



## **INSTALLATION, SERVICE AND MAINTENANCE INSTRUCTIONS**

### **RVN PUMP**



01.216.32.0001

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Original Manual

01.216.30.01EN

(A) 2021/11

# EC Declaration of Conformity



**INOXPA S.A.U.**  
Telers, 60  
17820 - Banyoles (España)

hereby declare under our sole responsibility that the

Machine: **CENTRIFUGAL PUMP WITH HELICOIDAL IMPELLER**

Model: **RVN**

Type: **RVN-65, RVN-80, RVN-100**

Serial number: **IXXXXXXXXXX to IXXXXXXXXXX**  
**XXXXXXXXXXIINXXX to XXXXXXXXXXXIINXXX**

fulfills all the relevant provisions of the following directive:

**Machinery Directive 2006/42/EC**  
**Regulation (EC) n° 1935/2004**  
**Regulation (EC) n° 2023/2006**

and with the following harmonized standards and/or regulations:

**EN ISO 12100:2010**  
**EN 809:1998+A1:2009/AC:2010**  
**EN 12162:2001+A1:2009**  
**EN 60204-1:2018**

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

A handwritten signature in black ink, appearing to read 'DRB', enclosed within a light gray rectangular box.

David Reyero Brunet  
Technical Office Manager  
15th November 2021



Document: 01.216.30.02EN  
Revision: (0) 2021/11

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fulfils all the relevant provisions of these regulations:

**Supply of Machinery (Safety) Regulations 2008**

and with the following designated standards:

**EN ISO 12100:2010**  
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David Reyero Brunet  
Technical Office Manager  
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# 1. Safety

## 1.1. INSTRUCTION MANUAL

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

The information published in the 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 should be kept in a safe location near the installation area.

## 1.3. SAFETY

### 1.3.1. Warning symbols



Safety hazard for people in general



Danger of injury caused by rotating equipment parts



Electric hazard



Danger! Caustic or corrosive agents.



Danger! Suspended loads



Danger for 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. Contact INOXPA in case of doubt.

### 1.4.1. During the installation



The *Technical Specifications* of Chapter 8 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 motor, especially if its working conditions create an explosion hazard.



During the installation, all the electric work should be carried out by authorised personnel.

#### 1.4.2. During operation



The *Technical Specifications* of Chapter 8 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 IP-55: protection against dust and water spray.

#### 1.4.3. During maintenance



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

NEVER disassemble the pump until the pipes have been emptied. Remember that liquid will remain inside the pump's 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 pump prior to carrying out any maintenance. Remove the fuses and disconnect the cables from the motor's terminals.

All electrical work must be carried out by authorised personnel.

#### 1.4.4. 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.

#### 1.4.5. Warranty

Any warranty will be void immediately and lawfully; 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 INOXPA genuine parts;
- 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 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

RVN Helical Impeller pumps are compactly built. They are axial suction and radial discharge pumps, and are fitted with hygienic type connection. The pump casing and impeller are manufactured with investment casting technology. All the parts that come into contact with the product are made of AISI 316L stainless steel.

The RVN range is designed for continuous operation. The most significant constructional features of the range are:

- Monoblock pump
- Pump casing with drainage
- Helical type impeller
- Mechanical seal with silicon carbide faces
- Premium Efficiency NEMA C face motor.

### 3.2. OPERATING PRINCIPLE

Even though the impeller pump is of the helical type, its operating principle is that of a centrifugal pump.

The pump is not reversible.

The direction of rotation is clockwise when the pump is viewed from the rear side of the motor.

### 3.3. APPLICATION

RVN pumps bring together a series of characteristics suited to those sectors in which any alteration to the product is forbidden. As a result of the helical profile of the impeller, the pump does not clog up, and what is more, the solid substances in suspension remain undamaged, because this type of impeller accompanies the product to the inside of the pump casing. This characteristic of the RVN pump makes it an essential element in many tasks such as pieces of fruit or whole fruits, olives, mushrooms, orange segments, vegetables, fish, etc, which require the preservation of the form of the solids in suspension.

RVN pumps are widely in wineries for the pump-over process where the high capacity and minimum destruction of the solid parts (seeds, skins, etc.) is required. The design of the pump contributes to a better extraction of tannin, the colouring matter of wine, in the phase of vinification, reducing the lees formation and, as the result, achieving high quality wines.



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

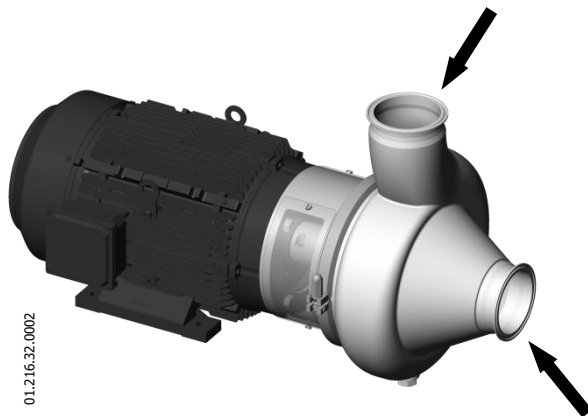


INOXPA will not be liable for any deterioration of the material due to transport or unpacking. Visually check that the packaging has not been damaged.

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.

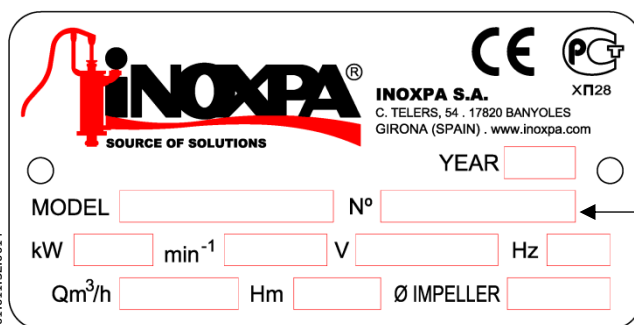
Unpack the pump and check the following:



- 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.

### 4.1.1. Identification of the pump

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



Serial number

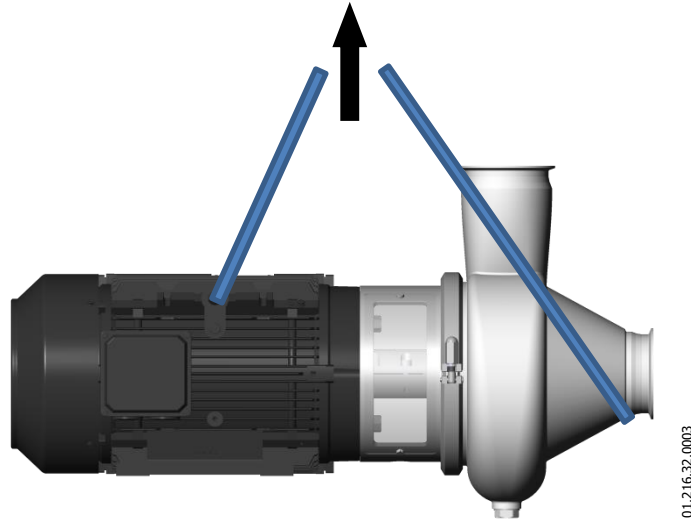
Pump plate

## 4.2. TRANSPORT AND STORAGE



The RVN pumps are often too heavy to be stored manually.

Lift the pump as indicated below:



## 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. (Refer to Section 8. *Technical Specifications* for dimensions and weights.)

Place the pump on a flat and level surface.



Install the pump so that it can be properly ventilated.

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 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.

### 4.4.1. 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.

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

#### 4.5. ELECTRICAL INSTALLATION



Only qualified personnel can connect the electric motors.  
Take the necessary measures to prevent damage to cables and connections.

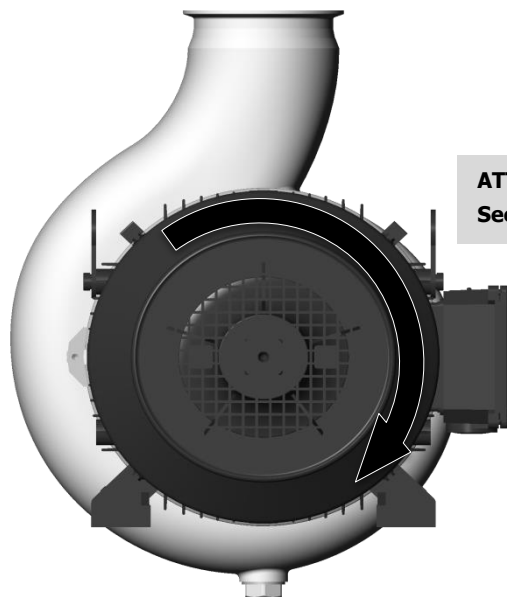


Electrical equipment, terminals and components of the control systems may still carry current when they are disconnected. Contacting them may impose a hazard to operators or cause irreparable material damage.

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.

Seen from the rear of  
the motor.



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 Section 4. *Installation*.

## 5.1. START-UP



Carefully read Section 8. *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.

### 5.1.1. 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.



The pump must never turn dry.

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

### 5.1.2. Checks when starting the pump

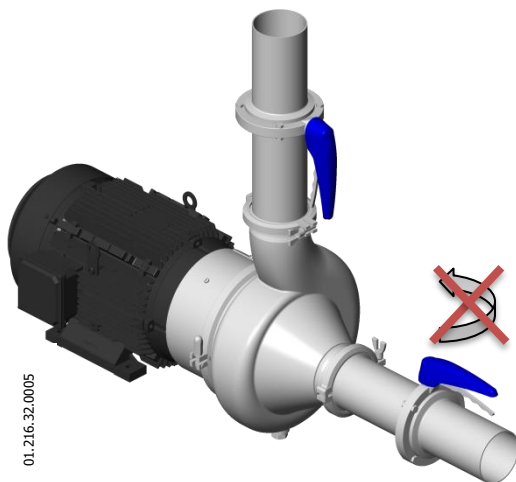
- Check that the pump is not making any strange noises.
- Check if the absolute inlet pressure is sufficient to prevent cavitation in the pump. Check the curve to obtain the minimum required pressure above the vapour pressure (NPSHr).
- Control the discharge pressure.
- Check for leaks in the sealing areas.



A shut-off valve shall not be used to regulate the flow in the suction line. 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.



Use special protection when the sound pressure in the operation area exceeds 80 dB(A).

# 6. Operating problems

The attached table lists 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. Contact INOXPA if technical assistance is required.

Motor overload																																			
<input type="checkbox"/>	The pump flow or pressure is insufficient.																																		
<input type="checkbox"/>	There is no pressure on the discharge side.																																		
<input type="checkbox"/>	Irregular discharge flow rate / pressure.																																		
<input type="checkbox"/>	Noise and vibrations.																																		
<input type="checkbox"/>	The pump gets clogged.																																		
<input type="checkbox"/>	Pump overheated.																																		
<input type="checkbox"/>	Abnormal wear.																																		
<input type="checkbox"/>	Leak through the mechanical seal.																																		
<input type="checkbox"/>	<table border="1"> <thead> <tr> <th>PROBABLE CAUSES</th> <th>SOLUTIONS</th> </tr> </thead> <tbody> <tr> <td>Wrong direction of rotation.</td> <td>Reverse the direction of rotation .</td> </tr> <tr> <td>Insufficient NPSH</td> <td>Raise the suction tank. Lower the pump. Reduce the vapour pressure. Widen the diameter of the suction pipe. Shorten and simplify the suction line.</td> </tr> <tr> <td>Pump not purged</td> <td>Purge or fill.</td> </tr> <tr> <td>Cavitation.</td> <td>Increase the suction pressure.</td> </tr> <tr> <td>The pump sucks in air.</td> <td>Check the suction line and all of its connections.</td> </tr> <tr> <td>Suction pipe obstructed</td> <td>Check the suction line and the filters, if available.</td> </tr> <tr> <td>Discharge pressure too high</td> <td>If necessary, reduce the pressure losses, for example, by increasing the pipe diameter.</td> </tr> <tr> <td>Flow rate too high</td> <td>Reduce the flow by means of a diaphragm. Partially close the discharge valve. Trim the impeller. Decrease speed.</td> </tr> <tr> <td>Viscosity of the liquid too high.</td> <td>Reduce the viscosity, for example, by heating the liquid.</td> </tr> <tr> <td>Liquid temperature is too high</td> <td>Decrease the temperature by cooling the liquid.</td> </tr> <tr> <td>Mechanical seal worn or damaged.</td> <td>Replace the seal.</td> </tr> <tr> <td>Inadequate O-rings for the liquid.</td> <td>Install the correct O-rings after consulting the supplier.</td> </tr> <tr> <td>The impeller scrapes</td> <td>Lower the temperature. Reduce the suction pressure. Adjust the impeller/cover play.</td> </tr> <tr> <td>Tension in the lines.</td> <td>Connect the pipes to the pump without tension.</td> </tr> <tr> <td>Foreign matter in the liquid.</td> <td>Install a filter in the suction pipe.</td> </tr> <tr> <td>Mechanical seal spring tension is too low.</td> <td>Adjust as indicated in this manual.</td> </tr> </tbody> </table>	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 line.	Pump not purged	Purge or fill.	Cavitation.	Increase the suction pressure.	The pump sucks in air.	Check the suction line and all of its connections.	Suction pipe obstructed	Check the suction line 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 lines.	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.
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# 7. Maintenance

## 7.1. 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 8. *Technical Specifications*.

All replaced material should be duly disposed of/recycled according to the directives in force in each area.



ALWAYS disconnect the pump before beginning any maintenance work.

### 7.1.1. 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.

Use rubber gloves during the cleaning process.



Always use protective goggles.

### 7.3.1. CIP (Clean-in-Place) cleaning

If the pump is installed in a system with a CIP process, its removal 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 (HNO<sub>3</sub>) at 70°C (150°F)

0.7 litres of 53% HNO<sub>3</sub> + 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.

### 7.3.2. 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

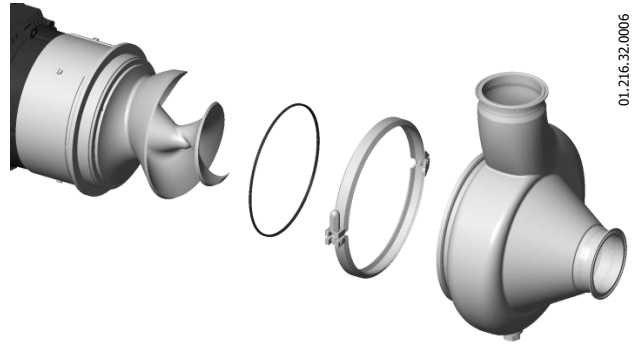
- a) **Max. temperature:** 140°C / 284°F
- b) **Max. time:** 30 min.
- c) **Cooling:** Sterile air or inert gas
- d) **Materials:** EPDM  
FPM

## 7.4. ASSEMBLY / DISASSEMBLY OF THE PUMP

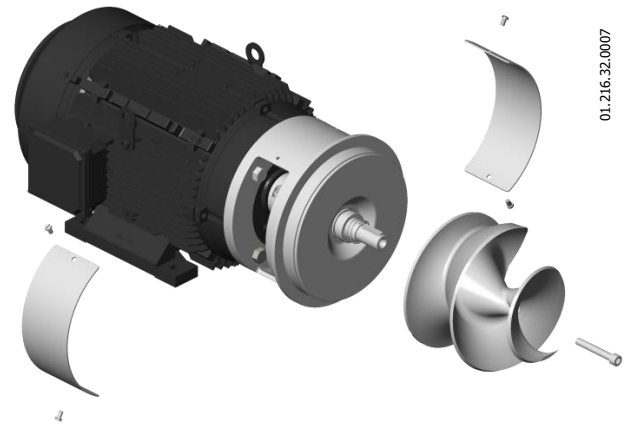
### 7.4.1. Pump and single mechanical seal

#### ⇒ Disassembly

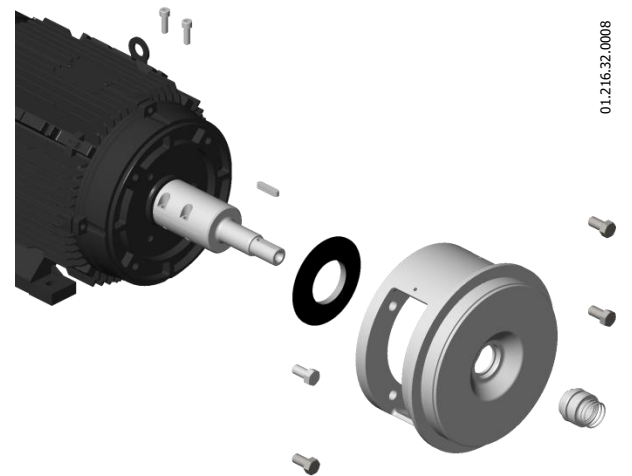
1. Remove the clamping ring (15) and disassemble the pump casing (01).
2. Check the condition of the O-ring (80) on the pump casing and replace if damaged.



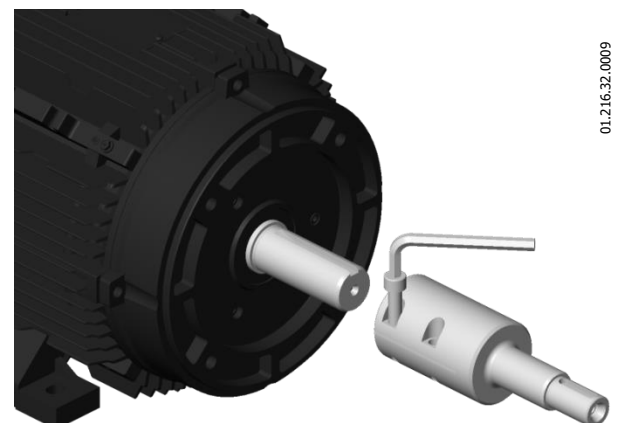
3. Remove the lantern protectors (47), and their screws (50).
4. Place an open-end wrench on the flat sides of the shaft (05) to prevent it from rotating and take out the impeller (02) along with the allen screw (51).



5. Remove the key (61) from the shaft (05).
6. Remove the rotating part of the seal (08) from the shaft (05).
7. Manually remove the stationary part of the seal (08) which is located in the pump lantern (04).
8. Remove the lantern (04) by removing the screws (52) that fix the motor (93).
9. Remove the splash ring (82).



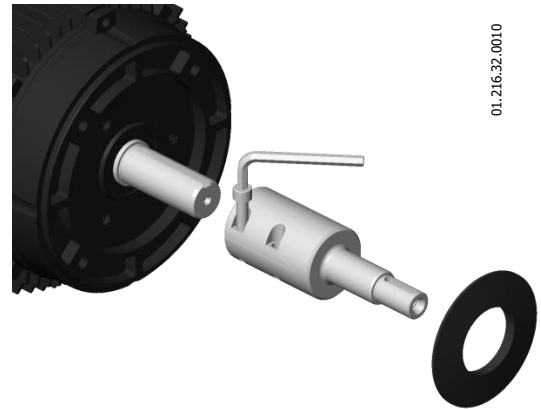
10. Loosen the allen screws (51A) securing the shaft (05) to the motor (93). If you cannot take out the shaft (05), introduce a screw in the first hole to help extract it.





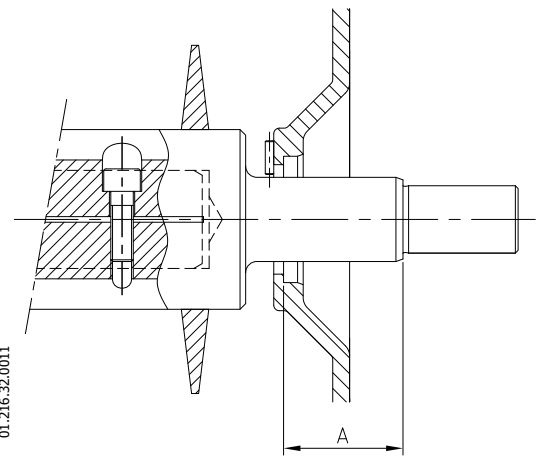
## ← Assembly

1. Place the shaft (05) on the motor (93). To make easy this assembly to the shaft motor, the shaft (05) bring one threaded hole as shown in the picture.
2. Fix the shaft (05) with the allen screws (55) to the motor (93) leaving it to gauge the shaft (05) to the lantern (04).
3. Place the splash ring (82) in the shaft (05) without arrive at the back.

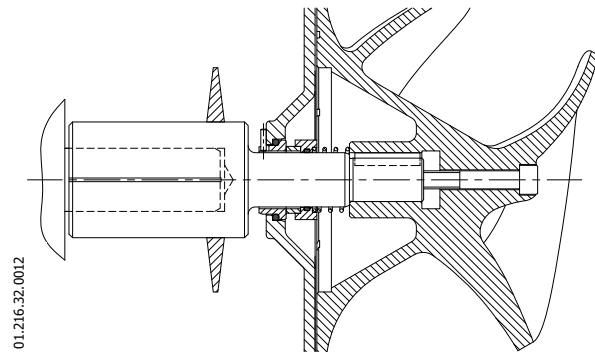


4. Fix the lantern (04) to the motor (93) with the screws (52).
5. Now, gauge the shaft position according the A dimension between the shaft and lantern.
6. Tighten the allen screws (51A) strongly that fix the shaft (05) to the motor (93).

Pump size	Mechanical seal	A
RVN-65	Ø25	40,5±0,5
RVN-80	Ø30	42,5±0,5
RVN-100		

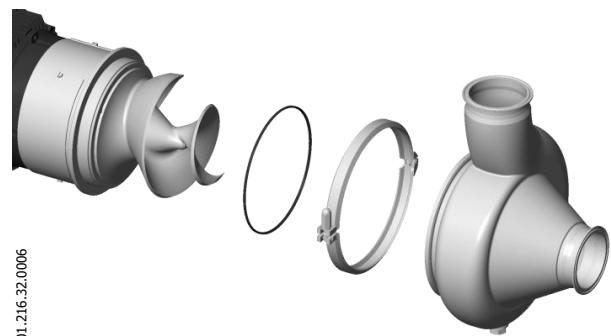


7. Fit the stationary part of the seal (08) on the lantern (04) with the fingers.
8. Fit the rotating part of the mechanical seal (08) in the shaft (05).
9. Put the key (61) in the shaft (05).
10. Put the impeller (02) on the pump shaft (05) and secure with the allen screw (51).



**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.

11. Mount the o-ring (80A) on the lantern (04) taking care that it is not twisted.
12. Put the pump casing (01) and secure it on the lantern (04) by the casing clamp (15) and tighten the clamp nut tightly.



# 8. Technical Specifications

## 8.1. TECHNICAL SPECIFICATIONS

Maximum operating pressure	1000 kPa (10 bar)
Temperature range	-10 to 120 °C (EPDM)
Maximum speed	1800 rpm (60 Hz)

### Materials

Parts in contact with the product	AISI 316L (1.4404)
Other steel parts	AISI 304L (1.4306)
Gaskets in contact with the product	EPDM (standard) FPM (other materials available upon request)
Exterior surface finish	Bright polished
Interior surface finish	Polished Ra<0,8 µm

### Mechanical seal

Type	Single internal seal
Material of rotating part	Silicon carbide (SiC) (standard)
Material stationary part	Silicon carbide (SiC) (standard)
Gasket material	EPDM (standard)

### Motor

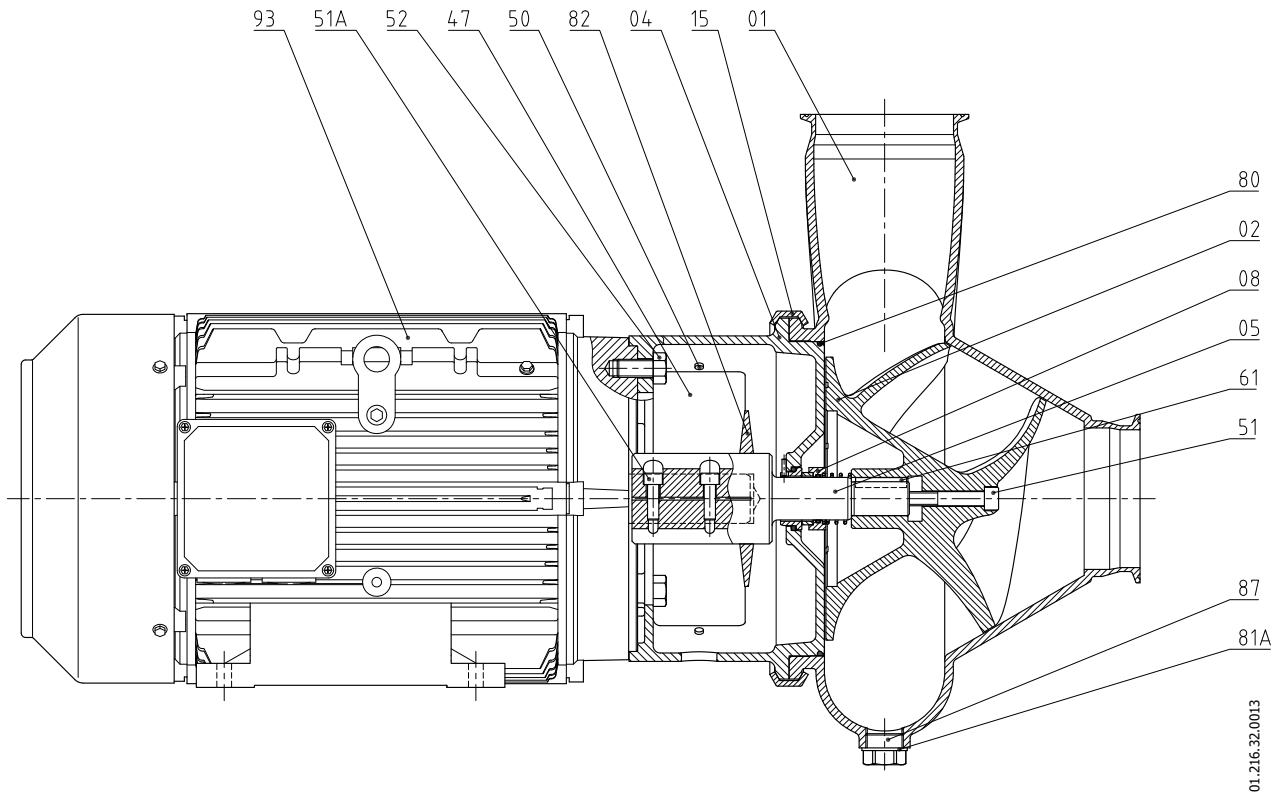
Type	NEMA Premium Efficiency C Face
Power	1 to 10 HP
Voltage and frequency	230V / 460V 60Hz

## 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 RVN



### 8.4. RVN PARTS LIST

Position	Description	Quantity	Material
01	Pump casing	1	AISI 316L
02	Impeller	1	AISI 316L
04	Lantern	1	AISI 316L
05	Shaft	1	AISI 316L
08	Mechanical seal	1	-
15	Casing clamp	1	AISI 304
47	Lantern protector	2	PETP
50	Screw with flange	4	A2
51	Allen screw	1	A4
51A	Allen screw	2	A2
52	Hexagonal screw	4	A2
61	Key	1	AISI 316
80	O-ring	1	EPDM
81A	Gasket	1	PTFE
82	Splash ring	1	EPDM
87	Drain plug	1	-
93	Motor	1	-

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