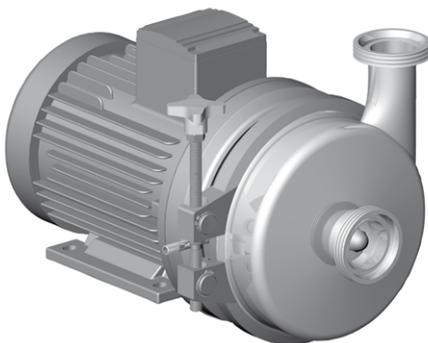


**TECHNICAL SERVICE**  
**01903 730900**

## **CENTRIFUGAL PUMPS**

### **CL - CLC Series**



**INSTRUCTIONS FOR INSTALLATION,  
OPERATION AND MAINTENANCE**

## INDEX

- FOREWORD**
- 1 SYMBOLS**
- 2 SAFETY WARNINGS**
- 3 GUARANTEE**
- 4 GOODS TRANSPORTATION, RECEIVING AND TRANSFERRING**
  - 4.1 Transportation
  - 4.2 Receiving
  - 4.3 Transferring
- 5 DESCRIPTION**
- 6 SETUPS**
- 7 SOUND PRESSURE LEVEL**
- 8 INSTALLATION**
  - 8.1 Suction and inflow conditions
  - 8.2 Piping
  - 8.3 Electrical connection
- 9 NON-PERMITTED USES**
- 10 OPERATION**
  - 10.1 Preliminary operations
  - 10.2 Starting
  - 10.3 Operating checks
- 11 WORKING IRREGULARITIES**
- 12 EXTENDED STOP**
  - 12.1 Cleaning the pump
  - 12.2 Disposal of the pump
- 13 SPARE PARTS**
  - 13.1 Reference table of main parts subject to replacement
  - 13.2 Recommended supply
- 14 SEALS**
- 15 MAINTENANCE**
  - 15.1 Disassembly of CL-CLC pump "T / W" exec.
  - 15.2 Assembly of "T / W" exec.
  - 15.3 Disassembly of CL-CLC pump "U" exec.
  - 15.4 Assembly of "U" exec.
- 16 CLEANING PROCEDURE**

## FOREWORD

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

Plate example

Item.

Mod. CL 51-2-7,5/B.PT31 (\*)

N° 12345 (\*\*)      Giri 2900

kW 10      Volt 380-660      Hz 50

## 1 SYMBOLS

<b>WARNING</b>	<i>Pay great attention to the text parts indicated by this symbol.</i>
	<b>Danger:</b> <i>the non-observance of instructions can cause serious damages to persons and/or objects.</i>
	<b>Danger:</b> <i>only skilled personnel is allowed to carry out operations concerning the electric parts.</i>

## 2 SAFETY WARNINGS

When the pump is working the following occurs:

- Electric parts are in tension.
- Mechanical parts are moving.
- Pump body, pipelines and articulations are under internal pressure. Therefore do not remove any protection or locking, do not loosen screws or clampings, as this can cause serious damages to persons or objects. The clamp joining the pump casing and the cover must be well tightened and it should not be easily unscrewed by hand.
- Non-observance of inspection and maintenance can cause damages to persons and objects, especially when dangerous or toxic liquids are pumped.
- When pumping liquids at a temperature over 60°C, adequate protection and warning signals are required.

- When you buy a pump with bare shaft, motor coupling operations have to be carried out according to technical directions and law, providing adequate protections for joints, gear belts, etc.

- Operations on the electric parts have to be carried out by skilled personnel, according to technical directions and law, on authorization of the responsible installer.

- Installation must ensure an adequate ventilation, in order to cool the engine, as well as enough space for maintenance operations.

Before carrying out any operation which requires to disassemble the pump (inspection, cleaning, seal replacement, etc.), the following preliminary operations have to be carried out:

- switch off engine tension and disinsert electric connection;
- close valves on suction and outlet pipelines, in order to avoid the risk of inundation;
- use adequate protections for hands and face, if the pump contains liquids which are injurious to health (for example acids, solvents, etc.);
- consider if the liquid which flows out of the pump when disassembling is dangerous and arrange for adequate safety measures.

### 3 GUARANTEE

All products manufactured by C.S.F. Inox 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. Excluded from the guarantee other than distinctive wear and tear are repairs to damage caused by improper use, abrasion, corrosion, negligence, defect of installation, non-observance of inspection and maintenance, use of non-genuine spare parts, cause of accident or fortuity and from any action carried out by the purchaser not according to the normal instructions of the manufacturer.

**WARNING** 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.

Any item must be properly packed in order to avoid damages during the transferring and **a technical report explaining the fault occurred, must accompany the returned item/s.**

Any item with a presumed fault should be returned to C.S.F. Inox S.p.A. with shipment costs at purchaser's charge, unless different agreements are given.

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

### 4 GOODS TRANSPORTATION, RECEIVING AND TRANSFERRING

#### 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 RECEIVING

**WARNING** By goods receiving, the wholeness of packing must be verified, in order to identify possible damages to the content occurred during transferring and to claim them immediately to the carrier. Should any damage be ascertained, the following procedure must be observed:

- collect the goods with reservation;
- take the necessary figures showing the damages;
- notify the suffered damages, by registered airmail, to the carrier by sending at the same time the figures taken to show the damaged pieces.

#### 4.3 TRANSFERRING

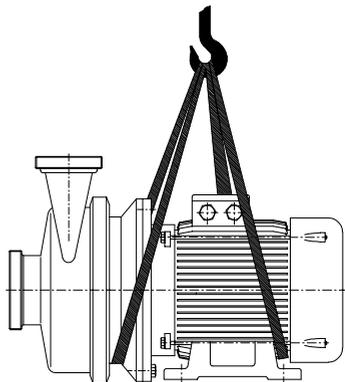


Carry the packed pumps as close as possible to the place of installation by means of appropriate lifting devices and unpack them. During this operation take care, as unsteady parts could fall down.

**The material used for packing (wood, paper, cellophane, etc.) should be properly got rid, according to the corresponding rules in force in receiver's country.**

After unpacking the pump, use special lifting belts and move the pump-motor-set to the place of installation; never use the eyebolts on the motor to move the pump, as the eyebolts are for moving the motor only.

In versions complete with shroud, take the shroud off before moving the pump-motor-set, in order to avoid damages.



## 5 DESCRIPTION

The CL-CLC series comprise single-stage centrifugal pumps with axial suction port. The impeller is keyed directly onto the motor shaft. They are designed and constructed to sanitary standards and are intended for professional use. All models have threaded connections for fittings to DIN 11851 standards (unless otherwise requested) and all models are fitted with mechanical seals. The materials used for the components and the mechanical seal are chosen according to the liquid to be pumped.

They are fitted with three-phase electric motors, IP 55 protection rating, unless otherwise specified.

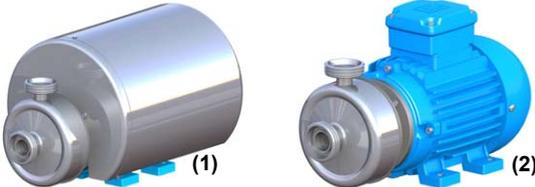
The pumps type CL are with 3 or 6-blade open impeller designed to minimise slapping of the liquid.

The pumps type CLC are with 6-blade closed impeller designed to optimise hydraulic efficiency.

These pumps are designed for applications where the liquid to be pumped :

- is not subject to pollution of any kind,
- is at a temperature between -30°C and +140°C,
- must under no circumstances come into contact with the outside environment,
- is chemically aggressive.

## 6 SETUPS

 <p>(1) (2)</p>	<p>1) CL 22 - exec. with shroud 2) CL 22 - exec. without shroud</p>
	<p>CL-CLC - exec. with shroud with 3 adjustable feet from kW 0.55 to kW 4</p>
	<p>CL-CLC - exec. with shroud with 4 adjustable feet from kW 5.5 to kW 15</p>
	<p>CL-CLC exec. with shroud with fixed feet</p>
	<p>CL-CLC exec. without shroud with fixed feet</p>

## SOUND PRESSURE LEVEL

The sound pressure level of centrifugal pumps is the following (see table):

The measurement has been made by means of a phon-meter placed at 1 m distance from the pump and at a height of 1.6 m from the ground.

Preliminary condition is that the pump is fixed correctly; the above mentioned values do not take into account external noise sources (e.g. valves, abrupt hydraulic deflections).

		Pump type			
Sound pressure level dB(A)	< 80	CL 22 CL 31 CL 41 CL 51	2 & 4 poles 2 & 4 poles 4 poles HP 3 - 4 - 5,5	CLC 41 CLC 51	2 & 4 poles 2 poles HP 2 - 3 - 4 - 5,5
	80÷85	CL 51 CLC 51	2 poles HP 7,5 - 10 2 poles HP 7,5 - 10		
	85÷90	CL 51 CLC 51	2 poles HP 15 - 20 2 poles HP 15		

## 8 INSTALLATION

### 8.1 SUCTION AND INFLOW CONDITIONS

(NPSH = Net Positive Suction Head)

**NPSH of system** (available NPSH)

In order to ensure that pump operation is free from cavitation, it is essential to observe the maximum permitted suction lift **ha geo max** or the minimum allowable head **hc geo min**.

**NPSH of pump** (required NPSH)

The centrifugal pumps can operate correctly only if vapour has not formed inside. For this reason the static head at the reference point for the NPSH is the centre of the impeller, that is the point of intersection of the pump shaft axis with the vertical plane that passes through the external points of the blade inlet corners.

**NPSH** is the value required by the pump, expressed in metres, obtained from the performance curve. In practice 0.5 m should be added to this value as a safety margin.

### 8.2 PIPING

In order to prevent the creation of harmful stresses, the suction and discharge pipes must be connected to the pump ports without the use of force. These pipes must also be supported independently avoiding causing stresses on the pump. The internal diameter must be the same size as the pump connections. It must in any case not be smaller to avoid head loss and/or poor performances.

Always use elbows with large radius. If the pipe diameter changes along the line, use reduction cones, choosing the ones that are most suitable to avoid any formation of air pockets (Fig.1).

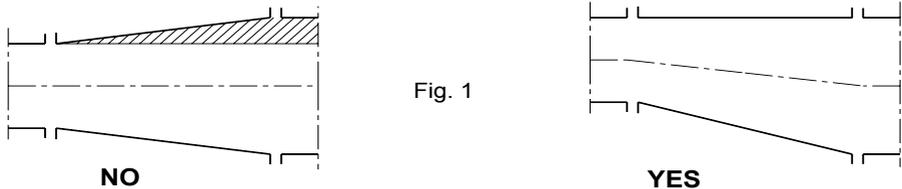


Fig. 1

The suction pipe must be as short as possible and rise as it moves towards the pump if it is sucking from a tank (Fig.2). Always fit a bottom valve with a suction rose. If on the other hand the pump is below the level of the liquid, the pipe should descend slightly (Fig.3). If the pump is used for transporting hot liquids, fit expansion joints to compensate any expansion of the piping. The maximum velocity of the liquid in the suction pipe must not be greater than 3 m/s. Velocities between 1 and 2 m/s are recommended. The suction pipe must be designed in such a way as to prevent air from entering the pump.

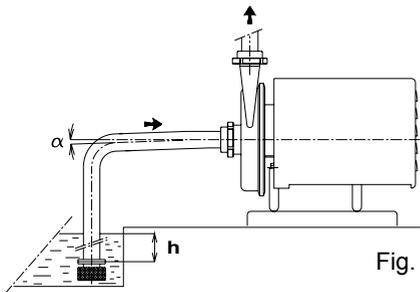


Fig. 2

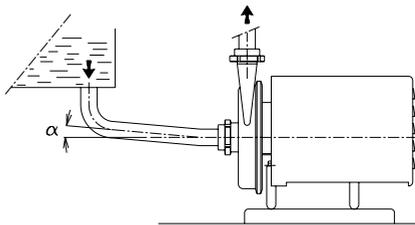


Fig. 3

For this reason, when sucking from a tank located at a lower level, the pipe must reach below the free surface of the liquid. In order to prevent the formation of vortices and avoid the risk of sucking in air, always keep a minimum head at the pipe inlet ( $h_{min}$ ) equal to at least the dynamic head plus a safety margin of 0.1 m (Fig.2).

$$h_{min} = \frac{Va^2}{2g} + 0,1$$

$h_{min} = m$   
 $V = m/s$

In order to prevent the formation of vortices when it is not possible to observe the values of minimum available head, it is possible to fit crosses in the piping. This system is suitable even for tanks with a positive head.

- Avoid creating obstacles which could increase suction losses disrupting smooth fluid flow. Make sure that there are no restrictions, sharp turns or tight elbows on the discharge line, since these increase disturbance.

### 8.3 ELECTRICAL CONNECTION



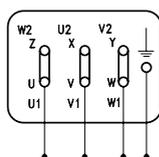
Make the electrical connection only after the hydraulic connection has been completed; set up the motor control system in conformity with the technical standards and regulations in force (EN 60204-1): in particular a manual electric power switch must be installed with adequate current switching capacity; devices for overcurrent and overload protection (e.g. fuses, automatic switches, etc.) must also be fitted, plus, if necessary, a device to prevent accidental restarting.

Check that the main frequency and voltage and the available power are suitable for the motor installed. All the material used for the electrical connection (cables, cable clamps, switches and shielding) must have a suitable level of protection for the environment in which it is installed. Be sure to use cables of sufficient cross-section for the current shown on the motor plate so as to prevent them from overheating.

Before doing anything else, make the motor's earth connection, using the terminal on the motor and a cable of sufficient cross-section. The cables may be connected to the terminal board using either a delta or star arrangement. Follow the data given on the motor plate for the main voltage, as shown in the diagram in fig.4; ensure that the terminals are clean and tight and not under stress.

When starting, the motor's current absorption increases briefly to 5-6 times the nominal value. If the mains supply is unable to sustain this increase in absorption, use a star-delta starter or other kind of device (e.g. an autotransformer).

Lower voltage



Higher voltage

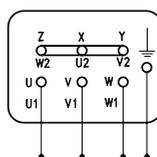


Fig.4

## 9 NON-PERMITTED USES

Do not use the pump with a suction pressure greater than the specified value (0.5 times the discharge head generated by the pump).

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.

**WARNING 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 the safety standards for the environment in question must be used.

## 10 OPERATION

### 10.1 PRELIMINARY OPERATIONS



- Check that the pump turns freely under hand pressure.

- Check that the clamp joining the pump casing and the cover is well tightened and that it cannot be easily unscrewed by hand. The tightening of the clamp must be carried out by means of a key and NOT by hand.

- Check that the pump turns in the marked direction (CLOCKWISE, as seen from the control end).

- 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 primed by introducing liquid into the pump body.

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.

- If the sealing chamber is to be cooled, open the cooling water supply and adjust the flow.

### 10.2 STARTING

- Carry out the preliminary operations, then close the discharge gate valve completely and make sure that the suction gate valve is completely open.

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

### 10.3 OPERATING CHECKS

- If the pump does not generate the required discharge head rapidly, stop and repeat the priming operations.

- If the discharge gate valve is opened more than necessary, i.e. further than the specified working point, and the pump is operating with a lower discharge head than that required, there will be an increase in delivered capacity and absorbed power. If this occurs, throttle the discharge until the required head and capacity values are obtained.

- If the discharge head generated by the pump is greater than that required, the diameter of the impeller can be reduced. If, on the other hand, the discharge head is lower than required, with the same capacity, it will be necessary to install a larger diameter impeller (if the one fitted is not already the largest available) and probably also a higher power motor.

- The pump must operate smoothly and without vibrations.

- Do not operate without liquid and in any case avoid prolonged operation with the discharge gate valve closed.

- Check that the suction liquid level is always sufficient to guarantee an adequate energy load for normal operation of the pump.

- Mechanical seal: check that there is no leakage along the shaft.

## 11 WORKING IRREGULARITIES

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.

### Trouble:

A) The pump does not run

B) The delivery is not sufficient

C) The pressure is not sufficient

D) The pump stops priming

E) Power absorption too higher

F) Leakages from the mechanical seal

G) Short life of the mechanical seal

H) Failure of the mechanical seal

I) Anomalous vibrations and/or noise

L) Short life of bearings

		TROUBLE										
		A	B	C	D	E	F	G	H	I	L	M
POSSIBLE CAUSES AND NECESSARY OPERATIONS TO SOLVE THEM	1	●	●									
	2	●	●		●							
	3	●	●		●							
	4	●	●		●							
	5	●	●		●							
	6	●	●									
	7	●	●	●								
	8	●	●	●								
	9	●	●	●		●						
	10		●	●								
	11		●	●						●		
	12		●	●								
	13			●	●							
	14				●							
	15					●						
	16					●						
	17					●						
	18					●						
	19					●				●	●	
	20					●	●	●		●	●	
	21					●				●		
	22		●	●		●						
	23		●	●		●						
	24						●					
	25						●	●	●			
	26						●	●	●			
	27						●	●				
	28						●					
	29						●	●				
	30						●	●				
	31						●	●				
	32							●				
	33								●			
	34									●	●	
	35									●		
	36									●		
	37									●		
	38										●	
	39										●	

### **Possible causes and necessary operations to solve them:**

- 1) The pump is not properly primed.
  - Repeat the priming.
- 2) Air entering from suction connections.
  - Check the lock.
- 3) Air entering from the mechanical seal.
  - Replace the mechanical seal or arrange a solution with a vacuum spring in case of vacuum suction operation.
- 4) Obstructions present along suction pipes or valves closed along pipes.
  - Verify and remove all foreign matters from pipes and finally verify valves status (if closed, open them).
- 5) NPSH available in the plant is lower than NPSH needed by the pump.
  - Reduce the friction loss or adjust the pump at a lower delivery point.
- 6) Defective operation of the standing valve (not flooded pumps).
  - Restore the proper operation of the valve or replace it with a perfect one.
- 7) Plant friction losses higher than pump performances.
  - Reduce friction losses or replace the pump with a most suitable one for requested performances.
- 8) Opposite direction of rotation or too low velocity (in case of a pump operated by an inverter).
  - Restore the correct sense of rotation; increase the motor speed.
- 9) The impeller is clogged by foreign matters (in case of pump with closed-impeller).
  - Remove foreign matters from the impeller.
- 10) Worn mechanical seals.
  - Replace worn parts.
- 11) Worn or partially clogged impeller.
  - Replace the impeller or remove foreign matters.
- 12) Product viscosity higher than foreseen one.
  - Verify the pump size.
- 13) Presence of too much gas in the fluid.
  - Fit an air relief valve.
- 14) Plant friction losses lower than foreseen ones.
  - Increase friction losses or adjust the pump at a higher working point.
- 15) Fluid specific gravity higher than foreseen one.
  - Increase the installed motor power.
- 16) Pumped fluid too much viscous.
  - Verify the pump size.
- 17) Higher pump delivery during operation due to plant friction losses lower than foreseen ones.
  - Adjust the pump at a lower working point or increase the plant friction losses.
- 18) Rotation speed too high (when pump is controlled by an inverter).
  - Reduce the velocity.
- 19) Internal frictions caused by slipping between rotating and fix parts.
  - Restore normal assembling conditions.
- 20) Misalignment of pump-motor or deformed shaft.
  - Restore the correct alignment between pump and motor; replace the shaft with a new one.
- 21) Damaged bearings of pump or motor.
  - Replace the bearings.
- 22) Electric misconnection.
  - Modify the electric connection by strictly following ratings written on the motor plate according to the available voltage.
- 23) Voltage not suitable for the installed motor.
  - Replace the motor with one having a suitable voltage.
- 24) Mechanical seal too much worn.
  - Replace the mechanical seal.
- 25) Pump fluid or temperature not suitable for the assembled mechanical seal or its parts.
  - Verify the mechanical seal selection.
- 26) Non-cleaning when using fluids which tend to crystallize.
  - Increase washing cycles and don't leave the product laying inside the pump for a long time.
- 27) Misassembly of the mechanical seal.
  - Assemble the mechanical seal again with attention.
- 28) Opposite rotation direction for non-reversible mechanical seals.
  - Restore the correct sense of rotation.
- 29) Flushing non sufficient for external flushed seals.
  - Increase the flushing fluid.

- 30) Dry operation of the pump.
  - Arrange the proper dry-running protection in order to avoid the problem.
- 31) Oscillations on the shaft due to a too high assembly allowance, worn bearings, etc.
  - Restore normal assembly conditions by replacing the worn pieces.
- 32) Suspended solid parts in the fluid.
  - Verify the mechanical seal selection.
- 33) Too high temperature or thermal shock.
  - Increase gradually the fluid temperature by avoiding instantaneous thermal amplitudes; prevent the pump from dry-running.
- 34) Out-of-balance of the impeller.
  - Replace the impeller.
- 35) The pump runs at a low delivery.
  - Adjust the pump at a higher working point.
- 36) The pump runs at a high delivery.
  - Adjust the pump at a lower working point.
- 37) Pump and/or pipes are not properly anchored.
  - Verify and adjust anchorage of the involved parts.
- 38) Bearings not lubricated (where lubrication is foreseen).
  - Replace bearings and restore the proper lubrication of them; lubrication according to the use conditions should be at intervals filled up.
- 39) Water seepage due to worn oil retainers.
  - Replace worn parts.

## 12 EXTENDED STOP

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. When starting the pump again, please follow the above-mentioned instructions.

### 12.1 CLEANING THE PUMP

The pump does not require any special washing procedures. The washing cycles normally used for the plant in which it is installed are quite satisfactory. When using the pump for liquids that tend to harden or crystallize, always make sure that it is washed before periods in which the machine is out of service. This will ensure durability of the seal and of the pump itself. It is the user's responsibility to ensure that the washing liquids are compatible with the process liquid and the pump.

### 12.2 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 dismantling; wash the components and clean the structure accurately.

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

- pump casing, cover, impeller, S.S. Aisi 316  
shaft, impeller nut
- elastomers NBR - EPDM - FLUOROCARBON (FPM) - TEFLON
- motor Aluminium - Cast iron - Copper

Components made from amianthus or lead are not used in our production.

**WARNING** The components of the pump should be properly got rid, according to the corresponding rules in force in receiver's country.

**13 SPARE PARTS**  
**13.1 REFERENCE TABLE OF MAIN PARTS SUBJECT TO REPLACEMENT**

<b>Pump type CL-CLC</b>	22	31	41 mot. size 80 + 112	51 mot. size 80 + 112	51 mot. size 132 + 160	CLC 66	CL 66
<b>Part</b>							
* Mechanical seal EN12756-ISO3069	D.14	D. 18	D. 24		D.28	D. 24	D.28
Pump casing "O-Ring"	OR 8462	OR 206	OR 8650	OR 8850	OR 8850	OR 81050	
TMR seal ring	---	HN2390 30/47/7	HN2390 40/55/8		HN2390 45/62/8		

**\* NB:**

The type and materials of the rings are identified in the enclosed technical parts list

**13.2 RECOMMENDED SUPPLY**

RECOMMENDED SPARE PART FOR TWO YEARS OF OPERATION ACCORDING TO THE NUMBER OF PUMPS INSTALLED - VDMA STANDARD					
Denomination	NUMBER OF PUMPS (including reserve)				
	1	2	3	4	5
MECHANICAL SEAL	1	2	3	4	4
PUMP COVER O-RING SEAL	2	3	5	6	7

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

**14 SEALS**

All C.S.F. centrifugal pumps of the CL - CLC series are fitted with unified mechanical seals according to EN 12756 - ISO 3069 standards, in order to grant the interchangeability (subject to verification of axial space). The type of mechanical seal and material are chosen according to the liquid to be pumped.

**WARNING** 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.

**MATERIAL CODES**

**METALS**

**X** - Stainless steel AISI 316L  
**L** - Hastelloy (Ni alloy)

**METAL OXIDES**

**2** - Alumina ceramic

**ELASTOMERS**

**6** - Nitrile (NBR)  
**7** - Ethylene propylene (EPDM)  
**W** - FPM for high T  
**Y** - Fluorocarbon (FPM)  
**B** - Silicone  
**Q** - Chemraz  
**U** - Kalrez

**CARBONS**

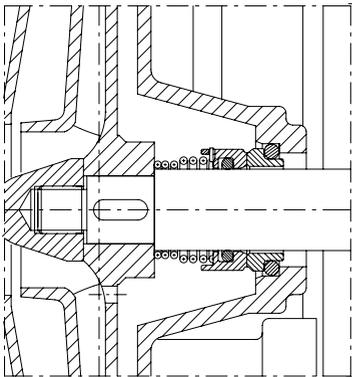
**V** - Normal carbon  
**Z** - Special carbon

**RESINS**

**5** - Normal PTFE  
**4** - Loaded PTFE  
**F** - O-RING FEP

**METAL CARBONS**

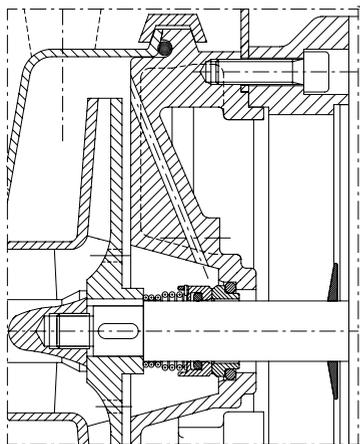
**3** - Hard metal welded on stainless steel (TUC)  
**R** - Integral anti-corrosion hard metal (TUC)  
**K** - Integral silicate carbon (SiC)



#### EXEC. T

##### Internal mechanical seal

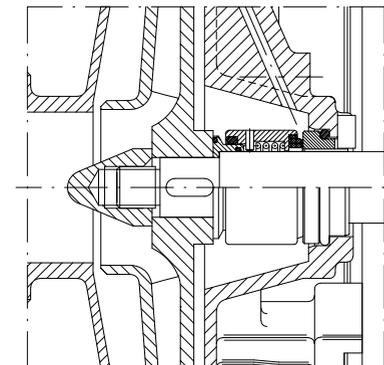
The rotary mechanical seal is internal in order to ensure improved cooling and consequently to reduce its wear. The type of mechanical seal and the materials of the rotating surfaces and of the elastomers are chosen each time, among the several types available, according to the nature of the handled product.



#### EXEC. W

##### Internal mechanical seal with liquid circulation

In pumping heated liquid, it induces a forced liquid circulation in the area around the seal, in order to avoid whichever steam formation, which may damage the seal itself. It removes deposits by limiting sedimentation.

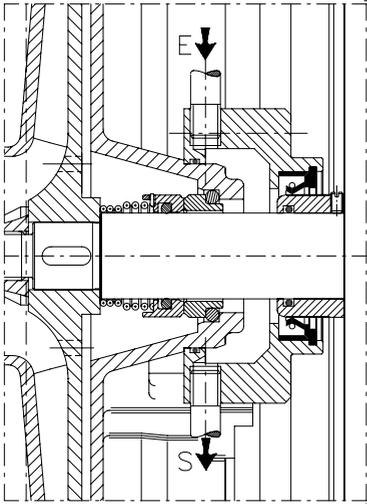


#### EXEC. TH

##### Internal mechanical seal "H"

Protected spring, hydraulically balanced and bi-directional; especially suited for high cleanliness, vacuum and semi-viscous product applications. Easy to clean with CIP, it is perfect for use with foodstuffs, sanitary products, pharmaceuticals and wherever process sterilisation is a requirement.



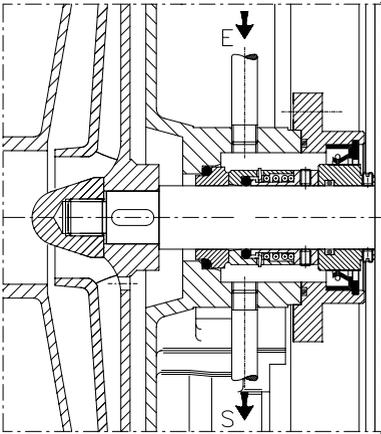


**EXEC. V**

**Flushed internal mechanical seal**

The external chamber, by means of the flushing liquid circulation, avoids any damages to the electric motor and contamination of the environment, due to the possible leakages of the internal mechanical seal.

The function of the flushing is to cool, lubricate and clean the seal surfaces.



**EXEC. U**

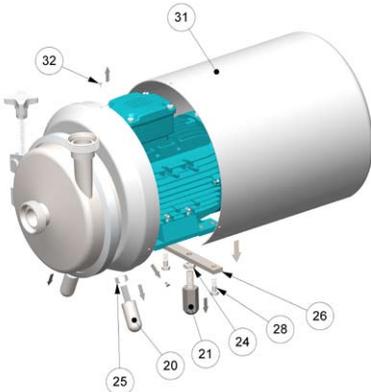
**Double mechanical seal**

Double mechanical seal with circulation of the cleaning and cooling liquid. It is used with products that tend to crystallise, to glue, to harden, to be abrasive, to reach high temperatures and whenever the seal life is limited. The function of the fluxing is to clean, lubricate and cool the seal; the circulating liquid must be clean. If the seal is leaking the fluxing liquid will point out this fault.



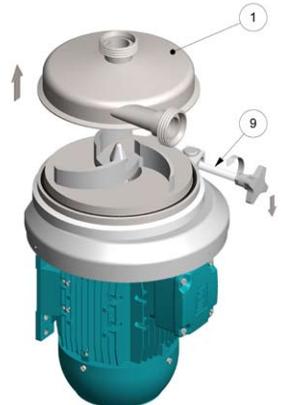
**15 MAINTENANCE**

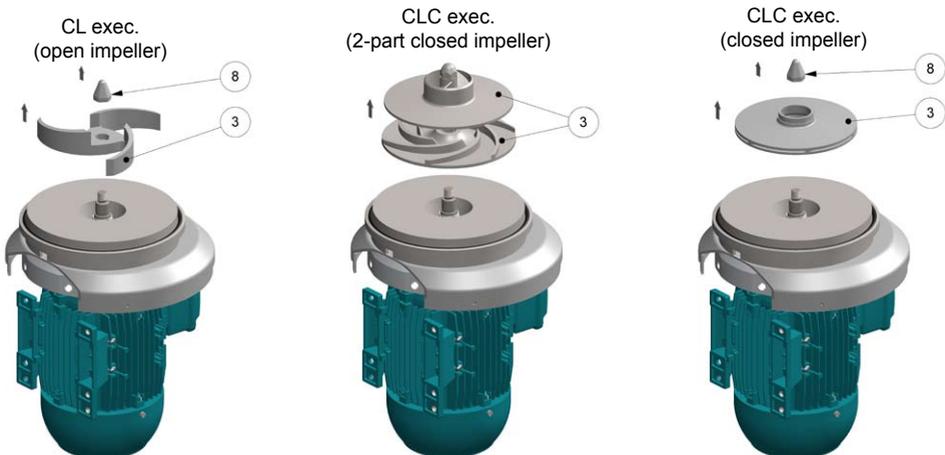
**15.1 DISASSEMBLY OF CL-CLC PUMP "T / W" EXEC.**



**A** - Remove the supporting feet (20-21-24-25-26-28) from the pump.

**B** - Set the pump vertically. Loosen the clamp (9) with a fixed wrench, expand it by rotating the knob until the nut is released (1). Remove the nut and clamp.





**C** - Use the relative wrench to loosen the impeller cover or the nut (8) and remove it by unscrewing anti-clockwise.

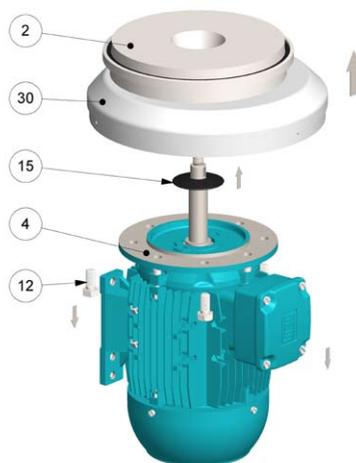
Dimension of the hexagon: nut/impeller:

CL 31 - 32	CH=19
CL 41 - CLC 41	CH=24
CL 51 - CLC 51	CH 22-24-34

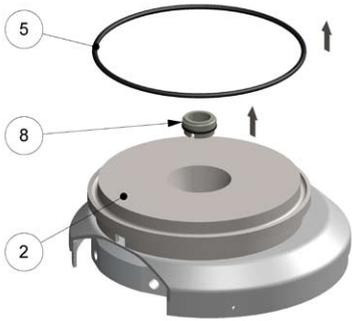
**NB:** A hexagonal slot or two levels for a fixed wrench are provided for this operation at the rear end part of the motor shaft, in order to block it when unscrewing the nut (8) (or the impeller cover 3).  
Remove the impeller (3) from the shaft.



**D** - Remove the key (10) and the rotating part of the mechanical seal (6) inside the cover using two screwdrivers.



**E** - Proceed by unscrewing the screws (12) that secure the motor to the coupling flange of the pump. Separate the pump block from the motor (4).



**F** - Remove the O-Ring (5) from outside the cover (2) and the fixed part of the mechanical seal from the inside (8).

**G** - Turn the pump block over and remove the fixing screws (6). Separate the coupling flange (1), seal (128), eccentric part (3) and the cover (2).



## 15.2 ASSEMBLY OF "T / W" EXEC.

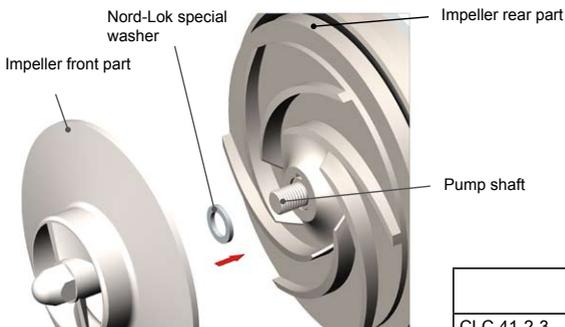
By for performing the disassembly operations in the opposite order, the pump can be assembled.

### CLC 2-PIECES IMPELLER

The CLC version, with 2-pieces impeller (impeller + cover), is equipped with a special **WASHER** that prevents the cover from loosening due to improper rotation. (This condition can occur during installation caused by start-ups with inverse rotation).

For impeller assembly insert the rear part of the impeller on the motor shaft and the special washer. Screw the front part of the impeller with the torque wrench.

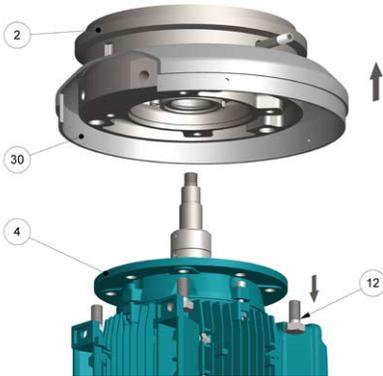
Note: See tightening torques tab. 1.



tab. 1

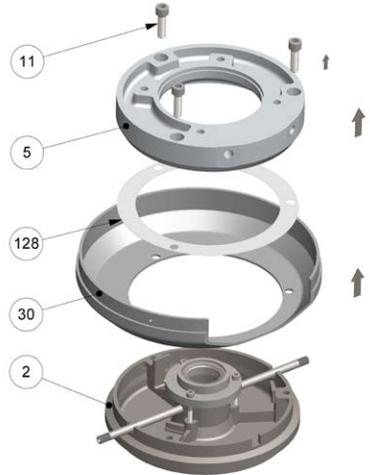
TIGHTENING TORQUES	
CLC 41-2-3 CLC 41-2-4 CLC 41-2-5,5 CLC 51-2-2 CLC 51-2-3 CLC 51-2-4 CLC 51-2-5,5 CLC 51-2-7,5	Mt = 89 N•m Fs = 34 KN
CLC 51-2-10 CLC 51-2-15	Mt = 136 N•m Fs = 46 KN

**15.3 DISASSEMBLY OF CL-CLC PUMP "U" EXECUTION**  
 Perform steps A/B/C as described in paragraph 15.1.

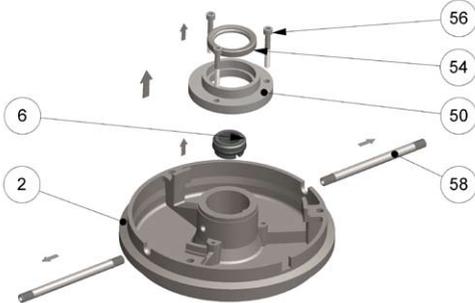


**H** - Unscrew the screws (12) and separate the pump unit from the motor (4).

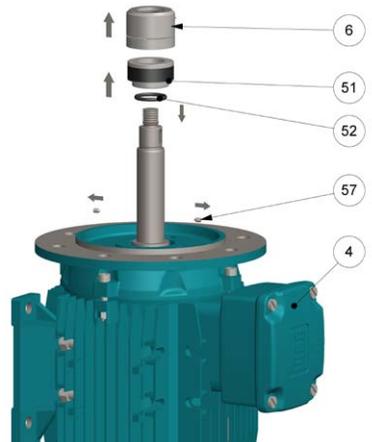
**I** - Remove the screws (11) and release the flange (5), the seal (128) and the eccentric part (30) from the cover (2).



**L** - Remove the pipes (58) to flush the seal. Unscrew the screws (56), remove the radial mechanical seal (54) from the cover (50) and the fixed part of the mechanical seal (6) from the cover (2).



**M** - Loosen the fixing dowels on the rotating part of the mechanical seal (6) and remove it from the motor shaft (4). Remove the fixing dowels (57) from the bush (51) and remove it from the shaft and separate the O-ring (52).



**15.4 ASSEMBLY OF "U" EXEC.**

By for performing the disassembly operations in the opposite order, the pump can be assembled.

## 16 CLEANING PROCEDURE

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

Typically the cleaning process should be developed by a plant responsible of sanitization.

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 detergent:**

A sodium hydroxide/water solution may be used at concentration 1-3% at a temperature of 70-90°C; a surfactant could be added to increase the rinse cleaning.

### **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).

### **Suggested cleaning process:**

- 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.

### **Caution:**

- 1) During the CIP process there are thermal expansion: take care that there are not rapid temperature variation.
- 2) Chemical agents at high temperature can cause potential health risk: respect the safety regulation and use protection devices
- 3) Control the concentrations and temperature of chemical agents during the CIP.
- 4) Store the cleaning agents in compliance with the safety regulations

### **Sterilization:**

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.

Temperature limits for rubber gasket	Steam/hot water	Chemical bactericidal
EPDM	121°C	82°C
FPM/FKM	149°C	82°C

### **Impeller nut cleaning and sterilization:**

- 1) The dismantled nut should be cleaned before assembling (internal threads).
- 2) Clean the nut with Ultrasound washing system or detergent and rinsing with clean water.
- 3) Sterilize the nut with steam at 143°C for 30 minutes in autoclave or using chemicals solution (i.e. glutaraldehyde solution). Do not use chlorine solutions because stainless steel could be damaged by corrosion.



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