

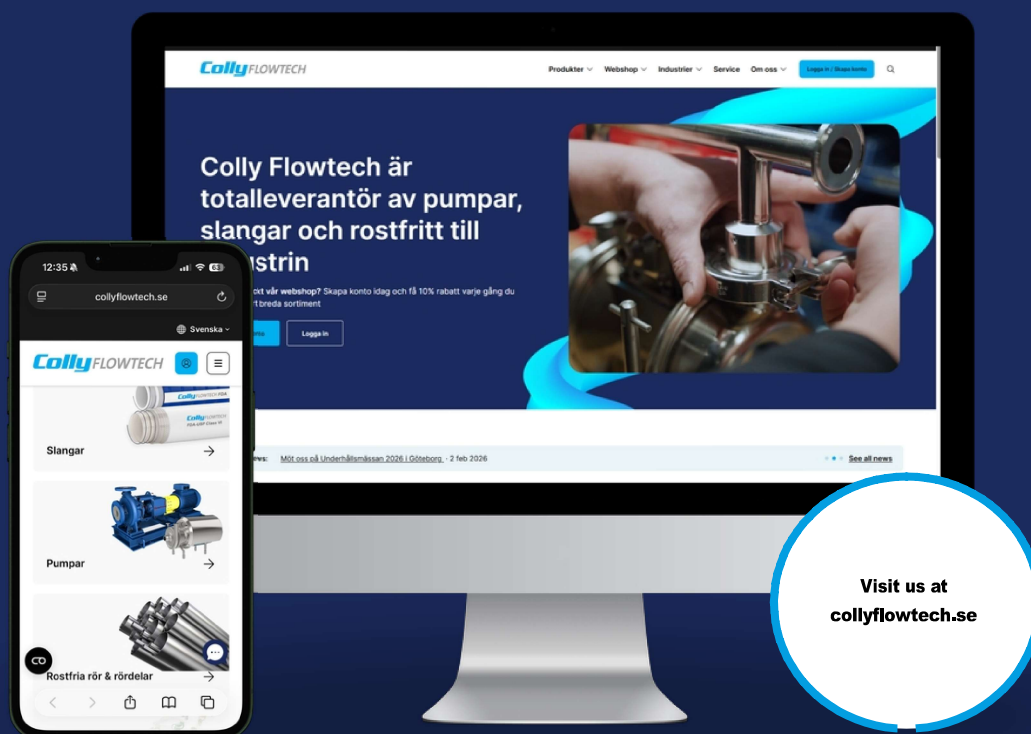
TWIN SCREW PUMP TS SERIES

CSF HYGIENIC TWIN SCREW PUMPS TS

Instructions for assembly, installation,
operation and maintenance



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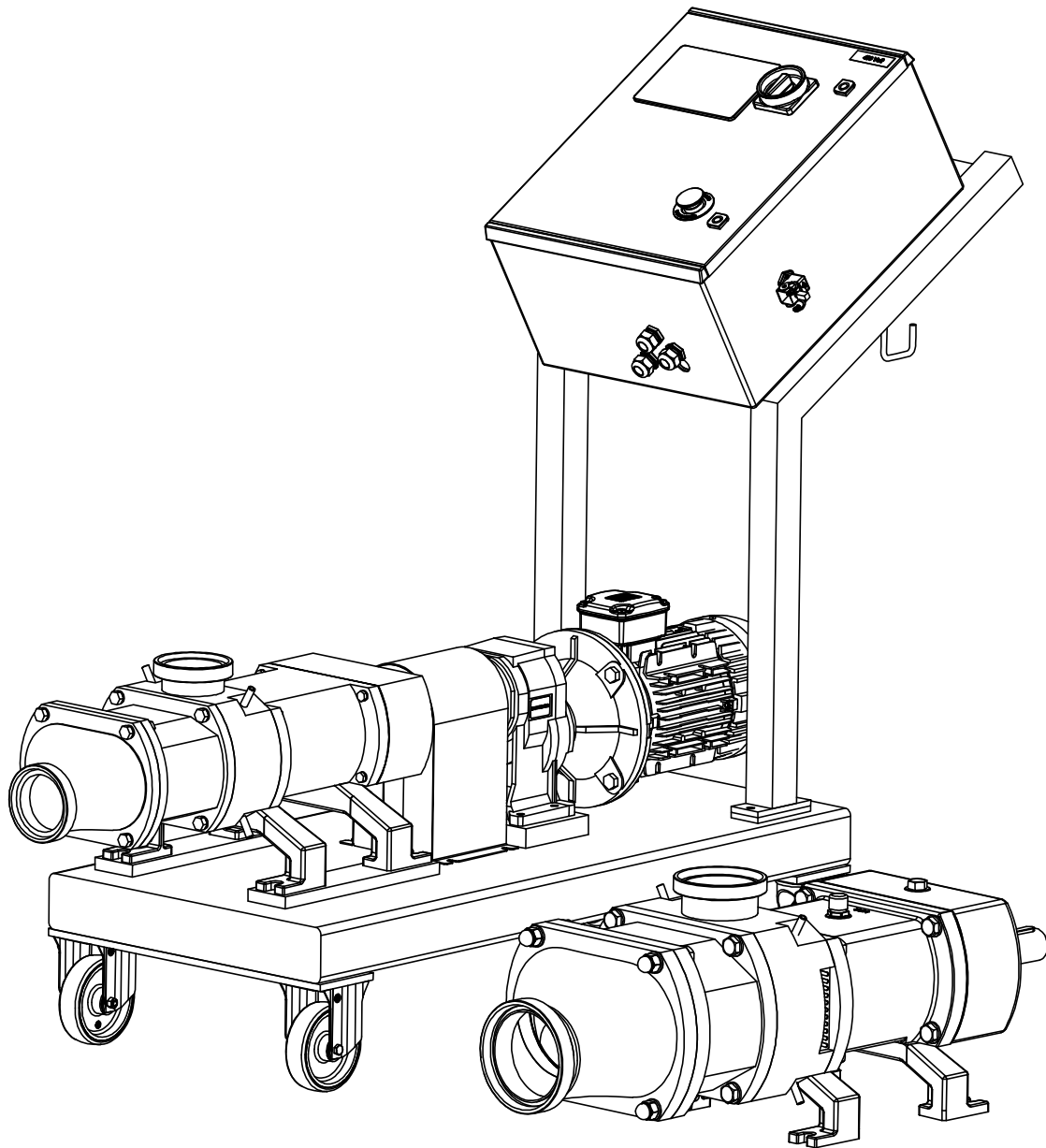
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TWIN SCREW DISPLACEMENT PUMPS

TS Series



INSTRUCTIONS FOR ASSEMBLY, INSTALLATION,
OPERATION AND MAINTENANCE

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FOREWORD

This instruction manual is designed to provide the user with all the information needed to perform all use and maintenance activities concerning the pump and its accessories throughout its entire service life. Read the instructions carefully and keep them for future consultation.

C.S.F. Inox S.p.A. reserves the right to make any changes to the documentation it deems necessary without being obliged to update publications that have already been issued.

This Manual contains confidential technical data owned exclusively by the Manufacturer/Constructor, consequently any copying of its contents and/or format (in their entirety or only partially) for any purposes other than those for which they were intended is prohibited without the Manufacturer's/Constructor's prior consent.

The official language chosen by the Manufacturer/Constructor is Italian. No liability shall be accepted for translations in other languages that do not match the original meaning.

All operators must read the instructions carefully and keep them for future reference. Refer to paragraph 2.3 Operators and responsibilities.

SIGNS AND DATA PLATES

The danger, warning and obligation signs illustrated in this manual are positioned on or near the equipment.

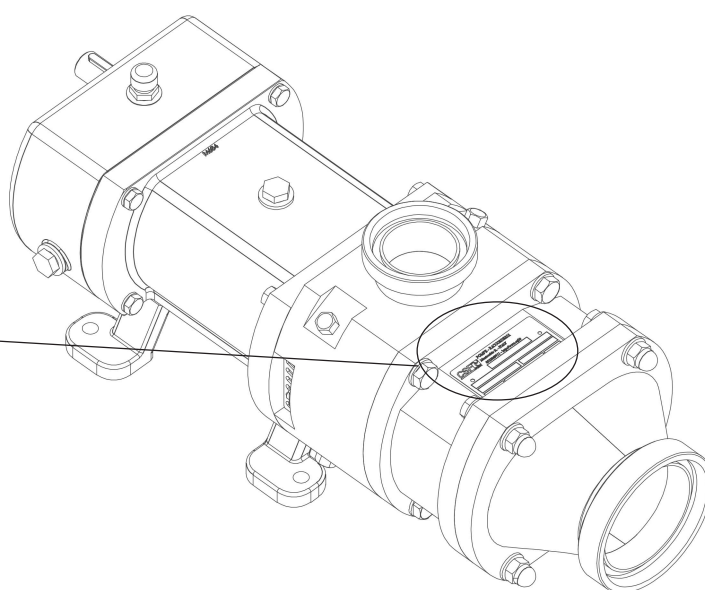
An exact description of the machine type, serial number and electrical voltage data will facilitate a rapid and effective response from the assistance service (when envisaged).

When requesting information, spare parts or assistance, always specify the pump type (2) and serial number (3) in order to ensure fast and efficient service: the complete code is given on the plate and in the purchase documents.

This manual refers exclusively to the pump supplied.

CSF Plate example

		POMPE-RACCORDERIA Montecchio E. - ITALY Tel.0522-869911 http://www.csf.it			
Item. (1)					
Type (2)					
N° Matr. (3)	Anno (4)	(5)	r.p.m		
kW (6)	Volt (7)	Hz (8)			



1. System item provided by the client
2. Manufacturing series, size and execution
3. Serial number
4. Year of construction
5. Pump rotation speed
6. Installed power in kW
7. Motor voltage
8. Motor frequency

1.0 - SYMBOLS USED ON THE EQUIPMENT AND IN THE MANUAL

	CONSULT	Consult the instructions before carrying out a specific operation.
	THE USE AND MAINTENANCE MANUAL MUST BE READ	It is mandatory to read the Use and Maintenance Manual before performing any work on/with the machine.
	GENERAL SAFETY WARNINGS/INFORMATION	Indicates a warning or a note concerning key functions or useful information. Pay great attention to the text parts indicated by these symbols.
	WARNING! DANGER	Failure to observe the warnings may lead to serious injury and/or material damage.
	ELECTRICAL HAZARD	Only skilled personnel can carry out operations on electrical parts.
	MOVING PARTS HAZARD	Hazard caused by moving mechanical components during machine operation.
	DANGER: HOT SURFACES	Elements with a higher temperature than normal (xxxx zone).
	CRUSHING HAZARD	Danger of dragging, crushing or amputation of fingers and hands.
	ROTATING PARTS HAZARD	Danger: drawing in, crushing or amputation of fingers.
	WARNING! HAZARDOUS FLUIDS	The fluids used in these processes can cause serious harm to persons and/or objects.
	WARNING! TOXIC PRODUCT	Toxic product: the fluids used in these processes can cause serious harm to persons and/or objects
	SUSPENDED LOADS HAZARD	Suspended loads: exercise maximum caution as unsteady parts could fall down.
	GENERAL PROHIBITION	Indicates a generic prohibition.
	DO NOT REMOVE SAFETY DEVICES	The removal of safeguards is prohibited.
	DO NOT SERVICE MOVING PARTS	Never perform maintenance on moving parts
	NO WATER JETS	Do not use high pressure jets of water to clean the machine.
	NO STEPPING	Do not climb on the machine
	NO SITTING	Do not sit on the machine
	WEAR PROTECTIVE WORKWEAR	Mandatory protective equipment
	WEAR PROTECTIVE GLOVES	Hand protection must be worn: gloves
	WEAR SAFETY FOOTWEAR	Foot protection must be worn: safety footwear

2.0 - SAFETY WARNINGS

The pumps supplied are designed for professional use and are not intended to come into contact with the general public and minors.

Operators and maintenance personnel must read and comprehend the instruction manual.

Maintenance personnel must have adequate training and qualifications to carry out maintenance operations in compliance with safety standards.

Trainees may only carry out activities under the supervision of qualified, expert personnel.

 The equipment must not be tampered with. In the event of tampering, the manufacturer shall decline all liability concerning incorrect operation or any damage/injury caused by the product.

 Before using the equipment, make sure any situation which may represent a health and safety hazard has been eliminated.

Furthermore, it is essential for operators to take note of the warnings listed below:

	Do not use the machine when psychophysical state is impaired.
	Do not use the machine for purposes other than those for which it was designed.
	Do not remove or modify the signs affixed to the machine by the manufacturer.
	Do not try to remove or modify machine parts unless the operation is described in this manual.
	Never allow unauthorized personnel to work on or with the equipment.
	Do not stand or sit on the machine.
	Never leave the machine connected to power supplies when it is not being used/supervised.
	Never open electrical equipment enclosures when the machine is connected to the electrical power supply.
	Before starting the machine, make sure there are no unauthorized persons in the work area.
	Before starting the machine, make sure all safety devices are working properly.
	Wear the personal protective equipment prescribed in this manual, based on the operations being carried out.
	Keep the equipment as a whole and the work area clean, tidy and free of foreign objects.
	Internal inspections, modifications and repairs must only be carried out by qualified technical personnel authorized by the Manufacturer.
	Periodically carry out all the operations described in the specific paragraph on maintenance.
	In the event of anomalies or damage that could compromise equipment operation and safety, it must immediately be removed from service.
	Notify a supervisor if any operating irregularity occurs.
	Make sure that all guards or other protective devices are in place and that all safety devices are installed and working effectively.

When the pump is in operation:



- Mechanical parts are moving.



- the pump casing, pipelines and joints are under internal pressure. Consequently, do not remove any safety devices or covers or loosen any screws or fastener as this could result in serious physical injury or material damage.
- Non-observance of inspection and maintenance operations can lead to physical injury or material damage, especially when dangerous or toxic liquids are pumped



- Live parts: all operations on electrical parts must be performed by expert personnel who are able to observe technical standards and laws and are duly authorized by the plant manager.



- When pumping liquids at a temperature over 60°C, adequate protection and warning signals are required.
- Installation must ensure an adequate ventilation, in order to cool the engine, as well as enough space for maintenance operations;
- Before carrying out any operations involving disassembly of the pump (inspection, cleaning, seal replacement, etc.), the following preliminary operations must be carried out:

2.1 - DANGER ZONES

The pump described herein has been designed and built to be safely used by operators.

All operators must be provided with suitable Personal Protective Equipment for performing the relative operations, i.e. safety footwear, protective gloves and workwear as better specified in § 2.2.



Should any unauthorized personnel come into the work area near the equipment, the operator must immediately stop all operations.

A - EXPLOSIVE ATMOSPHERES

Follow the indications on explosion protection given in this section in case of operation in potentially explosive atmospheres.



Only the pumps marked according to the ATEX directive and identified in such way in the list may be used in potentially explosive atmospheres. Special conditions apply to the use of pumps according to the 2014/34/EU (ATEX) directive. Use in explosive atmospheres is guaranteed only if the pump is used according to its intended use (see heading 7.2).

MARKING

The marking on the pump only refers to the pump itself.

The coupling to the drive shaft needs a proper CE marking by the manufacturer.

The motor must be taken into account separately.

TEMPERATURE LIMITS

Under normal operating conditions, maximum temperatures are expected on the external surface of the bearings housing, however, if the handled fluids are transiting at high temperatures, the external surfaces of the pumping components may reach even higher temperatures.



Make sure the temperature of the fluid handled by the pump does not change abruptly. If this is inevitable, stop the pump for an adequate period of time (see heading 17.1 on page 53).

If the pump is supplied with a bare shaft, when selecting the coupling motor it is necessary to consider the following conditions:

- The temperature limit allowed to the flange and drive shaft must be higher than the temperature generated by the pump;
- Contact C.S.F. for the actual temperatures of the pump.

B - TROLLEY-MOUNTED PUMPS WITH OR WITHOUT ELECTRICAL PANEL

The machinery is designed to be run by a single operator.

The trolley must be pushed manually using the relative gripping points. Manoeuvres must be carried out with the panel switched off and unplugged.

All operators must be provided with suitable Personal Protective Equipment for performing the relative operations, i.e. safety footwear, protective gloves and workwear as better specified in §2.2.



Should any unauthorized personnel come into the work area near the equipment, the operator must immediately stop all operations.

2.2 - SAFEGUARDS



Any failure to use the personal protective equipment indicated in this heading exposes operators to unnecessary hazards.

The employer must provide all machine operators referred to in this manual with the relevant PPE.

Machine operators must wear the following PPE:



Protective workwear;



Gloves providing protection against cuts, abrasion and burns, and safety footwear.



The employer, following risk assessment and taking into consideration variations in the production processes, may deem the use of additional PPE necessary.



Rotors inside the pump:

Danger of crushing or amputation of fingers and hands.

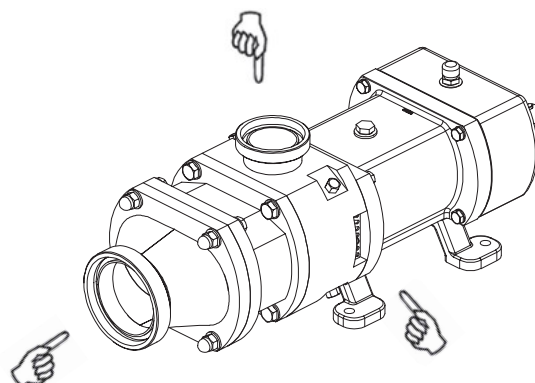


Mechanical seals inspection windows:

Danger of dragging, crushing or amputation of fingers and hands.

The pump has guards protecting the side openings indicated (pos. 50)

It is forbidden to use the pump without said guards.



The suction and delivery ports must be connected to the relative piping before each start-up and protection against inadvertent motor start-up must be guaranteed.

The Customer must safeguard the pump to prevent people from being able to put their hands/fingers through the openings while the rotors are moving.

Inspect the condition of the guards and relative fasteners on a regular basis (at least every 12 months). If the guards are damaged, worn or have been removed or if the fastening devices have been removed or come loose, the user must immediately restore the condition of the guards and relative fastenings.

2.3 - OPERATORS AND RESPONSIBILITIES

SAFE WORK PROCEDURES

To reduce the potential consequences of the hazards set out in the previous headings, operators must abide by the following instructions:

- Always wear personal protective equipment as referred to in § 2.2;
- Supervise the danger zone, never start the machinery if other unauthorized persons are inside the danger zone or in the machine's immediate vicinity. Should any unauthorized person enter the aforementioned zone when an operating cycle is in progress, the operator must immediately stop all operations.



If particular maintenance, inspection or repair work on the machine requires the operator to completely or partially disable certain safety devices, it is his/her duty to restore operation of said devices as soon as the operations in question have been completed.

The responsibilities of the operators are given below:



To be done by the operator

- Use the machine for the purposes and in the operating conditions specified in this manual.
- Perform the periodic maintenance checks indicated in this User Manual and relative appendices.
- Regularly check elements subject to possible wear, in particular all moving mechanical parts (gear units, pumps) and piping containing pressurized fluids
- Check and keep all safety-related devices enabled and in good working order by periodically checking their operation (for example: regulators, control devices, indicators/gauges, etc.).
- Keep the operating area clean and tidy at all times.
- Stop the machine immediately if any malfunctions or anomalies arise that may affect safety during use.



To be done by the mechanical maintenance technician:

- Before carrying out any maintenance operations, always make sure the equipment has been disconnected from all power sources.
- Before carrying out any maintenance operations, to prevent inadvertent start-up by uninformed personnel, always put up one or more "MACHINE UNDER MAINTENANCE" signs in a clearly visible position.
- Always keep the maintenance area clean and dry.
- Never allow unauthorized personnel to work on or with the pump.
- Do not use petrol or flammable solvents as a cleaning detergent; always use authorized, non-hazardous commercial solvents only.
- Do not use compressed air to clean parts; if no other option is available, wear suitable eye protection with side shields and limit the pressure to a maximum of 2 bar.

- Never use naked flames as a light source when carrying out checks or maintenance operations.
- To avoid the risk of damaging the equipment and/or injuring personnel, after every maintenance or adjustment operation, always make sure no tools or foreign bodies are left on the machine or between moving parts.



Maintenance personnel are responsible for checking that all safety devices (guards, casings, etc.) have been correctly restored before authorizing machine use.



To be done by the electrical maintenance technician:

- Before carrying out any work on electrical components, make sure the electrical power lines have been disconnected (LOTO procedures).
- Before carrying out any maintenance operations, to prevent inadvertent start-up by uninformed personnel, always put up one or more "MACHINE UNDER MAINTENANCE" signs in a clearly visible position.
- After performing any work on electrical components, close the guards correctly before restoring the power supply and restarting the machine.
- In the event of accidents involving electricity, immediately cut off the power supply, move the injured person away from the machine using a dry, non-conducting material (such as wood, PVC, fabric or leather) and take him to a safe place.



CAUTION: This operation is dangerous. Touching the injured person with the power line still connected involves a risk of electrocution. Get medical help immediately.



Equipment maintenance operations (both mechanical or electrical) must only be carried out by qualified personnel who have been adequately trained, informed and instructed on how to perform the aforementioned activities.

3.0 - GUARANTEE

All products manufactured by C.S.F. Inox S.p.A. are guaranteed to the purchaser, for one year from the date of purchase, against hidden defects in materials or manufacture, providing that they are installed and used according to instructions and recommendations of the manufacturer.

The guarantee does not cover wear parts or repairs for damage caused by improper use, abrasion, corrosion, negligence, defective installation, non-observance of inspection and maintenance operations, use of non-genuine spare parts, accidents or any work carried out by the purchaser designed to alter the machine's performance as indicated by the manufacturer.



Before returning to C.S.F. Inox S.p.A. any item to be substituted or repaired under guarantee, inform about the problem the Customer Assistance Office and follow instructions of the manufacturer. Returned items must be properly packed in order to avoid damages during transport and a technical report describing the defect and how it manifested itself must accompany the returned item/s.

Any item with a presumed fault should be returned to C.S.F. Inox S.p.A. at the customer's expense, accompanied by a Declaration of Decontamination (attached to page 55), unless otherwise agreed. C.S.F. Inox S.p.A. will examine, repair and/or replace the returned piece and then send it back to the purchaser on ex-works basis.

Should the piece be found under warranty, no further costs will be owed by the purchaser. If, on the contrary, the fault is not found under warranty, all necessary reparations and replacements will be charged at normal cost to the purchaser.

C.S.F. Commercial parts incorporated in C.S.F. Inox products are guaranteed by their corresponding manufacturers.

3.1 - CERTIFICATION AND EC MARKING

The equipment was made in accordance with Machinery Directive 2006/42/EC and relevant EC directives applicable at the time of its placing on the market.

This Use and Maintenance Manual complies with Annex I point 1.7.4 of the aforementioned Directive as well as with standard UNI 10893 and ISO/IEC guide 37.



The list of Directives and standards applied is included in the Declaration of Conformity found in the manual of the pump supplied.

4.0 - TRANSPORT, DELIVERY, STORAGE AND HANDLING

4.1 - TRANSPORTATION

The packings of all pumps manufactured by C.S.F. Inox S.p.A. are defined when placing the order. Unless prior arrangements are given, goods will be packed only for transit conditions and not for long-term storage; in case it should be necessary to store the pumps outside, you are requested to cover the pumps appropriately in order to protect the electrical parts (motor) from rain, dust, humidity etc.

4.2 - ACCEPTANCE



On delivery of the supply it is essential to make sure that the packaging has not been damaged during transport so that any claims can be made immediately to the carrier. Should any damage be ascertained, the following procedure must be observed:

- Accept the goods with reservation;
- take photographic evidence of the damage;
- notify the carrier of the damage sustained via registered mail with the photographic evidence attached.

4.3 - STORAGE

Should you wish to put the machine into storage for periods of inactivity, it is advisable to place it in a covered area protected from the weather where the temperature is between -5°C and 40°C.

4.4 - SITE PREPARATION

It is the user's responsibility to:

- Prepare the installation sites as prescribed by local legislation governing health and safety in the workplace



- Make sure the electrical power supply is compliant with the legislation in force and possesses an efficient earthing system.

LIGHTING

The machine installation site must have adequate natural and/or artificial lighting in compliance with the legislation in force in the country of installation.

Lighting must be uniform, guarantee good visibility in every part of the machine and must not create hazardous reflections. It must also be such that commands on the control panels and emergency stop buttons can be clearly seen (with pumps equipped with electric panel).

FLOORING

Flooring must be of industrial standard, smooth and even. For pumps with bearings housing, after securing the base to the floor, correct alignment of the joints must be checked.

4.5 - TRANSFERRING

The personnel involved must have adequate qualifications and experience in handling and lifting operations.

Use suitable and certified equipment for lifting and handling the machine supplied.



Carry the packed pumps as close as possible to the place of installation by means of appropriate lifting devices and unpack them. During this operation take care, as unsteady parts could fall down. **Packing materials must be disposed of by the user in accordance with the relative regulations in force in the country of installation (see Chapter 18 on page 56).** After unpacking, use suitably sized hoisting belts to lift and move the pump-motor assembly to the place of installation* (see fig. A); NEVER use the eye bolts on the motor to move the whole assembly as these are suitable for moving the motor only.

N.B.: if the pump is sold coupled to the motor, it CANNOT be moved without the base.

In versions complete with shroud, take the shroud off before moving the pump-motor assembly (fig. A and B) or the trolley-pump assembly (fig. C) to avoid damaging it.

Pumps which have a base must be handled using eye bolts screwed into the holes which are ultimately used to secure the assembly to the floor (see fig B).

When handling with a crane, always rig up the load using at least two ropes/belts.

When handling with a forklift, the length of the tines must always be greater than the width of the machine and protrude from the opposite side of the load.

When lifting machinery the centre of gravity MUST always be in line with the lifting point.

*** N.B.: check the weight of the machine indicated on the data sheet attached to the instructions.**

Observe all relevant local health & safety regulations.

Fig. A

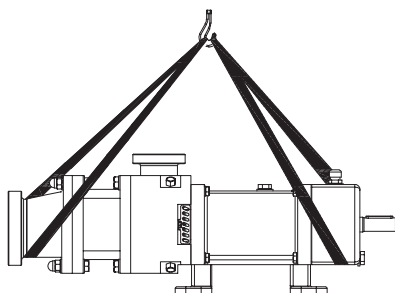


Fig. B

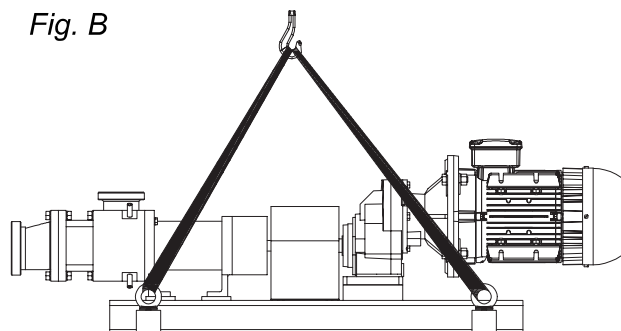
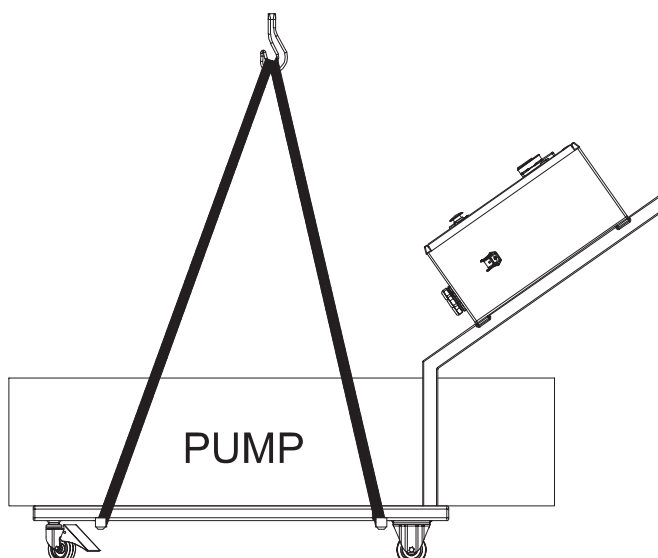


Fig. C



5.0 - RETURNS

- Empty the pump correctly
- Wash and thoroughly clean the pump, especially in the case of harmful or explosive liquids.



TROLLEY-MOUNTED PUMPS WITH ELECTRICAL PANEL MUST NOT BE WASHED WITH JETS OF WATER AS THIS COULD DAMAGE THE INTERNAL ELECTRICAL COMPONENTS.

- Thoroughly dry the pump.
- A duly compiled Declaration of Decontamination must accompany the pump (see page 55).

6.0 - DESCRIPTION

6.1 - MACHINE OVERVIEW

Twin-screw displacement pumps are machines with two counter-rotating shafts, synchronized by a gear placed outside the pumping chamber.

The two shafts support as many rotors, which engaging, rotate inside a gauged stator and transfer fluid volumes from the suction chamber to the delivery chamber.

Therefore, the main elements that determine operation of a twin-screw pump are the rotors and stator chamber.

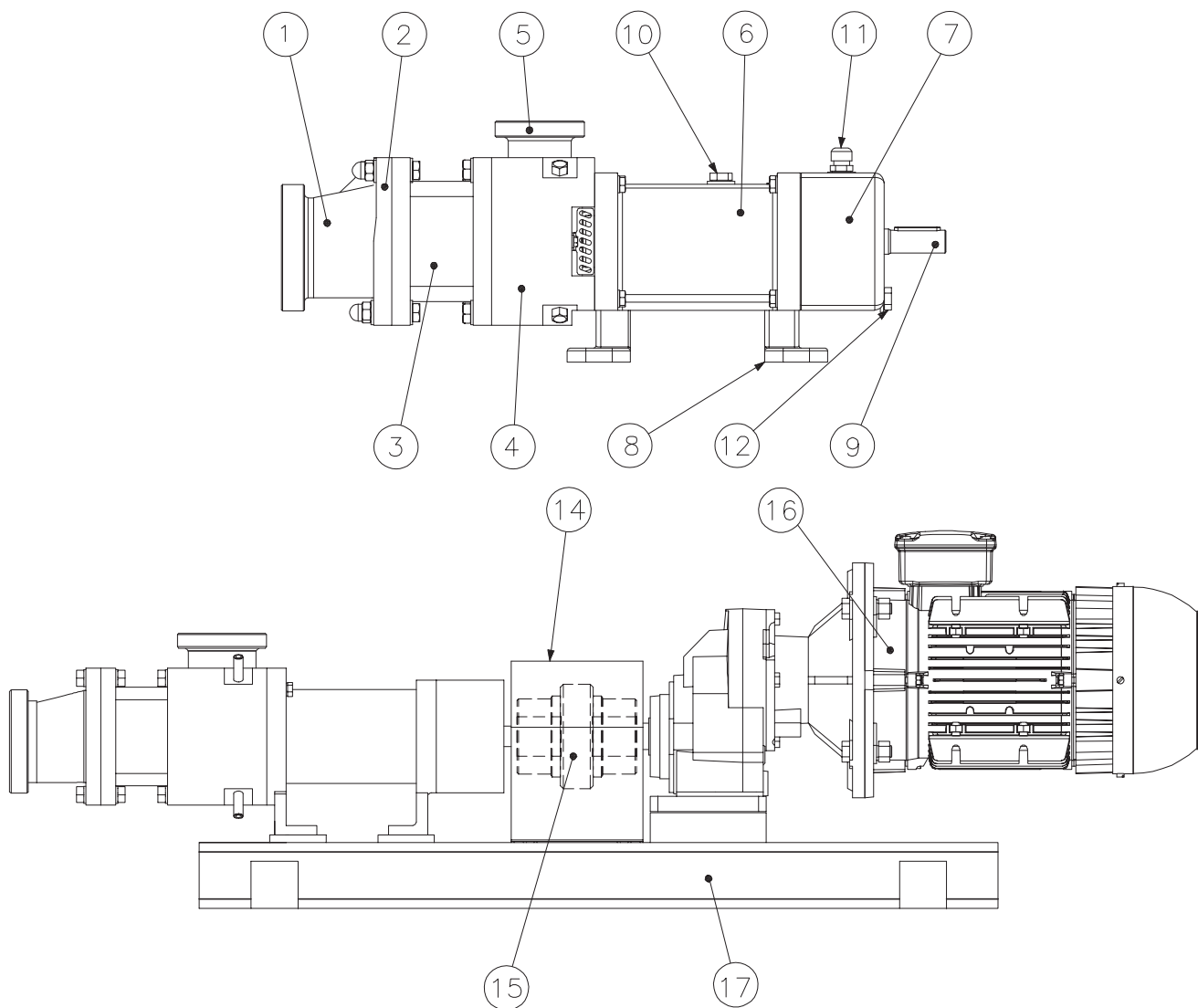
The rotors are single- or double-thread start stainless steel screws with optimized side profiles to minimize backflow during rotation.

The stator chamber consists of a cylinder shaped according to the form given by coupling of the rotors. If rotation is reversed, suction and delivery are also reversed.

All models have threaded connections for DIN 11851 standard fittings (unless otherwise re-requested) and all models are fitted with mechanical seals. The materials used for the components and the mechanical seal are chosen based on the liquid to be pumped. They are fitted with three-phase electric motors, IP 55 protection rating, unless otherwise specified.

6.2 - TECHNICAL DESCRIPTION OF THE MACHINE

POS.	Description	POS.	Description
1	Suction port	9	Drive shaft
2	Suction chamber	10	Oil top-up cap
3	Rotor chamber	11	Vent plug
4	Outlet Casing	12	Oil drain plug
5	Delivery port	14	Joint cover
6	Pump support	15	Coupling joint
7	Rear box	16	Motor
8	Foot	17	Base



6.3 - TECHNICAL DATA

- Maximum suction pressure: 16 bar
 - Maximum differential pressure: contact C.S.F. Inox S.p.A.
 - Temperature range: -10°C to 130°C (from 100°C up to 130° C with increased clearance)
- The operating temperature range is determined by the type of mechanical seal and the material of the elastomers used.



If there is any need to use the pump with different performance data and product characteristics to those indicated at the time of ordering, contact C.S.F. Inox S.p.A. to make sure the pump is suitable for your requirements.

6.4 - WEIGHTS

TABLE OF WEIGHTS FOR TS BARE-SHAFT PUMPS

Pump size	Weight [kg]
TS 65	≈ 52
TS 70	≈ 55
TS 80	≈ 97
TS 90	≈ 101
TS 100	≈ 230

For the pump overall weight, see the data provided as an appendix to the instructions.

7.0 - INTENDED USE

Twin-screw displacement pumps are mainly used for viscous (up to a maximum of 1,000,000 centipoise) delicate, abrasive process fluids or fluids containing suspended solid particles). They can also be used for Cleaning/Sterilizing in Place operations. They are mainly used in the food and beverage industries, pharmaceutical industry, chemical, textile, ceramic and in water purification and treatment plants. However, this technology has its origin in the oil sector, because the operation principle is particularly suitable also for the pumping of biphasic fluids.

The features of this type of pump are the virtually absence of pulsations and the smooth flow, for which fluid maintains its own rheological properties.

Indeed, due to the constant quantity of conveyed fluid and to the screws' geometry, the fluid is neither centrifuged nor mistreated, keeping its own organoleptic properties intact as well.

Note: For the field of application of the pump in your possession, please refer to the technical sheet.

7.1 - DANGERS ARISING FROM THE USE OF THE MACHINE

The TS pump is state-of-the-art built and complies with the mechanical safety standards. in force Nevertheless, its use may pose a danger to the life and limbs of the operator or third persons and/or damage the machine and other assets. The machine must be used only and exclusively:

- for the purpose for which it is built
- in compliance with the safety standards.

In the event of any malfunction which might compromise safety, stop using the pump and carry out the necessary repairs.

7.2 - INTENDED USE

The machine and/or parts thereof must never be used for purposes other than those foreseen in this Use and Maintenance Manual. Observance and strict compliance with the conditions of use, repair and maintenance, as specified by the Manufacturer, constitute essential aspects of the equipment's intended use.

Correct use of this machine is detailed in the order confirmation. A different use or a use that disregards the intended use is considered incorrect. If you want to modify the product, pressure, speed or temperature, first you need to consult our company or one of our agents

The equipment was designed and built for the uses indicated in chapter 6.0 "Description".

7.3 - PROHIBITED USE



The machine **MUST NOT** be used:

- By personnel other than those indicated in the previous heading;
- For purposes other than those described in Chapter 6.0 and the previous paragraphs;
- With materials and fluids different to those indicated in the intended use;
- In atmospheres that are potentially explosive and/or constitute a fire risk;
- If it has not been installed correctly;
- If there are power supply faults;
- In the event of serious maintenance shortcomings;
- The pump must always be used in an environment appropriate to the level of protection of the motor. Always check this on the motor plate before installation



THE PUMP MAY NOT BE USED IN ENVIRONMENTS WHICH REQUIRE A HIGHER LEVEL OF PROTECTION OR A HIGHER SPECIFICATION MOTOR OR ELECTRICAL PARTS.

Components complying with relative safety standards must be used.

- In ambient conditions different to those indicated in Chapter 4.0.



For any use of the equipment different to that indicated herein, the Manufacturer reserves the right to review the warranty conditions and validity of equipment certification.

8.0 - INSTALLATION, HOOK-UP AND START-UP

The equipment is built and assembled on the Manufacturer's premises and is then delivered to the customer.

8.1 - HANDLING AND LIFTING PRECAUTIONS

Handling must be carried out in a manner that avoids any damage.

- When handling with a crane, always rig up the load using at least two ropes/belts.
- When handling with a forklift, the length of the tines must always be greater than the width of the machine and protrude from the opposite side of the load.
- All protective devices, guards and casings must be correctly secured in place.
- When transporting the machine, parts must be protected against possible impact and strain (pay particular attention to electrical components).
- The equipment must be lifted as per the procedures described in chapter 4.0.
- Secure cables and adequately protect connectors.

8.2 - TRANSPORT AND POSITIONING

The machine must be installed in observance of the minimum clearances required for safe use and comfortable manoeuvring of personnel and handling equipment.

The machine **MUST** be pushed manually, it must not be towed or pushed using any other means. It must be moved on flat and sound surfaces. It must not be moved on ramps or slopes.



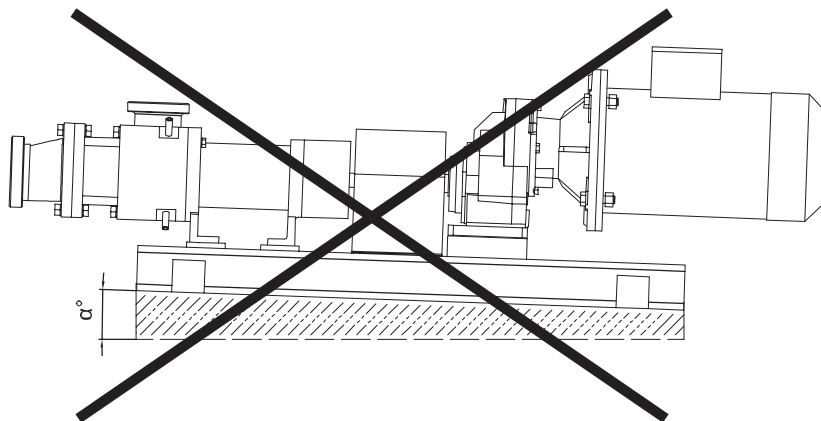
It is important to ensure that the machine is well levelled to avoid vibrations during operation.

Maximum permissible slope of floor: $\pm 2^\circ$.

For further information, see chapter 4.0 on page 12.

8.3 - INSTALLATION

TS pumps are self-draining from the axial port if installed horizontally, as described in this chapter. Place the pump on a flat surface.



To avoid the risk of coming into contact with moving parts, never start the pump without the guards installed.



The entire machine must be protected from any static charge.

The connection between the drive shaft and the pump shaft must be protected from contact hazards.



There must be enough space around the pump to allow for maintenance operations.

Make sure that the motor is well ventilated.

Align the pump shaft with the transmission shaft.



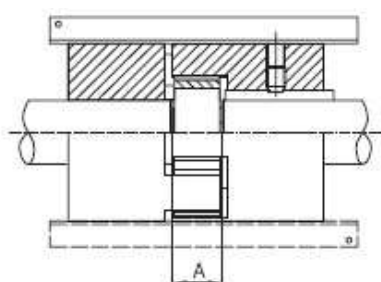
The size of the foundations must be able to support the weight of the pump.

If the pump is to be used in environments at risk of explosion, it will be necessary to use a motor with adequate protection against explosions.

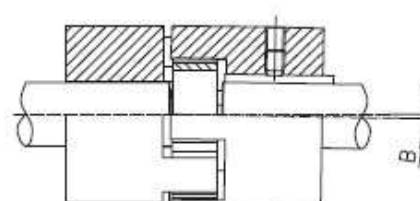
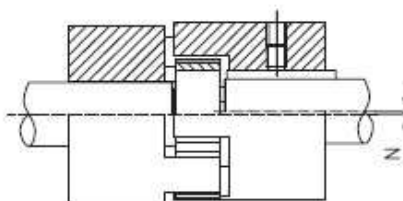
8.4 - MOTOR TRANSMISSION COUPLINGS

Drive for independently mounted is transmitted via flexible couplings designed to absorb impact and torsional vibration. These couplings compensate for both angular and radial misalignment and can sustain variations in load and rotation inversion.

The couplings are sized in compliance with standard DIN 740/2. A coupling is sized so that the maximum moment transmitted by the coupling in different operating conditions is less than the maximum permissible strain for the coupling itself. Transmission couplings with ATEX marking are available for machines for use in potentially explosive environments. Pumps supplied complete with motor and base are delivered already aligned during assembly. The baseplate may be warped, however, if fixed to an uneven surface.



RADIAL MISALIGNMENT



ANGULAR MISALIGNMENT

Precision alignment of the pump-drive unit is essential for correct operation. Consequently, once secured in place, it is advisable to check pump-motor coupling alignment one more time.

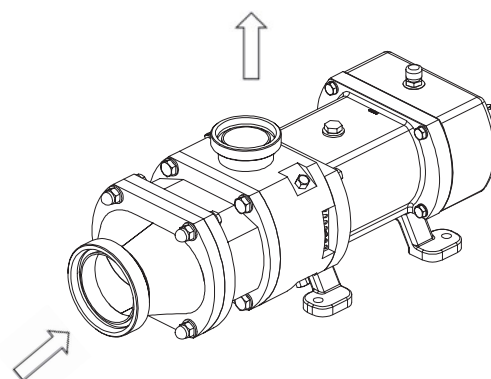
8.5 - CHANGING THE DIRECTION OF ROTATION



TSM pumps have been designed to transfer the fluid in the direction stated in the image aside, unless otherwise stated in the attached list by C.S.F.

Subject to authorization, it is possible to reverse the fluid movement changing the direction of rotation of the motor. Such operation is allowed for short periods at reduced differential pressures.

For more information, please contact C.S.F. via the contact details in the end of this manual.



8.6 - SUCTION AND INFLOW CONDITIONS

NPIPA (Net Positive Inlet Pressure Available)

NPIPA is the average pressure value (in meters of water column) measured near the pump's suction port during operation, net of steam pressure. This parameter indicates the quantity of pressure energy available to feed the rotors of the twin screw pump and depends on the geometrical characteristics of the system in suction, as well as the operating conditions (temperature, flow rate, characteristics of the fluid...)

NPIPR (Net Positive inlet Pressure Required)

Twin-screw pumps can only operate correctly as long as steam does not form on the inside. **NPIPR** is an experimental parameter characteristic to each individual pump and represents the necessary suction pressure energy needed to correctly feed the pump. This value varies with pump speed and the viscosity of the liquid being pumped.

To guarantee correct operation of the machine, the following condition must be verified:

$$\text{NPIPA} > \text{NPIPR} + 0.5\text{m}$$

8.7 - PIPING

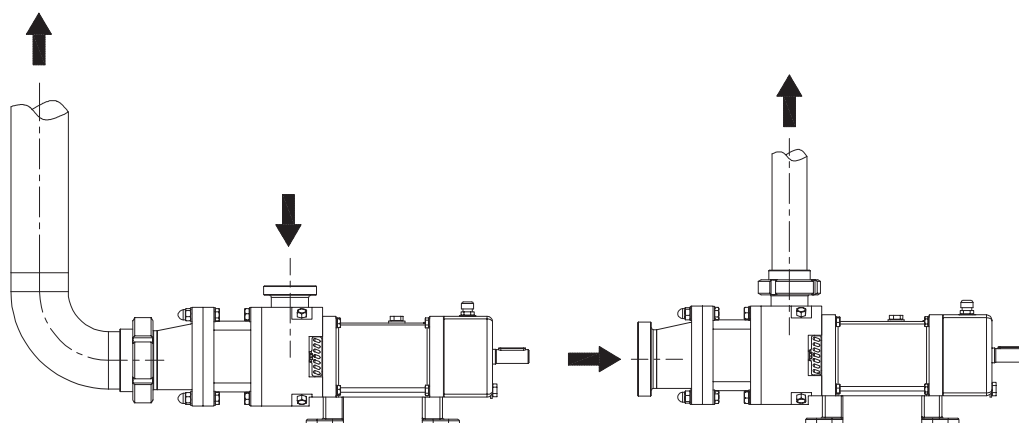
Before connection clean the piping and remove foreign bodies (e.g. welding residues).

Place flexible spacers (compensators) between the pump and the piping as this inhibits propagation of vibrations from the pump and stops any forces and torque generated by the piping from acting on the pump connections.

The delivery line must point upwards, so that any residual liquid can always flow back into the pump. This helps to prevent dry operation of the pump and facilitates the following suction process. The operator must make sure that the pump observes the pressure level stipulated in the order and indicated on the technical data sheet.

TS pumps usually run with such a low resonant frequency that no corresponding damage is caused. However, particularly when running with converters, certain frequencies can cause interfering vibrations, which must be avoided.

It is important during initial commissioning to ascertain whether such vibrations exist and to define them accordingly, so that the frequency converter can then be programmed to avoid these frequencies. Similarly, cavitation resonance caused by rigid piping must be avoided.



EHEDG certified pumps are only available with the connections listed in the position paper *Easy Cleanable Pipe Couplings and Process Connections*.

8.8 - ELECTRICAL CONNECTION



Electrical connection must be performed only after the plumbing connection has been completed in compliance with the technical standards and regulations in force (EN 60204-1).

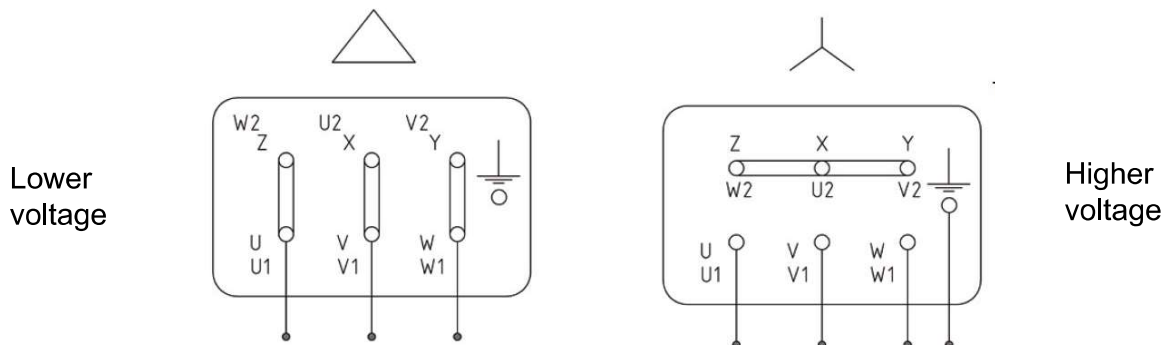
Provide a manual power supply cut-off device with an adequate current breaking power and overcurrent and overload protection (e.g. fuses, automatic switches, etc.). If necessary provide for a proper device to avoid spontaneous restarting.

Check that voltage, network frequency and number of phases conform to the technical features shown on the electric motor. The safety level of all components used for electric connection (cables, cable presses, switches and protections) must conform to the environment where the unit is installed; further, it is important to use electric cables of suitable section corresponding to the current values indicated on the motor plate, in order to avoid the overheating of the electrical conductors.

Before doing anything else, make the motor's earth connection, using the terminal on the motor and a cable of sufficient cross-section.

The cable connection to the terminal box can both be star or delta connection, according to the values indicated on the motor plate and to the network voltage shown below in the following picture; the clamps must be clean and carefully tightened; do not force the clamps.

When starting the motor, current absorption raises (5-6 times the nominal value) for a very short period; if the network cannot bear this absorption increase, we advise to use star or delta starters or other systems (for example auto-transformer).



C.S.F. Inox S.p.A. will accept no responsibility for damage to property and/or injury to persons caused by failure to comply with the technical standards and regulations in force.

9.0 - OPERATION

The twin-screw pumps do not pressurize the fluid being handled, they simply transfer it from the suction chamber to the delivery piping. Depending on the model of the pump used, differential pressures up to 18 bar can be achieved.

The maximum static pressure to which the pump may be subjected varies depending on set-up. For further detail, please contact C.S.F.

9.1 - PRELIMINARY OPERATIONS

Before starting the machine, a series of checks and controls must be carried out to prevent any errors or accidents during the start-up phase.

- Check that the pump has not been damaged during transport, installation and handling.
- Check that all fixed guards are securely attached to the machine.



If ever the equipment does not appear suitable for correct and safe operation, **TAKE IT OUT OF SERVICE** until damaged parts have been repaired or replaced.

- Check that the pump turns in the direction indicated.

The suction pipe and the pump must be filled with liquid. There are two possible cases:

- a) When the pump is to operate with a negative suction head, it must be filled by pouring liquid into the piping.
- b) When the pump is to operate below the level of the suction liquid, i.e. with a positive head, the suction and discharge gate valves must be opened until the pressure gauge on the pump discharge shows a pressure corresponding to the positive suction head.



Dry operation of the pump is **ONLY** allowed if flushing of the mechanical seals is guaranteed. If the sealing chamber is to be flushed, open the cooling water supply and adjust the flow. Ensure the suction and outlet valves are completely open



The twin-screw pump is a displacement pump and, therefore, must never operate with a closed valve on the outlet piping.

The twin-screw pump is a displacement pump that can produce a theoretically infinite pressure. If the outlet pipe is closed, the pressure generated by the pump may achieve values higher than those allowed by the system.

It is advisable to install adequate safety devices on the system, such as pressure switches or by-passes.

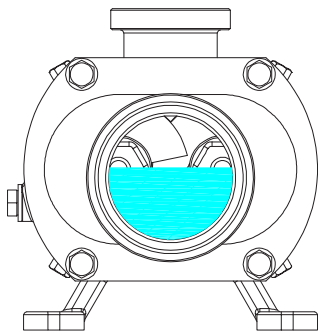
Start the pump and check once again that it rotates in the right direction.

CHECKS PRIOR TO START-UP

If cleaning or repairs have been performed or if the first start-up is about to be carried out, ensure all the screws are correctly and completely tightened before starting the pump.

In case of pumps for hazardous fluids, comply with the indications provided for such materials.

The customer must ensure that the pump is installed in the right position and with all the necessary safety devices (sensors, switches, pressure gauges, etc.)!



The pump must always be filled with product before being turned on and the liquid level must be above the rotor centre line during operation (see figure).

Pump filling must be performed outside the inflammable area. Before start-up, make sure all the valves are open. The pump will not be able to pump to a closed valve without an overpressure valve. If the pump leaks, suspend the ongoing operation as soon as possible to replace the damaged gaskets.

9.2 - STARTING

- Perform the preliminary operations and make sure the suction and delivery valves are fully open.
- Start the pump and check once again that it rotates in the right direction.

OPERATING CHECKS

- Do not operate without liquid and avoid prolonged operation with the delivery valve closed.
- Check that the suction liquid level is always sufficient to grant an adequate energy load for normal operation of the pump.
- Mechanical seals: check that there are no leaks along the shaft.

9.3 - PROLONGED STOP

If a period of prolonged inactivity is envisaged, refer to the storage operations described in § 4.3 (page 14) and take the following measures:

- Disconnect the electrical power supply;
- Disconnect the suction and delivery hoses from the pump;
- Store the machine in an indoor location, applying the brakes on the wheels;
- Grease any unpainted parts and make sure the machine does not come into contact with corrosive substances;
- Protect the machine from knocks and mechanical stress;

When stopping the pump for a longer time, empty the pump completely and wash it accurately in order to avoid the formation of scales and/or encrustations.



To return the machine to service after a prolonged period of inactivity, perform the initial controls for first start-up (previous heading).

9.4 - CLEANING THE PUMP

Handle substances and materials correctly, especially:

- When working on the lubricating system.
- When cleaning with solvents.

In order to guarantee maximum life expectancy of the seals and pump itself, before periods of non-use always wash the pump if it has been used to handle products which tend to solidify or crystallize. It is the user's responsibility to ensure that the washing liquids are compatible with the process liquid and the pump.

For correct cleaning of the pump, please see the washing procedures described in heading 18 on page 53.

9.5 - FAULTS

In the case of operating faults switch off the machine and secure it against unauthorized or inadvertent start-up.

10.0 - OPERATING IRREGULARITIES



All troubleshooting operations must be carried out by authorized and qualified personnel.

IMPORTANT: before resetting the machine, make sure that the cause behind the emergency stop has been eliminated.



Never carry out maintenance and/or repairs that alter the safety of the machine.

The purpose of this chapter is to provide solutions for the problems or malfunctions that are most likely to occur.

The list below is not exhaustive, if necessary contact the Manufacturer or relative service centre (if present).

We are herewith listing some of the possible working irregularities which may occur using the pumps, with a table helping to find out the possible causes and how to solve the problem.

Problem encountered:

- | | |
|-----------------------------------|--------------------------------------|
| A) The pump does not run | F) Leaks from mechanical seal |
| B) Insufficient flow rate | G) Short life of the mechanical seal |
| C) The pressure is not sufficient | H) Failure of the mechanical seals |
| D) The pump stops priming | I) Anomalous vibrations and/or noise |
| E) Power absorption too high | J) Short life of bearings |

Possible causes and necessary operations to solve them:

- 1) Pump not properly primed: repeat priming operations
- 2) Air entering from suction connections: check tightness.
- 3) Air entering from the mechanical seal: replace the seal.
- 4) Obstructions along suction pipes or closed valves along piping: check for and remove all foreign matter obstructing pipes and check valve status (open if closed).
- 5) NPSH available in the plant is lower than NPSH needed by the pump: reduce friction losses.
- 6) Defective operation of the bottom valve (not flooded pumps): restore proper operation of the valve or replace it with one in good condition.
- 7) Plant friction losses higher than pump performance: reduce friction losses or replace the pump with a more suitable one for requested performances.
- 8) Incorrect direction of rotation or velocity too low: restore correct direction of rotation or increase motor speed.
- 9) Rotors clogged by foreign matter: remove all foreign matter.
- 10) Worn seals: replace worn parts.
- 11) Worn or partially clogged rotors: replace the rotors or remove foreign matter.
- 12) Product viscosity higher than specified: check pump size and configuration.
- 13) Too much gas in the fluid: install a deaerator.
- 14) Plant friction losses lower than foreseen: increase friction losses or set the pump at a higher working point.
- 15) Specific weight of the fluid higher than envisaged: increase the installed motor power.
- 16) Pumped fluid viscosity too high: check pump size.
- 17) Pump operating at a higher flow rate than envisaged due to plant friction losses lower than expected: set the pump at a lower working point or increase plant friction losses.
- 18) Rotation speed too high (when pump is controlled by an inverter): reduce speed.
- 19) Internal friction caused by rubbing between rotating and fixed parts: restore correct assembly conditions; check that the working differential pressure corresponds to the design pressure.
- 20) Pump-motor misalignment or deformed shaft: restore correct pump-motor alignment or contact C.S.F. Inox S.p.A. to request shaft replacement.
- 21) Damaged pump or motor bearings: contact C.S.F. Inox S.p.A. .
- 22) Incorrect electrical hook-up: modify electrical hook-up observing the data provided on the motor data plate based on available voltage.

- 23) Incorrect voltage for motor installed: replace the motor with one which has a suitable voltage.
- 24) Excessive wear on the seal: change the mechanical seal.
- 25) Pumped fluid and/or fluid temperature not suitable for the seal type or the materials from which it is made: verify the choice of seal.
- 26) Inadequate cleaning of pump handling liquids which tend to crystallize: do not allow the product to remain inside the pump for a long time.
- 27) Incorrect seal assembly: reassemble taking care to do it correctly.
- 28) Incorrect direction of rotation for non-reversible seals: restore correct direction of rotation.
- 29) Insufficient flushing (for flushed seals): increase the quantity of flushing fluid (see par. 11.0 Seals, page 29).
- 30) Dry operation of pump: to prevent further occurrences of dry operation, install protective devices (e.g. flow switch) to block pump operation when necessary.
- 31) Shaft oscillations due to excessive play in the assembly, worn bearings, etc.: restore correct assembly conditions replacing any worn parts.
- 32) Suspended solids in the fluid: verify the choice of seal and pump configuration.
- 33) Temperature too high or thermal shock: gradually increase the temperature of the fluid to avoid sudden massive temperature changes, avoid dry operation of the pump.
- 34) Rotors out of balance: replace the rotors.
- 35) Pump running with excessively low flow rate: set the pump at a higher working point.
- 36) Pump running with excessively high flow rate: set the pump at a lower working point.
- 37) Pump and/or piping not adequately anchored: check and adjust the anchorage of the relative parts.
- 38) Bearings not lubricated: replace bearings and restore correct lubrication (lubricant must be topped up from time to time based on operating conditions) (see chapter 15.8 - Lubrication on page 48).
- 39) Water infiltration due to worn radial shaft seal: replace worn parts.

Problems that may arise with trolley-mounted pumps with or without electric panel:

The machine does not start, the panel does not turn on or freezes:

- Check the connections inside the electrical panel.
- Check the display for any alarm messages.
- If the problem persists, notify the Manufacturer.



The person carrying out the operations above must be kitted out with the necessary Personal Protective Equipment and must follow the safety instructions as indicated in heading 2.2 of this Use and Maintenance Manual.

		PROBLEM ENCOUNTERED									
		A	B	C	D	E	F	G	H	I	L
POSSIBLE CAUSES AND NECESSARY OPERATIONS TO SOLVE THEM	1	●	●								
	2	●	●		●						
	3	●	●		●						
	4	●	●		●						
	5	●	●		●						
	6	●	●								
	7	●	●	●							
	8	●	●	●							
	9	●	●	●		●					
	10		●	●							
	11		●	●						●	
	12		●	●							
	13			●	●						
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	20					●	●	●		●	●
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	22		●	●		●					
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	25						●	●	●		
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	27						●	●			
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	31						●	●			
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	33								●		
	34									●	●
	35									●	
	36									●	
	37									●	
	38										●
	39										●

11.0 - SEALS

The mechanical seal is a device designed to retain the fluid so that it does not get out of the pump. It consists of two sliding surfaces, one rotating in relation to the other, kept in axial contact by the pressure generated by the fluid (hydraulic force) and by the presence of components, such as springs or bellows (mechanical force).

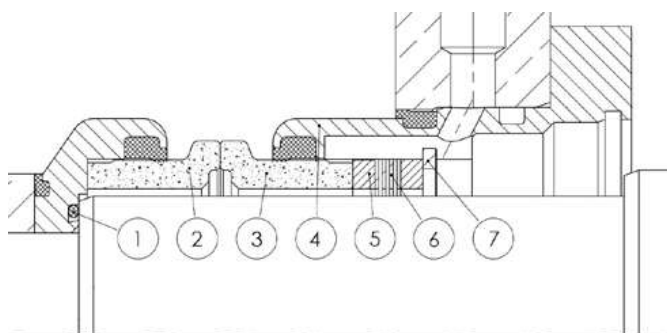
The mechanical seal is usually cooled by the retaining fluid.

The materials used are selected according to the properties of the fluid used, under the conditions of use at which the seal is installed and for the required performance. The seals installed on twin-screw pumps are reversible.



Before using the pump for any liquids other than those specified when selecting and ordering, ensure that mechanical seals and gaskets are suitable for the new product.

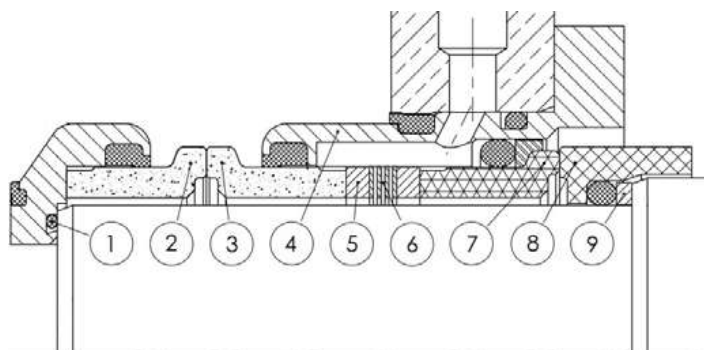
11.1 - SINGLE MECHANICAL SEALS, EXECUT. "T"



Pos.	Component
1	Rotary gasket
2	Rotary ring
3	Fixed ring
4	Frame
5	Guide ring
6	Spring
7	Internal retaining ring



11.2 - DOUBLE FLUSHED MECHANICAL SEAL, "Q"



Pos.	Component
1	Rotary gasket
2	Rotary ring
3	Fixed ring
4	Frame
5	Guide ring
6	Spring
7	Fixed ring
8	Rotary ring
9	Centering spacer

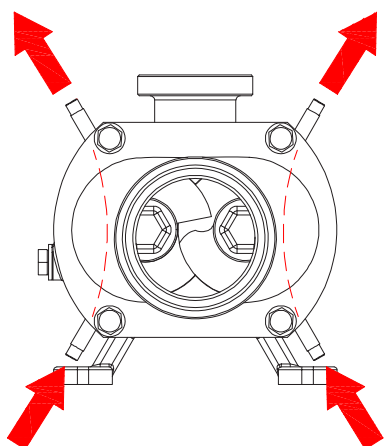


"Q" exec. – mechanical seal auxiliary flushing

- Maximum pressure of the flushing system: 5 bar
- Minimum flow rate of the flushing system: 0,5 l/min

For applications with high sanitary requirements, we recommend using a non-pressurized system to avoid the contamination of the product in case of pressure drops.

Should it be necessary to maintain the flushing liquid at a pressure higher than the process fluid, said overpressure must not exceed 5 bar.



Connections to the seals flushing circuit must be made as shown in the figure, guaranteeing flow on both sides of the mechanical seals,

Operation checks:

Verify flushing of the mechanical seal.

Verify the absence of leaks from the auxiliary service connections of the seals (if present).

Check that the temperature of the flushing liquid in mechanical seal outlet does not exceed 45°C.

The condensed steam must not drop below 90°C.

EHEDG specifications recommend the installation of a valve and pipe for draining off the liquid used for mechanical seal flushing.

Flushing liquid requirements

The flushing liquid must be compatible with the liquid being pumped.

It is advisable to use one of the following liquids.

- Water with electrical conductivity of 100 — 800 µs/cm
- Water and glycol mixture
- Glycerine

12.0 - TS PUMP DISASSEMBLY



Electricity

Electrical shock hazard:

- Electrical connection/disconnection operations on the pump must be performed by qualified personnel only.



Improper maintenance

Injury hazard:

- Only qualified maintenance technicians are authorized to perform maintenance operations.



Automatic start-up

Injury hazard due to the presence of rotating parts:

- Before performing any maintenance operations, disconnect the machine from the power socket and ensure that it cannot start accidentally.



Hot surface

Burning hazard:

- Detect the temperature of the product.
- Allow the pump to cool down.
- Wear the designated personal protective equipment (PPE).



Dangerous fluids

Health risk:



- Avoid contact with skin
- Follow the safety instructions of the fluid manufacturer.
- Wear the designated personal protective equipment (PPE).



Improper maintenance

Damaging the pump:

Before performing such operations, disconnect the electrical motor from the power grid, remove the pipes that connect the pump to the system, uncouple the pump from the coupling joint and position it on a flat surface. Moreover, the pump must be washed internally.

- Use only original C.S.F. spare parts.
- Changes to the pump's components must be approved by C.S.F.
- Carefully clean the pump and provide the safety sheet of the fluid.
- Remove dirt on the inner parts of the pump.

Below are the steps to follow in order to disassemble the twin-screw pump completely.

Before performing such operations, disconnect the electrical motor from the power grid, remove the pipes that connect the pump to the system, uncouple the pump from the coupling joint and position it on a flat surface.

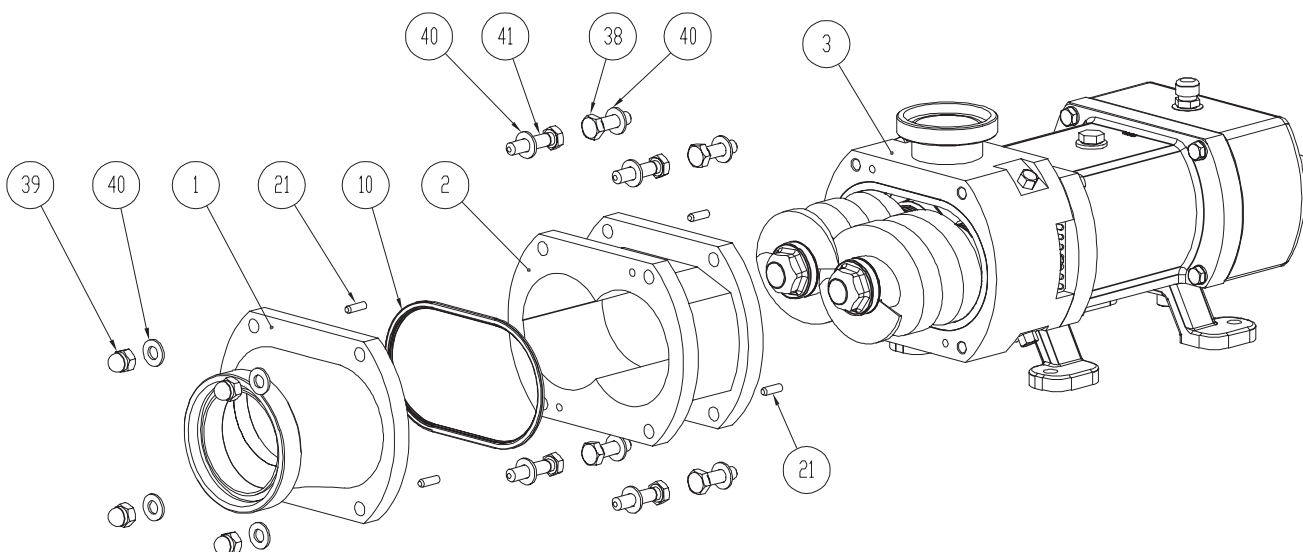
12.1 - DISASSEMBLY OF PUMP WITH SINGLE MECHANICAL SEAL

1- REMOVAL OF THE ROTOR CHAMBER AND SUCTION PORT:

Unscrew the 4 fastening nuts (39) and screws (41) with relative washers (40) which hold the suction port (1) onto the rotor chamber (2). Remove the suction port (1) and relative gasket (10). Remove the 2 centering pins (21).

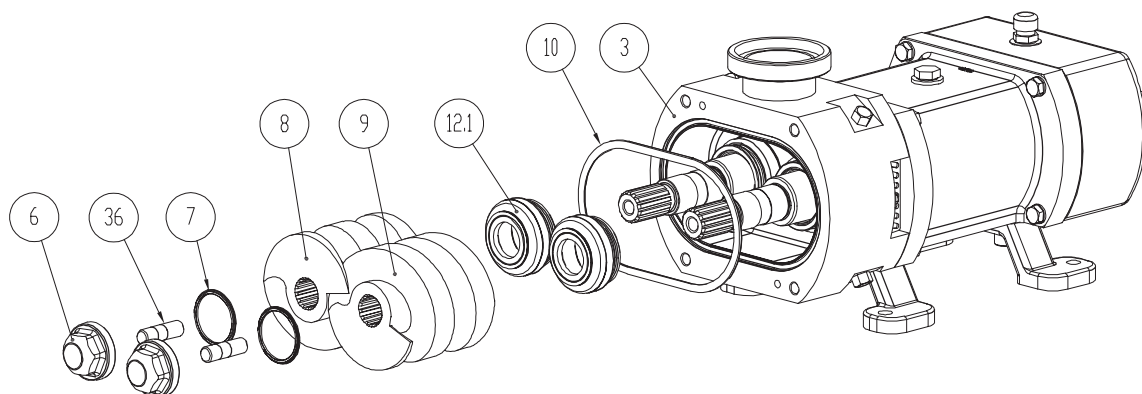
Unscrew the 4 fixing screws (38) and washers (40) in order to separate the rotor chamber (2) from the pump casing (3).

Remove the two centring pins (21) and check the clearance between the sides of the rotors.



2- REMOVAL OF THE ROTORS:

Block the rotors (8) and (9) with a soft wedge, slacken and remove the fixing nuts (6) on the rotors (8), (9), the studs (36) and relative shaped gaskets (7). Mark the reciprocal position between each rotor and shaft if you intend to reassemble the pumping section without removing the rear box. Pull out the rotors (8), (9), remove the front rotary part of the mechanical seals (12.1) and remove the gasket (10) from its seat in the pump casing (3).

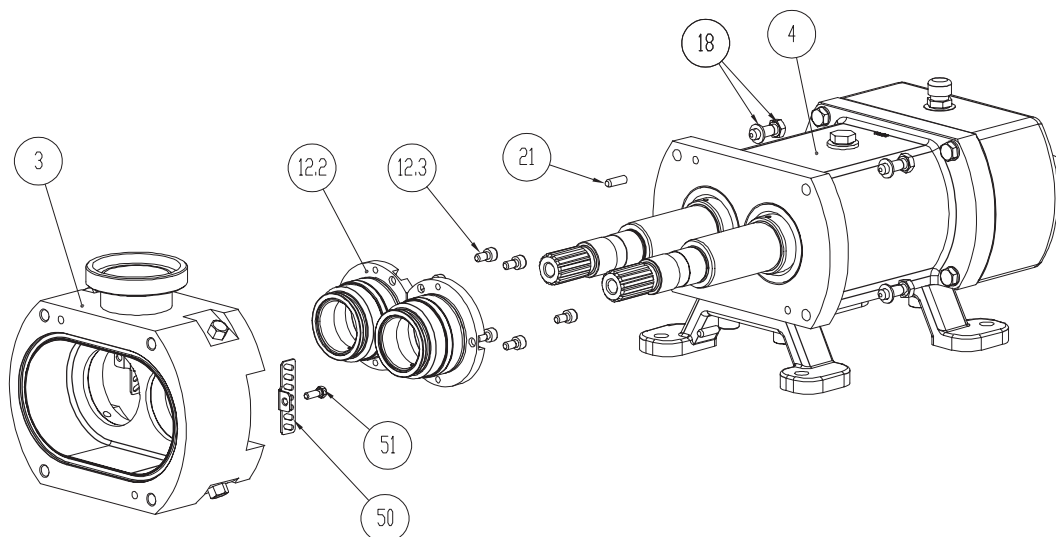


3- REMOVAL OF THE OUTLET CASING:

Unscrew the 4 fixing screws and washers (18) which fasten the pump casing (3) to the bearings housing (4). Extract the pump casing (3) and the 2 centring pins (21).

Remove the fixed parts of the mechanical seals (12.2) from the pump casing (3) by acting on the 6 fixing screws (12.3) and on the 4 extraction holes in the seals flange.

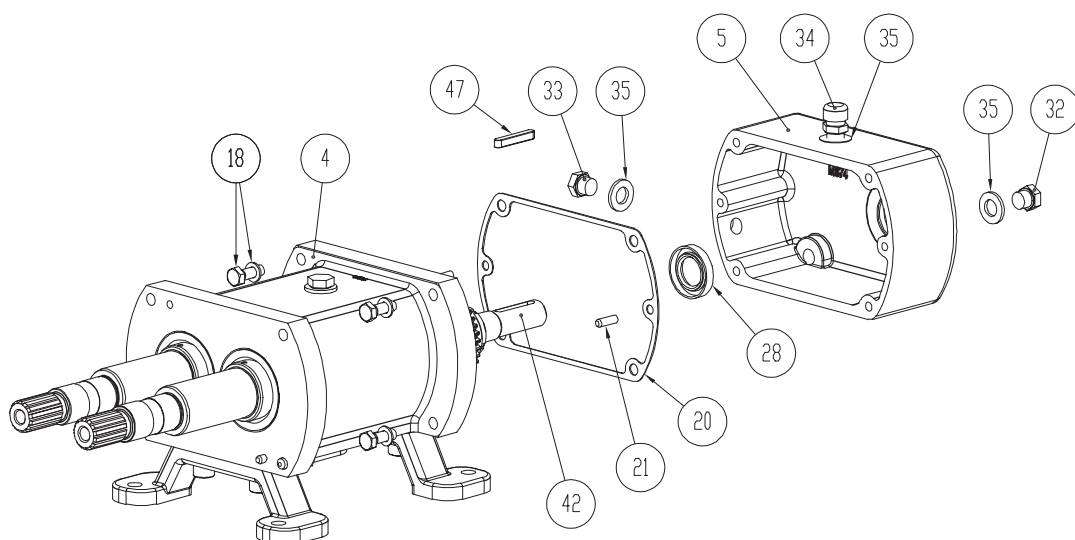
Unscrew the screws (51) to remove the guards (50) from the pump casing (3).



4- REMOVAL OF THE REAR BOX:

Loosen the vent plug (34) on the rear box (5) and remove the lubricating oil inside the pump by unscrewing the drain plug (32). Take off the gasket (35); unscrew the level gauge (33) with relative gasket (35). Unscrew the 4 fixing screws (18) which fasten the rear box to the bearings housing (4), remove the washers (18), remove the box (5) and the gasket (20) from the seat on the housing (4).

Remove the 2 centring pins (21) from the bearings housing (4), the key (47) and lip seal (28) from the motor shaft (42).

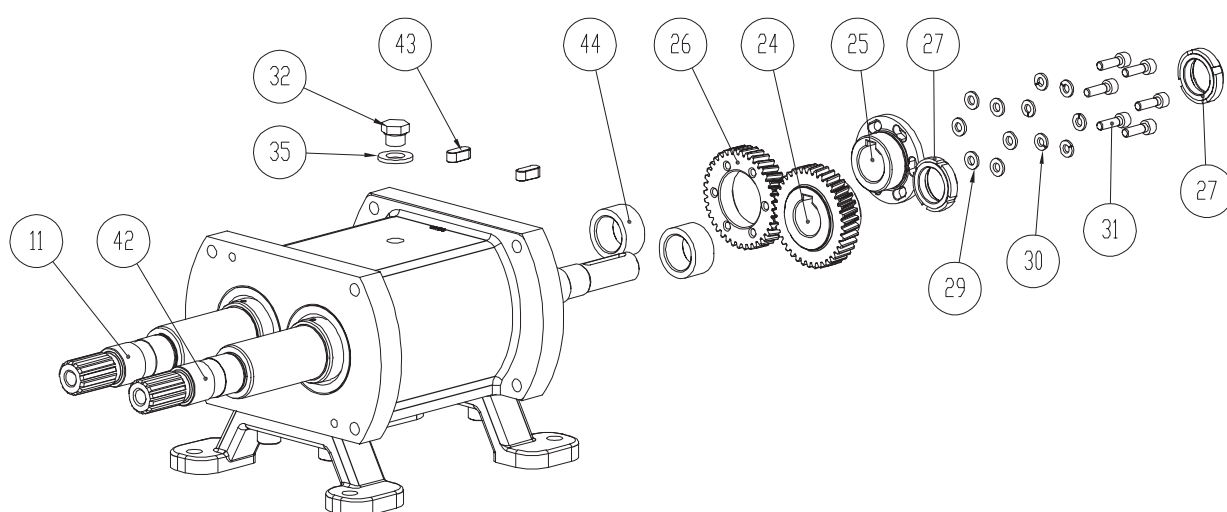


5. REMOVAL OF SYNCHRONIZATION COMPONENTS:

Unscrew the 2 locking ring nuts (27), slacken the 6 synchronization adjuster screws (31) with relative washers (29-30) and remove the gear wheel (24) from the motor shaft (42).

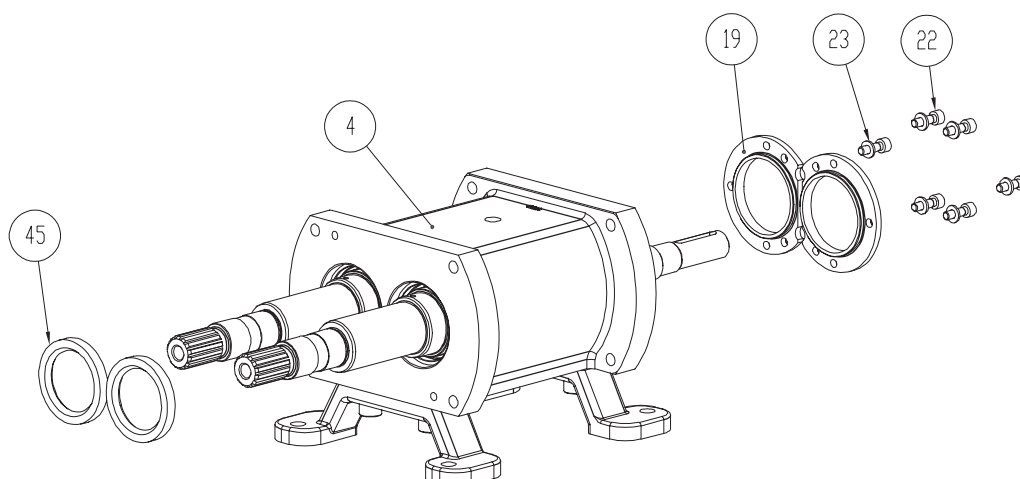
Remove the bush (25) and driven gear wheel (26) assembly from the shaft (11) and the fixing screws (31) with relative washers (29),(30); unscrew the latter to separate them from the bush (25).

Remove the coupling keys (43) of the gear wheels, pull off the spacers (44) and remove the oil top-up cap (32) with relative gasket (35).



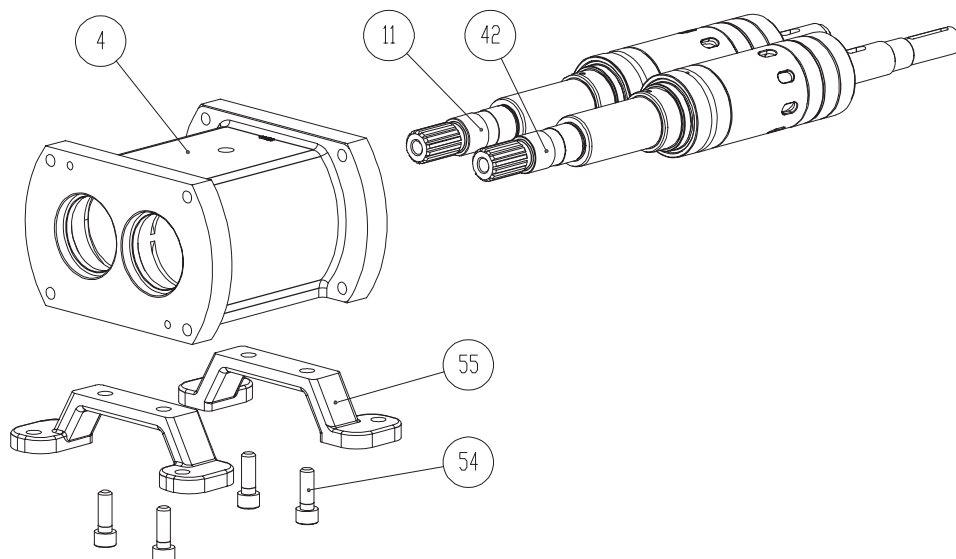
6. BEARING COVER EXTRACTION:

Unscrew and remove the fixing screws (22) from the bearing covers (19) with relative washers (23) in order to be able to remove the bearing covers (19) and extract the radial seal rings (45) from the support (4).



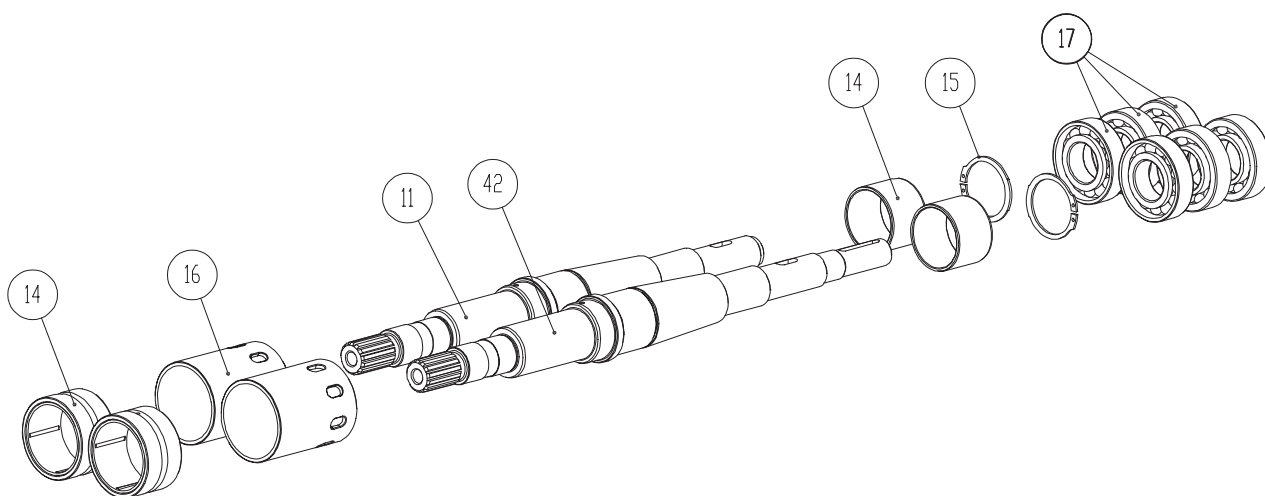
7. SHAFT REMOVAL:

Extract the complete rotary shafts (11 - 42) from the rear section of the bearings housing (4); remove the feet (55) by unscrewing the relative screws (54).



8. SHAFT DISASSEMBLY:

Extract the external rings of the two front roller bearings (14) and extract the external spacers (16). Extract the set of 3 rear ball bearings (17), remove the circlips (15) and extract the internal front roller bearing rings (14).



A vertical press is needed to remove the bearings.

12.2 - DISASSEMBLY OF PUMP WITH DOUBLE FLUSHED MECHANICAL SEAL

1. REMOVAL OF ROTOR CHAMBER AND ROTORS.

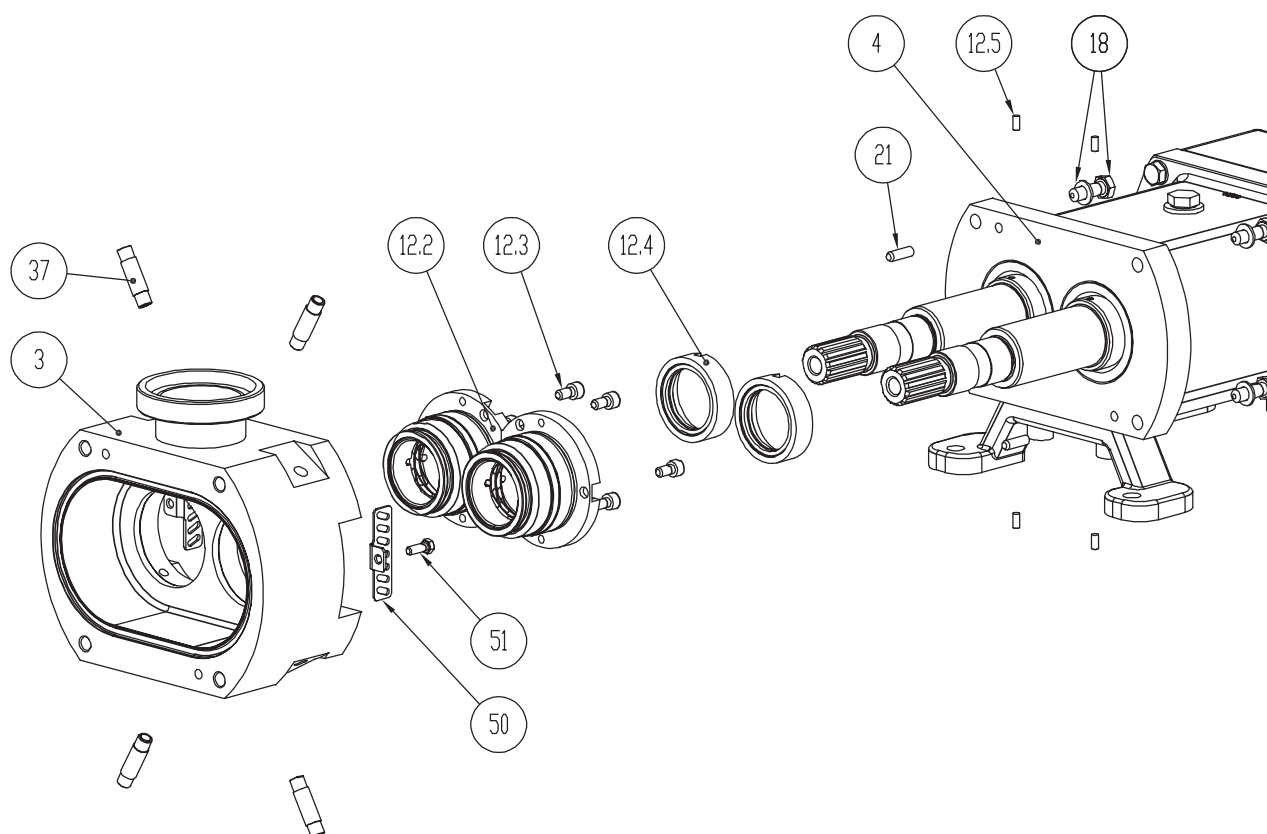
Perform steps 1 - 2 as described in the previous heading 12.1.

2. REMOVAL OF THE OUTLET CASING:

Unscrew the 4 fixing screws and washers (18) which fasten the pump casing (3) to the bearings housing (4). Extract the pump casing (3) and the 2 centring pins (21).

Remove the fixed parts of the mechanical seals (12.2) from the pump casing (3), by acting on the 6 fixing screws (12.3) and on the 4 extraction holes on the seal flange, then extract the rear rotary parts (12.4) of the mechanical seals and relative grub screws (12,5).

Unscrew the screws (51) and take the guards (50) and flushing pipes (37) off the pump casing (3).



3. REMOVAL OF REAR BOX, GEARS AND BEARING COVERS, SHAFT REMOVAL AND DISASSEMBLY:

Perform steps 4, 5, 6, 7 and 8 as described in the previous heading 12.1.

For further technical details on how to disassemble the various pump components, please contact the C.S.F. technical assistance service.

13.0 - TS PUMP ASSEMBLY

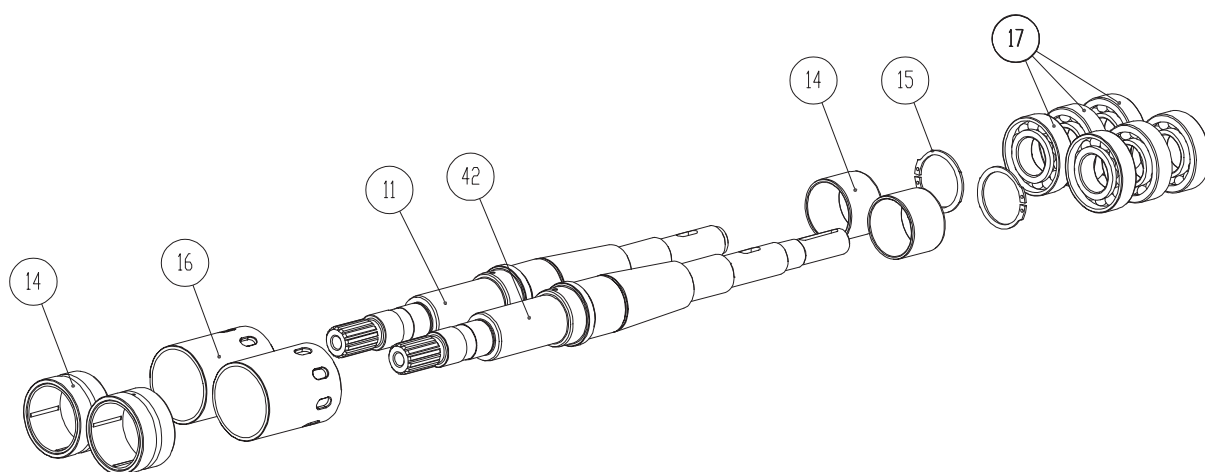
13.1 - ASSEMBLY - SINGLE MECHANICAL SEAL - TS EXEC. PUMPS

After accurately checking the condition of the shafts and bearings, proceed with assembly as described below.

1. SHAFT ASSEMBLY:

Insert the internal rings of the front bearings (14) on the drive and driven shafts (42), (11), driving them home. Insert the circlips (15) in their seats and complete assembly of the front bearings by positioning the relative external rings (14).

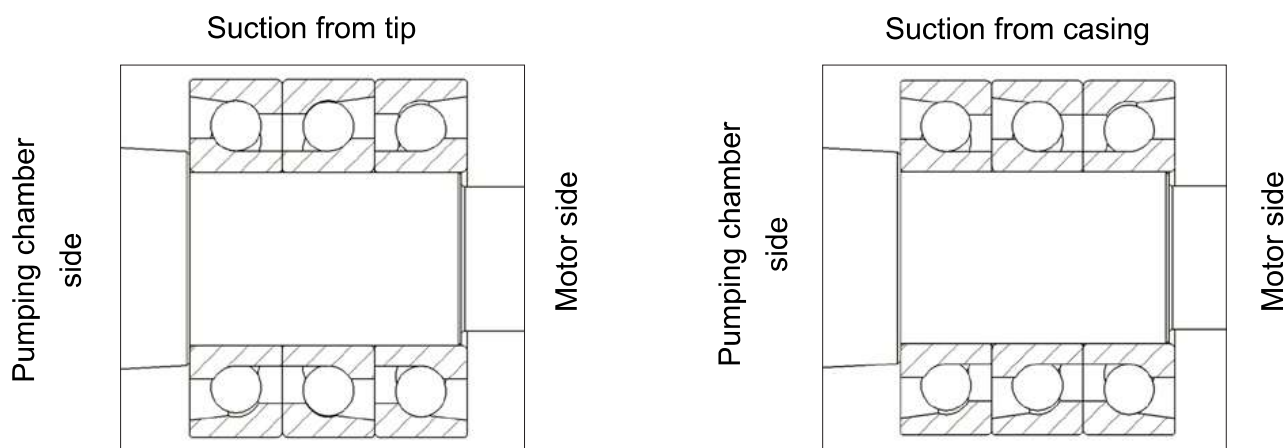
Insert the external spacers (16) and install the set of rear bearings (17).



Assembly of the internal rings of the front and rear bearings (14), (17) must be performed by heating up the components to a maximum temperature of 110°C.

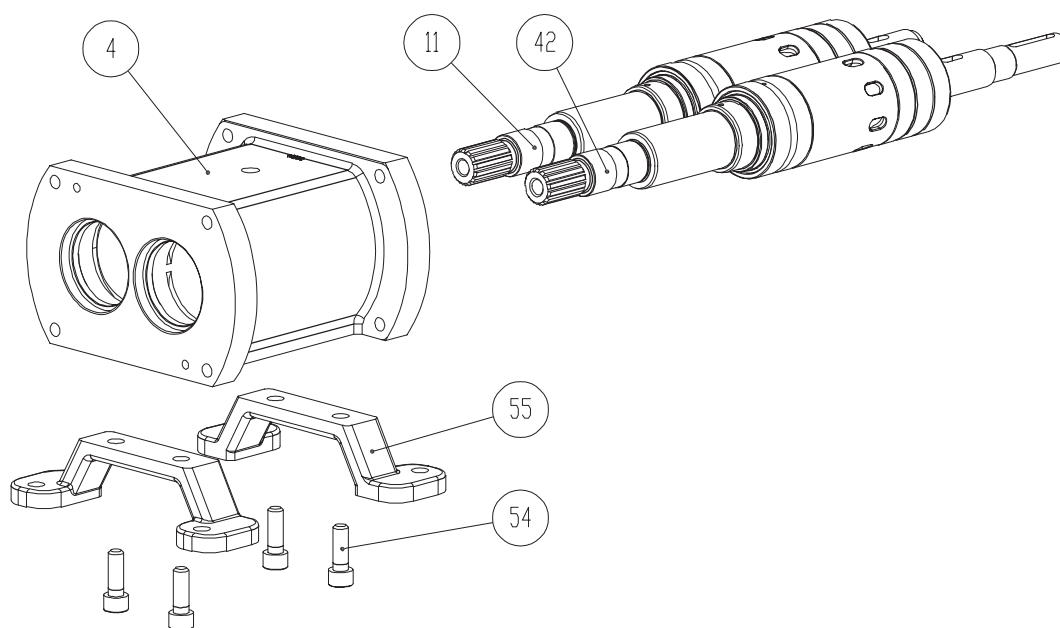
Assemble the set of rear bearings (17) by positioning one bearing at a time, in accordance with the following indications depending on the pump configuration:

Positioning of the rear bearings



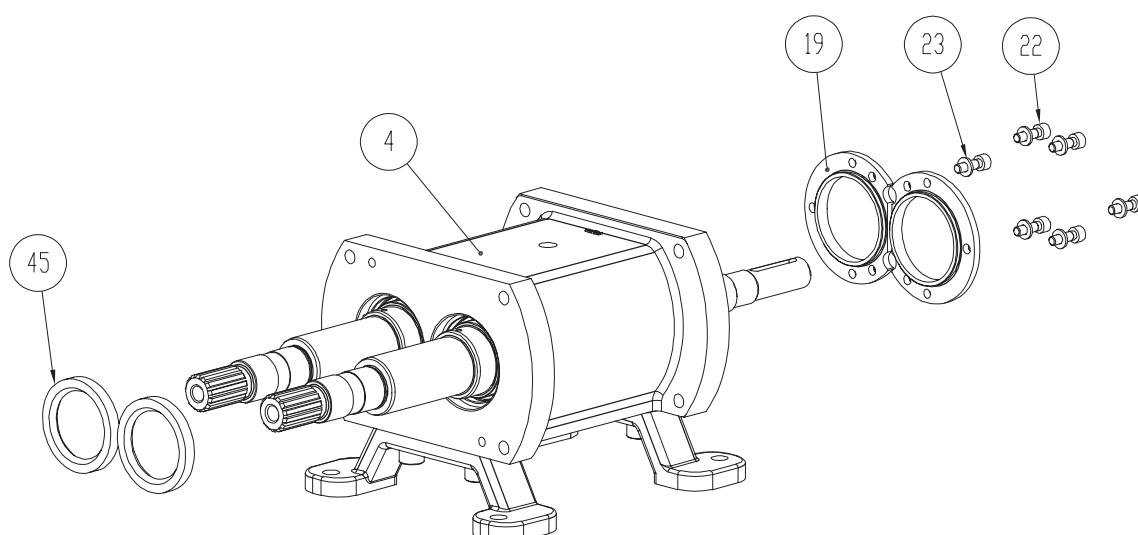
2. SHAFT INSERTION AND FEET ASSEMBLY:

Install the feet (55) by screwing in the relative screws (54) and insert the complete rotary shafts (11-42) from the rear of the bearings housing (4).



3. FITTING THE BEARING COVERS:

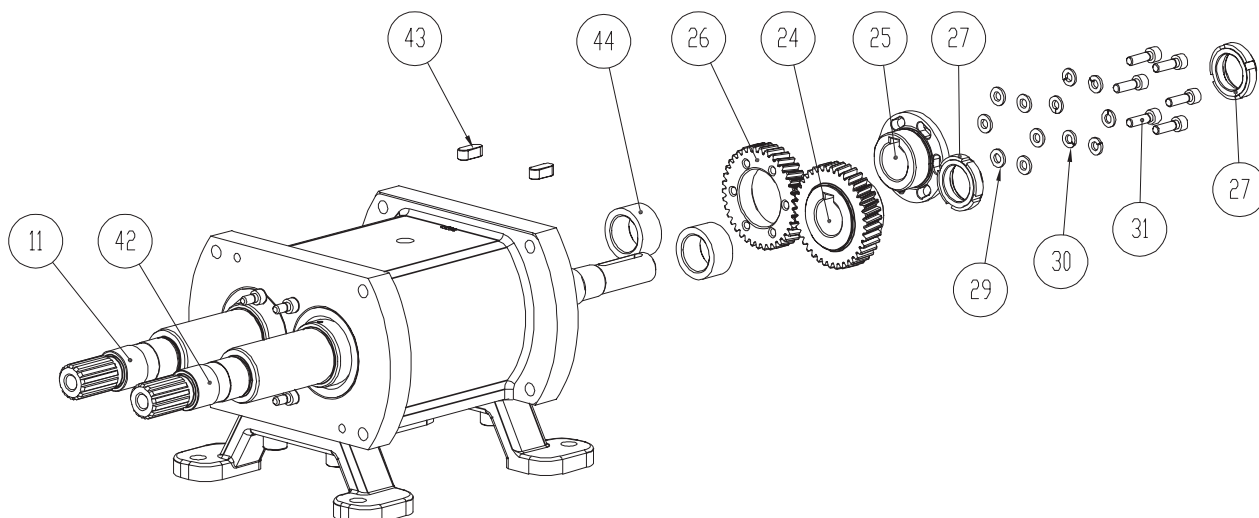
Fit the radial seal rings (45) on the front of the bearings housing (4) and insert the shafts assembled in the previous point, from the rear of the bearings support (4), pushing them all the way home. Fit the bearing covers (19), securing them in place with the 6 screws (29) and washers (22).



4. INSERTION OF THE SYNCHRONIZATION COMPONENTS:

Insert the spacers (44), pushing them all the way home, and position the bush (25) in the driven gear wheel (26), inserting the fixing screws (31) and relative washers (29)(30), without tightening them. Splice the drive gear wheel (24) and the bush (25) and driven wheel (26) unit, assembled in the previous step, on the drive and driven shafts (42), (11) using the keys (43).

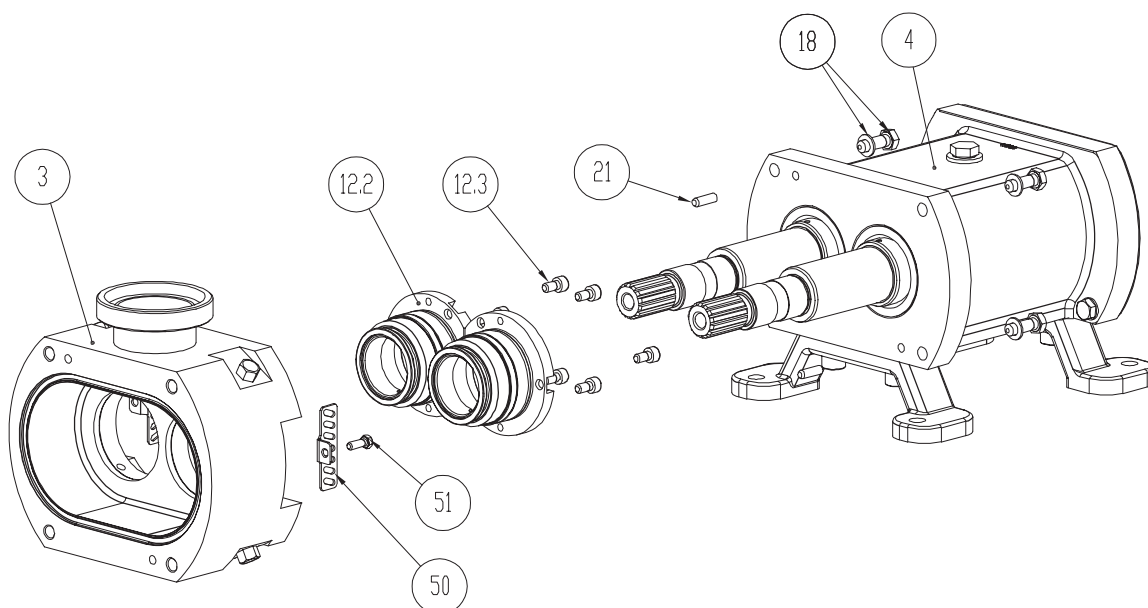
Axially block the assembled components by tightening the self-locking ring nuts (27).



5. ASSEMBLY OF THE MECHANICAL SEALS AND PUMP CASING:

Insert the fixed parts of the seals (12.2) in the rear part of the pump casing (3), securing them in place with the 6 fixing screws (12.3). Install the guards (5) on the casing (3), securing them in place with the 2 screws (51).

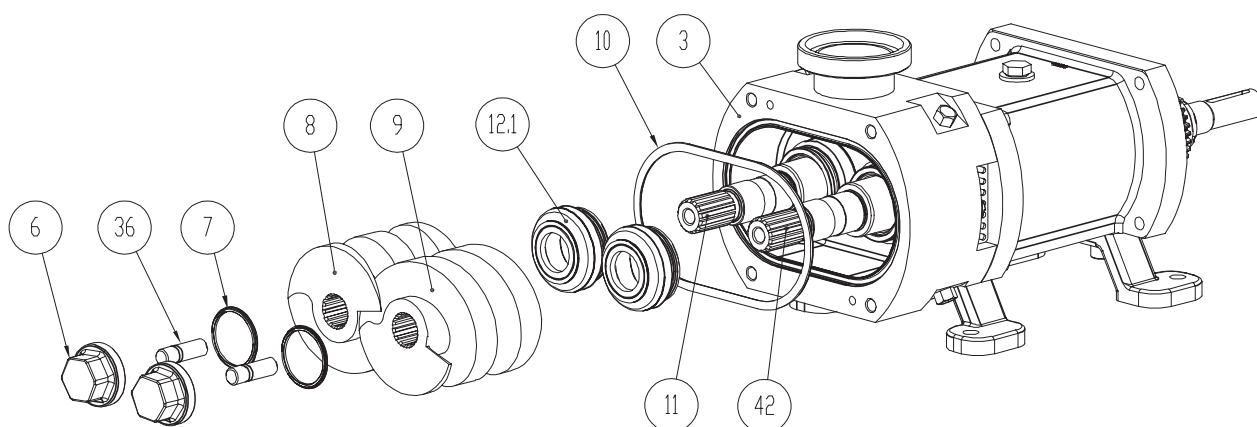
Fit the unit assembled in the previous step on the bearings housing, centring it with the relative pins (21) and tightening the screws with relative washers (18).



6. INSERTION OF THE ROTORS:

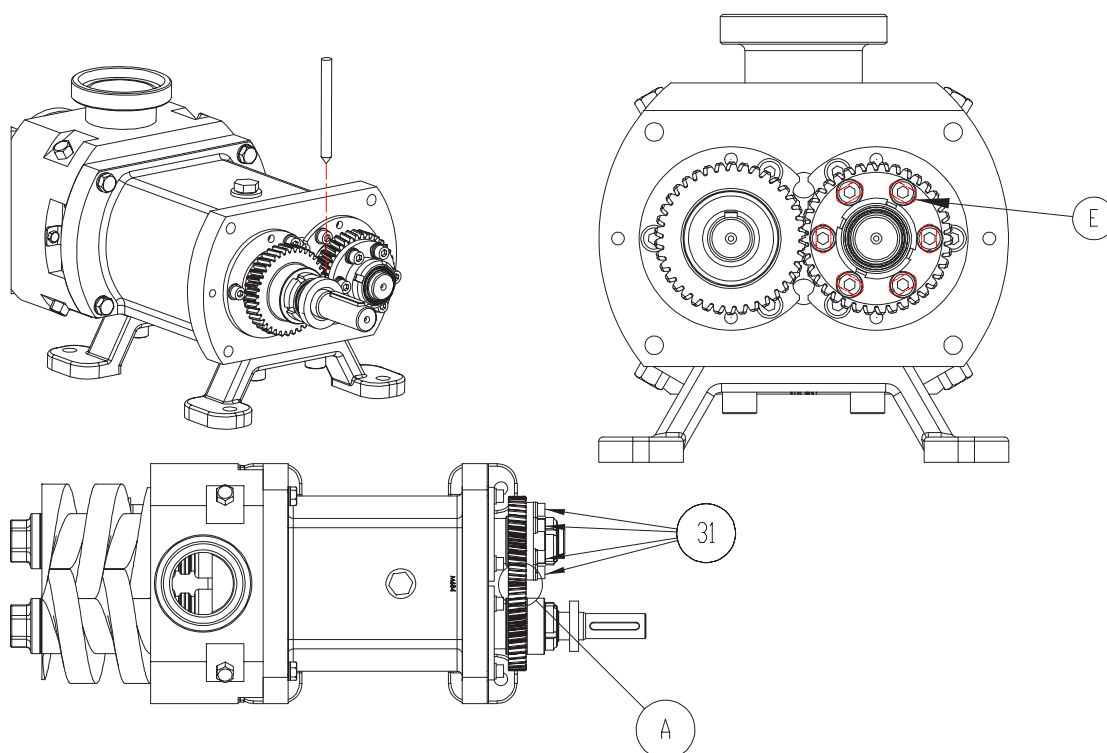
Fit the gasket (10) in its seat on the pump casing (3) and insert the internal rotary parts of the mechanical seal (12.1) on the drive and driven shafts (42), (11), pushing them all the way home. Install both rotors (8)(9) simultaneously on their respective shafts, coupling them using the grooved profile at the end of the shafts.

Fit the gaskets (7) and studs (36) to the locking nuts of the rotors (6) and screw the unit assembled in the previous step to the drive and driven shafts by tightening the 2 lock nuts (6).



7. SYNCHRONIZATION OF THE ROTORS:

Place a soft wedge between the gear wheels to block the gear (A), turn the shafts so that the 6 synchronization screws (31) are positioned at the centre of the 6 slots (E).



Tighten the 6 synchronization screws (31) with the tightening torque indicated in the following table:

TIGHTENING TORQUES TABLE	Size	TS 65 - TS 70		TS 80 - TS 90		TS 100	
		Screw	Torque [Nm]	Screw	Torque [Nm]	Screw	Torque [Nm]
	Suction chamber - Rotor chamber	M10	44	M12	80	M16	110
	Rotor chamber - Pump casing	M10	44	M12	80	M16	110
	Blocking of the rotors	M12 (WAF 30)	80	M12 (WAF 30)	80	M16 (WAF 32)	80
	Pump casing - Bearings housing	M8	20	M10	44	M16	110
	Bearings housing - Gear guard	M8	20	M10	44	M16	110
	Synchronization screws	M6	15	M8	20	M10	50
	Bearing covers	M6	15	M8	20	M10	50
	Mechanical seal screws	M6	15	M6	15	M8	20

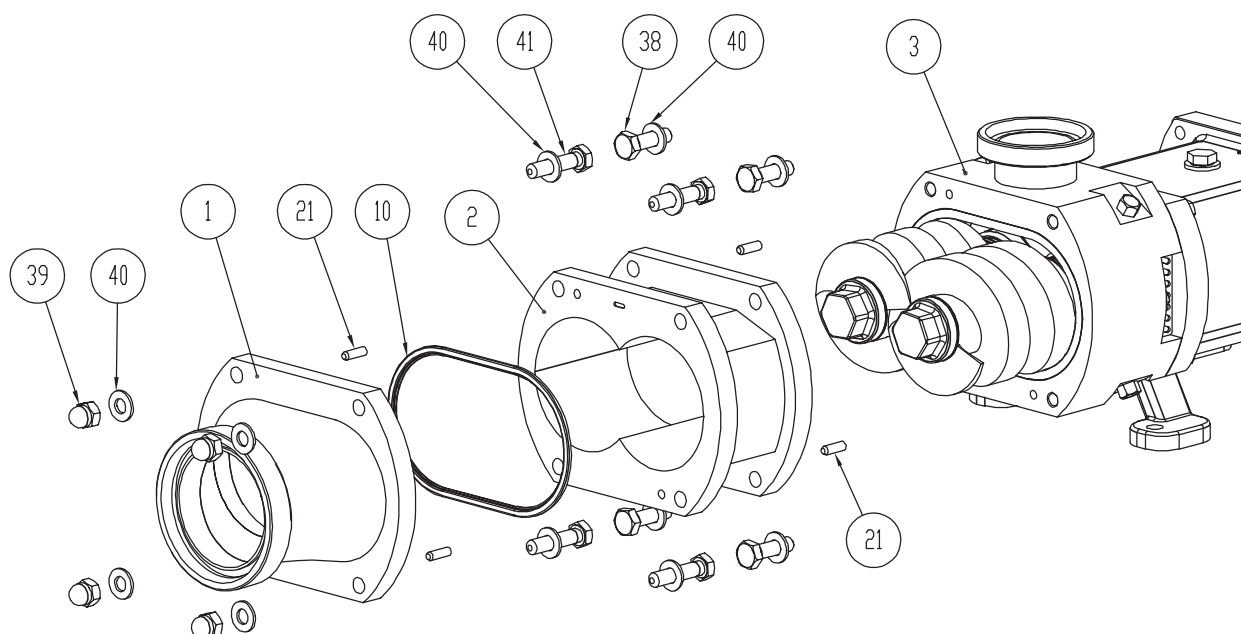
8. ASSEMBLY OF THE ROTOR CHAMBER AND SUCTION PORT:



During the following steps, the pump could lose its balance and fall forward: hold it in place!

Insert the 2 centring pins (21) and check the clearance between the sides of the rotors. Centre using the pins and secure the rotor chamber (2) to the pump casing (3) by tightening the 4 fixing screws (38) and washers (40).

Insert the 2 centring pins (21) and the gasket (10) in the seat on the suction port (1); centre using the pins and secure the port to the rotor chamber (2) by tightening the 4 fixing nuts (39) on the screws (41) and relative washers (40).



Check that the clearances between the rotors and the chamber meet the values provided in the table below:

Configuration	Top clearance	Side clearance	Bottom clearance
TS 65/70/80/90/100 B...	0.3 mm	0.2 mm	0.1 mm
TS 65/70/80/90/100 C...	0.3 mm	0.2 mm	0.1 mm

9. PUMP CLOSURE:

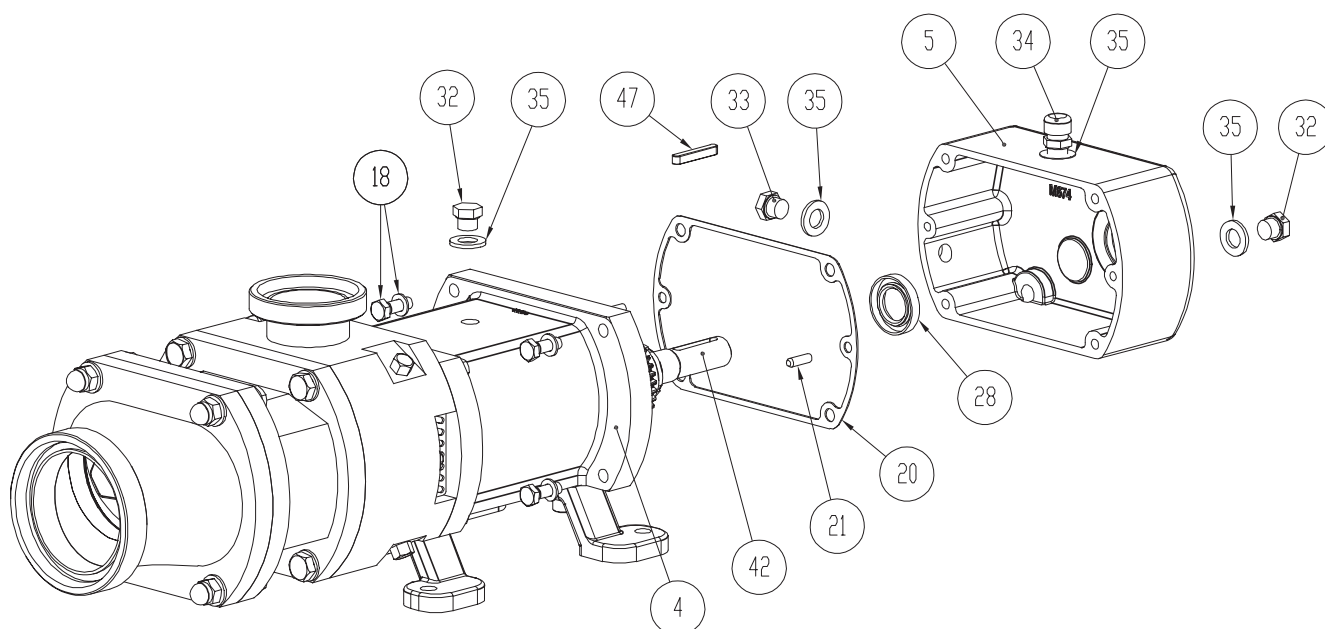


During the following steps, the pump could lose its balance and fall forward: hold it in place! Push the lip seal (28) onto the driven shaft (42), pushing it up against the gear wheel and the centring pins (21) in the seat on the rear box (5). Fit the gasket (20) and the rear box (5) on the bearings housing (4), securing them in place with the 4 screws and relative washers (18). Insert the oil drain plug (32) and the oil level screw (33) with relative aluminium gaskets (35).

Close the vent hole on the top of the box (5) using the plug (34) with seal (35) and the cap (32) with gasket (35) on the top of the bearings housing (4).



Pump assembly is completed by pouring in the lubricant oil (for further information see Chapter 17.0 - Lubrication, on page 42).



13.2 - ASSEMBLY OF PUMP WITH DOUBLE FLUSHED MECHANICAL SEAL

After accurately checking the condition of the shafts and bearings, proceed with assembly as described below.

1. ASSEMBLY AND INSERTION OF SHAFTS, FEET ASSEMBLY, FITTING OF GEAR AND BEARING COVERS:

Perform steps 1, 2, 3 and 4 as described in the previous heading 13.1.

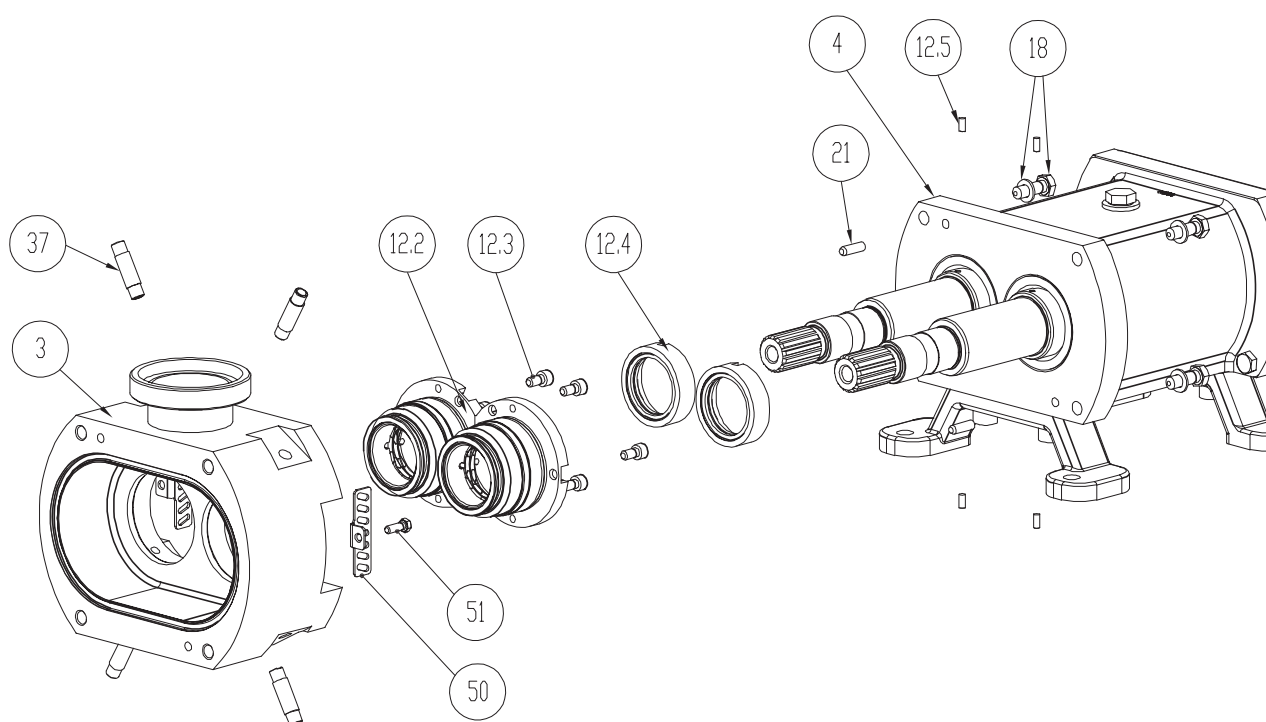
2. ASSEMBLY OF THE MECHANICAL SEALS AND PUMP CASING:

Insert the fixing grub screws (12.5) of the mechanical seal on the drive shaft (42) and driven shaft (11).

Insert the external rotating parts of the mechanical seals (12.4), bringing them to the end of their stroke on the shafts and fixing them tangentially to the grub screws inserted in the previous point;

Insert the fixed parts of the seals (12.2) in the rear part of the pump casing (3), securing them in place with the 6 screws (12.3).

Fit the unit assembled in the previous step on the bearings housing (4), centring it with the relative pins (21) and tightening the screws with relative washers (18).



3. ROTOR INSERTION AND SYNCHRONIZATION, SUCTION CHAMBER AND PORT ASSEMBLY, PUMP CLOSURE:

Perform steps 6, 7, 8 and 9 as described in the previous heading 13.1.

For further technical details on the assembly and disassembly of the several components of the pump, please contact the C.S.F. customer care service.

14.0 - SPARE PARTS

14.1 - MAIN PARTS SUBJECT TO REPLACEMENT

Detail	Pump size		
	TS 65 - TS 70	TS 80 - TS 90	TS 100
Mechanical seals	BCU/BFU	BCU/BFU-056	BCU/BFU-080
Rotor chamber gaskets	LIP-HFI-136	LIP-HFI-185	LIP-HFI-259
Nut gaskets	LIP-HFO-044	LIP-HFO-052	LIP-HFO-067
Front seal rings	AS 45x62x8	AS 65x85x10	AS 85x110x12
Rear seal ring (*)	AS 22x40x7	AS 35x55x10	AS 50x65x8

(*) ONLY for standard version - not present in TSM version

14.2 - RECOMMENDED SUPPLY

RECOMMENDED SPARE PARTS FOR TWO YEARS OF OPERATION ACCORDING TO THE NUMBER OF PUMPS INSTALLED - VDMA STANDARDS					
Denomination	QUANTITY OF PUMPS (including reserve ones)				
	1	2	3	4	5
Mechanical seal	2	4	6	8	8
Casing and suction chamber gasket	4	6	10	12	14
Locking nut gasket	4	6	10	12	14
Radial seal rings	2	4	6	8	8

C.S.F. Inox declines all responsibility for damage or injury resulting from the use of non-original spare parts.

15.0 - MACHINE MAINTENANCE

The following paragraphs contain the indications regarding the routine maintenance operations of the twin-screw pumps. For any further information, please contact C.S.F. via the contact details in the end of this manual.

15.1 - SAFETY DURING MAINTENANCE OPERATIONS

When carrying out maintenance and/or repair work, always observe the following instructions:

- Before carrying out any type of maintenance or repair work, always isolate the machine from all power supplies (see chapter 9.0 on installation).
- Before starting work, put up a "MACHINE UNDER MAINTENANCE" sign where it is clearly visible.
- Perform specified adjustment, maintenance and inspection work on time.
- Inform operating personnel before starting the maintenance and repair work.
- Protect all plant parts and operating media connected before and after the machine such as compressed air and hydraulics and similar against unintentional start-up
- Do not use solvents or flammable products for cleaning.
- Take maximum care not to disperse lubricating oils or grease into the environment.
- Fasten and secure larger assemblies on replacement carefully to lifting gear. Check loosened screw connections for firm seating. Use only original spare parts.



Maintenance/repair work must be carried out **ONLY AND EXCLUSIVELY** by qualified, trained personnel.



Repairing or cleaning moving parts is strictly forbidden.

When carrying out maintenance or repair work, it is advisable to abide by the following:



- When handling the products, wear protective gloves against mechanical and chemical risks, overalls (trousers must always be worn outside safety shoes) and safety glasses.

- Check the product safety data sheets and the manuals for the machine/component on which you are working to see if there are any special PPE requirements.
- At the end of maintenance operations, always restore any safety devices/guards that may have been removed/opened and check that the machine can resume normal operating conditions.
- In the event of an anomaly, find the cause and resolve it before putting the machine back into operation (see previous chapter).

PRECAUTIONS FOR TROLLEYS WITH AN ELECTRICAL PANEL

Before carrying out any work, disconnect the electrical power supply by acting on the main power switch on the electrical panel and padlocking it in the OFF position.

Alternatively, pull the plug out and adopt a Lockout Tagout procedure.

Furthermore, put up "MACHINE UNDERGOING MAINTENANCE" signs on different sides of the machine where they are clearly visible.

15.2 - PUMP MONITORING



Injury hazard due to contact with moving parts:

Do not touch the pump during operation.



Do not operate on the pump during operation.



If needed, let the pump cool down before operating on it.



Injury and poisoning hazard due to hazardous fluids:

Wear the personal protective equipment.

To ensure the proper operation of the pump, please check the following features regularly:

- Bearings temperature
- Maintenance of regular operating conditions
- Coupling alignment and status of the connection of the elastic components providing the connection between the pump and motor
- Auxiliary systems conditions
- Status of the seals and conditions of the flushing system
- Lubricant oil level

It is also necessary to ensure, the compliance with the following requirements, in order to guarantee the correct operation of the machine:

- Avoid dry running
- Avoid cavitation
- Open suction valves
- Open outlet valves
- The filters in the system must be free and clean
- The supply pressure must be enough to ensure the correct operating of the system
- No vibrations or unusual noises while the pump is operating
- No leaks on the seals and gaskets
- Clean the outer surfaces of the pump regularly.

15.3 - WEAR PARTS

The following components have a limited duration and, therefore, are excluded from the warranty:

- Mechanical seals
- Gaskets
- Radial seal rings

Namely, the listed components must be replaced in the following cases:

- If deformed in terms of shape or surface
- After 500 CIP
- After 6000 hours
- After 2 years



In the case of EPDM seals, do not allow these elements to come into contact with lubricant fluids.

15.4 - BEARINGS MAINTENANCE

Operations on the bearings of TS pumps can ONLY be performed by authorized CSF Inox personnel, therefore please communicate the need for maintenance operations.

15.5 - MAINTENANCE FOR TROLLEY-MOUNTED PUMP WITH ELECTRICAL PANEL

General maintenance operations required by the trolley-mounted machine with electrical panel are indicated below:

Every day (or every use):

- Check correct operation of the control devices.
- Check the wheels turn smoothly.

Every week:

- Check the condition of the electrical cables.
- Check the condition of the wheels.
- Check correct operation of the parking brake.

Every month:

- Check the structure for dents and inspect the welds.
- Check the overall condition of the machine



If ever the equipment does not appear suitable for correct and safe operation, TAKE IT OUT OF SERVICE until damaged parts have been repaired or replaced.

15.6 - REPAIRS

If repairs are needed, please fill in the "Decontamination Declaration" form provided as an appendix to this manual (page 55) and send it together with the pump to the address indicated on the form. Contact C.S.F. for further information.

15.7 - MAINTENANCE TABLE

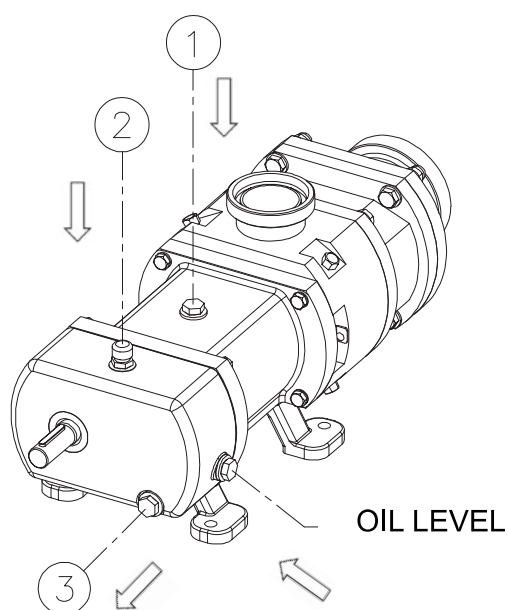
Component	Staff	Operations	Intervention timetable
Flushing/quenching and seal system	Qualified technician	Check the correct operation of the flushing/quenching system	Hourly during start-up, then weekly
		Replace the quenching fluid	Every 3 months
		Leaks checking	Weekly
Coupling with the drive	Qualified technician	Check the alignment and the coupling status	Weekly
Rear gear casing	Qualified technician	Check the oil level; Top up as required	Weekly
		Replace the oil	After the first 250 hours, then at least every 3 months
			Continuous service: every 8000 hours
			Intermittent service: every 2000/6 months
Radial seal rings	Qualified technician	Leaks checking	Weekly

15.8 - LUBRICATION

The images indicate:

- Points **1** and **2**, where to pour the lubricant
- The oil draining plug **3**
- The level indicator of the lubricant inside the pump, located at the side of the gear casing (OIL LEVEL). The pump must be filled up to half of the level indicator plug.

For handling fluids with a temperature over 90°C and/or with a rotation speed which constantly exceeds 2000 rpm, the use of an FDA lubricant with viscosity ISO VS 150 is recommended.



Filling volumes:

TS 65 - TS 70	approx. 0.40 litre
TS 80 - TS 90	approx. 0.60 litre
TS 100	approx. 1.40 litre

C.S.F. Inox recommends KLÜBEROIL H1 oil for the first filling or oil with ISO 100 viscosity grade and temperature field between -10°C and 60°C.

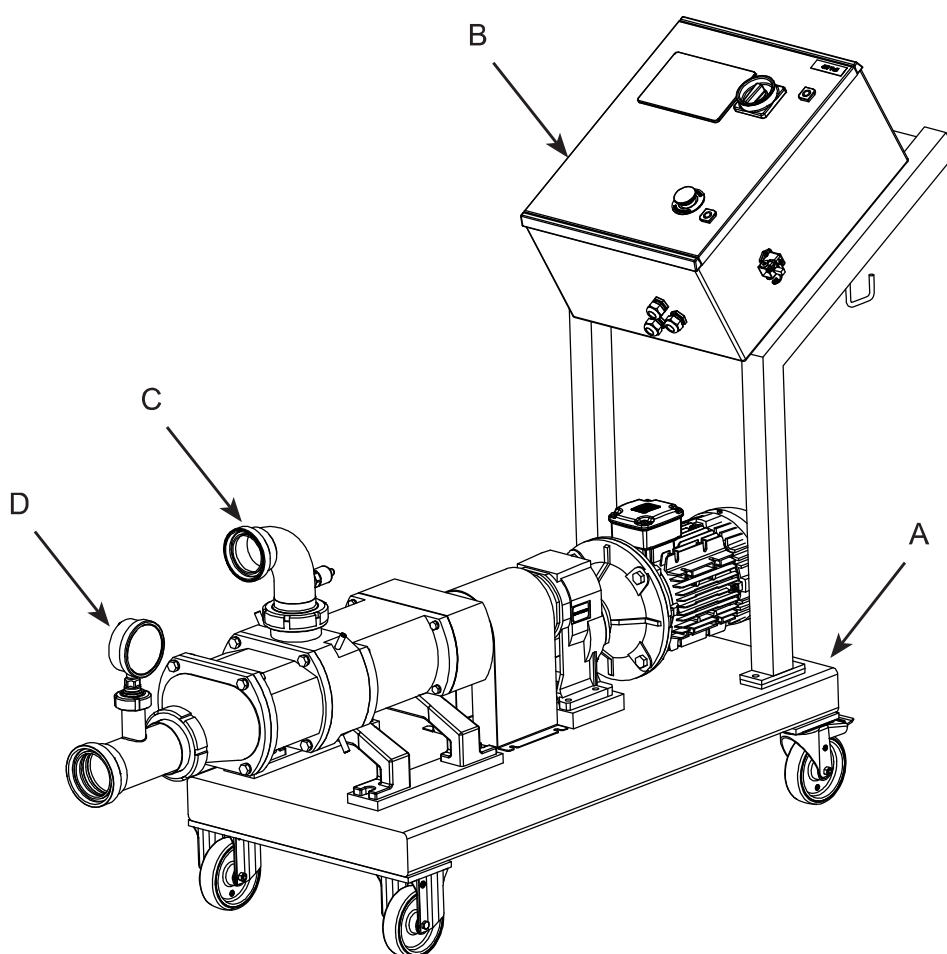
Disposal:

Send spent oils and/or greases to companies specialized in their treatment (see heading 18.0 on page 56).

16.0 - ACCESSORIES

TS twin-screw pumps may have the following accessories that allow them to be moved and controlled:

- A) Manually pushed trolley
- B) Electrical panel
- C) Flow switch
- D) Pressure switch



For information on the use of these accessories, see the following headings.



To identify the type of accessory and obtain further information, consult this manual. Any accessories not listed in this manual are described in specific sheets provided as an appendix to this documentation.



Any modifications made to the accessories installed that differ from the instructions given in the pump manual will result in the warranty becoming null and void.

16.1 - MANUALLY PUSHED TROLLEY

Trolley-mounted pumps are machines made up of a pump that performs the required process and a manually pushed trolley which supports the pump and allows it to be moved easily.

This chapter refers to different pump sizes and different trolleys. To identify the specific components, see the documentation provided.

1. WEIGHTS AND DIMENSIONS



For the main dimensional characteristics and weight and for further details regarding the pump installed on the trolley, see the documentation in the appendices (data sheet).

2. FURTHER WARNINGS FOR THE INSTALLATION, CONNECTION AND START-UP OF TROLLEY-MOUNTED PUMPS

The equipment must be lifted as per the procedures described in chapter 4.0.

- The operator can manually push the machine to move it over short distances. It must NOT be towed or pushed using any other means.
- The machine must be installed in observance of the minimum clearances required for safe use and comfortable manoeuvring of personnel and handling equipment.
- It must be moved over flat and sound surfaces. It must not be moved on ramps or slopes.
- Once the trolley-mounted pump has been positioned, the wheels must be locked using the relative brake:



For further information, see the instructions provided in this manual.

3. MACHINE OPERATORS

The trolley-mounted pump is designed to be controlled autonomously by the appointed operator. The machine must be used by just one Operator who, after setting the working parameters, need only periodically monitor its correct operation.



The person in charge of operating the machine must know the contents of this manual, its appendices and all information concerning safety.

The Operator must possess (or acquire through adequate training and education) the requirements indicated in heading 2.3 (page 11).

Always observe all the safety instructions indicated in chapter 2.0 (page 8).

4. PRELIMINARY OPERATIONS



When operating the machine, use only the materials and products specified by the Manufacturer.

Before starting the work cycle, if an electrical panel is mounted on the trolley, check that the emergency stop button works properly.

Machine operators must be equipped with the necessary Personal Protective Equipment as specified in heading 2.2 on page 10.

Before each use, carry out the following preliminary checks and if any anomalies are found contact the Maintenance Manager immediately and take the machine out of service. Furthermore:

- Check there is adequate space to work in.
- Check routes are free from clutter and unauthorized personnel.
- Check the condition of the machine/structure/wheels.
- Check operation of all control devices.
- Check the power line connection.
- Check that the suction and delivery piping have been connected correctly.

5. USE

On reaching the trolley-mounted pump, perform the aforementioned checks, release the brakes on the wheels, push the equipment to the desired location and relock the wheels with the brakes. Proceed according to the purpose of pump use and based on the additional accessories installed.



The Operator must always carry out periodic checks on the trolley-mounted pump as prescribed in this manual.

16.2 - ELECTRICAL PANEL

The electrical panel used with the TS twin-screw pump allows the pump (and any accessories connected to it) to be controlled in remote mode.



This heading refers to several types of electrical panel; it is mandatory to refer to the specific manual of the electrical panel supplied in order to proceed with its set-up and use.



This paragraph does not replace the manual accompanying the specific electrical panel.

The electrical panel can be installed on a manually pushed trolley and connected to the pump. This results in a trolley-mounted pump with electrical panel. To identify the weight and maximum dimensions, see the data sheet and the dimensional drawing provided as an appendix to the instructions.

1. FURTHER WARNINGS FOR THE INSTALLATION, CONNECTION AND START-UP OF TROLLEY-MOUNTED PUMPS WITH ELECTRICAL PANEL

The equipment must be lifted as per the procedures described in chapter 4.0.

- When transporting the machine, parts must be protected against possible impact and strain (pay particular attention to electrical components).
- Secure cables and adequately protect connectors.

2. A - MAINS POWER SUPPLY



The electrical panel must be electrically connected to the machine by a qualified technician in accordance with the diagrams and instructions provided in the manual accompanying the electrical panel.



The equipment must be connected to an electrical power supply with characteristics that match those shown on the pump's data plate using the relative plug.

Before connecting the machine to the mains, check that the equipment delivered has suitable electrical power characteristics as required for the country of use.

3. PRELIMINARY OPERATIONS

Before turning on the panel, a series of checks and controls must be carried out to prevent any errors or accidents during the start-up phase.

- Check that the panel has not been damaged during transport, installation and handling operations.
- Carefully check control panels and electrical cables for any damage.
- Check that the emergency stop device works effectively.
- Check that all external energy sources are connected correctly.
- Check that the electrical panels have been correctly connected to the rest of the equipment.
- Check that all fixed guards are securely attached to the electrical control panel
- Check that processing adjustment controls are working properly.

- Power up the electrical panel by connecting it to the power line and acting on the main power switch.



If ever the equipment does not appear suitable for correct and safe operation, **TAKE IT OUT OF SERVICE** until damaged parts have been repaired or replaced.

4. CORRECT USE



Consult the use and maintenance manual of the electrical panel supplied.

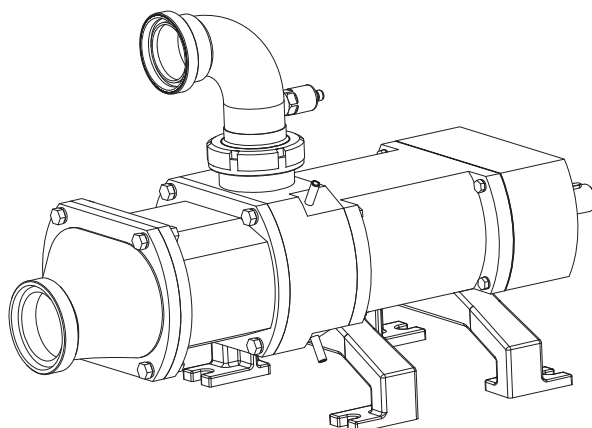
16.3 - FLOW SWITCH

The flow switch is used to check the presence of a fluid in the circuit. It transmits an ON-OFF signal to an electrical panel, intervening in the absence of the fluid.

In twin-screw pumps, it is installed on the inlet with the function of stopping the pump when there is no product.

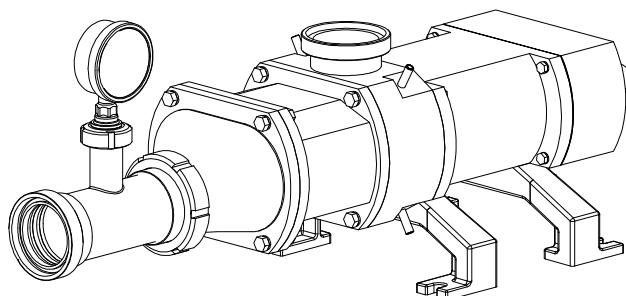


To use the flow switch via the electrical panel, see the Use and Maintenance Manual accompanying the panel and provided as an appendix to the instructions.



16.4 - PRESSURE SWITCH

The pressure switch, installed on the pump delivery port, is used as a safety device to stop the pump in the event of overpressure in the system, preventing any damage to it. It is necessary to set a maximum pressure and a minimum pressure on the device. If the maximum pressure is reached on the pump delivery port, the pressure switch sends a digital signal to the electrical panel that stops the pump. Once the pressure drops and falls below the set minimum pressure, the pump restarts. If the minimum pressure and maximum pressure values are set close to each other (with a DP between the two values not exceeding 0.5 bar), a “modulating” function is obtained, i.e. the pressure switch is able to maintain the pump delivery pressure almost at a constant value.



17.0 - CLEANING PROCEDURE

 The user shall choose the most suitable washing cycle and fluids to meet his needs. C.S.F. Inox declines all responsibility concerning the use of unsuitable and/or harmful fluids.



During cleaning process, the surfaces of the pump can reach high temperatures. Pay attention!

- 1) Prerinse with cold water (15-25°C) for 10-15 minutes to remove any residue.
- 2) Warm prerinse with water at 45-60°C for 10 minutes.
- 3) Rinse with alkaline solution at 70-95°C for 20-30 minutes.
- 4) Intermediate rinse with water (warm or cold) up to 60°C for 5-10 minutes.
- 5) Rinse with acid solution like nitric acid for 10 – 15 minutes at ambient temperature.
- 6) Final rinse with cold water for 10-15 minutes or until any traces of cleaning agent have been removed.



During the CIP process there are thermal expansion: take care that there are not rapid temperature variations.

Control the concentrations and temperature of chemical agents during the CIP.



Chemical agents at high temperature can cause potential health risk; respect the safety regulation and use protection devices.



Store the cleaning agents in compliance with the safety regulations.



During sterilization process, the surfaces of the pump can reach high temperatures. Pay attention!

If requested, a sterilization can be carried out by means of hot water or steam; the pump must be stopped during the sterilization process with steam.

See the admissible temperature for sterilization depending on gasket compound.

Any sterilization process must be approved beforehand by C.S.F. .

WASHING WHEN THE TROLLEY HAS AN ELECTRICAL PANEL:



THE ELECTRICAL PANEL HAS AN IP 55 PROTECTION RATING. DO NOT WASH WITH JETS OF WATER AS DOING SO COULD DAMAGE THE INTERNAL ELECTRICAL COMPONENTS.

17.1 - CLEANING FLUIDS



The fluids and procedures reported in this paragraph may cause SEVERE damage to persons or objects.



Please bear in mind that the manager of the production process is responsible for the suitable washing procedure.



The cleaning of stainless steel pumps depends on the process liquid.

C.S.F. Inox recommends a fluid velocity between 1,5-3 m/s, with rinsing water and chemical agent like alkaline detergent and acid.

Chemicals like hypochlorite and chlorine must be avoided because stainless steel could be damaged by corrosion.

Alkaline detergents:

A sodium hydroxide/water solution may be used at a concentration of 1-3% and at a temperature of 70-90°C; a surfactant may be added to reduce the amount of foam created.

Acid solution:

It is used to neutralize alkaline residual and for the passivation of the stainless steel surface; a

solution of nitric acid at 1-2,5% could be used at ambient temperature up to 45°C.

Other acid solution could be: citric acid and water (0,5-3% at 70°C) and phosphoric acid at 0,5% with a temperature up to 45°C (with inhibitor of corrosion).

FLUID TEMPERATURE

Fluid temperature variations may irreversibly damage the components of the pump. This may happen in case of two products at different temperature, as when washing the system, when the pump stops processing the process fluid and passes to the detergents, which can be at a considerably higher temperature.

In a situation of this kind, it is a good idea to stop the pump and observe the wait times before starting it up again (see table below).

Temperature difference [°C]	Waiting time [s]
20	100
60	200
80	300

17.2 - CIP / SIP

The twin-screw pump can perform Cleaning/Sterilizing in Place launch.

If one wishes to use the pump for processing and for washing and sterilization purposes, it is necessary to notify CSF during the selection phase, in order to receive a machine suitable for the performance requested and for the processed fluids.

Below are the procedures to follow in order to protect the pump from temperature variations when starting the cleaning cycles.

17.3 - DOUBLE FLUSHED SEAL

If the pump is equipped with a double flushed mechanical seal, ensure that the flushing system is in operation and that the pump is stopped, then start the cleaning fluid on the system.

Based on the temperature difference between the processing fluid and the CIP, refer to the table in paragraph 17.1 for the waiting times that must be observed before starting the pump for the washing cycle.

17.4 - INTERNAL SINGLE SEAL

If the pump is equipped with single seal, start the cleaning fluid in the system.

Based on the temperature difference between the processing fluid and the CIP, refer to the table in paragraph 18.1 (on page 64) for the waiting times that must be complied with before starting the pump for the washing cycle.

DECLARATION OF DECONTAMINATION

In observance of the legal provisions in force and to protect the health and safety of our personnel, you must fill in, sign and return this declaration to us before we can process your order. Please make sure that the same declaration is attached to the outside of the packaging.

Shipping address: C.S.F INOX S.p.a. Strada per Bibbiano, 7 42027 Montecchio E. (RE), Italy	For information contact:
---	---------------------------------

*Mandatory fields

* Pump: _____ *Serial Number: _____

Commissioning date: _____

* Field of application: _____
 Fluid handled: _____

Process data: Temperature: _____ [°C] Pressure: _____ [bar]
 Flow rate: _____ [m³/h] Viscosity: _____ [mm²/s]

* Product and warnings:

	Product/ concentration	Flammable	Toxic	Corrosive	Hazardous/ irritant	Other**	Harmless
Processing product		☐	☐	☐	☐	☐	☐
Cleaning product		☐	☐	☐	☐	☐	☐
Parts cleaned by		☐	☐	☐	☐	☐	☐

** Explosive; oxidant; harmful for the environment; biological risk; radioactive.

Please mark the appropriate warning, include the material safety data sheet and, if necessary, any further specific warnings.

* Reason for returning item/s:

* ☐ Particular safety precautions for further handling are not required

* ☐ The following precautions are required in the case of cleaning liquids, fluid residues and disposal:

Company details:

Company: _____ Phone no.: _____

Contact: _____ Fax: _____

Address: _____ Email: _____

Your order number: _____

' We hereby certify that this form has been filled in to the best of our knowledge and in accordance with the legal provisions in force. Furthermore, we certify that the parts have been carefully cleaned and to the best of our knowledge are free from residues in quantities which could be deemed harmful. '

Place, date

Name, department

Signature

.....

18.0 - WASTE DISPOSAL AND DECOMMISSIONING



The pump, complete with electrical drive system, is a plant component which must be disposed of in accordance with regulations governing the disposal of waste derived from professional electrical and electronic equipment.

Neither the pump nor any of its parts may be disposed of with household waste.

18.1 - PACKAGING MATERIALS

The packaging material consists of wooden or cardboard boxes, polyethylene shrink-wrap covers and polyurethane foam, galvanized steel screws, polyester belts.

Wooden or cardboard boxes and screws can be recycled or sent to authorized waste disposal facilities.

The remaining packaging materials must be sent to authorized waste disposal facilities.

18.2 - WASTE RESULTING FROM MAINTENANCE OPERATIONS

All materials replaced during maintenance operations must be disposed of in compliance with current regulations and sent to an authorized waste disposal facility.

Consult the pump's bill of materials, supplied with this manual, to identify the materials used to make the replacing components.

All replaced metal parts must be sent to metal recycling centres; plastic or elastomeric parts and spent lubricants must be disposed of at authorized waste disposal facilities.

18.3 - DISPOSAL OF THE PUMP

For disposing the pump please observe the following instructions:

- Disconnect electrical and hydraulic connections according to technical rules and laws in force.
- Disassemble all components of the pump for separate disposal; wash the components and thoroughly clean the structure.

The main components of the pump are made from the following materials:

- Body, casing, rotor, impeller nut: AISI 316L stainless steel; shaft: Duplex, type 1.4462
- Elastomers: NBR-EPDM-FKM-FFKM
- Support and external parts: AISI 304.
- Other components: mechanical seals in composite materials, stainless steel and elastomers, ball/roller bearings.
- Motor: Aluminium - Cast Iron - Copper (consult the manual supplied by the manufacturer).
- Drive/Gearbox: Cast iron, steel, aluminium (if installed, consult the manual supplied by the manufacturer).
- Spent oils and greases.

The main components of the trolley are made from the following materials:

- Aisi 304, Polyamide, Polyurethane, Aluminium.

The main components of the electrical panel are made from the following materials:

- Electrical material.

For further details, consult the pump's bill of materials, supplied with this manual, to identify the materials used to make the various components.

There are no components containing asbestos, cadmium or lead, PBB or PBDE.



Pump components must be disposed of correctly by the user in compliance with the relative legislation in the country of disposal.



DECLARATION OF CONFORMITY

The company: **C.S.F. Inox S.p.A.**
based in: **Strada per Bibbiano, 7**
Montecchio Emilia (R.E.)
ITALIA

hereby declares, under its sole responsibility that the pump:

Type XXX

Serial no. XXX Year XXX

CE Declaration of Conformity (Ann. II.A, 2006/42/EC)

to which this declaration refers, is in conformity with safety requirements according to Directive 2006/42/EC.

Name and address of the person authorized to compile the technical file:

C.S.F. Inox S.p.A. Strada per Bibbiano 7 - 42027
Montecchio Emilia (RE) ITALY

Applied Regulations:

EN 12100 2010

EN 809 2009

Food products-contact suitability declaration

is made with materials suitable to come in contact with food according to the regulation (EC) no. 1935/2004.

Montecchio Emilia, XX-XX-XX

The Chairman Mr. Rolando
Paterlini



DISCOVER THE WIDTH OF OUR RANGE!

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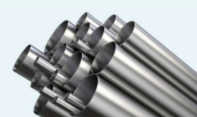
PUMPS



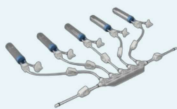
HOSES



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