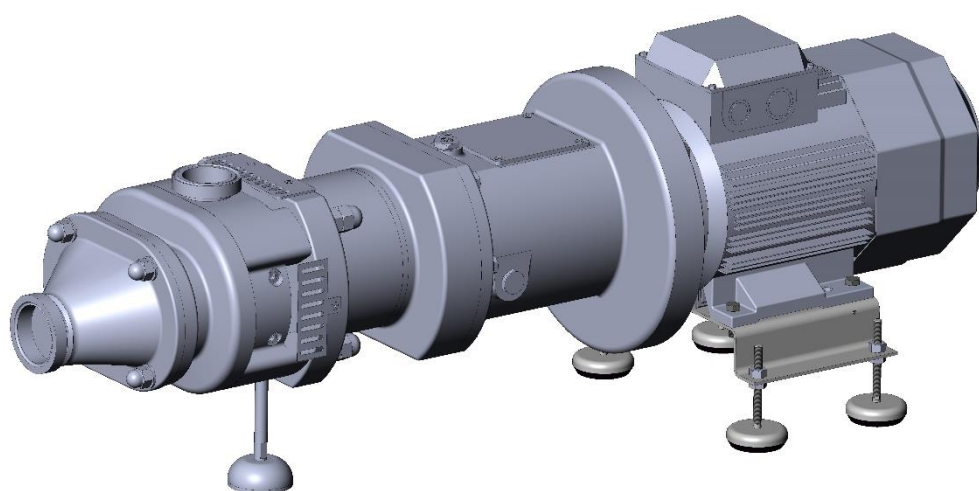


INSTALLATION, SERVICE AND MAINTENANCE INSTRUCTIONS

# TWIN SCREW PUMP

# DCH



01.530.32.0001



# EC Declaration of Conformity



**INOXPA S.A.U.**

Telers, 60  
17820 - Banyoles (España)

hereby declare under our sole responsibility that the

Machine:	<b>TWIN SCREW PUMP</b>
Model:	<b>DCH</b>
Type:	<b>DCH 1A1, DCH 1A2, DCH 2A1, DCH 2A2, DCH 3A1, DCH 3A2</b>
Serial number:	<b>IXXXXXXXXXX to IXXXXXXXXXX XXXXXXXXXXIINXXX to XXXXXXXXXXXIINXXX</b>

fulfills all the relevant provisions of the following directive:

**Machinery Directive 2006/42/EC  
Regulation (EC) n° 1935/2004  
Regulation (EC) n° 2023/2006**

and with the following harmonized standards and/or regulations:

**EN ISO 12100:2010  
EN 809:1998+A1:2009/AC:2010  
EN 60204-1:2018**

The technical file has been prepared by the signer of this document.

A handwritten signature in black ink, appearing to read 'Dr. Reyero'.

David Reyero Brunet  
Technical Office Manager  
25th October 2021



Document: 01.530.30.03EN  
Revision: (0) 2021/10

# Declaration of Conformity



**INOXPA S.A.U.**

Telers, 60  
17820 - Banyoles (Spain)

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Serial number:	<b>IXXXXXXXXXX to IXXXXXXXXXX XXXXXXXXXXIINXXX to XXXXXXXXXXXIINXXX</b>

fulfils all the relevant provisions of these regulations:

**Supply of Machinery (Safety) Regulations 2008**

and with the following designated standards:

**EN ISO 12100:2010  
EN 809:1998+A1:2009/AC:2010  
EN 60204-1:2018**

The technical file has been prepared by the signer of this document.

A handwritten signature in black ink, appearing to read "Dr. Reyero Brunet".

David Reyero Brunet  
Technical Office Manager  
25th October 2021



Document: 01.530.30.04EN  
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## 2. General Information

### 2.1. INSTRUCTIONS MANUAL

This manual contains information regarding the reception, installation, operation, assembly, disassembly and maintenance of the DCH pump. Carefully read the instruction prior to starting the pump, familiarize yourself with the installation, operation and correct use of the filter and strictly follow the instructions. These instructions should be kept in a safe location near the installation area. The information published in the instruction manual is based on updated data. INOXPA reserves the right to modify this instruction manual without prior notice

### 2.2. COMPLIANCE WITH THE INSTRUCTIONS

Not following the instructions may impose a risk for the operators, the environment and the machine, and may result in the loss of the right to claim damages. This non-compliance may result in the following risks:

- failure of important machine/plant functions,
- failure of specific maintenance and repair procedures,
- possible electrical, mechanical and chemical hazards,
- risk to the environment due to the type of substances released.

It is necessary to retain carefully this handbook that has to be available for the skilled staff in charge of the pump use and maintenance, which is responsible for the operations executed on it and, for this reason, it must be CAREFULLY read before operating.

The pump must be used exclusively for the specified situation contained on the confirmation for which INOXPA ordered the production, the construction materials and the running tests which make the pump perfectly equivalent to the requests.

For this reason it CANNOT be used for situations different from the ones specified on the confirmation.

In case of a change in working conditions, it is absolutely necessary to contact with INOXPA, which decline every kind of responsibility for uses different from those provided for by the contract.

If the pump constructive and working data are not available, they will be required to INOXPA defining the serial number pressed on the plate fixed on the pump. It has to be always used the pump serial number to require the technical information and/or to order spare parts or replacement pieces.

Besides, the user has to verify the right environmental conditions (for example frost or high temperature) where the pump will be installed and could condition its performances and/or seriously damage it.

### 2.3. SYMBOLS



#### HEALTH HAZARD

This sign advises the operator he has to pay attention to important info in order to avoid dangerous operation which can be to the prejudice of his and other persons' physical integrity. Follow carefully the indications.



#### DEVICES INTEGRITY HAZARD

This sign advises the operator he has to pay attention to important info in order to avoid dangerous operation which can be to the prejudice of his and other persons' physical integrity and of surrounding devices. Follow carefully the indications.



## IMPORTANT TECHNICAL INFORMATION

This sign indicates technical information or conduct of particular importance should not be overlooked



### IMPORTANT!

Keep this manual and all accompanying documents in a PLACE accessible and known to all users (operators and maintenance personnel). It is advisable to make a copy of this manual to be kept in a safe place.



It is expressly forbidden to use the pump for staff lacking the required qualifications.

In the case where the operating conditions specified on the order could be changed (for example, operating fluid pumped, temperature or use), it is absolutely necessary to contact INOXPA to receive an eventual written consent. INOXPA declines all responsibility for uses other than those specified in the contract.

## 2.4. WARRANTY

Any warranty will be void immediately and lawfully and, additionally, INOXPA will be compensated for any civil liability claims submitted by third parties, in the following cases:

- the service and maintenance work have not been carried out in accordance with the service instructions, the repairs have not been carried out by our personnel or have been carried out without our written authorisation,
- modifications have been carried out on our material or equipment without written authorisation,
- the parts or lubricants used are not original INOXPA parts and products,
- the material or equipment has been improperly used, has been used negligently, or has not been used according to the instructions and their intended.
- the pump parts are damaged because they have been subjected to high pressure due to not having used a safety valve.

The General Conditions of Delivery already in your possession are also applicable.

The machine may not undergo any modification without prior approval from the manufacturer. For your safety, only use original spare parts and accessories. The usage of other parts will relieve the manufacturer of any liability. Changing the service conditions can only be carried out with prior written authorization from INOXPA.

Please do not hesitate to contact us in case of doubts or if further explanations are required regarding specific data (adjustments, assembly, disassembly, etc.).



Disassembling the pump is allowed only for the execution of cleaning operations to be performed manually (Cleaning Out of Place). The instructions for the proper execution of manual cleaning of the pump parts in contact with the operating medium are shown in Chapters 6 and 8 of this manual.

Any other disassembling operation on the pump components not mentioned in the operation of COP (Cleaning Out of Place), if it was not expressly authorized by INOXPA determines the immediate termination of the guarantee.

## 2.5. PUMP NAMEPLATE

Below is shown the nameplate fixed on the pump:

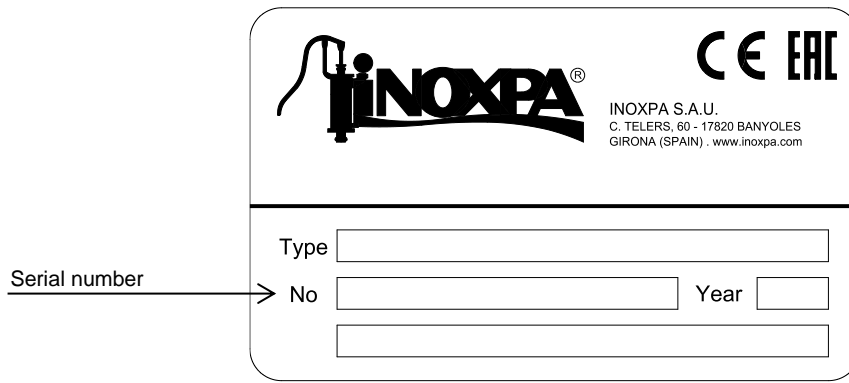
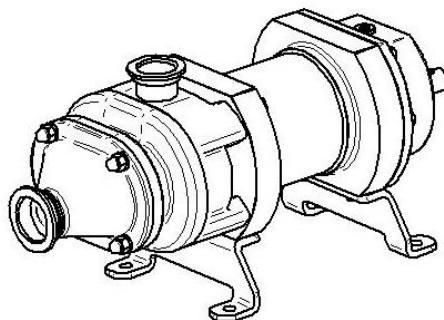


Fig.1 – Example of pump nameplate



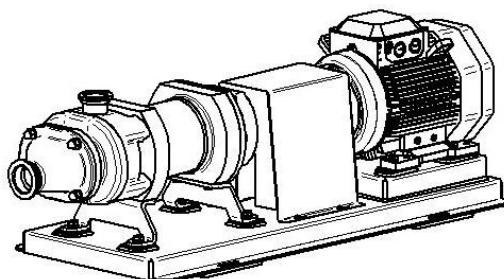
## 2.6. PUMP VERSION

- Bare shaft pump, supplied without motor or baseplate:



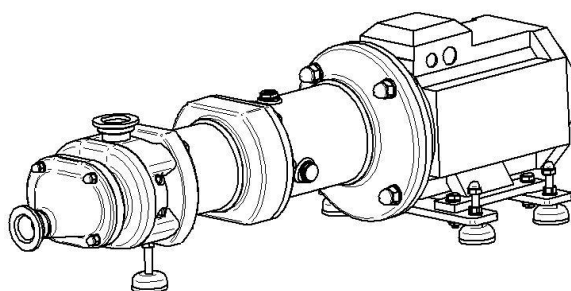
**Fig.2 – Bare-shaft pump**

- Pump assembled on a baseplate with drive motor, coupling and coupling guard:



**Fig.3 – Pump on baseplate**

- Pump with a flange connection (close-coupled). The drive unit is directly mounted to the gear housing, by means of a flange. The adjustable feet enable the location of the pump at the required height.

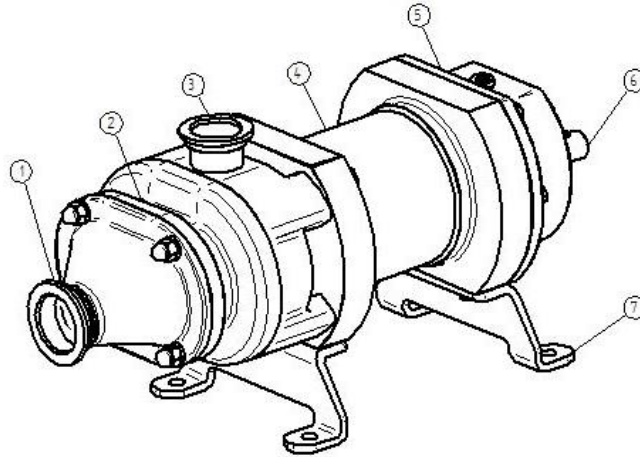


**Fig.4 – close-coupled pump**

## 3. Design

### 3.1. PUMP DESIGN

Below it is shown an example of the structure of the pump.  
For the scale drawing please refer to the dimensional drawing.



**Fig.5 – Indication of the main components of the pump (example)**

These are the main parts:

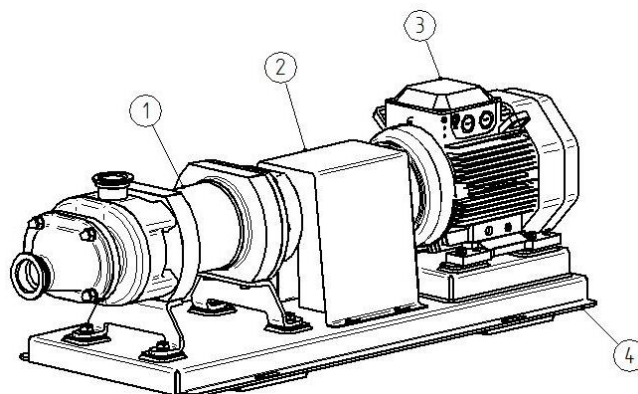
1. Suction casing
2. Separate flange
3. Discharge casing
4. Bearing support
5. Gear housing
6. Drive shaft
7. Feet

With close-coupled pumps the drive shaft is not visible and the drive unit is flange-mounted directly to the gear housing.

The direction of flow, in certain cases, can be reversed, therefore item 1 will be the discharge casing and the item 3 the suction casing.

### 3.2. PUMP ON BASE PLATE

The pump may be provided with base plate, these are the main parts:



**Fig.6 –Indication of the main components of the pump with base plate (example)**

These are the main parts:

1. Pump
2. Coupling and coupling guard
3. Drive unit
4. Baseplate

### **3.3. PUMP OPERATIONS**

DCH pumps are volumetric devices fitted with two screws without contact between rotating parts. The synchronism between the rotors is ensured by a timing gear located outside the bearing support.

The medium goes into the separate flange from the suction casing and it is being pushed by the screws to the discharge casing. The area of the pump in contact with the fluid is separated from the outside by two mechanical seals.

The mechanical seals can be:

- Single mechanical seal
- Double mechanical seal

## 4. Safety



Do not use the DCH pumps outside the prescribed limits contractually without the express consent of INOXPA.

The unauthorized use outside of the pressure and temperature limits may cause the deterioration of the seals, the binding and the explosion of the pump. Products with a viscosity higher than those prescribed by contract can cause overheating of the pump.



The pump designed to be inserted in locations classified as reported in its CE certificate of conformity issued by the manufacturer.

It is absolutely forbidden the installation of the equipment in hazardous areas with a greater degree of danger posed by the requirements of certification.

### 4.1. GENERAL INFORMATION



In this chapter all the precautions that have to be carefully respected to avoid serious damages to persons and/or to the pump are listed:

- damages to the installation vital parts
- damages to the persons due to electrical, mechanical and chemical danger

The security regulations contained in other chapters should have been observed in addition to those listed in this page:

- Follow ALWAYS the regulations and the use provided for the pump confirmation.
- The pump engine electrical connections must ALWAYS be executed by the authorized and skilled staff following the current regulations.
- The intervention on the pump must ALWAYS be executed by 2 persons at least.
- Get near the pump ALWAYS with the right wears (to avoid wide sleeve wears, ties, necklaces, etc.) and/or a protection equipment (helmet, glasses, gloves, shoes for the prevention of industrial accidents, etc.) suitable for the operation to do.
- Disconnect ALWAYS the engine from the feeding installation, for example, taking away voltage to the line, when it is necessary to interfere on it.
- The pump must ALWAYS be stopped before touching it for every reason.
- The pump has NEVER to be warm when somebody is working on it.
- Reset ALWAYS the security regulations, that sometimes are kept away to intervene on the pump
- Do NEVER touch the pump and/or the piping connected to it when there is the warm fluid transport at more than 80°C.
- Be ALWAYS careful in touching a transporting pump or a pump that has transported toxic liquids and/or acids and/or dangerous substances.
- Arrange ALWAYS a fire-fighting equipment in the neighborhood.
- NEVER use the pump in a sense opposed to the expected and rotation sense and it is showed on the pump.
- Do NEVER introduce hands or fingers into the holes and/or into the pump group openings.
- Do NEVER get on the pump and/or the piping connected to it.
- The pump and the piping connected to it do MUSTN'T be in pressure when it is necessary to intervene on it.
- Maintain ALWAYS the surface of the pump clean by the dust and/or by greases to remove every possibility of self-supporting combustions due to the surfaces overheating.
- Observe ALWAYS the regulations imposed by the local specifications.
- Avoid dry running, ensure that the pump always works with the product fluid.
- Avoid cavitation, ensure that the inlet side valve and outlet side valve are fully opened during pump operation. Do not use the inlet side valve for regulating pump capacity.
- Respect the operational limits of the pump in relation to temperature, pressure, viscosity, pump capacity and speed.

Besides, in the pump there are some components that can cause some dangers to the persons who keep in touch with it even during the normal maintenance and/or use procedures:

Component	Use	Correlate dangers
Oil and/or grease	The bearing casing lubrication	Skin and eyes inflammation.
Plastic and elastomer components	O-ring, V-ring	Smoke release in case of overheating.
Aramid fiber	V-ring	Emissions of dust, smokes released when overheating.
Pump	*	Noise-exposure

**Tab.1 - Hazard of common components**

**4.2. MECHANICAL RISKS**



During the assembled machine movement operations (installation and put out duty) or some parts of it (maintenance phase and put out duty) there are remaining risks typical of the lifting and transport machine: crush for the use of a lifting and transport means, crush for the load fall or the transport means, impact, entrapping, lag, entangling.

To restrict the risk, the Buyer can ask the handling be done by a skilled staff, suitably informed about the risks concerning the load movement according to the current regulations.

The operators must respect these handbook dispositions.

Do not do handlings different from the expected ones.

**4.3. MANUAL OPERATION RISKS**



There is a general mechanic risk due to the manual operations with the tools used during the installation, the maintenance and the put out duty, the drilling and the screw-cutting operations, the operations for the alignment test. To limit the risk, the Buyer can ask the handling be done by a skilled staff, suitably informed about the typical of the treated activities, with the right tools and specific Individual Protection Dispositive that they require.

The operator, before starting every kind of maintenance or cleaning operation, has to disconnect the electrical feeding. If this operation has not been done, there is a risk connected to the casual engines start during the phases in which the machine protections are temporarily removed

**4.4. ELECTRICAL RISKS**



If the machine has got the total electrical engine already mechanically installed, while the electrical part (feeding and electrical display) is due to the Buyer. It is enclosed the Conformity Declaration furnished by the engine Constructor.

There are direct contact remaining risks with tension elements, or indirect contact with elements put in tension because of damages. These risks cannot be directly ascribed to the machine. At any rate, it reminds the following general rules:

- The electrical display must be realized in conformity with the current regulations dispositions, all the electrical net connection must be done by an authorized installer. The installer has to assure the derivation suitability from the electrical net and then doing all the connection respecting the current regulations.

- After any kind of impact on the machine from the movement means or the moved material, even if with a light intensity, it is necessary to open the electrical isolator and then go on with an electrical isolation test before restarting the machine.
- Make all the maintenance operations only after having disconnected the electrical feeding. All the maintenance operations on the electrical installation must be done by the authorized staff.

The operator, before starting every maintenance operation, has to disconnect the electrical feeding. If this operation has not been made, there is a risk connected to a casual engine starting during the phases in which the machine protections are temporarily removed.

#### 4.5. THERMAL RISKS



Some parts of the circuit and the engine, during the working, can have temperatures higher than 80°C. These parts marked with the suitable signaling.

Do not touch these parts during the working.

Make any intervention on these components only after the machine has been cooled, at least, 30 minutes. Foresee always the suitable protective means, such as delimiter barriers or other.

#### 4.6. CHEMICAL RISKS



Observe the safety dispositions relative to the fire risk contained in the current regulations.

During the maintenance operations, restarting after maintenance or put out duty stop, it is possible that the operator comes into contact with the pumped fluid, with lubricant substances used in the machine or with products used for the cleaning.

In this case, it is necessary to follow the warnings and the instructions showed by the Constructor and the products Supplier.

In case of contact with substances, refer to the Safety Cards. At any rate, it is suggested the gloves use.

#### 4.7. DANGEROUS AREAS



The pump is not self-operating equipment. When connected to a driving motor a full risk assessment of the motor pump unit should be carried out by the unit manufacturer and/or by the user.

The dangerous pump's areas may be the following:

- Close to the shaft catching.
- Under pressure devices.
- Hazardous or toxic liquids, to evaluate, to be evaluated after the installation
- Close to the pump: noise pressure level to be measured and evaluated after the installation.
- Risk of electrocution when next to electric panels (if they are in use).

There may be additional risks.

# 5. Carriage, lifting and Storage

## 5.1. CARRIAGE AND PACKAGING

When the pump arrives to the installation where it is destined, it is always suitable to verify the right correspondence between the transport papers and the supply really received.

During the pump disassembly operations, it is necessary to follow these instructions:

- Check on the packing the lack of damages due to the transport
- Remove with care the pump packing.
- Check that on the pump and on the equipment provided with it there is a lack of visible damages.

If there are damages on the pump and on the equipment provided with it, contact immediately INOXPA to verify the pump function.

So, provide immediately to the packing elements waste disposal which can be dangerous, (such as rivets, splinters etc.) and to the materials checked and differentiated waste disposal in according to the locally applicable regulations.



Before the pump transport, which has been already disassembled on the arranged installation base, check the dimensional drawings where there are the weight and overall dimension data.

So, transport ALWAYS the pump (or the group pump-base-engine) in horizontal position on the arranged installation base.

## 5.2. LIFTING

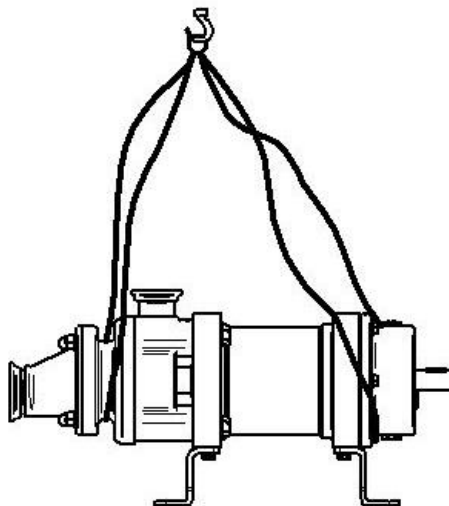
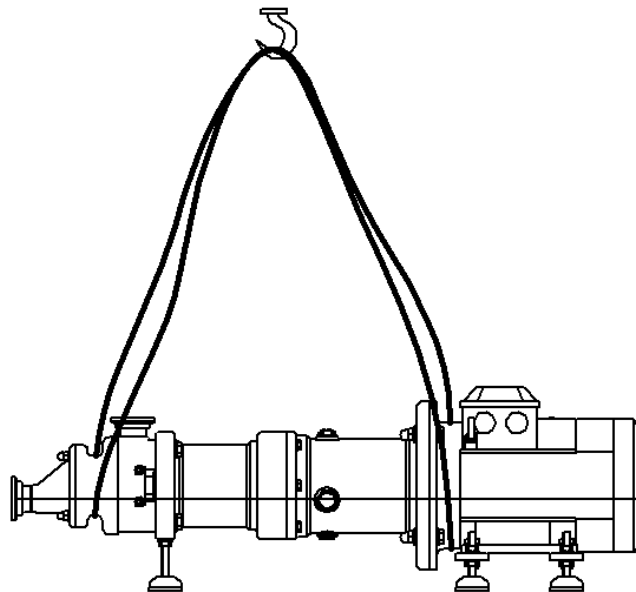
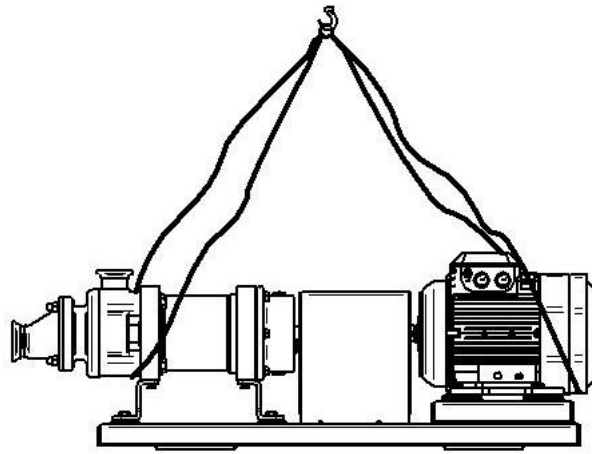


Fig.7 – Fixing the lifting ropes for pump without baseplate



**Fig.8 – Fixing the lifting ropes for pump with base plate**

Always avoid that the ropes do not damage the pump or the engine. Select the lifting equipment properly to the total weight. Lift the pump properly.

It has forbidden the movement of the pump or parts of it other than as described above.



The pump transport has to be effected by skilled and experienced staff, informed about the risks connected to the movement operations following the current laws.



Make sure that the lifting and carrying of the unit is done with proper equipment to support its weight. Before performing the movement, verify that the path forward is clear of obstacles and size are suitable for the passage of the group. Check the stability of the load. Avoid that the ropes or slings used for lifting of the group form a triangle with the angle at the lower vertex at 90 °.



IT IS FORBIDDEN every pump's movement or move some parts of its differently from what above described.



### 5.3. STORAGE

For (a period of) temporary storage it is necessary that the pump is not exposed to the weather for any significant period of time. All openings shall be closed with plastic covers.

For (a period of) long storage replace the pump in a closed, cleaned, dry place that is not exposed to solar rays and vibration free. Avoid that the temperature goes down below 5°C (in this case it is necessary to drain entirely the pump from every kind of liquid that is not antifreeze). Close every hole and/or communicating opening with the interior pump.

Lubricate all visible, internal and external uncoated metal parts and all flange connections with an acid-free and resin-free grease compatible with the packing set up on the pump.

Protect all internal cavities of the pump. Protect the working area with rust prevention products. Cover the pump with an impermeable sheet. Fill up entirely the bearing casing and the gear housing with lubricant oil. Rotate the pump shaft, at least, every month, and then let do one turning to the pump. Periodically, check the liquid level in the pump and in the mountings.

## 6. Installation and connection



The pump installation in site is a very important operation and it has to be carefully attended because the good working depends on it.

Proceed to the group installation only after all the regulations imposed by the local institution have been verified (for example safety, pollution laws etc.).



The installation and maintenance of the equipment should be performed by qualified and authorized personnel. The place of installation must be designed according to the laws and the directives for systems installed in potentially explosive atmospheres.



Do not install the pump directly direct exposure of sunlight or inclement weather. Do not install the pump in places without ventilation.

Ensure the equipotentiality of the pump grossed a link to a suitable ground reference using electrical conductors with an appropriate section. Do not exceed the number of revolutions and the pressure values for which the pump has been sold. Install a suitable suction filter to prevent ingress of dirt or harmful materials for the pump. The filter should have a filtering area at least 4 times the area of the front flange of the pump.

Predict the damper on the piping and / or upstream flexible joints and downstream of the pump so as to reduce the system noise and the effects of water hammer

### 6.1. GENERAL RULES FOR INSTALLATION

Do not remove the protection caps mounted on the suction and discharge casings, and the closing caps installed on all auxiliary connections, before they are connected to the piping, all this in order to protect the pump from the access of foreign bodies. Before performing the connection of discharge and suction casings, it is always necessary to verify that these are perfectly clean and therefore without any kind of dirt, such as welding residues, sand, foreign bodies, etc. Always protect the pump using a suction filter, which shall be selected on the basis of the viscosity of the fluid to be pumped, placed on the suction circuit. The pressure loss across the filter should not be reach the unallowable limit of the suction pressure, which shall remain within the limits provided by the supplier or the pump datasheet. If the pump is intended for pumping liquids with a temperature above 80 °C, some of it surfaces could reach a higher temperature value during operation. In this case it is always advisable to provide suitable security tools, such as barriers or other. The positioning must be performed carefully on foundations, trying to prevent crushing and using adequate tools for the lifting. Install the pump group in a place accessible from all sides, clean and able to ensure a horizontal installation of the pump by providing a free area of 1500 mm around the pump. Provide adequate ventilation of the group, avoiding placement in narrow, dusty and poorly ventilated areas.

### 6.2. PUMP GROUP INSTALLATION

#### 6.2.1. Preparing the location

The pump group positioning shall be carefully performed on the foundations, trying to avoid crushes and using adequate tools for the lifting.

Set up the pump group in a place accessible from each side, cleaned and able to provide a right and a viable installation, foreseeing an adequate area around the pump.

Guarantee an adequate ventilation group avoiding narrow, dusty and poorly ventilated places.

If the pump is supplied without base-plate, provide a base-plate which avoids torsional deformations and vibrations during operation, provide height compensation for the drive, check the direction of rotation of the motor.

Make sure that the pump is freely accessible from all sides and there is sufficient space for piping installation and maintenance operations.

### 6.2.2. Fixing baseplate on foundation

It is possible to mount the pump group on concrete foundation, only if the pump is mounted on a baseplate.

The foundations must be projected and realized to take over both the engine-pump vibrations, and sustain the pump weight, the auxiliary machines, the engine and the metallic base so as to prevent vibrations and bad alignments during the operation, making sure a correct alignment of the pump group.

The foundations bolts shall be set as showed on the construction and installation drawing.

Ensure that every preparation work necessary for the group starting, such as concrete structures, will be completed before the pump group installation and start-up.

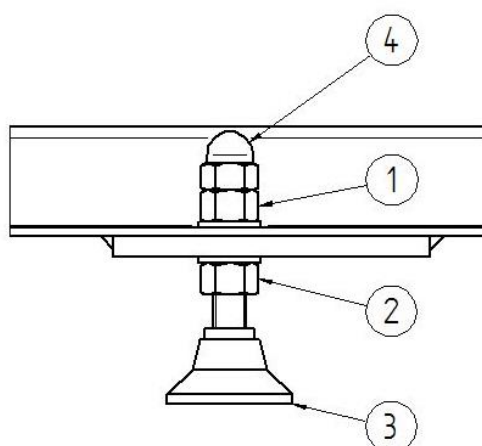
After placing the pump unit on the foundation, align the pump group in accordance with the information provided by INOXPA.

### 6.2.3. Assembly pump without foundation

It is possible to mount the pump group on flat and horizontal surfaces without foundation, by using levelling feet.

For the correct positioning of the pump follow the instructions below:

1. Lift the pump group
2. Install the levelling feet as shown in Fig. 9



**Fig. 9 – Mounting without foundations (schematic diagram)**

3. Place the pump group on a plane surface
4. Use the levelling feet to adjust the height as indicated as follow:
  - Hold the nut (2) with a spanner and loosen the other nut (1)
  - Adjust the height by turning the nut (2), then tighten the nut (1)
  - Make sure that the height deviation of the baseplate not exceed 0,33%
  - Tighten the blind nut (4) on the top of the levelling feet



**NOTE:** Adjust the height considering that, for these kind of baseplate, the main standards in the food industry require a 100 mm minimum clearance between the lowest part of the baseplate and floor.

### 6.3. COUPLING

The shaft of the pump and the motor of the pumping assembly were properly aligned at factory.

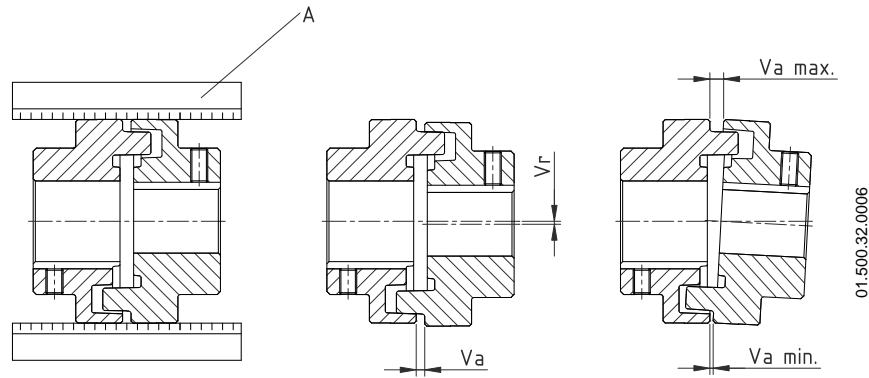
#### ATTENTION



Align the shaft of the pump and the motor again after install the pumping assembly.

- Check the alignment of the pumping assembly after installation. If is necessary, realign.
- In the case of applications dealing with high temperatures the pump can be operated temporarily at its working temperature. Then recheck alignment pump-piping.
- Place a straight-edge (A) on top of the coupling: the straight should make contact with both halves of the coupling over their entire length. See the follow figure.

- Repeat the check, but this time on both sides of the coupling near the shaft.



Maximum alignment deviations:

Outside diameter of the coupling [mm]	Va [mm]	Va max. - Va min. [mm]	Vr [mm]
69	3	1,2	0,20
87	4	1,5	0,25
96	4	1,7	0,25
129	5	2,2	0,30
140	5	2,4	0,35
182	5	3	0,40
200	5	3,4	0,45
224	6	3,9	0,50

The coupling have to be adequately protected during the operating the pump to avoid possible accidental accesses.



Do not operate the pump if the protectors are not installed adequately.

### 6.3.1. Motor alignment

Align the motor in such a way that the coupling is correctly mounted, if necessary use shims plates.

Check alignment carefully.

Tight the motor screws to fix the motor to baseplate.

### 6.3.2. Coupling guard mounting

Lift and position the coupling guard.

Make sure it is at the right distance between the motor and the pump

Tight the screws to fix the coupling guard to baseplate.

## 6.4. PIPING CONNECTION

### 6.4.1. General information

All the piping must be set on their own mounting, independent from the pump, in order to sustain its own weight, the accessories weight with the isolation, the transported fluid weight and all the forces and the wringed moments due to the thermic expansions.

It is necessary to install devices that avoid the transmission of forces or moments from piping to pump flanges. These forces could compromise the alignment and then cause vibrations and vibrations.

Possible thermic shock and/or over vibrations should have been prevented using, for example, some expansion joints.

The coupling between the different piping has to be executed through flanges interposing a gasket made of the suitable material, verifying that these are well centered between the tightening bolts so they do not cause flux resistances or remaining tensions.

The rated diameter of the suction and delivery piping not necessarily has to correspond to the pump flanges. But this diameter does not have to be smaller than the rated diameter of the suction/delivery pump.

With higher speed there will be higher pressure losses that could cause the cavitation arise, pressure over fall; in this way, the pump good working is compromised.

If the pump has to work with low values NPSHA (Net Pressure Suction Head Available) or in depression, the aspiration piping and the whole aspiration system must be well sized and studied. It is unimaginable that the pump can pass the system project lacks, such as the long piping and aspiration ways, maybe undersized and containing many curves, valves and first of all the aspiration piping has not to have bags or high points where the gas can tin.

Besides, this kind of machine, for its own peculiar working characteristics, has internal very strict clearances, and then every slag can cause serious damages to the pump. Examine carefully the piping to assure that there aren't foreign bodies or encrustation and clean with care before connecting the piping.

Avoid, when it is possible, the curves use and in particular the ones with short radius, and the connection of different diameter piping with reduction to tapered invitation and the eccentric type, and if possible with a connection way long about 10 times the diameter differences.

Check again the alignment after having blocked the piping to the pump before connecting the coupling to the motor.

A correct suction and discharge piping connection is necessary to avoid the bad alignment and the following bearing overheating and the over wear of the rotary parts.

The faces of the pump and the piping flanges must be parallel and bolted without interferences.

Do not use levers to force the bolt holes alignment.

**WARNING:** *Check again the alignment after having blocked the piping to the pump before connecting the joint to the motor.*



After mounting the pump on the base and after connecting all the piping to the pump, check that the pump shaft rotates freely without being connected to the elastic elements, the pump must be able to rotate freely. The mechanical resistance to be overcome is mostly due to the friction between the contact surfaces to the mechanical seal. Re-check the alignment after mounting the piping to the pump before connecting the coupling to the engine. A proper connection of the suction and discharge pipes is necessary to prevent misalignment and overheating of bearings and rotating parts. The pump flanges and the flanges of the connecting piping must be parallel and coupled with no residual stresses. Do not use levers to force the alignment of the bolt holes. Do not weld the connecting pipes to the pump.

#### 6.4.2. Suction piping

Install the suction piping in order to avoid some air bags, that can cause vibrations and bad pump working.

This piping should have a rising size in case of low suction, or descending in case of suction. from a tank.

The suction valve (if present) set on the aspiration line has to be used only for interception function and NOT for regulation one.

Install, where it is necessary, a check valve to prevent the suction collector emptying during the stop.

In case of more pumps installation, every pump must have its own suction piping connected to the main collector.

#### 6.4.3. Discharge piping

At the discharge pipe is necessary to install a safety valve and a shutoff valve.

The safety valve (pressure relief valve) must be mounted downstream of the discharge casing and as close as possible to the pump, so that its operation is not affected or compromised by other devices interposed between the pump and the valve (filters, bottlenecks, valves, etc.).

The safety valve of the pipe must be fitted with a suitable exhaust manifold, connected with the power source, in order to avoid recirculation of the fluid and the consequent excessive overheating of the pump.

In case of frequent switching, it is recommended to install a check valve just downstream of the discharge casing. In this way is possible to prevent, when the engine is stopped, the fluid within the shafts flows back, putting screws in motion and causing it to break.

In case the flow rate regulation is required, do not intervene on the valve placed on the flow pipe in that, because for volumetric machine, this could cause an overpressure that can damage the pump.

If flow rate adjusting is needed, use the motor speed regulation.

#### 6.4.4. Auxiliary piping

The auxiliary piping can include those for breather, drainage, seal flange washing, seal circulation oil, seal flushing, bearing mounting cooling, etc.

If the piping are furnished by INOXPA, refer to the attached installation drawing. When the auxiliary piping has to be installed by the Customer, dimensions and all connection positions will be shown on the installation drawing.

#### 6.4.5. Electrical connection

The electrical connections must be done only by qualified staff which should follow the engine constructor instructions, the electrical machines and the provided current regulations.

Verify the constructor specifications contained in the instruction journal enclosed to this handbook or furnished with the engine.

##### WARNING

Every action must be always executed without electrical voltage.

It is recommended to protect the engine against the overload with suitable switches and/or fuse-wires. Choose their protection degree verifying the full load current stamped on the engine plate. Besides, it is suggested to install an emergency pushbutton.

Do the right electrical connections without neglecting the engine grounding.

Before doing the electrical connections, verify that pump and engine turn freely by hand.

Verify that the engine rotation direction agrees with the pump rotation direction stamped on it, if possible, before it is connected to the pump.

Foresee the suitable protection means in case of the rotation test of the engine got away from the pump in order to avoid possible incidents.

The opposite and/or dry rotation can cause serious damages to the pump



# 7. Pump Operation

## 7.1. PRELIMINARY OPERATION

Determine the type of the pump, the type of mechanical seals and the type of installation.

Before going on with the starting operations, verify that piping and pump are filled up with the fluid to pump and entirely emptied from possible air bags.

Verify that all the auxiliary services are available and ready to use and where it is necessary, properly started (such as, for example, the mechanicals seals flushing).

Check that the pump and the engine bearings and the gear housing are properly lubricated and the levels reflect the ones indicated.

Possible filling must be done through the suitable connections and using the suitable lubricants.

If the pumped liquid temperature represents a danger, it is necessary to protect both the pump and the piping from the contact possibility, besides, it is necessary to avoid thermic shocks to the pump with suitable devices (such as insulation, pump body gradual preheat, etc.).

Check that the engine rotation agrees with the pump rotation direction as showed by the arrow set on the separate flange.

Before starting the pump, check again the alignment and if necessary correct again as showed by the section "Installation and Connection" verifying that it turns freely by hand.



### WARNING

The pump must not run in the absence of liquid for over a minute. Times longer than one minute may result in internal heat buildup of equipment that, in the presence of flammable liquids, can be extremely dangerous.

## 7.2. STARTING AFTER A LONG STORAGE

Before starting the pump, it must be entirely removed the anti-corrosive protection from the pump, using a solvent compatible both with the anti-corrosive product used with the pump constructive materials and, particularly, with the service to which the pump is destined.

Before starting the pump, check the condition of the elastomeric components such as O-rings, V-ring, checking their elasticity and, if necessary, replacing them with new samples.

Fill with lubricant oil.

### 7.3. CHECK BEFORE STARTING

Before pump starting procedures, it is necessary to verify the following:

1	Does this handbook have been read in its totality?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
2	Does the whole piping system have is filtered and emptied by possible slags?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
3	Does every possible choking have been removed from piping and pump?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
4	Do all the auxiliary connections (if present) and the pump piping have been properly installed as showed on the installation drawing/s?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
5	Does all the auxiliary connections (if present), such as the mechanics seal flushing, the gear housing cooling, are ready for working?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
6	Does all the connections and piping are without leakages and does there are residual forces and wringed moments?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
7	Does all the bolts, the piping connections and taps are properly tightened?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
8	Does the pump and the engine have been properly lubricated? Does the lubricant levels are correct?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
9	Does the pump-engine coupling have been verified?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
10	Does the coupling is properly reassembled?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
11	Does all the piping valves are in the right position?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
12	Does the safety protections are properly reassembled?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
13	Does the engine rotation direction is correct?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
14	Does the pump stop pushbutton position is clear and evident?	Yes <input type="checkbox"/>	No <input type="checkbox"/>

If there are one or more negative answers, do not start the pump but verify the point or the points till to obtain a positive answer.

### 7.4. PUMP FILLING

Make sure that the inlet side valve is open, until pressure equalization has taken place and close the inlet side valve.

Check pump and pipeline leakage, later repeat the filling procedure until the pump has been correctly filled.

Close the inlet side valve and ensure that all the connections are leak tight.

### 7.5. PUMP STARTING

#### WARNING

Before starting the electric motor and pump make sure you have read all the manual operating engine electrical motor and the manual operating frequency converter.

Never start the pump if the suction valve is closed, because the installed pump is the volumetric type and the pump delivery pressure is only the installation counter-pressure function, and if the delivery valve is closed the pressure in the piping can reach intolerable values for the whole discharge system. The installation of a safety valve on the discharge pipe is preferred. In the case in which is installed a safety valve on the discharge pipe, do not operate the pump with the discharge line closed for over 1 minute.





Open completely the valves set in pump suction and discharge branch.

Check the piping leakage and/or air bags.

If there are hot fluids let the pump fill in with the fluid and then wait till the pump reaches the contractual value.

Start the pump and check:

- Suction pressure
- Discharge pressure
- Pump rotation speed
- Motor power absorption
- Seal system, if necessary follow additional instruction by the seal manufacturer
- If necessary, clean the pump
- Verify the presence of leaks

Close the delivery valve till the attainment of the contractual discharge pressure.

After having checked the contractual starting and the operational characteristics, the pump and the driver must be free from noise and anomalous vibration.

If there are anomalous conditions it is necessary to stop the pump and find the bad working causes.



#### **WARNING**

Make sure that the temperature of the fluid is changing with a rate of less than 2K/min.

### **7.6. SWITCH OFF**

The volumetric pumps must be stopped with the discharge valve OPENED.

If there is not a no-return valve on the piping, it is necessary to avoid the pump reverse rotation, due to the fluid reflow from the suction tank.



Never close the discharge valve before the pump stops.

Never start the pump if the shaft is running.

If there is an extended stop, empty completely the pump in order to avoid body breakings in case of freezing or erosion due to the possible chemical alteration of stagnant fluid in the pump.

At operating temperature, check coupling alignment and realign motor if necessary.

Check all connecting screws and tighten, if necessary.

If necessary, clean the pump.

### **7.7. WORKING CHECK**

Periodically, through the installation instrumentation, check the pump good working verifying that the pump is constantly able to perform the service for which it has been arranged.

Check always with care:



- Suction pressure
- Discharge pressure
- Pump rotation speed
- Engine power absorption
- Lubricant levels

The pump working must be free from vibrations or anomalous noises.

If there are anomalous presences or unknown noises stop immediately the pump, find the cause and eliminate the disadvantage.

Even if there is a lack of anomalies, it is necessary to check periodically the good pump working verifying also the alignment of it.

Check periodically the capacity system working and all the installed auxiliaries circuits.

## 7.8. CIP/SIP PROCEDURES

DCH series pumps can be cleaned without dismantling the pump.

It is necessary to determine the CIP temperature and the CIP medium in accordance with the operating requirements.

CIP temperature below 80°C procedure:

- The pump is switched off.
- Sealing system in operation (if present).
- Switch pipeline system to CIP medium.
- Wait until the temperature of the casing pump is above 60°C.
- Start the pump.
- Make sure that the flow rate of the fluid inlet is adequate, acting on motor frequency converter.
- Is it necessary to have a velocity of the CIP medium of 1,5m/s in the suction piping.
- Clean piping system and the pump.
- Switch off the pump.
- Remove CIP medium, make sure there are no residues.
- Perform a flushing and neutralize the system.

CIP cleaning/sterilizing at temperature above 80°C procedure with mechanical seals with flushing:



**WARNING:** Material damage due to overheated of the mechanical seals

- The pump is switched off.
- Sealing system in operation.
- Warm up pump when is stationary.
- Switch pipeline system to CIP/SIP medium.
- Wait until the temperature of the casing pump is above 60°C.
- Start the pump.
- Make sure that the flow rate of the fluid inlet is adequate, acting on motor frequency converter.
- Is it necessary to have a velocity of the CIP medium of 1,5m/s in the suction piping.
- Clean the pipeline and the pump.
- Switch off the pump.
- Remove CIP/SIP medium, make sure there are no residues.
- Perform a flushing and neutralize the system.

**CIP cleaning/sterilizing at temperature above 80°C procedure without sealing system:**



**WARNING:** Cleaning duration shorter than 30minutes



**WARNING:** Material damage due to overheated of the mechanical seals



**WARNING:** When cleaning/sterilizing the pump using steam, block the pump

- The pump is switched off.

- Only clean/sterilize pump when the pump is stopped and with a cleaning duration shorter than 30minutes.
- Block the pump if using steam for cleaning/sterilizing the pump.
- Switch pipeline system to CIP/SIP medium.
- Clean the pipeline and the pump.
- Remove CIP/SIP medium, make sure there are no residues.
- Remove the blockage of the pump.
- Perform a flushing and neutralize the system.

### 7.9. COP (cleaning of place) PROCEDURE

It is possible to perform a mechanical cleaning of the inner parts of the pump.  
For the correct cleaning of the pump follow the instructions:



**WARNING**

Please refer to Chapter 8 before pump disassembly

- Switch off and depressurize the pump.
- Make sure that the pump cannot be switched on accidentally.
- Close suction and discharge-side valves.
- Switch off heating/cooling system (if present), make sure it cannot be switched on accidentally.
- Switch off auxiliary operating systems (if present), make sure they cannot be switched on accidentally.
- Remove suction and discharge lines from the pump.
- Unscrew cap nuts on suction casing.



**NOTE:** Please refer to Chapter 8 before performing this action

- Remove suction casing



**NOTE:** Please refer to Chapter 8 before performing this action.

- Remove separate flange and the O-rings wet side.



**NOTE:** Please refer to Chapter 8 before performing this action.

- Clean/sterilize suction casing, separate flange, discharge casing, screws, nuts and studs with suitable cleaning agent



**NOTE:** Perform this action carefully to avoid damaging the components

- Reassemble separate flange and the O-rings wet side.



**NOTE:** Please refer to Chapter 8 before performing this action.

- Tighten the bolts on separate flange.



**NOTE:** Please refer to Chapter 8 before performing this action.

- Reassemble suction casing and tighten the cap nuts.

# 8. Maintenance



For the replacement of any part of the pumps always use original spare parts INOXPA.

## 8.1. INSTRUCTION FOR SPARE PART ORDERING

To order spare parts, you must provide:

- The serial number and type of pump as shown on the nameplate.
- The quantity of parts required.
- The description of replacement parts and their location.

## 8.2. WEARING PARTS

Spare parts not supplied by the manufacturer are not approved. The fitting and/or use of such parts can change the characteristics of the pump and therefore compromise its safety.

No liability or warranty claims shall be accepted for any damage arising from the use of non-original spare parts and accessories.

Malfunctions that cannot be rectified by the user may only be rectified by the service department of the manufacturer.

The standard wearing parts are:

- Mechanical seals.
- Wet side O-rings.
- Bearings O-rings
- Sealing rings.



The mechanical seals and the wet side o-rings, are certified according to the main food and sanitary Standards. Use original parts or parts approved by INOXPA exclusively.



We recommend using our genuine spare parts because these are confirmed by the main food and sanitary Standards.

## 8.3. GENERAL INFORMATION ON MAINTENANCE ACTIVITIES

The DCH series pumps require regular maintenance and care like all mechanical equipment. An incorrectly repaired pump could cause premature breakage and unsafe conditions. In order to ensure product longevity and safety, maintenance operations must be performed by properly trained technicians. Check that all safety systems are in place and that the system pressure has been eliminated before performing ANY maintenance.

When you need to repair the pump or remove it from the system, it must be absolutely certain that all the pumped product has been removed from the pump and connected piping. After the whole product is discharged from the pump and related piping, check that the system is not under pressure.



Pay special attention during the drainage process to prevent damage to personnel and adjacent equipment. Purge completely the system and make sure that the product is de-aerated or collect the product in accordance with local regulations. The pumping system shall be purged by authorized and trained personnel.



Plan to replace bearings every 5000 operating hours. Be sure to use only original parts supplied by INOXPA, in order to avoid the invalidation of product warranty.



The pump must be kept clean by avoiding accumulation of dust exceeding 5mm above it. Excessive accumulations of dust could hinder proper heat dispersal. Consider cleaning activities in the plane of the equipment maintenance.

#### 8.4. MAINTENANCE TABLE

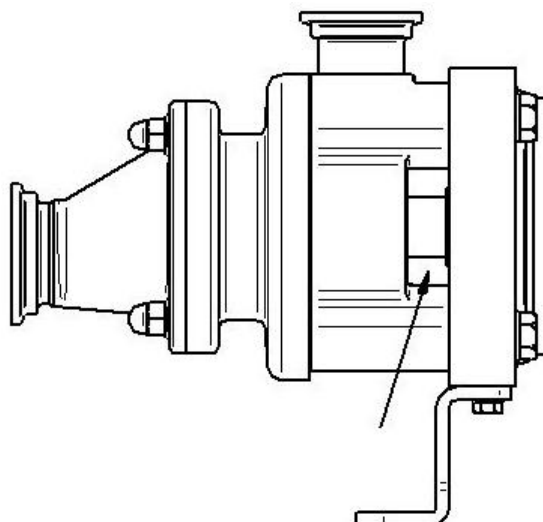
Carry out maintenance work in accordance with the following table:

Inspection Interval	Component	Who	Measure
Hourly during the start-up phase	Pump, motor	Qualified personnel	<i>Check alignment and adjust if necessary</i>
Daily	Gear housing	Qualified personnel	<i>Check gear oil and top up if necessary</i>
Daily	Coupling	Qualified personnel	<i>Check the correct mounting of coupling and guard</i>
Daily	Mechanical seals	Qualified personnel	<i>Check for leakage and in case of leakage, contact the manufacturer if necessary</i>
Daily	O-rings wet side	Qualified personnel	<i>Check for leakage and In case of leakage, contact the manufacturer if necessary</i>
Daily	Barrier	Qualified personnel	<i>Check function, top if necessary. If contamination is present check mechanical seals and replace if necessary</i>
Weekly	Drive unit	Qualified personnel	<i>Check for wear in accordance with manufacturer's instructions</i>
After 250 operating hours or 3 months	Gear housing	Qualified personnel	<i>Change lubricating oil</i>
With non-continuous operation, every 2000 hours after 3 months	Gear housing	Qualified personnel	<i>Change lubricating oil</i>
6 months	Barrier system	Qualified personnel	<i>Change lubricating oil</i>

**Tab. 5 – Maintenance table**

## 8.5. MECHANICAL SEAL CHECK

It is important to perform a daily check of the mechanical seals to detect any leakage. Perform a visually inspection of the area shown in Fig.15, this area is a potential leak site.



**Fig.15 – Potential leak site**

In case of leakage, the mechanical seal shall be replaced.

## 8.6. LUBRICATION

### 8.6.1. General information

To ensure a good pump working, it is necessary to take care of the mounting and bearing lubrication.

The INOXPA twin screw pumps DCH series are always constructed with the gear housing, and are lubricated with oil.

Consult the data sheets of the pump, enclosed to this handbook, to verify both the type and the quantity of the required lubricant.

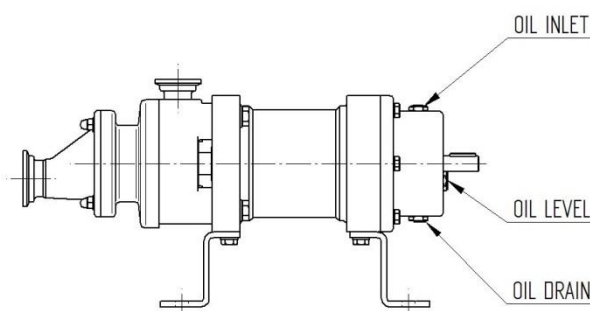
If the work environment is clean and there are no particular oil pollution hazards due to water and dust, and the operating temperature is about 60 ° C, the lubricant must be replaced (or only controlled in case of use of grease) each 4000/6000 hours.

For mounting temperatures above 60 ° or particularly dirty or wet environments, reduce the time between controls and changes.

A possible overheating can be caused by an excess of oil charge, a bad alignment or heavy vibrations.

### 8.6.2. Lubrication points

Below are shown the lubrication points:



**Fig.16 – Overview of lubrication points**

### 8.6.3. Changing of lubricating oil

To perform lubricating oil changing, follow the instructions below:

- Switch off the pump and make sure that the pump cannot be switched on accidentally
- Unscrew the oil drain cap and drain lube oil at warm operating temperature
- Tighten the oil drain cap and top up lubricating oil

Top up with lube oil until the oil level reaches the middle of the oil level eye

### 8.6.4. Lubricant table

The following gear housing oils are suitable for use in the foodstuffs and pharmaceutical sectors



**NOTE:** Lubricant must be H1/food grade approved



**WARNING:** Risk to damage the equipment if non compatible lubricants are used.

Manufacturer	Gear Oil
Mobil	SHC CIBUS 150
Shell	Cassida Fluid GL 150
Total	Nevastane SL 100



## 8.7. MALFUNCTIONS AND POSSIBLE CAUSES

Malfunctions that are not specified in the following table or which are not traceable to one of the specified causes should be discussed with INOXPA. The list of possible faults is in the following table.

Pump fails to provide flow rate	Flow rate is insufficient	Flow rate is too large	No pump suction	Not running smoothly	Pump clogging	Pump leaks	Motor power consumption too high	High temperature increase	Cause	Remedy
X	X			X			X	X	Pressure differential too great	Modify operating data
X	X		X					X	Clearance between pumping elements and casing too great	Replace worn parts Consult INOXPA
X			X						Incorrect direction of rotation	Change drive's direction of rotation
X	X		X					X	Speed too low	Increase speed with speed regulator
X	X		X	X					Feed line closed by valve	Fully open valve
X	X		X	X					Air is sucked in	Seal intake Increase speed
X			X						Pump cavitation: $NPSH_r < NPSH_a$	Improve feed line Reduce speed
X	X		X	X					Outlet line closed	Open pressure line
X			X	X			X	X	Pump blocked by solid matter	Clean pump Consult INOXPA
X	X	X	X	X			X	X	Operating conditions deviated from datasheet	Coordinate with manufacturer
		X		X			X	X	Speed too high	Reduce speed with speed regulator
X	X		X			X			Shaft seal defective	Replace shaft seal
X			X						Pump not filled before start	Fill pump completely
				X					Oil level in gear housing too low	Top up oil and correct oil level
			X			X			Casing moulded ring defective	Replace moulded ring
				X	X		X		Too many direction changes on piping	Optimise piping
				X	X		X		Pumping elements dirty	Clean pumping elements
				X	X				Coupling not aligned	Align the coupling
				X	X		X		Thermal expansion of pumping elements because of rapid temperature fluctuations	Wait for temperature equalisation
					X		X		Roller bearings defective	Replace roller bearings Consult the manufacturer

Tab.6 – Malfunctions table

# 9. Assembly and disassembly

## 9.1. GENERAL INFORMATION

### WARNING



If it is necessary to repair the pump, it is required the knowledge of the operations to do. Follow some regulations listed in chapter “SAFETY”. If the working temperature is high, stop the machine and wait until the pump temperature has decreased to 20°C.

Let the components transport be done by skilled staff, informed about the risks connected to the movement operations following current regulations.

Ensure that the lifting and transport means is suited to the weight of moved components.

### WARNING



It is important that the tools used for the pump assembly and disassembly, have the following properties:

- Tools should not be in carbon steel
- The tools that are used for the assembly and disassembly of wetted parts of the pump, they must be used exclusively with stainless steel parts. This precaution is very important to avoid the ferrite contamination of the tools.
- Carefully clean the tools after the use with anti-corrosive liquid

These instructions are designed to be used in conjunction with the sectional drawing.

Before acting on the pump, it is necessary to:

- Wear suitable protective wears, such as helmet, glasses, shoes, etc.
- Take away the engine feeding tension and if it is necessary, disconnect the pump.
- If the pump transports hot fluids, let cool it down until ambient temperature.
- Discharge all the pumped liquid through the drainage holes.
- Check the materials and product compatibility of all auxiliary products used (lubricants, cleaning agents, adhesives and securing devices)
- Make sure that during the different phases of the assembly/disassembly, are used only clean tools without ferrite

## 9.2. REMOVE THE PUMP FROM THE GROUP

### WARNING



During the maintenance do not disassembly casually the pump parts, but follow the regulations below mentioned.

Besides, it is important to consider that some internal pump details, such as gears, have been installed in accurate and marked with numbers positions.

Reassemble always the disassembled components in the original positions, checking the marking signs correspondence.

To disconnect the pump from the installation, it is necessary to:

- Switch off and depressurize the pump
- Make sure that the pump cannot be switched on accidentally
- Disconnect the suction and discharge casing from the piping
- Disconnect the auxiliary piping, if present
- Remove the coupling guard (if installed)
- Remove the coupling spacer and the pump-side coupling half from the drive shaft (if installed)
- Disassembly the pump unscrewing the screws on the base-plate (if installed).
- Disconnect the pump from the installation taking care to not damage any component and raising it, if necessary, as showed in the chapter CARRIAGE. LIFTING AND STORAGE.
- Lift pump and put down on a suitable surface

- Lay the pump on a suitable surface

Remove all the tools used for positioning

### 9.3. DISASSEMBLY WET SIDE COMPONENTS AND MECHANICALS SEALS

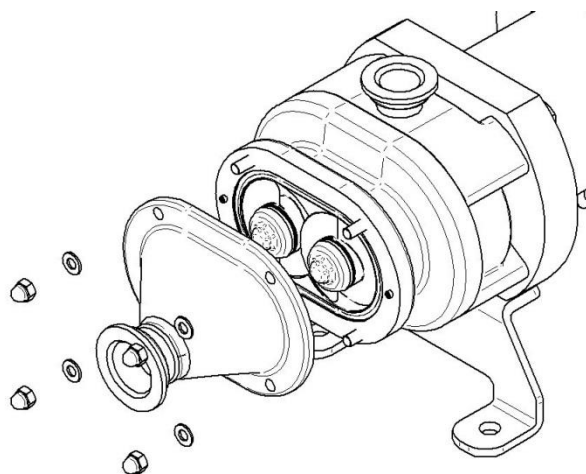


**WARNING**

Careful handling the pump components and put them in the appropriate place

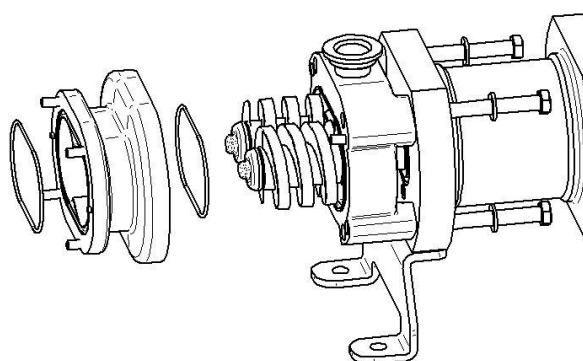
The following are the steps to follow for a proper disassembly of the pump

- Remove the cap nuts (Item 48.1) from the suction casing (Item 1)
- Remove the suction casing (Item 1) sliding it horizontally



**Fig.17 – Disassembly of suction casing**

- Unscrew the screw on bearing support side (Item 46)
- Remove the separate flange (Item 2) sliding it horizontally and the 2 wet side O-rings (Item 8).



**Fig.18 – Disassembly of separate flange**

- Use a piece of soft metal (as aluminum or copper) block the CW (Item12) and CCW screw (Item 10)
- Unscrew and remove the 2 cap screw (Item 6) by turning in counter-clockwise



**NOTE:** Use a spanner to unscrew the cap. Perform this operation carefully to avoid damages of the cap's surface.

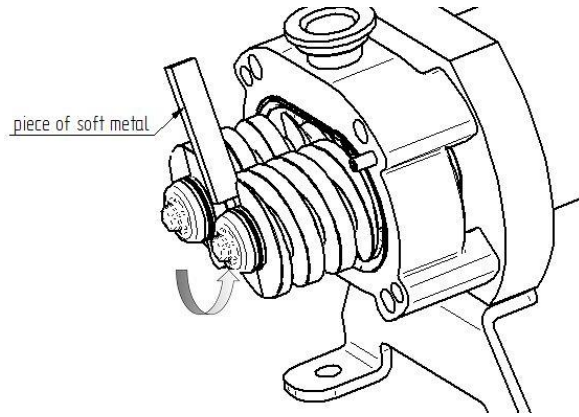


Fig.19 – Disassembly of CW screw

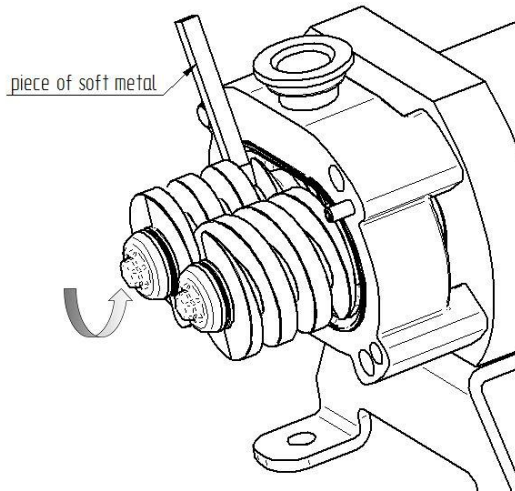


Fig.20 – Disassembly of CCW screw

- Remove both cap screw (Item 6) and the O-ring cap (Item 7).



**NOTE**

Use a spanner to unscrew the cap. Perform this operation carefully to avoid damages of the cap's surface.

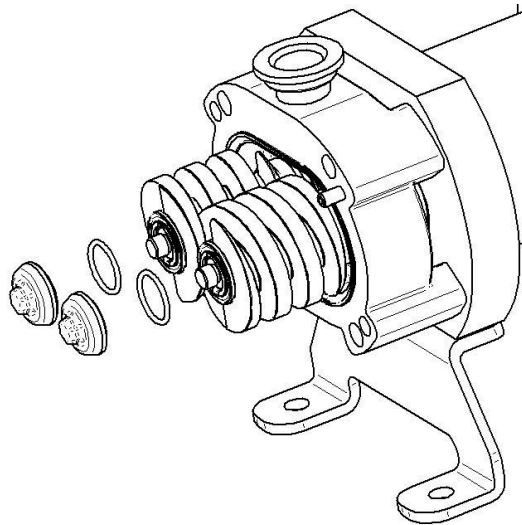
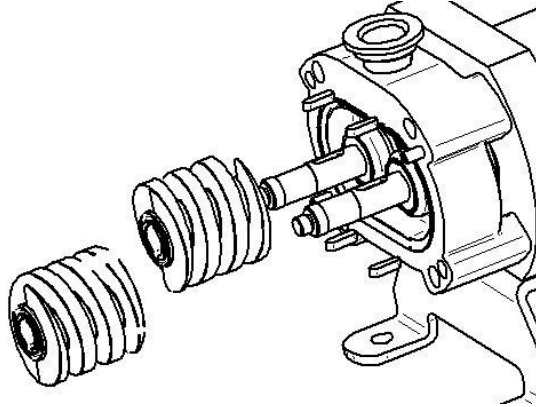


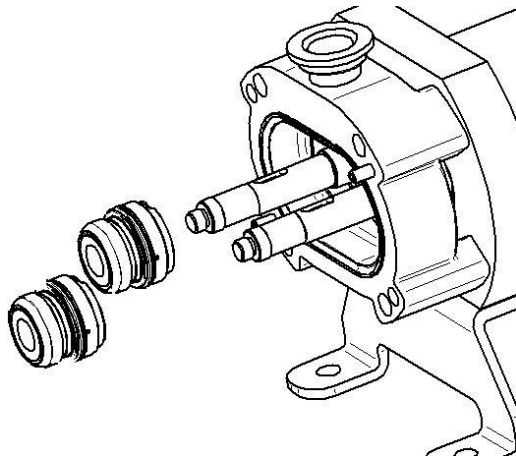
Fig.21 – Disassembly of cap screw

- Remove the CW (Item 9) and CCW(Item10) screws and the keys (Item 30.1) on the shaft.



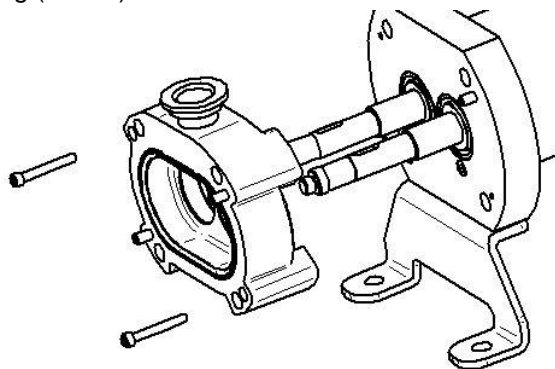
**Fig.22 – Disassembly of CW and CCW screw**

- Remove the rotary holder of the mechanical seals and later remove the static holder (Item11.1-11.2).



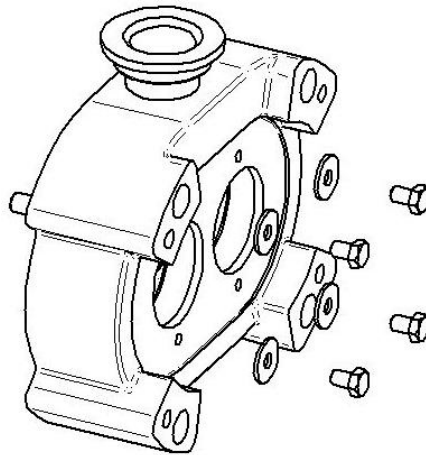
**Fig.23 – Disassembly of mechanical seals**

- Remove the socket head bolts (Item 38).
- Remove the discharge casing (Item 3).



**Fig.24 – Disassembly of discharge casing**

- Remove the screws (Item 41.1) and the washers (Item 42.1) place on the rear side of the discharge casing.



**Fig.25 – Disassembly of screws for mechanical seal**

#### 9.4. ASSEMBLY SCREW CW, SCREW CCW AND MECHANICAL SEALS



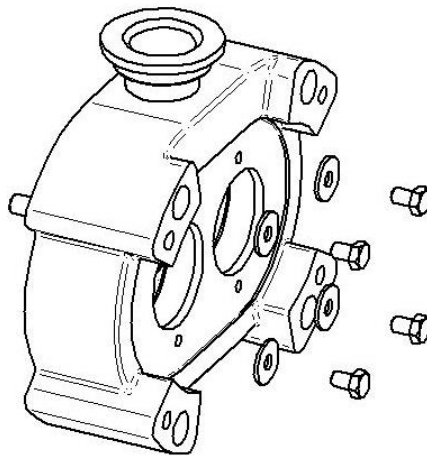
**WARNING**

Careful handling the pump components and deposited in the appropriate place to prevent damages.

In the different phases of assembly refer to tightening torque table (paragraph 8.5).

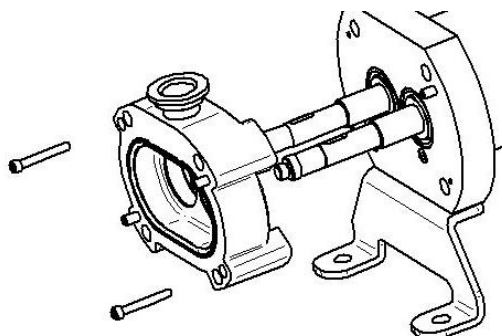
The following are the steps to follow for a proper assembly of the pump:

- Tighten the screws and the washers place on the rear side of the discharge casing (Item 41.1 – 42.1).



**Fig.26 – Assembly of screws for mechanical seal**

- Assemble the discharge casing (Item 3) on the bearing support tightening the socket head bolts (Item 38).



**Fig.27 – Assembly of discharge casing**

- Carefully check sliding surfaces of the mechanical seals for score marks and cracks
- Insert the static holder and the rotary holder of the mechanical seals (Item 11.1 – 11.2) taking care to place them in a correct way with the washers (Item 42.1)

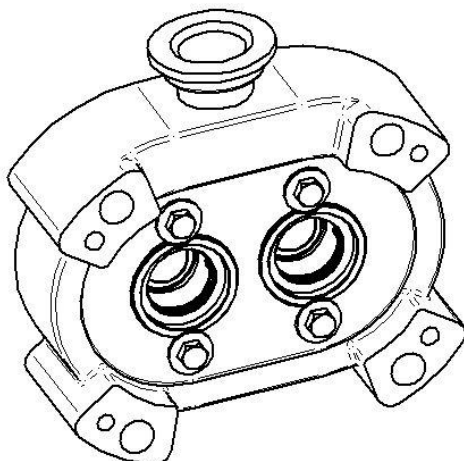


Fig.28 – Assembly of mechanical seals

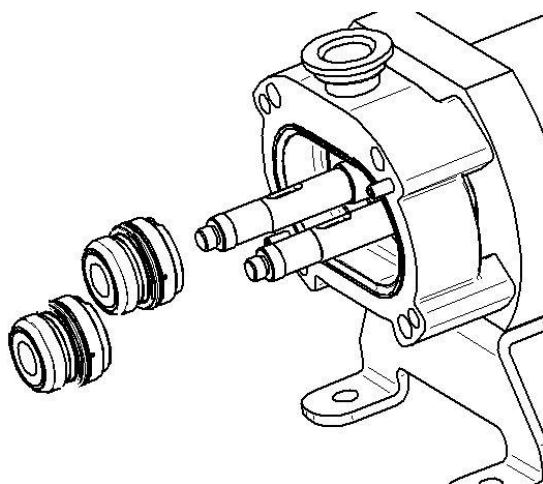


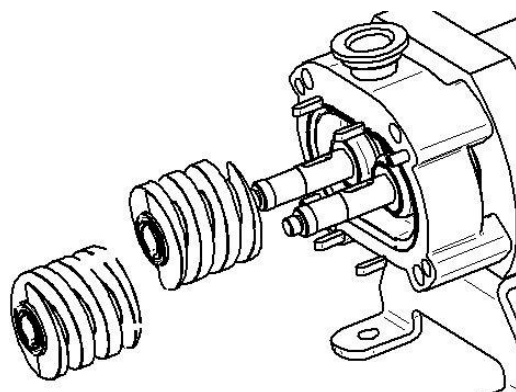
Fig.29 – Reference for assembly of mechanical seals

- Mount the keys (Item 30.1) on the shaft and position CW (Item 9) and CCW (Item 10) screws on a level surface so that they intermesh and rotate them against each other until both faces lie completely on the surface.



**NOTE**

Before assembling the screws, assure that they are mounted on the same shaft



**Fig.30 – Assembly of CW and CCW screw**



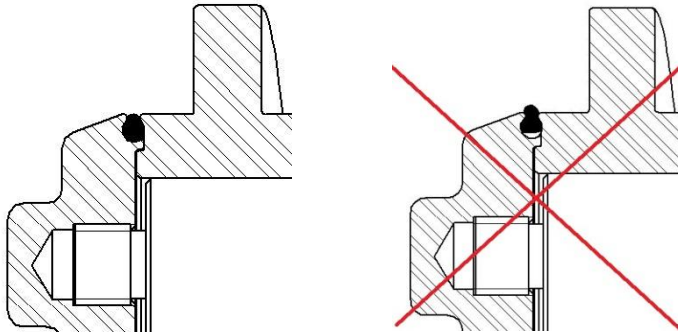
**NOTE**

Before mounting the O-ring caps, perform an accurate inspection to verify if the O-ring is damaged. The operator shall check carefully the integrity of the O-ring (damages, deformations) and of the metal surface in contact with the O-ring.



**WARNING**

Before mounting the cap screw make sure the O-ring enters fully into its seat. Be very careful so that the O-ring is fitted correctly and does not protrude from its seat. Please see Fig.31.



**Fig.31 – Correct and incorrect mounting of the O-ring**

- Tighten the cap screw (Item 6) and the O-ring caps (Item 7) by turning in counter-clockwise.



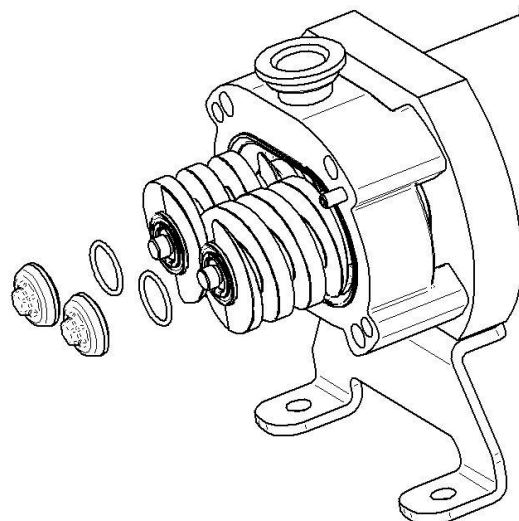
**NOTE**

Use a spanner to tighten the cap. Perform this operation carefully to avoid damages of the cap's surface.



**WARNING**

After tightening the cap screw, verify that the o-ring is fitted correctly and does not protrude from its seat. If the o-ring is not fitted correctly, loosen the cap screw and repeat the operations again. Please see Fig.31.



**Fig.32 – Assembly of cap screw**



- Using a piece of soft metal (as aluminum or copper) block the CW (Item 9) and CCW screw (Item 10).

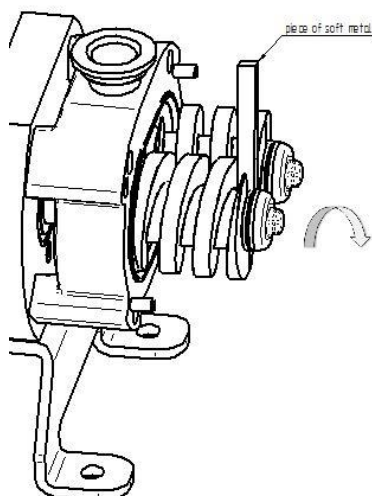


Fig.33 – Assembly of CCW screw

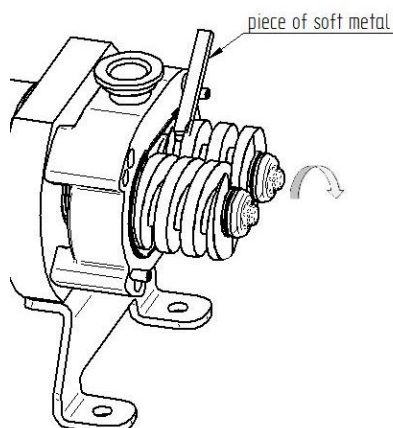


Fig.34 – Assembly of CW screw



**NOTE**

Before mounting the O-ring, perform an accurate inspection to verify if the O-ring is damaged. The operator shall check carefully the integrity of the O-ring (damages, deformations) and of the metal surface in contact with the O-ring.



**WARNING**

Before mounting the separate flange and the suction casing make sure the O-ring enters fully into its seat. Be very careful so that the O-ring is fitted correctly and does not protrude from its housing. Please see Fig.35.

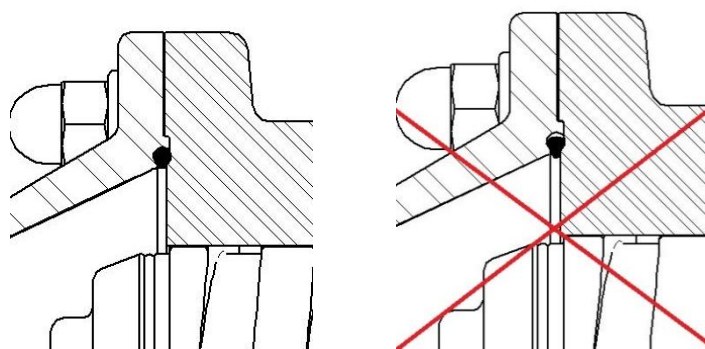


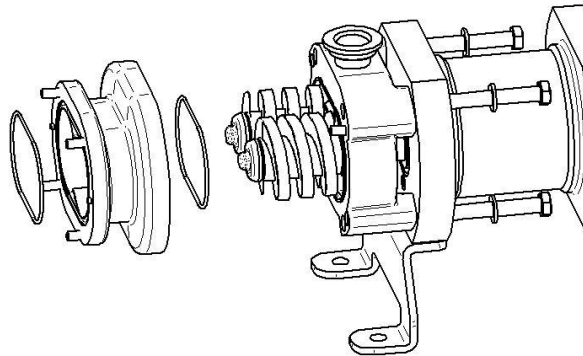
Fig.35 – Correct and incorrect mounting of the o-ring

- Mount the separate flange (Item 2) and the O-rings wet side (Item 8).
- Tighten the screws (Item 46) on bearing support side (Item 4).



**WARNING**

After tightening the screw (Item 48) on bearing support side (Item 4), verify that the o-ring is fitted correctly and does not protrude from its seat. If the o-ring is not fitted correctly, loosen the cap screw and repeat the operations again. Please see Fig.35.



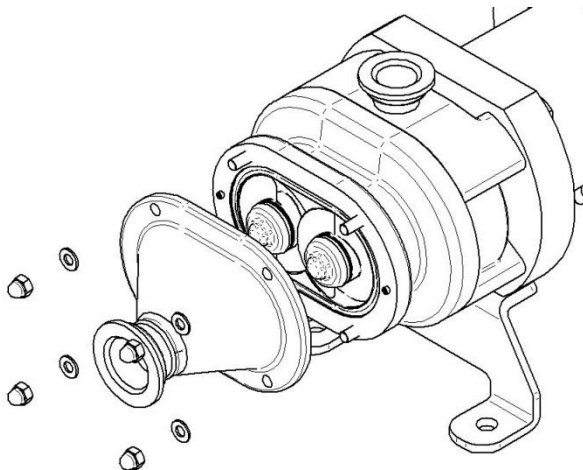
**Fig.36 – Assembly of separate flange**

- Mount the suction casing (Item 1).
- Tighten the cap nuts on the suction casing (Item 48.1).



**WARNING**

After tightening the cap nuts on the suction casing (Item 6), verify that the O-ring is fitted correctly and does not protrude from its seat. If the O-ring is not fitted correctly, loosen the cap screw and repeat the operations again. Please see Fig.35.

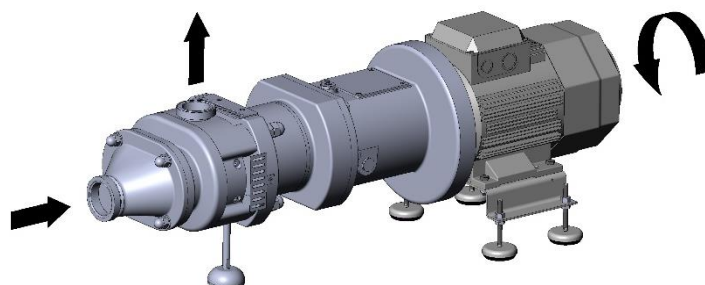


**Fig.37 – Assembly of suction casing**

### 9.5. ASSEMBLING THE SCREWS

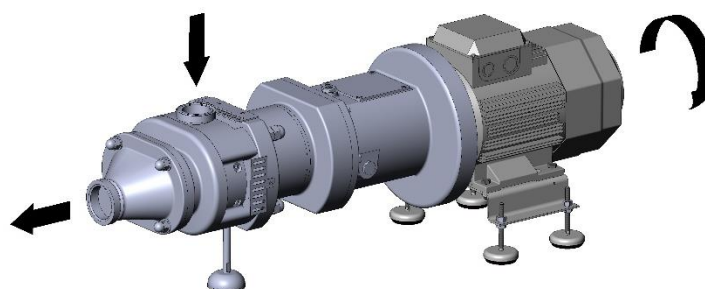
DCH are reversible pumps. It's possible to change the sense of liquid, changing the sense of rotation of the motor.

- Type 1: electric motor CW direction of rotation (looking from the drive side). Discharge side on the top of the pump.



**Fig.38 – Assembly of screw Type 1**

- Type 2: electric motor CCW direction of rotation (looking from the drive side). Discharge side on the front side of the pump.



**Fig.39 – Assembly of screw Type 2**

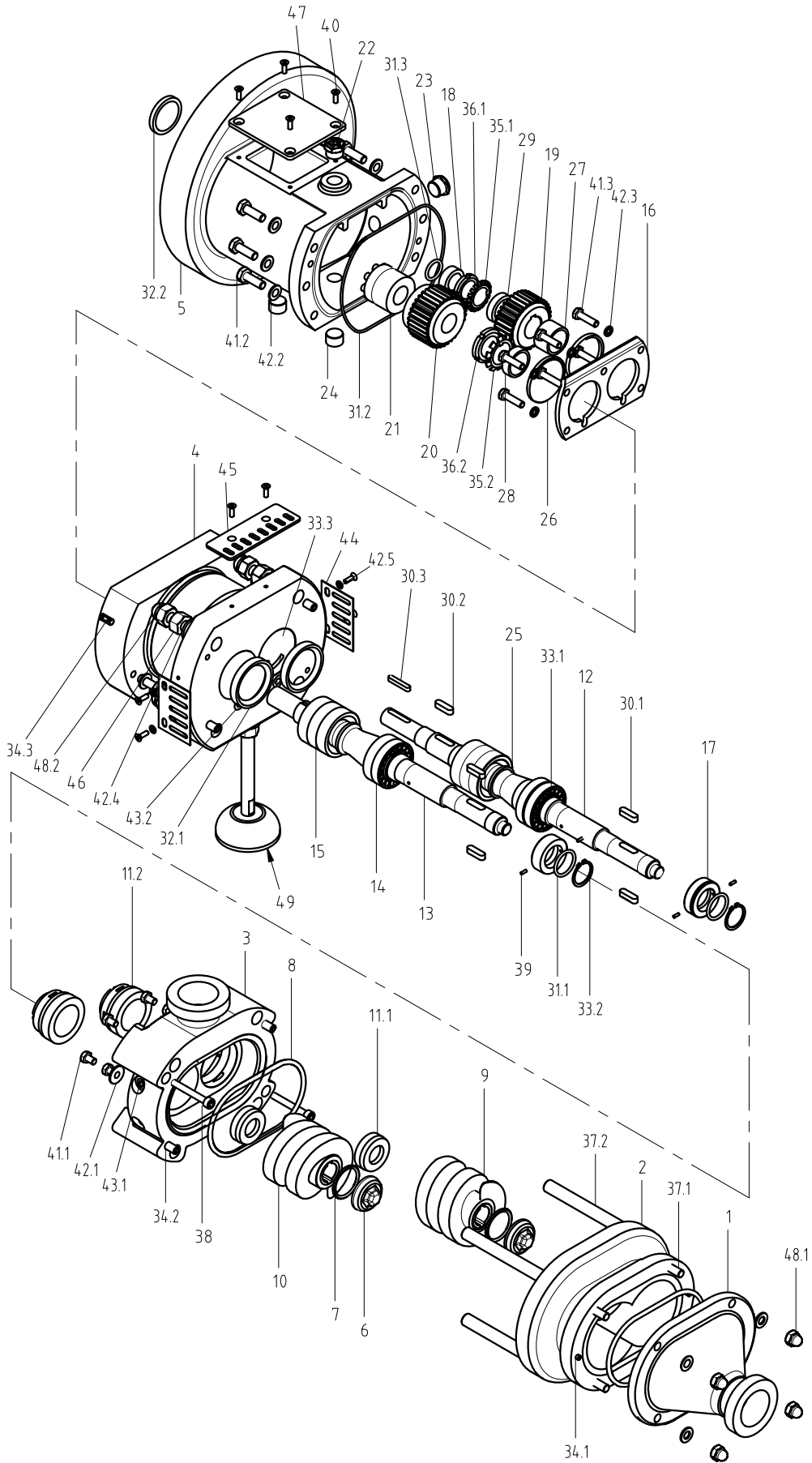
### 9.6. TIGHTENING TORQUE TABLE

In the different phases of assembly refer to the following table:

Description	Item N°	Pump Type		
		DCH 1A1 /1A2	DCH 2A1 / 2A2	DCH 3A1 / 3A2
Cap screw	10	78Nm (M14)	122Nm (M16)	168 Nm (M18)
Taper-lock screw	26	17Nm (M6)	17Nm (M6)	17Nm (M6)
Cap nut	6	14 Nm (M8)	28 Nm(M10)	122 Nm(M16)
Socket head bolts	16	6 Nm (M6)	14 Nm (M8)	28 Nm (M10)
Hexagon bolt	17	50 Nm (M12)	122 Nm (M16)	238 Nm (M20)
Hexagon bolt	19	6 Nm (M6)	14 Nm (M8)	14 Nm (M8)

**Tab.7 – Tightening torque table**

9.7. EXPLODED DRAWING (close-coupled DCH 2A1 / DCH 2A2)



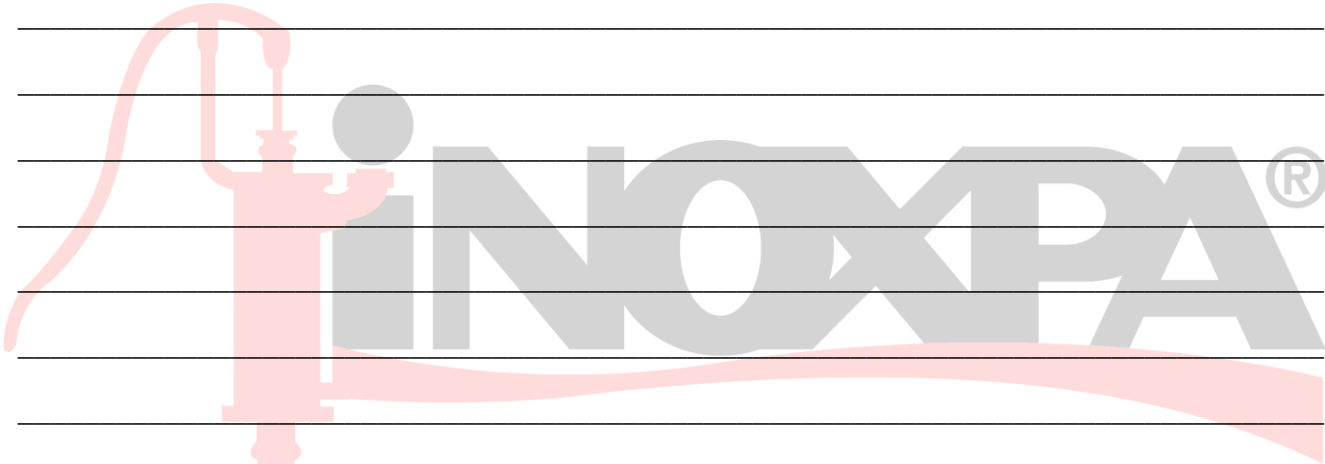
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9.8. PARTS LIST (close-coupled DCH 2A1 / DCH 2A2)

Position	Description	Quantity
1	Suction casing	1
2	Separate flange	1
3	Discharge casing	1
4	Bearing support	1
5	Gear housing	1
6	Cap screw	2
7	O-ring cap	2
8	O-ring wet side	2
9	CW screw	1
10	CCW screw	1
11.1	Mechanical seal	2
11.2	Mechanical seal	2
12	Main shaft	1
13	Secondary shaft	1
14	Roller bearing	4
15	Ang. cont. ball	6
16	Support flange	1
17	Sleeve not drive	2
18	Sleeve drive end	1
19	Main gear	1
20	Secondary gear	1
21	Taper lock	1
22	Oil inlet	1
23	Oil level	1
24	Oil drain	2
25	Conical sleeve	2
26	Bearing spacer	2
27	Main shaft sleeve	1
28	Secondary shaft	1
29	Main gear sleeve	1
30.1	Key	4
30.2	Key	1
30.3	Key	1
31.1	O-ring	2
31.2	O-ring	1
31.3	O-ring	1
32.1	V-ring	2
32.2	V-ring	1
33.1	Seeger	4
33.2	Seeger	2
33.3	Seeger	2
34.1	Pin	2

Position	Description	Quantity
34.2	Pin	4
34.3	Pin	2
35.1	Elastic washer	1
35.2	Elastic washer	1
36.1	Lock nut	1
36.2	Lock nut	1
37.1	Stud bolt	4
37.2	Stud bolt	4
38	Hexagon socket	2
39	Grab screw	4
40	Countersunk screw	8
41.1	Screw	4
41.2	Screw	4
41.3	Screw	6
42.1	Washer	4
42.2	Washer	10
42.3	Washer	8
42.4	Washer	4
42.5	Washer	4
43.1	Plug	4
43.2	Plug	2
44	Lateral protection	2
45	Top protection	1
46	Nut	5
47	Inspection plate	1
48.1	Cup nut	4
48.2	Cup nut	4
49	Levelling foot	1







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