En

Operating instructions and spare parts list

OptiGun 2-AE1
Enamel automatic gun
(GA02-E1 type)

Gema

CE 0102 Ex II 2 D

Documentation OptiGun 2-AE1 Enamel automatic gun

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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-AE1 Enamel automatic gun.

These safety regulations must be read and understood before the OptiGun 2-AE1 Enamel automatic gun is used.

Safety symbols (pictograms)

The following warnings with their meanings can be found in the ITW 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-AE1 Enamel automatic gun 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-AE1 Enamel automatic gun is to be used for other purposes or other substances outside of our guidelines then ITW Gema AG 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-AE1 Enamel automatic gun 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-AE1 Enamel automatic gun has been set up and wired according to the guidelines for machinery (98/37 EG). EN 60204-1 (machine safety) must also be observed.
5. Unauthorized modifications to OptiGun 2-AE1 Enamel automatic gun 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.

Technical safety regulations for stationary electrostatic powder spraying equipment

General information

The powder spraying equipment from ITW 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 ITW-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 ITW-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! Smoking is forbidden in the entire plant area!
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!

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

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 devices for the spray guns must only be set up and used in zone 22. Only the spray gun should be used in zone 21.

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. For dangerous materials, the employer has to provide an operating instructions manual for specifying the dangers arising for humans and environment by handling dangerous materials, as well

as the necessary preventive measures and behavior rules. The operating instructions manual has to be written in an understandable form and in the language of the persons employed, and has to be announced in a suitable place in the working area.

4. 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.
5. The operator is obliged to check that the powder spraying equipment is only operated when in satisfactory condition.
6. As far as it is necessary, the operating firm must ensure that the operating personnel wear protective clothing (e.g. facemasks).
7. The operating firm must guarantee cleanliness and an overview of the workplace with suitable instructions and checks in and around the powder spraying equipment.
8. 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.
9. 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 ITW-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 ITW-Gema workshops. Unauthorized conversions and modifications may lead to injury or damage to machinery. The ITW Gema AG 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 ITW-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/m³ 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	General regulations
BGV A2	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[1)] - Part 1 General requirements - Part 2 Examples of use

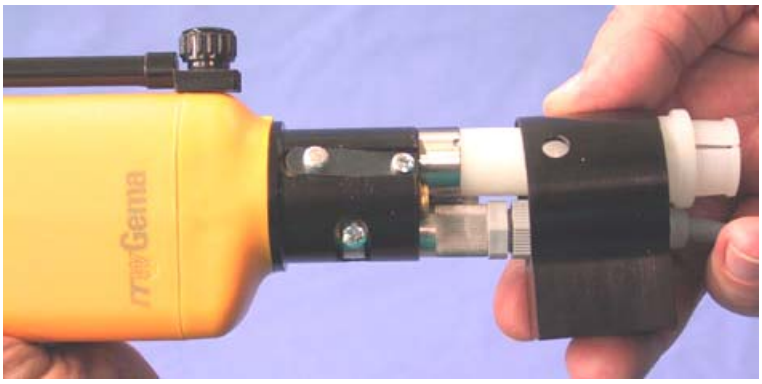
Leaflets

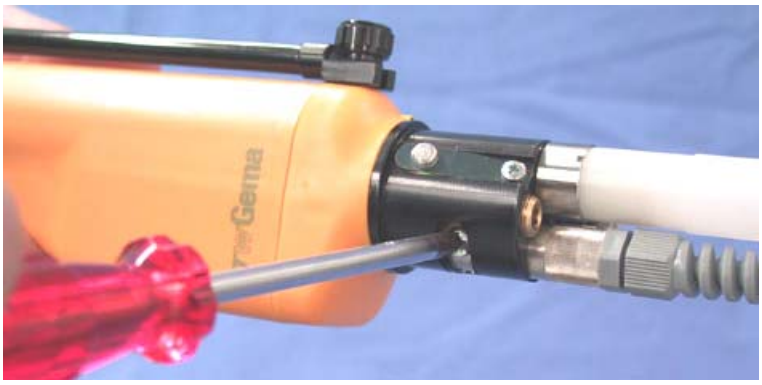
ZH 1/310	Leaflet for the use of tools in locations where there is danger of explosion [1)]

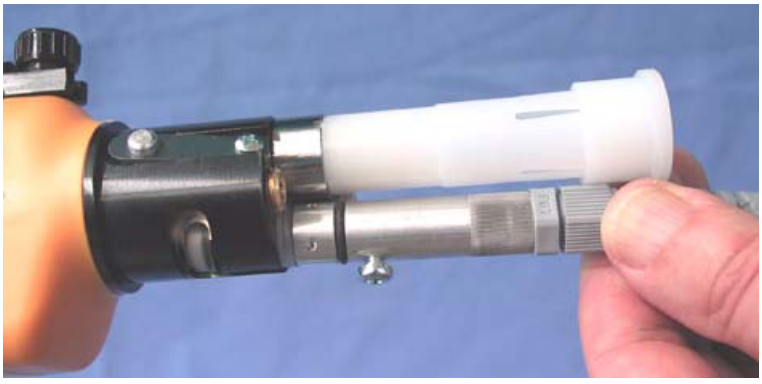
EN European standards

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 292-1 EN 292-2	Machine safety [2)]
EN 50 014 to EN 50 020, identical: DIN VDE 0170/0171	Electrical equipment for locations where there is danger of explosion [3)]
EN 50 050	Electrical apparatus for potentially explosive atmospheres - Electrostatic hand-held spraying equipment [2)]
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 [2)]
EN 50 177	Stationary electrostatic spraying equipment for flammable coating powder [2)]
PR 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 [2)]
EN 60 204 identical: DIN VDE 0113	VDE regulations for the setting up of high-vogunsati VDE regun v n veTD .5(ev)-5 cv t5.5(n)144.451eore9ue70039 e2o.479

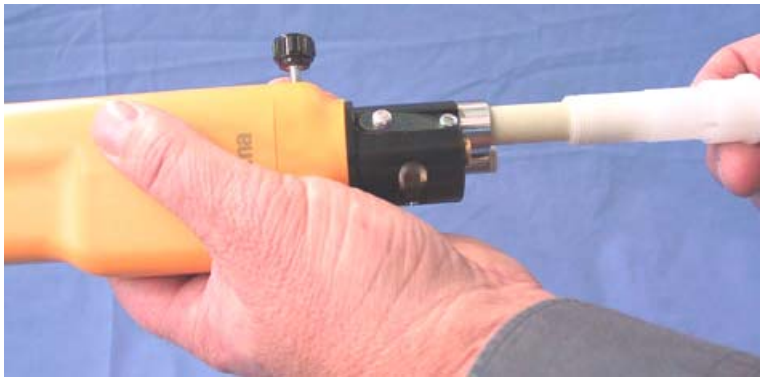
Dismantling procedure (cont.)

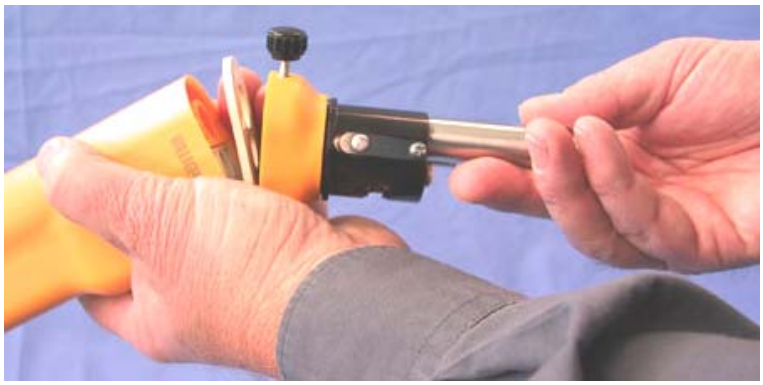






Dismantling procedure (cont.)





Dismantling procedure (cont.)

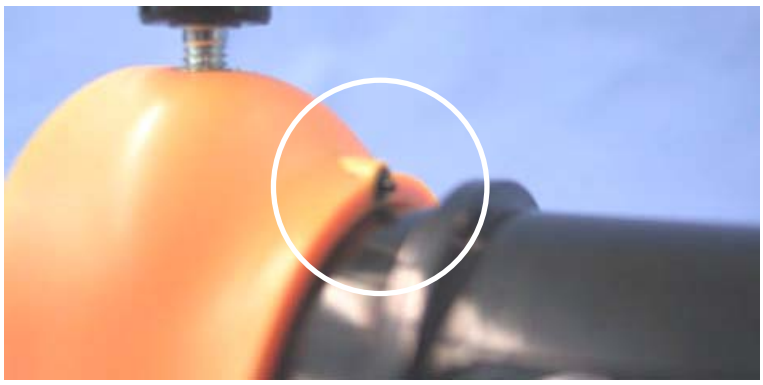
Dismantling procedure (cont.)

Assembling the powder gun

The assembling of the OptiGun 2-AE1 Enamel automatic gun is to be carried out in the reverse order to that shown above.

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

Attention:
A good contact must be ensured to the contact pin!



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 trouble-free. The repair of the gun cable connection, however, may only be made by an authorized ITW Gema service center!

Contact your ITW Gema representative for details!

Cleaning the spray nozzles

Daily or after each shift

1. Blow off the spray nozzles externally with compressed air

For cleaning the spray nozzles, also solvents or other fluidities can be used.

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

2. Check the seating of the spray nozzles

Attention:
It is to be noted, that the threaded sleeve is always tightened well. If the spray nozzle is not completely tight, the danger exists, that the high voltage of the gun can flash over to the spray nozzle, which can inevitably lead to damage to the powder gun!

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 in the nozzle slot or even the wall thickness is no longer visible
- The wedge of the electrode holder is worn
- On the nozzle with deflector, the wedge of the electrode holder can be worn. In this case, the electrode holder is to be replaced!

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 the corresponding part
	Insert sleeve in injector is worn	Replace
	No fluidization	See control unit or powder hopper operating instructions
	No conveying air:	
	Pressure valve in the control unit defective	Replace
	Solenoid valve in the control unit defective	Replace
	Electronic board in the OptiTronic defective	Send for repair
Powder gun sprays powder, but the powder does not adhere to workpiece	High voltage too low or not available	Adjusting high voltage on the control unit
	Gun cable (gun plug or gun connection) defective	Test the gun cable on another control unit
	High voltage cascade defective	Send in the gun body for repair
	Electronic board in the OptiTronic defective	Send for repair
Powder gun sprays powder, high voltage is available, powder does not adhere to workpiece	Workpiece not properly grounded	Check the grounding

Note:
Additional error descriptions are to be found also in the corresponding control unit operating instructions!

Spare parts list

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-AE1 Enamel automatic 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)

WARNING!
Only original ITW-Gema spare parts should be used, because the hazardous location approval will be preserved that way! The use of spare parts from other manufacturers will invalidate the ITW Gema guarantee conditions!

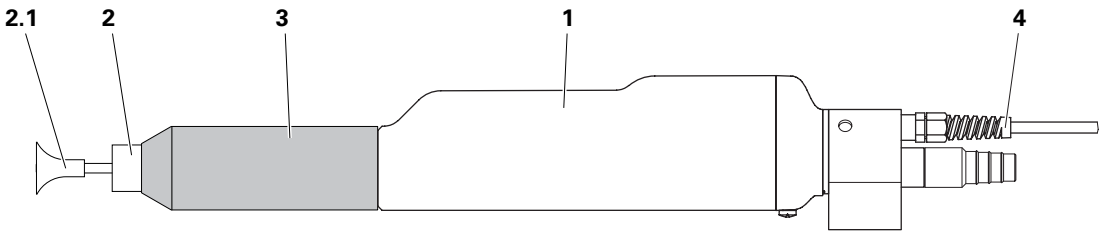
OptiGun 2-AE1 Enamel automatic gun - spare parts list

Remarks

Note:
Only parts were 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-AE1 Enamel automatic gun - complete, polarity negative, incl. pos. 1-6	406 732
1	OptiGun 2-AE1 gun body, see "Gun body" spare parts list	
2	Round jet nozzle - complete, see "Nozzle combinations" spare parts list	
2.1	Deflector, see "Nozzle combinations" spare parts list	
3	Threaded sleeve - see "Nozzle combinations" spare parts list	
4	Gun cable - complete, see "Gun cable" spare parts list	
5	Parts set (not shown), consisting of:	385 670
	Cable binder with Velcro closure (8x)	303 070
	Cylinder screw - M8x50 mm	235 113
	Plastic screw - M4x6 mm	267 139
	Washer - Ø 8,4/20x2 mm	215 880
	Quick release connection - 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)	100 854*****

***** Please indicate length

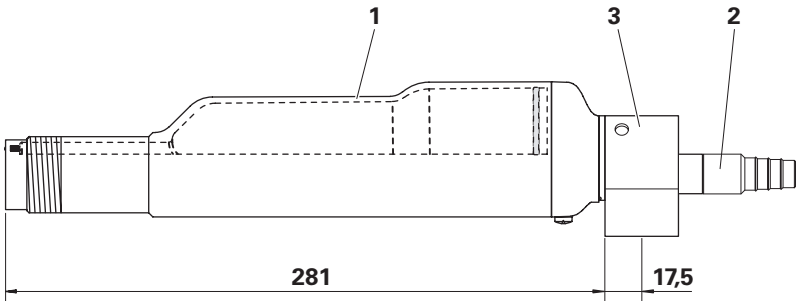


OptiGun 2-AE1 Enamel automatic gun - spare parts

OptiGun 2-AE1 Enamel automatic gun - gun body

	OptiGun 2-AE1 gun body - complete, polarity negative	406 724
1	OptiGun 2-AE1 shaft - complete, negative polarity (see spare parts list "Shaft")	
2	Powder tube GA02-E1 - complete, Ø 9 mm	1001 289#
3	Gun fixture	382 817

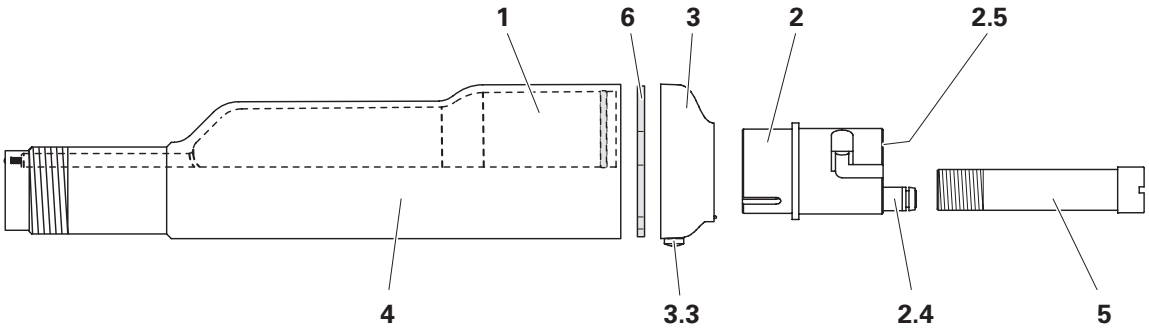
Wearing part



OptiGun 2-AE1 Enamel automatic gun - gun body

OptiGun 2-AE1 Enamel automatic gun - shaft

	OptiGun 2-AE1 shaft - complete, polarity negative	393 665
1	Cascade - complete, negative polarity	393 703
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	Cap screw - M4x6 mm	267 139
4	Shaft (without cascade)	393 681
5	Hollow screw	382 680
6	Gasket	382 698

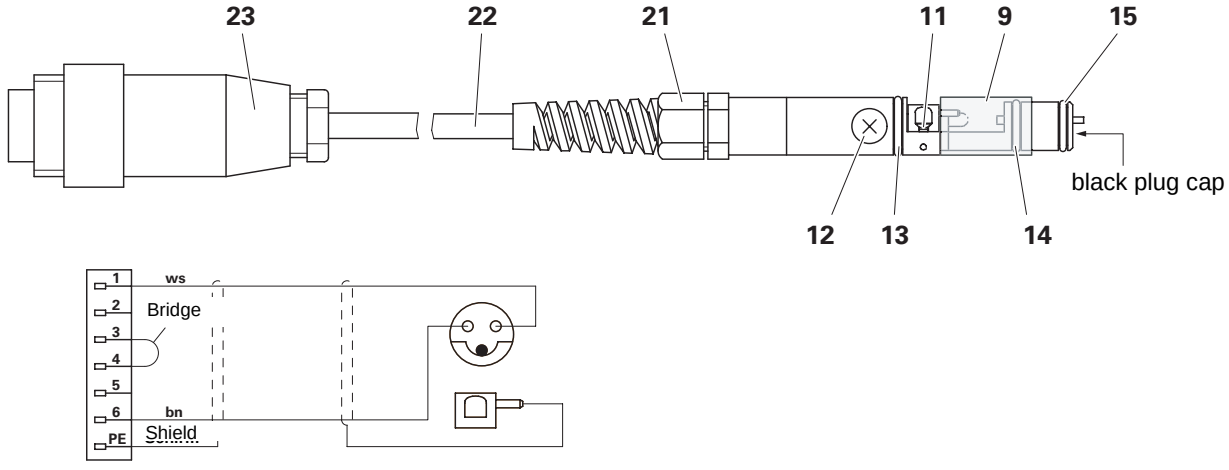


OptiGun 2-AE1 Enamel automatic gun - shaft

OptiGun 2-AE1 Enamel automatic gun - gun cable

	Gun cable - complete, 11 m	393 800
	Gun cable - complete, 15 m	393 819
	Gun cable - complete, 20 m	393 827
	Gun cable - complete, 30 m	395 935
	Extension cable - complete, 5 m	334 464
	Extension cable - complete, 10 m	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 mm², shielded	103 454*****
23	Connection plug - 7 pins with studs	200 085

***** Please indicate length



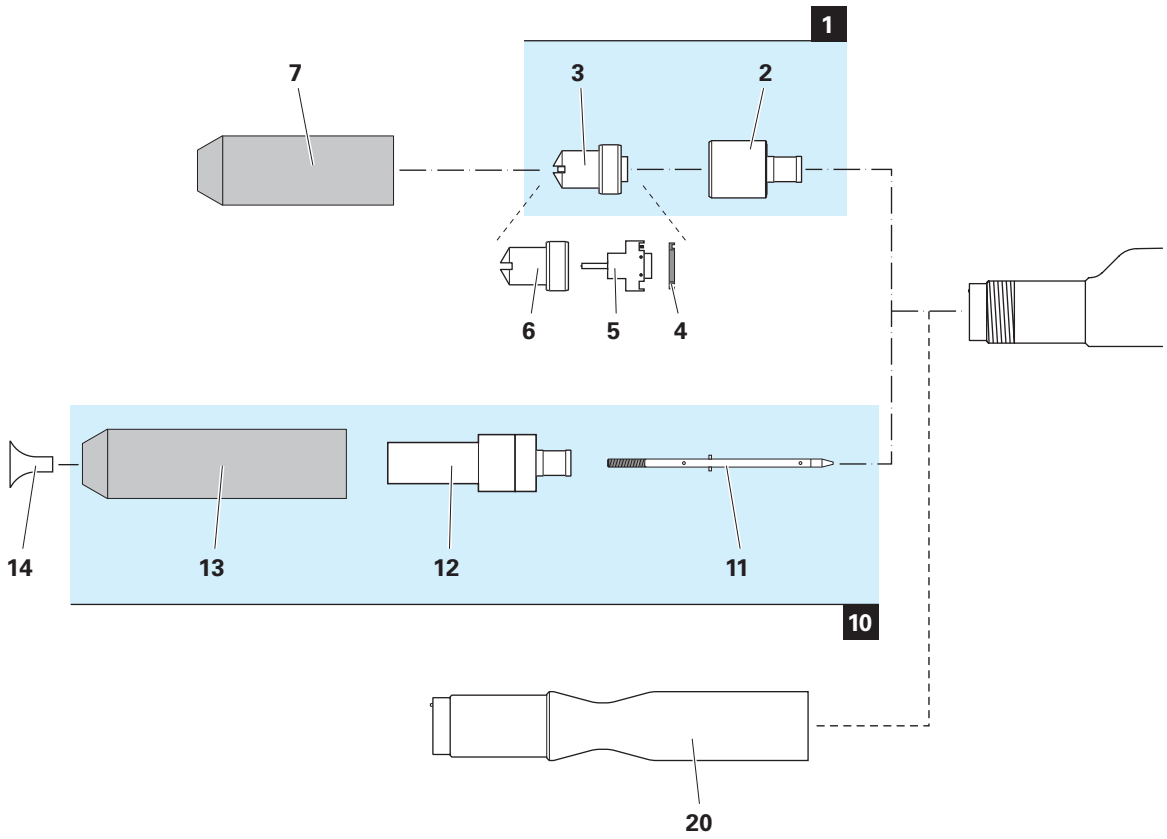
OptiGun 2-AE1 Enamel automatic gun - gun cable

OptiGun 2-AE1 Enamel automatic gun - nozzle combinations

1	Flat jet nozzle NF15-E - complete	1002 255#
2	Fixation piece NF15-E - complete	1002 253#
3	Flat jet nozzle set (without pos. 5.1)	404 225#
4	Contact ring	318 760#
5	Electrode holder - complete (Tefzel)	404 209#
5.1	Electrode holder - complete (Teflon)	406 058#
6	Flat jet nozzle	404 128#
7	Threaded sleeve PU04-E-NF - complete	405 728
10	Round jet nozzle NS07-E - complete	1002 254#
11	Deflector rod NS07-E - complete	1002 249#
12	Muzzle NS07-E - complete	1002 250#
13	Threaded sleeve PU04-E-NS - complete	405 736
14	Deflector - Ø 15 mm	400 262#
14.1	Deflector - Ø 24 mm	400 181#
14.2	Deflector - Ø 28 mm	400 254#
14.3	Deflector - Ø 32 mm	400 238#
14.4	Deflector - Ø 50 mm	400 246#
20	Extension PE03-E-150 - complete, 150 mm	406 708#
20.1	Extension PE03-E-300 - complete, 300 mm	406 716#

Wearing part

OptiGun 2-AE1 Enamel automatic gun - nozzle combinations

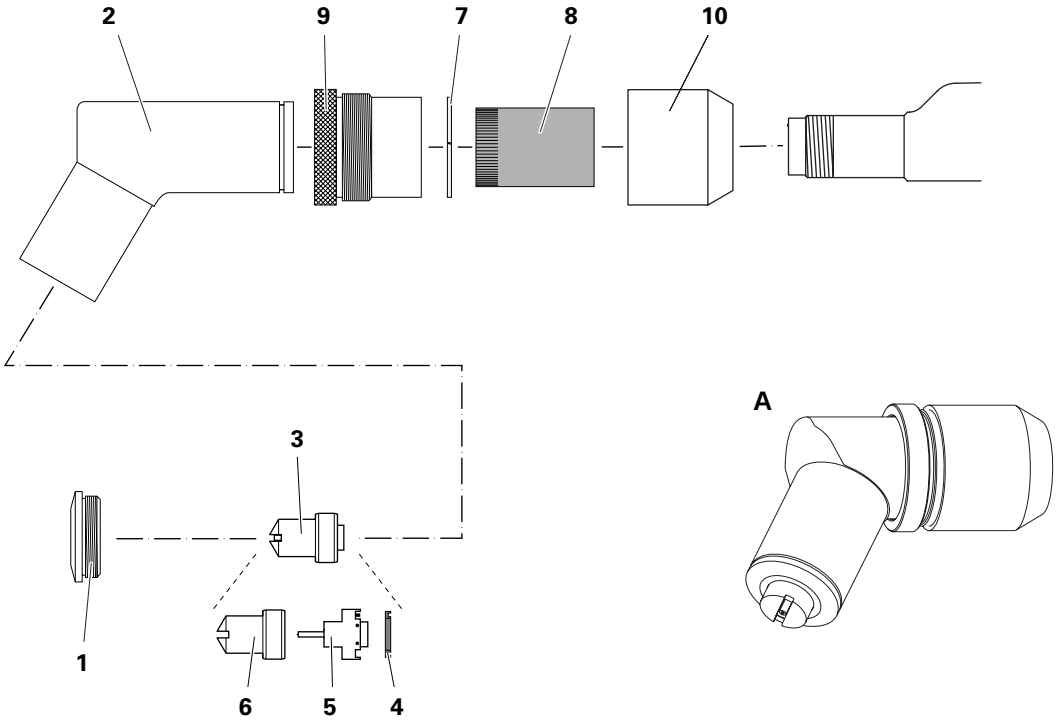


OptiGun 2-AE1 Enamel automatic gun - nozzle combinations

OptiGun 2-AE1 Enamel automatic gun - angled nozzle

A	Angled nozzle PA02-E-60° - complete	1001 299#
1	Tensioning screw - small	405 876
2	Angled body PA02-E-60° - complete (incl. pos. 7)	1001 298
3	Flat jet nozzle set (incl. pos. 4, 5 and 6, without pos. 5.1)	404 225#
4	Contact ring	318 760#
5	Electrode holder - complete (Tefzel)	404 209#
5.1	Electrode holder - complete (Teflon)	406 058#
6	Flat jet nozzle	404 128#
7	Snap ring	383 619
8	Sleeve	383 627
9	Tensioning screw - large	383 597
10	Cap	383 732

Wearing part

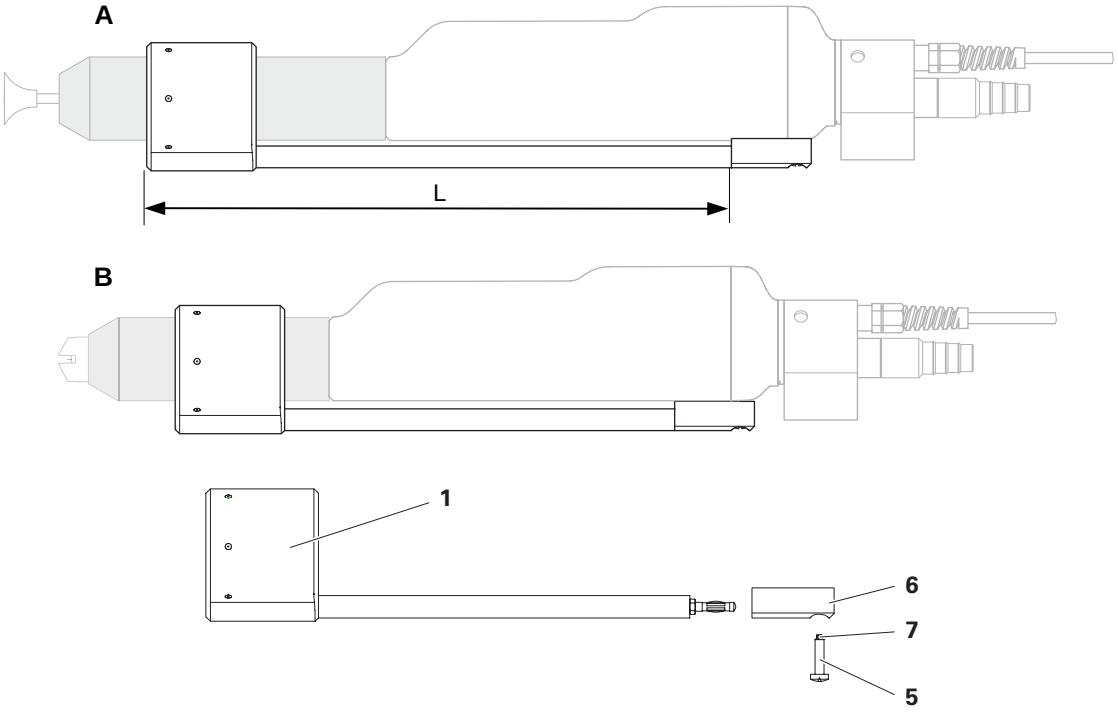


OptiGun 2-AE1 Enamel automatic gun - angled nozzle

OptiGun 2-AE1 Enamel automatic gun - SuperCorona

A	SuperCorona for round jet nozzle	
	SuperCorona PC01-277 - retrofit set (L=277 mm)	394 246#
	SuperCorona PC01-427 - retrofit set (L=427 mm)	394 270#
	SuperCorona PC01-577 - retrofit set (L=577 mm)	394 300#
B	SuperCorona for flat jet nozzle	
	SuperCorona PC01-237 - retrofit set (L=237 mm)	394 238#
	SuperCorona PC01-387 - retrofit set (L=387 mm)	394 262#
	SuperCorona PC01-537 - retrofit set (L=537 mm)	394 297#
1	SuperCorona ring - complete	
	For SuperCorona PC01-277	394 165#
	for SuperCorona PC01-427	394 190#
	for SuperCorona PC01-577	394 220#
	for SuperCorona PC01-237	394 157#
	for SuperCorona PC01-387	394 181#
	for SuperCorona PC01-537	394 211#
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-AE1 Enamel automatic gun - SuperCorona