LEADING IN PRODUCTION EFFICIENCY

EcoBell2 SL EC
Rotating Atomizer with External Charging

Operating Manual

www.durr.com

ORIGINAL OPERATING MANUAL

Document No.: MRA00001EN
Version:: 07
As of:: 01/2020
Approved: 05.12.2014

Manufacturer
Dürr Systems AG

Application Technology
Carl-Benz-Str. 34
D-74321 Bietigheim-Bissingen
Germany

Tel: +49 (0)7142 78-0

TABLE OF CONTENTS

1 Introduction

1.1 Information about the document

This instruction manual contains the necessary information for the safe operation, maintenance and repair of the product.

Please keep this manual handy at all times at the place of activity of the product for the staff. When passing on the product to a third party this instructional manual must also be handed over.

Activities described in this operation/instruction manual must be performed only by qualified staff.

Activities which have not been described in this instruction manual must be performed only by the manufacturer.

Every person who uses this product must have read and understood these operating instructions.

Dürr Systems disclaims all liability for damages arising from the fact that the instructions were not followed!

For further questions please contact our service- or replacement department or the representative of Dürr Systems (refer to chapter 11 "Contacts & Hotline").

Technical changes that cause variations of the specifications and illustrations in this instruction manual are subject to modification.

1.2 Symbols in the document

Potential risks are pointed out in the document with the help of symbols and signal words.

DANGER

Risk of fatal injuries

The safety phrase "Danger" marked in red represents a high risk the consequence of which could be either death or serious injury.

WARNING

Risk of serious injuries

The safety phrase "Warning" marked in orange represents a medium risk the consequence of which could be either death or serious injury.

CAUTION

Risk of minor injuries

The safety phrase "Caution" marked in yellow represents a low risk the consequence of which could be either minor or moderate injury.

ATTENTION

Risk of damage to property and production disruption

The safety phrase "Attention" marked in blue represents a risk the consequence of which could be either damage to property and or an interruption in production.

1.3 Intended use

During electrostatic coating, the rotating atomizer, “atomizer” in short, allows atomization of a fluid coating material into droplets by mechanical forces. High voltage up to 100 kV generates an electrostatic field. The electrostatic field charges the paint droplets. A grounded work piece attracts the charged droplets. Air flows support the process. A tapering spray cloud condenses on the work piece.

The EcoBell2 SL EC atomizer with external charging may only be operated with proven non-flammable fluid coating materials. The associated approved and permitted detergents and cleaning agents must also be non-flammable:

- Water based 1K paint (single component paint) (corresponding to EN 50348 Appendix A a)
- Pre-mixed water based 2K paint (two-component paint) (corresponding to EN 50348 Appendix A a)

The atomizer is intended for use in industrial application stations within a painting booth (also spray booths). Application stations and painting booths are subject to local, national and international specifications for machine safety and explosion protection.

If the atomizer is integrated in a total system, all technique-specific and safety standards as well as the valid specifications must be fulfilled.

Follow the following European standard in respect of coating materials and application process for the atomizer with external charging:

- EN 50348 Stationary electrostatic application equipment for non-flammable liquid coating material - Safety requirements
  The atomizer is classified for all process variants as atomizer of the type A-NL according to this standard.

If you have questions regarding the application range, our Service Department is at your disposal.

Restrictions for Atomizers with Recirculation:

In atomizers with recirculation, work only with slow-drying 2K paints. Do not use isocyanate based and epoxy resin based hardeners.

According to the ATEX Guideline, the atomizer type tested as device of the category 2G and for is approved for use in explosive areas of Ex zones 1 and 2. This permission is valid according to the type test certificate and the details on the type plate exclusively in combination with the assigned and in the declaration of conformity in accordance with the ATEX Guideline listed products from Dürr Systems:

- High voltage generator
- Controller
- Wiring board

If the atomizer is operated with products from another manufacturer, only a device of the category 3G and in Ex-zone 2 can be used.

Independently of the painting parameters, the deployment of the atomizer is only allowed according to the technical data, for example, within the specified temperature range and the specified relative humidity.
A deployment under any conditions other than those mentioned in the operation manual is not allowed.

Technical data and limits of use to be observed are included in these operation manual and in the drawings, schemata and parts lists associate with this product.

Failure to use the atomizer as intended is potentially very dangerous. The specifications and notes in these instructions must be absolutely followed for its intended use.

The atomizer and its attachments are free of LABS.

1.4 Avoiding foreseeable misuses

- Do not use flammable fluid coating materials and detergents.
- Do not point the atomizer towards people.
- Do not spray into the eyes.
- Do not reach into spray jet.
- Do not inhale atomized coating materials.
- Never operate the atomizer outside the spray booth.
- Never override or deactivate any safety devices.

The atomizer can be dangerous if it is not operated according to this operation manual.

1.5 Material numbers

The document is valid for the product:

Rotating Atomizer with External Charging **Eco**Bell2 SL EC	
N34150001 without recirculation	
N34150003 without recirculation	
N34150005 with recirculation	

1.6 Device combination

1.6.1 Dürr components needed for the use of the atomizer as 2G device

- Generator
- Controller
- Wiring board
- R/O converter
- Flange package
- Bell disk
- High voltage line with plug

1.6.2 Dürr components needed for the use of the atomizer as 3G device

- Flange package
- Bell disk
- High voltage line with plug

Recommended components

- Generator
- Controller
- Wiring board
- R/O converter

The optical electrical converter (R/O converter) used for sensing speed must conform to the “optical radiation (op)” ignition protection category according to EN 60079-28 or IEC 60079-28.

1.6.3 Available device combinations

- **Eco**Bell2 SL EC
- **Eco**Bell2 SL EC with “**Eco**AUC” control system
- Total system with **Eco**RP 10 R1100

1.6.3.1 **Eco**Bell2 SL EC

The **Eco**Bell2 SL EC includes the atomizer and the necessary components. The atomizer must be integrated in a painting system according to the technical data and the intended use. The conditions for type testing are not fulfilled.

1.6.3.2 **Eco**Bell2 SL EC with “**Eco**AUC” control system

The “**Eco**AUC” control system with integrated high voltage supply controls and monitors the **Eco**Bell2 SL EC. If this combination is integrated in a painting system according to the technical data and the intended use, the conditions of type testing are fulfilled.

1.6.3.3 Total system **Eco**RP 10 R1100

The total system comprises the following components:

- **Eco**Bell2 SL EC
- Robot **Eco**RP 10 R1100
- AUC control cabinet with integrated high voltage supply for the atomizer
- Robot control

The total system **Eco**RP 10 R1100 fulfills the conditions for type testing with regard to the atomizer.

2 Safety

The handling and use of the product requires specialized knowledge for the safe operation of the application stations for electrostatic coating. Safe handling of the media used is necessarily part of the expert knowledge.

When handling the media, always follow the instructions of the manufacturer.

Personnel must be trained in the operation, maintenance, and repair of the product.

If you need assistance in the training of operators, please contact our training department (see chapter "Contacts & Hotline").

2.1 Danger zones

A minimum distance must be maintained between grounded parts and high voltage parts.

CAUTION

Danger from explosive atmospheres

Electric flashovers with spark generation

The distance between the spray system parts under high voltage parts must be so large that there will not be any electrical flashover during normal operation.
A minimum distance of 400 mm must be maintained from the tips of the electrode needles.

This minimum distance does not apply to the distance between the atomizer and work piece (painting distance) or for design distances of the atomizer.

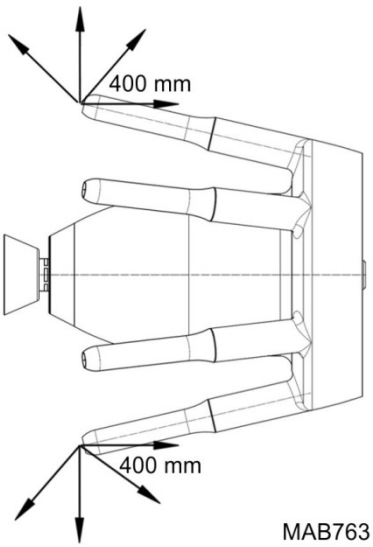


Fig. 1: Minimum distance from grounded parts

WARNING

Danger from explosive atmospheres

Sparking can cause an explosion.

Before entering the booth, and the use of ground rod no explosive atmosphere may be present in the booth.

Before working with the atomizer, it must be brushed against the grounding rod and discharged.

WARNING

Danger due to High Voltage

Danger of electric shock and discharges

Touch the atomizer with an grounding rod and discharge it before touching the atomizer.

2.2 Safety requirements

Rotational speed

The rotational speed of the atomizer must be monitored. This is achieved via an optical cable and processing of the signals in the control unit. The optical signals of the turbines must be recorded in an O/E converter and conducted to a speed controller. The control enables a speed controller to regulate the speed of the turbine and ensures that the speed is limited to the maximum value stored in the control.

High voltage

The high tension must be monitored. When the high voltage is switched off, the supply of the coating material is also interrupted.

Constraints for the high tension are given in the technical data of the atomizer.

The safety requirements for rotational speed and high tension are taken into consideration and implemented in the devices combinations with **Eco**AUC and for the total system EcoRP 10 R1100.
For the individual product EcoBell2 SL, the integrator or operator is responsible for the implementation.

Fire safety

The operator must include the atomizer is his onsite security and fire protection concept. This includes operation in a closed coating booth with technical ventilation. Forced ventilation must be locked with the high voltage in such a way that the high voltage cannot be turned on when the ventilation system is not working.

2.3 ATEX marking

The type plate is not located on the atomizer due to its design. It should be located near the atomizer, e.g. on the booth wall.

The type plate shows the following details:

- Type designation
- Material number
- Year of manufacture
- Serial number
- Permitted device combination
- EX labelling

- Certification number
- Discharge energy
- Maximum output current
- Maximum output voltage
- Input voltage
- Input frequency
- Power consumption
- Maximum surface temperature
- Maximum control air pressure
- Maximum material pressure
- CE labeling
- Manufacturer’s data
- QR Code

The atomizer fulfills the following requirements according to the ATEX guideline:

Device group	Device category	Temperature class	Discharge energy
II	2G	T4	<350mJ
II	3G	T4	<350mJ

The atomizer may be operated in the zone 1 and 2. For this purpose, the operating parameters given on the type plate should be noted. The atomizer is not suitable for operation in zone 0.

The use of atomizers as device of the category “2G” is permitted exclusively in combination with the following Dürr Systems products:

- High voltage generator
- Controller
- Wiring board
- R/O converter
- Flange package
- Bell disk
- High voltage line with plug

If the atomizer is operated with components from other manufacturers, the only use allowed is as a device of the “3G” category.

Special conditions for operation

The atomizer is to be operated in the “I-constant” operating mode in the entire setting range as equipment of type A-NL with a discharging power <350mJ.

2.4 Residual risks

2.4.1 Parameters

All application parameters (for example: time programs, high voltage settings, and others) may only be changed by specially trained personnel. There must be safety measures that allow only authorized personnel to change the application parameters.

Changes to parameters can lead to injury or malfunctions/operation halt. Therefore, a sound knowledge of the parameters is required.

After adjusting application parameters, all affected features need to be examined before re-starting operation (test run).

2.4.2 Operation

A bell disk coming loose from the turbine shaft can pose a risk of injury.

Please note the dangers of the high voltage when the atomizer is powered by static electricity.

2.4.3 Maintenance and repair

Discharge energy at system components

Discharge energy at system components may interfere with medical implants, such as cardiac pacemakers. It can cause serious injuries or death.

	Prohibition of entry for persons with cardiac pacemakers or implanted defibrillators

Risk of injury present during assembly work due to:

- Rotary bell disks
- Material squirting out during disassembly of the atomizer and volumetric measurement.

2.5 Conduct in the event of a hazardous situation

The behavior in the event of a hazardous situation is dependent on assembly at the operator.

Basically:

- Shut down the power supply.
- Close the pipe work and release the pressure.
- Discharge the residual energy. (Use the earthing rod).

2.6 Responsibility of the operator

The atomizer is part of an electrostatic spray system of a stationary spray unit for coating with non-flammable liquid coating materials, which do not generate an explosive atmosphere within the spray range. When designing, planning, constructing, erecting, setting up and operating such a spray unit, EN 50348 must be noted and adhered to.

The following points are particularly important:

- Integration in the on-site fire protection concept
- Integration in the on-site security concept:
  - Emergency stop
  - Safe switching off the high voltage
  - Discharge of residual energies.
- Handling paint, detergents and cleaning agents
- Constant pressure - pressure monitoring.

If the atomizer is operated as a category “2G” device, it must be ensured that during operation, the high voltage is switched off before the first discharge. The shutdown function must be adjusted and tested prior to commissioning. Furthermore, the shutdown function must be tested every 12 months.
The procedure is described in the standard EN 50176.

In the chapter “Optional accessories” of this manual you will find a case that contains the necessary equipment for testing the shutdown.

Fire protection

The painting booth must have a fire protection system. In the event of fire, the fire protection system shall be activated automatically and without delay. High voltage supply and supply of paint and detergent and compressed air must be turned off automatically.

Grounding/ Potential equalization

All conductive parts of the plant such as floors, walls, ceilings, fencing, transport equipment, work pieces, coating tank, robots, or structural parts in the spray area, with the exception of operationally high voltage live parts must be connected to the grounding system. Parts of the booth must be grounded in accordance with EN 16985.
If sufficient grounding of the work piece cannot be ensured, the electric charges on the work piece may be bled off by other means, e.g. ionizers. Such devices may not exceed the allowable discharge energy of the spray systems with which they are used. Furthermore, these devices must be subjected to the same tests regarding the allowable discharge energy like the atomizer systems used with them. The discharging device must be locked to the spraying system so that the high voltage is switched off and the coating cannot take place when the discharging device has a malfunction.

Grounded, conductive workpieces

Paint create an electrically isolating layer on a grounded workpiece. When painting on top of dried paint layers (especially on clear coat) highly charged surfaces can occur. This effect is even stronger with detail painting. On those surfaces propagating brush discharges might occur. Such discharges can be an ignition source in the painting booth.

You have the following option to prevent propagating brush discharges:

- Discharge the surfaces
  It is possible to discharge the electric charge on the workpiece with ionizers. Specific notes listed in the standard must be observed.
- Keep the atomizer at a good distance from the workpiece.
  Because even at a reduced high voltage propagated brush discharges at the work piece cannot be ruled out, this procedure may only be followed when using non-flammable coating materials.
- Work pieces that have been coated before may not be coated using high voltage again.
  High voltage may only be used on coated workpieces with a paint layer breakdown voltage lower than 4kV. On most work pieces with a clear coat the breakdown voltage is higher.

Accessories

The operator must ensure that this manual is always available wherever the atomizer is present.
The local standards and regulations for occupational safety and accident prevention should be observed at all times.

2.7 Personnel Requirements

Handling and use of the product require expertise in safe operation of application systems. Safe handling of the media used is necessarily part of the expert knowledge.

When handling the media, always follow the instructions of the manufacturer.

Personnel must be trained in the operation, maintenance, and repair of the product.

If you need assistance with the training of staff, please contact our training department (see "Contacts & Hotline").

2.7.1 Cleaning Staff

The cleaning staff must be trained for the specific task area in which they operate and know the relevant standards and regulations.

The cleaning staff must be familiar with the contents of this manual and the operating instructions of the atomizer. They must be informed about controlling the distance between the shaping air ring and the bell disk.

2.7.2 Assembly personnel

Due to their technical training, knowledge, and experience as well as knowledge of relevant standards and regulations, the installation team should be in a position to work on and with sprayers and automatic (fixed) spraying equipment.

The installation personnel must be familiar with policies, rules of engineering, industrial safety regulations, and applicable accident prevention regulations in order to identify possible hazards independently and avoid them. Furthermore, the installation personnel must be able to examine, service, and maintain sprayers and automatic (fixed) spraying equipment. In addition to special knowledge about any explosion hazards, assembly personnel must be knowledgeable about electrostatic coating.

The installation team must be trained specifically for the working environment in which it operates and know the relevant standards and regulations.

The installation personnel must be familiar with the contents of this manual and the operating instructions of the atomizer. They must be informed about controlling the distance between the shaping air ring and the bell disk.

2.7.3 Electrical personnel

A qualified electrician is someone who due to their professional training, knowledge, experience, and knowledge of the relevant regulations can evaluate the work assigned to them and the hazards involved. The following qualifications, to the extent required for the respective audit work, are:

- Knowledge acquired through training in the field of explosion protection, the field of electrostatic process / high voltage engineering,
- Knowledge of local conditions,
- Knowledge of the electrical system,
- Knowledge of stress on the electrical system.

2.7.4 Paint personnel

Due to professional training, knowledge, experience, and knowledge of relevant standards and regulations, the painting personnel are in a position to work on and with sprayers and automatic (fixed) spraying equipment.

The painting personnel must be familiar with policies, rules of engineering, industrial safety regulations, and applicable accident prevention regulations in order to identify possible hazards independently and avoid them.

In addition to special knowledge about any explosion hazards, painting personnel must be knowledgeable about electrostatic coating.

The painting personnel must be trained specifically for the working environment in which it operates and know the relevant standards and regulations.

2.8 Personal protective equipment

The atomizer must be operated in a closed spray booth with activated mechanical ventilation and inspection protection.

While entering the painting booth, protection measures must be taken:

- Protective goggles
- Respirator mask
- Protective clothing
- Protective gloves

Personal protective equipment of personnel working on the atomizer should meet at least the following standards:

- Footwear must meet the requirements of EN ISO 20344.
  The measured insulation resistance must be less than 100mΩ.
- Protective clothing including gloves must meet the requirements of EN 1149-5.
  The measured insulation resistance must be less than 100mΩ.

These requirements are due to the operation of the atomizer with high voltage.

For the atomizer, labels displaying the protective measures must be attached.

Symbol	Meaning
	Prohibition of entry for persons with cardiac pacemakers or implanted defibrillators
	The content of the operating instructions must be known to operate
	Wear protective goggles
	Wear protective hand gloves
	Wear conductive shoes
	Wear respiratory protection This symbol is only necessary if the air at the operation area of the atomizer does not meet the requirements for breathable air.

The warning signs must be posted clearly visible to the staff at eye level. Any access to the painting area must be marked with warning signs.

2.9 Danger of damage to property

- Poor painting results due to invalid parameters
- Poor painting results due to incorrect external conditions
- Damage due to lose bell disk
- Contamination due to spurting coating material.

To avoid property damage the operating parameters and technical data must be monitored and adhered to. Furthermore, maintenance and repair work must be performed as described in this manual.

2.10 Environmental protection

The atomizer is a component of an electrostatic spray system of a stationary spray unit for coating with flammable liquid coating materials.

Please observe the manufacturer's instructions about the paint, solvents and cleaning agents used.

2.11 Emergency shutdown

The operator must integrate the atomizer in his safety and emergency concept.

3 Transport and storage

3.1 Delivery

The atomizer is delivered in a box.

If you notice a defect in the delivered products then kindly contact the address specified in the chapter “Contacts & Hotline”.

3.2 Storage

Environmental condition at storage location:

- Temperature: 10 °C – 40 °C
- Humidity: 35% – 90%

3.2.1 Storage of electrode rings and atomizer body

Electrode ring and atomizer body are made of a special white plastic. The parts are in packages, which are also suitable for storage.

Different from the general provisions of storage, the following provisions are applicable to electrode ring and atomizer body:

Storage provisions

Temperature	20 °C - 26 °C
Room humidity	35% - 90%

ATTENTION

Danger of damage to property and interruption to production

Deformation of parts.

Please pay attention to the storage provisions for electrode ring and atomizer body.

The dimensions of the electrode ring and the atomizer body are temperature dependent. The parts can be fit correctly in the atomizer only when the storage provisions are adhered to.
Improperly fitted parts can cause problems in the operation of the atomizer.

4 Operating principle

4.1 Brief description

The **Eco**Bell2 SL is a high rotation atomizer with external charging for atomizing liquid coating materials with support of electrostatics.

4.2 Overview

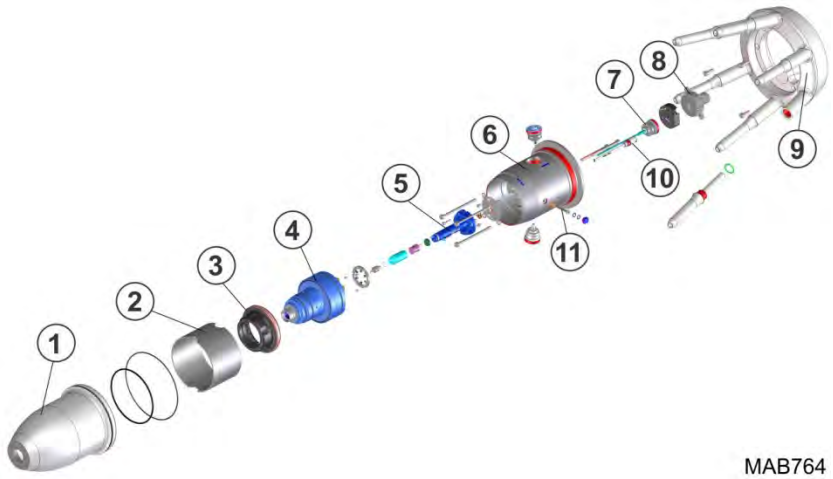


Fig. 12: Components of the atomizer

1	Atomizer body	7	Main needle
2	Tube	8	Chuck
3	Screw cap	9	Electrode ring
4	Turbine	10	Light conductor
5	Paint pipe	11	Shaft detent
6	Valve block		

4.3 Functionality

Atomizer without Recirculation

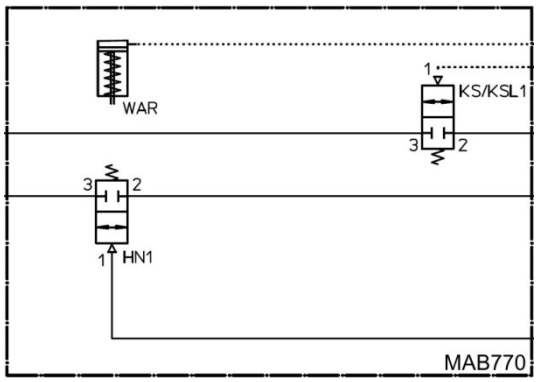


Fig. 3: Atomizer schematic

WAR Shaft detent
HN1 Main needle valve
KS/KSL1 Rinsing valve

The main needle valve controls the paint flow. When the valve is open the paint flows with the pressure set in the bell disk.

The rinsing valve closes and opens the rinsing channel of the atomizer. If the valve is open the section from the main needle to the nozzle is rinsed followed by the entire bell disk.

The shaft detent locks the turbine shaft. The shaft must be blocked before the bell disk can be removed.

At the front end of the atomizer a bell disk is attached. Paint flow into the middle of the rotating bell disk. Due to the centripetal forces of the rotating bell disk the paint flows in an even layer over the edge of the bell disk. When leaving the bell disk, the paint atomized into fine droplets.

Nozzles arranged in a ring on the housing blow compressed air onto the edge of the bell disk. The compressed air (control air) hits the paint droplets and propels them towards the surface to be painted on the work piece.

After leaving the bell disk, the paint droplets are getting charged in the electrostatic field of the electrodes. The surface of the work piece to be painted is earthed. The drops are, therefore, attracted to the surface.

The speed of the atomizer is monitored by an optical waveguide. The R/O converter converts the optical signals into electrical signals. It directs electrical signals onwards to the control. The control monitors the rotational speed and controls the speed controller.

To remove paint residue or dirt in and on the bell disk, the bell disk must be cleaned with a rinsing agent. For the so-called "short-rinse" cleaning, the rotational speed of the bell disk is reduced significantly. Instead of the paint a rinsing agent flows into the bell disk.
The rinsing agent flows through bores in the back of the bell disk and over the rear and outside of the bell disk to removes contaminants.

Atomizers with Recirculation

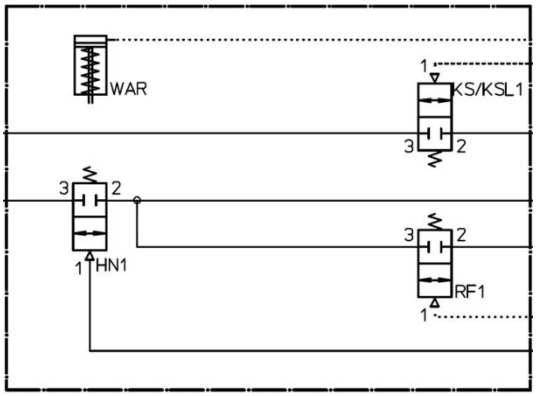


Fig. 4: Atomizer schematic

WAR Shaft detent
KS/KSL1 Rinsing valve
HN1 Main needle valve
RF1 Valve for recirculation

The functionality is identical to atomizers without recirculation. In addition, there is the disposal function of the unused paint and detergent through the recirculation. The “RF1” valve switches the strand for the recirculation.

Two component paint (2K paint)

2K paint is mixed from two components immediately before painting:

- Master lacquer
- Hardener

The mixed paint can only be used for a limited time (can time). When this time expires, the material starts coagulating. Coagulated material blocks the nozzle and lines. The atomizer must be rinsed more frequently.

ATTENTION

Risk of damage to property and production disruption

Quick-drying 2K paints clog the recirculation line in a short time.

Do not use atomizers with recirculation for quick drying 2K paints.

Quick-drying 2K paints contain:

- Isocyanate based hardeners
- Epoxy resin based hardeners

Do not use isocyanate based and epoxy resin based hardeners with 2K atomizers.

Hardener and main paint must be mixed outside the atomizer. An external mixer is therefore available (see chapter “Optional accessories”).

4.4 Assemblies

4.4.1 Bell disk

The bell disk is mounted on the hollow turbine shaft and rotates with the shaft.

The stationary paint pipe is located in the hollow turbine shaft. Paint flows through the paint pipe into the rotating bell disk.

From inside the bell disk, the paint escapes through the gap between bell disk and distributor disk (plastic) at the center of the bell disk. Part of the paint also leaks through the hole in the center of the disk.

The paint is distributed uniformly in the bell disk:

- 80% from the gap
- 20% from the hole

Through the rotation, the paint is pushed to the edges and atomized.

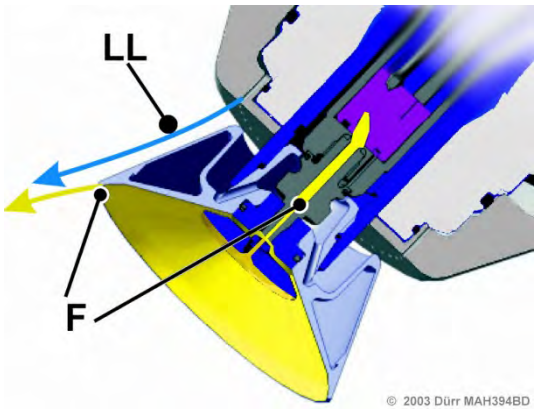


Fig. 5: Paint and shaping air in the bell disk

F paint
LL shaping air

Rinsing the bell disk

To ensure that there are no paint residues or stains in and on the bell disk, the bell disk is completely cleaned out with the rinsing agent.

Stains might reach the surface to be painted and might lead to faults in the painting.

For the cleaning, the so-called "Kurzspülen" [quick purge], the speed of the bell disk is reduced considerably. Instead of paint, rinsing agent flows into the bell disk.

The rinsing agent flows through the bores at the back of the bell disk, over the back and exterior sides of the bell disk, and removes the stains there.

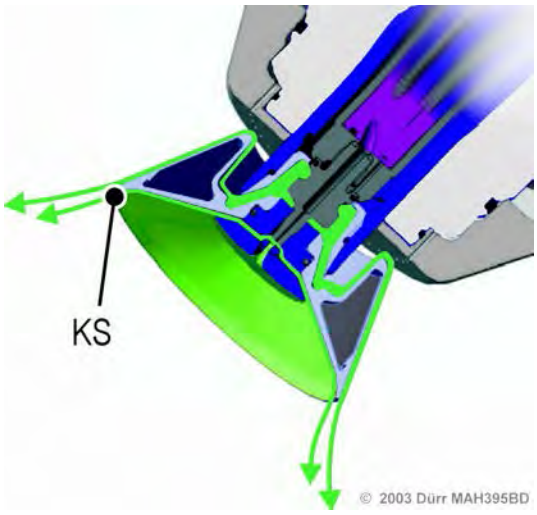


Fig. 6: Rinsing the bell disk

KS rinsing agent for quick rinse

The frequency of the quick purge depends on the intensity of staining and the requirements in operation.

4.4.2 Turbine

The turbine is a pneumatic motor. The bell disk is screwed to the turbine shaft end. A large cap nut holds the turbine in the valve block.

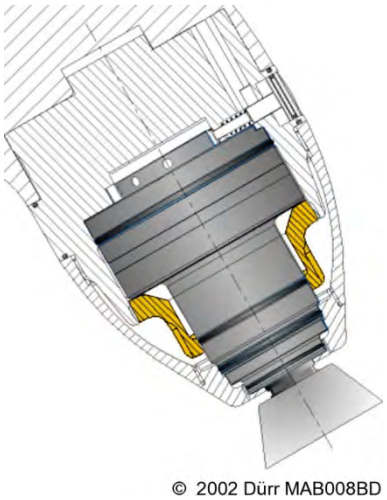


Fig. 7: Turbine with cap nut on the atomizer

The turbine consists of the bearing housing and the hollow shaft. The shaft rotates in the bearing housing with no contact to the air bearings. The shaft is pneumatically driven and braked.

4.4.2.1 Shaft detent

In combination with the valve block, the turbine has a shaft detent. With the shaft detent the shaft is blocked when the bell disk is being removed or fastened. For that, there are recesses in the rear end of the hollow shaft. A pneumatically driven piston in the valve block snaps into one of the holes.

Prerequisite for using the shaft detent:

- Switch of the atomizer (high voltage off).
- Stop the hollow shaft.

Triggering the shaft detent

Depending on the configuration of the application plant, there are various options to trigger the shaft detent. Possible configurations:

- Atomizer is operated by means of the EcoAUC control system and is not mounted on the elbow (1)
- Atomizer is operated by means of the EcoAUC control system and is mounted on the elbow (2).
- Atomizer is operated with a different control system and is not mounted on the elbow (3).
- Atomizer is operated with a different control system and is mounted on the elbow (4).

Option (1):

The shaft detent is triggered via the visualizer of the control system.

Option (2):

The shaft detent is triggered via the visualizer of the control system and a push-button on the elbow:

- Trigger shaft detent via control system.
- Push button on elbow.
  The shaft does not move as long as the button is pressed.

Fig. 8: Elbow

1 Push-button for shaft detent

Option (3):

The operator must provide compressed air that can trigger the shaft detent.

Option (4):

The operator must provide compressed air, that can be activated via the push-button on the elbow:

- Activate compressed air.
- Push button on elbow.
  The shaft does not move as long as the button is pressed.

4.4.2.2 Shaping air

The turbine housing bores conduct the shaping air to the inner shaping air ring. The arrangement of the holes ensures an even distribution of the shaping air.

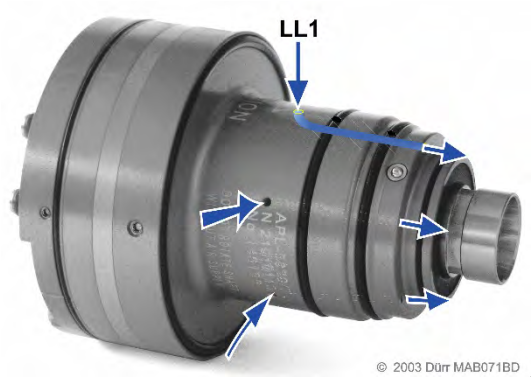


Fig. 9: Guiding the shaping air in the turbine

LL1 Shaping air for the inner shaping air ring

4.4.2.3 Rotational SpeedControl

⚠ WARNING

Fire Hazard

Too high a speed can deform the bell disk. This causes an imbalance in the bell disk. The bell disk can abrade the housing. Housing and bell disk heat up.

The maximum rotational speed of the bell disk must restricted to 70000 RPM ± 500 RPM.

The speed measurement is performed on the turbine wheel. The turbine wheel has alternately reflective and non-reflective surfaces. Four signals are generated per revolution.

Light is directed through an optical fiber and focused onto the turbine wheel. The non-reflective surfaces absorb the light. The reflecting surfaces send the light back into the light conductor.
An R/O converter must be placed at the end of the optical fiber. The R/O converter converts optical signals into electrical signals. The electrical signals are evaluated by the control. The control enables a speed controller to regulate the speed of the turbine.

4.4.3 Valve block

The turbine is flanged to the valve block. A large swivel nut keeps the turbine on the flange of the valve block.

In the hollow turbine shaft is the paint tube. The paint tube is flanged to the valve block as well.
There are three channels in the paint tube. In one channel, the paint is led to the main needle. In the second channel, the main needle is inserted. In the third channel, the rinsing agent is fed to the bell disk.

The main needle controls the paint flow through the nozzle of the paint tube into the bell disk. The location of the main needle is in the front end of the paint tube. The pneumatic drive of the main needle is in the valve block.

The valve for rinsing the bell disk is located in the valve block as well.

4.4.3.1 Main valve needle

The main needle valve controls the flow of paint into the bell disk. The tip of the main needle sits in the front part of the paint tube. The pneumatic part of the main needle valve is located in the valve block. The valve is either closed or open - the amount of paint is controlled by the paint quantity control upstream of the atomizer.

4.4.3.2 Valve for quick rinsing the bell disk

For quick purging, detergent is guided into the bell disk. The purge valve controls the flow.

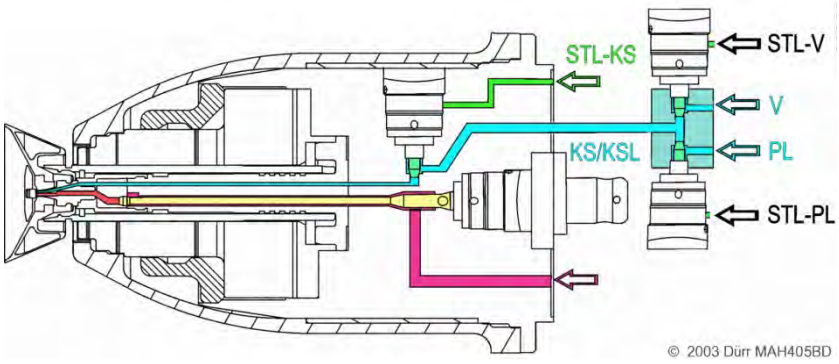


Fig. 10: Concept image: Quick rinsing

KS Quick rinsing
KSL Quick purge air
STL Control air
PL Pulsation air
V Detergent

4.4.3.3 Recirculation for 1K paints

The recirculation valve controls the quick filling and purging of the paint supply. The paint tube is bled via this valve during filling. During rinsing the unused material and the rinsing agent is expelled through the return.

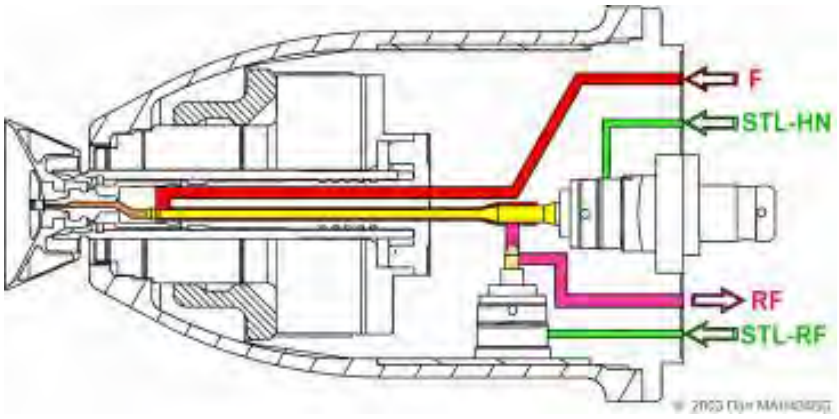


Fig. 11: Concept image: Recirculation

F	Paint Supply (Color)
RF	Recirculation
STL-HN	Control air for the main needle
STL-RF	Control air for the recirculation

4.4.4 Color tube

The color tube connects the valve block and the bell disk.

The color tube is sealed with the valve block. The color tube has two canals for:

- Supply of paint
- Supply of thinner.

The paint nozzle is attached at the end of the color tube. Through the hole in its center, the paint flows into the bell disk.

Through the other opening, thinner for the quick rinsing flows into the bell disk. The opening for the thinner is smaller than the opening for the paint.

4.4.5 Atomizer body and sleeve

The atomizer body covers valve block and turbine. It protects the internal components against soiling.
In addition, the atomizer body insulates the grounded components inside against the high-voltage carrying electrodes.

To protect the short rinse from high voltage, there is a sleeve. The sleeve is pushed onto the valve block, before the atomizer body is mounted.

At the front end of the atomizer body is the shaping air ring. The shaping air ring is an integral part of the atomizer body.

4.4.5.1 The shaping air

The atomizer has two independent shaping airs. Shaping air 1 is passed through the valve block and the turbine to the shaping air ring in the atomizer body.
Shaping air 2 is passed through the space between valve block and atomizer body to the shaping air ring.

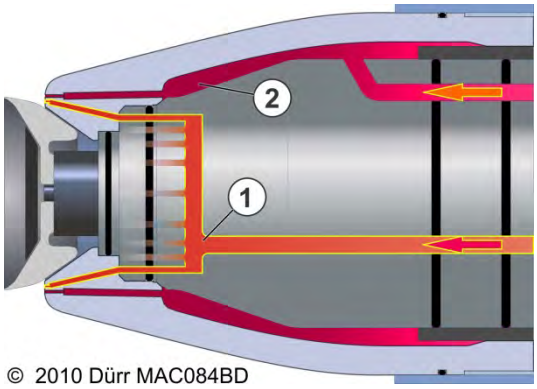


Fig. 112: Shaping airs in the atomizer

1 Shaping air 1
2 Shaping air 2

Control of shaping air

From the air quantity control, a predetermined amount of air is conducted through hoses and in the atomizer through channels and settling zones to the nozzle circuit.
The shapes and positions of the channels and settling zones in the body of the atomizer allow a uniform distribution of the shaping air to all the nozzles of the ring.

The shaping air flows out of the nozzles of the shaping air ring along the bell disk and hits the paint droplets at the edge of the bell disk. The shaping air forms the spray cone. The shape of the spray cone has an impact on the quality of the coating and the efficiency.

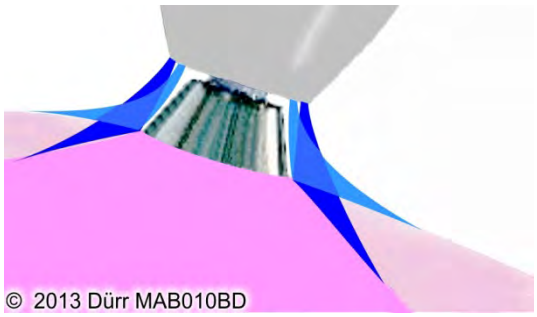


Fig. 213: The shaping air at the bell disk (example)

4.4.6 External charging

For the function of external charging, the atomizer is equipped with an electrode ring. The electrode ring is made of a special plastic.

Fig. 14: Electrode ring

On the back of the electrode ring the high voltage cable is connected. Inside the ring, the high voltage is conducted from the connection to the electrodes. There are resistances in each electrode which feed the high voltage to the needles in the ends of the electrodes.

4.4.6.1 Function

After leaving the bell disk the paint drops charge in the electrostatic field of the electrode. The surface of the work piece to be painted is grounded. Therefore, the droplets are attracted to the surface.

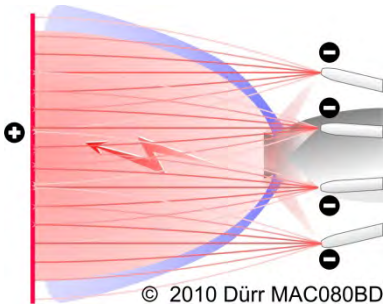


Fig. 15: External charging

Distribution of electrostatic field - power flow

All paint droplets, leaving the bell disk of the atomizer must be charged in equal strength charged by the electrodes. The better the charge, the greater the forces on the paint droplets.
Only when the charging of all the electrodes is the same, does this result in a uniform spray pattern. The electrode ring has six electrodes.

Damaged needles and contaminated electrodes prevent an effective, uniform spreading of the electrostatic field.

Insulation

The white plastic must insulate the high-voltage-carrying parts from the grounded parts electrically.

Dirt on the surface of the atomizer makes the surface electrically conductive - it weakens the electrostatic field.
If there is a spark discharge, parts of the plastic burn. The fire track on the plastic contains carbon, which is highly electrically conductive. Scorch marks cannot be removed completely. Components with scorch marks must be replaced.

4.4.7 Clamping device (Jig)

The back side of the atomizer is connected with the flange.
The flange is not included with the atomizer.

A special tappet holds the flange and the atomizer together. By tightening the grub screw in the flange, an axial force is created between the flange and the atomizer, which is required for pressurizing the seal.

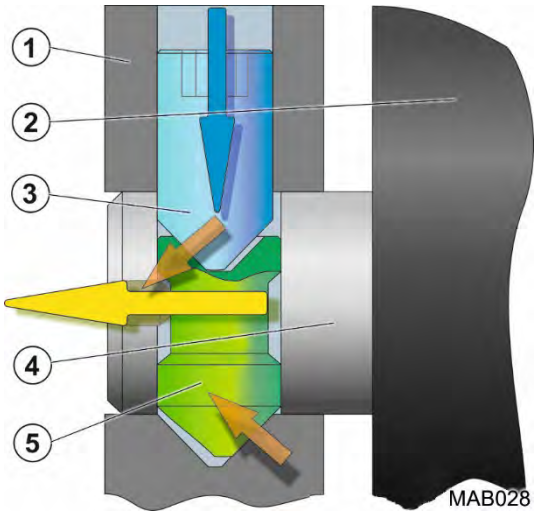


Fig. 116: Connection of flange and atomizer

1 Flange
2 Atomizer
3 Grub screw in the flange
4 Tappet in the atomizer
5 Interim piece in the tappet

4.5 Connections

4.5.1 Interfaces

The interfaces of the atomizer are located at the connection surface of the valve block. The connection surface should be connected with the flange packet. The connections required for the operation of the atomizer are located at the flange packet:

- Air connections
- Material connection
- Rinsing agent connection
- Light conductor for monitoring rotation speed

The purchase order number of the configured flange packet is available in the chapter “Accessories".

4.5.2 Flange assembly

The flange is a cylindrical plate. The plate has many different bores and threads for the connection of hoses and cables as well as for retaining screws.
Depending on the process, only those connections required for the functions of the atomizer are allocated.
The hole for the clamping device of the atomizer is in the center of the flange plate.

The flange packet connects the atomizer with the components of the material supply and the control. Following components build this connection:

- Hoses
- High voltage line
- Fiber optic cable
- Cable for potential equalization

4.5.2.1 Cable for potential equalization

For the operation with external charging, the flange kit must be conductively connected with the components of the material supply system. Smooth functioning requires the components to be on the same potential. The functional equipotential bonding is implemented via a coated steel cable. The steel cable is bolted to the flange with cable lug and safety washer. The counter side is bolted to the equipotential bonding busbar.

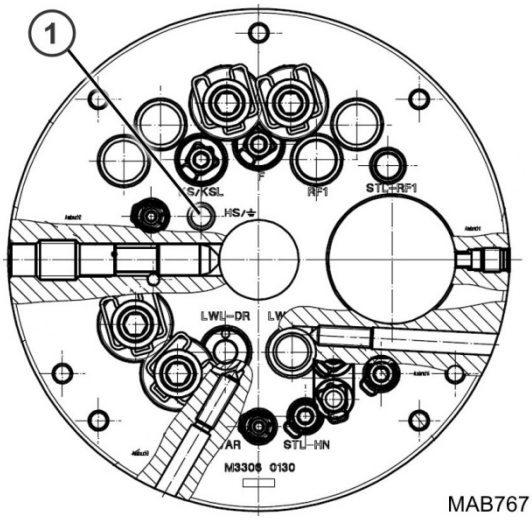


Fig. 17: Back of the flange

1 Connection of the Equipotential Bonding Conductor Connection

4.5.2.2 High voltage line

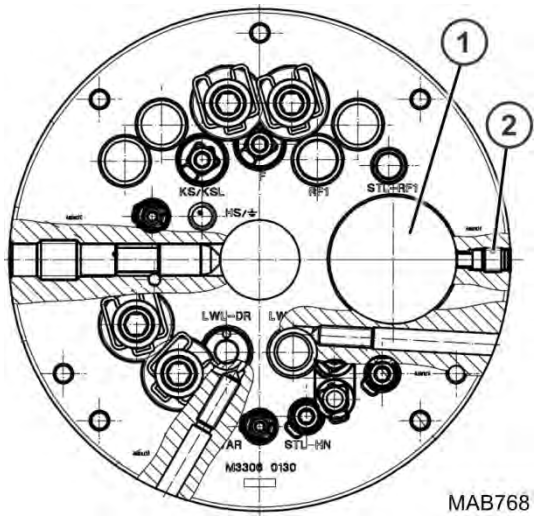


Fig. 18: Back of the flange

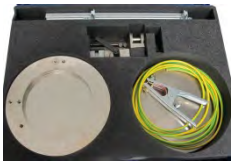
1 Grommet for the high voltage plug
2 Grub screw for mounting the high voltage plug

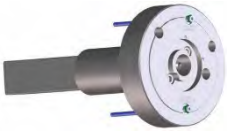
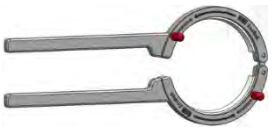
The plug of the high voltage cable is mounted on the flange.

The high voltage terminal is located at the electrode ring. At the time of later assembly of the electrode ring, the high tension cable plug is connected to the connection in the electrode ring.

4.6 Accessories and Related Parts

4.6.1 Accessories

Material number	Denomination	Figure
W50020096	Apparatus to check high voltage disconnect for category G2 devices	
N34850018	Atomizer attachment 60° (Elbow)	

Material number	Denomination	Figure
N34850035	Atomizer attachment 60 ° for Robot **Eco**RP 10 R1100 (Elbow)	
N44050015	Atomizer mount	
M24010343	Clamp for atomizer mount	
N65040001	Manual grounding rod	
W02020255	Assembly bracket for atomizer	
W12600018 (DS18 x 1)	Thread cleaner	
W02020187	Assembling aid for atomizer body	
W02020315	Tool for disassembly of the atomizer body	
N32500026	External mixer	
E09060502	Cable for potential equalization 5 m	
E09060503	Cable for potential equalization 10 m	
W02100108	Tool kit for N34150001	
W02100113	Tool kit for N34150003	

4.6.1.1 Case for checking high voltage shutdown

The tool kit is designed for checking atomizers of the 2G category according to the test run described in the appendix to these operating instructions.

4.6.1.2 Atomizer attachment 60 ° (elbow)

The elbow is hollow. The hoses run from the flange assembly through the elbow to the paint supply components. At the front of the elbow the flange is connected to the hose package. The rear end is fastened to the atomizer support.

In the elbow “N34850018”, a lid provides access to the inner parts of the elbow. A push-button control for the activation of the shaft detent is placed on the lid.

4.6.1.3 Atomizer pickup

The atomizer pickup can be used to mount the atomizer.

4.6.1.4 Clamp for atomizer mount

The clamp adjusts to the atomizer mount bar. The control valve for the recirculation can be mounted to the clamp.

4.6.1.5 Manual grounding rod

The manual grounding rod grounds dangerous charges.

- Discharge all components in the paint cell with the grounding rod before touching them.
- Attach the grounding rod to the atomizer during any maintenance work on the atomizer, if possible.

4.6.1.6 Assembly bracket for atomizer

The atomizer can be fixed to the assembly bracket in the work shop for maintenance. Compressed air can be connected to the assembly bracket.

4.6.1.7 Thread cleaner

The thread cleaner can help to clean dirt from the thread of the hollow turbine shaft. This is required for the correct assembly of the bell disk after cleaning and maintenance work.

4.6.1.8 Assembly aid for the atomizer body

Assembling aid for the atomizer body facilitates unscrewing of the atomizer body.

4.6.1.9 Tool for disassembly of the atomizer body

Pliers facilitate loosening of the atomizer body. The pliers may only be used for disassembly.

4.6.1.10 External mixer

The external mixer mixes hardener and master lacquer for 2K-paint, outside the atomizer. The 2K paint is then applied by the atomizer.

4.6.1.11 Cable for potential equalization

The cable for potential equalization connects the flange assembly of the atomizer to the potential equalization of the system.

4.6.1.12 Tool set

The tool kit contains the tools for maintenance and repairs of the atomizer.

4.6.2 Related Parts

Material number	Denomination
E10110011	EcoHT2 G500 Generator
E03240010	Controller
E03420013	Wiring board
E34010034	R/O converter

4.6.2.1 High tension supply

Generator, controller and wiring boards build the high tension supply for the atomizer.

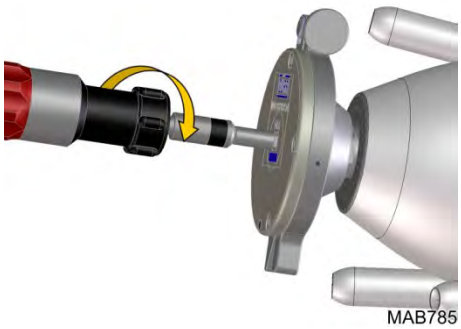
If these components are used together with the R/O converter and the high voltage connection, there is a prototype test for the atomizer. The atomizer can be operated as a device of the “2G” category.

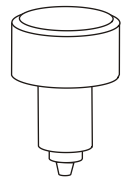
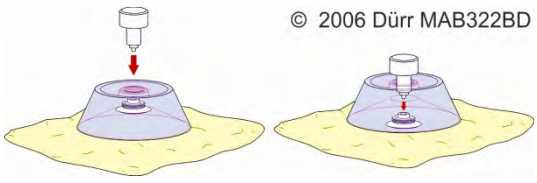
4.6.2.2 R/O converter

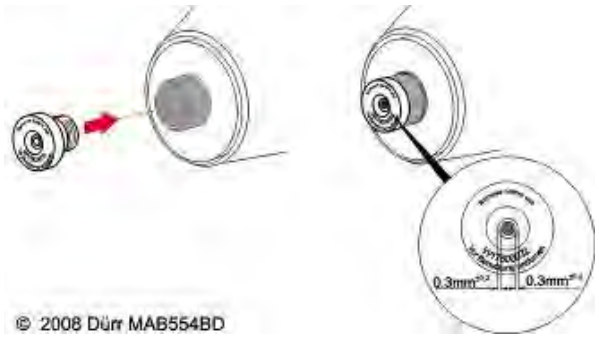
The R/O converter converts optical signals from the speed measurement into electrical signals. The electrical signals are further processed by the control.

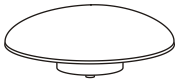
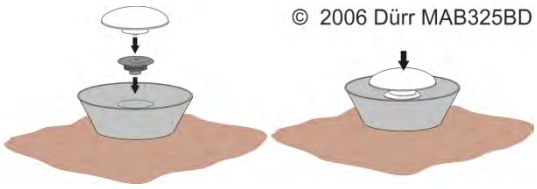
4.7 Tools

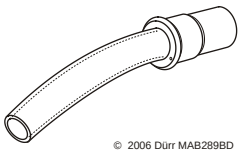
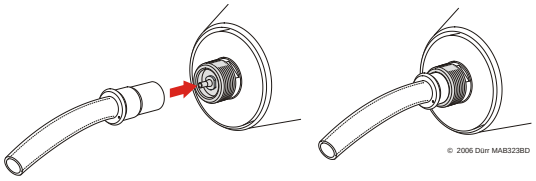
4.7.1 Tool kit

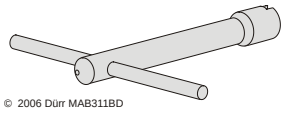
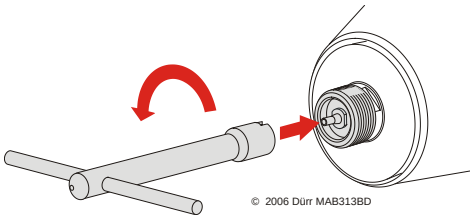
	Tool for Bell disk	M-Bell D55, W02020234
		Tool for the assembly of the bell disks with torque sensor. Tightening torque: 6Nm

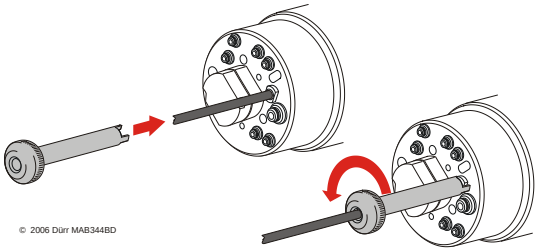
	Disassembly tool Distributor disk	W03010004
		Tool for pressing the distributor disk out.

	Test sleeve DS18 x 1	W17500065
		Sleeve for testing nozzle centering

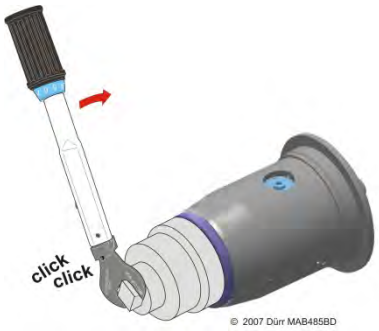
	Assembly tool Distributor disk	W02020017
		Tool for pushing the distributor disk in

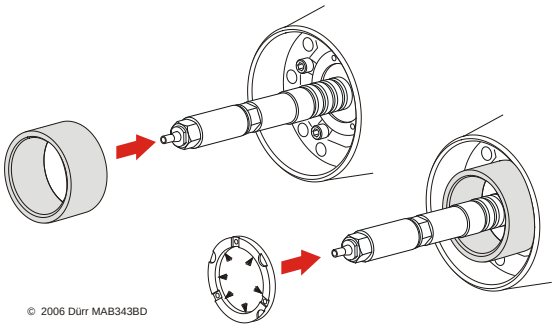
	Calibration sleeve	W13020004
		Sleeve with piece of tubing for calibrating.

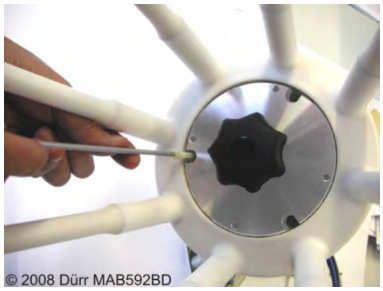
	Box wrench	W11020010
		Tool for unscrewing the nozzle.

	Tool Fiber optic cable	W02020062
		Push the tool over the fiber optic cable and loosen or tighten the screw connection.

	Auxiliary tool Paint pipe assembly	W02020147
		Auxiliary tool for the assembly of the paint pipe. Tightening torque: 12Nm

	Assembly tool for assembling the cap nut	W02020146
		Tightening the cap nut with auxiliary tool and torque wrench. Tightening torque: 8Nm

	Centering sleeve for contact ring	W02020097
		Sleeve for centering the contact ring on the flange of the paint pipe

	Assembly tool	W02020164
		Assembly tool for assembly of the electrode ring at the connection flange

4.7.2 Functionality of tools

Compliance with the tightening torques is important in order to guarantee the safety of the assembly and to prevent damage to the components. For this reason, the torque wrenches used must be periodically checked and calibrated by the operator.

4.7.3 Use of tools in Ex zones

The painting booth is separated into EX zones according to EN 16985. The Ex zone is defined only once and applies independently of the operating state of the installation. Even a painting booth in which no flammable medium is entered and which has been sufficiently ventilated is still classified as an Ex zone. Example: Maintenance and cleaning after sufficient ventilation duration without entering flammable materials.

As specified in EN 50176 only accessories complying with EN 60079-0 and/or EN ISO 80079-36 may be use in Ex zones.

EN 16985 requires sufficient ventilation of the spray booth prior to any repair, maintenance or configuration work.

In painting booths with fresh air operation sufficient ventilation is ensured after 3-10 air replacements. The painting booth is generally sufficiently ventilated after 5 minutes*. In recirculation systems, depending on the mixing ratio of circulating air and fresh air, a ventilation time of 30 minutes* is necessary in order to reach sufficient ventilation. The ventilation duration is subject to type and settings and must always be determined by the system-specific parameters.

4.7.3.1 Area of applicability

The above mentioned general operating conditions apply only in the area of applicability of ATEX directive, i.e. in the European Union. Outside of the area of applicability, other requirements may apply.

The following general operating conditions and measures are based upon the applicable “Technical rules for operating safety” (TRBS 1112-1) in the Federal Republic of Germany. In other countries, the respectively applicable country specific regulations are to be complied with.

4.7.3.2 Restricted use of tools in Ex zones

- The use of tools unclassified for purposes of explosion protection in Ex zones (e.g. painting booths) is solely the responsibility of the operator.
- The local conditions are to be analyzed by an expert and the adequate measures are to be defined.
- For each maintenance measure, the operator has to perform a hazard assessment, to document it, and to use it for preparing the specific work instructions.
- The operator has to ensure that these measures are well known to and complied with by all users who carry out the relevant work.

General operating conditions

All tools and devices that do not correspond to the equipment category of the respective Ex zone may only be used if the following points are observed:

The following rules of conduct give references (sources of information) for the operator. These make no claim to completeness. The full responsibility for the tool use lies solely with the operator.

- Before the operator enters the Ex zone, they have to make sure that no explosive atmosphere exists in the Ex zone. In this context, one has to pay particular attention to unequal distribution of concentration. The selection of the appropriate procedure depends on the local operational conditions at the operator.
  Examples:

  - Compliance with a calculated flushing duration of technical ventilation between last material entry and tool use in the Ex zone.
  - Use of an appropriate mobile measuring instrument.
  - Use of a permanently installed measuring system with visual display.

- The effects on other areas with the same or other zone classification must be taken into account for all works and the corresponding protective measures must be applied.
- No present entry of flammable materials of any kind in the Ex zone. This includes cleaning with flammable detergents.
- Sufficient thinning of the concentration of flammable materials. This is the case if the concentration of gases or vapors in the mixture with air drops well below 50% of the lower explosive limit, for example by using mechanical ventilation. (see TRBS 1112-1 Chap. 4.2.)
- If remaining in Ex zones, MAK values (maximum workplace concentration) must also be complied with.
- The mechanical ventilation must be turned on during the entire duration of the work.
- The effect of the mechanical ventilation must be monitored during the entire duration of the work. Appropriate measurements are continuous or repeated single measurements or checks of supply air rate and air extraction rate of the mechanical ventilation.
- Any unintentional turning off of the mechanical ventilation must be precluded through adequate technical or organizational measures.
- As far as possible, flammable materials or residues of flammable materials are to be removed.
- The application system must be in the operating mode “Cleaning” or “Off" and be secured against unauthorized operation mode changes according to the specifications of the operating instructions.
- All application parts have been rinsed and depressurized. The details of the operating instructions are to be observed.
- As far as possible, all electrical components in the Ex zone are without power. The details of the operating instructions are to be observed.
- The high voltage is turned off, completely discharged, and secured against unauthorized turning on according to the specifications of the operating instructions.
- In the Ex zone, detergents may only be used in a premixed condition.
- Avoid frictional and impact sparking.

5 Installation and assembly

5.1 Installation illustration

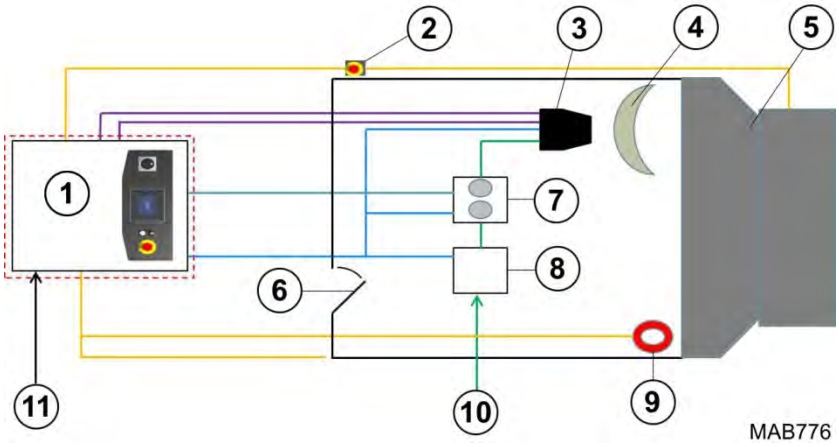


Fig. 19: Configuration example

1	Control system	7	Pump
2	Emergency off	8	Color changer
3	Atomizer	9	Fire detector
4	Work piece	10	Paint supply
5	Technical ventilation	11	Power and air supply
6	Safety door		

The schematic shows some options of atomizer installation. This is not an image of your configuration.

Your system must be set up according to your requirements. Contact the Service of Dürr System to assist.

5.2 Assembly

Assembly can be done by the technical personnel of Dürr Systems.

Please contact our customer service If you have any questions about the assembly. Please refer the notes in the chapter “Service” of this guide.

5.2.1 Requirements for the installation point

The atomizer must be supplemented with other components to an electrostatic spray system.
The atomizer completes the spray system. All other components must already be installed in accordance with the information in the chapter "Technical Data":

- Control system
- High tension supply
- Media Lines
- Pneumatic lines
- Painting booth (ATEX Zone).

5.2.2 Prerequisites for installation

- Energy supply completely switched off and secured against being switched on again.
- Media lines depressurized.
- Atomizer mount exists.

5.2.3 Flange assembly

5.2.3.1 Assemble the atomizer

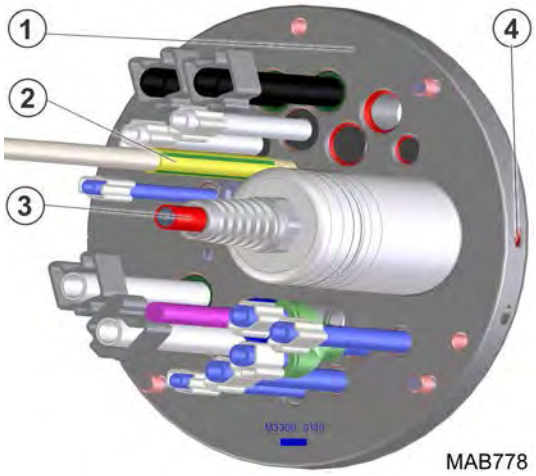


Fig. 20: Flange assembly with high voltage terminal

1 Flange assembly
2 Cable for potential equalization
3 High voltage connection
4 Grub screw for high voltage connector

The flange assembly is pre-assembled. All hoses are attached. Ground line and high voltage cables must remain connected.

- Screw on the potential equalization cable (2) to the flange (1) using the cable lug.

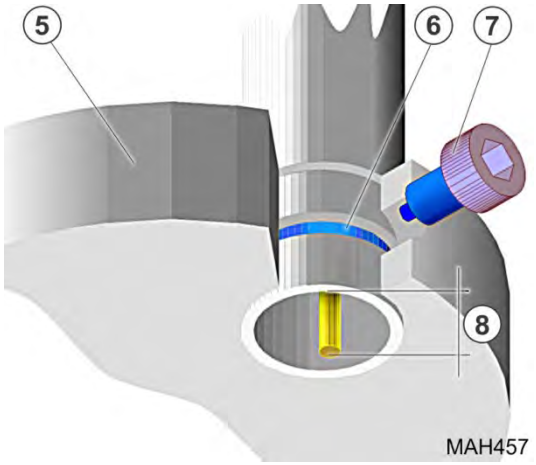


Fig. 21: Groove for the grub screw

5 Flange
6 Position of the groove on the plug
7 Grub screw
8 Degree of protrusion

- Push plug of the high voltage line through the flange (5) and secure it with the grub screw (7).

  The grub screw (7) glides into the groove of the plug housing (6).

The high voltage connection is prefabricated and must not be changed. The plug must not be opened. Only in the original state are safe operation and correct assembly guaranteed.
The projecting dimension (8) of the high voltage terminal shall be within 8 mm ± 1 mm. The projecting dimension (8) is the dimension, by which the high voltage plug protrudes from the plug housing.

- Guide flange assembly with all hoses and lines through the atomizer mount or the elbow.

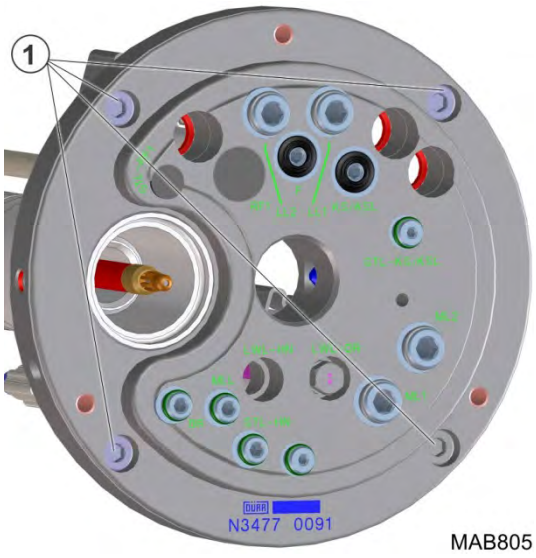


Fig. 22: Attaching flange assembly

1 Fastening screws on the flange assembly

- Tighten flange assembly with four screws (1) to the atomizer mount or the elbow.

5.2.3.2 Cable and hose routing

The lines and hoses of the flange assembly must be installed inside and outside the cabin in covered housings.

WARNING

Danger from explosive atmospheres

Lines and hoses can lead to electrostatic generation.

Note traverse rules.

The traverse of cables and hoses will affect electrostatic charging. Below you will find the rules that must be observed when laying the hoses and lines.

Laying inside the cabin

Respect the local or national traverse rules.

- Lines and hoses should be routed separately, e.g. in cable ducts or pipes with partitions.
  Separation by:

  - High voltage line
  - Hoses for media (paint, detergent)
  - Hoses for pneumatics
  - Cable for potential equalization

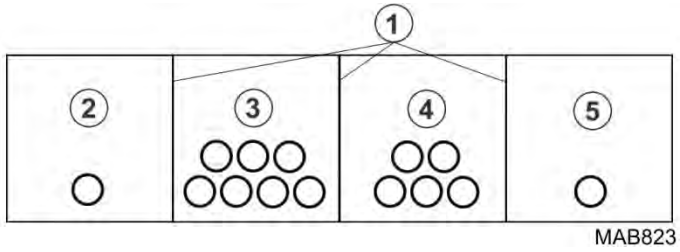


Fig. 23: Example of cable duct

1 Partition in the cable duct
2 High voltage cable
3 Hoses for pneumatics
4 Hoses for media
5 Cable for potential equalization

- Use for each atomizer a separate duct or own pipe.
- Cable ducts or pipes must be made of non-conductive material.
- Do not screw cable ducts or pipes on a large area to metal. (Danger of propagating brush discharge).
- Shorten lines and hoses to the required length. Especially the high voltage line must not be laid in loops.
- The interfaces of the hoses and lines on the cabin wall must be tight on the outside of the cabin.
  The atmosphere of the cabin may not be transferred outside the cabin.
- The media hoses must be connected to a grounded power supply.

Laying outside the cabin

Lines and hoses must be laid in a closed housing and grounded. This ensures that protection against direct contact is available and people and objects cannot be electro-statically charged.

5.2.4 Fasten electrode ring

Prerequisite:

- The flange assembly is installed on the atomizer slot or the elbow and fully connected and grounded.
- High voltage connection is secured to the flange assembly.
- Cable for potential equalization is fastened on the flange assembly.

The electrode ring is screwed to the flange assembly.

The electrode ring is provided in individual parts and must be assembled first.

Before assembling the parts of the electrode ring (ring and fingers), they must be stored at a temperature between 20 °C and 26 °C for at least 24 hours.

- Protective caps on the electrode ring must be removed.

ATTENTION

Risk of damage to property and production disruption

Penetration of moisture can cause electro-chemical corrosion of insulating components and thus lead to malfunctions during the high voltage operations.

Before assembly of the electrode ring to the flange assembly, the sealing surface and groove on the backside of the electrode ring must be filled with petroleum jelly. The petroleum jelly seals and insulates the gap between flange assembly and electrode ring.

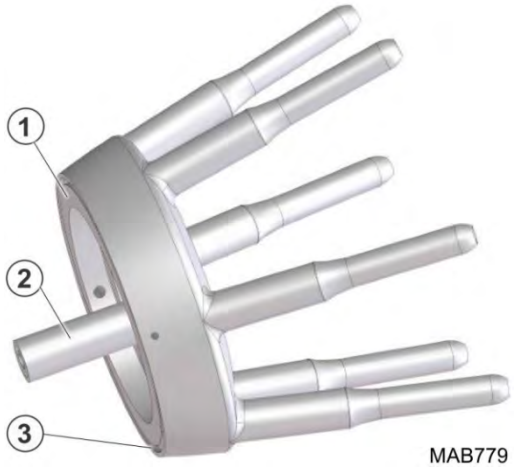


Fig. 24: Sealing the back of the electrode ring with petroleum jelly

1 Sealing surface
2 High voltage port on the electrode ring
3 Groove

- Brush 3 ml of petroleum jelly on the sealing surface (1) and groove (3) of the electrode ring.
- Fill high tension connection (2) on the electrode ring with 2 x 1 ml petroleum jelly.
- Attach the electrode ring to the flange assembly so that the high voltage terminal of the flange assembly fits into the high voltage terminal on the electrode ring.

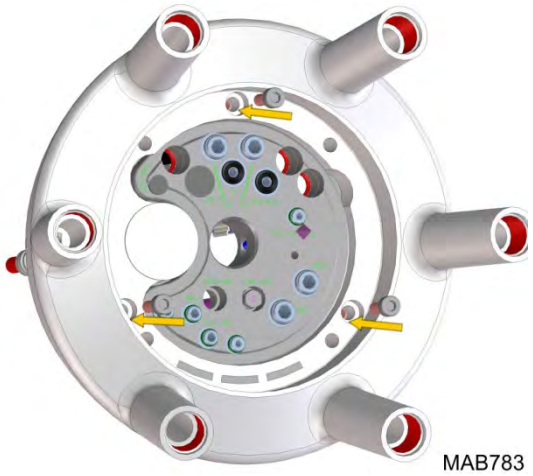


Fig. 25: Inserting the plastic screws

- Insert the three plastic screws and tighten slightly.

Use the original plastic screws only. Metal screws interfere with the electrostatic field of the electrode ring. The high voltage will not reach its maximum performance. The electrode ring and the atomizer soil faster and more intensively. Metal screws can damage the bores in the electrode ring.

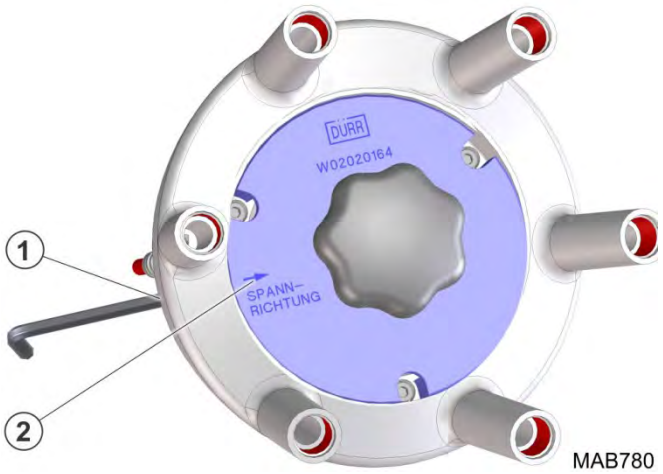


Fig. 26: Inserting assembly tools in the electrode ring

1 Clamping screw
2 Mark (arrow)

- Insert assembly tool in the electrode ring.
  The mark (2) on the tool must be aligned with the mount on the connecting flange. The hexagon socket key simplifies orientation.
- Tighten the clamping screw (1) of the electrode ring.
  The tool and thus the electrode ring are pressed against the connecting flange and centered. The excess petroleum jelly escapes from the gap between connecting flange and electrode ring.

ATTENTION

Risk of damage to property and production disruption

The plastic thread can be damaged easily.

Apply only the specified tightening torque.

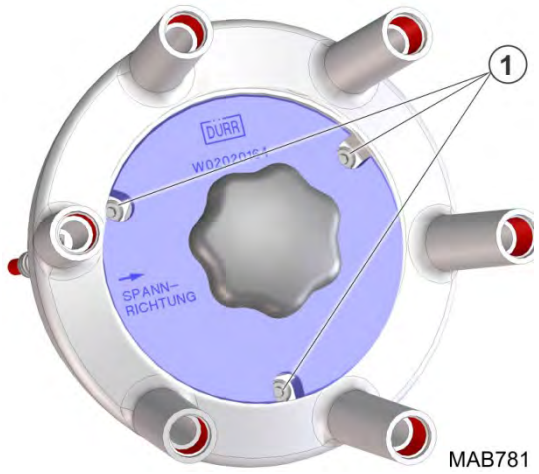


Fig. 27: Screw on the electrode ring

1 Plastic screws

- Tighten the three plastic screws (1) on the connecting flange with 0.5 Nm.
  In the tool, there are gaps for the screws.
- Release the clamping screw.
- Remove the tool from the electrode ring.
- Wipe off superfluous petroleum jelly.

⚠ CAUTION

Sharp tip of the electrode

You could suffer superficial skin injuries.

Touch electrode finger only at the side of the housing and do not touch the needle tip. Wear safety gloves.

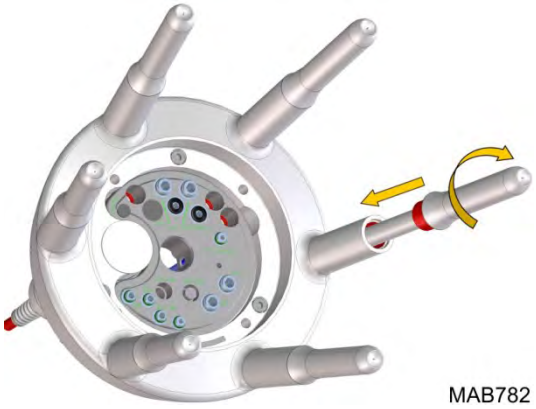


Fig. 28: Screwing in the electrode fingers

- Screw in the six electrode fingers hand tight in the electrode ring.

5.2.5 Attach the atomizer to the flange package.

Prerequisite:

- Electrode ring is mounted on the flange assembly.
- Chuck is checked:
  - Spigot is lightly greased.
  - Interimediate piece in the spigot moves easily.

The atomizer is attached to the flange assembly.

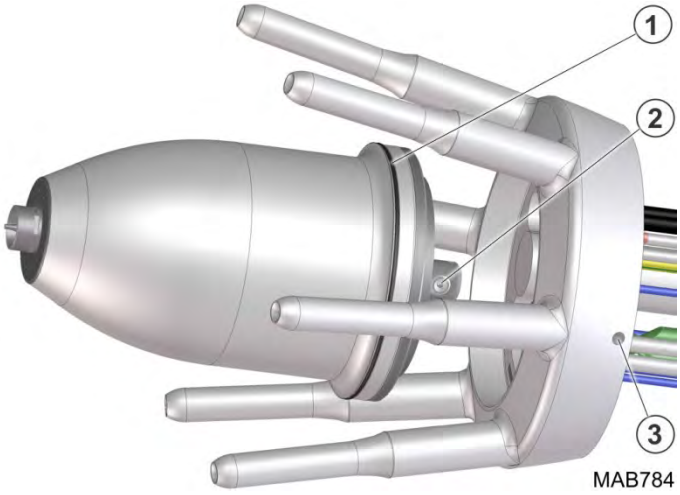


Fig. 29: Attaching the atomizer

1 O-ring
2 Clamping device
3 Clamping screw

- Wet the O-ring (1) on the atomizer with 2 ml of petroleum jelly.
- Set up atomizer in its correct position.
  Opening of the chuck (2) in the direction of the clamping screw (3).
- Push in atomizer until it reaches the stopper.
  Move atomizer slightly up and down. The atomizer fits only in one position.
- Tighten chuck (2) using the clamping screw(3) with 11 Nm.
  No gap between atomizer and electrode ring.
- Fill the hole of the clamping bolt (3) with 2 ml of petroleum jelly.
- Remove excess white petroleum jelly.

5.2.6 Attaching the bell disk

Requirements:

- Bell disk and shaft end without damage
- Threads of the turbine shaft clean.
- No paint residues

Fig. 30: Bell disk with tool

- Loosen the knurled screw on the special tool so that the clamp of the tool can be flipped open.
- Place the bell disk into the open tool.
  The bell disk must sit with its edge in the fixed half-shell.
- Close the clamp carefully.
  Only when the bell disk is in the correct position can the clamp be closed with minimal effort.
- Tighten the knurled screw with light manual force.

ATTENTION

Risk of damage to property and production disruption

If the bell disk is screwed improperly onto the shaft end of the turbine, the threads of bell disk and turbine may be damaged. An improperly mounted bell disk leads to irreparable damage to the turbine.

Only tighten the bell disk if it can be rotated easily.

- Activate the shaft detent.
- Set bell disk on the shaft end and screw it on manually.

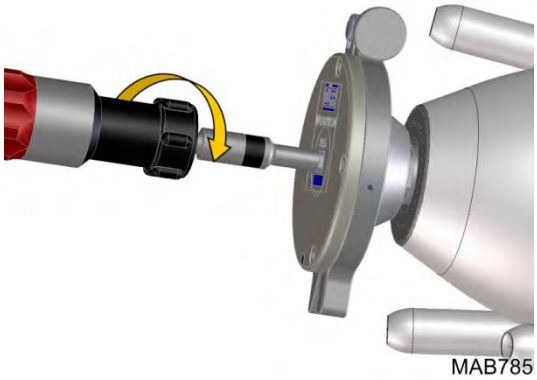


Fig. 31: Tightening the bell disk

- Plug wrench in the special tool.

ATTENTION

Risk of property damage and production disruption

If the pre-set torque is not maintained, it inevitably causes damage to the bell disk and the turbine.
Moreover, malfunction must be expected during operation.

Note torque when screwing on the bell disk.

- Screw the bell disk tightly with a torque of 6Nm.
- Remove the torque wrench and special tool.
- Loosen shaft detent.

5.2.7 Attach type plate.

The type plate must be positioned in the vicinity of the atomizer, for example, on the cabin wall.

5.2.8 Final checks

5.2.8.1 Atomizer

- All components fully installed according to drawing and parts list.
- Check the condition of the assembly (Damage, dirt, and functioning).
- It must be possible to rotate bell disk smoothly by hand. - Check the distance between bell disk and shaping air ring.

ATTENTION

Risk of property damage and production disruption

In case of wrong assembly, shaping air ring and bell disk can rub against each other. Shaping air ring and bell disk can be damaged.

Check the distance between shaping air ring and bell disk. The bell disk should not rub against the shaping air ring.

- Check the painting distance (200 mm ± 20 mm.
- Check distance of the electrode tips to grounded parts (at least 400 mm).
- Cable for potential equalization wire connected to the flange.
- High voltage line connected to the flange.

5.2.8.2 Pneumatic supply

- Ensure quality of compressed air.
- Check minimum pressure and maximum pressure.

5.2.8.3 Media Lines

- Lines must be clean and free of debris.
- Viscosity of the paint
- Paint temperature
- Pressure of the rinsing agent

6 Operation

The atomizer is part of an electrostatic spray system. The painting procedure runs fully automatically. The atomizer is put into operation and monitored by a higher-level control system.

6.1 Safety notes for operation

6.1.1 Danger due to explosive atmosphere

Death or serious injuries may ensue.

- Operate the atomizer only in a working environment permissible for the coating materials. Suction is required.
- Consider national and local regulations for exhaust air velocity.
- Paint, cleaning, and rinsing liquids should fulfill the requirements of the lowest explosion group IIA.
- No rusty surfaces in the painting area. Rusty surfaces can lead to sparking in case of collision.
- All equipment components and the tools to be coated should be grounded.
- Before working on the components of the spray system, the high voltage should be switched off.
- Use only tools permitted for the respective ex zones in explosive areas.

6.1.2 Danger due to high voltage

Death or serious injuries may ensue.

- Before working on the components of the spray system, the high voltage should be switched off and secured against unintentional reconnection.
- Discharge the components with a grounding rod.
- Persons with cardiac pacemakers should not work with the atomizer and should not stay near it.
- Persons should not stay in the booth during the automatic operation.

6.1.3 Material may leak uncontrollably at high speed.

Death or serious injuries may ensue.

- Before start-up of the atomizer, ensure that the atomizer is assembled completely and all connections are made according to the specifications of the operating instructions.

- Disconnect the system in which the atomizer is installed from every power supply and secure every power supply against unintentional reconnection before starting with the service and maintenance work.
- If possible, depressurize the pipes.
- Wear the appropriate protective clothing, gloves and protective glasses.

6.1.4 Danger due to harmful or irritant materials

If you come in contact with harmful liquids or vapors, serious or fatal injuries may ensue.

- Avoid contact of material with skin and eyes.
- Gather information regarding the particular risks of the materials used.
- Note the safety notes of the material manufacturer.
- Wear the appropriate protective clothing, gloves, protective glasses, and respiratory protection.

6.1.5 Danger due to rotating bell disk

Death or serious injuries may ensue.

- Bell disk may come loose from the shaft:
  - Note the details on speed in the “Technical Data.”
  - Note the maximum value for the pressure of breaking air.
  - Never fall below the minimum value for the pressure of motor bearing air.
- Bell disk has sharp edges:
  - Do not touch the rotating bell disk.
  - Screw and unscrew the bell disk only by using the appropriate tools.
  - Wear protective gloves.

6.2 General Notes on Operation

For the safe operation of the atomizer, important functions are monitored by the control unit. Faults recognized by the controller can be displayed with the visualization.
However, it is not possible to monitor all of the features of the components. Please note the following factors.

6.2.1 Valves

All valves are closed in the rest position. Compression springs hold the valves closed in rest position. Should a compression spring fatigue or even break, it affects the functions of the atomizer and endangers the paint finish. However, a broken valve spring will not create sources of ignition.
Check the functioning of the valve at regular intervals (follow the maintenance schedule).

6.2.2 Noises

During constant painting operation, the operating noise from the atomizer is also uniform. If irregular noises are noticed, the cause must be found out and rectified.

6.2.3 Vibrations

Bell disk and turbine shaft must always rotate without vibration. Incorrectly installed bell disks and damaged turbines cause noticeable vibration, especially when starting from low speeds.

6.2.4 Cleanliness

The surface of the atomizer must always be kept clean. Dirt impairs, among other things, the effect of the high voltage. Dirt particles that detach from the atomizer can get on the painted surface.
The atomizer must be cleaned at regular intervals. The intervals are derived from the amount of pollution and should be adapted according to operation.

6.2.5 Hoses

The condition of the hoses must be checked at regular intervals. The hoses must be replaced in time. Damage to the hoses leads to malfunctions of the atomizer.

6.2.6 Grounding and High Voltage

Ensure that all conductive parts of the atomizer are electrically connected with each other. Check mutual electrical resistance of the components.
Please note the information on measuring voltage and resistance in the chapter "Resistance Measurement" and the information provided on the measured values in the chapter "Operational Parameters."
Please note the information on the operation of the high voltage generator and the other components of the high voltage supply.
Note the prescribed tests and intervals in the applicable rules and standards.

The design of the workpiece holder must ensure that the work pieces remain grounded during the coating. The ground-leakage resistance at a test voltage of up to 1000V may not exceed 1 MΩ.

6.2.7 Spray Pattern

Damage to the bell disk or the shaping air ring have a negative effect on the spray pattern.

If during the operation of the atomizer, changes are noticed that indicate damage or inadmissible performance, the atomizer must immediately be taken out of service.

ATTENTION

Risk of production disruption due to defective components

A poor paint job can be the result.

An atomizer with defective components must not be operated in any case.

Never paint with a damaged or worn bell disk. Use bell disks from Dürr Systems only.

6.3 Operating Parameters

Operating modes

- Exterior painting with high voltage
- Metallic painting with high voltage
- Plastic painting with high voltage

Speed of bell disk

Rotational speed, max.	70,000 ± 500 RPM
Usable speed range	8,000 – 70,000 RPM
Speed sensor	reflector disk
Pulses per revolution of turbine shaft	4
Work areas	
Working range **Eco**Bell2 SL	15,000 – 55,000 RPM
Speed when flushing briefly (recommended)	40,000 – 45,000 RPM
Lowest braking speed	2,000min^{-1}

6.3.1 Painting data

Painting distance	220 ± 20mm
Typical relative painting speed	0.2 – 0.6m/s

Compressed air – required pressures

Control air for valves	p_{dyn} 6 – 8 bar
Motor air	p_{dyn} = 5,5 – 8 bar
Break air	6 bar
Motor bearing air:	p_{dyn} = 5.5 – 7 bar

The motor bearing air may in no case fall below the indicated minimum pressure. Operating at lower air pressure inevitably leads to turbine damage.

Shaping air	p_{dyn} 6 - 8 bar

Paint/detergent (brief load)	p_{max} = 20 bar
Slide medium (short-term load)	p max. = 20 bar

Maximal operating pressure of the shaping air

The shaping air system can be coupled with an inert gas supply for fire protection. An inert gas supply often works with high pressure.

ATTENTION

Risk of damage to property and production disruption

If the maximum allowable operating pressure is exceeded, there will be considerable damage to the atomizer.

Operate shaping air system with limited pressure only.

Shaping air system for inert gas	max. 10 bar

Maximum operating pressure for shaft detent

ATTENTION

Risk of damage to property and production disruption

If the maximum allowable operating pressure is exceeded, there will be considerable damage to the atomizer.

Operate the shaft detent with limited pressure only.

Control air for shaft detent	max. 6 bar

Paint - outflow rate

Maximum	700ml/min
recommended operating range	80 – 350ml/min

Rinsing agent - outflow rate

Detergent for quick purging via nozzle	700ml/min ±50ml/min

Temperature and humidity

Basic limits in the paint environment

If the atomizer is not operated, the following limits have to be complied with unconditionally.

Ambient temperature	10 – 40 °C
Relative humidity	35 – 90%

Outside these limits, the atomizer will be damaged.

Parameters when operating

Temperature	23 °C ±3 °C
Relative humidity	65% ±5%
Velocity of air flow in the painting booth	0.2 – 0.7m/s

6.3.2 High voltage

$I_{konstant}$	max. 400µA

Resistances

Resistance between paint nozzle/paint pipe and connecting port	
Test voltage	4 – 24V
Resistance value	≤ 10Ω
Resistance between shaft (on turbine side) and connecting port (with motor bearing air)	
Test voltage	50V
Resistance	< 0.1MΩ
Grounding of the work piece	
Test voltage	1,000V
Resistance value	< 1MΩ

6.3.3 Compressed air

Quality of the compressed air

Motor bearing air	according to ISO 8573.1:2010
Driving air	according to ISO 8573.1:2010
Brake air	according to ISO 8573.1:2010
Shaping air	according to ISO 8573.1:2010

Purity classes ISO 8573-1:2010	1:4:1

Limitations for purity class 4 (pressure dew point max.):

- ≤ -3 °C @ 7 bar absolute
- ≤ +1 °C @ 9 bar absolute
- ≤ +3 °C @ 11 bar absolute

Consumption of the turbine

Motor air	100 – 730Nl/min
Motor bearing air	60 Nl/min

The motor bearing air pressure must not drop below the specified minimum pressure. Operating at lower air pressure inevitably leads to turbine damage.

Shaping air consumption

Shaping air 1	max. 450Nl/min
Shaping air 2	max. 440Nl/min

Shaping air when rinsing the atomizer	200 – 400Nl/min
Shaping air when cleaning	80 – 100Nl/min

6.4 Starting Operations

The module may only be started when fully assembled. Before commissioning, ensure that there are no loose parts, such as tools or cleaning agents (cloth), in the module or in the cabin.

6.4.1 Commissioning notes

The following checks should be performed:

- Is the atomizer properly mounted? (See chapter "Installation.")
- Are all the hoses to the atomizer and its upstream components free of impurities?
  For this purpose, the air ducts and, where appropriate, the material lines are to be blown free before assembly.

- Are all the connections on the atomizer set up properly?
- Are all connections tight?
- Observe the details on the pressure of the motor bearing air of the turbine (see chapter “Operating Parameters”).
- Does the driving air of the turbine meet the requirements specified in the operating parameters of these instructions?
  In particular, the purity and dryness of the driving air is very important for a trouble-free operation of the turbine.
- Can the bell disk be spun smoothly and easily by hand with motor bearing air pressure applied?
- Is the bell disk correctly tightened on to the shaft?
- Are all high voltage components and the insulating components connected correctly and do they comply with the applicable regulations and standards?

The commissioning of an atomizer requires that the staff are fully aware of safety regulations.
The staff must be trained on the atomizer. The information and instructions in the operating instructions must be strictly adhered to.

If commissioning is being carried out because of work on the supply lines of the atomizer, all related effects must be checked.

Be sure to follow the instructions of the high voltage generator and of the components connected the high voltage.
Grounding, safe shut-off, and interlocks, among other things, are to be thoroughly inspected and tested.
Carry out all checks and tests prescribed in the instructions before you operate the atomizer.

The annex includes a check list for commissioning. The list contains measurements and testing procedures required for a safe operation of the equipment. Document all work carried out in the list.

At excessive speed, a firm grip of the bell disk on the shaft is not guaranteed. A flying bell disk puts at risk life and limb.

Observe maximum rotational speed. The rotational speed must be monitored.

Note the pressure of the braking air. If the pressure is above the prescribed value, the bell disk can due to its inertia come loose from the shaft while braking the turbine.
The pressure of the braking air must not exceed the "operating parameters" indicated above.

If the pressure of the bearing air is not sufficient, there is the risk that the shaft will suddenly seize.
In that case, a firm grip of the bell disk on the shaft is not guaranteed.
A flying bell disk puts at risk life and limb.
The pressure of the bearing air must not exceed the "operating parameters" indicated above.

6.4.2 Commissioning

The atomizer is part of an electrostatic spray system. Only when all required components are installed, the entire system can be put into operation.

The painting process is monitored by a higher-level control system and runs fully automatically. The painting process can be started via a user interface.

6.4.3 Testing the paint flow control (volumetric measurement)

The quality of the paint flow control must be tested prior to commissioning and at reasonable intervals and, if necessary, calibrated. This process is referred to as "volumetric measurement."

To measure is the predetermined target amount compared with the actual amount currently flowing from the nozzle.

For this test, a calibrated vessel and the adapter of the atomizer are needed. The adapter (volumetric measurement tool) is absolutely necessary to prevent pollution at the shaft end of the turbine.

⚠ WARNING

Danger due to escaping material

Material can get into eyes.

Wear safety glasses.

Prerequisites:

- The shaft of the turbine may not turn.
- The bell disk must be removed from the atomizer.
- Keep the nozzle mounted on the atomizer.
- Only use the original adapter.
- The container to collect the paint must be sufficiently large and have a secure stand.

Procedure:

- Remove the bell disk (see chapter "Installing bell disk").

Fig. 32: Adapter for volumetric measurement

- Stick the adapter over the nozzle into the shaft of the turbine.

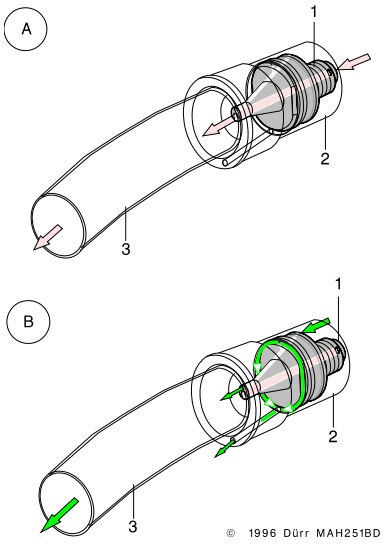


Fig. 33: Adapter over nozzle

1 Nozzle
2 Adapter
3 Hose

Volumetric measurement of the amount of paint

If you want, you can replace the hose of the adapter with a longer hose of the same diameter. The paint must be able to flow freely through the hose.

- Start the volumetric measurement on the visualizer via the control.
- Comparison of the actual quantity to the set quantity.

If the required paint quantity is not obtained or exceeded, the quantity must be regulated via a pressure change.

Volumetric measurement of the detergent

The required amount of detergent can also be determined by the principle of volumetric measurement. The quantity of detergent is determined by the pressure. The pressure depends on the system configuration. The table below shows how much rinsing agent is necessary for optimal cleaning results.

Valve operation	Volumetric measurement via	Ignitable paint	Non-flammable Paint
Short flush of bell disk total	Flush borings	500 ± 50 ml/min	700 ± 50 ml/min
Ignitable paint may not be used with external charging.			

If the required amount of rinsing agent is not obtained or exceeded, the quantity must be regulated via a pressure change.

Final work

After the volumetric measurement of the atomizer, bring it back to a working condition.

- Remove Adapter.
- Clean nozzle and the end of the shaft.

ATTENTION

Risk of damage to property and production disruption

Dirt on the thread of the shaft prevents proper seating of the bell disk and leads to unbalance.

Upon conclusion of volumetric measurement, check cleanliness.

- Screw on bell disk (see "bell disk assembly").

6.5 Purging

6.5.1 Purging sequence

The purging sequence cleans atomizer and bell disk.

- Ducts in the atomizer
- Inside and outside of the bell disk

Purging sequence must be done in the following situations.

- before stoppages
- before a color change
- end of day
- before service

Depending on the painting conditions a rinsing process between the painting operations may also be necessary.

Each painting sequence requires matching purge programs. The rinsing programs can be started automatically or manually via the user interface.

6.5.2 Detergent

The detergent must have the same characteristics, in its chemical composition, as the coating material used. Use the detergent recommended by the paint manufacturer for purging.

6.6 Checks during operation

The following table contains the procedures for checking and testing the atomizer and flange package:

Interval	Component	Check/Test
Daily before Start of operation	Bell disk	Soiling of the entire bell disk (inside and outside). Damage and wear on the edge of the bell disk.
	Shaping air ring	Dirt and damage, in particular in the region of the bores.
	Atomizer body	Atomizer body mounted on stop. The bell disk should not touch the shaping air ring.
	Turbine	Testing function of the turbine: easy and uniform rotation of the shaft by hand with active engine bearing air.
	Nozzle	Soiling and damages.
	Complete Atomizer	Leaks, dirt on atomizer body, condition of hoses and cables on atomizer.
1 x hourly	Complete Atomizer	Soiling.
Minimum 1 x a week	Bell disk	Unscrew and disassemble. Clean bell disk and thoroughly examine condition.
1 x a week	Flange package	Check the free movement of the clamping bolt in the flange package.
After dismantling/cleaning	Atomizer body/bell disk	Check distance between edge of bell disk and shaping air ring. The bell disk must not rub against the shaping air ring.
After 2000 operating hours	Turbine	Replace the contact ring on the turbine with a new contact ring.

Monitoring and checking of the Electrode ring:

Interval	Structural component	Monitoring/Checks
Daily prior to startup	Electrode ring	Pollution and damage to the electrode ring
	Electrode finger	Pollution and damage to the electrode finger
	Electrodes	All electrodes must be pointed and straight.

7 Cleaning and maintenance

7.1 Safety Instructions

The following safety instructions must be followed while carrying out cleaning and maintenance works.

⚠ CAUTION

Danger due to High Voltage

Danger of electric shocks and discharges.

Shut off the high voltage supply before commencing any cleaning and maintenance work and secure it against being switched on again.

⚠ CAUTION

Danger due to High Voltage

Risk of electric shock and discharges.

Touch and discharge the atomizer with a grounding rod before touching it.

If possible, keep the grounding rod attached while working on the atomizer inside the cabin.

CAUTION

Risk due to rotating bell disk

There is a risk of deep cuts.

Make sure that the bell disk is standing still before carrying out any work on the atomizer. An unintentional turning on of the turbine must be prevented.

WARNING

Danger of damage to hearing

Loud noises occur when disconnecting pneumatic lines under pressure. The hearing may be damaged.

Never disconnect lines under pressure. Wear ear protection.

WARNING

Danger due to electrostatic charge

Danger to personnel due to electrostatic discharge when touching the cable cover.

Use a grounding rod to discharge the complete cable cover in the paint booth before all maintenance and repair work.

7.1.1 Cleaning

Always wear suitable protective clothing, shoes, gloves, and safety glasses.

Consider the quality of the inhaled air. Work on the atomizer only if you are sure that the inhaled air meets health standards.

The spraying system must be in the “Cleaning" mode before you enter the spray booth. Make sure that nobody can switch on the system again, as long as someone is in the spray booth.

Bear in mind the manufacturer’s specification for paint, detergent, and rinsing agent.The associated approved and permitted detergents and cleaning agents must also be non-flammable.

ATTENTION

Risk of damage to property and production disruption

Moisture may enter and damage the atomizer.

Only use damp cloths for cleaning, no wet cloth.

ATTENTION

Risk of damage to property and production disruption

Cleaning agent must not leak into the atomizer while cleaning the bell disk.

Shaping air and motor bearing air must be switched on if the bell disk is cleaned on the atomizer.

Cleaning agent and impurities may enter the atomizer in the absence of shaping and motor bearing air.

ATTENTION

Material damage due to unsuitable cleaning agent

The aluminum bell disk is not resistant to water-based cleaning agents.

Do not immerse the aluminum bell disk in water-based cleaning agents for extended periods of time.

ATTENTION

Risk of damage to property and production disruption

The surface of the atomizer body and that of the electrode ring can get scratched and can thus be soiled more.

Do not use abrasive cleaning accessories.

7.1.2 Servicing and maintenance

The manufacturer does not permit repairs of individual components of the product. You may only replace damaged components. The suitable spare parts are available in the chapter “Spare parts."

ATTENTION

Replacement parts that are not approved by Dürr Systems may not be able to withstand the loads.

It can result in property damage and production disruption.

Use only original spare parts.

The spray system must be in the "Maintenance" mode before entering the spray carbine. Make sure that no one can switch on the station while someone is present in the spray booth.

In case of queries regarding servicing and maintenance work or if you require support in training personnel, contact our training department (see chapter “Contact & Hotline”).

WARNING

Danger from harmful or irritant substances

If you come in contact with hazardous liquids or vapors, death or serious injury can result.

Obtain information about the specific risks of the materials used. Note the safety recommendations of the material manufacturer.

Wear appropriate protective clothing, gloves, eye protection and respiratory equipment.

WARNING

Material can escape uncontrollably with high pressure and penetrate the body

Death or serious injury and amputations can result.

Before starting maintenance and repair work, disconnect the system into which the atomizer is built, from any power supply and secure any form of energy source against reconnection.

7.2 Cleaning agents

Cleaning agents (ATEX explosion group IIA):

- n-Propanol or Iso-Propanol
  Only use moist cloth.

CAUTION

Danger from explosive atmospheres

Flammable cleaning agents may explode in the painting booth.

Nonflammable cleaning agents are preferred.

Flammable cleaning agents should be used only if after shutdown of the high voltage supply all parts conducting high voltage have been discharged down to a discharge energy of less than 0.24mJ.
The electrically conductive parts of the atomizer must always be electrically interconnected.

Use only the detergent recommended by the paint manufacturer.

CAUTION

Danger through the flashpoint of the cleaning agent

Fire and explosion may ensue.

The flashpoint of the cleaning agent must be at least 15 K above the surrounding temperature.

Detergent must not enter inside the atomizer.

7.2.1 Recommended cleaning agents

The paint supplier must provide cleaning agents tailored to the paint system.

The cleaning agent should meet the following conditions:

- The cleaning agents used must not chemically dissolve the plastic parts and covers of the application equipment.
- The physical and chemical properties of the materials in the application technique that come into contact with the cleaning agent may not change in any way.
- Dried paint material should dissolve well and be easily removable (precleaning).
- The cleaning agent for non-flammable paints has to mix well with water (final cleaning).
- The detergent must be completely removed without leaving any residue or must evaporate in the available time (final cleaning).

You may preclean (pre-dissolve) dried paint residues that are difficult to dissolve with a suitable cleaning agent on a conventional basis even in non-flammable paints. Do that carefully with a rag soaked in solvent. Pay utmost attention that the solvent does not change the chemical and physical properties of the plastic parts and covers of the application equipment.

Examples of critical ingredients

Ingredients with a pH value < 7 and pH > 7 (except water based cleaning agents pH ~ 8 – 10) must not be used for cleaning.

The following table lists examples of critical ingredients that you should never use in pure form (100%) as a cleaning agent.

Solvent group	Ingredient
Aromatic hydrocarbons	(Solvent Naphta; High Flash Aromatic Naphtha) Xylene, toluol, or mixtures or blends of the two
Ketone	Methylisobutylketone MIBK
Ester	N-butyl acetate (butyl acetate)

The list does not address all critical ingredients. Use only detergents that meet the prescribed requirements.

Use of n-butyl acetate with non-inflammable paints

N-butyl acetate can also be found under the following names:

- Butyl acetate (ButAc)
- Butyl ethanoate
- N-butyl acetate

You may use butyl acetate (cleaning by hand with a cloth) non-flammable paints for gentle manual precleaning.

Requirements for external cleaning of the atomizer body with ButAc:

- No continuous load (e.g. plastics not to be immersed in ButAc)
- Maximum load temperature 25 °C
- No re-distilled ButAc or ButAc with extenders (e.g. aromatic hydrocarbons and their derivatives)
- Gentle cleaning (cleaning cloth moistened with ButAc)
- Subsequent drying and re-cleaning with iso- or n-propanol

ATTENTION

Danger of property damage and interruption of production

If you immerse bell disks in ButAc, they can be damaged.

Do not immerse bell disks in ButAc. Use ButAc for precleaning only.

7.3 Cleaning and maintenance plan

Interval	Maintenance activity	Personnel
2 times per shift	Visual check of the shaping air ring for stains and damages; cleaning; atomizer body should be fully screwed in.	Assembly personnel
	Visual inspection for contamination: Components for external charging and atomizer	Paint staff

1 time per shift	Visual inspection for contamination of the bell disk (inside and outside), damage, wear and tear on the edge of the bell disk; clean	Assembly personnel
	Vibration check on spinning bell disk and turbine shaft	Assembly personnel
	Functional check of the turbine	Assembly personnel
	Visual inspection for contamination and damage of the nozzle; Clean or replace if necessary	Assembly personnel
	Check the state of the electrodes, needles all pointed, needles all the same length, needles and indentations in the electrode are clean, surface free of traces of burns due to arcing, tight fit on the flange; replace if necessary	Assembly personnel
	clean all surfaces, visual leakage control	Assembly staff / cleaning staff
Weekly	Check all conductive parts of the atomizer for contact	Qualified electrician
	Check the free movement of the clamping bolt in the flange and the interim piece in the spigot of the atomizer.	Assembly personnel
	Check the operation of valves	Assembly personnel
	Disassemble the bell disk, check condition and clean.	Assembly personnel
1 time per year	If the atomizer is operated in the category “2G”: Check for spark-free disconnection (The procedure is described in the standard EN 50176.)	Qualified electrician
As necessary	Check operating noise	Assembly personnel
	Check spray pattern	Paint staff
	Check seals on the flange assembly and replace if necessary	Assembly personnel
at change of atomizer	Check projection of high voltage cable of atomizer (8mm ± 1mm).	Assembly personnel
After disassembly and cleaning	Check the correct distance between the edge of the bell disk and control air ring	Assembly personnel
After disassembly of the atomizer from the flange package	Checking of seals: State and completeness (replace seals if necessary)	Assembly personnel

7.4 Cleaning

Cleaning describes the elimination of external contamination from the atomizer.

Staff:

- Cleaning personnel

Protective equipment:

- Protective work wear
- Protective glasses
- Protective gloves
- Safety boots

Cleaning Accessories:

- Clean, lint-free cleaning cloths
- Clean, lint-free towels for drying
- Clean brushes

Container for cleaning agents:

The container for the cleaning agent must be electrically conductive. In the painting booth, the container must be grounded.

Cleaning position:

In the cleaning position, the atomizer is inclined downwards. This position largely prevents the cleaning fluid into the atomizer.

Fig. 34: Cleaning position

7.4.1 Cleaning procedure A

7.4.1.1 Pre-cleaning with non-flammable detergent

- Clean the entire atomizer including the 60° intermediate flange with non-flammable detergent and a cloth or brush.
  Most of the dirt can be removed thus.

The atomizer cannot be cleaned residue-free with just non-flammable detergents.
Barely visible residues of paint and detergents form a protective film. This coat leads to leakage currents when the high voltage current is switched on.

7.4.1.2 Main cleaning with n-propanol or iso-propanol

- **Heavy contamination:** Before the main cleaning of the atomizer, pre-clean the atomizer with a wet cloth with non-flammable detergent.
- **Light contamination:** Carry out main cleaning without precleaning.
- Moisten a clean cloth with volatile cleaning agent (n-propanol or iso-propanol).
- Wring cleaning cloth well before cleaning.
- Remove the leftover dirt coat from the atomizer with the damp cloth.

7.4.1.3 Drying the atomizer

Dry the whole atomizer with a dry clean cloth.

7.4.2 Cleaning procedure B

7.4.2.1 Cleaning with non-flammable detergent

As an alternative to cleaning procedure A, you can also clean the atomizer exclusively with non-flammable detergent.

- Clean the surface of the atomizer including the 60° intermediate flange very scrupulously with non-flammable detergent.
  Only residues that can be removed completely while drying may remain.

7.4.2.2 Drying the atomizer

Dry whole atomizer with a clean, dry, anti-static cloth. Make sure you remove all residues completely.

ATTENTION

Risk of damage to property and production disruption

If you dry the atomizer incorrectly or incompletely, it will soil faster and more intensely, especially the electrode rings and the electrode tips.

Paint particles accumulate faster on wet spots on the atomizer. These paint particles can transfer onto the work piece to be painted (e.g. bodywork, bumper).

Wet spots can lead to leakage currents. This can lead to massive high voltage interference. The system controller will then turn off the high voltage.

By all means dry the atomizer carefully after cleaning.

Dürr Systems generally recommends to paint at high voltage. Where appropriate, voltage or current must be adapted to the conditions during painting.

If spots must be painted without high voltage, make sure that the electrodes are absolutely clean during the subsequent high voltage painting. If necessary, you have to clean the electrodes before painting with high voltage.

7.4.3 Scope of cleaning

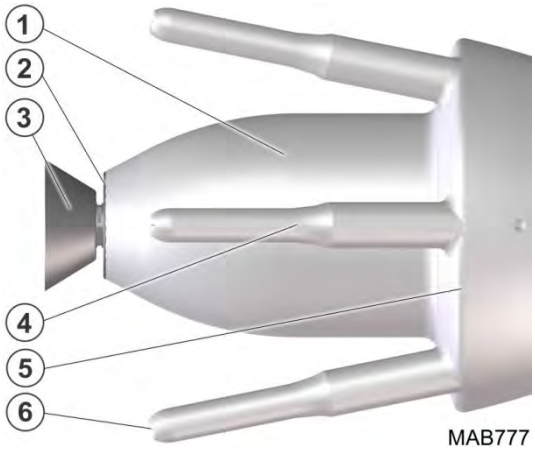


Fig. 35: Scope of cleaning

1 Outer contour atomizer body
2 Shaping air ring on the atomizer body
3 Bell disk
4 Electrode finger
5 Electrode ring
6 Electrode tips

7.4.3.1 Atomizer body

ATTENTION

Risk of damage to property and production disruption

Damage to body parts

Do not use an ultrasonic bath to clean body parts.

Cleaning in an ultrasonic bath causes micro-cracks on welds, which as a function of temperature, exposure, and detergent dissolve the weld. Clean only by hand with a brush, cleaning cloths, and compressed air.

Do not clean plastic parts in the ultrasonic bath!

Fig. 36: Cleaning the atomizer body

ATTENTION

Risk of damage to property and production disruption

The atomizer body can loosen.

Cleaning motions should be carried out in the direction of rotation of the thread of the atomizer body, not the other way.

- Wipe atomizer body with a damp cloth back to front.

7.4.3.2 Shaping air ring

Fig.37: Cleaning the shaping air ring

- Clean the outer surface of the shaping air ring.

- Visually check the shaping air ring:
  - Shaping air holes must be clean.
  - In case of heavy contamination that cannot be removed by rubbing, the atomizer body must be removed
    These tasks are described in the chapters “Removing and installing the atomizer body" and “Cleaning the shaping air ring."

7.4.3.3 Electrode fingers

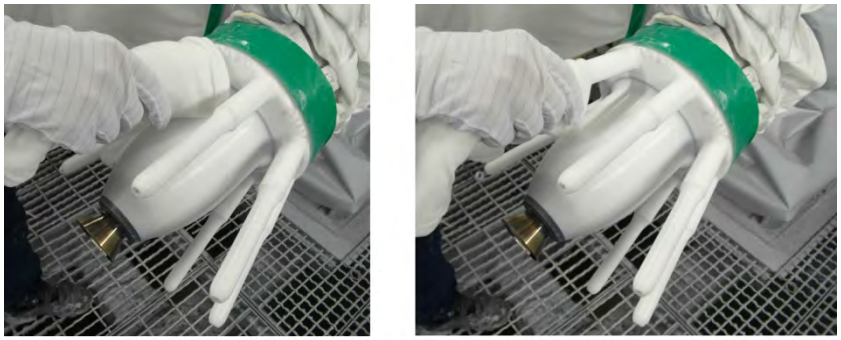


Fig. 38: Cleaning the electrode fingers

- Wipe electrode fingers body with a damp cloth back to front.

Fig. 39: Cleaning the electrode ring

- Wipe the ring of the electrode ring all the way around with a damp cloth.

Fig. 40: Cleaning the electrode tips

- Clean the electrode tips with a soft brush.

Fig. 41: Drying the electrode tips and electrode ring

- Dry electrode pins with air.
- Dry electrode ring with air.

7.4.3.4 Bell disk

ATTENTION

Material damage due to unsuitable cleaning agent

The aluminum bell disk is not resistant to water-based cleaning agents.

Do not immerse the aluminum bell disk in water-based cleaning agents for extended periods of time.

Fig. 842: Cleaning the bell disk

- Carefully wipe the exterior of the bell disk with a damp cloth.
- Wipe the entire front of the atomizer with a damp cloth.
- Check for damage to the edges of the bell disk.
- Replace damaged bell disk.
- Badly soiled bell disks should be removed and cleaned separately.

Removal and installation of the bell disk are described in the chapter "Installation of the bell disk."

7.4.3.5 Drying the atomizer

Fig. 43: Drying the entire atomizer

- Dry the entire atomizer with a clean, dry cloth.

7.4.3.6 Final work

- All components have to be correctly fitted as shown in the drawing and parts list.
- Check the flawless condition of assembly (damage, dirt, and function).
- Check for free movement of the bell disk.

  The bell disk with the shaft of the turbine must rotate by hand without resistance.

After cleaning, always check the distance between the shaping air ring and the bell disk. The distance may have changed.

ATTENTION

Risk of property damage and production disruption

In case of wrong assembly, shaping air ring and bell disk can rub against each other. Shaping air ring and bell disk can be damaged.

Check the distance between shaping air ring and bell disk. The bell disk should not rub against the shaping air ring.

7.5 Maintenance work

Staff:

- Assembly personnel

Protective equipment:

- Protective work wear
- Protective glasses
- Protective gloves
- Safety boots

The maintenance intervals are found in the maintenance plan. The work is described below:

- Dismantling and installing the bell disk
- Dismantling and installing the nozzle
- Replacing the electrodes
- Dismantling and installing the atomizer body
- Cleaning the shaping air ring
- Replacing the contact ring.

Maintenance position

In the Maintenance position, the atomizer is inclined upwards. In this position, residues of the liquid remain largely in the atomizer. This position is suitable for all maintenance work.

Fig. 44: Maintenance position

7.5.1 Assembling the bell disk

CAUTION

Risk of injury from sharp edges

The edge of the bell disk is sharp. You could get deep cuts.

Touch the bell disk only with protective gloves.
Use a special tool to screw the bell disk on and off. The special tool protects your hand and provides a secure grip while unscrewing.

The tool also protects the bell disk from damage.

Fig. 45: Special tool for bell disk

7.5.1.1 Unscrewing the bell disk from the shaft

The bell disk must not be turning anymore.

The atomizer is equipped with a shaft detent.

ATTENTION

Risk of property damage and production disruption

If the shaft detent is activated while the shaft of the turbine is still rotating, there will be significant damage to the pin of the detent and to the shaft of the turbine.

Use the shaft detent only when the shaft is stationary.

- Operate the shaft detent through the operator panel of the control unit.
  The pin of the shaft detent will extend after about 30 seconds.
- If necessary, rotate the bell disk slightly until the pin clicks audibly into place.
- Loosen the knurled screw on the special tool so that the clamp of the special tool can be opened up.
- Place the opened tool around the edge of the bell disk.

Fig. 46: Special tool on the bell disk

- Close the clamp carefully and tighten the knurled screw with light manual force.

  Only when the bell disk is in the correct position can the clamp be closed with minimal effort.
- Screw the bell disk counterclockwise from the shaft using the tool.

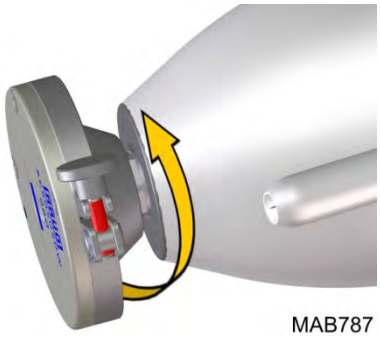


Fig. 47: Unscrewing the bell disk

- Remove the special tool from the bell disk.

7.5.1.2 Checking the distributor disk

The distributor disk can be dismantled, checked, and mounted again on the removed bell disk.

Dismantling the distributor disk

An assembly tool is required to remove the distributor disk from the bell disk housing (see chapter “Tool kit”).

The edge of the bell disk must not be damaged.

Place the edge of the bell disk on a soft, clean cloth on a flat working surface.

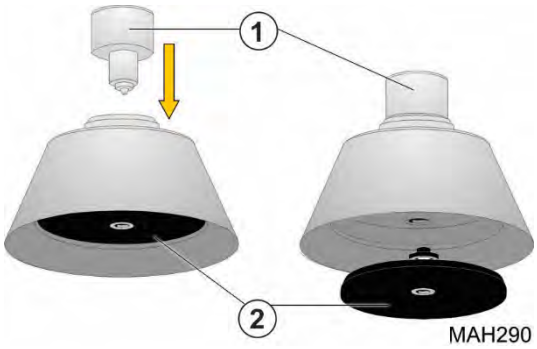


Fig. 48: Dismantling the distributor disk

1 Assembly tool
2 Distributor disk

- Place the front side of the bell disk on the cloth.
- Put the tool in the opening on the rear of the bell disk.
- Press the tool into the bell disk with the ball of the thumb using normal manual force.
- With a light push, the distributor disk gets released from its seat in the bell disk.

If the distributor disk is released from the bell housing without a push, the retaining ring of the distributor disk must be checked.

- Remove the special tool from the housing of the bell disk.

Checks at the distributor disk and bell disk

Distributor disks can only be cleaned. Damaged distributor disks cannot be repaired. They can only be replaced by new distributor disks.

After dismantling the distributor disk, check the following:

- Cleanliness and condition of the distributor disk and the position in the bell disk housing.
  Both must be clean and without residue. Soiling in these areas can cause an uneven distribution of paint.

- Damage to the distributor disk that originates from contact with the nozzle.
  Replace damaged distributor disk.

Assembling the distributor disk

An assembly tool is required to install the distributor disk in the housing of the bell disk (see chapter “Tool kit”).

Before starting the assembly, inspect the following:

- Distributor disk is in mint condition.
- Distributor disk is absolutely clean.
- Bores and gap of the distributor disk are absolutely clean.
- Retaining ring is in order.
- Housing is clean.
- Edge is in order.
- Knurling of the bell disk, if applicable, is in order.
- Thread and cone of the bell disk are clean and without damage.
- All bores in the bell disk housing are uncluttered and clean.

The parts must be assembled only when they are in good condition. Unclean or damaged parts cause disruptions in the operation of the atomizer.

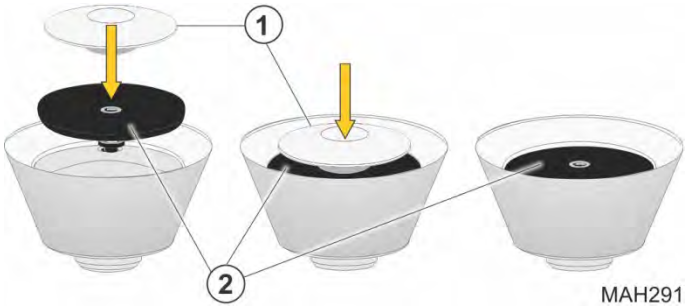


Fig. 49: Assembling the distributor disk

1 Assembly tool
2 Distributor disk

- Insert the distributor disk in the housing.
- Take the bell disk in both hands.
- Set up the assembly tool.
- Press uniformly with both the thumbs on the assembly tool, until the distributor disk audibly clicks into place in the housing.
- Have a look at the opening on the rear side of the bell disk to check the correct seating of the distributor cap.
  In the opening, the end of the distributor disk must smoothly align with the contours of the bore.

ATTENTION

Danger from tilted distributor disk

This could result in damage to the distributor disk.

Pay attention while assembling the distributor disk and make sure that the distributor disk is not tilted while pressing it into the housing.

If the distributor disk does not engage in the housing, the distributor disk must be disassembled again.

- Inspect the retaining ring of the distributor disk and replace it, if necessary.
- Turn the bell disk by 90° and press it on the assembly tool again.

ATTENTION

Danger from tilted distributor disk

This could lead to production disruptions.

At the time of assembly, make sure that the distributor disk is correctly seated in the housing.

An incorrectly assembled distributor disk will cause disruptions in operation:

- The paint is not evenly spread
- The bell disk gets dirty sooner
- The bell disk cannot be easily cleaned.

7.5.1.3 Screwing the bell disk onto the shaft

The assembly of the bell disk follows the reverse sequence of the disassembly.

- First, make sure that the thread and cone of the bell disk and of the shaft end are absolutely clean. Paint residue must also not be present.

WARNING

Danger from bell disk

Soiling of the thread can impede the proper mounting of the bell disk. The bell disk may detach from the shaft.

Completely remove all soiling.

There is a thread cleaner that considerably facilitates this cleaning work. The Thread cleaner is discussed in the chaoter on “Accessories”.

- Activate the shaft detent.
- To clean the thread, carefully turn the thread cleaner in the thread of the hollow shaft to its stop.

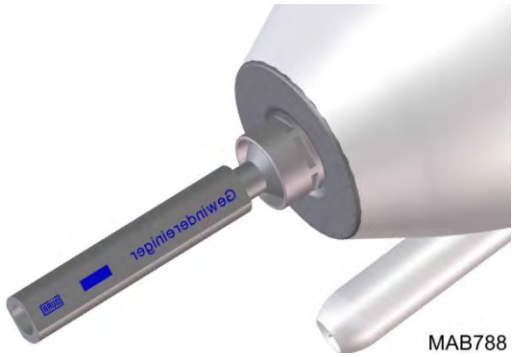


Fig. 50: Thread cleaner in the thread of the hollow shaft

- Remove the thread cleaner again from the shaft.
  If necessary, repeat the process several times.
- Remove the residue loosened by the thread cleaner from the hollow shaft.

Bell disk and shaft end must be undamaged.

Loosen the knurled screw on the special tool so that the clamp of the special tool can be opened up.

Fig. 51: Bell disk with tool

- Place the bell disk into the open tool.
  The bell disk must sit with its edge in the solid half shell.
- Close the clamp carefully.
  Only when the bell disk is in the correct position can the clamp be closed with minimal effort.
- Tighten the knurled screw with light manual force.

ATTENTION

Risk of damage to property and production disruption

Thread of the bell disk can be damaged.

First, screw the bell disk onto the shaft by hand, without a torque wrench. Just apply manual force.
Screw the bell disk onto the shaft only if it can be done easily.

If the bell disk is screwed improperly onto the shaft end of the turbine, the threads of bell disk and turbine may be damaged. An improperly mounted bell disk leads to irreparable damage to the turbine.

- Set the bell disk on the shaft end manually and turn the bell disk a few times on the thread.
- For final tightening, set the torque wrench on the special tool.

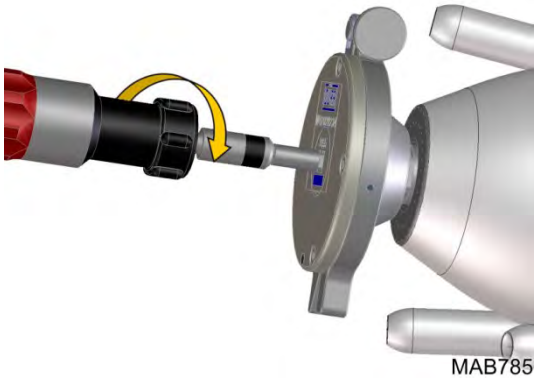


Fig. 52: Mounting the bell disk

ATTENTION

Risk of damage to property and production disruption

Not maintaining the given torque will inevitably cause damage to bell disk and turbine.
Moreover, malfunction must be expected during operation.

Watch the torque when screwing on the bell disk.

- Screw the bell disk tight onto the shaft with a torque of 6 Nm.
- Remove the torque wrench from the bell disk using the special tool.
- Release the shaft detent.

7.5.1.4 Final check

- Check the flawless condition of assembly (Damage, dirt, and function).

Turbine shaft with bell disk must move freely.

ATTENTION

Risk of property damage and production disruption

In case of wrong assembly, shaping air ring and bell disk can rub against each other. Shaping air ring and bell disk can be damaged.

Check the distance between shaping air ring and bell disk. The bell disk should not rub against the shaping air ring.

7.5.2 Installing and dismantling the nozzle

The nozzle is located at the end of the paint tube and can be reached via the opening of the turbine shaft.

7.5.2.1 Dismantling the nozzle

Prerequisite is that the bell disk is dismantled.
The disassembly of the bell disk is described in chapter "Installation and dismantling of bell disk".

- Place the special tool on the nozzle.
- Unscrew the nozzle counterclockwise from the paint tube using the special tool.

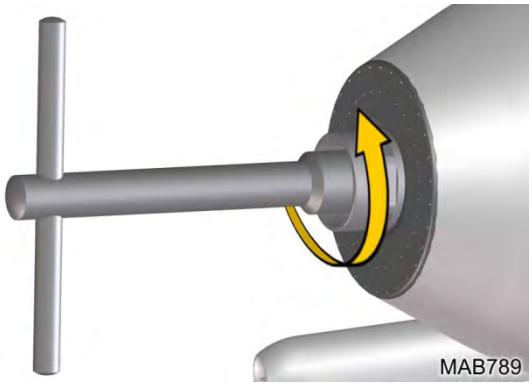


Fig. 53: Unscrew and remove the nozzle with the special tool

Checking the nozzle

- Check the condition of the nozzle.

The holes for paint and rinsing the bell disk must be in good condition. If necessary, compare the used nozzle with a new one. The nozzle tip must be free from damage and dirt.

If necessary, the nozzle can be cleaned.

Place the nozzle in a bath of detergent for cleaning. The container for the bath should be made of glass or plastic. With electrically conductive containers, the surface of the nozzle can be damaged. If necessary, the bores of the nozzle can be cleaned using suitable probes. Make sure that the bores are not damaged in any way.

Worn out or damaged nozzles must be replaced.

7.5.2.2 Installing the nozzle

The installation of the nozzle is carried out in the reverse order of removal.

- Insert the nozzle in the special tool.
- Screw the nozzle clockwise into the paint tube with the special tool.

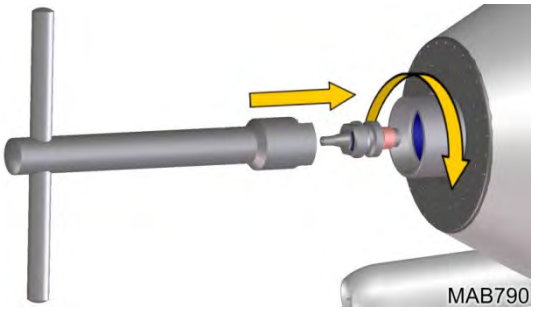


Fig. 54: Inserting the nozzle with the special tool

- Screw the nozzle tight with a torque of 4Nm.

7.5.3 Replacing the electrodes

No repairs must be carried out at the electrodes. It can not be confirmed if the electrode has been mounted correctly. Correct operation of the high voltage is not guaranteed.

A faulty electrode must be replaced with a new electrode.

7.5.3.1 Removing the electrodes

⚠ CAUTION

Sharp tip of the electrode

Danger of superficial skin injuries.

Only touch sides of the housing and not needle tip. Wear protective hand gloves.

- Unscrew the electrode in counterclockwise direction from the electrode ring.
- Remove the sealing ring from the thread of the electrode.

7.5.3.2 Installing the electrodes

- Screw the new electrodes with sealing rings in a clockwise direction into the electrode ring. Use minimal force.

  The electrode must be flush.
- Electrode and electrode ring must be cleaned with isopropyl alcohol after the installation.

7.5.4 Dismounting and mounting atomizer body

The atomizer body is screwed on at the upper edge of the valve block. The atomizer body and the shaping air ring are firmly interconnected. If the shaping air ring is worn out or damaged, the whole atomizer body must be replaced.

The atomizer body must be unscrewed from the atomizer in order to carry out the following tasks:

- Cleaning the shaping air ring
- Replacing atomizer body

To work on the interior components, first remove the entire atomizer from the flange package. Carry out all subsequent works in the workshop. Remove atomizer body only in the workshop.

7.5.4.1 Dismantling the atomizer body

Once the atomizer is detached from the flange, it can be attached to the assembly support. The assembly support is clamped in a vise.

- Unscrewing the bell disk
  See chapter “Bell Disk Assembly”.

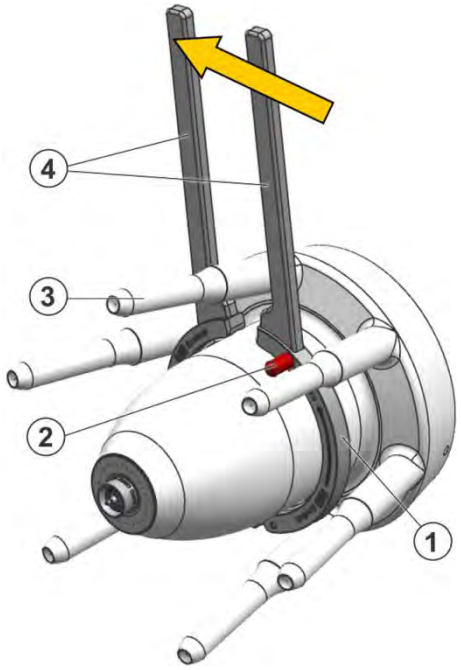


Fig. 55: Pliers on the atomizer body

1	Pliers	3	Uppermost Finger
2	Bolt	4	Handle

- Place pliers (1) around the atomizer body
  Bolt (2) must point forward.
- Position handle of the pliers (4) pointing up around the topmost finger (3).
- Loosen atomizer body carefully using the pliers.
  Do not damage the finger. Set multiple number of times if necessary.
- Remove pliers (1).

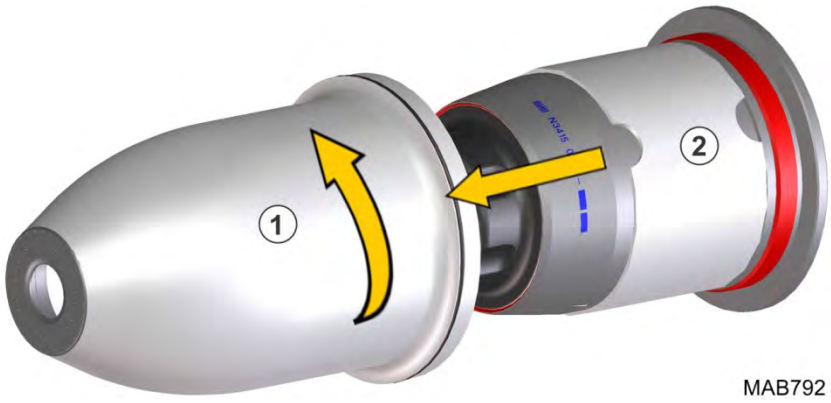


Fig. 56: Removing atomizer body and sleeve

1 Atomizer body
2 Sleeve

- Hold atomizer body (1) with both hands.
- Unscrew the atomizer body (1) counterclockwise.
- Pull off sleeve (2).
  The sleeve must be removed only if work is needed on the valves.

7.5.4.2 Install atomizer housing

Use only an atomizer body in mint condition.
Damage to the atomizer body, especially at the shaping air ring, negatively affect the paint result.

Fig. 57: Interior view of the atomizer body

1 O-Ring
2 Thread

- Check threads (2) in the atomizer body of the atomizer. Clean the thread, if necessary.
- Lightly apply 2 ml petroleum jelly on threads (2) in the atomizer body. Make absolutely sure that no surplus grease gets into the shaping air ring.
- Check O-Ring (1). Replace a damaged O-ring.
- Lightly apply petroleum jelly on the O-ring (1). When operating, no petroleum jelly may get into the shaping air ring.

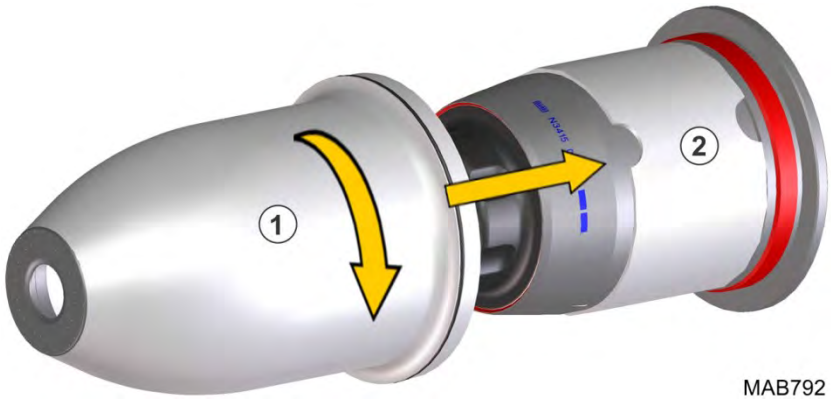


Fig. 58: Assembling the atomizer housing

1 Atomizer housing
2 Sleeve

- Push sleeve (2) up to the stop on the valve block.
- Push atomizer body (1) on to the valve block and tightly screw it by hand, until it stops.

Never tighten atomizer body using the pliers. The force exerted by the pliers is too high. Threads and atomizer body can be damaged. Tighten atomizer body only by hand.

- Screw the bell disk on the shaft of the turbine.

For installing the bell disk, follow the chapter "Bell disk assembly".

Final Inspection

- All components fully installed according to drawing and parts list.
- No gap between body and valve block?
- Surface is not scratched and is clean.
- Check smooth operation of the bell disk.
  The bell disk with the shaft of the turbine must rotate by hand without any resistance.
  No grinding sounds when the shaft rotates?

After cleaning and assembly work, always check the distance between shaping air ring and bell disk. The distance may have changed.

ATTENTION

Risk of property damage and production disruption

In case of wrong assembly, shaping air ring and bell disk can rub against each other. Shaping air ring and bell disk can be damaged.

Check the distance between shaping air ring and bell disk. The bell disk should not rub against the shaping air ring.

The procedure for distance check is described in the chapter on “Final steps after maintenance activities”.

The atomizer may only be operated if the correct distance between shaping air ring and bell disk is ensured.

7.5.5 Cleaning the shaping air ring

The shaping air ring is a component of the atomizer body. For this reason, the atomizer body must be dismantled in order to clean the shaping air ring. The dismantling of the atomizer body is described in the chapter "Dismantling of atomizer body."

- Always clean the atomizer body with a damp cloth. At no point, use tools that could damage the surface.
- The shaping air ring must be cleaned from the inside and the outside with a suitable cleaning agent.

  The cleaning agent used is based on the paint used.

Do not place the atomizer body in a bath of cleaning agent for an extended period of time. Aggressive cleaning agents can damage the surface of the atomizer body.

ATTENTION

Danger of damage to property and interruption of production

Tools can cause damage to the fine bores of the shaping air ring.

Clean the shaping air ring only with liquid cleaning agent.
Never clean the holes of the shaping air ring with compressed air.

A damaged shaping air ring cannot be repaired. Use a new atomizer body in this case. The installation of the atomizer body is described in the chapter "Install atomizer body."

7.5.6 Replacing the contact ring

The contact ring is bolted to the color tube with three screws.
The turbine must be dismantled in order to remove the contact ring.

7.5.6.1 Dismantling the contact ring

- Release the three screws on the contact ring and remove the contact ring.

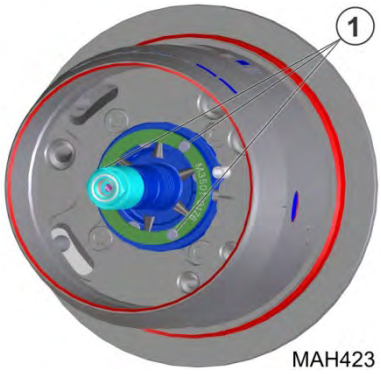


Fig. 159: Screws on the contact ring

1 Screws

7.5.6.2 Installing the contact ring

For the assembly of the contact ring there is a centering sleeve. The contact ring must be centered on the flange of the color tube with the centering sleeve. Only when the contact ring is in the correct position, the three screws must be used and tightened.

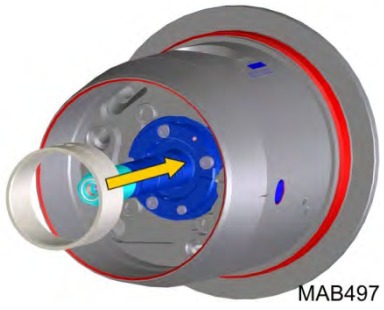


Fig. 260: Placing the centering sleeve

- Push centering sleeve over the paint tube.

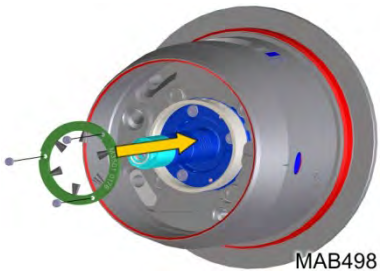


Fig. 361: Placing the contact ring

- Carefully insert the contact ring.
- Align the contact ring in the centering sleeve with the fastening holes.
- Secure the contact ring with three screws at 0.8 Nm.
- Remove the centering sleeve.

7.6 Final work after maintenance activity

Always check the distance between shaping air ring and bell disk after cleaning and assembly work. The distance may have changed.

ATTENTION

Risk of property damage and production disruption

In case of wrong assembly, shaping air ring and bell disk can rub against each other. Shaping air ring and bell disk can be damaged.

Check the distance between shaping air ring and bell disk. The bell disk should not rub against the shaping air ring.

If the bell disk rubs against the shaping air ring, atomizer body, shaping air ring and bell disk should be disassembled and reassembled.
Then check the distance again.

The atomizer must not be operated with a rubbing bell disk.

Finally, the following work should be executed:

- Clean the entire atomizer by hand with isopropyl alcohol.
- Check that the atomizer is assembled completely.
- Ensure that there are no loose objects (tools, spare parts, cloths) in the cabin.
- Rinse the atomizer.

Only then the atomizer should be used.

8 Faults

8.1 Safety provisions

Repairs to individual components of the product are not approved by the manufacturer. You may only replace damaged components. The corresponding spare parts can be found in the Chapter "Spare parts"

If you have any questions about maintenance and repair work or need assistance in staff training, please contact our training department (see "Contacts & Hotline").

CAUTION

Spare parts that are not approved by Dürr Systems, may not withstand the loads

Damage and production interruption can result.

Use only original spare parts.

WARNING

Risk from explosive atmospheres

Sparking can cause an explosion.

Before entering the booth, and the use of ground rod no explosive atmosphere may be present in the booth.

The spray system must be in the "maintenance" mode before entering the spray booth. Make sure that nobody can switch on the system again, as long as someone is in the spray booth.

WARNING

Danger from high voltage

Risk of electric shocks and discharges.

First touch atomizer with a grounding rod and discharge before touching the atomizer.

Always carry out repairs in the workshop.

Remove the defective atomizer and replace it with one which works. Thus, production can continue and the defective atomizer can be repaired in the workshop.

WARNING

Risk of harmful or irritant substances

If you come into contact with hazardous liquids or vapors, death or serious injury may result.

Get information about the specific hazards of the materials used.
Follow the safety instructions of the material manufacturer.
Wear appropriate protective clothing, gloves, eye protection and respiratory equipment.

WARNING

Material can escape uncontrollably under high pressure and enter the body

Death or serious injury can result.

Before starting maintenance and repair work, disconnect the system into which the atomizer is built, from any power supply and secure any form of energy source against reconnection.

WARNING

Danger from noise

When releasing pressure-prone pneumatic lines loud noise is created. The hearing may be damaged.

Never disconnect cables which are pressure-prone. Wear ear protection.

8.2 Fault Indicator

Faults/alarms are displayed on the control. Please pay attention to the manual of the control function.

There are no fault indicators in the atomizer itself. Faults in the atomizer can be perceived only by:

- Noise
- Poor painting results
- Leakages
- Increased pollution
- Malfunctions.

8.3 Behavior during faults

Should there be a fault, then kindly note the following instructions:

- Switch off the system and protect it against reconnection. Enable "Maintenance" mode.
- Completely separate material supply and compressed air.
- Discharge the residual energy (earthing rod).
- Troubleshooting according to the fault table or as specified in the control documentation.

8.4 Troubleshooting

Personnel:

- Assembly personnel

Protective equipment:

- Protective clothing
- Protective glasses
- Protective gloves
- Safety boots

The table below lists possible faults during the operation of the atomizer. Possible causes and fixes are specified.

Type of fault	**Possible cause** 9 **and fix**
Leakage	Leaking seal between the components - Assemble the atomizer correctly Leaking hose - Replace the hose on the flange assembly
Atomizer not working correctly	Bell disk not installed Missing bell disk - Install the bell disk correctly Damaged bell disk

	- Replace the bell disk Bell disk not attached correctly - Thoroughly clean the shaft and turbine Reattach the bell disk Dirty bell disk - Clean the bell disk Reattach the bell disk Distance between control air ring and bell disk incorrect - Install atomizer body, paint tube, turbine, and valve block correctly Dirty shaping air ring - Clean the shaping air ring Damaged shaping air ring - Replace the atomizer body Incorrect turbine speed - Correct speed (wrong parameter) Blocked nozzle - Clean the nozzle - Replace the nozzle

Rinsing result insufficient	Unsuitable cleaning agent - Change the cleaning agent Incorrect turbine speed - Correct speed (wrong parameter) Blocked nozzle - Clean the nozzle - Replace the nozzle
Turbine Incorrect speed	Turbine does not reach the set speed - Bell disk not screwed on the thread properly - Bell disk is imbalanced due to a damage - Inspect the hoses for motor air - Reflector disk of the turbine is dirty - Replace the Turbine Stopping operation takes too long - The pressure of the break air is insufficient - Leaking break air line
Turbine shaft detent does not work	Defective shaft detent - Defective solenoid valve - replace - Damaged shaft detent - replace - Replace the turbine

Heavy soiling	High voltage connector does not contact the electrode ring correctly - Check clearance Damaged electrode tips - Replace electrode tips High voltage cables are not routed correctly - Check routing (dry, bend radius at least 100 mm) - Replace if required
High voltage fault notification	Defective external charging - replace Defective high voltage cable - replace Defective high voltage generator or controller - Replace generator or controller Spacing between electrodes and grounded component to small - Correct spacing excessive soiling - Clean

The required steps are described in various chapters:

Repair

- Removing and installing the valve block
- Removing and installing the turbine
- Removing and installing the light conductor
- Removing and installing the shaft detent
- Removing and installing the main needle
- Removing and installing the color tube
- Removing and installing the valve
- Replacing the hose at the flange assembly

Cleaning

- in chapter “Cleaning”.

Maintenance

- Removing and installing the bell disk
- Removing and installing the nozzle
- Removing and installing the atomizer body

9.1 Mounting the valve block

The valve block must be dismantled together with the atomizer body. All subsequent work can then be carried out in the workshop.

The valve block must be dismantled for the following procedures:

- Dismantling of the electrode ring
- Work on the turbine
- Work on the fiber optics
- Work on the shaft detent
- Work on the main needle
- Work on the color tube
- Work on the rinsing valve
- Hose change at the flange assembly

9.1.1 Dismantling the valve block

If further work is to be carried out after the dismantling, remove the bell disk first. Information regarding the dismantling of the bell disk can be found in the chapter "Dismantling the bell disk”.

NOTICE

Danger of damage to property and interruption of production

The atomizer may fall down.

Hold the atomizer before releasing the clamping screw.

- Hold the atomizer.
- Release the central clamping screw of the atomizer in the electrode ring.
- Remove the atomizer.

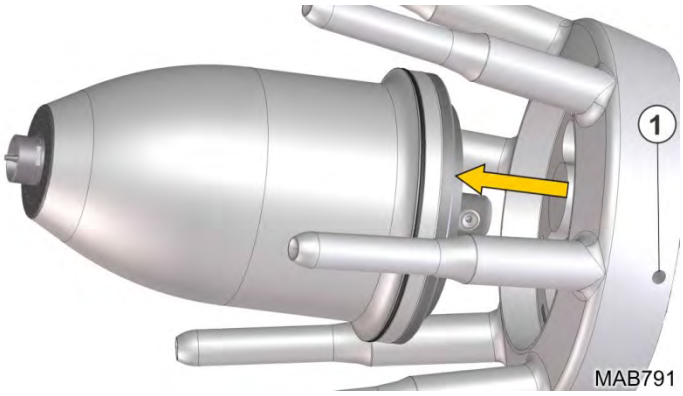


Fig. 162: Loosening the atomizer

1 Central clamping screw

- Move and clamp the atomizer for further assembly work in the workshop.
- Dismantle the atomizer body (see Chapter “Dismantle the atomizer body”).

9.1.2 Mounting the valve block

Requirements:

- The electrode ring is mounted on the flange.
- Sleeve and atomizer body are mounted.

- Place the atomizer in its correct position.

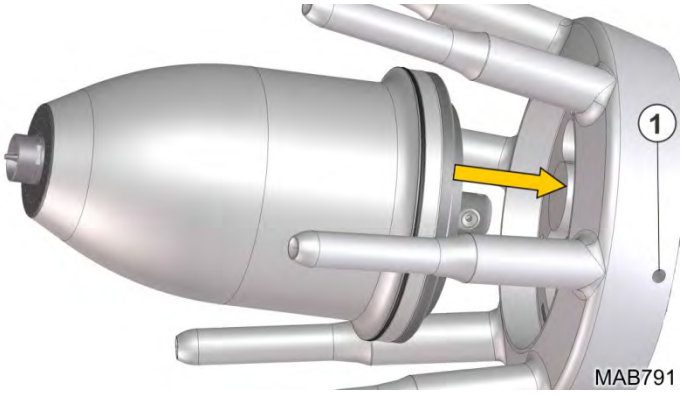


Fig. 263: Fastening the atomizer

1 Central fastening screw.

- Fasten the clamping spigot with the help of central fastening screw.

The valve block with atomizer body must be flush with the electrode ring. There should not be any gaps.

Finally mount the bell disk if required. Information for mounting the bell disk can be found in the chapter “Mounting the bell disk”.

9.2 Mounting the turbine

To dismantle the turbine, the atomizer body must be dismantled. The information regarding dismantling the atomizer body is found in the chapter "Dismantle atomizer body"

9.2.1 Dismantling the turbine

- Place the special tool on the screw cap of the turbine.

Fig. 64: Special tool for screw cap

- Turn the screw cap counterclockwise.
  If necessary, a half-inch wrench can be fixed on the special tool.

Fig. 65: Unscrew the screw cap

- Remove the screw cap from the turbine.

Fig. 66: Removing screw cap

- Loosen the turbine from its seat in the valve casing.
- Remove the turbine from the valve casing.

Fig. 67: Removing the turbine

9.2.2 Installation of the turbine

- Check condition and completeness of the five sealing rings.

Fig. 68: Sealing rings at the turbine connections

- Push turbine carefully on the paint tube and align with the valve casing. Pay attention to the markings on the turbine and the valve casing.

Fig. 69: Markings

- Set the turbine in the valve casing.
- Place the swivel nut.
- Tighten the swivel cap with the specialized 8 Nm tool.

Fig. 70: Tightening the screw cap

After installation of the turbine, the position of the nozzle must be checked.

9.2.3 Checking the position of the nozzle

- Instead of the bell disk, screw the test sleeve into the shaft.
- Visually inspect the centric position of the nozzle.

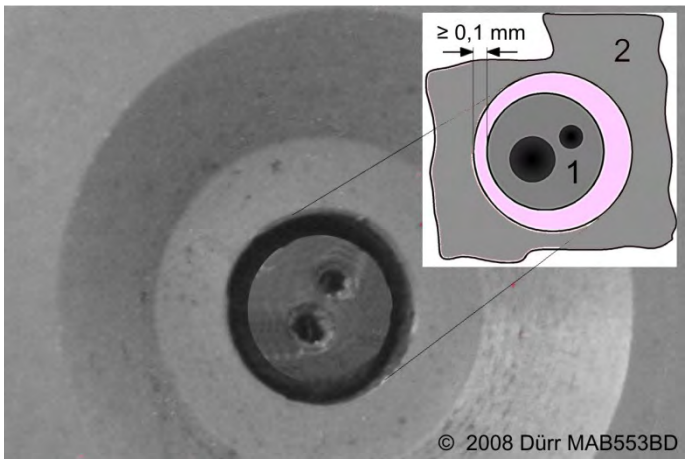


Fig. 71: Test sleeve, clearance for nozzle centering

1 Nozzle
2 Test sleeves

Should the tip of the nozzle not be in the correct position, it can be corrected using the following steps.

- Disassembling the turbine.
- Dismantle the paint tube.
  Paint tube and seat of the paint tube must be clean.
- Assemble the paint tube.
  Pay attention to the correct position and the correct tightening torque.
- Install the turbine.

Then the position of the nozzle must be checked again.

9.3 Installation of the light conductor

In order to assemble the light conductor, the valve block must be removed and dismantled from the turbine. Information about this is available in the chapters "Remove Valve Block" and "Remove Turbine."

9.3.1 Removing the light conductor

In order to remove the light conductor, you must first remove the chuck.

- Loosen screws on the inside of the valve block.

  The screws are secure against loss. The screws need to be only loosened and not removed completely.

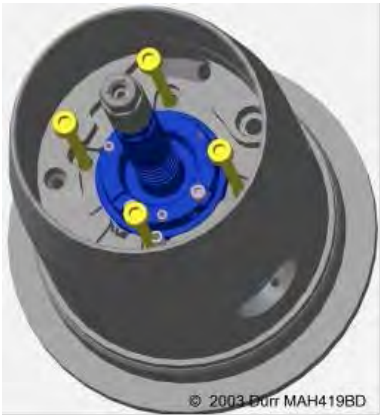


Fig. 172: Mounting bolts for the chuck

- Turn the valve block around.
- Pull the chuck out.

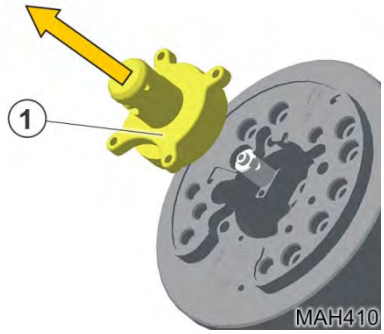


Fig. 273: Removing the chuck

1 Chuck

- Slide the special tool on the light conductor.

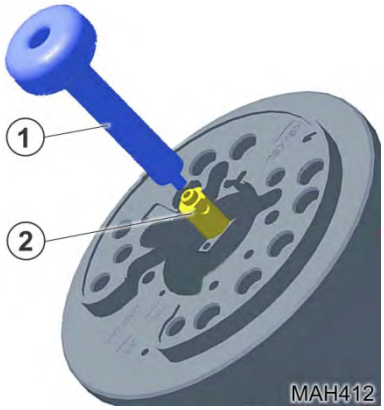


Fig. 374: Dismantling the light conductor

1 Special Tool
2 Light conductor

- Plug the two pins on the tool into the end of the light conductor .

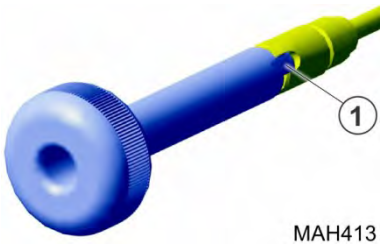


Fig. 475: End of light conductor with special tool

1 Pin on special tool

- Unscrew the light conductor from the valve block with the tool.

9.3.2 Cleaning the light conductor

If the interfaces of the light conductor are dirty, then they can be cleaned with a damp cloth. But note the following points:

- Only slightly turn the light conductor.
- Do not bend the light conductor.

9.3.3 Testing the light conductor

- Direct one end of the light conductor towards a light source.
- Put the other end in a position where no light shines directly on the cut surface.

  In an intact light conductor, the cut surface is evenly illuminated.

If the light conductor is defective, it must be replaced.

9.3.4 Installing the light conductor

- Screw the light conductor into the valve block with the special tool.
- Attach chuck and hold it.
- Turn the valve block around.
- Tighten the screws on the inside of the valve block with 3.2Nm.

9.4 Mounting of the shaft detent

The shaft detent must be removed if it is defective or if the color tube must be removed.

The valve block must be dismantled and the atomizer body removed.

9.4.1 Dismantling of the shaft detent

- Unscrew the lid of the shaft detent from the valve block. For this purpose, use the special tool for fiber optics.

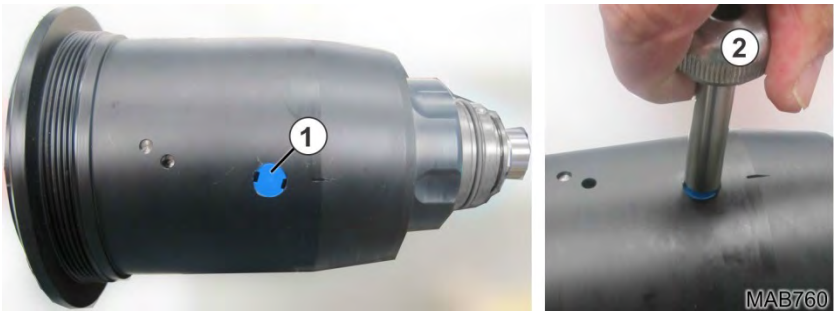


Fig 176: Lid of the shaft detent

1 Lid
2 Special fiber optics tool

- Remove the shaft detent from the body.

Fig. 277: Removing the detent from the body

9.4.2 Installation of the shaft detent

- Lightly grease the O-ring of the shaft detent with special grease (see chapter 10 in “Auxiliary materials for maintenance”).
- Insert the shaft detent.
- Screw in the lid of the shaft detent with the special fiber optics tool.

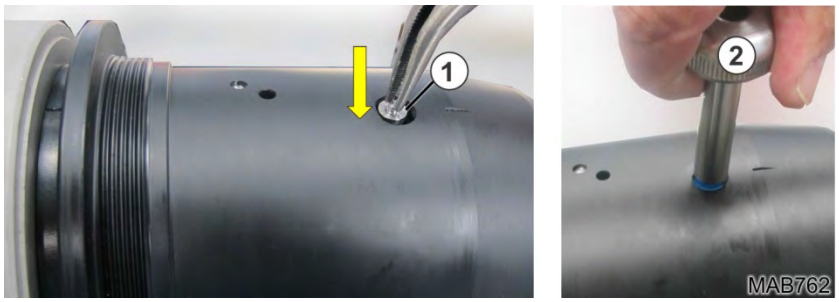


Fig. 378: Installing the shaft detent

1 Insert the shaft detent.
2 Screw the lid tight.

9.5 Installing the main needle valve

The main needle valve is located in the valve block.
The clamping device must be removed before the main needle valve can be removed. For information about dismantling the clamping device see chapter “Removing fiber-optic cables”.

All channels controlled by the valve should be rinsed and dry.

9.5.1 Removing the main needle valve

The main needle valve is covered by a lid. To remove the main needle valve, the lid must be removed first.

- Remove two screws of the lid.

Fig. 79: Back of the valve block

1 Screws on lid

- Remove the lid.
- Use a socket wrench to remove the main needle valve from the valve block.

Fig. 80: Removing the main needle valve

9.5.2 Installing the main needle valve

Prior to the installation of the main needle valve check its condition.

- The main needle valve must be equipped with the required sealing rings.
- The sealing rings must be lubricated with special grease.
- The main needle must be straight and undamaged.
- The thread of the main needle valve and the valve casing must be completely clean.
- The thread of the main needle valve must be lubricated with special grease.
- Main valve needle must only be installed in the valve casing when the paint tube is mounted on the valve block. Otherwise there is a risk that the main needle is bent during installation of the paint tube.

Follow these steps:

- Carefully insert the main needle valve into the bore of the valve block.
- The main needle valve must be manually screwed into the thread. It must be possible to screw the main needle valve with minimal effort. Do not damage the threads in the valve block.
- Tighten the main needle valve in the valve block with a socket wrench to 4.5 Nm.
- Align the lid on the valve block. Pay attention to the position of the pins.
- Insert screws in the holes.
- Tighten screws to 5.5 Nm.

9.6 Working on paint pipe

The paint pipe is lodged in the valve block.

Before removing the paint pipe, the following work should be done:

- Valve block removed
- Shaft detent removed
- Chuck removed
- Main needle valve removed
- Nozzle removed
- Contact ring removed.

9.6.1 Removing paint pipe

- Loosen the three screws at the bottom of the paint pipe.

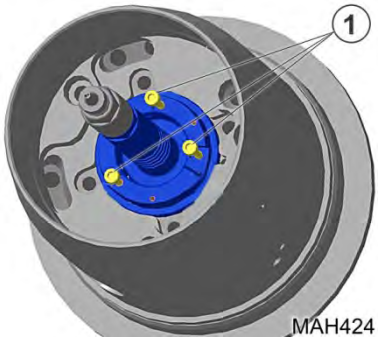


Fig. 81: Screws on the paint tube

1 Screws

- Pull out the paint tube from the valve block.

9.6.2 Checks on removed paint pipe

- Damage to the paint pipe, especially by contact with the turbine shaft
- Cleanliness of bores and channels
- Cleanliness and functioning of the contact for the high voltage (ball).

9.6.3 Disassembling the paint pipe

The nozzle holder of the paint pipe is unscrewed in the following way:

- Set one open-end wrench on the hexagon of the paint pipe.
- Set second open-end wrench on the nozzle holder.

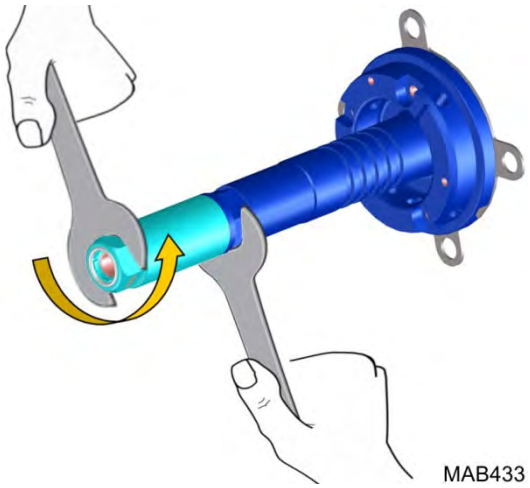


Fig. 82: Two open-end wrenches on the paint pipe

Secure the paint pipe. Paint pipe and nozzle holder can be loosened only with increased manual force if paint has leaked into the thread.

- Unscrew the nozzle holder from paint pipe.

The needle seat is in the nozzle holder. The paint tube without recirculation has an additional seal for the main needle.

Checks on disassembled paint pipe

- Cleanliness of bores and channels
- Cpondition of the needle seat
- For recirculation: Condition of the seal, especially in the area of main needle.

9.6.4 Assembling the paint pipe

9.6.4.1 Paint tube with recirculation

In the case of paint tube with recirculation, only the needle seat is in the nozzle holder. The positioning pin on the paint tube and the guide for the detergent determine the mutual position of the parts.

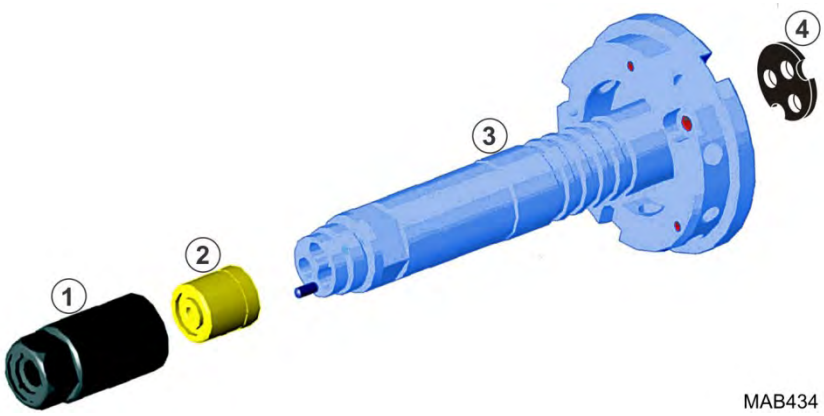


Fig. 83: Parts of the Paint Tube

1	Nozzle holder	2	Needle seat
3	Paint tube	4	Seal

- Lightly apply special grease on external surface of the needle seat (2) (see operating materials for maintenance).
- Push needle seat (2) into the nozzle holder (1).
- Apply a thin layer of thread protection on the paint tube (see operating materials for maintenance).Apply thread lock to thread of push-in fitting.
- Tighten nozzle holder (1) with 12 Nm on the paint tube (3).
  Make sure the nozzle holder is flush with the paint pipe after the tightening.
- Insert seal (4) at the foot of the paint tube.

9.6.4.2 Paint tube with recirculation

In order to ensure correct positioning of all components during assembly and to avoid a twisting of needle seal and needle seat during assembly, the assembly tool should be used.

- Determine the position of the main needle bore.

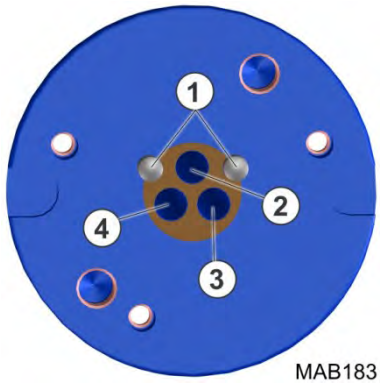
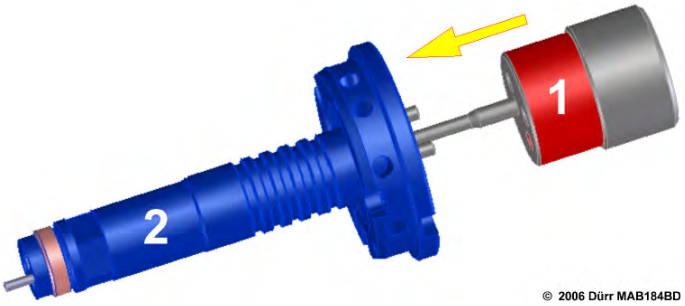


Fig. 84: View of the paint pipe from behind

1 Positioning pins
2 Paint bore
3 Main needle bore
4 Bore for quick rinse (KS)

- Insert the assembly tool for assembly of the paint pipe securely from behind into the main needle bore of the paint pipe.



Fig, 85: Inserting the assembly tool into the paint pipe

1 Assembly tool
2 Paint pipe

- Twist the assembly tool till the positioning pins on the paint pipe line up with the bores on the face.

- Apply the assembly tool flush on the paint pipe.

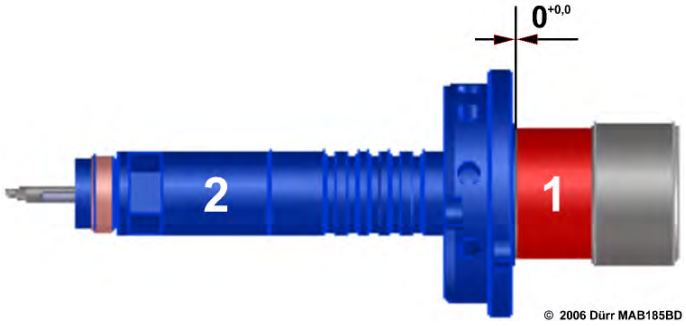


Fig. 86: Applying the assembly tool to the paint pipe

1 Assembly tool
2 Paint tube

- Grease the sealing lip of the needle seal lightly using special grease.
- Push needle seal carefully on the assembly tool with the sealing lip outwards.

Fig. 87: Applying the needle seal

1 Assembly tool
2 Paint pipe
3 Needle seal
4 Sealing lip

- Carefully put the needle seat in the correct position on the assembly tool. Note the position of the dowel on the needle seat.
- Lightly grease the needle seat outside with special grease, at the marked locations.

Fig. 88: Pushing up needle seat

1 Assembly tool
2 Paint pipe
3 Needle seat
4 Lightly lubricate with special grease

- Paint the threads on the paint tube with screw lock.

- Screw the nozzle holder on the paint tube.

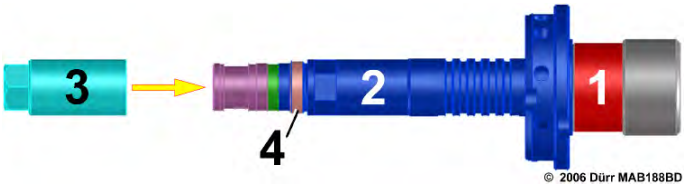


Fig. 89: Attaching nozzle holder

1 Assembly tool
2 Paint pipe
3 Nozzle holder
4 Coat thread with Screwlock

- Tighten nozzle holder with 12 Nm on the paint tube.
  Make sure the nozzle holder is flush with the paint pipe after the tightening.

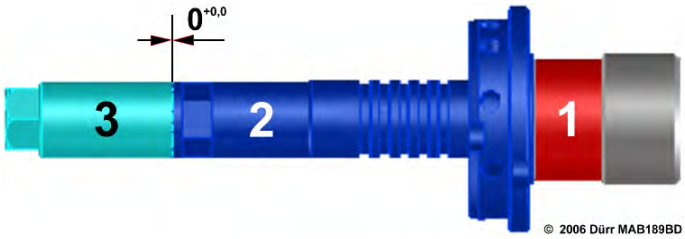


Fig. 90: Making sure the nozzle holder is flush

1 Assembly tool
2 Paint pipe
3 Nozzle holder

- Once work is completed, carefully pull the assembly tool out of the paint pipe.

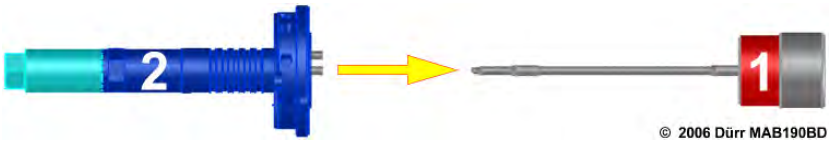


Fig. 91: Removing the assembly tool

1 Assembly tool
2 Paint pipe

- Insert seal at the foot of the paint tube.

9.6.5 Mounting the paint pipe

The following is prerequisite for mounting the paint pipe on the valve block:

- The paint pipe is clean.
- The seal of the paint pipe on the valve block is new or like new.
- The flange surface on the valve block is clean and undamaged.

Following steps are to be undertaken:

- Put seal in the sealing surface on the valve block.
- Align the paint pipe to the flange surface of the valve block. Check the markings in the paint pipe and the valve block.

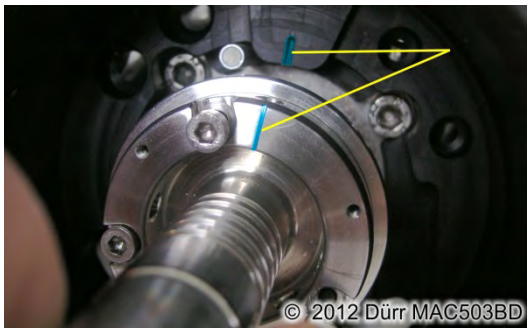


Fig. 92: Markings on the paint pipe and valve block

ATTENTION

Risk of property damage and production disruption

Over-tightening the screws will pull the thread inserts from their housings.

Observe the tightening torque.

- Tighten the three screws in turn with 0.8Nm max.

Once the paint tube is installed, the following work is yet to be carried out:

- Mount the contact ring.
- Attach the nozzle.
- Mount the main needle valve.
- Attach the chuck.
- Assemble the shaft detent.
- Attach the valve block.

9.7 Assemble valve

Up to two valves are installed in the valve block.

- Purge valve
- Valve for recirculation

The assembly procedure is identical for both the valves.

Prerequisites:

- All channels controlled by the valve are rinsed and dry.
- The valve block was removed.
- The atomizer body was removed.
- The sleeve was removed.

The valve is located in the valve block.

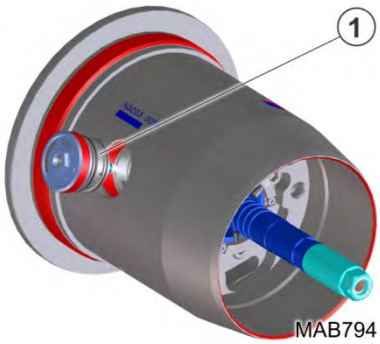


Fig. 93: Position of valve

1 Valve

A faulty valve must be replaced with a new valve. A repair is not possible.

9.7.1 Removing the valve

- Use a socket wrench to unscrew the valve from the component.

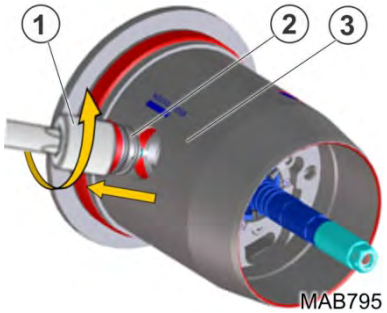


Fig. 94: Disassembling valve

1 Socket wrench
2 Needle valve
3 Valve block

If you are unable to unscrew the valve by hand, clean the mount opening of the valve block.

9.7.2 Assembling valve

Prior to installation, check the valve for its proper condition.

- The valve must be equipped with the required sealing rings.
- The sealing rings must be lubricated with special grease.
- The valve needle must be straight and undamaged.
- The thread of the valve and the valve casing must be completely clean.
- The thread of the valve must be lubricated with special grease.

NOTICE

Risk of damage to property and production disruption

Grease can impair the function of the valve. The valve may not open or close completely.

Coat the sealing rings and threads only with a thin layer of grease.

Follow these steps:

- Carefully insert the valve into the bore of the valve block.
- The valve must be manually screwed into the thread. It must be possible to screw the valve with minimal effort. Do not damage the threads in the valve block.
- Tighten the valve in the valve block with a socket wrench to 4.5 Nm.

9.8 Replacing the hose at the flange assembly

ATTENTION

Risk of damage to property and production disruption

Hoses not meeting the Dürr-quality requirements may cause production disruptions.

Only use the original Dürr hoses. The original hoses are specially designed to meet the requirements of the atomizer.

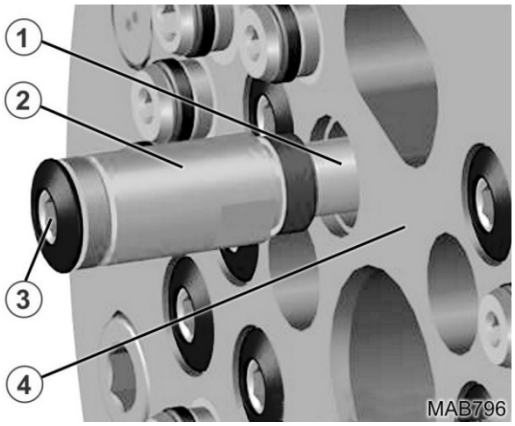


Fig. 95: Hose connection on the flange

1 Hose
2 Hose connection
3 Hexagon socket
4 Flange assembly

Ensure the following when working on the hose connections:

- Do not bend the hoses.
- Observe minimum bend radius of the hoses.
- Do not twist the hoses.
- Coat the hoses with a thin layer of Vaseline.

Requirements:

- Atomizer was removed from the flange assembly.
- The other end of the defective hose is free.

The hose connections are screwed into the flange assembly.

- Unscrew the defective hose from the flange assembly with a hexagon socket.
- Remove the hose.
- Insert new hose with hose connection in the flange assembly.
- Screw hose connection into the flange packet with a tightening torque of 1.5 Nm.

9.9 Resistance test

This measurement must be carried out by a qualified electrician.

If the atomizer been disassembled, the electrical resistance between chuck and paint pipe and between chuck and turbine must be measured after reassembly. The bell disk must not be mounted yet.

The electrically conductive parts in the atomizer are electrically interconnected to one another. Due to this connection, the electrodes and the leads carry high voltage when operating the atomizer at high voltage.

ATTENTION

Risk of damage to property and production disruption

Malfunction of high voltage due to excessive resistance.

After working on the inside of the atomizer, check the resistance.

A resistance test shows whether the electrical connection of the parts with one another is OK:

- The resistance between chuck and color tube must be ≤ 10Ω. Test voltage 4-24V.
- The resistance between chuck and shaft/turbine must be ≤0.1MΩ. Test voltage 50V.

If the resistance is higher, the atomizer must be disassembled again. Check all contact surfaces. Then assemble the atomizer again.

9.10 Final work after fault removal

After cleaning and maintenance work, always check the distance between shaping air ring and bell disk. The distance may have changed.

ATTENTION

Risk of damage to property and production disruption

In case of wrong assembly, shaping air ring and bell disk can rub against each other. Shaping air ring and bell disk can be damaged.

Check distance between shaping air ring and bell disk. The bell disk should not rub against the shaping air ring.

If the bell disk rubs against the shaping air ring, then atomizer body, shaping air ring and bell disk should be disassembled and are reassembled.
Then check the distance again.

The atomizer should not be operated with a rubbing bell disk.

Finally, the following work should be executed:

- Clean the entire atomizer by hand with isopropyl alcohol.
- Check that the atomizer is assembled completely.
- Ensure that there are no loose objects (tools, spare parts, cloths) in the cabin.
- Rinse the atomizer.

Only then the atomizer should be used.

10 Dismantling and Disposal

10.1 Switching off the atomizer

Personnel:

- Electrician

Protective equipment:

- Protective workwear
- Protective gloves
- Safety boots

CAUTION

Danger to life due to high voltage

There is danger to life due to high voltage when approaching the atomizer with external charging.

Prior to start of the operation, switch off the atomizer and secure it against restart.
Brush the atomizer against the grounding rod in order to remove the residual charge.

10.2 Separating the atomizer from the flange package

Personnel:

- Assembly personnel

Protective equipment:

- Protective work wear
- Protective glasses
- Protective gloves
- Safety boots

Procedure:

- Release the clamping screw. Meanwhile, hold the atomizer tight.
- Remove the atomizer from the flange.
- Remove three plastic screws on the electrode ring.
- Pull out electrode ring.

10.3 Dismantling of the atomizer

Personnel:

- Assembly personnel

Protective equipment:

- Protective work wear
- Protective glasses
- Protective gloves
- Safety boots

Process:

- Dismantle the atomizer into individual parts.

10.4 Disposal of the atomizer

ATTENTION

Environmental damage caused by improper disposal

Improper disposal threatens the environment and prevents reuse and recycling.

Dispose of components based on the nature of the material.
Spilled paint or solvent residues to be recorded immediately.
Dispose of paint or solvent according to local waste disposal regulations.
In case of doubt, refer to the local disposal authorities.

11 Technical Data

Dimensions and weight	
Length (without bell disk)	283 mm
Flange diameter	165 mm
Electrodes diameter	244 mm
Weight	6.5kg

Air consumption at 6 bars dynamically	
Motor air	100 – 730Nl/min
Motor bearing air	approx. 50 Nl/min
Shaping air 1	450Nl/min max.
Shaping air 2	440Nl/min max.
Typical operating range of shaping air	100 – 350Nl/min

Rotational speed	
Maximum	70000 ± 500 RPM
Usable range	8000 – 70,000 RPM
Typical range	15,000 – 55,000 RPM

Compressed air, dynamic	
Control air valves, min.	6 bar
Control air valves, max.	8 bar
Motor air, min	6 bar
Motor air, max	8 bar
Break air	6 bar
Motor bearing air, min	6 bar
Motor bearing air, max	7 bar
Shaping air, min.	6 bar
Shaping air, max	8 bar

Paint flow rate	
Max. outflow rate	700ml/min
At a rotational speed of 70,000 RPM	400 ml/min max.
Typical range	80 – 350ml/min

Specific paint data	
Painting materials	1K paint (non-flammable) 2K paint (non-flammable)
Painting distance	220 ± 20 mm
Typical paint speed	0.2 – 0.6ms^{-1}
Viscosity of the paint material	50 – 180 mPas
Paint temperature	20 – 25 °C
Relative humidity	65 ± 5 %
Solid body diameter	5 µm
Material pressure (briefly)	maximum 20 bar
Cabin temperature	23 °C ± 3 K

High voltage	
Current (I)	400µA max.
Voltage (U)	70 – 80kV

Bell disk	
With knurl	For primer, single, and clear coat
Without knurl	For single and metallic paint

Working material for maintenance	
Technical petroleum jelly	W32120003
Screw locking Loctite 222	W31010001
Special grease Klüber SYNTHESO GLEP 1 1000 g 100 g	 W32020009 W32020010

11.1 Replacement parts

11.1.1 Ordering

Replacement parts can be ordered via the WEB shop.

11.1.2 Replacement parts list

CAUTION

Risk of injury from unsuitable replacement parts

Replacement parts from third party providers may not withstand the high loads. There is a risk of injury.

Use only original replacement parts.

CAUTION

Risk of injury from unsuitable replacement parts in potentially explosive atmospheres

Replacement parts from third party providers may not comply with the ATEX guidelines. There is a risk of injury.

Use only original replacement parts.

Replacement Parts

Material number	Denomination
N16310004	Bell disk D55 straight knurl
N16310005	Bell disk D55 without knurl
N34770091	Flange assembly 5 m
N34770092	Flange assembly 10 m
N34770113	Flange assembly with recirculation 5 m
N34770112	Flange assembly with recirculation 10 m
M01530015	High voltage connection complete 5 m
M01530016	High voltage connection complete 10 m
M09020143	Nozzle d 0.7M6x0.75
M09020144	Nozzle d 0.9 M6x0.75

Repair kits

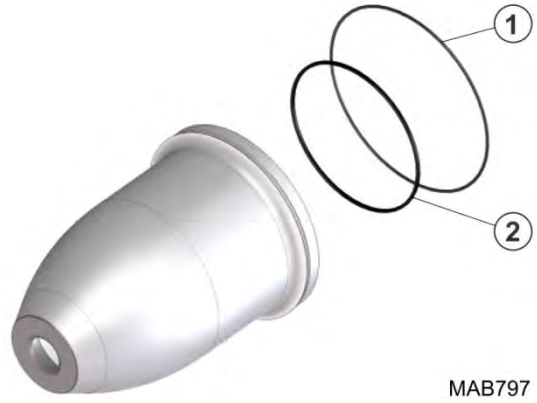


Fig. 96: Repair set for atomizer body

1 O-ring 110x2
2 O-ring 98x2

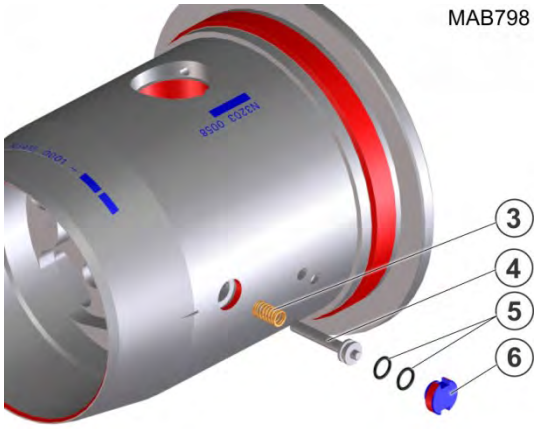


Fig. 97: Repair set for shaft detent

3 Compression spring
4 Piston D8
5 O-Ring 6x1
6 Lid M12x1

Fig. 98: Repair set for paint pipe

7	Flat seal 12x1	9	Needle seat
8	Needle seal for paint pipe	10	O-ring 8x1

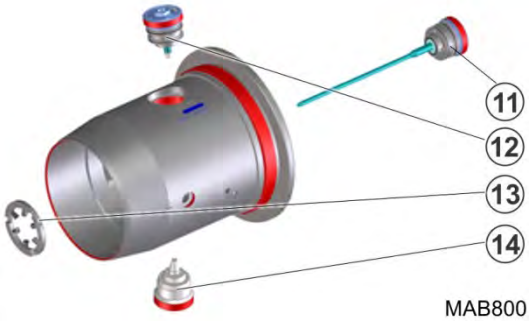


Fig. 99: Repair set for valve block

11	Valve unit L142 main needle	13	Ring with carbon fiber brush
12	Valve unit L35	14	Gland M27x1.5

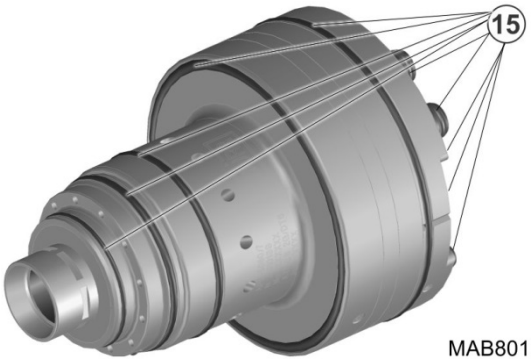


Fig. 100: Repair set for turbine

15 Seal kit

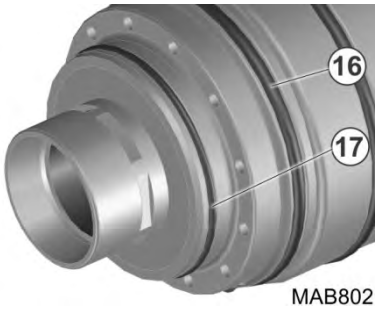


Fig. 101: Repair set for turbine / shaping air ring

16 O-ring 43x2
17 O-ring 34x1.1

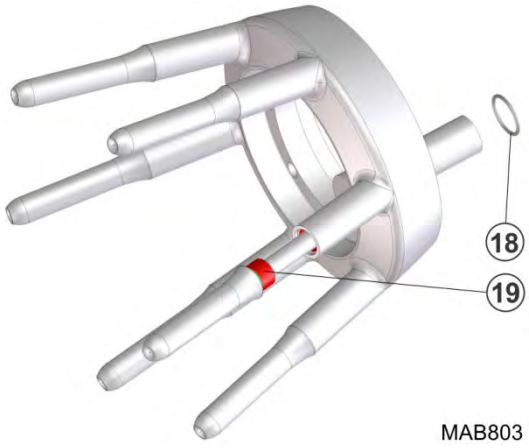


Fig. 102: Repair set for electrode ring

18 O-ring 23.47x2.62
19 Complete electrode

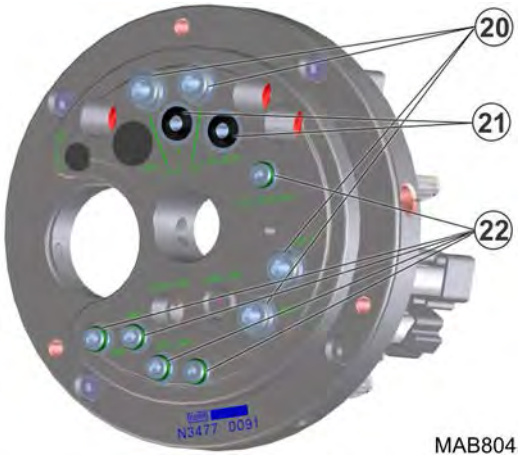


Fig. 103: Repair set for flange assembly

20 O-ring 7x1.5
21 Sealing ring D9
22 O-ring 4x1.5

Fig. 104: Repair set distributor disk (complete)

23 Distributor disc D22

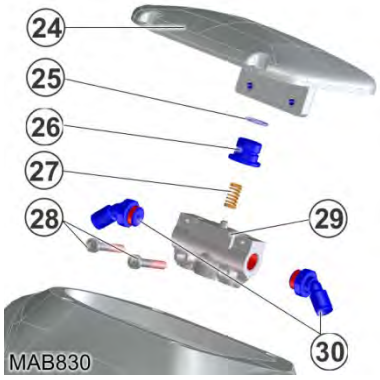


Fig. 105: Repair set for elbow (lid complete)

24 Lid
25 O-Ring 10x1
26 Pressure pin
27 Compression Spring
28 Screws
29 3/2-directional control valve
30 Plug-in connection

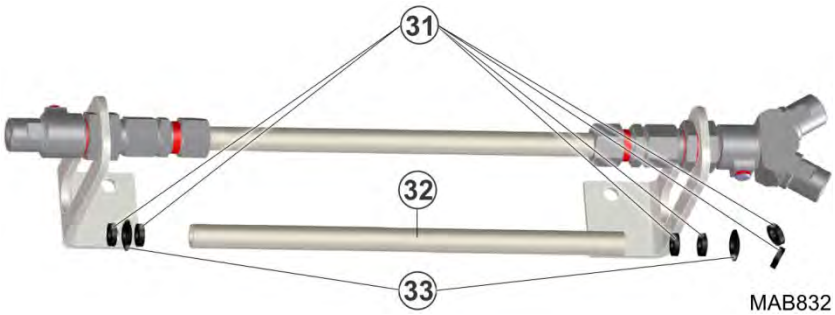


Fig. 106: Repair set for external mixer

31 Sealing ring D8
32 Mixing tube
33 Sealing ring D11

Repair kits with recirculation

Fig. 107: Repair set for paint pipe

34 Flat seal 12x1
35 Needle seat
36 O-ring 8x1

Fig. 108: Repair set for valve block

37 Valve unit L142 main needle
38 Valve unit L35
39 Ring with carbon fiber brush

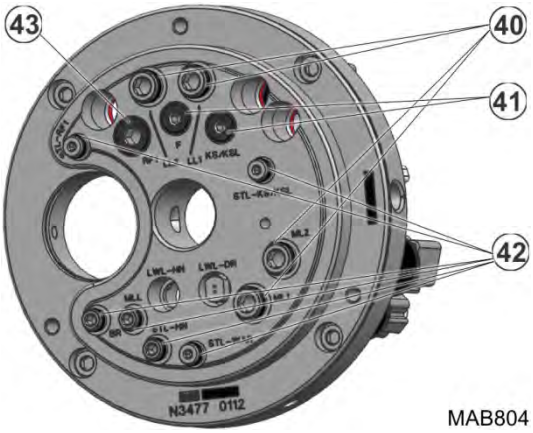


Fig. 109: Repair set for flange assembly

40 O-Ring 7x1.5
41 Sealing ring D9
42 O-Ring 4x1.5
43 Sealing ring D13

Position	Order number	Denomination	Number
1	N34960002	O-ring 110x2	1
2		O-ring 98x2	1
3	N34960003	Compression spring	1
4		Piston D8	1
5		O-ring 6x1	2
6		Lid M12x1	1
7	N34960004	Flat seal 12x1	1
8		Needle seal for paint pipe	1
9		Needle seat	1
10		O-ring 8x1	1
11	N34960005	Valve unit L142 main needle	1
12		Valve unit L35	1
13		Ring with carbon fiber brush	1
14		Gland M27x1.5	1
15	N34960006 N34960010	Seal kit storage unit Seal kit bearing unit (solvent-resistant)	1 1
16	N34960007	O-ring 43x2	1
17		O-ring 34x1.1	1
18	N34960008	O-ring 23.47x2.62	1
19		Complete electrode	6
20	N34960012	O-ring 7x1.5	4
21		Sealing ring D9	2
22		O-ring 4x1.5	5
23	N34960014	Distributor disk D22 (complete)	1
24	N34960016	Lid	1
25		O-ring 10x1	1
26		Pressure pin	1
27		Compression spring	1
28		Cheese-head screw M4 x 25	2
29		3/2-directional control valve	1
30		Plug-in connection	2
31	N34960017	Sealing ring D8	6
32		Mixing tube	1
33		Sealing ring D11	2

Position	Order number	Denomination	Number
34	N34960018	Flat seal 12x1	1
35		Needle Seat	1
36		O-Ring 8x1	1
37	N34960019	Valve unit L142 Main needle	1
38		Valve unit L35	2
39		Ring with carbon fiber brush	1
40	N34960020	O-ring 7x1.5	4
41		Sealing ring D9	2
42		O-Ring 4x1.5	6
43		Sealing ring D13	1

12 Contacts and Hotline

If you have queries or would like technical information, please contact your dealer or sales partner.

13 Appendix

13.1 Check list for commissioning - External charging G500

1 Measurements

Measuring instruments used	Measuring device number
High voltage measuring device	
Capacitance meter	
Scope meter	
Insulation tester	

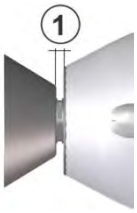
Installation measurements	Date	Name / Signature
Low impedance measurement performed and appended to the protocol of this check list		
Insulation measurement performed and appended to the protocol of this check list		
Loop measurement performed and appended to the protocol of this check list		

Grounding	Limit value	Measured value
Conveyor / goods carriers <> moving machine	<2Ω	•
Moving machine <> control cabinet (e.g. **Eco**AUC Bell)	<2Ω	•
Control cabinet <> Central grounding point	<2Ω	•

Atomizer (without medium)	Limit value	Measured value
Paint pipe / nozzle <> Central grounding point	<10Ω	•

Comment: Before checking the speed, the distance between the control air ring and the bell disk is to be checked.

The distance between the outer edge of the bell disk and control air ring (1) must be checked with the test tool W02020284. The information about the surface to be used for a certain sprayer gun type is engraved on the testing tool.



Checked:	

2 High Voltage EcoHT G500 external charging — ATEX category 2G/3G

Insulation measurement with test voltage 1000V	Limit value	Measured value
Pickup point work piece <> Central grounding point	<1MΩ	MΩ
Insulation measurement with test voltage 50V	**Limit value**	**Measured value**
Shaft/turbine (with motor bearing air) <> Central grounding point	<100kΩ	kΩ

Set point, actual value comparison					
	Control display		Controller		Electrode atomizer
Nominal value	Actual value		Actual value		Actual value
	U [kV]	I [µA]	U [V]	I [V]	U [kV]
200µA	kV	µA	V	V	kV
300µA	kV	µA	V	V	kV
400µA or max. I	kV	µA	V	V	kV

2 High Voltage EcoHT G500 external charging — ATEX category 2G/3G

Threshold value for safety			
Static	0 - 10V > 0 - 100kV	Setting system-specific	kV
Minimum voltage during painting			kV

Documentation	Date	Name / Signature
Shut down tested		
Threshold U_{stat} displayed via “High voltage self-test” (kV; µA) and appended to this check list		

3 High Voltage EcoHT G500 external charging — ATEX category 2G

Test according to EN 50176

Exemplary test assembly according to EN 50 176

The electrode spacing in the starting position must be at least 0.5cm/kV. At maximum allowed output voltage of 80kV, this means 40cm.

The approach speed between the high voltage leading spray member and the grounded test electrode must be at least 1.2 times the maximum coating speed, but at least 500mm/s

The two electrodes have to be approximated to be an electrode spacing of about 1cm.

The test shall be performed five times per spray. In all cases, a safe shut down before the first discharge must take place. After shut down, no discharge between the electrodes may be made.

Comment: For the purpose of this testing requirement, a discharge is a visible and audible flashover between the electrodes.

Test voltage at maximum current	kV
Approach speed	mm/s

Test	**confirm with “X”**
1. Test	
2. Test	
3. Test	
4. Test	
5. Test	

Documentation	**Date**	**Name / Signature**
Spark-free disconnection tested		
Switch off threshold U_{stat} displayed via “High voltage self-test” (kV; µA) and appended to this check list		

Operator		
Date (DD-MM-YYYY)	Name, first name (legible)	Signature…….....…… …...

Comments	
Point	**Comments**