



# INSA Trading GMBH

## Instruction Manual

Manual Guns Types MG801, MG801S and MG850



Automatic Gun AG800

*This manual is supplied by INSA Trading GmbH, Switzerland*



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# Table of Contents

<b>Foreword</b> .....	<b>4</b>
<b>Version Information</b> .....	<b>4</b>
<b>Safety-regulations concerning Electrostatic Powder Coating</b> .....	<b>5</b>
<b>General notes applying to all guns</b> .....	<b>7</b>
Introduction .....	7
Generation of high tension .....	8
Technical specifications of the manual and automatic guns .....	9
<b>The Manual Guns Type MG801 and MG801S</b> .....	<b>10</b>
Introduction .....	10
Differences between the MG801 and the MG801S .....	10
<b>The Manual Gun Type 850</b> .....	<b>11</b>
Introduction .....	11
Settings at the gun .....	12
High voltage adjustment.....	12
Adjustment of the powder output .....	12
<b>The Automatic Gun AG800</b> .....	<b>13</b>
Generalities.....	13
<b>Gun Compatibility Chart</b> .....	<b>14</b>
Manual Guns .....	14
Automatic Gun .....	14
<b>Recommended voltage settings for typical applications</b> .....	<b>15</b>
<b>Using Muzzles</b> .....	<b>16</b>
The use of different muzzles .....	16
Function of a deflector muzzle.....	17
Function of a flat spray muzzle .....	18
<b>Options available with INSA Guns</b> .....	<b>19</b>
Triboelectric Versions .....	19
Muzzle Prolongations.....	19
Low Ion Adaptor .....	20
Cup Gun Attachment .....	21
<b>Maintenance</b> .....	<b>22</b>
Generalities.....	22
Daily Check.....	23
Weekly check .....	24
<b>Troubleshooting</b> .....	<b>25</b>
<b>Parts listing</b> .....	<b>26</b>
Muzzles and wearable parts .....	26
Parts of the manual guns .....	28
Special buttons for the MG850 .....	30
Parts of the Automatic Gun AG800 .....	31
External view.....	31
Internal View .....	32

## Illustration Index

Basic operation of the gun .....	8
The Manual Gun MG801 .....	10
The MG850 Gun, companion of the Smarcoat Series .....	11
Settings at the gun.....	12
Different types of muzzles available.....	16
Function of a deflector muzzle .....	17
Function of a flat spray muzzle.....	18
An MG801 with a low ion adaptor .....	20
Cup gun Attachment for INSA manual units.....	21
Electrode holder position at gun reassembly .....	23
Overview of the muzzles and other wearable parts .....	26
Overview of a disassembled manual gun .....	28
Special buttons of the MG850 .....	30
The Automatic Gun AG800.....	31
Internal view of an automatic gun type AG800.....	32

## Foreword

Thank you for choosing an INSA Powder Coating System. It is a very efficient system with a low consumption of spare parts. In order to gain the most profit from your equipment, please review the different functions and maintenance required as described in this manual.

### **Important**

Please note that INSA Trading GMBH or its representative take no responsibility if the equipment is used outside its specification, or for uses other than those described in this manual.

## Version Information

Version of the document	2
Date of last modification	2003-07-16

# Safety-regulations concerning Electrostatic Powder Coating

1. The equipment can be dangerous when not used in accordance with the requirements of the following standards:
  - ∞ EN 50 050 (resp. VDE 0745 chapter 100)
  - ∞ EN 50 053 (resp. VDE 0745 chapter 102)
  - ∞ Instructions for electrostatic powder coating ZH 1/444
2. All electrostatically conductive parts within a reach of 5 m from the spray area must be grounded.
3. The floor of the room containing the spray area must be electrostatically conductive.
4. The personnel must to wear shoes with conductive soles.
5. The personnel that will handle the gun must use it with either bare hands or with electrostatically conductive gloves.
6. The ground wire (green/yellow) has to be connected to the ground screw on the back of the electrostatic control module.

7. The ground wire must have a solid metallic connection with the booth, the recovery system, and the conveyor chain as well as the objects to be coated.
8. The electric cables as well as the powder hoses leading to the guns must be handled in such a way that they are protected against mechanical damage.
9. Only after the recovery system has been put into operation may the powder coating unit be switched on.
10. Electric wires as well as powder hoses have to be examined at least once a week.
11. The grounding of all the electrostatically conductive parts and equipment within the reach of 5m from the spray area must be examined at least once a week.
12. The control panel must be switched off when cleaning the gun or when changing nozzles or extensions.

## **General notes applying to all guns**

### ***Introduction***

The manual powder guns with the integrated high voltage generator are designed to apply electrostatically chargeable powder on grounded work-pieces. The guns are designed with state of the art of technology. The parts are assembled in a simple manner which assures easy maintenance and repair. The guns produce high voltage and it is therefore absolutely necessary to read the instruction manual carefully before starting to operate.

All guns are built in accordance with the CE-regulations. They have been tested together with the electronic control board ECB, and have been found to comply with the European Regulation EN 50 050/54 regulation.

### **Important**

The guns and the electronic control board ECB 110 have been used in accordance with the european regulation EN 50 050 as components of a configuration, they can only be used in this combination. Any change or manipulation of the components will automatically void the warranty and any implicated liability. Use of any parts other than original spare parts will void the warranty.

## **Generation of high tension**



The powder gun with the integrated high voltage generator (Pos.1 in Illustration 1 above) is supplied from the central drawer by the cable (pos.2) with low voltage of 16 kHz frequency. This voltage is transformed to high AC tension and afterwards multiplied up to 110 kV at the electrode (pos.3). The powder hose is connected to the hose connector (pos.4). When the gun trigger (Pos. 5) is pressed, the magnetic valve will activate (for compressed air) along with the voltage supply to the gun. The grounded plate (Pos. 6) at the handle will ensure the operator is not charged.

## ***Technical specifications of the manual and automatic guns***

Input voltage:	10,5 V <sub>eff</sub>
Frequency:	17 kHz
Output Voltage:	110 kV -10 %
Max. Output current:	140 μA
Polarity:	negative
Licence:	EN 50 050
Examination No:	BVS 97.D.2048

# The Manual Guns Type MG801 and MG801S

## ***Introduction***

The Manual Gun Series MG801 is a very rugged, well balanced, and light unit, designed to withstand day-to-day powder coating operations. This gun is delivered as standard with all units of Type 5100, but it may be used on **any** of the many INSA units.



## ***Differences between the MG801 and the MG801S***

The MG801 was constructed and is optimized for the use with a Series 5100 Manual Unit.

The MG801S was built to operate on the Series 5300 'Suitcase' Unit. This Unit is ideal for coating small batches of different parts, or to do powder tests. The MG801S is delivered with a cup attachment as standard.

# The Manual Gun Type 850

## ***Introduction***

The INSA Manual Gun MG850 was specially designed to be used with the INSA Series 5800 Smartcoat Drawer Type 5800. With this drawer, it can offer special functionality, as described below.

The Series 850 Manual gun will operate on any INSA Drawer. The drawer may limit its functionality though, and not allow the use of all the push button functions at the gun.

*Illustration 3 The MG850 Gun, companion of the Smarcoat Series*



## Settings at the gun

*Illustration 4 Settings at the gun*



### High voltage adjustment

The gun has a switch (Position 1 in Illustration 4) which allows the adaptation of the voltage to difficult coating situations (Faraday corners).

When the button is pushed, it will be locked in place. This will result in a reduction of the voltage, and yield more uniform results and easier coating of corners and hard to coat areas.

When the button is pushed again, the voltage will return to the level it was before.

### Adjustment of the powder output

The operator can adjust the level of powder output directly at the gun by pushing the buttons labeled '-' or '+' (Positions 2 and 3 in Illustration 4). When the button is pressed, the output will change in the indicated direction. As soon as the button is released the change stops.

Please note that the adjustment as described above requires a drawer of the Smartcoat type (Series 5800)

# The Automatic Gun AG800

## **Generalities**

The automatic gun AG800 is available in different variants, which are different in their polarity, and input voltage. Those differences have been color coded:

<i>Color</i>	<i>Variant</i>
Green	Standard variant, negative polarity
Red	Positive polarity
Grey	Negative polarity, 9 V input voltage

The muzzles and other accessories are compatible with the automatic gun, so please consult the respective sections to find a muzzle suitable for your application.

### **Distances in the powder booth**

To reach near optimal coating performance, the minimal distance from the front part of the automatic gun AG800 to the grounded part should be at least 100mm. Using distances lower than this may lead to a charging of the cascade, which may cause damage to it.

# Gun Compatibility Chart

## **Manual Guns**

<i>Gun Model</i>	<i>Series 5300 Suitcase</i>	<i>Series 5100 Manual</i>	<i>Series 5800 Smartcoat</i>
MG801S	O	O	N
MG801	O	O	N
MG850	X	X	O

O = Fully Compatible

N = Gun is usable and works fine, but does not use the full potential of the drawer

X = Gun is usable and works fine, but the drawer can not support all the functionality of the gun

## **Automatic Gun**

<i>Gun Model</i>	<i>Series 5500 Standard Automatic</i>	<i>Series 5800 Advanced Automatic 'Merlin System'</i>
AG800	O	O

O = Fully Compatible

N = Gun is usable and works fine, but does not use the full potential of the drawer

X = Gun is usable and works fine, but the drawer can not support all the functionality of the gun

## Recommended voltage settings for typical applications

The adjustment of the voltage can be done at the control drawer type 5100 or 5800, or the panel of the 5300 Series 'Suitcase' Unit.

The powder application is variable, and depends on several external factors:

- Type of powder used
- Desired thickness of the powder film
- Range of different parts to be coated

The table below is provided as a starting point.

We recommend the following settings for a typical application:

<i><b>Voltage</b></i>	<i><b>Typical Application</b></i>
100 kV	Large flat parts, film thickness 60 micron
80 kV	General application
60 kV	Profile coating
50 kV	Application of metallic powder

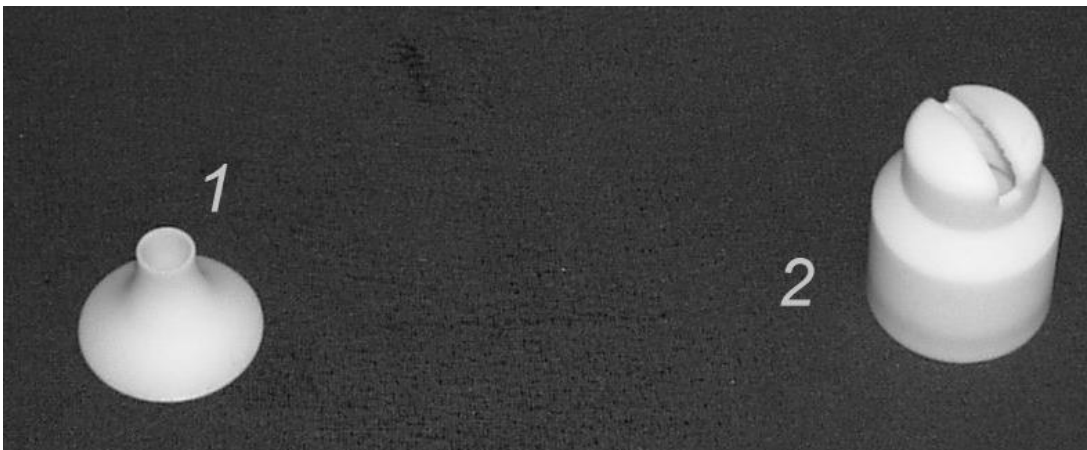
Please note that the MG801S type gun delivered with the Series 5300 Suitcase unit is limited to an output voltage of about 80kV.

## Using Muzzles

### ***The use of different muzzles***

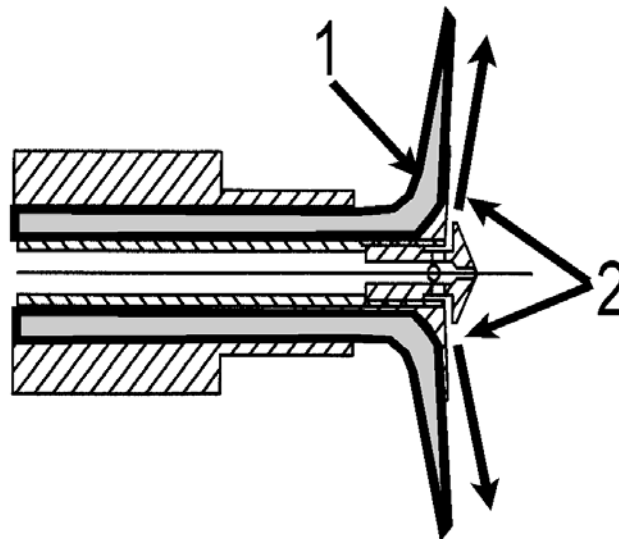
As described below, muzzles can be used to adapt the powder cloud to different situations. There are two different types of muzzles available, as shown in Illustration 5. Position 1 on the left hand side depicts a deflector muzzle, Position 2 on the right shows a flat spray muzzle. Both types exist in variations, to achieve gradual differences in the desired effect.

*Illustration 5 Different types of muzzles available*



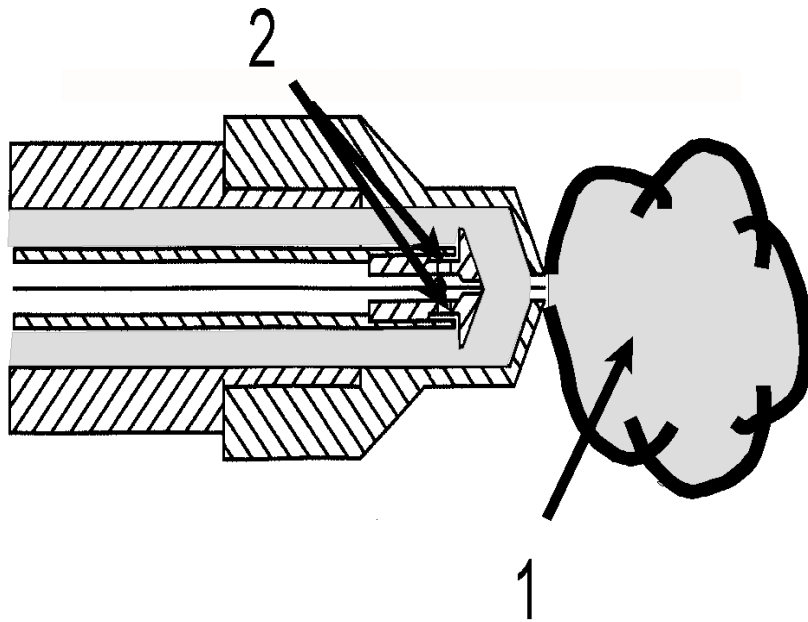
## Function of a deflector muzzle

*Illustration 6 Function of a deflector muzzle*



Position 1 in Illustration 6 shows the powder flow. The deflector cleaning air prevents a powder buildup at the deflector (Pos. 2)

*Illustration 7 Function of a flat spray muzzle*



### ***Function of a flat spray muzzle***

As can be seen in Illustration 7, the powder exits through the slot of the muzzle and creates a flat cloud (Pos. 1). The speed at the exit can be adjusted through the pressure of the cleaning air (Pos. 2). There are different variants of this muzzle which will create different shapes of clouds.

## **Options available with INSA Guns**

Various options are available with INSA guns:

- Triboelectric Versions instead of electrostatic versions
- Muzzle extensions
- Low Ion Adaptor
- Cup Gun Attachment

### ***Triboelectric Versions***

INSA guns are available for both triboelectric charging as well as electrostatic charging.

All INSA Units can be used with triboelectric versions and electrostatic versions.

### ***Muzzle Prolongations***

The distance between the gun and the parts to be coated may be too far, or there are other special cases requiring a longer length of the muzzle. Please contact your local representative, or INSA in Switzerland if you need more information and pricing.

## ***Low Ion Adaptor***

All INSA guns can be equipped with a low ion adaptor. Illustration 8 shows an MG801 with such an adaptor. The adaptor reduces the number of free ions. Its use will result in the following:

- More uniform coating, esp. less variation in the depth of the powder covering
- Less 'orange peel'
- Better penetration in faraday corners

*Illustration 8 An MG801 with a low ion adaptor*



## **Cup Gun Attachment**

All manual units allow the mounting of a cup gun attachment. Such an attachment is shown in illustration 9 below. The attachment is usually mounted where the powder hose would be and has the following benefits:

- Allows small quantities of powder to be used
- Container holds about 1.5 Litres
- Built-in fluidization of the powder and powder injector

*Illustration 9 Cup gun Attachment for INSA manual units*



When the main application is coating small batches of parts, a cup gun attachment may be more economical than a powder hopper.

# Maintenance

## *Generalities*

A regular maintenance of the system is necessary in order to assure uniform results. It will also prolong the lifetime of the components of your system.

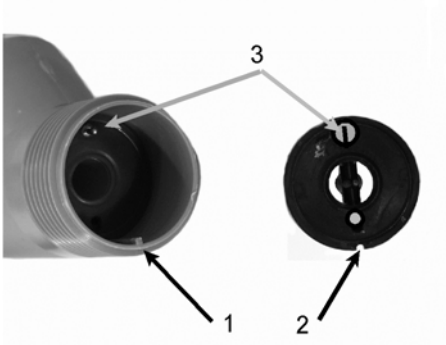
**Please take note of the following points before doing  
any maintenance work**

- Before disassembling the gun, the control drawer must be switched off.
- The gun plug must to be disconnected.
- The compressed air used for cleaning the gun must be free of oil and water.
- It will only be necessary to remove the muzzle assembly. There are no further user-serviceable parts.

## Daily Check

- ☞ Clean the outside of the gun.
- ☞ Remove the muzzle assembly including the electrode holder and clean it.
- ☞ Pull out the electrode holder and clean it carefully
- ☞ the gun has to be cleaned with compressed air at the powder hose connector, following the direction of the powder flow.
- ☞ The thread of the gun barrel as well as the inside has to be cleaned with compressed air.
- ☞ Clean the powder hose
- ☞ Re-assemble the gun and connect it with the drawer.

### Please Note



*Illustration 10 Electrode holder position at gun reassembly*

- When reassembling the electrode holder and the muzzle it has to be ascertained that the groove in the electrode holder (pos.2) and the muzzle correspond with the guide (pos.1) in the gun.
- The contact hole in the electrode holder must be free of powder to assure a good electrical contact. This prolongs the lifetime of the electrode holder and gives the best coating performance.

## ***Weekly check***

- œ clean the injector
- œ change the insert sleeve, if necessary (wear part)
- œ clean the gun with compressed air
- œ disassemble and clean the gun carefully
- œ replace the deflectors if necessary (wear part)
- œ replace the muzzle if necessary (wear part)
- œ disassemble the injector completely and clean all parts, ev. Change the insert sleeve (wear part)

<p style="text-align: center;"><b>Please Note</b></p>
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<p>Other than the muzzle, the gun contains no other user serviceable parts.</p>
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## Troubleshooting

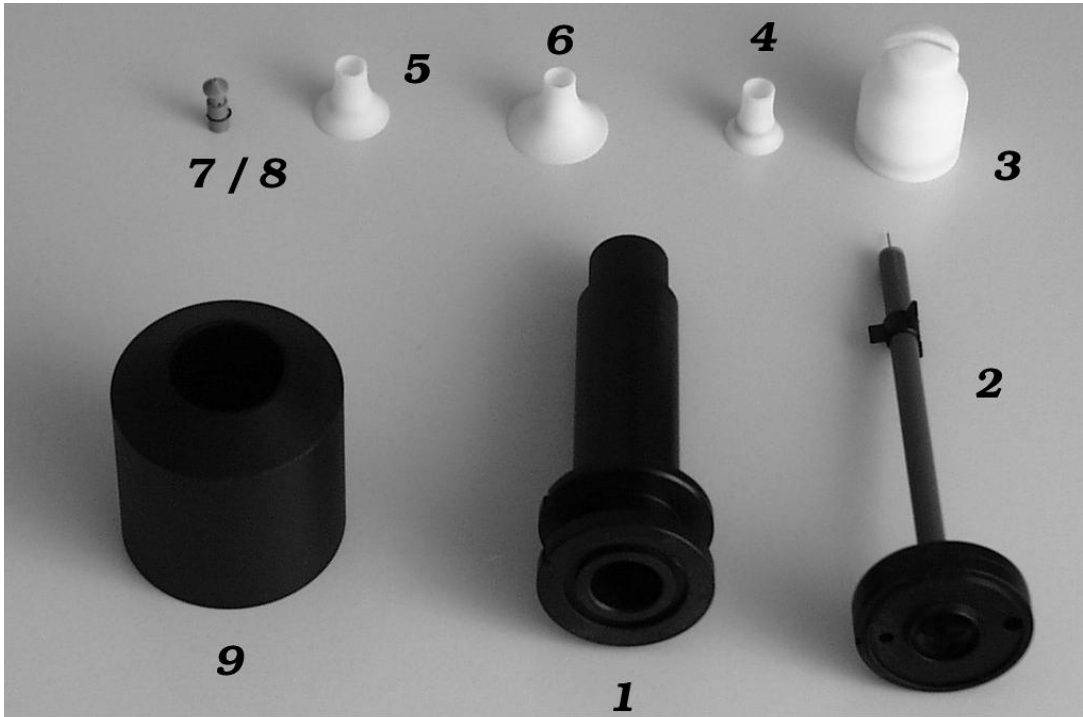
### Caution

Before opening the casing, switch off the electrical voltage and disconnect the electric cable.

<i>Failure</i>	<i>Causes of failure</i>	<i>How to fix them</i>
No voltage supply	<ul style="list-style-type: none"> <li>- main supply not connected</li> <li>- broken cable</li> <li>- input fuse defect</li> </ul>	<ul style="list-style-type: none"> <li>- connect it</li> <li>-replace it</li> <li>-replace it</li> </ul>
No light on main switch	<ul style="list-style-type: none"> <li>- lamp defect</li> </ul>	<ul style="list-style-type: none"> <li>- replace it</li> </ul>
No high tension	<ul style="list-style-type: none"> <li>- ECB 100 defect</li> <li>-cascade defect</li> <li>-gun switch defect</li> <li>-cable broken</li> </ul>	<ul style="list-style-type: none"> <li>-replace it</li> <li>-replace it</li> <li>-replace it</li> <li>-replace it</li> </ul>
Powder poorly charged	<ul style="list-style-type: none"> <li>- no high tension</li> <li>- electrode covered with powder</li> <li>- parts not grounded</li> <li>- faulty cascade</li> </ul>	<ul style="list-style-type: none"> <li>- follow above mentioned advice</li> <li>- clean it</li> <li>- connect them to ground</li> <li>- replace it</li> </ul>
No powder flow	<ul style="list-style-type: none"> <li>- examine the input pressure</li> <li>- defective magnetic valve</li> <li>- ECB 110 defect</li> </ul>	<ul style="list-style-type: none"> <li>- Replace it</li> <li>- replace it</li> </ul>
Insufficient coating in the corners	<ul style="list-style-type: none"> <li>- Powder output speed too high</li> <li>- voltage too high</li> </ul>	<ul style="list-style-type: none"> <li>- reduce air pressure</li> <li>- reduce it</li> </ul>

## Parts listing

### *Muzzles and wearable parts*



Different muzzles and wear parts are available to be used with the different INSA Guns. All spare parts can be used with all INSA Guns. To get uniform, reproducible results, wear parts should be replaced as soon as a deterioration is apparent.

Please refer to Illustration 11, and to the table on the following page to determine which parts fit your application best.

<i>Pos.</i>	<i>Order No.</i>	<i>Description</i>
<i>1</i>	<i>200.104.01</i>	<i>Muzzle 100 mm</i>
<i>2</i>	<i>200.101.01</i>	<i>Electrode holder 110mm</i>
<i>3</i>	<i>200.106.01</i>	<i>Flatspray nozzle</i>
<i>4</i>	<i>200.110.01</i>	<i>Deflector dia 13mm</i>
<i>5</i>	<i>200.111.01</i>	<i>Deflector dia 18 mm</i>
<i>6</i>	<i>200.112.01</i>	<i>Deflector dia 24 mm</i>
<i>7</i>	<i>200.102.01</i>	<i>Air deflector dia 6mm</i>
<i>8</i>	<i>200.102.02</i>	<i>Air deflector dia10mm</i>
<i>9</i>	<i>200.105.01</i>	<i>Union nut</i>

Wear Parts are printed in *italic type*

## Parts of the manual guns

Please consult Illustration 12 and the table on the following page.



<i>Pos.</i>	<i>Order.No.</i>	<i>Description</i>
1	200.051.01	Powder tube
	201.001.01	HT-Generator green negative
2	201.001.02	HT-Generator red positive
	201.001.03	HT-Generator grey 9Vnegative
3	<i>200.100.01</i>	<i>Rubber-sealing</i>
4	200.001.01	Guncable with plug to drawer
7	200.058.01	Gun trigger
8	200.059.01	Cable clamp
9	200.060.01	Gun switch
10	200.061.01	Powder tube with hose connector
11	200.062.01	Handle screw
12	200.063.01	Plastic cap
13	200.064.01	Handle screw
14	200.065.01	Screw for coverplate
15	200.066.01	Coverplate
16	200.067.01	Upper handle body with push button
17	200.068.01	Lower handle body with push button
18	201.002.01	Coverplate for cascade
19	200.069.02	Powder diverter

Wear Parts are printed in *italic type*

## **Special buttons for the MG850**

In addition to the parts outlined above, the MG850 also contains special buttons.

*Illustration 13 Special buttons of the MG850*



<i>Pos.</i>	<i>Order No.</i>	<i>Description</i>
20	200.070.01	Button for voltage
21	200.071.01	Button for powder output

## Parts of the Automatic Gun AG800

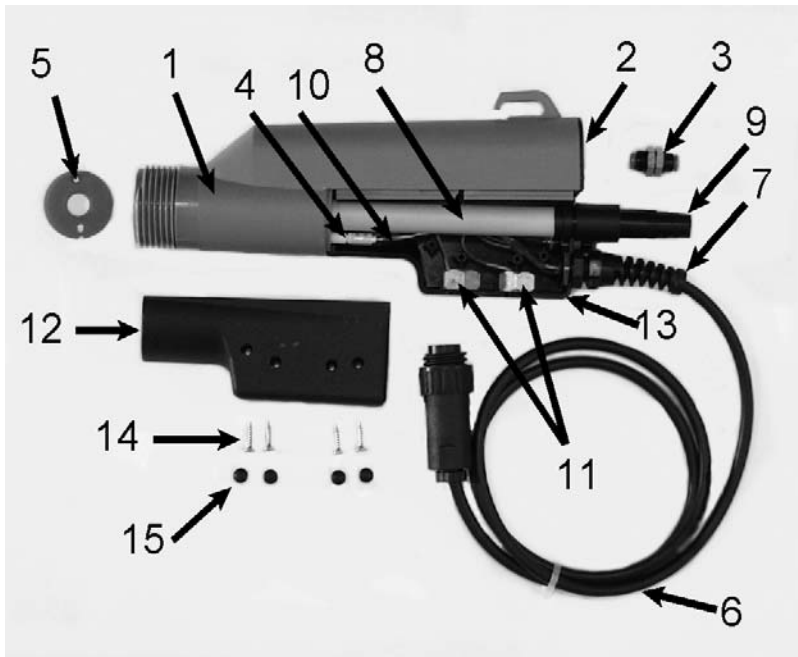
### External view



<i>Pos. in Illustration 14</i>	<i>Order No.</i>	<i>Description</i>
1	Various	Muzzle, please consult Illustration 11 on page 26
2	210.000.01	Cascade, with negative polarity
	210.000.02	Cascade, with positive polarity
	210.000.07	Cascade, 9V, with negative polarity
3	210 012 01	Lower gun body
4		Air connector
5		High Voltage Supply

## Internal View

Illustration 15 Internal view of an automatic gun type AG800



<i>Pos. in Illustration 15</i>	<i>Order No</i>	<i>Description</i>
1	Various	Cascade
2	201 002 01	Cover Plate
3	210 007 01	Pneumatic Connector
4	201 008 01	Air tube
5	200 100 01	Rubber Sealing
6	210 003 01	Cable with plug
7	210 004 01	Cable clamp
8	210 005 01	Powder tube
9	210 006 01	Hose Connector
10	210 009 01	Air hose
11	210 010 01	Connection screws
12	210 011 01	Upper gun body

<i>Pos. in Illustration 15</i>	<i>Order No</i>	<i>Description</i>
13	210 012 01	Lower gun body
14	210 013 01	Fixation Screws
15	210 014 01	Plastic Caps

Wear parts are printed in *italic type*