



INSTALLATION, SERVICE AND MAINTENANCE INSTRUCTIONS

HYGINOX SEN



01.013.32.0001

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EC Declaration of Conformity

The manufacturer: **INOXPA, S.A.**
c/ Telers, 57
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herewith declares that the machine:

HYGINOX SEN centrifugal pump

with the serial number: _____

conforms to the relevant provisions of the following directives:

Machinery Directive 2006/42/EC (RD 1644/2008)
Low voltage Directive 2006/95/EC
Electromagnetic Compatibility Directive 2004/108/EC

Applicable harmonised Standards:

UNE-EN ISO 12100:2012
UNE-EN 809:1999+A1:2010

Identification of the person empowered to draw up the Declaration on behalf of the manufacturer, and qualified to compile the technical file established by the Community:

Banyoles, 2April 2014

A handwritten signature in black ink, appearing to read 'David Reyer Brunet', is written over a light gray rectangular background.

David Reyer Brunet
Technical Office Manager

1. Safety

1.1. INSTRUCTION MANUAL

This manual contains information regarding the reception, installation, operation, assembly, disassembly and maintenance of the HYGINOX SEN pump.

The information published in this instruction manual is based on updated data.

INOXPA reserves the right to modify this instruction manual without prior notice.

1.2. INSTRUCTIONS FOR START-UP

This instruction manual contains essential and useful information for the correct handling and maintenance of your pump.

Carefully read the instructions prior to starting the pump, familiarise yourself with the installation, operation and correct use of the pump and strictly follow the instructions. These instructions must be kept in a safe location near the installation area.

1.3. SAFETY

Warning symbols



Danger for people in general



Danger of injury caused by rotating equipment parts



Electrical hazard



Danger! Caustic or corrosive agents



Danger! Suspended loads



Danger to the correct operation of the equipment



Mandatory to ensure safety at the workplace



Mandatory use of safety goggles

1.4. GENERAL SAFETY INSTRUCTIONS



Read the instruction manual carefully before installing and starting the pump. If in doubt, please contact INOXPA.

During the installation



The *Technical Specifications* in Chapter 8 shall always be observed.

Never start the pump before connecting it to the pipework.

Do not operate the pump if the pump cover is not fitted.

Check for correct specifications of the motor, especially if its working conditions create an explosion hazard.



During the installation, all the electrical work must be carried out by authorised personnel.

During operation



The *Technical Specifications* in Chapter 8 shall always be observed. The specified limit values shall NEVER be exceeded under any circumstance.

NEVER touch the pump or the pipework during operation if the pump is being used for transferring hot liquids or during cleaning.



The pump contains moving parts. NEVER place your fingers inside the pump during operation.



NEVER operate with the suction and discharge valves closed.

NEVER spray water directly on the electrical motor. The standard motor protection is IP-55: protection against dust and water spray.

During maintenance



The *Technical Specifications* in Chapter 8 shall always be observed.

NEVER disassemble the pump until the pipes have been emptied. Remember that liquid will always remain inside the pump's body (if it does not have a purge). Bear in mind that the liquid being pumped may be hazardous or extremely hot. Consult the regulations in effect in each country for these cases.

Do not leave loose parts on the floor.



ALWAYS disconnect the electrical power to the pump prior to carrying out any maintenance. Remove the fuses and disconnect the cables from the motor terminals.

All electrical work must be carried out by authorised personnel.

Compliance with the instructions

Any failure to comply with the instructions may impose a risk to the operators, the environment and the machine, and may ultimately result in the loss of any right to claim damages.

This non-compliance may result in the following risks:

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

Warranty

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

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

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



The machine may not undergo any modification without prior approval from the manufacturer. For your safety, only use original spare parts and accessories.

The usage of other parts will relieve the manufacturer of any liability.

Changing the service conditions is only possible with prior written authorisation from INOXPA

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

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3. General Information

3.1. DESCRIPTION

HYGINOX SEN is a range of close-coupled centrifugal pumps with hygienic design, suitable for use in the dairy, beverage, and food processing industry in general.

This single-stage horizontal pump has a circular body with axial suction and tangential discharge. The main pump components are: body, impeller, cover, lantern and a shaft which is rigidly coupled to the motor shaft.

The pump is driven by a NEMA Premium Efficiency C face motor.

3.2. APPLICATION

As a general rule, the most common application of HYGINOX SEN pumps in their standard version is in the food processing industry, mainly to transfer liquids.

For each type of the pump, the hydraulic performance is given by the choice of impeller diameters and speeds. The characteristic curves also show the power and NPSH requirements. The intended use of the pump is defined by its characteristic curve and operating limits provided in the Technical Specifications section.



Misuse of the pump or its use beyond the operating limits may be dangerous or cause permanent damage to the equipment.

4. Installation

4.1. RECEPTION OF THE PUMP

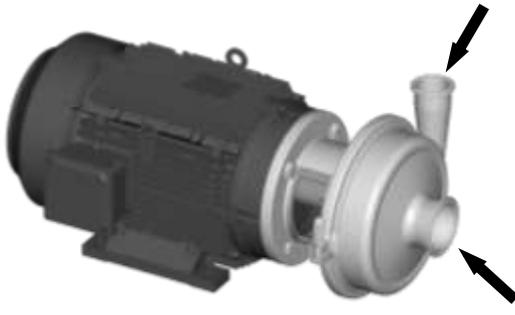


INOXPA will not be liable for any deterioration of the material due to transport or unpacking. Visually check that the packaging has not been damaged.

The following documentation is included with the pump:

- Shipping documents
- Instructions and Servicing manual for the pump.
- Instructions and Servicing manual for the motor (*).
- (*) If the pump has been supplied with a motor from INOXPA.

Unpack the pump and check the following:



- The suction and discharge connections on the pump, removing any remaining packaging material.
- Check that the pump and motor have not suffered any damage.
- If not in good material condition and/or if not all the parts are included, the shipping carrier should submit a report as soon as possible.

Identification of the pump

Each pump has a nameplate with the basic data required to identify the model.



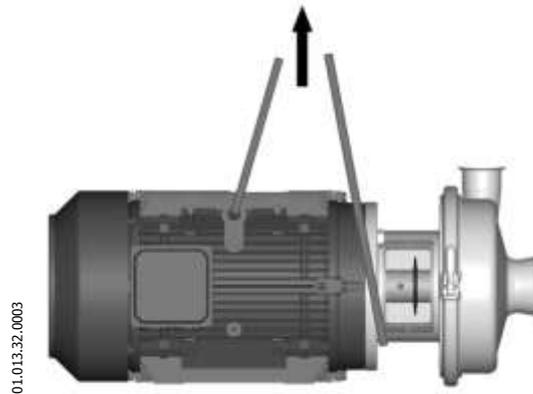
Pump plate

4.2. HANDLING AND STORAGE



HYGINOX SEN pumps are too heavy to be handled and stored manually.

Lift the pump as indicated below:



ATTENTION!

Always remove the motor shroud before hoisting.

4.3. LOCATION

Place the pump in a position that allows enough space around it to provide access to the pump as well as to the motor. (See the Technical Specifications for dimensions and weights).

Place the pump on a flat and level surface.



Install the pump so as to allow proper ventilation.

If the pump is installed outdoors, it must be sheltered under a roof. Its location must allow for easy access during any inspection or maintenance tasks.

4.4. PIPES

- As a general rule, install the suction and discharge pipes in straight sections, with the minimum possible number of bends and fittings in order to reduce as much as possible any pressure losses that may be caused by friction.
- Make sure that the pump's ports are properly aligned with the pipework and have a diameter similar to that of the pump connections.
- Place the pump as close as possible to the suction tank, if possible below the fluid level, or even below the tank, in order to achieve the largest possible static head for suction.
- Install support brackets for the pipes as close as possible to the pump's suction and discharge ports.

Shut-off valves

The pump may be isolated for maintenance. To accomplish this, shut-off valves must be installed and connected to the pump's suction and discharge connections.

These valves must ALWAYS be open during operation of the pump.

4.5. ELECTRICAL INSTALLATION



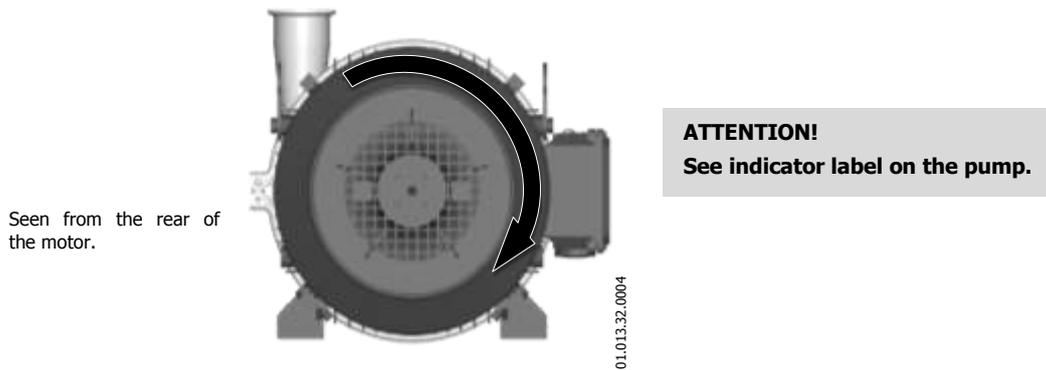
The connection of the electrical motors must be performed by qualified personnel.
Take the necessary precautions to prevent damage to cables and connections.



Electrical equipment, terminals and components of the control systems may still bear electrical current when they are disconnected. Contact with them may be dangerous for operators or cause irreversible damage to equipment.

Prior to handling the pump, make sure that the electrical panel is disconnected.

- Connect the motor in accordance with the instructions supplied by the motor manufacturer.
- Check the direction of rotation.



Start and stop the pump motor momentarily. Make sure, looking at the pump from behind, that the motor fan rotates in a clockwise direction.



ALWAYS check the direction of rotation of the motor with liquid inside the pump.

5. Starting the pump



Prior to starting the pump, carefully read the instructions in Chapter 4. *Installation*.

5.1. STARTING THE PUMP



Carefully read Chapter 8. *Technical Specifications*. INOXPA cannot be held responsible for the improper use of the equipment.



NEVER touch the pump or the pipes if hot liquids are being pumped.

Checks before starting up the pump

- Fully open the shut-off valves on the suction and discharge pipes.
- If liquid does not flow into the pump, fill it with the liquid to be pumped.



The pump must NEVER rotate without a liquid inside it.

- Check that the direction of rotation of the motor is correct.

Checks to be carried out when starting up the pump

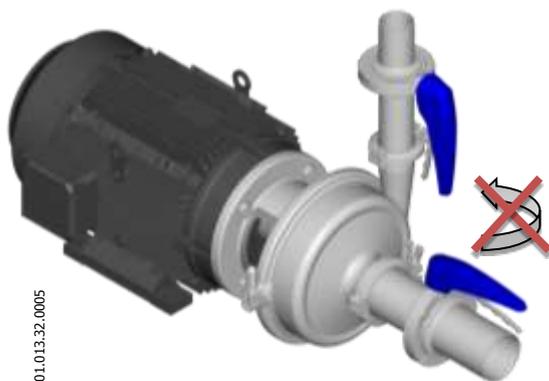
- Check that the pump is not making any strange noises.
- Check if the absolute inlet pressure is sufficient to prevent cavitation in the pump. Check the curve to determine the minimum pressure required above the vapour pressure (NPSHr).
- Control the discharge pressure.
- Check that there are no leaks through the sealed areas.



Do not use a shut-off valve to regulate the flow in the suction pipe. All shut-off valves must be fully open during operation.



Control the motor consumption to prevent an electrical overload.



Reduce the flow rate and the electrical power consumed by the motor:

- by regulating the pump's discharge flow.
- by decreasing the motor speed.



When the sound pressure level in the operating area exceeds 80 dB(A), appropriate personal protective equipment must be used.

6. Operating problems

The following table provides solutions to problems that may arise while operating the pump. It is assumed that the pump has been properly installed and that it has been selected correctly for the specific application. Please contact INOXPA if technical assistance is required.

Motor overload.								
↓	The pump flow or pressure is insufficient.							
↓	There is no pressure on the discharge side.							
↓	Uneven discharge flow rate / pressure.							
↓	Noise and vibrations.							
↓	The pump gets clogged.							
↓	Pump overheated.							
↓	Abnormal wear.							
↓	The mechanical seal leaks.							
↓				PROBABLE CAUSES		SOLUTIONS		
•	•	•	•	•	Wrong direction of rotation	Reverse the direction of rotation		
•	•	•	•	•	Insufficient NPSH	Raise the suction tank. Lower the pump. Reduce the vapour pressure. Widen the diameter of the suction pipe. Shorten and simplify the suction pipe.		
•	•	•	•	Pump not purged		Purge or fill		
•	•	•	•	Cavitation		Increase the suction pressure.		
•	•	•	•	•	The pump sucks in air	Check the suction pipe and all of its connections		
•	•	•	•	•	Suction pipe obstructed	Check the suction pipe and the filters, if available		
•	•	•	•	•	Discharge pressure too high	If necessary, reduce the pressure losses, for example, by increasing the pipe diameter.		
•	•	•	•	•	Flow rate too high	Reduce the flow by means of a diaphragm. Partially close the discharge valve. Trim the impeller. Decrease speed		
•	•	•	•	•	Viscosity of the liquid too high	Reduce the viscosity, for example, by heating the liquid		
•	•	•	•	•	Liquid temperature is too high	Decrease the temperature by cooling the liquid		
•	•	•	•	•	Mechanical seal worn or damaged	Replace the seal		
•	•	•	•	•	Inadequate O-rings for the liquid	Install the correct O-rings after consulting the supplier		
•	•	•	•	•	The impeller scrapes	Lower the temperature Reduce the suction pressure. Adjust the impeller/cover play.		
•	•	•	•	•	Tension in the pipes.	Connect the pipes to the pump without tension		
•	•	•	•	•	Foreign matter in the liquid	Install a filter in the suction pipe		
•	•	•	•	•	Mechanical seal spring tension is too low	Adjust as indicated in this manual		

7. Maintenance

7.1. GENERAL CONSIDERATIONS

This pump, just like any other machine, requires maintenance. The instructions in this manual cover the identification and replacement of spare parts. The instructions are aimed at maintenance personnel and those responsible for the supply of spare parts.



Carefully read Chapter 8. [Technical Specifications](#).



ALWAYS disconnect the pump before beginning any maintenance work.

Check the mechanical seal

Periodically check that there are no leaks around the shaft. If leakage is detected through the mechanical seal, replace it following the instructions in the section [Assembly and Disassembly](#).

7.2. STORAGE

Before storing the pump it should be completely drained. Prevent as far as possible exposing the parts to excessively humid environments.

7.3. CLEANING



The use of aggressive cleaning products such as caustic soda and nitric acid may burn the skin.

Wear rubber gloves during all cleaning procedures.



Always wear protective goggles.

CIP (Clean-in-Place) cleaning

If the pump is installed in a system with a CIP process, its disassembly will not be required.

If an automatic cleaning process is not available, disassemble the pump as indicated in the section [Assembly and Disassembly](#).

Cleaning solutions for CIP processes.

Only use clear water (chlorine-free) to mix with the cleaning agents:

a) Alkaline solution: 1% by weight of caustic soda (NaOH) at 70°C (150°F)

1 kg NaOH + 100 litres of water = cleaning solution

or

2.2 litres of 33% NaOH + 100 litres of water = cleaning solution

b) Acid solution: 0.5% by weight of nitric acid (HNO₃) at 70°C (150°F)

0.7 litres of 53% HNO₃ + 100 litres of water = cleaning solution



Check the concentration of the cleaning solutions; incorrect concentrations may lead to deterioration of the pump seals.

To remove any traces of cleaning products, ALWAYS perform a final rinse with clean water at the end of the cleaning process.

SIP (Sterilization-in-Place) cleaning

Sterilization with steam is applied to all equipment including the pump.

Do NOT use the equipment during the steam sterilization process.

The parts/materials will not be damaged if the indications specified in this manual are observed.



Make sure that no cold liquid enters the system until the temperature of the pump is lower than 60°C (140°F).

The pump generates an important pressure loss through the sterilization process. We recommend the use of a branch circuit with a discharge valve to ensure that steam / superheated water sterilizes the integrity of the circuit.

Maximum conditions during the SIP process with steam or overheated water

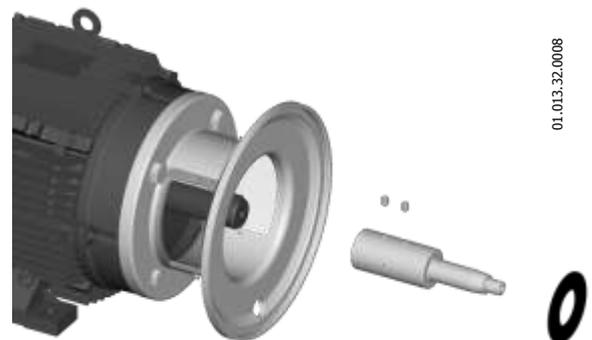
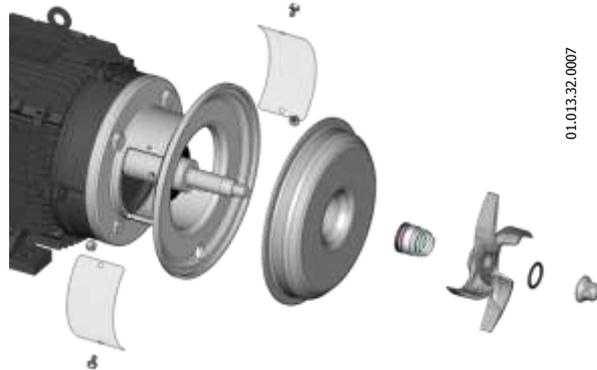
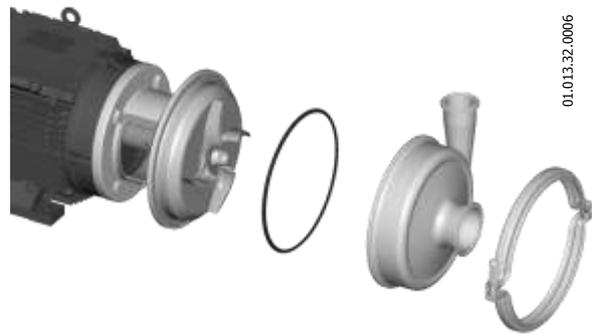
- a) **Max. temperature:** 140°C / 284°F
- b) **Max. time:** 30 min
- c) **Cooling:** Sterile air or inert gas
- d) **Materials:** EPDM
FPM

7.4. ASSEMBLY / DISASSEMBLY OF THE PUMP

Pump and mechanical seal

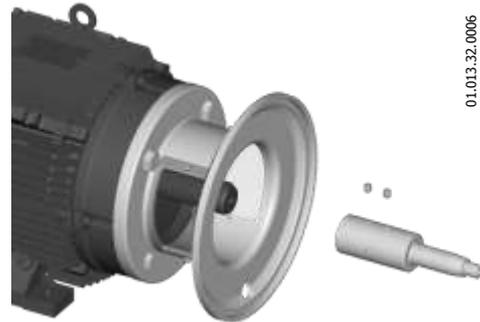
⇒ Disassembly

1. Remove the clamping ring (15) and disassemble the pump casing (01).
2. Check the condition of the O-ring (80A) on the pump body and replace it if damaged.
3. Remove the screws (50A) and the lantern protections (47A).
4. Introduce a pin in the hole in the shaft (05) to prevent the shaft from rotating.
5. Remove the impeller nut (45) to release the O-ring (80D).
6. Pull out the impeller (02). If necessary, hit it with a dead blow using a plastic mallet in order to disengage the cone.
7. Remove the rotating part of the mechanical seal (08A) from the rear side of the impeller (02).
8. Remove the pump cover (03) from the lantern (04).
9. Manually remove the stationary part of the mechanical seal (08A) which is located in the pump cover (03).
10. Remove the splash ring (82) from the shaft (05).
11. Loosen the studs (55) on the shaft (03) in order to separate the shaft (03) from the motor (93).

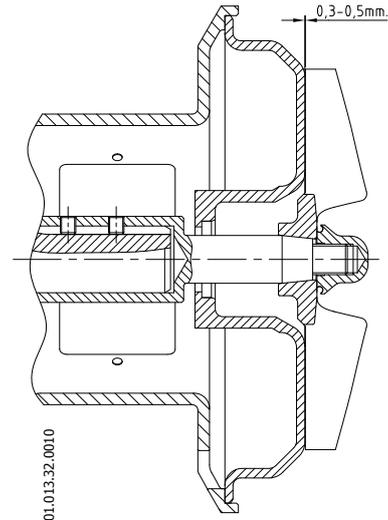


← **Assembly**

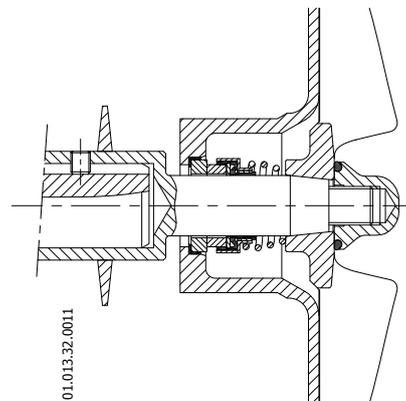
1. Fit the shaft (03) on the motor (93).
2. Secure the shaft (03) to the motor (93) with the studs (55), leaving it slightly loose to allow positioning the impeller (02) relative to the cover (03).



3. Hold the cover (03) on the lantern (04) with the hand.
4. Fit the impeller (02) on the shaft, secure it with the nut (45) and check the mounting position with a feeler gauge.
5. Firmly tighten the studs (55) securing the shaft (03) to the motor (93).
6. Unscrew the nut (45) and remove the impeller (02) and the cover (03).

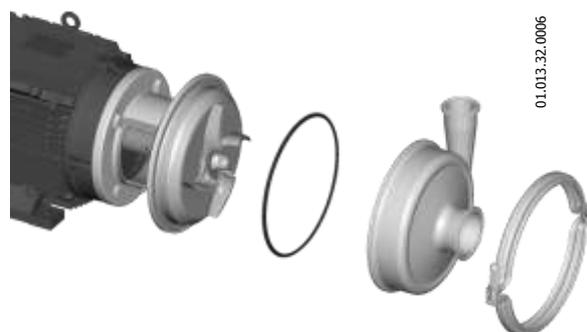


7. Fit the splash ring (82) on the shaft (03).
8. Place the stationary part of the mechanical seal (08A) on the cover (03).
9. Install the cover (03) on the lantern (04).
10. Slide the rotating part of the mechanical seal (08A) over the shaft (03) and install the impeller (02).
11. Place the O-ring (80D) on the nut (45) and secure the impeller (02) with the nut (45).



ATTENTION! When installing the new mechanical seal, use soapy water when fitting the different parts and gaskets to allow them to slide better; apply to the stationary part on the cover as well as the rotating parts on the shaft.

12. Place the O-ring (80A) on the cover (03) making sure it is not twisted.
13. Install the body (01) and secure it to the Lantern (04) using the clamp ring (15); firmly tighten the clamp nut.



8. Technical Specifications

8.1. TECHNICAL SPECIFICATIONS

Maximum operating pressure	1000 kPa (10 bar)
Temperature range	- 10 to 120 °C (EPDM)
Maximum speed	3000 rpm (50 Hz) 3600 rpm (60 Hz)

Materials

Parts in contact with the product	AISI 1.4404
Other steel parts	AISI 304 L (1.4306)
Seals in contact with the product	EPDM (standard) FPM (ask for other materials)
Exterior surface finish	Bright polished
Interior surface finish	Polished Ra<0,8 µm

Mechanical seal

Type	Single internal seal
Material rotary part	Graphite (C) (standard) Silicon carbide (SiC)
Material stationary part	Silicon carbide (SiC) (standard)
Seal material	EPDM (standard) FPM

Motor

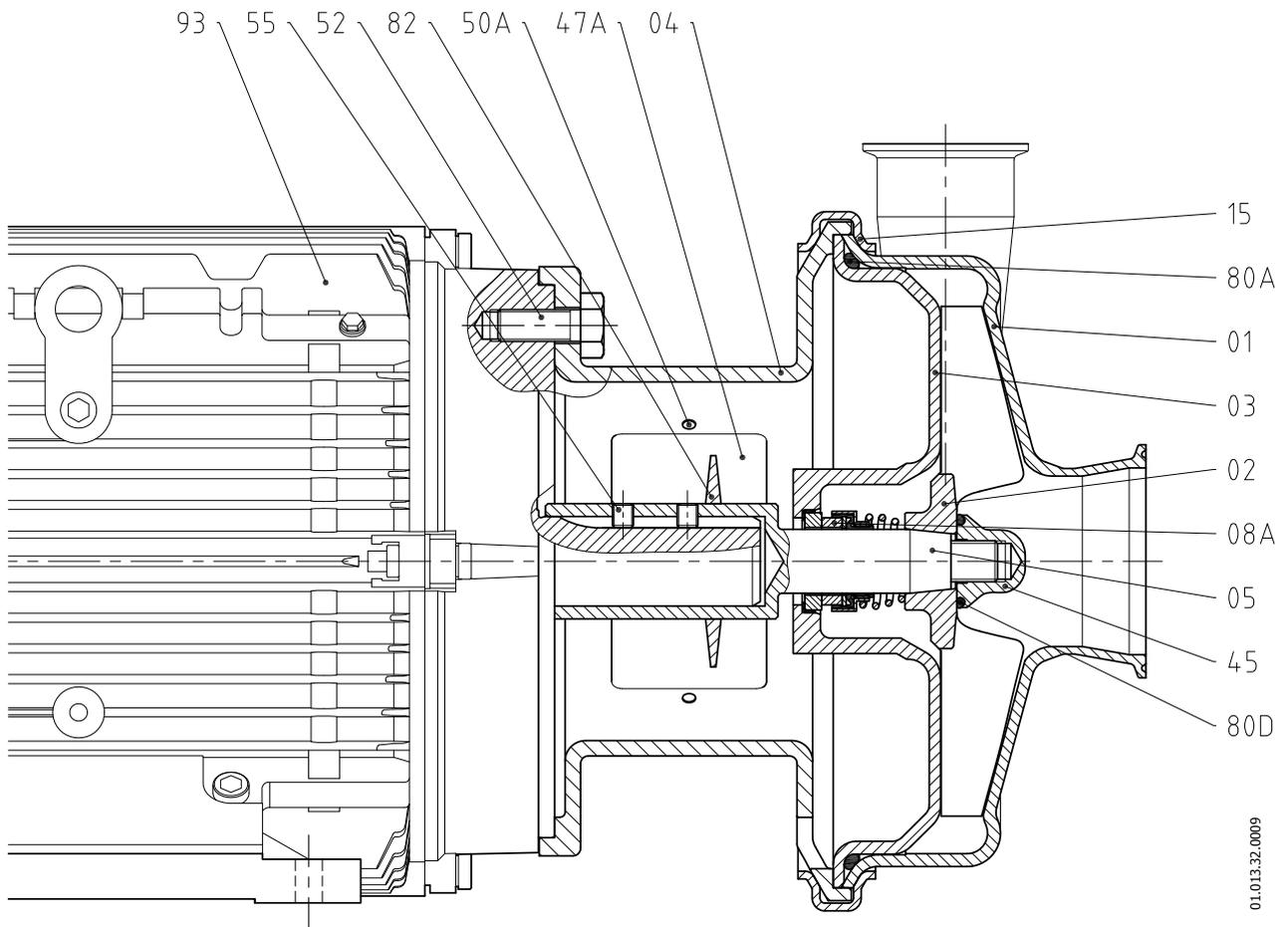
Type	Three-phase asynchronous motor, NEMA C Face, 2 or 4 poles, IP55 protection, class F insulation
Power	1HP to 30HP
Voltage and frequency	208-230 V / 460 V, 60 Hz

8.2. TIGHTENING TORQUES

If not stated otherwise, the torques listed in the following table should be applied on the nuts and bolts of this pump.

Size	Nm	lbf·ft
M6	10	7
M8	21	16
M10	42	31
M12	74	55
M16	112	83

8.3. CROSS SECTION HYGINOX SEN



8.4. PARTS LIST HYGINOX SEN

Item	Description	Quantity	Material
01	Pump housing	1	AISI 316L
02	Impeller	1	AISI 316L
03	Pump cover	1	AISI 316L
04	Lantern	1	AISI 304
05	Shaft	1	AISI 316L
08A	Mechanical seal	1	-
09	Seal cover	1	AISI 316L
15	Clamp body	1	AISI 304
45	Cap nut	1	AISI 316L
47A	Lantern protection	2	PETP
50A	Protector screw	4	A2
52	Hexagonal screw	4	A2
55	Threaded stud	2	A2
80A	O-ring	1	EPDM
80D	O-ring	4	EPDM
82	Splash ring	1	-
93	Motor	1	-

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