CSF

MULTISTAGE CENTRIFUGAL PUMPS
CSM SERIES

CSF HYGIENIC MULTISTAGE CENTRIFUGAL PUMP CSM

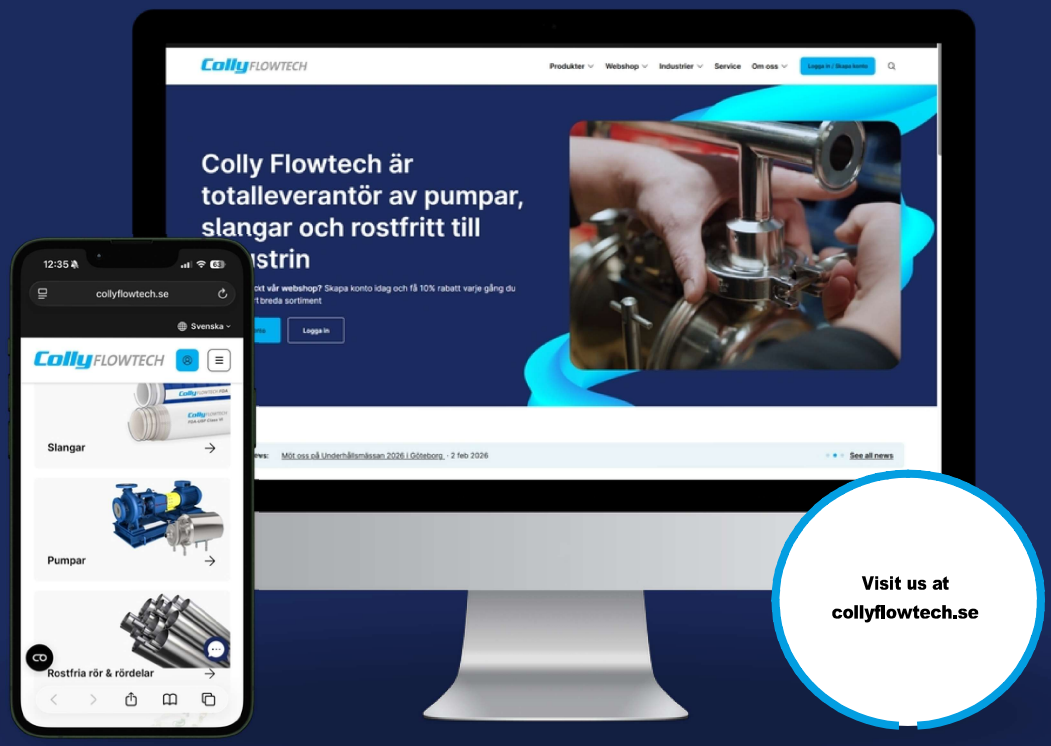
Instructions for assembly, installation, operation and maintenance



Colly FLOWTECH

Translation of the original operating instructions

Rev_1-2026



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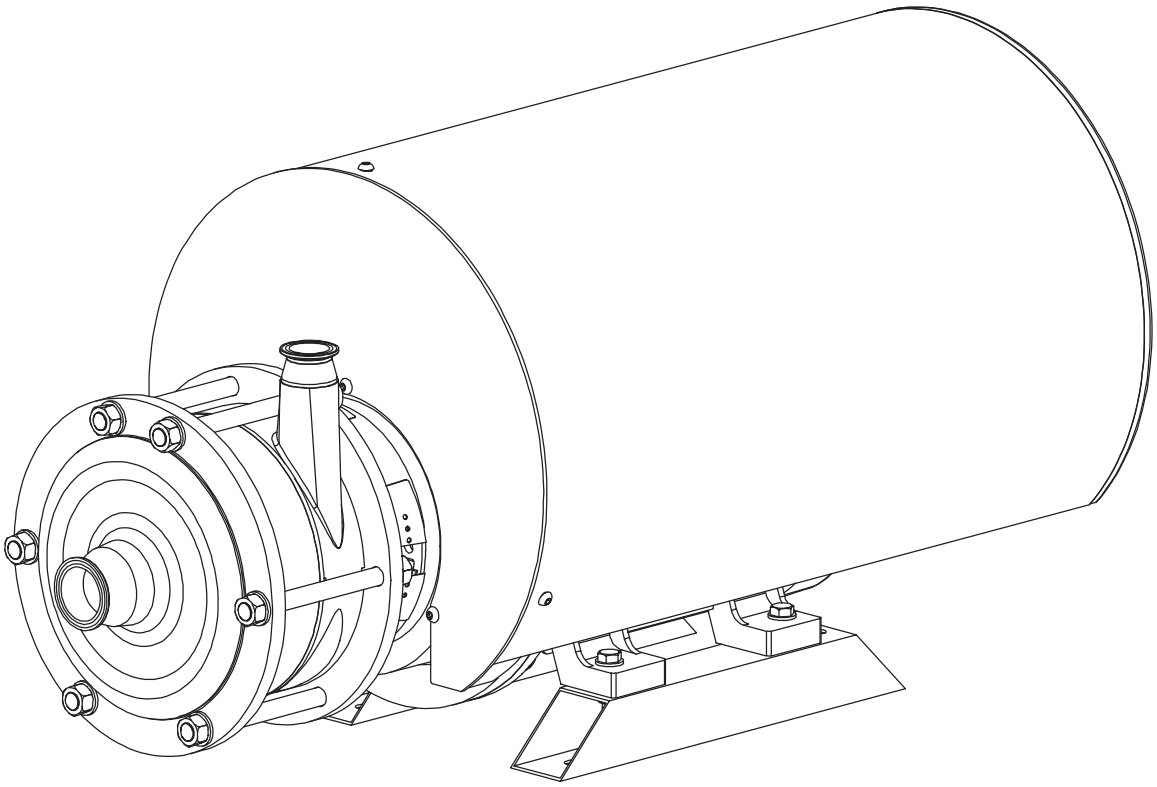
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CSFinoxGroup
FLOW TECHNOLOGY COMPONENTS

SINGLE- AND MULTI-STAGE CENTRIFUGAL PUMPS SERIES CSM



INSTRUCTIONS FOR ASSEMBLY, INSTALLATION,
OPERATION AND MAINTENANCE

CSF

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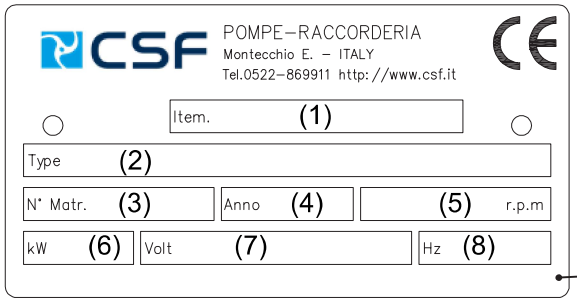
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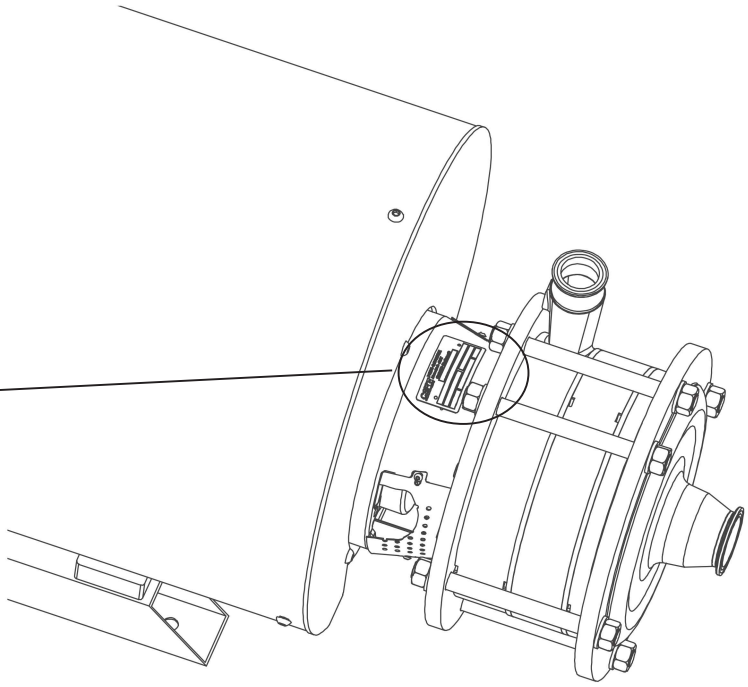
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FOREWORD

This instruction manual is designed to provide the user with all the information needed to perform all use and maintenance activities concerning the pump 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.
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





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

	Pay great attention to the text parts indicated by this symbol.		Compulsory foot and hand protection PPE: gloves and safety shoes
	Danger: the non-observance of instructions can cause serious damages to persons and/ or objects.		Compulsory respiratory tract PPE: mask
	Danger: only skilled personnel is allowed to carry out operations concerning the electric parts.		Danger: hot surfaces

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.

When the pump is working the following occurs::



- Mechanical parts are moving
- Pump casing, pipelines and articulations are under internal pressure. Therefore do not remove any safeguard or locking, do not loosen screws or clamps, as this can cause serious damage to persons or objects.



- Electric parts are in tension
- Non-observance of inspection and maintenance operations 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.



- 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 operations involving disassembly of the pump (inspection, cleaning, seal replacement, etc.), the following preliminary operations must be carried out:



- switch off engine tension and disinsert electric connection
- Close the valves on the suction and outlet pipelines to avoid the risk of flooding;



- 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.





2.1 - SAFEGUARDS

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.

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 34), 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.

4.0 - GOODS TRANSPORTATION, RECEIVING AND TRANSFERRING

4.1 - TRANSPORT

The packings of all pumps manufactured by C.S.F. Inox S.p.A. are defined when placing the order. Unless prior arrangements are made, 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 - DELIVERY

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 reserve
Take photographic evidence of the damage
Notify the carrier of the damage sustained via registered mail with the photographic evidence attached.

4.3 - 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

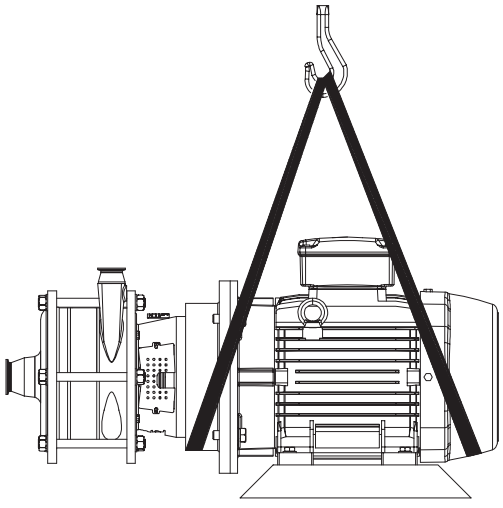
The machine installation site must have adequate natural and/or artificial lighting in compliance with the legislation in force in the country of installation.
Lighting must be uniform, guarantee good visibility in every part of the machine and must not create hazardous reflections. It must also be such that commands on the control panels and emergency stop buttons can be clearly seen.

4.4 - 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 in accordance with the relative regulations in force in the country of installation (see Chapter 20, page 35).
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.
Observe the health & safty regulations in force locally.



5.0 - RETURNS

- Empty the pump correctly.
- Wash and thoroughly clean the pump, especially in the case of harmful or explosive liquids.
- Thoroughly dry the pump.
- A duly compiled Declaration of Decontamination must accompany the pump (see page 34).

6.0 - DESCRIPTION

The CSM series comprises single-stage centrifugal pumps with axial suction port, open centrifugal impeller. Pump connections are available according to different standards and must be chosen to comply with the permitted pressure.
The single-stage pumps in the CSM series have been designed to operate in pressurized loops, typically used in reverse osmosis processes, nanofiltration and other similar applications, while the multistage pumps in the CSM series have been designed to operate with medium-low flow rates and high head and can withstand high suction pressures.
The seal is mechanical and the materials used for the components of the seal are selected based on the liquid being pumped.
The pumps are coupled to three-phase electric motors with efficiency ratings in compliance with current regulations and an IP 55 protection rating (unless otherwise specified).
They are designed exclusively for professional use.

6.1 - TECHNICAL DATA

- Maximum operating pressure (in outlet): 40 bar depending on the type of connections.
- Temperature range: 0°C – 100°C (up to 140°C for sterilization needs on request).

The temperature use range is determined by the type of mechanical seal and the material of the elastomers installed. Seal execution depends on the operating pressure.
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.

	PRESSURE VALUES - Barg		
CONNECTIONS	**16**	**25**	**40**
CLAMP (*for high pressure values)	YES	YES *	YES *
DIN 11851	YES	NO	NO
DIN 11864-1	YES	YES	NO
DIN 11864-2	YES	NO	NO
DIN 11864-3	YES	NO*	NO
FLANGE EN 1092	PN 16	PN 25	PN 40
OTHER REQUESTS	To be verified	To be verified	To be verified
PRESSURE / SEAL EXECUTION	H1-H4 H1D-H4D H6-H9	H5/HA/HS H5D/HAD	H5/HA/HS H5D/HAD

6.2 - SOUND PRESSURE LEVEL

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

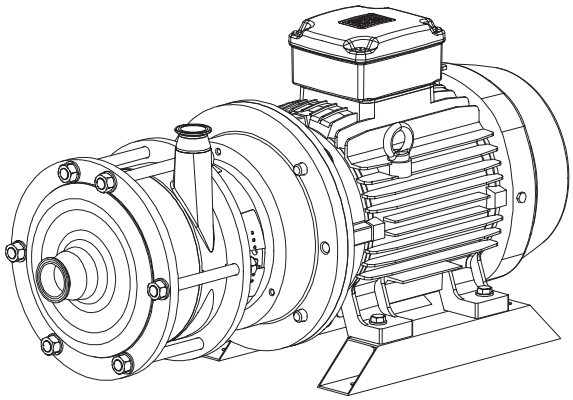
		PUMP TYPE	
Noise index dB(A)	76 ÷ 80	CSM 41-175 CSM 51-175 CSM 42/43	2-pole 2-pole 2-pole
	81 ÷ 85	CSM 51-100 CSM 52/53/54	2-pole 2-pole
	86 ÷ 90	CS 61-210 CS 81-210	2-pole 2-pole

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).

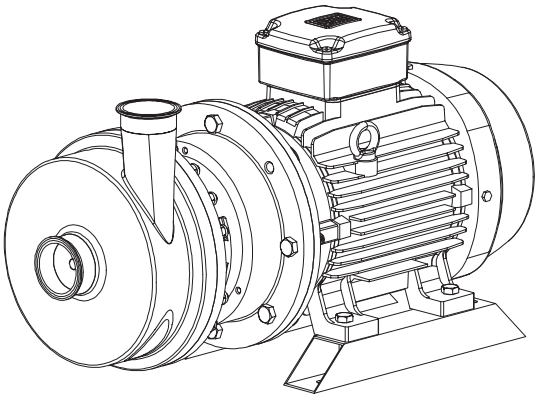
6.3 - WEIGHTS

The weight may vary depending on the execution, make and/or model of the motor installed.
For information on the weight of the pump, see the data sheet provided as an appendix to the instructions.

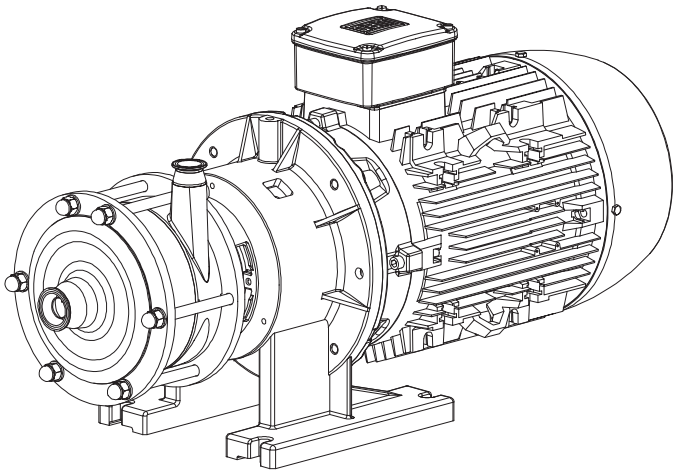
7.0 - SET-UPS



MULTISTAGE CSM pump
execution with fixed feet.



SINGLE-STAGE CSM pump
execution with fixed feet.



CSMX MULTISTAGE pump in close-coupled execution with independent motor and double bearing (also available in SINGLE-STAGE version).

8.0 - NON-PERMITTED USES

Do NOT use the pump in the following cases:
- Without guards and/or with disabled, faulty or missing safety devices.
- If it has not been installed correctly.
- If there are power supply faults.
- In the event of serious maintenance shortcomings.
- Following unauthorized modifications.
- For improper use of the machine.
- Without following the instructions provided.

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

9.0 - INSTALLATION

9.1 - SUCTION AND INFLOW CONDITIONS

(NPSH = Net Positive Suction Head)

NPSHa (NPSH available)

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 system (available 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.

NPSHr (required 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.

9.2 - 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 (Pict.1).

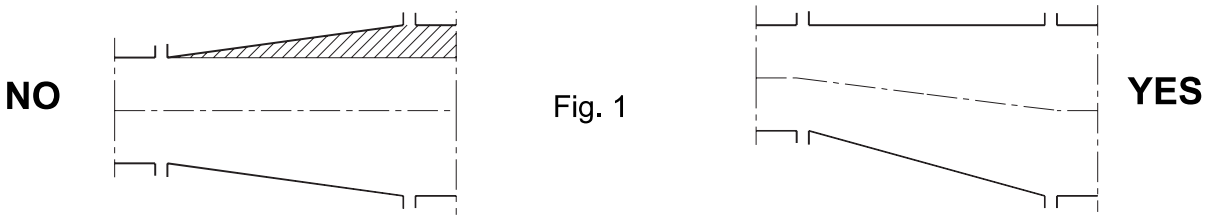
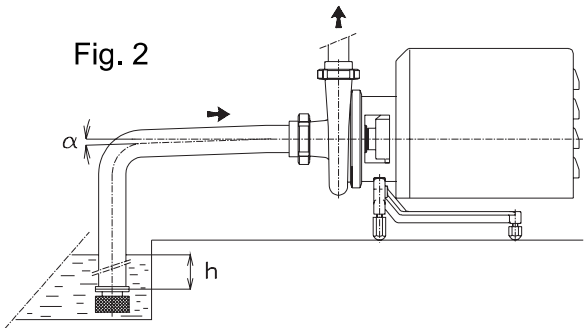


Fig. 1

The suction pipe must be as short as possible and rise as it moves towards the pump if it is sucking from a tank (Pict.2). If on the other hand the pump is below the level of the liquid, the pipe should descend slightly (Pict.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



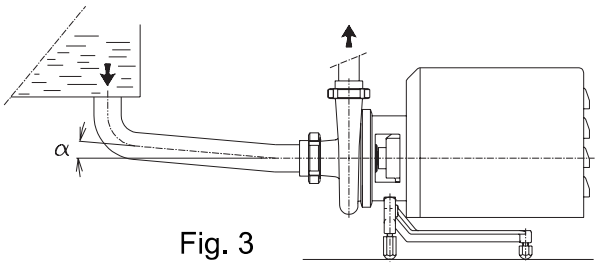


Fig. 3

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 (Pict.2).

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

$h_{min} = m$

$V = m/s$

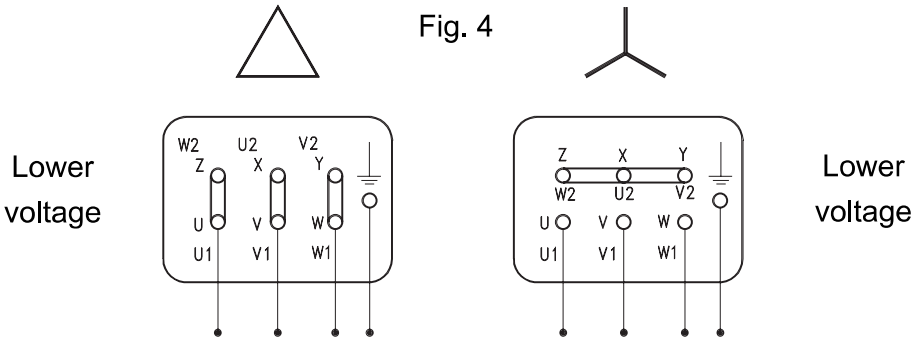
In order to prevent the formation of vortices when it is not possible to observe the values of minimum available head, it is possible to fit crosses in the piping. This system is suitable even for tanks with a positive head.
Avoid creating obstacles which could increase suction losses disrupting smooth fluid flow. Make sure that there are no restrictions, sharp turns or tight elbows on the discharge line, since these increase disturbance.
During electro-welding work never use the pump as an earthing point and make sure the current does not flow through the bearings.
Before using the pump, make sure the tank and piping are clean and examine the inside of the pump before connecting the piping.

9.3 - 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 pict.4; when starting, the motor's current absorption increases briefly to 5-6 times the nominal value. If the mains supply is unable to substain this increase in absorption, use a star-delta starter or other kind of device (e.g. an autotransformer).

Fig. 4



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.

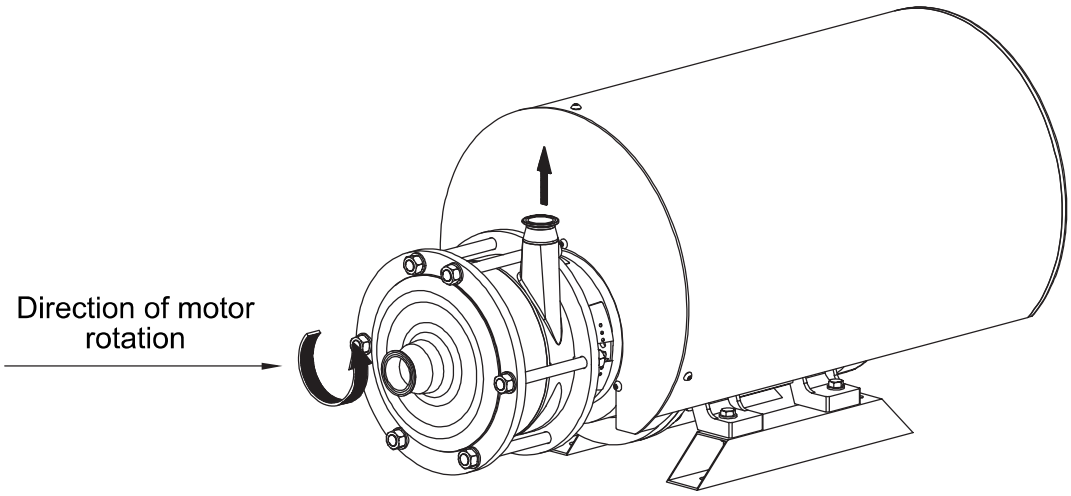
10.0 - OPERATION

10.1 - PRELIMINARY OPERATIONS BEFORE START-UP

- Check that the pump turns freely under hand pressure
- Check the tightness of the pump casing closure screws or tie rods and the tightness of the connections.

The screws or tie rods must be tightened using a wrench and NOT simply by hand.

- Check that the pump turns in the marked direction as described in the figure (counter clockwise as seen from the pump side).



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 casing.

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.

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

- After carrying out the preliminary operations, then close the discharge valve completely and make sure that the suction valve is completely open.
- Start the pump and check once again that it rotates in the right direction.

OPERATING CHECKS

- If the pump does not generate the required discharge head rapidly, stop and repeat the priming operations.
- If the delivery 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 head is lower than required, with equal flow rate, an impeller with a larger diameter can be installed (provided that the one installed isn't already the largest) and probably a more powerful motor is needed.
- 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 grant an adequate energy load for normal operation of the pump.
- Mechanical seal: check that there is no leakage along the shaft.

10.2 - 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.

10.3 - 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 it is washed before taking the machine out of operation. 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.
For correct cleaning of the pump, please see the washing procedures described in heading 19 on page 32.

11.0 - SPARE PARTS

11.1 - MAIN PARTS SUBJECT TO REPLACEMENT

PUMP TYPE CSM - CSMX / Detail		42/43/44 52/53/54	41/51-175	51-210	61-210	81-210
Mechanical seal		Diam. 28 mm	Diam. 28 mm	Diam. 28 mm	Diam. 43 mm	Diam. 43 mm
Casing O-ring		4850	4850	6995	6995	6995
Element O-ring		4675	np	np	np	np
Impeller Nut O-ring		2112	2112	2112	2150	2150
Bearing	IEC 112	3208 A 2RS - C3	3208 A 2RS - C3	NP	NP	NP
	IEC 132	3210 A 2RS - C3	3210 A 2RS - C3	3210 A 2RS - C3	np	np
	IEC 160	3212 A C3	3212 A C3	3212 A C3	3212 A C3	3212 A C3
	IEC 180	3214 A C3	3214 A C3	3214 A C3	3214 A C3	3214 A C3
	IEC 200 (CSMX)	C 2216 C3	NP	NP	C 2216 C3	C 2216 C3
		6216 A C3	NP	NP	6216 A C3	6216 A C3
AS seal ring	IEC 160	AS 70/90/10	AS 70/90/10	AS 70/90/10	AS 70/90/10	AS 70/90/10
	IEC 180	AS 80/100/10	AS 80/100/10	AS 80/100/10	AS 80/100/10	AS 80/100/10
V-ring	IEC 200 (CSMX)	V-Ring seal 90	np	np	V-Ring seal 90	V-Ring seal 90

*<u>NB: The type and materials of the seals are</u>

<u>identified in the enclosed technical parts list</u>

11.2 - RECOMMENDED SUPPLY

RECOMMENDED SPARE PARTS FOR TWO YEARS OF OPERATION ACCORDING TO THE NUMBER OF PUMPS INSTALLED - VDMA STANDARDS					
Denomination	NUMBER OF PUMPS (including reserve)				
	1	2	3	4	5
MECHANICAL SEAL	1	2	3	4	4
CASING O-RING SEAL	(Multiply by no. of stages)				
	2	3	5	6	7
ELEMENT O-RING SEAL	(Multiply by n ° of stages)				
	2	3	5	6	7
IMPELLER CAP NUT O-RING SEAL	2	3	5	6	7
BEARING	1	2	3	4	5
GACO RING (for power ratings of 11 kW and over)	1	2	3	4	5

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

12.0 - OPERATING MALFUNCTIONS

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) Insufficient flow rate
C) The pressure is not sufficient
D) The pump stops priming
E) Power absorption too high
F) Leaks from mechanical seal
G) Short life of the mechanical seal
H) Failure of the mechanical seal
I) Anomalous vibrations and/or noise
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 or arrange a solution with a vacuum spring in case of vacuum suction operation.
4) Obstructions present along suction pipes or valves closed along piping: check for and remove all foreign matter from pipes and verify valve status (open if closed).
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 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 (in the case of a pump operated by an inverter): restore correct direction of rotation or increase motor speed.
9) Impeller clogged by foreign matter (in the case of pump with closed impeller): remove all foreign matter.
10) Worn seals: replace worn parts.
11) Worn or partially clogged impeller: replace the impeller or remove foreign matter.
12) Product viscosity higher than specified: check pump size.
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
20) Pump-motor misalignment or deformed shaft: restore correct alignment between pump and motor or replace shaft with a new one.
21) Damaged pump or motor bearings: replace the bearings.
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 external flushed seals: increase the quantity of flushing fluid.
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.
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) Unbalanced impeller: replace the impeller
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 (when lubrication is foreseen): replace bearings and restore correct lubrication (lubricant must be topped up from time to time based on operating conditions).
39) Water infiltration due to worn radial shaft seal: replace worn parts.

POSSIBLE CAUSES AND NECESSARY OPERATIONS TO SOLVE THEM	PROBLEM ENCOUNTERED									
	A	B	C	D	E	F	G	H	I	L
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										●

13.0 - SEALS

All C.S.F. Inox CSM series pumps are fitted with internal balanced mechanical seals with standardized seats in compliance with standards EN12756 and ISO 3069. The type of mechanical seal and material are chosen according to the liquid to be pumped.

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 Inox AISI 316L

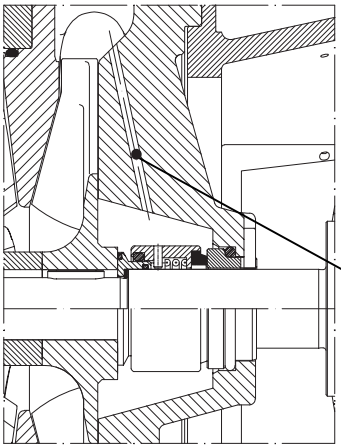
METAL CARBONS

3 - Hard metal welded on stainless steel (TUC)
R - Integral hard metal
hard metal (TUC)
K - Integral silicate carbon (SIC)

ELASTOMERS

7 - Ethylene propylene (EPDM)
(FDA-Regulation (EC). 1935/2004)
Y6 - Special Fluorocarbon (FDA-3A-USP VI)
Y - Fluorocarbon (FPM)
(FDA-Regulation (EC). 1935/2004)
U - FFPM-FFKM

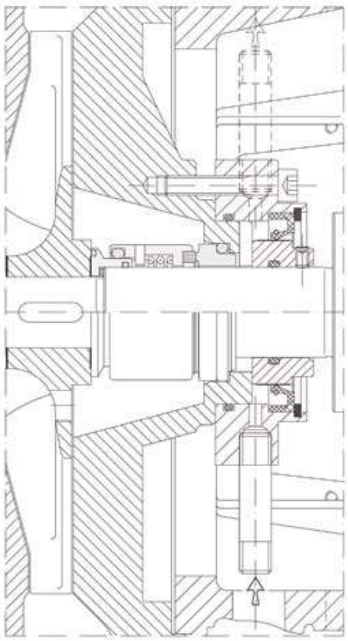
"TH-WH" EXECUTION – SINGLE INTERNAL MECHANICAL SEAL



Protected and balanced execution. It is easy to clean making it ideal for sanitary, pharmaceutical uses etc..
W= Execution with circulation forced by the pumped liquid.



"VH" EXECUTION – SINGLE INTERNAL FLUSHED MECHANICAL SEAL



The external liquid circulation chamber creates a protective barrier in the presence of aggressive or toxic liquids. Helps to clean the seal contact surfaces and limit wear.



"VH" exec. – mechanical seal auxiliary flushing

At first start-up, filling of the pump must be guaranteed, furthermore, complete filling of the auxiliary systems must also be guaranteed.
Failure to comply with this requirement will result in dry operation of the pump and external radial mechanical seal leading to mechanical seal damage due to overheating. The auxiliary service is the external flushing of the internal seal.
The following conditions are recommended:

Ø Mechanical seal	Ø Flushing tubes	Speed	Flow rate l/min	Pressure bar
V 2° Gr. Ø 28	Ø 1/8" Gas male	1450-2900	0.2-0.5	0.5-1.0
V 3° Gr. Ø 43	Ø 1/8" Gas male	1450-2900	0.5-1.0	0.5-1.0

In the presence of dangerous liquids and /or use of flushed seals the presence of the flushing liquid must be monitored by means of a system that can intervene to stop the pump in case of flushing liquid absence.
In the presence of liquids dangerous to health and/or the environment, it is advisable to insert a monitoring device of the seal flushing liquid that can intervene to stop the pump or as an alarm sign, in case of contamination of the flushing liquid.

OPERATION CHECKS:

Verify the presence of flushing of the mechanical seal.
Verify the absence of leaks from the auxiliary service connections of the seal (if present).

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

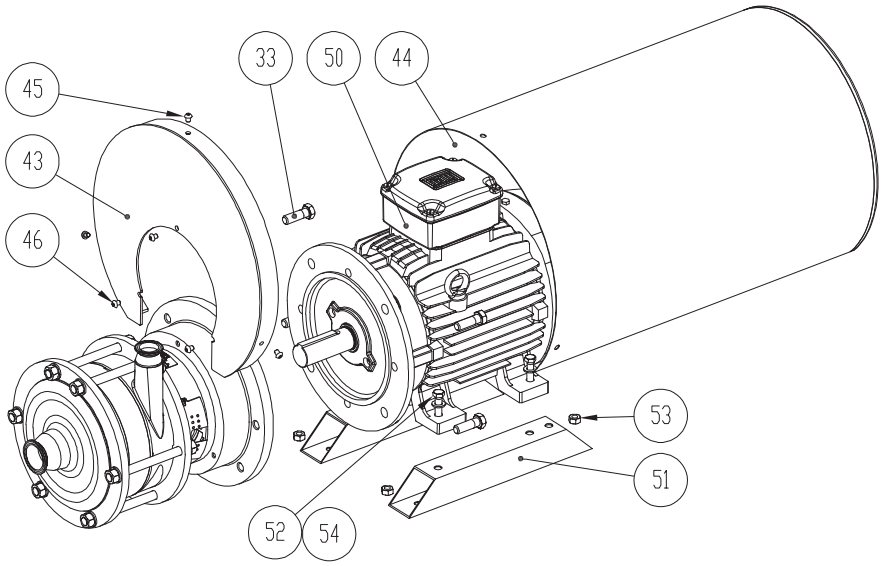
14.0 - DISASSEMBLY OF SINGLE-STAGE AND MULTISTAGE PUMP

14.1 - DISASSEMBLY OF SINGLE-STAGE AND MULTISTAGE PUMP - EXEC. "TH"-"WH"

1. Remove the screws (45-46) to disassemble the shroud (44) and eccentric closure casing (43).

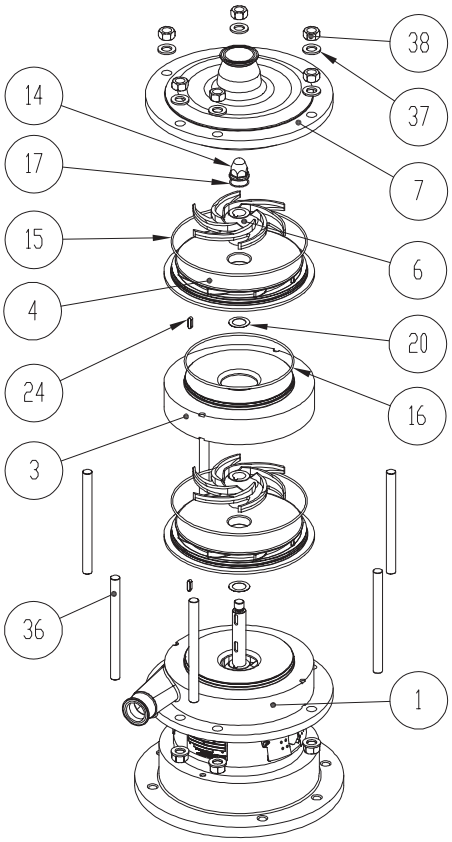
N.B.: THE FOLLOWING OPERATIONS MUST BE CARRIED OUT PLACING THE PUMP UPRIGHT.

2. Then release the motor (50) by unscrewing the screws (33) and proceed to lift the pump unit (using appropriate lifting gear) and slide it off the motor.
   Remove the feet (51) by unscrewing the screws (52-54) and the nuts (53).

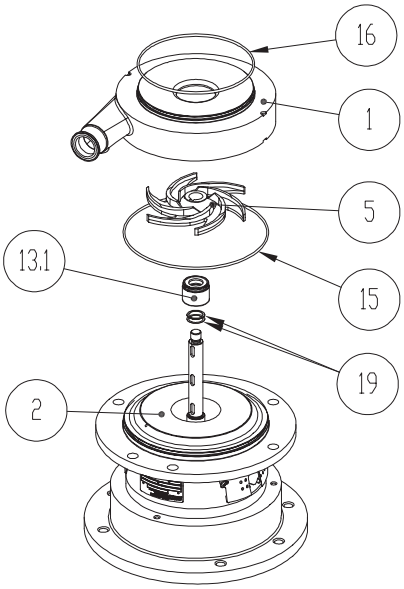


3. Loosen and remove the nuts (38) and the washers (37), then remove the suction cover (7). Remove the tie rods (36), keeping the nuts and washers. Remove the impeller nut (14) (by turning it anti-clockwise) and remove the O-ring (17).
   This operation can be performed using an air ratchet or hand wrench.

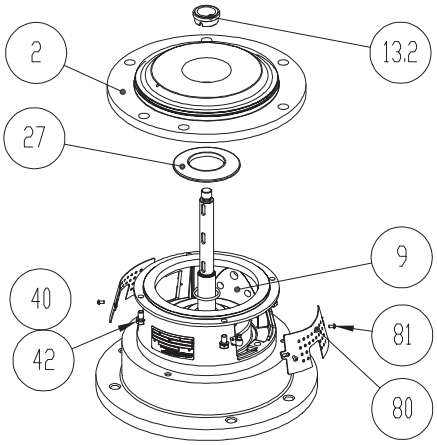
4. Remove the O-ring (15), extract the impeller (6) then remove the key (24) and the diffuser (4). During this step it is advisable to number the impeller and the vaned diffuser (e.g. 3 for 3-stage pump). If present, remove the shim (20) keeping it coupled to the relative impeller.
   Remove the element (3) and the O-ring (16).
   Repeat this operation for the following stages (if present), until you reach the casing (1).



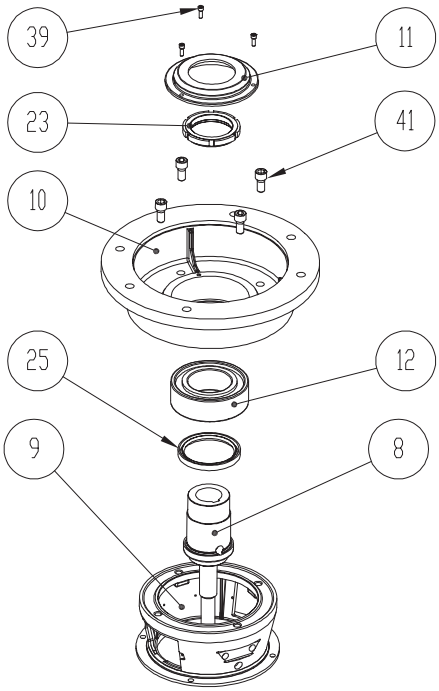
5. Extract the O-ring (16) then remove the casing (1), the impeller (5) and the O-ring (15) from the cover (2). Extract the rotary part (13.1) of the mechanical seal, taking care not to lose the shims (19) which will be needed for reassembly operations.



6. Unscrew the screws (40) and remove them with the relative washers (42), then separate the cover (2) from the lantern bracket (9), taking care not to damage the fixed part of the mechanical seal (13.2), which can then be removed from its seat.
Remove the splash guard ring (27), unscrew the screws (81) and remove the guards (80).



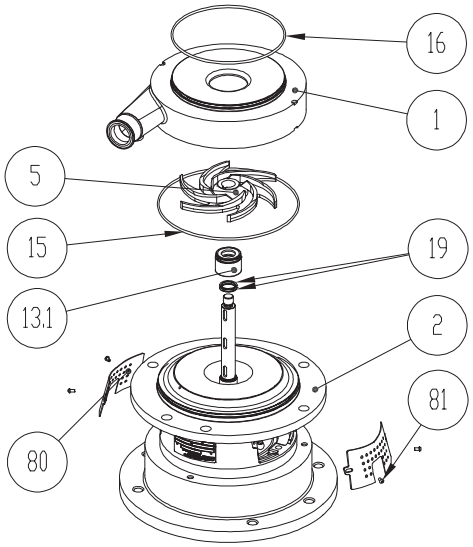
7. Turn over the bearing support, shaft and lantern bracket assembly to access the screws (41) which allow you to separate the support (10) from the lantern bracket (9). Remove the bearing cover (11) pulling off the screws (39); extract the shaft (8) - bearing (12) - ring nut (23) unit from the support (10). Unscrew the ring nut (23) and extract the bearing (12) and Gaco ring (25) (if present) from the shaft (8).



14.2 - MULTISTAGE PUMP DISASSEMBLY – EXEC. "VH"

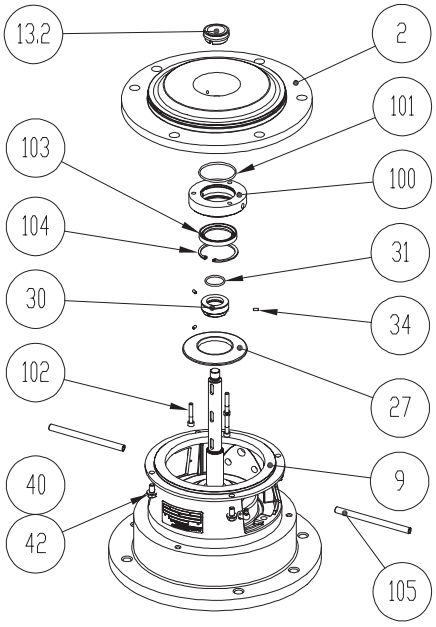
1. Carry out the operations from 1 to 4 as described in the previous heading 14.1.

2. Extract the O-ring (16) then remove the casing (1), the impeller (5) and the O-ring (15) from the cover (2). Extract the rotary part (13.1) of the mechanical seal, taking care not to lose the shims (19) (if present) which will be needed for reassembly operations. Unscrew the screws (81) and remove the guards (80).



3. After having disassembled the flushing pipes (105) separate the seal box (100) from the cover (2) by unscrewing the screws (102). Unscrew the screws (40) and remove them with the relative washers (42), then separate the cover (2) from the lantern bracket (9), taking care not to damage the fixed part of the mechanical seal (13.2), which can then be removed from its seat.

4. Loosen the grub screws (34) to remove the bush (30) from the shaft (8); then extract the O-ring (31) from its seat in the bush (30). Disassemble the Seeger ring (104) and the radial mechanical seal (103). Remove the O-ring (101) from the seal chamber (100). Remove the splash guard ring (27) from the shaft (8).

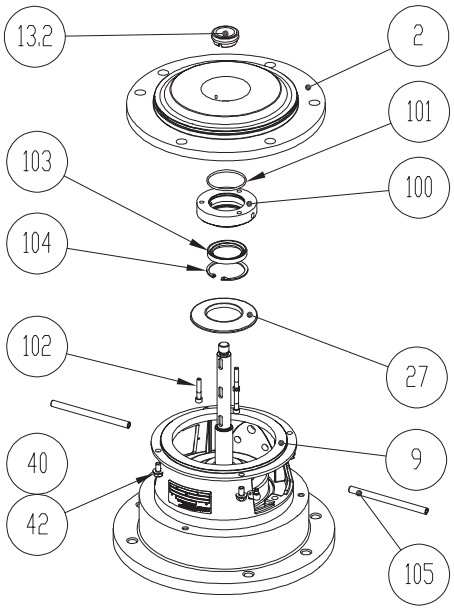


5. Carry out operation 7 as described in the previous heading 14.1.

14.3 - SINGLE-STAGE PUMP DISASSEMBLY – EXEC. "VH"

1. Perform the operations 1 - 2 as in the previous heading 14.2.

2. After having disassembled the flushing pipes (105) separate the seal box (100) from the cover (2) by unscrewing the screws (102).
   Unscrew the screws (40) and remove them with the relative washers (42), then separate the cover (2) from the lantern bracket (9), taking care not to damage the fixed part of the mechanical seal (13.2), which can then be removed from its seat.



3. Disassemble the Seeger ring (104 (only for size CSM51)) and the radial mechanical seal (103).
   Remove the O-ring (101) from the seal chamber (100).
   Remove the splash guard ring (27) from the shaft (8).

4. Carry out operation 7 as described in the previous heading 14.1.

15.0 - PUMP ASSEMBLY

15.1 - ASSEMBLY OF PUMP – EXEC. "TH"-"WH"

Carry out the assembly operations described in the previous heading 14.1 in reverse order to obtain the sequence of steps needed to assemble the pump.
N.B.: Refer to the tables (heading 15.5) to observe the assembly allowances.

15.2 - ASSEMBLY OF PUMP "VH" EXEC.

Follow the disassembly operations described in the previous chapter (heading 14.3 for MULTISTAGE pumps and heading 14.3 for SINGLE-STAGE pumps) in reverse order to achieve the sequence of steps needed to reassemble the pump.
N.B.: Refer to the tables (heading 15.5) to observe the assembly allowances.

15.3 - IMPELLER NUT SIZES

Pump size	Thread Size	Tightening torque [Nm]
CSM 41/42/43/44 CSM 51/52/53/54	M 16 (CH 26)	60
CSM 61 CSM 81	M 18 (CH 36)	70

15.4 - TIE ROD TIGHTENING TORQUES

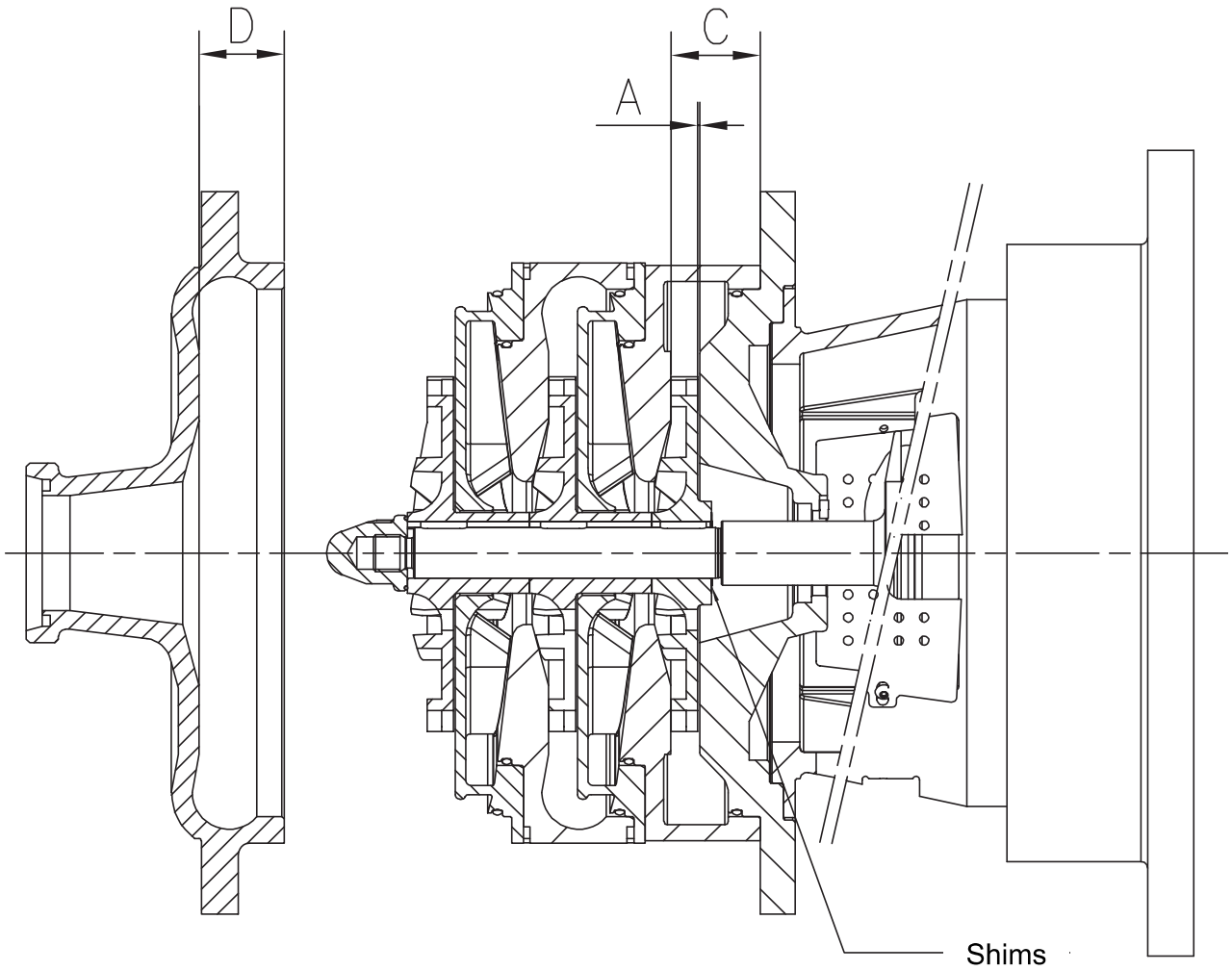
Pump size	Thread Size	Tightening torque [Nm]
CSM 42/43/44	M16	80
CSM 52/53/54	M16	80
CSM 41	M12	60
CSM 51	M12	60

* Tightening torque only valid without butterfly nut.

15.5 - IMPELLER-COVER ASSEMBLY CLEARANCES

Value A refers to the 1st stage impeller/cover assembly clearances achieved using shims (pos. 19).
For the internal depth of the casing, the two values A and C are added together.

CSM-CSMX PUMP	Dimensions			CSM-CSMX PUMP	Dimensions		
	A	C	D		A	C	D
CSM 42/43/44	0.3-0.4	38	37	**CSM 61**	0.4	61.4	53.3
CSM 52/53/54	0.3-0.4	39.5	38.5-	**CSM 81**	0.4	66.4	58.3
CSM 51	0.4	55.4	47.3				



16.0 - BEARINGS MAINTENANCE

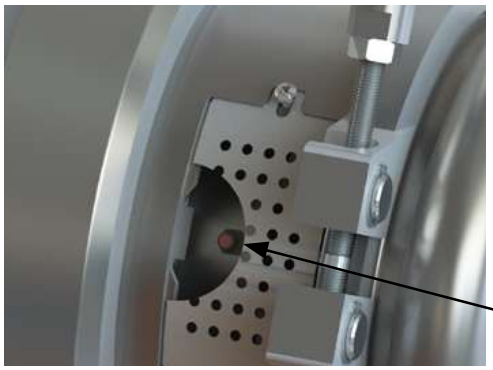
16.1 - SERIES CSM BEARINGS MAINTENANCE

In CSM series pumps up to motor size 132 (5.5 - 9.2 kW) the bearings installed are shielded and consequently do not need to be lubricated.

16.2 - BEARINGS MAINTENANCE FOR CSM-CSMX SERIES PUMPS WITH HOUSING SIZE 160-200

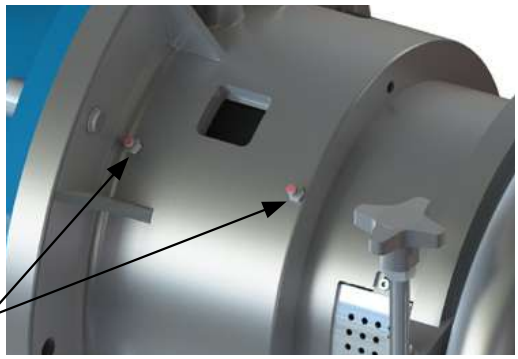
The bearings of CSM - CSMX pumps are sized for an operational life of 20,000 service hours or more.
The life of the bearing and feasible re-lubrication interval may be reduced in the following cases: harsh working conditions (high ambient temperature and humidity, dust, aggressive atmosphere), use with frequent starting and stopping cycles and/or at variable loads and extended periods of inactivity.
Maintenance intervals are therefore to be established according to the conditions of use and based on acquired experience.

"CSM" series pumps (Fig. 5)



Grease nipples

"CSMX" series pumps (Fig. 6)



In CSM series pumps with housing size 160 ÷ 200 (11 ÷ 22 kW), the bearings must be lubricated periodically; to ensure correct lubrication, the bearing must be disassembled, cleaned thoroughly and lubricated with fresh grease, making sure only to fill the crowns to half their volume. They can be topped-up with grease periodically via the grease nipple on the bearing housing (see fig.5 - fig.6).
Each time the bearing is disassembled, replace the grease lip seal (pos.25 for CSM pumps and pos. 206-207 for CSMX pumps, split lip seal), making sure the seat of the seal is not worn.
To lubricate the bearings correctly, you are recommended to use high performance grease of SKF LGHP2 with temperature range -30°C/150°C.

The following table provides indications on the re-lubrication interval on the amount of grease to be used and the type of bearing on the pump:

CSM-CSMX PUMP		CSM 41-210 CSM 51-210	CSM 42/43/44-175 CSM 52/53/54-175 CSM 61-210 CSM 81-210 CSM 51-260	CSMX 44-175 CSMX 53/54-175 CSMX 61-210 CSMX 81-210 CSMX 51-260
Motor IEC 160/180	Bearing	3212 A C3	3214 A C3	---
IEC 200 motor 30 kW 2 poles (CSX with 2 bearings)	Bearing	---	---	C 2216
	Bearing	---	---	6216 A

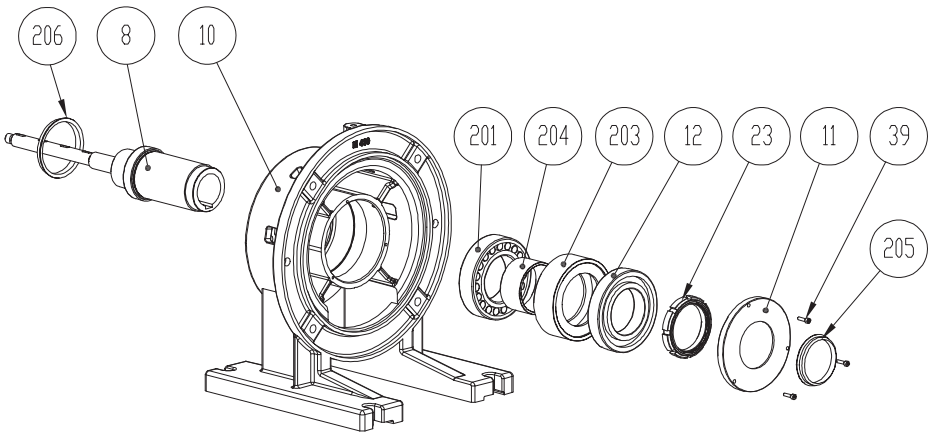
CSM-CSMX PUMP	CSM 41-210 CSM 51-210	CSM 42/43/44-175 CSM 52/53/54-175 CSM 61-210 CSM 81-210 CSM 51-260	CSMX 44-175 CSMX 53/54-175 CSMX 61-210 CSMX 81-210 CSMX 51-260	Lubrication interval (service hours)	Q.ty grease (grams)
IEC 200 motor 30 kW 2 poles (CSX with 2 bearings)	---	---	Bearing C 2216	1500** ÷ 500***	
	---	---	Bearing 6216 A		18

** Bearing temperature < 60°C and low level of contamination.
*** Bearing temperature > 60°C and medium level of contamination.

17.0 - DISASSEMBLY OF THE CSMX PUMP SUPPORT

After disassembling the pump group as described in chapter 14.0, proceed with disassembly of the "X" version support:

1. Remove the V-ring (205) from the shaft (8) and unscrew the screws (39) which allow you to separate the bearing cover (11) from the housing (10).
2. Unscrew the ring nut (23) and, in sequence, extract the roller bearing (12), the outer bearing spacer (203) and the inner spacer (204), and the ball bearing (201).
3. Remove the V-ring (206) and extract the shaft (8) from the support (10).



18.0 - ASSEMBLY OF THE CSMX PUMP SUPPORT

Perform the disassembly steps described in the previous chapter in reverse order to reassemble the bearings housing.

19.0 - CLEANING PROCEDURE



Use suitable personal protective equipment during cleaning operations.

19.1 - EXTERNAL CLEANING

Periodically clean the external parts of the pump and motor to prevent dust and deposits building up which could reduce heat dissipation and/or damage the external surfaces.

19.2 - CLEANING OF INTERNAL PARTS

Before performing any maintenance work which requires disassembly of the pumping parts, carry out internal cleaning by running the pump with washing fluids compatible with the pumped fluid and the pump itself.
If the pump needs to be sent C.S.F. Inox for maintenance/repair work, fill in the Declaration of Decontamination.

19.3 - CLEANING OF FOOD-CONTACT PUMPS



When a pump is intended to handle food products, it must be perfectly clean before it is put into operation.

This can be achieved by performing a CIP (cleaning in place) washing procedure or by disassembling the pumping part for manual cleaning.
It is up to the user to choose the most suitable cleaning method based on the type of food product being handled and the processing stage in which the pump is used.
In the case of CIP, the user is responsible for selecting the necessary detergents, operating temperatures and detergent product concentrations based on the type of food product being pumped.
The duration of each step in the CIP washing cycle depends on the type of dirt/residue that needs removing.
It is important to check the compatibility of the chemical products and operating temperatures used in the washing cycle with the pump components specified in the data sheet (elastomers, mechanical seal).
The cleaning process must also be carried out in the following situations:
- Before a long period of non-use
- Before any disassembly operations for maintenance work and after subsequent reassembly if worn parts have been replaced.
- Before restarting after a long period of non-use.
- At intervals established by the user based on the characteristics of the pumped products and the type of process in which the pump is used, in order to guarantee food product hygiene.

It is the user's responsibility to verify the effectiveness of the cleaning procedure adopted.

Alkaline detergents:
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).

19.4 - CIP WASHING PROCEDURE

A typical example of a CIP washing procedure is described below:

4. Prerinse with cold water (15-25°C) for 10-15 minutes to remove any residue.
5. Warm prerinse with water at 45-60°C for 10 minutes.
6. Rinse with alkaline solution at 70-80°C for 20-30 minutes.
7. Intermediate rinse with water (warm or cold) up to 60°C for 5-10 minutes.
8. Rinse with acid solution like nitric acid for 10 – 15 minutes at ambient temperature.
9. Final rinse with cold water for 10-15 minutes or until any traces of cleaning agent have been removed.

CAUTION:

- During the CIP process there are thermal expansion: take care that there are not rapid temperature variations.
- It is advisable to perform washing keeping the flow speed in the suction port at at least 1.5 m/s.
- Chemical agents at high temperature can cause potential health risk: respect the safety regulation and use protection devices.
- Control the concentrations and temperature of chemical agents during the CIP.
- Store the cleaning agents in compliance with the safety regulations.

Sterilization:

If requested, sterilization can be carried out by means of hot water or steam; the pump must be stopped during the sterilization process with steam.
The pump should be ordered based on the high temperatures.
See the admissible temperature for sterilization depending on gasket compound.

Elastomers / temperature limits	Steam/hot water	Chemical bactericidal
EPDM	121°C	82°C
FPM/FKM	140°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 cap nut using steam at 143°C for 30 minutes in an autoclave or using chemicals (for example glutaraldehyde-based solutions). Do not use chlorine solutions because stainless steel could be damaged by corrosion.

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 processyour 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:_____ [m^3/h] Viscosity:_____ [mm^2/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 returningitem/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

.....

20.0 - 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.

20.1 - 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.

20.2 - 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.

20.3 - 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 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, shaft, impeller nut: AISI 316L stainless steel (for special alloy pumps, see the bill of materials)
- Elastomers/Polymers NBR-EPDM-FKM-FFKM-PTFE
- Support and external parts: AISI 304, cast iron with corrosion proof treatment
- Other components: composite mechanical seals, stainless steel and elastomers, ball and roller bearings.
- Motor: Aluminium - Cast Iron - Copper (consult the manual supplied by the manufacturer)
- Spend oils and greases

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.

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

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:

CENTRIFUGAL 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.

2014/35/EU : electrical material intended for use within certain voltage limits.

Montecchio Emilia, XX-XX-XX

The Chairman Mr. Rolando Paterlini

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Colly Flowtech offers one of the market's widest ranges of flow technology for industry. We offer everything from pumps, homogenisers, industrial hoses and heat exchangers to stainless steel piping systems, valves, couplings, quick-connect fittings and filter solutions. With both standard products and customised solutions, we help industry create safe, efficient and reliable flow systems.

























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