NOVA ROTORS®
Progressing cavity pumps

OPERATING, USE AND MAINTENANCE ISTRUCTIONS FOR PROGRESSING CAVITY PUMPS

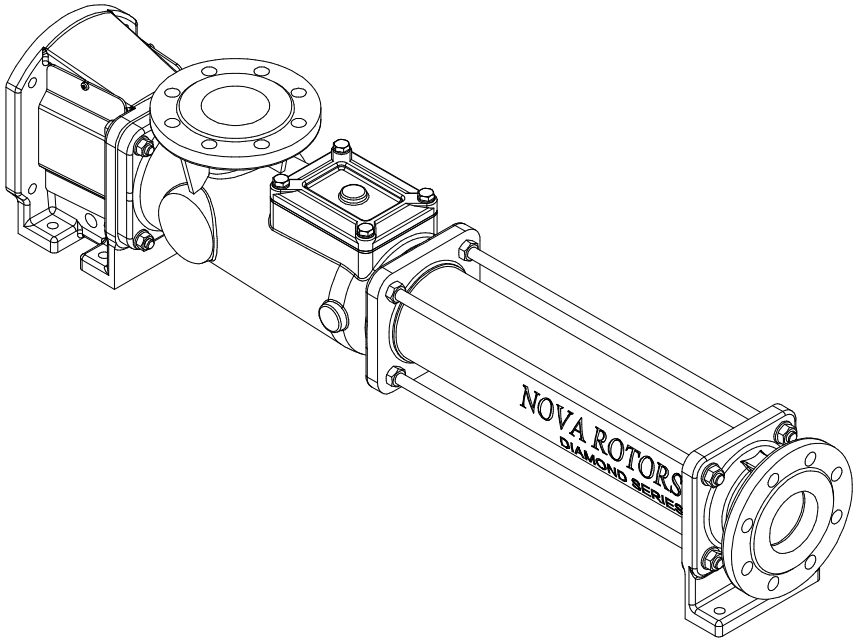
SERIES:

DN

DIAMOND

PUMP MODEL : **DN**

SERIAL NUMBER :



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1 FOREWORD

1.1 Manufacturer's details

NOVA ROTORS S.r.l.
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via C. Cattaneo, 19/25
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Fax: +39 0444 888152
Mail: info@novarotors.com
Web: www.novarotors.com

1.2 Purpose of the Operating Instructions

These Operating Instructions are an integral part of the machine and are directed to all those persons that operate on the machine or that interact with its users, for the purpose of providing all the information necessary to:

- correctly perform all the operations involved in the set up, running, maintenance and scrapping stages;
- ensure protection of the health and safety of all persons involved in working with the machine;
- ensure the efficient operation of the machine.

1.3 Use of the Operating Instructions

The Operating Instructions must be read carefully in their entirety prior to carrying out any operation on the machine; if in doubt about the correct interpretation of any of the instructions, contact the Manufacturer.
The Operating Instructions must be stored with care for the entire life of the machine and they must accompany the machine in all its transfers, of any kind, and made available to the users.
The Operating Instructions must be stored in the immediate vicinity of the machine, in a place that is easy to access and known to all users; it must be treated with care during consultation, pages must not be removed and its contents must not be altered in any way; it must be stored in a place that is protected from the weather, heat, humidity, corrosive agents, and preferably enclosed in a protective cover.

CAUTION!

The Manufacturer shall not be liable for consequences resulting from improper use of the machine caused by the failure of the user to read these Operating Instructions and shall not be liable for *any civil or criminal liability* arising from the user's failure to comply with these instructions.

1.4 Intellectual property rights

The rights on the entire contents of these Operating Instructions and of the documents supplied with the machine, including information, drawings and diagrams, are reserved. No information contained in these Instructions may be reproduced or communicated to third parties without the written consent of the Manufacturer, who retains all proprietary rights .
Only the Customer to whom the Operating Instructions are supplied as an integral part of the machine, for the sole purpose of ensuring that all the operations related to the various stages in the life cycle of the machine are carried out correctly, is authorised to use this information.

1.5 Warranty and voiding of warranty

The Manufacturer warrants that the machine and all the equipment supplied with it are free from flaws, defects in material or workmanship and comply strictly with the declared technical specifications and quality standards.
The warranty covers the replacement of defective materials for a period **12 months** from the date of shipment unless otherwise specified in writing in the order confirmation. The rotor, the stator and the components of the seal system, which are subject to wear and tear, are excluded from the warranty except for workmanship defects.

The warranty will only be valid if the machine has been used in the strictest observance of the provisions and instructions contained in these Operating Instructions and if operational limits agreed in the Order Confirmation have been complied with.
The warranty will not be valid if the machine is installed incorrectly, or for any changes, replacements, repairs or alterations made by the Customer or third parties.
For machines supplied without a drive system, in close-coupled configuration, the warranty is not valid for damage caused by a drive that has been incorrectly mounted by the Customer or third party. It is advisable to contact the Manufacturer for information about mounting the drive system.
All tools and consumables supplied by the Manufacturer together with the machine are not covered by warranty.

The Manufacturer is not liable for damage or removal of parts that might occur during transit.
To ensure that material and workmanship defects and flaws are dealt with under warranty they must be reported in writing to the Manufacturer at the above address.
If judged by the Manufacturer to be defective the part will be replaced or repaired free of charge.

However, the Customer will be required to pay for costs of transport and/or shipment of parts and/or for travel expenses incurred by the Manufacturer's personnel if required to travel to the Customer's factory. The replaced parts will remain the property of the Manufacturer.
Parts repaired or replaced under warranty will be covered by a new warranty for a period of **12 months** from the date of the replacement or repair, but this , however, does not apply to any parts that are not replaced or repaired.

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P.IVA - VAT: 02149270247 – REA: VI-209864
Capital : €1.000.000

Declaration of Conformity / Dichiarazione di conformità

CE

Manufacturer's name / Nome del costruttore: **NOVA ROTORS S.r.l.**

Manufacturer's address / Indirizzo del costruttore: Via Carlo Cattaneo, 19/25 – 36040 Sossano (VI) – Italy

Herewith declares conformity of the Products
Dichiara con la presente la conformità del prodotto

MODEL : **DN**

SERIAL NUMBER :

Product description:
Descrizione del prodotto

Progressing cavity pumps with vertical and horizontal axis
Pompe monovite ad asse verticale e orizzontale

Complies with the essential requirements stipulated by the following applying directives:
E' conforme ai requisiti essenziali di sicurezza previsti dalle seguenti direttive:

2006/42/CE (Direttiva Macchine / machinery Directive)

In according to the following harmonized standards / In accordo alle seguenti norme armonizzate:

UNI EN ISO 12100-1:2005	Sicurezza del macchinario Parte 1 / Safety of machinery. Part 1
UNI EN ISO 12100-2:2005	Sicurezza del macchinario Parte 2 / Safety of machinery Part 2
UNI EN ISO 809:2009	Pompe e gruppi di pompaggio per liquidi / Pumps and pump unit for liquids
UNI EN ISO 13857:2008	Distanze di sicurezza per impedire il raggiungimento di zone pericolose con gli arti superiori e inferiori - Safety distance to prevent danger zones being reached by the upper and lower limbs

Le istruzioni operative riportano importanti informazioni per la sicurezza, l'uso, l'installazione e la manutenzione della macchina.
Operating instructions includes important information for safety, use, installation and maintenance for the machinery

Sossano, 08/07/13

Sigra. Carla Dovigo

Amministratore Delegato – Chief executive officer
Nova Rotors S.r.l.

2 GENERAL INFORMATION

2.1 Conventions and symbols used in these Operating Instructions

2.1.1 Textual conventions

Bold type is used to highlight important information. References to the figures are indicated in bold type, using the abbreviation "**Fig.**" and a number that identifies the figure (e.g. **Fig.1**). Sometimes a letter or a number is added to identify a particular component of a figure (e.g. **A - Fig 1** or **1 – Fig.1**).

NOTE!

The illustrations in these Operating Instructions are simply by way of example; the pumps illustrated in the figures with different dimensions, optional accessories or different types of construction may differ in some details, however the general contents of the Operating Instructions apply to all the pumps.

2.1.2 Terminology and symbols

The terminology used in the Operating Instructions is based on the definitions and glossary included in the Machinery Directive : 2006/42/EC.
The following symbols are used throughout these Operating Instructions to ensure correct and safe use of the machine:

CAUTION!

This symbol alerts the user to hazardous situations or situations that could cause damage to the machine.

CAUTION! SUSPENDED LOAD!

The symbol alerts the user to dangerous situations related to the presence of suspended loads during machine handling and positioning procedures.

CAUTION! ROTATING PARTS HAZARD!

The symbol alerts the user to dangerous situations due to rotating parts in motion.

PROHIBITED!

The symbol draws the user's attention to actions that are prohibited.

NOTE!

The symbol draws the user's attention to information that is particularly important.

PERSONAL PROTECTIVE EQUIPMENT

Indicates that **protective gloves** must be worn when carrying out the operations to which it is associated.

PERSONAL PROTECTIVE EQUIPMENT

Indicates that **protective footwear** must be worn when carrying out the operations to which it is associated.

PERSONAL PROTECTIVE EQUIPMENT

Indicates that **a safety helmet** must be worn when carrying out the operations to which it is associated.

2.2 Target audience for these Operating Instructions and duties

SUPERVISOR

Customer's employee who oversees all operations related to the machine to ensure they are carried out correctly, in compliance with the instructions contained in these Operating Instructions and with general safety regulations.

OPERATOR

Customer's employee who is responsible for operating the machine under normal conditions.

QUALIFIED TECHNICIAN

Customer's employee who has the technical-professional qualifications to carry out specialist operations in the various stages of the machine's life cycle. The specialization required for particular operations that requiring the assistance of the qualified technician will be indicated each time.

MANUFACTURER'S TECHNICIAN

Manufacturer's employee or personnel authorised by the Manufacturer, or by the Reseller/Distributor, who has the technical-professional qualifications to carry out specialist operations that require a thorough knowledge of the machine and its operation.

3 SAFETY

3.1 Failure to comply with the safety regulations

NOTE!

Failure to comply with the safety regulations described in these Operating Instructions and common sense safety rules could result in hazards to persons, the environment and the machine.

Specifically, this could lead to:

- failure of the machine and/or system to carry out key functions
- damage to the machine and/or system
- electrical, mechanical and/or chemical danger to persons
- environmental hazards caused by leakage of dangerous substances.

Failure to observe or comply with the safety regulations will invalidate warranties and lead to loss of compensation for damages.

3.2 Startup, operation and maintenance

The plant of destination for the progressing cavity pump is not an integral part of the supply, consequently the customer is required to verify the suitability of the machine for the specific requirements, to provide the process data necessary to ensure that the right pump is selected and to ensure that any accessories required to guarantee the safety of the plant are included in the order. If the user maintains that certain accessories he considers useful or essential have not been included in the Order Confirmation, it is the customer's responsibility to inform the Manufacturer and to request that the parts in question be installed on the machine.

3.3 Intended conditions of use

The machine is designed pumping a product, referred to as "fluid", of the type specified in the Order Confirmation.

NOTE!

The machine must always observe the operating limits for which it was constructed and those declared in the Order Confirmation.

The main limits to observe relate to: temperature, pressure, capacity, viscosity and speed.
Only **1 Operator** is required to run the machine. The work station is in the vicinity of the drive unit.

NOTE!

If the machine is required to work with a different rotating direction to the one indicated in the order, contact the Manufacturer to verify the possibility of changing the direction and to define the operating limits.

3.4 General rules – Safety in the workplace and for machines intended for use in potentially explosive atmospheres (ATEX)

The ATEX directives concern the use of machines in potentially explosive atmospheres and the standards for accessories and protection systems to be used in these atmospheres.

If the pump is intended to be used in a potentially explosive atmosphere the ATEX mark is included on the data plate, and a separate ATEX annex in compliance with Directive 94/9 EC is supplied with these Operating Instructions. The order must specify if the machine is to be used in a potentially explosive atmosphere.

The ATEX Directive 94/9 EC applies specifically to electrical and non-electrical accessories; the conditions of use must comply with the limits of the operating conditions laid down and described in the directive.

ATTENTION!

The Customer's personnel must have the following technical-professional requirements if working with ATEX machines:

- ITT certification and authorization
- awareness of the electrical hazards and the hazards related to the chemical and physical characteristics of the gas and/or vapour present in the danger zones
- knowledge of the European Machinery Directive and its transposition into Italian law, of the European Standard EN 12100:2005, and the safety standards in force in the country of installation.

3.5 General rules – Training of personnel and guidelines for safe use of the machine

It is the Customer's responsibility to provide their personnel with the necessary general training in the following areas:

- safety and health hazards related to the activities carried out in the company's plant
- measures and devices adopted for the prevention of accidents and for the protection of worker safety and health
- specific hazards to which the workers are exposed in relation to their duties, the safety regulations and the corporate health and safety provisions
- general safety rules laid down in the European Directive 89/391/EEC and in the regulations in force in the country of installation
- first aid procedures, use of fire-fighting equipment and emergency evacuation procedures.

It is the Customer's responsibility:

- to provide workers with the necessary training on the contents of these Operating Instructions
- to identify which of their workers should be given this training
- to verify that the worker has achieved the required knowledge and understanding to perform his assigned duties
- to verify that the application of these Operating Instructions becomes routine practice in all machine operating stages.

Personnel training must be updated as new hazards arise connected to changes in the configuration of the machine or its use.

3.6 Spare parts and design modifications

3.6.1 How to request Technical Assistance

The Manufacturer's sales office is at the Customer's disposal:

- for explanations and information
- to provide expert technical personnel on site at the Customer's premises for geographically limited areas
- to send spare parts.

For technical assistance requests, the Customer is required to contact the Manufacturer directly using the details provided In **1.1 – Manufacturer's identification data**. To enable the Manufacturer to identify the machine see **6.1 – Product identification**.

3.6.2 How to request Spare Parts

Only genuine spare parts supplied by the Manufacturer or those authorised in writing by the Manufacturer may be used.

The Manufacturer accepts no liability for any damage to objects and/or personal injury or any other damages arising from the Customer's use of non-genuine spare parts or parts not authorised by the Manufacturer.
Follow the instructions provided by the Manufacturer to disassemble the parts to be replaced and to assemble the replacement parts. For the spare parts list see **13 – Spare parts**.

3.6.3 Design modifications

PROHIBITED!

It is strictly prohibited to make structural changes to the machine without the written authorization of the Manufacturer.

3.7 Noise emission

The machine is designed and constructed to reduce the sound emission level at the source.
The A-weighted sound power level emitted by the machine does not exceed **85dB(A).**
This value is guaranteed if the pump is installed correctly, in stable conditions and with the appropriate fixings and it is measured at a distance of 1 metre from the pump. It does not include any other external noise sources or reverberation of the pipes connected to the pump while it is operating.
The Manufacturer does not guarantee this value if the pump is used in working conditions that do not comply with those specified in the work order and stated in the Order Confirmation.

3.8 Leakage of dangerous fluids and other emissions

CAUTION!

If the pump is used to pump dangerous fluids (toxic, corrosive, etc…), the fluids leaking from the seal must be collected and disposed of without endangering persons or the environment.

3.9 General rules – Work area and protective clothing

The work area and the surrounding area must be kept free of objects that could cause trips or falls. The work area must be well-illuminated, clean, free of grease, oils, water or any other liquid that could make the floor around the machine slippery and therefore represent a slip or falls hazard.
Access to the work area must be prohibited to persons who are not authorised to work on the machine during any of its various working stages; prohibition signs to this effect must be displayed in the vicinity of the pump. Adequate fire-fighting equipment must be provided in the work area and it must be indicated by suitable signs.

Suitable protective equipment must be worn to protect the parts of the body:

- safety gloves to protect hands against various hazards: mechanical, electrical, chemical and hot temperature
- appropriate clothing and safety footwear to protect the foot against drop hazards.

3.10 General rules for machine maintenance

Before beginning any maintenance work it is mandatory to put the machine in "MAINTENANCE MODE" as described in **11 – Maintenance**, unless otherwise indicated in these Operating Instructions.

CAUTION!

Do not disassemble the machine until the fluid has been emptied from the tubes. Even if the tubes are empty, some fluid may remain in the machine. The fluid could be a hazard to persons and to the environment, and it could be extremely hot. In servicing operations that require the machine to be running at least 2 people must be present so that in the event of a dangerous situation one person can disconnect the power supply or sound the alarm.

CAUTION! ROTATING PARTS HAZARD!

The machine contains rotating parts in motion. Do not insert limbs while the machine is in operation.

CAUTION! RISK OF ELECTRIC SHOCK!

For machines fitted with an electric motor, the drive is powered.

PROHIBITED!

Do not carry out any operation on the safety systems while the machine is in operation. While the machine is in operation the safety systems must be must be installed and mounted properly on the pump.

3.11 General rules - Prohibitions

PROHIBITED!

The following prohibitions apply to all workers.
Do not use the pump for operations other than those intended.
Do not use the pump in ambient conditions other than those intended.
Do not use accessories, tools, lubricants, consumables other than those intended.
Do not make any changes to the machine without the Manufacturer's approval.
Do not use the machine in a configuration different from that authorised by the Manufacturer.
Do not remove, tamper with, deactivate or bypass the safety devices unless required in specific foreseen situations.
Do not run the machine dry.
Do not remove or deface danger or prohibition labels affixed to the machine.
Do not climb onto the machine.
Do not use the machine or the protections as work tables.
Do not store inflammable material such as petrol, solvents, gas cylinders, etc, in the vicinity of the machine.
Do not perform any repairs, adjustment, cleaning, lubrication or maintenance action on moving parts.
Do not wear clothing with loose sleeves, ties, scarves, rings, watches, bracelets, chains or any other object or item of clothing that could catch on the moving parts.

3.12 Fire emergency procedures

Use carbon dioxide extinguishers to put out electrical equipment fires. Do not use dry powder extinguishers or water jets, as they could cause a short circuit or electrocute the firefighter during the firefighting procedure. If the fire is not extinguished immediately, be alert to the possible dispersion of air, water, oil and heating fluids. If the machine is fitted with pressurised tanks and tubes, exposure to flames for an extended period of time could lead to an explosion: consequently make sure you are not showered by the fluids contained in the tanks or tubes.

CAUTION!
Carbon dioxide and dry powder extinguishers must be stored in the vicinity of the machine. To prevent the onset of fire, the machine must be kept free of oils, solvents, cloths, etc…
Dry powder extinguishers cause serious damage to the machine, so only use one in the event of actual necessity and not on the electrical parts or parts that may accidently have been left under voltage.
When using carbon dioxide extinguishers, the firefighters (minimum of 2) must wear suitable protective gloves and use self-contained breathing apparatus.

3.13 Description of the residual risks

Pursuant to European Community Directive 2006/42/EC the danger zones and the residual risk zones for the Operator, that could not be eliminated so as not to compromise the functionality of the pump, are listed below:

- **Danger zone 1**: electric motor while the machine is operational being an electric shock hazard due to the presence of voltage.
- **Danger zone 2**: machine while operating being a burn hazard due to possible contact with hot surfaces.
- **Danger zone 3**: for the construction types with hopper H, HB, HE, HP, HS, HSB when the pump is running the hopper is a trapping, impact hazard for upper limbs.
- **Danger zone 4**: for special applications when the fixed Plexiglas shield of the transmission shaft has been removed, transmission shaft rotating during operation of the machine with risk of trapping, impact of the upper limbs on the transmission shaft.

3.14 Affixed information and warning signs

The machine is supplied with warning signs and decals. These signs do not replace the information and the warnings contained in these Operating Instructions nor must they be considered the only ones to be observed.

PROHIBITED!

Do not remove, damage or deface the signs affixed to the machine.

4 DESCRIPTION OF THE PUMP

4.1 Main technical characteristics of the pump

The main characteristics of the pump are:

- uniform flow rate proportional to the rpm of the pump;
- minimum suction capacity of 4 mWC (NPSH), depending on the size, the number of stages and rpm of the pump;
- capacity to pump heterogeneous products, containing gases, abrasives, solid and fibrous materials in the liquid matrix;
- capacity for pumping high or low viscosity liquids;
- liquid metering capacity;
- pulse-free pumping with minimum tensile stress on the fluid;
- high pumping pressure of 6 bar per stage,
- 1-2-4-and 8 number of stages depending on the required pressure .

4.2 Operating Principle

The progressing cavity pump is a self priming rotary positive displacement machine. The hydraulic part of the pump consists of a rotor **(11 - Fig.1)** and a stator **(12 - Fig.1)**.
The rotor, typically made of metal, is a single- or multi-start screw with round thread, extremely large pitch, considerable height and high eccentricity in relation to the core diameter.
The stator, typically made of elastic material, is impressed with a cavity in the shape of a two or more start screw, double thread compared to the rotor and with the same eccentricity.
The rotor, rotating within the stator, is forced to perform a hypocycloid roto-translational movement. This coupling of the two elements always creates a line of contact along the profile that guarantees the seal between them. This movement creates an airtight chamber that shifts with a helical movement, from the suction casing to the delivery casing.
The theoretical flow rate (Qt) is directly proportional to the number of revolutions of the pump and it can be calculated using the following equation:

$$Qt = \frac{D \times 4e \times 2P \times n \times 60}{1000^3}$$

Qt = theoretical flow rate [m³/h]
D = rotor diameter [mm]
e = rotor eccentricity [mm]
P = rotor pitch [mm]
n = revolutions per minute [rpm]

The absorbed power is calculated using the following equation: ::

$$P = \frac{Q \times H}{36 \times \eta}$$

P = absorbed power [kW]
Q = flow rate [m³/h]
H = differential pressure [bar]
η = overall efficiency (is the product of the volumetric efficiency and the mechanical efficiency)

In progressing cavity pumps the axis of rotation of the rotor does not coincide with the axis of rotation of the drive **(3 - Fig.1)**. The rotor receives motion from a double-jointed drive shaft **(1 - Fig.1)**. The function of the rotating unit, consisting of drive shaft, hollow shaft **(2 - Fig.1)** and rotor, is to transfer the torque given by the drive, support the eccentricity of the pumping unit (rotor + stator), bear the axial loads generated by back pressure and the reaction generated by the roto-translation between rotor and stator.

4.3 Structure of the pump

For a description of the pump see **Fig.1.**
The pump can be coupled to the drive **(3)** with 2 types of coupling, defined as:

- type D: the drive is coupled directly to the coupling flange **(4)** and the hollow shaft **(2)**; in this case the pump stress is absorbed by the drive.
- type J: the bearing housing **(6)** is positioned between the drive **(3)** and the coupling flange **(4).** The drive is connected to the male shaft with a flexible coupling fitted with a protective shield. The bearing support absorbs the pump stress and consequently increases its reliability and sturdiness. This solution includes high performance bearings that require correct lubrication to work properly.

The pump can be made in various construction types, depending on the type of pump body **(7)** for pumps **N** and **V** or hopper for pumps H, HB, HE, HP, HS. The HB and HP constructions include bridge breaker hopper with additional motor-driven product pushers. Various shapes and sizes of connections are available, flanged or with quick couplings, terminal, threaded or special. Additional connections can also be made for C.I.P. applications (Cleaning In Place).
The dimensions of each construction type of pump/hopper body are optimised for the type of fluid to be pumped guaranteeing suitability for high viscosity fluids containing solids.
There are two joints **(9)** inside the pump body that enable the transmission of torque in presence of eccentricity. They are sealed with a rubber protection and filled with oil to ensure perfect lubrication of the internal components.
The standard shaft has a single mechanical type seal **(10)**, but the pump can also be configured with PTFE gland packing seals or double mechanical seals. On request, cartridge or other types of seals can also be used. For both mechanical and gland packing seals suitable housings are available for flushing the seals..

NOTE!

All variations must be defined and agreed with the Manufacturer at both the Offer and the Order Confirmation stage. The operational limits of the pump are agreed at the Order Confirmation stage.

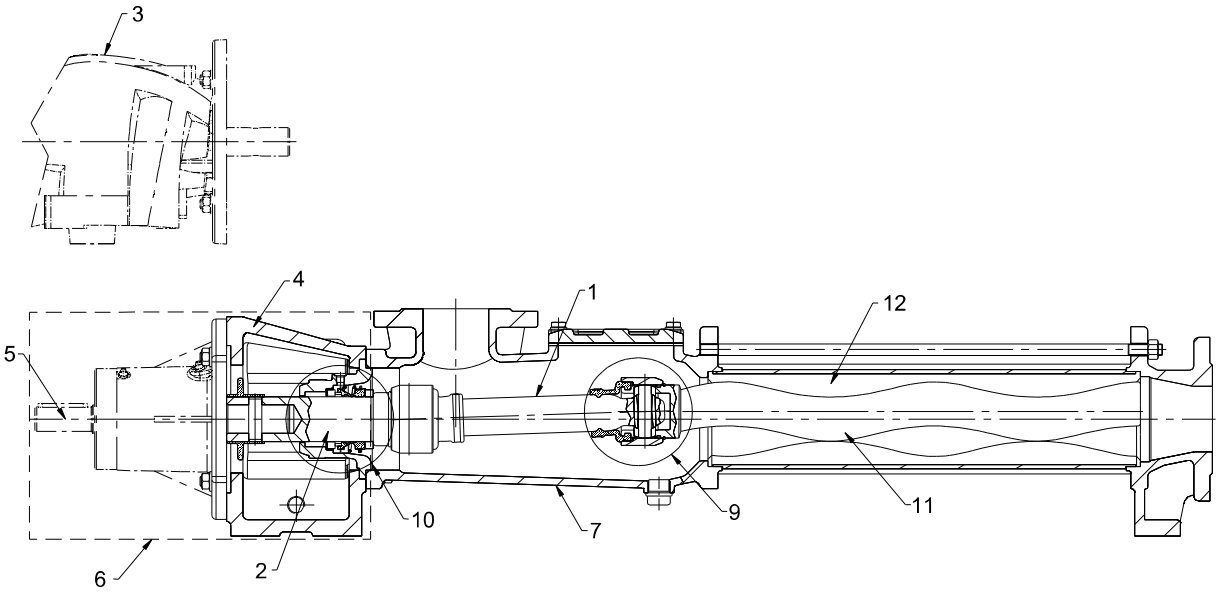


Fig.1 – General description

4.4 Pump with bypass (optional)

The bypass (**Fig.2)** is an overpressure protection device. It consists of a valve (on request pre-calibrated or not), tubing and flanges which connect the delivery casing to the suction casing. When the delivery pressure exceeds valve calibration pressure, the valve opens and the fluid returns to the suction casing. The valve calibration pressure depends on process requirements, the type of pumped product and the number of pump stages.

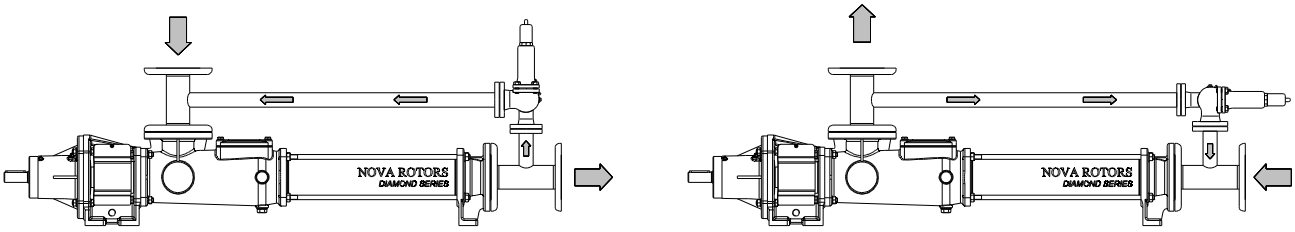


Fig.2 – Bypass operating principle

CAUTION!
The calibration pressure of the bypass valve must be agreed with the Manufacturer. The operating limits must comply with those specified at the Order Confirmation stage.
With the bypass installed, the pump can only operate in one direction depending on how the bypass is installed, see **Fig.2**.

4.5 Safety, pressure relief, check valves

The Manufacturer recommends installing the following devices:

- safety valve on the delivery casing to prevent operating pressures exceeding the pump's specifications;
- check valve on the delivery casing to prevent return flow through the system.

NOTE!
If both a safety valve and a check valve are installed then the safety valve should be positioned closer to the pump than the check valve.

4.6 Dry run protection

CAUTION!
Running the pump dry, even for just a few seconds, can ruin or even irreparably damage it.

When a continuous flow of liquid is not guaranteed, it is advisable to use special protection against dry running to protect the stator.
For pumps fitted with electric motors, a typical protection that prevents damage to the stator cause by lack of fluid, involves installing a temperature sensor in the stator and connecting it to the electric panel that powers the motor. If fluid does not arrive, the rubber of the stator overheats and increased temperature acts on the electrical circuit and shuts off the motor; this device can even be fitted after the pump has been installed.
Alternatively, flow switches or other systems suitable for specific requirements can be used to directly control product presence; in this case contact the Manufacturer.

4.7 Drives

Various types of drives can be applied to the pump, but the most commonly used combinations include electric motors, hydraulic motors, gearmotors or variable speed motors.
For pumps with J type support, refer to the dimensional drawing for the dimensions of the independent output shaft and for the drive refer to the Manufacturer's specifications.
For pumps with D type support, the drive must be coupled to the pump with the special coupling pin and the drive output shaft must be made to the Manufacturer's specifications. With reference to **Fig**.3, **Tab.1** below lists the dimensions of the drive connections for the input flange and the hollow shaft.

Size	Model	Input flange [mm]	A (±0,05) [mm]	B [mm]	d (F8) [mm]	D (h7) [mm]
D020	1L1 05K2 025K4	160/200	16	8,1	20	30
D025	2L1 1K2 05K4	160/200	20	8,1	24	35
D030	4L1 2K2 1K4 05K8	160/200	20	8,1	24	35
D040	10L1 4K2 2K4 1K8 16L1 8K2	200	30	12,1	30	45
D060	20L1 10K2 4K4 2K8 30L1 16K2	200/250	35	16,1	35	55
D120	40L1 20K2 10K4 4K8 60L1 30K2	250/300	35	18,1	40	65
D300	80L1 40K2 20K4 10K8 120L1 60K2	250/300	38	20,1	50	70

Tab.1 – Dimensions of the drive connections

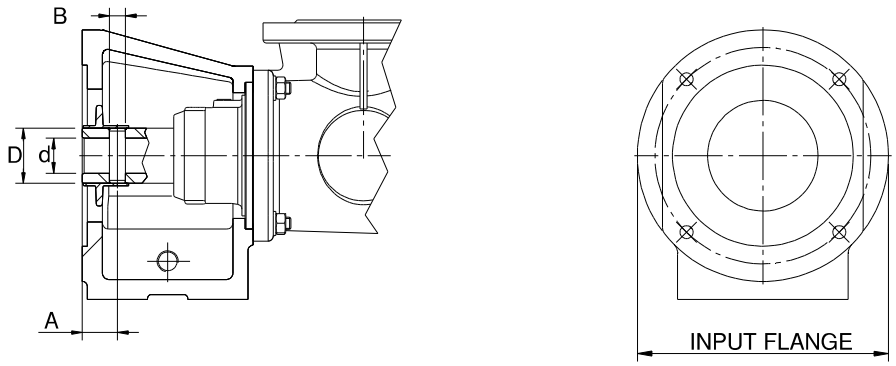


Fig.3 – Dimensions of the drive connections

5 ORDER IDENTIFICATION

5.1 Product identification

To enable the Manufacturer to identify the pump you must quote the following details that are marked on the data plate:

- *model and version (marked on the data plate in the "PUMP TYPE" field)*
- *serial number (marked on the data plate in the "SERIAL NUMBER" field)*

5.2 Supplied documentation and technical specifications

The documents listed in **Tab.2** are provided together with these Operating Instructions.

NOTE!

Specific documentation relating to special pumps or pumps with features made to customer specifications must be requested prior to signing the order.
All documents relating to a job order are certified by the Manufacturer solely for the pump specified in that job order.

Document	Description
Datasheet / Order Confirmation	Technical specification of the pump and the drive (if installed), operating conditions, operational limits, product configuration
Dimensional Drawing	Size configuration, operational dimensions, connection sizes
Performance Curve (Performance Data)	The pump's performance characteristics
Performance Test (on request)	Performance and functional testing of the pump
Third Party Documents	Technical documents, instructions for use and maintenance for third party components installed on the pump
Declaration of Conformity	Compliance with Pump Directive 2006/42/EC
Supplementary ATEX Instruction (for ATEX pumps)	*Operating Instructions for potentially explosive atmospheres*

Tab.2 – Supplied Documentation

5.3 Data plate

The data plate is made of aluminium and is affixed to the coupling flange with rivets.
There are two types of data plate:

- *for standard pumps **(Fig.4)**;*
- *for ATEX pumps (**Fig.5**).*

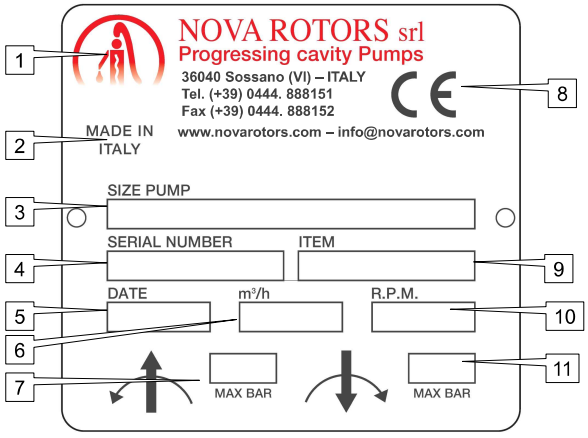


Fig.4 – Data plate for standard pump

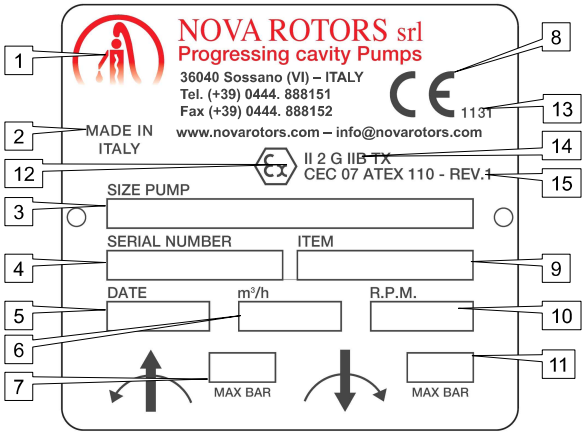


Fig.5 - Data plate for ATEX pump

The ATEX marking consists of the following elements (**14 - Fig.5**):

- *CE 1131: CE mark with the identification number of the notified body*
- *II: equipment group: surface*
- *2: (equipment) category: high protection*
- *G: type of explosive atmosphere: gas vapours*
- *IIB: explosion group: type of gas present in the atmosphere where the pump is used*
- *TX: Max surface temperature class*

Det.	Description of standard pump data plate	Det.	Description of ATEX pump data plate
1	Manufacturer's details	**1**	Manufacturer's details
2	Country of manufacture	**2**	Country of manufacture
3	Model and version	**3**	Model and version
4	Serial number	**4**	Serial number
5	Year of manufacture	**5**	Year of manufacture
6	Capacity [m^3/h]	**6**	Capacity [m^3/h]
7	Maximum pressure [bar] for counterclockwise rotation direction	**7**	Maximum pressure [bar] for counterclockwise rotation direction
8	CE certification symbol	**8**	CE certification symbol
9	Customer ref. no. (if necessary)	**9**	Customer ref. no. (if necessary)
10	Speed [R.P.M.]	**10**	Speed [R.P.M.]
11	Maximum pressure [bar] for counterclockwise rotation direction	**11**	Maximum pressure [bar] for counterclockwise rotation direction
		12	ATEX certification sysmbol
		13	Certification body identification
		14	ATEX marking
		15	Certificate number

Tab.3- Data plate

5.4 Model identification

The pump is identified with the following code number, corresponding to the "SIZE PUMP" section on the data plate **(3 - Fig.4 and Fig.2)**:

- *pump type (D or J)*
- *construction type (N - X - V - H - HB - HE- HP – HS- HSB)*
- *model (corresponding to Model column in **Tab.4**)*
- *complete assembly (E)*

The technical characteristics for the different sizes and models are given in **Tab.4**.

Size	Model	Qmax 2 bar [m³/h]	rpm max	P max [bar]
D020	1L1	4.9	1400	6
	05K2	2.5	1400	12
	025K4	0.7	800	24
D025	2L1	10	1400	6
	1K2	5.1	1400	12
	05K4	1.5	800	24
D030	4L1	14	1000	6
	2K2	7.2	1000	12
	1K4	2.9	800	24
	05K8	1.5	800	48
D040	10L1	22	800	6
	4K2	11.5	800	12
	2K4	4.2	600	24
	1K8	2.9	800	48
	16L1	32.5	800	4
	8K2	16.8	800	8
D060	20L1	39.1	700	6
	10K2	17.2	600	12
	4K4	7.2	500	24
	2K8	4.2	500	48
	30L1	46	700	4
	16K2	21.5	600	8
D120	40L1	65.5	600	6
	20K2	31	600	12
	10K4	11.7	400	24
	4K8	7.3	500	48
	60L1	82	500	4
	30K2	40.5	500	8
D300	80L1	88	400	6
	40K2	43	400	12
	20K4	22	400	24
	10K8	11.7	400	48
	120L1	120	400	4
	60K2	64.5	400	8

Tab.4 – Performance of each model

NOTE!

The data in **Tab.4** are merely intended as a guide and only serve to give a rough indication of the range of use for each size. For the actual operating data always refer to the supplied Datasheet and Performance Curves.
Depending on the construction type some models are not available or are limited to different pressure and capacity values.

The pump can be:

- *D: close coupled, where the pump is directly coupled to the drive by means of a coupling flange*
- *J: bearing housing, where the pump is coupled to the drive with a flexible coupling*

The construction type can be:

- *N: pump with pump body and outlet flange with couplings for connection to the system tubes*
- *X: machine for the healthcare industry with body pump and vents with sanitary connections for connecting to the plant piping*
- *V: pump for vertical installation with pump body and coupling for connection to the system tubes and outlet flange immersed in the product to be pumped*
- *H: pump with hopper, auger feed screw and outlet flange with coupling for connection to the system tubes*
- *HB: pump with hopper, auger feed screw and outlet flange with coupling for connection to the system tubes and equipped with two bridge breaker blades*
- *HE: pump with hopper, auger feed screw and outlet flange with coupling for connection to the system tubes, designed specifically for the winemaking industry*
- *HP: pump with hopper, auger feed screw, outlet flange and coupling for connection to the system tubes, fitted with product pushers*
- *HS: pump with hopper and auger feed screw reinforced for heavy duty applications and outlet flange with coupling for connection to the system tubes*
- *HSB: HS pump equipped with bridge breaker module*

The various models have been grouped according to size as indicated in **Tab.4**, and each model belonging to the size group has the same:

- *transmission (excluding the rotor)*
- *connection to the drive*
- *seal system*
- *hopper or pump body*
- *bearing housing, if present*

The type of assembly corresponds to the type of standard accessory supplied:

- *E: if the pump is equipped with a food-grade bypass assembly and trolley*

An example of “PUMP TYPE” is DN 120L1 – E: Close-coupled pump, construction type N, size 120L1 equipped with food-grade bypass assembly and trolley.

6 DATASHEET

Company:

Order confirm. N.: **of:**

Offer N°: **Rev.** **of:**

Your Order N.: **of:**

Serial number:

PROGRESSIVE CAVITY PUMP
mod.: **DN** *DIAMOND SERIES*
Wetted casing and rotating parts material:

Classification:
Series ID - Industrial sector

FLUID CHARACTERISTICS

Pumped fluid:
Viscosity:
Solids concentration:
Solids size:
Specific gravity:
Abrasiveness:
PH:
Working temperature:

OPERATING CONDITIONS

Service:
Rotation:
Differential pressure:
Suction pressure:
Design pressure:
Torque:
Solid passage:
Sound power level:

	Min.	Max.	
Rotation speed:			rpm
Flow:			m³/h

CONSTRUCTION AND PUMP MATERIALS

Installation:
Pump body::
Outlet connection:
Stator:
Rotor:
Joint:
Transmission shaft:
Drive shaft:
Seal housing:
Seal:
Coupling:
Painting:

7 TRANSPORTATION AND STORAGE

7.1 Transportation, handling and positioning

7.1.1 Instructions for transportation

Progressing cavity pumps are packed in special containers (boxes on pallets, crates) unless the user/purchaser specifies a different type of packaging in the order.
The Manufacturer is not liable for damages or lost parts that could occur following transportation of the machine.

7.1.2 Precautions to be taken upon receipt of the pump

On receipt of the pump the Customer must:

- check against the delivery note that all the machine parts have been delivered;
- check that the information on the data plate corresponds to the specifications set out in the order;
- check for damages incurred during transit;
- inform the carrier and the Manufacturer immediately if you discover any damage incurred during transit;
- check that you have received all the documents listed in **6.2 – Supplied documentation and technical specifications**, if any are missing contact the Manufacturer for a copy.

7.1.3 Ambient conditions required for storage

The pump must be stored in a safe, cool and dry location, sheltered from the weather.

7.1.4 Instructions for handling and positioning the pump

QUALIFIED TECHNICIAN – Person in charge of handling the machine

All the handling/positioning operations are the responsibility of the Customer.
These operations are the responsibility of the **Person in charge of handling the machine,** who has been adequately trained on the use of lifting and handling equipment.

The following instructions must be observed when handling and positioning the machine:

- prohibit access to unauthorised persons;
- move away from the loads before carrying out lifting and lowering operations;
- prohibit vehicles that are not used for lifting/handling the pump from circulating in the installation area to prevent accidental collision with protruding parts.

CAUTION!

The equipment used, including the ropes, must be approved for lifting and handling the specific weight of the pump (use the dimensional drawing as reference).

NOTE!

Use suitable lifting and handling equipment and always observe appropriate safety measures.

The pump must be transported manually or with suitable transportation or lifting equipment, depending on: the construction type and size, its mass and distribution (barycentre) and the lug points provided on the pump.

Avoid collisions with and/or application of pressure on the protruding parts, particularly the protection guards.

Some medium and small sized models are trolley-mounted for easy handling.

The individual packages are marked with the name of the part and handling instructions are affixed to each one.

Refer to the dimensional drawing for the weight and dimensions of the machine.

PROHIBITED!

It is prohibited to lift the machine with its barycentre shifted with respect to the lift point.

It is prohibited to lift the whole machine using the eyebolts on the motor or gearbox. These are intended solely for the purpose of lifting the motor or the gearbox.

CAUTION! RISK OF TIP-OVER!

Abrupt or reckless manoeuvres can cause the pump to tip over with serious consequences.

Operators must ensure that the pump will not tip over while being transported and positioned, and that it is handled safely and in a stable position.

The pump must always and only be placed in a horizontal position.

Vertical axis machines (V) must never be left in an upright position without adequate fixing.

PERSONAL PROTERCTIVE EQUIPMENT

It is mandatory to wear a **safety helmet** when handling and positioning the machine.

PERSONAL PROTERCTIVE EQUIPMENT

It is mandatory to wear **protective gloves** when handling and positioning the machine.

PERSONAL PROTERCTIVE EQUIPMENT

It is mandatory to wear **protective footwear** when handling and positioning the machine.

As the pump configurations are all very different, the following instructions are of a general nature, but they do provide sufficient guidelines on how to correctly handle the pump. If in doubt contact the Manufacturer for more detailed instructions.
Once the packaging has been removed from the horizontal axis pump, it must only be lifted by means of the base **(1 - Fig.6)**. The external fixing holes or the eyebolts on the base (**2 - Fig.6**) can be used to lift it.

NOTE!

If the pump is not supplied with a base or eyebolts, use ropes. The ropes must be placed around the pump in such a way to ensure a balanced lift **(3 - Fig.6)**.

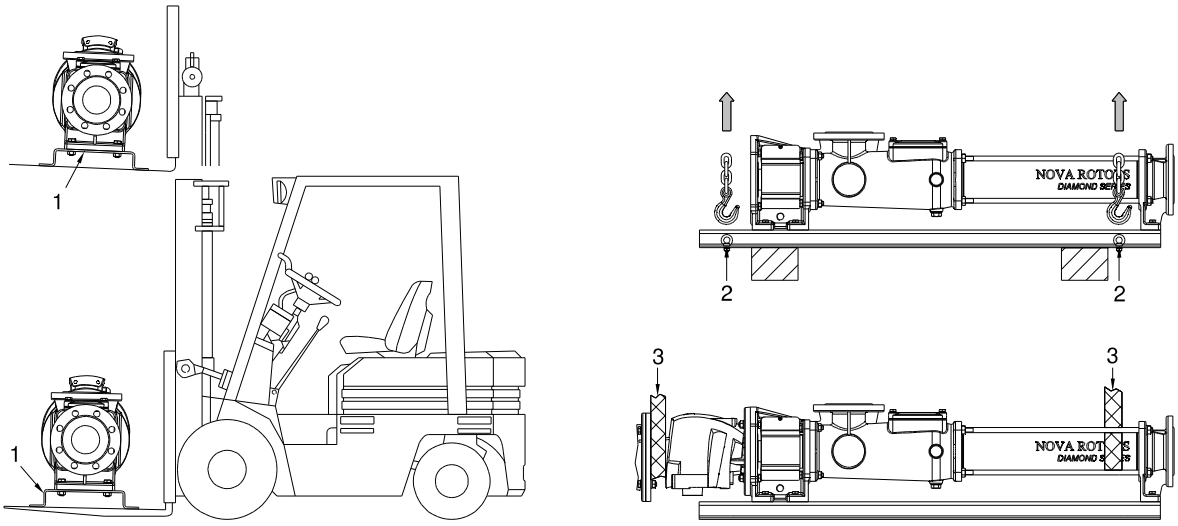


Fig.6 – Handling and positioning

7.1.5 **Instructions for subsequent handlings and positionings**

Subsequent handlings and positionings differ depending on whether the machine is trolley-mounted or not.

7.1.6 **For machines that are not trolley-mounted there are no particular instructions, simply refer to 7.1.4 - Instructions for handling and positioning the pump.**

For subsequent handlings and positionings, if the pump is trolley-mounted, proceed as follows:

- put the machine in "MAINTENANCE MODE" as described in **11 - Maintenance**;
- verify that the machine is not connected to any plant;
- release the wheel brakes;
- shift the trolley-mounted pump manually, slowly and carefully, and position it in its new position;.
- apply the brakes to the wheels;
- return the machine to normal operating mode as described in **11 - Maintenance**.

7.2 Unpacking and disposal of packaging materials

Packaging requirements are discussed and agreed with the Customer at the ordering stage. They can include:

- boxes;
- pallets;
- crates.

Once the pump has been unpacked, check that all machine parts are intact. Contact the Manufacturer if there is evidence of damage and/or defects. Unpacking and disposal of the packaging are the responsibility of the Customer, who is required to comply with the applicable regulations in the country of installation.

8 INSTALLATION AND ASSEMBLY

8.1 Positioning the machine

QUALIFIED TECNICIAN – Plant engineer

The Customer is must adhere to the applicable regulations in the country of installation and employ a **Plant engineer** to perform this operation .

CAUTION!

The Customer is responsible for assessing the space available in their facility for the installation of the pump. Unless otherwise specified at the ordering stage, the machine must not be used in environments that are subject to the formation of a potentially explosive atmosphere.

The Customer must provide an installation area that is adequate for the dimensions of the pump, while also allowing for the movement of the handling equipment. There must not be any obstacles along the route required for the placement of the machine.
The foundations of the installation site must be capable of absorbing the weight of the machine.

CAUTION!

Stator maintenance operations require the amount of space illustrated below **(L – Fig.7)** for disassembly and replacement. For the overall dimensions of the stator refer to **Tab.5.**

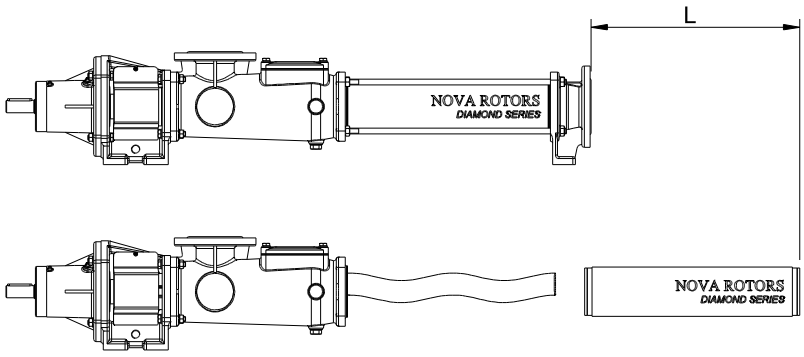


Fig.7 – Space required for maintenance of the stator

Size	Model	L [mm]
D020	1L1	220
	05K2	220
	025K4	300
D025	2L1	270
	1K2	270
	05K4	420
D030	4L1	340
	2K2	340
	1K4	520
	05K8	520
D040	10L1	420
	4K2	420
	2K4	660
	1K8	660
	16L1	490
	8K2	490
D060	20L1	530
	10K2	530
	4K4	810
	2K8	810
	30L1	600
	16K2	600
D120	40L1	645
	20K2	645
	10K4	1060
	4K8	1060
	60L1	780
	30K2	780
D300	80L1	840
	40K2	840
	20K4	1280
	10K8	1280
	120L1	960
	60K2	960

Tab.5 – Overall dimensions of stators

CAUTION!

The entire base, whether provided by the Customer or supplied by the Manufacturer, must lie flat against the foundations. The pump must not be installed on a base that is larger than the foundations. For the dimensions of the base refer to the supplied dimensional drawing.

The pump should be placed and positioned in such a way that the access and escape routes are practical and easy to use in an emergency. Lighting must comply with applicable regulations in the country of installation; in any case, it must be uniform and provide good visibility in all points of the pump.

In addition, take into account :

- the space required for maintenance of the pump and for any additional devices

- the space required for handling the pump
- the space required for adjusting/reading the number of revolutions and for the regulation of the bypass valve (if fitted)
- the position and functional orientation with respect to the other machines
- the sizing and the connection to the power supply

8.2 Mounting the pump

QUALIFIED TECNICIAN – Maintenance Mechanic

A **Maintenance Mechanic** is responsible for carrying out the operations involved in mounting the pump.

PERSONAL PROTECTIVE EQUIPMENT

It is mandatory to wear **protective gloves** when carrying out operations involved in mounting the pump.

No special equipment is required to mount the pump. Simply fasten the pump by means of the bolts on the base, the size and position of which is provided in the supplied dimensional drawing. It is essential that all the holes in the base be used to fasten the pump to the foundations.
If the machine is mounted on a trolley do not lock the wheels while it is operating; unlocked wheels will ensure greater stability while the machine is operating.

8.3 Installation

QUALIFIED TECNICIAN - Installer

Installation of the machine is the Customer's responsibility, unless otherwise specified at the ordering stage, and must comply with applicable regulations in the country of installation. Prior to making the electrical connection and the first startup the technician must verify that the rotation direction of the pump complies with the direction indicated on the data plate.

CAUTION!

If the machine is not installed immediately refer to **10.6.2. Storage for periods of inactivity**.

8.3.1 Connection to tubing

QUALIFIED TECNICIAN – Maintenance Mechanic

It is the Customer's responsibility to connect the pump to the tubes in compliance with the applicable regulations in the country of installation and to employ a **Maintenance Mechanic** to perform this operation.

CAUTION!

The dimensions and the position of the tubes must comply with those indicated in the dimensional drawing while taking into account the space needed to disassemble the pump**.**

PERSONAL PROTECTIVE EQUIPMENT

It is mandatory to wear **protective gloves** when connecting the machine to the tubes.

Prior to connecting the pump to the tubing carry out the operations listed below in the following order:

- ensure that the diameters of the inlet and outlet tubes are suitable for the viscosity and required flow rate
- thoroughly clean the tubes and remove any sediment and any other solids
- position the pump in such a way that when it is stopped, a sufficient quantity of fluid is guaranteed inside the suction body to provide lubrication for the pump at startup
- evaluate the reaction forces and reaction moments generated on the delivery and suction connections when the machine starts up.

To connect the pump to the tubes carry out the operations listed below in the following order:

- install compensators between the pump and the tubes
- fill the pump with fluid
- connect the pump to the tubes using the dimensional drawing as reference
- minimize the air input to the pump's suction casing

CAUTION!

The compensators are intended to protect the machine from vibrations that could damage the pump body.

The maximum permissible reaction forces and moments for the connections are indicated in **Tab.6,** respectively for the "pump body" connection and for the "outlet flange" connection:

- Fx, Fy, Fz : maximum permissible reaction force respectively along the x, y, z axis
- Mx, My, Mz : maximum permissible reaction force respectively about the x, y, z axis.

NOTE!

The reaction forces and moments for **flanged couplings** comply with **API 676**. If the couplings are threaded the Mz moment is zero. For construction types H - HB - HE - HP - HS the pump is fitted with a hopper so only the reaction forces and moments that act on the "outlet flange" connection apply. For construction type V only the reaction forces and moments that act on the "pump body" connection apply.

Size	Model	Standard DN Pump Body/ Outlet Flange	Standard INCH Pump Body/ Outlet Flange	Fx, Fy, Fz [N]	Mx, My, Mz [Nm]
D020	1L1	***32 - 32***	***1"1/4 - 1"1/4***	416	224
	05K2	***32 - 32***	***1"1/4 - 1"1/4***	416	224
	025K4	***32 - 25***	***1"1/4 - 1"***	416 / 325	224 / 175
D025	2L1	***40 - 40***	***1"1/2 - 1"1/2***	520	280
	1K2	***40 - 40***	***1"1/2 - 1"1/2***	520	280
	05K4	***40 - 32***	***1"1/2 - 1"1/4***	520/416	280/224
D030	4L1	***50 - 50***	***2" - 2"***	650	350
	2K2	***50 - 50***	***2" - 2"***	650	350
	1K4	***50 - 40***	***2" - 1"1/2***	650 / 520	350 / 280
	05K8	***50 - 32***	***2" - 1"1/4***	650 / 416	350 / 224
D040	10L1	***65 - 65***	***2"1/2 - 2"1/2***	845	455
	4K2	***65 - 65***	***2"1/2 - 2"1/2***	845	455
	16L1	***65 - 65***	***2"1/2 - 2"1/2***	845	455
	8K2	***65 - 65***	***2"1/2 - 2"1/2***	845	455
	2K4	***65 - 50***	***2"1/2 - 2"***	845 / 650	455 / 350
	1K8	***65 - 40***	***2"1/2 - 1"1/2***	845 / 520	455 / 280
D060	20L1	***80 - 80***	***3" - 3"***	1040	560
	10K2	***80 - 80***	***3" - 3"***	1040	560
	30L1	***80 - 80***	***3" - 3"***	1040	560
	16K2	***80 - 80***	***3" - 3"***	1040	560
	4K4	***80 - 65***	***3" - 2"1/2***	1040 / 845	560 / 455
	2K8	***80 - 50***	***3" - 2"***	1040 /650	560 / 350
D120	40L1	***100 - 100***	***4" - 4"***	1300	700
	20K2	***100 - 100***	***4" - 4"***	1300	700
	60L1	***100 - 100***	***4" - 4"***	1300	700
	30K2	***100 - 100***	***4" - 4"***	1300	700
	10K4	***100 - 80***	***4" - 3"***	1300 / 1040	700 / 560
	4K8	***100 - 65***	***4" - 2"1/2***	1300 / 845	700 / 455
D300	80L1	***125 - 125***	***5" - 5"***	1625	875
	40K2	***125 - 125***	***5" - 5"***	1625	875
	120L1	***125 - 125***	***5" - 5"***	1625	875
	60K2	***125 - 125***	***5" - 5"***	1625	875
	20K4	***125 - 100***	***5" - 4"***	1625 / 1300	875 / 700
	10K8	***125 - 80***	***5" - 3"***	1625 / 1040	875 / 560

Tab.6 – Reaction forces and moments

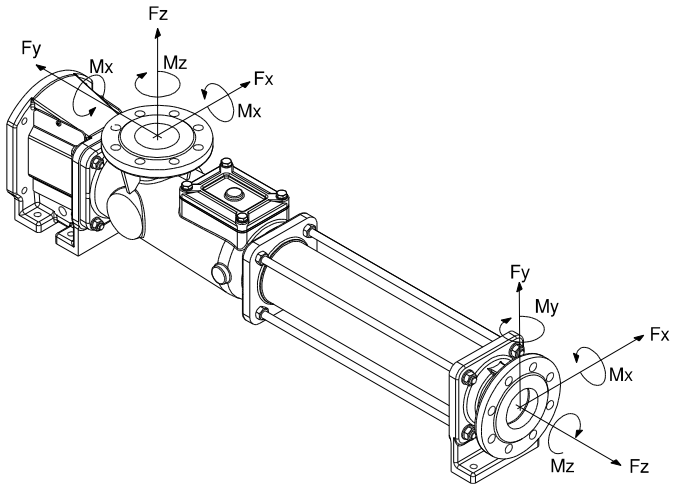


Fig.8 – Reaction forces

9 PUMP OPERATING INSTRUCTIONS

9.1 Filling the pump

The pump must be filled with fluid before startup. This initial procedure is not for priming purposes, but to provide the stator with the necessary lubrication until the pump self-primes. **Fig.9** shows an example of a possible method for filling the pump, which varies depending on the system in which the pump is installed.

CAUTION!

Running the pump dry, even for just a few seconds, can ruin or even irreparably damage it.
Running the pump dry increases friction between the rotor and the stator which generates unacceptable high temperatures. This kind of heat develops rapidly and completely ruins the contact surfaces between the rotor and the stator.

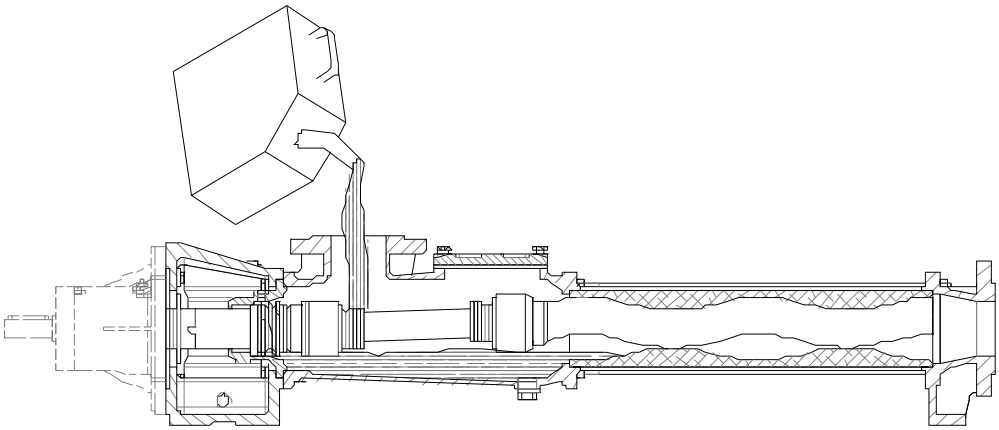


Fig.9 – Example of how to fill the pump

9.2 Electrical connection for pumps equipped with electric motor

QUALIFIED TECHNICIAN – Maintenance Electrician

The Customer is responsible for the electrical connection, which must comply with the applicable regulations in the country of installation, and it must be carried out by a **Maintenance Electrician**.

CAUTION!

The electrical system must comply with the provisions of CEI EN 60204-1:2005, the Manufacturer's specifications and any other applicable regulations in force in the country of installation of the pump.
The electrical panel of the drive system is live, risk of electric shock.

PERSONAL PROTECTIVE EQUIPMENT

It is mandatory to wear **protective gloves** when connecting the pump to the electrical system.

To connect the pump to the electrical system carry out the operations below in the following order:

- verify that the supply voltage corresponds to the voltage required by the pump, as indicated on the data plate of the electric motor
- carefully read the instruction manual provided by the supplier of the electric motor
- determine the cross-section of the conductors;
- verify the ingress protection rating IP of the electric motor;
- connect the conductive parts of the pump to the earth circuit in the place of installation
- check the star/delta connection of the wires to the motor terminals (see **Fig.10**)
- check the phase connections to ensure that the rotation is in the direction indicated on the pump

NOTE!

Because of the friction between the stator and the rotor it may be necessary to increase the start-up torque.
If an inverter is used an incorrect configuration of the parameters could cause problems.
On motors with 7.5 kW or larger inverters it is recommended to set an acceleration ramp of at least 4 s, whereas for motors with smaller inverters, at least 2 s. This will reduce the stress at start-up. Moreover, the starting rpm significantly affects the startup torque required to start the pump. It is therefore recommended to reduce the pump's starting rpm if any problems arise.
See the supplier's manual for information on how to set the parameters for the inverter.

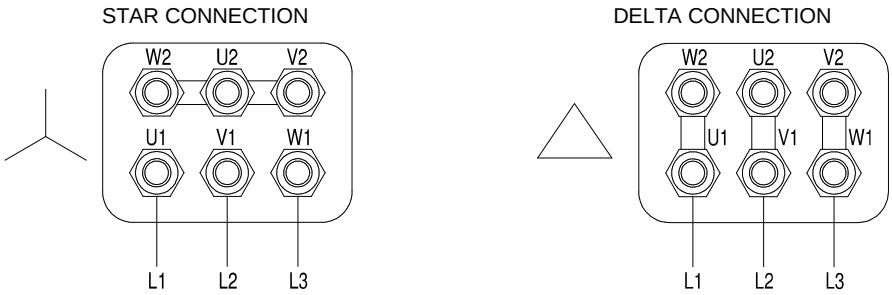


Fig.10 – Electrical connection

9.3 Other connections

For pumps equipped with a hydraulic motor see the manual provided by the supplier of the hydraulic motor.

9.4 Preparation for putting into service

9.4.1 Lubrication

MANUFACTURER'S TECHNICIAN

The pump is pre-lubricated at the Manufacturer's factory.

9.4.2 Adjustments

QUALIFIED TECHNICIAN – Maintenance Mechanic

The adjustments are the responsibility of a **Maintenance Mechanic**.

PERSONAL PROTECTIVE EQUIPMENT

It is mandatory to wear **protective gloves** when carrying out adjustments on the pump.

Before beginning the first startup operations check the following regulations:

- seal: if a gland packing seal B01 or B02 is present, adjust the gland bush in order to guarantee limited leakage of fluid between the hollow shaft and the gland packing to ensure correct lubrication
- if present, check the seal flushing system
- if present, check the speed variator
- if present, check the inverter
- if present, check the bypass valve
- if present, check the safety valve on the pump's delivery casing
- if present, check the check valve on the pump's delivery casing

NOTE!

For pumps with **gland packing seal** the adjustment is made by the Manufacturer at the factory.
To adjust the **seal flushing system**, for the **safety valve** on the delivery casing and for the **nonreturn valve** on the delivery casing refer to the documentation relating to the third-party components.
To adjust the **speed variator** refer to the Datasheet and the user manual provided by the supplier.
To adjust the **inverter** refer to the Datasheet and the user manual provided by the supplier.
To adjust the **bypass valve** refer to the Datasheet and the user manual provided by the supplier.

9.4.3 Testing

MANUFACTURER'S TECHNICIAN

The pump is tested at the Manufacturer's factory.
If the pump is supplied without a drive system it is not tested, unless otherwise agreed at the time of ordering.

In the case in which the machine is provided in health configuration with open pins transmission, it is not performed the testing, if otherwise agreed at time of order.

9.4.4 Pre-use checks

Before starting the pump carry out the carry out the operations below in the following order:

- check that the pump is complete and that all the protections and fixed guards are correctly fitted;
- check that the pump is filled with fluid.

9.4.5 Startup

For instructions on starting the pump refer to the drive system manual.

9.5 First startup

NOTE!

The following paragraphs refer to a drive system consisting of an electric motor but the description is also applicable to a pump fitted with any other type of motor.
In general, refer to the user manual provided by the supplier.

9.5.1 Precautionary checks

QUALIFIED TECHNICIAN – Maintenance Mechanic

The precautionary check prior to the first startup is the responsibility of the **Maintenance Mechanic** and involves checking that the pump rotation direction is correct.

The rotation direction determines the fluid flow direction **(Fig.11)**.

CAUTION!

If the rotation direction is incorrect then the operational limits, set out in the Datasheet, are not applicable.
To verify the correct operational limits refer to the Datasheet and to **data plate** for Atex or standard pumps.

To check the pump rotation direction carry out the operations below in the following order:

- start the pump as instructed in the motor manual;
- check the fluid flow direction **Fig.11**;
- stop the pump as instructed in the motor manual.

If the pump rotation direction, that is, the fluid flow direction, is not correct then it is necessary to invert the phases of the connection to the electrical system as set out in the drive system manual.

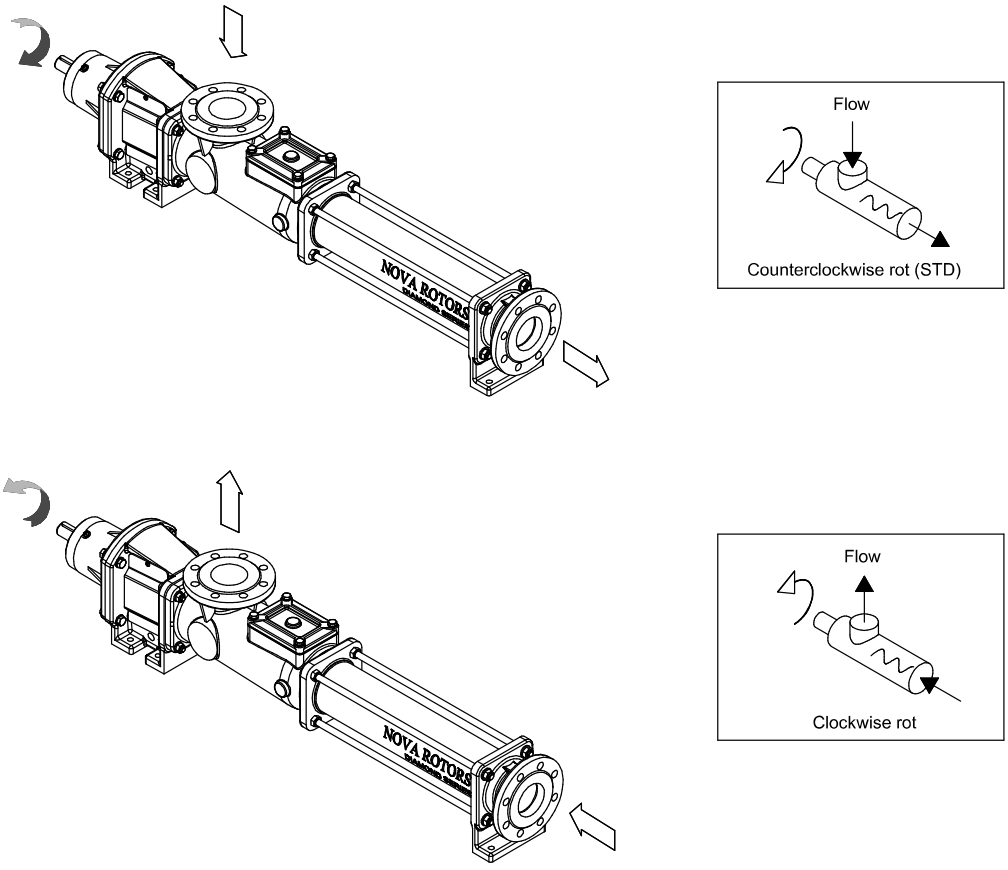


Fig.11 – Pump rotation direction

9.5.2 First startup operations

QUALIFIED TECHNICIAN - Maintenance Mechanic

A **Maintenance Mechanic** is responsible for the first startup operations.

CAUTION!

If all of the following operations cannot be completed refer to the Troubleshooting section or contact the Manufacturer.

For the first pump startup carry out the operations below in the following order:

- start the pump as instructed in the motor manual
- check that the pump reaches the operating speed
- check that the flow rate is within the operational limits
- check that the pressure in the delivery connection does not exceed the values set out in the Datasheet
- check that the pressure in the suction connection does not exceed the values set out in the Datasheet
- stop the pump as instructed in the motor manual

CAUTION!

Excessive tube lengths, sediment in the tubes or closed valves produce pressure increases that, if greater than those agreed on at the time of ordering, can irreparably damage the pump. For this reason it is important to monitor the pressure in the delivery connection and adopt suitable preventive systems to prevent overpressure.
Excessive pressure in the suction connection can break the seal, the hollow shaft and the joints or irreparably damage the entire pump. For this reason the suction connection pressure data agreed on at the time of ordering must be guaranteed.

9.6 Periods of inactivity

QUALIFIED TECHNICIAN - Maintenance Mechanic

A **Maintenance Mechanic** is responsible for carrying out the operations required when the pump is expected to be inoperative for some time.

9.6.1 General guidelines

If the pump is inoperative for a long period of time the operations below must be carried out in the following order:

- disconnect the pump from the power supply systems
- clean the pump as instructed in chapter **11 – Maintenance**
- dismount the stator and package it in order to protect it from light and air
- cover the rotor with suitable protections against knocks and blunt objects
- for the gland packing seal perform the following operations: remove the gland packing seal, apply protective lubricant to the hollow shaft and hole, remount the gland packing seal
- protect the unpainted parts of the pump with grease
- rotate the drive shaft once a month
- for the motor and the other accessories refer to the supplier's manual

NOTE!

When the pump is shut down due to long process stops or plant downtime, is it essential to thoroughly clean it by removing solids, sediment, corrosive fluids or fluids that tend to crystallise and in general all residual fluids, to prevent the formation of ice inside the pump.
The stainless steel pump parts do not require protection.

9.6.2 Storage for periods of inactivity

In periods of inactivity the pump must be stored in a safe, cool, dry place protected from the weather.

CAUTION!

Incorrect storage preparation and warehousing can result in pump damage.
Occasionally prolonged storage of the pump can result in problems relating to some components: stator, rotor, gland packing seal and drive shaft.

9.6.3 Restarting after periods of inactivity

CAUTION!

In the event of a long downtime, the rotor could deform the contact surfaces of the stator. If this occurs, a greater startup torque is required.

When restarting after a long period of inactivity, carry out the operations below in the following order:

- for the motor, refer to the dedicated user manual
- remove the protections from the rotor
- for the stator, perform the following operations: unpack the stator, then mount it as instructed in chapter **11 - Maintenance**
- check that the pump is complete and that all the protections and fixed guards are correctly fitted
- carry out the maintenance operations of the parts indicated in **11 - Maintenance**
- fill the pump with fluid
- connect the pump to the electrical power supply system
- start then pump as instructed in the motor manual

9.7 Pump operation

OPERATOR

The **Operator** is responsible for operating the pump, unless otherwise specified.

CAUTION! DANGER! PARTS IN MOTION!

The pump contains parts in motion. Do not insert limbs or objects other than those being processed while the pump is running.

PERSONAL PROTECTIVE EQUIPMENT

It is mandatory to wear **protective gloves** when operating the pump.

9.7.1 Pump work cycle

For information on the pump work cycle refer to the motor manual.
During the work cycle carry out these operations in the following order:

- check that the flow rate is within the operational limits
- check that the pressure in the delivery connection does not exceed the values set out in the Datasheet
- check that the pressure in the suction connection does not exceed the values set out in the Datasheet

9.8 Stop functions

CAUTION! RISK OF ELECTRIC SHOCK!

Even when the pump stops some electrical parts remain live.
If the pump stops due to a fault the Supervisor must be informed.

For instructions on stopping the pump refer to the drive manual.

9.9 Reset functions

For instructions on stopping the pump refer to the drive manual.

9.10 Scrapping and disposal instructions

QUALIFIED TECHNICIAN – Officer in charge of Reclamation, Recycling and Disposal

The scrapping and disposal operations are entrusted to **Companies specialising in Reclamation, Recycling and Disposal**, and whose personnel possess the required technical-professional qualifications and PPE.

When scrapping the pump the authorised personnel are required to separate the materials by type and deliver the separated waste to the appropriate collection points in compliance with the regulations in force in the country of installation.

10 MAINTENANCE

Safety of both machine and workers also depends on following proper maintenance practices and observing the maintenance schedule.

CAUTION!
Partial or complete failure to observe the indications provided in these Operating Instructions and in the manuals supplied with the pump relating to maintenance operations will render the contractual warranty null and void and relieve the Manufacturer of all liability for any bodily injury and/or property damage caused by the machine.
The Manufacturer will not be held liable for any damage caused by operations that are not compatible with those set out in these Operating Instructions. If it is not possible to carry out any of the operations described herein see **11 – Troubleshooting** or contact the Manufacturer.

QUALIFIED TECHNICIAN - Maintenance Mechanic
A **Maintenance Mechanic** is responsible for carrying out maintenance operations on the machine.

PERSONAL PROTECTIVE EQUIPMENT
It is mandatory to wear **protective gloves** when carrying out maintenance operations.

PERSONAL PROTECTIVE EQUIPMENT
It is mandatory to wear **protective footwear** when carrying out maintenance operations.

10.1 Put the pump in "Maintenance Mode"

To put the pump in "MAINTENANCE MODE" carry out the operations below in the following order:

- stop the pump and disconnect it from the power supply as described in the drive manual, and make sure that it cannot be switched back on by third parties
- discharge the pressure and make sure that there is no residual pressure remaining in the system
- close the on-off valves and/or gate valves
- disconnect the delivery and suction tubes

CAUTION!
It is mandatory to put the pump in " MAINTENANCE MODE " prior to starting any maintenance operation excepting in cases where these Operating Instructions specify the exact opposite.

Once the maintenance operations are completed return the pump to normal use mode by carrying out the operations below in the following order:

- check that all the protections and guards removed for servicing have been correctly replaced and positioned and are functional
- reconnect the delivery and suction tubes
- if the on-off valves and/or gate valves were closed before the operation, reopen them
- connect the machine to the electrical power supply as described in the drive manual
- if the pump was completely emptied of all fluid, fill with sufficient fluid to avoid a dry startup

10.2 Maintenance Operations

The maintenance operations include:

- cleaning operations
- lubrication operations
- disassembly operations
- assembly operations

The disassembly and assembly operations, described below, are required when it is necessary to access the internal parts of the pump for: adjustments, operations related to periods of inactivity, cleaning or servicing operations.

CAUTION!
Maintenance requirements and the type of operations to perform will determine the most appropriate sequence for each Customer to follow.

The maintenance operations involve :

- disassembly and assembly of the stator and the pump body/hopper
- disassembly and assembly of the joints
- disassembly and assembly of the connections to the flange coupling and of the seal
- disassembly and assembly of the bearing housing (only for type J pumps)
- disassembly and assembly of the bridge breaker, if installed

NOTE!
If necessary, remove the fixed plexiglas shield from the coupling flange support.

10.3 Cleaning operations

It is important to set time intervals between one cleaning operation and the next depending on the type of pumped liquid, its density and consistence, the pressure, the frequency of use and the ambient conditions. For these reasons if in doubt contact the Manufacturer. The pump can be cleaned in the following ways:

- through an inspection port if present on the pump body
- manually by disassembling the pump
- automatically (CIP) for pumps fitted with washing connections

It is recommended to carry out the cleaning operations every time the pump is used and before leaving it idle for long periods. The product to use for this operation must not be aggressive as this could cause deterioration of the pump seals, it must be compatible with the process fluid and with the application, that is, whether it is used in the food industry or the industrial sector.

10.4 Wear and tear of pump parts

10.4.1 Rotor and stator

Wear and tear on the rotor and stator is related to many factors, the main ones being: type of process fluid, abrasiveness of the fluid, pump speed, pressure and operating temperature.
When the pump is running lubrication between the stator and the rotor occurs solely through the process fluid.

CAUTION!
When pump performance drops to insufficient values, one or both parts will have to be replaced.

10.4.2 Joints and transmission shaft

Tab.7 indicates the volume of oil that each **single** joint can contain.

Size	Model	oil vol. [cm³]	Non food	Food NSF/H1 certified
D020	1L1 05K2 025K4	2.5	LUBCON TURMOPOLOIL 220/320 EP (PAG)	LUBCON TURMOSYNTHOIL 220/320 PG (PAG)
D025	2L1 1K2 05K4	5		
D030	4L1 2K2 1K4 05K8	10		
D040	10L1 4K2 2K4 1K8 16L1 8K2	20		
D060	20L1 10K2 4K4 2K8 30L1 16K2	40		
D120	40L1 20K2 10K4 4K8 60L1 30K2	60	MaconOil Sint 220/320 HT (PAG)	MaconOil Sintofluid 220/320 (PAO)
D300	80L1 40K2 20K4 10K8 120L1 60K2	100		

Tab.7 – Lubrication of joints and transmission shaft

Avoid using different lubricants inside the same joint and prevent the lubricant from coming into contact with other lubricants both before and after filling the joint. The quantities specified below will ensure perfect operation and maximum durability of the joint. We recommend using no less than 70% of the quantity indicated in **Tab.7**.

Regular inspection and lubrication of the joints (sleeve, clamps, pin, guide bushes, joint cover) and the transmission shaft will prolong their life and improve their efficiency.
Maintenance on the joints and the **transmission** shaft must be carried out **every 8000 hours** of operation .

CAUTION!

One or both joints and/or the transmission shaft must be replaced when signs of wear or breakage appear.

The use of high quality synthetic oil is essential to ensure optimal durability of the joints. The lubricants tested by the Manufacturer guarantee performance and compatibility with the elastomers used for the joint protection sleeves. Lubricants other than those indicated in the table below are not guaranteed as they will not have not been tested and could cause premature wear or breakage of the joint.

10.4.3 Seal

Wear and tear on the seal is related to many factors, the main ones being:

- abrasiveness and viscosity of the pumped fluid
- pump speed
- pressure
- temperature of the fluid.

To ensure satisfactory performance it is essential to select, at the Ordering stage, the type of seal that is most suitable for the operating conditions of the pump and the process fluid.
If using a gland packing seal it is necessary to regularly adjust the gland to guarantee a leakage of pumped fluid between the hollow shaft and the packing to ensure correct lubrication. At machine start up the leak rate should be between 50 - 200 drops/min. After 30 minutes it is necessary to adjust the gland bush to achieve a leak rate of 5 - 20 drops/minute. If the temperature of the gland packing exceeds the process fluid temperature by 20 °C, loosen the gland bush and repeat the adjustment procedure.
The parts of the gland packing that wear are the packing, the hollow shaft and to a lesser degree the stuffing box.

NOTE!
To improve the performance of the gland packing seal, flushing rings can be used, with different positions depending on the process conditions, in order to lubricate the gland packing seal with a specific lubricant. Moreover, one or more rings can be replaced with lip seal rings for applications that require them.

In systems using mechanical seals, the seal itself (rotating part and stationary part) is the only element that wears, consequently the hollow shaft does not contribute to wear and tear on the system. The mechanical seals can be single, back-to-back double, tandem double, single flushed with quench depending on the conditions of use.

NOTE!

La mechanical seal greatly limits the leakage compared to gland packing seal systems as the quantity of liquid required for the lubrication of the sealing faces is very low. Typical leakage is around 0.5 - 1 ml/h.

Dry running even for just a few seconds can ruin or irreparably damage the seal.

CAUTION!

When checking the presence of seal leaks do not remove the protections or safety devices.

For the following types of seal:

- **single mechanical seal with quench Q0K9**
- **gland packing with flushing B02**
- **double back-to-back mechanical seal D0K9/D0S9**
- **double tandem mechanical seal K0K9/K0S9.**

to prevent serious damage to the sealing system it is essential for the Customer, unless specifically ordered through the Manufacturer, to provide the machine with a suitable flushing system. If you do not have sufficient information about how to install the flushing system contact the Manufacturer.

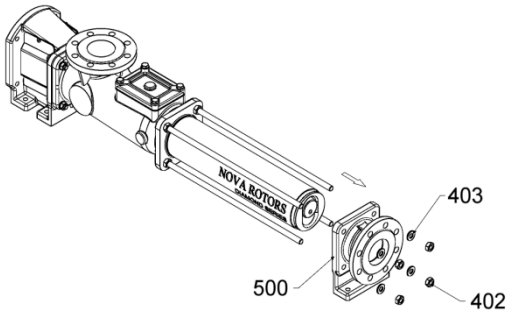
Using the above sealing systems without suitable flushing, therefore causing them to run dry even for a few seconds, can irreparably damage the contact faces of the mechanical seals.

10.4.4 Bearing housing (pump with support type J)

If the pump is constructed with a bearing housing with independent output shaft, the lubrication of the bearings inside the housing must be checked regularly. We recommend re-greasing the bearings after **4000 operating hours** with AGIP GREASE SM 2. Avoid using different lubricants inside the bearing housing and prevent the lubricant from coming into contact with other lubricants both before and after filling the housing. In any case, a *lithium* based *grease* with added *molybdenum* disulphide can be used. Contact the Manufacturer for information on using products other than those specified here.

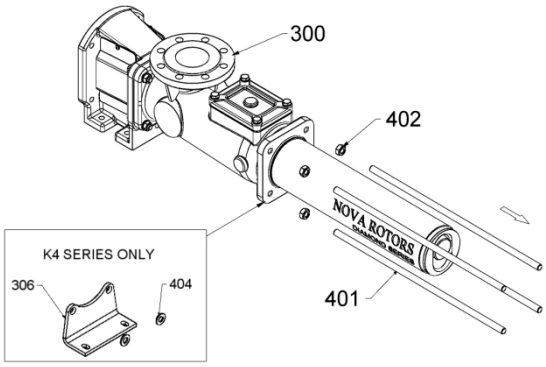
10.5 Disassembly of the stator and pump body

To disassemble the stator and the pump body proceed as follows:



10.5 / 1

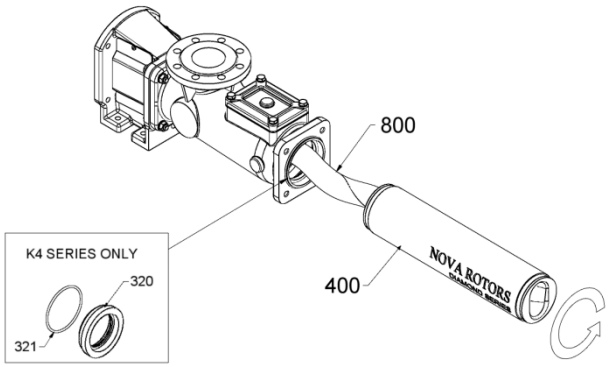
1. Unscrew the hex nuts **(402)** and remove the washers **(403)** from the coupling flange **(500)** to free it.
2. Slide off the coupling flange **(500)**.



10.5 / 2

3. Unscrew the hex nuts **(402)** on the tie rods **(401)** to enable them to rotate.
4. Unscrew the tie rods from the pump body **(300)**.

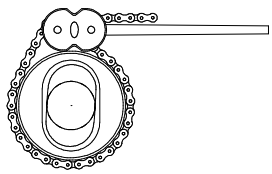
NOTE!
Four-stage models (K4) have an extra support foot **(306)** with washers **(404)** which can be removed by unscrewing the tie rods **(401)** from the pump body.



10.5 / 3

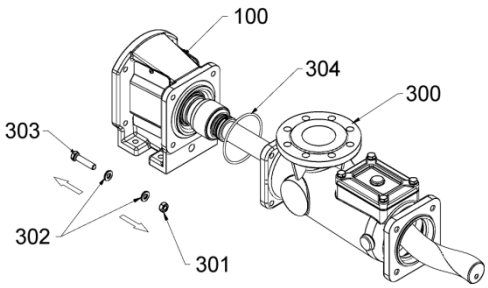
5. Lubricate the stator **(400)** with liquid or slightly viscous products (soap, silicone spray, etc.) to facilitate unscrewing it from the rotor **(800)**.
6. As soon as possible position a wood block under the rotor to support its weight and to facilitate extraction of the stator.

NOTE!
Four-stage models (K4) are fitted with an adapter ring **(320)** and an O-ring **(321)** between the pump body and the stator which can be removed once the stator has been disassembled.



10.5 / 4

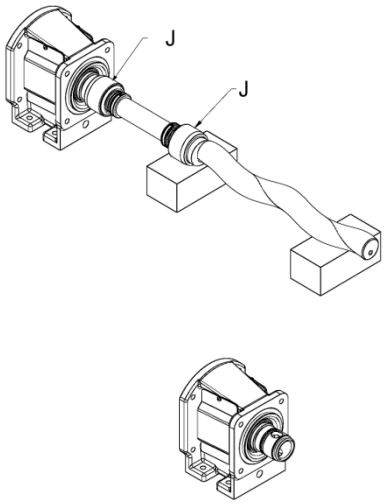
7. If the stator sticks to the rotor or in any case proves difficult to move use the special chain.



8. Unscrew the hexagonal head bolts **(303)** from the hex nut **(301)**, remove the washers **(302)** from the coupling flange **(100)** and from the pump body **(300)**, slide off the pump body and remove the O-ring **(304)**.

NOTE!
Models with a welded pump body do not have any hex nuts **(301)** or washers **(302)** as the bolts are screwed directly onto the pump body.

10.5 / 5



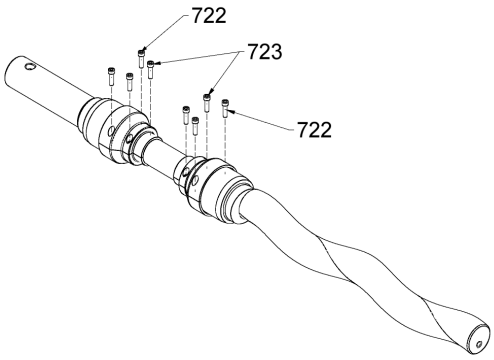
9. Disassemble both transmission joints **(J)** as described in **Disassembly of the joints**.

NOTE!
If you only need to work on the seal it is not necessary to disassemble the joints. See **Disassembly of the connections to the coupling flange and the seal**.
Take care not to damage parts of the seal that are still useable.

10.5 / 6

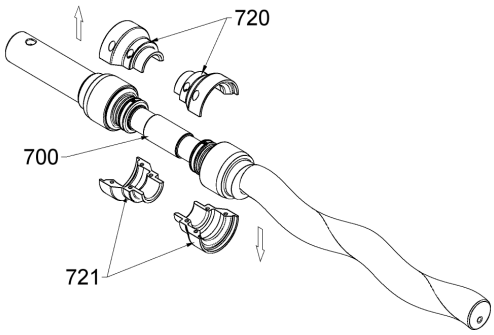
10.6 **Disassembly of the joint protector**

To disassemble the joint protector proceed as follows:



10.5 / 1

1. Unscrew the hexagonal socket head screws **(723)** and **(722)** and remove them.



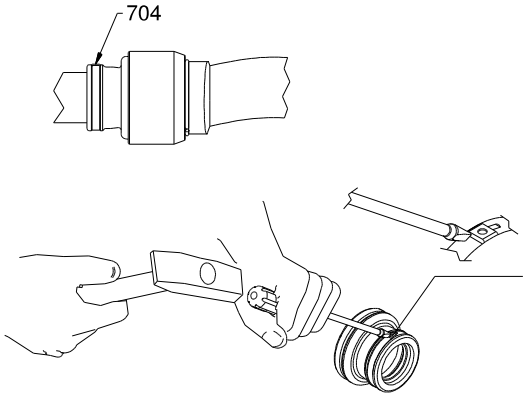
10.5 / 2

2. Remove the half-shells of the joint protector **(720)** and **(721)**.

10.7 Disassembly of the joints

To disassemble the joints proceed as follows:

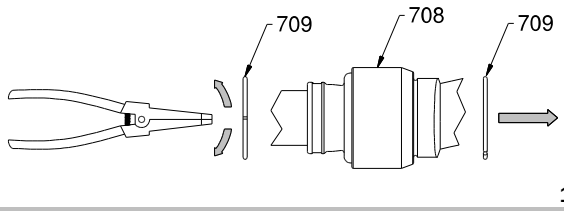
NOTE!
The following procedure for disassembling the joints applies to both the joint on the rotor side and the joint on the hollow shaft side.
It is essential to ensure that the transmission is locked without however having any obstructions interfering with the disassembly operations.



10.7 / 1

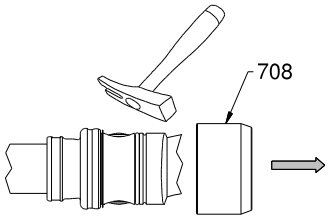
1. Locate the clamp **(704)** and fastening clip. Open the clip with a rubber hammer and a flat blade screwdriver.

NOTE!
When performing this operation take care not to damage or make nicks in the elastomer sleeve.



10.7 / 2

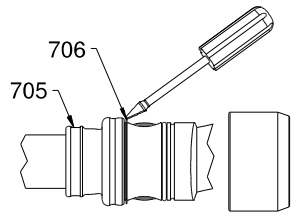
2. Use external circlip pliers to loosen the wire retaining ring **(709)**, remove it from its groove and move it in the opposite direction to the joint cover **(708)**, as far back as possible.



10.7 / 3

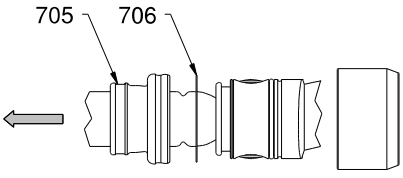
3. Move the joint cover **(708)** in the same direction as the wire retaining ring **(709)**.

NOTE!
To facilitate the operation lubricate the area that is in contact with the sleeve. If the joint cover is difficult to extract tap lightly with a rubber hammer or place a copper shim between the hammer and the cover to prevent damaging it.



10.7 / 4

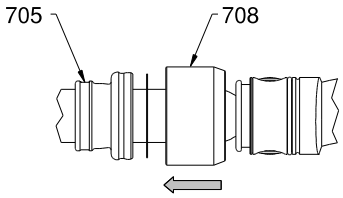
4. Remove the sleeve **(705)** and the spiral retaining ring **(706)**. Use a flat blade screwdriver for both operations.



10.7 / 5

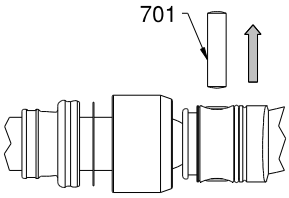
5. Move the sleeve **(705)** and the spiral retaining ring **(706)** towards the centre of the transmission shaft.

NOTE!
Lubricate the transmission shaft to facilitate moving the sleeve.



6. Shift the joint cover **(708),** previously moved back, towards the sleeve **(705)** (point 4).

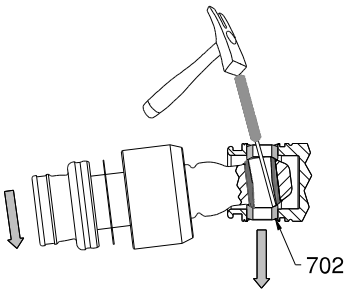
10.7 / 6



7. Remove the pin **(701)**.

NOTE!
If the pin proves difficult to remove use an pin ejector and hammer.

10.7 / 7

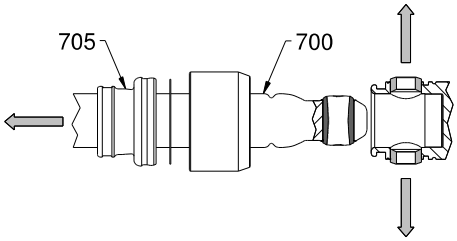


8. Bend the transmission shaft and using a pin ejector and hammer partially remove the guide bush **(702)** as illustrated in the figure.

9. Bend the transmission shaft in the opposite direction and remove the second bush in the same way.

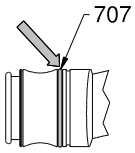
NOTE!
If the guide bushes do not need to be replaced, shift them to a position where they will not hamper removal of the transmission shaft.

10.7 / 8



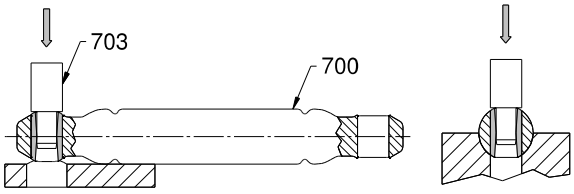
10. Slide out the transmission shaft **(700)** from the joint casing. If necessary remove the sleeve **(705)** to replace it.

10.7 / 9



11. Remove the O-ring **(707)** from the joint casing.

10.7 / 10



12. Place the transmission shaft **(700)** on a pneumatic or hand force fit press, insert an extractor drift into the transmission bush **(703)** and remove it from its seat.

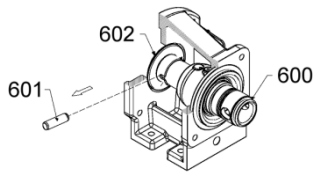
NOTE!
The extractor drift must be centred on the transmission bush.

10.7 / 11

10.8 Disassembly of the coupling flange and the seal G0K9/Q0K9

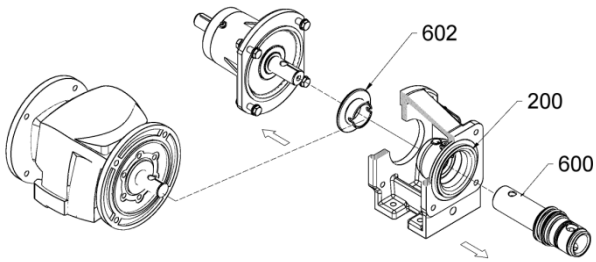
To disassemble the **single mechanical seal G0K9 (STANDARD) / Q0K9** and the connection to the drive or to the bearing housing for type J pumps, proceed as follows:

NOTE!
Take care not to damage any parts of the seal that are still useable.
It is possible to perform the operations without removing the entire transmission, in this case the entire transmission replaces the hollow shaft; it comprises the hollow shaft, transmission shaft, rotor and joint parts. This implies a greater difficulty in handling the transmission given the additional weight.



1. Use a screwdriver to shift the splash ring **(602)** until the coupling pin **(601)** is visible.
2. Remove the coupling pin from the hollow shaft **(600)** using a pin ejector and hammer.

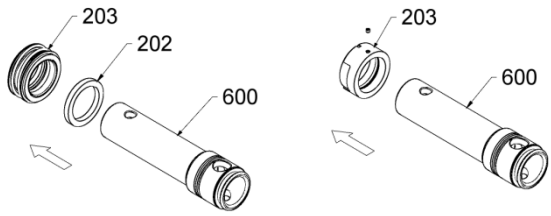
10.8 / 1



3. Pull out the hollow shaft from the splash ring **(602)** and from the mechanical seal housing **(200)** with the rotating part of the mechanical seal.
4. Undo the fixing bolts to remove the drive unit or the bearing housing.

NOTE!
Do not remove the drive unit or the bearing housing before removing the hollow shaft or the entire transmission as this could irreparably damage the mechanical seal.

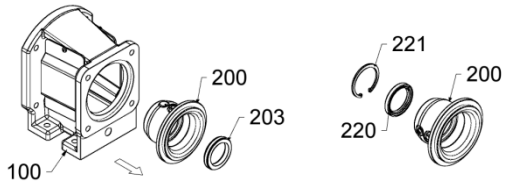
10.8 / 2



5. Remove the rotating part of the mechanical seal **(203)** and the sealing ring **(202)** from the hollow shaft **(600).**

NOTE!
For models with the rotating part of the seal made of steel undo the fixing screws on the seal.

10.8 / 3



6. Remove the mechanical seal housing **(200)** from the coupling flange **(100)**.
7. Remove the stationary part of the mechanical seal **(203)** from the mechanical seal housing.

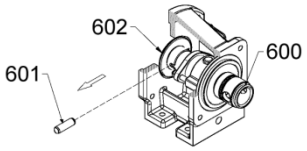
NOTE!
For single mechanical seal Q0K9 remove the retaining ring **(221)** and the oil seal **(220)** from the mechanical seal housing.

10.8 / 4

10.9 Disassembly of the coupling flange and the seal B01/B02

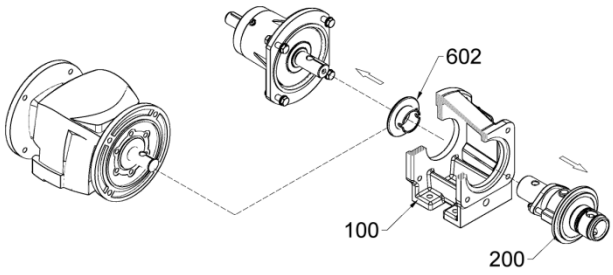
To disassemble the **gland packing B01 / B02** and the connection to the drive or to the bearing housing for type J pumps, proceed as follows:

NOTE!
Take care not to damage any parts of the seal that are still useable.
It is possible to perform the operations without removing the entire transmission, in this case the entire transmission replaces the hollow shaft; it comprises the hollow shaft, transmission shaft, rotor and joint parts. This implies a greater difficulty in handling the transmission given the additional weight.



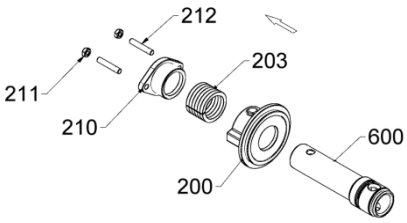
1. Use a screwdriver to shift the splash ring **(602)** until the coupling pin **(601)** is visible.
2. Remove the coupling pin from the hollow shaft **(600)** using a pin ejector and hammer.

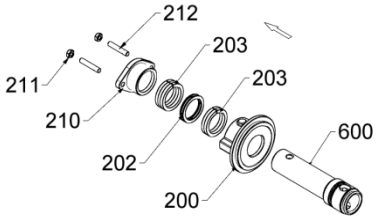
10.8 / 1



3. Remove the hollow shaft **(600)** with the gland housing **(200)** from the coupling flange **(100)**. Remove the splash ring **(602)** from the hollow shaft.
4. Undo the fixing bolts to remove the drive unit or the bearing housing.

10.8 / 2





5. Undo the hex nuts **(211)** and remove the gland bush **(210)**. Pull out the hollow shaft **(600)** from the gland housing **(200)**.
6. Remove the packing set **(203)** from the gland housing and unscrew the studs **(212)**.

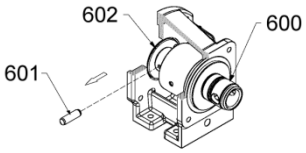
NOTE!
If the seal is a gland packing B02, remove the flushing ring **(202)** from the gland housing as well as the gland packing seal.

10.8 / 3

10.10 Disassembly of the connections to the coupling flange and the seal D0K9/D0S9

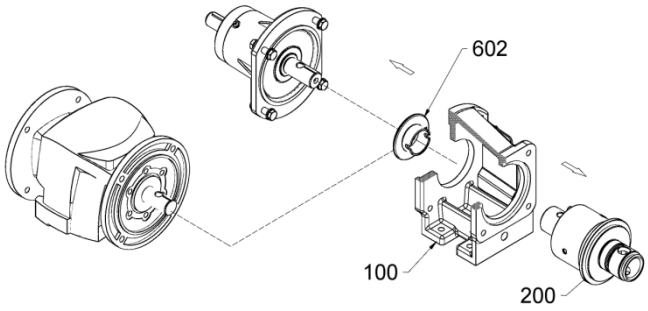
To disassemble the **double back-to-back mechanical seal D0K9 / D0S9** and the connection to the drive unit or the bearing housing for type J pumps, proceed as follows:

NOTE!
Take care not to damage any parts of the seal that are still useable.
It is possible to perform the operations without removing the entire transmission, in this case the entire transmission replaces the hollow shaft; it comprises the hollow shaft, transmission shaft, rotor and joint parts. This implies a greater difficulty in handling the transmission given the additional weight.



10.8/ 1

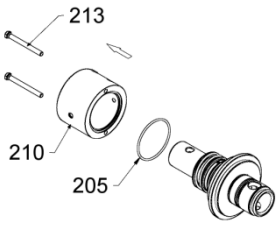
1. Use a screwdriver to shift the splash ring **(602)** until the coupling pin **(601)** is visible.
2. Remove the coupling pin from the hollow shaft **(600)** using a pin ejector and hammer.



10.8/ 2

3. Remove the hollow shaft **(600)** with the mechanical seal housing **(200)** from the coupling flange **(100)**. Remove the splash ring **(602)** from the hollow shaft .
4. Undo the fixing bolts to remove the drive unit or the bearing housing.

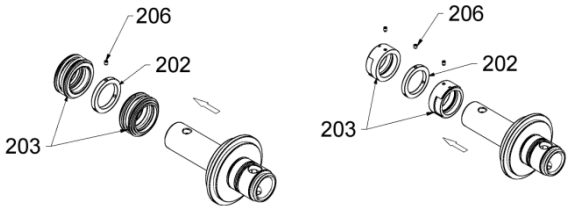
NOTE!
Do not remove the drive unit or the bearing housing before removing the hollow shaft or the entire transmission as this could irreparably damage the mechanical seal.



10.8/ 3

5. Unscrew the hexagonal head bolts **(213)**, remove the mechanical seal bush **(210)** and the O-ring **(205)**.

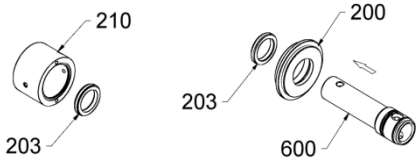
NOTE!
Take care not to damage the stationary part of the mechanical seal by touching it with the hollow shaft.



10.8/ 4

6. Loosen the threaded screws **(206)** and remove the rotating parts of the mechanical seal **(203)** and the mechanical seal ring **(202)**.

NOTE!
Use lubricant to facilitate the operation.
For models with the rotating part of the seal made of steel undo the fixing screws on the seal.



10.8/ 5

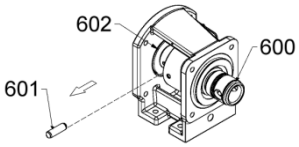
7. Remove the stationary part of the mechanical seal **(203)** from the mechanical seal bush **(210).**
8. Pull out the hollow shaft **(600)** from the mechanical seal housing **(200)** and remove the housing from the stationary part of the mechanical seal **(203)**.

NOTE!
Take care not to damage the stationary part of the mechanical seal by touching it with the hollow shaft.

10.11 Disassembly of the connections to the coupling flange and the seal K0K9/K0S9

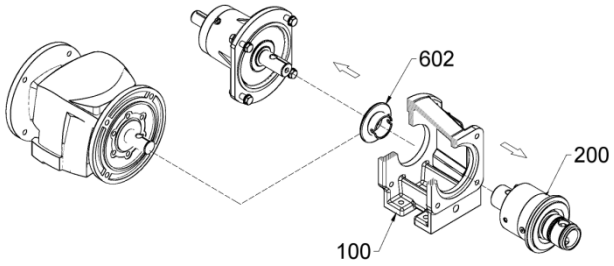
To disassemble the **double *tandem mechanical seal* K0K9 / K0S9** and the connection to the drive unit or the bearing housing for type J pumps, proceed as follows:

Note!
Take care not to damage any parts of the seal that are still useable.
It is possible to perform the operations without removing the entire transmission, in this case the entire transmission replaces the hollow shaft; it comprises the hollow shaft, transmission shaft, rotor and joint parts. This implies a greater difficulty in handling the transmission given the additional weight.



10.8 / 1

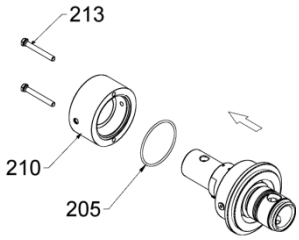
1. Use a screwdriver to shift the splash ring **(602)** until the coupling pin **(601)** is visible.
2. Remove the coupling pin from the hollow shaft **(600)** using a pin ejector and hammer.



10.8 / 2

3. Remove the hollow shaft **(600)** with the mechanical seal housing **(200)** from the coupling flange **(100)**. Remove the splash ring **(602)** from the hollow shaft .
4. Undo the fixing bolts to remove the drive unit or the bearing housing.

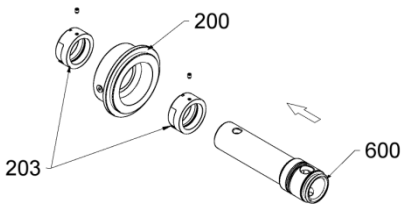
NOTE!
Do not remove the drive unit or the bearing housing before removing the hollow shaft or the entire transmission as this could irreparably damage the mechanical seal.



10.8 / 3

5. Unscrew the hexagonal head bolts **(213)**, remove the mechanical seal bush **(210)** and the O-ring **(205)**.

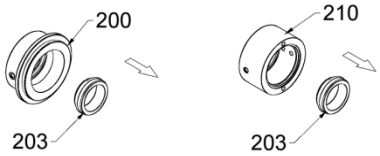
NOTE!
Take care not to damage the stationary part of the mechanical seal located inside the mechanical seal bush by touching it with the hollow shaft.



10.8 / 4

6. Loosen the screws and remove the rotating part of the mechanical seal **(203)** from the hollow shaft **(600)**.
7. Slide out the mechanical seal housing **(200)** from the hollow shaft.
8. Loosen the screws and remove the second rotating part of the mechanical seal **(203)** from the hollow shaft **(600)**.

NOTE!
Use lubricant to facilitate the operation.
Take care not to damage the stationary part of the mechanical seal located inside the mechanical seal bush by touching it with the hollow shaft.

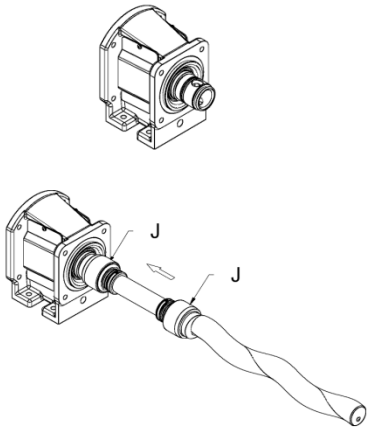


10.8 / 5

9. Remove the stationary part of the mechanical seal **(203)** from the mechanical seal housing **(200)**.
10. Remove the stationary part of the other mechanical seal **(203)** from the mechanical seal bush **(210).**

10.12 Assembly of the stator and the pump body

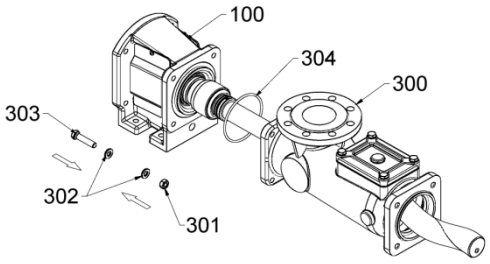
To assemble the stator and the pump body proceed as follows:



1. Assemble the joints **(J)** using **Assembly of the joints** as reference.

NOTE!
If the entire transmission has already been assembled on the bench it will not be necessary to work on the joints and corresponding parts.
In this case take care not to damage the seal parts when inserting the rotating unit.

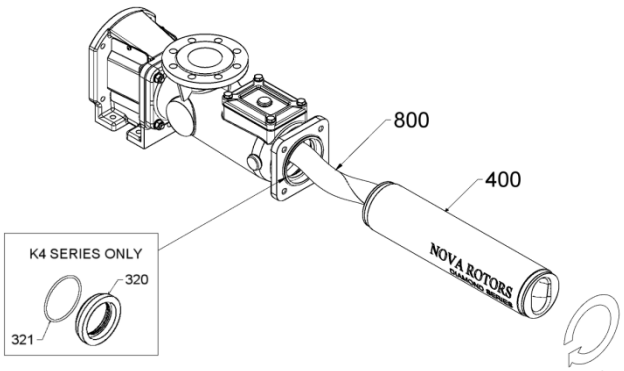
10.12 / 1



2. Position the O-ring **(304)** and the pump body **(300)**. Join the coupling flange **(100)** to the pump body with the hexagonal head bolts **(303),** fitted with the washers **(302)** and the hex nut **(301)**.

NOTE!
Models with a welded pump body do not have any hex nuts **(301)** or washers **(302)** as the bolts are screwed directly onto the pump body.

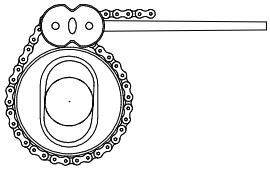
10.12 / 2



3. Lubricate the stator **(400)** with liquid or slightly viscous products (soap, silicone spray, etc.) to facilitate screwing it onto the rotor **(800)**.

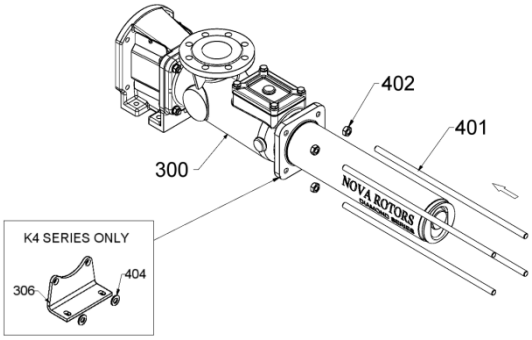
NOTE!
Four-stage models (K4) are fitted with an adapter ring **(320)** and an O-ring **(321)** between the pump body and the stator which must be placed into position on the pump body before the stator is remounted.

10.12 / 3



4. If the stator sticks to the rotor or in any case proves difficult to move use the special chain.

10.12 / 4

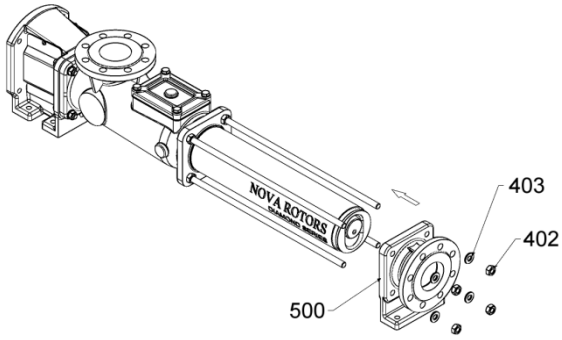


5. Screw the hex nuts **(402)** onto the tie rods **(401)**.

6. Screw the tie rods onto the pump body **(300)**, screw the hex nuts until they butt against the body, so as to prevent the tie rods from rotating.

NOTE!
Four-stage models (K4) have an extra support foot **(306)** with washers **(404).**
To remount it position the foot and the washers between the tie rods fitted with hex nuts and the pump body; tighten the tie rods.

10.12 / 5



7. Position the outlet flange **(500)** on the stator.

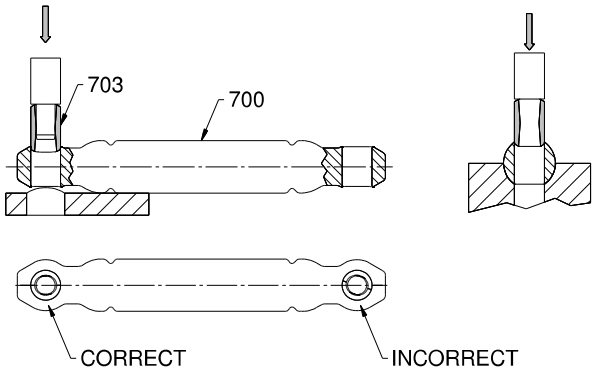
8. Mount the washers **(403)** on the tie rods and tighten the hex nuts **(402)**, until the outlet flange butts against the stator.

10.12 / 6

10.13 Assembly of the joints

To assemble the joints proceed as follows:

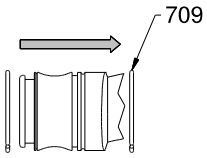
NOTE!
The following procedure for assembling the joints applies to both the joint on the rotor side and the joint on the hollow shaft side. It is essential to ensure that the transmission is locked without however having any obstructions interfering with the disassembly operations.



1. Position the transmission shaft **(700)** on a pneumatic or hand force fit press, insert a special extractor drift into the transmission bush **(703)** and insert it in the housing of the transmission shaft.

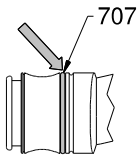
NOTE!
The extractor drift must be centred on the transmission bush. The correct position for the transmission bush is illustrated in the figure on the left.

10.13 / 1



2. Mount the retaining ring **(709)** on the joint casing set back from its seat as illustrated in the figure.

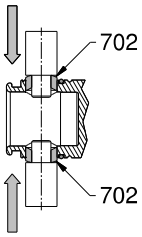
10.13 / 2



3. Mount the O-ring **(707)** on the joint casing.

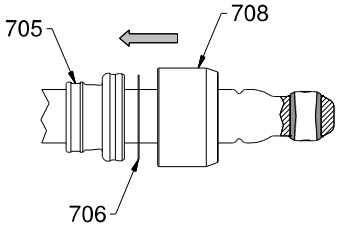
NOTE!
Take care not to damage the O-ring, as this could affect its sealing efficiency.

10.13 / 3



4. Mount the guide bushes **(702)** on the joint casing, as illustrated, using a drift.

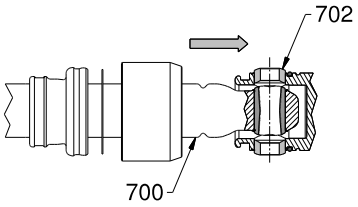
10.13 / 4



5. Mount the following elements on the transmission shaft in sequence: the sleeve **(705)**, the spiral retaining ring **(706)** and the joint cover **(708)**.

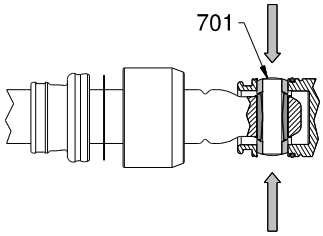
NOTE!
Lubricate the sleeve and the transmission shaft to facilitate positioning of the parts.

10.13 / 5



6. Align the hollow shaft/rotor with the transmission shaft **(700)**, so that the holes in the guide bushes **(702)** are aligned with the hole in the transmission bush mounted on the transmission shaft.

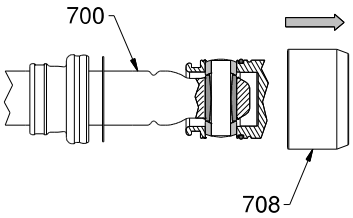
10.13 / 6



7. Insert the pin **(701)** and position the guide bushes.

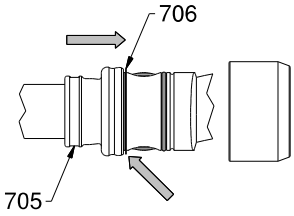
NOTE!
Check that the pin rotates easily and that the movement of the transmission shaft is smooth. If the latter does not move tap gently with a rubber hammer after step 11.

10.13 / 7



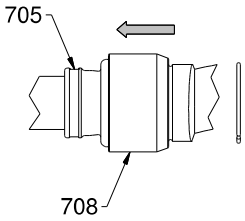
8. Position the joint cover **(708)** opposite to the transmission shaft **(700)** and move it until the sleeve seat and the spiral ring seat are accessible.

10.13 / 8



9. Insert the spiral retaining ring **(706)** and the sleeve **(705)** in their respective seats.

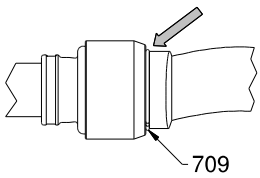
10.13 / 9



10. Position the joint cover **(708)** up against the spiral retaining ring taking care not to dislocate the sleeve **(705)** from its seat.

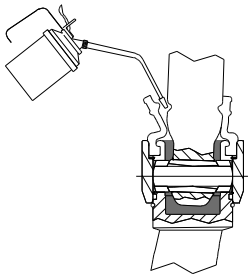
NOTE!
To facilitate the operation lubricate the area that it is in contact with the sleeve. If the joint cover is difficult to position tap lightly with a rubber hammer or place a copper shim between the hammer and the cover to prevent damaging it.

10.13 / 10



11. Position the wire retaining ring **(709)** so that it blocks the joint cover.

10.13 / 11

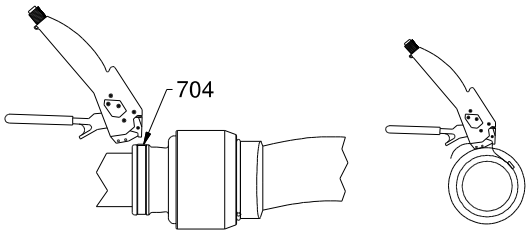


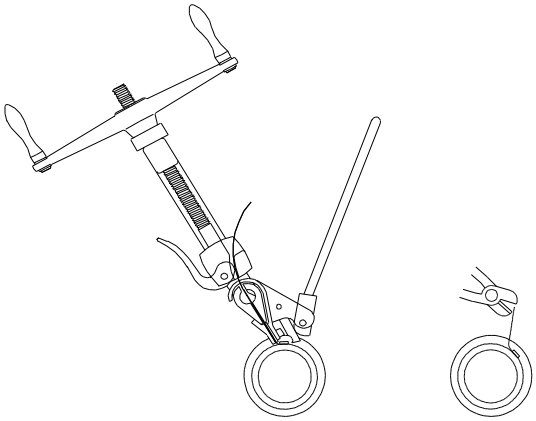
12. Lubricate the joint.

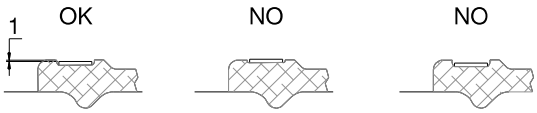
NOTE!
If the joint is in a horizontal position when assembled we recommend adding some of the lubricant after step 8.

10.13 / 12

13. Mount the clamps **(704)** with the special tool and ensure that the joint is sealed. Make sure that the punch is deep enough to secure the clip.





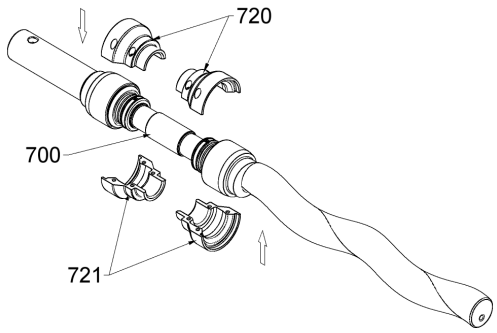


NOTE!
Check that the clamp is tightened as illustrated in the figure. If it is too tight it could impact the sleeve, break it and affect the functionality of the joint after just a few hours of operation.

10.13 / 13

10.14 **Assembly of the joint protectors**

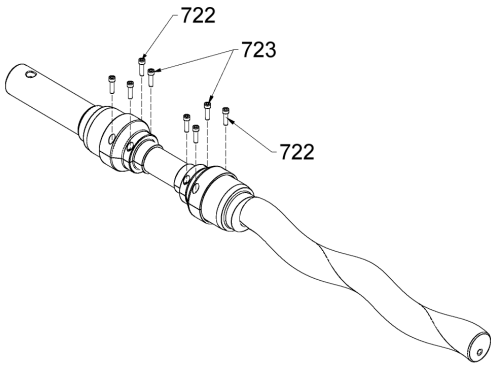
To assemble the joint protectors proceed as follows:



10.5 / 1

1. Position the half-shells of the joint protector **(720)** and **(721)**.

NOTE!
To ensure perfect coupling of the protectors with the joint, position the transmission horizontally so that the axis of the transmission shaft **(700)** is aligned with the rotor axis and the hollow axis.

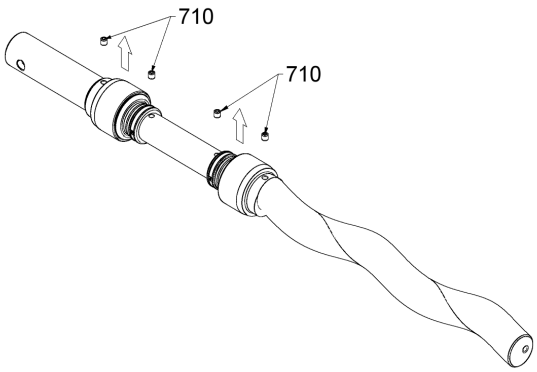


10.5 / 2

2. Apply the hexagonal socket head screws **(723)** and **(722)**.

10.15 Lubrication of balanced joints

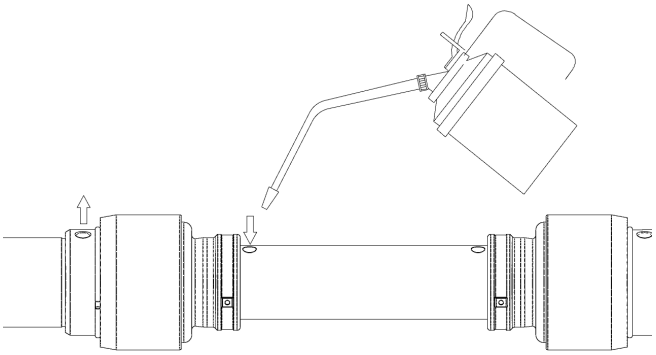
The balanced joints make it possible to work with high pressures in the pump body without damaging the joint components. To correctly lubricate the balanced joints, proceed as follows:



10.5 / 1

1. Place the entire transmission in a horizontal position with the threaded plugs **(710)** facing upwards. Remove the plugs from the holes on both the hollow shaft side and the rotor side.

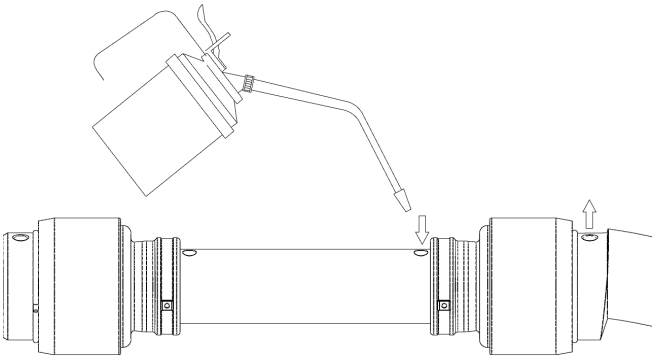
2. Rotate the transmission to enable the old lubricant to flow out from the joints.



10.5 / 2

3. Pour the new lubricant in the hole provided on the transmission shaft from the hollow shaft side. The joint will be filled correctly when the lubricant starts to flow out from the hole on the hollow shaft.

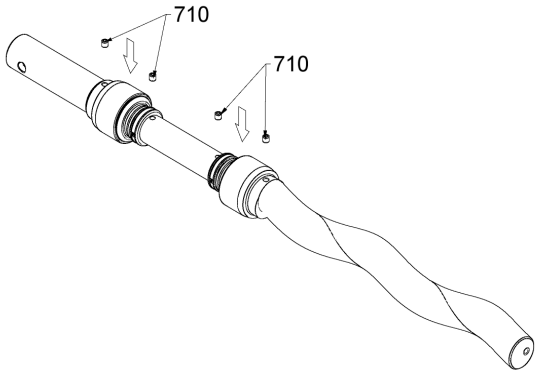
NOTE!
To ensure that no air pockets remain inside the joint top up with lubricant several times, waiting several seconds between each top up to eliminate any residual air from inside the joint.



10.5 / 3

4. Proceed in the same way for the joint on the rotor side.

NOTE!
To ensure that no air pockets remain inside the joint top up with lubricant several times, waiting several seconds between each top up to eliminate any residual air from inside the joint.



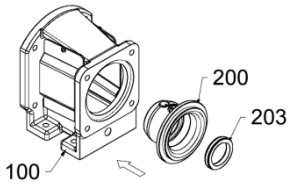
10.5 / 4

5. Screw the threaded plugs **(710)** into the holes on the transmission shaft, the hollow shaft and the rotor, using the sealant to the threads so as to ensure a seal

10.16 Assembly of the connections to the coupling flange and the seal G0K9/Q0K9

To assemble the **single mechanical seal G0K9 (STANDARD) / Q0K9** and the connection to the drive or to the bearing housing for type J pumps, proceed as follows:

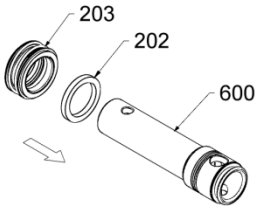
NOTE!
Take care not to damage any parts of the seal that are still useable.
It is possible to perform the operations without removing the entire transmission, in this case the entire transmission replaces the hollow shaft; it comprises the hollow shaft, transmission shaft, rotor and joint parts. This implies a greater difficulty in handling the transmission given the additional weight.

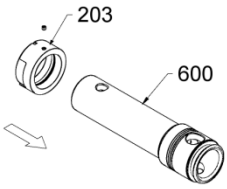


1. Position the stationary part of the mechanical seal **(203)** in the housing **(200)**.
2. Position the mechanical seal housing on the coupling flange **(100)**.

NOTE!
For single mechanical seal Q0K9 arrangements insert the oil seal **(220)** and the retaining ring **(221)** in the mechanical seal housing before mounting it on the coupling flange.
For mechanical seal 110-120-122 arrangements match the slot on the stationary part of the mechanical seal with the pin positioned in the mechanical seal housing.

10.8 / 1

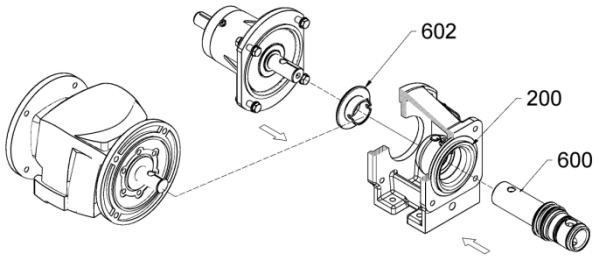




3. Mount the sealing ring **(202)** and the rotating part of the mechanical seal **(203)** on the hollow shaft **(600)**.

NOTE!
Apply lubricant to facilitate the operation.
For models that have the rotating part of the seal made of steel position the rotating part and tighten the fixing bolts on the seal.

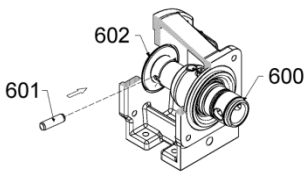
10.8 / 2



4. Mount the splash ring **(602)** on the drive or bearing housing output shaft. Mount the drive or the bearing housing on the coupling flange **(100)** and lock in positon with the nuts and bolts.
5. Insert the hollow shaft **(600)** with the rotating part of the mechanical seal in the mechanical seal housing **(200)**, in the splash ring **(602)** and on the drive output shaft; make sure that the holes match up with the pin.

NOTE!
To avoid the formation of rust apply protective oil to the drive output shaft.
Mount the drive or the bearing housing before the hollow shaft or the entire transmission to avoid irreparably damaging the mechanical seal.

10.8 / 3



6. Align the groove of the splash ring with the hole for the pin on the hollow shaft **(600)** (if this has not already been done).
Lubricate and insert the pin **(601)** to lock the shafts in position.

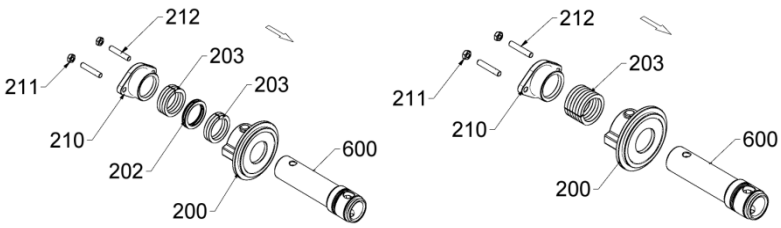
NOTE!
If the pin is difficult to insert tap lightly with a hammer until it is in position.

10.8 / 4

10.17 Assembly of the connections to the coupling flange and the sea B01/B02

To assemble the gland packing seal **B01 / B02** and the connection to the drive or to the bearing housing for type J pumps, proceed as follows:

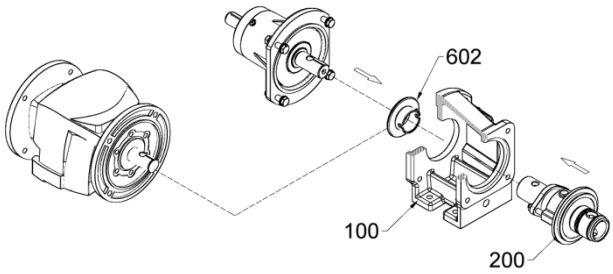
NOTE!
Take care not to damage any parts of the seal that are still useable.
It is possible to perform the operations without removing the entire transmission, in this case the entire transmission replaces the hollow shaft; it comprises the hollow shaft, transmission shaft, rotor and joint parts. This implies a greater difficulty in handling the transmission given the additional weight.



10.17 / 1

1. Insert the hollow shaft **(600)** in the gland housing **(200)**; position the gland packing set **(203)** between the hollow shaft and gland housing.
2. Screw the studs **(212)** onto the gland housing and insert the gland bush **(210)**. Tighten the hex nuts **(211)**.

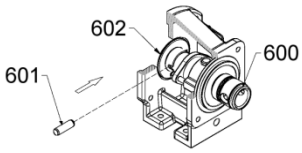
NOTE!
For gland packing seal B02 arrangements insert the flushing ring **(202)** between the gland packing rings in the gland housing; for the correct position see **13 – Spare parts**.



10.17 / 2

3. Mount the drive or the bearing housing on the coupling flange **(100)** and lock in positon with the nuts and bolts.
4. Mount the splash ring **(602)** on the hollow shaft so that the drain slot matches up with the hole for the pin. Position the gland housing **(200)** on the coupling flange.

NOTE!
To avoid the formation of rust apply protective oil to the drive output shaft.



10.17 / 3

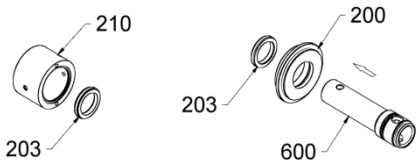
5. Align the holes for the pin of the hollow shaft with those on the drive or bearing housing output shaft. Lubricate and insert the pin **(601)** to lock the shafts in position.

NOTE!
If the pin is difficult to insert tap lightly with a hammer until it is in position.

10.18 Assembly of the connections to the coupling flange and the seal D0K9/D0S9

To assemble the **double back-to back mechanical seal D0K9 / D0S9** and the connection to the drive or to the bearing housing for type J pumps, proceed as follows:

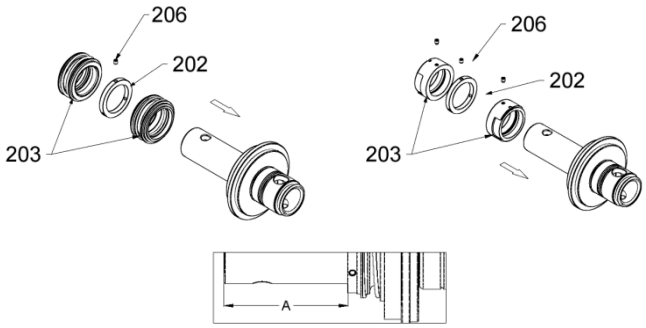
NOTE!
Take care not to damage any parts of the seal that are still useable.
It is possible to perform the operations without removing the entire transmission, in this case the entire transmission replaces the hollow shaft; it comprises the hollow shaft, transmission shaft, rotor and joint parts. This implies a greater difficulty in handling the transmission given the additional weight.



1. Position the stationary part of the mechanical seal **(203)** in the mechanical seal bush **(210)**.
2. Position the stationary part of the mechanical seal **(203)** in the housing **(200)** Insert the hollow shaft **(600)** in the mechanical seal housing.

NOTE!
Take care not to damage the stationary part of the mechanical seal by touching it with the hollow shaft.
For mechanical seal 110-120-122 arrangements match the slot on the stationary part of the mechanical seal with the pin positioned in the mechanical seal housing.

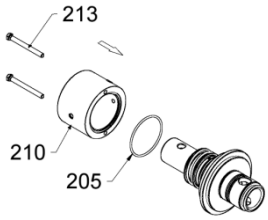
10.18 / 1



3. Insert the rotating parts of the mechanical seal **(203)** and the mechanical seal ring **(202)**. Tighten the screws **(206)** of the mechanical seal ring, for position **A** see **13.2 –Spare parts for double back-to back mechanical seals D0K9 / D0S9**.

NOTE!
Apply lubricant to facilitate the operation.
For models that have the rotating part of the seal made of steel position the rotating part up against the mechanical seal ring and tighten the fixing screws on the seal.

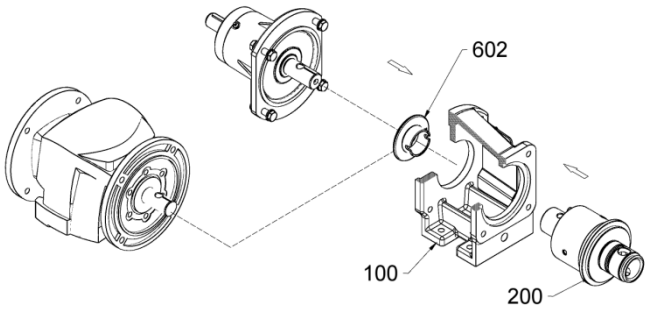
10.18 / 2



4. Position the O-ring **(205)** and the mechanical seal bush **(210)** on the mechanical seal housing. Tighten the hexagonal head bolts **(213)**.

NOTE!
Take care not to damage the stationary part of the mechanical seal located inside the mechanical seal bush by touching it with the hollow shaft.

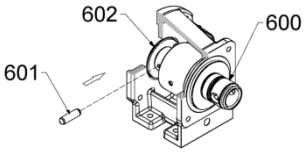
10.18 / 3



5. Mount the drive or the bearing housing on the coupling flange **(100)** and lock in positon with the nuts and bolts.
6. Mount the splash ring **(602)** on the hollow shaft so that the drain slot matches up with the hole for the pin. Position the gland housing **(200)** on the coupling flange.

NOTE!
To avoid the formation of rust apply protective oil to the drive output shaft.

10.18 / 4



7. Align the holes for the pin of the hollow shaft with those on the drive or bearing housing output shaft. Lubricate and insert the pin **(601)** to lock the shafts in position.

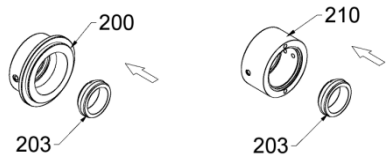
NOTE!
If the pin is difficult to insert tap lightly with a hammer until it is in position.

10.18 / 5

10.19 Assembly of the connections to the coupling flange and the seal K0K9/K0S9

To assemble the **double *tandem mechanical seal* K0K9 / K0S9** and the connection to the drive or to the bearing housing for type J pumps, proceed as follows:

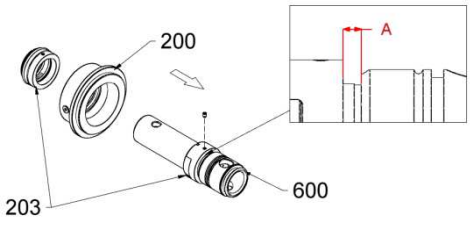
NOTE!
Take care not to damage any parts of the seal that are still useable.
It is possible to perform the operations without removing the entire transmission, in this case the entire transmission replaces the hollow shaft; it comprises the hollow shaft, transmission shaft, rotor and joint parts. This implies a greater difficulty in handling the transmission given the additional weight.



1. Position the stationary part of the mechanical seal **(203)** in the housing **(200)**.
2. Position the stationary part of the mechanical seal **(203)** in the mechanical seal bush **(210)**.

NOTE!
For mechanical seal 110-120-122 arrangements match the slot on the stationary part of the mechanical seal with the pin positioned in the mechanical seal housing.

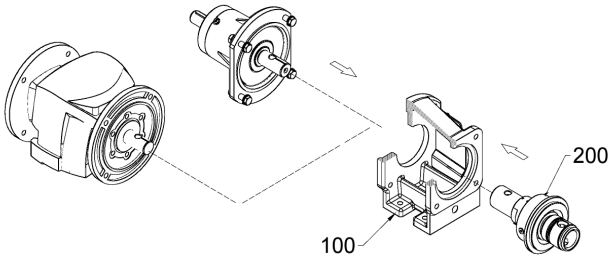
10.19 / 1



3. Position the rotating part of the mechanical seal **(203)** on the hollow shaft **(600).** For the position **A** see **13.2 - Spare parts for double tandem mechanical seal K0K9 / K0S9** and tighten the fixing screws. To facilitate the operation use a shim of suitable dimensions.
4. Mount the mechanical seal housing **(200)** and the rotating part of the second mechanical seal on the hollow shaft without tightening the fixing screws.

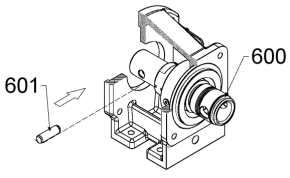
NOTE!
Apply lubricant to facilitate the operation.

10.19 / 2



5. Mount the drive or the bearing housing on the coupling flange **(100)** and lock in positon with the nuts and bolts.
6. Position the mechanical seal housing **(200)** with the hollow shaft already inserted in it, on the coupling flange.

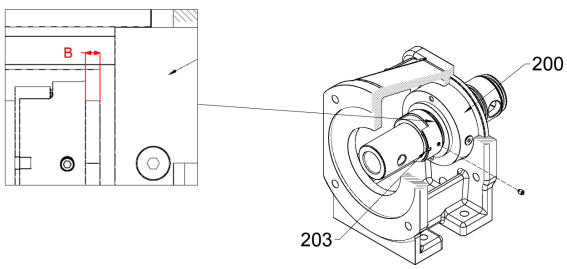
10.19 / 3



7. Align the holes for the pin of the hollow shaft with those on the drive or bearing housing output shaft. Lubricate and insert the pin **(601)** to lock the shafts in position.

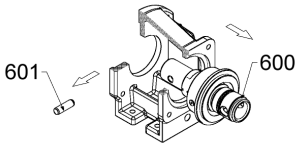
NOTE!
If the pin is difficult to insert tap lightly with a hammer until it is in position.

10.19 / 4



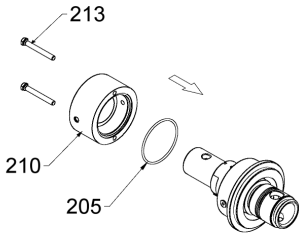
8. Position a shim between the rotating part of the second seal **(203)** and the seal housing **(200)** and tighten the fixing screws on the second seal. For the dimensions of the shim **B** see **Spare parts for double tandem mechanical seal K0K9 / K0S9**.

10.19 / 5



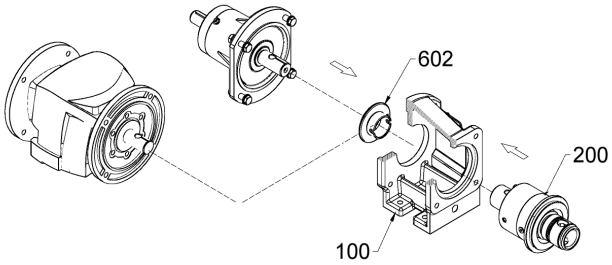
9. Remove the coupling pin **(601)** from the hollow shaft **(600)** using a pin ejector and hammer.
Remove the mechanical seal housing and the mechanical seal with the hollow shaft inserted in it from the coupling flange.

10.19 / 6



10. Position the O-ring **(205)** and the mechanical seal bush **(210)** on the mechanical seal housing. Tighten the hexagonal head bolts **(213)**.

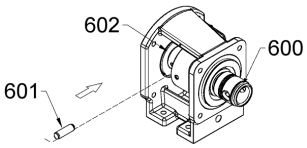
10.19 / 7



11. Mount the splash ring **(602)** on the hollow shaft so that the drain slot matches up with the hole for the pin. Position, on the coupling flange, the mechanical seal housing assembly **(200)**, the mechanical seal and the hollow shaft, mount the hollow shaft on the output shaft of the previously mounted drive or bearing housing.

NOTE!
To avoid the formation of rust apply protective oil to the drive output shaft.

10.19 / 8



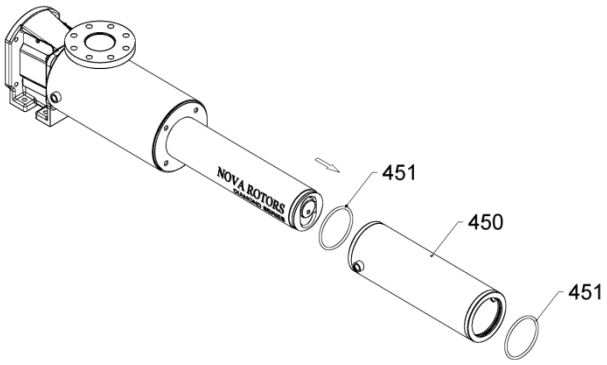
12. Align the holes for the pin of the hollow shaft with those on the drive or bearing housing output shaft. Lubricate and insert the pin **(601)** to lock the shafts in position.

NOTE!
If the pin is difficult to insert tap lightly with a hammer until it is in position.

10.19 / 9

10.20 Disassembly of the stator jacket

To disassemble the stator jacket proceed as follows:

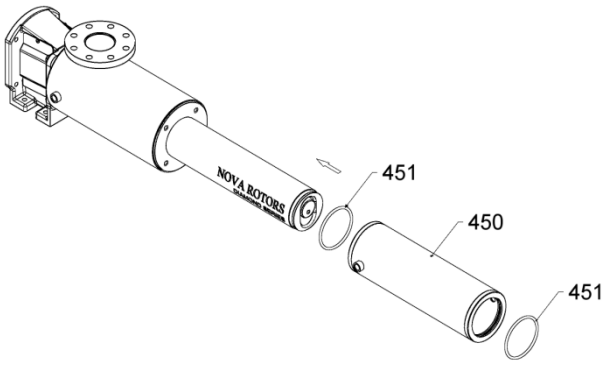


10.5 / 1

1. Disassemble the outlet flange and the tie rods, as described in **Disassembly of the stator and the pump body.**
2. Remove the stator jacket **(450)** from the stator and the two O-rings **(451)** from their grooves.

10.21 Assembly of the stator jacket

To assemble the stator jacket proceed as follows:



10.12 / 2

1. Insert the two O-rings **(451)** in the recesses provided on the stator jacket **(450)**, slide the stator jacket onto the stator taking care to position it with the connections horizontally.
2. Reassemble the tie rods and the outlet flange, as described in **Assembly of the stator and the pump body.**

11 TROUBLESHOOTING TABLE

	PROBLEM											
	THE PUMP WON'T START	THE PUMP HAS NO SUCTION	WRONG FLOW RATE	UNEVEN FLOW	EXCESSIVE PUMP VIBRATION OR NOISE	PUMP HAS SEIZED OR HAS STOPPED CONVEYING	FAULTY STATOR	FAULTY ROTOR	THE SEAL LEAKS	THE DRIVE GENERATES TOO MUCH HEAT	INSUFFICIENT PRESSURE	
	A	B	C	D	E	F	G	H	I	J	K	PROBABLE CAUSES / SOLUTIONS
1	•									•		Adhesion between rotor and stator even if new or in perfect condition due to prolonged inactivity. / Lubricate and move the stator with the special tool.
2	•		•	•		•	•	•		•		Excessive pressure on pump outlet port. / Reduce pressure.
3	•	•	•			•	•	•	•			Foreign body inside the pump. / Disassemble the pump, eliminate the object and place any damaged parts.
4	•	•				•	•			•		Expansion of the stator is too high and blocks the rotor. Stator is inflated or burned out. / Verify the fluid temperatures and its chemical compatibility with the stator material.
5	•	•			•	•	•	•	•			Dimension of the solids in the fluid are too big. / Reduce the rpm or install a filter at the pump suction casing.
6	•	•				•	•	•				The product tends to sediment and/or crystallise when the pump is inactive. / Flush the pump; disassemble and clean if necessary.
7		•	•	•	•							Air leakage at suction casing or from the seal. / Verify suction connection. Verify whether the type of seal is suitable, if the seal is mounted correctly, if the operating limits are respected.
8	•	•					•	•	•			Temperature too low. The fluid solidifies. / Heat the pump.
9		•	•	•	•		•					Suction pressure too low or empty aspiration. / Increase inlet section or the filter mesh gauge. Open the intake valves.
10			•	•								Air inclusions in process liquid. / Verify operating limits.
11		•	•									Speed too low with low-viscose liquids and intake sections too big. / Verify operating limits.
12		•		•	•		•	•	•			Speed too high with very viscous liquids and intake sections too small. Risk of cavitation. / Verify operating limits.
13		•				•			•			Wrong rotation direction. / Check the data plate and pump specifications. If necessary, invert motor polarity.
14		•			•		•	•				Available NPSH inferior to pump demand. Cavitation. / Check the correct fluid supply in the pump.
15					•	•						Incorrect positioning of the transmission bush. / Verify the movement of the drive shaft.
16		•	•	•		•	•					The pump is running dry, either partially or completely. / Replace the stator if faulty. Install a dry run protection probe.
17		•	•	•	•	•	•				•	Stator faulty or worn. / Replace stator.
18		•	•	•	•	•		•			•	Rotor faulty or worn. / Replace rotor.
19	•						•					Stator material not suitable. / Check the technical specification.
20								•				Rotor material not suitable. / Check the technical specification.
21			•		•	•						A part of the transmission is broken. Joints excessively worn or damaged. / Replace worn or damaged components.
22					•	•						The bearings in the bearing housing (version type J) or in the drive are no longer suitable. / Replace parts.
23	•		•		•		•	•		•		Wrong pump speed. / Verify rpm and power absorbed at the motor. Verify frequency and voltage.
24	•	•	•	•		•			•			Viscosity too high. / Check with pump specifications
25	•	•	•						•	•		Gland packing. / The gland requires adjustment. Replace any worn parts (Rings and hollow shaft).
26			•						•			Mechanical seal. / Check faces and o-ring for wear. Verify seal compression. Replace worn parts.
27			•						•			Unsuitable seal system. / Verify operating limits.

Tab.8 - 1 Troubleshooting table

12 SPARE PARTS

The spare parts are divided into 2 lists:

- spare parts for the machine
- spare parts for the seal systems

12.1 Spare parts for machine JH L1/K2/K4

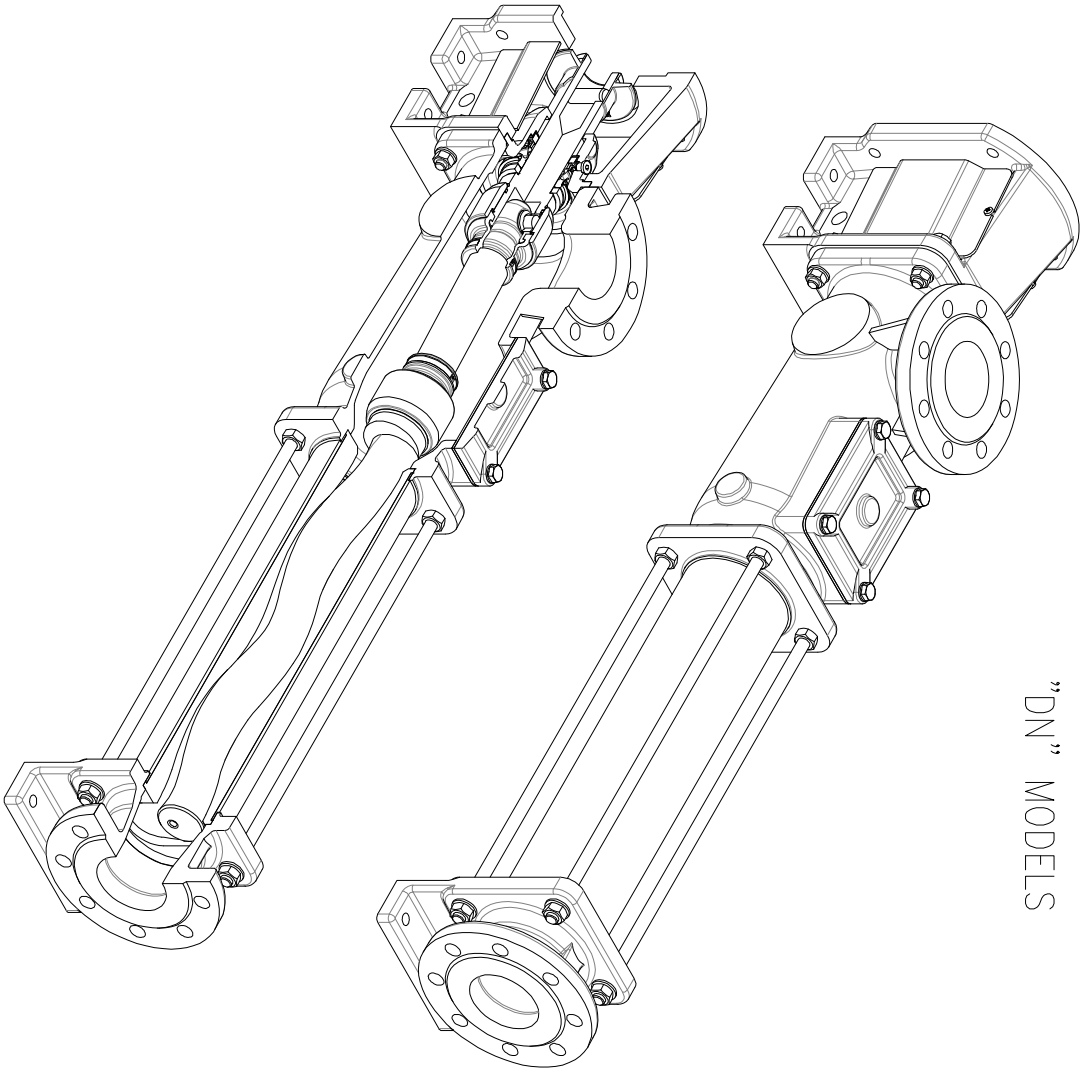
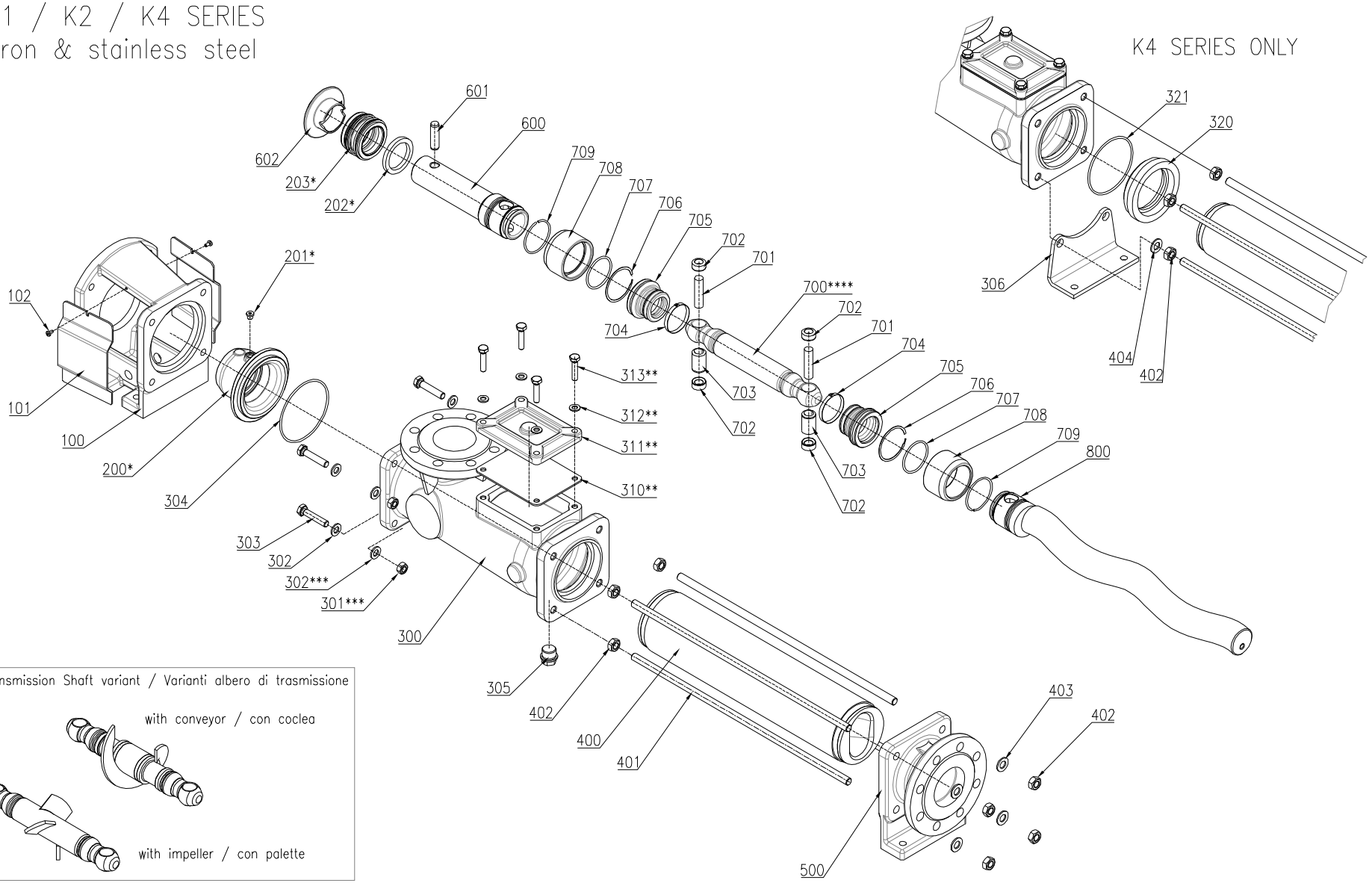
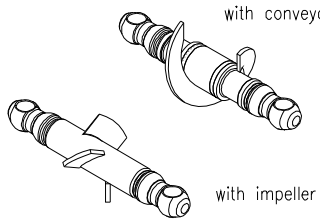


Fig.12 – Macchine DN L1/K2/K4

"DN" L1 / K2 / K4 SERIES
cast iron & stainless steel



**** Transmission Shaft variant / Varianti albero di trasmissione



*** Only for Cast Iron Version / Solo per versioni in Ghisa

** Optional in stainless steel version / Optional per versioni in acciaio inox

* Standard single mechanical seal
For different seal type see specific section in OMI operating & maintenance instructions

Tenuta meccanica singola standard.
Per altri tipi di tenuta consultare la specifica sezione in Istruzioni operative uso e manutenzione

Pump model: DN-ID SIZE025 to SIZE300 | Replacement for: EXP11-001 | Replacement for:

Drw Nr.: XPL.EXP005

Denomination:
Exploded view DN L1 / K2 / K4 series
G0K9 - Industrial Connections

DATE	REV	DESCRIPTION	NAME
01/04/2015	01		MDM
07/10/2013	00		MDM

Drawn : MDM
Date: 05/07/13
Check: MDM
Date: 01/04/2015

Scale:

Weight: Kg

Sheet 1 of 1

General Tollerances ISO 2768 mK-v
Geometrical tollerance and roughness ISO 1302

NOVA ROTORS srl
Progressing Cavity Pumps
www.novarotors.com

LISTA RICAMBI / SPARE PARTS LIST "DN" L1 / K2 / K4 SERIES

LEGENDA / KEY

R = RICAMBIO CONSIGLIATO SOGGETTO A USURA GRAVOSA / RECOMMENDED REPLACEMENT FOR HIGH WEAR PART
r = RICAMBIO CONSIGLIATO NON SOGGETTO A USURA O A USURA GRAVOSA / RECOMMENDED REPLACEMENT FOR PART NOT SUBJECT TO WEAR OR HIGH WEAR

POS.	Qty	Descrizione / Denomination	NOTE / NOTES
100	1	SUPPORTO MONOBLOCCO / COUPLING FLANGE	
101	2	PROTEZIONE SUPPORTO / CLOSE COUPLED ARRANGEMENT PROTECTION	
102	2	VITE TESTA CILINDRICA / CHEESE HEAD SCREW	
200	1	ALLOGGIAMENTO TENUTA / SEAL HOUSING	S
201	1	TAPPO FILETTATO / THREADED PLUG	S
202	1	ANELLO TENUTA / SEAL RING	S
203	1	TENUTA MECCANICA / MECHANICAL SEAL	R S
300	1	CORPO POMPA / PUMP BODY	
301	4*	DADO ESAGONALE / HEX NUT	5
302	8*	RONDELLA / WASHER	6
303	4	VITE TESTA ESAGONALE / HEXAGONAL HEAD SCREW	
304	1	O-RING	R
305	1	TAPPO FILETTATO / THREADED PLUG	
306	1	PIEDE / FOOT	3
310	1	GUARNIZIONE COPERCHIO CORPO POMPA / PUMP BODY COVER GASKET	
311	1	COPERCHIO CORPO POMPA / PUMP BODY COVER	
312	4*	RONDELLA / WASHER	4
313	4*	VITE TESTA ESAGONALE / HEXAGONAL HEAD SCREW	4
320	1	ANELLO ADATTAMENTO STATORE / STATOR ADAPTER RING	3
321	1	O-RING	R 3
400	1	STATORE / STATOR	R
401	4	TIRANTE / TIE ROD	
402	8	DADO ESAGONALE / HEX NUT	
403	4	RONDELLA / WASHER	
404	2	RONDELLA / WASHER	3
500	1	BOCCHETTONE / OUTLET FLANGE	
600	1	ALBERO CAVO / HOLLOW SHAFT	R 1
601	1	SPINA DI COLLEGAMENTO / COUPLING PIN	r
602	1	ANELLO PARA SPRUZZI / SPLASH RING	r
700	1	ALBERO DI TRASMISSIONE / TRANSMISSION SHAFT	r 2
701	2	SPINOTTO / PIN	R
702	4	BUSSOLA GUIDA / GUIDE BUSH	R
703	2	BUSSOLA DI TRASMISSIONE / TRANSMISSION BUSH	R 2
704	2	FASCETTA / CLAMP	R
705	2	MANICOTTO / SLEEVE	R
706	2	ANELLO DI ARRESTO A SPIRALE / SPIRAL RETAINING RING	r
707	2	O-RING	R
708	2	ANELLO COPRI SNODO / JOINT COVER	r
709	2	ANELLO DI ARRESTO FILO / RETAINING RING WIRE	R
800	1	ROTORE / ROTOR	R

1. L'USURA DELL'ALBERO CAVO DIPENDE DAL TIPO DI TENUTA INSTALLATO / WEAR OF THE HOLLOW SHAFT DEPENDS ON THE TYPE OF SEAL INSTALLED ON THE PUMP
2. CONSIGLIAMO DI ORDINARE ALBERO DI TRASMISSIONE (700) E BUSSOLA DI TRASMISSIONE (703) GIA' PREASSEMBLATI DA NOVA ROTORS (KIT 700/703). PER ATTREZZATURE E PROCEDURE NECESSARIE ALL'ASSEMBLAGGIO VEDERE PARTE RELATIVA A MONTAGGIO/SMONTAGGIO SNODO / WE RECOMMEND ORDERING THE TRANSMISSION SHAFT (700) AND TRANSMISSION BUSH (703) PREASSEMBLED BY NOVA ROTORS (KIT 700/703). FOR TOOLS AND PROCEDURES NECESSARY FOR ASSEMBLY SEE THE SECTION ON JOINT ASSEMBLY/DISASSEMBLY
3. SOLO SERIE K4 / ONLY SERIES K4
4. 6* PER VERSIONE IN GHISA SIZE 300 O VERSIONE FUSIONE IN ACCIAIO INOX SIZE 060-120-300 / 6* FOR CAST IRON VERSION SIZE 300 OR CASTING STAINLESS STEEL VERSION
5. SOLO VERSIONE IN GHISA / ONLY CAST IRON VERSION
6. *4 PER LA VERSIONE IN GHISA / 4* FOR CAST IRON VERSION

S COMPONENTI APPARTENENTI AL GRUPPO TENUTA. PER TIPOLOGIE DIVERSE DA TENUTA MECCANICA SINGOLA G0K9 VEDI SEZIONE TENUTE / PARTS BELONGING TO THE SEAL UNIT. FOR TYPES OTHER THAN THE SINGLE MECHANICAL SEAL G0K9 SEE SECTION ON SEALS

12.2 **Datasheet tenuta meccanica singola G0K9 - Tenuta tipo 52-10 / Datasheet single mechanical seal G0K9 - Seal Type 52-10**

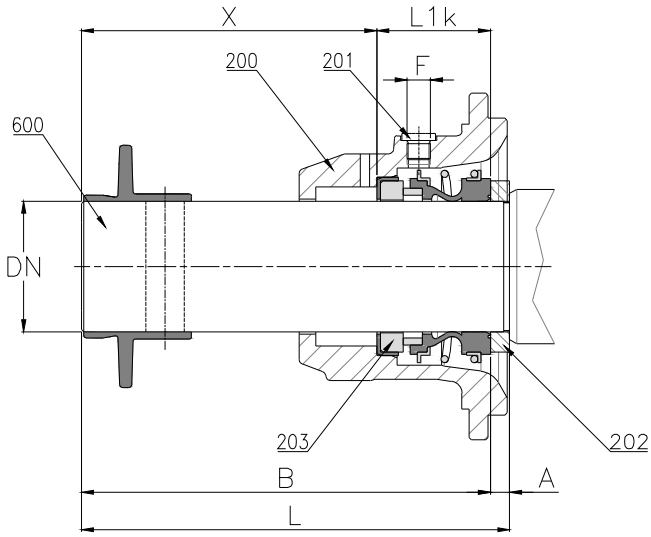


Fig.13 – Tenuta meccanica singola G0K9 - Tenuta Tipo 52-10
Single mechanical seal G0K9 - Seal Type 52-10

Size	Model	DN (h7)	A	B	L	X	L1k	F
D020	1L1 05K2 025K4	30	8	128	136	85.5	42.5	G 1/8"
D025	2L1 1K2 05K4	35	8	128	136	85.5	42.5	G 1/8"
D030	4L1 2K2 1K4 05K8	35	8	128	136	85.5	42.5	G 1/8"
D040	10L1 4K2 2K4 1K8 16L1 8K2	45	8	152	160	107	45	G 1/8"
D060	20L1 10K2 4K4 2K8 30L1 16K2	55	8	171	179	123.5	47.5	G 1/8"
D120	40L1 20K2 10K4 4K8 60L1 30K2	65	8	171	179	118.5	52.5	G 1/8"
D300	80L1 40K2 20K4 10K8 120L1 60K2	70	8	191	199	131	60	G 1/8"

Tutte le misure sono in mm / All dimensions are in mm
Tab.9 - Dimensioni tenuta meccanica singola G0K9
Single mechanical seal dimensions G0K9

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / Recommended replacement for high wear part
r = ricambio consigliato non soggetto a usura o a usura gravosa / Recommended replacement for part not subject to wear or high wear

POS.	Qty	Descrizione	NOTE
200	1	ALLOGGIAMENTO TENUTA MECCANICA / MECHANICAL SEAL HOUSING	
201	1	TAPPO / PLUG	
202	1	ANELLO TENUTA MECCANICA / MECHANICAL SEAL RING	
203	1	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
600	1	ALBERO CAVO / HOLLOW SHAFT	r

Tab.10 - Lista ricambi tenuta meccanica singola G0K9
Spare parts list single mechanical seal G0K9

12.3 **Datasheet tenuta meccanica singola G0K9 - Tenuta tipo 120-9 / Datasheet single mechanical seal G0K9 - Seal Type 120-9**

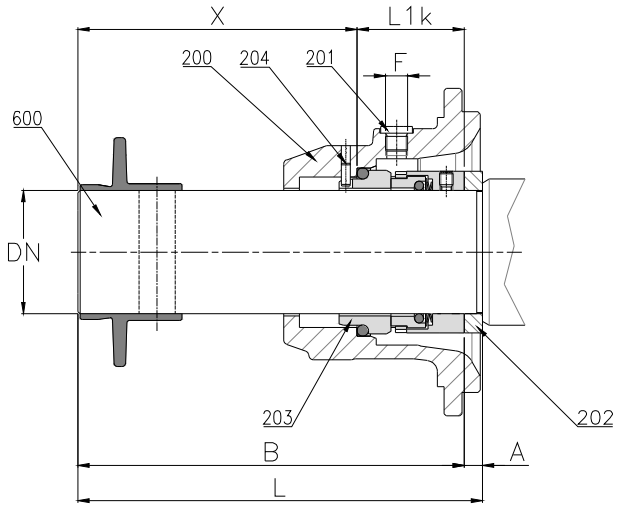


Fig.14 – Tenuta meccanica singola G0K9 - Tenuta Tipo 120-9
Single mechanical seal G0K9 - Seal Type 120-9

Size	Model	DN (h7)	A	B	L	X	L1k	F
D020	1L1 05K2 025K4	30	8	128	136	85.5	42.5	G 1/8"
D025	2L1 1K2 05K4	35	8	128	136	85.5	42.5	G 1/8"
D030	4L1 2K2 1K4 05K8	35	8	128	136	85.5	42.5	G 1/8"
D040	10L1 4K2 2K4 1K8 16L1 8K2	45	8	152	160	107	45	G 1/8"
D060	20L1 10K2 4K4 2K8 30L1 16K2	55	8	171	179	123.5	47.5	G 1/8"
D120	40L1 20K2 10K4 4K8 60L1 30K2	65	8	171	179	118.5	52.5	G 1/8"
D300	80L1 40K2 20K4 10K8 120L1 60K2	70	8	191	199	131	60	G 1/8"

Tutte le misure sono in mm / All dimensions are in mm
Tab.11 - Dimensioni tenuta meccanica singola G0K9
Single mechanical seal dimensions G0K9

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / Recommended replacement for high wear part
r = ricambio consigliato non soggetto a usura o a usura gravosa / Recommended replacement for part not subject to wear or high wear

POS.	Qty	Descrizione	NOTE
200	1	ALLOGGIAMENTO TENUTA MECCANICA / MECHANICAL SEAL HOUSING	
201	1	TAPPO / PLUG	
202	1	ANELLO TENUTA MECCANICA / MECHANICAL SEAL RING	
203	1	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
204	1	SPINA / PIN	
600	1	ALBERO CAVO / HOLLOW SHAFT	r

Tab.12 - Lista ricambi tenuta meccanica singola G0K9
Spare parts list single mechanical seal G0K9

12.4 **Datasheet tenuta meccanica singola G0K9 - Tenuta tipo 110-16 / Datasheet single mechanical seal G0K9 - Seal Type 110-16**

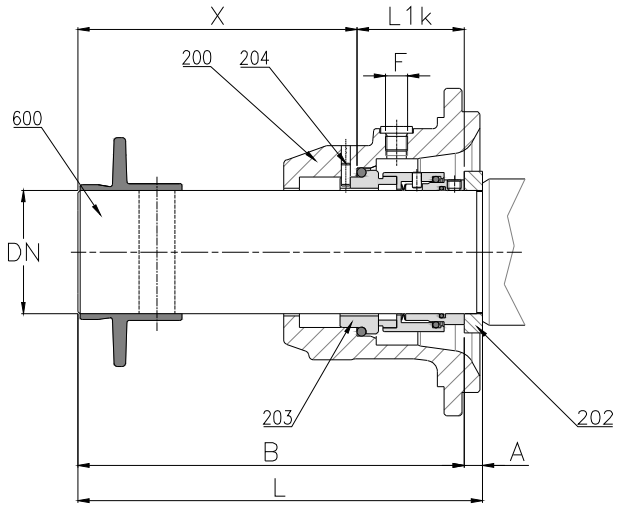


Fig.15 – Tenuta meccanica singola G0K9 - Tenuta Tipo 110-16
Single mechanical seal G0K9 - Seal Type 110-16

Size	Model	DN (h7)	A	B	L	X	L1k	F
D020	1L1 05K2 025K4	30	8	128	136	85.5	42.5	G 1/8"
D025	2L1 1K2 05K4	35	8	128	136	85.5	42.5	G 1/8"
D030	4L1 2K2 1K4 05K8	35	8	128	136	85.5	42.5	G 1/8"
D040	10L1 4K2 2K4 1K8 16L1 8K2	45	8	152	160	107	45	G 1/8"
D060	20L1 10K2 4K4 2K8 30L1 16K2	55	8	171	179	123.5	47.5	G 1/8"
D120	40L1 20K2 10K4 4K8 60L1 30K2	65	8	171	179	118.5	52.5	G 1/8"
D300	80L1 40K2 20K4 10K8 120L1 60K2	70	8	191	199	131	60	G 1/8"

Tutte le misure sono in mm / All dimensions are in mm
Tab.13 - Dimensioni tenuta meccanica singola G0K9
Single mechanical seal dimensions G0K9

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / Recommended replacement for high wear part
r = ricambio consigliato non soggetto a usura o a usura gravosa / Recommended replacement for part not subject to wear or high wear

POS.	Qty	Descrizione	NOTE
200	1	ALLOGGIAMENTO TENUTA MECCANICA / MECHANICAL SEAL HOUSING	
201	1	TAPPO / PLUG	
202	1	ANELLO TENUTA MECCANICA / MECHANICAL SEAL RING	
203	1	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
204	1	SPINA / PIN	
600	1	ALBERO CAVO / HOLLOW SHAFT	r

Tab.14 - Lista ricambi tenuta meccanica singola G0K9
Spare parts list single mechanical seal G0K9

12.5 **Datasheet tenuta meccanica singola G0K9 - Tenuta tipo 172-9 / Datasheet single mechanical seal G0K9 - Seal Type 172-9**

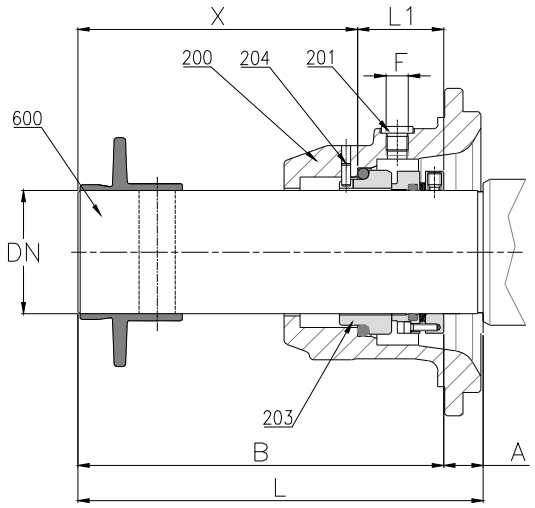


Fig.16 – Tenuta meccanica singola G0K9 - Tenuta Tipo 172-9
Single mechanical seal G0K9 - Seal Type 172-9

Size	Model	DN (h7)	A	B	L	X	L1	F
D020	1L1 05K2 025K4	30	24	128	136	85.5	26.5	G 1/8"
D025	2L1 1K2 05K4	35	23	128	136	85.5	27.5	G 1/8"
D030	4L1 2K2 1K4 05K8	35	23	128	136	85.5	27.5	G 1/8"
D040	10L1 4K2 2K4 1K8 16L1 8K2	45	19	152	160	107	34	G 1/8"
D060	20L1 10K2 4K4 2K8 30L1 16K2	55	17.5	171	179	123.5	38	G 1/8"
D120	40L1 20K2 10K4 4K8 60L1 30K2	65	15.5	171	179	118.5	45	G 1/8"
D300	80L1 40K2 20K4 10K8 120L1 60K2	70	18	191	199	131	50	G 1/8"

Tutte le misure sono in mm / All dimensions are in mm
Tab.15 - Dimensioni tenuta meccanica singola G0K9
Single mechanical seal dimensions G0K9

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / Recommended replacement for high wear part
r = ricambio consigliato non soggetto a usura o a usura gravosa / Recommended replacement for part not subject to wear or high wear

POS.	Qty	Descrizione	NOTE
200	1	ALLOGGIAMENTO TENUTA MECCANICA / MECHANICAL SEAL HOUSING	
201	1	TAPPO / PLUG	
203	1	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
204	1	SPINA / PIN	
600	1	ALBERO CAVO / HOLLOW SHAFT	r

Tab.16 - Lista ricambi tenuta meccanica singola G0K9
Spare parts list single mechanical seal G0K9

12.6 **Datasheet tenuta meccanica singola flussata Q0K9 - Tenuta tipo 52-10 / Datasheet single mechanical seal with quench Q0K9 - Seal Type 52-10**

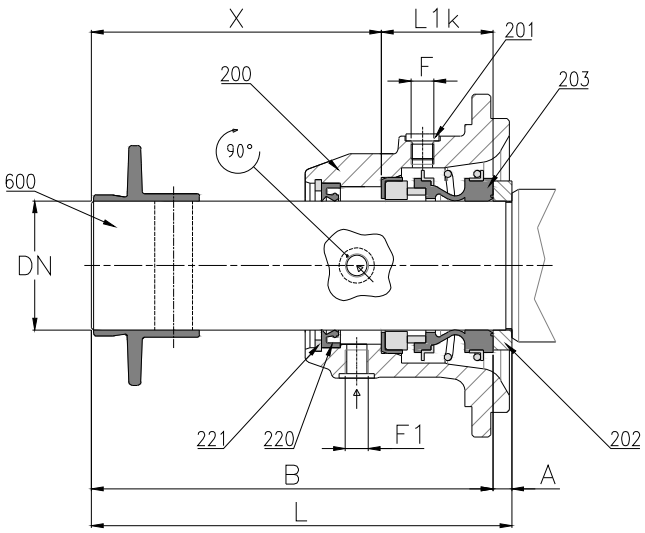


Fig.17–Tenuta meccanica singola flussata Q0K9-Tenuta Tipo 52-10
Single mechanical seal with quench Q0K9 - Seal Type 52-10

Size	Model	DN (h7)	A	B	L	X	L1k	F	F1
D020	1L1 05K2 025K4	30	8	128	136	85.5	42.5	G 1/8"	G 1/8"
D025	2L1 1K2 05K4	35	8	128	136	85.5	42.5	G 1/8"	G 1/8"
D030	4L1 2K2 1K4 05K8	35	8	128	136	85.5	42.5	G 1/8"	G 1/8"
D040	10L1 4K2 2K4 1K8 16L1 8K2	45	8	152	160	107	45	G 1/8"	G 1/8"
D060	20L1 10K2 4K4 2K8 30L1 16K2	55	8	171	179	123.5	47.5	G 1/8"	G 1/8"
D120	40L1 20K2 10K4 4K8 60L1 30K2	65	8	171	179	118.5	52.5	G 1/8"	G 1/8"
D300	80L1 40K2 20K4 10K8 120L1 60K2	70	8	191	199	131	60	G 1/8"	G 1/8"

Tutte le misure sono in mm / All dimensions are in mm

Tab.17 - Dimensioni tenuta meccanica singola flussata Q0K9
Single mechanical seal dimensions with quench Q0K9

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / Recommended replacement for high wear part
r = ricambio consigliato non soggetto a usura o a usura gravosa / Recommended replacement for part not subject to wear or high wear

POS.	Qty	Descrizione / Description	NOTE
200	1	ALLOGGIAMENTO TENUTA MECCANICA / MECHANICAL SEAL HOUSING	
201	1	TAPPO / PLUG	
202	1	ANELLO TENUTA MECCANICA / MECHANICAL SEAL RING	
203	1	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
220	1	PARAOLIO / LIP SEAL	R
221	1	ANELLO DI ARRESTO / RETAINING RING	
600	1	ALBERO CAVO / HOLLOW SHAFT	R

Tab.18 - Lista ricambi tenuta meccanica singola flussata Q0K9
Spare parts list single mechanical seal with quench Q0K9

12.7 **Datasheet tenuta meccanica singola flussata Q0K9 - Tenuta tipo 120-9 / Datasheet single mechanical seal with quench Q0K9 - Seal Type 120-9**

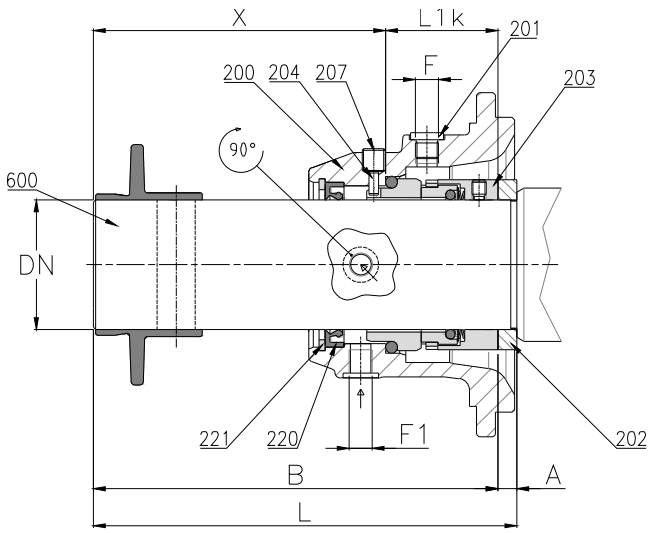


Fig.18–Tenuta meccanica singola flussata Q0K9-Tenuta Tipo 120-9
Single mechanical seal with quench Q0K9 - Seal Type 120-9

Size	Model	DN (h7)	A	B	L	X	L1k	F	F1
D020	1L1 05K2 025K4	30	8	128	136	85.5	42.5	G 1/8"	G 1/8"
D025	2L1 1K2 05K4	35	8	128	136	85.5	42.5	G 1/8"	G 1/8"
D030	4L1 2K2 1K4 05K8	35	8	128	136	85.5	42.5	G 1/8"	G 1/8"
D040	10L1 4K2 2K4 1K8 16L1 8K2	45	8	152	160	107	45	G 1/8"	G 1/8"
D060	20L1 10K2 4K4 2K8 30L1 16K2	55	8	171	179	123.5	47.5	G 1/8"	G 1/8"
D120	40L1 20K2 10K4 4K8 60L1 30K2	65	8	171	179	118.5	52.5	G 1/8"	G 1/8"
D300	80L1 40K2 20K4 10K8 120L1 60K2	70	8	191	199	131	60	G 1/8"	G 1/8"

Tutte le misure sono in mm / All dimensions are in mm

Tab.19 - Dimensioni tenuta meccanica singola flussata Q0K9
Single mechanical seal dimensions with quench Q0K9

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / Recommended replacement for high wear part
r = ricambio consigliato non soggetto a usura o a usura gravosa / Recommended replacement for part not subject to wear or high wear

POS.	Qty	Descrizione / Description	NOTE
200	1	ALLOGGIAMENTO TENUTA MECCANICA / MECHANICAL SEAL HOUSING	
201	1	TAPPO / PLUG	
202	1	ANELLO TENUTA MECCANICA / MECHANICAL SEAL RING	
203	1	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
204	1	SPINA / PIN	
207	1	GRANO FILETTATO / GRUB SCREW	
220	1	PARAOLIO / LIP SEAL	R
221	1	ANELLO DI ARRESTO / RETAINING RING	
600	1	ALBERO CAVO / HOLLOW SHAFT	R

Tab.20 - Lista ricambi tenuta meccanica singola flussata Q0K9
Spare parts list single mechanical seal with quench Q0K9

12.8 **Datasheet tenuta meccanica singola flussata Q0K9 - Tenuta tipo 110-16 / Datasheet single mechanical seal with quench Q0K9 - Seal Type 110-16**

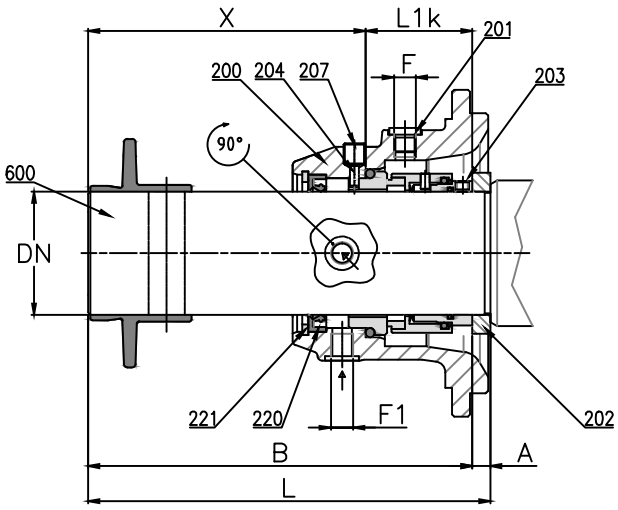


Fig.19–Tenuta meccanica singola flussata Q0K9-Tenuta Tipo 110-16
Single mechanical seal with quench Q0K9 - Seal Type 110-16

Size	Model	DN (h7)	A	B	L	X	L1k	F	F1
D020	1L1 05K2 025K4	30	8	128	136	85.5	42.5	G 1/8"	G 1/8"
D025	2L1 1K2 05K4	35	8	128	136	85.5	42.5	G 1/8"	G 1/8"
D030	4L1 2K2 1K4 05K8	35	8	128	136	85.5	42.5	G 1/8"	G 1/8"
D040	10L1 4K2 2K4 1K8 16L1 8K2	45	8	152	160	107	45	G 1/8"	G 1/8"
D060	20L1 10K2 4K4 2K8 30L1 16K2	55	8	171	179	123.5	47.5	G 1/8"	G 1/8"
D120	40L1 20K2 10K4 4K8 60L1 30K2	65	8	171	179	118.5	52.5	G 1/8"	G 1/8"
D300	80L1 40K2 20K4 10K8 120L1 60K2	70	8	191	199	131	60	G 1/8"	G 1/8"

Tutte le misure sono in mm / All dimensions are in mm
Tab.21 - Dimensioni tenuta meccanica singola flussata Q0K9
Single mechanical seal dimensions with quench Q0K9

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / Recommended replacement for high wear part
r = ricambio consigliato non soggetto a usura o a usura gravosa / Recommended replacement for part not subject to wear or high wear

POS.	Qty	Descrizione / Description	NOTE
200	1	ALLOGGIAMENTO TENUTA MECCANICA / MECHANICAL SEAL HOUSING	
201	1	TAPPO / PLUG	
202	1	ANELLO TENUTA MECCANICA / MECHANICAL SEAL RING	
203	1	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
204	1	SPINA / PIN	
207	1	GRANO FILETTATO / GRUB SCREW	
220	1	PARAOLIO / LIP SEAL	R
221	1	ANELLO DI ARRESTO / RETAINING RING	
600	1	ALBERO CAVO / HOLLOW SHAFT	R

Tab.22 - Lista ricambi tenuta meccanica singola flussata Q0K9
Spare parts list single mechanical seal with quench Q0K9

12.9 **Datasheet tenuta meccanica singola flussata Q0K9 - Tenuta tipo 172-9 / Datasheet single mechanical seal with quench Q0K9 - Seal Type 172-9**

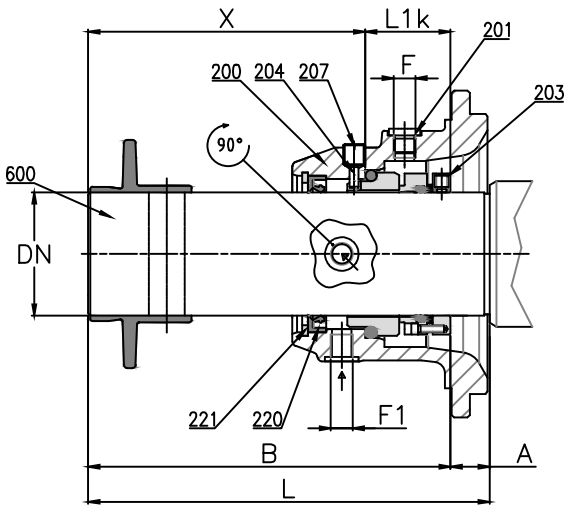


Fig.20–Tenuta meccanica singola flussata Q0K9-Tenuta Tipo 172-9
Single mechanical seal with quench Q0K9 - Seal Type 172-9

Size	Model	DN (h7)	A	B	L	X	L1k	F	F1
D020	1L1 05K2 025K4	30	24	128	136	85.5	26.5	G 1/8"	G 1/8"
D025	2L1 1K2 05K4	35	23	128	136	85.5	27.5	G 1/8"	G 1/8"
D030	4L1 2K2 1K4 05K8	35	23	128	136	85.5	27.5	G 1/8"	G 1/8"
D040	10L1 4K2 2K4 1K8 16L1 8K2	45	19	152	160	107	34	G 1/8"	G 1/8"
D060	20L1 10K2 4K4 2K8 30L1 16K2	55	17.5	171	179	123.5	38	G 1/8"	G 1/8"
D120	40L1 20K2 10K4 4K8 60L1 30K2	65	15.5	171	179	118.5	45	G 1/8"	G 1/8"
D300	80L1 40K2 20K4 10K8 120L1 60K2	70	18	191	199	131	50	G 1/8"	G 1/8"

Tutte le misure sono in mm / All dimensions are in mm

Tab.23 - Dimensioni tenuta meccanica singola flussata Q0K9
Single mechanical seal dimensions with quench Q0K9

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / Recommended replacement for high wear part
r = ricambio consigliato non soggetto a usura o a usura gravosa / Recommended replacement for part not subject to wear or high wear

POS.	Qty	Descrizione / Description	NOTE
200	1	ALLOGGIAMENTO TENUTA MECCANICA / MECHANICAL SEAL HOUSING	
201	1	TAPPO / PLUG	
203	1	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
204	1	SPINA / PIN	
207	1	GRANO FILETTATO / GRUB SCREW	
220	1	PARAOLIO / LIP SEAL	R
221	1	ANELLO DI ARRESTO / RETAINING RING	
600	1	ALBERO CAVO / HOLLOW SHAFT	R

Tab.24 - Lista ricambi tenuta meccanica singola flussata Q0K9
Spare parts list single mechanical seal with quench Q0K9

12.10 **Datasheet tenuta baderna B01 / Datasheet gland packing seal B01**

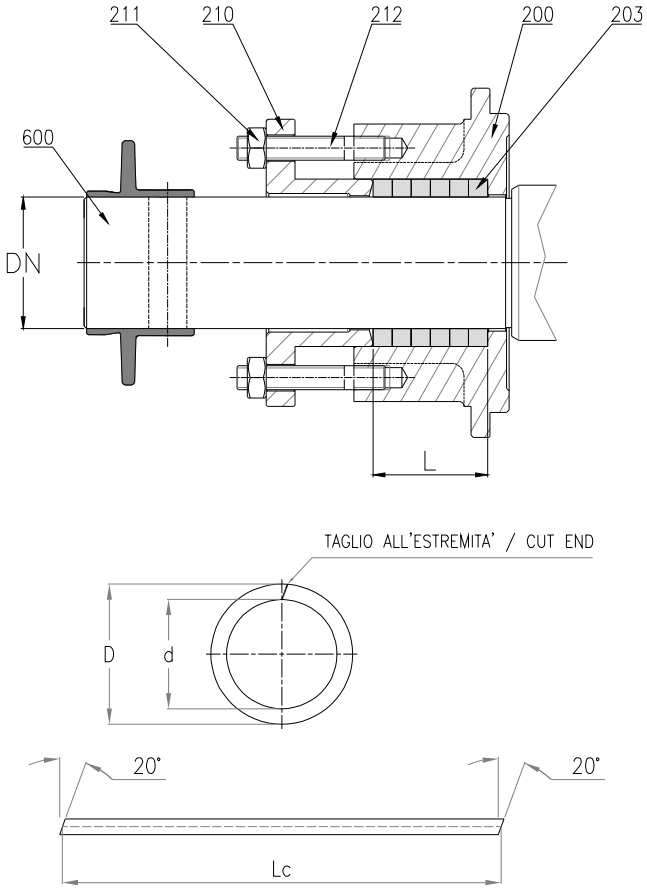


Fig.21 – Tenuta baderna B01
Gland packing seal B01

Size	Model	DN (h7)	N° rings per pack	Ring dimensions (D - d) □s Lc	L Pack
D020	1L1 05K2 025K4	30	5	Ø50-Ø30 □10 Lc=134.4	50
D025	2L1 1K2 05K4	35	6	Ø51-Ø35 □8 Lc=144.5	48
D030	4L1 2K2 1K4	35	6	Ø51-Ø35 □8 Lc=144.5	48
D040	10L1 4K2 2K4 16L1 8K2	45	6	Ø61-45 □8 Lc=178.1	48
D060	20L1 10K2 4K4 30L1 16K2	55	6	Ø75-55 □10 Lc=218.4	60
D120	40L1 20K2 10K4 60L1 30K2	65	6	Ø85-65 □10 Lc=252	60
D300	80L1 40K2 20K4 120L1 60K2	70	6	Ø94-70 □12 Lc=275.5	72

All dimensions are in mm

Tab.25 - Dimensioni tenuta baderna B01
Gland packing seal dimensions B01

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / Recommended replacement for high wear part

POS.	Qty	Descrizione / Description	NOTE
200	1	ALLOGGIAMENTO TENUTA / SEAL HOUSING	
203	1	PACCHETTO BADERNA / GLAND PACKING	R
210	1	BUSSOLA PREMISTOPPA / GLAND BUSH	
211	2	DADO ESAGONALE / HEX NUT	
212	2	PRIGIONIERO / STUD	
600	1	ALBERO CAVO / HOLLOW SHAFT	R

Tab.26 - Lista ricambi tenuta baderna B01
Spare parts list gland packing seal B01

12.11 **Datasheet tenuta baderna con flussaggio B02 / Datasheet gland packing seal with flushing B02**

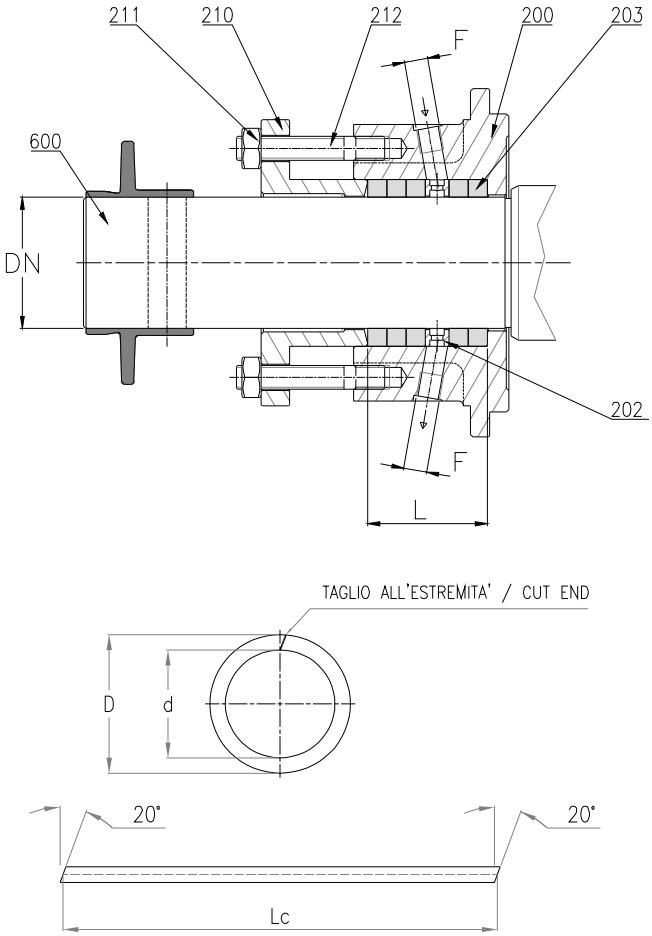


Fig.22 – Tenuta baderna con flussaggio B02
Gland packing seal with flushing B02

Size	Model	DN (h7)	N° rings per pack	Ring dimensions (D - d) □s Lc	L Pack
D020	1L1 05K2 025K4	30	4	Ø50-Ø30 □10 Lc=134.4	50
D025	2L1 1K2 05K4	35	5	Ø51-Ø35 □8 Lc=144.5	48
D030	4L1 2K2 1K4	35	5	Ø51-Ø35 □8 Lc=144.5	48
D040	10L1 4K2 2K4 16L1 8K2	45	5	Ø61-45 □8 Lc=178.1	48
D060	20L1 10K2 4K4 30L1 16K2	55	5	Ø75-55 □10 Lc=218.4	60
D120	40L1 20K2 10K4 60L1 30K2	65	5	Ø85-65 □10 Lc=252	60
D300	80L1 40K2 20K4 120L1 60K2	70	5	Ø94-70 □12 Lc=275.5	72

All dimensions are in mm

Tab.27 - Dimensioni tenuta baderna con flussaggio B02
Gland packing seal with flushing dimensions B02

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / recommended replacement for high wear part

POS.	Qty	Descrizione / Description	NOTE
200	1	ALLOGGIAMENTO TENUTA / SEAL HOUSING	
202	1	ANELLO DI FLUSSAGGIO / FLUSHING RING	❶
203	1	PACCHETTO BADERNA / GLAND PACKING	R
210	1	BUSSOLA PREMISTOPPA / GLAND BUSH	
211	2	DADO ESAGONALE / HEX NUT	
212	2	PRIGIONIERO / STUD	
600	1	ALBERO CAVO / HOLLOW SHAFT	R

Tab.28 - Lista ricambi tenuta baderna con flussaggio B02
Spare parts list gland packing seal with flushing B02

❶ l'anello di flussaggio **(202)** può essere posizionato in base alle esigenze applicative / the flushing ring **(202)** can be positioned in according to application requirements

12.12 **Datasheet tenuta meccanica flussata doppia back to back D0K9 - Tenuta tipo 52-10 / D0S9 - Tenuta tipo 51-10**
Datasheet flushed double mechanical seal back to back D0K9 - Seal Type 52-10 / D0S9 - Seal Type 51-10

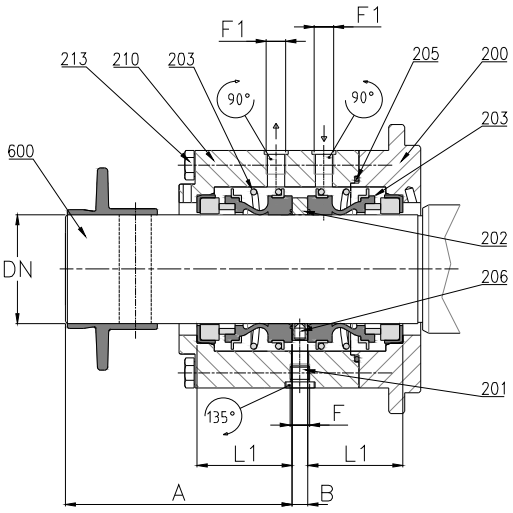


Fig.23 – Tenuta meccanica doppia D0K9 - Tenuta Tipo 52-10 / D0S9 - Tenuta tipo 51-10
Double mechanical seal D0K9 - Seal Type 52-10 / D0S9 - Seal Type 51-10

Size	Model	DN (h7)	A	B	L1	F1	F
D020*	1L1 05K2 025K4	30	71	20	34	G 1/8"	G 1/8"
D025*	2L1 1K2 05K4	35	73	16	36	G 1/8"	G 1/8"
D030*	4L1 2K2 1K4 05K8	35	73	16	36	G 1/8"	G 1/8"
D040**	10L1 4K2 2K4 1K8 16L1 8K2	45	96	8	45	G 1/8"	G 1/8"
D060**	20L1 10K2 4K4 2K8 30L1 16K2	55	113.5	8	47.5	G 1/8"	G 1/8"
D120*	40L1 20K2 10K4 4K8 60L1 30K2	65	109	8	51	G 1/8"	G 1/8"
D300*	80L1 40K2 20K4 10K8 120L1 60K2	70	115.3	21.4	51.3	G 1/8"	G 1/8"

Tutte le misure sono in mm / All dimensions are in mm
* Tenuta Tipo 51 / Seal Type 51
** Tenuta Tipo 52 / Seal Type 52

Tab.29 - Dimensioni tenuta meccanica doppia D0K9 / D0S9
Dimensions Double mechanical seal D0K9 / D0S9

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / Recommended replacement for high wear part
r = ricambio consigliato non soggetto a usura o a usura gravosa / Recommended replacement for part not subject to wear or high wear

POS.	Qty	Descrizione	NOTE
200	1	ALLOGGIAMENTO TENUTA MECCANICA / MECHANICAL SEAL HOUSING	
201	1	TAPPO / PLUG	
202	1	ANELLO TENUTA MECCANICA / MECHANICAL SEAL RING	
203	1	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
205	1	O-RING	R
206	3	GRANO FILETTATO / GRUB SCREW	
210	1	BUSSOLA TENUTA MECCANICA / MECHANICAL SEAL BUSH	
213	2	HEXAGONAL HEAD SCREW	
600	1	ALBERO CAVO / HOLLOW SHAFT	r

Tab.30 - Lista ricambi tenuta meccanica doppia D0K9 / D0S9
Spare parts list double mechanical seal D0K9 / D0S9

12.13 **Datasheet tenuta meccanica flussata doppia back to back D0K9 - Tenuta tipo 120-9 / D0S9 - Tenuta tipo 122-9**

12.14 **Datasheet flushed double mechanical seal back to back D0K9 - Seal Type 120-9 / D0S9 - Seal Type 122-9**

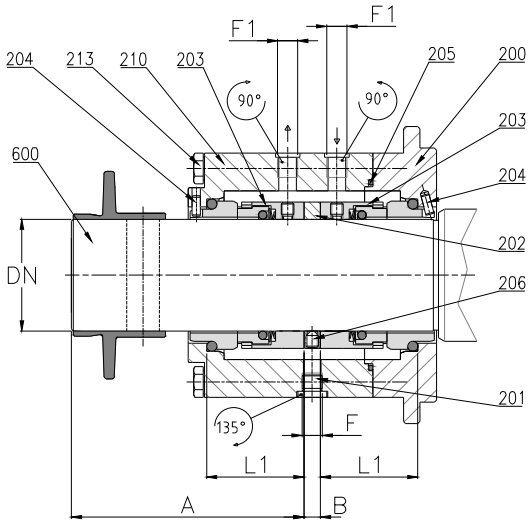


Fig.24 – Tenuta meccanica doppia D0K9 - Tenuta Tipo 120-9 / D0S9 - Tenuta tipo 122-9
Double mechanical seal D0K9 - Seal Type 120-9 / D0S9 - Seal Type 122-9

Size	Model	DN (h7)	A	B	L1	F1	F
D020*	1L1 05K2 025K4	30	77	8	40	G 1/8"	G 1/8"
D025*	2L1 1K2 05K4	35	77	16	40	G 1/8"	G 1/8"
D030*	4L1 2K2 1K4 05K8	35	77	16	40	G 1/8"	G 1/8"
D040**	10L1 4K2 2K4 1K8 16L1 8K2	45	96	8	42.5	G 1/8"	G 1/8"
D060**	20L1 10K2 4K4 2K8 30L1 16K2	55	113.5	8	47.5	G 1/8"	G 1/8"
D120*	40L1 20K2 10K4 4K8 60L1 30K2	65	109	8	51	G 1/8"	G 1/8"
D300*	80L1 40K2 20K4 10K8 120L1 60K2	70	122	81	58	G 1/8"	G 1/8"

Tutte le misure sono in mm / All dimensions are in mm
* Tenuta Tipo 122 / Seal Type 122
** Tenuta Tipo 120 / Seal Type 120

Tab.31 - Dimensioni tenuta meccanica doppia D0K9 / D0S9
Dimensions Double mechanical seal D0K9 / D0S9

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / Recommended replacement for high wear part
r = ricambio consigliato non soggetto a usura o a usura gravosa / Recommended replacement for part not subject to wear or high wear

POS.	Qty	Descrizione	NOTE
200	1	ALLOGGIAMENTO TENUTA MECCANICA / MECHANICAL SEAL HOUSING	
201	1	TAPPO / PLUG	
202	1	ANELLO TENUTA MECCANICA / MECHANICAL SEAL RING	
203	1	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
204	2	SPINA / PIN	
205	1	O-RING	R
206	3	GRANO FILETTATO / GRUB SCREW	
210	1	BUSSOLA TENUTA MECCANICA / MECHANICAL SEAL BUSH	
213	2	HEXAGONAL HEAD SCREW	
600	1	ALBERO CAVO / HOLLOW SHAFT	r

Tab.32 - Lista ricambi tenuta meccanica doppia D0K9 / D0S9
Spare parts list double mechanical seal D0K9 / D0S9

12.15 **Datasheet tenuta meccanica flussata doppia tandem K0K9 - Tenuta tipo 120-9 / Datasheet flushed double mechanical seal tandem K0K9 - Seal Type 120-9**

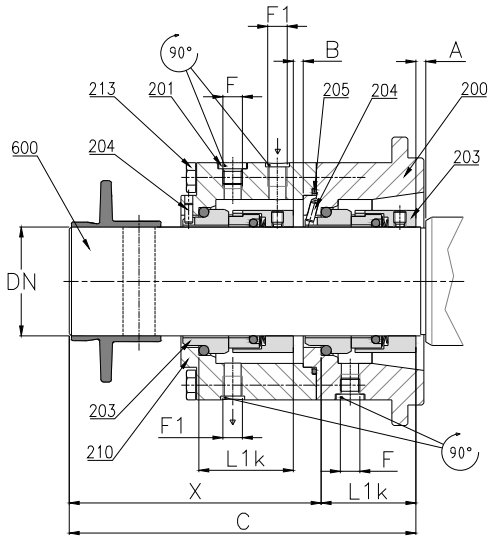


Fig.25 – Tenuta meccanica doppia K0K9 - Tenuta Tipo 120-9 / Double mechanical seal K0K9 - Seal Type 120-9

Size	Model	DN (h7)	A	B	C	X	L1k	F1	F
D020	1L1 05K2 025K4	30	5	5	131	88.5	42.5	G 1/8"	G 1/8"
D025	2L1 1K2 05K4	35	5	5	131	88.5	42.5	G 1/8"	G 1/8"
D030	4L1 2K2 1K4 05K8	35	5	5	131	88.5	42.5	G 1/8"	G 1/8"
D040	10L1 4K2 2K4 1K8 16L1 8K2	45	5	5	155	110	45	G 1/8"	G 1/8"
D060	20L1 10K2 4K4 2K8 30L1 16K2	55	5	5	174	126.5	47.5	G 1/8"	G 1/8"
D120	40L1 20K2 10K4 4K8 60L1 30K2	65	5	5	174	121.5	52.5	G 1/8"	G 1/8"
D300	80L1 40K2 20K4 10K8 120L1 60K2	70	5	5	194	134	60	G 1/8"	G 1/8"

Tutte le misure sono in mm / All dimensions are in mm

Tab.33 - Dimensioni tenuta meccanica doppia K0K9 / Dimensions Double mechanical seal K0K9

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / Recommended replacement for high wear part
r = ricambio consigliato non soggetto a usura o a usura gravosa / Recommended replacement for part not subject to wear or high wear

POS.	Qty	Descrizione	NOTE
200	1	ALLOGGIAMENTO TENUTA MECCANICA / MECHANICAL SEAL HOUSING	
201	1	TAPPO / PLUG	
203	2	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
204	2	SPINA / PIN	
205	1	O-RING	R
210	1	BUSSOLA TENUTA MECCANICA / MECHANICAL SEAL BUSH	
213	2	HEXAGONAL HEAD SCREW	
600	1	ALBERO CAVO / HOLLOW SHAFT	r

Tab.34 - Lista ricambi tenuta meccanica doppia K0K9 / Spare parts list double mechanical seal K0K9

12.16 **Datasheet tenuta meccanica flussata doppia tandem K0K9 - Tenuta tipo 110-16 / Datasheet flushed double mechanical seal tandem K0K9 - Seal Type 110-16**

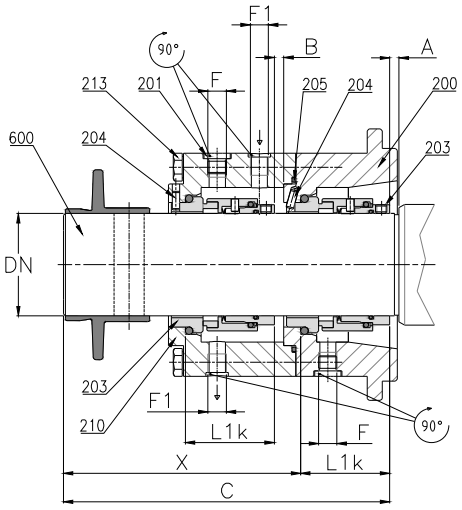


Fig.26 – Tenuta meccanica doppia K0K9 - Tenuta Tipo 110-16 / Double mechanical seal K0K9 - Seal Type 110-16

Size	Model	DN (h7)	A	B	C	X	L1k	F1	F
D020	1L1 05K2 025K4	30	5	5	131	88.5	42.5	G 1/8"	G 1/8"
D025	2L1 1K2 05K4	35	5	5	131	88.5	42.5	G 1/8"	G 1/8"
D030	4L1 2K2 1K4 05K8	35	5	5	131	88.5	42.5	G 1/8"	G 1/8"
D040	10L1 4K2 2K4 1K8 16L1 8K2	45	5	5	155	110	45	G 1/8"	G 1/8"
D060	20L1 10K2 4K4 2K8 30L1 16K2	55	5	5	174	126.5	47.5	G 1/8"	G 1/8"
D120	40L1 20K2 10K4 4K8 60L1 30K2	65	5	5	174	121.5	52.5	G 1/8"	G 1/8"
D300	80L1 40K2 20K4 10K8 120L1 60K2	70	5	5	194	134	60	G 1/8"	G 1/8"

Tutte le misure sono in mm / All dimensions are in mm

Tab.35 - Dimensioni tenuta meccanica doppia K0K9 / Dimensions Double mechanical seal K0K9

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / Recommended replacement for high wear part
r = ricambio consigliato non soggetto a usura o a usura gravosa / Recommended replacement for part not subject to wear or high wear

POS.	Qty	Descrizione	NOTE
200	1	ALLOGGIAMENTO TENUTA MECCANICA / MECHANICAL SEAL HOUSING	
201	1	TAPPO / PLUG	
203	2	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
204	2	SPINA / PIN	
205	1	O-RING	R
210	1	BUSSOLA TENUTA MECCANICA / MECHANICAL SEAL BUSH	
213	2	HEXAGONAL HEAD SCREW	
600	1	ALBERO CAVO / HOLLOW SHAFT	r

Tab.36 - Lista ricambi tenuta meccanica doppia K0K9 / Spare parts list double mechanical seal K0K9

12.17 **Datasheet tenuta meccanica flussata doppia tandem K0K9 - Tenuta tipo 120-9 / 172-9 / Datasheet flushed double mechanical seal tandem K0K9 - Seal Type 120-9 / 172-9**

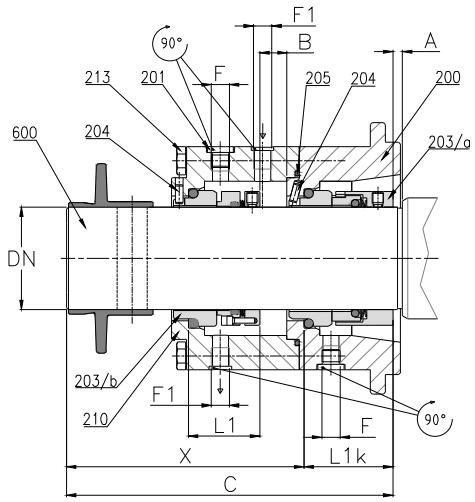


Fig.27 – Tenuta meccanica doppia K0K9 - Tenuta Tipo 120-9 / 172-9
Double mechanical seal K0K9 - Seal Type 120-9 / 172-9

Size	Model	DN (h7)	A	B	C	X	L1k / L1	F1	F
D020	1L1 05K2 025K4	30	5	11	131	88.5	42.5 / 26.5	G 1/8"	G 1/8"
D025	2L1 1K2 05K4	35	5	10	131	88.5	42.5 / 27.5	G 1/8"	G 1/8"
D030	4L1 2K2 1K4 05K8	35	5	10	131	88.5	42.5 / 27.5	G 1/8"	G 1/8"
D040	10L1 4K2 2K4 1K8 16L1 8K2	45	5	16	155	110	45 / 34	G 1/8"	G 1/8"
D060	20L1 10K2 4K4 2K8 30L1 16K2	55	5	14.5	174	126.5	47.5 / 38	G 1/8"	G 1/8"
D120	40L1 20K2 10K4 4K8 60L1 30K2	65	5	12.5	174	121.5	52.5 / 45	G 1/8"	G 1/8"
D300	80L1 40K2 20K4 10K8 120L1 60K2	70	5	10	194	134	60 / 50	G 1/8"	G 1/8"

Tutte le misure sono in mm / All dimensions are in mm

Tab.37 - Dimensioni tenuta meccanica doppia K0K9 / Dimensions Double mechanical seal K0K9

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / Recommended replacement for high wear part
r = ricambio consigliato non soggetto a usura o a usura gravosa / Recommended replacement for part not subject to wear or high wear

POS.	Qty	Descrizione	NOTE
200	1	ALLOGGIAMENTO TENUTA MECCANICA / MECHANICAL SEAL HOUSING	
201	1	TAPPO / PLUG	
203/a	1	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
203/b	1	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
204	2	SPINA / PIN	
205	1	O-RING	R
210	1	BUSSOLA TENUTA MECCANICA / MECHANICAL SEAL BUSH	
213	2	HEXAGONAL HEAD SCREW	
600	1	ALBERO CAVO / HOLLOW SHAFT	r

Tab.38 - Lista ricambi tenuta meccanica doppia K0K9 / Spare parts list double mechanical seal K0K9

12.18 **Datasheet tenuta meccanica flussata doppia tandem K0K9 - Tenuta tipo 110-9 / 172-9 / Datasheet flushed double mechanical seal tandem K0K9 - Seal Type 110-9 / 172-9**

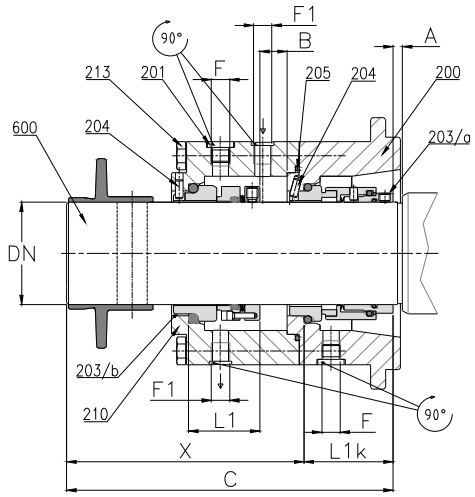


Fig.28 – Tenuta meccanica doppia K0K9 - Tenuta Tipo 110-9 / 172-9
Double mechanical seal K0K9 - Seal Type 110-9 / 172-9

Size	Model	DN (h7)	A	B	C	X	L1k / L1	F1	F
D020	1L1 05K2 025K4	30	5	11	131	88.5	42.5 / 26.5	G 1/8"	G 1/8"
D025	2L1 1K2 05K4	35	5	10	131	88.5	42.5 / 27.5	G 1/8"	G 1/8"
D030	4L1 2K2 1K4 05K8	35	5	10	131	88.5	42.5 / 27.5	G 1/8"	G 1/8"
D040	10L1 4K2 2K4 1K8 16L1 8K2	45	5	16	155	110	45 / 34	G 1/8"	G 1/8"
D060	20L1 10K2 4K4 2K8 30L1 16K2	55	5	14.5	174	126.5	47.5 / 38	G 1/8"	G 1/8"
D120	40L1 20K2 10K4 4K8 60L1 30K2	65	5	12.5	174	121.5	52.5 / 45	G 1/8"	G 1/8"
D300	80L1 40K2 20K4 10K8 120L1 60K2	70	5	10	194	134	60 / 50	G 1/8"	G 1/8"

Tutte le misure sono in mm / All dimensions are in mm

Tab.39 - Dimensioni tenuta meccanica doppia K0K9 / Dimensions Double mechanical seal K0K9

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / Recommended replacement for high wear part
r = ricambio consigliato non soggetto a usura o a usura gravosa / Recommended replacement for part not subject to wear or high wear

POS.	Qty	Descrizione	NOTE
200	1	ALLOGGIAMENTO TENUTA MECCANICA / MECHANICAL SEAL HOUSING	
201	1	TAPPO / PLUG	
203/a	1	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
203/b	1	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
204	2	SPINA / PIN	
205	1	O-RING	R
210	1	BUSSOLA TENUTA MECCANICA / MECHANICAL SEAL BUSH	
213	2	HEXAGONAL HEAD SCREW	
600	1	ALBERO CAVO / HOLLOW SHAFT	r

Tab.40 - Lista ricambi tenuta meccanica doppia K0K9 / Spare parts list double mechanical seal K0K9

12.19 **Datasheet tenuta meccanica flussata doppia tandem K0K9 - Tenuta tipo 172-9 / Datasheet flushed double mechanical seal tandem K0K9 - Seal Type 172-9**

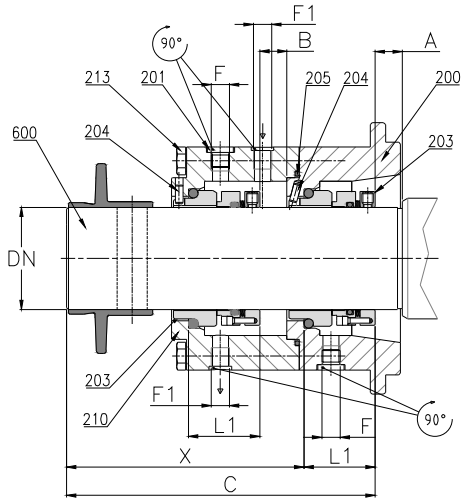


Fig.29 – Tenuta meccanica doppia K0K9 - Tenuta Tipo 172-9 / Double mechanical seal K0K9 - Seal Type 172-9

Size	Model	DN (h7)	A	B	C	X	L1	F1	F
D020	1L1 05K2 025K4	30	11	10	131	88.5	26.5	G 1/8"	G 1/8"
D025	2L1 1K2 05K4	35	10	10	131	88.5	27.5	G 1/8"	G 1/8"
D030	4L1 2K2 1K4 05K8	35	10	10	131	88.5	27.5	G 1/8"	G 1/8"
D040	10L1 4K2 2K4 1K8 16L1 8K2	45	16	16	155	110	34	G 1/8"	G 1/8"
D060	20L1 10K2 4K4 2K8 30L1 16K2	55	14.5	14.5	174	126.5	38	G 1/8"	G 1/8"
D120	40L1 20K2 10K4 4K8 60L1 30K2	65	12.5	12.5	174	121.5	45	G 1/8"	G 1/8"
D300	80L1 40K2 20K4 10K8 120L1 60K2	70	10	10	194	134	50	G 1/8"	G 1/8"

Tutte le misure sono in mm / All dimensions are in mm

Tab.41 - Dimensioni tenuta meccanica doppia K0K9 / Dimensions Double mechanical seal K0K9

LEGENDA
R = ricambio consigliato soggetto a usura gravosa / Recommended replacement for high wear part
r = ricambio consigliato non soggetto a usura o a usura gravosa / Recommended replacement for part not subject to wear or high wear

POS.	Qty	Descrizione	NOTE
200	1	ALLOGGIAMENTO TENUTA MECCANICA / MECHANICAL SEAL HOUSING	
201	1	TAPPO / PLUG	
203	2	TENUTA MECCANICA (PARTE ROTANTE + PARTE FISSA) / MECHANICAL SEAL (ROTATING PART + STATIONARY PART)	R
204	2	SPINA / PIN	
205	1	O-RING	R
210	1	BUSSOLA TENUTA MECCANICA / MECHANICAL SEAL BUSH	
213	2	HEXAGONAL HEAD SCREW	
600	1	ALBERO CAVO / HOLLOW SHAFT	r

Tab.42 - Lista ricambi tenuta meccanica doppia K0K9 / Spare parts list double mechanical seal K0K9

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