

INSTALLATION, SERVICE AND MAINTENANCE INSTRUCTIONS

# CENTRIFUGAL PUMP

# HYGINOX SE



01.011.32.0015



# EC Declaration of Conformity

We,

**INOXPA, S.A.U.**

Telers, 60  
17820 – Banyoles (Girona)

Hereby declare under our sole responsibility that the machine

## **CENTRIFUGAL PUMP**

Designation

**HYGINOX SE**

Type

**HYGINOX SE-15, HYGINOX SE-20, HYGINOX SE-26, HYGINOX SE-28,  
HYGINOX SE-35, HYGINOX SE-36**

From serial number **IXXXXXX** to **IXXXXXX** <sup>(1)</sup> / **XXXXXXXXXXIIN** to **XXXXXXXXXXIIN** <sup>(1)</sup>

Fulfills all the relevant provisions of the following directive:

### **Machinery Directive 2006/42/CE**

Applicable harmonized standards:

**EN ISO 12100:2010**

**EN 809:1998+A1:2009/AC:2010**

**EN 60204-1:2006+A1:2009**

The technical file has been prepared by the signer of this document in INOXPA.

Signed by and on behalf of INOXPA S.A.U.



David Reyero Brunet  
Technical Office Manager

Banyoles, September 30, 2019

<sup>(1)</sup> The serial number may be preceded by a slash and by one or two alphanumeric characters

# 1. Table of Contents

<b>1. Table of Contents</b>	
<b>2. Generalities</b>	
2.1. Instructions manual.....	4
2.2. Compliance with the instructions .....	4
2.3. Warranty .....	4
<b>3. Safety</b>	
3.1. Warning symbols .....	5
3.2. General safety instructions .....	5
<b>4. General Information</b>	
4.1. Description.....	6
4.2. Application .....	6
<b>5. Installation</b>	
5.1. Reception of the pump.....	7
5.2. Identification of the pump.....	7
5.3. Transport and storage .....	8
5.4. Location .....	8
5.5. Pipes.....	9
5.6. Electrical installation .....	9
<b>6. Start-up</b>	
6.1. Checks before starting the pump .....	10
6.2. Checks when starting the pump.....	10
<b>7. Troubleshooting</b>	
<b>8. Maintenance</b>	
8.1. General considerations.....	13
8.2. Check the mechanical seal .....	13
8.3. Tightening torque.....	13
8.4. Storage .....	13
8.5. Cleaning.....	13
8.6. Dissassembly and assembly of the pump .....	15
<b>9. Technical Specifications</b>	
9.1. Noise level .....	17
9.2. Weight.....	18
9.3. Dimensions.....	18
9.4. Exploded drawing of Hyginox SE pump.....	20
9.5. Parts list of Hyginox SE pump .....	21

## 2. Generalities

### 2.1. INSTRUCTIONS MANUAL

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

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

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

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

### 2.2. COMPLIANCE WITH THE INSTRUCTIONS

Not following the instructions may impose a risk for the operators, the environment and the machine, and may result in the loss of the 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.

### 2.3. WARRANTY

Any warranty will be void immediately and lawfully and, additionally, INOXPA will 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 original INOXPA parts and products,
- the material or equipment has been improperly used, has been used negligently, or has not been used according to the instructions and their intended,
- the pump parts are damaged because they have been subjected to high pressure due to not having used a safety valve.

The General Conditions 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 can only be carried out with prior written authorization 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.)

# 3. Safety

## 3.1. WARNING SYMBOLS



Safety hazard for people in general and/or for equipment



Electric hazard

### ATTENTION

Important instruction for the protection of the equipment and its functions

## 3.2. GENERAL SAFETY INSTRUCTIONS



Read the instruction manual carefully before installing and starting the pump. Contact INOXPA in case of doubt.

### 3.2.1. During the installation

The [Technical Specifications of chapter 9](#) should always be observed.



Never start the pump before connecting it to the lines.

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

Check for proper specifications of the motors, especially if its working conditions create an explosions hazard.



During the installations, all the electric work should be carried out by authorized personnel.

### 3.2.2. During operation

The [Technical Specifications of chapter 9](#) should always be observed. Under no circumstances can the specified limit values be exceeded.



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 IP55: protection against dust and water spray.

### 3.2.3. During maintenance

The [Technical Specifications of chapter 9](#) shall always be observed.



NEVER disassemble the pump until the pipes have been emptied. Remember that liquid will remain inside the pump's pump casing (if does not have a purge). Bear in mind that the pumped liquid 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 pumps prior to carrying out any maintenance.

Remove the fuses and disconnect the cable from the motor's terminals.

All electrical work must be carried out by authorized personnel

# 4. General Information

## 4.1. DESCRIPTION

HYGINOX SE is a range of close-coupled centrifugal pump with hygienic design. This single-stage horizontal pump has a circular casing with axial suction and tangential discharge. The main pump components are pump casing, impeller, cover, lantern and a shaft which is rigidly coupled to the motor shaft.

The standard IEC motor of type IM B34 is protected by a stainless steel shroud and provided with a height adjustable stainless steel legs.

## 4.2. APPLICATION

As a general rule, HYGINOX SE pumps in their standard versions are used in the food 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 [9. Technical Specifications](#).

### ATTENTION



The range of application for each type of pump is limited. The pump was selected for a given set of pumping conditions when the order was placed. INOXPA shall not be liable for any damage resulting from the incompleteness of the information provided by the purchaser (nature of the fluid, RPM, etc.).

# 5. Installation

## 5.1. RECEPTION OF THE PUMP



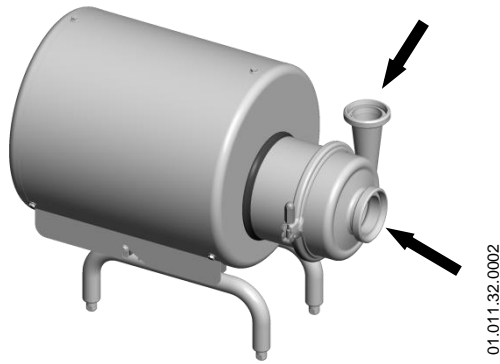
INOXPA cannot be held responsible for the damage sustained by the equipment during transport or unpacking. Please visually check that the packaging is not damaged.

The pump package includes the following documents:

- shipping documents,
- installation, service and maintenance instructions manual,
- instructions and service manual of the motor<sup>1</sup>.

Unpack the pump and check the following:

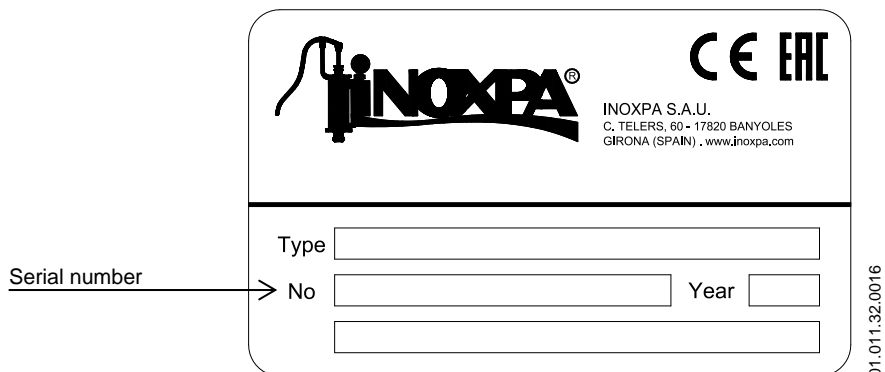
- The suction and discharge connections of the pump, removing any rest of packaging materials,



- The pump and the motor are not damaged,
- If the equipment is not in good condition and/or any part is missing, the carrier should report accordingly as soon as possible.

## 5.2. IDENTIFICATION OF THE PUMP

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



<sup>1</sup> If the pump has been supplied with a motor from INOXPA

### 5.3. TRANSPORT AND STORAGE

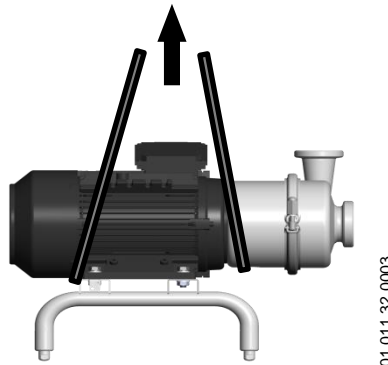
#### ATTENTION



The HYGINOX SE pumps are often too heavy to be stored manually. Use an appropriate means of transport. Use the points which are indicated in the drawing for lifting the pump. Only authorized personnel should transport the pump. Do not work or walk under the heavy loads.

Lift the pump as indicated below:

- Always use two support points placed as far apart as possible.



#### ATTENTION



Always remove the motor shroud before hoisting

- Secure the supports so that they will not move.

See chapter 9. [Technical Specifications](#) to consult dimensions and weights.

#### ATTENTION



During the transport, disassembly or assembly of the pump, there is a risk of loss of stability and that the pump could fall down and cause damages to the operators. Make sure that the pump is properly supported.

### 5.4. LOCATION

Place the pump in position that allows enough space around it to provide access to the pump as well as to the motor. See chapter 9. [Technical Specifications](#) to consult dimensions and weights.

#### ATTENTION



Install the pump so as to allow proper ventilation. If the pump is installed outdoors, it should be covered by a roof. Its location should allow easy access for inspection or maintenance operations.

#### 5.4.1. Excessive temperatures

Depending on the fluid to be pumped, high temperatures can be reached inside and around the pump.





Over 68°C the operator should take protective measures and place warning notices advising of the danger which exists if the pump is touched.

The type of protection selected should not isolate the pump entirely. It should allow for the bearings to be cooled more efficiently and for the bearings to be lubricated.

## 5.5. PIPES

- As a general rule, install the suction and discharge lines in straight sections, with the minimum possible number of elbows and fittings in order to reduce 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 and whenever possible below the liquid level, or even below the tank level in order to achieve the largest possible static head for suction.
- Install support brackets for the lines as close as possible to the pump's suction and discharge ports in order to avoid vibrations and stress on the pump.

### 5.5.1. 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.



#### ATTENTION

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

## 5.6. ELECTRICAL INSTALLATION



Only qualified personnel can connect the electric motors.

Take the necessary measures to prevent damage to cables and connections.

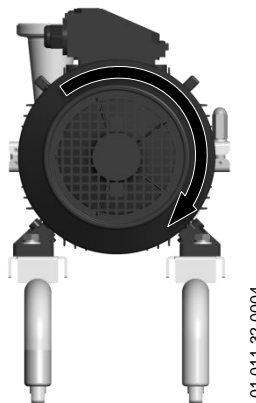


Electrical equipment, terminals and components of the control systems may still carry current when they are disconnected. Contacting them may impose a hazard to operators or cause irreparable material damage.

Before handling the pump, make sure that the motor is stopped.

- Connect the motor in accordance with the instructions supplied by the motor manufacturer, in accordance with the current national legislation and in compliance with EN 60204-1.
- Check the direction of rotation (see the signalling label on the pump).
- Start and stop the pump motor momentarily. Make sure that the direction of rotation is correct. If the pump rotates in the wrong direction it could cause serious damage.

See from the rear of the motor



#### ATTENTION

See indicator label on the pump.

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



## 6. Start-up



Prior to starting the pump, carefully read the instructions in chapter 5. [Installation](#).

Carefully read section 9. [Technical Specifications](#). INOXPA will not be liable for improper use of the equipment.



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

### 6.1. CHECKS BEFORE STARTING THE PUMP

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



#### ATTENTION

The pump must never turn dry.

- Check that the power supply matches the rating indicated on the motor plate.
- Check that the direction of rotation of motor is the right one.

### 6.2. CHECKS WHEN STARTING 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. See the curve to determine the minimum pressure required above steam pressure (NPSHr).
- Control the discharge pressure.
- Check for leaks in the sealing areas.



#### ATTENTION

Shut-off valves on the suction pipe must not be used to regulate the flow. All shut-off valves must be fully open during operation.

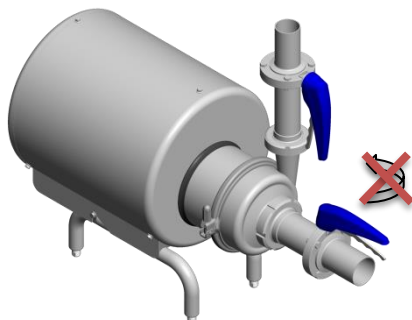


#### ATTENTION

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



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Use special protection when the sound pressure in the operation area exceeds 85 dB(A).

# 7. Troubleshooting

The following table provides solutions to problems that might arise during the operation of the pump. The pump is assumed to have been properly installed and be suitable for the relevant application.

Please contact INOXPA if technical assistance is required.

Motor overload																																			
↓	The pump does not provide enough flow or pressure																																		
↓	↓ No pressure on the discharge side																																		
↓	↓ Uneven discharge flow / pressure																																		
↓	↓ Noise and vibration																																		
↓	↓ The pump gets clogged																																		
↓	↓ Overheated pump																																		
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# 8. Maintenance

## 8.1. GENERAL CONSIDERATIONS

This pump, just like any other machine, requires maintenance. The instructions contained 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 [9. Technical Specifications](#).

Maintenance work can only be carried out by qualified personnel that are trained and equipped with the necessary resources to carrying out this work.

All parts or materials that are replaced must be properly disposed of/recycled in accordance with the current directives applicable in each area.



ALWAYS disconnect the pump before beginning any maintenance work.

## 8.2. 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 chapter [8.7. Disassembly and assembly of the pump](#).

## 8.3. TIGHTENING TORQUE

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

## 8.4. STORAGE

Before being stored the pump must be completely emptied of liquids. Avoid, as far as possible, the exposure of the parts to excessively damp atmospheres.

## 8.5. CLEANING



The use of aggressive cleaning products such as caustic soda and nitric acid may give raise to skin burns.

Use rubber gloves during cleaning procedures.

Always use protective goggles.

### 8.5.1. Automatic CIP (clean-in-place)

If the pump is installed in a system with a CIP process, it is not necessary to disassemble the pump.

If the automatic cleaning process is not provided, proceed to disassemble the pump as indicated in the chapter [8.7. Disassembly and assembly of the pump](#).

#### 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) a 70°C (150°F)  
 1 kg NaOH + 100 l H<sub>2</sub>O = cleaning solution  
 or  
 2,2 l NaOH of 33% + 100 l H<sub>2</sub>O = cleaning solution
- b. Acid solution: 0,5% by weight of nitric acid (HNO<sub>3</sub>) a 70°C (150°F)  
 0,7 l HNO<sub>3</sub> of 53% + 100 l H<sub>2</sub>O = cleaning solution

#### ATTENTION



Check the concentration of the cleaning solutions. Incorrect concentrations may lead to the 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.

### 8.5.2. Automatic SIP (sterilization-in-place)

The process of sterilization with steam is applied to all the equipment including the pump.



Do NOT start the pump during the process of sterilization with steam.

The parts/materials suffer no damage if the indications specified in this manual are observed.

No cold liquid can enter the pump till the temperature of the pump is lower than 60°C (140°F).

The pump generates an important pressure drop through de sterilization process, use a by-pass circuit provide with a discharge valve is recommended for ensuring that the steam or overheated water sterilize the circuit integrity.

#### **Maximum conditions during SIP process with steam or overheated water:**

- a) Maximum temperature: 140°C / 284°F  
 b) Maximum time: 30 min  
 c) Cooling: sterile air or inert gas  
 d) Materials: EPDM/PTFE (recommended)  
 FPM/NBR (not recommended)

## 8.6. DISSASSEMBLY AND ASSEMBLY OF THE PUMP

The assembly and disassembly of the pumps should be done by qualified personnel. Make sure that the personnel read carefully this instruction manual and, in particular, those instructions which refer to the work they will perform.

### ATTENTION



Incorrect assembly or disassembly may cause damage in the pump's operation and lead to high repair costs and a long period of down time.

INOXPA is not responsible for accidents or damages cause by a failure to comply with the instructions in this manual.

### Preparation

Provide for a clean working environment so some parts, including the mechanical seal, require very careful handling and others have close tolerances.

Check that the parts which are used are not damaged during transport. When doing this, you need to inspect the adjustment edge, the butted faces, the tight fit, burrs, etc.

After each disassembly, carefully clean the parts and check for any damage. Replace all damaged parts.

### Tools

Use the proper tools for assembly and disassembly operations. Use them correctly.

### Cleaning

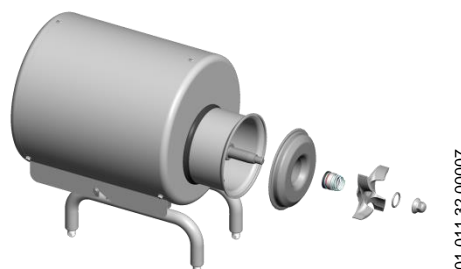
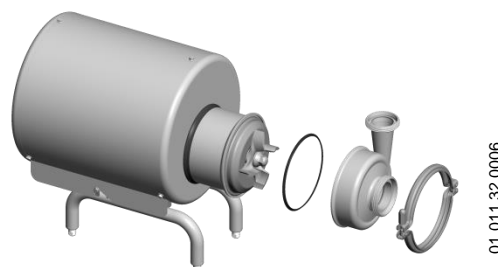
Before disassembling the pump, clean it outside and inside.



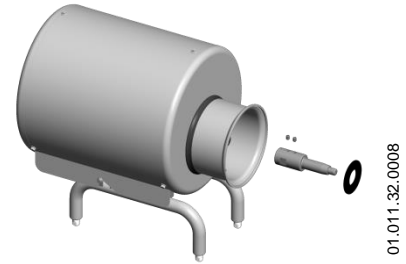
NEVER clean the pump by hand when it is running.

### 8.6.1. 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 casing and replace if damaged.
  
3. Place an open-end wrench on the flat sides of the shaft (05) to prevent it from rotating.
4. Remove the impeller nut (45) and the O-ring (80A).
5. Pull out the impeller (02). If is necessary, hit it with a dead blow using a plastic mallet in order to disengage the cone.
6. Remove the rotating part of the seal (08) from the rear side of the impeller (02).
7. Remove the pump cover (03) from the lantern (04).
8. Manually remove the stationary part of the seal (08) which is located in the pump cover (03).

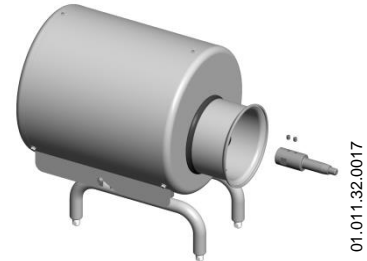


9. Remove the splash ring (82).
10. Loosen the studs (55) from the shaft (05) and take it off from the motor (93).

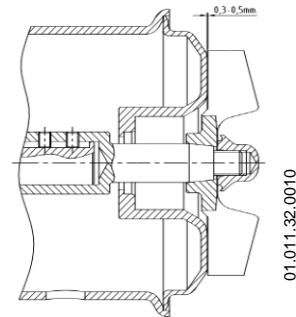


### 8.6.2. Assembly

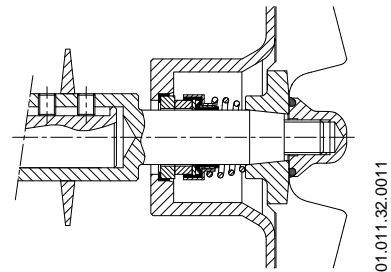
1. Place the shaft (05) on the motor (93).
2. Fix the shaft (05) with the studs (55) to the motor (93) leaving it to gauge the impeller (02) with the pump cover (03).



3. Enter the pump cover (03) on the centering lantern (04).
4. Put the impeller (02) on the shaft, tighten the cap nut (45) and gauge according the picture.
5. Now, tighten the studs (55) strongly that fix the shaft (05) to the motor (93).
6. Untighten the cap nut (45) and quit the impeller (02) and the pump cover (03).



7. Place the splash ring (82) in the shaft (05).
8. Fit the stationary part of the seal (08) on the pump cover (03) with the fingers.
9. Put the pump cover (03) on the lantern (04).
10. Fit the rotating part of the mechanical seal (08) in the shaft (05) and place the impeller (02).
11. Place the O-ring (80D) in the impeller nut (45) and insert the impeller (02) on the pump shaft (05) and secure with the nut (45).

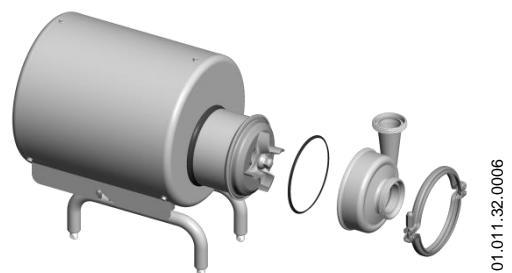


#### ATTENTION



When installing the new seal, use soapy water when fitting the different parts and gaskets to allow them to slide better. Apply to the stationary as well as the rotating parts.

12. Mount the O-ring (80A) on the pump cover (03) taking care that it is not twisted
13. Punt the pump casing (01) and secure it on the lantern (04) by the casing clamp (15) and tighten the clamp nut tightly.





# 9. Technical Specifications

Maximum operating pressure	1.000 kPa (10 bar)
Temperature range	-10°C to 120°C
Maximum speed	3.000 rpm (50 Hz) 3.600 rpm (60 Hz)

## Materials

Parts in contact with the product	AISI 316L
Other stainless steel parts	AISI 304L
Seals in contact with the product	EPDM (standard)
Other materials for the seal	consult with INOXPA
Exterior surface finish	matt
Interior surface finish	$Ra \leq 0,8 \mu m$

## Mechanical seal

Type of seal:	single inside seal
Stationary parts material	silicon carbide (SiC) (standard)
Rotary parts material	graphite (C) (standard) Silicon carbide (SiC)
Seal material	EPDM - FPM

## Motor

Type	Three-phase asynchronous motor, IEC B34 type, 2 or 4 Poles, IP55 protection, class F insulation
Power	0,37 to 11 kW
Voltage and frequency	220-240 V $\Delta$ / 380-420 V Y, $\leq 4$ kW 380-420 V $\Delta$ / 660-690 V Y, $\geq 5,5$ kW

### 9.1. NOISE LEVEL

The indicated noise levels correspond to the standard pump, with maximum impeller and shrouded motor, running at approx. 2900 rpm, at the point of best efficiency and with a motor with sufficient power.

These values were taken at a distance of 1 m from the pump and at a height of 1.6 m above the floor level. The measurements were carried out according to the standard EN 12639 / ISO 3746 Grade 3 with a tolerance of  $\pm 3dB$  (A).

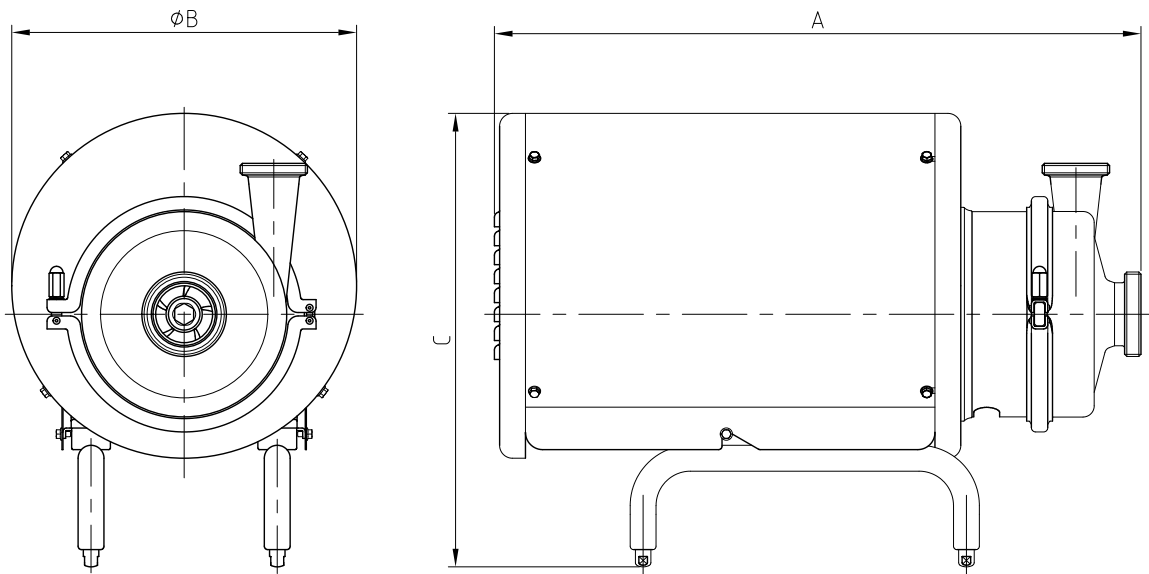
Pump type	Motor power (kW)	Sound pressure $L_{pA}$ dB(A)	Sound power $L_{wA}$ dB(A)
<b>SE-15</b>	0,55	64	
<b>SE-20</b>	2,2	69	
<b>SE-26</b>	5,5	77	
<b>SE-28</b>	7,5	79	
<b>SE-35</b>	11	81	94
<b>SE-36</b>	15	83	97

It must be borne in mind that the noise levels can greatly increase if reducers, elbows or other fittings are installed near the pump.

9.2. WEIGHT

Weight (kg)																
IEC	71		80		90		100		112		132		160			
kW	0,25	0,55	0,75	1,1	1,1	1,5	2,2	2,2	3	4	5,5	5,5	7,5	11	11	15
SE-15	14	15	22	24	28											
SE-20					30	29	31	43		49						
SE-26					31		43		50	56	71	79				
SE-28					36		48		55	61	76	84				
SE-35									49	54	62	76	85	98	134	154
SE-36									52	57	63	88		101	136	156

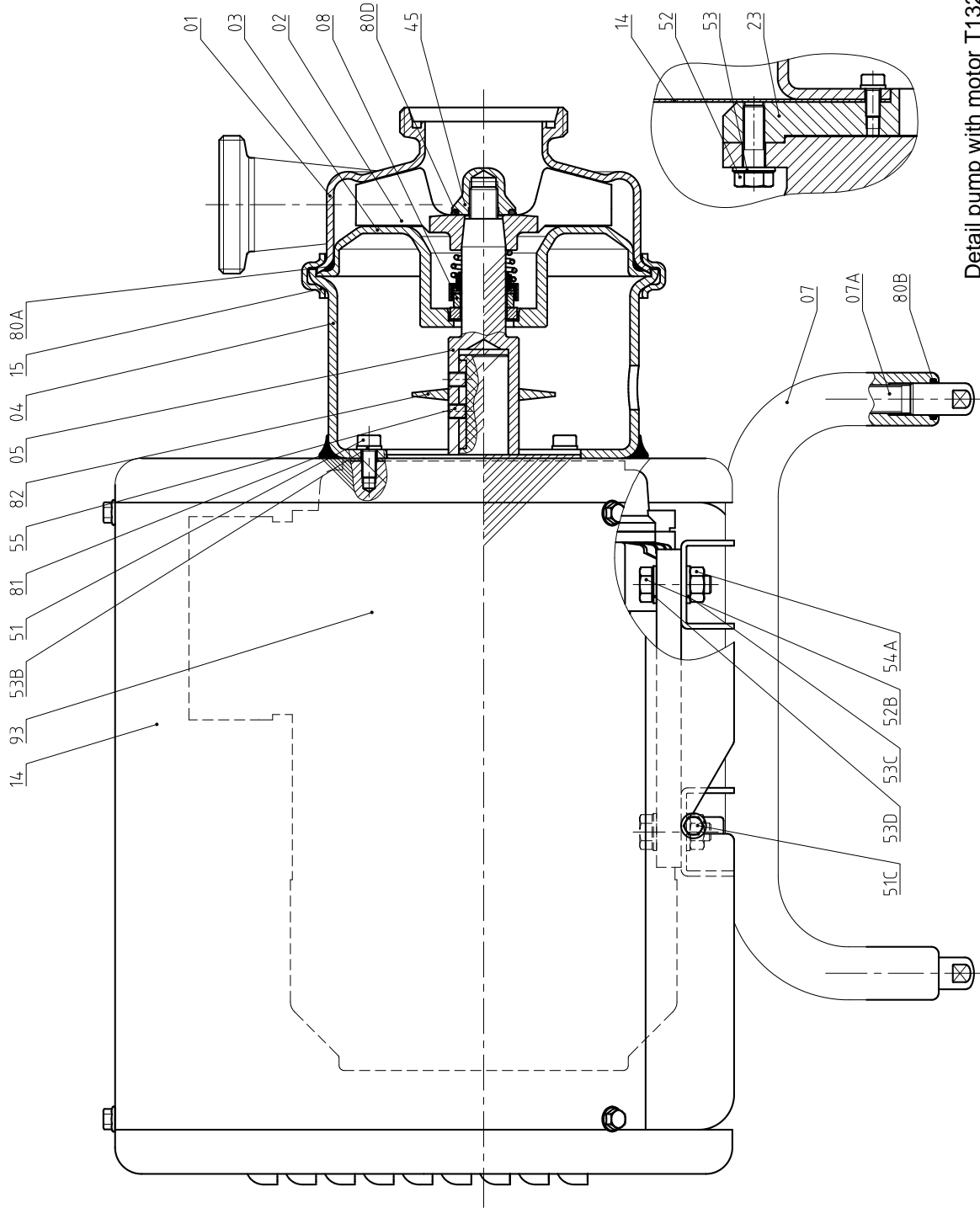
9.3. DIMENSIONS



01.011.32.0018

Pump type	Motor		Dimensions (mm)		
	IEC	kW	A	B	C
SE-15	71	0,25	440	230	350
		0,55	440	230	350
	80	0,75	530	290	405
		1,1	530	290	405
	90	1,5	530	290	415
	SE-20	90	1,1	530	290
1,5			530	290	415
2,2			530	290	415
100		3	605	350	480
112		4	605	350	490
SE-26		90	1,1	540	290
	100	3	610	350	480
	112	4	610	350	490
		5,5	610	350	490
	132	5,5	740	400	530
		7,5	740	400	530
SE-28	90	1,1	535	290	415
	100	3	610	350	480
	112	4	610	350	490
		5,5	610	350	490
	132	5,5	740	400	530
		7,5	740	400	530
SE-35	100	2,2	620	350	480
		3	620	350	480
	112	5,5	620	350	490
		5,5	750	400	530
		7,5	750	400	530
	132	7,5	750	400	530
11		750	400	530	
160	11	885	465	645	
	15	885	465	645	
SE-36	100	2,2	620	350	480
		3	620	350	480
	112	4	620	350	490
		7,5	750	400	530
	132	7,5	750	400	530
		11	750	400	530
160	11	885	465	645	
	15	885	465	645	

### 9.4. EXPLODED DRAWING OF HYGINOX SE PUMP



Detail pump with motor T132/166

01.011.32.0009

9.5. PARTS LIST OF HYGINOX SE PUMP

Position	Description	Quantity	Material
01	Pump casing	1	AISI 316L
02	Impeller	1	AISI 316L
03	Pump cover	1	AISI 316L
04	Lantern	1	AISI 304
05	Shaft	1	AISI 316L
07	Motor leg	2	AISI 304
07A	Adjustable leg	4	AISI 304
08	Mechanical seal*	1	-
14	Shroud	1	AISI 304
15	Casing clamp	1	AISI 304
45	Cap nut	1	AISI 316L
51	Allen screw	4	A2
51C	Screw with flange	2	A2
52A	Hexagonal screw	2	A2
52B	Hexagonal screw	4	A2
53B	Grower washer	4	A2
53C	Flat washer	8	A2
53D	Grower washer	4	A2
54A	Hexagonal nut	4	A2
55	Stud	2	A2
80A	O-ring*	1	EPDM
80B	O-ring*	4	EPDM
80D	O-ring*	1	EPDM
81	Lantern joint	1	EPDM
82	Splash ring	1	EPDM
93	Motor	1	-

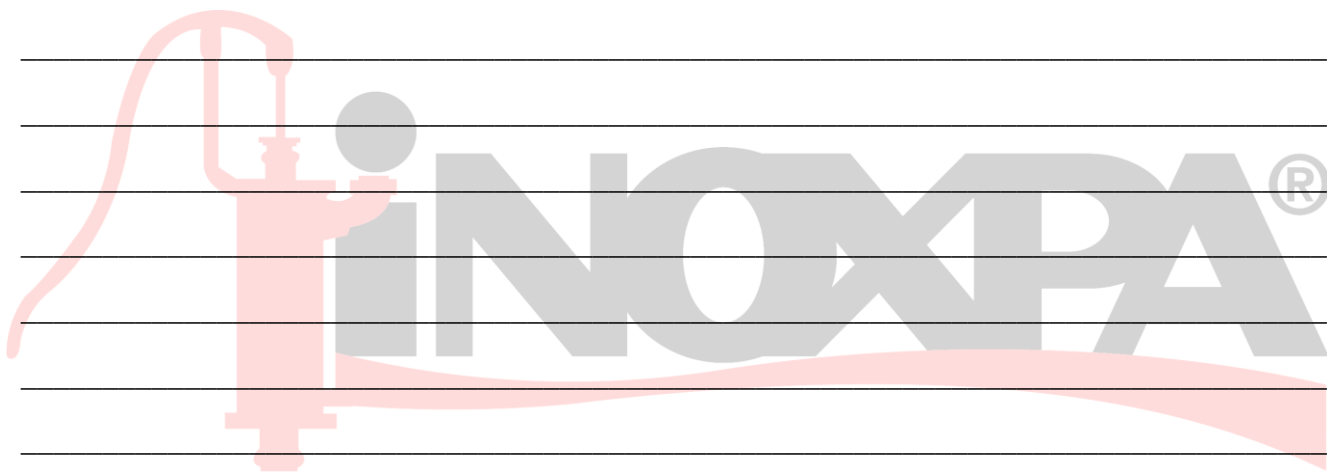
Parts only for pumps with motor sizes 132 and 160:

Position	Description	Quantity	Material
23	Counterflange	1	LM4
52	Hexagonal screw	4	A2
53	Flat washer	4	A2

\* Recommended spare parts



NOTES



**How to contact INOXPA S.A.U.:**

Contact details for all countries are  
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