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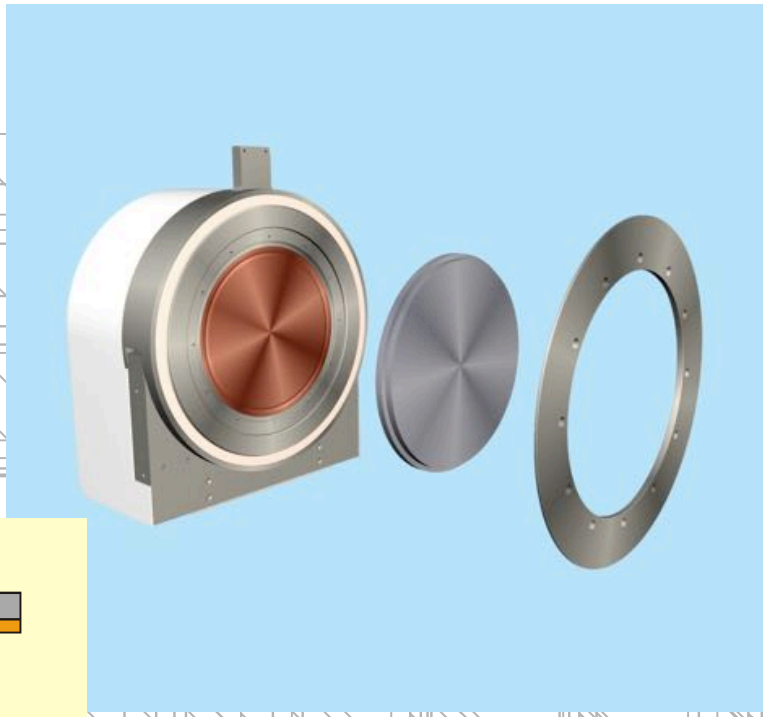
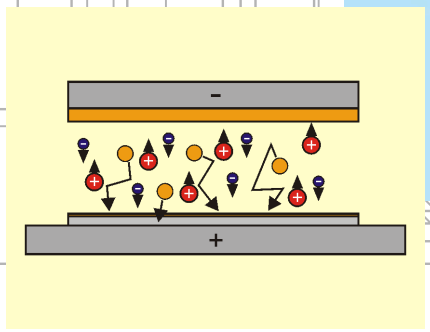
ARQ 151 6"/8"
Sputtering Source





Instructions
300004495/TS1/001/03
Edition 03/2002

System manufacturer

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1. Use, Data

1.1 Intended Use and Purpose

The ARQ 151 6"/8" Planar Magnetron Sputtering Source (termed simply «ARQ 151 6"/8"» in the following documentation) is always integrated in a vacuum coating system and, as such, may only be used for coating substrates with sputtering technology.

⚠WARNING

Improper use of the ARQ 151 6"/8" can cause injuries to the user or to third parties. In addition, the ARQ 151 6"/8" itself or other property can be damaged.

NOTE:
Any uses other than those stipulated in these operating instructions are considered inadmissible. Unaxis will assume absolutely no liability for any damage which occurs when the unit is used for purposes other than those directed.

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1.2 Technical Data

1.2.1 Type Label

There are three type labels on the housing of the ARQ 151 6"/8". These labels state all customer-specific modifications which may have been made and provide all the information required for optimal support by Unaxis.

Always state this information whenever you contact Unaxis for support in matters of troubleshooting, general queries, malfunctioning etc. The three labels provide information on:

- Type of the Planar Magnetron Sputtering Source
- Identification of the magnet system with the target diameter (in encoded form)
- Target material

1.2.2 Weight

ARQ 151 6"/8"
(incl. target and magnet system): 62 kg

1.2.3 Dimensions

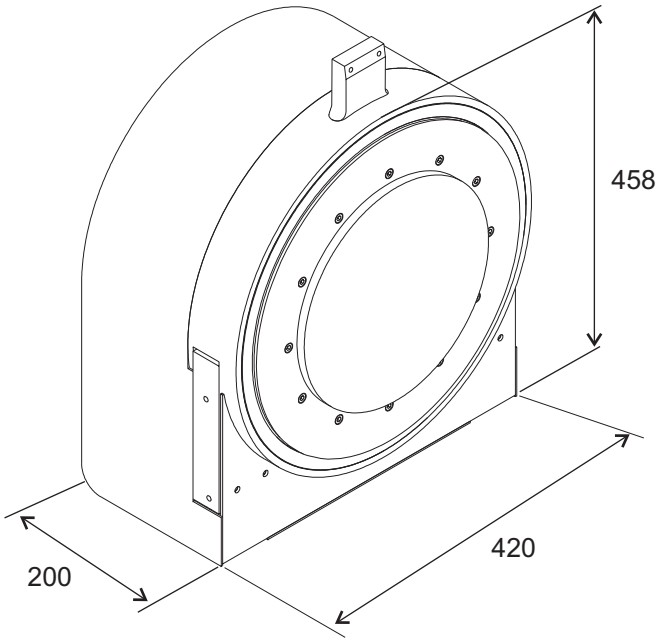

Fig. 1-1 *Dimensions of the ARQ 151 6"/8" (in mm)*

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1.2.4 Installation Position

Installation position:	Any alignment

1.2.5 Ambient Conditions

Ambient temperature:	18…30 °C
Humidity, relative:	40…60 % (non-condensing)
Degree of contamination, class 1:	No or only dry, non-conducting contamination is permissible. The contamination must not influence the electrical properties (DIN VDE 0110 Part 1, 4.2).

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1.3 Specifications

1.3.1 Electrical Data (Supply)

The ARQ 151 6"/8" is designed in accordance with the DIN VDE 0 160 specifications.
The ARQ 151 6"/8" complies with the IP 43 protection type according to IEC 529.

⚠CAUTION

The ARQ 151 6"/8" may only be operated with DC voltage of up to a maximum of 1800 V.

Planar Magnetron sputtering source

Voltage:	Max. 1800 VDC
Power:	Max. 20 kW

Motor for magnet rotation

Voltage:	3 × 400 VAC
Frequency:	50/60 Hz
Power:	190/174 W

Rotation sensor

Voltage:	24 VDC

1.3.2 Cooling Water

Quality:	In accordance with product information BB 800 851 BN
Inlet temperature:	The temperature of the cooling water must be above dew point and may not exceed a maximum of 25 °C
Inlet pressure:	4 bar
Consumption:	13 l/min
Outlet pressure:	0…0.5 bar

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1.3.3 Hot Water (for Conditioning)

Quality:	In accordance with product information BB 800 851 BN
Inlet temperature:	Max. 60 °C
Inlet pressure:	4 bar
Outlet pressure:	0…0.5 bar

1.3.4 Compressed Air

Pressure:	Below 2 bar
Temperature:	Ambient temperature

1.3.5 Argon (process gas)

Quality (purity):	Min. 99.998 %, no condensate
Process pressure:	Typical operating range 4×10^{-3} mbar to 1×10^{-2} mbar. The process pressure depends on the magnet system.

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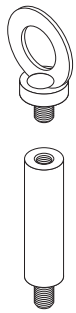
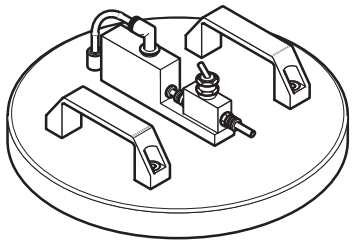
1.4 Accessories

Mounting tool for ARQ 151 6"/8"	BK 221 548-T	
Safety package	BK 221 352-T BK 221 354-T	Isolating switch left Mount for isolating switch
Target removal device (refer to the technical drawings for details on the connection flange)	BK 221 690-T	

NOTE:
It is recommended to always use a target removal device for the target replacement procedure. Magnetic targets (e.g. magneto-optical targets) are attracted by the permanent magnet system of the ARQ 151 6"/8" to such an extent that it is practically impossible to replace a target without using the target removal device.

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2. Safety

2.1 Be Sure to Read!

Chapter 2. Safety, 11 must be read by all persons involved in installing, operating and repairing the ARQ 151 6"/8"!

2.2 Safety Concept

The ARQ 151 6"/8" is a source of danger when it is operated by persons who have not been suitably trained and when it is not used properly. See Chapter 1.1 Intended Use and Purpose, 5.

Normally, the ARQ 151 6"/8" is an integral part of a vacuum sputtering system. As such, it is integrated in the overall safety concept devised specifically for the system.

In addition to the constructional safety measures (e.g. protective hoods, shielding, ground connections, etc.) additional safety devices are provided in the form of an EMERGENCY OFF switch and a safety contact (interlock).

EMERGENCY OFF
Pressing the EMERGENCY OFF switch immediately interrupts the supply of electrical power to the ARQ 151 6"/8" and switches the magnet system's rotary drive (motor) off.

Safety contact (interlock)
If the ARQ 151 6"/8" is removed from its fastening device during repair work, then a safety contact (interlock) opens. In the safety circuit, this safety contact is connected in series with the EMERGENCY OFF switch. This means the source is disconnected from the source of electrical power in the same manner as when the EMERGENCY OFF switch is actuated.

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2.3 General Safety Regulations

In addition to the safety regulations and the safety-related notes and warnings which appear in the individual chapters of this manual, the following general safety regulations are also relevant for the ARQ 151 6"/8" and must be adhered to.

Intended use and purpose
Do not use the ARQ 151 6"/8" for purposes other than those directed! See Chapter 1.1 Intended Use and Purpose, 🗎 5.

Operational regulations stipulated by the manufacturer
Proper use includes adherence to the operational, repair and maintenance regulations stipulated by Unaxis.

Personnel qualifications
Only trained and coached personnel with experience in working with high-voltage and high-frequency systems is permitted to install, operate or repair the ARQ 151 6"/8". All users must be comprehensively informed about the dangers and risks involved.

System management's (customer) responsibilities
The system management (customer) is responsible for making sure that:

- Every person who works with the ARQ 151 6"/8" is technically qualified and accordingly trained
- No unauthorized persons have access to the ARQ 151 6"/8"
- Persons with pacemakers or other implants do not have access to the area in which the ARQ 151 6"/8" is being operated

The system management (customer) is obliged only to operate the ARQ 151 6"/8" and its accessory equipment when it is in a flawless state.

Operating instructions
These operating instructions must always be kept at a predetermined location near to the ARQ 151 6"/8".

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2.4 Safety Labels and Pictograms

The following safety labels draw attention to the different danger levels:

⚠DANGER

Indicates an extremely hazardous situation which, if not avoided, will result in serious injury or death.

⚠WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or extensive property damage.

⚠CAUTION

Indicates a slightly hazardous situation. If you fail to heed the information, this situation could result in moderate injury, property damage or malfunctioning products.

NOTE:
Identifies technical requirements that require particular attention.

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2.5 Dangers

⚠DANGER

Magnetic and high-frequency electromagnetic fields.

Strong permanent magnetic fields around the ARQ 151 6"/8" influence the function of cardiac pacemakers. This can cause cardiac disrhythmia or even death.

Persons with pacemakers or similar physical aids may not enter areas where the ARQ 151 6"/8" is operating. Maintain a distance of at least 5 meters.

⚠DANGER

Danger of electrical shock from parts carrying high voltage.

The ARQ 151 6"/8" is operated with DC voltage levels of up to 1800 V. Touching parts carrying high voltage causes electric shocks that can be fatally dangerous.

Make sure that all protective devices, e.g. disconnect switches, interlocks, protective hoods, shielding and ground connections, always operate safely and are not disabled.

Service work on the electrical equipment may only be performed when the components are free of all voltage (idle). Disconnect such components from the source of electrical power before beginning work, ground them with the grounding rod and make sure that no-one can switch them on again.

Only trained personnel who have gained experience in dealing with high voltage systems are permitted to perform service work on the electrical equipment.

⚠CAUTION

Strong permanent magnet fields.

Magnetic fields from the permanent magnets in the cathode can cause injuries when performing service work on the opened cathode module.

For all work, remove hearing aids, jewelry and wrist watches and be sure to use antimagnetic tools only.

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3. Design, Function

3.1 Process Technology

3.1.1 Sputtering

Sputtering is a process which is used to produce thin films. Ion bombardment removes particles of coating material from a target. These particles are deposited on a substrate.

Plasma

A plasma is required to execute a sputtering process. A plasma is an ionized gas. This can be created by subjecting a gas at reduced pressure to an electrostatic field or a high-frequency alternating field.

Plasma ignition

The following example uses argon as process gas. The gas is incited to produce a plasma by subjection to an electrostatic field. The negative pole of the voltage is applied to the target, i.e. the target constitutes the cathode. The positive pole of the voltage is generally connected to the housing ground.

Ionizing radiation (cosmic radiation and natural radioactivity) is always present. As a result, gas always contains a small amount of gas ions. This means that some atoms in the process gas are split up into positive argon ions and negative electrons in accordance with the following chemical reaction:

$$Ar \rightarrow Ar^{+} + e^{-}$$

The electric field accelerates the argon ions to the cathode and the free electrons to the anode. In the process, the accelerated electrons collide with further atoms and ionize these atoms with their kinetic energy. The above process is repeated continuously and therefore produces an avalanche of argon ions and electrons. The plasma ignites.

Gas pressure

In order to maintain a plasma when applying a voltage of a few hundred volts, the pressure of the process gas must be within a range of approx. 10^{-4} to 10^{-1} mbar. When the pressure level is set too high, the accelerated electrons will collide with the gas atoms before they can achieve the minimum energy that is required for ionization. On the other hand, when the pressure is too low, the particle number density is reduced and the probability of collision decreases.

Sputtering

Subsequent to plasma ignition, large amounts of positive argon ions impact on the target (Fig. 3-1, 🗎 16). Their high mass gives them a high level of impulse transmission. This is transferred to the atoms on the target surface and thus causes single atoms or whole clusters of atoms to be removed. Ion impact also generates heat and this, in turn, induces undesirable target heating. The target is therefore cooled with water.

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Deposition

The atoms removed from the target move freely inside the process chamber and then settle on the substrate and other surfaces. Appropriately positioned masks allow for localized material coating on the substrate. The procedure is called «deposition». Fig. 3-1, 16 illustrates the typical circumstances, i.e. the substrate carrier is positioned parallel to and opposite the target.

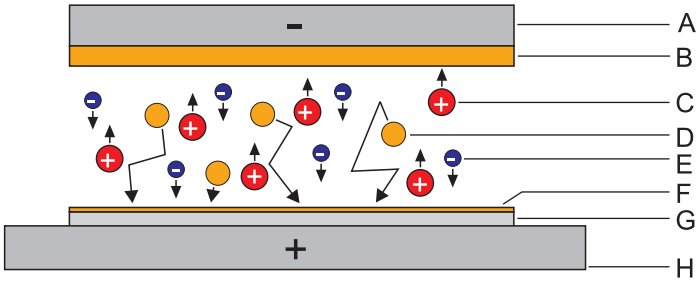

Fig. 3-1 *Principles of sputtering*

A Cathode (negative pole)
B Target
C Gas ions
D Target material particles
E Free electrons
F Deposited layer
G Substrate
H Substrate carrier and anode

Advantages

The method of sputtering has two main advantages over the method of thermal evaporation of material:

- The sputtering process is largely a stochastic procedure. This means that the chemical composition of the deposited layer corresponds with the target even when alloys or chemical compounds are sputtered.
- The sputtering process endows particles with a substantially higher level of energy than the thermal evaporation process. This improves layer adhesion and produces a compact layer structure even at low substrate temperatures.

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3.1.2 Planar Magnetron Technology

The ARQ 151 6"/8" is equipped with a permanent magnet assembly that is positioned behind the target. The magnet field compels the free electrons to additional circular movements so that they all move in helical (screw-like) paths. This lengthens the electron path, thereby increasing the probability of collisions between electrons and gas atoms. The degree of dissociation of the process gas and therefore the plasma density is increased correspondingly.

«Planar Magnetron» technology offers the following advantages over conventional sputtering systems:

- Highly stable plasma
- Increased sputtering rate
- Decreased sputtering voltage (i.e. low particle energy)
- Performs well even at low gas pressure

3.1.3 Reactive Sputtering

For sputtering, a process gas that is chemically inert and that does not react in conjunction with the target atoms is usually implemented. A typical process gas is the noble gas argon. The chemical composition of the deposited layer corresponds with the target material.

During reactive sputtering a «reactive gas», e.g. oxygen or nitrogen is mixed with the chemically inert process gas. This enables chemical compounds of target material and reactive gas to be deposited on the substrate. Typical applications are the deposition of oxides and nitrides when a metal is used as target and oxygen or nitrogen as reactive gas.

3.1.4 Sputter Etching

Sputter etching is a method used for cleaning and removing surfaces. The only difference between sputtering described above in Chapter 3.1.1 Sputtering, 15 and the method of sputter etching is that the negative voltage for sputter etching is applied to the substrate. Because of this the substrate is bombarded with argon ions and thus particles on the substrate surface are removed. The removed particles are pumped out along with the process gas or are deposited on the walls.

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3.2 Design of the ARQ 151 6"/8"

Fig. 3-2, 18 shows the design of the ARQ 151 6"/8".

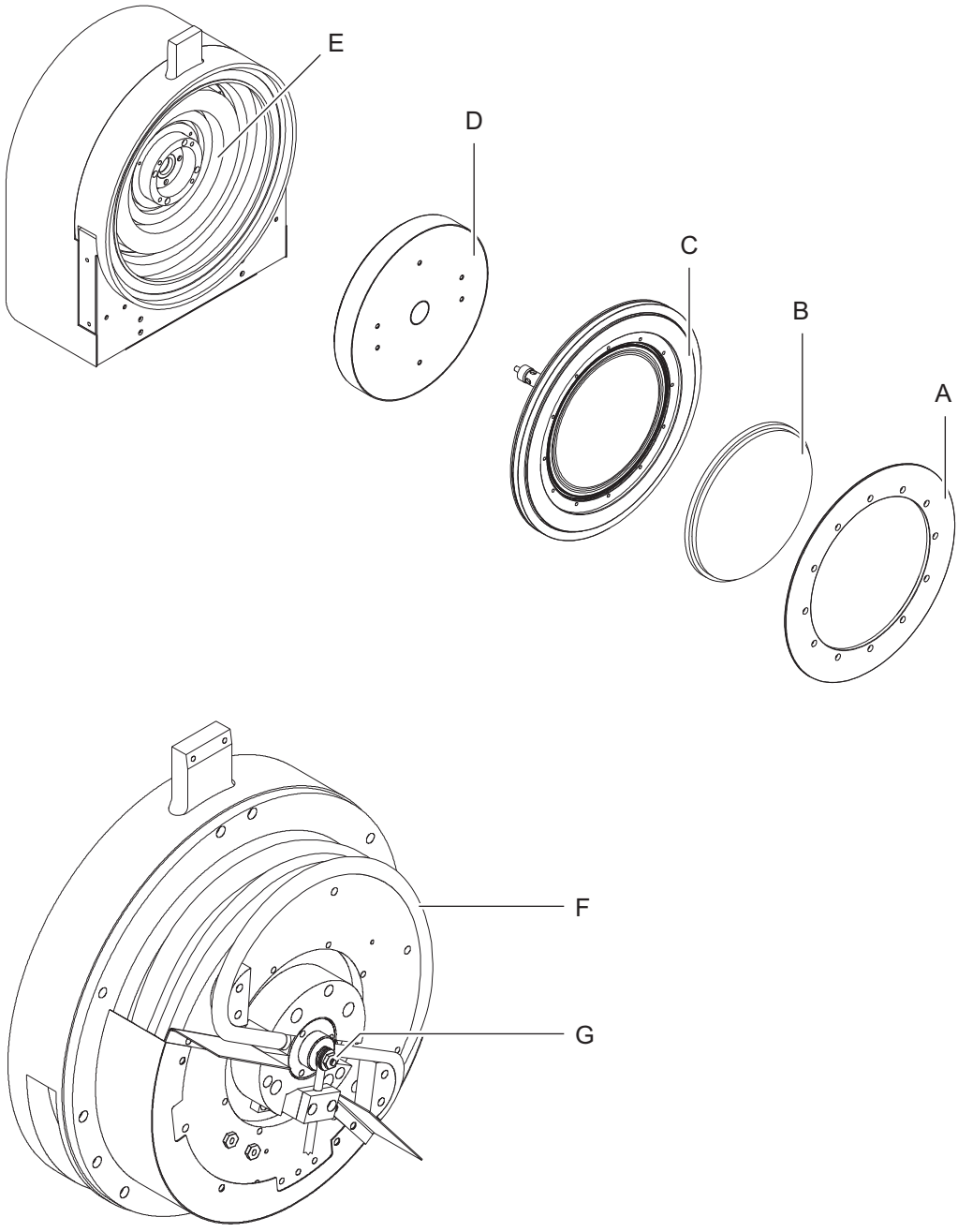

Fig. 3-2 *Design of the ARQ 151 6"/8"*

A Target clamping ring
B Target
C Cooling plate
D Magnet system
E Motor
F Cooling system
G High voltage connection

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3.3 Connection Diagrams

3.3.1 DC System (Overview)

Standard

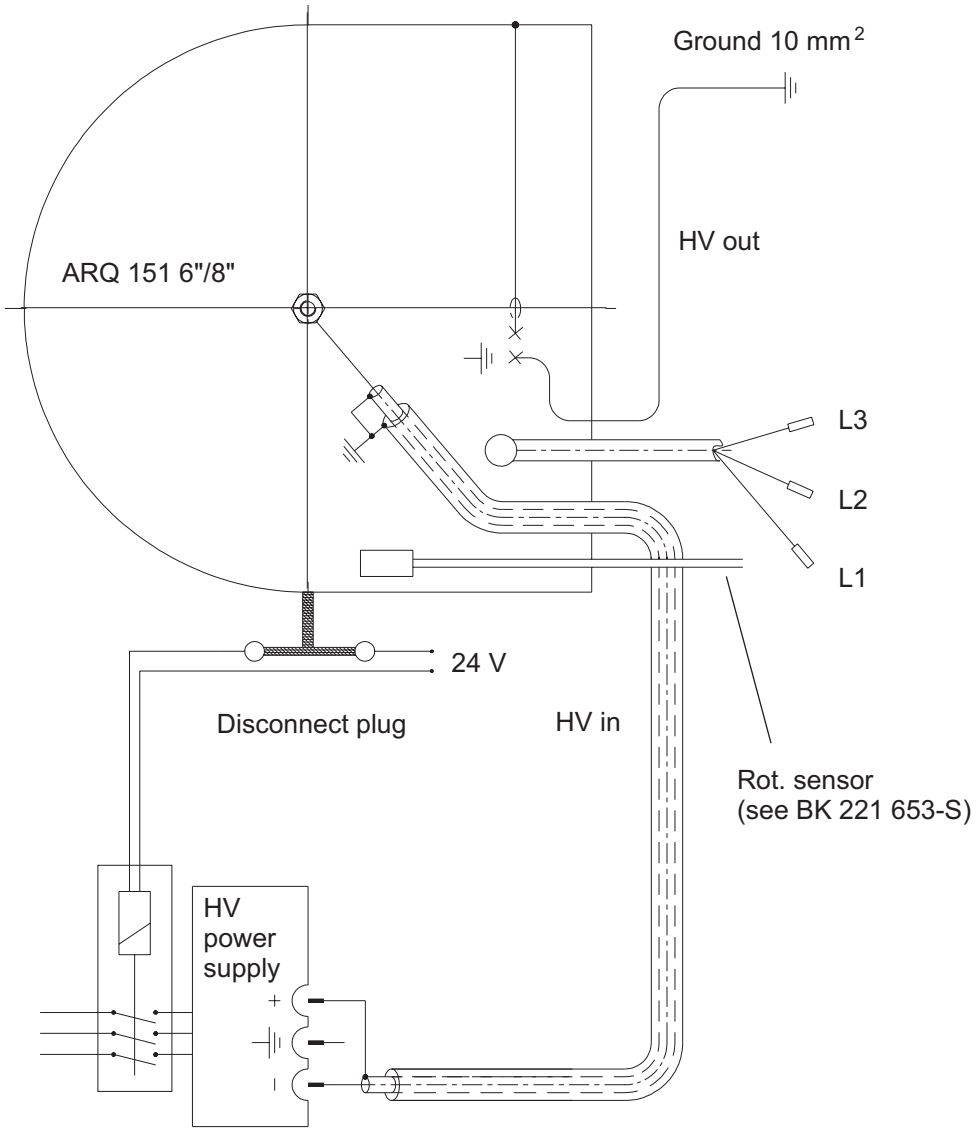

Fig. 3-3 *Connection diagram: DC system ARQ 151 6"/8" (overview)*

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With chopper (optional)

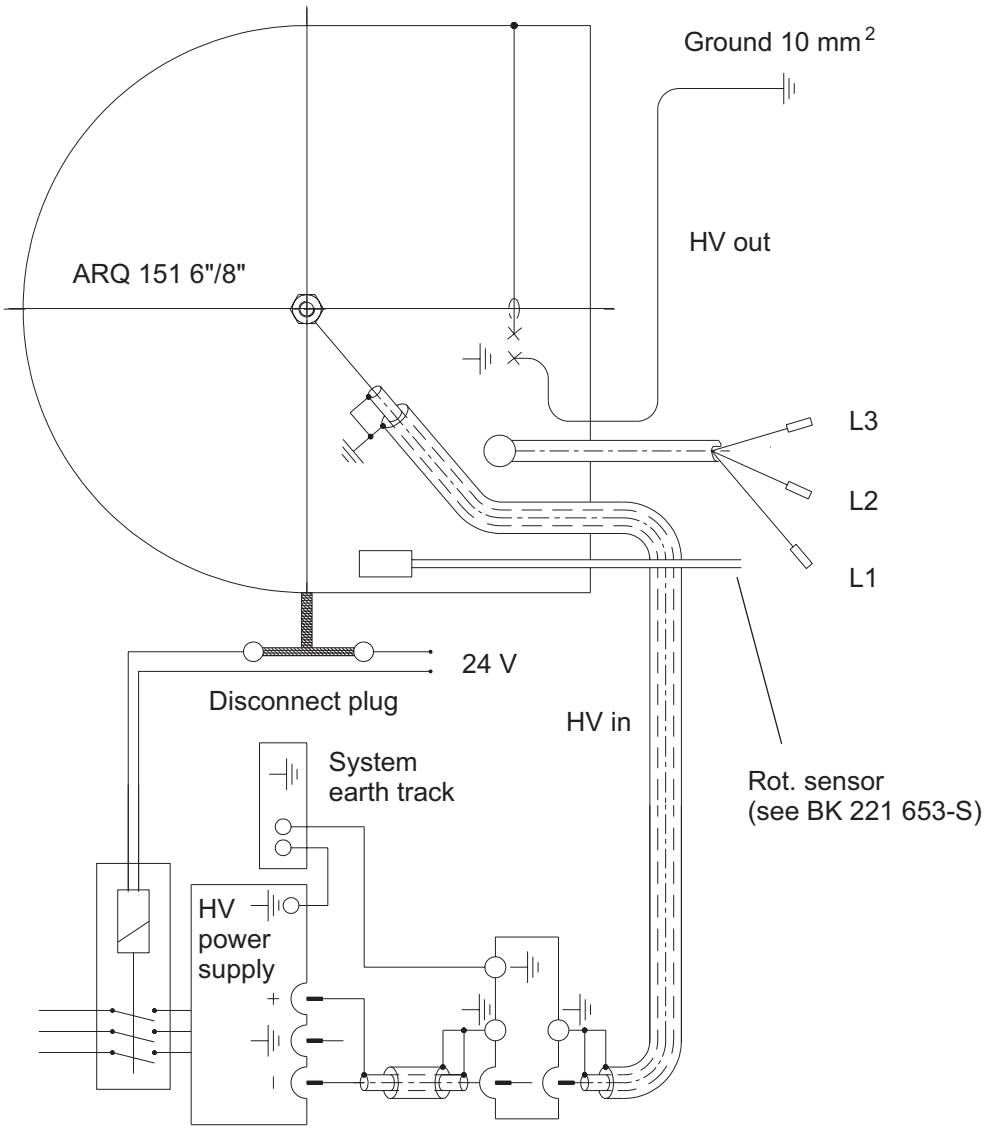

Fig. 3-4 *Connection diagram: DC system ARQ 151 6"/8" with chopper (overview)*

3.3.2 Connection Diagram: Motor (Rotary Drive)

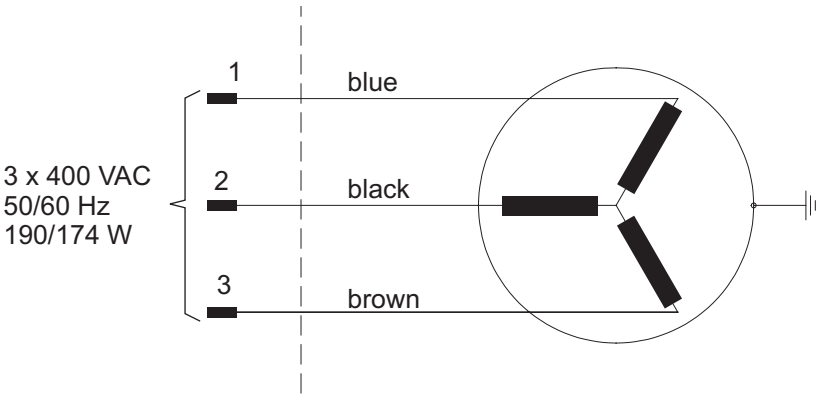

Fig. 3-5 *Connection diagram: Motor*

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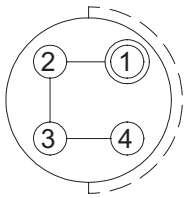
3.3.3 Connection Diagram: Sensor (Rotary Drive)



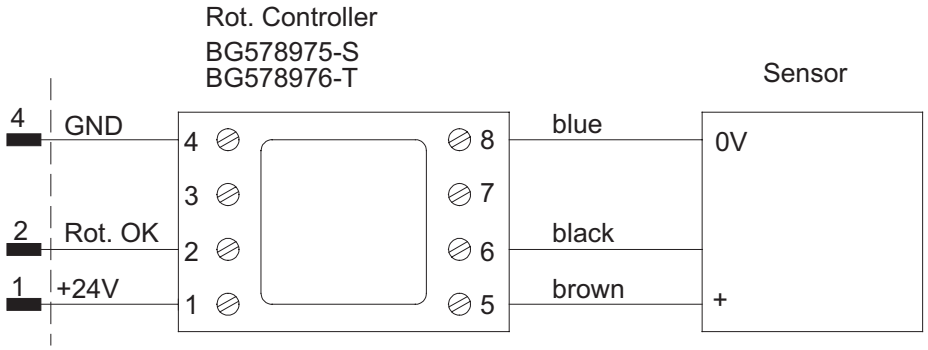


Fig. 3-6 *Connection diagram: Sensor*

3.3.4 Connection Diagram: Sputtering Source

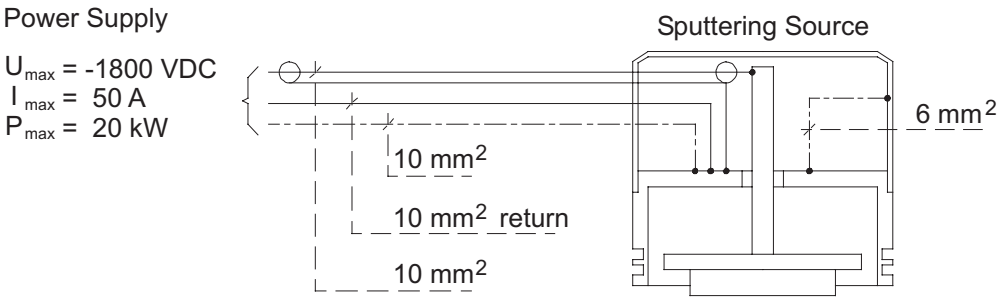


Fig. 3-7 *Connection diagram: Sputtering source*

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3.4 Target Removal Device

Fig. 3-8, 🗎 22 shows the target removal device of the ARQ 151 6"/8".

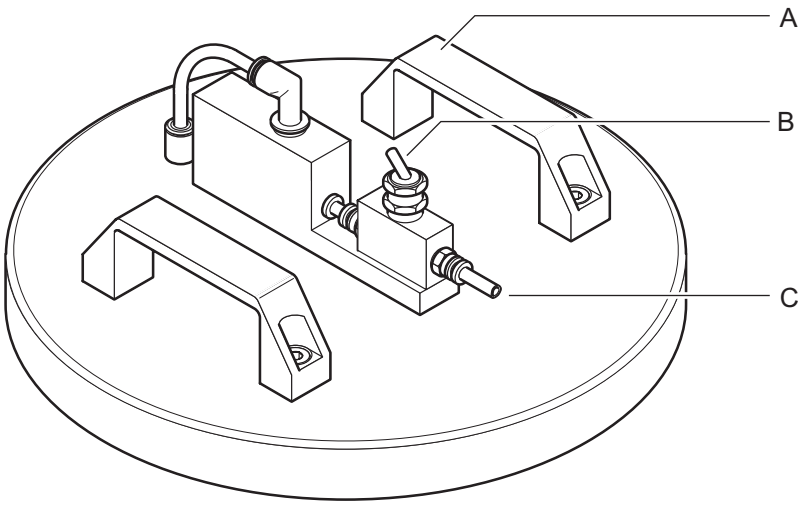

Fig. 3-8 *Target removal device*

A Handle
B Switch
C Connection hose for compressed air

Magnetic targets (e.g. magneto-optical targets) are attracted by the permanent magnet system of the ARQ 151 6"/8" to such an extent that it is practically impossible to replace a target without using the target removal device

The target removal device is connected to the appropriate flange in the compressed air line. Refer to the technical drawings or the operating instructions of the system for details on the position of the compressed air connection flange.

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4. Maintenance

	**⚠ DANGER** **Danger of electrical shock from parts carrying high voltage.** **The ARQ 151 6"/8" is operated with DC voltage levels of up to 1800 V. Touching parts carrying high voltage causes electric shocks that can be fatally dangerous.** **Make sure that all protective devices, e.g. disconnect switches, interlocks, protective hoods, shielding and ground connections, always operate safely and are not disabled.** **Service work on the electrical equipment may only be performed when the components are free of all voltage (idle). Disconnect such components from the source of electrical power before beginning work, ground them with the grounding rod and make sure that noone can switch them on again.** **Only trained personnel who have gained experience in dealing with high voltage systems are permitted to perform service work on the electrical equipment.**

	**⚠ CAUTION** **Strong permanent magnet fields.** **Magnetic fields from the permanent magnets in the cathode can cause injuries when performing service work on the opened cathode module.** **For all work, remove hearing aids, jewelry and wrist watches and be sure to use antimagnetic tools only.**

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4.1 Removing a Used Target

Vent the process chamber and then proceed as described below:

1 Make sure that the cooling water is turned off and that the cooling water circuit is not under pressure

2 Make sure that the high voltage is switched off

3 Open the process chamber. Make sure that the target side of the ARQ 151 6"/8" is fully exposed.

NOTE:
Always wear special clean room gloves to perform the target change. Never touch parts of the opened ARQ 151 6"/8" with your bare hands.

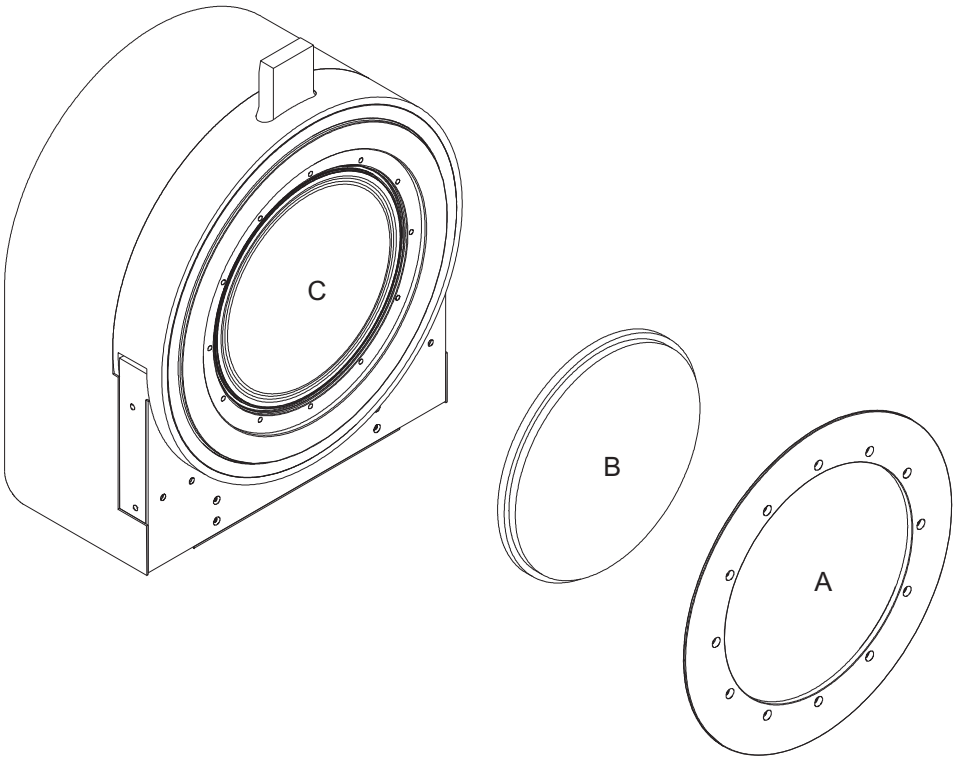

Fig. 4-1 *Target change at the ARQ 151 6"/8"*

A Target clamping ring
B Target
C Cooling plate

4 Loosen and remove the screws which hold the target clamping ring (item A). Remove the target clamping ring.

NOTE:
It is recommended to always use a target removal device for the target replacement procedure. Magnetic targets (e.g. magneto-optical targets) are attracted by the permanent magnet system of the ARQ 151 6"/8" to such an extent that it is practically impossible to replace a target without using the target removal device.

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5 Position the target removal device above the target (item B) and open the valve by activating the switch. See Chapter 3.4 Target Removal Device, 22. The target will attach itself by suction.

6 Carefully lift the target off

7 Check the cooling plate (item C) for any signs of damage

8 Clean the cooling plate with a cloth which has been moistened with alcohol

⚠CAUTION

The cooling plate's membrane is very thin and can, as a result, be easily damaged. Do not work with pointed objects and do not place any tools on the cooling plate. Magnetic materials can by attracted by the strong permanent magnet system and can therefore damage the cooling plate.

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4.2 Mounting a New Target

⚠CAUTION

Be careful when working with magnetic targets: They are attracted by the permanent magnet system of the ARQ 151 6"/8". Install such targets with extreme caution to avoid damaging the thin membrane of the cooling plate.

1 Inspect the target clamping ring for contamination, and clean or replace it if necessary

2 Position the new target with the removal device in the centre above the clean cooling plate

- Use the recess of the target gripping ring as a guide

3 Actuate the switch to remove the target from the removal device, and lift the removal device. See Chapter 3.4 Target Removal Device, 22.

4 Place the target clamping ring around the target and screw it on. Tighten the screws cross-wise with a torque of 7 Nm. (Apply a thin layer of molybdenum to the screws.)

5 Inspect the insulating ring of the process chamber flange for damage. Remove any contamination.

6 Close the process chamber with the ARQ 151 6"/8" and pump down the system

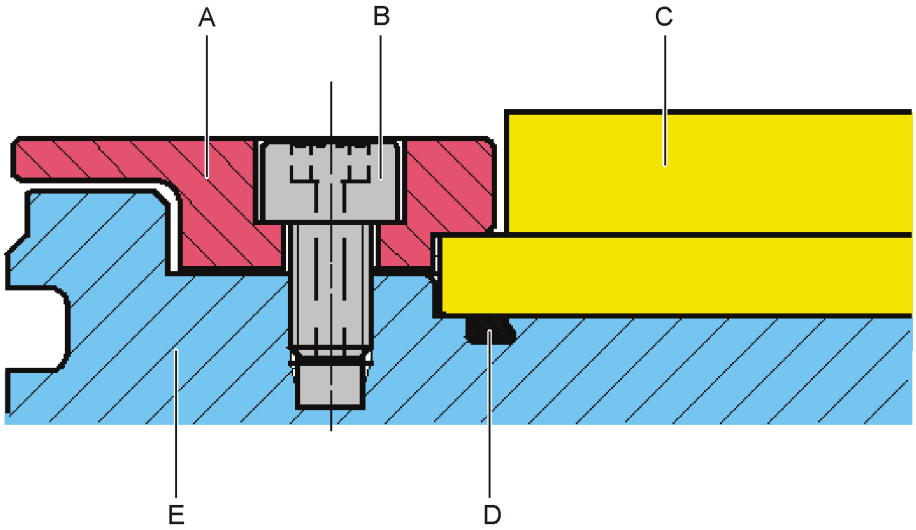

Fig. 4-2 *Mounting target (material see Fig. 7-2, 39)*

A Target clamping ring
B Fillister head screw
C Target
D O-ring
E Cooling plate

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4.3 Replacing the Cooling Plate and the Magnet System

1 Make sure that the cooling water is switched off

2 Make sure that the high voltage supply is switched off

3 Vent the process chamber to atmospheric pressure

4 Blow out any remaining cooling water with compressed air. At this point the target must still be installed otherwise the cooling plate's membrane will be damaged.

5 Remove the target. See Chapter 4.1 Removing a Used Target, 24.

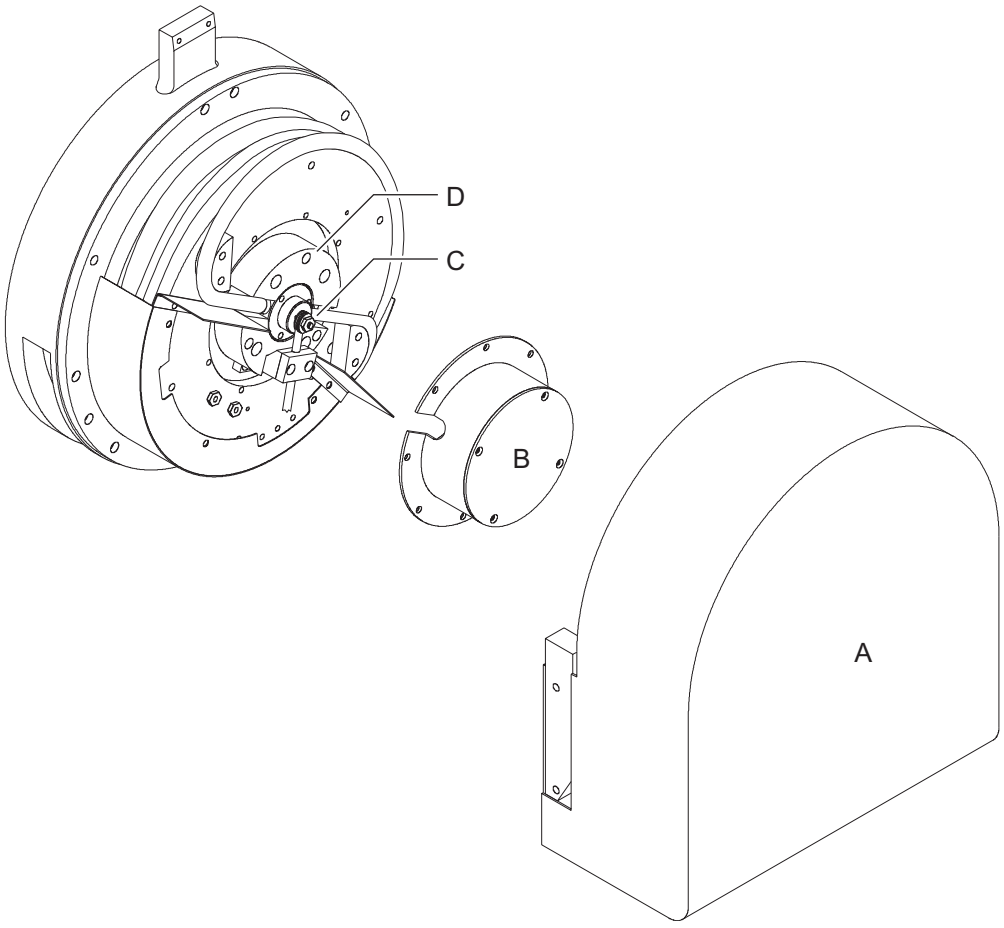

Fig. 4-3 *Rear view of the ARQ 151 6"/8"*

A Protective hood
B High voltage shielding
C Hexagon nut
D Hexagon socket screw (4 pieces located radially on the flange)

6 Remove the screws from the protective hood (item A) and then remove the hood

7 Remove the screws from the high voltage shielding (item B) and then remove the shielding

8 Remove the hexagon nut (item C) from the center of the rear panel of the ARQ 151 6"/8" and remove the high voltage cable

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9 Carefully press in the cooling plate's grub screw in the center of the rear plate of the ARQ 151 6"/8". Hold the cooling plate (item E) at the front side and pull it out completely.

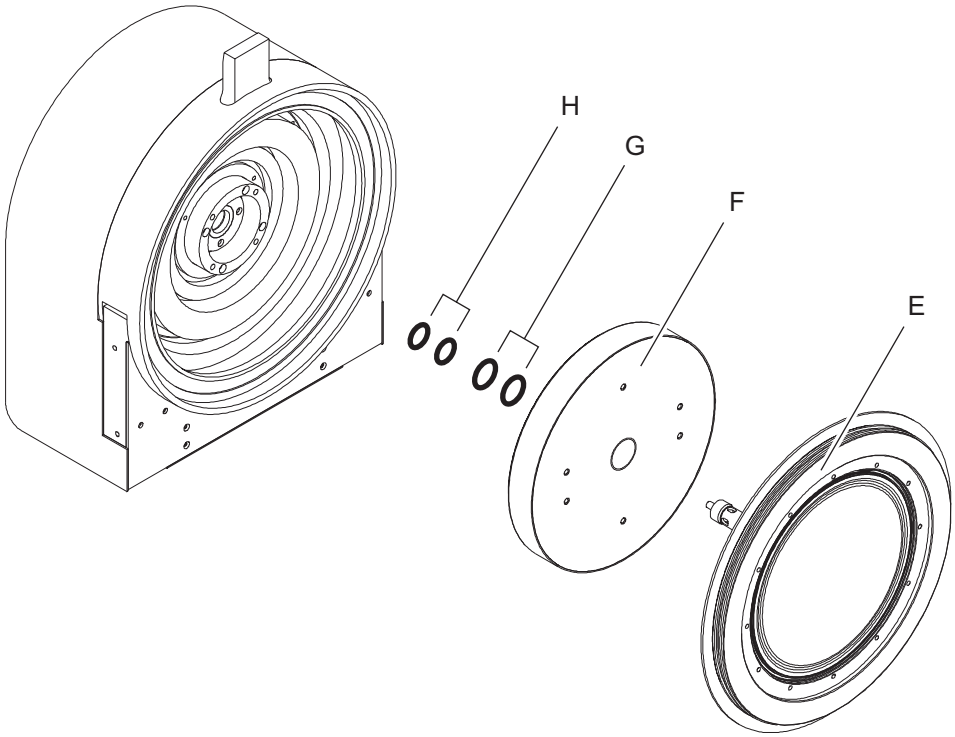

Fig. 4-4 *Magnet system and cooling plate of the ARQ 151 6"/8"*

E Cooling plate
F Magnet system
G O-Ring 18.72 × 2.62 (2 pieces)
H O-Ring 13.95 × 2.62 (2 pieces)

10 Remove the four hexagon socket screws (item D) from the rear side of the cathode

11 Remove the magnet system (item F)

12 Inspect the O-rings (items G and H) for signs of damage and, if necessary, replace them

13 Select the required spare parts. See Chapter 7. Spare Parts, 37.

14 Assemble the ARQ 151 6"/8" by following the above instructions in the reverse order

NOTE:
Make sure that the permanent magnets do not attract any particles. These may cause electrical arcing during operation.

Make sure that the rectangular piece at the cooling plate shaft fits exactly into its counterpart at the ARQ 151 6"/8".

Make sure that the grounding cable is screwed back onto the protective hood.

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4.4 Recommendations for Cleaning

The following cleaning recommendations are relevant for the target clamping ring.

⚠DANGER

Risk of severe caustic burns.

Make sure to adhere strictly to the safety instructions for handling acids and disinfectants. Hydrofluoric acid (HF), in particular, is extremely dangerous.

1 Place the parts which are to cleaned in a cleaning bath or sandblast the parts until the film which you want to remove has gone. Examples:

Schicht	Reinigungsmethode
Al	20…40 % NaOH
SiN	Sandstrahlen
Cu	$FeCl_3$
Ti	H_2SO_4
CrCu	NH_4HF_2
TaO_5	HF, NH_4HF_2

Tab. 4-1 *Cleaning methods*

2 Rinse the cleaned part under running water

3 Roughen the surface of the parts by sandblasting them (Sand quality: 90…150 µm.)

4 Clean the parts either with a solvent or with ultrasonics and let them dry at the dust-free location

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5. Service

⚠ DANGER

Danger of electrical shock from parts carrying high voltage.

The ARQ 151 6"/8" is operated with DC voltage levels of up to 1800 V. Touching parts carrying high voltage causes electric shocks that can be fatally dangerous.

Make sure that all protective devices, e.g. disconnect switches, interlocks, protective hoods, shielding and ground connections, always operate safely and are not disabled.

Service work on the electrical equipment may only be performed when the components are free of all voltage (idle). Disconnect such components from the source of electrical power before beginning work, ground them with the grounding rod and make sure that noone can switch them on again.

Only trained personnel who have gained experience in dealing with high voltage systems are permitted to perform service work on the electrical equipment.

⚠ CAUTION

Strong permanent magnet fields.

Magnetic fields from the permanent magnets in the cathode can cause injuries when performing service work on the opened cathode module.

For all work, remove hearing aids, jewelry and wrist watches and be sure to use antimagnetic tools only.

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5.1 Maintenance Schedule

Maintenance activity	Maintenance interval	Remarks
Replacing both motor ball bearings	After 19,000 operating hours	See Chapter 5.2 Replacing the Motor Ball Bearings, 33
Deliming the cooling water circuit	After 19,000 operating hours	See Chapter 5.3 Deliming the Cooling Water Circuit, 34

Tab. 5-1 *Maintenance schedule*

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5.2 Replacing the Motor Ball Bearings

First remove the cooling plate and the magnet system in the ARQ 151 6"/8". See Chapter 4.3 Replacing the Cooling Plate and the Magnet System, 27.

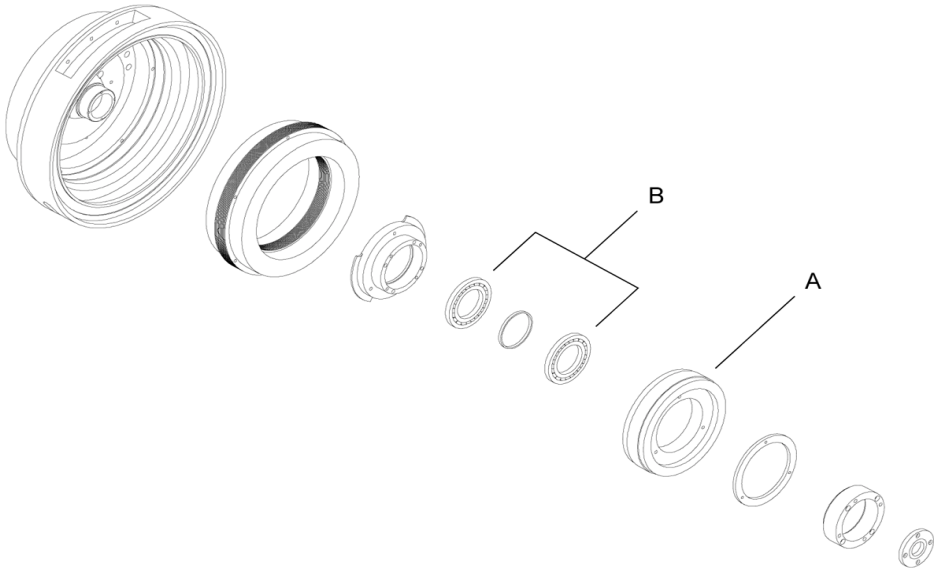

Fig. 5-1 *Motor of the ARQ 151 6"/8"*

A Rotor
B Ball bearings (2 pieces)

1 Remove the motor's rotor (item A)

2 Replace both of the ball bearings (item B)

3 Assemble the ARQ 151 6"/8" by following the above instructions in the reverse order

NOTE:
Always use the removal device (order ID 102086506) to remove the ball bearings.

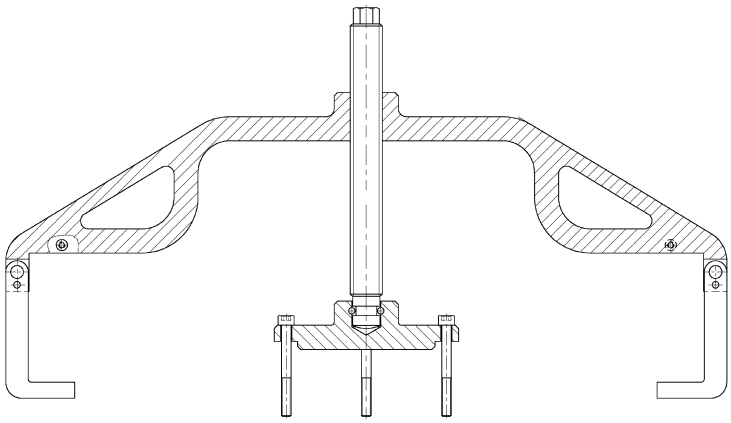

Fig. 5-2 *Mounting and removal device*

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5.3 Deliming the Cooling Water Circuit

It is important to delime the cooling water circuit in order to optimize the cooling effect of the cooling plate. The effectiveness of the cooling plate is reduced if the cooling water circuit is full of lime.

Solvent: Use any common commercial deliming agent.

⚠WARNING

Risk of caustic burns.

Make sure to adhere strictly to the safety instructions for handling the particular deliming agent you use.

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6. Storage, Disposal

6.1 Safety Note

⚠ DANGER

Magnetic and high-frequency electromagnetic fields.

Strong permanent magnetic fields around the ARQ 151 6"/8" influence the function of cardiac pacemakers. This can cause cardiac disrhythmia or even death.

Persons with pacemakers or similar physical aids may not enter areas where the ARQ 151 6"/8" is operating. Maintain a distance of at least 5 meters.

6.2 Transport and Packaging

TheARQ 151 6"/8" may only be packaged and transported in its original packaging material.

6.3 Storage

The ARQ 151 6"/8" may only be stored in a dry room. Ensure that the following ambient conditions are guaranteed:

Ambient temperature:	15…25 °C
Air humidity:	40…60 % (non-condensing)

6.4 Disposal

The disposal and environmental regulations for industrial systems and electrical components in force for your line of business and local area are applicable for all disposal activities.

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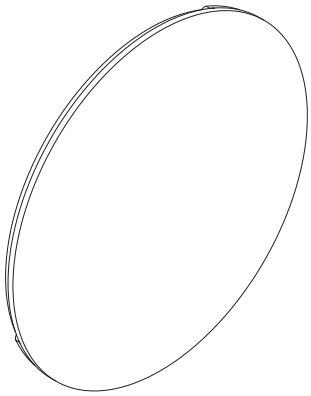
7. Spare Parts

Explosion drawings which illustrate the available spare parts and the related order numbers are shown on the following pages.

7.1 Consumables

Item	Order no.	Picture
Targets, ∅ 260 mm		
Refer to Unaxis	Refer to Unaxis	
Targets, ∅ 300 mm		
Refer to Unaxis	Refer to Unaxis	

Tab. 7-1 *Consumables*

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7.2 Spare Parts

Front

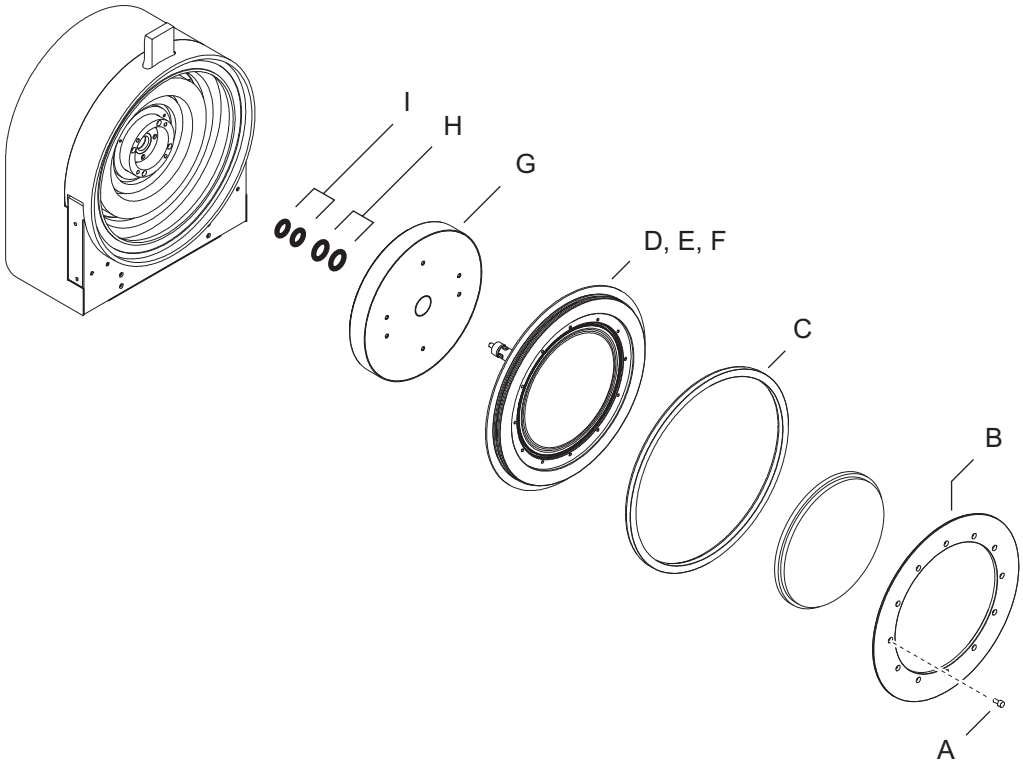

Fig. 7-1 *Spare parts: Front of the ARQ 151 6"/8"*

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Item	Description	Dimensions	Qty.	Order no.
A	Pan head screws, vented	M6 × 10	12	BB 147 116
B	Target clamping ring 260 (for ARQ 151 6") Target clamping ring 300 (for ARQ 151 8")		1 1	BK 221 593 BK 221 707
C	Insulating ring		1	BK 221 513
D	Cooling plate 260, cpl. (for ARQ 151 6") Cooling plate 300, cpl. (for ARQ 151 8")		1 1	BK 221 595 - X BK 221 703 - X
E	O-ring: target O-ring: target	6” 8”	1 1	BK 221 556 - T BK 221 711 - T
F	O-ring: cooling plate/insulating ring	354.97 × 5.34	1	BK 221 557 - T
G	Magnet system, cpl.	MB 260 DB	1	BK 221 550 - T
H	O-ring	28.17 × 3.53	2	B 4070 485 PP
I	O-ring	21.82 × 3.53	2	B 4070 370 PV

Tab. 7-2 *General Spare parts: Front of the ARQ 151 6"/8"*

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Rear

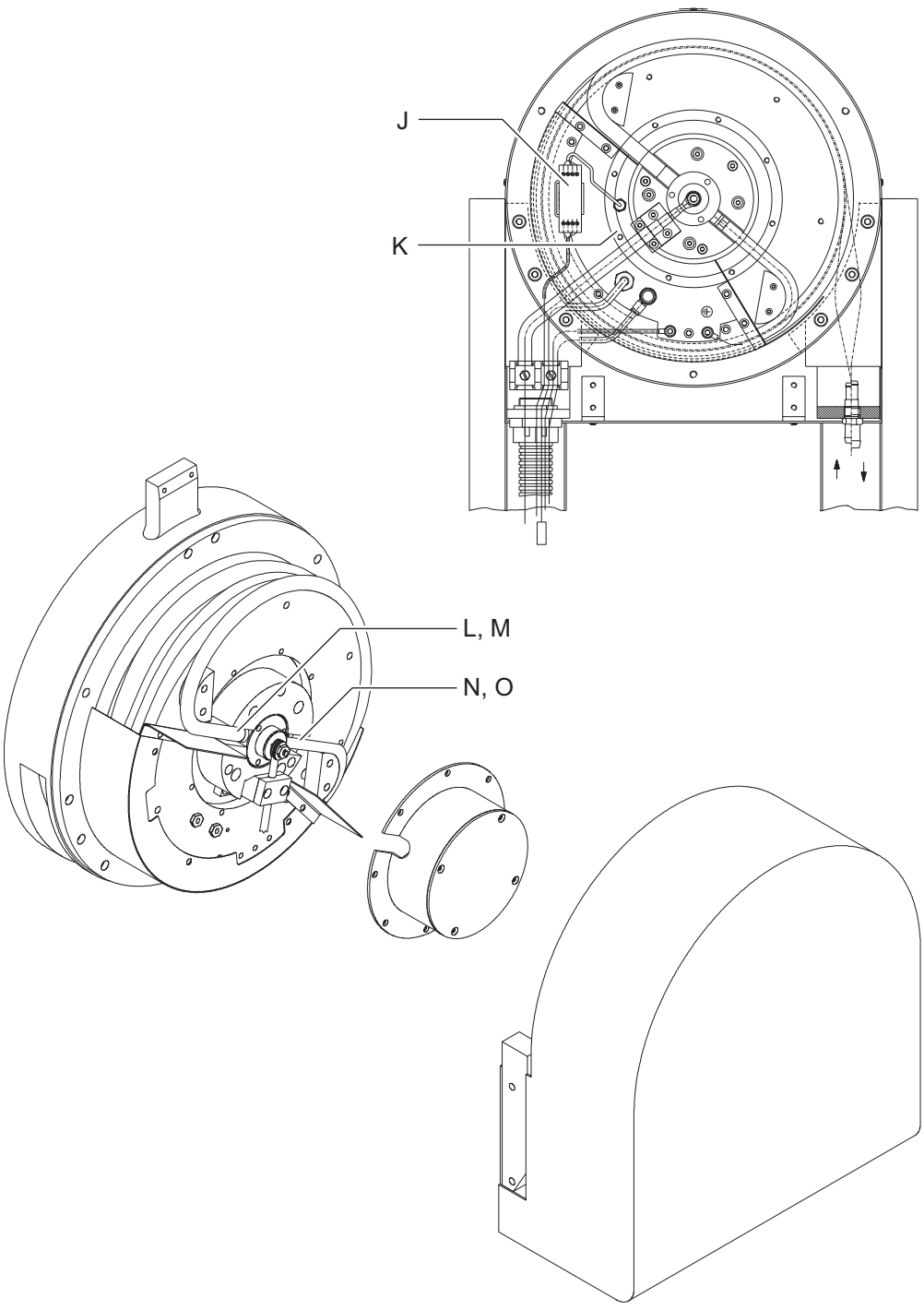

Fig. 7-2 *Spare parts: Rear of the ARQ 151 6"/8"*

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Item	Description	Dimensions	Qty.	Order no.
J	Rotation controller		1	BG 578 976 - T
K	Approach switch		1	B 4755 050 H1
L	Cooling water hose	∅ 16.9 mm	1	B 2355 294 GS
M	Hose clamp		2	B 4163 240 XZ
N	Cooling water hose	∅ 12.5 mm	1	B 2355 256 GS
O	Hose clamp		2	B 4163 240 XY

Tab. 7-3 *Spare parts: Rear of the ARQ 151 6"/8"*

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Motor

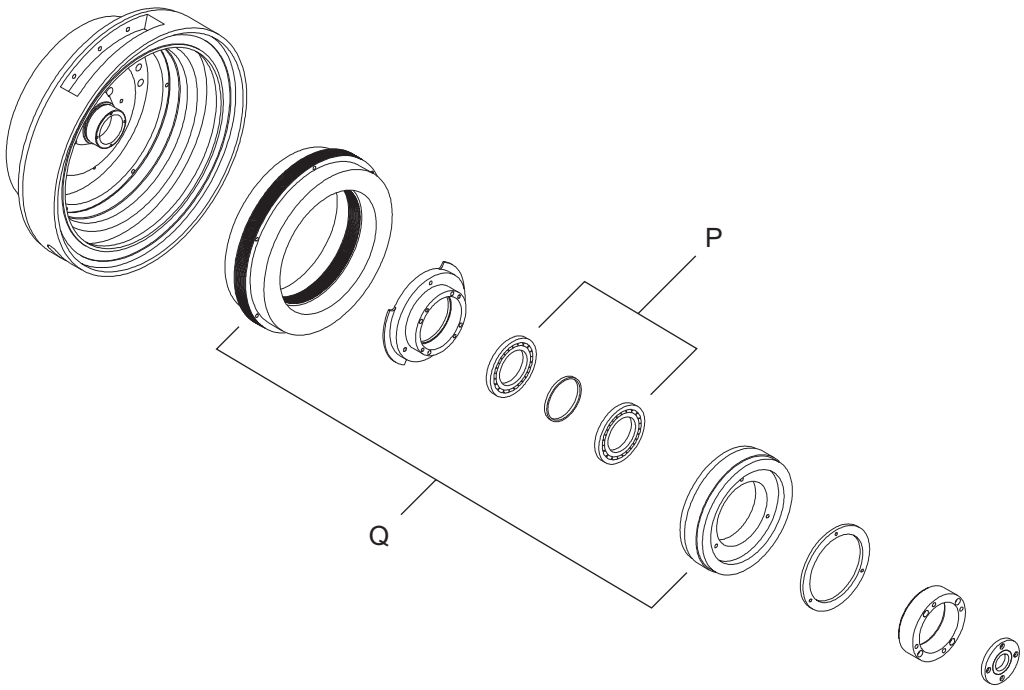

Fig. 7-3 *Spare parts: Motor of the ARQ 151 6"/8"*

Item	Description	Dimensions	Qty.	Order no.
P	Ball bearings		2	N 4001 131 BY
Q	Motor		1	BK 221 591-T

Tab. 7-4 *Spare parts: Motor of the ARQ 151 6"/8"*

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8. Appendix

8.1 Feedback Form

Overleaf you will find a feedback form.

Our teams for «Unaxis Technical Communication» produce professional documentation for Unaxis systems and products. Our aim is to constantly improve the quality of our documentation and thus to fulfill our customers' requirements.

We therefore appreciate any comments, suggestions or recommendations which will help us to improve the quality of these Instructions. We will also reward you for your trouble. Each year in December all contributions will be entered in a raffle and lots will be drawn for three prizes. Refer to our «Customer Support» website to discover the name of the lucky winner.

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Feedback Form

Instructions ARQ 151 6"/8" No. 300004495/TS1/001/03, Edition 03/2002

We would be glad to receive comments, recommendations and suggestions for improvement on these Instructions from you. You find our postal address and a fax number on the copyright page of these Instructions. Thank you for your assistance!

Chapter	Page	Comments, recommendations, suggestions for improvement

Note: Received comments and suggestions will be considered the intellectual property of Unaxis.

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