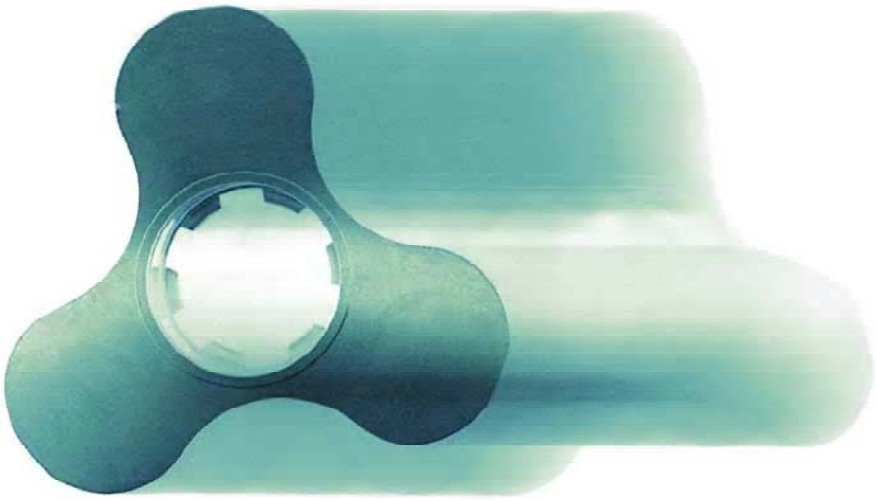
Operation and maintenance manual



B series lobe positive displacement pump unit

OMAC Srl
Via G. Falcone nr. 8
42048 Rubiera (RE) - Italy

Printed directly by the company

Table of contents

O.M.A.C. s.r.l. POMPE
POMPE VOLUMETRICHE A LOBI IN ACCIAIO INOX
per prodotti alimentari, bevande, chimica, enologia, farmaceutica, cosmetica

Declaration of conformity

According to 98/37EEC directive

We declair that :

☐ **EC DECLARATION OF CONFORMITY** (Ann. II.A, 98/37/EEC)

rotary lobe displacement pump unit B serie _____ Serial N° _____Year_____

- ☐ with reduction geared motor/variable speed unit mod.
- ☐ with baseplate/trolley stainless steel
- ☐ + Couplings
- ☐ + Cover for drive

described herein in the use and maintenance manual (MUM) has been manufactured in accordance with 98/37/EEC directive and amendments.

☐ **EC DECLARATION OF INCORPORATION** (Ann. II.B, 98/37/EEC)

Lobe pump B serie _____ Serial N° _____ Year_____
cannot be operated before the machine in which is assembled the pump, will be declared in conformity with the safety requirements according to the 98/37/EEC directive and amendments.

☐ **FOOD PRODUCTS-CONTACT SUITABILITY DECLARATION**

Lobe pump B serie _____ Serial N° _____ Year_____
is made with materials suitable to come in contact with food grade product according to the 2004/1935/EEC regulation and amendments.

Rubiera, ____ /____ / _____ ,

The legal representative

I GENERAL INSTRUCTION

1.1 - Introduction

The purpose of this manual is to be a useful working tool for all the operators, as defined according to the EC98/37 Directive and following modifications, who must necessarily examine it.
Inside this manual the operators shall find the instructions and indications required for a proper utilisation of the B series positive-displacement pump unit , such as:

- A proper transportation
- A proper installation
- A proper setting at work
- A proper maintenance

The operators in charge shall become familiar with the problems concerning the machine and the corresponding product under production.

CAUTION

Before operating the Pump unit, read the instructions in this manual carefully and follow the indications in strict compliance.

A) Reception

When the machine is delivered, carry out an immediate visual check and in case of damages due to transportation, carry out the procedure, according to the supply contract, required for damage covering. The order of any damaged parts and components must be made by following the list indicated in this manual.
The expenses for putting the machine back in working order are chargeable to the damager.

B) Storage

The machines or components not immediately installed must be stored, with their packaging, in a place safe from weather agents or other elements.
Damages due to storage may be exclusively contemplated only according to the supply contract relative to the machine to which this manual refers.

C) Assembly and Installation

The assembly and installation of the machines and/or components must be carried out exclusively by qualified staff, authorised and in compliance with the regulations in force on the subject, as well as with the observance of the supplied instructions.

D) Setting at work and adjustment

The setting at work and adjustment must be carried out exclusively by a specialised and authorised staff.
Initially, the personnel in charge (operators) must study properly and in-depth all the warnings contained in the delivered documentation.

CAUTION

The machine can work only in automatic mode once installed in the system of which it must be part. The setting at work of the machine outside the above-mentioned system is strictly forbidden, in that the risk deriving from its inner accessibility shall be eliminated only when the machine is connected.

E) Accident protection

All that is established by this manual concerning accident prevention, and especially what is imposed by the regulations in force on the subject must be strictly observed .
OMAC Srl works towards the realisation of its machines in compliance with the current international safety standards.
The Customer is liable for notifying, before setting the machine at work, any local safety standards.
Any additional charge must be on the Customer.

F) Maintenance and cleaning

The maintenance and cleaning operations of the machine must be carried out by qualified and authorised staff in compliance with the regulations of this manual.
The purpose of these indications is to maintain the value, reduce the wear and lengthen the life of the machine .

1.2 - Guarantee

Guarantees are provided only within the limited imposed by the contract clauses, providing *OMAC Srl* original spare parts are used.
OMAC Srl shall not be liable for any damage caused for having used non-original spare parts and considers the terms of the guarantee cancelled. In no case the manufacturer shall be liable for damages deriving from improper treatment, non-observance of our instructions, tampering carried out by non-instructed staff .

WARNING

The presence of foreign bodies in the pump like sand, dust, welding slags, pipe scraps that cause the inevitable seize of the rotors shall cancel the terms of the guarantee.

1.3 - Normative references

Directives concerning machine safety

- EEC 98/37 Machine Directive and following amendments.
- EEC 73/23 Directive, known as “Low voltage directive”.
- EEC 89/336 Directive, relative to Electromagnetic compatibility.
- EEC 75/442, 76/403, 768/319 and 757 439 Directives, relative to waste and their disposal
- EEC 89/654 and 89/391, relative to the improvement of the emergency and the health in job atmospheres.

Technical standard

- EN 292-1:1991 Machine Safety. Basic concepts, general principles for the project
- EN 292-2:1991 Machine Safety. Basic concepts, general principles for the project
- EN 294:1992 Machine Safety. Safety distances in order to prevent danger areas that may be reached by upper parts

- EN 349:1993 Machine Safety. Minimum distances for preventing damages to the human body.
- EN 418:1992 Machine Safety. Emergency stop system, principles for the operative aspects of the project.
- EN 60204-1:1992 Machine Safety. Electric installation for industrial machines.

1.4 - By the Customer

Except for specific contract conditions, the Customer shall see to:

- the appropriate logistic arrangement for the positioning and management of the machines;
- the proper lifting equipment;
- the connections to electrical supply;
- the expendable materials;
- the lubricants (for maintenance operations).

1.5 - Customer servicing

The Customer can directly contact Customer Servicing in order to request a Specialised Technical Personnel.
The customer engineering shall check the availability and professionalism of the Technician to be sent.

2 GENERAL DATA

2.1 - Pump with drive unit on baseplate

The lobe pump with drive unit consist mainly of (Ref. Fig.2.1):

1) Baseplate in stretch-formed sheet
2) Lobe pump fixed to the baseplate pos. 01
3) Variable-speed unit (or geared motor) fixed to the baseplate pos. 01
4) Coupling
5) Welding net coupling guard
6) Plexiglas protections
7) Cover for drive (when provided in the supply of the Pump unit; in this special configuration the protection cover, pos.05 of the coupling is not installed).

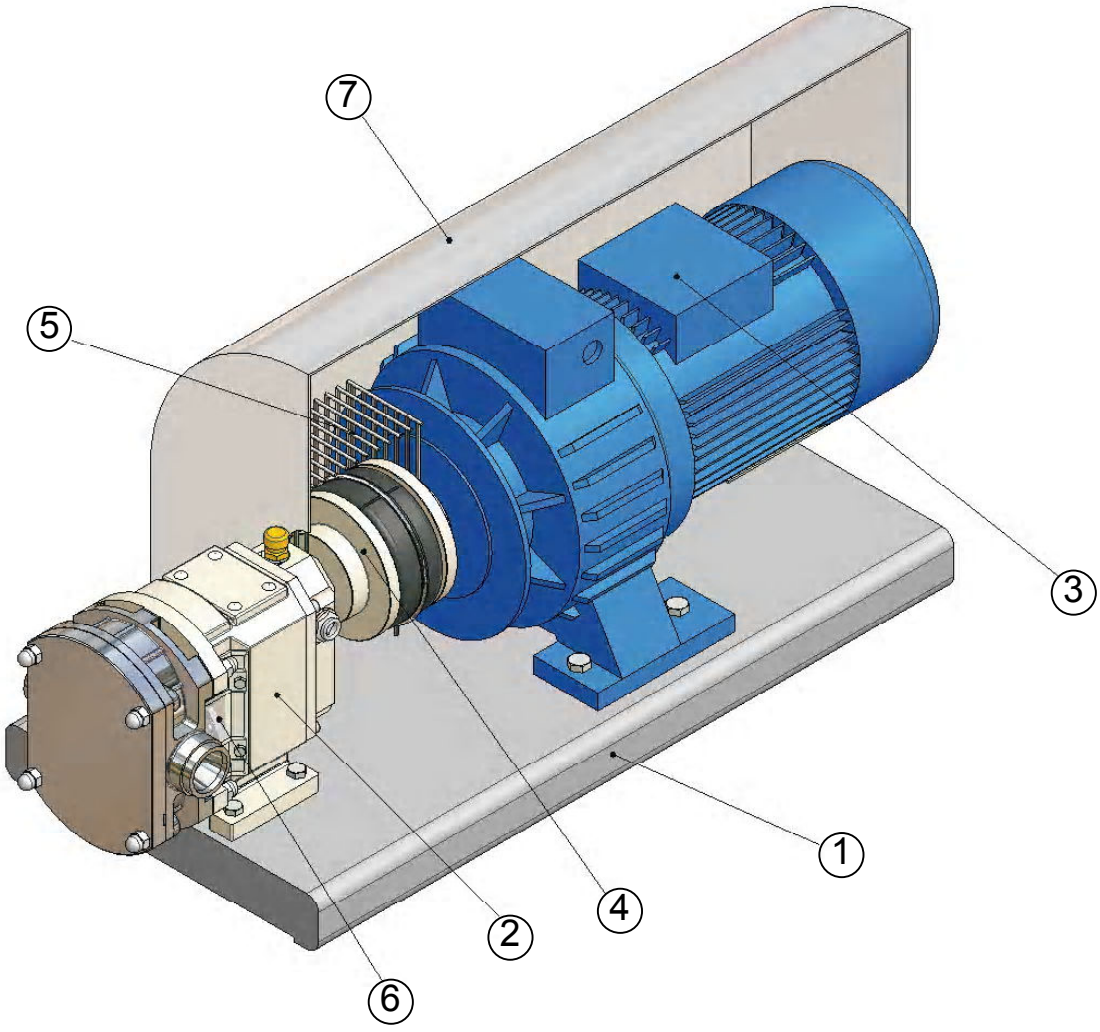


Fig. 2.1

2.1.1 - Pump with drive unit on trolley

Lobe pumps with drive unit on trolley consist mainly of (Ref. Fig. 2.2):

1) Trolley
2) Lobe pump fixed to the trolley pos. 01
3) Variable-speed unit (or geared motor) fixed to the trolley
4) Coupling
5) Welding net coupling guard
6) Plexiglas protections
7) Cover for drive (when provided in the supply of the Pump unit; in this special configuration the protection cover, pos. 05, of the coupling is not installed).
8) Electrical control panel board.

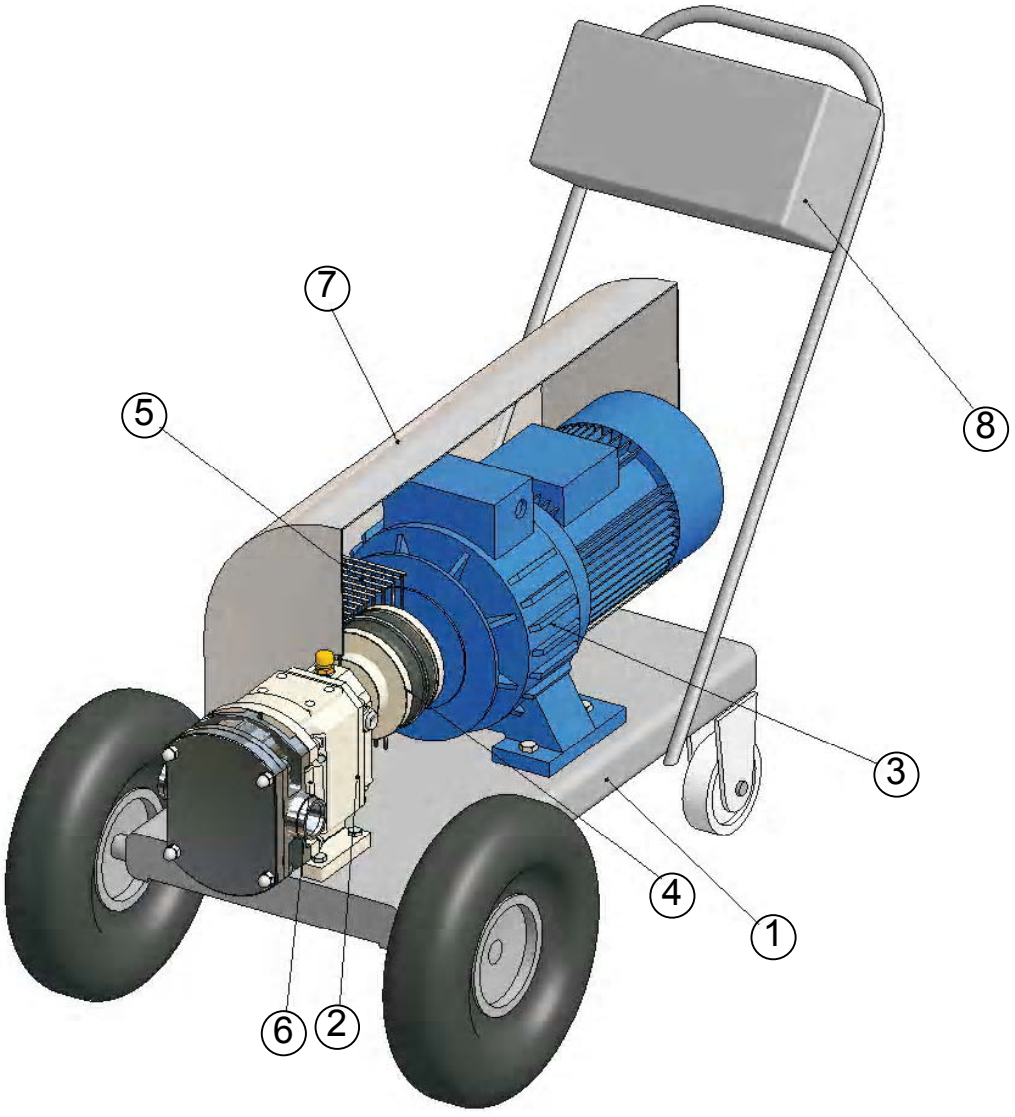


Fig. 2.2

2.2 - Pump code

PUMP TYPE	**Z** = Pump with bare shaft
	K = pump+motorization+base+accessories

PUMP SERIES	B

PUMP SIZE	**A**=100	**B**=105	**C**=110	**D**=115	**E**=215
	F=220	**G**=325	**H**=330	**L**=390	**M**=430
	N=440	**P**=470	**Q**=490	**R**=550	**S**=570
	T=660	**U**=680			

SEAL TYPE	**0** = UM type - S1
	1 = Teflon packing rings
	2 = Teflon packing rings + hydraulic barrier
	3 = Mechanical simple seal S.S-Carb.
	4 = Mechanical simple seal tungsten carbide-carb.
	5 = Mechanical simple seal tungsten carbide-tungsten carbide
	6 = Mechanical simple seal ceram.-carb.
	7 = Mechanical simple seal ceram.-rulon
	8 = Mechanical simple seal silicon carbide-silicon carbide
	9 = Mechanical simple seal tungsten carbide-silicon carbide
	A = Mechanical simple seal silicon carbide-carbon
	B = Open frontal lip seal
	C = Frontal O-ring seal
	D = Closed frontal lip seal
	M = PTFE Double lip seal 2HN
	N = PTFE simple lips seal HN
	P = PTFE frontal lips seal
	Q = Special simple lip seal HN (type VEM)

SUCTION / DESCHARGE POET CONNECTION	**0** = GAS-BSP ports
	1 = Flanged ports PN16 UNI EN 1092-1 1 DIN2576(ex**UNI2278-57**)
	2 = DIN 11851 ports
	3 = SMS ports
	4 = RJT (BS) ports
	5 = IDF ports
	6 = CLAMP ports
	7 = Female GAS thread
	8 = Fitting for wine making
	9 = Special ports
	A = Aseptic ports "OMAC" type
	B = Ports DIN 11864/1a
	C = Ports DIN 11864/2a
	D = Ports DIN 11864/3a
	E = Ports DIN 11864/1b
	F = Ports DIN 11864/2b
	G = Ports DIN 11864/3b
	H = Flanged ports PN40 UNI 6084-67 / DIN 2501
	J = Flanged ports ASME 150 lb ex ANSI (ASA) B 16.5
	K = Flanged port IDF
	L = Port to weld
	M = Ports DS 722
	N = Ports DIN 11851 male with nut
	P = Ports MACON

ROTOR TYPE	**0** = Standard stainless steel ST tri-lobe
	1 = Stainless steel increased clearance SM tri-lobe or gear rotors
	2 = Stainless steel standard bi-lobe
	3 = Stainless steel increased clearance bi-lobe
	4 = Rubber coated stainless steel EPDM tri-lobe
	5 = Anti-seizure alloy dual wing
	6 = Rubber coated stainless steel EPDM bi-lobe
	7 = Anti-seizure alloy tri-lobe (anti.seizure alloy gear rotors for B100-B105)
	8 = Standard stainless steel gear rotors (for B100-B105)
	9 = Special rotors
	A = ST anti-seizure alloy bi-lobe
	B = Stainless steel
	C = Stainless steel increased clearance dual wing
	H = Hastelloy
	J = Monel
	K = Titanium
	L = Anti-seizure alloy increased clearance tri-lobe or gear rotors
	M = Anti-seizure alloy increased clearance dual wing
	N = Anti-seizure alloy tri-lobe with restricted tolerance PR
	P = Anti-seizure alloy dual wing with restricted tolerance PR
	Q = Anti-seizure alloy gear ST ultra reducted for B105
	R = Anti-seizure alloy gear ST reducted for B105

END COVER	**0** = Standard end cover
	1 = End cover with felief valve
	2 = Heated end cover
	3 = End cover with pneumatic By-pass
	4 = Standard end cover with facing O-ring type "F"
	5 = Solid end cover for lock nut rabbeted
	6 = End cover for ultra reducted version
	7 = Heated cover with BB locking nut
	9 = Special end cover
	A = Aseptic end cover

SPECIAL VERSION SINGLE OPTIONAL	**A** = Aseptic pump
	B = NBR O-ring
	C = Standard flushing for mechanical seal
	D = Duplex shafts
	E = P.A.C.D. surface haredening
	F = FKM - Kaflon O-ring
	G = Inner polishing surface <0,6 µ
	H = Higt pressure pump
	J = Titanium pump
	K = Kolsterising surface hard
	L = Enlarged inlet port
	M = Monel pump
	N = Niploy surface haredening
	P = Teflon (INCO-FEP) O-ring
	R = Rotor case with heating jacket
	S = Polyurethan lip seal
	T = Hydraulic flange pump
	U = EPDM O-ring
	V = FKM O-ring
	W = Kalrez Spectrum 6375 O-ring
	X = Certificate ATEX
	Y = Hastelloy pump
	Z = Hastelloy-Titanium pump
	1 = Cheniflon surface hardening
	2 = Stainless steel gear box
	3 = 3A certificate
	5 = External rotor's fastener
	6 = Gear box cast iron + Nicasil
	7 = With foot for vertical port positioning
	8 = Cover with drainage
	9 = internal mechanical seal
	0 = Indicatore di campo vuoto

OPTIONAL GROUP	**C1** = Single flushed mech. Seal with NBR lip seal and NBR O-ring
	C2 = Single flushed mech. Seal with EPDM lip seal and EPDM O-ring
	C3 = Single flushed mech. Seal with PTFE lip seal and INCO-FEP O-ring
	Q3 = Double mechanical seal with S.S-Carbon secondary seal
	Q4 = Double mechanical seal with tungsten carbide-Carbon secondary sea
	Q5 = Double mechanical seal with tungsten carbide-tungsten carbide secondary sea
	Q6 = Double mechanical seal with Ceram-Carbon secondary sea
	Q7 = Double mechanical seal with Ceram.-Rulon secondary sea
	Q8 = Double mechanical seal with silicon carbide-silicon carbide secondary sea
	QA = Double mechanical seal with silicon carbide-carbon
	RV = Rotor case with heating jacket + FKM O-ring
	11 = Modified diameter suc/disc port DN 20 = 3/4"
	12 = Modified diameter suc/disc port DN 25 = 1"
	13 = Modified diameter suc/disc port DN 32 = 1"1/4
	14 = Modified diameter suc/disc port DN 40 (38) = 1"1/2
	15 = Modified diameter suc/disc port DN 50 (51) = 2"
	16 = Modified diameter suc/disc port DN 65 (63) = 2"1/2
	17 = Modified diameter suc/disc port DN 80 (73) = 3"
	18 = Modified diameter suc/disc port DN 100 (101) = 4"
	19 = Modified diameter suc/disc port DN 125 = 5"
	21 = Modified diameter suc/disc port DN 150 = 6"
	22 = Modified diameter suc/disc port DN 200 = 8"
	23 = Modified diameter suc DN 125 - disc DN 100
	24 = Special suc. port Flangie PN16 UNI2278 - disc. DIN11851 (DN= standard diameter)
	25 = EPDM O-ring (3A)
	26 = FKM O-ring (3A)

SEAL MODEL	**0** = Not mechanical seal
	1 = Frontal internal seali
	2 = FLUITEN KL2A seal
	3 = Knife FLUITEN seal
	5 = BURGMANN C5E seal
	7 = ROTEN U7K seal
	8 = ROTEN 7KFO seal

2.3 - Position of the data plates

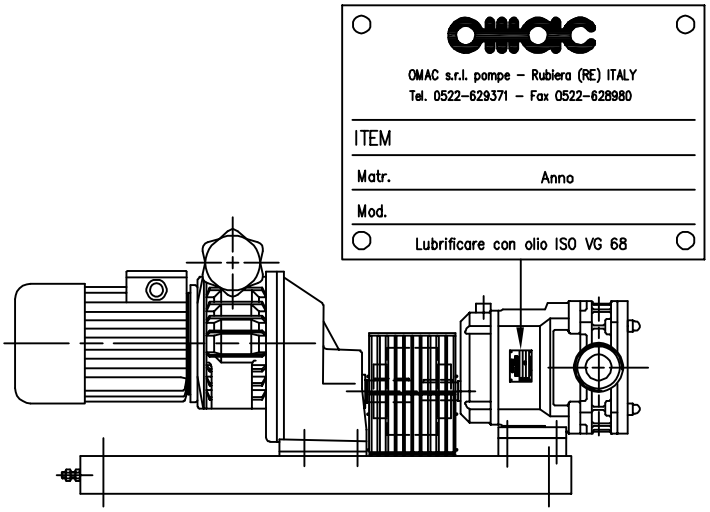


Fig. 2.3 Name plate

For the pump unit designed for products at high temperatures (until 150° C) the data plate is placed on the pump warning the operators of the presence of high-temperature surfaces. (Ref. Fig. 2.4)

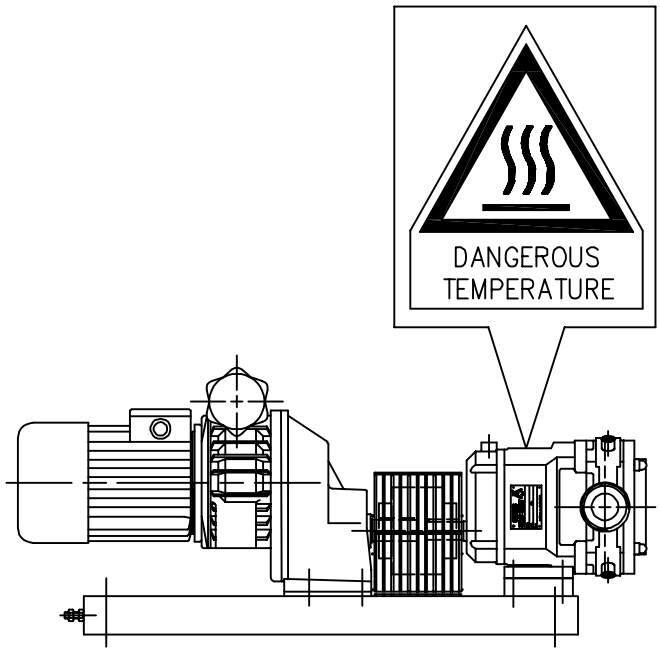
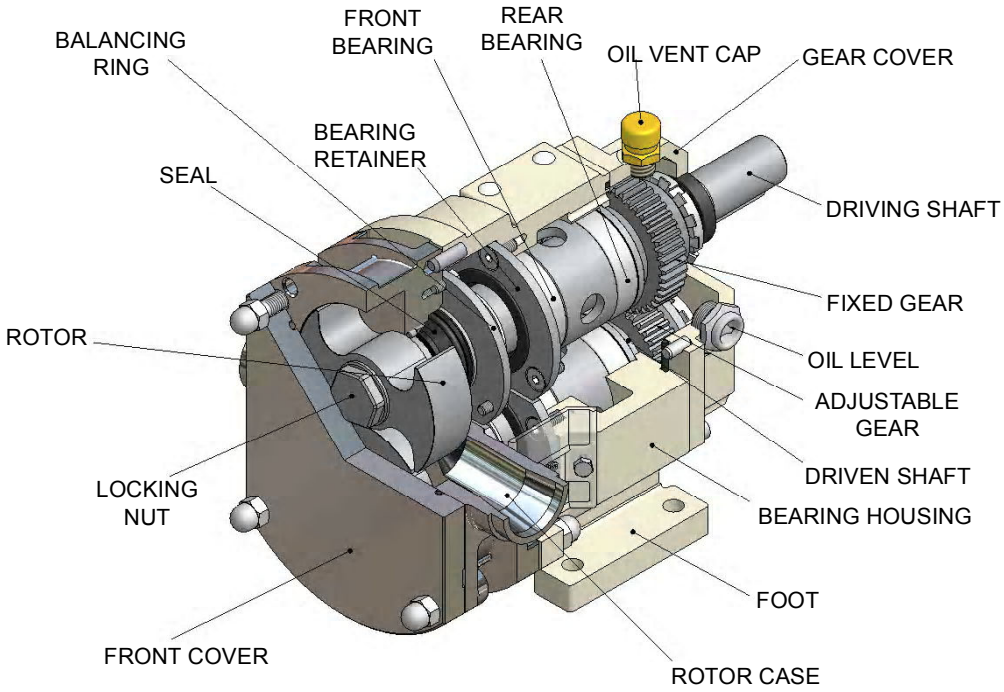


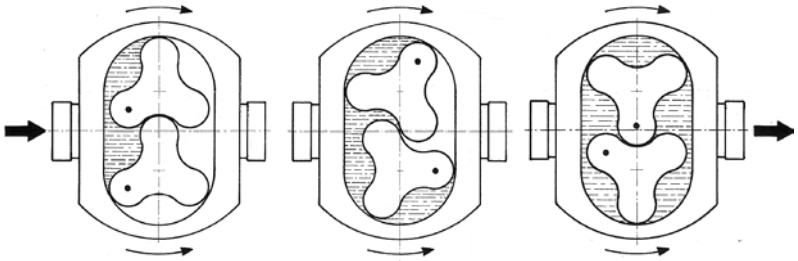
Fig. 2.4 Warning sign for high-temperature surfaces

2.4 - Bare shaft pump



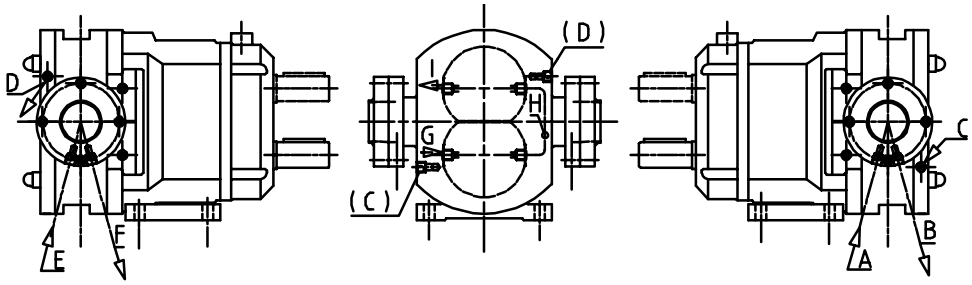
2.5 - Principle of operation

The Pump unit whose functional element is the B series lobe positive-displacement pump is equipped with a controlling unit that can be realised in two versions, a variable-speed motor or a reduction motor. The adjustment of the capacity is carried out by increasing or decreasing the number of revolutions of the pump rotation intervening on the number of revolutions at the output of the control unit. The Pump unit is reversible i.e. full performances can be reached in both directions of rotation of the rotors of the pump. The pumping action of the pumps is achieved by the contra rotation of two pump rotors within a rotorcase, see figure below. The rotors are mounted on shaft is fitted with gears, placed within the gearbox, to transfer the drive from the drive shaft to the driven shaft. The rotors synchronize so that they rotate without contact with each other. As the lobes of the rotors move away form each other the volume between them increases, creating a depression on the suction side. This causes the media to flow into rotor case. The pumped media is carried around the rotorcase to the discharge side of the pump.
As the rotors move towards each other, the volume between them decreases, causing a rise in pressure on the discharge. This causes the media to be pressed out of the rotorcase.



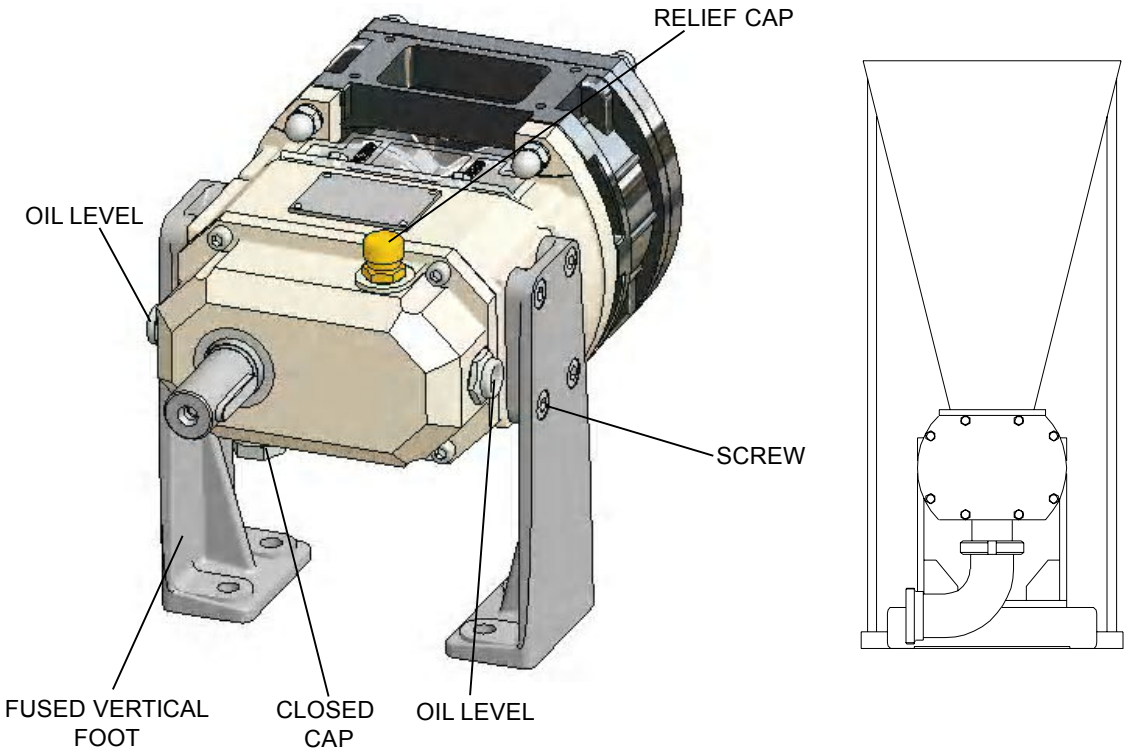
2.5.1 - Aseptic pump

Not all the models (B100, B660, B680) are available also in the aseptic version, with steam barrier or sterile liquid on the cover, on the mechanical seals and on the ports. The aseptic lobe pump is used in the packaging processes of food or pharmaceutical products that have undergone a sterilisation and must not be absolutely contaminated during the transfer.



2.5.2 - Pump with enlarged port

Models B115, B220, B330,B390, B440, B490 can be realised with enlarged box inlet port in order to facilitate the feeding of the pump with very viscous products such as thick mixtures with semi-solid pieces.
In these cases, in order to facilitate the entrance of the dropping product, the pump is installed with ports in vertical axis directly under the hopper.For the connection with vertical axis piping of bare shaft pump you need to disassemble pump foot (fixed for models B100-B5-B6) and fix directly the bearing housing to a special vertical feet that can be supplied on request (already included in the “vertical base”). If the pump is supplied with bare shaft , check the correct position of the caps and of the oil level.



Example of vertical installation of a pump with enlarged port positioned under a hopper.

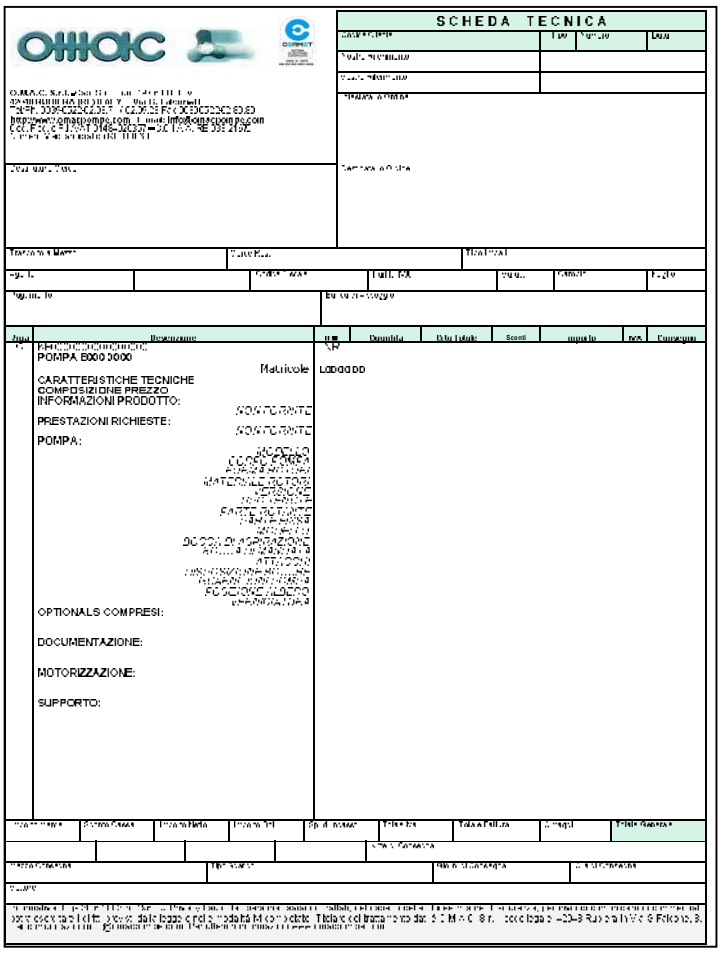
2.5.3 - Pump with heating/cooling jackets

If it is necessary to keep the pumped fluid at a constant temperature a heated jacket body and/or jacketed end cover is avaible for all the pumps (except the B100). This allows the circulation of heating or cooling liquid. Typical examples are melted fats, butter and margarine, chocolate and glucose....

For connections dimensions and circuit scheme refer to tab.4.8. The pipeworki and fittings are not supplied with the pump.

2.6 - Data sheet

In order to check of the technical data refer to enclosure “1” fac-simile is indicated below


SCHEDA TECNICA

POMPA B000 0000

Matricole L0D0000

CARATTERISTICHE TECNICHE

COMPOSIZIONE PREZZO

INFORMAZIONI PRODOTTO:

PRESTAZIONI RICHIESTE:

POMPA:

OPTIONALS COMPRESI:

DOCUMENTAZIONE:

MOTORIZZAZIONE:

SUPPORTO:

2.7 - Noise levels

The Pump unit that is designed and produced by adopting all the solutions technologically possible for reducing the sound level at the origin and it presents:

- Standardised sound level equivalent to idle 67 dB (A)
- Standardised sound level equivalent to load 65 dB (A)

Readings taken in accordance with ISO standard 3746.

- Sound level equivalent to 2 m. work distance 65 dB (A)
- The level of sound pressure equivalent to two meters of distance refers to a reverberant environment of characterstics (35 dB (A)); other noise sources and environments with different sound characteristics shall determine equivalent sound pressure values different from those indicated.
- If the Pump unit is inserted in a reverberant environment or in the presence of other noise sources and the daily personal exposure level is greater than 80 dB (A), there is a noise risk condition for the person in charge. This situation is regulated by D.M. no. 277/91.

The daily personal exposure level represents the average value, in time, of the pressure levels which the person undergoes during its activity.

OMAC Srl is willing to help, on request, when analysing and looking for the solutions to the problems that may occur concerning operator noise risk .

3 SAFETY STANDARDS

3.1 - Foreword

Printing conventions

The following signs are used in order to emphasize special expedients or suggestions important for a safe and correct machine running.

CAUTION

General safety instructions for the operator and for who is working nearness.

WARNING

Pay special attention to the instructions below this sign.

PRECAUTION

Further information concerning the operation in progress.

Note Useful information concerning the discussed subject.

CAUTION

All the operations concerning transportation, installation, utilisation, ordinary and extraordinary maintenance of the machine must be carried out exclusively by specialised and competent operators.

Keep this manual and all the attached publications in an accessible place known by all the operators.
All the Utilisation and Maintenance operations of the commercial components of the pump not indicated in this handbook are contained in the corresponding publications attached hereto.

3.2 - Safety instructions

Pursuant to the 98/37 EEC Machine Directive and subsequent revisions, the following is specified:

- **"Dangerous Zones"'** indicates any zone inside and/or near the machine in which the presence of an exposed person is a risk for the safety and health of such person ;
- **"Exposed person"** indicates the person who is completely or partially in a dangerous zone ;
- The room housing the machine must not have shadowy areas, blinding glares or dangerous stroboscopic effects due to the lighting provided by the Customer.
- The zones in which the operator stands (see § 3.3) must always be free and clean without any oily residue.
- Any operation of ordinary and extraordinary maintenance must be carried out when the machine is idle, after having properly disconnected all the supply lines and after discharging any residual energy.
- In any case, the behaviour of the operators in charge of the machine must be in strict compliance with the safety regulations of the country of utilisation.

CAUTION

Before starting the machine and beginning to work, all the electrical panels, control panels, all the accident-prevention safety barriers, all the protection covers must be installed as indicated by the manufacturer.

- If the product being processed consists of toxic substances, the operators, during the maintenance, cleaning, adjustment, repair, demolition and running operations , must be equipped with proper personal safety clothes such as faceplate, goggles, gloves, and so on.
- Check periodically the proper operation of the circuit breakers, if present.
- Dust and dirt deposits must always be eliminated. The cleaning of the machine and of the installations increase the operating safety and the hygiene of the plant; in this way, dust explosions are prevented.
- Safety devices must always be in perfect working order and must never be removed or made ineffective. In this case, we accept no responsibility.
- Faulty electric installations or equipment must be immediately replaced.
- Never place loose cables on the floor.
- At least once every six months, check all the electric network for any insulation defects, according to the directives of the prescriptions for strong currents.

3.3 - Staff qualification

Operator

The person or persons in charge of the installation, operation, adjustment, maintenance, cleaning, repair and transportation of the machine.

3.4 - Prevention measures concerning to the user

Concerning work, the prevention is the set of rules that the person in charge of the company's safety must observe (and enforce) in order to prevent accidents on the place of work.

The general information to make such person in charge aware of these measures is stated below.

Ergonomics

The instructions and suggestions for helping the user to work in a comfortable and low-risk environment are indicated below. Activities requiring continuous efforts of the body may cause "repetitive fatigue injury". This type of injury causes the irritation and inflammation of the soft tissue such as muscles, nerves or tendons and may cause, at worst, permanent damages.

The most common factors related to the repetitive fatigue injury comprise: excessive continuous repetitions of an activity or movement, executing activities in an uncomfortable and unnatural pose, static positions for a lengthy period of time, lack of short and frequent pauses.
Uneasiness, dizziness, and nausea can be the first symptom; in this case, consult immediately a doctor. The sooner the problem is diagnosed, the simpler the solution will be.

To reduce such risk to a minimum, the personnel in charge shall execute its activities correctly, in compliance with the information mentioned above. Moreover, it is the responsibility of the company's safety manager to organise proper work shifts and prepare the environment in such a way as to have enough space to move and change position.

Lighting

The user must guarantee a proper lighting of the working room, according to what is provided by the community directives and by the laws in force in the customer's country.
We suggest indirect light in order not to create reflections that may distract and blind the operators or prevent them, even only partially, from reading the control panels and signalling.
Note For the maintenance and repair interventions of the machine, it is advisable to use a battery-operated portable lamp, revolving as desired according to the type of intervention.

Clothing

The clothing of those working and executing maintenance operations on the machine must be in compliance with the essential safety requirements defined by the community directives and by the laws in force in the user's country . The utilisation of gloves, hair caps, overalls, faceplates and/or goggles are prescribed.

 **CAUTION**

In order to avoid mechanical risks, such as dragging, trapping and so on, do not wear bracelets, clocks, rings and chains.

Lubricants

There are different types of lubricating substances used and they are specific for each mechanical component. The indications supplied below shall be generic.
Lubricating oils and greases are used on the machine.

Refer to the technical card of the supplier for what concerns the chemical composition of the product.

The lubricating products may be irritating by inhalation and contact and are toxic by ingestion. Due to their high polluting power, avoid littering. All these products are in danger of fire.

During the execution of the work, observe the normal safety provisions. Protect hands and feet with rubber gloves and proper clothes. In normal operating conditions,respiratory or eye protections are not required.

In case of accidental contact, follow the recommendations described below:

- contact with the skin and with clothes: remove the contaminated clothes immediately and wash yourself with water and soap; apply a barrier cream;
- contact with eyes: wash immediately with running water and, if necessary, send for a doctor;
- ingestion: do not cause vomit; send for a doctor and inform him on the toxicological characteristics of the ingested substance.

In normal conditions, lubricating products are stable.
Contact with high-energy sources such as electricarcs, superheated surfaces and live flames, may cause the combustion of the lubricant.
Avoid contact with strong acids and oxidising agents. According to the decomposition conditions, dangerous products may be formed (refer to the technicalcard).

Due to its chemical characteristics, the dead lubricant must be kept in closed and sealed containers and must be disposed of in compliance with the regulations in force. The cleaning of the contaminated containers must be carried out only by authorised personnel. Refer to the technical card for the documentation requirement.
The water used for washing, polluted in whatever way by the lubricant, must be kept with proper physical means, without pouring it in the sewers or waterways.
In this case,use absorbent materials to be disposed of according to the regulations in force.

The product must be transported and handled in safety conditions. Keep it in closed containers at room temperature, protecting it from the damp and contact with foreign substances. Do not store it with energetic oxidising agents.

3.5 - Proper use of the Pump unit

The B series lobe positive-displacement pump unit was designed and realised for the transfer, through pumping, of clean products compatible with the materials used for manufacturing the pump.
The pump should only be used for the pumping application for which it was realised. The working conditions (operating pressure, media, speed, temperature,...) have been selected and specified at the time
of order and **must not** be different or exceeded for the pump. This details are stated on enclosure "1" Data Sheet or on similar seller's documentation.

Every other use is considered by *OMAC Srl* ***"improper"*** and such condition shall cancel the guarantee and responsibility existing between the manufacturer and the user.

If necessary, on explicit request of the user, *OMAC Srl* shall analyse special problems and authorise different pumping applications.

CAUTION

The user is warned against using the pump unit, purpose of this manual, for unexpected uses unless provided with written authorisation issued by *OMAC Srl.*

3.6 - Mechanical safety devices

The pump is provided with the following fixed guards as defined by the PRD 459/96

- safety cover (Ref. pos. 05 of Fig. 2.1- *§ 2.1)* bolted to the supporting structure that prevents unintentional contacts with the coupling.
- Plexiglas protections (when provided Ref. pos. 06 of Fig. 2.1- *§ 2.1)* bolted to the pump in order to prevent unintetional contacts with the mechanical seals of the pump.

It is strictly forbidden to use the pump without the safety cover protecting the coupling and, if present, the Plexiglas protections of the mechanical seals of the pump. If the Pump unit is used provided with the cover for drive (Ref. pos. 07 of Fig. 2.1- *§ 2.1) it is* strictly forbidden to use the unit without the aforementioned cover.
The installation of a relief valve directly on the pump or on the plant is always recommended to protect the safety of the pump itself in case of wrong operations that may cause overpressure peaks.
If the pump has no relief valve, it absolutely cannot work with the delivery pipes partially clogged .
On request, the OMAC pumps can be equipped with an internal relief valve.

3.6.1 - Internal relief valve (on the cover)

1 - The relief valve, assembled directly on the pump front cover, is reversible and driven by a spring compressed by an adjuster.
2 - The adjustment of the relief valve is carried out in the site of assemblage because the extent of the recycle depends on the speed of the pump, on the specific weight and viscosity of the product.
3 - In order to avoid continuous vibrations, the relief valve must be adjusted in such way that it starts operating at a pressure greater than 10% of the operating pressure.

PUMP	SPRING CODE ABOUT THE PRESSURE		
B100	0 ÷ 5 bar 422F015	6 ÷ 10 bar 422F016	
B1	0 ÷ 13 bar 422F001	14 ÷ 17 bar 422F011	18 ÷ 20 bar 422F002
B2	0 ÷ 13 bar 422F001	14 ÷ 17 bar 422F011	18 ÷ 20 bar 422F002
B3	0 ÷ 7 bar 422F003	8 ÷ 13 bar 422F004	14 ÷ 17 bar 422F005
B4	0 ÷ 7 bar 422F017	8 ÷ 11 bar 422F007	12 ÷ 17 bar 422F008
B470 / B490	0 ÷ 7 bar 422F013	8 ÷ 15 bar 422F014	

3.6.2 - Adjustment of the internal relief valve fig. 3.2

1 - Start the pump after loosening the relief valve, i.e. with the spring not under pressure.
2 - Tighten the adjusting screw (59) by gradually putting the spring under pressure , checking that the pressure at the outlet port of the pump does not exceed the maximum allowed pressure.
3 - By operating the adjusting screw and checking with a probe (see fig.3.1), find the critical opening point of the valve at the desired pressure.
4 - Compress the spring by about a 1/4 of a screw turn beyond the critical opening point, in order to avoid vibrations.
5 - Position the adjustment retainer (62) and lock it with the special screw (65).

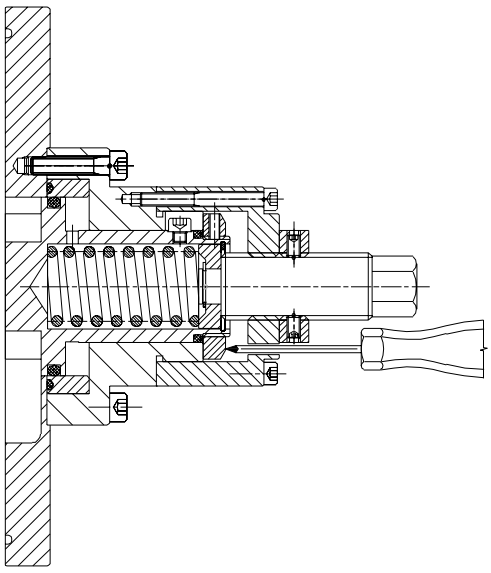


Fig.3.1

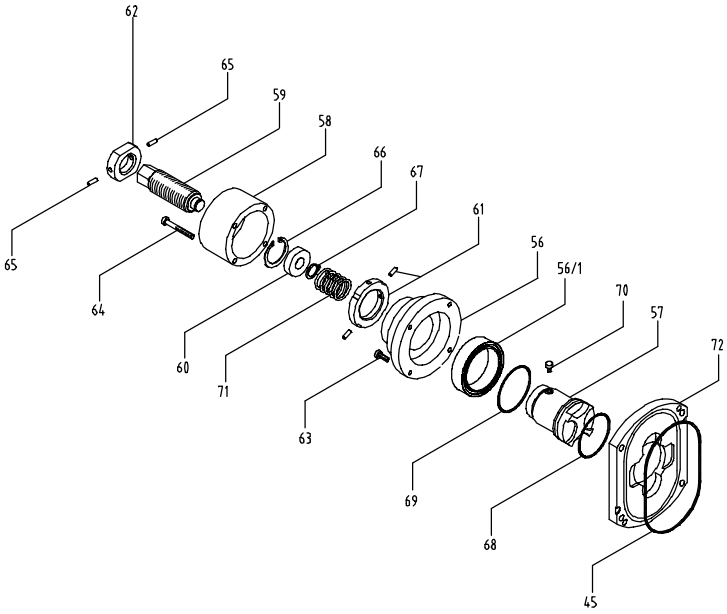


Fig.3.2 ***Relief valve and manual by-pass valve***

3.6.3 - Manual by-pass valve

1 - The relief valve can also be used as a manual by-pass to adjust the capacity.
2 - Loosening the register screw (59), release the pressure on the spring so that to remove the piston (57) form the pumping chamber, letting part of the pumped liquid go back into the sucking chamber.
3 - This operation is not allowed with volatile liquids or with products sensitive to temperature increase, due to product continuous recycle.
4 - For products with viscosity over 15000 Cps, if you have to recycle the whole pumped product, we suggest you should arrange in line a by-pass, rightly proportionate, so that it allows the whole flow transit.

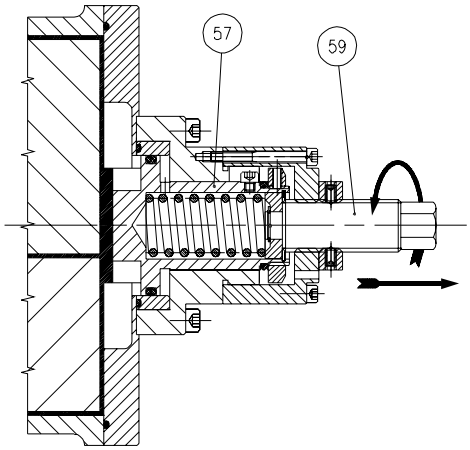


Fig.13

3.6.4 - Pneumatic pressure relief valve

Valve, assembled on the cover, consist mainly of a cylindrical case and a piston. At one side of piston there is a discharge pressure of pump, at the other side a chamber with the pressure of pneumatic circuit. As the air force over piston is greater than liquid pressure, valve is closed; when the situation change (outlet pressure the value of compressed air) piston leave out. So the pressure opposite discharhe decrease.

Adjustment of by-pass means to feed air side of piston at a pressure value corresponding the limited liquid pressure value you want in system.

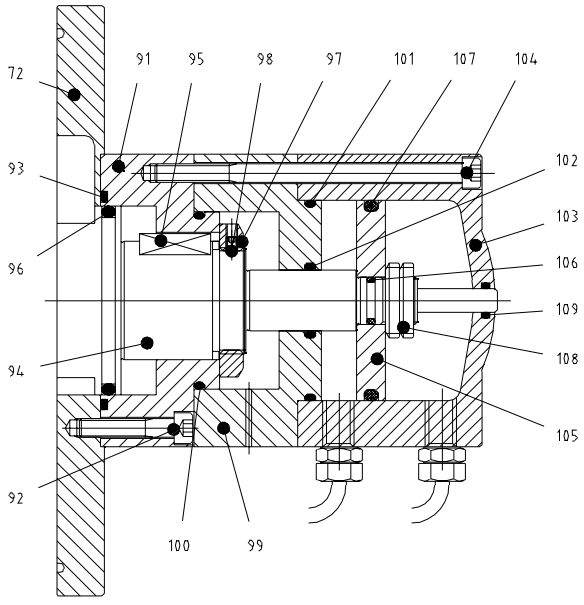
3.6.5 - Adjustament of pneumatic relief valve

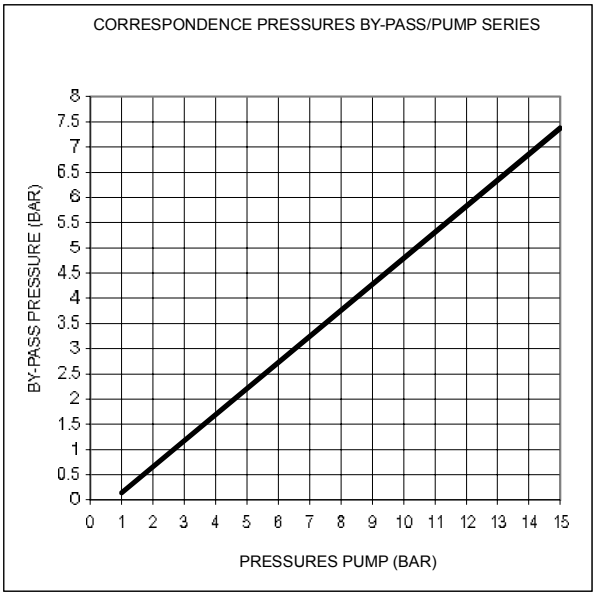
The adjustament of valve have to be made on site beacouse it's necessary connect it on pneumatic system. In order to execute the adjustament we suggest to use, as reference for dimensioning of pneumatic system, graphic inserted, where you can see the correspondence between pressure at one side (pump) and at the other side (valve) of piston.

1 Start the pump after connecting relief valve with pneumatic system

2 Following graphic indication, feed air side of piston with a test pressure.

3 With a manometer, applied at the discharge pipe, check outlet pressure; then increase and decrease the value of pneumatic circuit pressure just to achieve the balance value. In order to avoid continuous vibrations, valve have to be set at a 10% value over critical pressure.





3.6.6 - External relief/by-pass valve

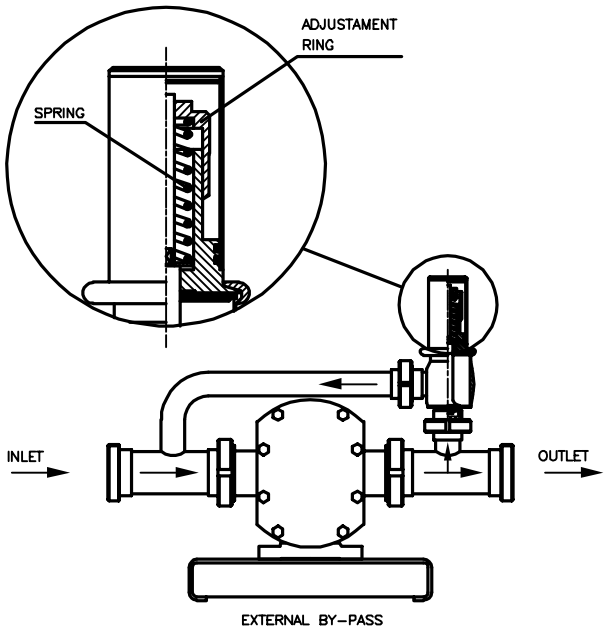
The external relief valve consists of a spring valve placed on a bridge pipe that connects the outlet with the inlet and can be used also as a by-pass to recycle all or part of the pumped liquid.

On this valve, the regulation of the sealing pressure is entrusted to the loading of a spring that can be more or less compressed.

This system is unidirectional, therefore if the direction of the pump is inverted, it is essential to invert also the positioning of the valve that, in any case, must always be on the discharge side.

Different types of springs can be chosen according to the operating pressure.

The adjustment must be carried out in the site of assemblage by operating manually the special adjustment ring.



Available springs for external relief valves

Valve size	REGULATION PRESSURE (BAR)				
	Spring "A"	Spring "B"	Spring "C"	Spring "D"	Spring "E"
DN 25	0,5 ÷ 2	1 ÷ 3,5	1 ÷ 6,5	1 ÷ 9	1 ÷ 10
DN 32	0,5 ÷ 2	1 ÷ 3,5	1 ÷ 6,5	1 ÷ 9	1 ÷ 10
DN 40	0,5 ÷ 2	1 ÷ 3,5	1 ÷ 6,5	1 ÷ 9	1 ÷ 10
DN 50		0,5 ÷ 2	1 ÷ 3,7	1 ÷ 6	1 ÷ 10
DN 65			0,5 ÷ 2	0,5 ÷ 3,3	1 ÷ 7,7
DN 80			0,5 ÷ 1,7	0,5 ÷ 2,3	1 ÷ 5
DN 100				0,5 ÷ 1,3	0,5 ÷ 4

3.7 - Earth connection

The connection must be carried out by means of a NO7Vk type wire with a 16 mm^2. sec. with yellow-green insulation and crimped wire terminals.

3.8 - Residual risk areas

Notwithstanding the accident-prevention devices provided on the Pump unit, possible residual risk areas may be present due to a possible improper maintenance intervention by the personnel in charge.

If the Pump unit is used for pumping special materials (for example chemical substances), before beginning any maintenance operation, refer to the safety card of the product in order to wear the proper ISD (Individual Safety Devices) recommended when handling these products.

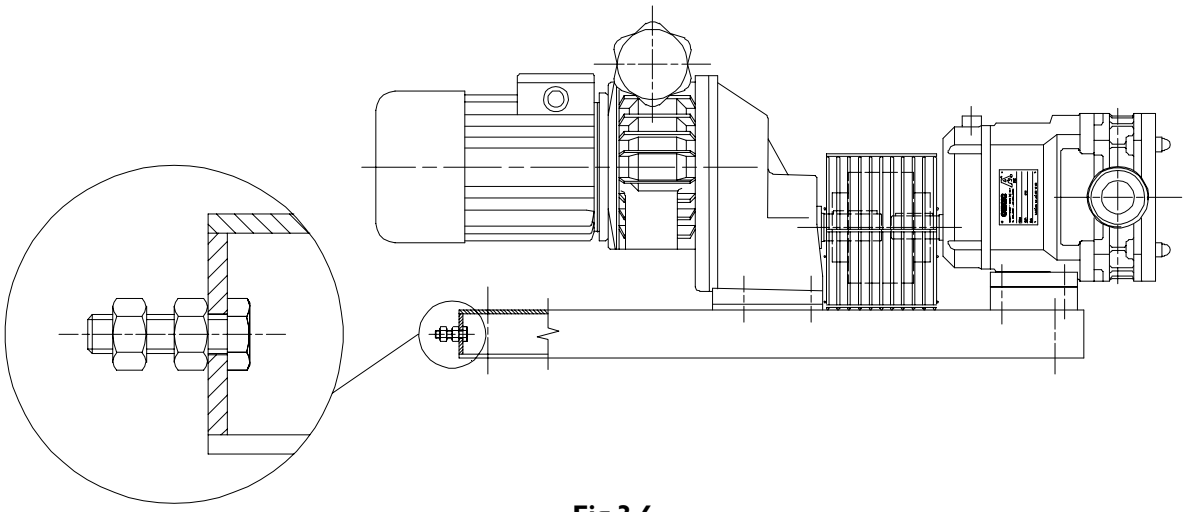


Fig.3.6

3.9 - Common fluids features-seal/rotor preferred choice

If the pump is used for transferring products other than those for which it has been chosen, check in the following table whether its features (speed, seal type, O-ring, rotors) are compatible with the new product.

PRODUCTS	Viscosity cPs	Temperature °C	Speed revol. r.p.m.	Seals		O-Ring	Rotors	
				1°	2°		1°	2°
Dairy products								
milk	2	18	250 - 450	3	0	T	0	\
yoghurt	500 - 150	20 - 40	250 - 350	6	3	T	0	\
butter	50000	4	20 - 70	5	\	T	5	\
cream 30%	14	16	250 - 350	3	0	T	0	\
curd	20 - 500	10	50 - 200	3	0	T	0	5
condensed milk	40 - 80	40	250 - 450	3	0	T	0	\
cond. Milk 75% ss	2000	20	200 - 400	5	3	T	0	\
melted butter	40	50	300 - 400	5	\	T	0	\
processed cheese	30000-6500	18 - 80	200 - 400	5	\	T	0	5
cottage cheese	30000	18	50 - 150	5	\	T	0	5
whey	1	20	300 - 500	3	0	T	0	\
milk enzymes	5	10	250 - 300	3	0	T	0	\
ice-cream	400	10	200 - 300	5	0	T	0	5
Food products								
broth	1 - 400	20	250 - 450	5	3	T	0	\
cocoa butter	50 - 0.5	60 - 100	300 - 400	5	\	T	0	\
animal fats	60	40	250 - 400	3	\	T	0	\
meat extract	10000	65	200 - 350	5C	\	T	0	\
mayonnaise	20000	20	200 - 300	5	\	T	0	\
malt extract	3000 - 9500	18 - 60	200 - 300	5	1	T	0	\
sugar-candy	30000	20	150 - 250	5C	1	T	0	5
molasses	280 - 15000	40	150 - 300	5	1	T	0	5
jam	8000	16	200 - 350	5	\	T	0	5
honey	1500	40	250 - 350	5	\	T	0	\
whole eggs	150	4	200 - 350	6	5C	T	0	\
brewer's yeast	350	18	300 - 400	5	\	T	0	\
soya lecithin	6000	50	200 - 300	5	\	T	0	\
olive oil	40	38	250 - 350	5	3	T	0	\
various seed oil	20 - 60	20	250 - 350	5	3	T	0	\
minced meat	100000	30	20 - 150	5	1	T	5	\
pectin	300	30	300 - 400	3	5	T	0	\
maize porridge	100	100	100 - 200	1	0	T	0	\
cookie pastry	5000 - 10000	18	50 - 150	5	\	T	5	0
chocolate	200 - 2000	18 - 40	50 - 150	0	1	T	0	\
icing	500 - 2000	18	100 - 300	5	\	T	5	0
brine	1	20	300 - 450	6	5	T	0	\
tomato sauce	10	20	200 - 300	5	\	T	0	\
diced tomato	10	20	50 - 200	5	\	T	5	\
tomato purrée	7000	20	150 - 250	5	\	T	0	\
tomato triple pu.	12000	18	150 - 250	5	\	T	0	\
tomato paste	200	18	200 - 300	5	\	T	0	\
ketchup	1000	30	200 - 300	5	\	T	0	\
Drinks								
glucose	4300 - 8600	25 - 30	200 - 300	5C	\	T	0	\
sorbitol	200	20	250 - 350	5	\	T	0	\

PRODUCTS		Viscosity cPs	Temperature °C	Speed revol. r.p.m.	Seals		O-Ring	Rotors	
					1°	2°		1°	2°
Drinks									
glucose		4300 - 8600	25 - 30	200 - 300	5C	\	T	0	\
sorbitol		200	20	250 - 350	5	\	T	0	\
sugar solution	30° Brix	4	10	300 - 400	5	\	T	0	\
	40° Brix	10	10	300 - 400	5	\	T	0	\
	50° Brix	25	10	300 - 400	5	\	T	0	\
	60° Brix	60	18	300 - 400	5	\	T	0	\
	70° Brix	550	18	250 - 350	5	\	T	0	\
	80° Brix	6000	30	200 - 300	5	\	T	0	\
vinegar		15	20	300 - 500	3	\	T	0	\
wine		1	18	350 - 750	3	\	T	0	\
spirits		10 - 100	20	250 - 400	5	\	T	0	\
alcohol		1	18	300 - 500	3	\	T	0	\
grape juice		1	18	350 - 450	5	\	T	0	\
beer		1		300 - 400	3	\	T	0	\
potato purée		400 - 4000	18	150 - 300	5	\	T	0	5
fruit juice		20 - 80	18	250 - 400	5	\	T	0	\
concentrated orange juice		5000 - 500	5 - 20	200 - 300	5	\	T	0	\
Cosmetic and pharmaceutical products									
dodecilbenzensulphonic acid		6000	18	300 - 400	5	\	V	0	\
detergents		100 - 4000	18	250 - 400	5	3	V	0	\
hand cream		800 - 35000	20	150 - 350	5	3	V	0	\
shampoo		2000	20	250 - 350	5	3	T	0	\
hair gel		5000	20	250 - 350	5	3	T	0	\
nail polish		10000	20	250 - 350	5	\	P	0	\
soap		3000	20	150 - 250	1	\	V	0	\
toothpaste		100000	18	50 - 150	5	1	V	0	\
hydrogen peroxide		1	15	300 - 400	7	5	V	0	\
glycerine		600	18	250 - 350	6	4	T	0	\
vaseline		30000 - 500	10 - 40	40 - 350	5	\	T	0	\
Industrial products									
citric acid		1	20	300 - 450	3		T	0	\
sulphonic acid		125	30	250 - 400	5	6	V	0	\
neutralized ethoxyl alcohols		200 - 600	60 - 30	300 - 400	5	\	P	0	\
isopropyl alcohol		1	20	300 - 400	3	\	U	0	\
flavour for tobacco		10 - 100	20	300 - 450	5	3	T	0	\
fermentation soup		20	20	250 - 350	3	\	T	0	\
cellulose		6000 - 15000	18	250 - 350	5C	\	P	0	\
wax		500	93	200 - 300	5	\	T	0	\
vinyl glue		1500	18	200 - 300	5C	1	V	0	\
ureic phenolic glue		600	20	200 - 300	5C	1	P	0	\
latex emulsion		200	20	300 - 400	5C	\	P	0	\
paraffin emulsion		3000	18	250 - 350	5	\	V	0	\
ethylene		20	20	250 - 400	3	\	T	0	\
ethylene glycol		10	20	250 - 400	3	\	T	0	\
printing ink		500 - 2000	35	300 - 500	6	\	V	0	\
fluid silicons		500	40	300 - 400	5C	\	P	0	\
dyes		1 - 200	20	300 - 500	6	\	V	0	\
acrylic resin		5000	20	200 - 300	5C	1	P	0	\
alkyl resin		180 - 900	5 - 40	250 - 350	5C	1	V	0	\
vinyl resin		5500	20	200 - 300	5C	1	V	0	\

4 TECHNICAL DATA

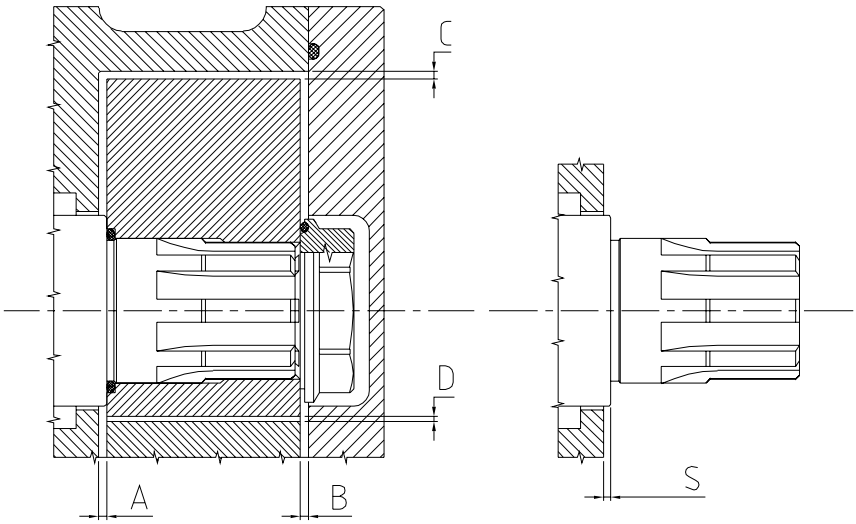
4.1 - Hydraulic technical data

PUMP MODEL	THEORETIC CAPACITY lt/100 revolutions	MAX SPEED revolutions/min	MAX POWER KW	MAX OPERATING PRESSURE (bar)					STANDARD CONNECTION	
				ST with shaft		SM with shafts		HP Duplex + Aceton		
				AISI 316	Duplex	AISI 316	Duplex		DN	Inches
B100	3	1400	1,5	7	10	/	/	/	25	1”
B105	7	1000	4	10	13	15	18	/	40	1 1/2”
B110	12	1000	4	10	13	15	18	20	40	1 1/2”
B115	18	1000	5,5	7	10	12	15	/	40	1 1/2”
B215	23	950	7,5	10	13	15	18	20	40	1 1/2”
B220	34	950	7,5	7	10	12	15	/	50	2”
B325	55	720	18,5	10	13	15	18	20	65	2 1/2”
B330	70	720	18,5	7	10	12	15	/	80	3”
B390	90	720	18,5	5	7	10	12	/	80	3”
B430	116	600	30	10	13	15	18	20	80	3”
B440	155	600	30	7	10	12	15	/	100	4”
B470	240	500	45	10	13	15	18	20	100	4”
B490	330	500	45	7	10	12	15	/	100	4”
B550	400	500	45	5	/	7	/	/	125	5”
B660	700	500	75	7	/	/	/	/	150	6”
B680	1050	500	75	4	/	/	/	/	200	8”

4.2 - Limiting differential pressure at varyng temperature

TEMP. °C	ROTOR TYPE	PUMP SIZES															
		B100	B105	B110	B115	B215	B220	B325	B330	B390	B430	B440	B470	B490	B550	B660	B680
0-70°C	ST	7	10	10	7	10	7	10	7	5	10	7	10	7	5	7	5
	SM	-	15	15	12	15	12	15	12	10	15	12	15	12	7	10	7
	HP	-	-	20	-	20	-	20	-	-	20	-	20	-	-	-	-
90°C	ST	5,2	8,8	8,9	6,5	9	6,5	9,1	6,5	4,5	9,1	6,4	9,1	6,3	4,4	6,4	4,4
	SM	-	15	15	12	15	12	15	12	10	15	12	15	12	7	10	7
	HP	-	-	18,8	-	18,9	-	19	-		19	-	19	-	-	-	-
110°C	ST	4	7,6	7,8	5,7	8	5,9	8,2	6		8,4	5,8	8,4	5,9	5,8	5,8	3,9
	SM	-	15	15	12	15	21	15	12		15	12	15	12	10	10	7
	HP	-	-	17,6	-	17,7	-	18	-		18	-	18	-	-	-	-
120°C	ST	3,4	7	7,3	5,5	7,5	5,6	7,8	5,7		7,9	5,5	7,8	5,4	3,7	5,5	3,7
	SM	-	14	14,6	11,7	14,5	11,7	14,5	11,7		14,6	11,7	14,6	11,6	6,8	9,5	6,8
	HP	-	-	17,1	-	17,2	-	17,6	-		17,5	-	17,5	-	-	-	-
140°C	ST	2,2	6	6,3	5,1	6,5	5	7	5,2		7,2	4,9	7,2	4,9	3,2	4,9	3,2
	SM	-	13	13,6	11,3	13,6	11,1	13,8	11,2		13,7	11,1	13,7	11,1	6,4	8,6	6,4
	HP	-	-	16,1	-	16,3	-	16,8	-		16,6	-	16,6	-	2,6	-	-
160°C	ST	-	-	5,3	5	5,5	4,4	6,1	4,6		6,4	4,3	6,4	4,2	2,6	4,3	2,6
	SM	-	-	12,7	10,8	12,7	10,5	12,9	10,7		12,9	10,4	12,7	10,4	6	7,8	6
	HP	-	-	15,1	-	15,3	-	15,8	-		15,8	-	15,6	-	-	-	-
180°C	ST	-	-	4,3	4,2	4,5	3,9	5,2	4,1		5,5	3,6	5,4	3,6	2	3,6	2
	SM	-	-	12,1	9,9	11,8	10,5	12,1	10,1		12	9,7	12	9,7	5,5	6,9	5,5
	HP	-	-	14,1	-	14,3	-	14,9	-		14,9	-	14,6	-	-	-	-

4.3 - Rotor clearances



	AISI 316 Rotors / ST Version				AISI 316 Rotors / SM Version				Anti-seizure s.s. alloy rotors				Shaft jut
	A	B	C	D	A	B	C	D	A	B	C	D	S
B100	0,12	0,12	0,15	0,2	0,15	0,15	0,2	0,2	0,07	0,08	0,19	0,15	0,12
B105	0,12	0,14	0,15	0,25	0,17	0,19	0,2	0,3	0,05	0,05	0,13	0,15	0,12
B110	0,14	0,14	0,15	0,3	0,19	0,19	0,23	0,3	0,08	0,07	0,15	0,2	0,14
B115	0,14	0,14	0,18	0,3	0,19	0,19	0,22	0,3	0,07	0,08	0,2	0,2	0,14
B215	0,15	0,15	0,18	0,3	0,22	0,23	0,3	0,3	0,08	0,07	0,18	0,2	0,15
B220	0,15	0,17	0,23	0,3	0,25	0,25	0,32	0,3	0,08	0,07	0,2	0,2	0,15
B325	0,17	0,17	0,2	0,35	0,25	0,25	0,32	0,35	0,08	0,08	0,2	0,2	0,17
B330	0,17	0,19	0,23	0,35	0,27	0,28	0,32	0,35	0,09	0,08	0,23	0,2	0,17
B390	0,17	0,19	0,23	0,35	0,27	0,28	0,32	0,35	0,09	0,08	0,23	0,2	0,17
B430	0,18	0,18	0,22	0,35	0,27	0,27	0,32	0,35	0,09	0,08	0,23	0,2	0,18
B440	0,18	0,18	0,22	0,35	0,27	0,27	0,32	0,35	0,1	0,1	0,25	0,2	0,18
B470	0,2	0,2	0,27	0,35	0,32	0,32	0,35	0,35	0,09	0,09	0,25	0,2	0,2
B490	0,23	0,23	0,3	0,35	0,35	0,35	0,35	0,45	0,09	0,09	0,25	0,2	0,23
B550	0,22	0,22	0,3	0,4	0,32	0,32	0,43	0,4	0,15	0,15	0,35	0,25	0,22
B660	0,27	0,27	0,35	0,5	0,37	0,37	0,5	0,5					0,27
B680	0,3	0,35	0,35	0,5	0,37	0,37	0,5	0,5					0,27

Dimensions in millimeters - Tolerances 0/+0.03

4.4 - Rotor type

Rotor type	Pump															
	B100	B105	B110	B115	B215	B220	B325	B330	B390	B430	B440	B470	B490	B550	B660	B680
S.S. GEAR	•	•														
ANTI SEZURE GEAR	•	•														
ANTI SEIZURE DUAL WING	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
S.S. DUAL WING						•										
S.S. TRI-LOBE			•	•	•	•	•	•	•	•	•	•	•	•	•	•
ANTI SEIZURE TRI-LOBE			•	•	•	•	•	•		•	•					
S.S. BI-LOBE	•		•	•	•	•	•	•	•	•	•	•	•	•		
ANTI SEIZURE BI-LOBE	•		•	•	•	•	•	•		•	•					

* For B100 e B105

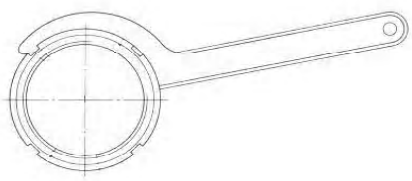
4.5 - Tightening torques

Pump size	Pos. 8 Gear adjustment			Pos. 42 Rotor locking		
	Thread d x pitch	Key type/Size [mm]	Torque [Nm]	Thread d x pitch	Key type/Size [mm]	Torque [Nm]
B100	M4x0,7	A/7	3	M8x1	A/17	25
B1	M5x0,8	B/4	5	M12x1	A/27	85
B2	M6x1	B/5	10	M14x1,5	A/30	190
B3	M8x1,25	B/6	20	M20x1,5	A/38	305
B4	M10x1,25	B/8	50	M24x2	A/46	480
B470	M10x1,25	B/8	50	M24x2	A/46	480
B550	M12x1,75	A/19	70	M24x2	A/46	500
B6	M16x2	A/24	170	M36x2	A/60	600

Tightening torques [Nm] for pos. see fig.12.1 - 12.2 - 12.3 - 12.9

Pump size	Pos. 52 Rotorcase			Pos. 51 Front cover		
	Thread d x pitch	Key type/Size [mm]	Torque [Nm]	Thread d x pitch	Key type/Size [mm]	Torque [Nm]
B100	M6x1	A/10	10	M6x1	A/10	10
B1	M8x1,25	A/13	30	M8x1,25	A/13	30
B2	M10x1,5	A/17	50	M10x1,5	A/17	50
B3	M12x1,75	A/19	70	M10x1,5	A/17	50
B4	M16x2	A/24	115	M12x1,75	A/19	70
B470	M20x2,5	A/30	180	M14x2	A/22	95
B550	M14x2	A/22	115	M12x1,75	A/19	70
B6	M14x2	A/22	115	M14x2	A/22	70

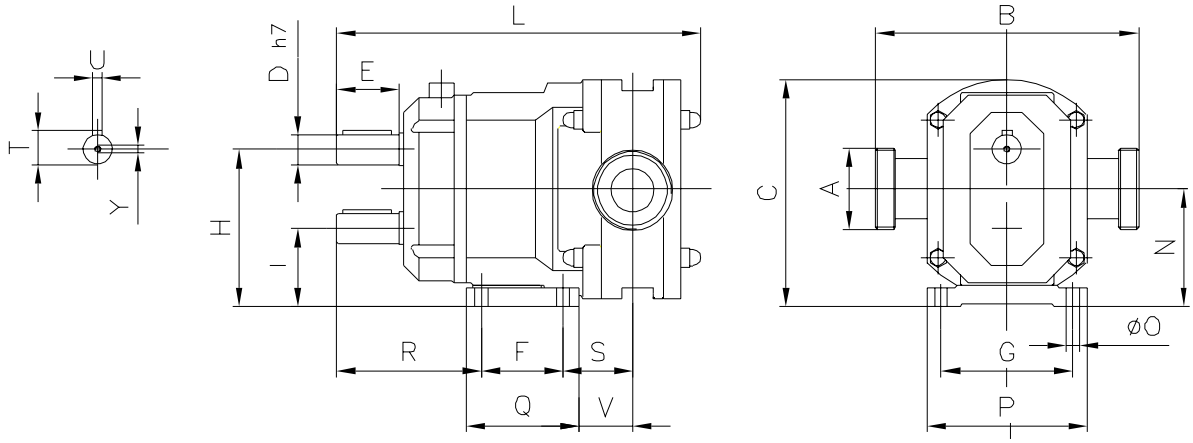
Key type : A= hexagonal head, B= socket head



Pump size	Pos. 21 Bearing ring nut		
	Thread d x pitch	Key type/Size [mm]	Coppia Torque [Nm]
B1	M30x1,5	HN 6	90
B2	M40x1,5	HN 8	105
B3	M50x1,5	HN 10	115
B4 - B5	M70x2	HN 14	220
B470	M80x2	HN 16	400

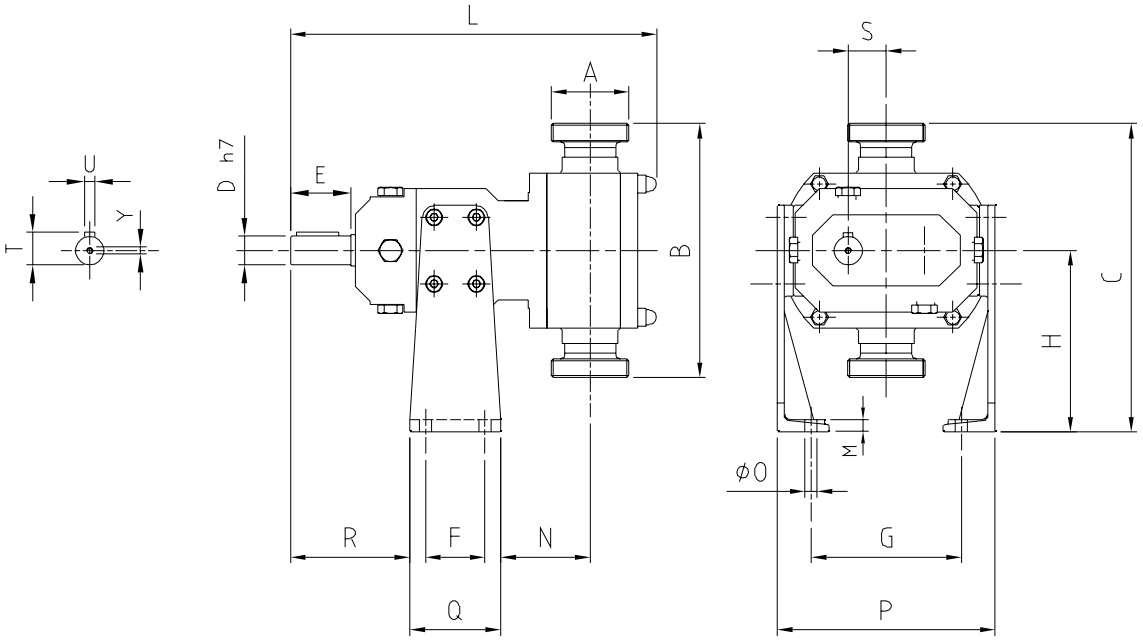
Pump size	Pos. 23 Gear ring nut		
	Thread d x pitch	Size	Torque [Nm]
B100	M20x1	HN 4	50
B1	M30x1,5	HN 6	90
B2	M35x1,5	HN 7	90
B3	M40x1,5	HN 8	105
B4	M60x2	HN 12	145
B470 - B5	M70x2	HN 14	220
B6	M100x2	HN 20	600

4.6 - Overall Dimensions and weight table of bareshaft pumps



Standard version

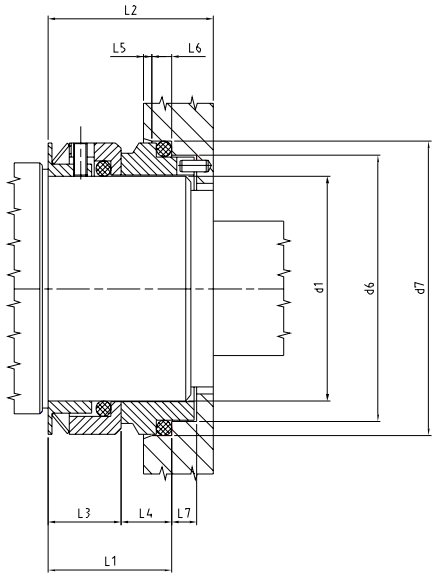
POS. ITEM	TYPE OF PUMP WITH GAS - BSP - PORTS															
	B100	**B105**	**B110**	**B115**	**B215**	**B220**	**B325**	**B330**	**B390**	**B430**	**B440**	**B470**	**B490**	**B550**	**B660**	**B680**
A	1"	1" 1/2	1" 1/2	1" 1/2	1" 1/2	2"	2" 1/2	3"	3"	3"	4"	4"	4"			
B	160	170	170	170	208	208	236	236	236	335	335	385	385			
C	115,5	181	181	181	235,5	235,5	270	270	270	367,5	367,5	442,5	442,5	515	690	690
D	18	24	24	24	28	28	35	35	35	48	48	55	55	55	80	80
E	45	50	50	50	55	55	65	65	65	85	85	110	110	110	140	140
F	65	65	65	65	90	90	120	120	120	140	140	150	150	200	300	300
G	105	105	105	105	125	125	140	140	140	190	190	250	250	300	400	400
H	80	125	125	125	165	165	190	190	190	255	255	300	300	350	480	480
I		62	62	62	90	90	100	100	100	130	130	160	160	178	250	250
L	265	290,5	290,5	302,5	365,5	380,5	459	474	494	543,5	563,5	654	684	637	807	867
N	58,6	93,5	93,5	93,5	127,5	127,5	145	145	145	192,5	192,5	230	230	264	365	365
O	9	10	10	10	12	12	14	14	14	18	18	22	22	19	26	26
P	125	128	128	128	152	152	174	174	174	235	235	300	300	350	460	460
Q	85	90	90	90	130	130	170	170	170	195	195	255	255	250	360	360
R	108	115,5	115,5	115,5	136,5	136,5	167	167	167	206,5	206,5	255	255	227	283	283
S	52	55,5	55,5	67	78	87	94	103	123	109	116,5	143,5	173	106,5	122	152
T	20,5	27	27	27	31	31	38,5	38,5	38,5	52	52	60	60	60	85	88
U	6	8	8	8	8	8	10	10	10	14	14	16	16	16	22	22
V	42	42,5	42,5	54	52	61	62	71	91	76,5	84	63,5	93	81,5	92	122
Y		M6	M6	M6	M8	M8	M10	M10	M10	M12	M12	M12	M12	M12	M16	M16
Kg.	10,5	20	20	21	41	43	63	65	69	130	135	225	233	270	610	670
Pumps with UNI 2278 PN 16 flanged ports																
A	DN25	DN40	DN40	DN40	DN40	DN50	DN65	DN80	DN80	DN80	DN100	DN100	DN100	DN125	DN150	DN200
B	165	186	186	186	224	228	256	256	256	355	355	405	405	566	680	670
Pumps with DIN 11851 ports																
A	DN25	DN40	DN40	DN40	DN40	DN50	DN65	DN80	DN80	DN80	DN100	DN100	DN100	DN125		
B	160	210	210	210	248	248	296	296	296	395	395	445	445	632		
Pumps with SMS ports																
A	DN25	DN38	DN38	DN38	DN38	DN51	DN63	DN76	DN76	DN76	DN101	DN101	DN101			
B	143	210	210	210	248	248	296	296	296	395	395	445	445			
Pumps with IDF - ISS ports																
A	DN25	DN38	DN38	DN38	DN38	DN51	DN63	DN76	DN76	DN76	DN101	DN101	DN101			
B	146	210	210	210	248	248	296	276	276	375	378	428	428			
Pumps with RJT ports																
A	DN25	DN38	DN38	DN38	DN38	DN51	DN63	DN76	DN76	DN76	DN101	DN101	DN101			
B	157	210	210	210	248	248	290	286	286	385	389	439	439			
Pumps with TRI-CLAMP ports																
A	DN 1"	DN 1" 1/2	DN 1" 1/2	DN 1" 1/2	DN 1" 1/2	DN 2"	DN 2" 1/2	DN 3"	DN 3"	DN 3"	DN 4"	DN 4"	DN 4"			
B	160	210	210	210	248	248	293	290	290	389	392	442	442			



Vertical version

POS. ITEM	TYPE OF PUMP WITH GAS-BSP PORTS											
	B105	**B110**	**B115**	**B215**	**B220**	**B325**	**B330**	**B390**	**B430**	**B440**	**B470**	**B490**
A	1" 1/2	1" 1/2	1" 1/2	1" 1/2	2"	2" 1/2	3"	3"	3"	4"	4"	4"
B	170	170	170	208	208	236	236	236	335	335	385	385
C	235	235	235	259	259	293	293	293	377,5	377,5	492,5	492,5
D	24	24	24	28	28	35	35	35	48	48	55	55
E	50	50	50	55	55	65	65	65	85	85	110	110
F	49	49	49	87	87	110	110	110	135	135	175	175
G	124	124	124	166	166	192	192	192	270	270		
H	150	150	150	155	155	175	175	175	210	210	300	300
L	290	290	302	365	380	458	473	494	543	563	654	684
N	62,5	62,5	74	79	88	107	116	136	119	126,5		
O	10,5	10,5	10,5	12	12	14	14	14	18	18	22	22
P	180	180	180	240	240	272	272	272	360	360		
Q	75	75	75	115	115	140	140	140	170	170		
R	97,5	97,5	97,5	110,5	110,5	134	134	134	166,5	166,5		
S	31,5	31,5	31,5	37,5	37,5	45	45	45	62,5	62,5	70	70
T	27	27	27	31	31	38,5	38,5	38,5	52	52	60	60
U	8	8	8	8	8	10	10	10	14	14	16	16
Y	M6	M6	M6	M8	M8	M10	M10	M10	M12	M12	M12	M12
Kg.	20	20	21	41	43	63	65	69	130	135	225	233
Pumps with UNI 2278 PN 16 flanged ports												
A	DN40	DN40	DN40	DN40	DN50	DN65	DN80	DN80	DN80	DN100	DN100	DN100
B	186	186	186	224	228	256	256	355	256	355	405	405
Pumps with DIN 11851 ports												
A	DN40	DN40	DN40	DN40	DN50	DN65	DN80	DN80	DN80	DN100	DN100	DN100
B	210	210	210	248	228	296	296	395	395	395	445	445
Pumps with SMS ports												
A	DN38	DN38	DN38	DN38	DN51	DN63	DN76	DN76	DN76	DN101	DN101	DN101
B	210	210	210	248	248	296	296	395	395	395	445	445
Pumps with IDF - ISS ports												
A	DN38	DN38	DN38	DN38	DN51	DN63	DN76	DN76	DN76	DN101	DN101	DN101
B	210	210	210	248	248	296	276	375	375	378	428	428
Pumps with RJT ports												
A	DN38	DN38	DN38	DN38	DN51	DN63	DN76	DN76	DN76	DN101	DN101	DN101
B	210	210	210	248	248	290	286	385	385	389	439	439
Pumps with TRI-CLAMP ports												
A	DN 1" 1/2	DN 1" 1/2	DN 1" 1/2	DN 1" 1/2	DN 2"	DN 2" 1/2	DN 3"	DN 3"	DN 3"	DN 4"	DN 4"	DN 4"
B	210	210	210	248	248	293	290	389	389	392	442	442

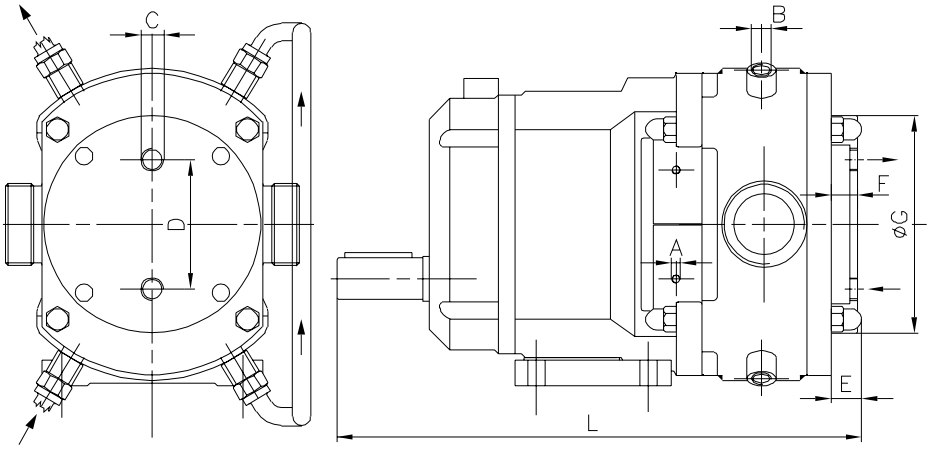
4.7 - Mechanical seal overall dimensions



	B100	B1	B2	B3	B4	B470-490	B5	B6
d1	20	30	35	50	65	80	65	100
d6	29	39	44	62	77	95	77	115
d7	35	45	50	70	85	105	85	125
L1	29,1	29,1	29,1	34,1	38,8	43,8	38,8	41,3
L2	44	44	44	50	55,5	59	55,5	85
L3	19,1	19,1	19,1	21,1	25,8	25,8	25,8	25,8
L4	10	10	10	13	13	18	13	15,5
L5	2	2	2	2,5	2,5	3	2,5	3
L6	5	5	5	6	6	7	6	7
L7	9	9	9	9	9	9	9	9

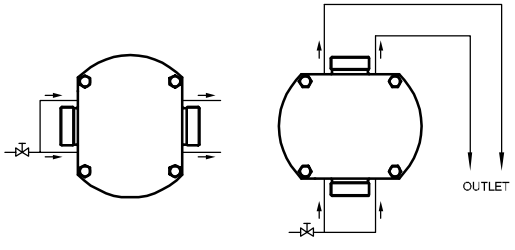
Mechanical seal overall dimensions in mm

4.8 - Heating jackets and seal flushing connections

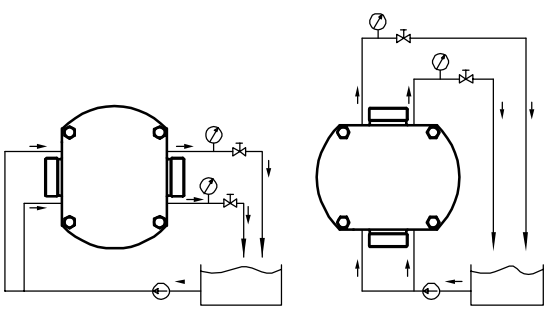


POS	DENOMINATION	PUMP TYPE														
		B100	B105 B110	B115	B215	B220	B325	B330	B390	B430	B440	B470	B490	B550	B660	B680
A	**Seal flushing connections size**		1/8”	1/8”	1/8”	1/8”	1/8”	1/8”	1/8”	1/8”	1/8”	1/8”	1/8”	1/8”	1/4”	1/4”
B	**Rotor case heating fluid connections size**		1/4”	1/4”	1/4”	1/4”	1/4”	1/4”	1/4”	1/2”	1/2”	3/4”	3/4”	3/4”	3/4”	3/4”
C	**End cover heating fluid connections size**	1/8”	1/4”	1/4”	1/4”	1/4”	1/4”	1/4”	1/4”	1/2”	1/2”	3/4”	3/4”	3/4”	3/4”	3/4”
D	**Distance between end cover fluid connections**	56	75	75	100	100	122	122	122	150	150	150	180	180	300	300
E	**Nut height**	12	15	15	18	18	18	18	18	22	22	25	25	24	27	27
F	**End cover heating chamber thikness**	17	15	15	15	15	16	16	16	18	18	23	23	25	30	30
G	**End cover heating chamber Ø**	104	126	126	156	156	179	179	179	219	219	280	280	300	400	400
L	**Pump lenght**	256	290.5	302.5	365.5	380.5	459	474	474	543.5	563.5	654	684	637	807	867

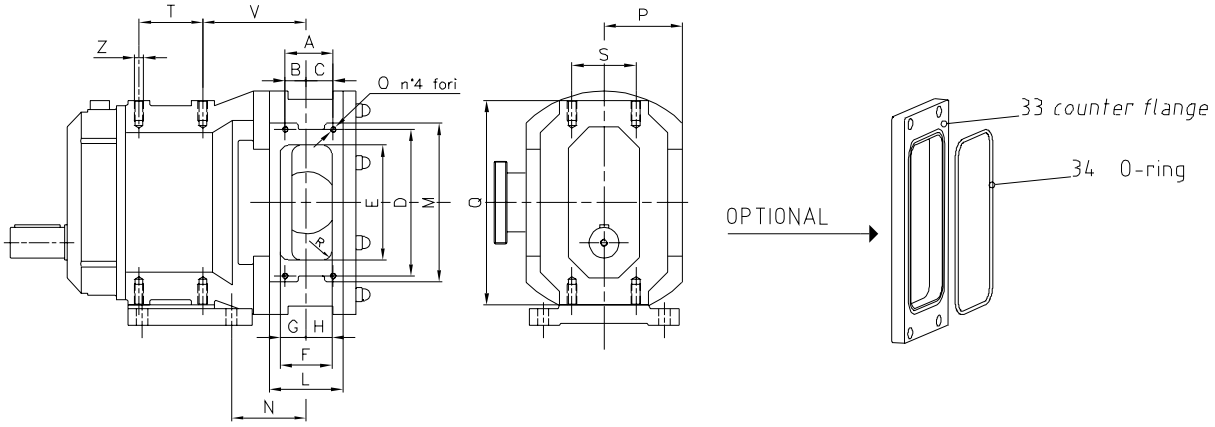
Flushing scheme for simple mechanical seals with low pressure ciruit



Flushing scheme for double mechanical seals with circuit under pressure



4.9 - Dimensions of enlarged inlet ports (“L version”)

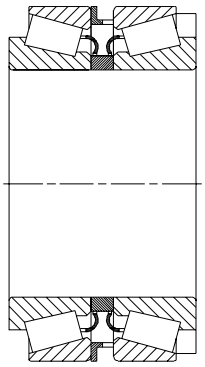


POSIZIONE ITEM	A	B	C	D	E	F	G	H	L	M	N	O	P	Q	R	S	T	U	V	Z
B115	40	22	18	90	70	42	23	19	61	120	67	M6	64	154	6	55	35	93,5	94	M8
B220	55	31	24	110	92	54	32	22	72	150	87	M8	78	210	15	67	67	127,5	114	M10
B330	75	37	38	146	133	65	32	33	93	176	103	M8	95	236	12,5	70	85	145	143,5	M12
B440	75	32,5	42,5	230	180	81	40,5	40,5	115	248	116,5	M10	122,5	320	12,5	100	100	192,5	161,5	M14
B490	107	67	40	230	180	107	69	38	143	256	173	M12	152,5	370	12,5	130	135	230	190,5	M20

4.10 - Bearings

Pump size	Bearings pre assembled	
	front	rear
B1	32006 X	
B2	32008 X	32007 X
B3	32010 X	32008 X
B4	32014 X	32012 X
B470 - B490	32016 X	32014 X

Pump size	ISO Bearings	
	front	rear
B100	TLA 3020 Z	NATB 5904
	LRT 253020	
B5	NJ2216 E	3214
B6	NJ 224 E	3220



Bearing SET- RIGHT TM

1 - The bearings for pump type B100 are according ISO norms of radial needle.
The rear radial needle bearings combined with angular bearings NATB 5904 receive an adjustment in order to eliminate axial clearance.

2 - The bearings of pump types B1 - B2 - B3 - B4 - B470 are composed by 2 single row taper roller bearings, a spacer for inner rings and a spacer for outer rings.
The assembling of type SET-RIGHT TM, of TIMKEN company, is carefully carried out by our staff in order to garante an ideal rolling without clearances.
Therefore these bearings must be directly requested to OMAC, that supply them already pre-assembled for the right pre-loading.

3 - The bearings for pump type B5 - B6 are according ISO norms of straight roller type and double ball crown type, everywhere available.

4 - The bearings life time depends on duty conditions (speed, pressure, absorbed power). Calculus about bearing life time will delivered, upon request, only if duty conditions are well know.

4.11 - Lubrificants

BRAND	WORKING TEMPERATURE	
	from -20°C a +90°C (*)	from +90°C a +150°C (*)
ESSO	SPARTAN EP 68	SPARTAN EP 150
SHELL	OMALA OIL 68	OMALA OIL 150
CASTROL	ALPHA SP 68	ALPHA SP 150
BP	ENERGOL GR-XP 100	ENERGOL GR-XP 150
MOBIL	MOBILGEAR 600 XP 68	MOBILGEAR SAE 85W/140
AGIP	BLASIA 68	BLASIA 150
FINA	GIRAN 100	GIRAN 150
NYE	SYNTHETIC OIL 271	
TOTAL	CARTER EP 100	CARTER EP 150

Advised lubricants

PUMP MODEL	LITRES
(*) B100	0,2
(*) B105 - B110 - B115	0,5
(*) B215 - B 220	1
(*) B325 - B330 - B390	2,2
(*) B430 - B440	4,5
(*) B470 - B490	6,7
(**) B550	15
(**) B660 - B680	30

Oil quantity

4.12 - Used matarials

Particular		Used material
Bearing house		G25 cast iron
Gear cover serie	B1-B2-B3-B4	Aluminium
	B5-B6	G25 cast iron
Rotor case and end cover	**standard**	AISI 316 stainless steel
	optional	Titanium degree 2
	optional	Hastelloy C 276
	optional	Mekton S polymer
Shaft (dring driven)	**standard**	Aisi 316 stainless steel
	optional	Titanium degree 5
	optional	Hastelloy C276
	optional	Duplex SAF 2507
Rotors		
- standard clearance ST	**standard**	AISI 316 stainless steel
and increased clearance	**optional**	Titanium degree 2
	optional	Hastelloy-alloy C276
- rubber coated		AISI 316 stainless steel
		N.B.R. (EPDM, VITON)
- dual wing or bi-lobe	**standard**	Stainless steel anti-seizure alloy (Aceton)
	optional	Dew 88 met alloy
	optional	AISI 316 stainless steel
	optional	Titanium degree 2
	optional	Hastelloy C 276

5 RECEIVING AND HANDLING

FOREWORD

To avoid any problem on receipt your pump unit use the following procedure:

DOCUMENTS

I) Check the delivery note as soon as you receive the goods.

2) If the pump has been delivered with electric motor, check for the motor instructions.

UNPACKING

Unpack the pump with great care and the following steps must be completed:
1) Check the package for any damage sign in progress
2) Carefully unpack the pump
3) Check whether the pump shows clear signs of damage
4) Keep the packing away from the connection ports of the pump
5) Make sure that any additional equipment supplied, such as external by-pass, is not damaged.

5.1 - Transport

Unless otherwise indicated, the Pump unit is shipped completely mounted, protected by a Nylon cloth and fixed in a wooden box.
The above-mentioned fixing occurs by means of four “wood” screws (pos.1 Fig. 5.1) placed in the special perforation prepared on the supporting base of the Pump unit. If the user needs to transport the Pump unit, the conditions must be restored.

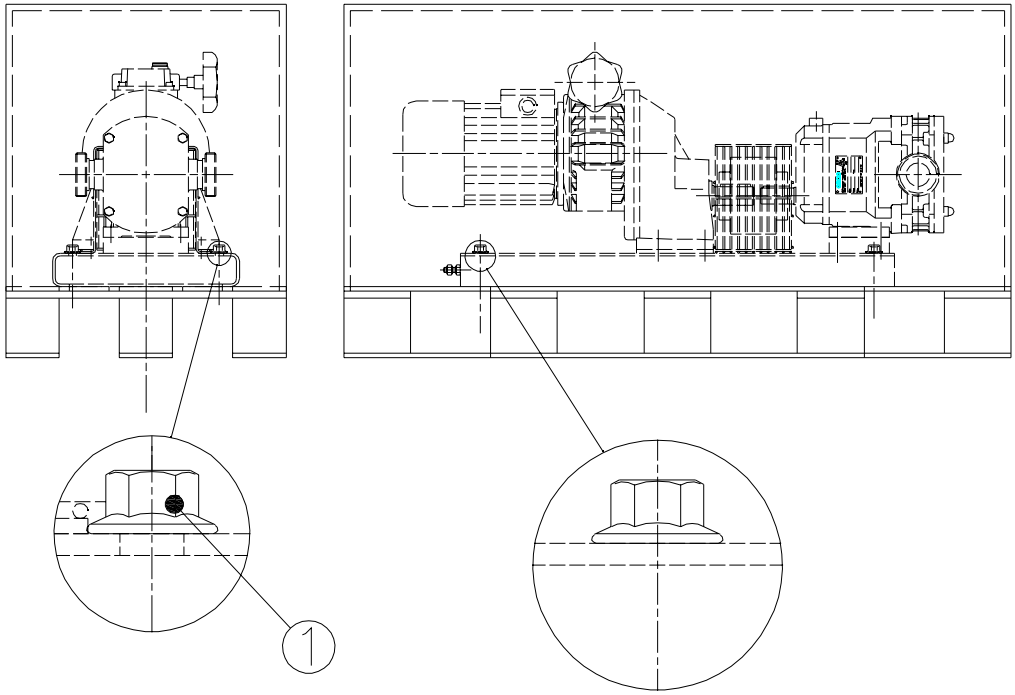


Fig. 5.1 Pump packing

5.2 - Weights and lifting devices

5.2.1 - Packaged pump unit

For handling and lifting the packaged pump unit , we recommend using a lift truck with a proper carrying capacity and “lifting”.

5.2.2 - Pump unit without packing

For handling and lifting the pump unit without packaging , we recommend using a bridge crane with a minimum load suiting the machine to be lifted (for the weights, refer to tab below).
Lift and handle the Pump unit as indicated in Fig. 5.2
The Pump unit with model B100 pump can be handled and lifted by hand since its maximum weight is equal to 30 Kg.
The above-mentioned operations must be carried out by using belts having a proper carrying capacity not provided with the machine.

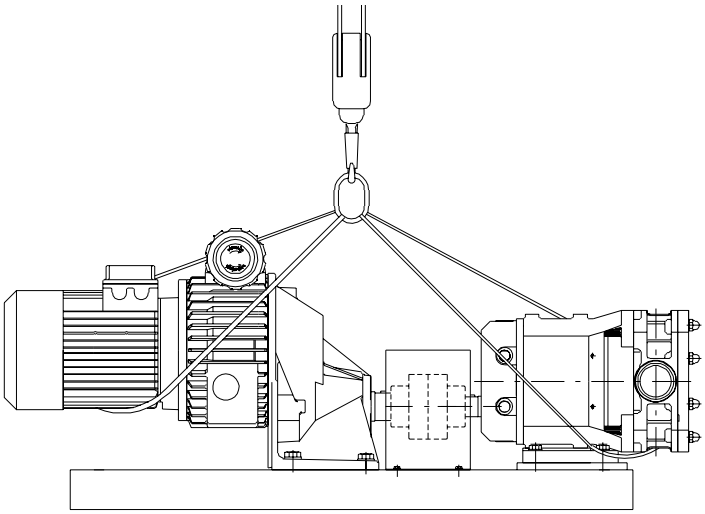


Fig. 5.2 Pump unit lifting

WARNING

If the Pump unit is delivered with the cover for drive (Ref. Fig. 2.1 pos. 07 - § 2.1) before carrying out the lifting operation, it is necessary to “disassemble” the cover untightening the sochet head screws that hold it to the supporting base (Ref. Fig. 2.1 pos. 01 -§2.1).

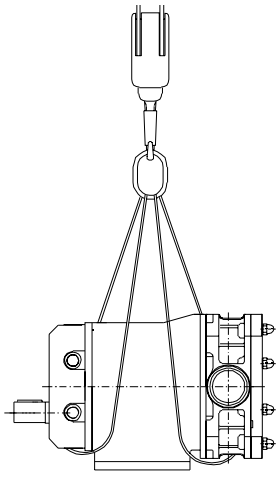
Pump Mod.	Indicative weight pump group (Kg)	Belts tipy
B 100	40	Check the weight to be lifted
B 105	80	
B 110		
B 115		
B 215	130	
B 220		
B 325	220	
B 330		
B 390		
B 430	350	
B 440		
B 470	550	
B 490		
B 550	700	
B 660	1100	
B 680		

Max weights of the pump units

5.2.3 Bare shaft pump lifting - Models from B105 to B 490

The pump must be lifted by using the special belts having a proper capacity not provided with the pump.
Model B100 can be lifted manually.

For the weight of each pump model, refer to tab.5.2.



Pump lifting Mod. from B105 to B490

Models from B550 to B 680
The pump must be lifted by using the special eyebolts already "installed" on the pump (Ref. Fig. 5.4).
For the weight of each pump model, refer to tab.5.2.

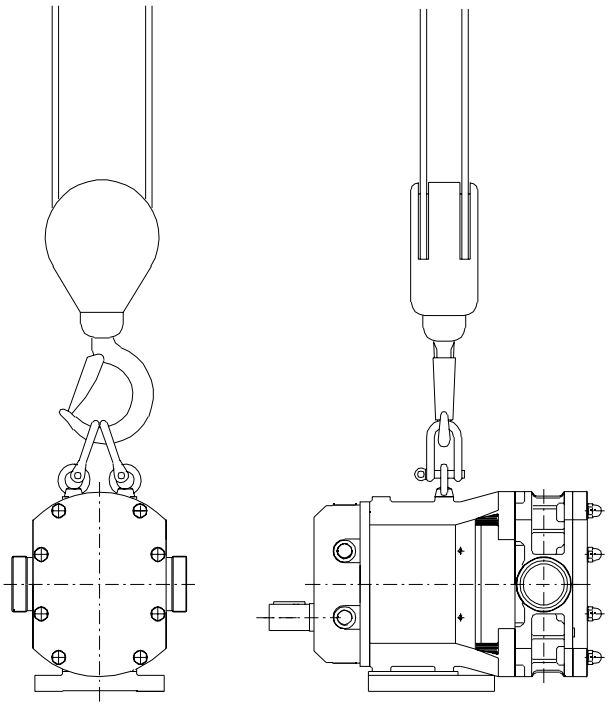


Fig.5.4 Pump lifting Mod. from B550 to B680

Pump Mod.	Pump weight (KG)
B 100	11
B 105	20
B 110	20
B 115	21
B 215	41
B 220	43
B 325	63
B 330	65
B 390	69
B 430	130
B 440	135
B 470	225
B 490	233
B 550	370
B 660	610
B 680	670

Tab. 5.2 Pump Mod. weights

5.2.4 - Control board lifting
In order to lift the single control board, follow the instructions contained in the "Operation and maintenance manual" supplied by the manufacturer of the control board and delivered together with this publication.

5.3 - Fixing the pump unit (fixed base)

5.3.1 - Structure fixing in metal structural work
If you must fix the Pump unit to a metal structural work, use the fixing holes prepared on the baseplate (Ref. Fig. 5.5).
For fixing holes dimensions refer to Tab.5.3

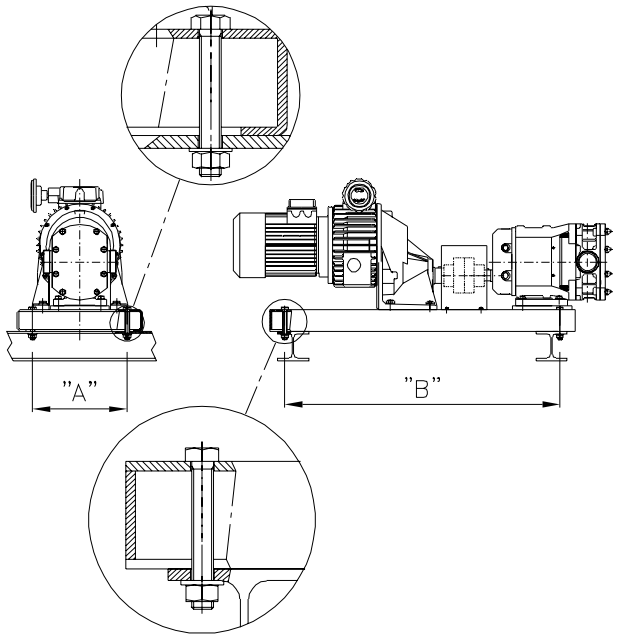


Fig. 5.5 Example of structure fixing in metal structural work

Baseplate size	A	B	Bolts size
0	220	590	M12
1	220	590	M12
2	270	720	M12
3	330	920	M16
4	400	1100	M20
5	500	1400	M20
6	500	1400	M20
7	180	460	M10
8	450	1250	M20

Tab. 5.3 Standard baseplate pre-drilled fixing holes dimensions

5.3.2 - Fixing on a concrete base

If the Pump unit must be fixed on a foundation, use the fixing holes prepared on the baseplate (Ref. Fig. 5.6). For fixing holes dimensions see the tab.5.3 and the indications supplied by the manufacturer of the used anchor bolts.

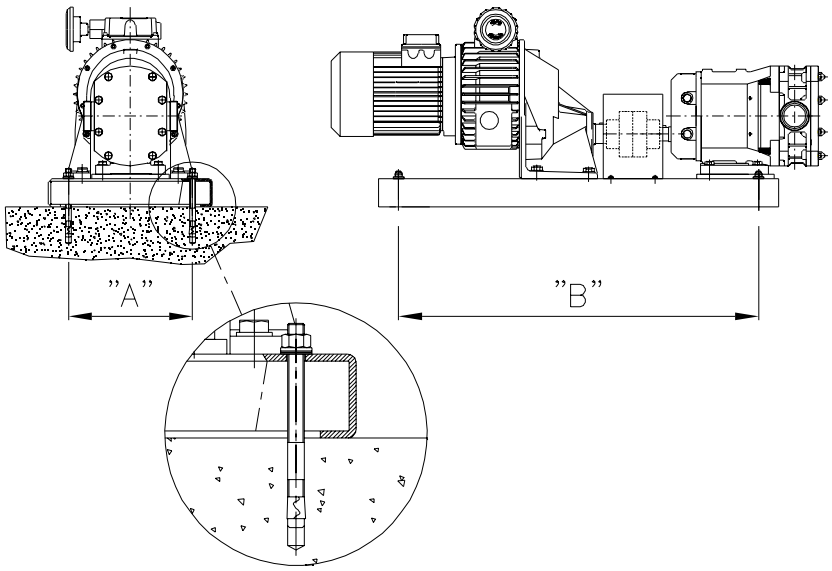


Fig. 5.6 Securing the pump unit a foundation

5.3.3 Resting on adjustable feet

On explicit request of the user, the Pump unit can be equipped with four adjustable feet fixed on the base (Ref. Fig. 5.7).

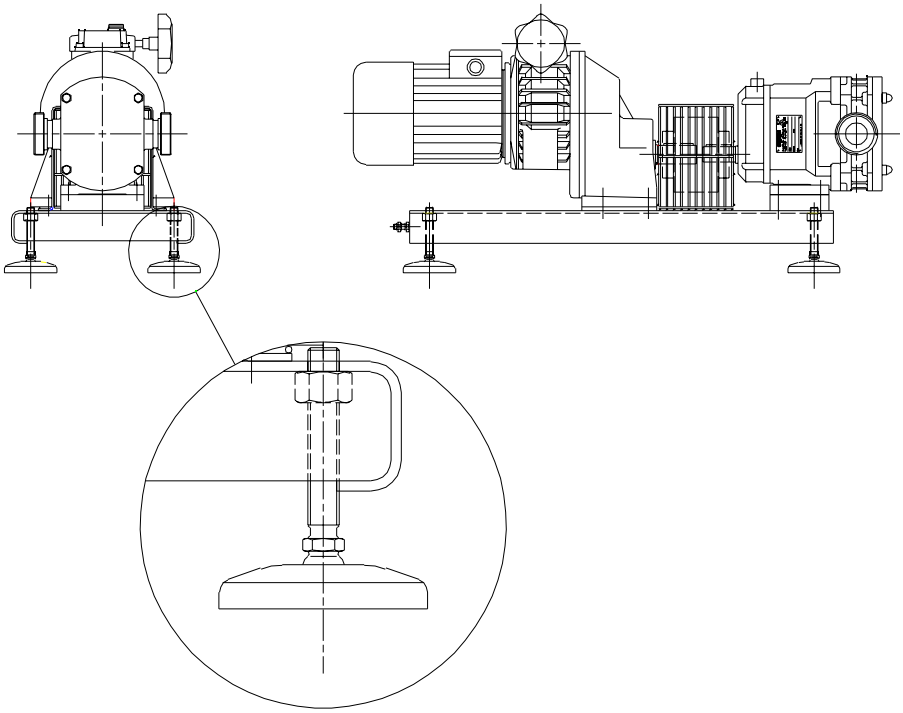


Fig. 5.7 Pump unit with levelling feet

WARNING

Check that the feet are provided with the special antislip rubber rings (Ref. Fig. 5.8)

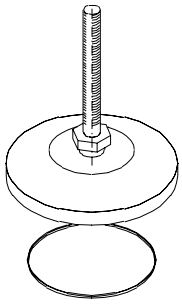


Fig. 5.8 Antislip rubber rings for levelling feet

6 INSTALLATION

6.1 - Installation requirements

The pump unit was designed and produced in order to work in typical industrial environments, on specific request also in hazardous area, with temperature and humidity values comprised within the limits indicated in the table below.

Temperature	5 / 40°C
Relative humidity	< 50%

The room must be equipped with the proper electrical supply and whatever is required for the operation of the Pump unit.

WARNING

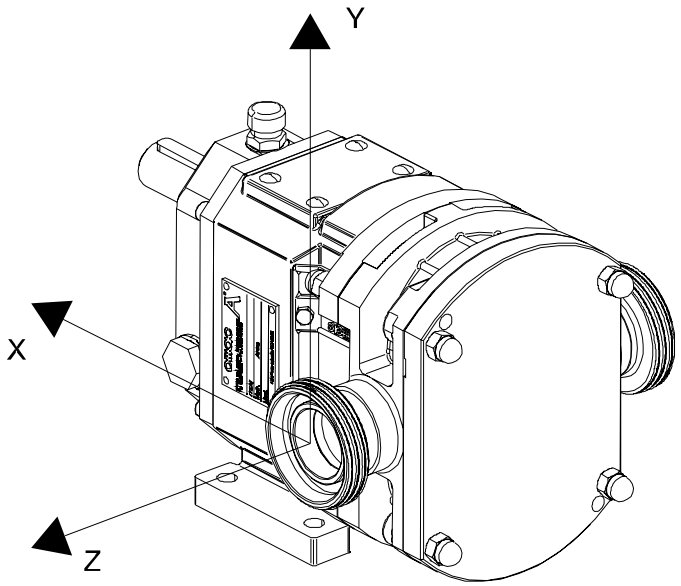
The user is responsible for equipping the installation room according to the regulations in force concerning safety.

6.2 - Assembly instructions

1 - If the pump is supplied in bareshaft, the coupling with the drive unit should be entrusted to qualified staff.A joint misalignement can cause a damaging stress, that may produce vibration in the pipeline and accelerated pump wear.
2 - In choosing the speed, at which the pump must run, consult carefully the chart, given by manufacturer, about medium viscosity.
3 - If the pump is delivered with motor, coupling and base, the assembling has been carried out at our works. Anyway check to see that no damage has occurred during transit.
4 - Where possible we advise you to fix the pump or the base to floor; after bolting down, re-check the alignement pump-motor and correct it, if necessary, by introducing shims under the base.
5 - In some applications height adjustable feet are normally used, because they allow a regular cleaning under the base.

6.3 - Maximum force and torques

Pump type	FORCES				TORQUE			
	Fx (N)	Fy (N)	Fz (N)	EF (N)	Mx (Nm)	My (Nm)	Mz (Nm)	EM (Nm)
B100	65	55	75	113	110	85	70	140
B110/115	105	95	120	186	125	100	90	164
B215	145	130	160	252	130	110	95	172
B220	190	180	220	342	140	115	100	183
B325	210	200	250	383	150	120	110	197
B330/390	240	230	280	435	160	130	110	206
B430/440	255	245	300	464	175	150	130	230
B470/490	260	250	305	472	180	150	130	234
B550	340	340	355	598	190	160	150	255
B660/680	405	405	440	722	200	180	170	276



6.4 - Piping system

1 - OMAC pump suction and discharge are sized to suit passage of even very viscous medium; consequently the piping should not be necessarly proportionate to them.

2 - The suction and discharge piping should be sized according to the calculus in the technical handbook, considering the expected capacity, viscosity and friction losses.

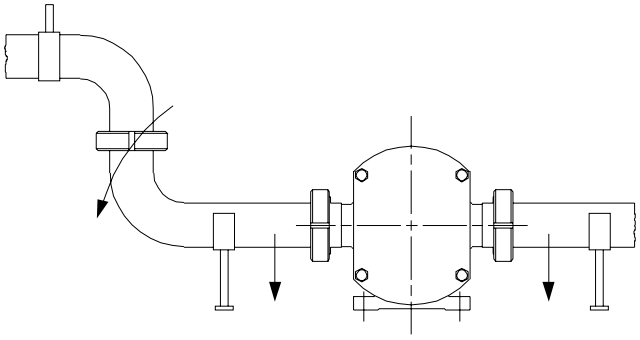
3 - The lobe pumps can work with great friction losses in outlet, but not in inlet, where we advise as large and short piping as possible in order to have a lower NPSH that the available one.

4 - The pump should be installed near the source, from which it sucks.

5 - Reduce at min. bends and necks along the whole line.

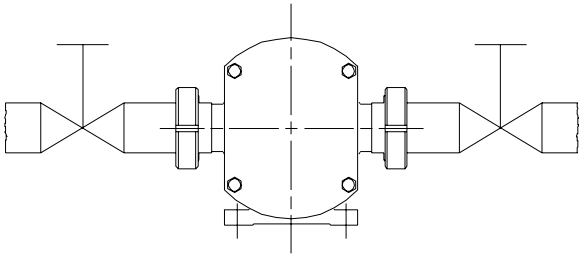
6 - Use large radius bends, avoiding Tees and needless runs.

7 - Check the perfect inlet connection seal not to reduce the pump suction power.

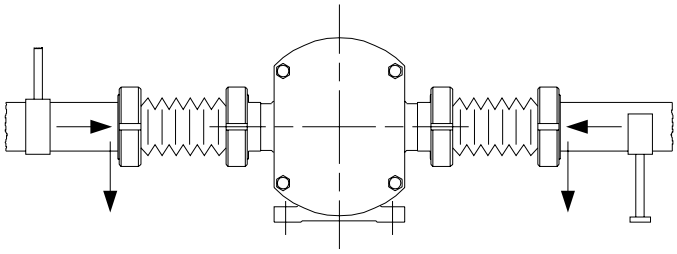


8 - The piping weight must not load on pump body and the connection must be carried out without forcing in order to avoid overloads and distortion of the rotor case.

9 - Especially in case of very long piping system isolation valves on both inlet and outlet side to permit pump maintenance and removal without total draining of the piping system.

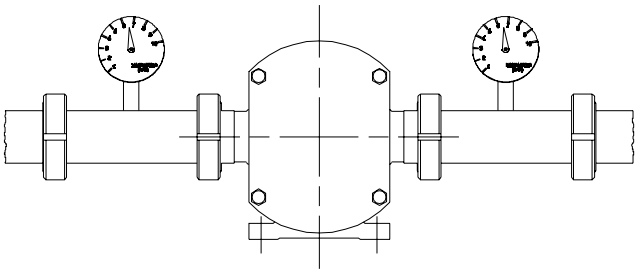


10 - Where possible arrange a flexible expansion joint to reduce vibration and to avoid forcing, due to thermal expansion of piping.

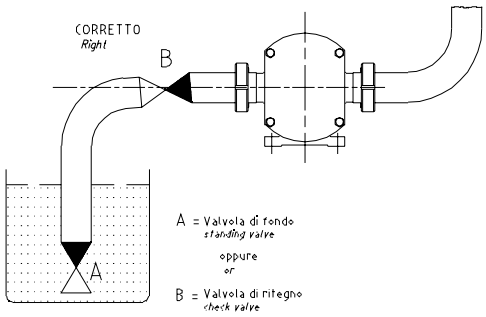


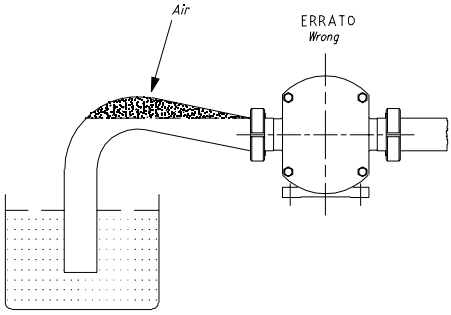
11 - We advise to arrange gauges and vacuum gauges near the pump. They are usefull to check the pump working conditions and diagnose possible trouble such as:

- pressure overload
- flow absence
- instability in duty conditions
- cavitation

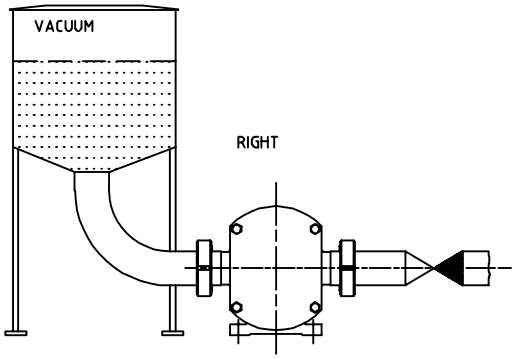


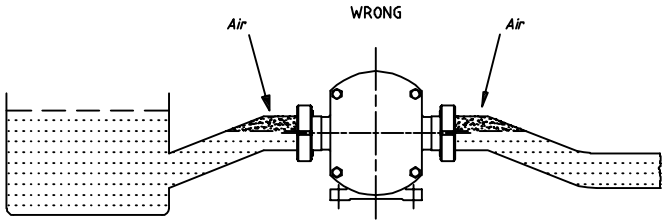
12 - Protect the pump against blockage from hard solid objects. Where possible arrange on inlet a filter, whose suction area must not be smaller than 4-5 time the suction pipe to minimize the friction losses.
13 - During the pump unit installation it's necessary to leave a usefull room for maintenance and possible removal.
14 - If the pump is not flooded, arrange on inlet side a "foot" valve or a check valve to keep the priming.



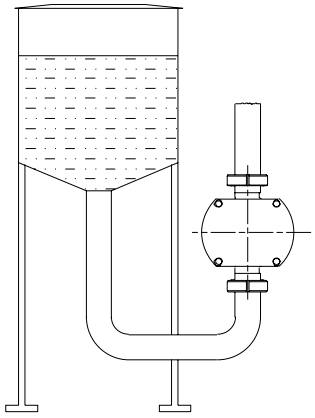


15 - The horizontal sections of the suction pipe must be a bit inclinated towards to the top in order to avoid the creation of air pockets, which can damage the pump priming.

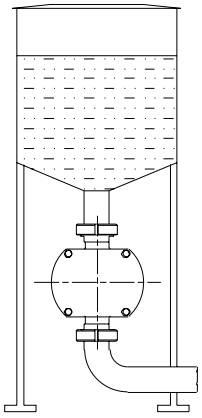




16 - In vacuum sucking reduce at min. the friction losses due to suction pipe. Arrange a check valve on outlet side in order to:
– avoid the air or liquid reflux during the pause so that to keep the piping completely full;
– to make easier the starting on load.



WRONG



RIGHT

17 - When the pump is vertical the suction would be in upper port to guarantee the correct operation.
Contact the technical office for a different application.

7 CONNECTIONS

7.1 - Foreword

WARNING

In order to carry out the electric connections, observe the general rules and the provisions indicated in the CEI 64-8 Standard.
The installation and electric connections must be carried out exclusively by qualified and authorised staff.

CAUTION

Before executing any operation, ensure that the electrical supply correspond to the information on electric motor data plate or on electrical board.

7.2 - Electric powers

In order to check the installed electric powers, see the *"Data sheet"* of enclosure 1.

7.3 - Electric connections

Refer to Enclosure 3 to check the wiring diagrams of the Pump unit.

7.4 - Piping connections

The operation of the Pump unit requires the following hydraulic connections:

- inlet and delivery port
- flushed seals (if present - check the Data Sheet Enclosure 1)
- heating jackets (if present - check the Data Sheet Enclosure 1)

PRECAUTION

It is essential, before carrying out the piping connections, ***to wash the piping*** in such a way as to clean all the lines, removing the dirt residues such as dust, sand, scraps, and so on. Since, despite washing , welding scraps may detach also after several hours of operation, we recommend a careful ***sight inspection*** of all the ***weldings*** carried out on the piping system so as to "clean them carefully".

8 START AND RUNNING

8.1 - Initial operations

Before setting the Pump unit at work, check the following:

- make sure that all the parts subject to lubrication are properly lubricated:
- make sure that all the bolts are properly tightened;
- make sure that inside the rotor case there are no foreign bodies;
- make sure that the power supply voltage of the pump unit is the one required as indicated on drive or control board plate;
- make sure that all the piping connections are properly carried out;
- make sure that coupling guard of the transmission joint is install properly ;
- check the continuity of the unipotential protection circuit (see § 3.8).

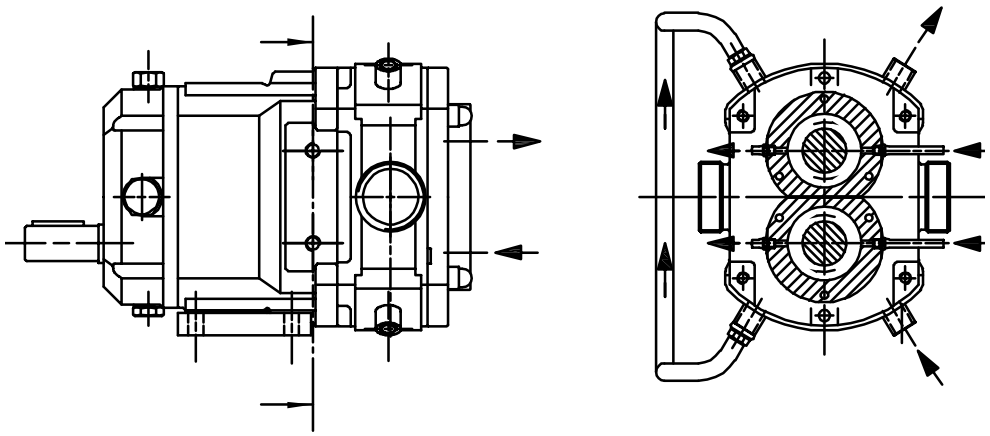
8.2 - Control and work places

There are no special workstations for the pump unit.
The operator shall start, stop and regulate the machine by means of the corresponding controls on the electrical panel of the machine.

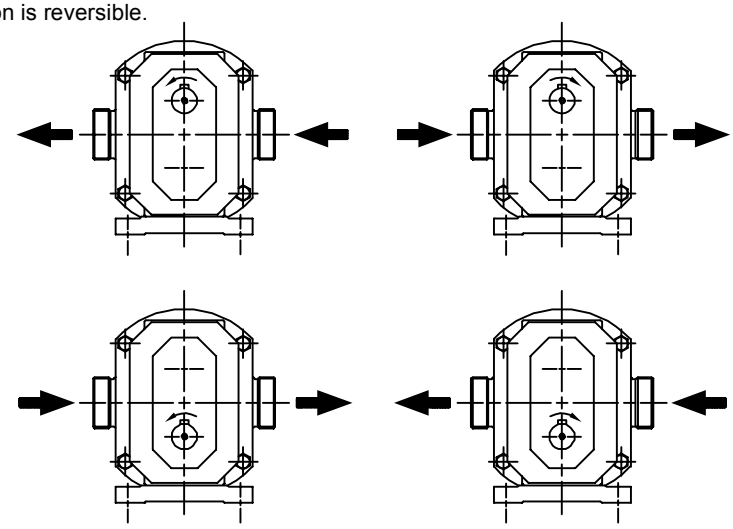
The positioning and fixing of the above-mentioned electrical panel pertain to the user who must see to its ergonomic and safe location.

8.3 - First start

1 - The electric connection must be carried out by a qualified staff and in compliance with the motor data plate, for the connection of the terminal board and for the thermic setting according to the max possible absorption.
2 - Wash the piping with clean water in order to remove foreign bodies, scraps or dust.
IMPORTANT: do not use the lobe pump for the A.M. duty.
3 - Check all the gate valves on the inlet and outlet are completely open.
4 - When the rotors are dry, the lobe pump has got a very low suction power, so if the pump is not below the hydrostatic head, fill the pumping element and the suction pipes with liquid.
IMPORTANT: Lobe pumps can run even dry, because the moving parts are not in touch, except for slip faces of the seals which, expecially at high speed, tend to get overheated. Therefore we suggest you should not let the pump run dry for long time in order to avoid seal wear.The allowed time for dry running depends on turning speed and on materials of seals slip faces (5minutes for PTFE or carbon and 15 seconds for carbide).
5 - In the pumps provided with flushed seals and/or heating jackets, make sure that these devices are regularly connected and that the flushing liquid, especially for the packing seals with liquid barriers, is consistent with the pumped fluid (see par.4.8).



6 - Check the right direction of pump rotation according to the position of the driving shaft.In standard version the direction of rotation is reversible.



7- Start the pump possibly at reduced speed,then increase it till it reaches the duty speed,checking possible troubles (pressure overload,loss in piping,cavitation,vibration).

8- If the duty speed is very high,it's normal that the bearing housing temperature reaches 50-60°C, expecially during the first working hours.

9 - Pump seizure can result from thermal shock. Do not subject the pump to rapid temperature change during C.I.P. procedures.

8.4 - Control and signalling systems

8.4.1 - General information

All the control, signalling and adjustment devices are marked with symbols or small wordings that allow to quickly intuition their functions.
These devices are also marked with different colours having different meanings.

The Pump unit can be equipped, on request, with a electrical control panel containing the operating "switches".

COLOURS FOR LIGHT INDICATORS

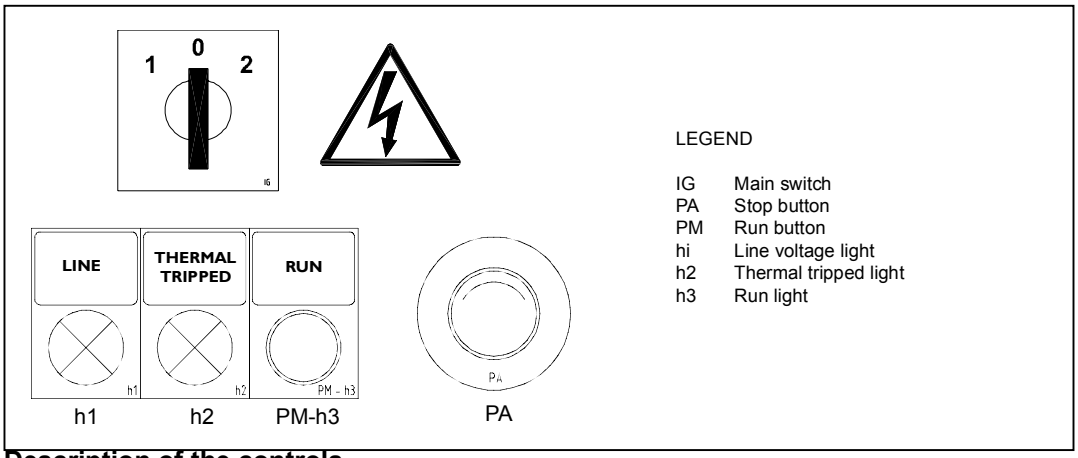
Colour	Meaning
Red	Danger or alarm
Yellow	Caution
Green	Safety
White	Neutral (no specific meaning)
Blue	Specific meaning according to the requirement

COLOURS FOR THE CONTROLS

Colour	Meaning
Red	Emergency action (stop or disconnection)
Yellow	Pause
Green	Start or connection

8.4.2 - Electrical panel controls/signalling

8.4.2.1 - Electrical panel without inverter



Description of the controls

Main switch (Ref pos. IG)

The main switch IG turns is a ON/OFF reversing switch.
Position 0 = OFF (not live)
Position 1 = ON (live)

Position 2 = ON, with the pump running in the opposite direction as to position 1.

WARNING

The door opening interlock of the electric panel prevents the access to the panel if the switch is in position 1 or 2.

Ordinary stop button (Ref pos. PA)

The emergency push button stops the Pump unit also in normal operating conditions.
Run button (Ref pos. PM - h3 Fig 8.3)

The PM green light button starts the Pump unit in normal and continuous run. The run and stop conditions are signalled by the light incorporated in the button:
on = Pump unit running
off = Pump unit stopped

Emergency button (Ref pos. PA)

The PA red push button stops the Pump unit immediately in emergency conditions.

NOTE

The special red push-button allows an easy and quick intervention by the operator; moreover, a mechanical lock blocks it in pressed position.

Only after releasing the button, the normal running conditions of the Pump unit shall be restored.
The button is reset by “pulling” the red knob.

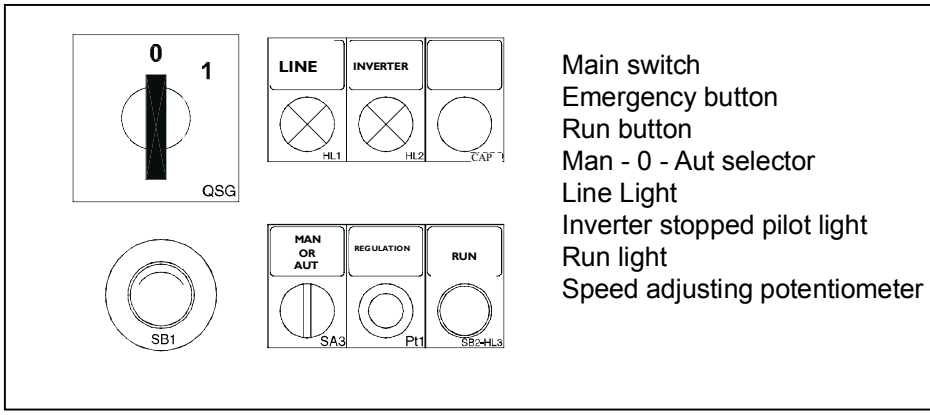
Pilot light “LINE” (Ref pos. h1 Fig. 8.3)

This light is on when the electrical panel is “live” i.e. when the main switch is in position “1” or “2”.

Pilot light “THERMAL TRIPPED” (Ref pos. h2)

This light is on when, due to problems during the operation of the Pump unit, the electric motor is overloaded.
To restore the normal operating conditions the “thermal” must be reset as indicated in the operation and maintenance instructions of the electrical supply.

8.4.2.2 - Electrical control panel with inverter



Description of the controls

Main switch (Ref pos. QSG)

The QSG main switch turns on or off the electric installation of the machine.

- Position 0 = OFF (not live)
- Position 1 = ON (live)

WARNING

The door opening interlock of the electric panel prevents the access to the panel if the switch is in position 1.

Ordinary stop button (Ref pos. SA3)

The ordinary stop button stops the Pump unit in normal operating conditions.

0 = ordinary arrest
MAN = manual drive
AUT = automatic drive

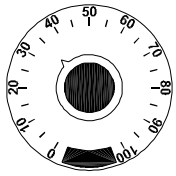
Run button (Ref pos. SB2 - HL3)

The SB2 green light button starts the Pump unit in normal and continuous run.
The run and stop conditions are signalled by the light incorporated in the button:

- on = Pump unit running
- off = Pump unit stopped

Speed adjustment potentiometer (Ref pos. Pt1)

The Pt1 knob allows to regulate the speed of rotation of the pump rotors and therefore, as a result, the capacity of the Pump unit.
In particular, if you want to increase or decrease the capacity, turn the potentiometer right or left, respectively (Ref. Fig. 8.5)



Speed adjusting potentiometer

Emergency button (Ref pos. SB1)

The SB1 red push-button stops the Pump unit immediately emergency conditions.

NOTE

The special red push-button allows an easy and quick intervention by the operator; moreover, a mechanical lock blocks it in pressed position.

Only after releasing the button, the normal running conditions of the Pump unit shall be restored. The button is reset by "pulling" the red knob.

WARNING

Do not use the button for the ordinary stop of the Pump unit.

Pilot light "LINE" (Ref pos. h1)

This light is on when the electrical panel is "live" i.e. when the main switch is in position "1".

Pilot light "THERMAL TRIPPED" (Ref pos. h2)

This light is on when, due to problems during the operation of the Pump unit, the electric motor is overloaded. To restore the normal operating conditions the "thermal" must be reset as indicated in the operation and maintenance instructions of the electrical supply.

Electric motor with integrated inverter

In case of integrated inverter on the motor, refer to the enclosure of the manufacturer.

8.5 - Ordinary stop of the Pump unit

The ordinary stop of the Pump unit can be carried out without any precaution.

8.6 - Adjustment

8.6.1 - Safety valve and manual by-pass (if installed)

For what concerns the safety valve, refer to paragraph 3.6.1 of this manual.

8.6.2 Pump capacity

In order to regulate the capacity of the pump, change the number of revolutions that the rotors execute in the time unit. More precisely, if you increase the number of revolutions, the capacity increases; vice versa, the capacity decreases. Therefore, according to what has been supplied, for the changes described above you must operate on the adjusting handwheel of the variable-speed unit or on the inverter by intervening on the corresponding control placed on the electrical panel (see § 8.4.2.2) or on the terminal board for the integrated inverters.

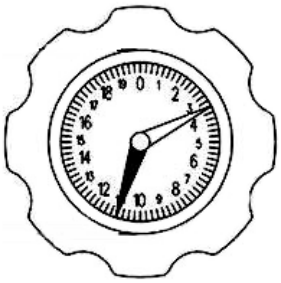
Variable speed unit adjustment

Turn the control handwheel right or left if you want to decrease or increase the number of revolutions exiting the variable-speed unit and as a consequence the number of revolutions of the pump rotors.

WARNING

Carry out the above-mentioned regulation when the variable-speed unit is running. For further information, refer to the "Instruction Manual" of the variable-speed unit delivered together with this publication.

In order to check the number of revolutions in exit on the basis of the indications on the adjusting handwheel, refer to the tables of shown.



Variable-speed unit adjusting handwheel

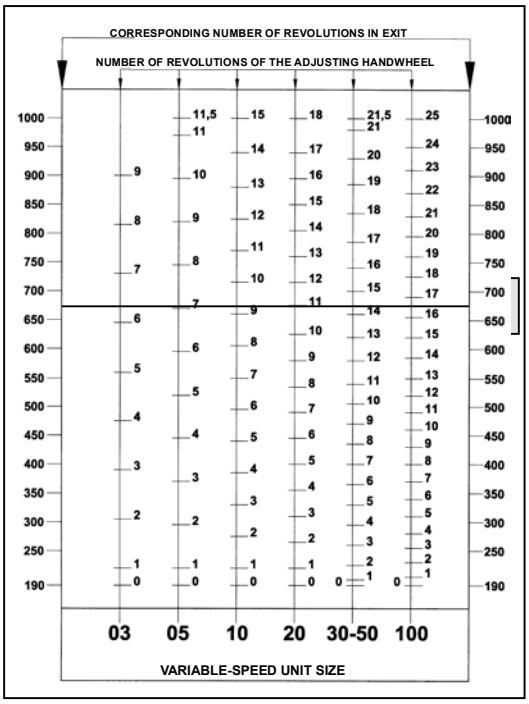
Number of revolutions in exit and number of revolutions indicated by the handwheel

Example : **if we want 675 revolutions in exit and we have a variable-speed unit of size 20, we must set the adjusting handwheel on "11".**

Note

If the drive unit is a geared variable speed motor, in order to regulate the number of revolutions of the pump, you must divide the number of revolutions exiting from the variable-speed motor by the gear ratio of the gearbox (the gear ratio of the gearbox is indicated on its data plate).

VARIABLE-SPEED UNIT OF MOTOVARIO/SPAGGIARI



WARNING

If the variable speed unit is a producer other than "Motovario" or "Spaggiari trasmissioni", the table for matching the number of revolutions in exit with the number of revolutions indicated on the wheel is contained in Enclosure 4.

8.7 - External cleaning of the Pump unit

CAUTION

The following indications are generic. For more detailed information, refer to the specifications of the products normally used.

It is better to use detergent and solvent products in order to clean the machine. Refer to the data sheet of the supplier for what concerns the chemical composition of the product.
Sometimes the direct contact with the skin of the substances used for cleaning may cause dermatological sicknesses and allergies. The skin can also absorb some solvents and the substances contained in them. The fumes of the solvents may be toxic if inhaled in excessive quantities.
When carrying out the cleaning operations, the following general safety regulations must be observed:
• wear the provided ISD such as gloves, goggles, overalls, faceplates, and so on, in order to avoid direct contact with the skin and eyes
• keep under control the concentration of solvent fumes in the working environment (REFER TO THE LAWS IN FORCE IN THIS FIELD AND COMMUNITY DIRECTIVES)
• check the ventilation conditions of the working place (if necessary, prepare an extractor unit)
• avoid solvent blowing
• forbid smoking in the working area

8.8 - Pump unit inactivity period

If the machine is kept inoperative for a long time, follow some precautions such as:
• wash and dry carefully the internal parts of the rotor case (seals, rotors, connections)
• disconnect the machine from all electrical supply
• cover the machine with cloths
• store the machine safe from shocks and vibrations

9 MAINTENANCE

9.1 - General standards

CAUTION!

Before proceeding with any maintenance operation, prepare all the safety measures in compliance with the safety regulations in force. In particular, prevent the operation of all the electrical uses and discharge any residual energy.

The tools and equipment required for a good maintenance are those normally supplied to the technician in charge of fitting and maintenance. If the machine is placed above the ground level, the Customer gives the operator access to the machine so that he can carry out the regulation, maintenance, repair, etc. operations, in safety conditions.

9.2 - Required maintenance areas

For the maintenance of the Pump unit, special minimum “free” areas are not required.

9.3 - Ordinary maintenance

9.3.1 - Electric

All the electric motors (main, fans, etc.) require a partial disassembly for internal cleaning and lubrication of the roller bearings. At intervals not longer than two years, the bearings and the surrounding openings must be cleaned from the old grease and other dirt and lubricated again. If the bearings are very worn out, replace them immediately.

WARNING

When inserting the bearing back on the shaft, take care only to apply the pressure on the internal ring and proceed with great care.

9.4 - Lubrication

1 - Omac pumps are delivered ready filled with oil of ISO VG68
2- Check every day the level of oil placed on the side of the pump, which must be completely full when the pump is not working.
3 - If necessary, restore the level by adding the type of oil recommended under point 4.11.
4 - If the pump is used with vertical ports check the plugs position. If necessary invert the oil vent cup with the oil level.
5 - The oil must be replaced after a running in period of about 150 working hours, later , every 2500 hours.
6 - If the bearing house works continuously at temperatures higher than 90°C, lubricate with an oil with a higher viscosity (see point 4.11) and replace it every 1000 working hours.

9.5 - Single mechanical seals Fig:12.14-12.15-12.16 (chap.12)

1 - The mechanical seals require no maintenance.
2 - If a leakage occurs,beacouse of contact surface wear,replace the complete seal (see disassembling instructions).
3 - In case of long working with worn seals,check the product doesn’t enter the bearing housing.
4 - **IMPORTANT:** don’t work the simple mechanical seals dry.

9.6 - Flushed mechanical seals fig.12.17

1 - As well as the single mechanical seals,the flushed mechanical seals require no maintenance.
2 - When the mechanical seal is replaced,replace the turning ring (224) and the lip ring (223) of the auxiliary seal too.
3 - With a well connected flushing,the pump can work even with no product being pumped,beacouse the seals can not become overheated.
4 - Check the fluxing is efficent during the pump working,in order not to damage the auxiliary seals (connection diagram par.4.8)
5 - To disassemble the flushed mechanical seals,see single mechanical seal instructions.
6 - To remove the stationary part of the mechanical seals,see single mechanical seals instructions.
7 - During the assembling, before inserting the rotating part of the mechanical seal,put rightly the turning ring (224) and assemble the auxiliary sealing ring (223) in its seat on the flushing box (220) according to fig. 12.17 (chap.12).

9.7 - Seal balancing

All the mechanical seals mounted on the B series lobe pumps are provided with balancing rings for the fixed parts. In order to work under difficult condition such as:

- pressure peaks due to the first breakaway.
- very viscous or gluey product
- frequent starting

IMPORTANT: the balancing ring must not force on fixed part of seal; check that there is a little clearance (0.05/0.3 mm) (ref. 210 fig. 12.14-15-16; 230 fig. 12.17)

9.8 - Packing glands fig.12.12-12.13 (chap.12)

1 - Initial adjustement of the packing glands should be carried out during commissioning.
2 - After the pump has run for a few hours, the packing will have compacted and a further adjustment is a necessary, taking care to leave a low drop to provide lubrification of the packing.
3 - When the dropping loss is too big and further tightening is no more possible replace packing rings as well as shaft protection bush.

9.9 - Lip seals fig.12.10-12.11 (chap.12)

1 - The lip seals are composed by a support,in which two lip gaskets type UM are arranged:one turned inside for product sealing and the other turned outside for suction sealing. The shaft is protected by a bush in AISI 316.
2 - During the assembling, check the lip gaskets are rightly arranged on the support (244).
3 - Assemble the supports on rotor case,lubricate by means of grease between the gaskets and insert the bushes (241).
4 - Being the gaskets already seated,assemble the rotor case and tighten the socket screws of the bushes,locking them on the shaft.
5 - In order to replace lip seals which are not included in chap.12,see the enclosed documentation.

9.10 - Cautions

1 - If the product is subjet to easy drying,crystallization or decantation,it's necessary to wash pump and piping system at the end of each work or at the beginning of a long plant pause.
2 - The reversibility of the rotation direction,peculiarity of all OMAC pumps,allows the product return,emptyng discharge piping.
3 - If the pump hasn't run for long period,at starting check the sealing devices are not blocked,turning by hand the pump shaft.
4 - If the product is subject to congelation or solidification,before starting,check the pumps and piping are not blocked by solids,created during the pause.

9.11 - Daily checks

1 - Visual check of all sealing devices and of general working.
2 - If a leakage from mechanical seal occurs,arrange a replacement as soon as possible in oreder to avoid the product enters the bearing housing.

9.12 - Weekly checks

1 - Check the oil level of the pump and of the motor unit;if necessary top up by means of oil according to manufacturer instructions.
2 - Check the rotor case and clean it,removing possible product deposits.
3 - Check that no seizures between rotors or among rotors and static surfaces of rotor case have occurred.
4 - Check the by-pass valve,when arranged,is not blocked after long working pause.To see it, it's necessary to untighten completely the adjusting screw (59) and re-arrange it in its initial position,indicated by retainer (62) fig.3.2 (par.3.6.2).

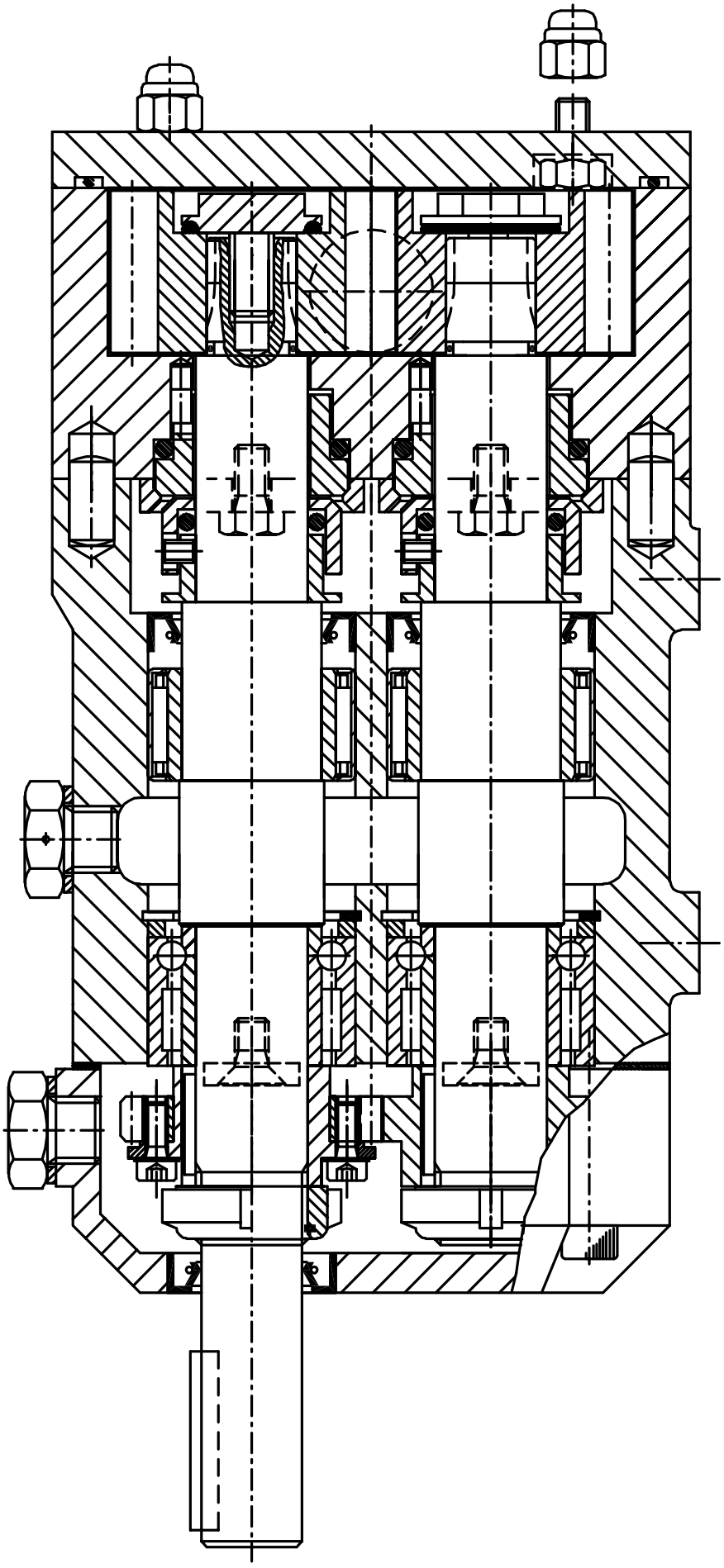
9.13 - Six-month checks

1 - If the pump works constantly at high temperature,over 120°C,check the lubricant oil health;if it has become dark,arrange its replacement.
2 - Check the timing gears don't allow the rotors get in touch; otherwise replace the worn gears.
3 - Check the shaft stiffness; if they show a min. axial or radial play,replace the bearings.
4 - Check the corrosion of the bearing housing;if necessary arrange its repainting by means of a paint,suitable to protect it from a quick wear. The OMAC standard pumps are pianted with:
BRIGHT EPOXID ENAMEL RAL 7032.

NOTE

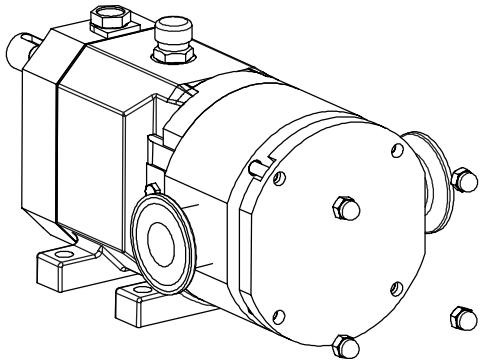
If you carry out these checks sistematycally, the pump will keep its initial performaces for many years.

9.14 - Pump assembly and disassembly instructions for pump series Mod. B100

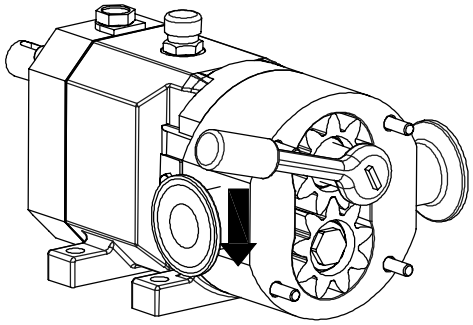


9.14.1 - Rotor case disassembly Mod. B100

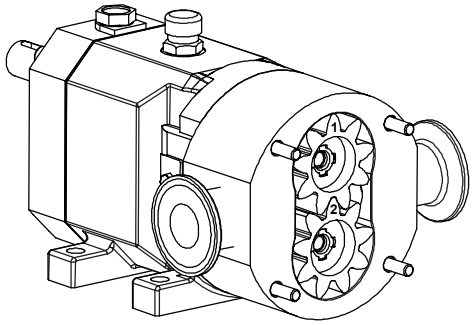
Before removing the cover, make sure that the pump and the motor are isolated, the pump is cool enough to touch it safely, all the fluids are discharged, and make sure that the rotor case is isolated and depressurized. If the end cover is provided with a by-pass valve, refer to the corresponding section. Then, preceed as follows:



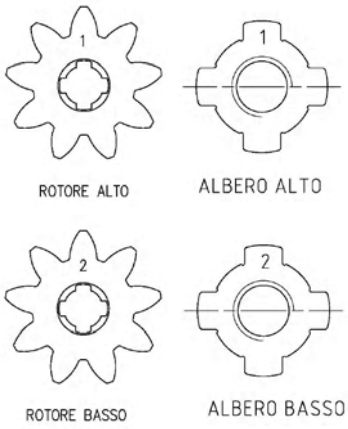
1 Remove the front nuts and exert laverage in the provided slots on cover

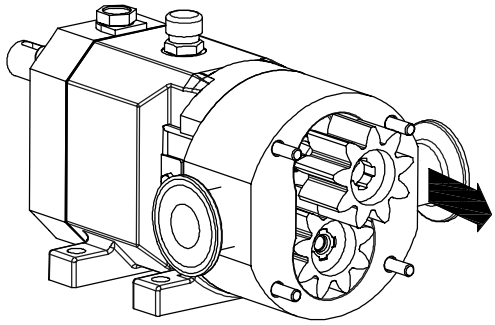


2 Unscrew anticlockwise the rotor nuts, interposing a non metal element between the rotors, making them stop rolling.

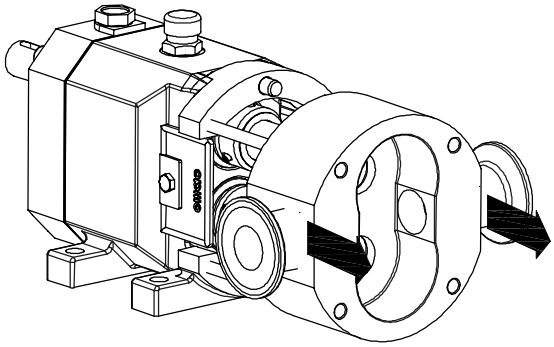


3 Take care of the reference marked on rotors and shafts (1-2) so that you will set them rightly while reassembling.

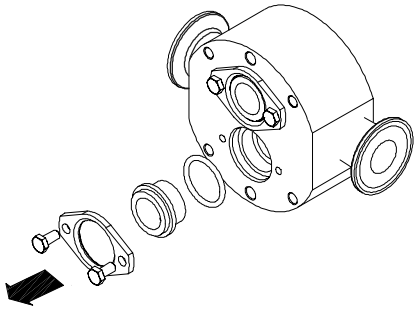




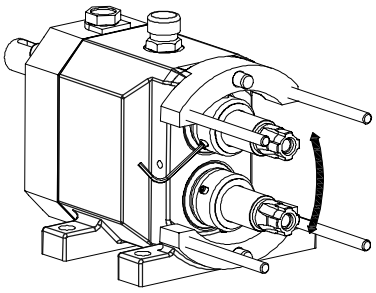
4 Extract the rotors, taking care you don't damage them by means of metal tools.



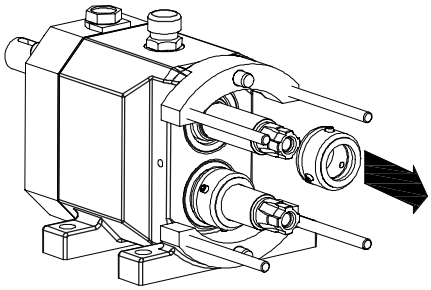
5 extract the rotor case



6 Extract the rotating part of the mechanical seal from the shaft, after disassembling the bearing retainers



7 Untighten the socket head screws on mechanical seal.

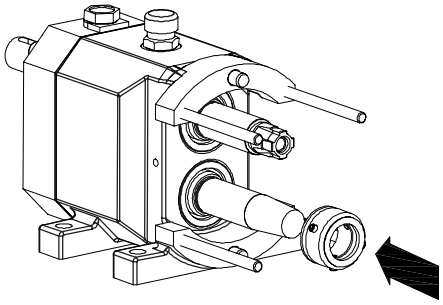


8 Extract the rotating part of the mechanical seal from the shaft.

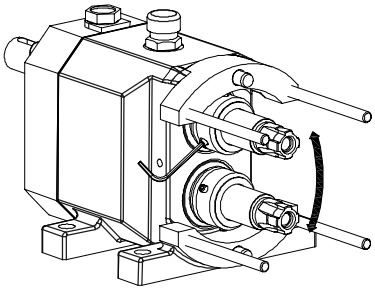
9.14.2 - Rotor case assembly Mod. B100

IMPORTANT

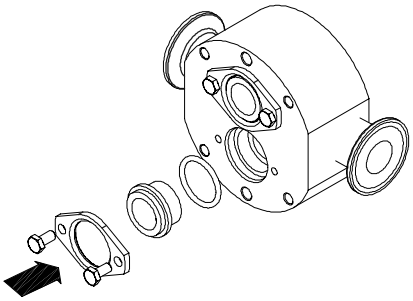
9 During the following operations, take care you don't damage the lapped seal surface; don't lay them on the bench and handle them with clean hands.



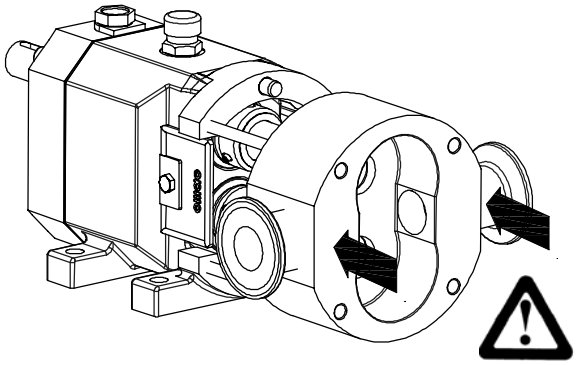
10 Clean carefully the shafts. Lubricate lightly the O-ring and introduce the rotating part of the seal, possibly by means of a conical bush.
Exert pressure only with hands; avoid using metal tools.



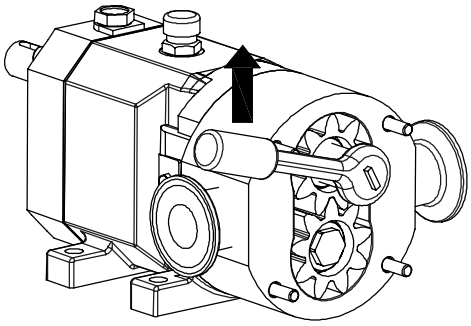
11 Be sure the mechanical seals stand on the shaft shoulder and tighten step by step the socket head screws.
We suggest you should use a thread locking adhesive in order to avoid their untightening on work.



12 Assemble the stationary part of the seal on rotor case, taking care to aline the slot with the retainer pin, alrea dy arranged on seat bottom.

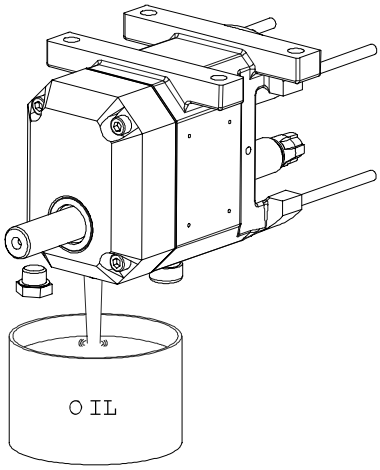


13 Clean carefully the seal slide surfaces and assemble the rotor case delicately in order not to damage the seals and be sure it is well set on plugs.
Clamp the back nuts.

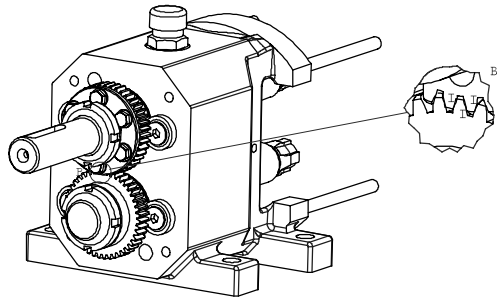


14 Assemble the rotors, setting them on pitch setting, according to reference marks (1-2). Clamp the rotor nuts (see cap.4.5). In order to stop turning, interpose a non metal element between rotors

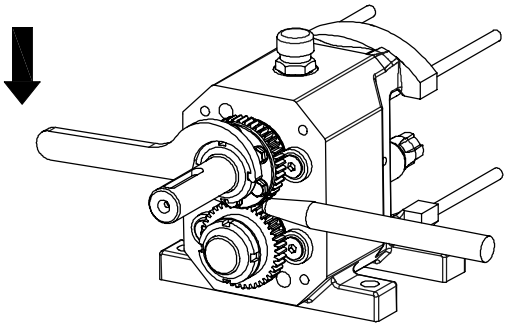
9.14.3 - Bearing housing disassembly



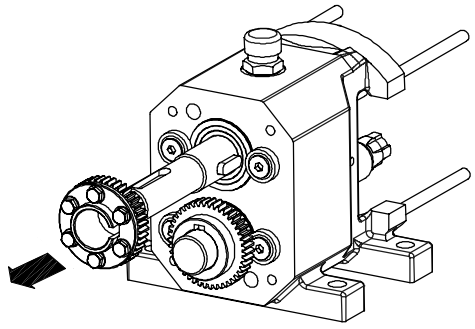
15 After disassembling the rotor case, drain the oil and the remove drive key on shaft.



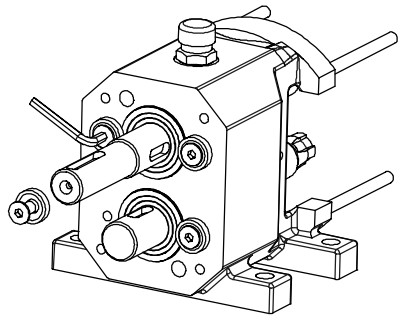
16 Remove the gear cover and make a reference mark on gears in order to respect the right timing while reassembling.



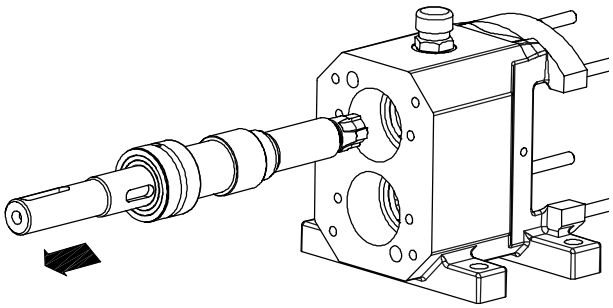
17 Disconnect the retainer keys on lock washers.



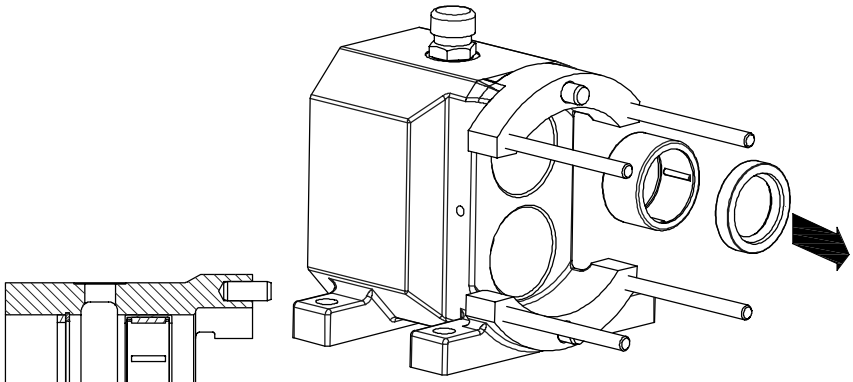
18 Unscrew the gear ring nut, inserting a non metal wedge between gears in order to stop turning



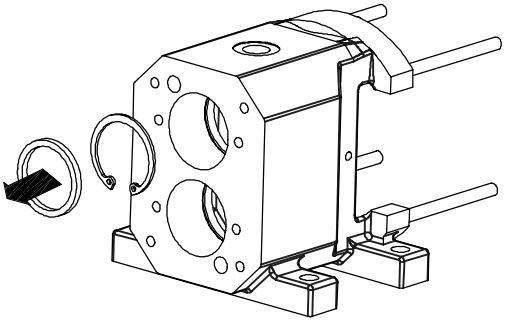
19 Disassemble the shafts, unscrewing the flathead screw, with the lock washer



20 Extract the shafts by the posterior side of the pump

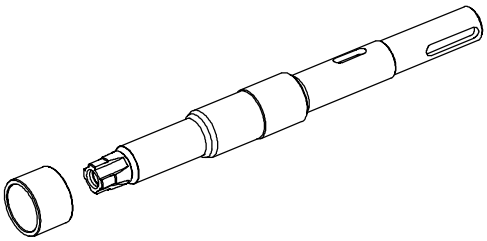


21 extract the oil retainer and the external rings of the front bearing

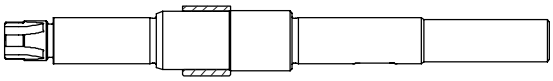


22 extraxt the spacers and the snap rings

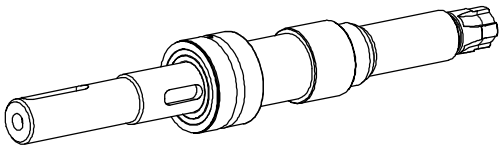
9.14.4 - Bearing housing assembly Mod. B100



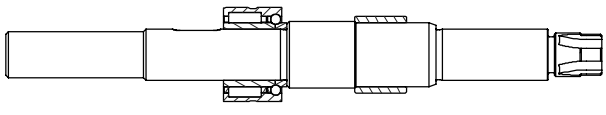
23 BEARING ASSEMBLING PHASE
Prepare the shafts and the bearings, checking they are without dents and burrs

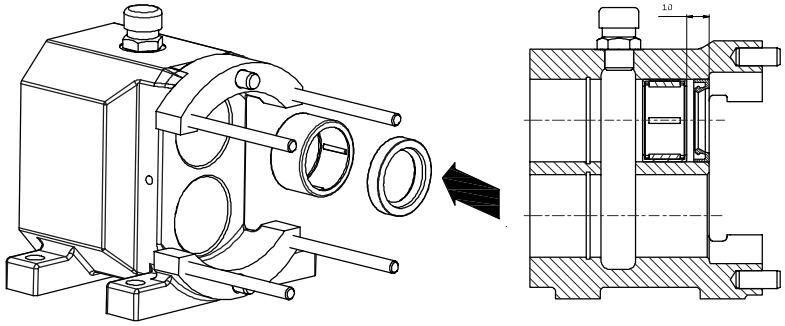


24 Drive the inner ring on the driving shaft.
Repeat the operation on the drived shaft

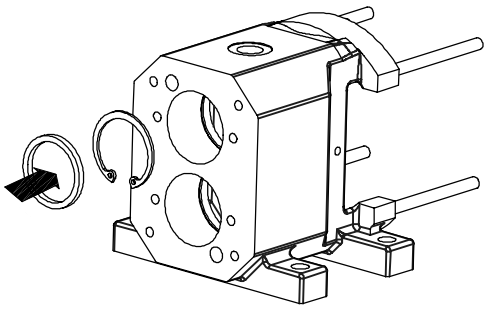


25 Assemble the rear bearing on the driving shaft and then on the drived one.

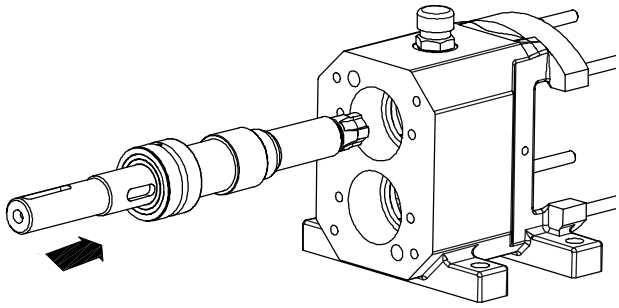




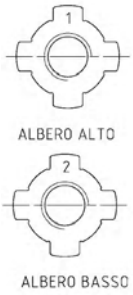
26 Drive the external bearing rings on the gear box, observing the depth on the figure (10 mm)

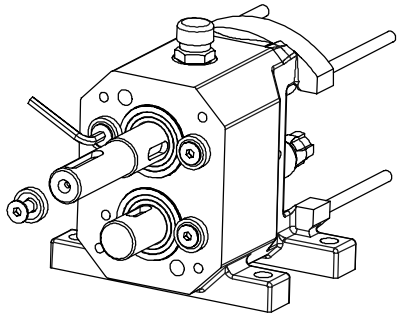


27 Insert the snap rings and the spacers for the axial setting

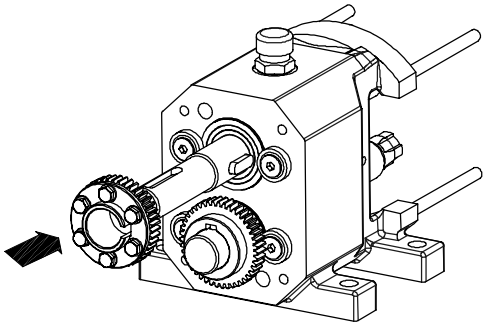


28 Assemble the shafts by the rear side of the pump, respecting the timing previously marked while reassembling, with the numbers marked “1” and “2” turned towards the high

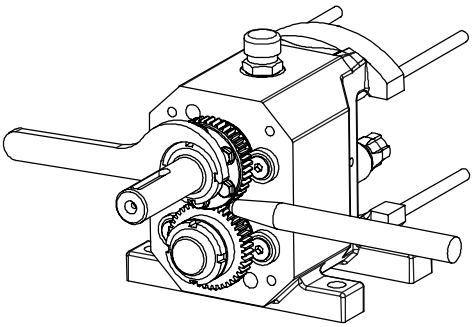




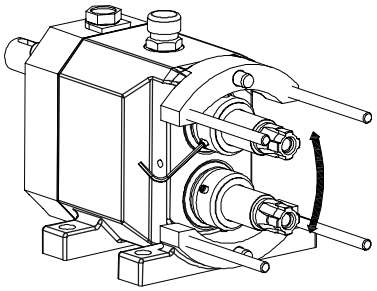
29 Fixed the rear bearings with the washers and the flathead screws



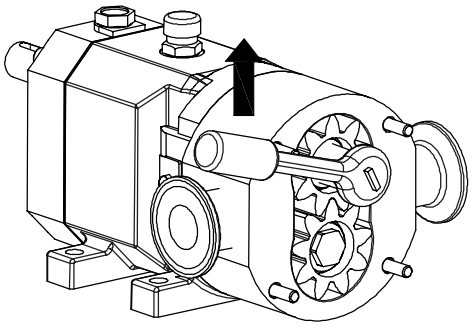
30 The gear couple is composed by a fixed gear and an adjustable one. Assemble the fixed gear, then the adjustable one with untightened screws, taking care to a first approximate rotor timing.



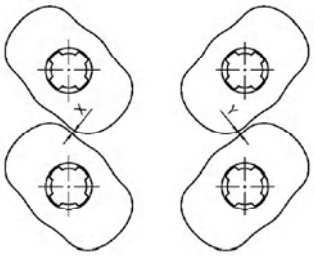
31 Tighten the retainer ring nuts with the corresponding safety washers and set rightly the suited retainer key. In order to avoid turning during operation insert a wedge in soft material among the gear teeth.



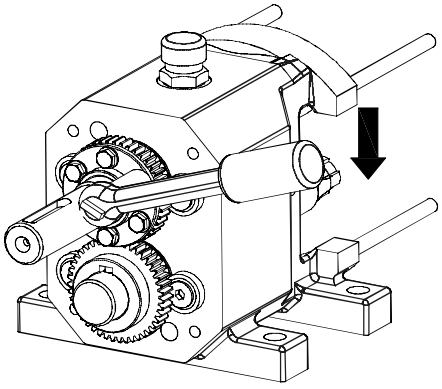
32 Assemble the rotor case and rotors as previously described and check the “Clearences” (see cap.4.3). If rotor clearances are not included in tolerances as prescribed in chap. 4.3, disassemble rotors, the rotor case and adjust the spacer according to the requested dimension.



33 Being the wedge inserted among the gears tighten the rotor nuts, taking care of the driving torque (see cap.4.5).

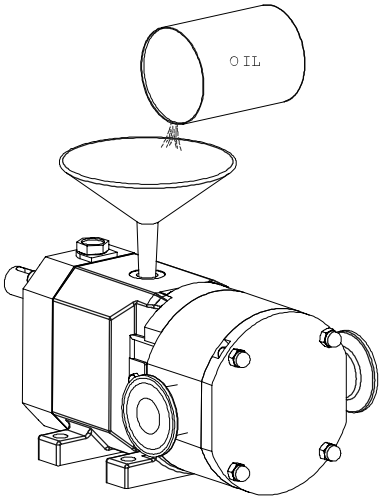


34 Time perfectly the rotors and tighten the screws of the adjustable gear gradually, checking the rotor timing.



35 Tighten completely the adjustable gear screws taking care of the driving torque (see cap.4.5.).

N.B. IN CASE OF RE-TIMING IT’S NECESSARY TO REPLACE THE PLANE WASHERS, CAVED BY PREVIOUS CLAMPING.



36 Assemble the gear cover, taking care to set the O-ring gasket and insert the key on the shaft. Put into bearing housing the oil quantity as per chap.4.12.

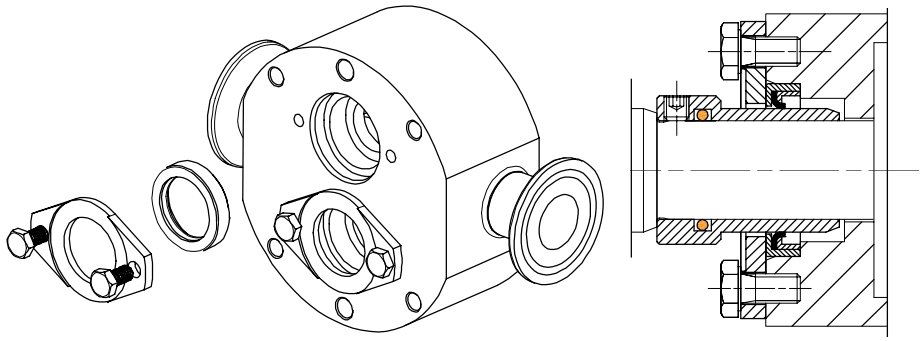
9.14.5 - Lip seals disassembling Mod. B100

IT IS RACCOMMENDED TO SUBSTITUTE LIP SEALS, IN CASE OF WEAR, TO BADLY AVOID SPILLAGES OF PRODUCT FROM THE PUMPING CASE AND THE MALFUNCTION OF THE PUMP.

Perform first operations 1-2-3-4-5 of chap. 9.14.1.

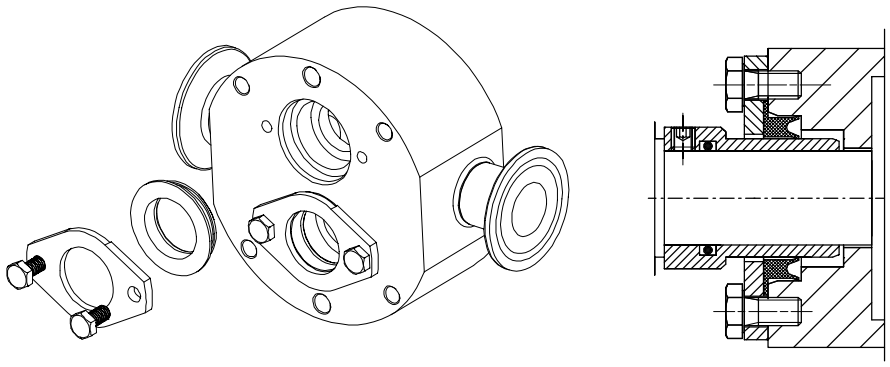
Rotor case can be equipped by one of these seals:

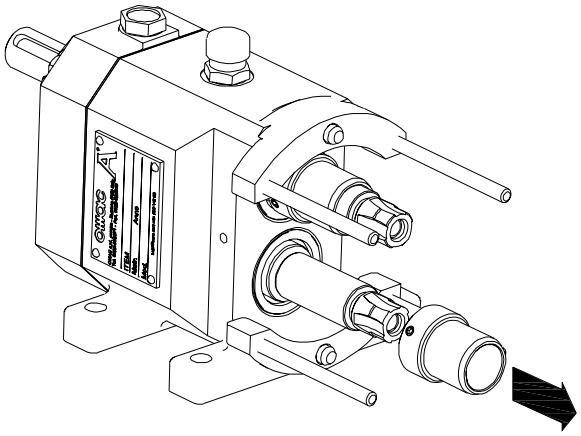
A) ELRING HN LIP SEALS :



6 IN BOTH CASES OPERATE AS FOLLOWS: extract the stationary parts of the seals from rotor case, after disassembling the retainers rings

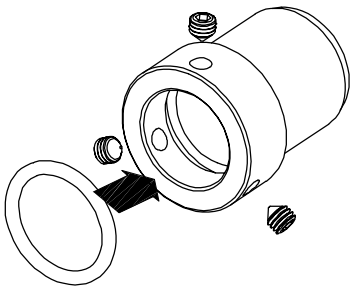
B) SINTEK H - TPU LIP SEALS :





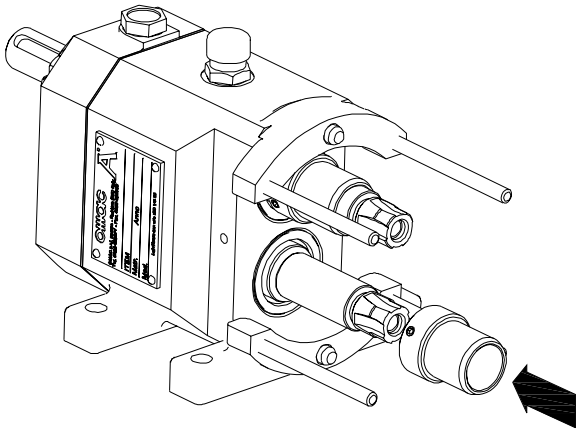
7 after untightening the security dowels, extract the rotating part of the seal from the shaft

9.14.6 - Lip seals assembling Mod. B100



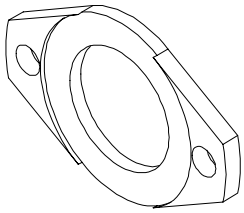
ATTENZIONE

8 **Put the O-Ring into the rotating part of the seal and screw the security dowels**

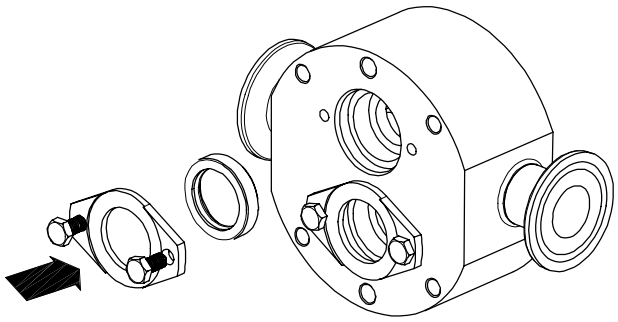


9 Lubricate the shafts before inserting the rotating part of the seals, taking care not to damage O-Ring.
Be sure the rotating part is on the shoulder of the shafts and tighten the security dowels.
It is raccommended using a threads-locking glue to avoid unscrewing during the rotational motion

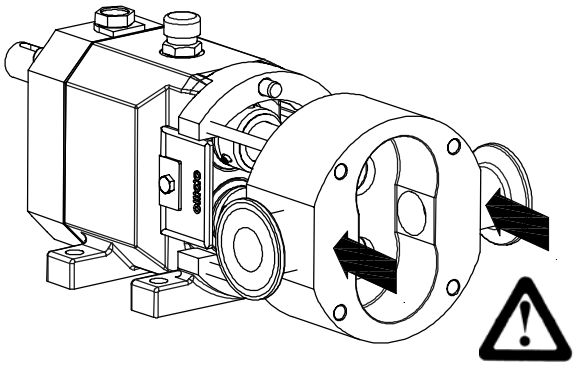
A) PUMP CASING SETTING WITH HN ELRING LIP SEALS :



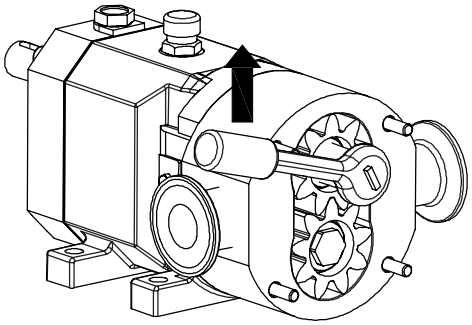
TAKE CARE OF THE RIGHT POSITIONING OF THE RETAINER RING, AS FOLLOWOS:



10 Assemble the stationary part (ELRING HN RING) on the pumping case, then assemble the retainer ring with its hexagonal-head screws

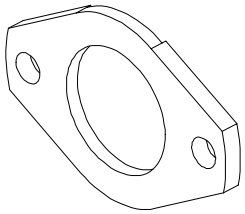


11 **Clean carefully the seal slide surfaces and assemble the rotor case delicately,** in order not to damage the seal and be sure it is well set on plugs.
Clamp the front nuts.

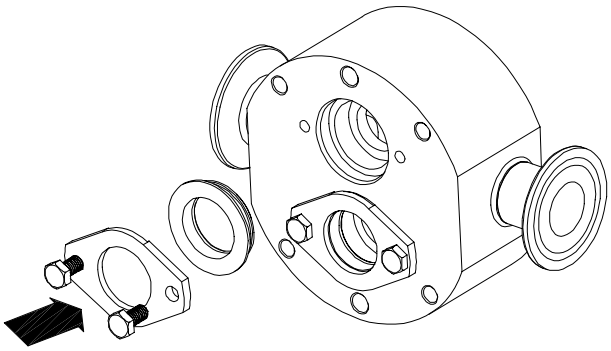


12 Assemble the rotors, setting them on pitch setting, according to reference marks (1-2). Clamp the rotor nuts (see chap. 4.5). In order to stop turning, interpose a non metal element between rotors

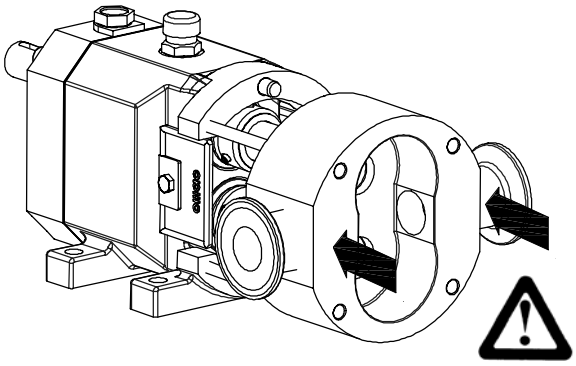
B) PUMP CASE SETTING WITH SINTEK H - TPU LIP SEALS:



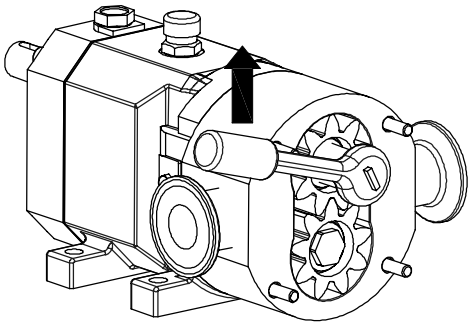
TAKE CARE OF THE RIGHT POSITIONING OF THE RETAINER RING, AS FOLLOWS:



10 Assemble the stationary part (SINTEK H - TPU RING) on the pumping case, then assemble the retainer ring with its hexagonal-head screws

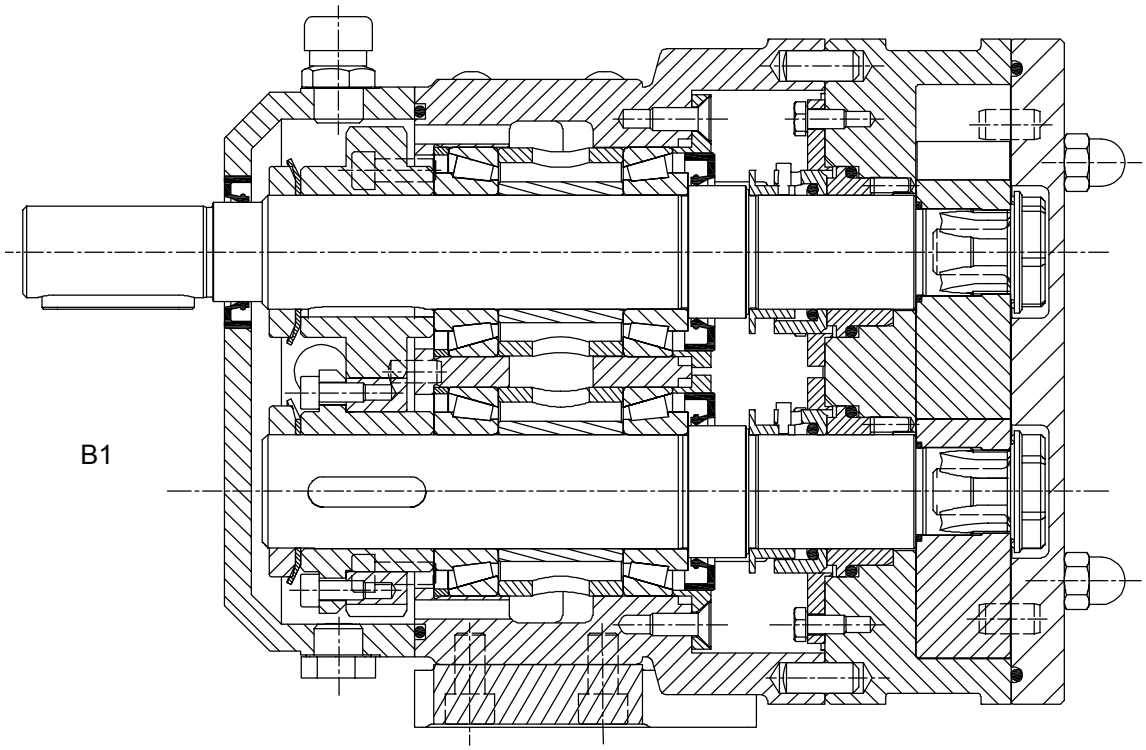


11 **Clean carefully the seal slide surfaces and assemble the rotor case delicately,** in order not to damage the seal and be sure it is well set on plugs. Clamp the front nuts.

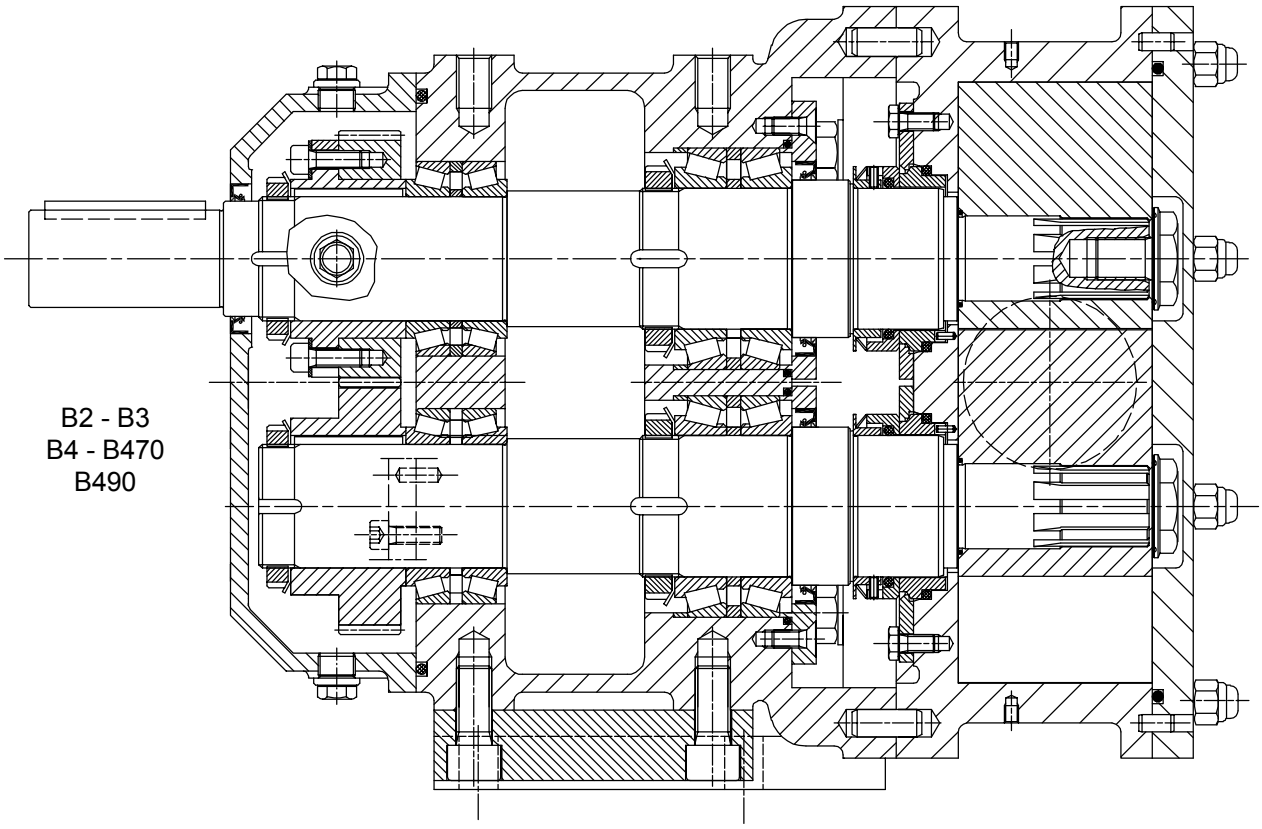


12 Assemble the rotors, setting them on pitch setting, according to reference marks (1-2). Clamp the rotor nuts (see chap. 4.5). In order to stop turning, interpose a non metal element between rotors

9.15 - Pump assembly and disassembly instructions for pump series B1-B2-B3-B4-B470-B490



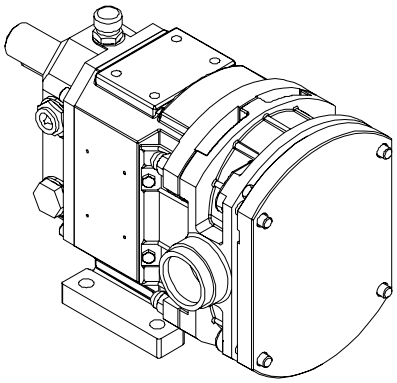
B1



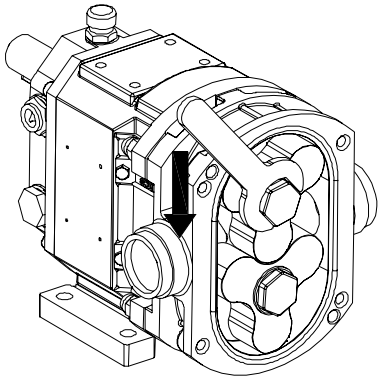
B2 - B3
B4 - B470
B490

9.15.1 Rotor case disassembly Mod. B1-B2-B3-B4-B470-B490

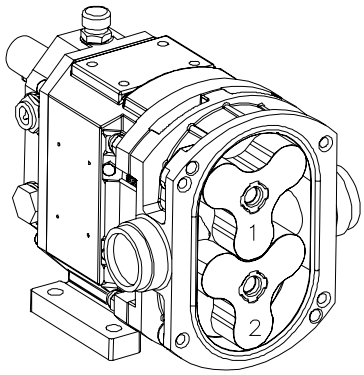
Before removing the cover, make sure that the pump and the motor are isolated, the pump is cool enough to touch it safely, all the fluids are discharged, and make sure that the pump, the flushing system of the seals and the jackets are isolated and de-pressurised. If the end cover is provided with a by-pass valve, refer to the corresponding section. Then, proceed as follows:



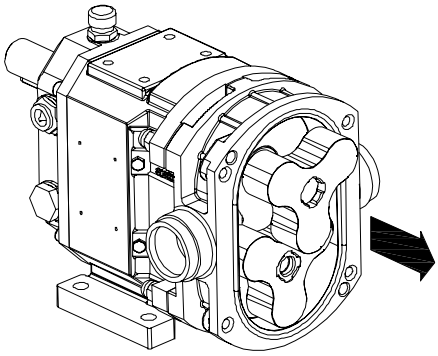
1 Remove the front nuts and exert laverage in the provided slots on cover.



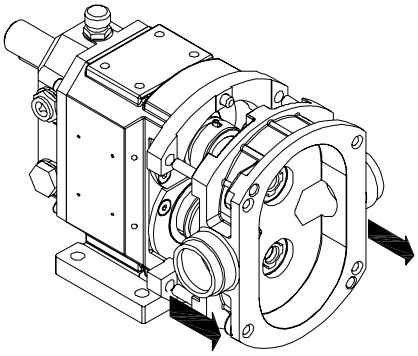
2 Unscrew anticlockwise the rotor nuts, interposing a non metal element between the rotors, making them stop rolling.



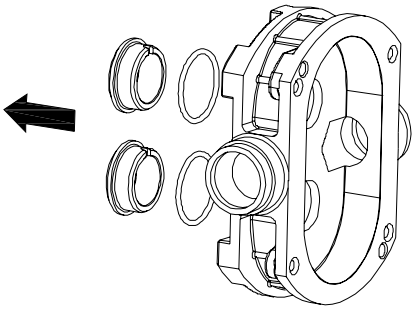
3 Take care of the reference marked on rotors and shafts (1-2) so that you will set them rightly while re-assembling.



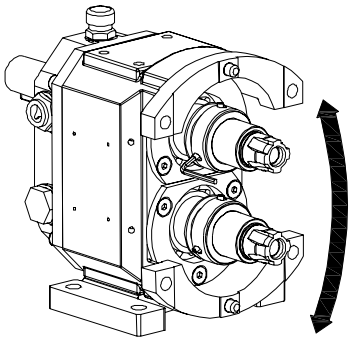
4 Extract the rotors, taking care you don't damage them by means of metal tools.



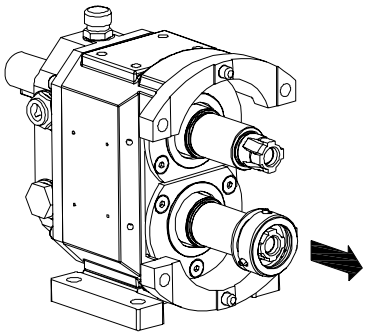
5 Unscrew the back nuts and extract the rotor case



6 Extract the stationary part of the mechanical seal from rotor case



7 Untighten the socket head screws on mechanical seal.

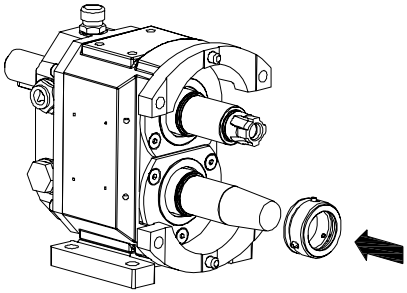


8 Extract the rotating part of the mechanical seal from the shaft.

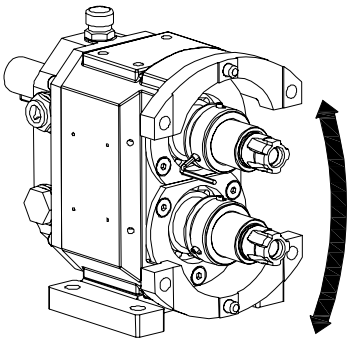
9.14.2 Rotor case assembly Mod. B1 -B2 - B3 - B4 - B470 - B490

IMPORTANT

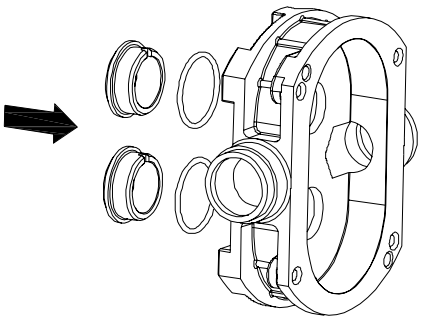
9 **During the following operations, take care you don't damage the lapped seal surface; don't lay them on the bench and handle them with clean hands.**



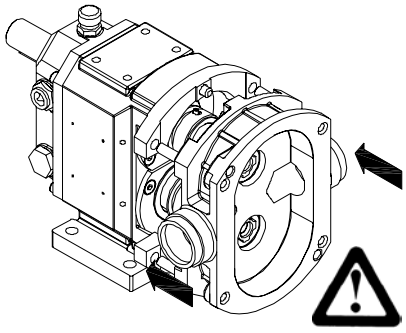
10 Clean carefully the shafts. Lubricate lightly the O-ring and introduce the rotating part of the seal, possibly by means of a conical bush.
Exert pressure only with hands; avoid using metal tools.



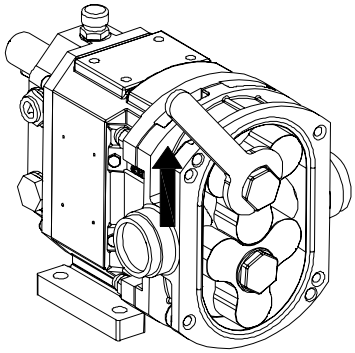
11 Be sure the mechanical seals stand on the shaft shoulder and tighten step by step the socket head screws. We suggest you should use a thread locking adhesive in order to avoid their untightening on work.



12 Assemble the stationary part of the seal on rotor case, taking care to aline the slot with the retainer pin, already arranged on seat bottom.

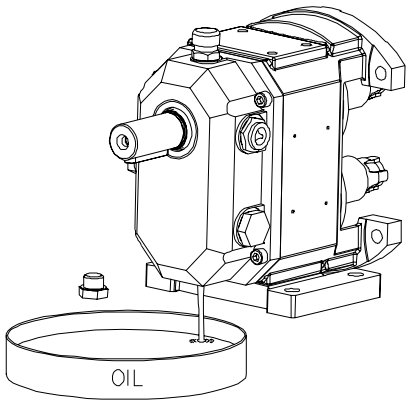


13 Clean carefully the seal slide surfaces and assemble the rotor case delicately in order not to damage the seals and be sure it is well set on plugs. Clamp the back nuts.

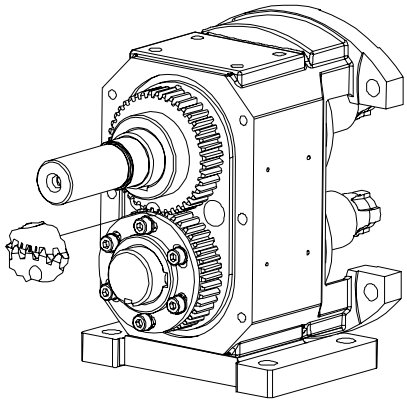


14 Assemble the rotors, setting them on pitch setting, according to reference marks (1-2). Clamp the rotor nuts (see cap.4.5). In order to stop turning, interpose a non metal element between rotors

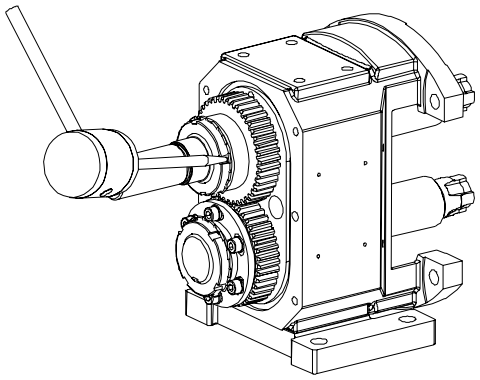
9.15.3 - Bearing housing disassembly Mod. B1-B2-B3-B4-B470-B490



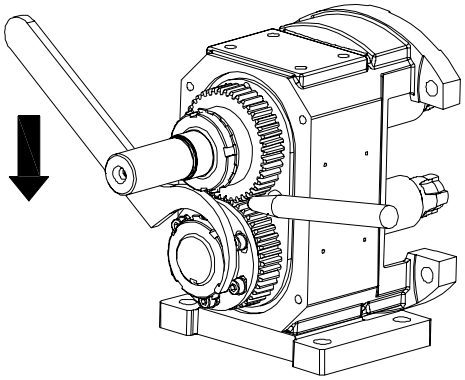
15 After disassembling the rotor case, drain the oil and the remove drive key on shaft.



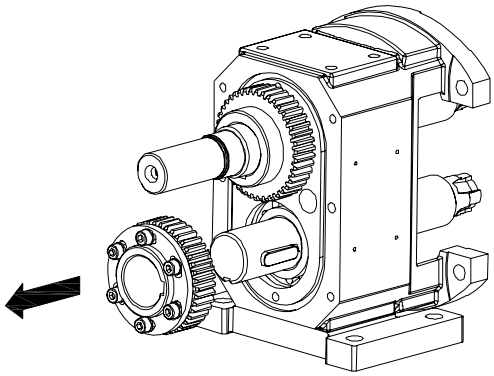
16 Remove the gear cover and make a reference mark on gears in order to respect the right timing while re-assembling.



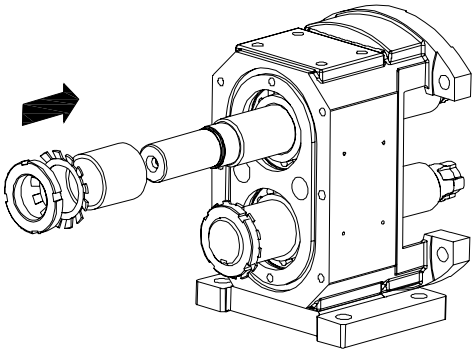
17 Disconnect the retainer keys on lock washers.



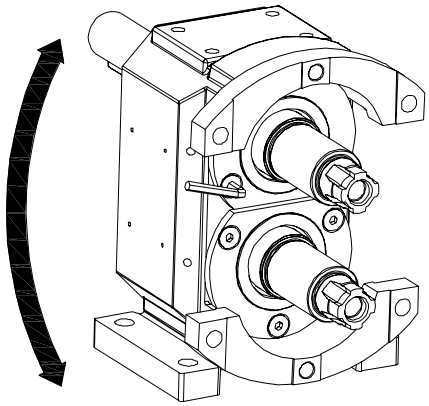
18 Unscrew the gear ring nut, inserting a non metal wedge between gears in order to stop turning



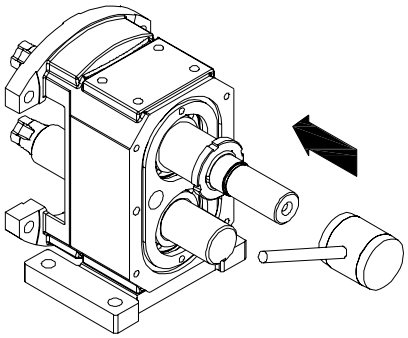
19 Extract the gears, exerting leverage between the bea ring housing and the gears side, without damaging the toothing outline.



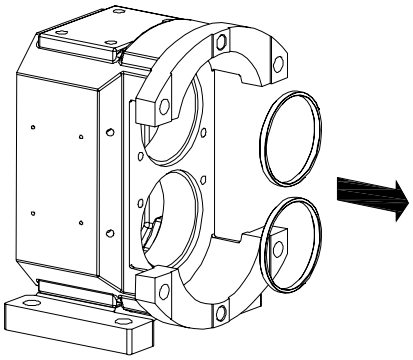
20 On assembling and disassembling we suggest you should replace the gears with a spacer in order not to break down the pre-assembled bearing.



21 Remove the bearing retainers.

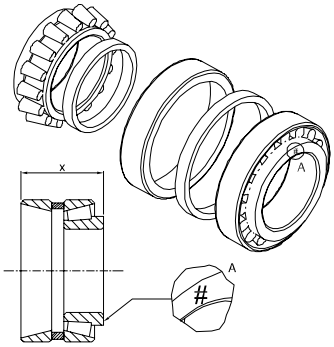


22 Extract the shafts by means of a non metal hammer.



23 Mark the spacers for the axial shaft adjustment, then replace them rightly while re-assembling.

9.15.4 - Bearing housing assembly Mod. B1-B2-B3-B4-B470-B490

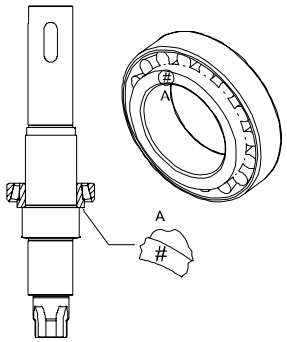


24 FRONT BEARING ASSEMBLING PHASE1

If you replace bearings with others that are not supplied by OMAC, you must mark, with the electric pen, the internal ring of a bearing with the # symbol. Check with depth micrometer gauge the dimension “x” according to the table, take it without the inner spacer and the inner ring with roller set on the opposite side of #.

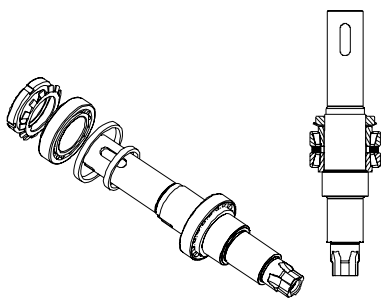
B1	B2	B3	B4	B470 B490
63	39,5	41,4	50,9	59

Value of the measurement “X” (+/- 0.02)



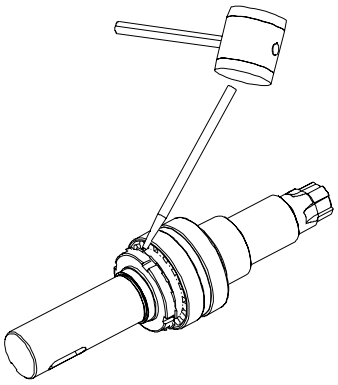
25 PHASE 2

USE GLOVES. Heat the inner ring # up to ca 150° C and assemble it on the shaft.
Wait for the temperature to drop to room temperature



26 PHASE 3

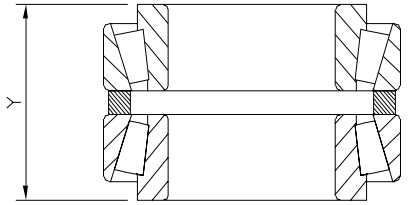
Assemble the bearing. Insert the inner spacer the first time just lapped with lapping machine. Consider the axial clearance between the rollers and carry out another lapping until you obtain a preloading on the bearings of about 0,05 mm. The best assembling is obtained when the bearings, tightened with the ring nut, roll freely and the outer spacer is slightly blocked but moves exerting a radial pressure with fingers. For tightening torques see chap. 4.5.



27 Assemble the pre-assembled front bearing, tighten firmly the ring nut and set the retainer key in the ring nut slot

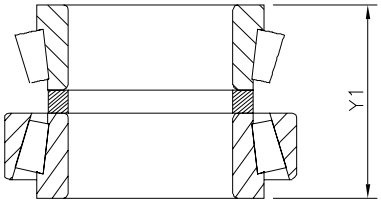
IMPORTANT

Put all keys of the safety washer up to the ring nut in order to let the spacer pass for the axial adjustement.



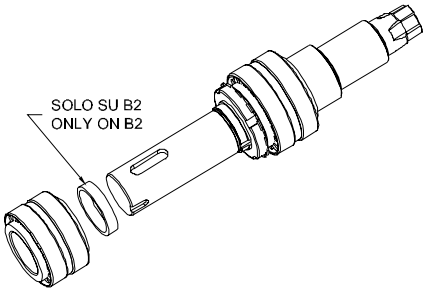
28 REAR BEARING ASSEMBLING PHASE1

Measurement of the “Y” dimension without the inner spacer.



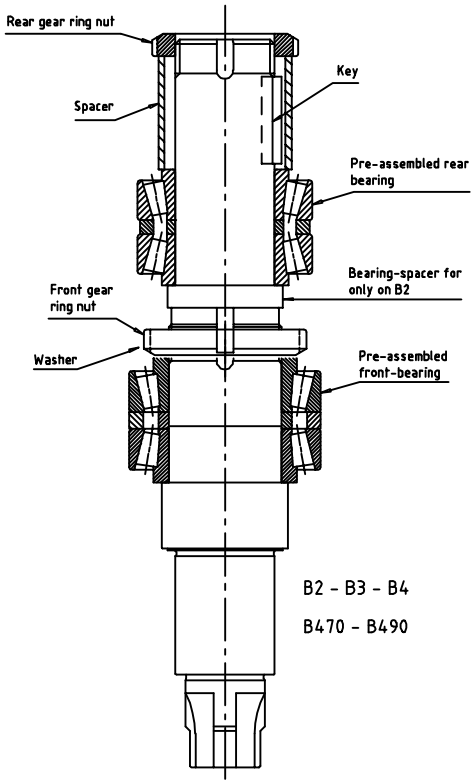
29 PHASE 2

Measurement of the “Y1” dimension without the outer spacer , without an outer ring and with the inner spacer, which must be inserted the first time just lapped, then the second time with the correct measure in such a way that:
Y1 = Y-0,05

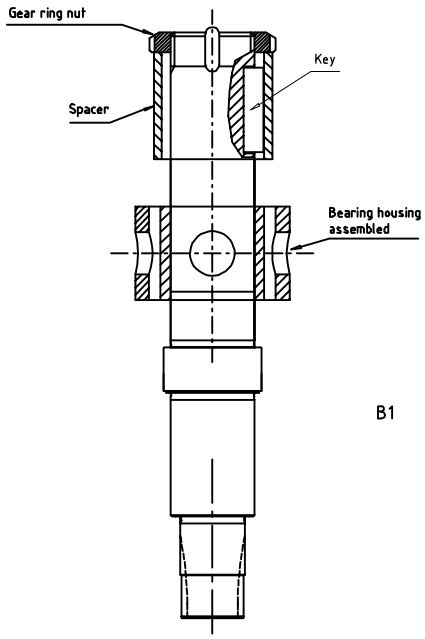


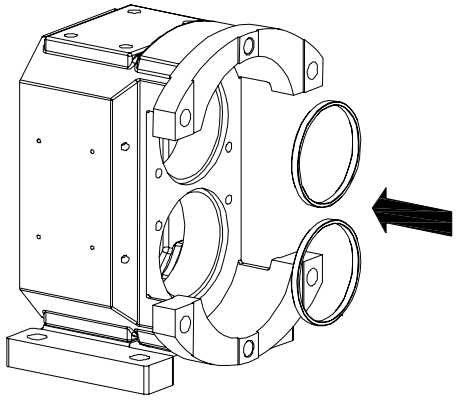
30 **ATTENTION**

Bearing spacer (pos. n°10 fig.12.2) has to be placed only on B2 size.

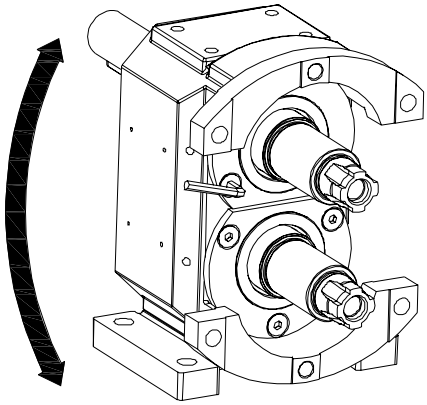


31 Assemble the pre-assembled rear bearing, tighten the ring nut inserting a spacer suitable for replacing the gear, in order to keep assembled the bearing during the assembling operations.

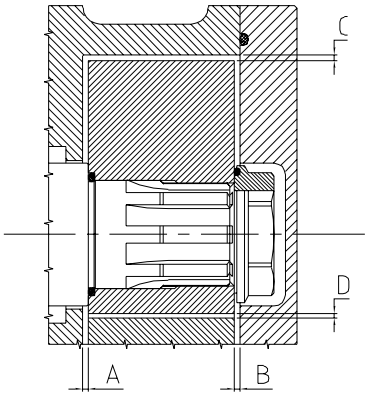




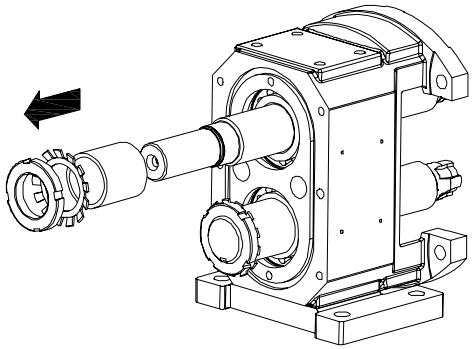
32 Set the spacers for axial shaft adjustment and assemble the shafts with the already fixed bearings.



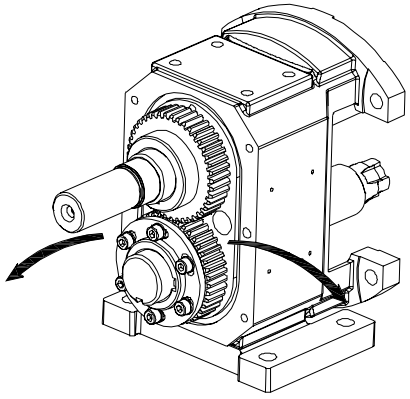
33 Set the O-ring gasket in its seat and assemble the bearing retainers with oil lip seal already fixed. Assemble the rotor case and rotors as previously described and check the “Clearences” (see cap.4.3).



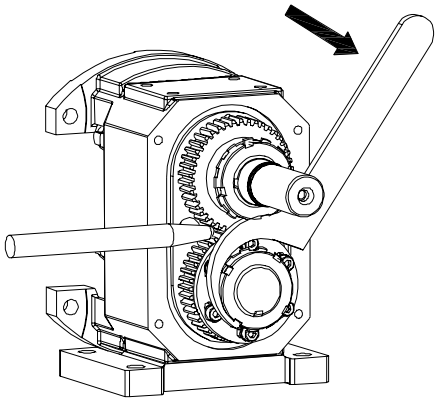
34 If rotor clearances are not included in tolerances as per chap. 4.3, disassemble rotors, the rotor case and adjust the spacer according to the requested dimension.
N.B. A spacer set can be requested to the manufacturer company.



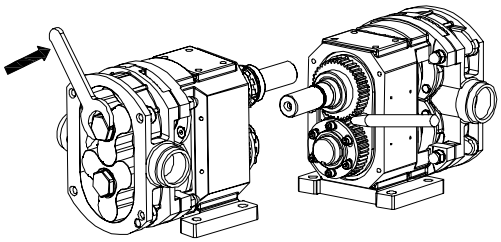
35 Remove the spacers used for the assembly and insert the keys for gear drive in their seats with a lightly forced connection.



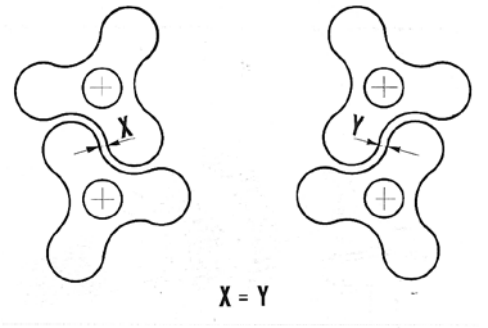
36 The gear couple is composed by a fixed gear and an adjustable one. Assemble the fixed gear, then the adjustable one with untightened screws, taking care to a first approximate rotor timing.



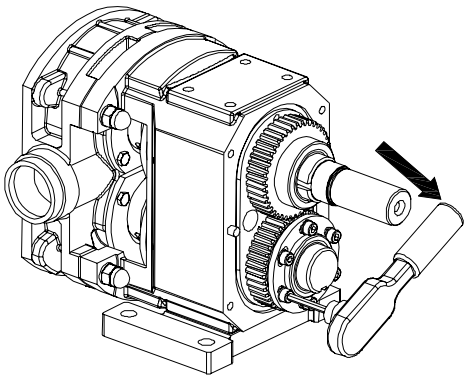
37 Tighten the retainer ring nuts with the corresponding safety washers and set rightly the suited retainer key. In order to avoid turning during operation insert a wedge in soft material among the gear teeth.



38 Being the wedge inserted among the gears tighten the rotor nuts, taking care of the driving torque (see chap.4.5).

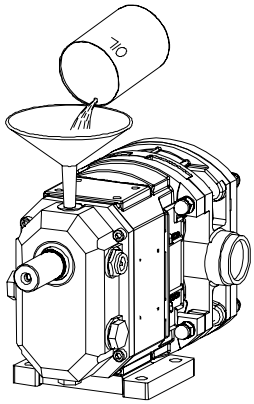


39 Time perfectly the rotors and tighten the screws of the adjustable gear gradually, checking the rotor timing.



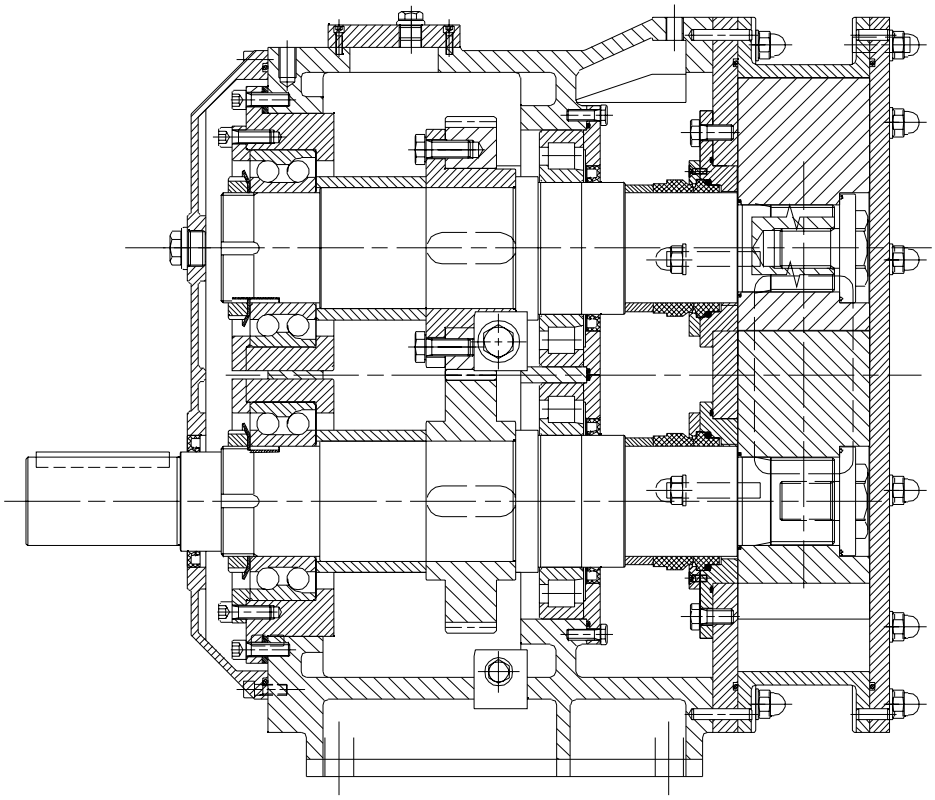
40 Tighten completely the adjustable gear screws taking care of the driving torque (see chap.4.5.).

N.B. IN CASE OF RE-TIMING IT'S NECESSARY TO REPLACE THE PLANE WASHERS, CAVED BY PREVIOUS CLAMPING.

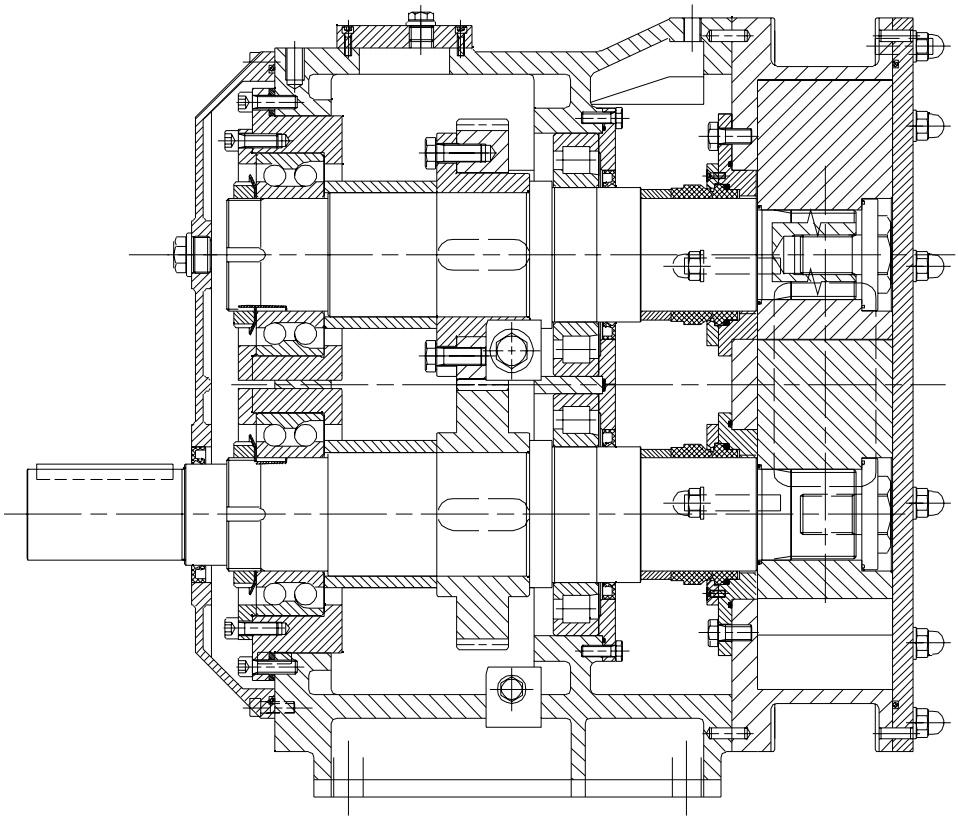


41 Assemble the gear cover, taking care to set the O-ring gasket and insert the key on the shaft. Put into bearing housing the oil quantity as per chap.4.12.

9.16 - Pump assembly and disassembly instructions Mod. B550-B660-B680

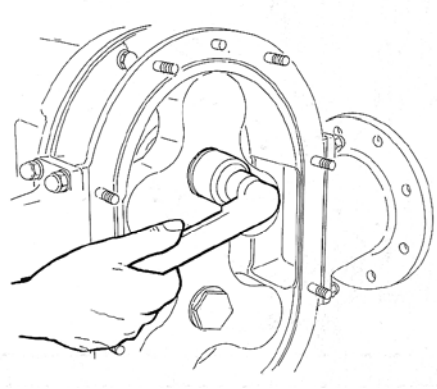


Cross section type B660 - B680

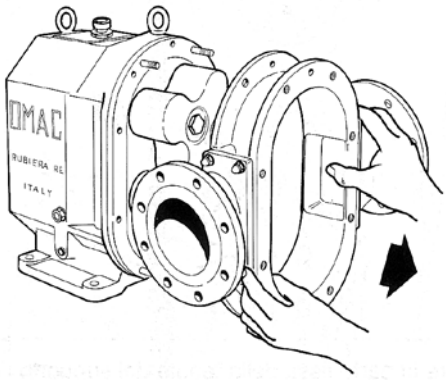


Cross section type B550

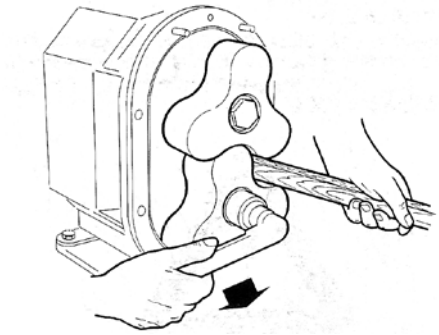
9.16.1 - Rotor case disassembly pump type B660-B680 (for model B550 see the par.9.15)



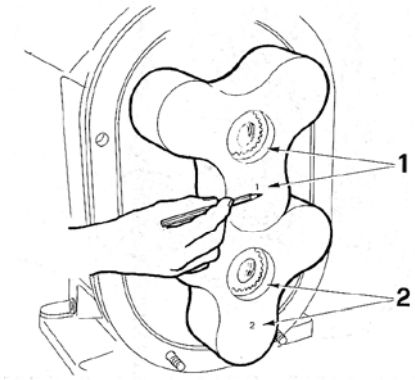
1 Remove the end cover and untighten the two locking nuts of the rotors.



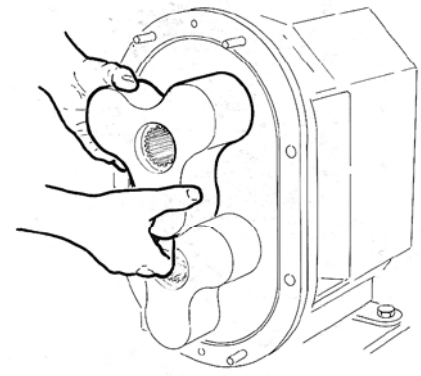
2 Untighten the back nuts and remove the rotor case



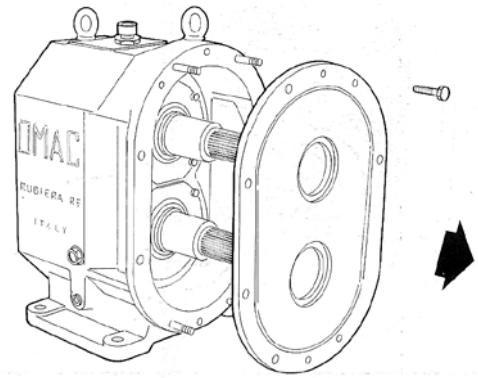
3 Unscrew anticlockwise the rotor nuts, interposing a non metal element between the rotors, making them stop rolling.



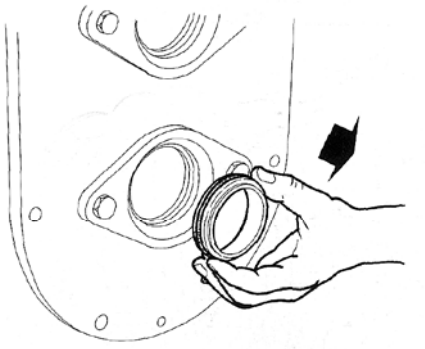
4 Take care of the reference marked on rotors and shafts (1-2) so that you will set them rightly while re-assembling.



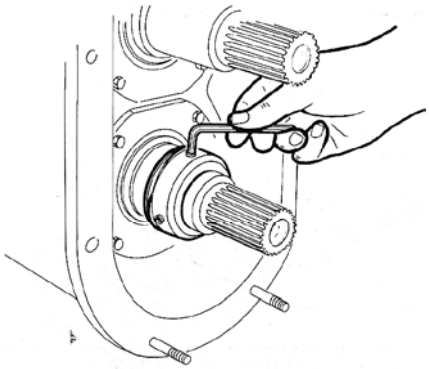
5 Extract the rotors, taking care you don't damage by means of metal tools.



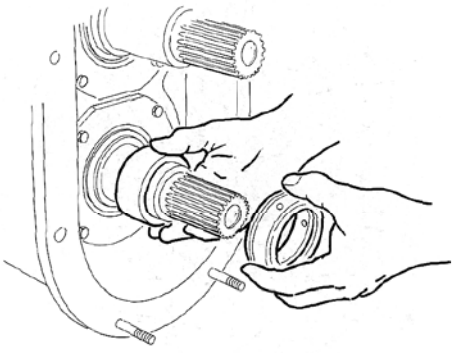
6 Untighten the two security screws and remove the seal flange.



7 Extract the stationary part of the seal from the support fixed on seal flange.



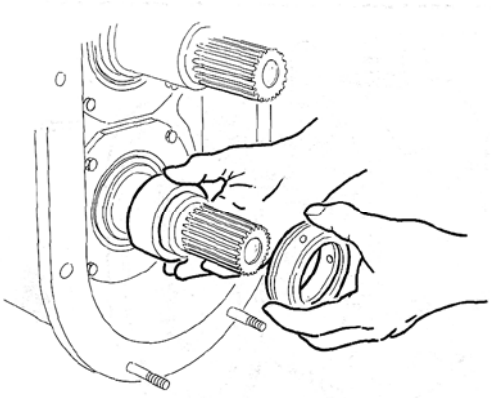
8 Untighten the socket head screws on mechanical seal.



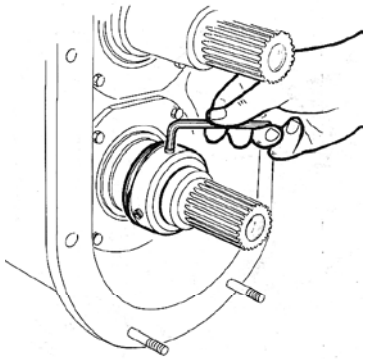
9 Extract the rotating part of the seal from the shaft.

9.16.2 - Rotor case assembly (for mod. B550 see par.9.15)

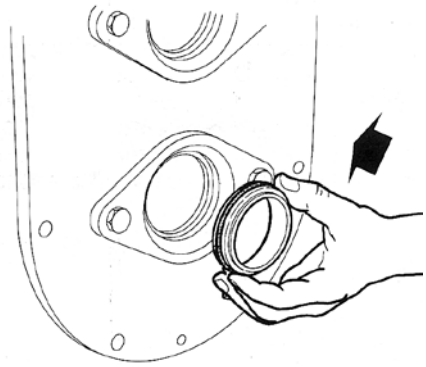
10 **IMPORTANT!**
During the following operations, take care you don't damage the lapped seal surfaces; don't lay them on the bench and handle them with clean hands.



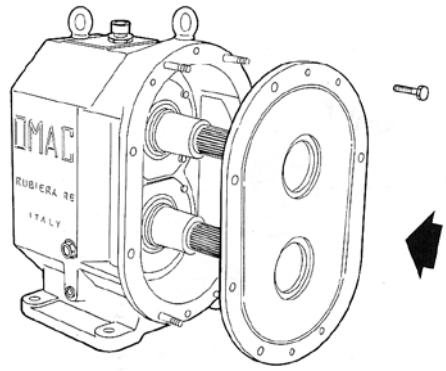
11 Clean carefully the shafts. Be sure the spacers for the seals are set (295). Lubricate lightly the O-rings and insert the rotating part of the seals on the shafts. Exert pressure only with hands; avoid using metal tools.



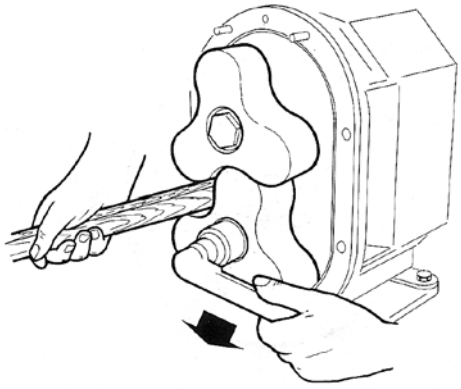
12 Be sure the mechanical seals stand on the shaft shoulder and tighten by degrees the socket head screws. We suggest you should use a thread locking adhesive in order to avoid their untightening on work.



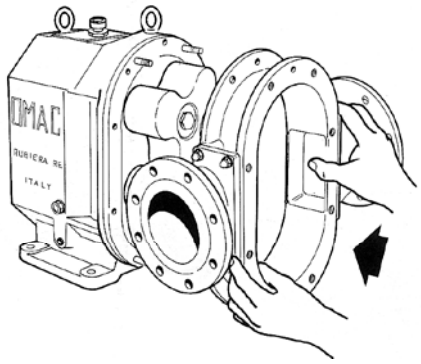
13 Assemble the stationary part of the seals on supports, taking care to aline the slot with the retainer pin. Assemble these supports on seal flange, setting the O-ring.



14 **Clean carefully the seal slide surface** and assemble the seal flange delicately in order not to damage the seals. Be sure the flange is set according to reference pins and tighten the suited screws



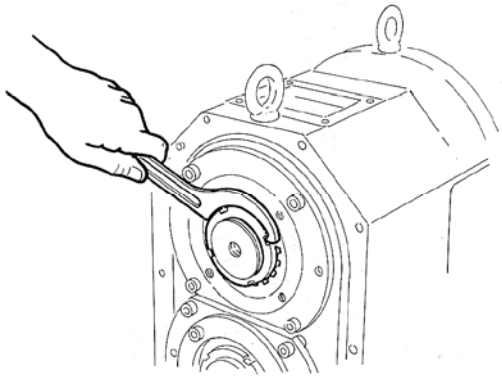
15 Assemble the rotors, setting them on pitch according to the reference marks (1-2). Clamp the rotors nuts (see tab. 14). In order to stop turning, interpose a non metal element between rotors. Tighten the rotor nuts (see cap.4.5).



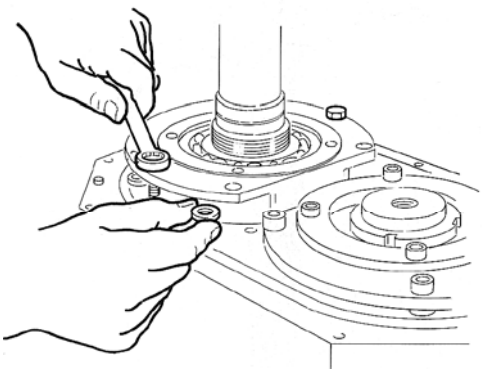
16 Assemble the rotor case, setting the O-ring.

9.15.3 - Bearing housing disassembly Mod. B550-B660-B680

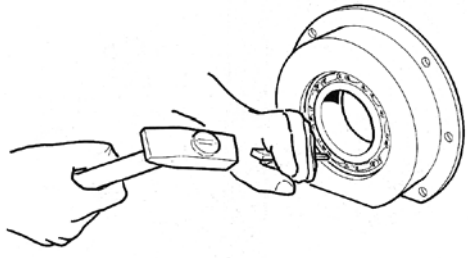
17 After disassembling the rotor case remove the oil and the drive key on shaft.



18 Remove the gear cover, disconnect the retainer keys of the lock washer and unscrew the ring nuts.

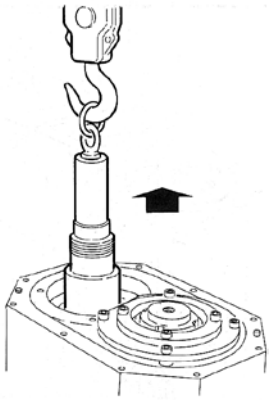


19 Stand the pump upright and extract the two bearing supports, making use of the threaded holes for removal. Doing so you will remove the spacers for axial adjustement too, which should be marked and separated for a right re-setting while assembling.

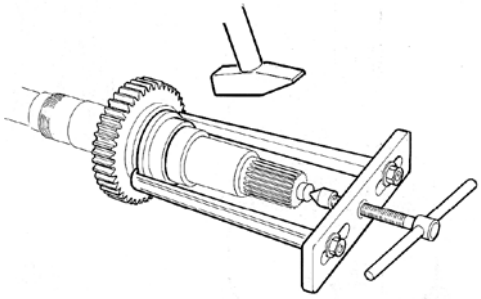


20 Remove the ball bearing from its support, taking away the bull ring.

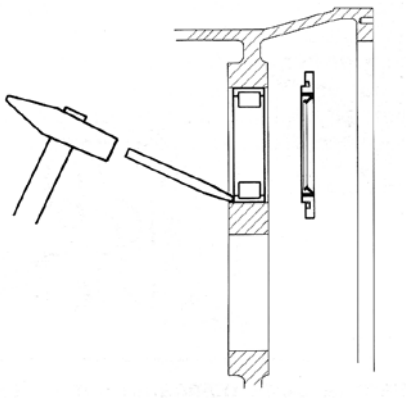
21 Mark the gears in order to set them rightly while reassembling.



22 Withdraw the shafts, with the gears, still inserted. For this operation we suggest a mechanical lifting equipment, which can use the threaded holes arranged on shaft ends.

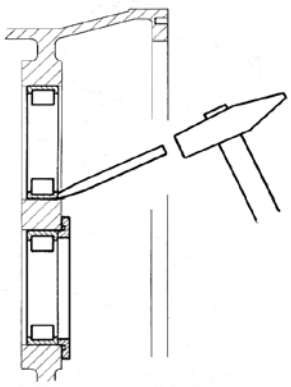


23 Remove the inside ring of the roller bearing by means of an extractor. Remove the gear taking care not to damage the toothing outline.

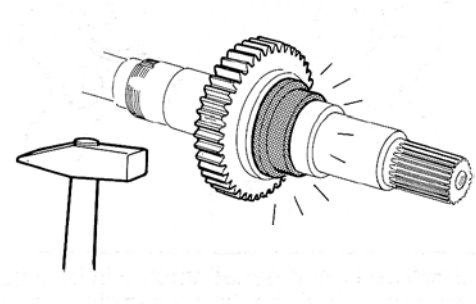


24 Remove the bearing retainer and extract the outer ring of the roller bearing from the bearing housing.

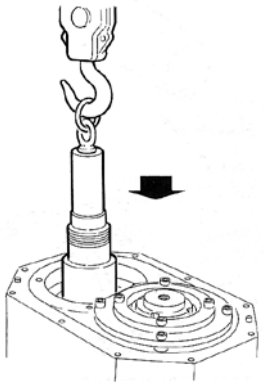
9.16.4 - Bearing housing assembly Mod. B550-B660-B680



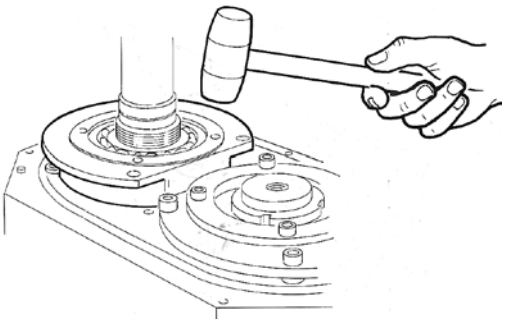
25 Assemble the outer rings of the roller bearings on the bearing housing, using a bearing retainer to set them axially, because no counterboring is arranged. Assemble the bearing retainer without seal rings.



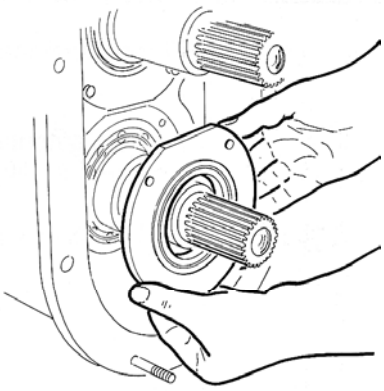
26 **USE GLOVES**. The inner ring of the roller bearing is assembled with a interference, therefore we suggest a shrink fitting, heating the ring in 90 °C oil bath, in order to avoid any seizure. Insert the gear keys in their seats with a lightly forced connection. **IMPORTANT**: Assemble the adjustable gear on the shaft, which will be set up on the pump.



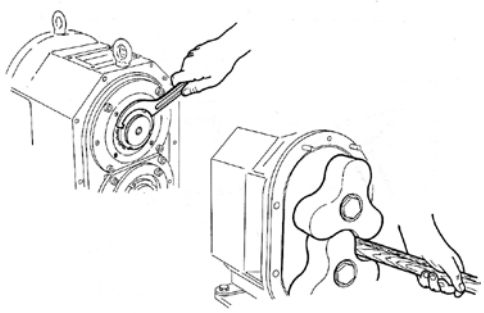
27 Assemble the shafts. If the gears heven't been removed from the shafts, respect the timing previously marked while re-assembling.



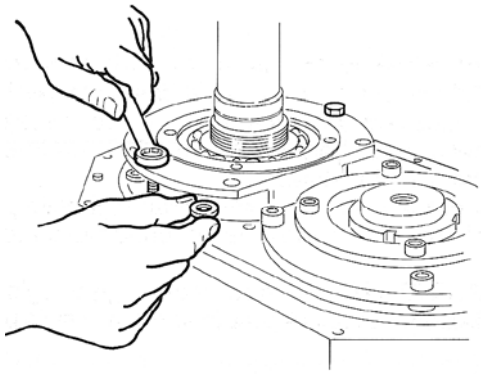
28 Insert the spacers (10) on the shafts and assemble the supports (75) with the ball bearings already connected. Set the spacers for axial adjustement (11) and tighten the screws.



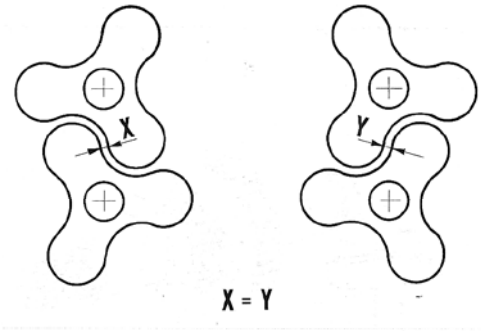
29 Assemble the seal rings (18) on bearings retainers (9).



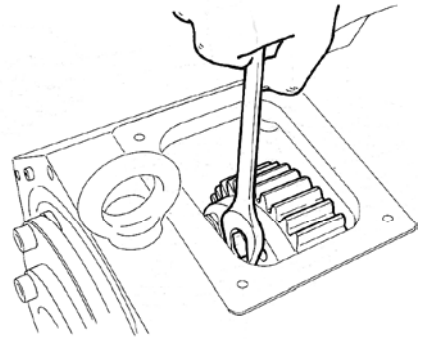
30 Assemble the rotor case as previuosly described; tighten the retainer ring nut with the corresponding lock washers and set rightly the retainer keys. In order to avoid turning during operation insert a non metal wedge between rotors.



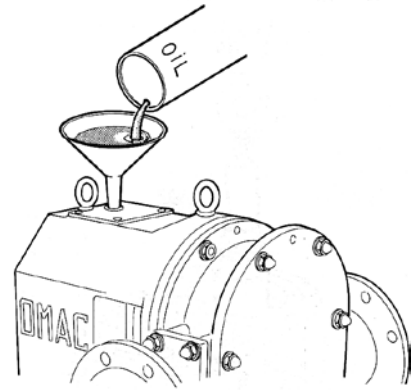
31 If clearance are not included in tolerances as per cap.4.3, untighten the screws which lock the back bearing supports, remove the spacers and adjust them according to the requested dimension.
N.B. a spacer set can be requested to the manufacturer company.



32 Time perfectly the rotors and tighten the screws of the adjustable gear gradually checking the rotor timing. You can reach the adjustable gear through a window arranged on the top of the bearing housing.



33 Tighten completely the adjustable gear screws taking care of the driving torque as described in chap.4.5
N.B. IN CASE OF RE-TIMING IT'S NECESSARY TO REPLACE THE PLANE WASHERS, CAVED BY PREVIOUSLY CLAMPING.



34 Assemble the gear cover, taking care to set the O-ring and insert the key on the shaft. Put into gear box the oil quantity as per chap. 4.12.

DRIVING SHAFT INVERSION - PUMP TYPE B550 - B6

1 - To invert the drive shaft position it's necessary to remove the shafts from bearing housing, as previously described. **IMPORTANT!** Ref. operation n°20: Mark the rotors B, the bearing supports (75) and the axial adjustement spacers (11) in order to re-set them rightly on the same shaft while re-assembling.

2 - Re-assemble the inverted shafts, each with the corresponding marked details on disassembly. The gears must mesh with the same gear and tooth space, previously marked, in order to respect timing.
Being completely assembled, check clearances and rotor timing are included in tolerance table as per cap.4.3.

10 TROUBLE SHOOTING GUIDE

No flow	Insufficient flow	Irregular flow	Pump loses prime	Pump blocks as soon as it starts	Pump gets overheated	Motor gets overheated	Pump absorbs too much power	Pump is noisy or vibrates	Rotors wear out	Seals wear out quickly	Pump seizes	INCONVENIENCES / CAUSES	REMEDIES
▪												Wrong rotation direction	1 Invert it
•												Unprimed pump	2 Fill pumping chamber and feeding piping with liquid, expelling air
•	•	•	•					•				Not enough flushed	3 Increase flushig height, enlarge suction piping diam, reduce suction piping lenght and bends, reduce pump speed and medium temperature, check the viscosity increase is suitable to motor power
	▪	•	•					▪				Product evaporates at inlet	4 Remedies as per par.3
	•	•	•					•				Air enters inlet	5 Check and tighten suction piping connections, tighten the packing gland, if necessary replace it.
▪	▪	•	•					▪				Air is suction piping	6 Remedies as per par.2
	▪	•	•					▪				Not enough flushed in suction container	7 Increase product level, lower suction opening position
▪	▪	•	•					▪				Dirty or blocked valve or suction filter	8 Clean them
			•	•	•	•	•	•				Excessive product viscosity	9 Reduce pump speed, increase product temperature
	•											Insufficient product viscosity	10 Increase pump speed, decrease product temperature
	•				•			•	•		•	Excessive product temperature	11 Decrease product temperature, cool pumping chamber
				▪		•	•					Insufficient product temperature	12 Increase product temperature, heat pumping chamber (within the limits given by manufacturer)
								•	•	•	•	Suspended particles in product	13 Clean suction pipe, arrange on inlet a filter
	▪			▪	▪	•	•		▪		•	Excessive back pressure	14 Remove possible obstructions in outlet piping, clean it, enlarge its diam., reduce lenghts and bends of outlet piping
					▪	•	•			•	•	Too tight packing	15 Loosen packing gland and tighten is rightly (see instructions)
	▪	•	•					▪				Too loose packing	16 Tighten packing gland rightly (see instructions)
										•		Insufficient seal liquid	17 Check liquid flow and if necessary increase it
		•	•			•	•	▪				Excessive pump speed	18 Decrease pump speed
	▪											Insufficient pump speed	19 Increase pump speed
					▪	•	•	▪	▪		•	Press on rotor case	20 Check piping alignment, insert flexible joints, sustain piping
	▪											Belts slips	21 Strech it
					▪	•	•	▪				Not alined joint	22 Adjust alignment between and drive device
								•				Pump or drive device not fixed on base	23 Tighten bolts, re-checking alignment
					▪	•	•	▪	▪		•	Worn out bearings	24 Have them replaced by manufacturer
				•	•	•	•	•	•		•	Worn out or unsynchronized gears	25 Replace them or adjust them according to manufacturer's instruction
					▪	•	•	▪			•	Wrong quantity or quality of gear oil	26 Act according to manufacturer's instructions
				▪	▪	•	•	▪	▪		•	Parts in touch rotor case	27 check plan pressure and duty pressure, contact manufacturer
	▪					•	•					Worn out rotors	28 Replace them
▪	▪				▪							Check valve leaks	29 Check valve adjustment, check and clean sealing devices, if necessary replace part
	▪							▪				Check valve vibrates	30 Check valve adjustment (see instruction), check and clean valve
	▪							▪				Check valve is bad adjusted	31 Adjust spring compression, so that opens with a pressure over 10% of duty pressure

11 WASTE DISPOSAL

11.1 - Waste disposal

11.1.1 - Waste definition

Waste means any substance and object deriving from human activities or natural cycles , abandoned or to be abandoned.

11.1.2 - Disposal

The collection of special and/or toxic-noxious waste must be entrusted through contract to expressly authorised companies and who actually transports the materials must possess the prescribed authorisation and must be registered at the haulage contractor roll.

11.2 - Machine demolition

11.2.1 - Foreword
Since there is a different observance method, in each Country the prescriptions enforced by the Laws and by the Bodies in charge by the Countries must be observed .

11.2.2. - Procedure
A) Disconnect the machine and disinstall it by following the operations described during installation backwards.
B) Refer carefully to the Laws in force in the Country of the user for what concerns environmental protection.
C) Activate according to what is prescribed by the Law, the inspection procedure of the Body in charge and the ensuing recording in the minutes of the demolition (remember that the machine is an asset).
D) Empty and store the tanks containing mechanical lubrication liquids and lubricants.
E) Disassemble the parts of the machine by grouping the components according to their chemical nature.
F) Scrap according to the provisions of the Law in force in the Country of the user.

Note
The disassembly operations must be carried out by qualified staff.

12 SPARE PARTS LIST

In order to check the pump type refer to data sheet (enclosure 1) or pump name plate.

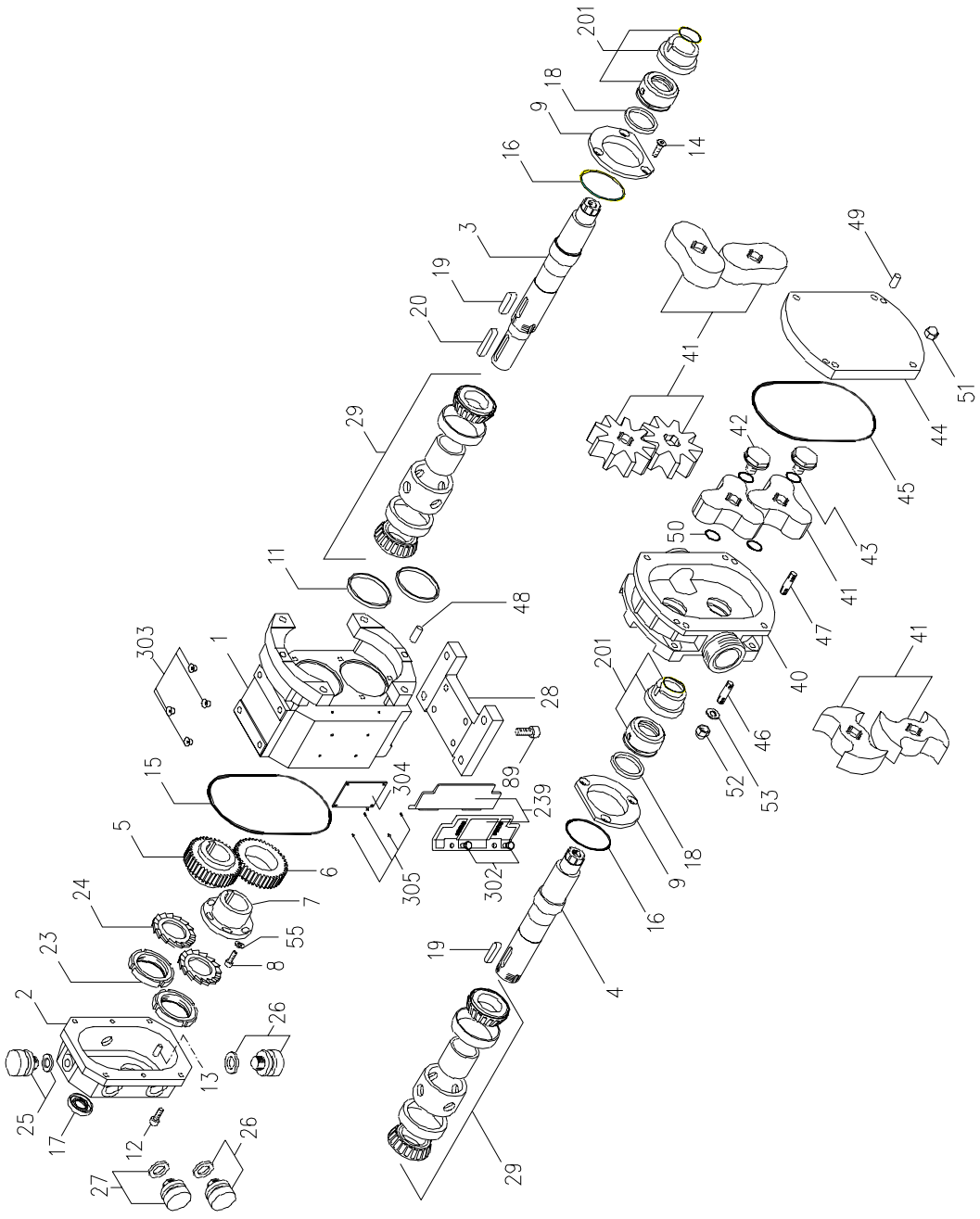


Fig.12.1 Pump type B105 - B110 - B115

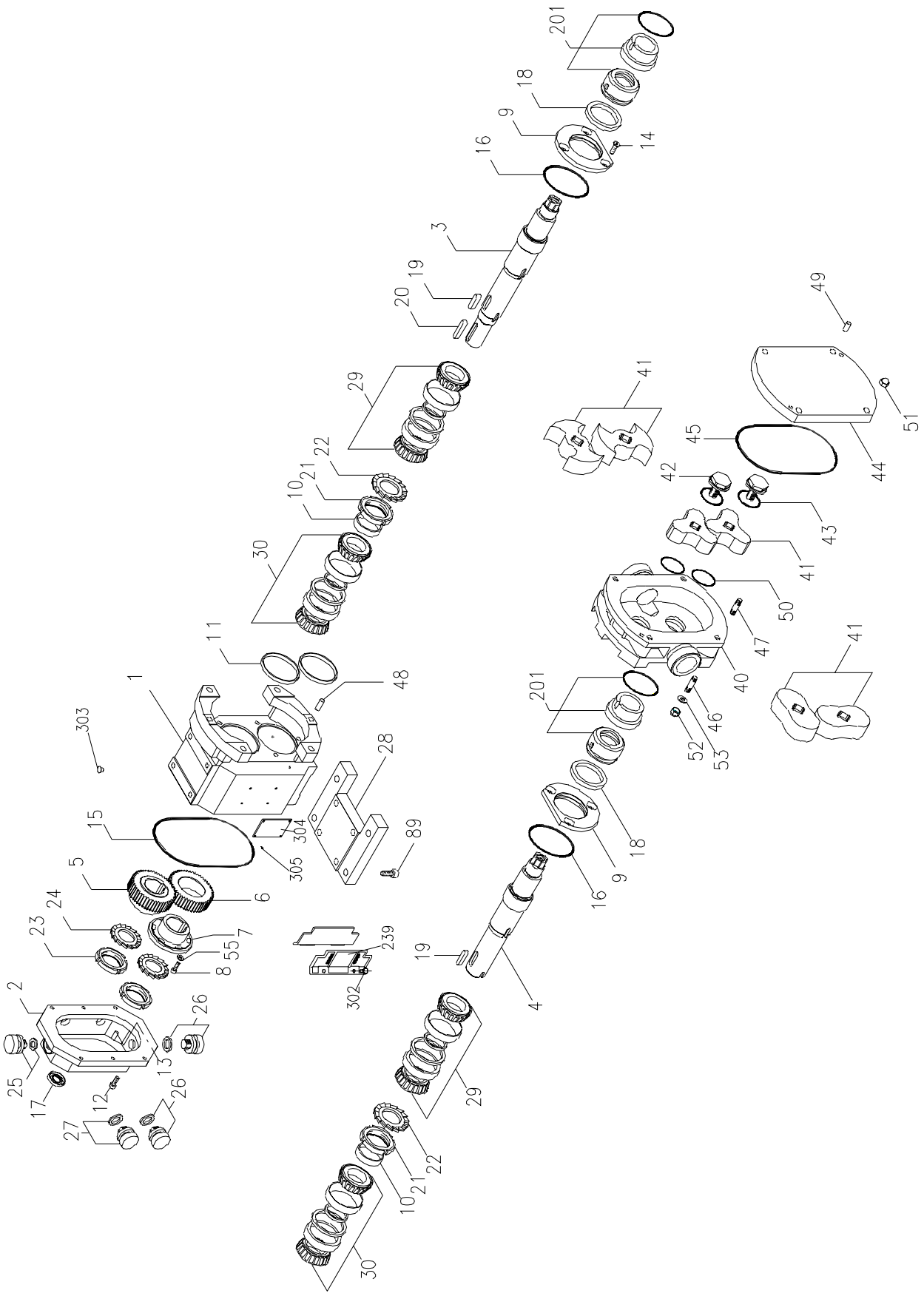


Fig.12.2 Pump type B215 - B220 - B325 - B330 - B390 - B430 - B440 - B470 - B490

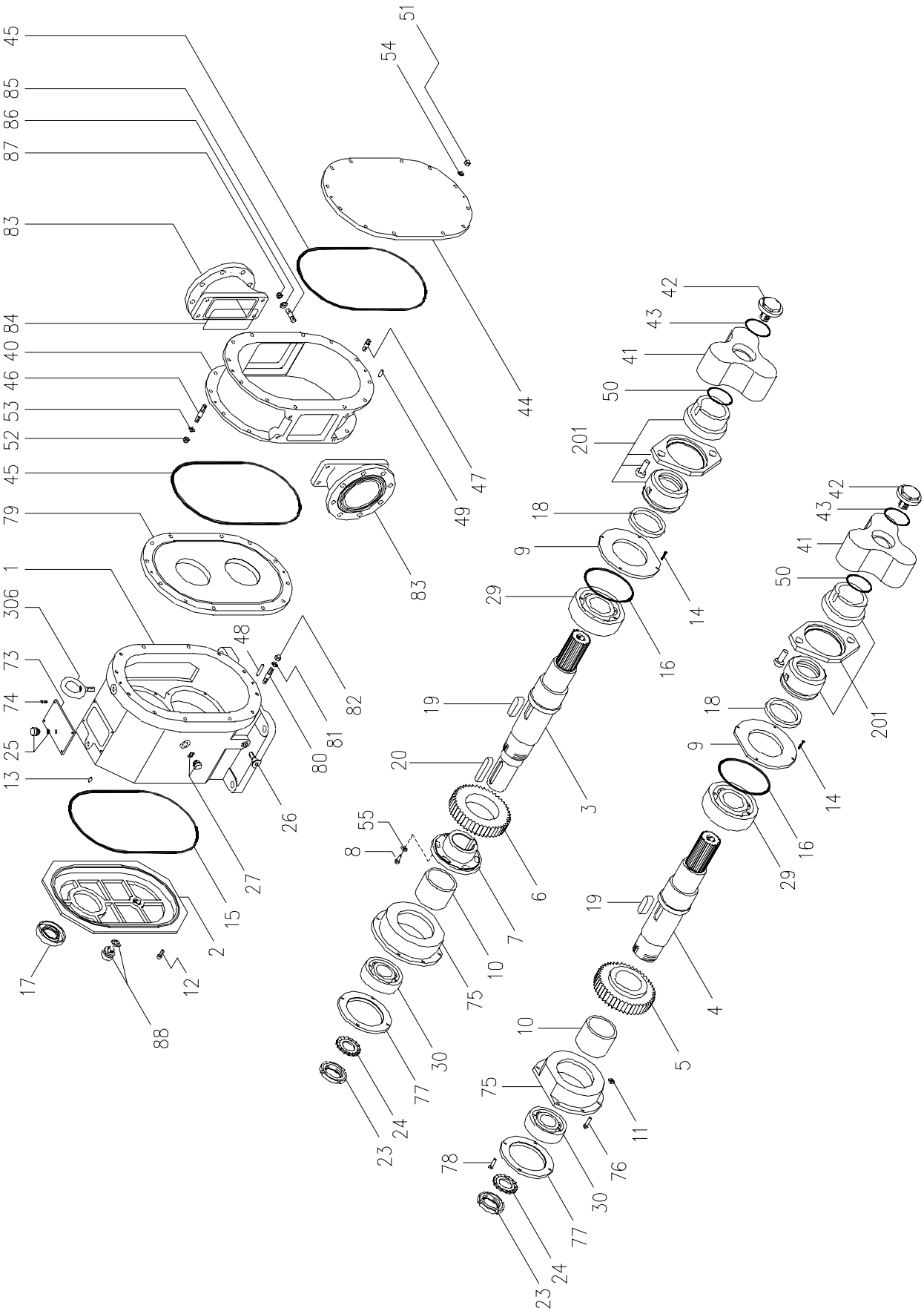


fig.12.3 Pump type B550 - B660 - B680

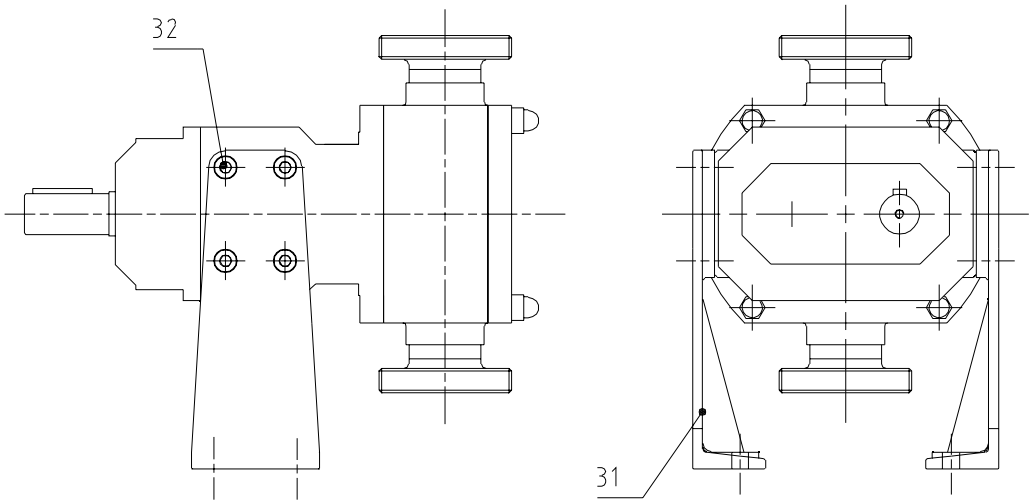


Fig.12.4 Pump with vertical feet

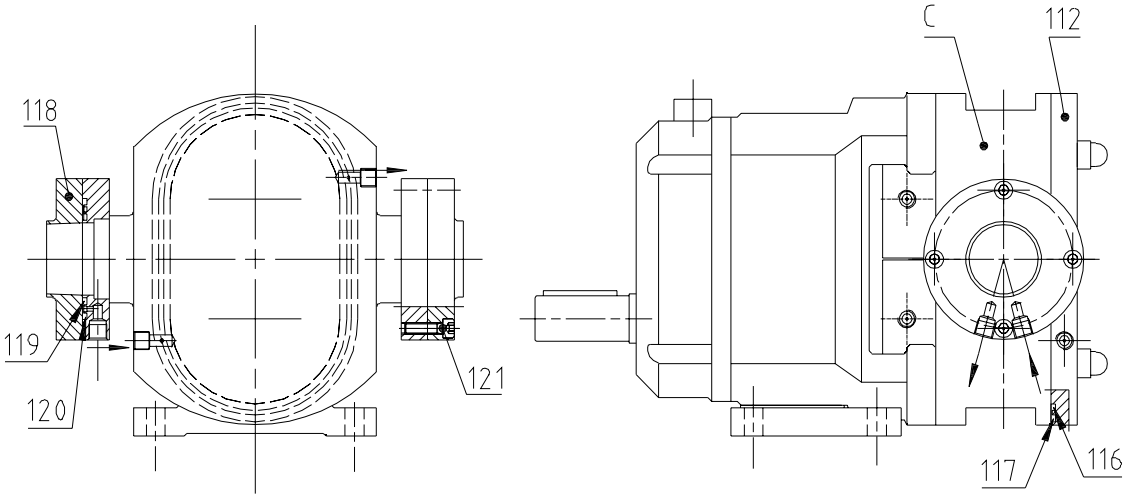


Fig.12.5 Aseptic version rotor case

Fig.12.6 End cover with jacketed

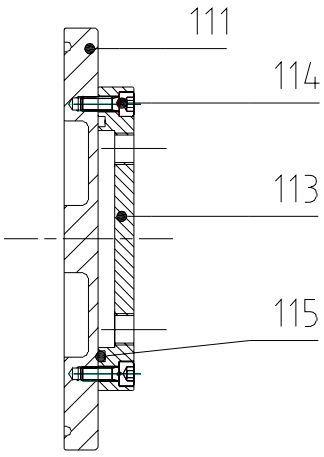
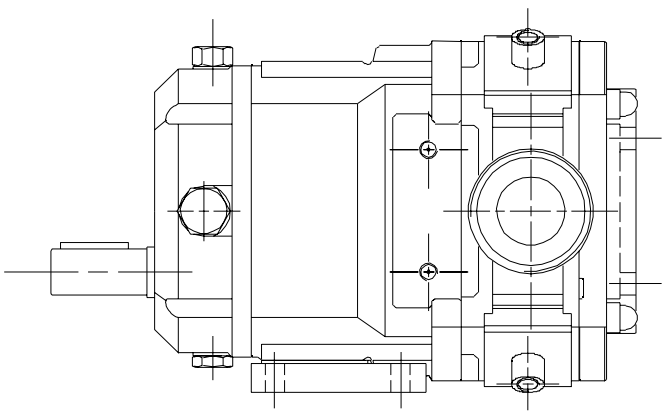


Fig.12.7 ***Rotor case with jacket***



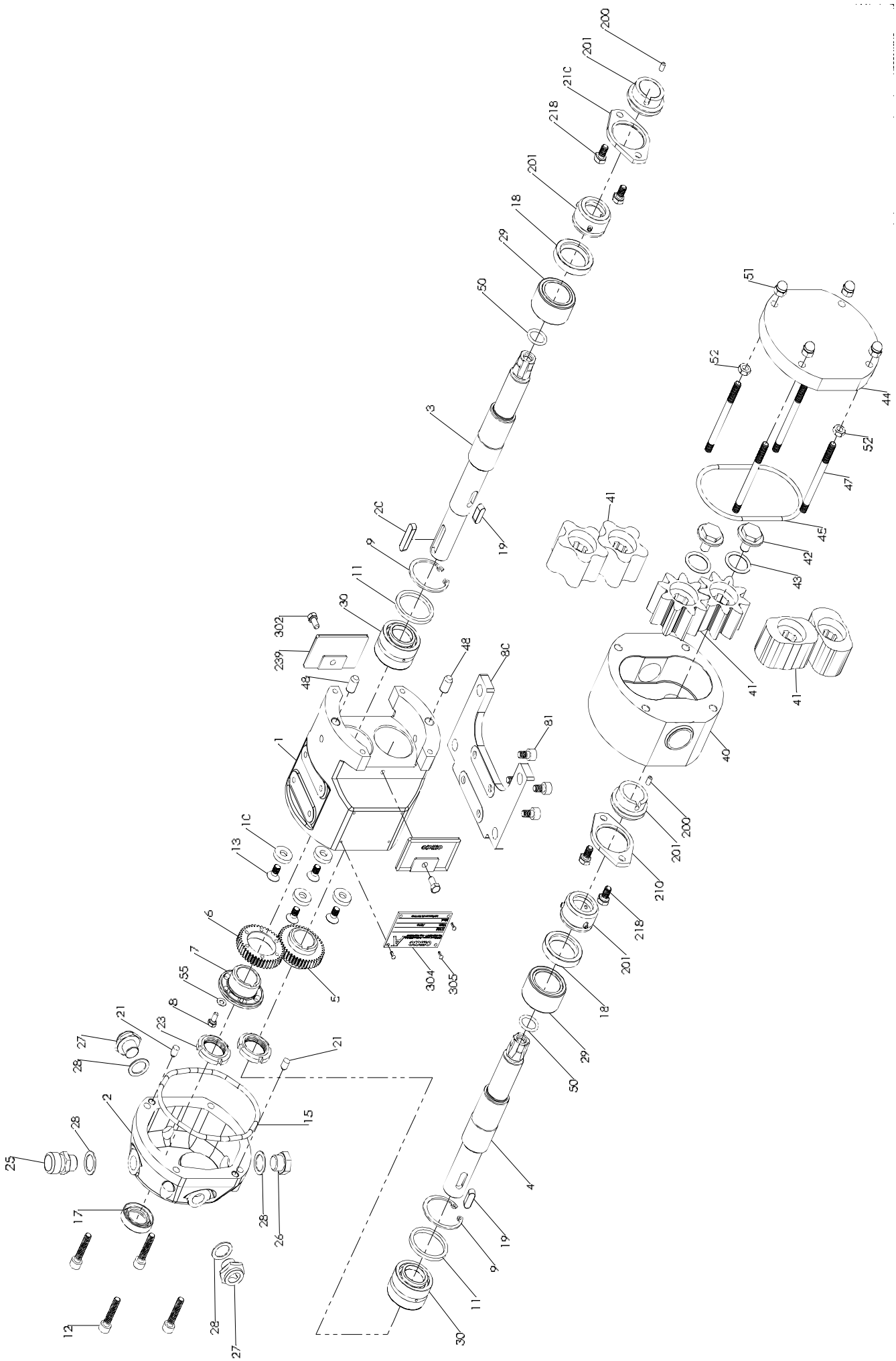


Fig.12.9 Pump type B100

Pos. N°	Description	Q.ty N°	Code
1	Bearing Housing G25	1	2001G010
2	Gear cover	1	2001L030
3	Standard driving shaft	1	2004B061
4	Standard driven shaft	1	2004B062
5	Fixed gear	1	2008M013
6	Adjustable gear	1	2008M017
7	Adjustable gear bush	1	2008M038
8	Screw	6	410A04x10
9	Split ring	2	421F37I
10	Plane washer	4	412F06G17
11	Axial adjustement spacer	2	2014M030
12	Screw	4	411A06x30
13	Screw	4	411F06x12Z
15	O-Ring cover seal	1	404T3350
17	Oil seal ring	1	403Y18307D
18	Oil seal ring	2	403Y25377D
19	Key	2	418F06x18
20	Key	1	418A06x30
21	End cover pin	2	417A06x10
23	Gear ring nut	2	415F20AUT
25	Oil cup vent	1	407L14S
26	Oil cap	1	407L14T
27	Inspection oil cap	2	407L14L
28	Plane washer	4	407L14R
29	Front bearing	2	2019M020
30	Rear bearing	2	406FNATB5904
40	Rotor case	1	23...B14
41	316 S.S. gear rotor ST	2	2005B806
41	316 S.S. 2 lobe ST	2	2005B089
41	Rubber coated 316 S.S. 5 lobe	2	2005B098
41	S.S. anti-seizure alloy gear rotor	2	2005&086
41	S.S. anti-seizure alloy 2 lobe	2	2005&089
42	Locking nut for rotor	2	2004B107
43	Locking nut O-ring for rotor	2	404T3075
44	Standard end cover	1	2006B007
45	Cover O-Ring	1	404T4337
47	Stud	4	419A06x80
48	Pin	2	417A08x16
50	O-ring	2	404T2050
51	Cap nut	4	414A06
52	Nut	2	413A06
55	Plane washer	6	412F04
56	By-Pass support	1	2013L019
56/1	Bush support	1	2013B050
57	By-Pass piston	1	2013B057
58	By-Pass cover	1	2013L018
59	By-Pass adjustement screw	1	2013B058
60	Thrust washer	1	2013L017
61	Adjustement ring nut	1	2013A021

Pos. N°	Description	Q.ty N°	Code
62	By-Pass adjustement retainer	1	2013L020
63	Screw	4	411A06x55
65	Screw	2	420A05x06
66	Split ring	1	421A025I
67	Split ring	1	421A10E
68	O-ring	1	404T4118
69	O-ring	1	404T4150
70	Lock By-Pass piston	1	411A05x05
71	Spring	1	Vedi tap pag.16
72	End cover for By-Pass	1	2006B025
80	Foot	1	2001G100
81	Foot screw	4	411A06X10
111	End cover for heating version	1	2006B058
113	End cover jacket	1	2006B167
114	Screw	4	411A06x16
115	O-Ring	1	404T176
200	Retainer pin	2	2014B200
201	Mechanical seal UNITEN 7K-X7XZ7-HX	2	4U020U7KXZ7
201	Mechanical seal UNITEN 7K-X7XZ7-HX	2	4U020U7KXZY
201	Mechanical seal UNITEN 7K-XFXZ5-HX	2	4U020U7KXZ5
201	Mechanical seal UNITEN 7K-X73Z7-HX	2	4U020U7K3Z7
201	Mechanical seal UNITEN 7K-XY3ZY-HX	2	4U020U7K3ZY
201	Mechanical seal UNITEN 7K-XF3Z5-HX	2	4U020U7K3Z5
201	Mechanical seal UNITEN 7K-X7337-HX	2	4U020U7K337
201	Mechanical seal UNITEN 7K-XY33Y-HX	2	4U020U7K33Y
201	Mechanical seal UNITEN 7K-XF335-HX	2	4U020U7K335
201	Mechanical seal UNITEN 7K-XYDKKY-HX	2	4U020U7KKKY
210	Balancing ring for seal	2	2014B015
218	Screw	4	410A06x12
239	Seal protection	2	4034Y005
240	Viton° seal ring	4	402V35255
240	EPDM seal ring	4	402U35255
240	SINTEK H-TPU polymer lip seal	2	402Q35256
240	HN Elring lip seal	2	402HN25357
241	Stuffing box - SINTEK H-TPU - HN ELRING - UM seal bush	2	2004B170
242	Bush O-Ring	2	404T3081
243	Screw	6	420A05x05
244	Seal ring support	2	2014B058
244	SINTEK H-TPU / HN ELRING lip seal suopport	2	2014B065
245	Screw for flange S1 / HN ELRING / TE	4	410A06x12
246	Screw	4	410A06x14
280	Packing ring kit	1	205P25355
288	Register	2	2014B108
289	Screw	4	410A06x16
295	Spacer	2	2014B045
302	Screw	2	410A05x10
304	Name plate	1	4034A100
305	Rivet	4	44301027

POS. No.	DESCRIPTION	Q.ty No.	PART No. BY MODEL													
			B105	B110	B115	B215	B220	B325	B330	B390	B430	B440	B470	B490	B550	B660
1	BEARING HOUSING	1	2001G001	2001G301	2001G001	2001G002	2001G002	2001G003	2001G003	2001G003	2001G004	2001G004	2001G008	2001G008	2001G005	2001G006
2	GEAR COVER	1	2001L031	2001L031	2001L031	2001L032	2001L032	2001L033	2001L033	2001L033	2001L034	2001L034	2001L038	2001L038	2001G035	2001G036
3	STANDARD DRIVING SHAFT	1	2004B001	2004B001	2004B002	2004B003	2004B004	2004B005	2004B006	2004B006	2004B007	2004B008	2004B063	2004B065	2004B010	2004B012
3	DUPLEX DRIVING SHAFT	1	2004D001	2004D001	2004D002	2004D003	2004D004	2004D005	2004D006	2004D006	2004D007	2004D008	2004D009	2004D010	-	2004D011
3	DOUBLE FLUSH MECH.SEAL DRIVING SHAFT	1	2004D015	2004D015	2004D016	2004D017	2004D018	2004D019	2004D020	-	2004D021	2004D022	2004D023	2004D024	-	-
4	STANDARD DRIVEN SHAFT	1	2004B029	2004B029	2004B030	2004B031	2004B032	2004B033	2004B034	2004B034	2004B035	2004B036	2004B064	2004B066	2004B038	2004B039
4	DUPLEX DRIVEN SHAFT	1	2004D029	2004D029	2004D030	2004D031	2004D032	2004D033	2004D034	2004D034	2004D035	2004D036	2004D037	2004D038	-	2004D039
4	DOUBLE FLUSH MECH.SEAL DRIVEN SHAFT	1	2004D045	2004D045	2004D046	2004D047	2004D048	2004D049	2004D050	-	2004D051	2004D052	2004D053	2004D054	-	-
5	FIXED GEAR	1	2008M001	2008M001	2008M001	2008M002	2008M002	2008M003	2008M003	2008M003	2008M004	2008M004	2008M014	2008M014	2008M005	2008M006
6	ADJUSTABLE GEAR	1	2008M007	2008M007	2008M007	2008M007	2008M008	2008M009	2008M009	2008M009	2008M010	2008M010	2008M015	2008M015	2008M011	2008M012
7	ADJUSTABLE GEAR BUSH	1	2008M031	2008M031	2008M031	2008M031	2008M032	2008M033	2008M033	2008M033	2008M034	2008M034	2008M037	2008M037	2008M035	2008M036
8	SCREW	6	411A05X14	411A05X14	411A05X14	411A06X16	411A06X16	411A08X20	411A08X20	411A08X20	411A10X25	411A10X25	411A10X30	411A10X30	410A12X35	410A16X45
9	BEARING RETAINER	2	2001C051	2001C051	2001C051	2001C052	2001C052	2001C053	2001C053	2001C053	2001C054	2001C054	2001C057	2001C057	2001C055	2001C056
10	BEARING SPACER	2	-	-	-	-	2014M021	-	-	-	-	-	-	-	2014M022	2014M023
11	AXIAL ADJUSTMENT SPACER	2	2014M024	2014M024	2014M024	2014M025	2014M025	2014M026	2014M026	2014M026	2014M027	2014M027	2014M044	2014M044	2014M028	2014M029
12	SCREW	4	411A06X16	411A06X16	411A06X16	411A08X20	411A08X20	411A08X25	411A08X25	411A08X25	411A10X30	411A10X30	411A10X30	411A10X30	411A08X20	411A10X30
13	GEAR COVER PIN	2	417A06X15	417A06X15	417A06X15	417A06X14	417A06X14	417A06X16	417A06X16	417A06X16	417A6X16	417A6X16	417A08X16	417A08X16	417A08X16	417A10X30
14	SCREW	6	411A06X16S	411A06X16S	411A06X16S	411A08X20S	411A08X20S	411A08X20S	411A08X20S	411A08X20S	411A10X25S	411A10X25S	411A10X25S	411A10X25S	411A08X20	411A10X30
15	GEAR COVER O-RING	1	404T4437	404T4437	404T4437	404T4562	404T4562	404T4675	404T4675	404T4675	404T4900	404T4900	404T81050	404T81050	404T001	404T002
16	BEARING RETAINER O-RING	2	404T3218	404T3218	404T3218	404T3268	404T3268	404T4312	404T4312	404T4312	404T4437	404T4437	404T4500	404T4500	404T4562	404T4875
17	OIL SEAL RING	1	403Y26377D	403Y26377D	403Y26377D	403Y32457	403Y32457	403Y37528	403Y37528	403Y37528	403Y37528	403Y55721OD	403Y55721OD	403Y85851OD	403Y80901O	403Y80128120
18	OIL SEAL RING	2	403Y55570D	403Y55570D	403Y55570D	403Y45800D	403Y45800D	403Y60750D	403Y60750D	403Y60750D	403Y60800D	403Y60800D	403Y80110120	403Y80110120	403Y80110120	403Y12015012D
19	KEY	2	418F08X30M	418F08X30M	418F08X30M	418F08X30M	418F10X30M	418F12X40M	418F12X40M	418F12X40M	418F18X50M	418F18X50M	418F20X60M	418F20X60M	418F28X80M	418F28X80M
20	KEY	1	418F08X40	418F08X40	418F08X40	418F08X40	418F08X40	418F10X50	418F10X50	418F10X50	418F14X70	418F14X70	418F16X90	418F16X90	418F16X90	418F22X120
21	BEARING RING NUT	2	-	-	-	415F40	415F40	415F50	415F50	415F50	415F70	415F70	415F80	415F80	-	-
22	WASHER	2	-	-	-	416F40	416F40	416F50	416F50	416F50	416F70	416F70	416F80	416F80	-	-
23	GEAR RING NUT	2	415F30	415F30	415F30	415F35	415F35	415F40	415F40	415F40	415F60	415F60	415F70	415F70	415F70	415F100
24	WASHER	2	416F30	416F30	416F30	416F35	416F35	416F40	416F40	416F40	416F60	416F60	416F70	416F70	416F70	416F100
25	OIL VENT CAP	1	407L14S	407L14S	407L14S	407L12S	407L12S	407L12S	407L12S	407L12S	407L12S	407L12S	407L12S	407L12S	407L12S	407L12S
26	OIL CAP	2	407L14T	407L14T	407L14T	407L12T	407L12T	407L12T	407L12T	407L12T	407L12T	407L12T	407L12T	407L12T	407L38T	407L12T
27	OIL LEVEL	1	407L38L	407L38L	407L38L	407L12L	407L12L	407L12L	407L12L	407L12L	407L12L	407L12L	407L12L	417L12L	407L34L	407L1L
28	FOOT	1	2001G101	2001G101	2001G101	2001G102	2001G102	2001G103	2001G103	2001G103	2001G104	2001G104	2001G106	2001G105	-	-
29	ASSEMBLED FRONT BEARING	2	2019M001	2019M001	2019M001	2019M002	2019M002	2019M003	2019M003	2019M003	2019M004	2019M004	2019M008	2019M008	406FNJ2216E	406FNJ224
30	ASSEMBLED REAR BEARING	2	-	-	-	2019MW05	2019MW05	2019MW02	2019MW02	2019MW02	2019MW03	2019MW03	2019MW04	2019MW04	406F3214	406F3220
31	VERTICAL FOOT	2	2001A301	2001A301	2001A301	2001A302	2001A302	2001A303	2001A303	2001A303	2001A304	2001A304	2001A305	2001A305	-	-
32	SCREW	8	411A08X20	411A08X20	411A08X20	411A10X20	411A10X20	411A12X25	411A12X25	411A12X25	411A14X30	411A14X30	411A20X40	411A20X40	-	-
33	COUNTERFLANGE FOR ENLARGED INLET PORT	1	-	-	-	2006B045	2006B046	-	-	2006B047	-	-	2006B048	-	2006B049	-
34	O-RING	1	-	-	-	404T3281	-	-	404T4500	-	-	404T4650	-	404T4725	-	-
40	ROTOR CASE (1)	1	23 01	23 02	23 03	23 04	23 05	23 06	23 07	23 17	23 08	23 09	23 15	23 16	23 11	23 13
41	316 STAINLESS STEEL 3 LOBE ST	2	-	2005B002	2005B003	2005B004	2005B005	2005B006	2005B007	2005B096	2005B008	2005B009	2005B090	2005B092	2005B011	2005B012
41	316 STAINLESS STEEL 2 LOBE ST	2	-	2005B026	2005B027	2005B028	2005B029	2005B030	2005B031		2005B032	2005B033	2005B094	2005B095	2005B035	2005B036
41	316 STAINLESS STEEL 3 LOBE ST	2	-	-	2005B014	2005B015	2005B016	2005B017	2005B018	2005B019		2005B020	2005B021	2005B046	2005B023	2005B024
41	316 STAINLESS STEEL 2 LOBE SM	2	-	2005B038	2005B039	2005B040	2005B041	2005B042	2005B043		2005B044	2005B045	2005B048	2005B049	2005B102	2005B048
41	RUBBER COATED 316 S.S. 3(5) LOBE	2	2005B099	2005B050	2005B051	2005B052	2005B053	2005B054	2005B055		2005B056	2005B057	-	-	2005B059	2005B060
41	RUBBER COATED 316 S.S. 2 LOBE	2	-	2005B062	2005B063	2005B064	2005B065	2005B066	2005B067		2005B068	2005B069	2005B096	2005B097	2005B071	2005B072
41	ANTI-SEIZURE ALLOY DUAL WING ROT.PISTON	2	2005&087	2005&074	2005&075	2005&076	2005&077	2005&078	2005&079		2005&080	2005&081	2005&082	2005&083	2005&084	2005&085
41	ANTI SEIZURE ALLOY 3 LOBE	2	-	2005&002	2005&003	2005&004	2005&005	2005&006	2005&007	-	2005&008	2005&009	-	-	2005&011	2005&012
41	316 STAINLESS STEEL GEAR ROTOR	2	2005B001	-	-	-	-	-	-	-	-	-	-	-	-	-
41	ANTI SEIZURE ALLOY GEAR ROTOR	2	2005&001	-	-	-	-	-	-	-	-	-	-	-	-	-
42	LOCKING NUT FOR STANDARD ROTOR	2	2004B101	2004B101	2004B101	2004B102	2004B102	2004B103	2004B103	2004B125	2004B104	2004B104	2004B104	2004B104	2004B105	2004B106

(1) FOR B5-B6

(2) FOR B470-B490-B5-B6

POS. No.	DESCRIPTION	Q.ty No.	PART No. BY MODEL														
			B105	B110	B115	B215	B220	B325	B330	B390	B430	B440	B470	B490	B550	B660	B680
43	O-RING	2	4D4T3100	4D4T3100	4D4T3100	4D4T3118	4D4T3118	4D4T3162	4D4T3162	4D4T3162	4D4T3200	4D4T3200	4D4T3200	4D4T3200	4D4T3225	4D4T4350	4D4T4350
44	STANDARD FRONT COVER	1	2D06B009	2D06B001	2D06B001	2D06B002	2D06B002	2D06B003	2D06B003	2D06B003	2D06B004	2D06B004	2D06B008	2D06B008	2D06B005	2D06B006	2D06B006
45	COVER O-RING	1	4041201	4041 4525	4041 4525	4041 4625	4041 4625	4041 4750	4041 4750	4041 4750	4041 81025	4041 81025	4041 81175	4041 81175	4041 003	4041 61900	4041 61900
46	BACK STUD	4	419AD8X31	419AD8X31	419AD8X31	419A10X39	419A10X39	419A12X46	419A12X46	419A12X46	419A16X55	419A16X55	419A20X70	419A20X70	419A14X53	419A14X85	419A14X85
47	FRONT STUD	8 (2) 12	419AD8X33	419AD8X33	419AD8X33	419A10X39	419A10X39	419A10X39	419A10X39	419A10X39	419A12X46	419A12X46	419A14X55	419A14X55	419A12X46	419A14X52	419A14X52
48	BACK PIN	2	417AD8X20	417AD8X20	417AD8X20	417A10X20	417A10X20	417A12X25	417A12X25	417A12X25	417A12X25	417A12X25	417A16X40	417A16X40	417A14X30	417A10X55	417A10X55
49	FRONT PIN	2	417AD8X16	417AD8X16	417AD8X16	417AD8X16	417AD8X16	417AD8X16	417AD8X16	417AD8X16	417A08X16	417A08X16	417A08X16	417A10X20	417A10X20	417A10X30	417A10X30
50	O-RING	2	4041208/	4041208/	4041208/	4041 2106	4041 2106	4041 3143	4041 3143	4041 3143	4041 3187	4041 3187	4041 3187	4041 3187	4041 3200	4041 4312	4041 4312
51	CAP NUT	8 (2) 12	414AD8	414AD8	414AD8	414A10	414A10	414A10	414A10	414A10	414A12	414A12	414A14	414A14	414A12	414A14	414A14
52	CAP NUT	2 (1) 4	414AD8	414AD8	414AD8	414A10	414A10	414A12	414A12	414A12	414A16	414A16	414A20	414A20	414A14	414A14	414A14
53	PLANE WASHER	4	412AD8	412AD8	412AD8	412A10	412A10	412A12	412A12	412A12	412A16	412A16	412A20	412A20	412A14	412A14	412A14
54	PLANE WASHER	12	-	-	-	-	-	-	-	-	-	-	-	-	412A12	412A14	412A14
55	PLANE WASHER	6	412F05	412F05	412F05	412F06	412F06	412F08	412F08	412F08	412F10	412F10	412F10	412F10	412F12	412F16	412F16
	BY-PASS - COMPLETE RELIEF VALVE	1	2D13B001	2D13B001	2D13B001	2D13B002	2D13B002	2D13B003	2D13B003	2D13B003	2D13B004	2D13B004	2D13B021	2D13B021			
56	BY-PASS SUPPORT	1	2D13LD21	2D13LD21	2D13LD21	2D13LD21	2D13LD21	2D13LD22	2D13LD22	2D13LD22	2D13LD23	2D13LD23	2D13B047	2D13B047			
56/1	BUSH BY-PASS SUPPORT	1	2D13B040	2D13B040	2D13B040	2D13B040	2D13B040	2D13B041	2D13B041	2D13B041	2D13B042	2D13B042	2D13B042	2D13B042			
57	BY-PASS PISTON	1	2D13B025	2D13B025	2D13B025	2D13B026	2D13B026	2D13B027	2D13B027	2D13B027	2D13B028	2D13B028	2D13B048	2D13B048			
58	BY-PASS COVER	1	2D13LD29	2D13LD29	2D13LD29	2D13LD29	2D13LD29	2D13LD29	2D13LD29	2D13LD29	2D13LD30	2D13LD30	2D13A027	2D13A027			
59	BY-PASS ADJUSTMENT SCREW	1	2D13B031	2D13B031	2D13B031	2D13B031	2D13B031	2D13B031	2D13B031	2D13B031	2D13B031	2D13B031	2D13A028	2D13A028			
60	THRUST WASHER	1	2D13LD32	2D13LD32	2D13LD32	2D13LD32	2D13LD32	2D13LD32	2D13LD32	2D13LD32	2D13LD33	2D13LD33	2D13A026	2D13A026			
61	ADJUSTMENT RING NUT	1	2D13A034	2D13A034	2D13A034	2D13A034	2D13A034	2D13A034	2D13A34	2D13A34	2D13A035	2D13A035	2D13A038	2D13A038			
62	BY-PASS ADJUSTMENT RETAINER	1	2D13LD36	2D13LD36	2D13LD36	2D13LD36	2D13LD36	2D13LD36	2D13LD36	2D13LD36	2D13LD36	2D13LD36	2D13A025	2D13A025			
63	SCREW	4-6 (2)	411A06X20	411A06X20	411A06X20	411A06X20	411A06X20	411A08X35	411A08X35	411A08X35	411A10X40	411A10X40	411A08X50	411A08X50			
64	SCREW	4	411A06X55	411A06X55	411A06X55	411A06X55	411A06X55	411A06X55	411A06X55	411A06X55	411A08X60	411A08X60	411A08X70	411A08X70			
65	SCREW	2	420A06XD6	420A06XD6	420A06XD6	420A06XD6	420A06XD6	420A06XD6	420A06XD6	420A06XD6	420A06X06	420A06X06	420A06XD6	420A06XD6			
66	SPLIT RING (SEEGER)	1	421A38I	421A38I	421A38I	421A38I	421A38I	421A38I	421A38I	421A38I	421A52I	421A52I	421A63I	421A63I			
67	SPLIT RING (SEEGER)	1	421A16E	421A16E	421A16E	421A16E	421A16E	421A16E	421A16E	421A16E	421A16E	421A16E	421A34E	421A34E			
68	O-RING	1	4D4T4200	4D4T4200	4D4T4200	4D4T4200	4D4T4200	4D4T6275	4D4T6275	4D4T6275	4D4T189	4D4T189	4D4T208	4D4T208			
69	O-RING	1	4D4T3250	4D4T3250	4D4T3250	4D4T3250	4D4T3250	4D4T4337	4D4T4337	4D4T4337	4D4T4462	4D4T4462	4D4T4600	4D4T4600			
70	LOCK BY-PASS PISTON	1	411A06X10	411A06X10	411A06X10	411A06X10	411A06X10	411A06X10	411A06X10	411A06X10	411A06X10	411A06X10	411A06X10	418A20X56	418A20X56		
71	SPRING	1	SEE TABLE PAG.16														
72	END COVER FOR BY-PASS	1	2D06B031	2D06B031	2D06B031	2D06B032	2D06B032	2D06B033	2D06B033	2D06B033	2D06B034	2D06B034	2D06B029	2D06B029			
73	INSPECTION COVER	1													2D01L221	2D01L222	2D01L222
74	TCEI SCREW	4													411A06X16	411A06X16	411A06X16
75	BEARING SUPPORT	2													2D01G150	2D01G151	2D01G151
76	TCEI SCREW	8													411A10X30	411A12X40	411A12X40
77	BACKBULL RING	2													2D01F201	2D01F202	2D01F202
78	TCEI SCREW	8													411A10X30	411A12X35	411A12X35
79	SEAL FLANGE B5-B6	1														2D06B132	2D06B132
80	STUD	4-8 (1)														419A14X75	419A14X75
81	PLANE WASHER	4-8 (1)														412A14	412A14
82	CAP NUT	4-8 (1)														414A14	414A14
83	FLANGED PORT	2														2D06B152	2D06B153
84	PORT O-RING	2														4D4T005	4D4T8850
85	STUD	8														419A16X60	419A16X60
86	PLANE WASHER	8	-	-	-	-	-	-	-	-	-	-	-	-	-	412A16	412A16
87	CAP NUT	8	-	-	-	-	-	-	-	-	-	-	-	-	-	414A16	414A16
88	OIL CLOSE CAP	1	-	-	-	-	-	-	-	-	-	-	-	-	407L34T	407L1T	407L1T
89	SCREW	4	411A08X20	411A08X20	411A08X20	411A10X25	411A10X25	411A12X35	411A12X35	411A12X35	411A14X35	411A14X35	411A20X50	411A20X50	-	-	-
91	PNEUMATIC BY-PASS SUPPORT	1	2013B039	2013B039	2013B039	2013B039	2013B039	2013B032	2013B032	2013B032	2013B036	2013B036	2013B043	2013B043			

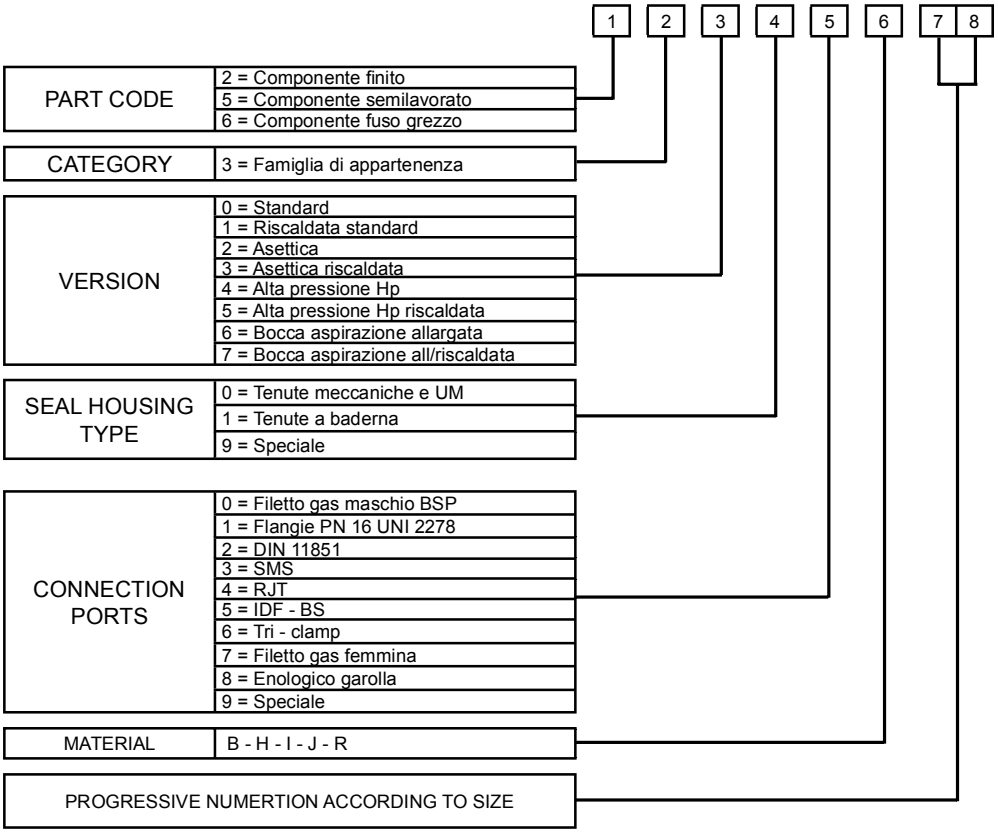
(1) FOR B6 (2) FOR B1-B2 (3) FOR B470-B490-B570 (5) PER B5-B6

POS. No.	DESCRIPTION	Q.ty No.	PART No. BY MODEL														
			B105	B110	B115	B215	B220	B325	B330	B390	B430	B440	B470	B490	B550	B660	B680
92	TCEI SCREW	4	411A06X35	411A06X35	411A06X35	411A06X35	411A06X35	411A08X40	411A08X40	411A08X40	411A10X40	411A10X40	411A08X40	411A08X40			
93	SUPPORT O-RING	1	404T3250	404T3250	404T3250	404T3250	404T3250	404T4337	404T4337	404T4337	404T4462	404T4462	404T4600	404T4600			
94	PNEUMATIC BY-PASS PISTON	1	2013B029	2013B029	2013B029	2013B030	2013B030	2013B035	2013B035	2013B035	2013B038	2013B038	2013B045	2013B045			
95	KEY	1	418A14X30	418A14X30	418A14X30	418A14X30	418A14X30	418A14X30	418A14X30	418A14X30	418A14X30	418A14X30	418A18X50	418A18X50			
96	PISTON O-RING	1	404T4200	404T4200	404T4200	404T4200	404T4200	404T6275	404T6275	404T6275	404T189	404T189	404T208	404T208			
97	ADJUSTMENT RING NUT	1	2013A034	2013A034	2013A034	2013A034	2013A034	2013A034	2013A034	2013A034	2013A034	2013A034	2013A038	2013A038			
98	SCREW	2	420A05X06	420A05X06	420A05X06	420A05X06	420A05X06	420A05X06	420A05X06	420A05X06	420A05X06	420A05X06	420A06X08	420A06X08			
99	PNEUMATIC BY-PASS COVER	1	2013A032	2013A032	2013A032	2013A032	2013A032	2013A030	2013A030	2013A030	2013A031	2013A031	2013A029	2013A029			
100	BACK COVER O-RING	1	404T4275	404T4275	404T4275	404T4275	404T4275	404T4275	404T4275	404T4275	404T4312	404T4312	404T4425	404T4425			
101	FRONT COVER O-RING	1	404T4312	404T4312	404T4312	404T4312	404T4312	404T4312	404T4312	404T4312	404T4475	404T4475	404T4600	404T4600			
102	PISTON COVER O-RING	1	404T134	404T134	404T134	404T134	404T134	404T134	404T134	404T134	404T134	404T134	404T4131	404T4131			
103	PNEUMATIC BY-PASS JACKET	1	2013A035	2013A035	2013A035	2013A035	2013A035	2013A036	2013A036	2013A036	2013A037	2013A037	2013A039	2013A039			
104	SCREW	[illegible]	411A06X110	411A06X110	411A06X110	411A06X110	411A06X110	411A08X130	411A08X130	411A08X130	411A10X130	411A10X130	411A08X130	411A08X130			
105	THRUST RING	1	2013L024	2013L024	2013L024	2013L024	2013L024	2013L024	2013L024	2013L024	2013L025	2013L025	2013L026	2013L026			
106	PISTON ROD-THRUST O-RING	1	404T119	404T119	404T119	404T119	404T119	404T119	404T119	404T119	404T119	404T119	404T4075	404T4075			
107	THRUST-JACKET O-RING	1	404T6300	404T6300	404T6300	404T6300	404T6300	404T6300	404T6300	404T6300	404T8450	404T8450	404T8562	404T8562			
108	RING NUT	2	415F20AUT	415F20AUT	415F20AUT	415F20AUT	415F20AUT	415F20AUT	415F20AUT	415F20AUT	415F20AUT	415F20AUT	415F25AUT	415F25AUT			
111	END COVER FOR HEATING VERSION	1	2006B059	2006B051	2006B051	2006B052	2006B052	2006B053	2006B053	2006B053	2006B054	2006B054	2006B057	2006B057	2006B055	2006B056	2006B056
112	END COVER FOR ASEPTIC VERSION	1	2006B101	2006B101	2006B101	2006B102	2006B102	2006B103	2006B103	2006B103	2006B104	2006B104	2006B105	2006B105	-	-	-
113	END COVER JACKET	1	2006B161	2006B161	2006B161	2006B162	2006B162	2006B162	2006B162	2006B162	2006B164	2006B164	2006B168	2006B168	2006B168	2006B166	2006B166
114	TCEI SCREW	4-6[2]	411A06X16	411A06X16	411A06X16	411A06X16	411A06X16	411A06X16	411A06X16	411A06X16	411A06X20	411A06X20	411A08X25	411A08X25	411A08X25	411A08X25	411A08X25
115	END COVER JACKET O-RING	1	404T4375	404T4375	404T4375	404T4500	404T4500	404T4500	404T4500	404T4500	404T4750	404T4750	404T4875	404T4875	404T8975	4D4T8140D	404T81400
116	INTERNAL COVER O-RING FOR ASEPTIC VERS	1	404V3500	404V3500	404V3500	404V4625	404V4625	404V4750	404V4750	404V4750	404V009	404V009	404T81175	404T81175	-	-	-
117	EXTERNAL COVER O-RING FOR ASEP. VERS.	1	404V008	404V008	404V008	404V4675	404V4675	404T4500	404T4500	404T4500	404V010	404V010	404T81300	404T81300	-	-	-
118	CONNECTION COUNTERFLANGE FOR AS. V.	2	2006B181	2006B181	2006B181	2006B181	2006B182	2006B183	2006B184	2006B184	2006B184	2006B185	2006B185	2006B185	-	-	-
119	INTERNAL CONNECTION O-RING FOR AS. VER	2	404V3168	404V3168	404V3168	404V3168	404V3212	404V174	404V4325	404V4325	404V4325	404V4426	404V4426	404V4426	-	-	-
120	EXTERNAL CONNECTION O-RING FOR AS. VER	2	404V3231	404V3231	404V3231	404V3231	404V3275	404V4360	404V4412	404V4412	404V4412	404V4525	404V4525	404V4525	-	-	-
121	SCREW	[illegible]	411A06X20	411A06X20	411A06X20	411A06X20	411A06X20	411A06X20	411A08X25	411A08X25	411A08X25	411A10X35	411A10X35	411A10X35	-	-	-
200	SEAL STOP PIN	2	2014B200	2014B200	2014B200	2014B200	2014B200	2014B200	2014B200	2014B200	2014B200	2014B200	2014B200	2014B200	2014B200	-	-
201	SINGLE MECHANICAL SEAL	2	SEE LIST MECHANICAL SEAL CODES														
210	BALANCING RING for MECH. SEAL 7K	2	2014B001	2014B001	2014B001	2014B002	2014B002	2014B003	2014B003	2014B003	2014B004	2014B004	2014B018	2014B018	2014B004	2014B006	2014B006
210	BALANCING RING for MECH. SEAL C5E	2	2014B221	2014B221	2014B221	2014B222	2014B222	2014B223	2014B223	2014B223	2014B224	2014B224	2014B236	2014B236	2014B224	2014B226	2014B226
218	SCREW	[illegible]	410A05X10	410A05X10	410A05X10	410A06X12	410A06X12	410A06X14	410A06X14	410A06X14	410A10X20	410A10X20	410A10X20	410A10X20	410A10X20	411A06X20S	411A06X20S
220	FLUSHING SEAL BOX	2	2014B141	2014B141	2014B141	2014B142	2014B142	2014B143	2014B143	2014B143	2014B144	2014B144	2014B159	2014B159	2014B144	2014B164	2014B164
221	FLUSHING SEAL BOX O-RING	2	404T3218	404T3218	404T3218	404T168	404T168	404T4312	404T4312	404T4312	404T4437	404T4437	404T4500	404T4500	404T4437	404T4625	404T4625
222	SCREW	[illegible]	411A05X30	411A05X30	411A05X30	411A06X35	411A06X35	411A06X40	411A06X40	411A06X40	411A10X40	411A10X40	411A10X50	411A10X50	411A10X40	-	-
223	SEAL RING UM	2	402V57486	402V57486	402V57486	402V705510	402V705510	402V857010	402V857010	402V857010	402V1109510	402V1109510	402V13511012	402V13511012	402V1109510	402U19016015	402U19016015
224	TURNING RING	2	2004B151	200B151	2004B151	2004B152	2004B152	2004B153	2004B153	2004B153	2004B154	2004B154	2004B166	2004B167	2004B166	2004B155	2004B155
225	TURNING RING O-RING	6	404T2137	404T2137	404T2137	404T3181	404T3181	404T4237	404T4237	404T4237	404T4312	404T4312	404T4350	404T4350	404T4312	404T4475	404T4475
226	SCREW	6	420A04X05	420A04X05	420A04X05	420A05X05	420A05X05	420A06X05	420A06X05	420A06X05	420A06X06	420A06X06	420A06X08	420A06X08	420A06X06	420A08X12	420A08X12
227	PIN	4	417A06X10	417A06X10	417A06X10	417A06X12	417A06X12	417A06X12	417A06X12	417A06X12	417A08X15	417A08X15	417A08X15	417A08X15	417A08X15	-	-
230	BALANCING RING for FLUSH. MEC. SEALS 7K	2	2014B007	2014B007	2014B007	2014B008	2014B008	2014B009	2014B009	2014B009	2014B010	2014B010	214B019	214B019	2014B010	-	-
230	BALANCING RING for FLUSH. MEC. SEALS C5E	2	2014B231	2014B231	2014B231	2014B232	2014B232	2014B233	2014B233	2014B233	2014B234	2014B234	214B237	214B237	2014B234	-	-
231	BALANCING RING for DOUBLE FLUSH. MECH. S	2	2014B011	2014B011	2014B011	2014B012	2014B012	2014B013	2014B013	-	2014B014	2014B014	-	-	2014B014	-	-
232	FLUSHING DOUBLE MEC.SEAL BOX O-RING	2	404T3218	404T3218	404T3218	404T168	404T168	404T4312	404T4312	-	404T4437	404T4437	-	-	404T4437	404T215	404T215
233	SCREW	[illegible]	411A05X40	411A05X40	411A05X40	411A06X40	411A06X40	411A06X50	411A06X50	411A06X50	411A10X45	411A10X45	411A10X55	411A10X55	-	410A14X30	410A14X30
234	DOUBLE MEC. SEAL BEARING HOUSING	1	2001G161	2001G161	2001G161	2001G162	2001G162	2001G163	2001G163	2001G163	2001G164	2001G164	2001G165	2001G165	-	-	-
235	FLUSHING DOUBLE MECH. SEAL BOX	2	2014B147	2014B147	2014B147	2014B148	2014B148	2014B149	2014B149	-	2014B150	2014B150	2014B151	2014B151	2014B160	2014B152	2014B152

(1) FOR B470-B490-B570 (2) FOR B440-B470-B490 (3) FOR B6 (4) FOR B3-B430

POS. No.	DESCRIPTION	Q.ty No.	PART No. BY MODEL														
			B105	B110	B115	B215	B220	B325	B330	B390	B430	B440	B470	B490	B550	B660	B680
236	FLUSHING DOUBLE MECH. SEAL BOX COVER	2	2014B153	2014B153	2014B153	2014B154	2014B154	2014B155	2014B155	-	2014B156	2014B156	2014B157	2014B157	2014B162	2014B158	2014B158
237	SCREW	4	410A05X16	410A05X16	410A05X16	410A06X18	410A06X18	410A06X16	410A06X16	-	410A10X20	410A10X20	410A10X20	410A10X20	410A10X20	410A10X20	410A10X20
238	COVER O-RING	2	404T3218	404T3218	404T3218	404T165	404T165	404T4312	404T4312	-	404T4412	404T4412	404T4500	404T4500	404T4437	404T4562	404T4562
239	SEALS PROTECTION	2	4034Y001	4034Y001	4034Y001	4034Y002	4034Y002	4034Y003	4034Y003	4034Y003	4034Y004	4034Y004	4034A007	4034A007	4034A008	4034A006	4034A006
240	SEAL RING UM VITON	4	402V45356	402V45356	402V45356	402V48405	402V48405	402V705510	402V705510	402V705510	402V857010	402V857010	402V1058510	402V1058510	402V857010	402V13011010	402V13011010
240	SEAL RING UM EPDM	4	402U45356	402U45356	402U45356	402U48405	402U48405	402U705510	402U705510	402U705510	402U857010	402U857010	402U1058510	402U1058510	402U857010	402U13011010	402U13011010
240	SEAL RING POLYMER S1	2	402Q45357	402Q45357	402Q45357	402Q48406	402Q48406	402Q70558	402Q70558	402Q70558	402Q857010	402Q857010	402Q1158510	402Q1158510	402Q857010	402Q13011010	402Q13011010
240	SEAL RING HN ELRING	4	402HN40558	402HN40558	402HN40558	402HN42608	402HN42608	402HN55728	402HN55728	402HN55728	402HN8010010	402HN8010010	-	-	-	-	-
241	SEAL RING BUSH	2	2004B156	2004B156	2004B156	2004B157	2004B157	2004B158	2004B158	2004B158	2004B159	2004B159	2004B168	2004B168	2004B159	2004B160	2004B160
241	SEAL RING BUSH FOR HN ELRING	2	2004B191	2004B191	2004B191	2004B192	2004B192	2004B193	2004B193	2004B193	2004B194	2004B194	-	-	-	-	-
242	BUSH O-RING	2	404T3118	404T3118	404T3118	404T3137	404T3137	404T4200	404T4200	404T4200	404T168	404T168	404T181	404T181	404T168	404T4400	404T4400
242	HN ELRING BUSH O-RING	2	404T3118	404T3118	404T3118	404T149	404T149	404T4237	404T4237	404T4237	404T168	404T168	-	-	-	-	-
243	SCREW	6	420A05X05	420A05X05	420A05X05	420A06X06	420A06X06	420A06X06	420A06X06	420A06X06	420A06X06	420A06X06	420A08X10	420A08X10	420A06X06	420A08X10	420A08X10
243	HN ELRING SCREW	6	420A05X05	420A05X05	420A05X05	420A05X05	420A05X05	420A05X05	420A05X05	420A05X05	420A05X05	420A06X06	420A06X06	-	-	-	-	-
244	UM SEAL RING SUPPORT	2	2014B051	2014B051	2014B051	2014B052	2014B052	2014B053	2014B053	2014B053	2014B054	2014B054	2014B057	2014B057	2014B054	2014B056	2014B056
244	S1 SEAL RING SUPPORT	2	2014B061	2014B061	2014B061	2014B062	2014B062	2014B063	2014B063	2014B063	2014B064	2014B064	2014B066	2014B066	2014B064	-	-
244	HN ELRING SEAL RING SUPPORT	2	2014B111	2014B111	2014B111	2014B112	2014B112	2014B113	2014B113	2014B113	2014B114	2014B114	-	-	-	-	-
245	O-RING	2	404T3218	404T3218	404T3218	404T168	404T168	404T4312	404T4312	404T4312	404T4437	404T4437	404T4500	404T4500	404T4437	404T4625	404T4625
245	HN ELRING O-RING	2	404T3218	404T3218	404T3218	404T168	404T168	404T4312	404T4312	404T4312	404T4437	404T4437	-	-	-	-	-
246	SCREW	6	410A05X14	410A05X14	410A05X14	410A06X12	410A06X12	410A06X25	410A06X25	410A06X25	410A10X25	410A10X25	410A10X30	410A10X30	410A10X25	410A14X20	410A14X20
246	SCREW	6	410A05X10	410A05X10	410A05X10	410A06X12	410A06X12	410A06X14	410A06X14	410A06X14	410A10X25	410A10X25	410A10X16	410A10X16	410A10X25	-	-
246	SCREW	6	410A05X16	410A05X16	410A05X16	410A06X20	410A06X20	410A06X20	410A06X20	410A06X20	410A10X25	410A10X25	-	-	-	-	-
247	UM SEAL RING PIN	4	-	-	-	-	-	417A06X16	417A06X16	417A06X16	417A08X15	417A08X15	417A08X16	417A08X16	417A08X15	-	-
247	HN ELRING SEAL PIN	4	417A06X10	417A06X10	417A06X10	417A06X12	417A06X12	417A06X16	417A06X16	417A06X16	417A08X16	417A08X16	-	-	-	-	-
280	PTFE PACKING RING KIT	1	205P38506	205P38506	205P38506	205P45576	205P45576	205P60768	205P60768	205P60768	205P80968	205P80968	205P10012010	205P10012010	205P80968	205P11013412	205P11013412
281	STUFFING BOX SEAL BUSH	2	2004B161	2004B161	2004B161	2004B162	2004B162	2004B163	2004B163	2004B163	2004B164	2004B164	2004B169	2004B169	2004B164	2004B165	2004B165
282	BUSH O-RING	2	404T3118	404T3118	404T3118	404T4137	404T4137	404T4200	404T4200	404T4200	404T168	404T168	404T181	404T181	404T168	404T4400	404T4400
283	SCREW	6	420A05X05	420A05X05	420A05X05	420A06X05	420A06X05	420A06X06	420A06X06	420A06X06	420A06X06	420A06X06	420A08X08	420A08X08	420A06X06	420A08X10	420A08X10
284	STUFFING BOX SEAL SUPPORT	2	2014B071	2014B071	2014B071	2014B072	2014B072	2014B073	2014B073	2014B073	2014B074	2014B074	2014B083	2014B083	2014B074	2014B076	2014B076
285	SUPPORT O-RING	2	404T3218	404T3218	404T3218	404T168	404T168	404T4312	404T4312	404T4312	404T4437	404T4437	404T4500	404T4500	404T4437	404T4625	404T4625
286	SCREW	6	411A05X14	411A05X14	411A05X14	411A06X16	411A06X16	411A06X20	411A06X20	411A06X20	411A10X16	411A10X16	411A10X25	411A10X25	411A10X16	419A14X110	419A14X110
287	PIN	4	417A06X10	417A06X10	417A06X10	417A06X12	417A06X12	417A06X12	417A06X12	417A06X12	417A08X12	417A08X12	417A08X12	417A08X12	417A08X12	-	-
288	PACKING GLAND	2	2014B101	2014B101	2014B101	2014B102	2014B102	2014B103	2014B103	2014B103	2014B104	2014B104	2014B107	2014B107	2014B104	2014B106	2014B106
289	SCREW	2	410A05X16	410A05X16	410A05X16	410A06X20	410A06X20	410A08X20	410A08X20	410A08X20	410A10X25	410A10X25	410A10X25	410A10X25	410A10X25	413A14	413A14
290	PTFE FLUSHED PACKING RING NUT KIT	1	201P38506	201P38506	201P38506	201P45576	201P45576	201P60768	201P60768	201P60768	201P80968	201P80968	201P10012010	201P10012010	201P80968	201P11013412	201P11013412
291	FLUSHED STUFFING BOX SEAL SUPPORT	2	2014B077	2014B077	2014B077	2014B078	2014B078	2014B079	2014B079	2014B079	2014B080	2014B080	2014B084	2014B084	2014B080	2014B082	2014B082
292	HYDRAULIC RING	2	2014B121	2014B121	2014B121	2014B122	2014B122	2014B123	2014B123	2014B123	2014B124	2014B124	2014B126	2014B126	2014B124	2014B125	2014B125
295	SPACER	2	-	-	-	-	-	-	-	-	-	-	-	-	2014B131	2014B132	2014B132
296	MECHANICAL SEAL SUPPORT	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2014B092	2014B092
297	SUPPORT O-RING	2	-	-	-	-	-	-	-	-	-	-	-	-	-	404T4625	404T4625
298	SCREW	4	-	-	-	-	-	-	-	-	-	-	-	-	-	410A14X20	410A14X20
299	PIN	2	430A05X10	430A05X10	430A05X10	430A05X10	430A05X10	430A06X12	430A06X12	430A06X12	430A08X18	430A08X18	430A08X20	430A08X20	430A08X18	430A08X18	430A08X18
302	SCREW	4	410A05X10	410A05X10	410A05X10	410A05X10	410A05X10	410A05X10	410A05X10	410A05X10	410A05X10	410A05X10	410A05X10	410A05X10	410A06X16	410A06X16	410A06X16
303	PLUG	4	44301020	44301020	44301020	44301022	44301022	44301023	44301023	44301023	44301024	44301024	44301025	44301025	-	-	-
304	NAME PLATE	1	4034A100	4034A100	4034A100	4034A100	4034A100	4034A100	4034A100	4034A100	4034A100	4034A100	4034A100	4034A100	4034A100	4034A100	4034A100
305	RIVET	4	44301027	44301027	44301027	44301027	44301027	44301027	44301027	44301027	44301027	44301027	44301027	44301027	44301027	44301027	44301027
306	EYEBOLT	2	-	-	-	-	-	-	-	-	-	-	-	-	432F12	432F16	432F16

ROTOR CASES CODE



Example: body with mechanical seals - DIN ports - heated - AISI 316 - BE430 code 23102 B 07

O - RING CODES

MECHANICAL SEALS MATERIALS	TYPE	RING TYPE	B 100	B105 B110 B115	B215-220	B325 B330 B390	B430-440-550	B470-490	B660-680
			d = 20	d = 30	d = 35	d = 50	d = 65	d = 80	d = 100
STAINLESS STEEL - CARBON	U7K	ROTATING	404U4081T	404U4118T	404U4137T	404U4200T	404U6262T	404U181T	404U189T
		STATIONARY	404U4112T	404U4150T	404U147T	404U6237T	404U6300T	404U92X7T	404U8450T
	KL2A	ROTATING	-	404U4118T	404U4137T	404U4200T	404U65X4,5T	404U80X4,5T	404U189T
		STATIONARY	-	404U4150T	404U147T	404U61X4,65T	404U76X4,65T	404U93X6T	404U6450T
	C5E	ROTATING	-	404U4118T	404U4137T	404U4200T	404U168T	404U181T	-
		STATIONARY	-	404U4150T	404U147T	404U61X4,65T	404U76X4,65T	404U94X6T	-
TUNGSTEN CARB. - CARBON	U7K	ROTATING	404U4081T	404U4118T	404U4137T	404U4200T	404U6262T	404U181T	-
		STATIONARY	404U4112T	404U4150T	404U147T	404U6237T	404U6300T	404U92X7T	-
	KL2A	ROTATING	-	404U4118T	404U4137T	404U4200T	404U65X4,5T	404U80X4,5T	404U189T
		STATIONARY	-	404U4150T	404U147T	404U6237T	404U6300T	404U93X6T	404U6450T
	C5E	ROTATING	-	404U4118T	404U4137T	404U4200T	404U168T	-	-
		STATIONARY	-	404U4150T	404U147T	404U61X4,65T	404U76X4,65T	-	-
TUNGSTEN CARB. - TUNGSTEN CARB.	U7K	ROTATING	404U4081T	404U4118T	404U4137T	404U4200T	404U6262T	404U181T	404U189T
		STATIONARY	404U4112T	404U4150T	404U147T	404U6237T	404U6300T	404U92X7T	404U8450T
	KL2A	ROTATING	-	404U4118T	404U4137T	404U4200T	404U65X4,5T	404U80X4,5T	404U189T
		STATIONARY	-	404U4150T	404U147T	404U6237T	404U6300T	404U93X6T	404U6450T
	C5E	ROTATING	-	404U4118T	404U4137T	404U4200T	404U168T	-	-
		STATIONARY	-	404U4150T	404U147T	404U61X4,65T	404U76X4,65T	-	-
CERAMIC - CARBON	KL2A	ROTATING	-	404U4118T	404U4137T	404U4200T	-	-	-
		STATIONARY	-	404U4150T	404U147T	404U61X4,65T	-	-	-
	C5E	ROTATING	-	404U4118T	404U4137T	404U4200T	404U168T	404U181T	-
		STATIONARY	-	404U4150T	404U147T	404U61X4,65T	404U76X4,65T	404U94X6T	-
SILICON CARBIDE - CARBON	KL2A	ROTATING	-	-	-	-	404U65X4,5T	404U80X4,5T	404U189T
		STATIONARY	-	-	-	-	404U76X4,65T	404U93X6T	404U6450T
CERAMIC - RULON	C5E	ROTATING	-	404U4118T	404U4137T	404U4200T	404U168T	404U181T	-
		STATIONARY	-	404U4150T	404U147T	404U61X4,65T	404U76X4,65T	404U94X6T	-
SILIC.CARBIDE - SILIC.CARBIDE	KL2A	ROTATING	404U4081T	404U4118T	404U4137T	404U4200T	404U65X4,5T	404U80X4,5T	404U189T
		STATIONARY	404U4112T	404U4150T	404U147T	404U61X4,65T	404U76X4,65T	404U93X6T	404U6450T
SILIC.CARBIDE - TUNG.CARBIDE	KL2A	ROTATING	404U4081T	404U4118T	404U4137T	404U4200T	404U65X4,5T	404U80X4,5T	404U189T
		STATIONARY	404U4112T	404U4150T	404U147T	404U6237T	404U6300T	404U93X6T	404U6450T

BALANCING RINGS

Cod. No.	MECHANICAL SEALS MATERIALS	STATIONARY SEAL FACE	TYPE	B105 - 110 - 115	B215-220	B325-330-390	B430-440 - 550	B470-490	B660-680
3	STAINLESS STEEL - CARBON	CARBON	U7K	2014B001	2014B002	2014B003	2014B004	2014B020	2014B006
		STAINLESS STEEL	KL2A	2014B221	2014B222	2014B223	2014B224	2014B236	2014B011
		STAINLESS STEEL	C5E	2014B221	2014B222	2014B223	2014B224	2014B236	-
4	TUNGSTEN CARBIDE - CARBON	CARBON	U7K	2014B001	2014B002	2014B003	2014B004	2014B020	-
		TUNGSTEN CARBIDE	KL2A	2014B001	2014B002	2014B003	2014B004	2014B018	2014B006
		TUNGSTEN CARBIDE	C5E	2014B215	2014B216	2014B217	2014B218	-	-
5	TUNGSTEN CARBIDE - TUNGSTEN CARBIDE	TUNGSTEN CARBIDE	U7K	2014B001	2014B002	2014B003	2014B004	2014B018	2014B021
		TUNGSTEN CARBIDE	KL2A	2014B001	2014B002	2014B003	2014B004	2014B018	2014B021
		TUNGSTEN CARBIDE	C5E	2014B215	2014B216	2014B217	2014B218	-	-
6	CERAMIC - CARBON	CERAMIC	KL2A	2014B221	2014B222	2014B223	-	-	-
		CERAMIC	C5E	2014B221	2014B222	2014B223	2014B224	2014B236	-
	SILICON CARBIDE - CARBON	SILICON CARBIDE	KL2A	-	-	-	2014B224	2014B236	2014B011
7	CERAMIC - RULON	CERAMIC	C5E	2014B221	2014B222	2014B223	2014B224	2014B236	-
8	SILIC.CARBIDE - SILIC.CARBIDE	SILICON CARBIDE	KL2A	2014B221	2014B222	2014B223	2014B224	2014B236	2014B011
9	SILIC.CARBIDE - TUNG.CARBIDE	TUNGSTEN CARBIDE	KL2A	2014B001	2014B002	2014B003	2014B004	2014B018	2014B011

BALANCING RINGS SINGLE FLUS. MEC. SEALS CODE

Cod. No.	MECHANICAL SEALS MATERIALS	STATIONARY SEAL FACE	TYPE	B105 B110 B115	B215 B220	B325 B330 B390	B430 B440 B550	B470 B490	B660 B680
3	STAINLESS STEEL - CARBON	CARBON	U7K	2014B007	2014B008	2014B009	2014B0010	2014B019	2014B006
		STAINLESS STEEL	KL2A	2014B231	2014B232	2014B233	2014B234	2014B237	2014B011
		STAINLESS STEEL	C5E	2014B231	2014B232	2014B233	2014B234	2014B237	-
4	TUNGSTEN CARBIDE - CARBON	CARBON	U7K	2014B007	2014B008	2014B009	2014B0010	2014B019	-
		TUNGSTEN CARBIDE	KL2A	2014B007	2014B008	2014B009	2014B0010	2014B019	2014B006
		TUNGSTEN CARBIDE	C5E	2014B241	2014B242	2014B243	2014B244	-	-
5	TUNGSTEN CARBIDE - TUNGSTEN CARBIDE	TUNGSTEN CARBIDE	U7K	2014B007	2014B008	2014B009	2014B0010	2014B019	2014B021
		TUNGSTEN CARBIDE	KL2A	2014B007	2014B008	2014B009	2014B0010	2014B019	2014B021
		TUNGSTEN CARBIDE	C5E	2014B241	2014B242	2014B243	2014B244	-	-
6	CERAMIC - CARBON	CERAMIC	KL2A	2014B231	2014B232	2014B233	-	-	-
		CERAMIC	C5E	2014B231	2014B232	2014B233	2014B234	2014B237	-
	SILICON CARBIDE - CARBON	SILICON CARBIDE	KL2A	-	-	-	2014B234	2014B237	2014B011
7	CERAMIC - RULON	CERAMIC	C5E	2014B231	2014B232	2014B233	2014B234	-	-
8	SILIC.CARBIDE - SILIC.CARBIDE	SILICON CARBIDE	KL2A	2014B231	2014B232	2014B233	2014B234	2014B237	2014B011
9	SILIC.CARBIDE - TUNG.CARBIDE	TUNGSTEN CARBIDE	KL2A	2014B007	2014B008	2014B009	2014B010	2014B019	2014B011

MECHANICAL SEALS CODES

Cod. No.	MATERIAL	TYPE	SINGLE MECHANICAL SEALS CODE					
			B105 B110 B115	B215 B220	B325 B330 B390	B430 B440 B550	B470 B490	B660 B680
3 Q3	STAINLESS STEEL-CARBON	U7K	4U030U7KXZ7	4U035U7KXZ7	4U050U7KXZ7	4U065U7KXZ7	4U080U7KXZ7	-
	STAINLESS STEEL-CARBON	KL2A	4U030KL2AZYE	4U035KL2AZYE	4U050KL2AZYE	4U065KL2AZYE	4U080KL2AZYE	4U100KL2AZYE
	O-ring E.P.D.M.	C5E	4U030C5EBGE	4U035C5EBGE	4U050C5EBGE	4U065C5EBGE	4U080C5EBGE	-
	STAINLESS STEEL-CARBON	U7K	4U030U7KXZY	4U035U7KXZY	4U050U7KXZY	4U065U7KXZY	4U080U7KXZY	-
	STAINLESS STEEL-CARBON	KL2A	4U030KL2AZYV	4U035KL2AZYV	4U050KL2AZYV	4U065KL2AZYV	4U080KL2AZYV	4U100KL2AZYV
	O-ring VITON°	C5E	4U030C5EBGV	4U035C5EBGV	4U050C5EBGV	4U065C5EBGV	4U080C5EBGV	-
	STAINLESS STEEL-CARBON	U7K	4U030U7KXZP	4U035U7KXZP	4U050U7KXZP	4U065U7KXZP	4U080U7KXZP	-
	STAINLESS STEEL-CARBON	KL2A	4U030KL2AZYP	4U035KL2AZYP	4U050KL2AZYP	4U065KL2AZYP	4U080KL2AZYP	4U100KL2AZYP
	O-ring P.T.F.E.	C5E	4U030C5EBGP	4U035C5EBGP	4U050C5EBGP	4U065C5EBGP	4U080C5EBGP	-
4	TUNGSTEN CARBIDE -CARBON	U7K	4U030U7K3Z7	4U035U7K3Z7	4U050U7K3Z7	4U065U7K3Z7	4U080U7K3Z7	-
	TUNGSTEN CARBIDE -CARBON	KL2A	4U030KL2AKZE	4U035KL2AKZE	4U050KL2AKZE	4U065KL2AKZE	4U080KL2AKZE	4U100KL2AKZE
	O-ring E.P.D.M.	C5E	4U030C5EBUE	4U035C5EBUE	4U050C5EBUE	4U065C5EBUE	-	-
	TUNGSTEN CARBIDE -CARBON	U7K	4U030U7K3ZY	4U035U7K3ZY	4U050U7K3ZY	4U065U7K3ZY	4U080U7K3ZY	-
	TUNGSTEN CARBIDE -CARBON	KL2A	4U030KL2AKZV	4U035KL2AKZV	4U050KL2AKZV	4U065KL2AKZV	4U080KL2AKZV	4U100KL2AKZV
	O-ring VITON°	C5E	4U030C5EBUV	4U035C5EBUV	4U050C5EBUV	4U065C5EBUV	-	-
	TUNGSTEN CARBIDE -CARBON	U7K	4U030U7K3ZP	4U035U7K3ZP	4U050U7K3ZP	4U065U7K3ZP	4U080U7K3ZP	-
	TUNGSTEN CARBIDE -CARBON	KL2A	4U030KL2AKZP	4U035KL2AKZP	4U050KL2AKZP	4U065KL2AKZP	4U080KL2AKZP	4U100KL2AKZP
	O-ring P.T.F.E.	C5E	4U030C5EBUP	4U035C5EBUP	4U050C5EBUP	4U065C5EBUP	-	-
5 Q5	TUNGSTEN CARB. - TUNGSTEN CARB.	U7K	4U030U7K337	4U035U7K337	4U050U7K337	4U065U7K337	4U080U7K337	4U100U7K337
	TUNGSTEN CARB. - TUNGSTEN CARB.	KL2A	4U030KL2AKKE	4U035KL2AKKE	4U050KL2AKKE	4U065KL2AKKE	4U080KL2AKKE	4U100KL2AKKE
	O-ring E.P.D.M.	C5E	4U030C5EUUE	4U035C5EUUE	4U050C5EUUE	4U065C5EUUE	-	-
	TUNGSTEN CARB. - TUNGSTEN CARB.	U7K	4U030U7K33Y	4U035U7K33Y	4U050U7K33Y	4U065U7K33Y	4U080U7K33Y	4U100U7K33Y
	TUNGSTEN CARB. - TUNGSTEN CARB.	KL2A	4U030KL2AKKV	4U035KL2AKKV	4U050KL2AKKV	4U065KL2AKKV	4U080KL2AKKV	4U100KL2AKKV
	O-ring VITON°	C5E	4U030C5EUUV	4U035C5EUUV	4U050C5EUUV	4U065C5EUUV	-	-
	TUNGSTEN CARB. - TUNGSTEN CARB.	U7K	4U030U7K33P	4U035U7K33P	4U050U7K33P	4U065U7K33P	4U080U7K33P	-
	TUNGSTEN CARB. - TUNGSTEN CARB.	KL2A	4U030KL2AKKP	4U035KL2AKKP	4U050KL2AKKP	4U065KL2AKKP	4U080KL2AKKP	4U100KL2AKKP
	O-ring P.T.F.E.	C5E	4U030C5EUUP	4U035C5EUUP	4U050C5EUUP	4U065C5EUUP	-	-
6	CERAMIC - CARBON - O ring EPDM	KL2A	4U030KL2AZCE	4U035KL2AZCE	4U050KL2AZCE	-	-	-
	CERAMIC - CARBON - O ring EPDM	C5E	4U030C5EBVE	4U035C5EBVE	4U050C5EBVE	4U065C5EBVE	4U080C5EBVE	-
	CERAMIC - CARBON - O ring VITON°	KL2A	4U030KL2AZCV	4U035KL2AZCV	4U050KL2AZCV	-	-	-
	CERAMIC - CARBON - O ring VITON°	C5E	4U030C5EBVV	4U035C5EBVV	4U050C5EBVV	4U065C5EBVV	4U080C5EBVV	-
	CERAMIC - CARBON - O RING P.T.F.E.	KL2A	4U030KL2AZCP	4U035KL2AZCP	4U050KL2AZCP	-	-	-
	CERAMIC - CARBON - O ring P.T.F.E.	C5E	4U030C5EBVP	4U035C5EBVP	4U050C5EBVP	4U065C5EBVP	4U080C5EBVP	-
	SILICON CARBIDE-CARBON-O ring EPDM	KL2A	-	-	-	4U065KL2AZUE	4U080KL2AZUE	4U100KL2AZUE
	SILICON CARBIDE-CARBON-O ring EPDM							
	SILICON CARBIDE-CARBON-O ring VITON°	KL2A	-	-	-	4U065KL2AZUV	4U080KL2AZUV	4U100KL2AZUV
	SILICON CARBIDE-CARBON-O ring VITON°							
	SILICON CARBIDE-CARBON-O ring PTFE	KL2A	-	-	-	4U065KL2AZUP	4U080KL2AZUP	4U100KL2AZUP
	SILICON CARBIDE-CARBON-O ring PTFE							
7	CERAMIC- RULON - O ring EPDM	C5E	4U030C5EYVE	4U035C5EYVE	4U050C5EYVE	4U065C5EYVE	-	-
	CERAMIC- RULON - O ring EPDM							
	CERAMIC- RULON - O ring VITON°	C5E	4U030C5EYVV	4U035C5EYVV	4U050C5EYVV	4U065C5EYVV	-	-
	CERAMIC- RULON - O ring VITON°							
	CERAMIC- RULON - O ring P.T.F.E.	C5E	4U030C5EYVP	4U035C5EYVP	4U050C5EYVP	4U065C5EYVP	-	-
	CERAMIC- RULON - O ring P.T.F.E.							
8	SILIC.CARBIDE-SILIC.CARBIDE-O ring EPDM	KL2A	4U030KL2AUUE	4U035KL2AUUE	4U050KL2AUUE	4U065KL2AUUE	4U080KL2AUUE	4U100KL2AUUE
	SILIC.CARBIDE-SILIC.CARBIDE-O ring EPDM							
	SILIC.CARBIDE-SILIC.CARBIDE-O ring VITON°	KL2A	4U030KL2AUUV	4U035KL2AUUV	4U050KL2AUUV	4U065KL2AUUV	4U080KL2AUUV	4U100KL2AUUV
	SILIC.CARBIDE-SILIC.CARBIDE-O ring VITON°							
	SILIC.CARBIDE-SILIC.CARBIDE-O ring PTFE	KL2A	4U030KL2AUUP	4U035KL2AUUP	4U050KL2AUUP	4U065KL2AUUP	4U080KL2AUUP	4U100KL2AUUP
	SILIC.CARBIDE-SILIC.CARBIDE-O ring PTFE							
9	SILIC.CARBIDE-TUNG.CARBIDE-O ring EPDM	KL2A	4U030KL2AUKE	4U035KL2AUKE	4U050KL2AUKE	4U065KL2AUKE	4U080KL2AUKE	4U100KL2AUKE
	SILIC.CARBIDE-TUNG.CARBIDE-O ring EPDM							
	SILIC.CARBIDE-TUNG.CARBIDE-O ring VITON°	KL2A	4U030KL2AUKV	4U035KL2AUKV	4U050KL2AUKV	4U065KL2AUKV	4U080KL2AUKV	4U100KL2AUKV
	SILIC.CARBIDE-TUNG.CARBIDE-O ring VITON°							
	SILIC.CARBIDE-TUNG.CARBIDE-O ring PTFE	KL2A	4U030KL2AUKP	4U035KL2AUKP	4U050KL2AUKP	4U065KL2AUKP	4U080KL2AUKP	4U100KL2AUKP
	SILIC.CARBIDE-TUNG.CARBIDE-O ring PTFE							

LIP SEALS

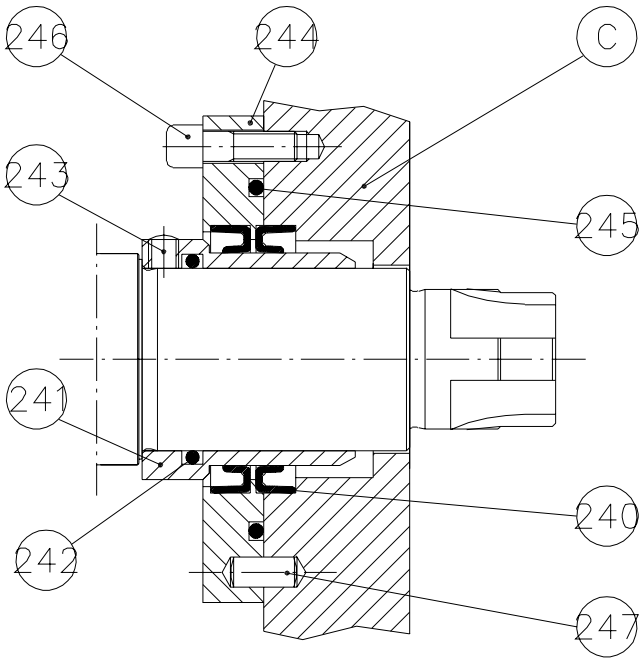


Fig.12.10 Code 0

S1 LIP SEALS

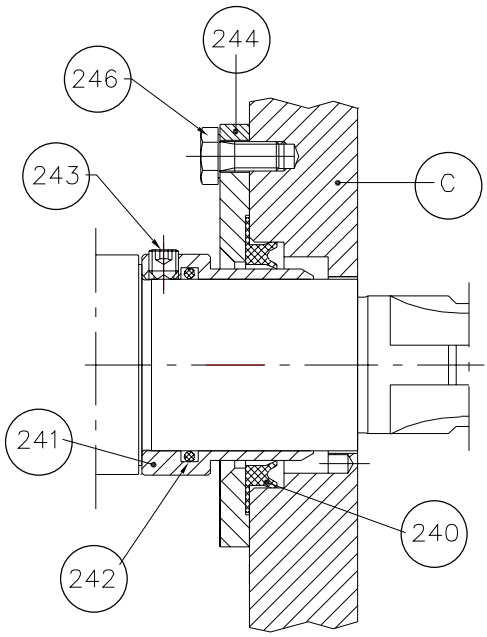


Fig.12.11 Code 0-S

PACKING GLAND

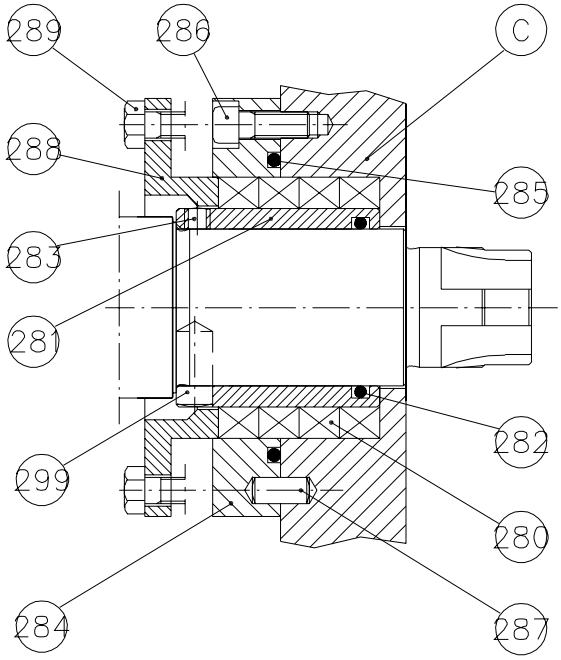


Fig.12.12 Code 1

PACKING SEAL WITH LIQUID BARRIER

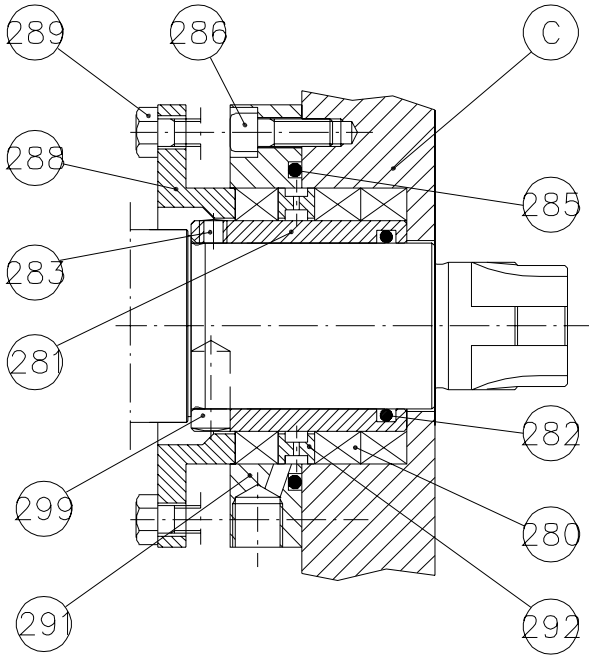


Fig.12.13 Code 2

SINGLE MECHANICAL SEAL TYPE "KL2A"

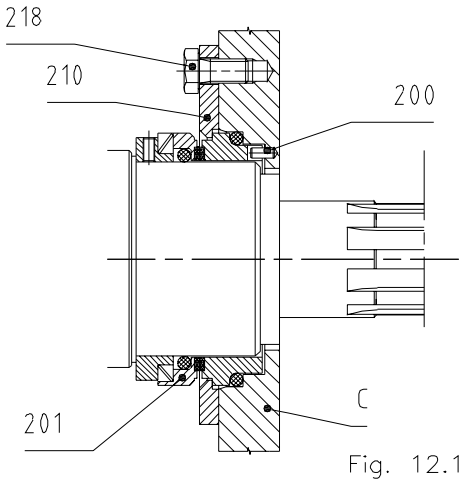


Fig. 12.14

SINGLE ROTARY MECHANICAL SEAL TYPE "UTK"

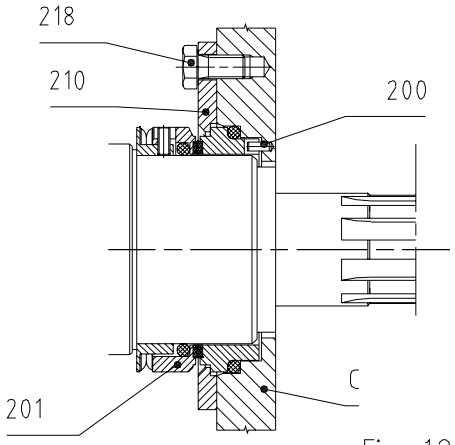


Fig. 12.15

SINGLE ROTARY MECHANICAL SEAL TYPE "C5E"

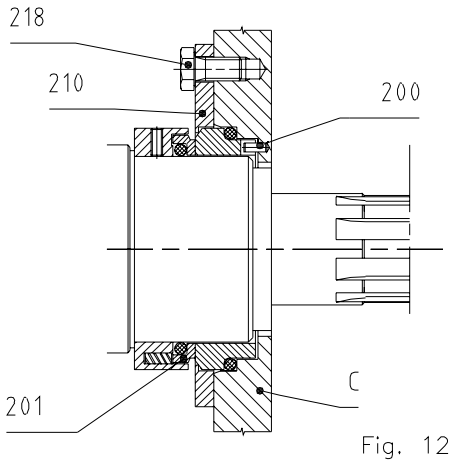


Fig. 12.16

HN ELRING LIP SEAL

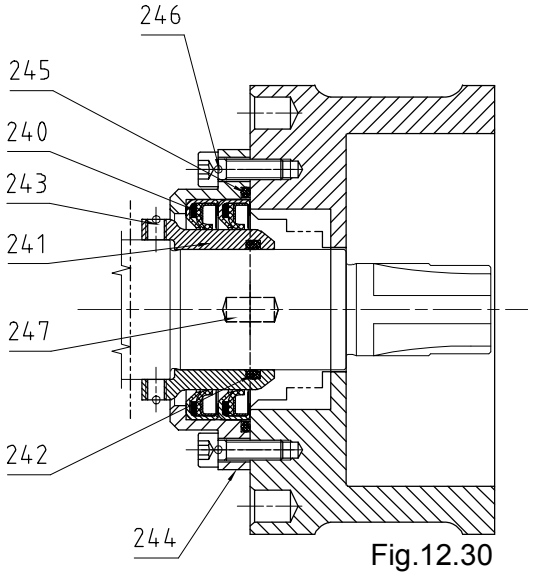


Fig.12.30

SINGLE FLUSHED MECHANICAL SEAL
"U7K" - "C5E" - "KL2A"

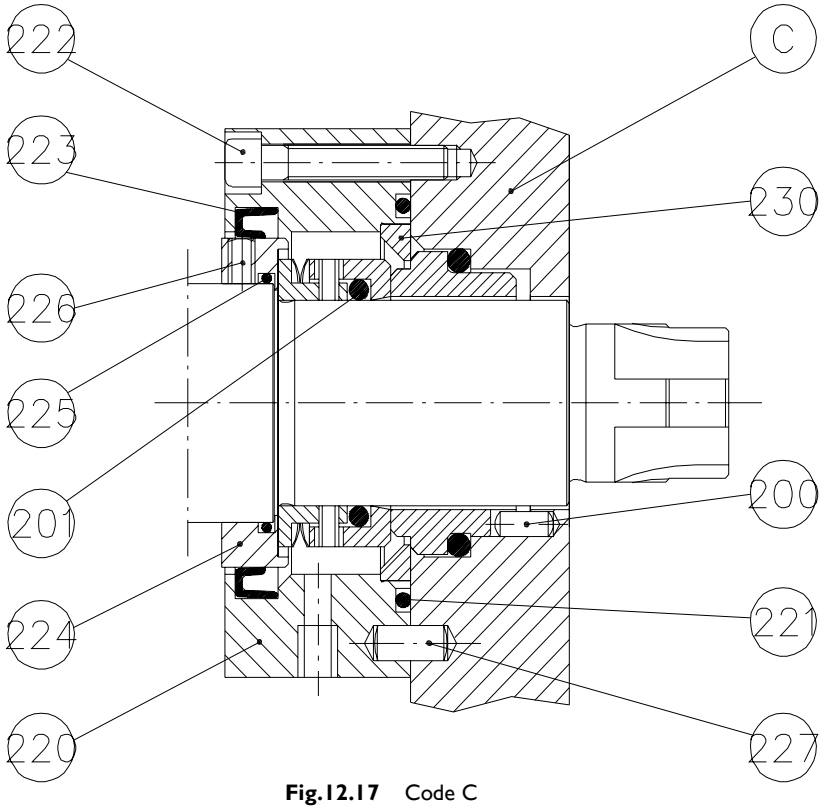


Fig.12.17 Code C

DOUBLE FLUSHED MECHANICAL SEAL

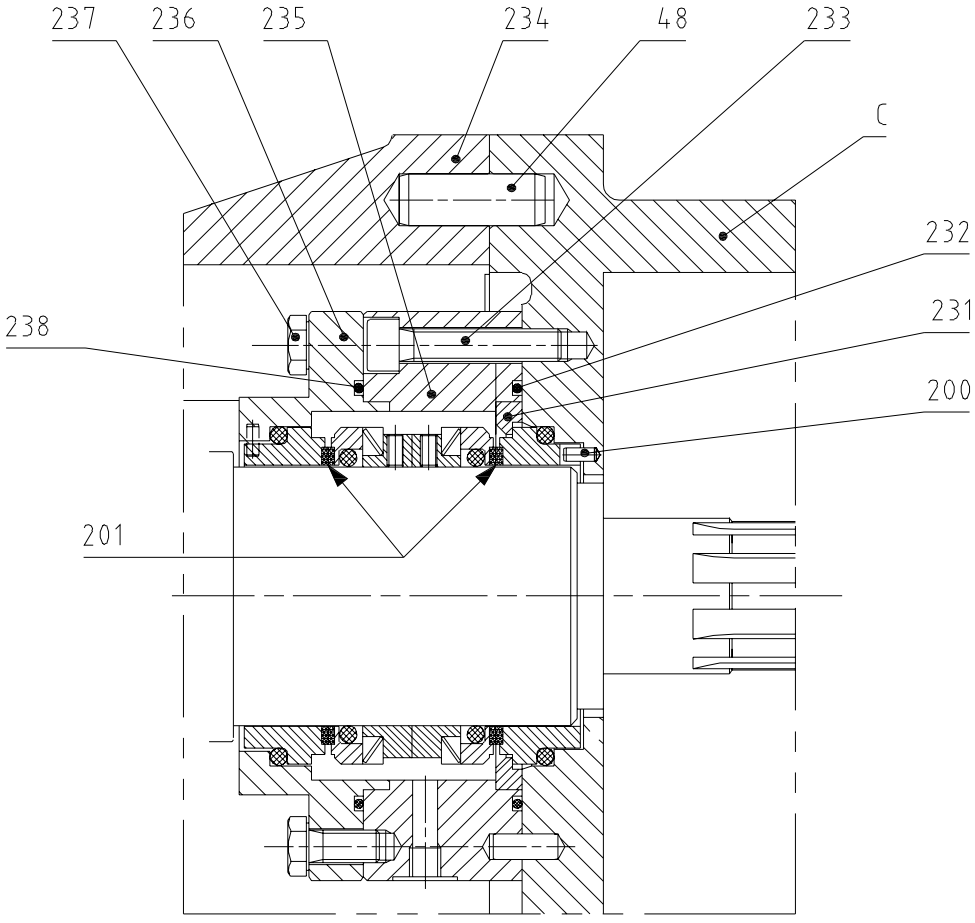


Fig.12.18 Code Q

LIP SEAL

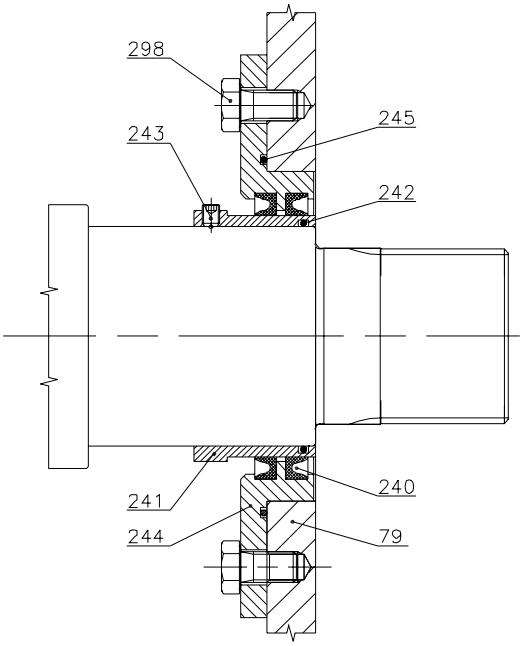


Fig. 12.19 Code 0

PACKING GLAND WITH HYDRAULIC BARRIER

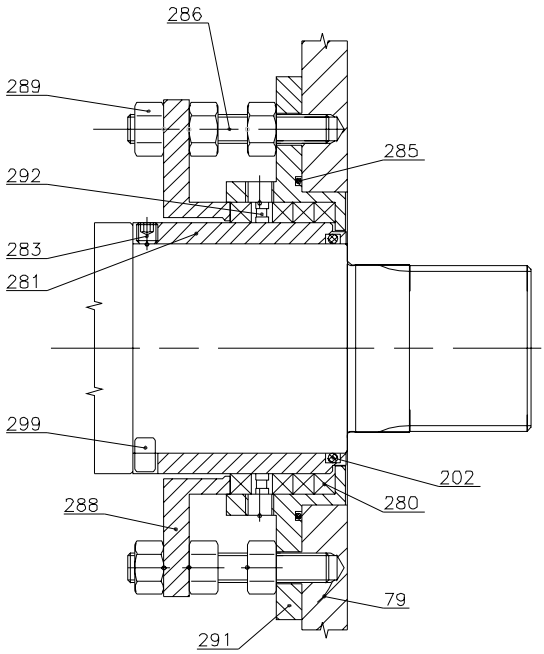


Fig. 12.21 Code 2

PACKING GLAND

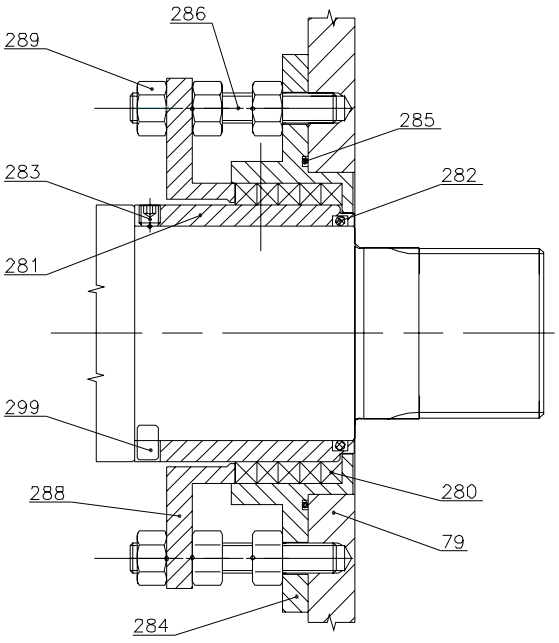


Fig. 12.20 Code 1

SINGLE MECHANICAL SEAL "U7K" - "C5E" - "KL2A"

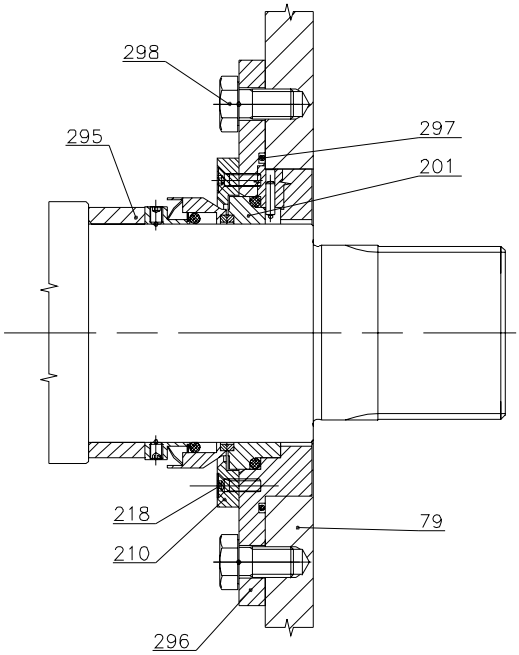


Fig. 12.22 Code 3-4-5-6-7-8

FLUSSAGGIO TENUTA MECCANICA SEMPLICE / SIMPLE FLUSHED MECHANICAL SEAL
"U7K" - "KL2A" - "C5E"

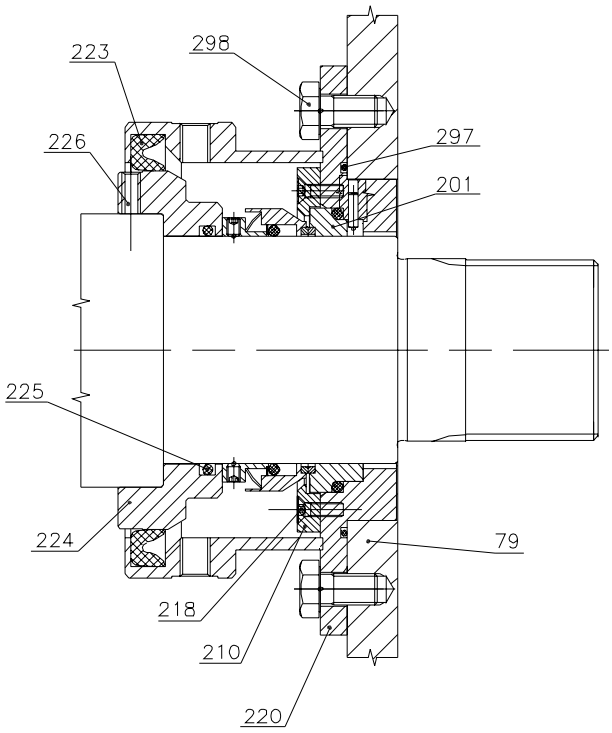


Fig. 12.23 Codice C Fig. 12.23 Code C

TENUTA MECCANICA DOPPIA FLUSSATA / DOUBLE FLUSHED MECHANICAL SEAL

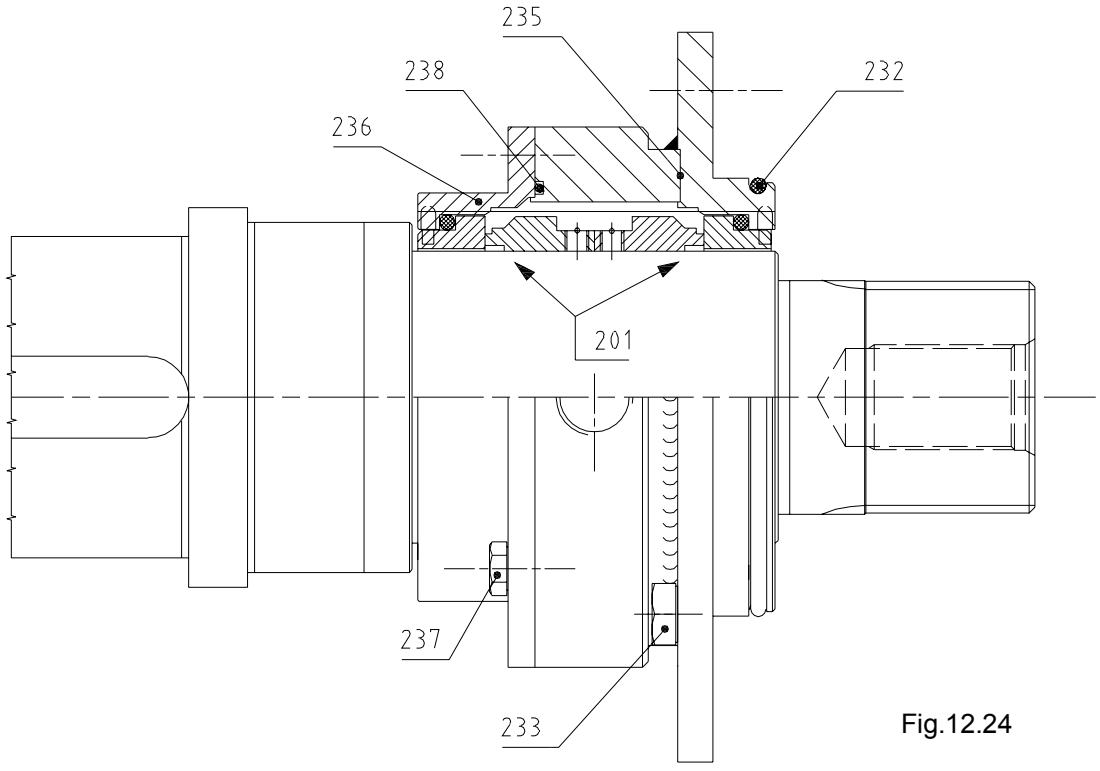


Fig.12.24

THE STANDARD FLUSHED MECHANICAL SEAL IS ASSEMBLED BY 2 OPPOSED BALANCED ROTARY MECHANICAL SEALS TYPE KL2A

LIP SEAL

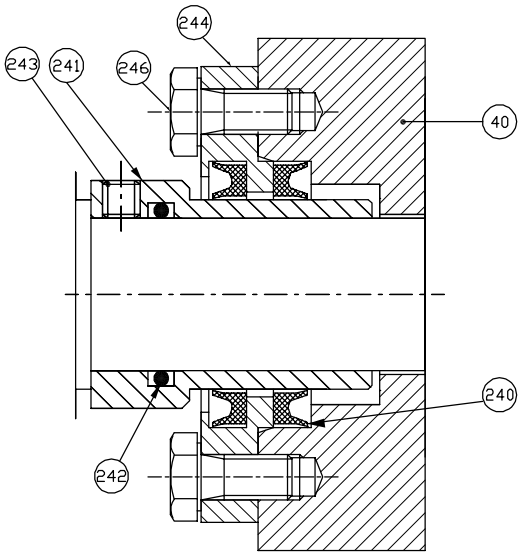


Fig.12.25 Codice 0

SINGLE ROTARY MECHANICAL SEAL "U7K"

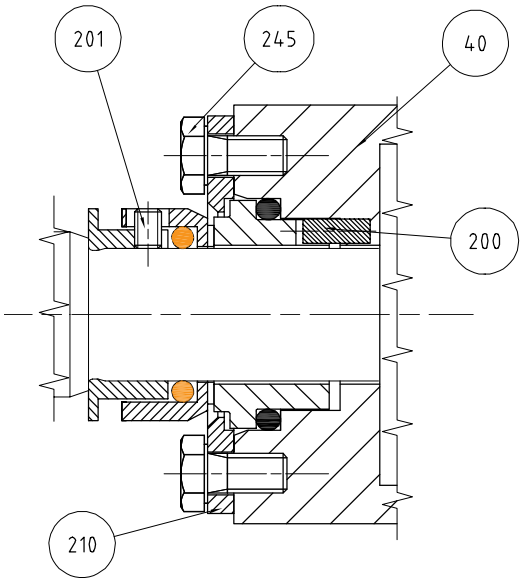


Fig.12.27 Codice 3-5-5-8

S1 LIP SEAL

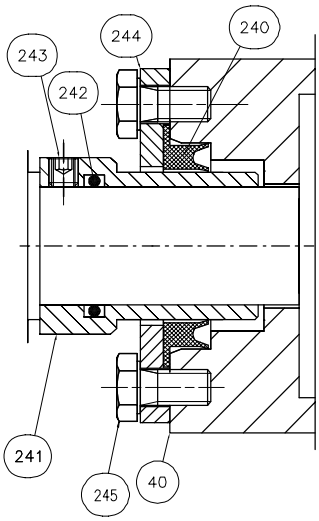


Fig.12.26 Codice 0-S

PACKING GLAND

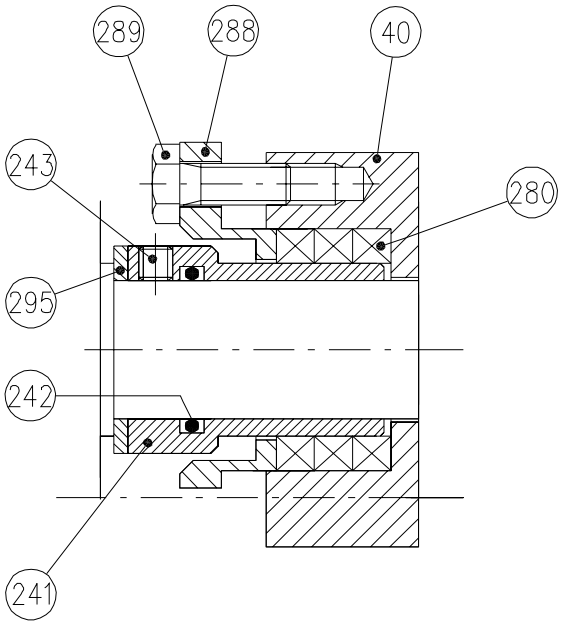


Fig.12.28 Codice 1

HN ELRING LIP SEAL

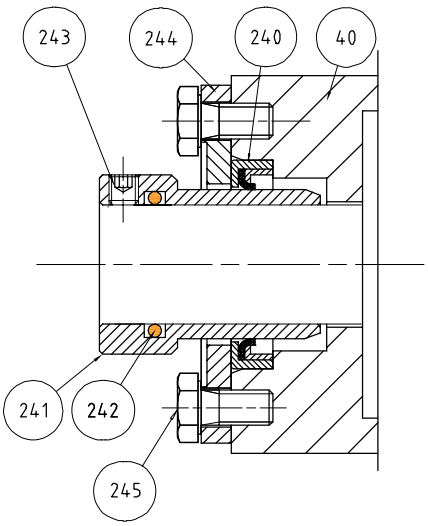


Fig.12.29 Code 0-S

Enclosures

OMAC Srl. Via G. Falcone nr. 8 - 42048 Rubiera (RE) - Italy
Tel. 0522/629371 - 629923 / Fax. 0522/628980
www.omacpompe.com E-mail: info@omacpompe.com