OptiFeed PP05
Enamel powder pump

Translation of the original operating instructions
Documentation OptiFeed PP05 Enamel powder pump

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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 OptiFeed PP05 Enamel powder pump.

These safety regulations must be read and understood before the OptiFeed PP05 Enamel powder pump 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 OptiFeed PP05 Enamel powder pump 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 OptiFeed PP05 Enamel powder pump is to be used for other purposes or other substances outside of our guidelines then ITW Gema GmbH should be consulted.
3. Observance of the operating, service and maintenance instructions specified by the manufacturer is also part of conformity of use. The OptiFeed PP05 Enamel powder pump 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 OptiFeed PP05 Enamel powder pump 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 OptiFeed PP05 Enamel powder pump 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</td>
<td>IP54</td>
<td>T6</td>
</tr>
</tbody>
</table>

**Product specific security measures**

- The installation work, to be done by the customer, must be carried out according to local regulations
- It must be observed, that all components are grounded according to the local regulations, before start-up

**OptiFeed PP05 Enamel powder pump**

The OptiFeed PP05 Enamel powder pump is a constituent part of the system and is thus integrated into the safety system of the plant.

For the use outside of the safety concept, corresponding measures must be taken.

**Note:**
For further information see the more detailed ITW Gema Safety regulations!
About this manual

General information

This operating manual contains all the important information which you require for the working with the OptiFeed PP05 Enamel powder pump. 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. - should be referenced to their corresponding documents.

Software version

This document describes the operation of the OptiFeed PP05 Enamel powder pump, with software version starting from 2.01!
Function description

Field of application

**OptiFeed PP05 Enamel powder pump**

The OptiFeed PP05 Enamel powder pump is intended for conveying coating powder (also enamel powder). 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 OptiFeed PP05 Enamel powder pump is suitable both for conveying fresh powder to automatic coating plants, and for general conveying of coating powders from powder hoppers.
Structure and function

OptiFeed PP05 Enamel powder pump - structure

A  Suction side  3  Powder chamber with filter elements
B  Transport side  4  Pinch valve
1  Pneumatic system  5  Pressure regulator
2  Pump control unit  6  Connections

Powder hoses

On the suction side, a powder hose with Ø 12/18 mm is connected and on the transport side, a powder hose with Ø 16/23 mm.
OptiFeed PP05 Enamel powder pump - functioning

**Suction procedure**

In powder chamber 1, a vacuum (negative pressure) is produced. This vacuum aspirates the coating powder in the powder chamber. A fine-porous filter element (1) in the powder chamber separates the powder. The powder chamber is closed at the output side by a pinch valve (2).

**Conveying procedure**

The pinch valve (3) on the input side of the powder chamber 2 is closed, the pinch valve (4) on the output side is opened. The coating powder is pressed out of the powder chamber by overpressure, which is created with compressed air by the fine-porous filter element, and continued to convey.

The suction and the conveying procedure alternate between both powder chambers.
Basic functions

- Conveying of coating powders
- Receiving and processing of signals from the superordinated control unit (e.g. PLC)
- Controlling of a single phase vibrator motor
- Processing of signals from the LM02 Level sensor

Secondary functions

- Emptying of the powder hose - this prevents an unintended powder hose clogging (factory setting by miniature switch - number of pumping cycles without powder aspiration)
- Powder hose rinsing (two different programs) and cleaning of the filter elements - this can positively influence the color change procedure
- Maintenance interval monitoring - indicates an upcoming maintenance
- Keyboard lock - prevents an unintended, manual intervention
- Fluidization connection
- Connection for electric conveying air pressure monitoring

Note:
The functions can be controlled manually or by an external, superordinated control unit!
Technical data

### OptiFeed PP05 Enamel powder pump

#### Powder output (guide values)

<table>
<thead>
<tr>
<th>OptiFeed PP05 Enamel powder pump</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hose length up to 8 m</td>
<td>5 kg/min</td>
</tr>
<tr>
<td>Hose length 8-16 m</td>
<td>4 kg/min</td>
</tr>
<tr>
<td>Hose length 16-25 m</td>
<td>3.5 kg/min</td>
</tr>
</tbody>
</table>

#### Electrical data

<table>
<thead>
<tr>
<th>OptiFeed PP05 Enamel powder pump</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal input voltage (without vibrator operation)</td>
<td>24 VDC</td>
</tr>
<tr>
<td>Nominal input voltage (with vibrator operation)</td>
<td>110/230 VAC</td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Power</td>
<td>20 VA (without AUX)</td>
</tr>
<tr>
<td>Input power value AUX</td>
<td>100 VA</td>
</tr>
<tr>
<td>Protection type</td>
<td>IP54</td>
</tr>
<tr>
<td>Temperature range</td>
<td>10°C - 40°C (+32°F - +104°F)</td>
</tr>
<tr>
<td>Temperature class</td>
<td>T6</td>
</tr>
</tbody>
</table>

#### Pneumatic data

<table>
<thead>
<tr>
<th>OptiFeed PP05 Enamel powder pump</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressed air main connection</td>
<td>Quick release connection - 8 mm</td>
</tr>
<tr>
<td>Max. input pressure</td>
<td>8 bar</td>
</tr>
<tr>
<td>Min. input pressure</td>
<td>6 bar</td>
</tr>
<tr>
<td>Max. compressed air consumption</td>
<td>12 Nm³/h</td>
</tr>
<tr>
<td>Max. water vapor content of the compressed air</td>
<td>1.3 g/m³</td>
</tr>
<tr>
<td>Max. oil vapor content of the compressed air</td>
<td>0.1 mg/m³</td>
</tr>
</tbody>
</table>
## Dimensions

<table>
<thead>
<tr>
<th>OptiFeed PP05 Enamel powder pump</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>550 mm</td>
</tr>
<tr>
<td>Width</td>
<td>255 mm</td>
</tr>
<tr>
<td>Height</td>
<td>209 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>13.5 kg</td>
</tr>
</tbody>
</table>
Start-up and operation

Preparation for start-up

Basic conditions

By the start-up of the OptiFeed PP05 Enamel powder pump, the following basic conditions, which have an influence on the powder transport, must be considered:

- Length and height difference of the suction distance
- Length of the conveying distance
- Powder preparation and powder quality
- Spatial arrangement of the OptiFeed PP05 Enamel powder pump

Basic information

The adherence of the following principles leads to a successful start-up of the OptiFeed PP05 Enamel powder pump:

- The suction distance is to be kept as short as possible
- The conveying distance should also be as short as possible. If the powder hose can be arranged wavy in plump line, then this is to be preferred to the horizontal arrangement (flat on the floor)
- At the suction area, a homogeneous fluidization must be ensured, so that no air ducts (crater) can be formed
- Basically, the powder transport with the OptiFeed PP05 Enamel powder pump works with every powder type, which can be fluidized. If the powder is for example humid or contaminated with other materials, then the conveying can be negatively influenced or does not work at all
- A vertical arrangement of the OptiFeed PP05 Enamel powder pump is to prefer to the horizontal arrangement, if possible (suction from above/conveying downwards)
Connect the OptiFeed PP05 Enamel powder pump

The OptiFeed PP05 Enamel powder pump is supplied ready for use by the manufacturer. Only a few cables and hoses must be connected.

The start-up takes place, depending on the powder pump control unit, according to following steps:

1. Connect the powder hoses to the powder pump input and output

   Note: The conveying in direction to the electrical and pneumatic connections is adjusted by factory! The change of the conveying direction is described in the section "OptiFeed PP05 Enamel powder pump - characteristics!"

2. Connect the fluidization to the connection 1.2 (if necessary)
3. Connect the compressed air supply to the connection 1.1
4. Connect the pump operating voltage by Control/PLC 2.4 or Power IN 2.1
5. If vibration is needed, connect the vibrator to the connection AUX 2.2 in conjunction with connection Power IN 2.1

   Note: If a vibration motor is used on the AUX 2.2 connection, the power supply is always to be realized by the Power IN 2.1 connection! Optionally, a control can still take place by the Control/PLC 2.4 connection!

6. Connect the level sensor (if necessary)

Attention: Not used connections are to be locked with the provided protection caps, so that no powder can attain to the electrical connections! In addition, make sure that not used pneumatic connections are also to be locked hermetically (if the fluidizing air is not used)! The closing is available by distribution, if the powder pump is delivered completely!
OptiFeed PP05 Enamel powder pump - connections

Pin assignment

Power IN 2.1 connection
1 Neutral conductor N
2 Phase (100-240 VAC) P
3 Input "System" (100-240 VAC)
PE Ground PE

Connection AUX 2.2
1 Neutral conductor N
2 Vibration motor
3 Not used
PE Ground PE

Connection Level Sensor 2.3
1 Ground
2 +24 VDC Level sensor
3 Signal (inverted)
PE Ground PE

Connection Control/PLC 2.4
1 +24 VDC
2 Pumping (see chapter "Special functions")
3 Rinsing
4 +24 VDC output (max. loading 100 mA)
5 Keyboard lock
6 Ground
PE Ground PE
OptiFeed PP05 Enamel powder pump - start-up

Connection and configuration

The start-up of the OptiFeed PP05 Enamel powder pump takes place according to following instructions:

1. Connect the compressed air supply (6-8 bar)
2. Connect the power supply 24 VDC (110-230 VAC with vibrator operation)
3. Ensure the grounding
4. Switch on the OptiFeed PP05 Enamel powder pump
5. Check the pump control unit configuration (see therefore "Functional check and operation")
6. Adapt the adjusting parameters for suction procedure, suction distance and height (see also chapter "Setting the suction and conveying parameters")
7. Check the air supply for fluidization in the suction area
8. Start the pump procedure by pressing the Pump key
9. Optimize the adjusting parameters for the suction and conveying procedure

Note:
It is recommended, to observe the pressure gauges of the pressure regulators. The displays should be in the green range!
The suction vacuum can be adjusted with more or less powder, the conveying air with more or less conveying air!

Powder fluidization

The powder obtains a fluid-like consistency, so that a conveying can take place. This occurs by blowing air into the powder (fluidization). The fluidization takes place in a fluidized powder hopper, or locally around a suction lance, which aspirates the powder from a vibrated container.

Note:
For a better understanding of the interrelationships in powder coating, it is recommended to read completely the operating instructions of the other components, so as to be familiar with their functions too!
Connection possibilities and controls

Connection by the Control/PLC 2.4 connector

The OptiFeed PP05 Enamel powder pump is supplied with an operating voltage of 24 VDC by the Control/PLC 2.4 connector. This provides an opportunity, if no vibrator motor must be connected to the AUX 2.2 connector, since for its operation, the mains voltage is missing. Optional connections are specified in italic.

<table>
<thead>
<tr>
<th>Control/PLC</th>
<th>OptiFeed PP05 Enamel powder pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>+24 VDC on connection <strong>Pump</strong> of the Control/PLC 2.4 input</td>
<td>Pumping</td>
</tr>
<tr>
<td>+24 VDC on connection <strong>Rinsing</strong> of the Control/PLC 2.4 input</td>
<td>Powder hose rinsing</td>
</tr>
<tr>
<td>+24 VDC on connection <strong>Keyboard lock</strong> of the Control/PLC 2.4 input</td>
<td>Local operation not allowed</td>
</tr>
</tbody>
</table>

**Note:**
If the power supply takes place by the Control/PLC 2.4 connection, no vibration motor voltage is available on the AUX 2.2 connection!

Power IN 2.1 connection

If the OptiFeed PP05 Enamel powder pump has to control a vibration motor, the connection by **Power IN 2.1** is mandatory, since a mains voltage is needed. The conveying can also be activated by the **Power IN 2.1** connection, by applying a mains voltage to the **System** connection of **Power IN 2.1**. Further functions are available by the Control/PLC 2.4 connection. Optional connections are specified in italic.
Control

<table>
<thead>
<tr>
<th>OptiFeed PP05 Enamel powder pump</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains voltage on the System connection of Power IN 2.1 input</td>
<td>Pumping</td>
</tr>
<tr>
<td>+24 VDC on connection Pump of the Control/PLC 2.4 input</td>
<td>Pumping</td>
</tr>
<tr>
<td>+24 VDC on connection Rinsing of the Control/PLC 2.4 input</td>
<td>Powder hose rinsing</td>
</tr>
<tr>
<td>+24 VDC on connection Keyboard lock of the Control/PLC 2.4 input</td>
<td>Local operation not allowed</td>
</tr>
</tbody>
</table>

Note:
If a vibrator is connected to the powder pump, the mains connection by Power IN 2.1 is necessary!

Connection with a connected level sensor

By connecting a level sensor on Level Sensor 2.3, the powder container level can be controlled with the powder pump.

If a level sensor is connected, a wake time can be activated/deactivated in the powder pump control unit. This wake time effects the after-conveying for 3 secs. after the achievement of the sensor switching point. This prevents the permanent switching on and off of the powder pump.

Optional connections are specified in italic.

Control with level sensor and Control/PLC 2.4 or Power IN 2.1

<table>
<thead>
<tr>
<th>OptiFeed PP05 Enamel powder pump</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LM02 Level sensor signal by Level Sensor 2.3 connection</td>
<td>Pumping</td>
</tr>
<tr>
<td>Mains voltage on System connection of the Power IN 2.1 input</td>
<td>Pumping</td>
</tr>
<tr>
<td>+24 VDC on connection Pump of the Control/PLC 2.4 input</td>
<td>Pumping</td>
</tr>
<tr>
<td>+24 VDC on connection Rinsing of the Control/PLC 2.4 input</td>
<td>Powder hose rinsing</td>
</tr>
<tr>
<td>+24 VDC on connection Keyboard lock of the Control/PLC 2.4 input</td>
<td>Local operation not allowed</td>
</tr>
</tbody>
</table>
**Level sensor connection cable**

A level sensor connection cable is optionally available (see the "Pump control unit" spare parts list).

<table>
<thead>
<tr>
<th>Pin number</th>
<th>Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
</tr>
<tr>
<td>2</td>
<td>24 VDC</td>
</tr>
<tr>
<td>3</td>
<td>Signal</td>
</tr>
<tr>
<td>PE</td>
<td>Shield</td>
</tr>
</tbody>
</table>

**OptiFeed PP05 Enamel powder pump - operating elements**

**LEDs and input keys**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>ON display</td>
</tr>
<tr>
<td>L3</td>
<td>Keyboard lock display</td>
</tr>
<tr>
<td>L4</td>
<td>Rinsing display</td>
</tr>
<tr>
<td>L5</td>
<td>Pump display</td>
</tr>
<tr>
<td>T1</td>
<td>ON key</td>
</tr>
<tr>
<td>T2</td>
<td>OFF key</td>
</tr>
<tr>
<td>T3</td>
<td>Rinsing/suction direction key</td>
</tr>
<tr>
<td>T4</td>
<td>Rinsing key</td>
</tr>
<tr>
<td>T5</td>
<td>Pump key</td>
</tr>
</tbody>
</table>
OptiFeed PP05 Enamel powder pump - characteristics

Conveying direction

The conveying direction of the OptiFeed PP05 Enamel powder pump is selected by factory in opposite direction of the connections (see picture). If the powder pump has to convey in the other direction (installation of the pump), the conveying direction can be changed.

To change the conveying direction, keep pressed the Pump key for 5 secs. when the equipment is switched on. After 5 secs. the Pump display blinks briefly.

By restarting the equipment, the new configuration is recognized.

Note:
By vertical position of the powder pump, the conveying direction must be set as adjusted by factory (suction side above/transport side below)!

Powder hose emptying/after-conveying

The after-conveying avoids powder accumulations and blockages in the powder hose. If the after-conveying is activated, after terminating the pump procedure, a few predefined pumping cycles will be executed without aspirating powder (recommended for powder tube lengths of over 2 m). The powder hose will be emptied in this way, and blockages will be avoided. The after-conveying is activated by factory.

The after-conveying can be deactivated when using tube lengths under 2 m, so that little containers cannot be filled over their target level.

Deactivate the after-conveying by pressing the T3 key (rinsing/suction direction) for 5 secs. when the equipment is switched on. After 5 secs. the LED L3 blinks briefly.

By restarting the equipment, the new configuration is recognized.

Powder hose rinsing

The powder hose rinsing allows the cleaning of the powder hoses and the filter elements in the powder pump. If color changes take place, rinsing must be done in conveying and in suction direction.

**Manual rinsing for color change preparation**

Rinsing in conveying direction is activated by pressing the T4 key.

Rinsing in suction direction is activated by pressing the T3 key.

**Automatic rinsing for color change preparation**

By activating the automatic rinsing function by an ext. control unit (Control/PLC), the suction side and the transport side are alternating rinsed automatically.

**Attention:**
Large dust formation possible!
Automatic rinsing for color change preparation

By activating the automatic rinsing function by an ext. control unit (Control/PLC), the powder pump is rinsed automatically. Two rinsing programs are available:

- Rinsing program 1 (rinsing preset by factory of both powder chambers with an external valve or with a compressed air gun)
- Rinsing program 2 (configurable rinsing in suction and conveying direction). The activation and deactivation takes place by pressing the T3, T4 and T5 keys at the same time for 5 secs. The LEDs L3 and L5 blink briefly.

Attention:
Large dust formation possible!

Change the powder hose rinsing direction

Change the powder hose rinsing by pressing the T4 key (rinsing) for 5 secs. when the equipment is switched on. After 5 secs. the LED L4 blinks briefly.

By restarting the equipment, the new configuration is recognized.

LM02 Level sensor - delay

When connecting the LM02 Level sensor, the internal delay in the pump control unit can be deactivated.

The level sensor delay effects, that the conveying procedure does not switch on and off continuously after the achievement of the level sensor switching point. Therefore the conveying works a little longer, so that the sensor level will be exceeded.

Deactivate the delay by pressing the T4 and T5 keys at the same time for 5 secs. when the equipment is switched on. After 5 secs. the ON display blinks briefly.

By restarting the equipment, the new configuration is displayed.

Maintenance interval monitoring

In order to offer an assistance to the user, the OptiFeed PP05 Enamel powder pump indicates an upcoming maintenance. By stopping the pumping procedure, blinking LEDs (L1, L3, L4, L5) indicate an upcoming maintenance. The function of the OptiFeed PP05 Enamel powder pump is not affected thereby!

Reset of the maintenance interval monitoring

After the maintenance has been carried out, the maintenance interval monitoring is reset by pressing the T3 and T4 keys at the same time for 5 secs. After 5 secs. the ON display blinks briefly.
Functional check and operation

**Note:**
When assembly or a first start-up takes place, it is recommended to carry out the function check without powder!

**Power supply by Power IN 2.1 connection (110-230 VAC)**

Switch on the OptiFeed PP05 Enamel powder pump by pressing the **ON** key, the LED of the **ON** key illuminates. The OptiFeed PP05 Enamel powder pump is ready for operation.

**Power supply by Control/PLC 2.4 with occupied Power IN 2.1 connection (24 VDC)**

The OptiFeed PP05 Enamel powder pump operating voltage is provided and switched on by the external control unit. Herewith, the equipment is switched on by a present operating voltage by this external connection. The illuminated LED on the **ON** key indicates that the OptiFeed PP05 Enamel powder pump is ready for operation.

**Attention:**
If a vibrator is connected, the equipment main switch must be switched on and the Power IN 2.1 connection must be occupied!

**Note:**
By applying the power supply on Control/PLC 2.4 or operating the power switch with connected power supply on Power IN 2.1, depending upon the configuration of the equipment, the LED L1, L3, L4 and L5 illuminate for 1 sec!
More detailed information is found in section "Connection possibilities and controls"!

**Manual switching on and off the conveying procedure on the pump control unit**

By pressing the **Pump** key, the conveying procedure will be started in the predefined conveying direction (for changing the conveying direction, see "OptiFeed PP05 Enamel powder pump - characteristics"). During the conveying procedure, the **Pump** LED illuminates permanently.

By pressing the **Pump** key again, the conveying procedure will be terminated. If the after-conveying is activated, the hose is emptied in going-off direction of the pump (see also section "Special functions"). The **Pump** LED blinks during the after-conveying, then it expires.
Manual switching on and off the rinsing procedure on the pump control unit

By pressing the **Rinsing** key, the rinsing procedure will be started.

By manually rinsing, the **Rinsing** key LED illuminates during the rinsing procedure.

The procedure is terminated by pressing the **Rinsing** key again. The **Rinsing** LED expires.

**Note:**
If the "Pumping" or "Rinsing" functions were activated locally on the equipment, the rinsing procedure is not affected by external signals (switching off, switching functions etc.)!

External switching on and off the conveying procedure

By external control of the pumping procedure, the **Pump** display and the **Keyboard lock** display illuminate, this indicates an external operation.

By switching off the external **Pumping** signal, the conveying procedure is terminated and the hose is emptied in going-off direction of the pump, if the after-conveying is activated (see also section "Special functions").

The **Pump** LED blinks during the after-conveying, then it expires. The conveying procedure can also be terminated by pressing the **Pump** key.

**Note:**
The after-conveying time is preset by factory! Therewith, it will be ensured that the powder hoses are emptied. The after-conveying time can be switched off when conveying distances are short, if the conveying distances are long, the after-conveying time can be extended. For further information, see in section "OptiFeed PP05 Enamel powder pump - characteristics"!

External switching on and off the rinsing procedure

The rinsing procedure is started by the external **Rinsing** command. The **Rinsing** and **Keyboard lock** LEDs (external control) are illuminated during the rinsing procedure.

The procedure is terminated when the **Rinsing** signal is ending. The **Rinsing** LED expires.

The rinsing procedure can also be terminated by pressing the **Rinsing** key.

**Note:**
The rinsing procedure is intended for the preparation of a manual cleaning! In addition, the filter elements will be cleaned!
Note:
If the rinsing procedure - released by an external signal - is inter-
rupted with the "Pump" or "Rinsing key", the "Keyboard lock" LED
illuminates until the corresponding external signal changes its con-
dition! Only then, another local or external command can be ac-
cepted!

Note:
In case of a simultaneous apply of the external signals "Pumping”
and “Cleaning”, a pumping in the opposite direction (back-pumping)
takes place!
The blowing off direction can be adjusted by parameterization to the
reverse pumping direction!

Operation with level sensor
The LM02 Level sensor is connected by default with an internal delay of
the pump control unit. This delay can be deactivated (see section "LM02
Level sensor - delay"). During the delay time, the Pumping and Rinsing
LEDs are blinking simultaneously.

External control - summary

| "Pumping", "Level sensor" or  | "Rinsing" input | Function   |
| "System" input                |                  |           |
| 0                             | 0                | 0         |
| 1                             | 0                | Pumping   |
| 0                             | 1                | Rinsing   |
| 1                             | 1                | Back-pumping |

OptiFeed PP05 Enamel powder pump - shutdown
Switch off the OptiFeed PP05 Enamel powder pump by pressing the OFF
key, or by switching off on the external control unit. The LED on the ON
key expires.
The compressed air supply to the powder pump must also be interrupted!
Setting the suction and conveying parameters

The parameterization of the OptiFeed PP05 Enamel powder pump takes place with two pressure regulators (CONV. AIR and VACUUM). The following parameters can be set with the pressure regulators:

- Suction vacuum for the suction procedure
- Conveying air for the conveying procedure

Setting the suction vacuum (VACUUM)

The desired suction vacuum can be set by adjusting the VACUUM pressure regulator. The presetting by factory is 3 bar. Here are some recommended guide values:

<table>
<thead>
<tr>
<th>Setting (bar)</th>
<th>Height difference (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0-1</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Setting the conveying air (CONV. AIR)

The conveying air can be set by adjusting the CONV. AIR pressure regulator. The presetting by factory is 3 bar.

Recommendation:
- Do not fall below 2 bar, this can lead to cloggings
- Do not exceed 5 bar, if possible

<table>
<thead>
<tr>
<th>Setting (bar)</th>
<th>Hose length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
<td>up to 2</td>
</tr>
<tr>
<td>3.0</td>
<td>2-8</td>
</tr>
<tr>
<td>4.0</td>
<td>8-16</td>
</tr>
<tr>
<td>5.0</td>
<td>from 16</td>
</tr>
</tbody>
</table>

Guide values for the conveying adjustment

<table>
<thead>
<tr>
<th>Option</th>
<th>Suction distance</th>
<th>Conveying distance</th>
<th>Suction vacuum (VACUUM)</th>
<th>Conveying air (CONV. AIR)</th>
<th>Powder hose emptying activated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 m</td>
<td>5 m</td>
<td>2 bar</td>
<td>3 bar</td>
<td>yes, recommended</td>
</tr>
<tr>
<td>2</td>
<td>2 m</td>
<td>25 m</td>
<td>2 bar</td>
<td>5 bar</td>
<td>yes, recommended</td>
</tr>
<tr>
<td>3</td>
<td>6 m</td>
<td>5 m</td>
<td>4 bar</td>
<td>3 bar</td>
<td>yes, recommended</td>
</tr>
<tr>
<td>4</td>
<td>6 m</td>
<td>25 m</td>
<td>4 bar</td>
<td>5 bar</td>
<td>yes, recommended</td>
</tr>
<tr>
<td>5</td>
<td>2 m</td>
<td>2 m</td>
<td>2 bar</td>
<td>2 bar</td>
<td>not necessary</td>
</tr>
</tbody>
</table>
Procedure monitoring (CHECK)

The **CHECK** pressure gauge enables the procedure monitoring. The indicated value remains stable, if the procedures proceed perfectly. If the powder hose tends to clogging, then the pressure increases noticeably!

---

**Note:**
By correct functioning, i.e. the OptiFeed PP05 Enamel powder pump is normally supplied with powder, a pressure peak between 0.3-0.8 bar should be generated!
On pumping process, the pressure may not exceed over 1 bar!
**Special functions**

**Internal settings of the pump control unit**

**Miniature switch (DIP switch)**

The setting values for **pump frequency** and **number of cycles** of the after-conveying can be changed with two miniature switches (DIP switches) within the given ranges.

**Setting the pump frequency (both conveying tubes)**

The pump control unit must be opened for this adjustment.

<table>
<thead>
<tr>
<th>Miniature switch A</th>
<th>Frequency (Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.6</td>
</tr>
<tr>
<td>1</td>
<td>1.0</td>
</tr>
</tbody>
</table>

The factory settings are printed in **bold**

**Setting the after-conveying in cycles (emptying the going-off powder hose)**

The pump control unit must be opened for this adjustment.

<table>
<thead>
<tr>
<th>Miniature switch A</th>
<th>Miniature switch B</th>
<th>Cycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>16</td>
</tr>
</tbody>
</table>

The factory settings are printed in **bold**
**Powder hose emptying before powder supply**

An external starting impulse permits a powder hose emptying before the powder supply starts. When the signal is ending, the pump stops without overtravel cycle.

**Timing-Diagram - Control/PLC 2.4 connection**

[Diagram showing pumping and powder hose emptying in cycles]

**Keyboard lock**

If the keyboard lock is activated by an external control unit, the **Remote** display illuminates constantly. No local operation is possible (not the shutdown of the current pumping or rinsing procedure either).

The keyboard lock is released by applying 24 VDC on pin 5 of **Control/PLC 2.4**.
Cleaning and maintenance

Note:
Regular and conscientious maintenance increases the service life of the OptiFeed PP05 Enamel powder pump and ensures a longer, more constant coating quality! The parts, which are to be replaced during maintenance work, are available as spare parts. These parts will be found in the corresponding spare parts list!

Cleaning the powder pump (color change)

For the preparation of a color change, the pump has to be rinsed in conveying direction and in suction direction. As described, the rinsing procedure can be started and stopped manually or externally.

Maintenance of the powder pump

The OptiFeed PP05 Enamel powder pump is designed in such a way, that only a minimum maintenance must be carried out.

Daily maintenance

Clean the powder pump with a dry cloth and check the connection points of the powder hoses. Replace the powder hoses, if necessary.

Weekly maintenance

Rinse the powder pump in conveying direction and in suction direction by using the rinsing program. Therewith, the filter elements are cleaned and possible, unintended powder deposits in the powder pump and in the powder hoses are avoided.
OptiFeed PP05 Enamel powder pump - maintenance plan

The Pinch valves of the OptiFeed PP05 Enamel powder pump are subject to a maintenance plan.

Attention:
A worn pinch valve hose, which becomes powder permeable, can damage the air valves!

Filter elements

The service life of the filter elements depends on the service duration, the powder quality and the quality of the air supply. Basically, it is recommended to replace also the filter elements by changing the pinch valves.

Maintenance according to maintenance interval monitoring

The OptiFeed PP05 Enamel powder pump indicates an upcoming maintenance after approx. 1900 h of operating time. As guide value, following service durations are applied:
- by 1 shift operation - after 360 days (continuous operation)
- by 3 shift operation - after 120 days (continuous operation)

Maintenance set

The wear parts to be replaced during the PP05 Enamel powder pump maintenance are available as maintenance set (see the spare parts list). This set contains 2 filter elements, 4 O-rings (Ø 30 mm), 4 O-rings (Ø 42 mm) and 4 pinch valve hoses.
Changing the filter elements

Required spare parts - 2 filter elements 40/30

1. 
2. 
3. loosen/turn
4. 
5. Activate for 3 secs.
   (rinsing procedure)
6. 

Note:
The assembly takes place in reverse order!

Changing the pinch valves

Required spare parts - 4 pinch valve hoses NW15

1. 
2. 

OptiFeed PP05 Enamel powder pump

Cleaning and maintenance ● 33
3. Cleaning and maintenance OptiFeed PP05 Enamel powder pump

4. Replace

5. Soapy water

6. Tighten the screws evenly on both sides!

7. PTFE tape

8. Replace

9. Information

Tighten the screws evenly on both sides!
## Troubleshooting

### General information

<table>
<thead>
<tr>
<th>Error</th>
<th>Causes</th>
<th>Troubleshooting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display <strong>Ready for use</strong> on the pump control unit does not illuminate</td>
<td>Operating voltage is missing</td>
<td>Check the power supply (110-240 VAC on connector 2.1 or +24 VDC on PIN 1 of connector 2.4) Replace the defective fuse</td>
</tr>
<tr>
<td>Enamel powder pump does not convey, display <strong>Pumping</strong> does not illuminate</td>
<td>Operating signal <strong>Pumping on</strong> is missing</td>
<td>Check the control signal (check the power supply (+24 VDC on PIN 2 of connector 2.4 or 110-240 VAC on System input of connector 2.1))</td>
</tr>
<tr>
<td>Enamel powder pump does not convey, display <strong>Pumping</strong> illuminates</td>
<td>If the LEDs on the valve plugs do not illuminate, the pump control unit is defective</td>
<td>Replace the pump control unit</td>
</tr>
<tr>
<td>Enamel powder pump does not convey, display <strong>Pumping</strong> illuminates</td>
<td>If the LEDs on the valve plugs illuminate, the valve which nevertheless does not switch, is defectively</td>
<td>Replace the defective valve</td>
</tr>
<tr>
<td>Error</td>
<td>Causes</td>
<td>Troubleshooting</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>---------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Enamel powder pump does not convey</td>
<td>Compressed air supply failed or pressure too low</td>
<td>Check the compressed air source (ensure an air pressure of 6-8 bar)</td>
</tr>
<tr>
<td></td>
<td>Fluidization in the suction in zone does work</td>
<td>Ensure the fluidization</td>
</tr>
<tr>
<td></td>
<td>Conveying hose is clogged</td>
<td>Change the suction direction, empty the powder hose until 6 m length (press the T5 key for 5 secs. and LED L5 blinks) - reset is identical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Empty the powder hose over 6 m length with compressed air or manually (Attention - powder output in suction direction!)</td>
</tr>
<tr>
<td></td>
<td>Suction hose is clogged</td>
<td>Run the rinsing program in conveying and in suction direction (Attention - powder output in suction direction!)</td>
</tr>
<tr>
<td></td>
<td>Suction line is clogged</td>
<td>Check the suction line, clean, ensure sealed transitions</td>
</tr>
<tr>
<td></td>
<td>Service life of the pinch valve runs off (defective)</td>
<td>Change the pinch valve, check the pneumatic system for defects and replace, if necessary</td>
</tr>
<tr>
<td>Error</td>
<td>Causes</td>
<td>Troubleshooting</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Enamel powder pump conveys irregularly or too little powder</td>
<td>Scratch development in the powder container</td>
<td>Prevent scratch development by better fluidization or vibration, if possible</td>
</tr>
<tr>
<td></td>
<td>Filter elements tend to clogging</td>
<td>Run the rinsing program in conveying and in suction direction, replace the filter elements</td>
</tr>
<tr>
<td></td>
<td>Suction vacuum set incorrectly</td>
<td>Set correctly the suction vacuum (see &quot;Setting the suction and conveying parameters&quot;)</td>
</tr>
<tr>
<td></td>
<td>Conveying air set incorrectly</td>
<td>Set correctly the conveying air (see &quot;Setting the suction and conveying parameters&quot;)</td>
</tr>
<tr>
<td></td>
<td>Powder hoses tend to clogging due to sinterings</td>
<td>Clean or replace the powder hoses</td>
</tr>
<tr>
<td></td>
<td>The gaskets in the powder chambers are defective</td>
<td>Check the seating or the presence of the two O-rings</td>
</tr>
<tr>
<td></td>
<td>Oil or water in the system</td>
<td>Ensure that oil or water will be separated before entering into the powder pump</td>
</tr>
<tr>
<td></td>
<td>Suction line and its transition to the powder hose is leaking</td>
<td>Verify, check the gasket</td>
</tr>
<tr>
<td></td>
<td>Discharges influence the control unit negatively</td>
<td>Check the grounding of the powder pump</td>
</tr>
<tr>
<td></td>
<td>Filter elements are completely clogged</td>
<td>Run the rinsing program in conveying and in suction direction, replace the filter elements</td>
</tr>
<tr>
<td>Too strong dust generation on the powder hose exit</td>
<td>Conveying air is too high</td>
<td>Reduce gradually the conveying air. <strong>Attention</strong> - if the conveying air is too low, a clogging in the powder hose can occur</td>
</tr>
<tr>
<td>Enamel powder pump does not run the rinsing program, equipment indi-</td>
<td>Operating signal <strong>Rinsing procedure</strong> is missing</td>
<td>Check control signal (+24 VDC on PIN 3 of connector 2.4)</td>
</tr>
<tr>
<td>cates ready status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment is pumping in wrong direction</td>
<td>Equipment is not correctly parameterized</td>
<td>Parameterize correctly the conveying direction</td>
</tr>
<tr>
<td>Error</td>
<td>Causes</td>
<td>Troubleshooting</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Equipment is pumping in wrong direction by external control</td>
<td>Pumping and Cleaning signals are not released at the same time</td>
<td>Check the Pumping and Cleaning signals (+24 VDC on PIN 2 and PIN 3 of connector 2.4)</td>
</tr>
<tr>
<td>Wrong blowing off direction</td>
<td>Equipment is not correctly parameterized</td>
<td>Parameterize correctly the blowing off direction</td>
</tr>
<tr>
<td>No after-conveying</td>
<td>Equipment is not correctly parameterized</td>
<td>Activate the after-conveying with parameterization</td>
</tr>
<tr>
<td>Wrong delay time by level sensor operation</td>
<td>Equipment is not correctly parameterized</td>
<td>Parameterize correctly the delay time</td>
</tr>
<tr>
<td>Equipment cannot be operated by the keys</td>
<td>Keyboard lock activated</td>
<td>Check the control signal of the keyboard lock (+24 VDC on PIN 6 of connector 2.4)</td>
</tr>
</tbody>
</table>
Schematic diagrams

OptiFeed PP05 - block diagram
OptiFeed PP05 - pneumatic diagram

1.0 Solenoid valve, 3/2 way NC, main valve
2.0 Solenoid valve, 4/2 way 24V, conv. air/suction air
3.0 Solenoid valve, 4/2 way 24V, pinch valve

4.0 Solenoid valve, 3/2 way NC, cleaning
5.0 Solenoid valve, 3/2 way NC, vacuum nozzle
6.0 Solenoid valve, 4/2 way NC, pinch valve
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** OptiFeed PP05 Enamel powder pump
  **Serial number** 1234 5678
- **Order no.** 203 386, 1 piece, Clamp - Ø 18/15 mm

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

The wear parts are always marked with a #.

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

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

WARNING!
Only original ITW-Gema spare parts should be used, because the hazardous location approval will be preserved that way! The use of spare parts from other manufacturers will invalidate the ITW Gema guarantee conditions!
## OptiFeed PP05 Enamel powder pump - pneumatic group

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pressure regulator</td>
<td>1003 291</td>
</tr>
<tr>
<td>2</td>
<td>Pressure gauge - 0-6 bar</td>
<td>1003 300</td>
</tr>
<tr>
<td>3</td>
<td>Hexagon nut</td>
<td>1003 292</td>
</tr>
<tr>
<td>4</td>
<td>3/2-way valve</td>
<td>1003 294</td>
</tr>
<tr>
<td>5</td>
<td>4/2-way valve</td>
<td>1003 293</td>
</tr>
<tr>
<td>6</td>
<td>Vacuum suction nozzle</td>
<td>1003 296</td>
</tr>
<tr>
<td>7</td>
<td>Check valve</td>
<td>1003 298</td>
</tr>
<tr>
<td>8</td>
<td>Mounting bracket</td>
<td>1003 295</td>
</tr>
<tr>
<td>9</td>
<td>Compressed air distributor - 6P</td>
<td>1002 693</td>
</tr>
<tr>
<td>10</td>
<td>Silencer</td>
<td>1003 299</td>
</tr>
<tr>
<td>11</td>
<td>Silencer - 1/4&quot;a</td>
<td>252 115</td>
</tr>
<tr>
<td>12</td>
<td>Schott lead-through connection - Ø 8/8 mm</td>
<td>253 880</td>
</tr>
<tr>
<td>13</td>
<td>Plug - Ø 8 mm</td>
<td>238 023</td>
</tr>
<tr>
<td>14</td>
<td>Bezel - A=1.4 mm</td>
<td>404 497</td>
</tr>
<tr>
<td>15</td>
<td>Pressure sensor holder</td>
<td>1004 341</td>
</tr>
<tr>
<td>16</td>
<td>Plug cap - 1/2&quot;a</td>
<td>1004 203</td>
</tr>
<tr>
<td>17</td>
<td>Screw-in nipple - 1/4&quot;a-Ø 8 mm</td>
<td>265 136</td>
</tr>
<tr>
<td>18</td>
<td>Vacuum filter - Ø 8 mm, Inline</td>
<td>1004 946</td>
</tr>
</tbody>
</table>
OptiFeed PP05 Enamel powder pump - pneumatic group
### OptiFeed PP05 Enamel powder pump - pump control unit

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mains cable (Schuko)</td>
<td>382 485</td>
</tr>
<tr>
<td></td>
<td>Mains cable (CH)</td>
<td>382 493</td>
</tr>
<tr>
<td></td>
<td>Mains cable (USA)</td>
<td>382 507</td>
</tr>
<tr>
<td></td>
<td>Mains cable (GB)</td>
<td>382 515</td>
</tr>
<tr>
<td></td>
<td>Mains cable (AUS)</td>
<td>382 523</td>
</tr>
<tr>
<td></td>
<td>Mains cable - 4 pins, for using a PLC</td>
<td>390 119</td>
</tr>
<tr>
<td></td>
<td>PLC connecting cable - L=5 m (not shown)</td>
<td>1003 651</td>
</tr>
<tr>
<td></td>
<td>PLC connecting cable - L=30 m (not shown)</td>
<td>1004 112</td>
</tr>
<tr>
<td>2</td>
<td>Protection cap</td>
<td>1003 372</td>
</tr>
<tr>
<td>3</td>
<td>Protection cap for connector socket</td>
<td>206 474</td>
</tr>
<tr>
<td>4</td>
<td>Protection cap for plug</td>
<td>206 458</td>
</tr>
<tr>
<td>5</td>
<td>Fuse - 2 AT</td>
<td>221 872</td>
</tr>
<tr>
<td>6</td>
<td>PP05 power pack connection</td>
<td>1003 371</td>
</tr>
<tr>
<td>7</td>
<td>Locknut - M3</td>
<td>262 498</td>
</tr>
<tr>
<td>8</td>
<td>Washer - Ø 3.2/7x0.5 mm</td>
<td>201 944</td>
</tr>
<tr>
<td>9</td>
<td>Spacer sleeve - Ø 3.2/6x0.6 mm, plastic</td>
<td>1000 590</td>
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<tr>
<td>10</td>
<td>Countersunk-head screw - M3x16 mm</td>
<td>263 419</td>
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<tr>
<td>11</td>
<td>OptiFeed PP05 front foil</td>
<td>1003 113</td>
</tr>
<tr>
<td>12</td>
<td>OptiFeed PP05 electronic board</td>
<td>1003 093</td>
</tr>
<tr>
<td>13</td>
<td>Power pack - 100-240 VAC / 24 VDC</td>
<td>1003 100</td>
</tr>
<tr>
<td>14</td>
<td>Socket cable - L=0.7 m</td>
<td>1003 297</td>
</tr>
<tr>
<td>15</td>
<td>Grounding cable - complete, L=5 m (not shown)</td>
<td>301 140</td>
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<tr>
<td>16</td>
<td>OptiFeed PP05 short instruction (not shown)</td>
<td>1003 574</td>
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<tr>
<td>17</td>
<td>Cable lead-through</td>
<td>258 865</td>
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<tr>
<td></td>
<td>Connection cable for LM02 Level sensor - L=6 m (not shown)</td>
<td>1003 229</td>
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OptiFeed PP05 Enamel powder pump - pump control unit

1. [Diagram element]
2. [Diagram element]
3. [Diagram element]
4. [Diagram element]
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7. [Diagram element]
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12. [Diagram element]
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14. [Diagram element]
15. [Diagram element]
16. [Diagram element]
17. [Diagram element]
### OptiFeed PP05 Enamel powder pump - powder chamber

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Part No.</th>
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<tbody>
<tr>
<td>1</td>
<td>Tube - 40/30 mm</td>
<td>1003 004</td>
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<td>2</td>
<td>Filter element - 40/30 mm</td>
<td>1002 876#</td>
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<td>3</td>
<td>Cone connection - 40/30 mm (stainless steel)</td>
<td>1006 594</td>
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<td>4</td>
<td>Threaded sleeve - M56x3 mm</td>
<td>1003 006</td>
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<td>5</td>
<td>O-ring - Ø 30x3 mm, FKM75</td>
<td>1003 534#</td>
</tr>
<tr>
<td>6</td>
<td>O-ring - Ø 42x3 mm, FKM75</td>
<td>1003 533#</td>
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<tr>
<td>8</td>
<td>Pinch valve body - NW15</td>
<td>1003 549</td>
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<tr>
<td>9</td>
<td>Pinch valve cover - NW15 (stainless steel)</td>
<td>1006 593</td>
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<td>10</td>
<td>Pinch valve hose - NW15</td>
<td>1003 543#</td>
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<td>11</td>
<td>PT-screw</td>
<td>1003 558</td>
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<td>12</td>
<td>Elbow joint - 1/4&quot;, Ø 8 mm</td>
<td>254 029</td>
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<tr>
<td>13</td>
<td>Screw-in nipple - 1/4&quot;, Ø 8 mm</td>
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<td>15</td>
<td>Y-piece (stainless steel)</td>
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<td>16</td>
<td>Hose connection - Ø 15 mm (stainless steel)</td>
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<td>17</td>
<td>Hose clamp - 17-25 mm</td>
<td>223 085</td>
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<td>18</td>
<td>Powder hose - Ø 16/23 mm, L=100 mm</td>
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<tr>
<td>19</td>
<td>T-piece - Ø 8 mm</td>
<td>230 987</td>
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<td>20</td>
<td>Compressed air hose - Ø 8/6 mm</td>
<td>103 500*</td>
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<td>Powder hose transport side - Ø 16/23 mm (not shown)</td>
<td>1003 307</td>
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<td></td>
<td>Maintenance set for PP05 Enamel powder pump (not shown)</td>
<td>1003 947</td>
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</tbody>
</table>

* Please indicate length

# Wearing part
OptiFeed PP05 Enamel powder pump - powder chamber