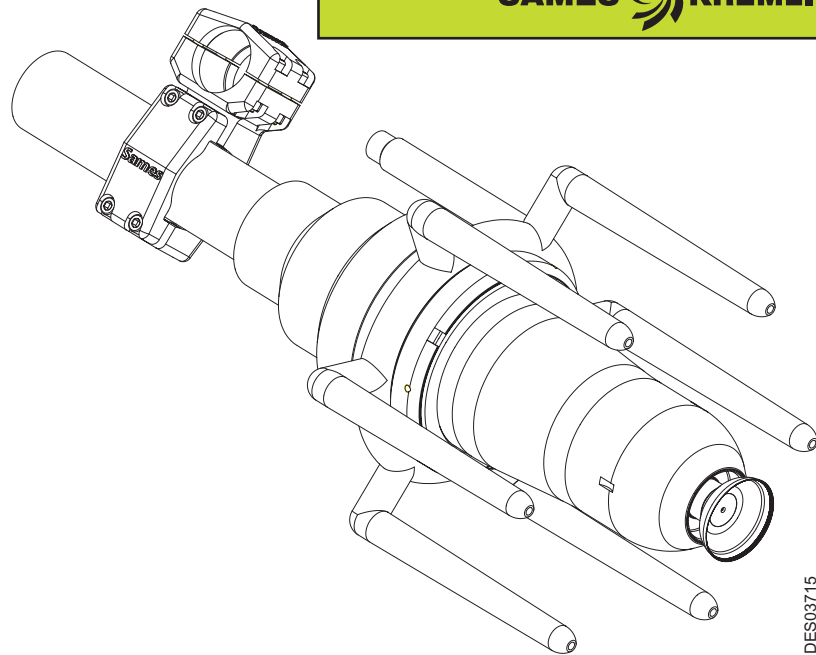




From February 1st, 2017 SAMES Technologies SAS becomes SAMES KREMLIN SAS
A partir du 1/02/17, SAMES Technologies SAS devient SAMES KREMLIN SAS

SAMES  **KREMLIN**



User manual

PPH 308 Single Circuit without Regulator External Charge used with waterborne paints

FRANCE **SAS SAMES Technologies.** 13 Chemin de Malacher 38243 Meylan Cedex
Tel. 33 (0)4 76 41 60 60 - Fax. 33 (0)4 76 41 60 90 - www.sames.com
USA **Exel North America.** 45001 5 Mile Road, Plymouth, Michigan, 48 170
Tel. (734) 979-0100 - Fax. (734) 927-0064 - www.sames.com

All communication or reproduction of this document, in any form whatsoever and all use or communication of its contents are forbidden without express written authorisation from SAMES Technologies.

The descriptions and characteristics mentioned in this document are subject to change without prior notice.

© SAMES Technologies 2008



WARNING : SAS Sames Technologies is registered with the Ministry of Labour as a training institution.

Throughout the year, our company offers training courses in the operation and maintenance of your equipment.

A catalogue is available on request. Choose from a wide range of courses to acquire the skills or knowledge that is required to match your production requirements and objectives.

Our training courses can be delivered at your site or in the training centre at our Meylan head office.

Training department:

Tel. 33 (0)4 76 41 60 04

E-mail: formation-client@sames.com

SAS Sames Technologies operating manuals are written in French and translated into English, German, Spanish, Italian and Portuguese.

The French version is deemed the official text and Sames will not be liable for the translations into other languages.

PPH 308
 Simple Circuit without Regulator
 External Charge
 used with waterborne paints

1. Health and Safety Instructions - - - - -	6
1.1. Configuration of the certified equipment	6
1.2. Marking on the atomizer	6
1.3. Precautions for Use	7
1.4. Warnings	7
1.4.1. Installation rules	10
1.5. Important Recommendations	12
1.5.1. Compressed Air Quality	12
1.5.2. Product Quality	12
1.5.3. Bearing Safety	12
1.5.4. Locking	13
1.5.5. Shaping Air	13
1.5.6. High Voltage	13
1.5.7. Maximum Speed	13
1.5.8. Vibrations	13
1.5.9. Bell Cup / Turbine Fitting	13
1.5.10. O-ring Seals	13
1.5.11. Ventilation	14
1.5.12. Residual pressure	14
1.5.13. Safety devices	14
1.5.14. Mechanical Collision	14
1.5.15. Ambient Temperature	14
1.5.16. Sound level	14
1.5.17. Specific maintenance provisions	14
1.6. Guarantee	15
2. Description - - - - -	16
2.1. 2-Way Air / Solvent Micro-Valve Block (1-Pneumovalve Block)	17
2.2. Manifold block	17
2.3. Injector, injector holder, restrictor	17
2.4. Magnetic air bearing turbine type "BTM"	18
2.5. Shaping air	18
2.6. Outer cover	18
2.6.1. Rinsing the external bellcup	18
2.7. Bell cups	18
2.8. UHT 280 EEx e High voltage unit	18
3. Technical characteristics - - - - -	19
3.1. Dimensions (mm)	19
3.2. Operating characteristics	20
3.3. Operating principle	21
3.3.1. Turbine	21
3.3.2. Turbine Rotation Speed	22
3.3.3. Microphone	22

4. Diagram of the various fluid circuits- - - - -	23
4.1. <i>Paint diagram</i>	23
4.2. <i>Exterior Bell cup and injector rinsing diagram</i>	23
4.3. <i>Microphone air diagram</i>	23
4.4. <i>Turbine rotation diagram</i>	24
4.5. <i>Shaping air diagram</i>	24
4.6. <i>Compensation air diagram</i>	24
4.7. <i>Turbine exhaust diagram</i>	25
4.8. <i>Colour change and rinsing cycles</i>	26
5. Maintenance- - - - -	28
5.1. <i>Shutdown and Startup Procedures</i>	28
5.1.1. <i>Shutdown procedure</i>	28
5.1.2. <i>Startup Procedure</i>	28
5.2. <i>Tools</i>	29
5.3. <i>Installation of the atomizer</i>	30
6. Assembly / Disassembly - - - - -	31
6.1. <i>Disassembly and reassembly of the PPH 308</i>	31
6.1.1. <i>Disassembly.</i>	31
6.1.2. <i>Reassembly</i>	31
6.2. <i>Bell cup</i>	31
6.3. <i>Shaping air assembly</i>	31
6.4. <i>Turbine</i>	32
6.5. <i>Injector holder</i>	32
6.6. <i>Injector</i>	32
6.6.1. <i>Disassembly.</i>	32
6.6.2. <i>Reassembly</i>	32
6.7. <i>1-PV block and Manifold block</i>	33
6.7.1. <i>Disassembly.</i>	33
6.7.2. <i>Reassembly</i>	33
6.8. <i>Microvalves</i>	33
6.9. <i>6-fingers Charge ring</i>	33
6.10. <i>High voltage connection</i>	34
6.10.1. <i>Preparing the high voltage connection.</i>	34
7. Cleaning procedures - - - - -	35
7.1. <i>Procedure A</i>	36
7.2. <i>Procedure B</i>	37
7.2.1. <i>Bell cup</i>	37
7.2.2. <i>Shaping air assembly.</i>	38
7.2.3. <i>Injector and injector holder.</i>	38
7.3. <i>Charge ring</i>	38
8. Spare Part Lists - - - - -	39
8.1. <i>PPH 308 - External charge, single circuit with EC 65 bell cup</i>	39
8.2. <i>1- PV block</i>	41
8.3. <i>Manifold block</i>	42
8.4. <i>Injector / Injector holder Assembly</i>	44

8.5. HVU placebo to connect to the ground 45
8.6. High voltage connection assembly 46
8.7. Turbine, injector and restrictor seals 47

1. Health and Safety Instructions

This manual contains links to the following user manuals:

- [see RT Nr 6285](#) for the magnetic bellcups.
- [see RT Nr 6350](#) for the magnetic air bearing turbine type "BTM".
- [see RT Nr 6021](#) for the microvalve.
- [see RT Nr 6190](#) for the microphone.
- [see RT Nr 7051](#) for the high voltage unit UHT 280 EEx e.
- [see RT Nr 6364](#) for the user manual of the electric systems.
- [see RT Nr 6213](#) for the GNM 200 control module.

1.1. Configuration of the certified equipment

The whole of these user manuals defines the configuration of the certified equipment.

1.2. Marking on the atomizer

SAMES Meylan France

CE 0080

PPH Ext. Charge

P/N : *

ISSeP06ATEX032X**



II 2 G

EEx > 350mJ

(Serial number)

* ATEX PPH 308 Configurations

Atomizer - P/N 910004948 Micro-valves - P/N 1507375 Turbine TPAM - P/N 910000295	UHT 280 EEx e - P/N 910006038	P/N PPH 308 (*)	GNM 200A P/N 1517071
X	X	910005152	X

** The sign "X" signifies that respecting the safety distance (between the parts of the atomizer that are under high voltage and the grounded parts) mentioned in this user's manual, ensures a safe use of the equipment.

1.3. Precautions for Use

This document contains information that all operators should be aware of and understand before using the PPH 308. This information highlights situations that could result in serious damage and indicates the precautions that should be taken to avoid them.



WARNING : Before any use of the PPH 308 equipment, check that all operators:

- have previously be trained by the compagny Sames Technologies, or by their distributors registered by them for this purpose.
- have read and understood the user manual and all rules for installation and operation, as laid out below.

It is the responsibility of the operators' workshop manager to ensure these two points and it is also his responsibility to make sure that all operators have read and understood the user manuals for any peripheral electrical equipment present in the spraying area.

1.4. Warnings



WARNING : Safety may be jeopardized if this equipment is not operated, disassembled and reassembled in compliance with the instructions given in this manual and in any European Standard or national safety regulations in force.



WARNING : Equipment performance is only guaranteed if original spare parts distributed by SAMES Technologies are used.



WARNING :

This equipment has to be used only within areas designed for spraying with respect to EN 50176, EN 50177, EN 50223, or with similar ventilation conditions. The equipment has to be used only within ventilated in order to reduce risks for the health of the operators, fire or explosion. The efficiency of the extraction ventilation system has to be daily checked.

Within explosive atmospheres produced by the spraying process, only appropriate explosion-proof electrical equipment has to be used.

Before carrying out any cleaning or general work on atomizers in the spraying area, the high voltage generator must be switched off and the atomizer HV circuit discharged to the ground.

The pressurised coating product or the pressurised air must not be directed towards people or animals.

Appropriate measures have to be taken to avoid, during periods when the equipment is not used and/or when the equipment is broken, the presence of potential energy (liquid or air pressure or electric) inside the equipment.

Using individual protection equipment will limit the risks of contact and/or inhalation of toxic product, gas, vapours, fog or dusts that can be produced while using the equipment. The user has to follow the coating product manufacturer's recommendations.

Electrostatic spraying equipment must be serviced regularly in accordance with the information and instructions given by SAMES Technologies.

Cleaning operations must be carried out either in authorised areas equipped with a mechanical ventilation system, or using cleaning liquids with a flash point at least 5 °C higher than room temperature.

Before starting cleaning operations in the spraying area with liquids containing flammable solvents, precautions must be taken to avoid energies of discharge which can reach ignition energy of the solvent used.

Only metal containers can be used for cleaning liquids and they must have a reliable ground connection

Inside the booth it is forbidden to use a naked flame, glowing object or a device likely to produce sparks

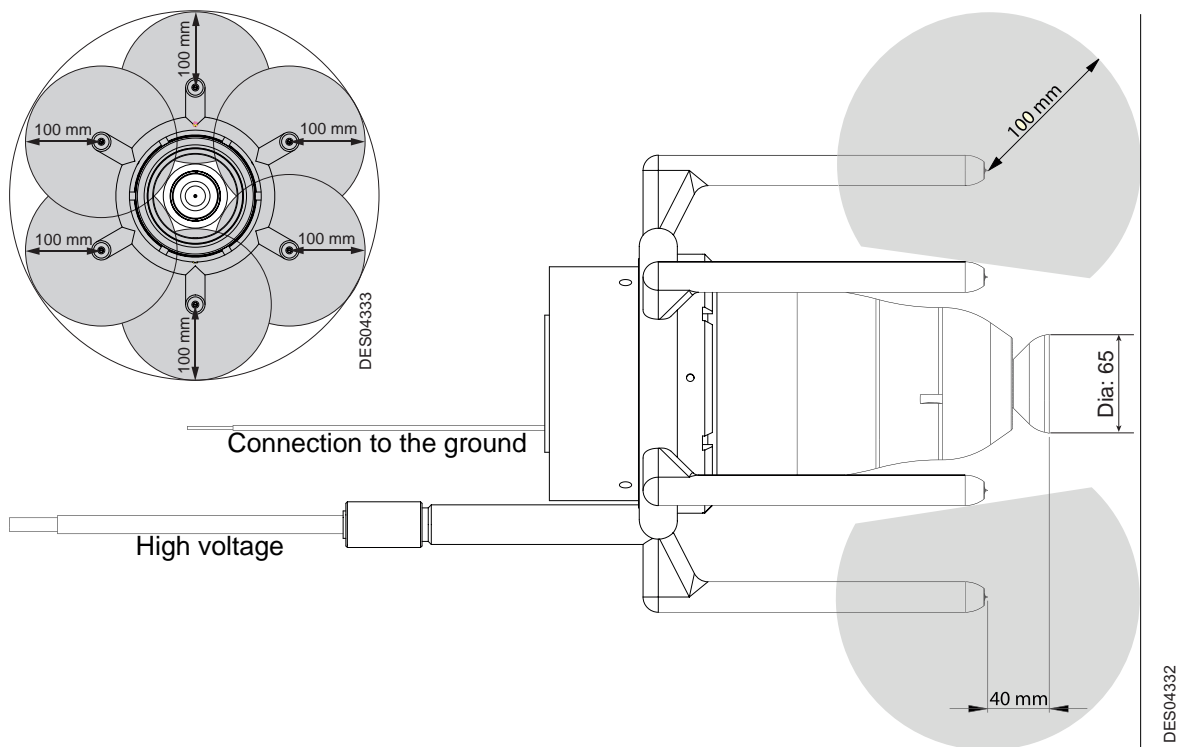
It is also forbidden to store inflammable products, or vessels that have contained them, close to the booth.

The surrounding area must be kept clear and clean.



WARNING : The use of very high voltage increases the risk of sparks. **SAMES Technologies** atomizers and high-voltage electrostatic generators are designed to minimize this risk. Although the HV electrode is the only accessible part, a safety distance has to be maintained between the parts of the sprayer that are under high voltage and all the parts that are grounded.

PPH 308 external charge with UHT 280 EEx e high voltage unit and high voltage cable, safety distance on each electrode finger:



The use of a UHT 280 imposes a connection to a GNM 200 control module whose version of program must be higher or equal to V 5.63.

In addition, a careful check must be made to ensure that any conducting or semi-conducting part closer than 2.5 m to the atomizer is correctly grounded.

If it is not, electrical charges capable of causing sparks could build up on it. Operating personnel must wear anti-static shoes and gloves to avoid this risk.

All metal parts of the booth and parts to be painted must be correctly grounded. Ground resistance must be less than or equal to 1 M Ω (minimum measurement voltage 500 V). This must be checked regularly.

Grounding is mandatory for all the conductive envelopes of the electrical equipments and for all the conductive components within explosive atmospheres by conductive connection with the ground terminal.

Finally, for the same reasons, the spraying area must have an anti-static floor, such as concrete, metal duckboard, etc.

It is essential to provide sufficient ventilation in the spraying booths to avoid the build up of inflammable vapors.

The effectiveness of the overcurrent protection (di/dt) must be checked every day. This check must be carried out in an area with **no explosive atmosphere** by placing a ground device near the electrode of the atomizer when the atomizer is switched on (the operator must be connected to ground); the control module must switch to the fault state.

Additional equipment has to be placed outside the dangerous area and its starting device has to be servo-controlled to the running mode of the booth aspiration fan. The correct working of the servo-control has to be checked once a week.

A warning board has to be placed in full view close to the sparing area.

An excessive turbine speed can engender major damages on the turbine as well as a loss of connection bell/turbine; this represents a risk for persons and equipment. The maximum speed indicated in this user manual must not be exceeded.

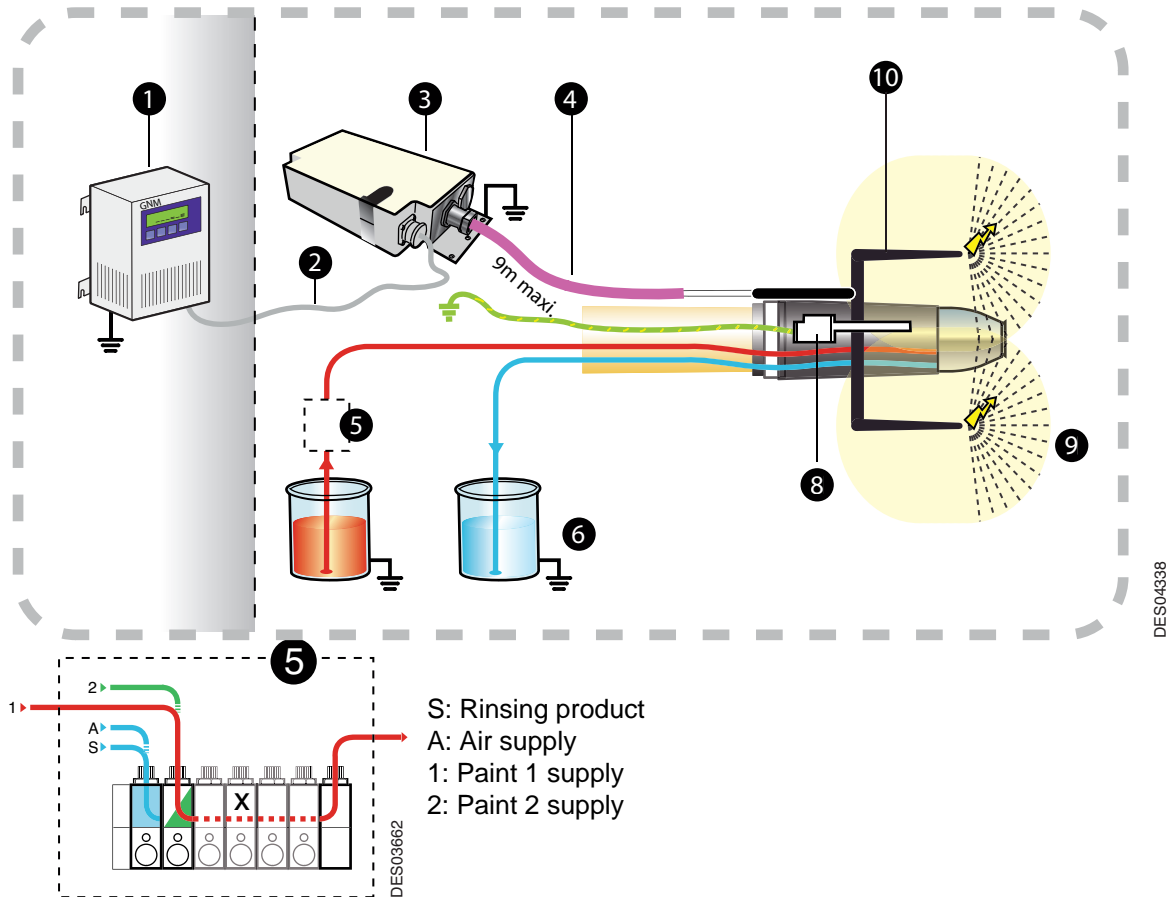
1.4.1. Installation rules

- The use of a UHT 280 high voltage unit imposes a connection to a **GNM 200** control module whose version of program must be higher or equal to **V 5.63**.
- **The UHT 280 supplies only one atomizer:** the high voltage cable must be no longer than 9m.
- **The UHT 280 supplies two atomizers:** the sum of HV cable lengths must be no more than 8.5m. e.g: if both atomizers are at the same distance from HVU, the allowable length of each HV cable is no more than 4.25 m ($8.5/2 = 4.25$ m).
If two atomizers are used, please note that as a part to be painted is brought close to one atomizer, the voltage to the second atomizer will simultaneously drop.



WARNING : The installation of any system that does not comply with the rules specified above and below is strictly prohibited.

PPH 308 external charge for waterborne paints coating



WARNING : All the conductive components must be connected to the ground potential (metallic fittings of Moduclean, gear pump, etc...).

Waterborne paints non flammable and not easily flammable	
1	GNM 200 control module (out of the ATEX area)
2	Low voltage connection
3	High voltage unit UHT 280 EEx e (80kV - 500 μA)
4	High voltage cable (Length: see § 1.4.1 page 10)
5	Supplies of paints and rinsing products connected to the ground potential
6	Dump return line connected to the ground potential
7	-
8	HVU Placebo
9	Safety distance (area around each finger of the charge ring connected to the high voltage)
10	Charge ring connected to the high voltage cable

1.5. Important Recommendations

1.5.1. Compressed Air Quality

The air must be filtered to a level that will guarantee a long life time and prevent any pollution during painting.

The filter must be installed as close as possible to the facility. The filter cartridges must be changed regularly to ensure that the air is clean.

PTFE tape or glue should not be used between the filter and the bearing as glue residue or pieces of PTFE may block the small holes of the air bearing and cause turbine failure.

The inside of hoses supplying air to the atomizer and the ports of the quick-disconnect plate must be clean and free of any traces of paint, solvent or other foreign matter.

The guarantee does not cover faults caused by unclean, unfiltered bearing air resulting from disregard of the previous recommendations.



WARNING : If the air is not correctly filtered, the bearing may become fouled resulting in a turbine operating fault. The filtering system used must prevent particles greater than 5 µm in diameter from reaching the bearing.



WARNING : The guarantee does not cover damage caused by foreign matter such as paint, solvent or other substances entering the air circuits of the PPH 308.

1.5.2. Product Quality

The paint must be filtered to prevent any damage to the atomizer.

The maximum permissible particle size in the atomizer is 200 µm.

1.5.3. Bearing Safety

The compressed air connection to the air bearing must be made directly to the supply circuit without the use of an isolating valve.

During operation, the air bearing must be continuously under pressure, otherwise considerable damage may be caused. A sudden cut in the air supply could destroy the air bearing of the turbine. Wait until the turbine has stopped completely before cutting off the bearing air.

Procedure for cutting off air to the air bearing:

- Switch off the turbine rotation air supply
- Wait until the turbine has stopped completely (at least 150 s).
- Switch off the bearing air supply.

Running the turbine with bearing air pressure of less than 6 bar at the atomizer inlet can damage the bearing. The standard bearing air pressure is 6 bar at the air control cabinet.

All these pressure values are measured at the atomizer inlet. If the bearing pressure drops below 6 bar at the turbine or atomizer inlet, cut off the air supply to the turbine.

In addition, a 25-liter air reserve should be available so that the turbine brakes gradually if the main air supply is cut off suddenly.



WARNING : The guarantee does not cover faults that occur if the turbine is operated with insufficient bearing air pressure.

1.5.4. Locking

Do not atomize the product if the bellcup is not turning at a speed of at least 15000 rpm. At lower speeds, paint or solvent may enter the turbine, bearing and control circuits. Opening the head valve, injector rinsing valve and bellcup exterior rinsing valve must be prohibited when the bellcup is not turning. Only qualified personnel are authorized to by-pass this locking system for flow rate checks



WARNING : If the turbine is not already operating, wait, after starting it up, until the bellcup reaches at least 15,000 rpm before opening the head valve. The recommended minimum waiting time is 2 seconds.

1.5.5. Shaping Air

Do not atomize the product until the shaping air rate is at least 80 NI/mn (i.e. 0.3 bar at the atomizer inlet). If it is less, there may be a feedback of atomized product which fouls the outer cover and the inside surface of the air shroud resulting in application faults.

1.5.6. High Voltage

Disable the high voltage if the PPH 308 is not operated for a prolonged period (conveyor shutdown, no objects to be painted, slack periods, etc.) to prevent ionization of the air.



WARNING : The high voltage supply must be turned OFF before rinsing cycles, bell cup and injector are engaged.

1.5.7. Maximum Speed

Excessive turbine speed can result in serious damage to the turbine and loss of connection between the bell cup and turbine, presenting a risk to persons and equipment. The speed must not exceed 45,000 rpm.



WARNING : The guarantee does not cover damage resulting from a rotation speed greater than 45,000 rpm.

1.5.8. Vibrations

If the atomizer vibrates more than usual, the cause is generally unbalanced rotating parts. There may be dry paint deposits on the bell cup or rotor. If any of these situations arise, it is essential to correct them. Excessive unbalance may damage the turbine resulting in failure to operate or even loss of the bell cup / turbine connection, presenting a risk for persons and equipment.



WARNING : The guarantee does not cover damage caused by unbalance of the rotating parts.

1.5.9. Bell Cup / Turbine Fitting

The bell cup must be correctly fitted on the turbine, a snap must be heard; the two cylinders must fit on top of each other without any foreign matter between them. If fitting is incorrect, the connection may be lost and the bell cup thrown out still spinning, presenting a risk for persons and equipment.

1.5.10. O-ring Seals

Use the seals recommended in this manual. For solvent-based products, seals in contact with the product must be chemically inert seals resistant to swelling or chemical attack. The PPH 308 is only guaranteed to operate correctly if it is used with seals whose size and material conform to this manual.

1.5.11. Ventilation

Do not begin applying paint with the PPH 308 before starting up the ventilation system in the spraying booth. If the ventilation is cut, toxic substances such as organic solvents or ozone may remain in the spraying booth, resulting in a risk of fire, poisoning or irritation.

1.5.12. Residual pressure

Before all maintenance or repair operations, remove paint and solvent from the atomizer, switch off the high voltage power supply and cut the paint, solvent and air supplies, then release residual pressure in each supply system. Residual pressure may lead to component damage and expose personnel to serious injuries. Paint or solvent dispersion may also lead to poisoning or irritation.

1.5.13. Safety devices

During installation of the PPH 308, it is important to set up safety devices enabling high voltage power, paint, solvent and air supplies to be cut immediately if there is a problem.

- Detection of control system faults
- Detection of high voltage surges linked with the SAMES high voltage module.
- Detection of air pressure drops.
- Detection of ventilation failure.
- Detection of fire
- Detection of human presence.
- Detection of turbine rotation speed faults.

Failure to install safety devices could result in a risk of fire, expose the personnel to serious injury and damage the equipment.

1.5.14. Mechanical Collision

The guarantee does not cover damage resulting from the operating environment (for example collision with the robot).

1.5.15. Ambient Temperature

The sprayer is designed to work normally under room temperature between 0°C and + 40°C.

In order to optimise application quality, it is advised to work under room temperature between + 15°C and + 28°C.

The storage temperature will never exceed +60°C.

1.5.16. Sound level

The acoustic pressure level, continuous, equivalent, weighted, equals to 59,7 dBA.

Conditions of measurement:

The equipment has been run at its maximum values, the measures have been made from the operator desk of the paint test booth "API" (closed booth with glass walls) of the Research & Development laboratory at Sames Meylan France.

Method of measurement:

The acoustic pressure level, continuous, equivalent, weighted (59,7 dBA) is given in LEQ value, measured for observation periods of at least 30 seconds.

1.5.17. Specific maintenance provisions

The access of the booth, near the atomizer in operation, will have to be proscribed and controlled by safety devices ([see § 1.5.13 page 14](#)) which will have to stop the equipment in case of intrusion of people in the area.

Nevertheless, for maintenance operation, these safety devices will have to be arranged in order to allow certain operations and checks (only for persons trained by Sames Technologies).

The turbine rotation with a bellcup, in all the cases, will be prohibited with personnel in the area.

1.6. Guarantee

Under the guarantee, which applies only to the buyer, **SAMES Technologies** agrees to repair operating faults resulting from a design fault, materials or manufacture, under the conditions set out below.

The guarantee claim must define, in writing, the exact nature of the fault concerned.

The **SAMES Technologies** guarantee only covers equipment that has been serviced and cleaned according to standard procedures and our own instructions, that has been fitted with parts approved by **SAMES** or that has not been modified by the customer.

More precisely, the guarantee does not cover damage resulting from:

- the customer's negligence or inattentiveness,
- incorrect use,
- failure to follow the procedure
- use of a control system not designed by **SAMES Technologies** or a **SAMES Technologies** control system modified by a third party without written permission from an authorized **SAMES Technologies** technical agent,
- accidents such as: collision with external objects, or similar events,
- flooding, earthquake, fire or similar events,
- inadequately filtered bearing air (solid particles more than 5 µm in diameter),
- inadequately filtered paint and solvent,
- use of seals not complying with **SAMES Technologies** recommendations,
- starting up turbine rotation without minimum bearing air pressure (6 bar),
- exceeding the maximum speed of 45,000 rpm under load,
- starting up rotating parts that are unbalanced (dry paint on bellcup, rotor or damaged bellcups),
- pollution of air circuits by fluids or substances other than air.

SAMES Technologies atomizer **PPH 308** is covered by a one-year guarantee for use in two 8-hour shifts under normal operating conditions.

By concession, the guarantee is extended to 10000 hours on the air turbine of the **PPH 308**. The guarantee does not apply to wearing parts such as atomizing bellcups, diaphragms, clips, seals, etc.

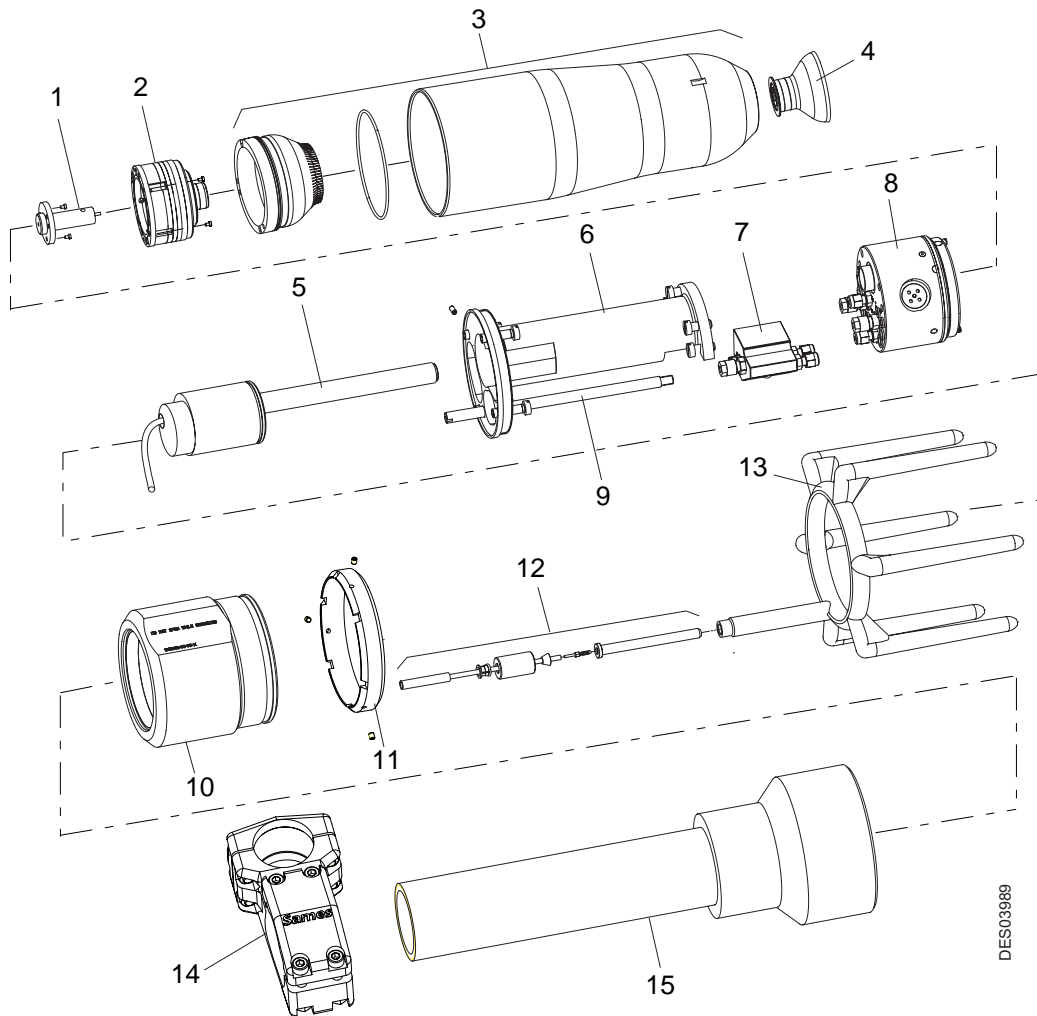
The guarantee will take effect from the date of the first startup or of the provisional acceptance report.

Under no circumstances, either in the context of this guarantee or in other contexts, will **SAMES Technologies** be held responsible for physical injury or intangible damage, damage to brand image and loss of production resulting directly from its products.

2. Description

Atomizer PPH 308 is used in automatic mode for electrostatic atomization of waterborne liquid paints. PPH 308 external charge is a complete atomizer with built-in painting and rinsing assemblies; it is fitted with a magnetic air bearing turbine, operating under an air cushion, capable of reaching a rotation speed of 45,000 rpm

Thanks to the external charge, PPH atomizer remains to the ground, only the charge ring is connected to the high voltage. Its carefully studied design and tools make maintenance easy and fast.



DES03989

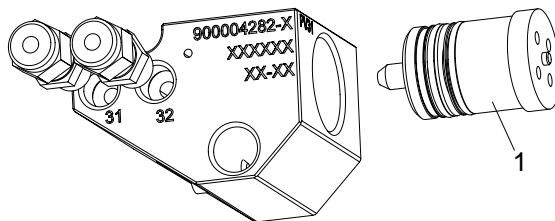
Item	Description	Item	Description
1	Injector / Injector holder assembly	8	Manifold block with product and dump 2-way micro-valves
2	Magnetic air bearing turbine type "BTM" (see RT Nr 6350)	9	Tie-rod for 1 PV block
3	Shaping air assembly (see RT Nr 6285)	10-11	Charge ring Adapter and fixing
4	Bell cup (see RT Nr 6285)	12	HVU cable connection kit
5	HVU placebo	13	Charge ring
6	Placebo holder	14	Securing nut
7	2-way air / solvent micro-valve block (1 PV block)	15	PPH support tube

2.1. 2-Way Air / Solvent Micro-Valve Block (1-Pneumovalve Block)

This block contains 1 air / solvent micro-valve:

1	Air / solvent micro-valve (PV 31) for external bellcup rinsing
---	--

The 2-way microvalves are air-controlled and are normally in closed position. They are involved in various operations, such as external bell cup rinsing, injector and paint supply rinsing, and paint rinsing (these latter three are located in the manifold block).

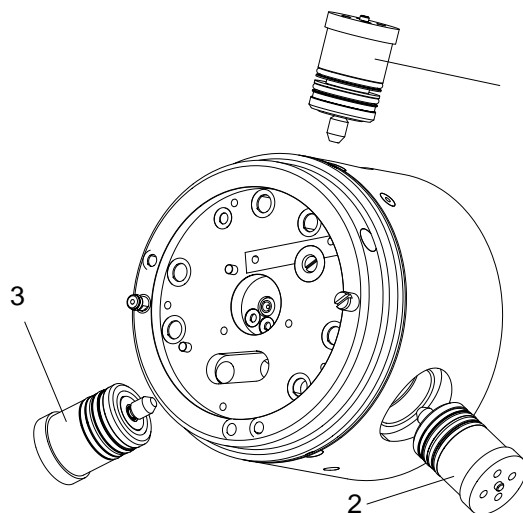


DES04177

2.2. Manifold block

The manifold contains 3 micro-valves:

1	Dump micro-valve (PV 41)
2	Air/ solvent microvalve (PV 32) for injector rinsing
3	Product micro-valve (PV 11)



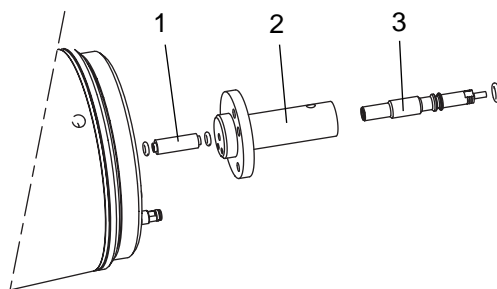
76

2.3. Injector, injector holder, restrictor

1	Restrictor (Diameter 1.2 mm)
2	Injector holder
3	Injector (Diameter 1.8 mm)

The restrictor provides a suitable pressure drop for the required flow rate.

The injector holder is permanently secured to the PPH 308. It is fitted with an injector whose restrictor can be changed according to the paint and product range used.



DES01307

2.4. Magnetic air bearing turbine type "BTM"

[see RT Nr 6350](#)

The bell cup is rotated by means of a pneumatic motor. Paint is sprayed due to the centrifugal forces generated by rotation of the bell cup. The higher the rotational speed, the smaller the particles that are sprayed.

2.5. Shaping air

This air supply circuit is used to modify the pattern size. If the shaping air pressure is increased, the pattern is narrowed and if it is decreased the pattern is widened (an O-ring provides a seal between the turbine and the inner surface of the shroud).

The shaping air arrives on the turbine side, passes through the holes on the shroud and is then directed towards the bellcup.

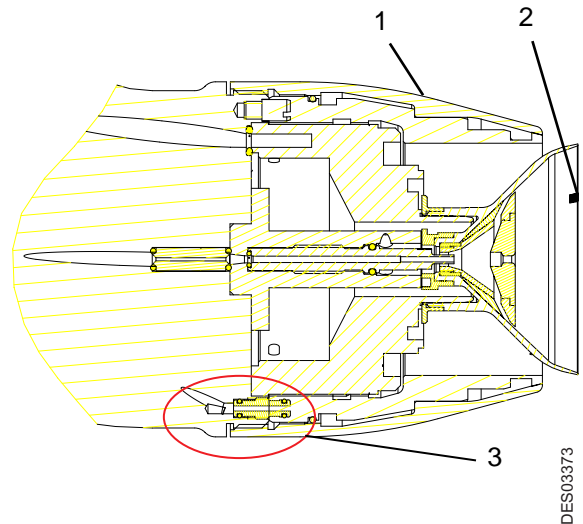
2.6. Outer cover

The outer cover provides protection and also facilitates cleaning of the atomizer.

2.6.1. Rinsing the external bellcup

1	Outer cover
2	Bellcup
3	Solvent pipette

Solvent passes through a pipette and uses one of the openings of the shaping air shroud to rinse the bellcup exterior.



2.7. Bell cups

[see RT Nr 6285](#)

The bell cup atomises all particle-base paint types . Select the appropriate bell cup according to the type of product used.

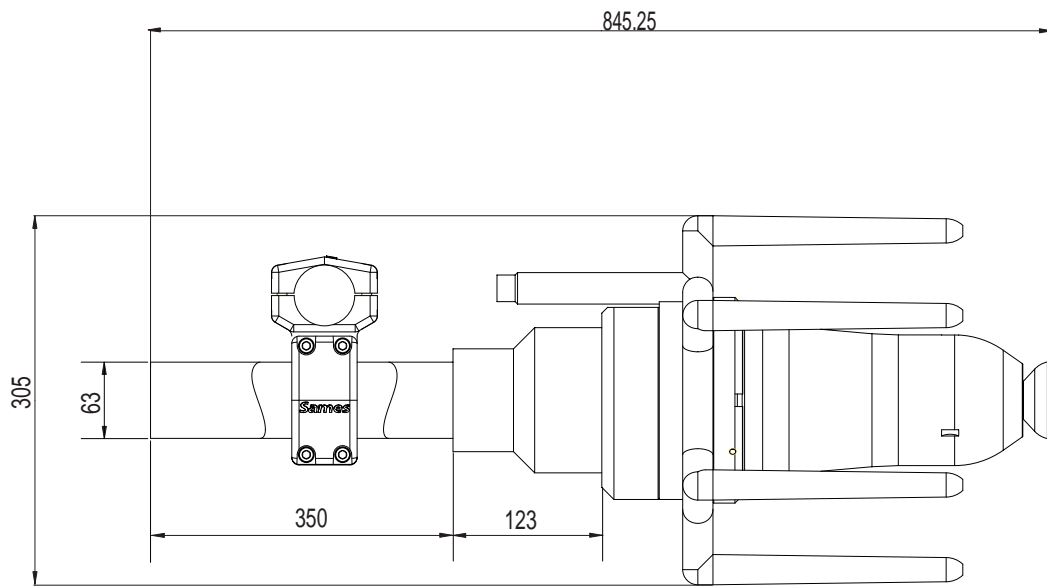
2.8. UHT 280 EEx e High voltage unit

PPH 308 atomizer is connected to the high voltage via the high voltage unit UHT 280 EEx e ([see RT Nr 7051](#)).

The paint particles are electrically charged and are attracted by the surface to be painted which is connected to the ground.

3. Technical characteristics

3.1. Dimensions (mm)



DES03714

3.2. Operating characteristics

Weight		
	PPH 308 without hoses or cables	3.5 Kg.
Current		
	Maximum operating voltage	80 kV
	Maximum operating current	500 μ A
Speed		
	Recommended rotation speed	10,000 to 45,000 rpm
Paint		
	Paint flow rate	30 to 500 cc/min maxi (depending on paint)
	Normal supply pressure	7 to 8 bar
	Maximum pressure	10 bar max.
	Viscosity	12 to 40 seconds - FORD cup # 4
	Viscosity	12 to 45 seconds - AFNOR cup # 4
Air pressure		
	Microvalve pilot	6 to 10 bar max.
	Bearing air	5 to 6 bar (4 bar min. / 7 bar max.)
	Microphone air	1.9 to 3 bar constant
	Shaping air	6 bar maximum
Compressed Air quality		
	Filtered (bearing air), dry, oil and dust-free according to standard NF ISO 8573-1	
	Maximum dew point at 6 bar (87psi)	Class 4, i.e + 3° C (37° F)
	Maximum oil concentration	Class 4, i.e 2 mg / m_0^3 *
	Maximum particle size of solid contaminants	Class 3, i.e 5 μ m
	Maximum concentration of solid contaminants	5 mg / m_0^3 *
Air consumption		
	Pilot	10NI/min.
	Bearing air	125NI/min.
	Shaping air	0 to 600 NI/min. according to the shaping air assembly used
	Turbine	see RT Nr 6350

* m_0^3 values given for a temperature of 20 °C at 1013 mbar atmospheric pressure.

3.3. Operating principle

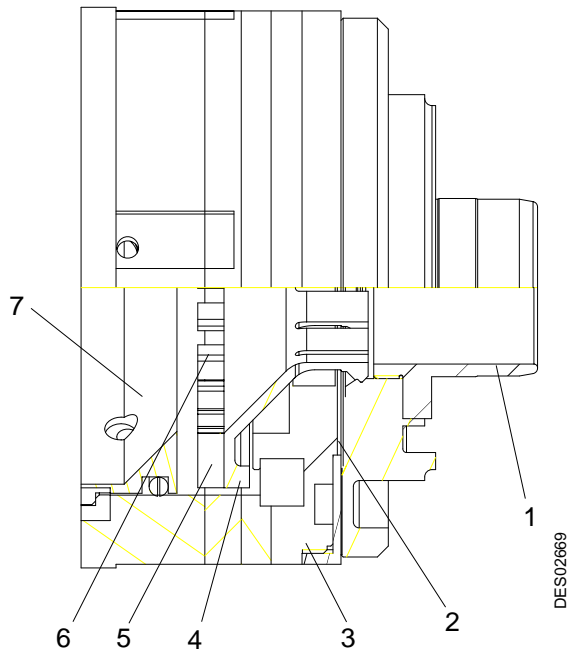
3.3.1. Turbine

see RT Nr 6350

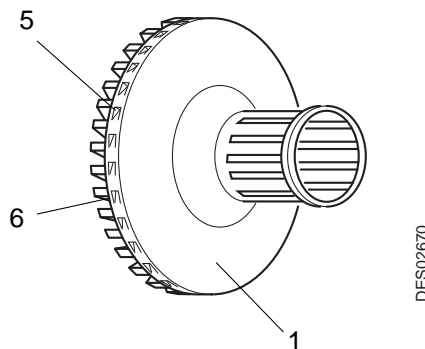
This turbine has no mechanical shaft; it is centered by the polarity difference between the bearing magnets making it totally frictionless.

The bearing air evenly spread over the stator surface produces an air cushion that pushes the rotor away from the stator. The rotor can rotate freely, supported by the balance of pressure and magnetic forces. The air directed onto the turbine blades controls the rotation or braking of the rotor.

The product is atomized by the centrifugal forces created by the rotation of the bell cup. To some extent, the size of the atomized particles decreases as the rotation speed increases.



1	Rotor
2	Stator magnet
3	Turbine body (stator) with supply of: - Bearing air - Turbine rotation and braking air - Shaping air
4	Openings for turbine braking
5	Teeth for turbine rotation
6	Drive vane for braking and rotation
7	Deflector fitted with seal



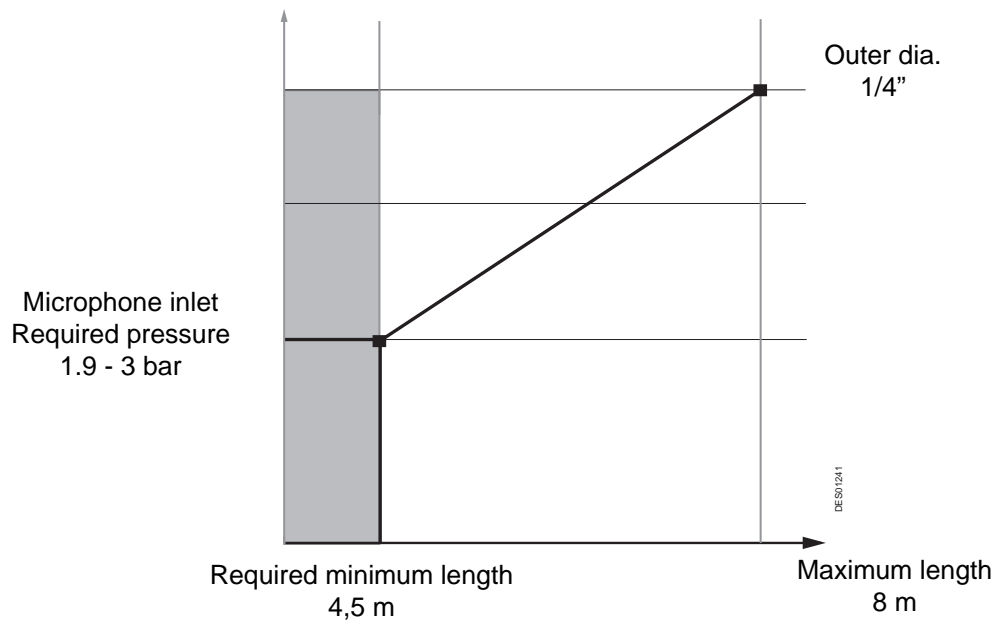
3.3.2. Turbine Rotation Speed

An acoustic method is used to measure rotation speed.

The air arrives at the injector holder. The channel machined in the 'microphone reader' located on the bellcup allows air to pass each time the bell cup rotates

This pressure variation induces a noise, or "frequency signal" which passes across the injector holder to reach a microphone.

This microphone converts the acoustic frequency signal into an electrical frequency signal for processing by the turbine speed regulation module.



3.3.3. Microphone

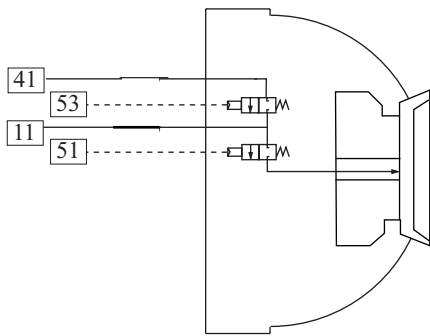
[see RT Nr 6190](#)

The microphone is linked to a SAMES frequency / voltage control to convert the analogue frequency signal into an analogue level signal (0 - 10 V) or digital signal (pulse).

Please contact Sames Technologies for the specific part number for use with your set-up.

4. Diagram of the various fluid circuits

4.1. Paint diagram



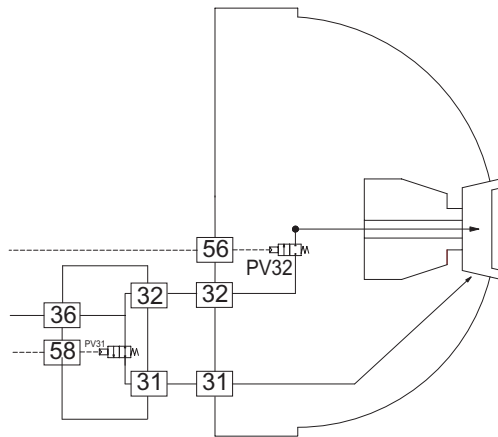
DES01309

11	Paint supply - Dia: 4 x 6 PTFE
41	Dump - Dia: 4 x 6 PTFE
51	Paint supply pilot - Dia 2.7 x 4 - Polyamide
53	Dump pilot - Dia 2.7 x 4 - Polyamide

Note: The PTFE hoses should never be replaced by polyamide hoses.

Blue hoses are used for the various different types of air supply.
Clear hoses are used for product.

4.2. Exterior Bell cup and injector rinsing diagram



DES04173

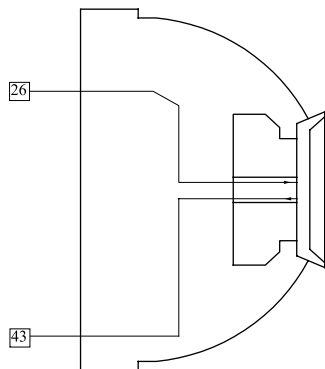
31	Exterior bellcup rinsing solvent / air - Dia: 2 x 4 PTFE
32	Injector rinsing solvent / air - Dia: 2 x 4 PTFE
56	Injector rinsing solvent / air pilot - Dia: 2.7 x 4 - Polyamide
58	Exterior bell cup rinsing solvent / air pilot - Dia: 2.7 x 4 - Polyamide

31: Exterior bell cup rinsing - the bell cup is rinsed via the air/ solvent inlet.
32: The air/solvent supply rinses the paint supply line up to the bell cup.

Recommendation:

After the bell cup and injector have been rinsed, you are advised to finish off the rinsing phase by blowing air through the "31" and "32" hoses for 1 to 2 seconds.

4.3. Microphone air diagram

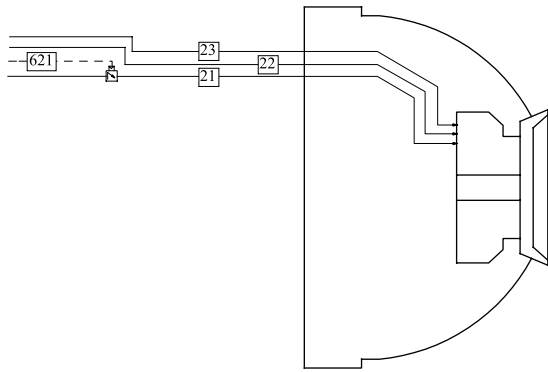


DES00004

The microphone air is controlled by a remote regulator.

26	Microphone air - Dia: 4 x 6 - Polyamide
43	Microphone return supply - Dia: 4 x 6 - Polyamide

4.4. Turbine rotation diagram



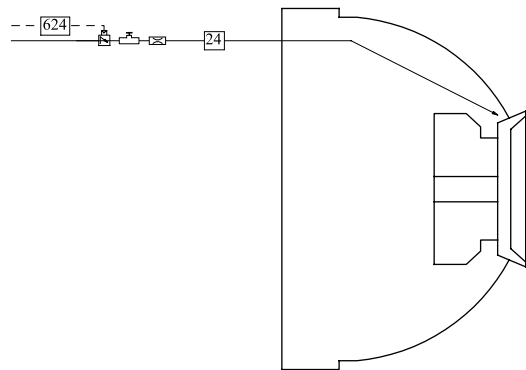
DES00007

21	Turbine drive - Dia 7 x 10 polyurethane
22	Turbine braking - Dia 6 x 8 - Polyamide
23	Bearing air - Dia 4 x 6 - Polyamide
621	Turbine rotation regulation pilot - Dia 2.7 x 4 - Polyamide

23: The bearing air separate the rotor from the stator.
 22: Supplies turbine braking air.
 21: Supplies turbine rotation air.

The bell speed control module activates 21-circuit via a proportional valve and 22-circuit via a solenoid valve.

4.5. Shaping air diagram

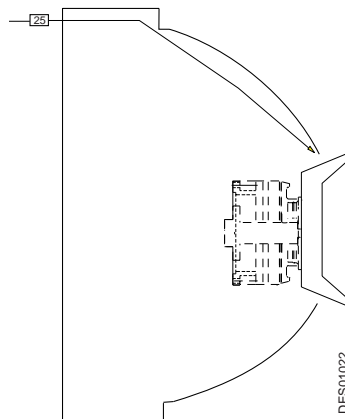


DES00040

24	Shaping air - Dia: 6 x 8 - Polyamide
624	Shaping air pilot - Dia 2.7 x 4 - Polyamide

24 : The shaping air supply controls the pattern diameter.
 Shaping air is controlled via a proportional air valve.

4.6. Compensation air diagram

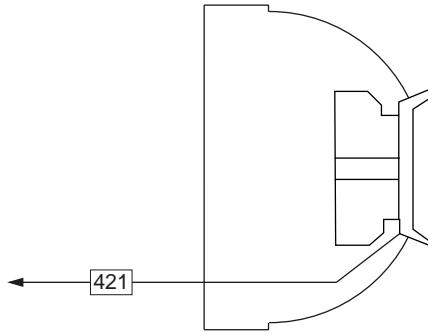


DES01022

25	Compensation air - Dia 6 x 8 - Polyamide
----	--

25 : The compensation air prevents any contamination of the shaping air shroud and is controlled via a remote regulator.

4.7. Turbine exhaust diagram

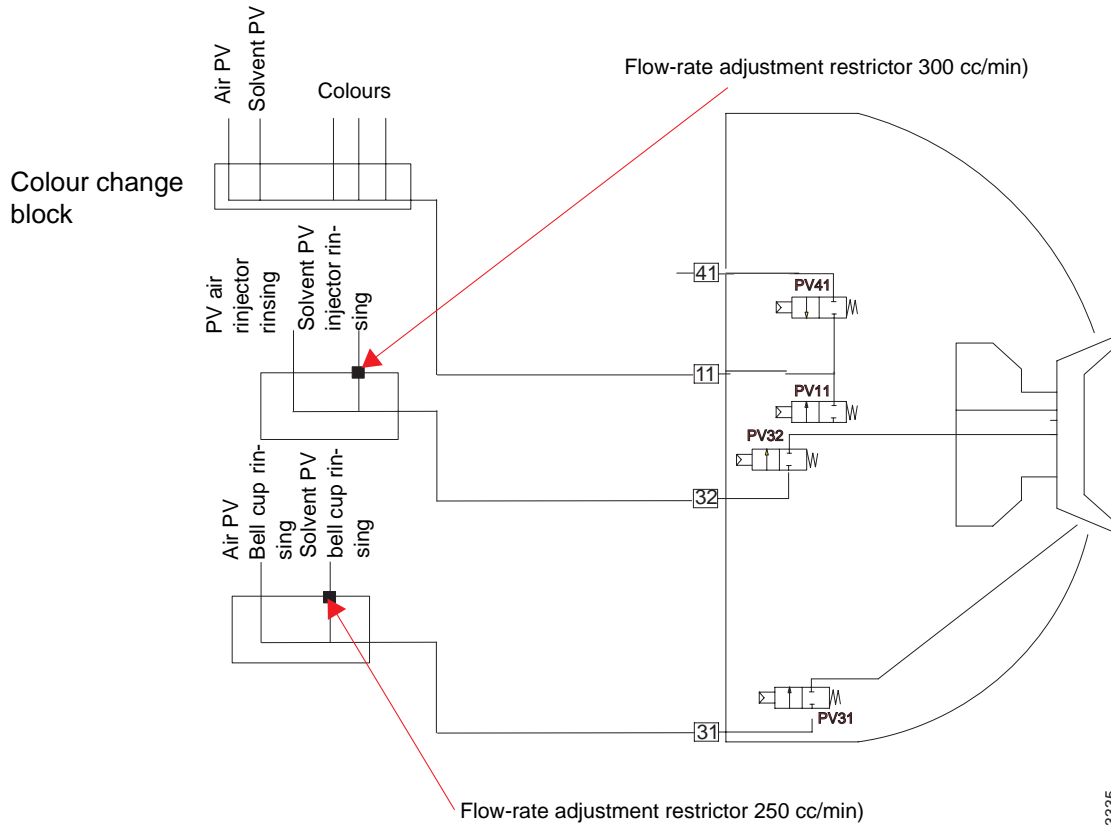


421	Turbine exhaust - Dia 8 x 10 - Polyamide
-----	--

DES03086

4.8. Colour change and rinsing cycles

Example of atomizer integration



DES03335

Seconds

Rinsing supply circuit only

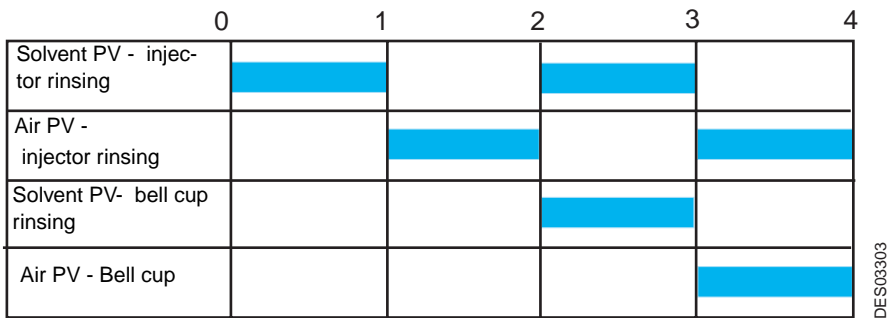
	0	1	2	3	4	5	6
Air PV - Colour change block		█		█		█	
Solvent PV - Color change block	█		█		█		
Dump valve PV 41	█	█	█	█	█	█	█

DES01056

- Standard Conditions: 6 bar, air, solvent and paint.
- Colour change block and rinsing block operated 1 to 1.5 metres from atomizer.

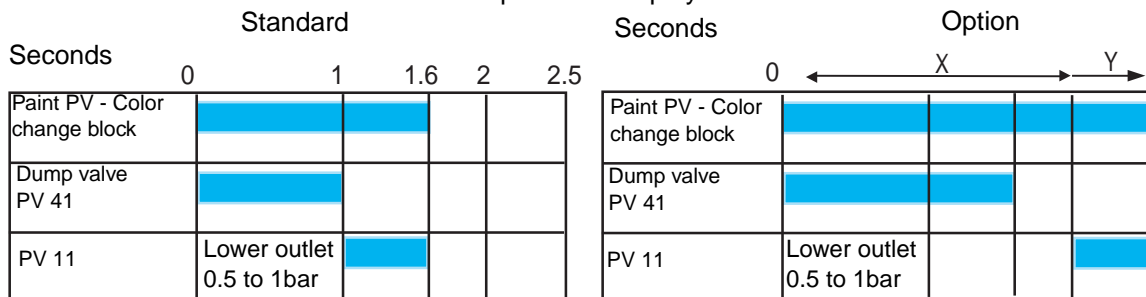
Seconds

Rinsing bell cup only



DES03303

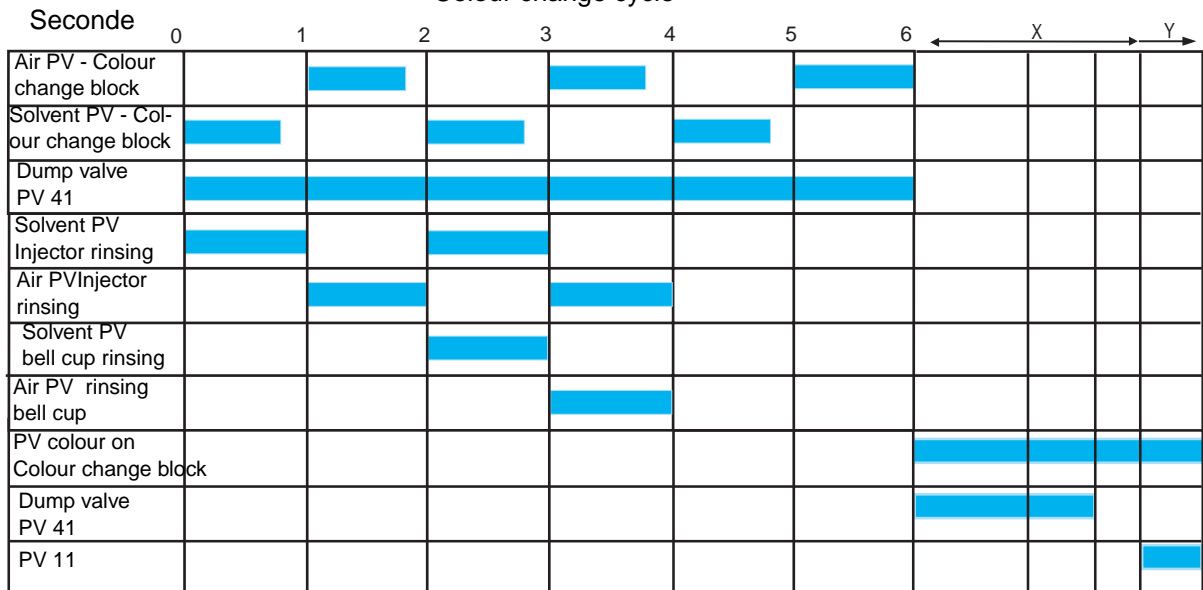
Example of start-up cycle



DES01057

- Normal paint flow rate, valve activated: 150 cc/min
- X : time required for paint to flow from the colour change block to the bell cup.
- Y: time required for paint to leave the bell cup.

Colour change cycle



- Recommended solvent flow rate for injector: 300 cc/mn.
- Recommended solvent flow rate for bell cup rinsing: 250 cc/mn.
- Always use restrictors if the flow rate exceeds the values above.
- The final pneumatic pulse clears and dries the rinsing circuit for the outside of the bell cup in order to prevent any solvent being sprayed.

5. Maintenance

5.1. Shutdown and Startup Procedures

Important recommendations

Follow the air settings given in Section 3.2.

The rotor and stator will become unusable if the bearing air is cut.

The bearing air must be at least 6 bar at the quick-disconnect plate.

(*For hose lengths greater than 4.5 m, measure the air pressure at the quick-disconnect plate to determine the correct setting).

Check that the speed regulating module transmits a signal.

5.1.1. Shutdown procedure

Important steps to be observed:

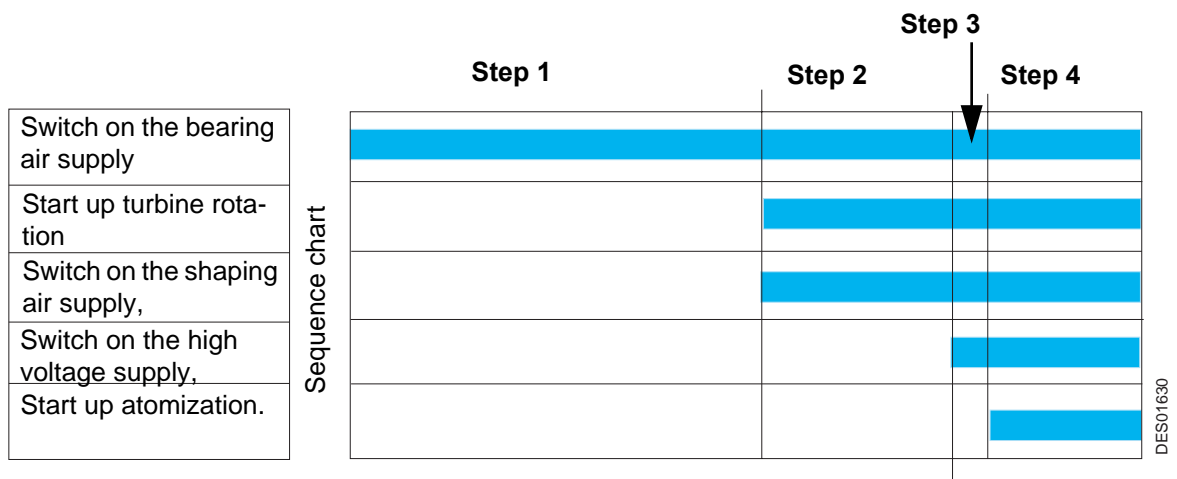
		Step 1	Step 2	Step 3	Step 4	Step 5
Switch off atomization	Sequence chart					
Switch off the high voltage power supply						
Run a rinsing cycle						
Switch off the shaping air						
Switch off turbine rotation *						
Switch off the bearing air						



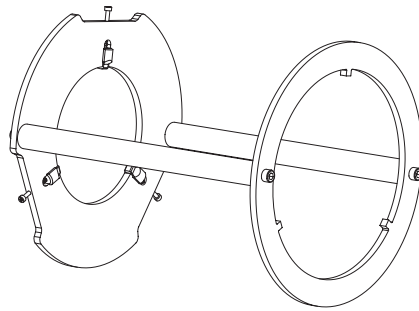
WARNING : * The turbine must never be stopped by switching off the bearing air supply. Wait until the turbine has stopped completely before switching off the bearing air.

5.1.2. Startup Procedure

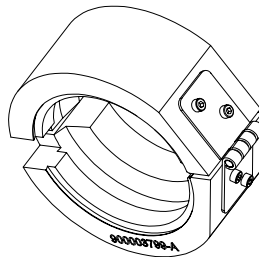
Important steps to be observed:



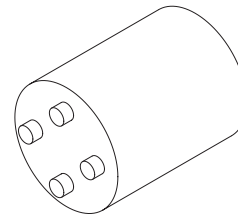
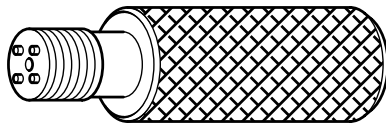
5.2. Tools



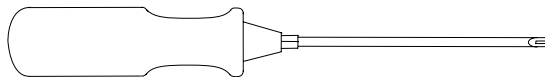
Part number	Description	Qty	Unit of sale
910005556	Removal tool for outer cover and charge ring adapter	1	1



Part number	Description	Qty	Unit of sale
900003799	Removal tool, 65 EC magnetic bellcup	1	1



Part number	Description	Qty	Unit of sale
1303689	Removal tool for microvalve	1	1
1403478	Microvalve automatic tightening tool	1	1



Part number	Description	Qty	Unit of sale
547112	Installation / removal screwdriver for screws and needles	1	1

5.3. Installation of the atomizer

- **Step 1:** Secure the support tube onto the painting apparatus using the securing nut.
- **Step 2:** Install the placebo equipped with the green / yellow wire (connection to the ground) in the atomizer sheath. The green / yellow wire must be connected to the securing nut. Lock placebo in place using the M4x10 screw, but do not fully tighten.
- **Step 3:** Connect air and product hoses to the manifold block.
- **Step 4:** Thread the hoses and the green / yellow wire through the support tube.
- **Step 5:** Secure the PPH 308 atomizer to the support tube with four M 8 x 30 screws.
- **Step 6:** Screw the charge ring adapter to the support.
- **Step 7:** Install the shaping air shroud, the outer cover then the bell cup.
- **Step 8:** Place the spacer of charge ring locking on the outer cover and screw it on the charge ring adapter using tool (P/N 910005556).
- **Step 9:** Place the charge ring on the spacer.
- **Step 10:** Screw the locking ring on the charge ring.
- **Step 11:** Insert the high voltage connection in the charge ring and screw the connection nut to the charge ring.

6. Assembly / Disassembly

6.1. Disassembly and reassembly of the PPH 308



WARNING : These different operations are to be carried out by a trained person.

6.1.1. Disassembly

Carry out a rinse of the PPH 308 before disassembly.

- Switch off the UHT power supply and remove the high voltage cable connection from the charge ring.
- Unscrew the locking ring of the charge ring.
- Remove the charge ring and the spacer.
- Unlock the outer cover with the wrench ([see § 5.2 page 29](#)).
- Unscrew the cover by hand and remove it.
- Unscrew the charge ring adapter from the support.
- Disconnect all the hoses to the manifold block and to 1 PV-block (except the hoses connected between the 1 PV-block and the manifold block).
- Remove the 4 screws securing the PPH 308 to its support.



WARNING : Leave the grips in place on the manifold to avoid losing them.

6.1.2. Reassembly

- Secure the PPH 308 with the 4 screws.
- Reconnect all the hoses to the manifold and 1-PV block.
- Then proceed in reverse order of the disassembly.

6.2. Bell cup

[see RT Nr 6285](#)

Disassembly:

- Place the tool (P/N 900003799) against the outer cover, close the tool on the bell cup, hold the tool until it stops and pull the bell cup in the axis.
- Maintain tool supporting the bell cup tightened in order not to let it fall.
- Place the bell cup on a plane and perfectly clean surface.

Re-assembly:

- Install the bell cup on the rotor, a "clac" must be heard.

6.3. Shaping air assembly

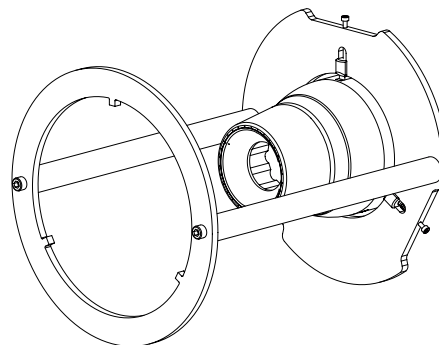
[see RT Nr 6285](#).

Removal:

- Slide the tool (P/N910005556) on the atomizer (the "small diameter" must be placed outer cover side). Place the retractable fingers of the tool in the grooves of the outer cover, unlock the outer cover.
- Manually unscrew then remove the outer cover.
- Manually remove the shaping air shroud.

Re-assembly:

- For re-assembly, proceed in reverse order.



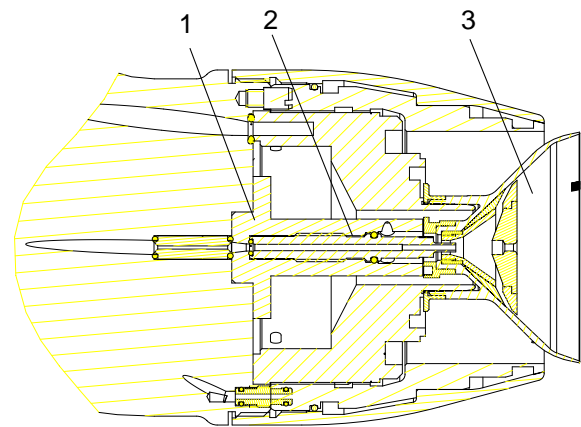
6.4. Turbine

[see RT Nr 6350.](#)

6.5. Injector holder

The injector holder is secured to the body of the PPH 308 by three M3 x 10 screws. Its positioning pin ensures correct fitting.

1	Injector holder
2	Injector
3	Bell cup



DES03373

6.6. Injector

6.6.1. Disassembly

- Switch off the machine.
- Remove the charge ring ([see § 6.1 page 31](#))
- Remove the bell cup ([see RT Nr 6285](#)).
- Remove the outer cover.
- Remove the shaping air shroud.
- Use a 2.5mm allen key to remove the five screws securing the turbine. Remove turbine.
- Use a 2.5mm allen key to remove the three screws securing the injector holder.
- Unscrew injector (clockwise) using a 5 mm open-ended spanner, and remove it carefully to avoid damaging the injector and its two o-rings.
- Clean ([see § 7 page 35](#)).

6.6.2. Reassembly

- Clean ([see § 7 page 35](#)) the components and check their condition. Replace if necessary.
- Insert the microphone seals into the manifold block.
- Put the injector holder in place with the alignment pin and tighten the three screws using a 2.5mm allen key.
- Fit both seals on the injector.
- Place the injector on the injector holder and tighten anticlockwise to a tightening torque of 3,5N.m.
- Put in place the shaping air shroud.
- Clip bell cup onto the turbine.
- Put the outer cover in place, manually tighten then complete the tightening using the special tool (P/N 1308689). Re-install the charge ring.
- Reconnect the power supply.

6.7. 1-PV block and Manifold block

6.7.1. Disassembly

- Remove the PPH 308.
- Remove the screw securing the 1-PV block to the brace.
- Disconnect the hoses between the 1-PV block and the manifold.
- Unscrew tie-rod ([see § 2 page 16](#)).
- Unscrew the tie-rod from the Manifold block.
- Extract tie-rod from 1-PV block.

6.7.2. Reassembly

- Install or replace the restrictor according to the paint viscosity.
- Check the condition of the manifold block components (o-rings, solvent pipette, fittings), replace if necessary.



WARNING : If the plastic fitting is replaced, PTFE tape will need to be wrapped around the thread of the new plastic fitting, (approximately 2 to 3 turns). Beware to avoid overlapping the tape onto the fitting surface.

- Check that all o-rings are in place on the Manifold block.
- Insert tie-rod into 1-PV block and screw onto the Manifold block.
- Lock tie-rod to support, tightening the screw fully in.
- Connect the hoses between 1-PV block and manifold block.
- Lock 1-PV block to tie-rod by tightening the nylon screw M5 x 10.

6.8. Microvalves

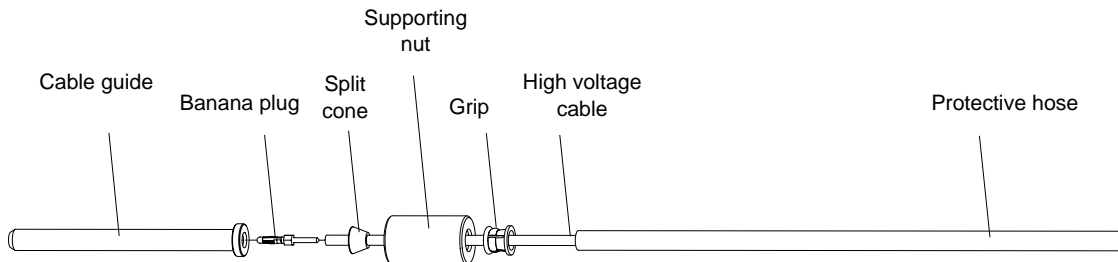
[see RT Nr 6021](#)

6.9. 6-fingers Charge ring

- Check the condition of the needle screws.
- Unscrew the needle screws using tool (P/N 547112).
- Replace the needle screw(s).
- Check high voltage.

6.10. High voltage connection

6.10.1. Preparing the high voltage connection



DES03718



WARNING : Ensure not to damage the insulating jack. The smallest nick or mark in the insulating jacket will cause the cable to breakdown.

- **Step 1:** Strip using a tool type strip-cable (rice-grain) the high voltage cable over 22.5 length for the violet sheath. It is imperative not to use a standard tool slicing "cutter" Then strip the semiconductor sheath (black sheath) over 19 cm length by peeling it and cut it using pliers.



Step 1

- **Step 2:** Place the seal onto the grip and pass the high voltage cable through the grip. Then slide the nut, the split cone onto the cable. Push the grip into the nut.



Step 2

- **Step 3:** Insert the banana plug into the high voltage cable, and screw on manually then with a 6 mm open-ended spanner, tighten fully.

- **Step 4: Greasing**

- Coat the banana plug and the high voltage cable until the split cone with a fine layer of dielectric grease.



Steps 3 and 4

- **Step 5:** Place the high voltage cable guiding tube on the cable before connecting the cable to the charge ring.

7. Cleaning procedures

According to the frequency of use and in all the cases at the end of each cycle:

- Run a rinsing cycle.
- Stop the atomizer and switch off the power supply.

Before any operation, refer to the health and safety rules [see § 1.4 page 7](#).



WARNING : Always wear safety goggles.
Whenever solvent is handled, rubber gloves must be worn.
Work in a well ventilated area whenever solvent is used.



WARNING : It is imperative to pass a rag soaked with water on the atomizer before cleaning it using a rag and an approved cleaning product. Do not use a manual solvent gun.



WARNING : Do not soak the turbine in solvent.

Under no circumstances must the atomizer or any of its components be sprayed with solvent or water at high or low pressure.



WARNING : SAMES Technologies disadvises the use of protective plastic sheets.
If, despite this warning, plastic sheets are used to protect the atomizer, do not choose "anti-static" sheets as these conduct electricity and will short-circuit the high voltage if they are used to protect insulating parts such as the atomizer body.
Sames Technologies advises the use of textile cover or dielectric grease.



WARNING : In all the cases, the protections installed must be insulating to avoid any risk of over-consumption in current. This is why, these protections must be regularly replaced in order to keep an acceptable leakage current by the high voltage generator (of HV defaults will be able to appear if clogging in painting is too important).

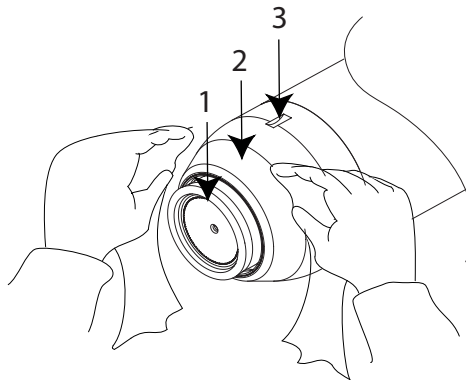
Procedure	Components	Frequency
A	Outer cover, bellcup exterior	8 hours
B	Bellcup, shaping air assembly, injector	120 hours
	Charge ring assembly	4 hours to 8 hours according to coatings

7.1. Procedure A



WARNING : Switch off the turbine. The bearing air and shaping air remain pressurised in order to prevent solvent passing between the bell cup and shaping air shroud and to prevent any blockage.

- Clean the outer cover and the exterior bell cup with a clean cloth, dampened with solvent
- Check that the outer cover grooves are clean.
- Dry carefully with a clean, dry cloth.



DES02097

1	Bell cup
2	Outer cover
3	Grooves in outer cover

7.2. Procedure B



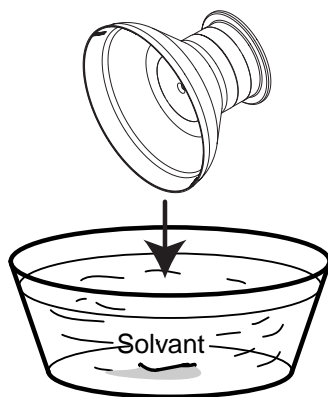
WARNING : Switch off the turbine and shaping air

7.2.1. Bell cup

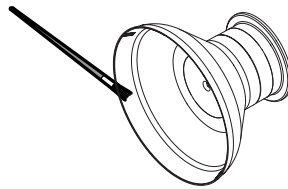
- Remove the bell cup using the specific tool.
- Leave the bell cup soaking in solvent for one hour then clean with a clean cloth and soft brush.



WARNING : Make sure that all surfaces are clean and free from impurities. Take care particularly of the internal and external surfaces of the cylinder of the bell cup fixing.

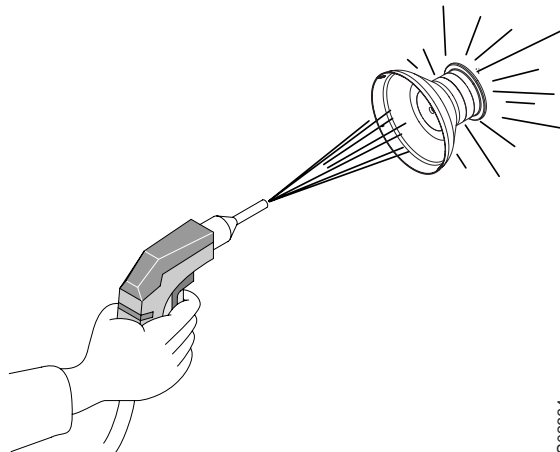


DES02662



DES02663

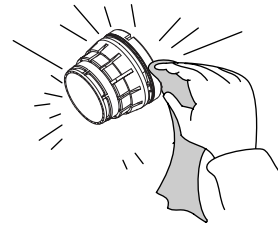
- Dry carefully the two faces of the bell cup with compressed air.



DES02664

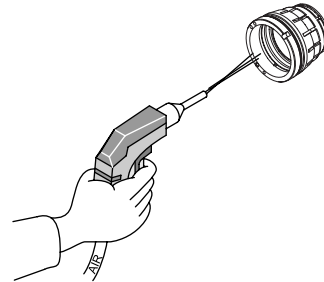
7.2.2. Shaping air assembly

- Remove the outer cover in order to remove the shaping air shroud.



- Clean the outer and inner surfaces of the shaping air shroud using a cloth soaked in solvent and a nylon brush.

- Dry carefully with compressed air then wipe with a clean, dry cloth.



DES02291

7.2.3. Injector and injector holder

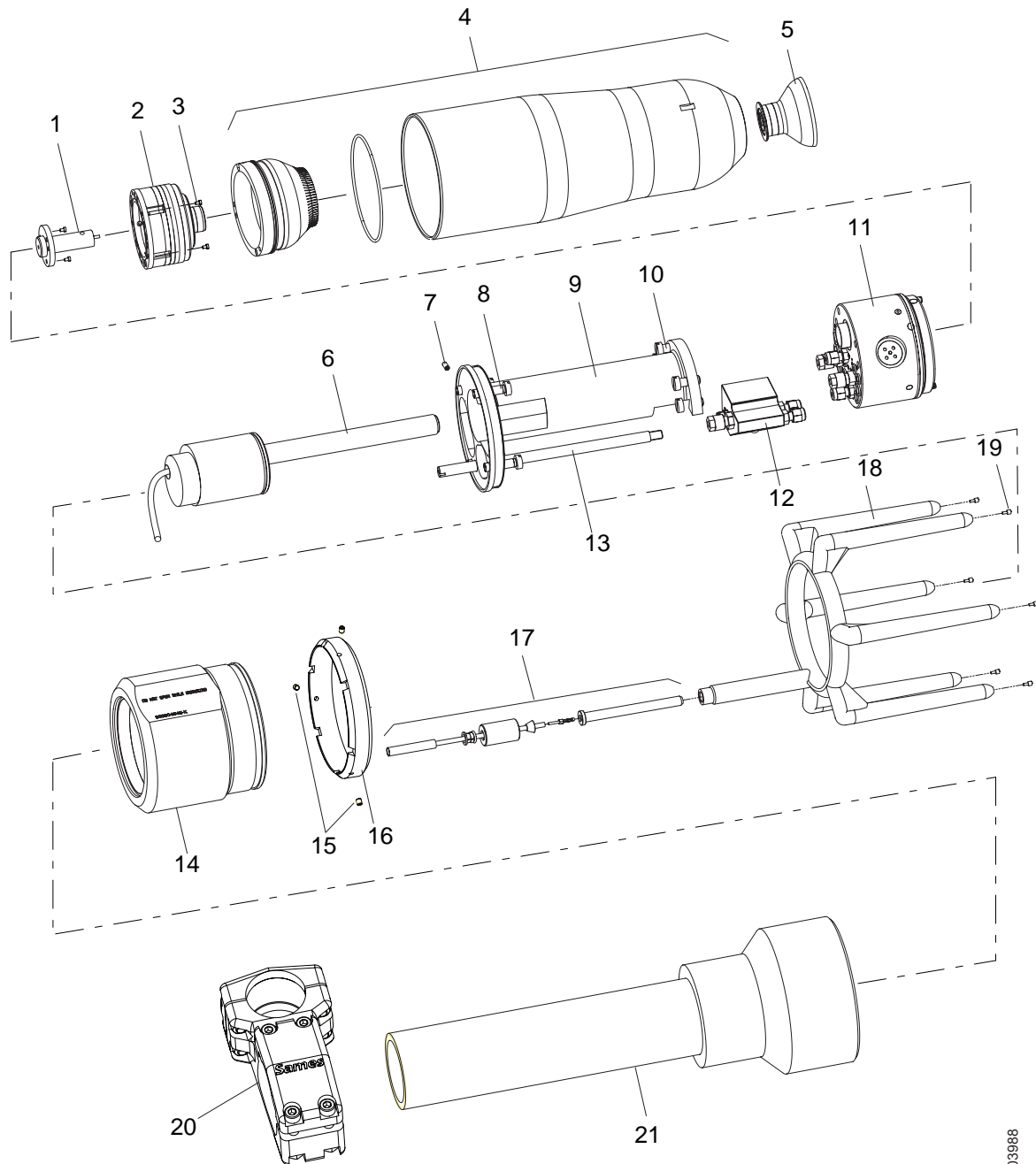
- Remove injector [see § 6.6 page 32](#)
- Leave to soak for one hour in MEK solvent (methyleneethylketone).
- Dry carefully with compressed air
- Proceed in reverse order to reassemble.

7.3. Charge ring

- Clean carefully the needle screws with a brush and solvent.
- Wipe carefully with a dry and clean cloth.
- Dry carefully with compressed air

8. Spare Part Lists

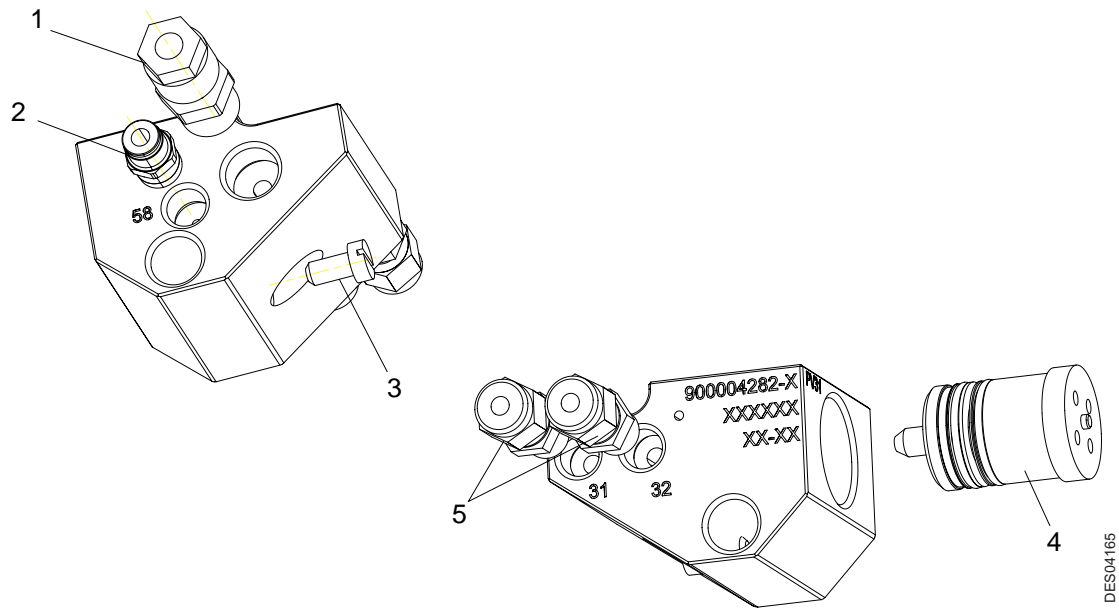
8.1. PPH 308 - External charge, single circuit with EC 65 bell cup



DES03988

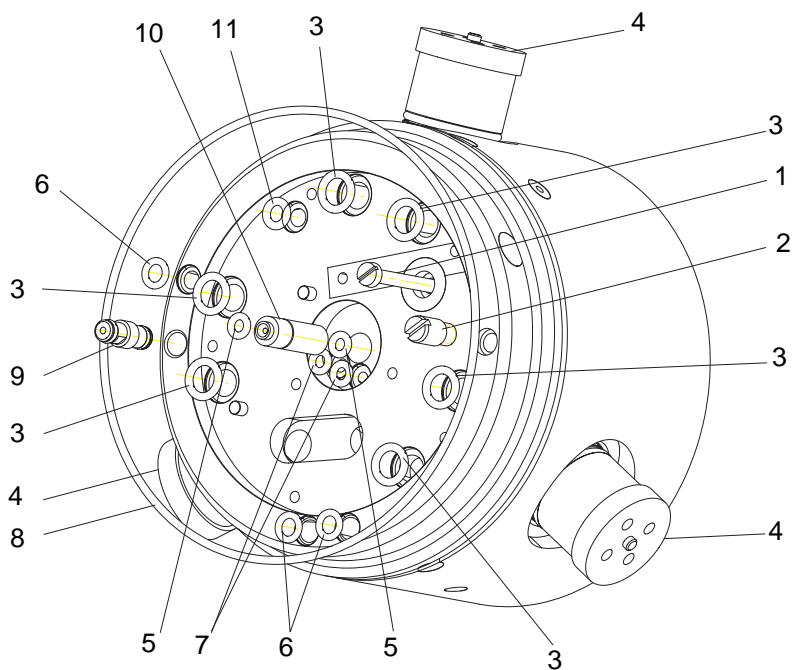
Item	Part number	Description	Qty	Unit of sale	First Priority	Wear
	910004948	PPH 308 SCSR external charge	1	1	-	-
1	910001130	Injector / injector holder assembly (see § 8.4 page 44)	1	1	X	
2	910000295	S6 Turbine"BTM" type - see RT Nr 6350	1	1	X	
3	X4FVSY067	Stainless steel Chc M3 x 10 screw	5	1	-	-
4	1521092	Shaping air assembly see RT Nr 6285	1	1	X	
5	1527176	EC 65 Bell cup see RT Nr 6285	1	1	X	
6	1517868	HVU placebo to connect to the ground (see § 8.5 page 45)	1	1	X	
7	X9NSFA118	c M4 nylon headless screw	1	1	-	-
8	X9SVCB285	c M8 x 30 glass filled nylon screw	4	1	X	
9	1202048	Placebo holder	1	1	-	-
10	X9SVCB283	c M8 x 20 glass filled nylon screw	4	1	X	
11	910006006	Manifold block (see § 8.3 page 42)	1	1	X	
12	910005997	1-PV block (see § 8.2 page 41)	1	1	X	
13	1405874	Tie-rod for 1-PV block	1	1	-	-
14	910006855	Charge ring adapter	1	1	-	-
15	X9NSFA706	M6 x 7 nylon headless screw	3	1	-	-
16	1303290	Locking ring of charge ring	1	1	-	-
17	910003653	High voltage connection assembly (see § 8.6 page 46)	1	1	-	-
18	853361	6-fin ers charge ring	1	1	-	-
19	549903	Needle screw (included in Item 18)	6	1	X	
20	1204441	Nut for tube	1	1	-	-
21	1203616	Tube holder PPH 308 - Dia:63	1	1	-	-

8.2. 1- PV block

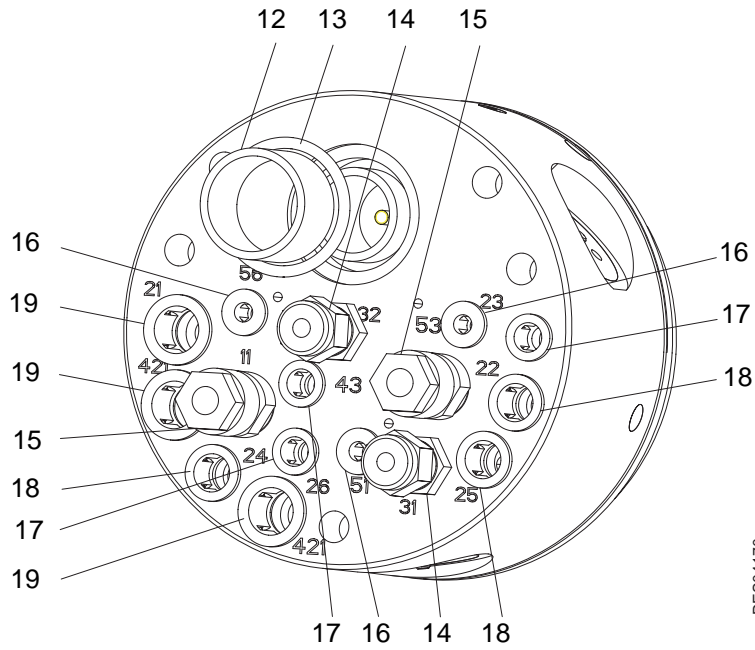


Item	Part number	Description	Qty	Unit of sale	First Priority	Wear
	910005997	1-PV block	1	1	X	
1	F6RPUK317	Fitting 1/4 BSP for 4/6 hose	1	1		X
2	F6RLUS268	Male union	1	1		X
3	X9NVCB181	Nylon screw C M 5 x 10	1	1		X
4	1507375	Microvalve, orange indicator (see RT Nr 6021)	1	1		X
5	F6RPUQ062	Male union	2	1		X

8.3. Manifold block



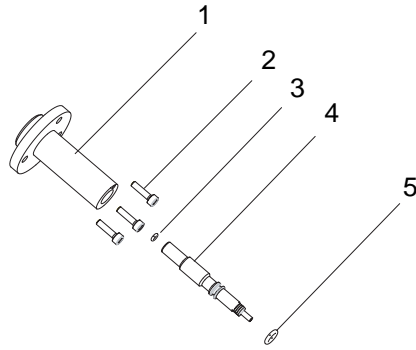
Item	Part number	Description	Qty	Unit of sale	First Priority	Wear
	910006006	Manifold block	1	1	X	
1	1405931	Screw C M3x50 brass	1	1	-	-
2	1402691	Alignment pin, shaping air	1	1	-	-
3	J3STKL078	O-ring - chemically inert	6	1		X
4	1507375	Microvalve, orange indicator (see RT Nr 6021)	3	1		X
5	J3STKL002	O-ring - chemically inert	2	1		X
6	J3STKL039	O-ring - chemically inert	3	1		X
7	J3STKL026	O-ring - chemically inert	2	1		X
8	J2FENV638	O-ring	1	1		X
9	1519555	Equipped solvent pipette	1	1	-	-
	J3STKL027	O-ring - chemically inert	2	1		X
10	640403	Restrictor \varnothing 1,2	1	1	X	
11	J3STKL035	O-ring - chemically inert	1	1		X



DES04170

Item	Part number	Description	Qty	Unit of sale	First Priority	Wear
12	449707	Outer sleeve insulator	1	1	-	-
13	J2FTCF051	O-ring - viton	1	2		X
14	F6RPUQ062	Male union	2	1		X
15	738245	Fitting 1/4 for hose 4/6	2	1		X
16	F6RXZG081	Stainless steel grip and o-ring	3	1	-	-
17	F6RXZG082	Stainless steel grip and o-ring	3	1	-	-
18	F6RXZG083	Stainless steel grip and o-ring	3	1	-	-
19	F6RXZG084	Stainless steel grip and o-ring	3	1	-	-

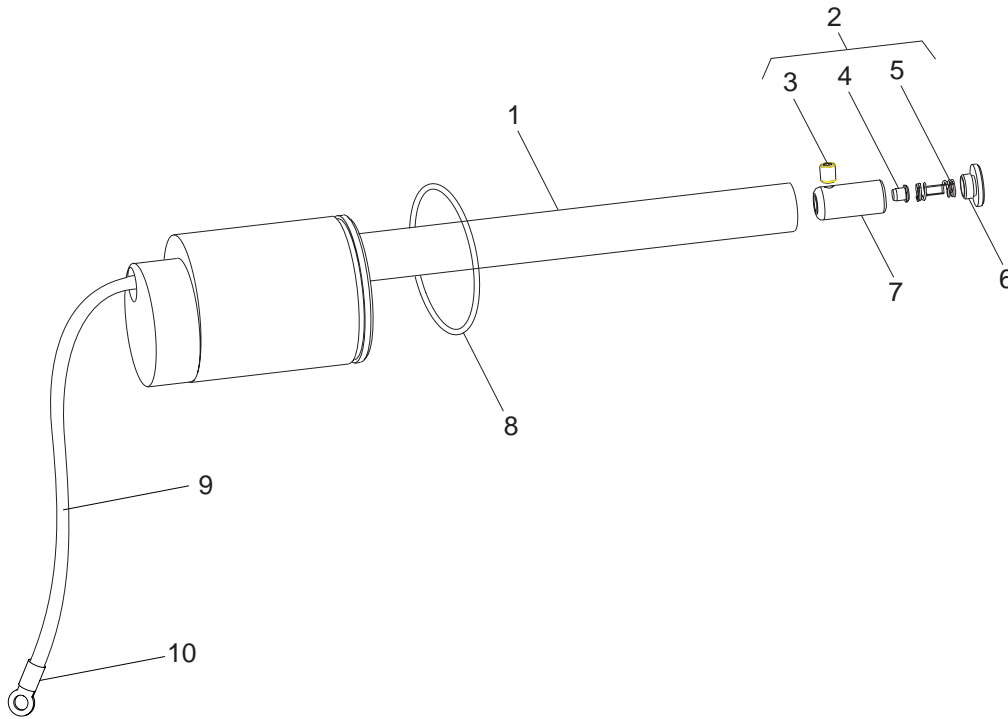
8.4. Injector / Injector holder Assembly



DES02117

Item	Part number	Description	Qty	Unit of sale	First Priority	Wear
	910001130	Injector / injector holder assembly	1	1	X	
1	738354	Injector holder	1	1	-	-
2	X4FVSY067	Screw C M 3 x 10 - stainless steel	3	1	-	-
3	J3STKL014	O-ring - chemically inert	1	1		X
4	738635	Injector Dia: 1.8	1	1	X	
5	J3STKL005	O-ring - chemically inert	1	1		X

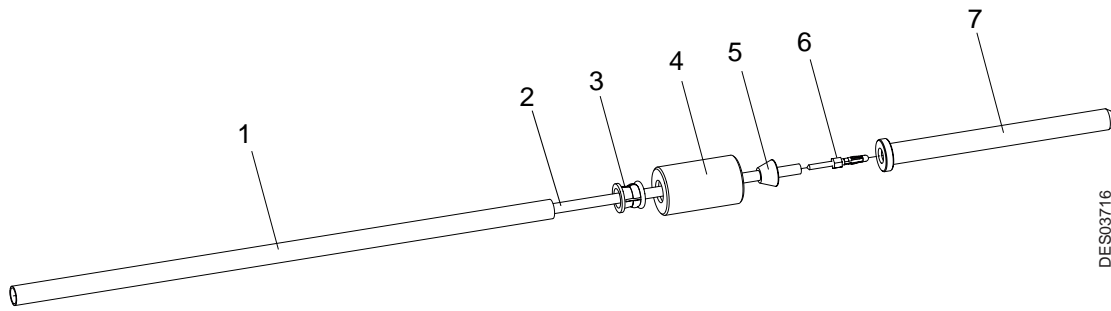
8.5. HVU placebo to connect to the ground



DES02079

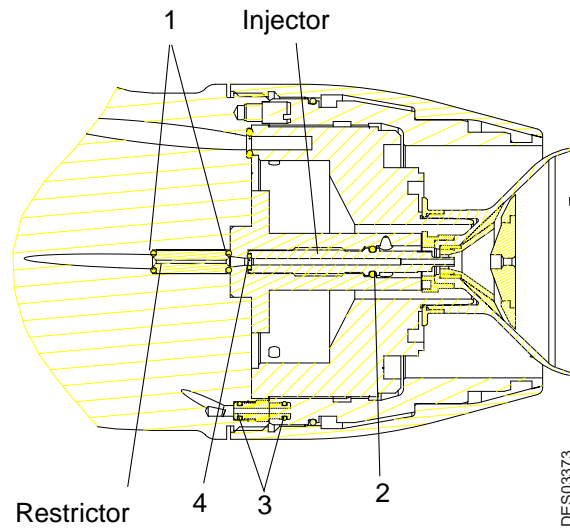
Item	Part Number	Description	Qty	Unit of sale	First Priority	Wear
	1517868	HVU Placebo	1	1	X	-
1	1303393	Ground wells	1	1	-	-
2	855792	Hv contact assembly	1	1	X	
3	X3ASSC116	HC M 4x 6 zinc coated steel screw	1	1	-	-
4	548304	HV cable stopper	1	1	-	-
5	Q2HRDC095	Spring	1	1	-	-
6	548303	HVcontact disc	1	1	-	-
7	737272	HV sleeve	1	1	-	-
8	J2FTDF416	O-ring - Viton	1	1	-	-
9	E2AAJF006	Green /Yellow wire	2.5	m	-	-
10	E4CSPR086	Round lug	1	1	-	-

8.6. High voltage connection assembly



Item	Part Number	Description	Qty	Unit of sale	First Priority	Wear
	910003653	High voltage connection assembly	1	1	-	-
1	U1CBBR057	Protective hose, HV cable Dia: 10/12 clear polyamide	8,5	m	-	-
2	E2DAVD101	High voltage cable	9	m	-	-
3	F4RXZG085	Stainless steel clamp and seal	1	1	-	-
4	900002769	Clamp nut	1	1	-	-
5	1411689	Split cone	1	1	-	-
6	E4CSHT181	Banana plug	1	1	-	-
7	900002770	High voltage cable guide in the charge ring	1	1	-	-

8.7. Turbine, injector and restrictor seals



Part Number	Restrictor	Number of grooves	Colour
640400	D: 0.8 mm	-	Black
640401	D: 0.9 mm	1	Black
640402	D: 1.0 mm	2	Black
640403	D: 1.2 mm	-	White
640456	D: 1.5 mm	1	White
640464	D: 3.0 mm	2	White

Part Number	Injector	Number of grooves
738632	D: 0.9 mm	-
738353	D: 1.2 mm	2
738634	D: 1.5 mm	3
738635	D: 1.8 mm	4

Item	Part Number	Description	Qty
1	J3STKL002	O-ring - chemically inert	2
2	J3STKL005	O-ring - chemically inert	1
3	J3STKL027	O-ring - chemically inert	2
4	J3STKL014	O-ring - chemically inert	1