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Operating instructions and spare parts list

# OptiGun 2-A(X) Automatic powder gun (GA02 type)

CE 0102  II 2 D

Order no. 396 800



Translation of the original operating instructions

Gema

## Documentation OptiGun 2-A(X)

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# General safety regulations

This chapter sets out the fundamental safety regulations that must be followed by the user and third parties using the OptiGun 2-A(X) Automatic powder gun (GA02 type).

These safety regulations must be read and understood before the OptiGun 2-A(X) Automatic powder gun (GA02 type) is used.

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## Safety symbols (pictograms)

The following warnings with their meanings can be found in the Gema operating instructions. The general safety precautions must also be followed as well as the regulations in the operating instructions.

**DANGER!**

danger due to live electricity or moving parts. Possible consequences: Death or serious injury

**WARNING!**

Improper use of the equipment could damage the machine or cause it to malfunction. Possible consequences: minor injuries or damage to equipment

**INFORMATION!**

useful tips and other information



---

## Conformity of use

1. The OptiGun 2-A(X) Automatic powder gun (GA02 type) is built to the latest specification and conforms to the recognized technical safety regulations. It is designed for the normal application of powder coating.
2. Any other use is considered as non-conform. The manufacturer is not responsible for damage resulting from improper use of this equipment; the end-user alone is responsible. If the OptiGun 2-A(X) Automatic powder gun (GA02 type) is to be used for other purposes or other substances outside of our guidelines, then Gema Switzerland GmbH should be consulted.
3. Observance of the operating, service and maintenance instructions specified by the manufacturer is also part of conformity of

use. The OptiGun 2-A(X) Automatic powder gun (GA02 type) should only be used, maintained and started up by trained personnel, who are informed about and are familiar with the possible hazards involved.

4. Start-up (i.e. the execution of a particular operation) is forbidden until it has been established that the OptiGun 2-A(X) Automatic powder gun (GA02 type) has been set up and wired according to the guidelines for machinery (2006/42 EG). EN 60204-1 (machine safety) must also be observed.
5. Unauthorized modifications to powder spraying equipment exempts the manufacturer from any liability from resulting damage.
6. The relevant accident prevention regulations, as well as other generally recognized safety regulations, occupational health and structural regulations are to be observed.
7. Furthermore the country-specific safety regulations must be observed.

Explosion protection	Type of protection	Temperature class
  0102 II 2 D	IP5X ◀ FM ▶ IP54	T6 (zone 21) T4 (zone 22)

## Technical safety regulations for stationary electrostatic powder spraying equipment

### General information

The powder spraying equipment from Gema is designed with safety in mind and is built according to the latest technological specifications. This equipment can be dangerous if it is not used for its specified purpose. Consequently it should be noted that there exists a danger to life and limb of the user or third party, a danger of damage to the equipment and other machinery belonging to the user and a hazard to the efficient operation of the equipment.

1. The powder spraying equipment should only be started up and used once the operating instructions have been carefully studied. Improper use of the controlling device can lead to accidents, malfunction or damage to the control itself.
2. Before every start-up check the equipment for operational safety (regular servicing is essential)!
3. Safety regulations BGI 764 and VDE regulations DIN VDE 0147, Part 1, must be observed for safe operation.
4. Safety precautions specified by local legislation must be observed.
5. The plug must be disconnected before the machine is opened for repair.
6. The plug and socket connection between the powder spraying equipment and the mains network should only be taken out when the power is switched off.
7. The connecting cable between the controlling device and the spray gun must be set up so that it cannot be damaged during

operation. Safety precautions specified by local legislation must be observed!

8. Only original Gema spare parts should be used, because the explosion protection will also be preserved that way. Damage caused by other parts is not covered by guarantee.
9. If Gema powder spraying equipment is used in conjunction with machinery from other manufacturers then their safety regulations must also be taken into account.
10. Before starting work familiarize yourself with all installations and operating elements, as well as with their functions! Familiarization during operation is too late!
11. Caution must be exercised when working with a powder/air mixture! A powder/air mixture in the right concentration is flammable! No smoking during powder coating!
12. As a general rule for all powder spraying installations, persons with pacemakers should never enter high voltage areas or areas with electromagnetic fields. Persons with pacemakers should not enter areas with powder spraying installations!




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**WARNING!**

**We emphasize that the customer himself is responsible for the safe operation of equipment. Gema is in no way responsible for any resulting damages!**

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## Safety conscious working

Each person responsible for the assembly, start-up, operation, service and repair of powder spraying equipment must have read and understood the operating instructions and the "Safety regulations" chapter. The operator must ensure that the user has had the appropriate training for powder spraying equipment and is aware of the possible sources of danger.

The control units for the spray guns must only be set up and used in zone 22. The spray guns are permitted in the zone 21 created by them.

The powder spraying equipment should only be used by trained and authorized personnel. This applies to modifications to the electrical equipment, which should only be carried out by a specialist.

The operating instructions and the necessary closing down procedures must be followed before any work is carried out concerning the set-up, start-up, operation, modification, operating conditions, mode of operation, servicing, inspection or repairs.

The powder spray equipment can be turned off by using the main switch or failing that, the emergency shut-down. Individual components can be turned off during operation by using the appropriate switches.

## Individual safety regulations for the operating firm and/or operating personnel

1. Any operating method which will negatively influence the technical safety of the powder spraying equipment is to be avoided.
2. The operator should care about no non-authorized personnel works on the powder spraying equipment (e.g. this also includes using the equipment for non-conform work).

3. The operator is under obligation to check the powder spraying equipment at least once every shift for signs of external damage, defects or changes (including the operating characteristics) which could influence safety and to report them immediately.
4. The operator is obliged to check that the powder spraying equipment is only operated when in satisfactory condition.
5. As far as is necessary, the operating firm must ensure that the operating personnel wear protective clothing (e.g. facemasks).
6. The operating firm must guarantee cleanliness and an overview of the workplace with suitable instructions and checks in and around the powder spraying equipment.
7. No safety devices should be dismantled or put out of operation. If the dismantling of a safety device for set-up, repair or servicing is necessary, reassembly of the safety devices must take place immediately after the maintenance or repair work is finished. The powder spraying device must be turned off while servicing is carried out. The operator must train and commit the responsible personnel to this.
8. Activities such as checking powder fluidization or checking the high voltage spray gun etc. must be carried out with the powder spraying equipment switched on.

## Notes on special types of hazard

### ***Power***

It is necessary to refer once more to the danger of life from high voltage current if the shut-down procedures are not observed. High voltage equipment must not be opened - the plug must first be taken out - otherwise there is danger of electric shock.

### ***Powder***

Powder/air mixtures can be ignited by sparks. There must be sufficient ventilation in the powder coating booth. Powder lying on the floor around the powder spraying device is a potentially dangerous source of slipping.

### ***Static charges***

Static charges can have the following consequences: Charges to people, electric shocks, sparking. Charging of objects must be avoided - see "Earthing".

### ***Grounding/Earthing***

All electricity conducting parts and machinery found in the workplace (according to DIN VDE 0745, part 102) must be earthed 1.5 meters either side and 2.5 meters around each booth opening. The earthing resistance must amount to maximally 1 MOhm. The resistance must be tested on a regular basis. The condition of the machinery surroundings as well as the suspension gear must ensure that the machinery remains earthed. If the earthing of the machinery includes the suspension arrangements, then these must constantly be kept clean in order to guarantee the necessary conductivity. The appropriate measuring devices must be kept ready in the workplace in order to check the earthing.



### ***Compressed air***

When there are longer pauses or stand-still times between working, the powder spraying equipment should be drained of compressed air. There is a danger of injury when pneumatic hoses are damaged and from the uncontrolled release and improper use of compressed air.

### ***Crushing and cutting***

During operation, moving parts may automatically start to move in the operating area. It must be ensured that only instructed and trained personnel go near these parts. The operator should ensure that barriers comply with the local security regulations.

### ***Access under exceptional circumstances***

The operating firm must ensure that local conditions are met when repairs are made to the electronic parts or when the equipment is restarted so that there are additional measures such as barriers to prevent unauthorized access.

### ***Prohibition of unauthorized conversions and modifications to machines***

All unauthorized conversions and modifications to electrostatic spraying equipment are forbidden for safety reasons.

The powder spraying equipment should not be used if damaged, the faulty part must be immediately replaced or repaired. Only original Gema replacement parts should be used. Damage caused by other parts is not covered by guarantee.

Repairs must only be carried out by specialists or in Gema workshops. Unauthorized conversions and modifications may lead to injury or damage to machinery. The Gema Switzerland GmbH guarantee would no longer be valid.

## **Safety requirements for electrostatic powder coating**

1. This equipment is dangerous if the instructions in this operating manual are not followed.
2. All electrostatic conductive parts, in particular the machinery within 5 meters of the coating equipment, must be earthed.
3. The floor of the coating area must conduct electricity (normal concrete is generally conductive).
4. The operating personnel must wear electricity conducting footwear (e.g. leather soles).
5. The operating personnel should hold the gun with bare hands. If gloves are worn, these must also conduct electricity.
6. The supplied earthing cable (green/yellow) must be connected to the earthing screw of the electrostatic powder spraying hand appliance. The earthing cable must have a good metallic connection with the coating booth, the recovery unit and the conveyor chain and with the suspension arrangement of the objects.
7. The electricity and powder supply to the hand guns must be set up so that they are fully protected against heat and chemical damage.

8. The powder coating device may only be switched on once the booth has been started up. If the booth cuts out then the powder coating device must be switched off.
9. The earthing of all electricity conducting devices (e.g. hooks, conveyor chains) must be checked on a weekly basis. The earthing resistance must amount to maximally 1 MOhm.
10. The control device must be switched off if the hand gun is cleaned or the nozzle is changed.
11. When working with cleaning agents there may be a risk of hazardous fumes. The manufacturers instructions must be observed when using such cleaning agents.
12. The manufacturers instructions and the applicable environmental requirements must be observed when disposing of powder lacquer and cleaning agents.
13. If any part of the spray gun is damaged (broken parts, tears) or missing then it should not be used.
14. For your own safety, only use accessories and attachments listed in the operating instructions. The use of other parts can lead to risk of injury. Only original Gema replacement parts should be used.
15. Repairs must only be carried out by specialists and under no circumstances should they be carried out in the operating area. The former protection must not be reduced.
16. Conditions leading to dangerous levels of dust concentration in the powder spraying booths or in the powder spraying areas must be avoided. There must be sufficient technical ventilation available, to prevent a dust concentration of more than 50% of the lower explosion limit (UEG) (UEG = max. permissible powder/air concentration). If the UEG is not known then a value of 10 g/m<sup>3</sup> should be used.

## A summary of the rules and regulations

The following is a list of relevant rules and regulations which are to be observed:

### ***Guidelines and regulations, German professional association***

BGV A1	Prevention principles
BGV A3	Electrical equipment and material
BGI 764	Electrostatic coating
BGR 132	Guidelines for the avoidance of the dangers of ignition due to electrostatic charging (guideline "Static Electricity")
VDMA 24371	Guidelines for electrostatic coating with synthetic powder <sup>1)</sup> - Part 1 General requirements - Part 2 Examples of use

### EN European standards

RL94/9/EC	The approximation of the laws of the Member States relating to apparatus and safety systems for their intended use in potentially explosive atmospheres
EN 12100-1 EN 12100-2	Machine safety <sup>2)</sup>
EN IEC 60079-0	Electrical equipment for locations where there is danger of explosion <sup>3)</sup>
EN 50 050	Electrical apparatus for potentially explosive atmospheres - electrostatic hand-held spraying equipment <sup>2)</sup>
EN 50 053, part 2	Requirements for the selection, installation and use of electrostatic spraying equipment for flammable materials - hand-held electrostatic powder spray guns <sup>2)</sup>
EN 50 177	Stationary electrostatic spraying equipment for flammable coating powder <sup>2)</sup>
EN 12981	Coating plants - spray booths for application of organic powder coating material - safety requirements
EN 60 529, identical: DIN 40050	IP-Type protection: contact, foreign bodies and water protection for electrical equipment <sup>2)</sup>
EN 60 204 identical: DIN VDE 0113	VDE regulations for the setting up of high voltage electrical machine tools and processing machines with mains voltages up to 1000 V <sup>3)</sup>

### VDE (Association of German Engineers) Regulations

DIN VDE 0100	Regulations for setting-up high voltage equipment with mains voltages up to 1000 V <sup>4)</sup>
DIN VDE 0105 part 1 part 4	VDE regulations for the operation of high voltage equipment <sup>4)</sup> General regulations Supplementary definitions for stationary electrical spraying equipment
DIN VDE 0147 part 1	Setting up stationary electrostatic spraying equipment <sup>4)</sup>
DIN VDE 0165	Setting up electrical equipment in locations in areas with danger of explosion <sup>4)</sup>

Sources:

<sup>1)</sup> Carl Heymanns Verlag KG, Luxemburger Strasse 449, 5000 Köln 41, or from the appropriate employers association

<sup>2)</sup> Beuth Verlag GmbH, Burgrafenstrasse 4, 1000 Berlin 30

<sup>3)</sup> General secretariat, Rue Bréderode 2, B-1000 Bruxelles, or the appropriate national committee

<sup>4)</sup> VDE Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12

## Special security measures

- The installation work, to be done by the customer, must be carried out according to local regulations
- Before starting up the plant a check must be made that no foreign objects are in the booth or in the ducting (input and exhaust air)
- It must be observed, that all components are grounded according to the local regulations, before start-up



# About this manual

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## General information

This operating manual contains all important information which you require for the working with the OptiGun-GA02-en.doc Automatic powder gun (GA02 type). It will safely guide you through the start-up process and give you references and tips for the optimal use of your new powder coating system.

Information about the function mode of the individual system components - booth, gun control unit, manual gun or powder injector - you will find in the corresponding enclosed documentations.



# Function description

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## Field of application

The OptiGun 2-A(X) Automatic powder gun is intended exclusively for the electrostatic coating with organic powders. Any other use is considered as non-conform. The manufacturer is not responsible for any damage resulting from this; the risk for this is assumed by the user alone.

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## OptiGun 2-A(X) Automatic powder gun - overview

The extremely light OptiGun 2-A(X) Automatic powder gun with integrated high voltage generation persuades by optimal penetrating ability and high charging. The vented central electrode allows a high, constant transfer efficiency and a high coating efficiency by symmetrical coating structure.

### Typical characteristics

The OptiGun 2-A(X) Automatic powder gun can be easily dismantled and is therefore maintenance and repair-friendly.

- Continuous, tightly sealed gun body with separate channels for cascade and rinsing air
- Continuous guided powder tube, self-sealing
- Quickly dismantlable SuperCorona ring
- Powder tube coupling with quick-release fastener
- Covered hose and cable ducting
- Excellent access to the connections due to snap lock
- Simple conversion to a quick color change gun (powder tube and gun fixture tube)
- Same nozzles and extensions as EasySelect manual gun
- Easily dismantlable by a few hand movements, therefore very easy to service
- Few wear parts (powder tube, nozzle and SuperCorona)
- Self-sealing powder tube (housing tube seat)
- Easily removable cascade because free of grease, with integrated current limiting resistors
- Spring loaded contact between cascade and contact pin

- Easily dismantlable and cleanable SuperCorona

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## Scope of delivery

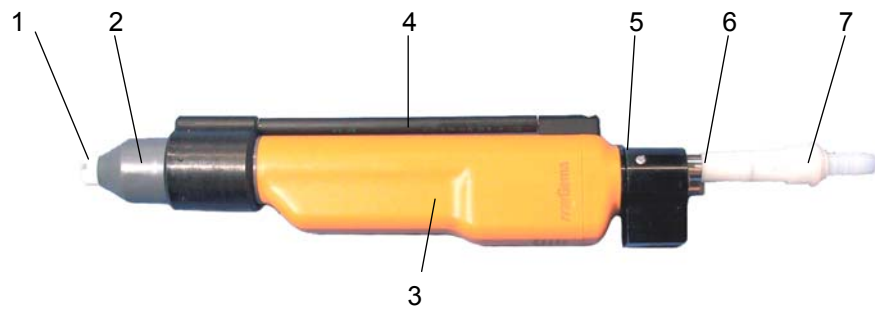
- OptiGun 2-A(X) Automatic powder gun
- Flat jet nozzle with electrode holder
- Cable binder with Velcro closure
- Gun cleaning brush
- Parts set



# Structure and function

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## OptiGun 2-A(X) Automatic powder gun



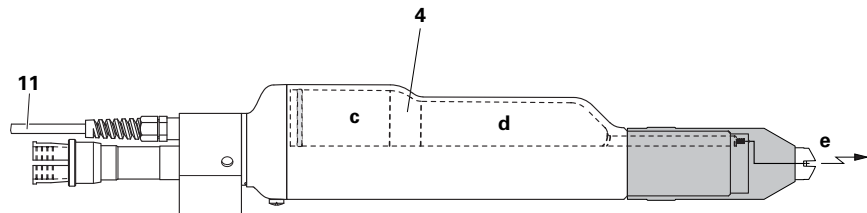
*OptiGun 2-A(X) Automatic powder gun*

- |   |   |   |                       |
|---|---|---|-----------------------|
| 1 | Spray nozzle                              | 5 | Powder gun attachment |
| 2 | Threaded sleeve                           | 6 | Powder tube           |
| 3 | Shaft with removable high voltage cascade | 7 | Clamping sleeve       |
| 4 | SuperCorona ring                          |   |                       |

## High voltage generation

The gun control unit supplies a high-frequency low voltage of approximately 10 V eff. This voltage is fed through the gun cable (11) and the gun plug to the high voltage cascade (4) in the shank of the gun.

In the high voltage cascade (4), the low-voltage is high-transformed in a first step (c). This primary high voltage is subsequently rectified and multiplied in the high voltage cascade in a second step (d), until the required high voltage is attained at the end (approx. 100 kV). The high voltage is now fed in the spray nozzle to the electrode (e).



*High voltage generation*

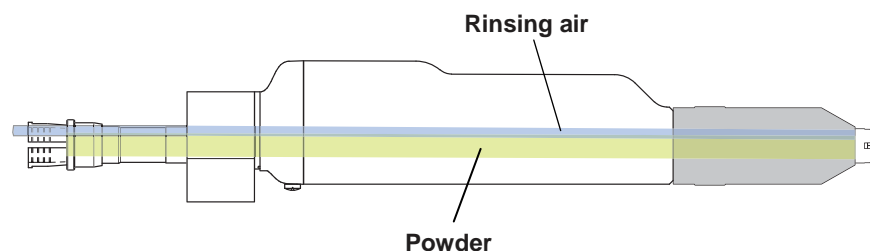
## Circuit

The OptiGun 2-A(X) Automatic powder gun is switched on and off by the gun control unit.

The control unit allows also the adjustment of low voltage, powder flow and rinsing air to the gun.

## Powder flow and rinsing air

The rinsing air, used by the vented spray nozzle, is connected with its designated connection on the rear of the gun control unit (see operating instructions of the powder gun control unit).



*Powder flow and rinsing air*

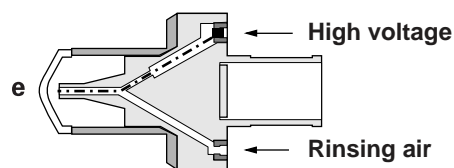
The functions of the spray nozzles are described in the following chapter.

## Spray nozzles

### Flat jet nozzle with vented central electrode

The vented flat jet nozzle serves for the atomizing and charging of the powder. The powder cloud obtains an oval spray pattern by the slot-shaped opening. The powder is charged by the central electrode. The high voltage, which is created in the gun cascade, is conducted through the black contact ring of the nozzle holder to the central electrode.

In order to prevent a powder sintering on the electrode, this is rinsed with compressed air during spraying procedure. Therefore, the rinsing air is fed through the small hole in the black contact ring of the nozzle holder into the electrode attachment. The rinsing air adjustment on the control module is explained in the corresponding operating manual.

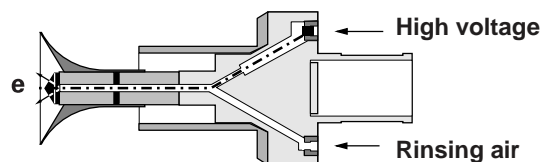


*Flat jet nozzle with vented central electrode*

### Round jet nozzle with vented deflector and vented central electrode

The vented deflector is used to give to the powder stream emerging from the gun the form of a powder cloud. The powder is charged by the central electrode. The high voltage, which is created in the gun cascade, is conducted through the black contact ring of the nozzle holder to the central electrode.

Since powder can accumulate on the rear side of the deflector, this must be rinsed with compressed air. The rinsing air is fed through the small hole in the black contact ring of the nozzle holder into the electrode attachment, and is driven in such a way, that it flows over the surface of the deflector rear side. The rinsing air strength depends on the powder and its sintering ability. The rinsing air adjustment on the control module is explained in the corresponding operating manual.



*Round jet nozzle with vented deflector and vented central electrode*



# Technical Data

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## OptiGun 2-A(X) Automatic powder gun

### Electrical data

OptiGun 2-A(X)	
Nominal input voltage	10 V eff.
Nominal output voltage	98 kV
Polarity	negative (option: positive)
Max. output current	100 $\mu$ A
Cascade	12 stages
Ignition protection	Type A acc. EN 50177

### Dimensions

OptiGun 2-A(X)	
OptiGun 2-A weight	670 g / 1.48 pounds (740 g / 1.63 pounds with SuperCorona ring)
OptiGun 2-AX weight	(depending on gun length)



#### Attention:

The OptiGun 2-A(X) Automatic powder gun may only be connected to the following control units:  
 OptiStar CG07, OptiStar CG06, OptiTronic CG02 ◀ FM ▶, OptiTronic CG03 ◀ FM ▶ and MultiTronic CG04!

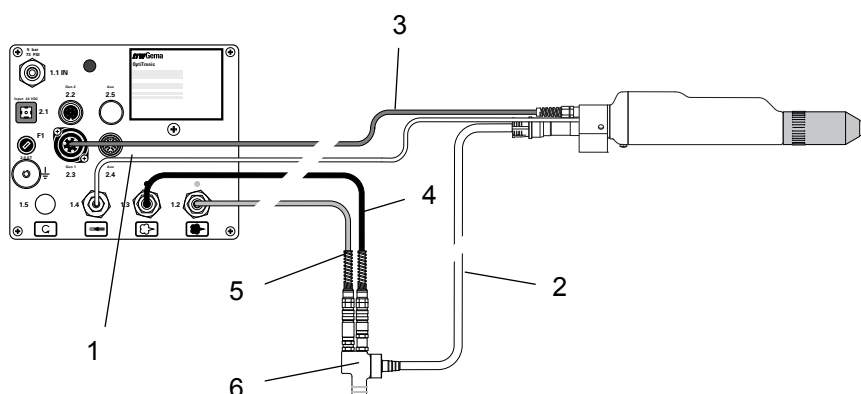
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# Start-up

## Connecting the OptiGun 2-A(X) Automatic powder gun

1. Connect the gun plug to gun control unit (see the gun control unit operating instructions)
2. Connect the rinsing air hose of the control unit to the gun
3. Connect the powder hose from the gun to injector



Connecting the OptiGun 2-A(X) Automatic powder gun

- |   |                  |   |                        |
|---|------------------|---|------------------------|
| 1 | Rinsing air hose | 4 | Supplementary air hose |
| 2 | Powder hose      | 5 | Conveying air hose     |
| 3 | Powder gun cable | 6 | Injector               |

## Function check

### General information

1. The installed gun must be directed toward a grounded work-piece in the coating booth. All connections must be attached!
2. Switch on the gun control unit (see also the control unit operating instructions) - the gun starts spraying
3. Adjust the desired coating parameters (powder volume, total air and high voltage) on the gun control unit (see also the control unit operating instructions)
4. Adjust the rinsing air on the control unit dependent upon the nozzle used

If all tests ran positive, the gun is ready for application. If malfunctions take place, the cause of the fault can be located by the corresponding troubleshooting guide.

## **Troubleshooting**

In the case of possible faults, see chapter "Troubleshooting guide". Please consider also the control unit operating instructions.



# Operation

---

## Start-up and powder coating



---

**Attention:**

**Make sure first, that all electrically conductive parts within 5 m of the coating booth are grounded!**

---

1. Check the powder fluidization
2. The fitted gun must be pointed towards a grounded work piece in the coating booth
3. Switch on the gun control unit
4. Adjust the coating parameters or select one of the programs. Check by observing the LED displays
5. The workpieces can be coated now

---

## Shut-down

1. Switch off the powder gun control unit. The adjustments for high voltage, rinsing air and powder output remain stored
2. If working interruptions take place, such as lunch time, night etc. the main compressed air supply is to be interrupted

---

## Setting powder output and powder cloud

The powder output depends on the powder type and the adjusted total air volume (see the gun control unit operating instructions).

---

## Setting total air volume

The total air volume is depending on the powder hose length, the number of hose curvatures, the hose diameter, the conveying air pressure and the supplementary air.

The operation mode of the injector and the effect of the supplementary air are described in the corresponding injector operating instructions.

**Note:**

The adjusted value of the total air volume can be left as it is, as long as the same diameter powder hose is used.

**If the hose diameter changes, the total air volume must be reset!**

---

## Selecting powder output volume

1. The powder output volume is selected in reference to the desired layer thickness. The selection is done by the + or - keys on the control unit. For the beginning, the standard adjustment of 60% is recommended. The total air volume is thereby kept constant automatically
2. Check the powder fluidization
3. Point the gun into the booth and press the gun switch

---

## Selecting electrode rinsing

1. Select the correct electrode rinsing  
(setting range: 0-2.8 Nm<sup>3</sup>/h, default value: 0.2 Nm<sup>3</sup>/h)  
(setting range: 0-1.65 scfm, default value: 0.12 scfm)
2. Adjust the powder cloud with a test object

If flat jet nozzles are used:

3. Unscrew the threaded sleeve approx. 45°, so that the flat jet nozzle (or its extension) can be moved slightly
4. Turn the flat jet nozzle to desired axis direction
5. Tighten the threaded sleeve firmly again

If round jet nozzles with air rinsed deflectors are used:

6. Replace the deflector (Ø 16, 24 and 32 mm are supplied with the gun)

---

## Rinsing the powder hose

If lengthy downtimes take place, the powder hose is to be cleaned from powder. Observe the following steps:

1. Remove the powder hose from the hose connection on the injector (see the operating instructions of the used injector)
2. Blow through the powder hose with compressed air. The powder hose can be cleaned by tearing off a foam cube from the packing material, and blowing it through the hose with compressed air. Therefore, use our air gun, which is specially designed for this operation (order no. 346 055)
3. The foam cubes can be ordered in sheets of 100 pieces (order no. 241 717)
4. Fit the powder hose again to the hose connection on the injector

# Maintenance

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## General information



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**Note:**

**Regular and conscientious maintenance increases the service life of the OptiGun 2-A(X) automatic powder gun and provides for a longer continuous coating quality!**

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**Attention:**

**All unauthorized conversions and modifications to the OptiGun 2-A(X) Automatic powder gun are forbidden for safety reasons and exempts the manufacturer from any liability from resulting damage!**

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## Daily maintenance

The OptiGun 2-A(X) Automatic powder gun must be cleaned daily and thoroughly (see in addition the chapter "Cleaning and repair").

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## Weekly maintenance

The powder hopper and the injector must be cleaned once a week. The powder hopper should be filled just before starting operation.

The grounding connections of the control module with the coating booth and the suspension device of the workpieces, and/or the conveyor chain are also to be checked weekly.



# Cleaning and repair

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## Cleaning the gun



---

**Attention:**

Before cleaning the OptiGun 2-A(X) automatic powder gun, the control unit must be switched off!

The compressed air used for cleaning must be free from oil and water!

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**Note:**

Only cleaning agents with a flash point of a least 5 Kelvin above the ambient temperature, or cleaning places with technical ventilation are allowed!

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### Daily



---

**Note:**

Frequent cleaning of the gun provides for a longer continuous coating quality!

---

1. Clean the gun thoroughly by blowing and wiping off etc. externally
2. Check the gun for abrasion

### Weekly

1. Remove powder hose from connector
2. Remove the spray nozzle from the gun and clean it
3. Blow through the gun with compressed air from the connection in the direction of flow
4. Clean the gun tube with the gun brush provided
5. Blow through the gun again with compressed air
6. Reassemble the gun and connect it
7. Blow through the powder hose and clean it



**Attention:**

Please note, that the threaded sleeve is always tightened well. If the spray nozzle is only fitted loosely, the danger exists that the high voltage of the gun can jump over to the spray nozzle, which can inevitably lead to damage to the powder gun!

## Dismantling the powder gun

### General information



**Attention:**

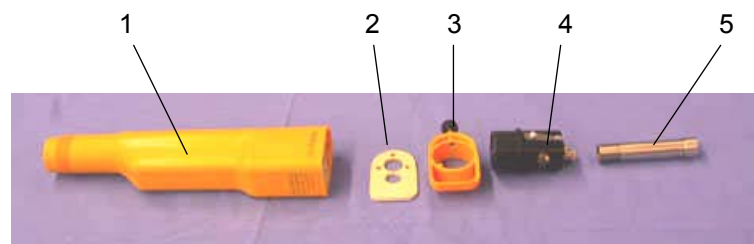
The gun should only be dismantled, if this is required because of a defect or pollution!

It is only to be dismantled so far, as the desired part is accessible!



**Attention:**

Before dismantling the OptiGun 2-A(X) automatic powder gun, the control unit must be switched off and the gun plug disconnected!



*OptiGun 2-A(X) Automatic powder gun - components*

- |   |                    |   |             |
|---|--------------------|---|-------------|
| 1 | Shaft with cascade | 4 | Connector   |
| 2 | Gasket             | 5 | Hollow bolt |
| 3 | Intermediate piece |   |             |

### Dismantling procedure

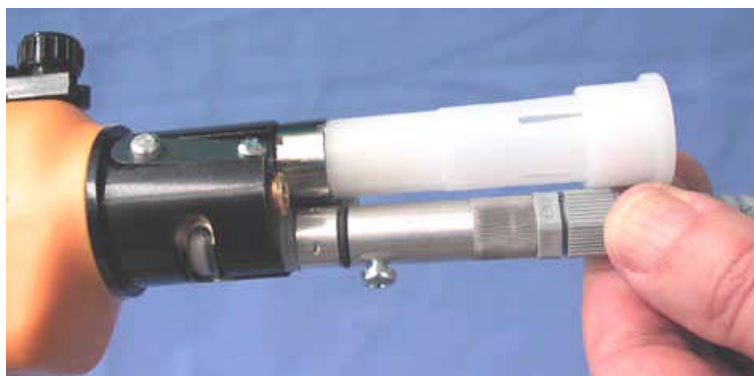
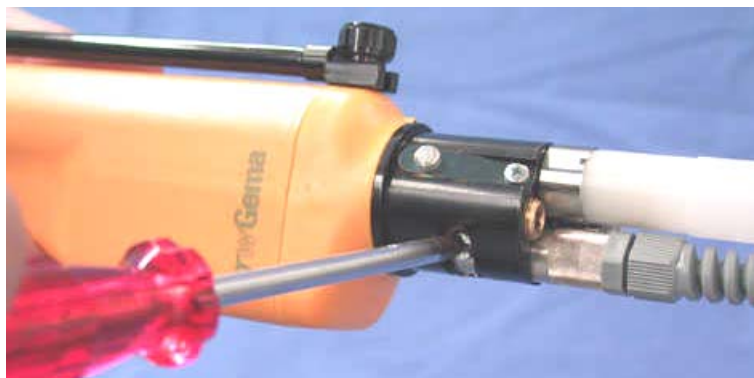
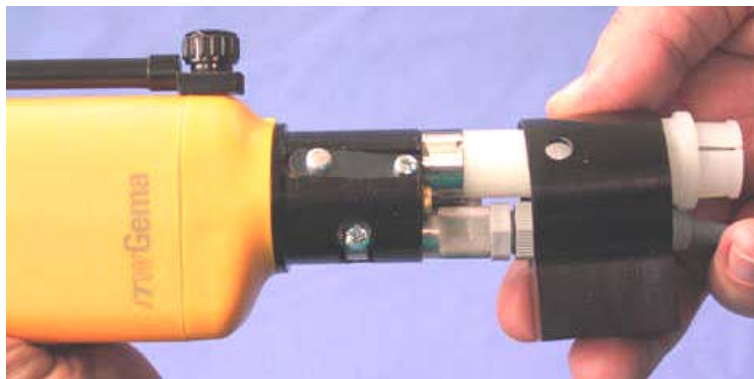


*OptiGun 2-A(X) Automatic powder gun*

### Dismantling procedure (cont.)



## Dismantling procedure (cont.)





### Dismantling procedure (cont.)



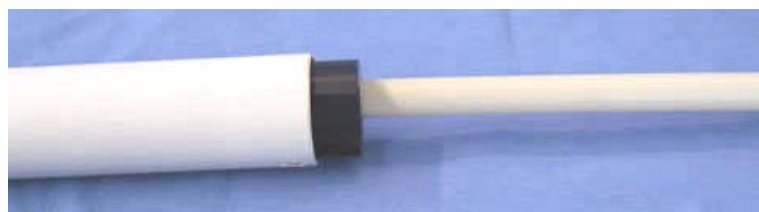
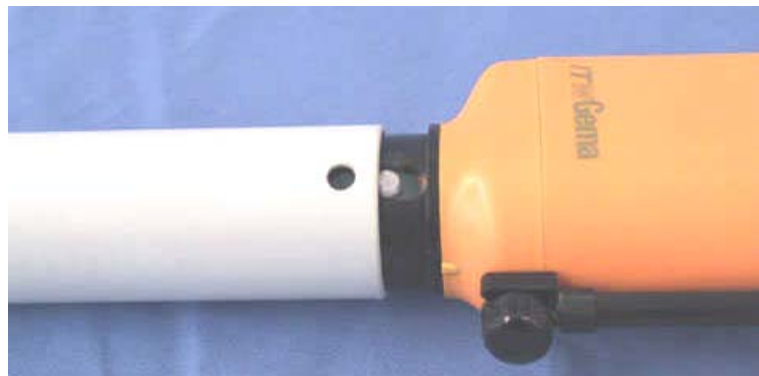
**Dismantling procedure (cont.)**



### Dismantling procedure (cont.)



*OptiGun 2-A(X) Automatic powder gun with extension*



## Dismantling procedure (cont.)



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## Reassembling the powder gun

The reassembly of the OptiGun 2-A(X) Automatic powder gun is to be carried out in the reverse order to the procedure shown above.

It is to be noted, that the powder tube is pushed in up to the stop.

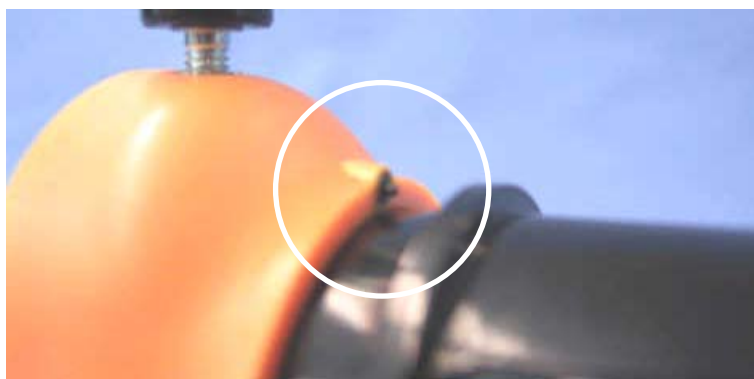


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**Attention:**

**A good contact to the contact pin must be ensured!**

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*Contact pin*

## Repairing the powder gun

Apart from the replacement of possibly defective parts, hardly any repairs have to be made. The cascade can be replaced completely unproblematic. The repair of the gun cable connection, however, may only be made by an authorized Gema service center.

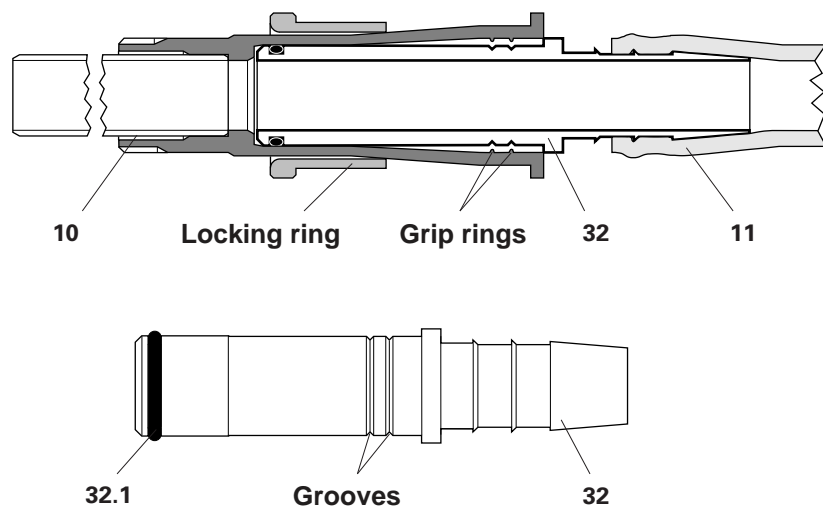
Ask your Gema Switzerland GmbHency!

### Powder hose connection

The powder hose (11) can be plugged directly into the hose holder (10) and locked by pulling the locking ring back to the stop. If tolerances deviate, powder can escape from the powder hose. Therefore, it is recommended to use the tube connection (32).

The tube connection (32) should be left on the powder hose (11), for as long as this is used, that means, if two sets of powder hoses are available, the double number of tube connections (32) are required.

On plugging on, make sure that the O-ring (32.1) sits correctly. Insert the tube connection (32) up to the shoulder stop and make certain that the grooves lock in.



*Powder hose connection*

10	Hose holder/powder tube	32	Hose connection (with O-ring)
11	Powder hose	32.1	O-ring

---

## Cleaning the spray nozzles

### Daily or after each shift

1. Blow off the spray nozzles externally with compressed air

Solvents or other fluidities can also be used for cleaning the spray nozzles.



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**Attention:**

**Clean the spray nozzles only with a solvent soaked cloth, never immerse the parts in solvent!**

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2. Check the seating of the spray nozzles



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**Attention:**

**It is to be noted, that the threaded sleeve is always tightened well. If the spray nozzle is only fitted loosely, the danger exists that the high voltage of the gun can jump over to the spray nozzle, which can inevitably lead to damage to the powder gun!**

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### Weekly

Remove the spray nozzles and clean inside with compressed air. If powder sinterings should have formed, these are to be removed.

### Monthly

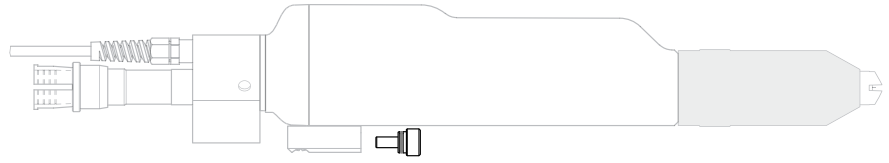
Check the spray nozzles for abrasion. The flat jet nozzle is to be changed, if:

- The spray pattern is no longer a regular oval
- Deeper grooves are in the nozzle slot, or even the wall thickness is not longer visible
- The wedge of the electrode holder is worn down
- On nozzles with deflector, the wedge of the electrode holder can be worn down. In this case, the electrode holder is to be replaced!

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## Cleaning the SuperCorona

In the case of a disassembly of the SuperCorona ring, the SuperCorona connection must be cleaned and closed with the corresponding plug cap (order no. 1001 037). This prevents powder deposits and contact problems on SuperCorona connection.



*SuperCorona plug cap*





# Troubleshooting guide

## General information

Fault	Causes	Fault elimination
The powder gun does not spray powder, although the powder gun control unit is switched on, the green lamp lights up and compressed air is available	Injector, non-return valve or throttle on injector, powder hose or powder gun clogged	Clean or replace corresponding part
	Insert sleeve in injector is worn	Replace
	No fluidization, no conveying air	See gun control unit or powder hopper operating instructions
	Pressure control valve in the control unit defective	Replace
	Solenoid valve in the control unit defective	Replace
	Electronic board in the unit control defective	Send in for repair
Powder gun sprays powder, but the powder does not adhere to workpiece	High voltage too low or not available	Adjust high voltage on the control unit
	Gun cable (gun plug or gun connection) defective	Test gun cable on another control unit
	High voltage cascade defect	Send in powder gun shaft for repair
	Electronic board in the control unit defective	Send in for repair
Powder gun sprays powder, high voltage is available, powder does not adhere to workpiece	Workpiece not properly grounded	Check the grounding



### Attention:

**Additional error descriptions are to be found also in the gun control unit operating instructions!**



# Spare parts list

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## Ordering spare parts

When ordering spare parts for powder coating equipment, please indicate the following specifications:

- Type and serial number of your powder coating equipment
- Order number, quantity and description of each spare part

**Example:**

- **Type** OptiGun 2-A(X) Automatic powder gun,  
**Serial number** 1234 5678
- **Order no.** 203 386, 1 piece, Clamp - Ø 18/15 mm

When ordering cable or hose material, the required length must also be given. The spare part numbers of this yard/meter ware is always marked with an \*.

The wear parts are always marked with a #.

All dimensions of plastic hoses are specified with the external and internal diameter:

**Example:**

Ø 8/6 mm, 8 mm outside diameter (o/d) / 6 mm inside diameter (i/d)



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**WARNING!**

**Only original Gema spare parts should be used, because the explosion protection will also be preserved that way. The use of spare parts from other manufacturers will invalidate the Gema guarantee conditions!**

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# OptiGun 2-A Automatic powder gun - complete

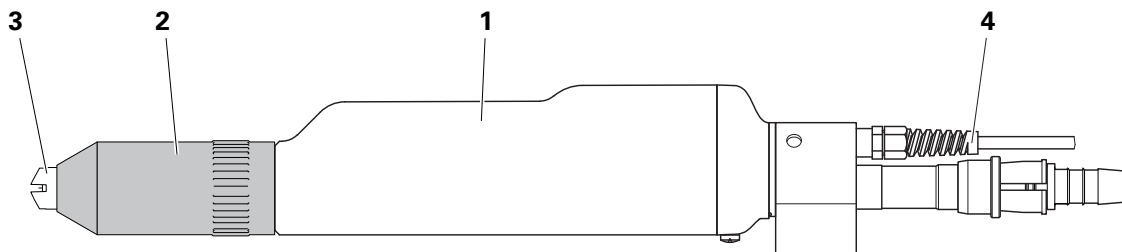


**Note:**

Only parts are included in the spare parts list, which the user can replace himself without problems!  
If the powder gun cable is defective, it is to be completely sent in for repair!

OptiGun 2-A Automatic powder gun - complete, negative polarity, incl. pos. 1-6	393 568
OptiGun 2-A Automatic powder gun - complete, positive polarity, incl. pos. 1-6	393 576
1 Powder gun body OptiGun 2-A - complete, negative polarity	393 649
Powder gun body OptiGun 2-A - complete, positive polarity	393 657
2 Threaded sleeve - see "Nozzle combinations" spare parts list	
3 Flat jet nozzle - see "Nozzle combinations" spare parts list	
4 Gun cable - complete, 20 m (65.61 ft), see also "Gun cable" spare parts list	393 827
5 Parts set (not shown), consisting of:	385 670
Cable binder with Velcro closure	303 070
Cylinder screw - M8x50 mm	235 113
Cap screw - M4x5 mm	216 763
Washer - Ø 8.4/20x2 mm	215 880
Quick release coupling - NW5, Ø 6 mm	200 840
6 Cleaning brush - Ø 12 mm (not shown)	389 765
7 Powder hose - Ø 16/11 mm (not shown)	103 012*
8 Rinsing air hose - Ø 6/4 mm (not shown)	103 144*

\* Please indicate length

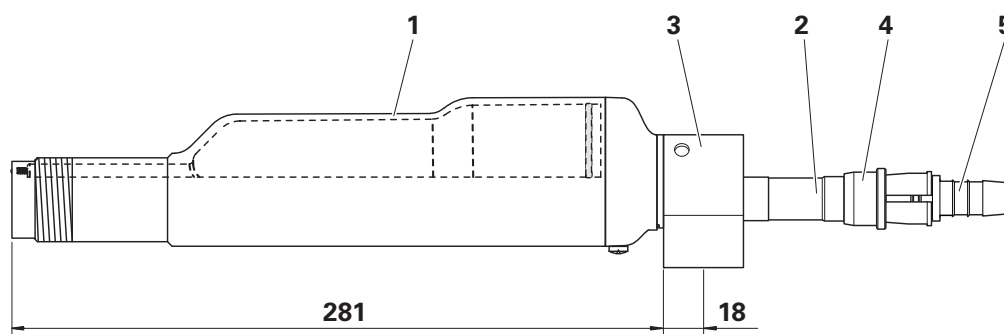


OptiGun 2-A Automatic powder gun - complete

## OptiGun 2-A Automatic powder gun - gun body

1	OptiGun 2-A shaft - complete, negative polarity (see "Shaft" spare parts list)	393 665
	OptiGun 2-A shaft - complete, positive polarity (see "Shaft" spare parts list)	393 673
2	Powder tube - complete	385 182#
3	Powder gun attachment	382 817
4	Clamp sleeve	358 584
5	Hose connection - complete	362 670#
5.1	O-ring for pos. 5 (not shown)	232 670#

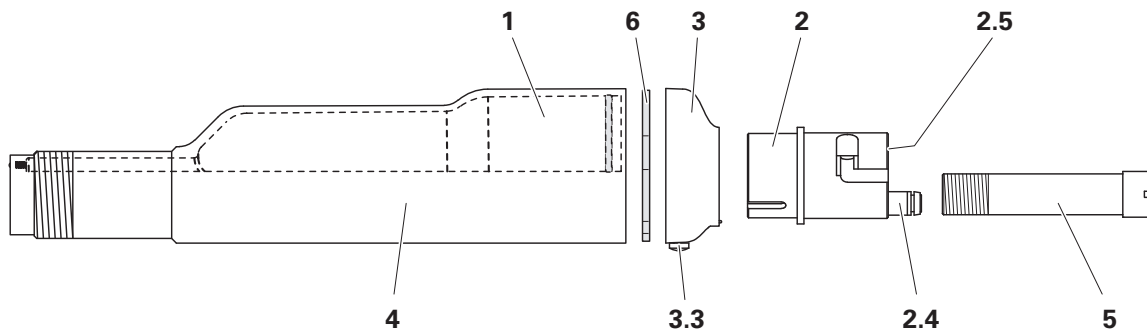
# Wearing part



OptiGun 2-A Automatic powder gun - gun body

## OptiGun 2-A Automatic powder gun - shaft

1 Cascade - complete, negative polarity	393 703
1 Cascade - complete, positive polarity	393 711
2 Adaptor - complete, incl. pos. 2.4 and 2.5	385 158
2.4 Screw-in nipple - 1/8"a, Ø 6 mm	251 542
2.5 Plug cap - 1/8"a	265 560
3 Adaptor piece - complete, incl. pos. 3.3	385 069
3.3 Pan head screw - M4x6 mm	267 139
4 Shaft (without cascade)	393 681
5 Hollow screw	382 680
6 Gasket	382 698

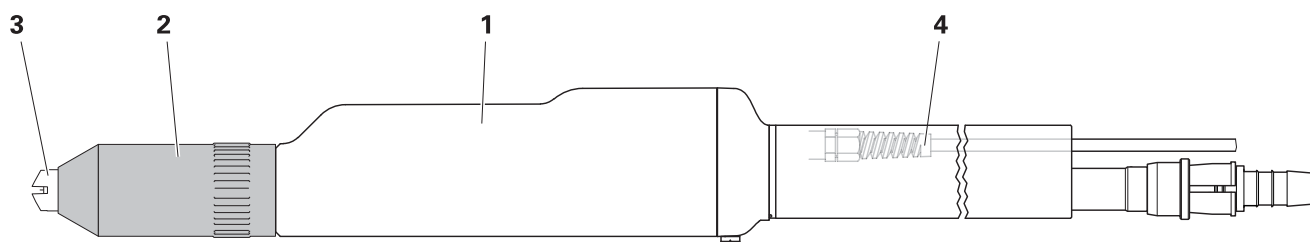


*OptiGun 2-A Automatic powder gun - shaft*

## OptiGun 2-AX Automatic powder gun - complete

OptiGun 2-AX Automatic powder gun - complete, negative polarity, incl. pos. 1-5	
OptiGun 2-AX Automatic powder gun - 1650	393 509
OptiGun 2-AX Automatic powder gun - 1450	393 517
OptiGun 2-AX Automatic powder gun - 1250	393 525
OptiGun 2-AX Automatic powder gun - 1050	393 533
OptiGun 2-AX Automatic powder gun - 850	393 541
OptiGun 2-AX Automatic powder gun - 650	393 550
1 OptiGun 2-AX Automatic powder gun body - complete, negative polarity, see "OptiGun 2-AX Automatic powder gun - gun body" spare parts list	
2 Threaded sleeve - see "Nozzle combinations" spare parts list	379 166
3 Flat jet nozzle - complete, see "Nozzle combinations" spare parts list	
4 Gun cable - complete, 20 m (65.61 ft), see also "Gun cable" spare parts list	393 827
5 Parts set (not shown), consisting of:	385 662
Cable binder with Velcro closure	303 070
Pan head screw - M4x6 mm	267 139
Quick release coupling - NW5, Ø 6 mm	200 840
6 Powder hose - Ø 16/11 mm (not shown)	103 012*
7 Rinsing air hose - Ø 6/4 mm (not shown)	103 144*

\* Please indicate length



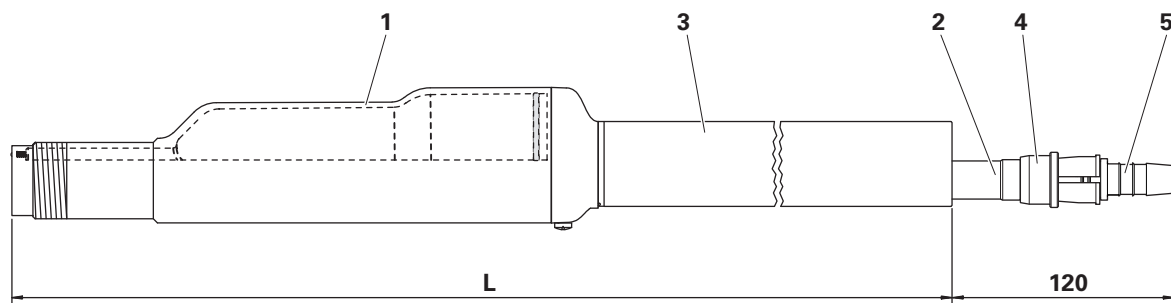
OptiGun 2-AX Automatic powder gun - complete

## OptiGun 2-AX Automatic powder gun - gun body

Powder gun body OptiGun 2-AX - complete, negative polarity

OptiGun 2-AX - 1650, L = 1646 mm (64.80 in)	393 584
OptiGun 2-AX - 1450, L = 1446 mm (56.93 in)	393 592
OptiGun 2-AX - 1250, L = 1246 mm (49.05 in)	393 606
OptiGun 2-AX - 1050, L = 1046 mm (41.18 in)	393 614
OptiGun 2-AX - 850, L = 846 mm (33.30 in)	393 622
OptiGun 2-AX - 650, L = 646 mm (25.43 in)	393 630
1 OptiGun 2-A shaft - complete, negative polarity (see spare parts list "Shaft")	393 665
2 Powder tube - complete, without pos. 4	
OptiGun 2-AX - 1650	385 255#
OptiGun 2-AX - 1450	385 344#
OptiGun 2-AX - 1250	385 352#
OptiGun 2-AX - 1050	385 360#
OptiGun 2-AX - 850	385 379#
OptiGun 2-AX - 650	385 387#
3 Extension tube	
OptiGun 2-AX - 1650	384 682
OptiGun 2-AX - 1450	385 441
OptiGun 2-AX - 1250	385 450
OptiGun 2-AX - 1050	385 468
OptiGun 2-AX - 850	385 476
OptiGun 2-AX - 650	385 484
4 Clamping part	358 584
5 Hose connection - complete	362 670#
5.1 O-ring for pos. 5 (not shown)	232 670#

# Wearing part



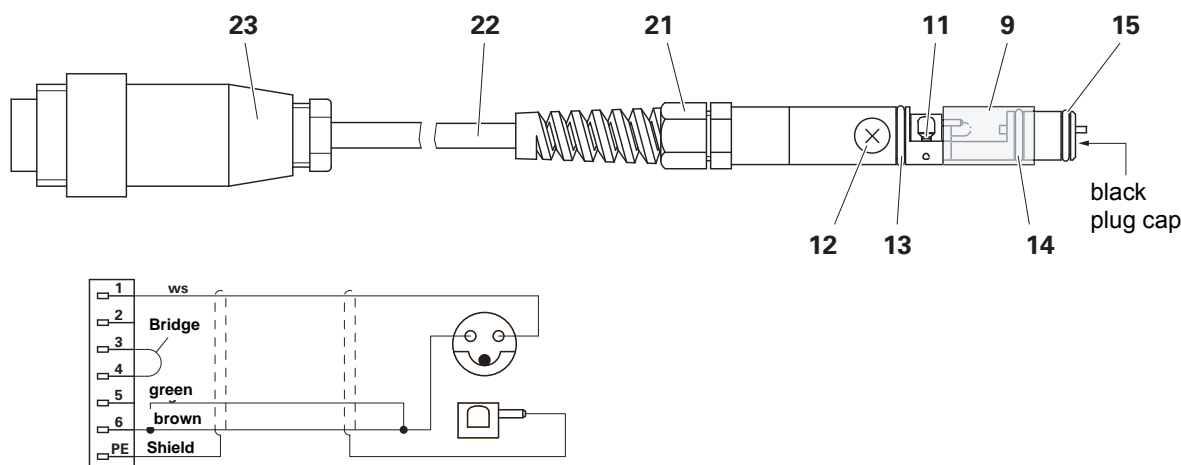
OptiGun 2-AX Automatic powder gun - gun body



# Gun cable

Gun cable - complete, 11 m (36.09 ft)	393 800
Gun cable - complete, 15 m (49.21 ft)	393 819
Gun cable - complete, 20 m (65.61 ft)	393 827
Extension cable - complete, 5 m (16.40 ft)	334 464
Extension cable - complete, 10 m (32.80 ft)	394 840
Cable socket for extension cable	206 504
Cable plug for extension cable	200 085
9 Cover tube	360 317
11 Countersunk head screw - M2x4 mm	257 958
12 Cylinder screw - M5x6 mm	263 907
13 O-ring - Ø 10.82x1.78 mm	232 556
14 O-ring - Ø 7.65x1.78 mm	232 564
15 O-ring - Ø 8.1x1.6 mm	263 818
21 Stuffing box - PG7 with kink protection	208 426
22 Cable - 2x0.75 mm <sup>2</sup> , shielded	103 454*
23 Connecting plug - 7-pin	200 085

\* Please indicate length



Gun cable (complete)

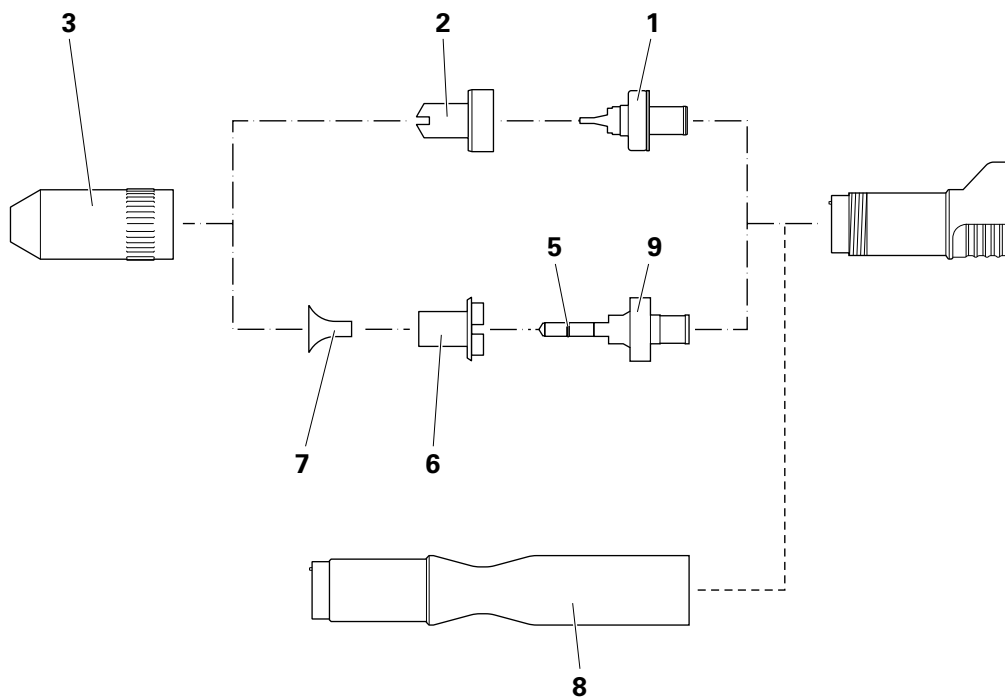
## Nozzle combinations - NF08

Nozzle set - flat jet, NF08, pos. 1, 2	1000 047#
Nozzle set - round jet, pos. 5, 6, 9	382 922
1 Electrode holder (flat jet nozzle)	1000 055#
2 Flat jet nozzle	1000 049#
3 Threaded sleeve	379 166
5 O-ring - Ø 5x1 mm	231 606#
6 Round jet nozzle	378 518#
7 Deflector plate - Ø 16 mm (0.63 in)	331 341#
7.1 Deflector plate - Ø 24 mm (0.94 in)	331 333#
7.2 Deflector plate - Ø 32 mm (1.26 in)	331 325#
8 Extension - 150 mm (5.91 in)	378 852#
8.1 Extension - 300 mm (11.82 in)	378 860#
9 Electrode holder, incl. pos. 5 (round jet central electrode)	382 914#

# Wearing part



**Note:**  
Further nozzle versions are described in the "System overview" spare parts list!



OptiGun 2-A(X) Automatic powder gun - nozzle combination

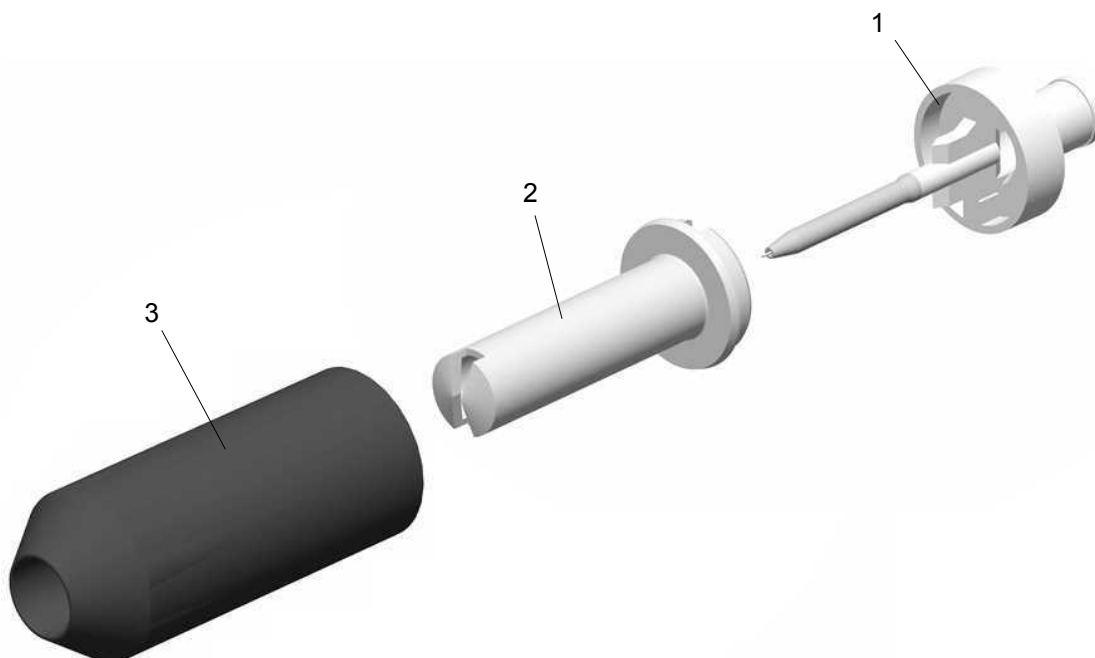
## Nozzle combinations - NF18-M

Nozzle set - flat jet, NF18-M, pos. 1, 2	1004 530#
1 Electrode holder (flat jet nozzle)	1004 529#
2 Flat jet nozzle	1004 527#
3 Threaded sleeve	379 166

# Wearing part



**Note:**  
Further nozzle versions are described in the "System overview" spare parts list!



*OptiGun 2-A(X) Automatic powder gun - nozzle combination*

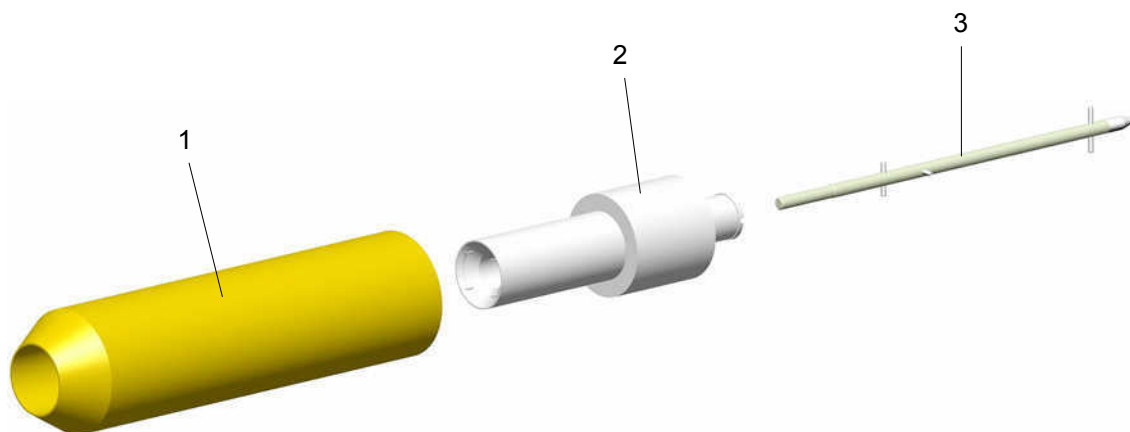
## Nozzle combinations - NS03

Round jet nozzle with 4 electrodes NS03-09 - complete, pos. 1, 2, 3	1000 249#
Round jet nozzle with 4 electrodes NS03-11 - complete, pos. 1, 2.1, 3.1	1000 250#
1 Threaded sleeve - complete	405 736
2 Muzzle NS03-09 - complete	1000 175#
2.1 Muzzle NS03-11 - complete	1000 176#
3 Deflector rod NS03-09 - complete	1000 345#
3.1 Deflector rod NS03-11 - complete	1000 346#
4 Deflector plate - Ø 12 mm (not shown)	301 175#
4.1 Deflector plate - Ø 16 mm (not shown)	302 040#
4.2 Deflector plate - Ø 20 mm (not shown)	301 183#
4.3 Deflector plate - Ø 24 mm (not shown)	301 191#
4.4 Deflector plate - Ø 28 mm (not shown)	302 031#
4.5 Deflector plate - Ø 32 mm (not shown)	301 205#
4.6 Deflector plate - Ø 40 mm (not shown)	301 206#
4.7 Deflector plate - Ø 45 mm (not shown)	301 207#
4.8 Deflector plate - Ø 50 mm (not shown)	302 023#

# Wearing part



**Note:**  
Further nozzle versions are described in the "System overview" spare parts list!

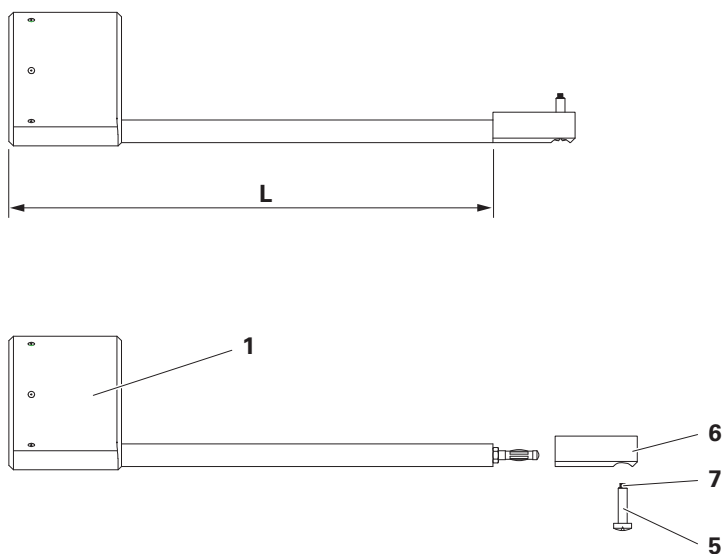


*OptiGun 2-A(X) Automatic powder gun - nozzle combination*

## OptiGun 2-A(X) Automatic powder gun - SuperCorona

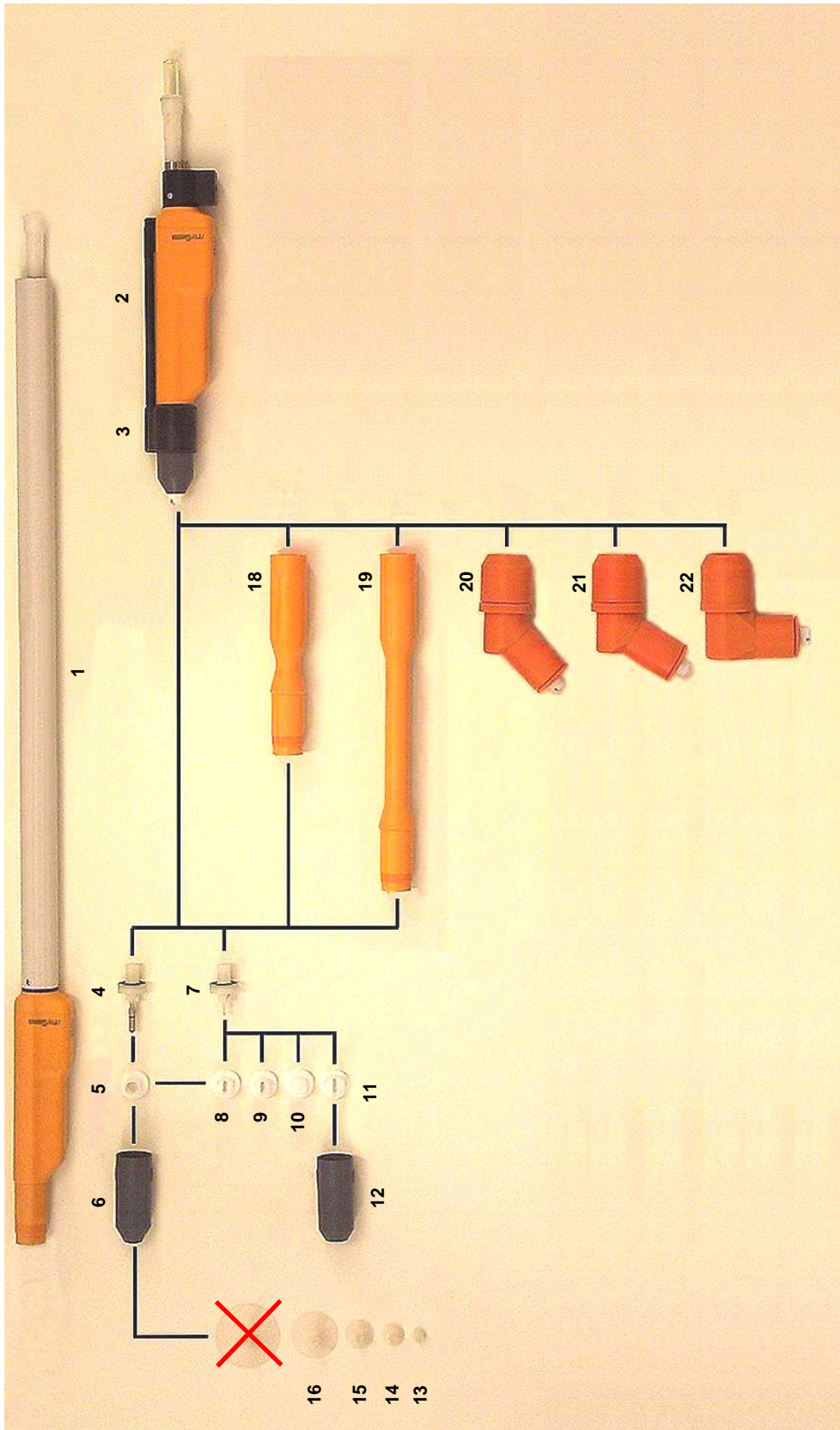
SuperCorona - complete, retrofit set, L=215 mm	385 174#
Version with extension 150 mm - L=365 mm	394 254#
Version with extension 300 mm - L=515 mm	394 289#
1 SuperCorona-Ring - complete, retrofit set	391 980#
SuperCorona-Ring - complete, for version with extension 150 mm	394 173#
SuperCorona-Ring - complete, for version with extension 300 mm	394 203#
5 Special screw	391 921
6 Cowl	384 372
6.1 Plug cap - complete (for pos. 6, not shown)	1001 037
7 Compression spring - 0.4x2x10.9 mm	245 330

# Wearing part



OptiGun 2-A(X) Automatic powder gun - SuperCorona

# OptiGun 2-A(X) - system overview



## OptiGun 2-A(X) - system overview

1	OptiGun 2-AX Automatic powder gun	
2	OptiGun 2-A Automatic powder gun - complete, with flat jet nozzle set, gun cable (20 m), parts set, cleaning brush, without SuperCorona, negative polarity	393 568
	OptiGun 2-A Automatic powder gun - complete, with flat jet nozzle set, gun cable (20 m), parts set, cleaning brush, without SuperCorona, positive polarity	393 576
3	SuperCorona - complete	385 174
	Nozzle set - round jet nozzle (pos. 4 and 5)	382 922
4	Electrode holder (round jet nozzle central electrode)	382 914#
5	Round jet nozzle	378 518#
6	Threaded sleeve	379 166
	Nozzle set - flat jet nozzle (pos. 7 and 8)	1000 047#
7	Electrode holder (flat jet nozzle)	1000 055#
8	Flat jet nozzle - NF08	1000 049#
9	Flat jet nozzle - NF04 (slot in round form)	383 082#
10	Flat jet nozzle - NF02 (without slot)	384 887#
11	Flat jet nozzle - NF03 (nozzle front part Ø 24 mm)	383 058#
12	Threaded sleeve for pos. 11	383 074
13	Deflector plate - Ø 16 mm (0.63 in)	331 341#
14	Deflector plate - Ø 24 mm (0.94 in)	331 333#
15	Deflector plate - Ø 32 mm (1.26 in)	331 325#
16	Deflector plate - Ø 50 mm (1.97 in)	345 822#
18	Extension - 150 mm (5.91 in)	378 852#
19	Extension - 300 mm (11.82 in)	378 860#
20	Angle nozzle - PA01-45° - complete (incl. round jet nozzle with deflector Ø 24 mm)	390 232
21	Angle nozzle - PA01-60° - complete (incl. round jet nozzle with deflector Ø 24 mm)	383 724
22	Angle nozzle - PA01-90° - complete (incl. round jet nozzle with deflector Ø 24 mm)	383 520

# Wearing part