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Operating instructions and spare parts list

# Manual powder gun OptiSelect GM03-E



Translation of the original operating instructions

## Documentation OptiSelect GM03-E

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### Printed in Switzerland

Gema Switzerland GmbH  
Mövenstrasse 17  
9015 St.Gallen  
Switzerland

Phone: +41-71-313 83 00

Fax.: +41-71-313 83 83

E-Mail: [info@gema.eu.com](mailto:info@gema.eu.com)

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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 OptiSelect GM03-E manual powder gun.

These safety regulations must be read and understood in full before the OptiSelect GM03-E is put into operation.

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## Safety symbols (pictograms)

The following warnings with their meanings can be found in the Gema Switzerland 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

- This product is built to the latest specification and conforms to the recognized technical safety regulations and is designed for the normal application of powder coating.
- Any other use is considered as non-conform. The manufacturer shall not be liable for damage resulting from such use; the user bears sole responsibility for such actions. If this product is to be used for other purposes or other substances outside of our guidelines then Gema Switzerland GmbH should be consulted.
- Observance of the operating, service and maintenance instructions specified by the manufacturer is also part of conformity of use. This product should only be used, maintained and started up by trained personnel, who are informed about and are familiar with the possible hazards involved.

- Start-up (i.e. the execution of intended operational tasks) is forbidden until it has been established that this product has been set up and wired according to the guidelines for machinery. The standard "Machine safety" must also be observed.
- Unauthorized modifications to the product exempt the manufacturer from any liability from resulting damage.
- The relevant accident prevention regulations, as well as other generally recognized safety regulations, occupational health and structural regulations are to be observed.
- Furthermore, the country-specific safety regulations also must be observed.

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## Product specific security regulations

- This product is a constituent part of the equipment and is therefore integrated in the system's safety concept.
- If it is to be used in a manner outside the scope of the safety concept, then corresponding measures must be taken.
- The installation work to be done by the customer must be carried out according to local regulations.
- All components must be grounded according to the local regulations before start-up.

**NOTE**

For further security information, see the more detailed Gema safety regulations!

# About this manual

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## General information

This operating manual contains all important information which you require for the working with the OptiSelect GM03-E. 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 functional mode of the individual system components should be referenced in the respective enclosed documents.



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### **DANGER:**

#### **Working without operating instructions**

**Working without operating instructions or with individual pages from the operating instructions may result in damage to property and personal injury if relevant safety information is not observed.**

- ▶ Before working with the device, organize the required documents and read the section "Safety regulations".
  - ▶ Work should only be carried out in accordance with the instructions of the relevant documents.
  - ▶ Always work with the complete original document.
-





# Product description

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## Field of application

The OptiSelect GM03-E manual gun is built exclusively for electrostatic coating with inorganic, non-flammable enamel powders. Any other use is considered non-compliant. The manufacturer is not responsible for any incorrect use and the risks associated with such actions are assumed by the user alone!



fig. 1

## Utilization

The manual powder gun type OptiSelect is suited for the electrostatic coating of objects (in all shapes and geometries) that must be grounded.

## Reasonably foreseeable misuse

- Coating of non grounded objects
- Use of metallic or organic powder
- Incorrectly configured values for powder conveyance
- Incorrectly configured values for electrode rinsing air
- Use of moist powder

## Technical data

### Electrical data

OptiSelect GM03-E	
Nominal input voltage	eff. 10 V
Frequency	18 kHz (average)
Nominal output voltage	100 kV
Polarity	negative (optional positive)
Max. output current	100 µA
High voltage display	with LED
Ignition protection	Type A acc. EN 50177 Ex 2 mJ T6
Temperature range	0 °C - +40 °C (+32 °F - +104 °F)
Max. surface temperature	85 °C (+185 °F)
Protection type	IP64

### Dimensions

OptiSelect GM03-E	
Weight	560 g

### Processible powders

OptiSelect GM03-E	
Enamel powder	yes
Plastic powder	no
Metallic powder	no



#### WARNING

The OptiSelect GM03-E manual gun may only be connected to the following control units:  
OptiStar CG06, CG07, CG08, CG13!

## Structure

### General view

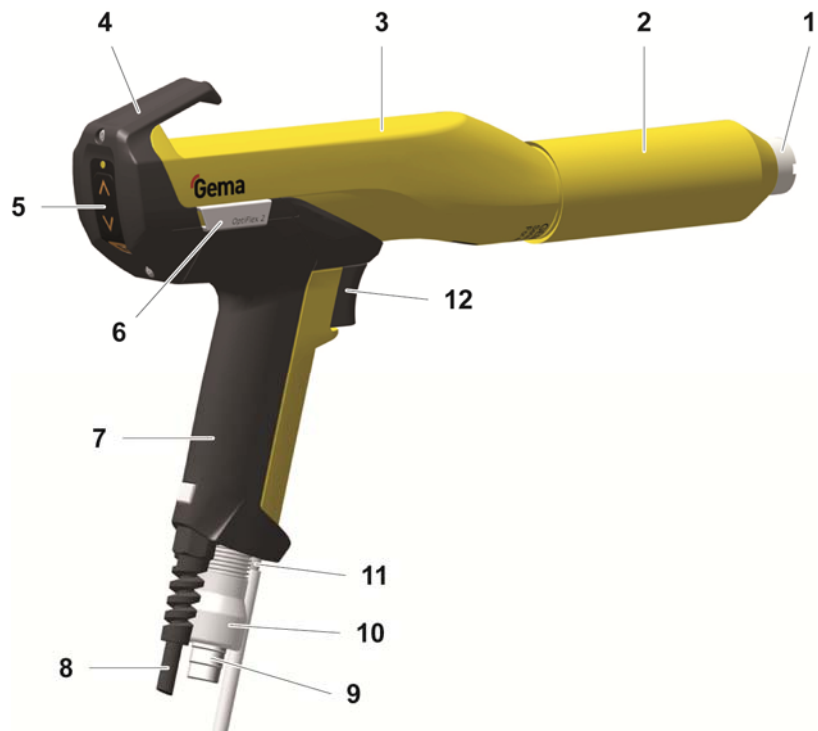


fig. 2

- |   |                                     |    |                                      |
|---|-------------------------------------|----|--------------------------------------|
| 1 | Spray nozzle system                 | 8  | Gun cable                            |
| 2 | Threaded sleeve                     | 9  | Powder hose connection               |
| 3 | Shaft                               | 10 | Powder hose quick release connection |
| 4 | Cover with remote control and hooks | 11 | Electrode rinsing air connection     |
| 5 | Remote control                      | 12 | Trigger                              |
| 6 | SuperCorona connection              |    |                                      |
| 7 | Gun handle                          |    |                                      |

## Operating elements

### *LED and remote control buttons*



fig. 3

Designation	Function
L1	Display <b>High voltage (intensity)</b>
T1	<b>Powder output +</b> key
T2	<b>Powder output -</b> key
T3	<b>Activate/stop rinsing process</b> key

## Scope of delivery

- OptiSelect GM03-E manual gun with gun cable (6 m), negative polarity
- Electrode rinsing air hose (6 m)
- Flat jet nozzle NF28-E, complete (incl. electrode holder)
- Cable tie with Velcro closure
- Gun cleaning brush
- Parts kit
- Operating manual

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## Available accessories\*\*

- SuperCorona ring
- Flat jet nozzle (for specific applications)
- Round jet nozzles
- Gun extension 150 and 300 mm
- Gun cable extensions
- Various adapters for connection to earlier generations of control units
- Gloves, anti-static

\*\*for more information, see spare parts list

## SuperCorona ring

### *Field of application*

The SuperCorona is an optional extension for the OptiSelect GM03-E manual gun, which allows a better surface quality when coating with the powder coating equipment.

When coating wheel rims, drawers, radiators, lamps etc. the surface quality is exceptional, also in places with higher coating layer requirements. By coating with several powder types, an "orange peel" finish can be completely avoided. By coating with structure powder, the "picture frame effect" is hardly visible.

The performance of the OptiSelect with SuperCorona is convincing due to its very good charging and very high deposition rate as well as an improved penetration into Faraday cages. The distance between nozzle and workpiece can be reduced to 100 mm without influencing the surface finish.



fig. 4

Due to its modular structure, the OptiSelect manual gun can be fast and easily extended with the light SuperCorona (approx. 60 g). With the additional SuperCorona ring attached to the OptiSelect gun, it remains repair-friendly and easy for maintenance.

### *SuperCorona assembly*

Before fitting the SuperCorona ring, make sure that the connection and the plug-in connector are free from grease and powder, otherwise the electric contact cannot be guaranteed.



## Principle of operation

### High voltage generation

The control unit supplies a high-frequency low voltage signal of approx. 10 V eff. This voltage is fed through the gun cable (1) to the high voltage cascade (2) in the gun body.

In the high voltage cascade (2), 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 obtained at the end (approx. 100 kV). The high voltage is now fed to the electrode (E) within the spray nozzle.

### Circuit

In addition to the modulated low voltage needed for high voltage generation, there are signal lines fed through the gun cable. The control signals are used for monitoring gun trigger status and gun remote control functions.

The gun is released by a touch-free switch (3), which is operated by a magnet (4) in the trigger (5). The gun control unit switches on the modulated low voltage, the powder transport and the rinsing air.

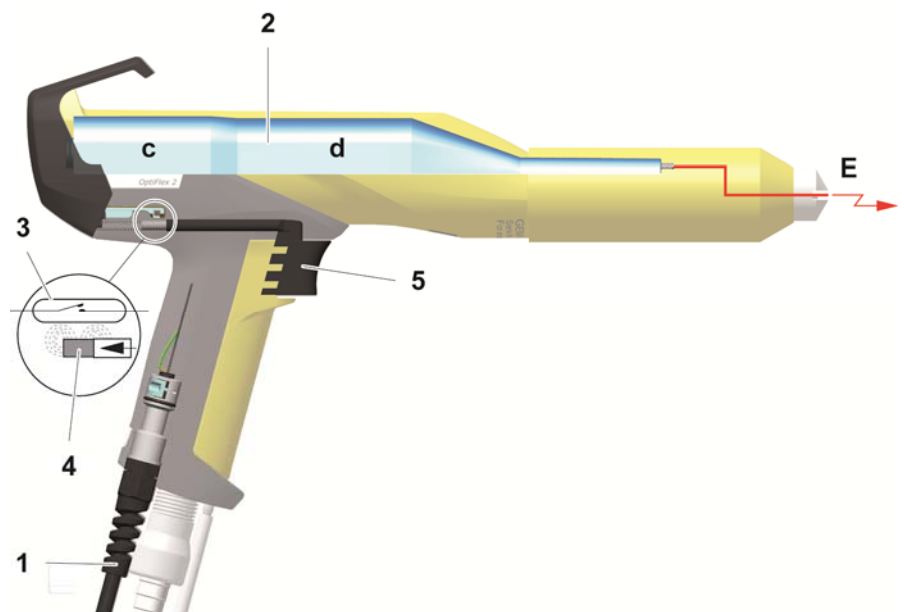


fig. 5

### Powder flow and electrode rinsing air

The electrode rinsing air is used by vented spray nozzles and is connected with its designated connection on the rear side of the gun control unit (see the operating manual of the gun control unit). The functions of the spray nozzles are described in the corresponding section of this manual.

## Flat jet nozzle with vented central electrode

The vented flat jet nozzle serves for the spraying and the charging of the powder. The powder is charged by the central electrode (E). The high voltage (H) created in the gun cascade is guided through the center electrode.

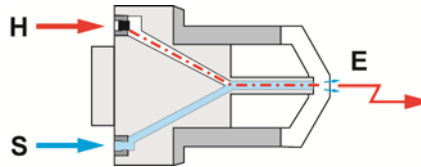


fig. 6

In order to prevent powder from sintering on the electrode, compressed air is used during the spray process.

The electrode rinsing air (S) adjustment on the gun control unit is described in the corresponding operating manual.

## Round jet nozzle with vented deflector and vented electrodes

The vented deflector is used, to give the powder stream emerging from the gun, a cloud formation. The powder is charged by radial arranged electrodes (E). The high voltage (H) created in the gun cascade is guided through the electrodes.

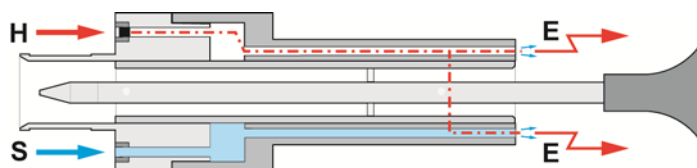


fig. 7

Since powder can accumulate on the baffle plate, it must be rinsed with compressed air.

The electrode rinsing air (S) cleaning ability depends on the powder and its sintering ability. The electrode rinsing air adjustment on the gun control unit is described in the corresponding operating manual.



## Typical properties – functional characteristics



### Remote control

- Adapt powder output (The powder output is correspondingly increased or reduced) – factory setting

or

- Program change (It is switching between programs P01-P20)  
- see also "Activate/deactivate the program change function on the gun control unit"



- Activate/stop rinsing process (injector, powder house and guns are rinsed)



### Powder hose quick release connection

- Quick and simple connection and disconnection from powder hose and application cup



### Connection for SuperCorona Ring

- Quick and simple connection and disconnection of SuperCorona ring



# Start-up

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## Preparation for start-up

### Basic conditions

When starting up the OptiSelect GM03-E manual gun, the following general conditions impacting the coating results must be taken into consideration:

- Gun correctly connected
- Gun control unit correctly connected
- Corresponding power and compressed air supply available
- Powder preparation and powder quality

---

## Connecting the manual gun

The OptiSelect GM03-E manual gun is delivered ready-to-use by the manufacturer. Just a few cables and hoses must be connected.



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### NOTE:

**The compressed air must be free of oil and water!**

---

The gun is connected as follows:

1. Connect electrode rinsing air hose and powder hose to gun
2. Lay out gun cable, electrode rinsing air hose and powder hose and bind using Velcro strips (included)
3. Connect the gun cable plug to the socket **2.3** on the rear side of the control unit
4. Connect electrode rinsing air hose to coupling **1.4**
5. Connect powder hose to injector

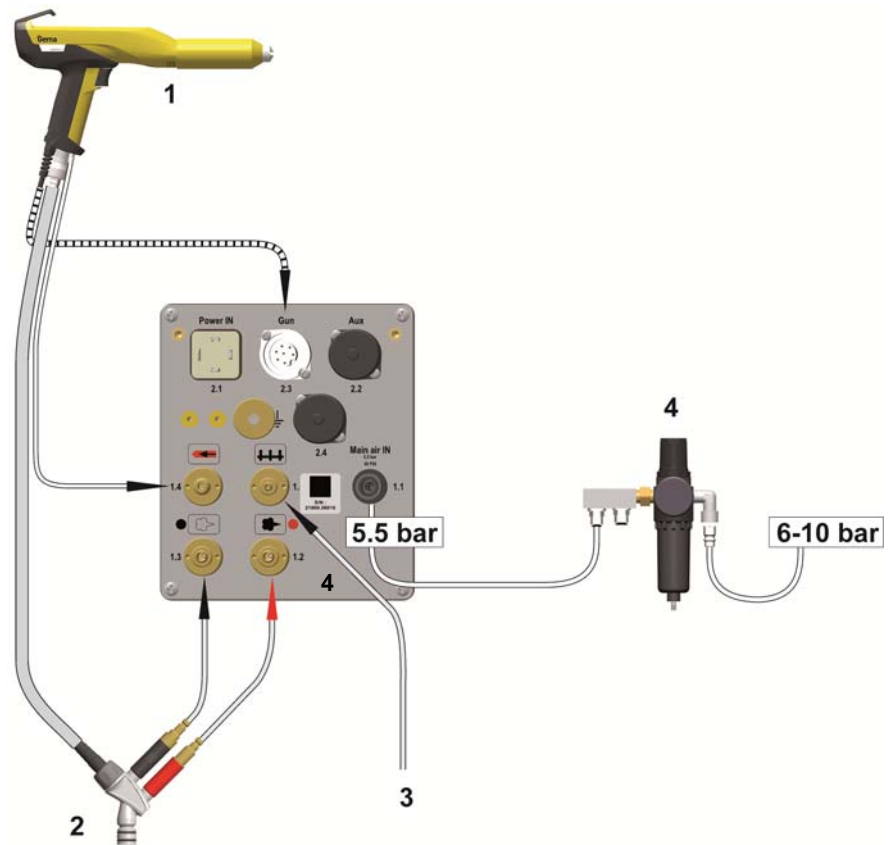


fig. 8

- 1 Gun
- 2 Injector

- 3 Fluidizing air hose
- 4 Maintenance unit

# Initial start-up




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**NOTE:**

If a malfunction occurs, see the troubleshooting guide, as well as the gun control unit operating manual!

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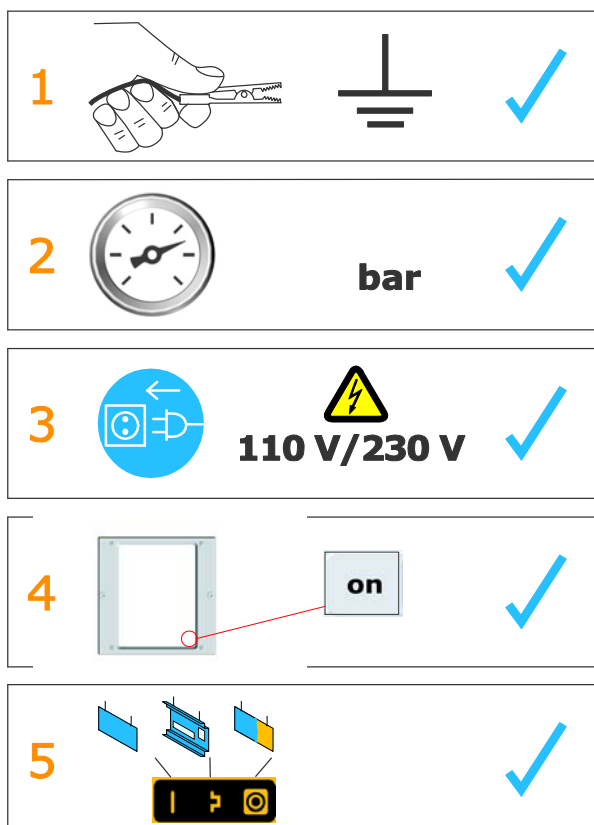


fig. 9




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**NOTE:**

The remainder of the start-up procedure for the OptiSelect GM03-E manual gun is explicitly described in the operating instructions for the OptiStar CGxx manual powder gun control unit (chapter "Initial start-up" and "Daily start-up")!

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## Operation



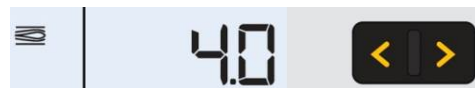
### DANGER!

#### Holding the gun incorrectly

During the coating process, the gun can discharge along the body of the coater if not held using its intended handle, which has been grounded.

- Always hold gun only by the handle!
- Do not touch any other parts of the gun!

### Setting of total air



*correct powder cloud*



*too little total air*



### NOTE:

A total air volume of 4 Nm<sup>3</sup>/h and a 50% powder share are recommended as the base values.

### Setting the powder quantity

The powder output volume is selected in reference to the desired layer thickness. The selection is done on the control unit. For the beginning, the standard adjustment of 60% is recommended. The total air volume is thereby kept constant automatically.



### NOTE:

The powder output depends on the powder type and the adjusted total air volume (see therefore the control unit operating manual)



*much powder**little powder***NOTE:**

To achieve maximum efficiency, we recommend avoided an overly high powder volume where possible!

## Setting the electrode rinsing air

1. Select the correct electrode rinsing



≈ 0,1 Nm<sup>3</sup>/h



≈ 0,5 Nm<sup>3</sup>/h

*too much electrode rinsing air*

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

**WARNING****Threaded sleeve not tightened well**

If the spray nozzle is just fitted loosely, there is danger of a flash-over of the gun high voltage, which can damage the gun!

► Always tighten the threaded sleeve well.

If round jet nozzles with air rinsed deflectors are used:

6. Exchange the deflector plate (Ø 16, 24 or 32 mm, see also the Spare parts list)

## Activation of the rinsing function

- 
  - The LCD segments begin to move on the display



**NOTE:**

**The rinsing function can be stopped as required using the P key.**

- 
  - 1 x**  
= automatically
  - 2 x**  
= manually

Procedure	Effect
<b>automatic</b>	<ul style="list-style-type: none"> <li>- The rinsing process is started</li> <li>- Injector, powder hose, gun and spray nozzle are purged using compressed air</li> <li>- The automated rinsing function enables parallel cleaning of other components, such as the fluid intake unit, powder container, etc.</li> </ul>
<b>manual</b>	<ul style="list-style-type: none"> <li>- The operator controls the number and length of the rinsing impulse by pressing the gun trigger a second time</li> </ul>

After completion of the rinsing procedure, the controller switches back to coating mode.





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## Activate/deactivate the program change via remote control

The remote control function has been set in the factory to change the powder output.

If the operator prefers the possibility to switch between the programs, this function is to be activated/deactivated on the gun control unit.

### ***Activate/deactivate the program change function on the gun control unit***

1. Hold  key pressed
2. Press  key  
The display flashes once, and the program change function is activated/deactivated



# Cleaning and maintenance

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## General information



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**NOTE:**

Regular, careful cleaning and maintenance extends the service life of the OptiSelect GM03-E manual gun and ensures long-lasting, uniform coating quality!

- ▶ The parts to be replaced during maintenance work are available as spare parts. These parts can be found in the corresponding spare parts list!
- 



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**WARNING**

All unauthorized modifications to the OptiSelect GM03-E manual gun are forbidden for safety reasons, and exempt the manufacturer from any liability from resulting damage!

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## Cleaning

### Cleaning the manual gun



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**NOTE:**

Before cleaning the powder gun, switch off the control unit. The compressed air used for cleaning must be free of oil and water!

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**Daily:**

1. Blow off the outside of the gun and wipe, clean etc.

**Weekly:**

2. Remove powder hose
3. Remove the spray nozzle from the gun and clean it with compressed air
4. Blow through the gun with compressed air, beginning from the connection in flow direction
5. Clean the integrated gun tube with the brush supplied, if necessary
6. Blow through the gun with compressed air again

7. Clean the powder hose
8. Reassemble the gun and connect it

**WARNING**

The following solvents may not be used to clean the OptiSelect GM03-E manual gun:

Ethylene chloride, acetone, ethyl acetate, methyl ethyl ketone, methylene chloride, premium gasoline, turpentine, tetrachloromethane, toluene, trichloroethylene, xylene!

**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!

## Cleaning the spray nozzle

### *Daily or after every shift*

- Clean the inside and outside of the spray nozzle with compressed air.  
Never immerse the parts in solvents!
- Check the seating of the spray nozzles.

**WARNING**

Make sure that the threaded sleeve is always tightened well. If the spray nozzle is just fitted loosely, there is danger of a flash-over of the gun high voltage, which can damage the gun!

### *Weekly:*

- Remove the spray nozzle and clean on the inside with compressed air. If sinterings should have formed, then they have to be removed!

### *Monthly*

- Check spray nozzle for wear

The flat jet nozzle is to be replaced, if:

- the spray pattern is no longer a regular oval
- deeper grooves are in the nozzle slot, or even the wall thickness is no longer recognizable
- the wedge of the electrode holder is worn

Nozzles with deflectors:

- if the wedge of the electrode holder is worn down, then the electrode holder is to be replaced

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## Maintenance

The OptiSelect GM03-E manual gun is designed to require only a minimum amount of maintenance.

1. Clean gun with dry cloth, see chapter "Maintenance"
2. Check connection points to powder house.
3. Replace the powder hoses, if necessary.

### Replacing parts

Except for the replacement of possible defective parts, there are very few repairs to be made.



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**NOTE:**

**The replacement of the cascade and the repair of the powder gun cable connection is only permitted by an authorized Gema Service center! Contact your Gema representative for details!**

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# Troubleshooting

## General information

Incident	Causes	Corrective action
<b>H11 (Help code on control unit)</b>	Gun not connected	Connect the gun
	Gun plug or gun cable defective	Contact local Gema representative
	Remote control on powder gun defective	Contact local Gema representative
<b>Gun LED remains dark, although the gun is triggered</b>	High voltage adjustment is set too low	Increase high voltage
	Gun plug or gun cable defective	Contact local Gema representative
	LED on gun defective	Contact local Gema representative
<b>Powder does not adhere to object, although the gun is triggered and sprays powder</b>	High voltage and current deactivated	Check the high voltage and current setting
	High voltage cascade defective	Contact local Gema representative
	The objects are not properly grounded	Check the grounding
<b>The gun does not spray powder, although the control unit is switched on and the gun trigger is pressed</b>	Compressed air not present	Connect the equipment to the compressed air
	Injector or nozzle on the injector, powder hose or powder gun clogged	Clean the corresponding part
	Insert sleeve in the injector is clogged	Clean/replace
	Pressure valve in the control unit defective	Replace
	Solenoid valve in the control unit defective	Replace

Incident	Causes	Corrective action
	No conveying air: - Throttle motor defective - Solenoid valve defective	Contact local Gema representative
	Front plate defective	Contact local Gema representative
<b>Gun achieving only poor spray profile</b>	Total air incorrectly configured	Increase the powder quantity and/or total air volume on the control unit
	Bend or damage to air lines to injector	Check air lines to injector
	Insert sleeve in the injector worn or not inserted	Replace or insert it
	Fluidization not running	see above



**NOTE:**

**Additional error descriptions are to be found also in the 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** OptiSelect GM03-E  
**Serial number** 1234 5678
- **Order no.** 203 386, 1 piece, Clamp – dia.18/15 mm

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

Wearing parts are always marked with a #.

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

**Example:**

dia. 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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## OptiSelect GM03-E manual gun

### Remarks

1. If a part of the gun body should be broken, or the high voltage cascade in the gun body should be defective, then the whole gun body has to be sent in for repair!
2. If the powder gun cable is defective, it is to be completely sent in for repair!

	OptiSelect GM03-E manual gun – complete <b>negative polarity</b> , incl. gun cable – 6 m, rinsing air hose – 6 m, flat jet nozzle, brush and parts kit, without powder hose	1012 545
	OptiSelect GM03-E manual gun – complete <b>negative polarity</b> , incl. gun cable – 12 m, rinsing air hose – 12 m, flat jet nozzle, brush and parts kit, without powder hose	1012 546
1	OptiSelect GM03-E gun body – complete, polarity negative, incl. pos. 4	1012 540
1.1	OptiSelect GM03-E gun body – complete, polarity negative, incl. pos. 4.1	1012 541
2	Threaded sleeve – see "Nozzle combinations" spare parts list	
3	Flat jet nozzle – complete, see "Nozzle combinations" spare parts list	
4	Gun cable – complete, 6 m, see also spare parts list "Gun cable"	1007 964
4.1	Gun cable – complete, 12 m, see also spare parts list "Gun cable"	1007 965
5	Electrode rinsing air hose – Ø 6/4 mm	100 854*
6	Quick release connection – NW5, Ø 6 mm, for pos. 5 (not shown)	200 840
7	Cleaning brush – Ø 12 mm (not shown)	389 765
	<b>Parts set (not shown), consisting of:</b>	<b>1012 544</b>
	Cable tie with Velcro closure (8x)	303 070
	O-ring – Ø 12x1,5 mm, FPM75, (2x)	1000 822 #
8	Powder hose – Ø 16/11 mm (not shown)	103 128*

\* Please indicate length

# Wearing part

## OptiSelect GM03-E manual gun

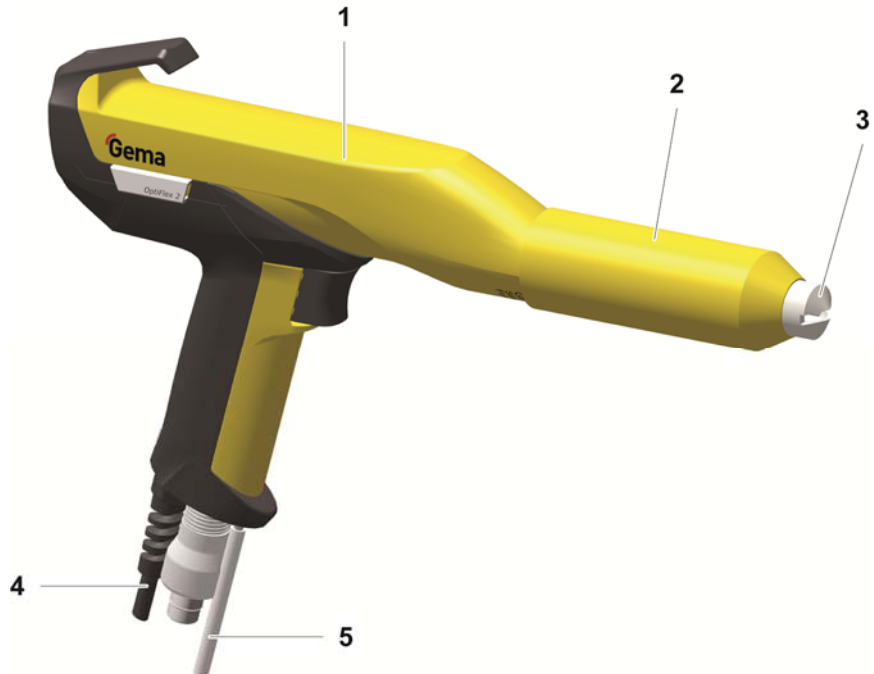


fig. 10

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## OptiSelect GM03-E – gun body

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1	Gun body (without pos. 1.1)	1012 530
1.1	Powder tube	1012 527 #
2	Cascade – complete, negative polarity	1007 231
3	Print holder – complete	1007 216
4	End plate with hook	1007 217
5	Grip end plate – complete	1007 961
6	Gun trigger – complete	1007 213
7	Trigger cover	1007 212
8	Countersunk-head screw – M4x6 mm	1000 845
9	SuperCorona connection	1007 238
10	Gun cable 2 m – complete	1007 963
	Gun cable 6 m – complete	1007 964
	Gun cable 12 m – complete	1007 965
11	Electrode rinsing air connection	1000 804
12	Powder tube – complete	1012 539 #
13	Compression spring	1001 488
14	Clip ring	1007 960
15	Hose connection – Ø 11-12 mm, complete (incl. pos 15.1)	1012 537 #
15.1	O-ring for pos. 15	1000 822 #
16	Cascade space gasket	1007 635#

# Wearing part

# OptiSelect GM03-E – gun body



fig. 11

## OptiSelect GM03-E – Nozzle combinations

1	Flat jet nozzle NF28-E – complete	1009 430#
2	Fixation piece NF28-E – complete	1009 429#
3	Flat jet nozzle set (without pos. 5.1)	404 225#
4	Contact ring	318 760#
5	Electrode holder – complete (ETFE)	404 209#
5.1	Electrode holder – complete (PTFE)	406 058#
6	Flat jet nozzle	404 128#
7	Threaded sleeve PU04-E-NF – complete	405 728
10	Round jet nozzle NS11-E – complete	1009 440#
11	Deflector rod NS11-E – complete	1002 249#
12	Muzzle NS11-E – complete	1009 439#
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 PE08-E-150 – complete, 150 mm	1010 501#
20.1	Extension PE08-E-300 – complete, 300 mm	1010 502#

# Wearing part



### WARNING

It is not permitted to connect more than two extensions together, in order to prevent the gun from being damaged by arising leverage force.

- ▶ The extensions (150 mm/300 mm) may be connected TO ONLY ONE ADDITIONAL extension (150 mm/300 mm), if necessary.

# OptiSelect GM03-E – Nozzle combinations

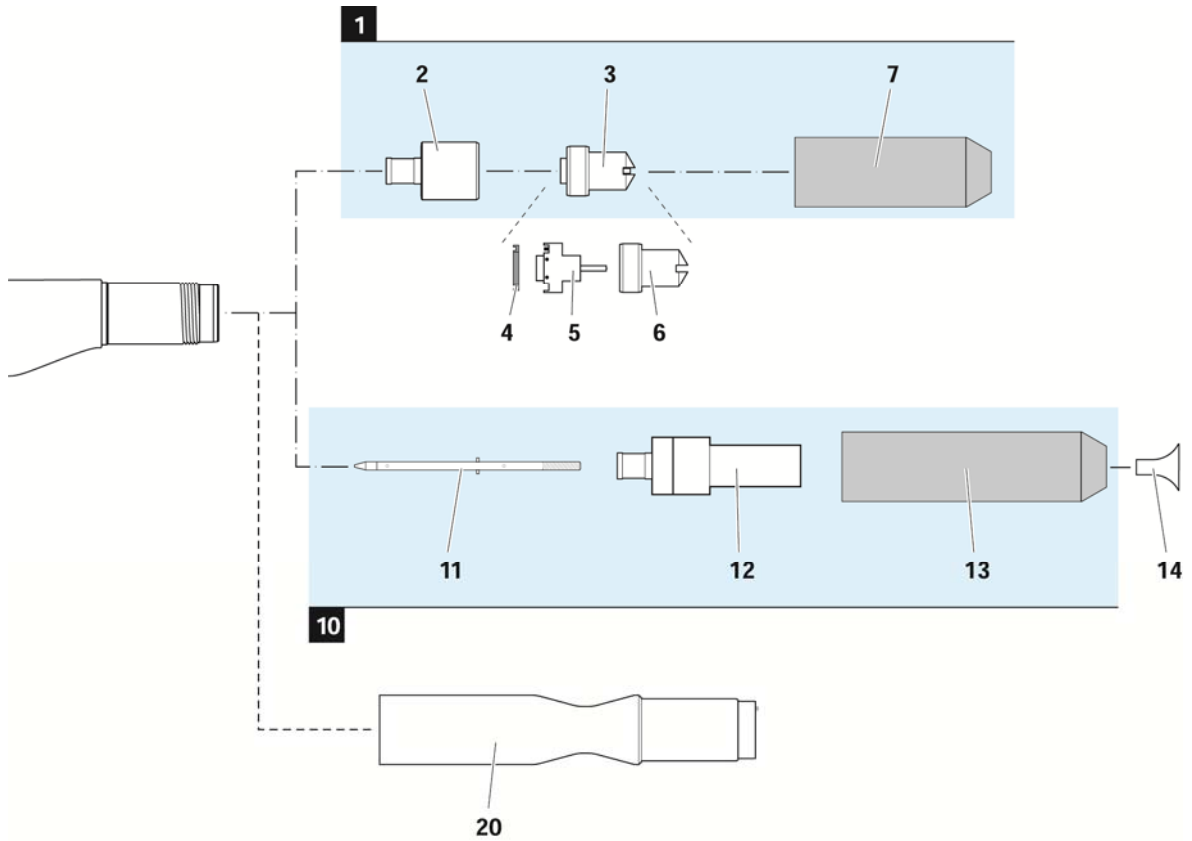


fig. 12

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**OptiSelect GM03-E – accessories**

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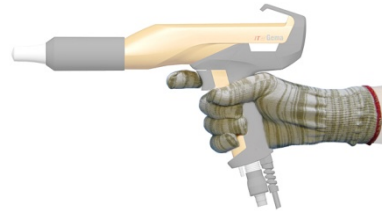
**Gun extension  
cables**



**L=6 m 1002 161**

**L=14 m 1002 162**

**Antistatic gloves  
(1 pair)**



**800 254**



