

启动之前，操作员必须进行必要的安全检查。

高压管路漏水时，立刻停止泵的运转并排除漏水原因。

泵的使用不能超过生产商规定的标准参数范围。

在环境温度接近0°C的情况下，如果需要关闭系统，要在关闭进水后继续运行该泵10秒钟（在停止系统运行前），保证让泵和整个管路内的水全部由排水管道排出，防止泵内结冰。

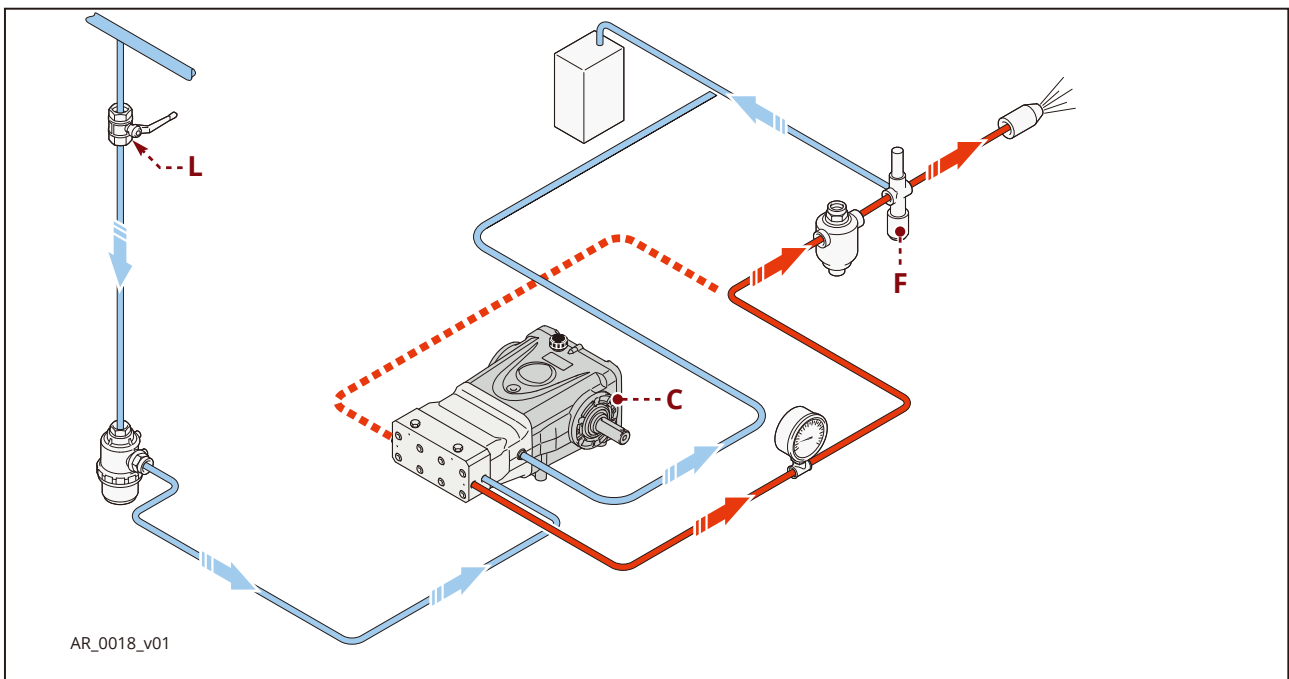
## 连接自来水管时泵的启动和关闭

按照以下步骤启动水泵：

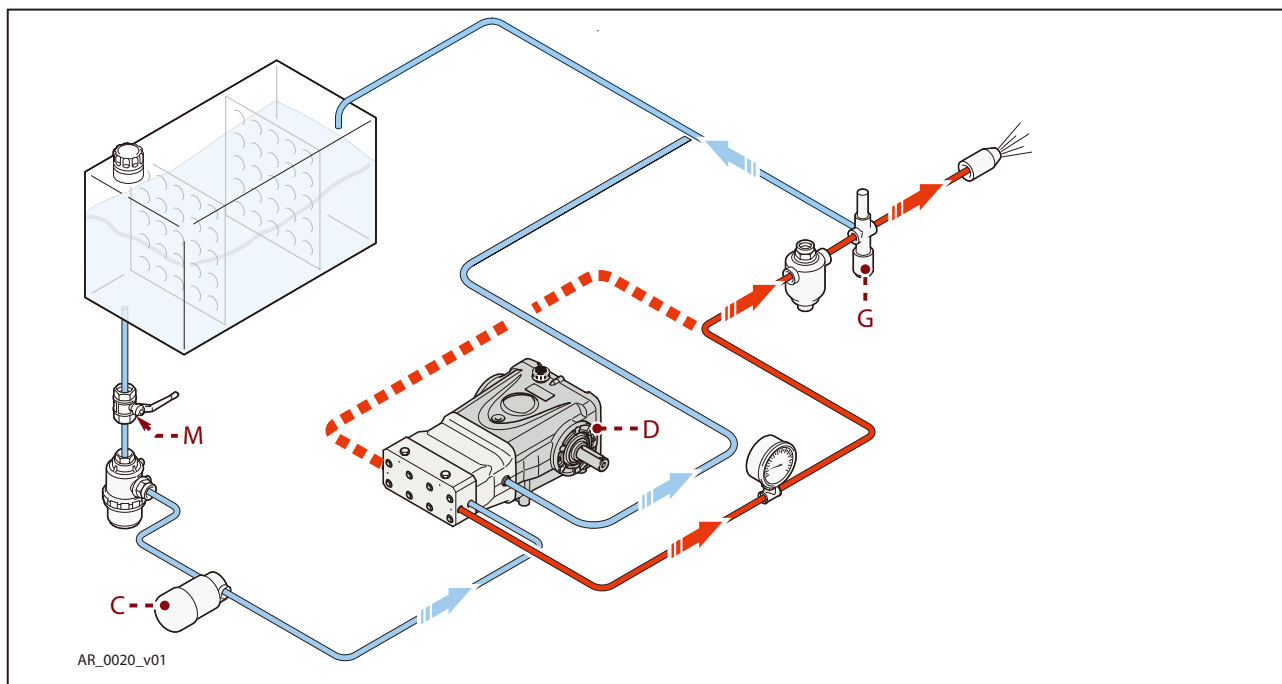
- 1) 打开进水开关(L).
- 2) 打开调压阀(F)卸压。
- 3) 启动水泵，在无压力的情况下运行几分钟。
- 4) 调节调压阀(F)使泵达到所需工作压力。

按照以下步骤停止泵的运转：

- 1) 打开调压阀(F)卸压。
- 2) 关闭泵。
- 3) 关闭进水开关(L)。



## 增压泵供水时泵的启动和关闭



按照以下步骤启动水泵：

- 1) 打开主供水管道开关(M)。
- 2) 打开调压阀(G)卸压。
- 3) 启动增压泵(C)。
- 4) 启动水泵(D)，在无压力的情况下运行几分钟。
- 5) 调节调压阀(G)使泵达到所需工作压力。

按照以下步骤停止泵的运转：

- 1) 打开调压阀(G)卸压。
- 2) 关闭泵(D)。
- 3) 关闭增压泵(C)。
- 4) 关闭供水开关(M)。



**保养注意事项**

在进行任何保养工作之前, 首先要卸掉整个系统回路中的所有压力, 并切断驱动泵的所有动力。  
 保养结束后, 在重新启动水泵前, 要检查是否有工具、抹布或其他物件在运转部件或危险区域附近。  
 使用原装零件更换过度磨损的零件, 并且使用制造商推荐的润滑油。  
 根据相关法律规定处理磨损的零件和润滑油。  
 按照制造商提供的说明进行日常保养, 以保持泵的性能和安全性。

定期保养			
保养间隔	零部件	步骤	参考
每个工作日	过滤器	检查过滤器滤芯	见“检查过滤器”
	泵	检查油位	见“检查油位”
每工作50小时	泵与动力装置的连接 (皮带轮, 皮带, 联轴器等)	检查	
	泵	检查安装件	见“检查泵的安装件”
	管道和接头	检查	见“检查管道和接头”
	曲轴箱	更换油 (1)	见“换油”
每工作500小时或每年	曲轴箱	换油	见“换油”
每工作500小时	水封和油封	更换	联系授权服务中心
	单向阀	更换	联系授权服务中心

(1) 仅供第一次换油时参考



## 润滑油表

泵在出厂时已经注满润滑油，润滑油的参数已经标注在泵的铭牌上。  
更换油时，使用适合作业环境的油（见附录中的建议，以及“操作条件”）。

润滑油粘度的选择需要根据外界温度来确定。  
请根据下图来选择适合作业环境温度的润滑油。

润滑油对照表		
出厂标准	ENI	MOBIL
SAE 30	i-SIGMA MONOGRADE 30 i-SIGMA UNIVERSAL DL 15W40	DELVAC SUPER 1400 15W40

## 检查泵的安装件

检查泵的固定螺钉是否有松动。  
需要时，按照安装设计中规定的扭矩紧固螺钉。

## 检查管路和接头

- **检查接头处是否泄漏**  
一般情况下，将接头处适当紧固便可以解决泄漏问题。  
如果进口管路接头处泄漏，则必须修理密封件。
- **检查软管**  
如果管路有老化、破损、突起和磨损等情况，必须更换。

中文

## 检查过滤器

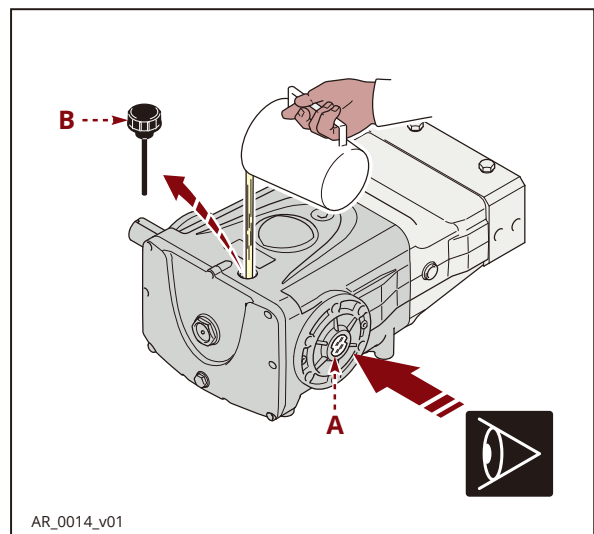
- **检查过滤器滤芯**  
如果过滤器滤芯污染或损坏，请参照过滤器制造商提供的详细说明来修复滤芯。

## 检查油位

- 在泵处于水平位置和冷却状态的情况下检查油位。
- 通过液位计(A)检查油量。
- 需要时，按照“润滑油表”中规定的牌号和规格来加油。

按照以下步骤来加油：

- 1) 拧下螺塞(B)加油，直到油位处于液位计(A)刻度的一半以上。
- 2) 拧上螺塞(B)。



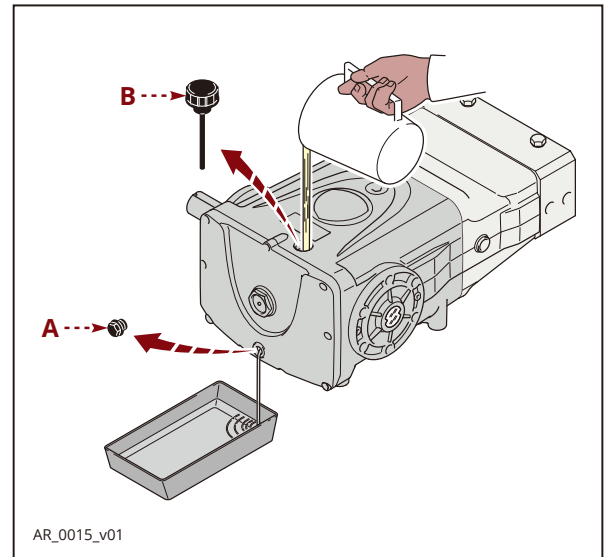
## 换油

在泵稍微温热的情况下, 将泵所在的设备置于完全水平的表面。  
不要将油排放到自然环境中。  
根据相关法律规定来处理用过的油。

更换油时, 请按照以下步骤进行操作:

- 1) 使用合适的容器来收集使用过的油。
- 2) 拧下排油口塞(A), 排出所有的油。
- 3) 拧上油塞(A)。
- 4) 拧下机油尺(B)。
- 5) 通过加油口添加新油至适当的油位(见“检查油位”)。
- 6) 拧上机油尺(B)。

每次换油时, 拧下排油口塞 (A), 用磁铁清理排油口塞上的铁屑残渣。



## 泵的保养

如果长时间不使用泵, 请按以下步骤进行操作:

- 1) 用清水运转泵几分钟。
- 2) 关闭水源后, 运转泵10秒钟, 清空泵和管路中的水, 以防止产生水垢。
- 3) 用水或相关法律许可使用的溶剂来冲洗泵。
- 4) 用压缩空气吹干泵。
- 5) 采取适当的防护措施, 避免受到环境影响。

中文

## 泵的重新使用

重新使用长期闲置的泵之前, 要检查油位和安装螺钉的紧固情况。

## 泵的报废

报废的泵必须由熟练的技术人员拆除, 而且要符合相关职业安全的法律规定。  
拆除的零件必须按零件的材料进行分类, 不要将密封件和润滑油等污染物直接丢弃到自然环境中。  
根据关于废物处理和回收的法律规定进行处理。



## 常见故障及排除方法

下面的信息用于指导操作人员排除使用过程中出现的故障。

因可能涉及更复杂的维修操作知识，并且需要使用相关专业维修工具，所以某些出现故障的泵需由专业技术人员处理或送交授权维修中心。

问题	原因	处理方法
泵在运转时不出水	供水有问题	打开供水阀
		确认供水管路是否处于折叠状态
		进水压力过小, 安装增压泵
		勿使空气进入供水管路
泵的压力达不到额定工作压力	泵吸入空气	紧固进水管路
	进水流量不足	更换大尺寸的进水管路
		排除管路扭结情况
		提高过滤器容量或清洁滤芯
		提高转速至额定速度
	进水口和出水口单向阀磨损	更换单向阀(1)
	调压阀座磨损	更换调压阀座
水封磨损	更换水封(1)	
泵的压力不稳	喷嘴不适合、磨损	更换喷嘴
	进水口和出水口单向阀磨损	更换单向阀(1)
	单向阀有异物堵塞	清洁单向阀(1)
	系统吸入空气	紧固进水管接头
管路震动	水封磨损	更换水封(1)
	单向阀堵塞	更换单向阀(1)
	调压阀故障	更换调压阀
	调压阀回水排放管路太小	更换大尺寸的回水排放管
	压力缓冲器无压力	设置合适的膨胀压力
压力下降	泵吸入空气	紧固进水管
	喷嘴磨损	更换喷嘴
	进水口和出水口单向阀磨损	更换单向阀(1)
	单向阀有异物堵塞	清洁单向阀(1)
	调压阀座损坏	更换调压阀座
泵噪音大 连杆磨损	水封磨损	更换水封(1)
	系统吸入空气	紧固进水口处的接头
	进水口和出水口单向阀弹簧损坏或破裂	更换单向阀弹簧(1)
	单向阀有异物堵塞	清洁单向阀(1)
	轴承磨损	更换轴承(1)
泵温度过高	进水温度过高	降低进水温度
	泵运行压力过高	降低压力至额定压力
	驱动皮带过紧	恢复正常的皮带张力
	皮带盘和驱动联轴器对中性较差	重新校准

(1) 必须通过授权服务中心进行的操作





问题	原因	处理方法
曲轴箱进水	柱塞环和水封磨损	更换柱塞环和水封(1)
	空气湿度过高	将油的更换频率提高一倍 (与“日常保养表”相比)
	水封磨损	更换水封(1)
泵下面的排油管漏油	油封磨损	更换油封(1)

(1) 必须通过授权服务中心进行的操作

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