Dokumentation PG 1-R4 Quick Robot Gun

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This chapter sets out the fundamental safety regulations that must be followed by the user and third parties using the PG 1-R4 Quick Robot Gun.

These safety regulations must be read and understood before the PG 1-R4 Quick Robot 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 PG 1-R4 Quick Robot Gun is built to the latest specification and conforms to the recognized technical safety regulations and is designed for the normal application of powder coating.

2. 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! If the PG 1-R4 Quick Robot 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 the conformity of use. The PG 1-R4 Quick Robot 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 PG 1-R4 Quick Robot 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 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.

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Technical safety regulations for stationary electrostatic powder spraying equipment

General information

The powder spraying equipment of 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. Incorrect operation of the control unit can lead to accidents, malfunctions or damage to the control itself or to the plant.

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. Please observe the local safety regulations!

5. The plug must be disconnected before the machine is opened for repair.

6. The plug and socket connections between the powder spraying equipment and the mains network should only be removed when the power supply 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. Please observe the local safety regulations!

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 alert that the customer himself is responsible for the safe operation of equipment. ITW Gema AG 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. Spray guns are admitted 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 shutdown. 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 has to ensure that no non-authorized persons work 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 operating enterprise has to ensure that GEMA electrostatic spraying equipment is only operated in perfect 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. All maintenance activities must be executed when the powder spraying mechanism is switched off. 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/tension**

It is necessary to refer once more to the danger of life from high voltage current if the shutdown 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 MΩhm. The resistance must be tested regularly. The condition of the work piece attachments as well as the hangers must guarantee that the work pieces remain grounded. If the grounding of the work pieces takes place by their attachments, 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 standstill 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 user enterprise has to ensure due to the local conditions, that when repairs at the electrical part or restarting operation activities are done, additional measures such as providing with gates against the admission of unauthorized persons are absolutely executed.

**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, and the faulty part must be immediately replaced or repaired. Only original ITW Gema spare parts may 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. Arbitrary, unauthorized repairs can lead to injuries and damages to the equipment! The ITW Gema AG guarantee would no longer be valid.

**Safety requirements for electrostatic powder coating**

1. This equipment can be 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 grounding cable (green/yellow) must be connected to the grounding screw of the manual electrostatic powder spraying equipment. The grounding cable must have a good metal to metal connection with the coating booth, the recovery unit and the work piece conveyor system, especially with the work piece suspension.

7. The electricity and powder supply to the hand guns must be set up in such a way that they are fully protected against heat and chemical damage.

8. The powder coating equipment may be able to be switched on only if the booth is in operation. 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 unit 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**

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<td>BGI 764</td>
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<td>BGR 132</td>
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<td>VDMA 24371</td>
<td>Guidelines for electrostatic coating with synthetic powder&lt;br&gt;- Part 1 General requirements&lt;br&gt;- Part 2 Examples of use</td>
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**Leaflets**

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**EN European standards**

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<tr>
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<td>Electrical equipment for locations where there is danger of explosion (2)</td>
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<td>EN 60 204 identical: DIN VDE 0113</td>
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**VDE (Association of German Engineers) Regulations**

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<td>Set up electrical equipment in locations in areas with danger of explosion</td>
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*Sources:*

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

2) Beuth Verlag GmbH, Burgrafenstrasse 4, 1000 Berlin 30

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

4) VDE Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12

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**Product specific 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

General information

This operating manual contains all the important information which you require for the working with the PG 1-R4 Quick Robot Gun. 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 or powder injector - should be referenced to their enclosed corresponding documents.
Function description

Field of application

The PG 1-R4 Quick Robot Gun is built 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!

The PG 1-R4 Quick Robot Gun with integrated high voltage generation can produce optimum penetration and high charging efficiency. The gun is detachable, therefore easy for maintenance and repair.

Typical characteristics

The PG 1-R4 Quick Robot Gun with an integrated high voltage generator is particularly suitable for operation on a freely programmable robot (up to 7 axes) for coating of complex contours and object positions difficult to access.

The gun is installed on the front side of a hollow-arm coating robot. An appropriate adaptor piece for the corresponding robot type is used for fitting the applicator on the robot. This adaptor provides by means of a pin for exact positioning of the gun, as well as the fixture of the gun cable and the hoses.

The indexation and the flange measures can be implemented robot-specifically.

The gun can produce optimum penetration and high charging efficiency. It is detachable, therefore easy for maintenance and repair.

The PG 1-R4 Quick is characterized by its fast assembly and disassembly to the robot. Accordingly, the time requirement for maintenance or cleaning purposes can be lowered.

The PG 1-R4 Quick Robot Gun can optionally be retrofitted with SuperCorona-Set
Scope of delivery

**PG 1-R4 Quick Robot Gun**

- Rinsing air hose
- A complete PG 1-R4 Quick Robot Gun with gun cable
- FSD 21 Flat jet nozzle with electrode holder
- Cable fixation with velcro fastener
- Gun cleaning brush
- Spare parts kit

**PG 1-R4 Quick Robot Gun**

**Structure**

1. Spray nozzle
2. Threaded sleeve
3. Shaft
4. High voltage cascade
5. End plate
6. LED window
7. Plastic screw
8. Support
9. Flange
10. Gun cable connection
11. Gun cable
12. Powder hose connection
13. Rinsing air connection
14. Rinsing air connection
High voltage generation

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

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 obtained at the end (approx. 100 kV). The high voltage is now fed to the electrode within the spray nozzle (e).

When the high-voltage is adjusted on the control unit, the intensity of the LED (6) also changes. The user has the assurance that high-voltage is present and can control this function.

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 the operating manual of the gun control unit). The functions of the spray nozzles are described in the corresponding section of this manual.
Spray nozzles

Standard-Set

Flat jet nozzle with vented central electrode

Flat jet nozzle with vented central electrode

The vented flat jet nozzle serves for 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 powder from sintering on the electrode, compressed air is used during the spray process. The compressed air (called rinsing air) is fed through the small hole in the black contact ring of the nozzle holder and into the electrode holder.

The rinsing air adjustment on the gun control unit is explained in the corresponding operating manual.
SuperCorona-Set

Field of application

SuperCorona is an optional extension for the PG 1-R4 Quick Robot Gun, which allows better surface quality when spraying with 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 PG 1-R4 Quick Robot Gun with SuperCorona is convincing due to its very good charging and very high deposition rate as well as an improved penetration in Faraday cages. The distance between nozzle and workpiece can be reduced to 100 mm without influencing the surface finish.

SuperCorona - retrofit

Due to its modular structure, the PG 1-R4 Quick Robot Gun can be fast and easily extended with the light SuperCorona (approx. 60 g). With the additional SuperCorona ring attached to the PG 1-R4 Quick Robot Gun, it remains repair-friendly and easy for maintenance.

Scope of delivery

The SuperCorona conversion kit consists of:

1. SuperCorona connection
2. SuperCorona ring
3. Milled-head screw
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.

1. Insert the SuperCorona ring on the threaded sleeve, and at the same time position the rod in the corresponding hole (to the stop) in the SuperCorona rod clamp block.

2. Place the milled screw in the rod clamp block and

3. screw tight
Technical data

PG 1-R4 Quick Robot Gun

Electrical data

| PG 1-R4 Quick Robot Gun |     |
|-------------------------|--|---|
| Nominal input voltage   | 10 V eff. |
| Operating frequency     | ca. 18 kHz |
| Nominal output voltage  | 98 kV |
| Polarity                | negative (optional positive) |
| Max. output current     | 100 µA |
| High voltage display    | with LED |
| Ignition protection     | Ex 2 mJ T6 |

Approvals

EN 50050 and PTB test no. Ex-91.C.9102.
PTB Ex 03-53018
Date tested 10/1993
Start-up and operation

General information

The relevant safety standards, as well as the safety regulations of the robot manufacturer are absolutely to be respected for the operation of the PG 1-R4 Quick Robot Gun!

Connecting guide

1. Fit the adaptor piece onto the robot arm.

   The indexation of the robot flange must correspond to the indexation of the adaptor piece!

   2. Tighten the fixing screws (see also the assembly instructions of the robot manufacturer).

   3. Lay out the gun cable, the powder hose and the rinsing air hose in such a way, that neither kinks nor torsions can arise

   4. Position the gun connecting flange onto the adaptor piece (note the indexation), and then tighten the threaded sleeve.

   5. Connect the gun cable plug to the control unit (see "Gun control unit" operating instructions)

   6. Connect the rinsing air hose from the control unit to the gun

   7. Connect the powder hose from the gun to the corresponding injector

   Note:

The compressed air must be free from oil and water!

(cont.)
Function check

1. Turn on the gun control unit

2. Adjust the high voltage at the control unit
   The high voltage LED (kV) lights up. The high voltage in the PG 1-R4 Quick Robot Gun is present.

3. Slowly increase the high voltage: The value on the high voltage display should increase slowly. The intensity of the LED on the gun cascade increases as the voltage rises.

4. Conveying air, supplementary air and electrode rinsing air are adjusted depending on the application by the superordinate plant control and are shown at the corresponding displays.

5. The maximal nominal output current can be monitored on the gun control unit (please read the "Gun control unit" operation manual).

When all the checks are positive, the gun is ready for operation.

Note:
When a malfunction occurs, see the "Troubleshooting Guide" as well as the gun control Operating instructions!
Start-up

Adjusting powder output and powder cloud

The powder output is depending on the powder type, 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.

1. Switch on the control unit
   Powder gun sprays powder

2. Because the powder output is given by a superordinate control, so the conveying air, supplementary air and electrode rinsing air are to be adjusted by this control too.

3. Adjust the rinsing air quantity, so that the desired form of the powder cloud is not impaired

Switch on the control unit - Powder coating

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

1. Switch on the control unit

2. Adjust the high voltage Check by observing the LED (6).

Switch off the control unit

1. Switch off the control unit
   The adjustments for high voltage, rinsing air and powder output can be left as they are.

2. If working interruptions take place, such as lunch time, night etc. the main compressed air supply is to be interrupted

Clean the powder hose

If lengthy downtimes take place, the powder hose must be cleaned. Proceed as follows:

1. Strip the powder hose from the hose connection on the injector

2. Blow through the hose manually with a compressed air gun

3. Fit the powder hose again to the hose connection on the injector
Maintenance and cleaning

Note:
Regular and conscientious maintenance increases the operating life of the unit and ensures a longer, more constant coating quality!

Daily maintenance

1. Clean the gun, see chapter "Cleaning"

Weekly maintenance

1. Clean the gun, see chapter "Cleaning"
2. Check the grounding connections of the coating booth, the suspension devices of the work pieces, or the conveyor chain.

Cleaning

Cleaning the PG 1-R4 Quick Robot Gun

Frequent cleaning of the gun helps to guarantee the coating quality.

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

Daily:

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

Weekly:

2. Remove the powder hose from the connection
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 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

**Attention:**
Cleaning the PG 1-R4 Quick Robot Gun with the following solvents is not allowed:
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 at least 5 Kelvin above the ambient temperature, or cleaning places with technical ventilation are allowed!

### Cleaning the spray nozzles

**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**
Make sure that the threaded sleeve is always tightened well. If the spray nozzle is fitted loosely, there is danger of flash-over of the gun high voltage, which leads inevitably to damaging the gun!

**Weekly:**
- Remove the spray nozzles and clean inside with compressed air. If sintering should have formed, then this is to be removed.

**Monthly:**
- Check the spray nozzles for wear
The flat jet nozzle is to be replaced, 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
Dismantling the gun

The gun should only be dismantled when this is made necessary by a defect or contamination. It is only to be dismantled so far, as the desired part is accessible.

Attention:
The control unit must be switched off and the gun plug detached, before dismantling the gun!
If the cascade is defective or the shaft is broken, send the complete shaft to an authorized ITW Gema service center!

Removing gun from the robot arm

1. Allan key 4 mm
2. Allan key 1,5 mm
3. NW 8/9
4. NW 20/22
Dismantling the gun (cont.)

The gun should only be dismantled when this is made necessary by a defect or contamination. It is only to be dismantled so far, as the desired part is accessible!

Before dismantling the gun, switch off its control unit. The high voltage cascade should not be removed, since it was installed in a special procedure. If it should be defective or the shaft broken, the complete shaft (3) is to be sent to an authorized ITW Gema service center!
1. Remove the gun from the robot arm (see above)
2. Remove the spray nozzle
3. Unscrew plastic screw (7) and remove the end plate (5)
4. Remove the support (8) with flange (9) and powder tube (19) from the shaft (3).
5. Check the O-ring (21) for damages and replace it, if necessary.
6. Pull out the powder tube (19) from the support (8)

**Assembling the gun**

The assembly of the gun is carried out in the reverse order to that shown above.

- The assembly of the gun is carried out in the reverse order to that shown above.
- Careful handling must be observed!
- If the gun cable connection can not be inserted properly without applying force, disassemble the gun again and reassemble it correctly.
- The powder hose connection should always be screwed in up to the stop.

After assembly check that:

- the gun cable connection sits correctly

**The locking grubscrew must be possible to be screwed in completely.**

- there are no gaps at the joins.
Replacing parts

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

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

### General information

<table>
<thead>
<tr>
<th>Fault</th>
<th>Causes</th>
<th>Troubleshooting</th>
</tr>
</thead>
<tbody>
<tr>
<td>High voltage display shows no value, although the control unit is switched on</td>
<td>Gun not connected</td>
<td>Connect the gun</td>
</tr>
<tr>
<td></td>
<td>Gun plug or gun cable defective</td>
<td>Replace corresponding part or send in for repair</td>
</tr>
<tr>
<td></td>
<td>High voltage part defective</td>
<td>Replace, send in for repair</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During coating, air flows out of the gun body</td>
<td>O-ring (21) defective or missing</td>
<td>Replace or insert</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED at the rear of the gun is not lit, although the gun sprays powder; powder does not adhere on the work piece</td>
<td>High voltage adjustment is set too low</td>
<td>Increase high voltage</td>
</tr>
<tr>
<td></td>
<td>Gun plug or gun cable defective</td>
<td>Replace corresponding part or send in for repair</td>
</tr>
<tr>
<td></td>
<td>High voltage cascade is defective</td>
<td>Send in the gun body for repair</td>
</tr>
<tr>
<td></td>
<td>Control circuit board (PCB) defective</td>
<td>Send for repair</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Powder does not adhere to object, although the high voltage is available, and the gun sprays powder</td>
<td>High voltage and current deactivated</td>
<td>Check the high voltage and current setting</td>
</tr>
<tr>
<td></td>
<td>High voltage cascade defective</td>
<td>Send in the gun for repair</td>
</tr>
<tr>
<td></td>
<td>Objects are not properly grounded</td>
<td>Check the grounding</td>
</tr>
</tbody>
</table>

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PG 1-R5 Quick Robot Gun

Troubleshooting • 31
<table>
<thead>
<tr>
<th>Fault</th>
<th>Causes</th>
<th>Troubleshooting</th>
</tr>
</thead>
<tbody>
<tr>
<td>The gun does not spray powder, although the control unit is switched on and the gun is triggered</td>
<td>Compressed air not present</td>
<td>Connect the equipment to the compressed air</td>
</tr>
<tr>
<td></td>
<td>Too little conveying air</td>
<td>Increase the powder output and/or total air volume on the control unit</td>
</tr>
<tr>
<td></td>
<td>Injector or nozzle on the injector, powder hose or powder gun clogged</td>
<td>Clean corresponding part</td>
</tr>
<tr>
<td></td>
<td>Insert sleeve in the injector worn or not inserted</td>
<td>Replace or insert</td>
</tr>
<tr>
<td></td>
<td>Nozzle in the injector is clogged</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Fluidizing not running</td>
<td>(see above)</td>
</tr>
<tr>
<td></td>
<td>No conveying air:</td>
<td>Replace the reducing valve</td>
</tr>
<tr>
<td></td>
<td>Reducing valve defective</td>
<td>Replace the solenoid valve</td>
</tr>
<tr>
<td></td>
<td>Solenoid valve defective</td>
<td>Send for repair</td>
</tr>
<tr>
<td></td>
<td>Front plate defective</td>
<td></td>
</tr>
</tbody>
</table>
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** PG 1-R4 Quick Robot 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 explosion protection will also be preserved that way. The use of spare parts from other manufacturers will invalidate the ITW Gema guarantee conditions!
# PG 1-R4 Quick Robot Gun - Spare Parts List

## Remarks

1. Only parts were included in the spare parts list, which can be replaced by the user himself without problems.

2. 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 is to be sent in for repair and check! The high voltage cascade was installed according to a special procedure and should be never removed therefore by the user.

3. If the powder gun cable is defective, it is to be completely sent in for repair!

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gun body complete - see next page</td>
<td>653 349</td>
</tr>
<tr>
<td>2</td>
<td>Powder hose connection</td>
<td>653 292#</td>
</tr>
<tr>
<td>3</td>
<td>Powder hose connection</td>
<td>653 306#</td>
</tr>
<tr>
<td>4</td>
<td>Clamping part</td>
<td>653 535</td>
</tr>
<tr>
<td>6</td>
<td>Hose connection D 9.5 mm - complete (incl. pos. 6.1)</td>
<td>653 527</td>
</tr>
<tr>
<td>6.1</td>
<td>O-ring D13.1x1.60 mm</td>
<td>600 326#</td>
</tr>
<tr>
<td>7</td>
<td>Gun cable 20 m</td>
<td>651 400</td>
</tr>
<tr>
<td>8</td>
<td>Rinsing air connection</td>
<td>653 284</td>
</tr>
<tr>
<td>10</td>
<td>Screw-in nipple M5-D6 mm</td>
<td>602 337</td>
</tr>
<tr>
<td>15</td>
<td>O-ring D13.1x1.60 mm</td>
<td>600 326#</td>
</tr>
<tr>
<td>16</td>
<td>O-ring D12.0x1.50 mm</td>
<td>602 345#</td>
</tr>
<tr>
<td>20</td>
<td>FSD 21 Flat jet nozzle - see next page</td>
<td>652 679#</td>
</tr>
<tr>
<td>21</td>
<td>Threaded sleeve - see also next page</td>
<td>328 774</td>
</tr>
<tr>
<td>30</td>
<td>Robot adapter</td>
<td>on demand</td>
</tr>
<tr>
<td>31</td>
<td>Cheese-head screw l-6kt M5x20 mm</td>
<td>222 950</td>
</tr>
<tr>
<td>32</td>
<td>Connecting flange</td>
<td>653 250</td>
</tr>
<tr>
<td>33</td>
<td>Nut M124X2 mm</td>
<td>653 268</td>
</tr>
<tr>
<td>34</td>
<td>Grubscrew M4x16 mm</td>
<td>600 342</td>
</tr>
</tbody>
</table>

* Please indicate length

# Wearing part
PG 1-R4 Quick Robot Gun - Spare Parts
## PG 1-R4 Quick Robot Gun - Gun body

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FSD 21 Flat jet nozzle</td>
<td>652 679#</td>
</tr>
<tr>
<td>2</td>
<td>Threaded sleeve</td>
<td>328 774</td>
</tr>
<tr>
<td>3</td>
<td>Shaft complete, incl.: Cascade, O-rings items 20 / 21 Polarity – (negative)</td>
<td>338 249</td>
</tr>
<tr>
<td>5</td>
<td>Cover</td>
<td>650 080</td>
</tr>
<tr>
<td>7</td>
<td>Plastic screw - M 8x35 mm</td>
<td>328 847</td>
</tr>
<tr>
<td>8</td>
<td>Support</td>
<td>650 064</td>
</tr>
<tr>
<td>8.1</td>
<td>Air tube</td>
<td>650 072</td>
</tr>
<tr>
<td>19</td>
<td>Powder tube</td>
<td>653 101#</td>
</tr>
<tr>
<td>20</td>
<td>O-ring - Ø 13.1x1.6 mm</td>
<td>600 326#</td>
</tr>
<tr>
<td>21</td>
<td>O-ring - Ø 6.1x1.6 mm</td>
<td>600 334#</td>
</tr>
<tr>
<td>28</td>
<td>Special extractor tool (for Item 19)</td>
<td>340 839</td>
</tr>
<tr>
<td>29</td>
<td>Brush for powder tube (for Item 19) - not shown</td>
<td>333 514</td>
</tr>
</tbody>
</table>

# Wearing part
# PG 1-R4 Quick Robot Gun - Gun cable

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Countersunk head screw - M2x4 mm</td>
<td>257 958</td>
</tr>
<tr>
<td>9</td>
<td>O-ring - Ø 10.82x1,78 mm</td>
<td>232 556#</td>
</tr>
<tr>
<td>17</td>
<td>O-ring Ø 7.65x1.78 mm</td>
<td>232 564#</td>
</tr>
<tr>
<td>18</td>
<td>Cover tube</td>
<td>332 925</td>
</tr>
<tr>
<td>19</td>
<td>Cheese-head screw M3x3 mm</td>
<td>230 430</td>
</tr>
<tr>
<td>21</td>
<td>Gland - PG07 with kink protection</td>
<td>208 426</td>
</tr>
<tr>
<td>22</td>
<td>Cable 4x0.50 mm² shielded</td>
<td>102 911*</td>
</tr>
</tbody>
</table>

* Please indicate length

# Wearing part

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* PG 1-R4 Quick Robot Gun - Gun cable
## PG 1-R4 Quick Robot Gun - SuperCorona

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Quantity</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SuperCorona - Set</td>
<td>on demand</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>SuperCorona ring</td>
<td></td>
<td>352 470#</td>
</tr>
<tr>
<td>3</td>
<td>Milled-head screw M4 x 8 mm</td>
<td></td>
<td>245 313</td>
</tr>
<tr>
<td>4</td>
<td>SuperCorona connection</td>
<td></td>
<td>352 748</td>
</tr>
</tbody>
</table>

# Wearing part

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**PG 1-R4 Quick Robot Gun - SuperCorona**