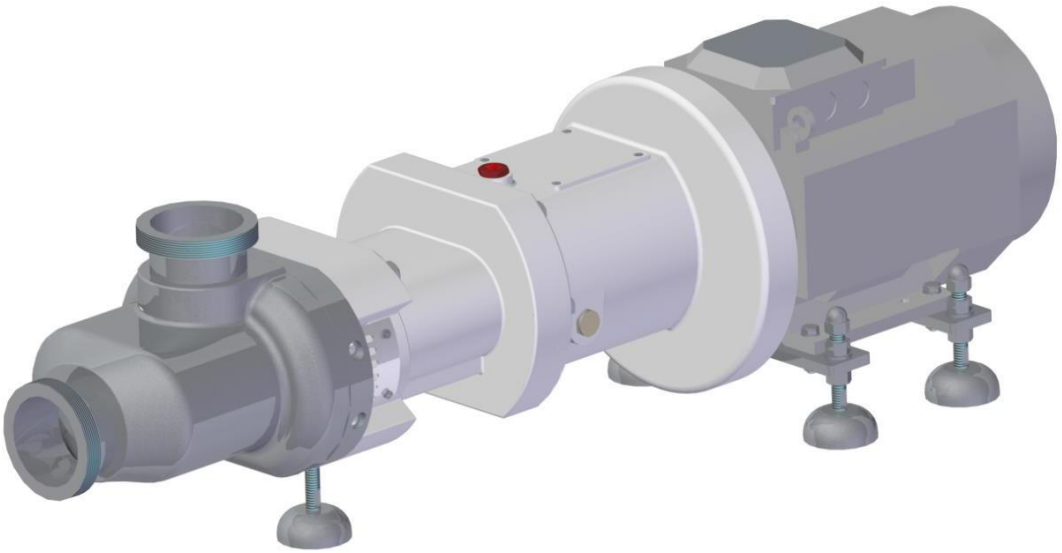
INSTALLATION, SERVICE AND MAINTENANCE INSTRUCTIONS

ANNEX FOR CE ATEX REGISTERED EQUIPMENT UNDER DIRECTIVE 2014/34/UE:

TWIN SCREW PUMP

DCS



Original Manual
01.531.30.03EN
(A) 2023/05

www.sks-online.com

01.531.30.04EN
(0) 2023/03

EU Declaration of Conformity

We,

INOXPA, S.A.U.
Telers, 60
17820 – Banyoles (Girona)

Hereby declare under our sole responsibility that the machine

TWIN SCREW PUMP

Designation
DCS

Type
DCS 1B2, DCS 1B3, DCS 2B2, DCS 2B3, DCS 3B2, DCS 3B3, DCS 4B2, DCS 4B3

From serial number **IXXXXXXXXX** to **IXXXXXXXXX** (1)

Is in compliance with applicable provisions of the following directive:

Directive ATEX 2014/34/EU

Applicable harmonized standards:

EN ISO 80079-36:2016
EN ISO 80079-37:2016

This Declaration of Conformity covers equipment with the following ATEX marking:

 II 2G Ex h IIB T4…T1 Gb

 II 2D Ex h IIIB T135 ºC…T450 ºC Db

 II 2G Ex h IIB T4…T1 Gb
II 2D Ex h IIIB T135 ºC…T450 ºC Db

The technical documentation referenced 18434012-787612 is on file with the notified body LABORATOIRE CENTRAL DES INDUSTRIES ELECTRIQUES (LCIE), 33, Av. du Général Leclerc BP 8, 92266 Fontenay-aux-Roses, France. Reference num. 0081.

The person authorized to compile the technical documentation is the signer of this document.

Banyoles, 2023

David Reyero Brunet
Technical Office Manager

(1) Where X is a numeric character

1. Table of contents

2. General Information

2.1. INSTRUCTIONS

This manual contains information on the reception, installation, operation, assembly, disassembly and maintenance of the DCS Ex pump to be used in potentially explosive atmospheres. This manual supplements the corresponding sections of the instructions for the standard DCS pump, and should be read in conjunction with these instructions.

When a particular section of the DCS standard pump instructions is not mentioned in this manual, this section applies to the extent reasonable.

2.2. WARNINGS

Any breach of the instructions could result in a risk for the operators, the environment and the machine, and could result in the loss of the right to claim damages.
This non-compliance could entail the following risk (in addition to those already indicated in the manual):

• Generation of explosive atmospheres and risk of explosion.

2.3. SYMBOLS

HEALTH HAZARD

This sign advises the operator he has to pay attention to important info to avoid dangerous operations 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 to avoid dangerous operations 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

ATEX REQUIREMENT

This sign shows information related only to the compliance with Directive ref. 2014/34/UE. The non-observance of above indications may lead to serious risks for health and safety.

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.

The pump must be used only for the intended conditions of use in the specific purchase for which INOXPA ordered the execution, selected construction materials and performed the operation tests that make the pump snugly against the claims.

For this reason, the pump cannot be used in situations other than those indicated in the listing.

In the case where the operating conditions specified on the order could be changed (for example, operating fluid pumped, temperature or use), it is necessary to contact INOXPA to receive an eventually written consent.

INOXPA declines all responsibility for uses other than those specified in the contract.

2.4. WARRANTY

The conditions of the warranty are specified in the General Sales Condition that has been delivered at the time of placing your order

The machinery 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.

Any warranty issued will be immediately and fully voided and, in addition, INOXPA will be compensated for any product liability claim presented by third parties if (in addition to the conditions already indicated in the manual):

• The material has been used incorrectly or negligently, or has not been used according to the working conditions in the classified zone, working in a different classified zone, or different temperature or pressure conditions.

2.5. PUMP NAMEPLATE

DCS pumps are CE marked to comply with European Regulation 2014/34 UE (ATEX). The marking on the pump refers to the pump part only.

 II 2G Ex h IIB T4…T1 Gb

 II 2D Ex h IIIB T135 ºC…T450 ºC Db

II 2G Ex h IIB T4…T1 Gb
II 2D Ex h IIIB T135 ºC…T450 ºC Db

Please refer to the individual temperature limits table for the temperatures permitted for the individual pump

Note: If the pump is used with an electrical motor a UE manufacturer's declaration is required for the shaft coupling; the shaft coupling must be marked accordingly.

The motor must be considered separately.

Note: DCS pumps are suitable for installation in potentially explosive up to zone 1.

The classification of the temperature, according to ISO EN 80079-36:2016, must therefore be made by the manufacturer of the complete system or by the user, knowing the specifications of the installation the pump is intended for.

The explosion-proof status of the pump set is only assured if the pump set is used in accordance with its intended use. Never operate the pump set outside the limits stated in the data sheet and on the name plate. Prevent impermissible modes of operation at all times.

Note: The marking indicates that the suitability of the product to be installed in a particular area is that shown on the label applied to the product itself and on the CE declaration of conformity that accompanies it.
The identification plate must always be kept legible in all the data on it by the user. If the plate is worn out or becomes unreadable, it is recommended to obtain a replacement from the manufacturer referring to the data in the purchase documents and to replace it.

Temperature limits.

In normal pump operation, the highest temperatures are to be expected on the surface of the pump casting, at the shaft seal and in the bearing areas. The surface temperature at the pump casting corresponds to the temperature of the fluid handled. If the pump is heated in addition (for example with an electric tracing), the operator of the system is responsible for observing the specified temperature class and fluid temperature (operating temperature).
The table below lists the temperature classes and the resulting theoretical temperature limits of the fluid handled.
The temperature class specifies the maximum permissible temperatures at the surface of the pump set during operation. For the permissible operation temperature of the pump in question refer to the data sheet.

Temperature class according to ISO 80079-36	Maximum permissible fluid temperature
T1	370 °C
T2	220 °C
T3	160 °C
T4	100 °C

Misuse, malfunctions or non-compliance with the instructions may result in substantially higher temperatures. If the pump is to be operated at a higher temperature, if there is no data sheet, contact INOXPA for the maximum permissible operating temperature.

The temperatures written above can be considered valid only if the minimum pump flow is guaranteed.

2.6. TYPE OF PUMP

The types of pumps supplied can be the following:

- Bare shaft pump, supplied without motor or baseplate:

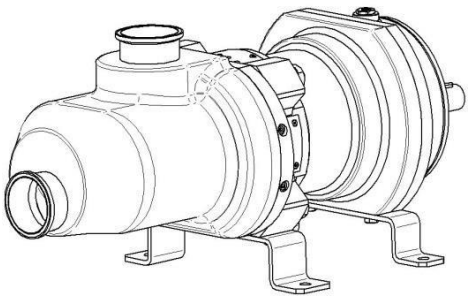


Fig. 2 – Bare-shaft pump

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

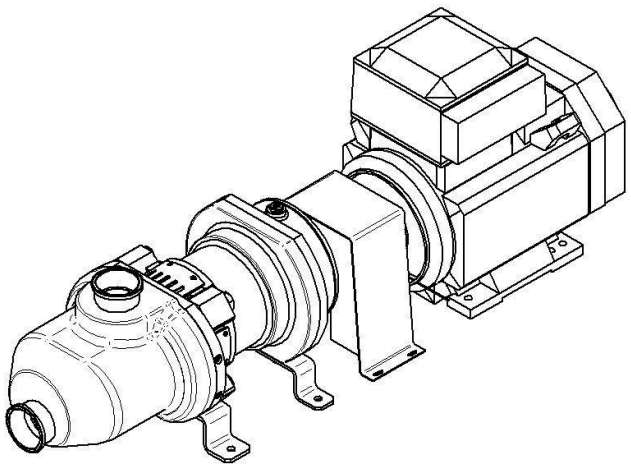


Fig. 3 – Pump on baseplate

- Pump with flange connection. This pump version has got the drive unit flange-mounted directly to the gear casing and the levelling feet to place the pump at the required height:

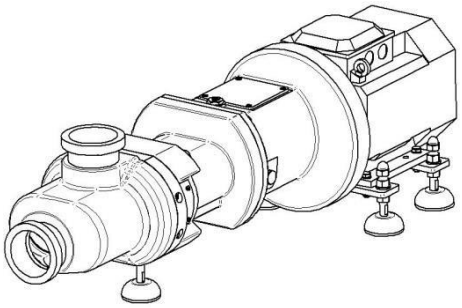


Fig. 4 – Pump flange mounted

The types of pump correspond to the scope specified in the order of the pump. When the pump is received, ensure that it is complete, check on the packing the lack of damages due to the transport and report immediately any defect or damage to the delivery company.

3. Design

3.1. PUMP DESIGN

DCS pumps have been designed for food and beverage products, and to be installed in classified sites (with potentially explosive atmosphere), apart from special designs requested by the customer for the specific use.
The pump must only be operated in the fields of application and within the use limits specified in the other applicable documents. Only operate pumps which are in perfect technical condition. Do not operate the pump in partially assembled condition.
Never operate the pump without the fluid to be handled. Check the flow rates indicated in the data sheet or product literature (to prevent overheating, bearing damage, etc).
Do not throttle the flow rate on the suction side of the pump (to prevent cavitation damage).
Consult the manufacturer about any use or mode of operation not described in the datasheet.

3.2. PUMP ON BASE PLATE

3.3. PUMP OPERATIONS

DCS 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 casing.

The medium goes into the pump casing from the suction body and it is inspired by the screws and pushed toward the discharge casing. The area of the pump in contact with the fluid is separated from the outside by 2 mechanical seals.

The mechanical seals can be:

- Single mechanical seal
- Single mechanical seal with flushing
- Double mechanical seal

4. Safety

Do not use the DCS pumps outside the prescribed limits contractually without the express consent of the 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 the contract can cause overheating of the pump.

The pump is 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

4.2. MECHANICAL RISKS

4.3. MANUAL OPERATION RISKS

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 is direct contact remaining risk 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 regulation dispositions, all the electrical net connections 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 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

4.6. CHEMICAL RISKS

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

5.2. LIFTING

5.3. STORAGE

For (a period of) temporary storage the pump must not be 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 boxes and the gearboxes 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 the mountings.

6. Installation and connection

The pump installation on 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 directives for systems installed in potentially explosive atmospheres.

Do not install the pump directly direct exposure to 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 to reduce the system noise and the effects of the water hammer.

6.1. GENERAL RULES FOR INSTALLATION

Do not remove the protection caps mounted to the suction and discharge flanges, and the closing caps installed on all auxiliary connections before they are connected to the piping, all this is to protect the pump from the access of foreign bodies. Before performing the connection of discharge and suction flanges, 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 based on the viscosity of the fluid to be pumped, placed on the suction circuit. The pressure loss across the filter should not 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 its 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 others. 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

6.2.2. Fixing baseplate on foundation

6.2.3. Assembly pump without foundation

6.3. PUMP GROUP ALIGNING

6.3.1. Pump aligning

During the alignment operations, wear suitable protections (in particular for the hands). Pay more attention in case of high temperature. Perform any work in the presence of at least 2 people. For any operation, use appropriate size engines ONLY. In case of doubt, contact INOXPA before performing any operation.

6.3.2. Pump alignment tolerances

6.3.3. Coupling alignment procedure

6.3.4. Motor alignment

6.3.5. Coupling guard mounting

6.4. PIPING CONNECTION

6.4.1. General information

6.4.2. Suction piping

6.4.3. Discharge piping

6.4.4. Auxiliary piping

Make sure that the connection between pump and baseplate is electrically conductive.

Make sure that the barrier fluid or quench liquid are compatible with the fluid handled.

Check the correct use of auxiliary connections (e.g. barrier fluid, flushing liquid, etc)

6.5. ELECTRICAL CONNECTION

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

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

WARNING

Every action must be always executed without electrical voltage.

A motor protection device is recommended. Choose their degree of protection by verifying the full load current stamped on the motor name plate. Install an emergency pushbutton.

Perform electrical connections without overlooking the motor earthing.

Before performing the electrical connections, check that the pump and motor rotate freely by hand.

Before performing the motor connection to the pump, check that the direction of rotation coincides with the one indicated on the pump, before being connected to the pump.

Arrange for suitable protective means during the rotation test in order to avoid possible accidents.

The wrong direction of rotation and/or dry running can cause serious damage 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 airbags.

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 gearboxes are properly lubricated and the levels reflect the ones indicated.

The possible filling must be done through suitable connections and using 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 pump body.

Before starting the pump, check again the alignment and if necessary correct again as shown 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

7.3. CHECK BEFORE STARTING

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. In case of a pump running without liquid for longer than one minute, the unit EX certification will be guaranteed only if combined with appropriate detection devices complying with the applicable standards.

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

Check the piping leakage and/or airbags.

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. The temperature of the bearing housing is below the value prescribed by the ATEX zone the pump is installed in.

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 at 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 the pump 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 auxiliary circuits.

Make sure that the barrier fluid or quench liquid are compatible with the fluid handled.

The internals in contact with the fluid to be handled, including the seal chamber and auxiliary systems must be filled with the fluid to be handled at all times. Provide sufficient inlet pressure. Provide an appropriate monitoring system.

7.8. CIP/SIP PROCEDURES

7.9. COP (cleaning out of place) PROCEDURE

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 number 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.

8.3. GENERAL INFORMATION ON MAINTENANCE ACTIVITIES

The DCS series pumps require regular maintenance and care like all mechanical equipment. An incorrectly repaired pump could cause premature breakage and unsafe conditions. 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 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 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, to avoid the invalidation of the product warranty.

The pump must be kept clean by avoiding the 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	Check alignment and adjust if necessary
Daily	Gear casing	Qualified personnel	Check gear oil and top up if necessary
Daily	Coupling	Qualified personnel	Check the correct mounting of coupling and guard
Daily	Mechanical seals	Qualified personnel	Check for leakage and in case of leakage, contact the manufacturer if necessary
Daily	O-rings wet side	Qualified personnel	Check for leakage and In case of leakage, contact the manufacturer if necessary
Daily	Barrier	Qualified personnel	Check function, top if necessary. If contamination is present check mechanical seals and replaces if necessary
Weekly	Drive unit	Qualified personnel	Check for wear in accordance with manufacturer's instructions
After 250 operating hours or 3 months	Gear casing	Qualified personnel	Change lubricating oil
With non-continuous operation, every 2000 hours after 3 months	Gear casing	Qualified personnel	Change lubricating oil
6 months	Barrier system	Qualified personnel	Change lubricating oil

Tab. 3 – Maintenance table

8.5. MECHANICAL SEAL CHECK

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 box lubrication.

The twin screw pumps DCS series are always constructed with the gearbox, 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

8.6.3. Changing of lubricating oil

8.6.4. Lubricant table

8.7. MALFUNCTIONS AND POSSIBLE CAUSES

9. Assembly and disassembly

NOTAS

NOTAS

How to contact INOXPA S.A.U.:
contact details for all countries are
continually updated on our website.
Please visit www.inoxpa.com to access the information.

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