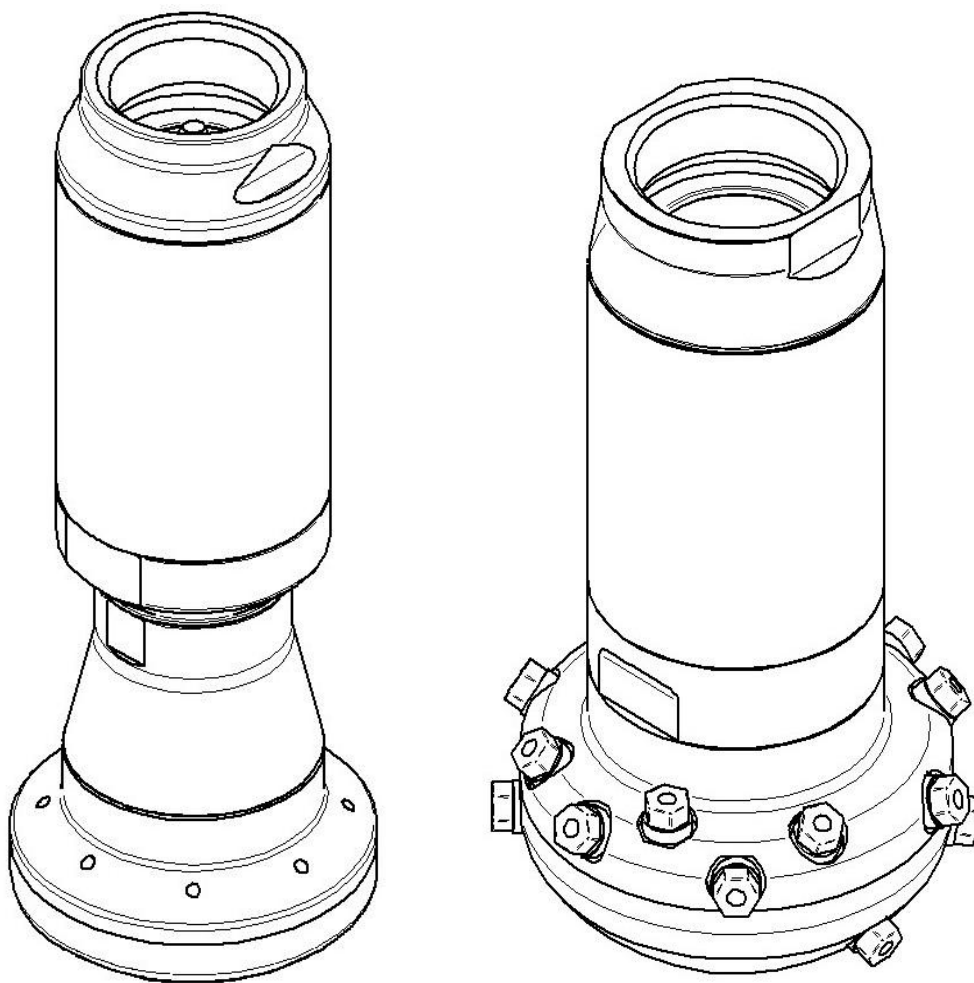


Operating instructions



DUNOS RB / RN



These operating instructions are part of the cleaner and must be available to the user at all times. All safety information is to be clearly instructed and must be observed. If this unit is passed on, the operating instructions must be passed on as well.

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1 General Information

1.1 Function

The DUNOS RB / RN spray cleaners are spray units functioning in one dimension which are driven by the cleaning medium. The cleaners have been manufactured with as few components as possible. The machines are designed with minimum clearance volume and are produced in Germany from inspected materials. The surfaces and their roughness have already been monitored during production.

The cleaning medium is supplied to the spray cleaner via a pre-filter. The spray cleaner can be installed within the vessel in all positions. The connection is made through a flanged nut. A G $\frac{3}{4}$ " flanged nut is used for the DUNOS RB50; for the DUNOS RN90, a G1 $\frac{1}{2}$ " flanged nut. The intruding medium generates an output speed of 10 rpm to 16 rpm via a turbine with downstream gearbox. The connection from the gearbox to the spray head is accomplished through a drive shaft. Due to the design of the spray cleaner, the emitted cleaning agent stream can be applied to the entire wall of the vessel with each revolution.

Important: The cleaning medium flows through a bypass, past the gearbox to the spray head. This prevents braking elements and ensures the maximum flow for the nozzles.

The spray cleaner can be operated with a wide range of nozzle diameters. Therefore the unit can be perfectly adapted to the cleaning task.

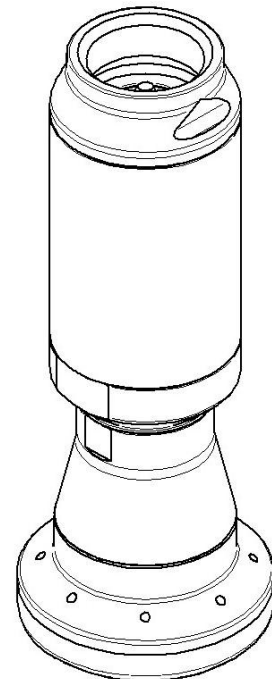


Figure 1: DUNOS RB

1.2 Design

The spray cleaner basically consists of three components.

- **Drive**

The fluid drive generates a rotational movement by means of the cleaning medium flow to drive the spray head.

- **Drive shaft**

The drive shaft couples the drive with the spray head.

- **Spray head**

The universal spray head can be fitted with different drive systems.

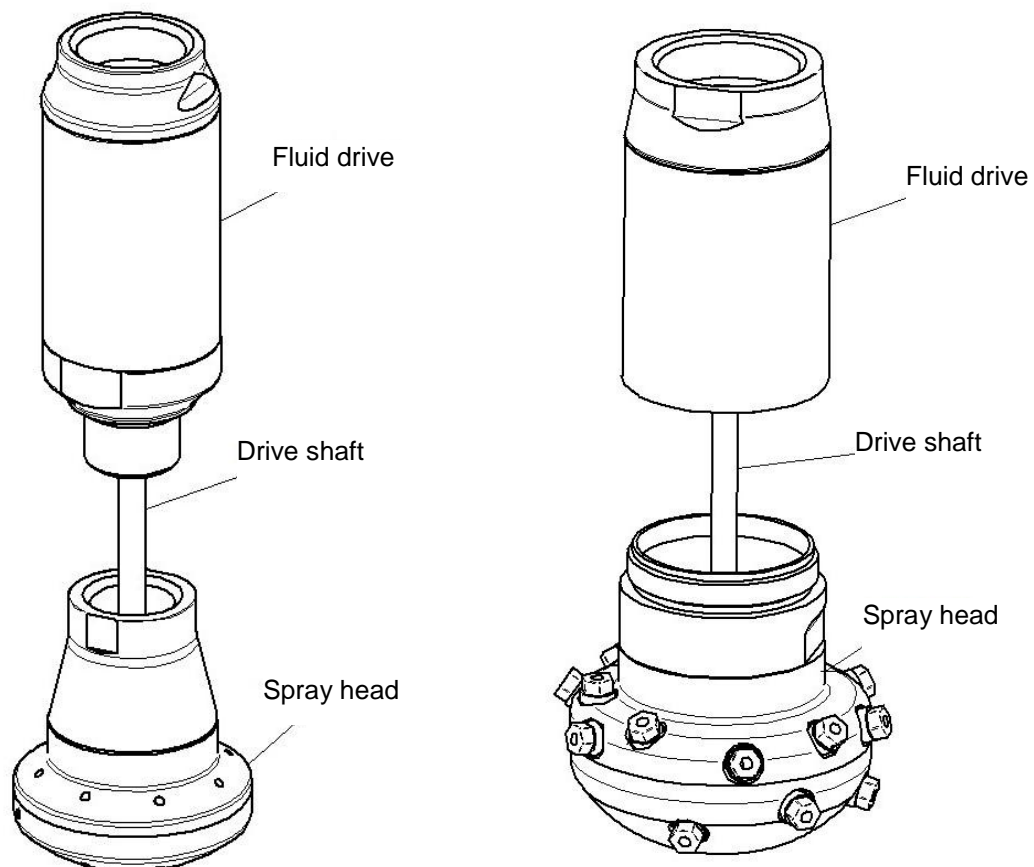


Figure 2: Design DUNOS RB / RN

1.3 Application

The spray cleaners of the DUNOS series are water-hydraulically driven machines. The flowing medium drives the head, which functions in one dimension. The water streams emitted by the nozzles strike the vessel wall. The resulting impact and shear forces remove the deposits from the vessel wall. Depending on the deposit to be removed, adding a portion of chemicals determined by the respective user to the cleaning agent is recommended.

The unit is made of stainless steel 316 L, PTFE and PEEK. It is resistant to the chemicals usually used in the pharmaceutical and food industries.

The units must only be used in closed vessels. Due to the high impact forces, operation outside the vessel may lead to injuries.



These spray cleaners are constructed to be used only inside closed vessels. They may be used only within the intended ranges. All non-intended applications are prohibited. The units must only be used by qualified and instructed persons.

Alterations or modifications are not covered by the manufacturer.

2 Technical Data

	DUNOS RB50	DUNOS RN90
Length:	162 mm	192 mm
Built-in diameter:	65 mm	125 mm
Medium connection:	G $\frac{3}{4}$ "	G1 $\frac{1}{2}$ "
Number of nozzles:	4 - 32	4 - 32
Shape of nozzles:	2 - 5 mm	2 - 8 mm
Work pressure:	3 - 12 bar	3 - 15 bar
Cleaning radius:	2.5 - 4.5 m	4 - 9 m
Spray radius:	3.5 - 6 m	4 - 11 m
Weight:	0.8 kg	4.0 kg

Temperature range:	4 - 120 °C
Materials:	Stainless steel 316L PEEK PTFE
Accessories (optional):	Rotation monitoring Connection parts Special nozzles

2.1 Dimensions

2.1.1 DUNOS RB50

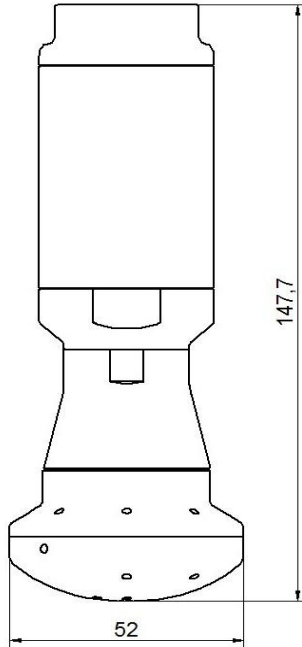


Figure 3: Dimensions DUNOS RB 50

2.1.2 DUNOS RN90

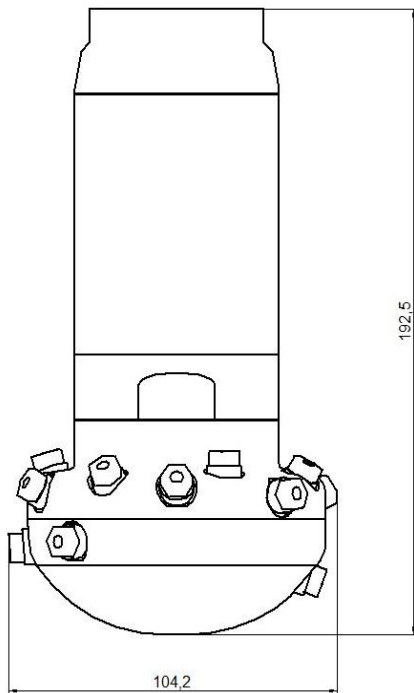


Figure 4: Dimensions DUNOS RN 90

3 Safety Information

The operator of the spray cleaner is obliged to instruct the operating personnel as well as the personnel authorised to carry out the maintenance. All persons working with rotating and spraying machines must be instructed regarding the dangers these machines may present.

Persons not listed as operating or maintenance personnel are not permitted to stay within the working range of the machine. The operator must ensure that the necessary measures are taken.

As a matter of principle, the machines must only be maintained by suitable qualified personnel. Only original replacement parts are to be used for maintenance or repair. Use of non-original parts voids the warranty.

4 Dangers



The spray cleaners are subject to high pressures. Therefore we expressly point out that only original parts are to be used for maintenance and repair. Damage resulting from use of **non-original parts** will **not** be accepted by the manufacturer.



The spray cleaner must be operated only in the environment it is intended for. Operation is permitted only in closed vessels / rooms. Pay attention to rotating parts.



The spray cleaner must not be turned on the machine head with force. This can destroy the drive.



When working with the spray cleaner, make sure that your hands cannot get caught between the nozzles and unit body.



Only authorised persons are allowed to stay within the operational area of the spray cleaner.

5 Installation and Maintenance

5.1 Installation

The spray cleaner is screwed to the threaded connectors of the system with the thread G $\frac{3}{4}$ " or G1 $\frac{1}{2}$ ". When screwing onto the machine, make sure the thread is first coated with a food grade lubricant such as Loctite 8014. Then the machine DUNOS RB50 is to be firmly screwed to the load-bearing element with a SW 32 spanner, and the machine DUNOS RN90 with a SW 55 spanner.



Before setting the machine into operation, always check all parts for a tight fit. The operator assumes sole liability for improperly mounted machines.

5.2 Commissioning

If all pipelines / supply lines are tightly fastened to the spray cleaner and the shut-off valves are closed, the spray cleaner is ready for initial commissioning. Check the function of the pre-filter in the supply line to the spray cleaner and make sure the filter body is inserted.

Before the initial commissioning, rinse out the supply line to the spray cleaner. Metallic contamination and welding residues can destroy the spray cleaner.

For initial commissioning, make sure all air has been vented from the supply line to the spray cleaner, especially with longer supply lines. This prevents pressure shocks which can damage the spray cleaner.



If hand-operated valves are used, in order to avoid pressure impacts they must not be opened abruptly.

For operation in automatic cleaning systems, the operator must familiarise himself with the cutoff and/or emergency stop states of the system.

5.3 Maintenance

5.3.1 Required tools

- DUNOS RB50
 1. Spanner SW 21
 2. Spanner SW 22
 3. Spanner SW 5
 4. Spanner SW 10
 5. Tool set DUNOS RB50

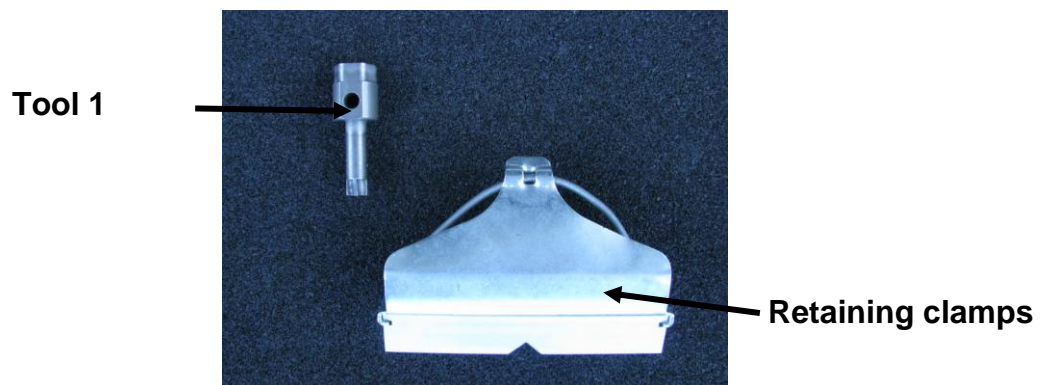


Figure 5: Tool set DUNOS RB50

- DUNOS RN90
 1. Spanner SW 46
 2. Spanner SW 41
 3. Spanner SW 10
 4. Tool set DUNOS RN90

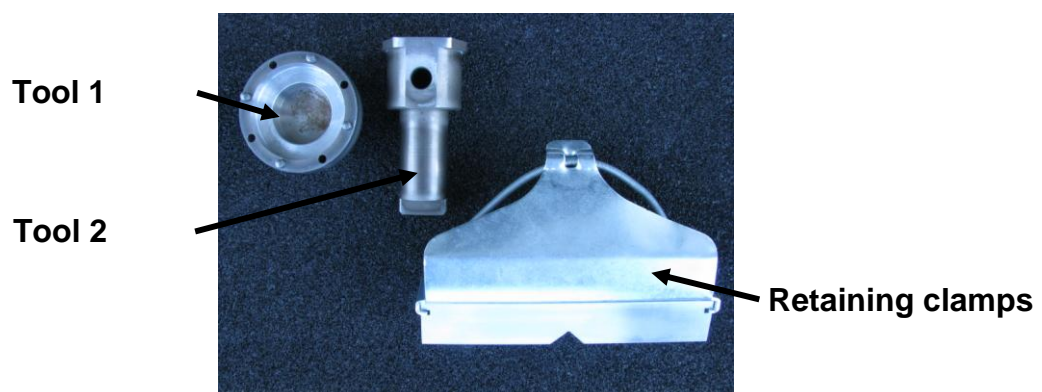


Figure 6: Tool set DUNOS RD90

5.3.2 Disassembly

The spray cleaner is to be disassembled when the cleaner



1. should be maintained or
2. parts of the cleaner should be replaced. In this case, the repair instructions apply.

The machine should be disassembled on a clean work surface. The required tools should be ready at hand. The qualified personnel who carry out the disassembly must be instructed.

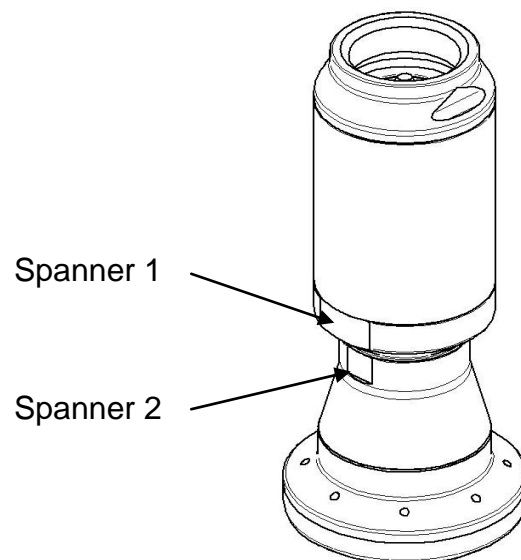


Figure 7: Disassembly

Use spanners 1 and 2 to disconnect the fluid drive from the housing of the spray cleaner. The drive shaft does not need to be removed.

Check the nozzles for free flow. If any residues are visible in the nozzles, use a soft object to push them out of the nozzle opening. Be certain that the inner surface of the nozzles is not scratched.

If there are any objects in the spray head, remove them. The drive shaft is screwed to the lower end of the housing with screw 1. If the shaft interferes when the head is cleaned, it can be unscrewed with spanner 3.

Check the dismantled fluid drive visually. Check if any contamination is visible in the supply and/or on the output side of the drive. If contamination is present, check whether it can be removed from outside. If it is not possible to remove

the contamination from outside, the housing of the fluid drive must be clamped in the vice with the retaining clamps. Now the supply is unscrewed from the jacket tube with the SW 46 spanner.

The drive unit can now be taken out of the jacket tube with a small flat pliers. Now the entire annular gap of the drive is visible. If contamination is visible here, it can be pushed out with a suitable screwdriver.

The jacket tube can now be blown free with 3 bar compressed air.

If the spray cleaner must be further disassembled for maintenance purposes, observe the repair instructions. This procedure should only be performed by very well-instructed personnel.

5.3.3 Assembly

If the fluid drive has been cleaned and the drive unit removed, now it must be re-inserted. When doing so, take particular care that the gear on the lower end of the drive unit is inserted into the gearbox under slight rotation.

Attention!! The gear must not press on the teeth of the gearbox.

If the drive unit is seated on the collar, the supply can be screwed on. To do so, apply lubricant to the thread.

The supply is firmly tightened with spanner 1.

After the fluid drive is assembled, the drive shaft is screwed into the spray head with the screw and spanner 3. This applies only when the shaft has been removed. Now the thread of the spray head is provided with lubricant and screwed into the fluid drive. When doing so, make sure the drive shaft is inserted smoothly into the drive flange of the gearbox. The spray housing is screwed to the drive housing with spanners 1 and 2.

Finally, the nozzles are screwed into the nozzle disc with spanner 3 and firmly tightened. When so doing, lubricant must also be used.

Always make sure that all loosened threads are firmly re-tightened.

5.4 Replacement and wearing parts

5.4.1 Fluid drive replacement parts

1. Supply
2. Drive unit complete
3. Jacket tube
4. Gearbox unit
5. Base flange
6. O-rings (only for external mounting)



Figure 8: Exploded view, fluid drive

5.4.2 Spray head replacement parts

1. Dome
2. Dome ball bearing
3. Locking ring
4. Bearing ring
5. Dome sealing ring
6. Dome ball bearing
7. Drive gear
8. Spray housing

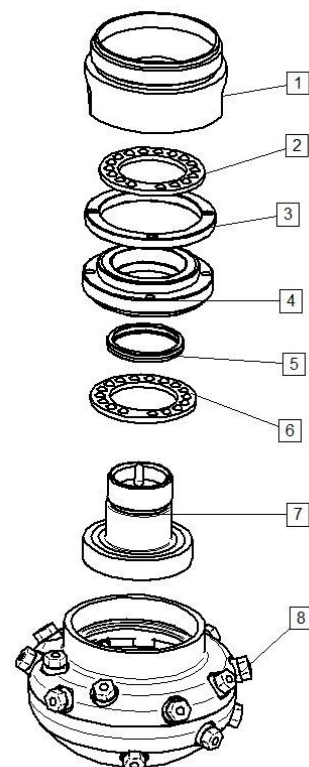


Figure 9: Exploded view, spray head

5.4.3 Fluid drive wearing parts

1. Drive unit
2. Gearbox unit

5.4.4 Wearing parts DUNOS RB / RN

Wearing parts consist of

- Dome ball bearing
- Dome sealing ring
- Nozzle ball bearing
- Nozzle sealing ring

6 Integration and Control

6.1 Integration into a cleaning system

If the spray cleaner is integrated into an automatically working system, make sure that the function of the spray cleaner can be monitored. This can be done by means of rotation monitoring or by an optical check. For optical check, the function monitoring must be documented (system log).

6.2 Control via manual control elements

If the spray cleaner is controlled by manual control elements, make sure that pressure shocks are avoided. Therefore the operating elements must be opened and closed slowly. If they are exposed to steam, make sure that the temperature does not exceed the specified limits. Monitoring of the spray cleaner must be guaranteed.

7 Troubleshooting

7.1 Emergency stop



In order to force an emergency stop of the spray cleaner, it is imperative for the system operator to be thoroughly familiar with the system concept. It is essential to instruct personnel in emergency stop procedures and to inform them of the elements necessary for an emergency stop. The instruction of the persons authorised to perform cleaning must be documented. The plant operator assumes sole responsibility for all personal injury and property damage resulting from faulty operation or faulty application.

8 Transport

8.1 Scope of delivery

The complete spray cleaner and operating instructions for the respective model are included with delivery.

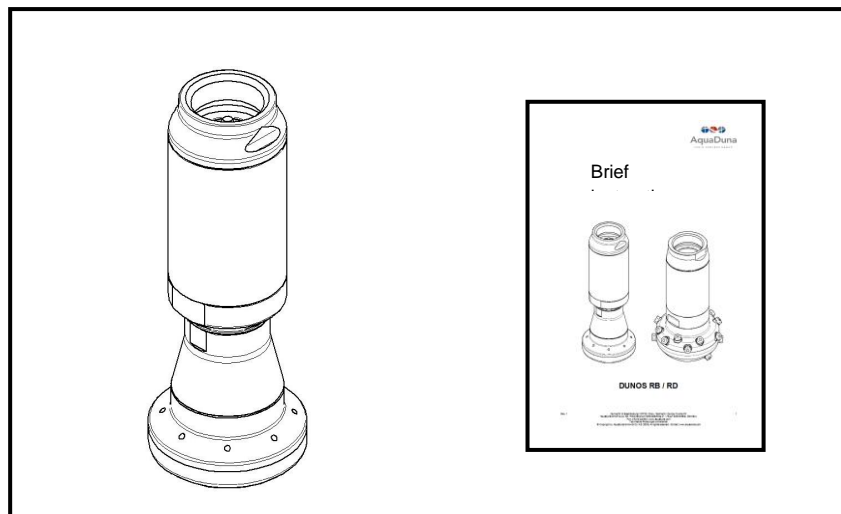


Figure 10: Delivery scope



Please refer to the delivery papers for type options.

8.2 Transport and packaging

Our products are carefully produced, assembled and tested. Should there nonetheless be any reason for complaint, we will naturally ensure your complete satisfaction within the scope of our warranty. We are also at your service after the warranty expires.



When receiving a delivery, always check the packing list against the delivery scope. After determining that delivery is complete, check the goods for damage.

If there is any damage, it is essential to note it down on the shipping documents. In case of damage, the forwarder must countersign the documents.

To return parts, either keep the outer packaging or select a packaging which will prevent damage to the units.

9 Quality Assurance

For us, quality in design, production, assembly, final inspection and testing is a matter of course. It is a mandatory precondition for the permanently efficient and high-quality production of our demanding products. In order to guarantee our high quality standards, we use a computer-assisted quality assurance system which we have applied for certification according to ISO 9001:2008. Furthermore, all our products are subjected to a final function test (100 % control). Thereby we assure that only 100 % functional products leave our company.

10 Disposal

All the materials used in production of the spray cleaner are harmless to the environment. The materials used are primarily stainless steel, PTFE and PEEK. These materials can be disposed of in the ways established for such disposal.



ATTENTION!! Make sure that there is no longer any contamination by materials remaining from operation. To do so, use the suitable material for rinsing the parts to be disposed.

Annex

I. Symbols

Danger warnings



The warning triangle informs of special dangers.



Danger of crushing or injury to the hand



Reference to rotating system parts

Warnings



Warning of dangers

Information



Observe the operating instructions



Observe the information

II. Terms Used

Fluid drive	Drive through fluid
PEEK	Polyetheretherketone
PTFE	Polytetrafluoroethylene
Stainless steel 316L	Austenitic stainless steel. e.g.: X2CrNiMo17-12-2

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