FPC03
Fresh powder control
Documentation FPC03 Fresh powder control

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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 FPC03 Fresh powder control.

These safety regulations must be read and understood before the FPC03 Fresh powder control 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 FPC03 Fresh powder control 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 FPC03 Fresh powder control 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 FPC03 Fresh powder control 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 FPC03 Fresh powder control 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 FPC03 Fresh powder control 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.

<table>
<thead>
<tr>
<th>Explosion protection</th>
<th>Protection type</th>
<th>Temperature class</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 0102 Ex II 3 D</td>
<td>IP54</td>
<td>T6 (zone 21)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T4 (zone 22)</td>
</tr>
</tbody>
</table>

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 fresh powder system may be switched on and operated only after exact reading of this manual. 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. Before opening the devices for repair, they must be disconnected from the mains!

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 cables between the control unit and the spray gun must be laid out in such a way that they 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! Do not smoke during powder coating!

12. As a general rule for all powder spraying installations, persons with pacemakers should never enter high voltage areas or areas with electromagnetic fields. Persons with pacemakers should not enter areas with powder spraying installations!

WARNING:
We advert 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. Only the spray gun should be used in zone 21.

GEMA electrostatic spraying equipment should only be operated by trained and authorized operating personnel. This applies to modifications to the electrical equipment, which should only be carried out by a specialist.

The shut-down procedures given in the operating instructions on all work concerning assembly, start-up, setting up, operation, modification of operating conditions and operating methods, maintenance, inspection and repair are to be observed as necessary.

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 GEMA electrostatic 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. The operator is under obligation to check the powder spraying equipment at least once every shift for signs of external damage, defects or changes (including the operating characteristics) which could influence safety and to report them immediately.

4. The operator is obliged to check that the powder spraying equipment is only operated when in satisfactory condition.

5. As far as is necessary, the operating firm must ensure that the operating personnel wear protective clothing (e.g. facemasks).

6. The operating firm must guarantee cleanliness and an overview of the workplace with suitable instructions and checks in and around the powder spraying equipment.

7. No safety devices should be dismantled or put out of operation. If the dismantling of a safety device for set-up, repair or servicing is necessary, reassembly of the safety devices must take place immediately after the maintenance or repair work is finished. 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.

8. Activities such as checking powder fluidization or checking the high-voltage spray gun etc. must be carried out when the powder spraying equipment is 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.

**Electrostatic charging**

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

**Grounding**

All electricity conducting parts and machinery found in the workplace (according to DIN VDE 0745, part 102) 1,5 meters either side and 2,5 meters around each booth opening, have to be grounded. The grounding resistance must amount to 1 MOhm. 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 GEMA 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 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 can be dangerous, if the instructions in this operating manual are not followed.
2. All electrostatic conductive parts within 5 meters of the coating area and in particular the work pieces, must be grounded.
3. The floor in the coating area must be electrically conductive (normal concrete generally is conductive).
4. The operating personnel must wear electrically conductive footwear (e.g. leather soles).
5. The operating personnel should hold the gun in the bare hand. If gloves are worn, they must be electrically conductive.
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 stops, the powder coating device must switch off too.

9. The grounding of all electricity conducting devices (e.g. hooks, conveyor chains) must be checked weekly. The grounding resistance must amount to 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 ignition endangered area. The ignition protection must not be compromised.

16. Conditions leading to dangerous levels of dust concentration in the powder spraying booths or in the powder spraying areas must be avoided. A sufficient technical ventilation must be 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 rules and regulations

Observe the following list of relevant rules and regulations:

### Guidelines and regulations, German professional association

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGV A1</td>
<td>General regulations</td>
</tr>
<tr>
<td>BGV A2</td>
<td>Electrical equipment and material</td>
</tr>
<tr>
<td>BGI 764</td>
<td>Electrostatic coating</td>
</tr>
<tr>
<td>BGR 132</td>
<td>Guidelines for the avoidance of the dangers of ignition due to electrostatic charging (Guideline “Static Electricity”)</td>
</tr>
<tr>
<td>VDMA 24371</td>
<td>Guidelines for electrostatic coating with synthetic powder ¹</td>
</tr>
<tr>
<td></td>
<td>- Part 1 General requirements</td>
</tr>
<tr>
<td></td>
<td>- Part 2 Examples of use</td>
</tr>
</tbody>
</table>

### Leaflets

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZH 1/310</td>
<td>Leaflet for the use of tools in locations where there is danger of explosion ¹</td>
</tr>
</tbody>
</table>

### EN European standards

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RL94/9/EG</td>
<td>The approximation of the laws of the Member States relating to apparatus and safety systems for their intended use in potentially explosive atmospheres</td>
</tr>
<tr>
<td>EN 292-1</td>
<td>Machine safety ²</td>
</tr>
<tr>
<td>EN 292-2</td>
<td>Machine safety ²</td>
</tr>
<tr>
<td>EN 50 014 to EN 50 020, identical: DIN VDE 0170/0171</td>
<td>Electrical equipment for locations where there is danger of explosion ³</td>
</tr>
<tr>
<td>EN 50,050</td>
<td>Electrical apparatus for potentially explosive atmospheres - Electrostatic hand-held spraying equipment ²</td>
</tr>
<tr>
<td>EN 50 053 Teil 2</td>
<td>Requirements for the selection, installation and use of electrostatic spraying equipment for flammable materials - Manual electrostatic powder spray guns ²</td>
</tr>
<tr>
<td>EN 50 177</td>
<td>Stationary electrostatic spraying equipment for flammable coating powder ²</td>
</tr>
<tr>
<td>PR EN 12981</td>
<td>Coating plants - Spray booths for application of organic powder coating material - Safety requirements</td>
</tr>
<tr>
<td>EN 60529, identical: DIN 40050</td>
<td>IP protection types; contact, foreign bodies and water protection for electrical equipment ²</td>
</tr>
<tr>
<td>EN 60 204 identical: DIN VDE 0113</td>
<td>VDE regulations for the setting up of high-voltage electrical machine tools and processing machines with nominal voltages up to 1000 V ³</td>
</tr>
</tbody>
</table>
**VDE (Association of German Engineers) Regulations**

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

*Sources:

1) Carl Heymanns Verlag KG, Luxemburger Strasse 449, 50667 Köln 41, or from the appropriate employers association
2) Beuth Verlag GmbH, Burgrafenstrasse 4, 10115 Berlin 30
3) General secretariat, Rue Bréderode 2, B-1000 Brussels, or the appropriate national committee
4) VDE Verlag GmbH, Bismarckstrasse 33, 10115 Berlin 12

**Special security measures**

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

General information

These operating manual contains all important information which you require for the working with the FPC03 Fresh powder control-en.doc. 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 - reciprocators, booths, powder gun controls, powder guns etc. - you will find in the corresponding enclosed documentations.
Description of function

Scope of application

The FPC03 Fresh powder control is designed exclusively for the controlling of the FPP01 Powder pump. Any other use is considered as non-conform. Any damage resulting from its misuse is not the responsibility of the manufacturer, the entire risk is carried by the customer alone.

For a better understanding of the relationships in powder coating, it is recommended to read completely the operating instructions of other components, so as to be familiar with their functions also.

Layout and function

The FPC03 Fresh powder control executes the controlling functions for the fresh powder pump, the vibrator and the powder fluidization during operation.

The FPC03 Fresh powder control is handled by two illuminated switches on the front side of the control unit.
The illuminated switch 0/1 (on/off) serves for switching on or off the control unit.

The illuminated switch **Manual/Automatic** serves for the definition of the operating modes. In the case of **Manual** operation mode, the illuminated push button shines yellow, the fresh powder pump, the vibrator and the fluidization of the powder is released manually.

In the case of **Automatic** operation mode, the illuminated push button flashes yellow and an external, superordinate control unit takes over the control functions by the plug 2.3 (Ext. Control) on the rear wall.

If no external, superordinate control is connected, the protecting cap is to be screwed on the plug 2.3 (Ext. control).
Technical Data

FPC03 Fresh powder control

Electrical Data

| FPC03 Fresh powder control |  
|---------------------------|---|
| Nominal input voltage     | 90-264 V |
| Frequency                 | 47-440 Hz |
| Nominal output voltage    | max. 12V |
| Max. output current       | max. 1 A |
| Type of protection        | IP 54 |
| Temperature range         | 0°C - +40°C (+32°F - +104°F) |

Pneumatic Data

| FPC03 Fresh powder control |  
|---------------------------|---|
| Main compressed air input | G1/4" internal thread |
| Max. input pressure       | 10 bar / 145 psi |
| Min. input pressure       | 6 bar / 87 psi |
| Max. content of water in compressed air | 1,3 g/m³ |
| Max. content of oil vapor in compressed air | 0,1 mg/m³ |

Dimensions

| FPC03 Fresh powder control |  
|---------------------------|---|
| Width                     | 248 mm / 9.76 inches |
| Depth                     | 250 mm / 9.84 inches |
| Height                    | 174 mm / 6.85 inches |
| Weight                    | 5.2 kg / 11.5 pounds |
Start-up

Connections

The electrical and pneumatic connections are located on the rear wall of the FPC03 Fresh powder control. The start-up takes place by the following steps:

1. Connect the air hose for the compressed air supply from the compressed air network to the main connection 1.1 IN on the rear wall of the control unit - connection thread G 1/4

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

   2. Assure the grounding of the control unit (if necessary), use to this the grounding screw on the rear wall of the control unit

   3. Connect the pneumatic hose for compressed air for the pump and for the fluidizing air connection to the compressed air output 1.2 OUT
4. The connection 2.4 (Ext.Valve) serves for the transmission of the control signal to the external valve of the powder pump.

5. The connection 2.3 (Ext.Control) serves for the interconnection with an external, superordinate control unit (if available). This connection must be locked with the protection cap, if not used.

6. The connection 2.2 (Vibrator) serves for the supply/control of the vibrator.

7. The electrical supply is connected with the corresponding mains cable to the connection 2.1 (Mains connection).

---

**Function check**

The control unit is switched on with the main switch (illuminated switch 0/1). The operation mode is selected with the illuminated switch Manual/Automatic.

**Manual operating mode**

- The illuminated switch shines yellow continually.
- The powder pump, the vibrator and the powder fluidization are starting up.

**Automatic operating mode**

- The illuminated switch flashes yellow.
- The powder pump, the vibrator and the powder fluidization are starting up after receiving the external signal of the superordinate control (remote control).

---

**FPC03 - remote control**

The FPC03 Fresh powder control starts up after receiving the signal of the external, superordinate control (Automatic operation mode).

**External control**

<table>
<thead>
<tr>
<th>Contact</th>
<th>+ 24V switched</th>
<th>Level sensor (incl. retardation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>+24 V</td>
<td>GND</td>
</tr>
<tr>
<td>C</td>
<td>Signal</td>
<td>GND</td>
</tr>
</tbody>
</table>

*External control*
Please note with version C:
The connection with a retarded level sensor (order no. 373 575) re-
quires the corresponding connection cable (order no. 1000 687)!

The incoming signal from the level sensor has the following value:

<table>
<thead>
<tr>
<th>Plug 2.3</th>
<th>Powder hopper empty</th>
<th>Powder hopper full</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal on pin 4 (PE)</td>
<td>+24 V</td>
<td>0 V</td>
</tr>
</tbody>
</table>

**Function**

By dropping below the level, the equipment switches retarded after 3
seconds to "Transport mode". After reaching the level, the equipment
does convey still for 3 seconds. This prevents that the equipment con-
tinuously switches on and off.
# Troubleshooting guide

## Recovery of problems

<table>
<thead>
<tr>
<th>Problem / fault / malfunction</th>
<th>Cause</th>
<th>Measures / remedy</th>
</tr>
</thead>
</table>
| Power supply lamp not illuminated after switching on | Mains cable not connected  
|                                | Power pack defective                      | Connect the mains cable  
|                                | Vibrator motor defect                     | Replace the power pack  
|                                | Vibrator motor defect has released the fuse in the control unit | Replace the vibrator motor and the fuse |
| Vibration does not work       | Vibrator motor not connected              | Connect the cable                                      |
| Fluidizing does not operate   | No compressed air present                 | Assure the compressed air supply                       |
| Pump does not convey          | Solenoid pinch valve defective            | Replace the valve bobbin and/or the solenoid valve     |
|                               | Fluidizing air not connected              | Connect the fluidizing air                             |
|                               | Powder hose clogged                      | Clean the powder hose                                  |
| Pump does convey even if no external signal is present | Manual switch is pressed                   | Release the switch                                      |
|                               | No powder present                         |                                                        |
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** FPC03 Fresh powder control
  **Serial no.** 1234 5678
- **Order no.** 203 386, 1 piece, clamp - Ø 18/15 mm

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

All wear parts are marked with a #.

All dimensions of plastic hoses are given as external and internal diameters:

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

**ATTENTION:**
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!
# FPC03 Fresh powder control - electrical parts

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fuse - 500 mA</td>
<td>201 073</td>
</tr>
<tr>
<td>2</td>
<td>Fuse - 2 A</td>
<td>221 872</td>
</tr>
<tr>
<td>3</td>
<td>Electronic board - complete</td>
<td>1000 189</td>
</tr>
<tr>
<td>4</td>
<td>LED element - 24 V, yellow</td>
<td>1000 174</td>
</tr>
<tr>
<td>6</td>
<td>Fuse - 4 A</td>
<td>262 897</td>
</tr>
<tr>
<td>7</td>
<td>Power pack - complete</td>
<td>389 277</td>
</tr>
<tr>
<td>8</td>
<td>Connection socket (external valve)</td>
<td>1000 385</td>
</tr>
<tr>
<td>9</td>
<td>Connection plug (external control)</td>
<td>1000 384</td>
</tr>
<tr>
<td>9.1</td>
<td>Protection cap for connection plug</td>
<td>206 458</td>
</tr>
<tr>
<td>10</td>
<td>Connection socket (power supply)</td>
<td>1000 382</td>
</tr>
<tr>
<td>11</td>
<td>Connection plug (vibrator)</td>
<td>1000 383</td>
</tr>
</tbody>
</table>

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![FPC03 Fresh powder control - electronic board](image)

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FPC03 Fresh powder control - electronic board
### FPC03 Fresh powder control - pneumatic parts

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pressure regulating valve - DR.022-00, 0-3,5 bar</td>
<td>242 225</td>
</tr>
<tr>
<td>2</td>
<td>Pressure gauge - 1/8&quot;a, 0-4 bar</td>
<td>258 997</td>
</tr>
<tr>
<td>3</td>
<td>Filter pad</td>
<td>237 264</td>
</tr>
<tr>
<td>4</td>
<td>Solenoid valve - 1/4&quot;, NW 11,5-24VDC, complete</td>
<td>262 455</td>
</tr>
</tbody>
</table>

![FPC03 Fresh powder control - pneumatic parts](image-url)