Operating instructions and Spare parts list

Powder pump OptiFeed 4.0 (PP07)

Translation of the original operating instructions

Gema

Documentation OptiFeed 4.0 (PP07)

For the latest information about Gema products, visit **www.gemapowdercoating.com**.

For patent information, see **www.gemapowdercoating.com/patents** or **www.gemapowdercoating.us/patents**.

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About these instructions

General information

This operating manual contains all the important information you require for the working with both OptiFeed 4.0 versions (PP07 and PP07-S). It will safely guide you through the start-up process and provide you with references and tips for optimum use of your powder coating system.

Information about the functional mode of the individual system components should be referenced in the respective enclosed documents.

Keeping the Manual

Please keep this Manual ready for later use or if there should be any queries.

Safety symbols (pictograms)

The following warnings with their meanings can be found in the Gema instructions. The general safety precautions must also be followed as well as the regulations in the relevant instructions.

⚠ DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

ATTENTION

Indicates a potentially harmful situation. If not avoided, the equipment or something in its surrounding may be damaged.

ENVIRONMENT

Indicates a potentially harmful situation which, if not avoided, may have harmful consequences for the environment.

MANDATORY NOTE

Information which must be observed.

NOTICE

Useful information, tips, etc.

Structure of Safety Notes

Every note consists of 4 elements:

– Signal word
– Nature and source of the danger
– Possible consequences of the danger
– Prevention of the danger

⚠ SIGNAL WORD

Nature and source of the hazard!

Possible consequences of the danger

▶ Prevention of the danger

Presentation of the contents

Figure references in the text

Figure references are used as cross references in the descriptive text.

Example:

*"The high voltage (**H**) created in the gun cascade is guided through the center electrode."*

Software version

This document describes the operation of the product OptiFeed 4.0 (PP07) with software version starting from 0.10.1.

Safety

Basic safety instructions

- This product is built to the latest specification and conforms to the recognized technical safety regulations and is designed for the normal application of powder coating.
- Any other use is considered non-compliant. The manufacturer shall not be liable for damage resulting from such use; the user bears sole responsibility for such actions. If this product is to be used for other purposes or other substances outside of our guidelines then Gema Switzerland GmbH should be consulted.
- Start-up (i.e. the execution of intended operational tasks) is forbidden until it has been established that this product has been set up and wired according to the guidelines for machinery. The standard "Machine safety" must also be observed.
- Unauthorized modifications to the product exempt the manufacturer from any liability from resulting damage.
- The relevant accident prevention regulations, as well as other generally recognized safety regulations, occupational health and structural regulations are to be observed.
- Furthermore, the country-specific safety regulations also must be observed.

Product specific security regulations

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

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

⚠ WARNING

Working without instructions

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

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

Product description

Intended use

The product is intended exclusively for the conveying of coating powder between plant components (e.g. powder hoppers, fresh powder systems, sieves).

Fig. 1

Observance of the operating, service and maintenance instructions specified by the manufacturer is also part of the intended use. This product should only be used, maintained and started up by trained personnel, who are informed about and are familiar with the possible hazards involved.

Any other use is not considered as intended use. The manufacturer is not responsible for any incorrect use and the risks associated with such actions are assumed by the user alone!

For a better understanding of the interrelationships in powder coating, it is recommended that the operating instructions for all other components be read as well, so as to be familiar with their functions too.

Versions

The powder pump is available in two versions.

	PP07	PP07-S
Input voltage	24 VDC	100 - 240 VAC
Power pack	–	integrated
Application	system-integrated	standalone
Control*	by higher-level controller	locally by operating elements
Parameter settings*	by higher-level controller / locally by operating elements	locally by operating elements
CAN bus	yes	–
SPS connector	yes	–
Analog OUT (“backpressure” signal)	yes	–
Level sensor connection	–	yes
Vibrator connection	–	yes
ON/OFF switch	–	yes
Primary-side fuse	–	yes

* See chapter "Connection instructions" on page 31.

Reasonably foreseeable misuse

- Operation without the proper training
- Use with insufficient compressed air quality or with input pressure too low
- Use of wet, liquid or powdered coating materials that contain solvents and/or water (e.g. liquid paint, flock, adhesives or foodstuffs such as sugar or flour)
- Use in connection with unauthorized coating devices or components

Technical Data

Processible powders

OptiFeed 4.0	
Plastic powder	yes
Metallic powder	yes
Enamel powder	yes

Electrical data

OptiFeed 4.0	PP07	PP07-S
Nominal input voltage	24 V DC ±10%	100–240 V AC ±10%
Connected load	20 W	20 VA
Frequency	–	50/60Hz
Protection type	IP54	
Temperature range	+10 °C – +40 °C (+50 °F – +104 °F)	
Temperature class	T6 (85 °C max. temperature)	
Approvals	CE Ex II 3 D	

Pneumatic data

OptiFeed 4.0	
Compressed air connection	plug-in connection – 10 mm
Min. input pressure	6 bar (87 psi)
Max. input pressure	8 bar (116 psi)
Max. compressed air consumption	≈ 12 Nm³/h
Max. water vapor content of the compressed air	1.3 g/m³
Max. oil vapor content of the compressed air	0.1 mg/m³

Powder output (reference values)

OptiFeed 4.0	
Hose length up to 8 m	6 kg/min
Hose length 8–16 m	4.5 kg/min
Hose length 16–25 m	4 kg/min

Dimensions

OptiFeed 4.0	
Height	870 mm
Width	253 mm
Depth	175 mm
Weight	14.5 kg

Sound pressure level

OptiFeed 4.0 (PP07)	
Normal operation	< 70 dB(A)
Cleaning operation mode	> 85 dB(A) (for a short time)

The sound pressure level was measured while the unit was in operation; measurements were taken at the most frequent operator positions and at a height of 1.7 m from the ground.

The specified value during normal operation is applicable only for this product itself and does not take into account external noise sources or cleaning impulses.

The specified value during cleaning operation requires the wearing of ear protection.

The sound pressure level may vary, depending on the product configuration and space constraints.

Rating plate

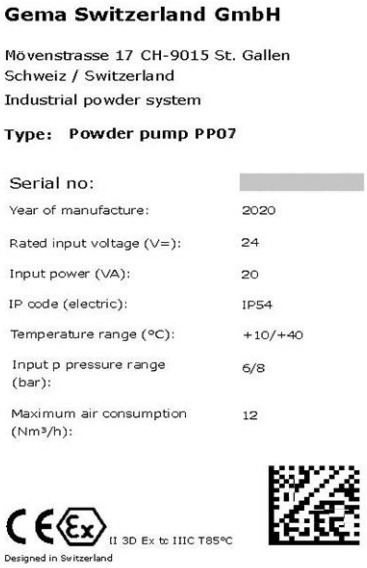


fig. 2

Design and function

Overall view

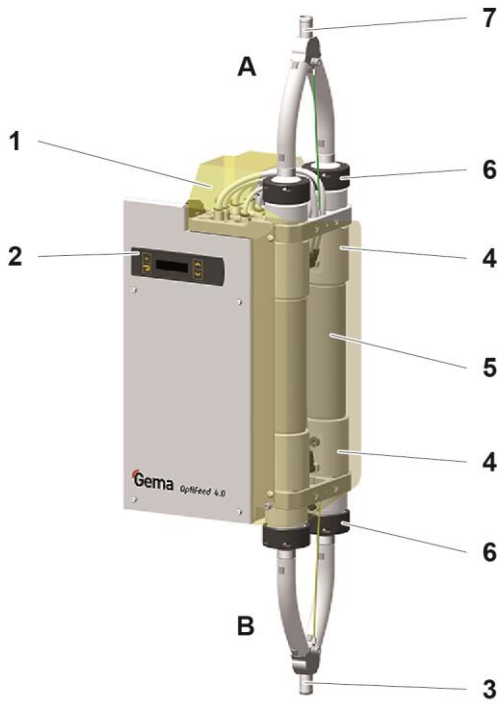


fig. 3

A **Suction side**
B **Conveyance side**
1 Connections
2 Operating elements
3 Conveyance side connection
4 Pinch valve
5 Powder chambers with filter elements and fluidized adapters
6 Threaded sleeve
7 Suction side connection

Operating elements

Display

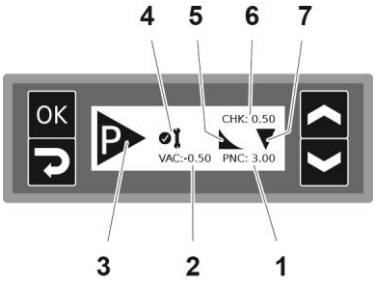


Fig. 4: Display

Designation	Function
1	Pinch valve pressure indicator (display in bar)
2	Negative pressure (vacuum) indicator (Suction power)
3	Pump operating status indicator: – Standby mode – Pumping (flashes)
4	Maintenance status indicator
5	After-conveying indicator
6	Backpressure indicator (display in bar)
7	Conveying direction indicator

Input keys

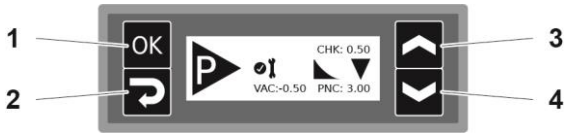


Fig. 5: Input keys

Designation	Function
1	Selection key – The displayed value is activated in order to be set – The displayed menu can be accessed
2	Back key – Back to previous menu or confirm the set value – Switchover to the menu level (press for at least 3 secs.)
3	Key UP
4	Key DOWN

Menu structure

Menu level		→
System parameters (System Parameters)	**Correction values (Correction Values)**	**Parameters (Parameters)**
P00-P13	C0, C1, C2, C3, C4, C5	Pre-conveying duration (Pre convey)
		After-conveying duration (Post convey)
		Duty cycle interval operation (T-On)
		Period duration of interval operation (T-Int)

Menu level		
Information (INFO)	**Settings (Settings)**	**Wear parts (Wear parts)**
Software version (Software version)	Memory Reset	Wear Part 1 (Wear Part 1)
Conveying Air Pressure (CONV. pressure)		Wear Part 2 (Wear Part 2)
Operating time (Operation time)		Wear Part 3 (Wear Part 3)
Total pumping cycles (Pump cycles total)		Wear Part 4 (Wear Part 4)
Pumping Cycle Counter (Pump cycle count)		

[1)] The process data is displayed locally and can be queried via the CAN bus

Connections

Compressed air hoses / cables

fig. 6: Connections – Compressed air hoses / cables (PP07)

Connection	Description
Mains / PLC 2.1	Power supply connection (24 VDC)
AUX 2.3	CAN bus connection (IN)
AUX 2.4	CAN bus connection (OUT)
AUX 2.5	Pressure sensor signal (backpressure) connection
IN	Compressed air connection
6.4	Fluidization connection

Fig. 7: Connections – Compressed air hoses / cables (PP07-S)

Connection	Description
Power IN 2.1	Mains cable connection (100-240 V AC)
AUX 2.2	Vibrator connection (OUT 100-240 V AC)
Level sensor 2.6	Level sensor connection
IN	Compressed air connection
6.4	Fluidization connection

PP07 Pin assignment

Mains / PLC 2.1 connection

1	24 VDC
2	Start
3	Cleaning
4	24 V – OUT
5	Keyboard lock
6	GND
7	PE grounding

CAN IN plug with 4 pins (AUX 2.3)

1	Ground
2	24 VDC
3	CAN high
4	CAN low
	Enclosure – shield

CAN OUT socket with 4 pins (AUX 2.4)

1	Ground
2	24 VDC
3	CAN high
4	CAN low
	Enclosure – shield

Connection, pressure sensor signal, socket with 4 pins (2.5 AUX)

1	–
2	0–10 V OUT
3	GND
4	–
5	–

PP07-S Pin assignment

Power IN 2.1 connection

1	Neutral conductor (power supply)
2	Phase (100-240 VAC)
3	Start/Stop
PE	PE grounding

Vibrator connection (AUX 2.2)

1	N
2	L
3	–
4	PE grounding

Level sensor connection (level sensor AUX 2.6)

1	GND
2	24 VDC
3	Signal IN
4	–
5	–
6	–
7	PE grounding

Powder hoses

A 16/23 mm-diameter powder hose is connected to the suction side and to the conveyance (output) side.

- The powder hose must be antistatic dissipative!
  Maximum electrical surface resistance < 10^9 ohms per meter
- The minimum pressure rating of the powder hose must be 10 bar.

Scope of delivery

- Supply/signal cable (PP07)
- Mains cable (PP07-S)
- Operating manual

Available accessories

- Retrofit set for powder fluidizing/suction units
- LM02 level sensor with connecting cable (PP07-S)
- Pressure sensor connection cable for analog OUT
- Tube connection for powder fluidizing/suction units

Typical properties – Characteristics of the functions

Conveying direction

The conveying (flow) direction of the powder pump is factory-preset in the direction of the arrow (see picture). If the powder has to flow in the opsite direction, the conveying direction may be changed.

To change the conveying direction, see chapter "System parameters" on page 35.

Powder hose emptying

After-conveying

The after-conveying avoids powder accumulations and clogging 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 after-conveying is activated by factory.

To activate/deactivate after-conveying, see chapter "System parameters" on page 35.

To set the duration of the after-conveying, see chapter "After-conveying length" on page 44.

Pre-conveying

In certain applications, it is not permissible to after-convey after stopping, because the powder container cannot absorb the after-conveyed powder volume. In such cases, the powder in the powder hose can be loosened during start-up by several pre-convey cycles without suction.

The pre-conveying is only carried out if the pump conveying process has been stopped for more than 90 s.

To activate/deactivate pre-conveying, see chapter "System parameters" on page 35.

To set the duration of the pre-conveying, see chapter "Conveying parameters" on page 43.

Powder hose cleaning

The powder hose cleaning enables the cleaning of the powder hoses and the filter elements in the powder pump. When changing colors, clean the unit in both the conveying direction and the suction direction. For more information, refer to see chapter "System parameters" on page 35.

Automatic cleaning

An additional external source of compressed air is mandatory for high-quality cleaning!

– This source is provided if the PP07 comes supplied as part of a Gema system (e.g. with OptiCenter)!

When the automatic cleaning function is activated by an external control unit, the powder pump is cleaned automatically according to the cleaning program setting.

The cleaning programs can be called up by:

– mains/PLC (R1-R5)

– CAN bus (R1-R5, C1)

Characteristics of the cleaning programs:

– non-directional, alternate cleaning of the powder chambers one after the other (the flow through the respective powder chamber is granted)

– directional, alternate cleaning of the powder chambers in suction or conveying direction (the flow through the respective powder chamber is not granted)

Manual cleaning

This function is initiated manually. Cleaning takes place in the set direction. The direction of powder hose cleaning can be changed.

Changing the direction of powder hose cleaning

The direction of powder hose cleaning can be set. The hose cleaning in the conveying direction is activated by factory.

See chapter "System parameters" on page 35.

Level sensor delay

If the switching signal of a connected level sensor is satisfied, the conveying procedure is switched off with a delay to prevent the powder pump from cycling on and off continuously.

The internal delay can be activated/deactivated in the pump control, see chapter "System parameters" on page 35.

Powder fluidization

The powder pump has a fluidizing air connection (**6.4**), which becomes active when the pump is switched on. The air can be used to fluidize the powder in a fluidized powder hopper or it can be used locally for a fluid suction unit.

▶ **The equipment required for this should be ordered in consultation with Gema Customer Service.**

– To ensure that the function of the powder pump is not impaired, the compressed air consumption at the fluidizing air connection must not be too high, i.e. the inlet pressure must not fall below 6 bar!

Interval operation

To prolong the service life of the pump parts, the pump should not be allowed to run continually in conveying mode. The interval function allows specific ON times and time periods to be programmed. This application is recommended especially when conveying used powder or waste powder.

To activate/deactivate this function, refer to see chapter "System parameters" on page 35.

To set the length of the duty cycle and period duration, refer to see chapter "Conveying parameters" on page 43.

Monitoring of the wear parts

Wear parts have a limited service life. The device offers functionality to monitor the service life of up to four wear parts. Wear part monitoring can be set and read out on the display or via can bus.

The monitoring of a wear part is either cycle-based or time-based:

Cycle-based monitoring	The number of operations of the monitored part is counted. Wear Part No. 1 = Pinch Valves
Time-based monitoring	The time the monitored part is in operation is added up. Wear part no. 2 – 4 = freely selectable

To better explain this function, a few terms relevant to this process must first be explained:

Term	Explanation
Duration	Actuation cycles or time interval
Operating time	Effective duration during which the wear part was in operation
Service life	Operating life after which wearing parts should be replaced (defined by the operator) (See also "Monitoring of the wear parts" on page 53.)
Remaining service life	Service life minus operating life (See also "Monitoring of the wear parts" on page 53.)
Warning limit	Remaining service life below which a warning is generated (See also "Monitoring of the wear parts" on page 53.)

The wear parts are assigned as follows:

No.	Allocation	Adjustment Range (Lifetime)	Notice
1*	Pinch valves (complete)	0.1 – 10 million of pumping cycles **Default 3.0** (changes only in consultation with Gema)	Warning limit at 20% remaining service life
2**	free, e.g. filter elements	0.1 – 999 days e.g. approx. 300 days	No warning limit, only alarm display at the end of the set service life
3**	free, e.g. powder hoses	0.1 – 999 days e.g. approx. 300 days	No warning limit, only alarm display at the end of the set service life
4**	free	0.1 – 999 days	No warning limit, only alarm display at the end of the set service life

* activated by factory

** deactivated by factory

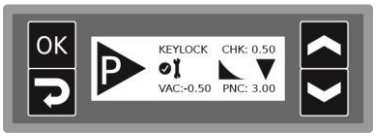
Keyboard lock

The powder pump has a keyboard lock that prevents the changing of individual values (system parameters, conveying parameters, correction values) as well as the starting of the conveying or cleaning operation. Following is not affected by the keyboard lock:

- Display of the desired values
- Display of the actual values
- Error acknowledgment

The keyboard lock is activated by an external signal.

- Active keyboard lock (**KEYLOCK**) is displayed:



Manually started operation is stopped when the keyboard lock is activated.

The keyboard lock status remains stored, when switching the pump off and on. The keyboard lock is cancelled if a RAM reset is performed.

Principle of operation

Suction procedure

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

Conveying procedure

The pinch valve (**3**) on the input side of the powder chamber **B** is closed, the pinch valve (**4**) on the output side is opened.

Compressed air flows into the powder chamber through the fine-porous filter element and the fine-porous end pieces (**5**). The coating powder is conveyed out of the powder chamber by overpressure.

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

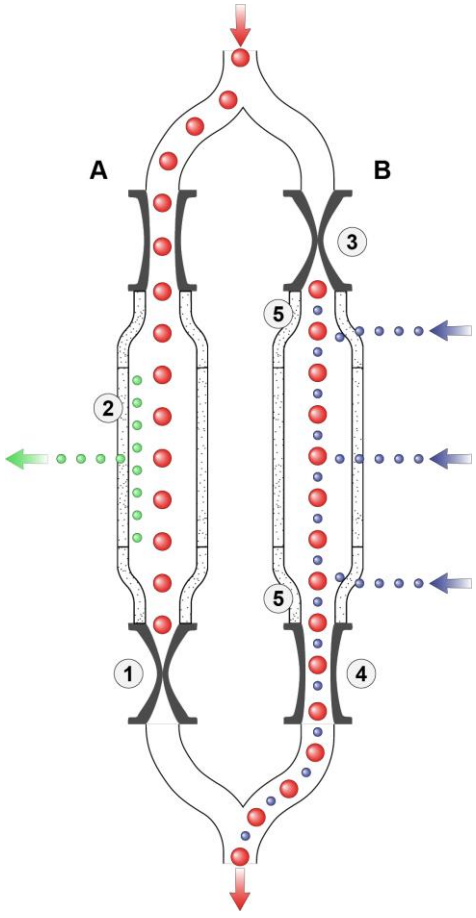


Fig. 8: Functioning – suction process/conveying procedure

Process Terminology:

PF [Hz] = pump frequency or pumping cycle (powder packs per time unit in the conveying hose)

QF [Hz] = pinch valve frequency (PF*0.5)

Correction values

The correction values are used to optimally adapt the powder pump to the suction and conveying distance. The correction values can be set and requested manually or via the CAN bus.
See chapter "Correction values" on page 48.

Assembly / Connection

Set-up

The pump is used to transport fresh powder as well as recovered powder or waste powder.

The powder pump must be mounted vertically.

▶ **Horizontal mounting will result in poor powder transport performance.**

ATTENTION

Surrounding temperature too high

– Install the pump only in locations with an ambient temperature of between +10 and +40 °C, i.e. never next to heat sources (such as an enameling furnace) or electromagnetic sources (such as a control cabinet).

Assembly guide

The powder pump is mounted with 4 M6 screws on the back.

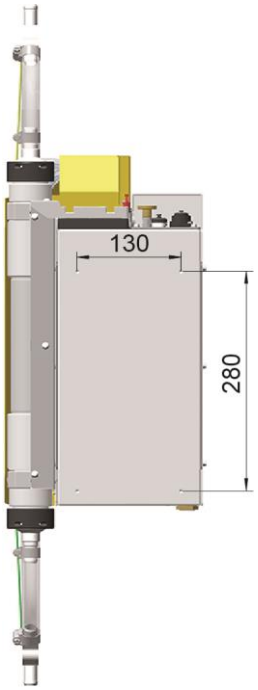


Fig. 9: Drilling pattern PP07

If the PP07 powder pump is to replace a type PP06 powder pump without any mechanical rework, the corresponding adapter plate can be used (order no. 1019 489). This will ensure installation compatibility.

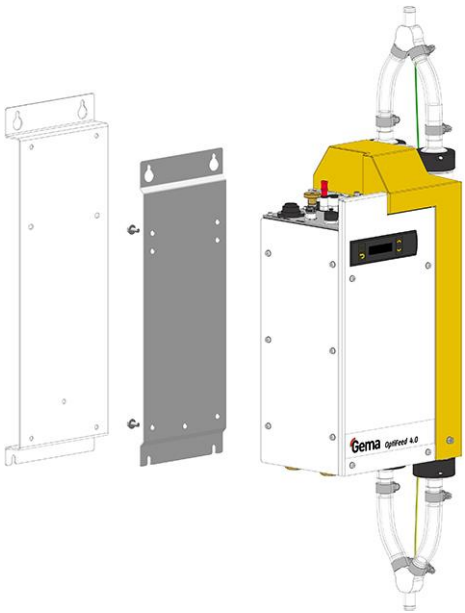


Fig. 10: Adapter plate PP07-PP06

Connection instructions

The powder pump(s) are supplied ready for use by the manufacturer. Just a few cables and hoses must be connected.

Depending on the system integration, different connection options may be selected.

System integration with CAN bus

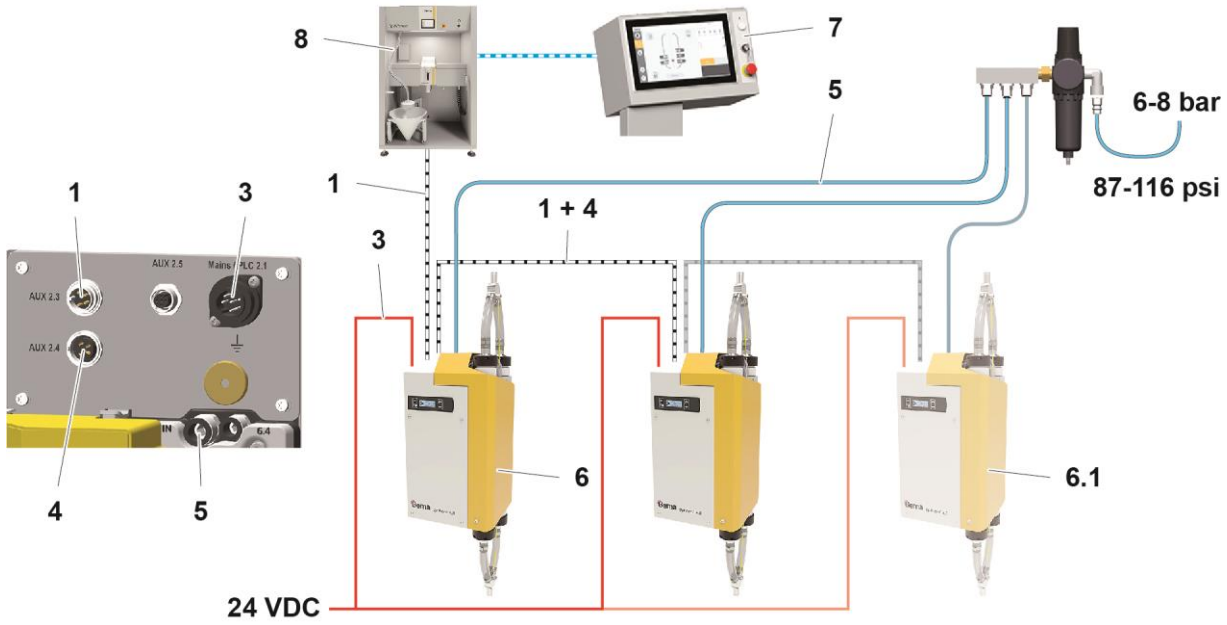


fig. 11: Connection instructions PP07 – overview

1	CAN bus cable IN	6	Powder pump no. 1
3	Power supply cable	6.1	Powder pump no. …
4	CAN bus cable OUT	7	Plant control unit
5	Compressed air hose	8	OptiCenter

Connect grounding cable to ground potential!

► Check ground connections with Ohm meter and ensure 0.1 Ohm or less!

The compressed air must be free of oil and water!

Close the unused connections with the provided dust protection caps!

System integration with PLC

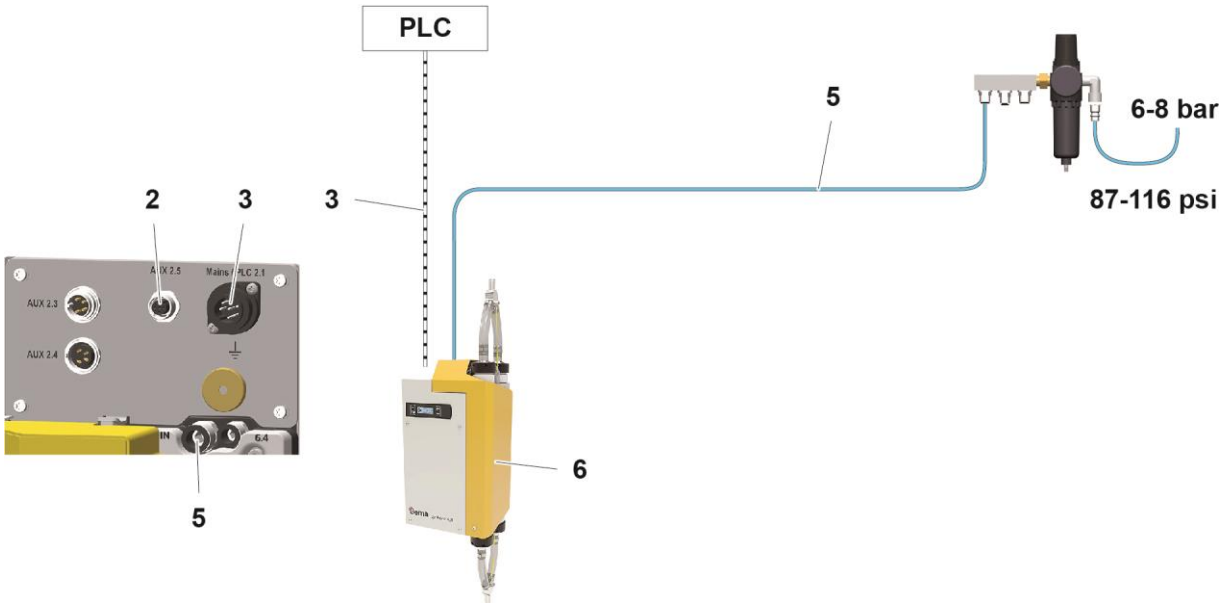


fig. 12: Connection instructions PP07 – overview

2	Signal cable (backpressure)	5	Compressed air hose
3	Signal cable	6	Powder pump

Connect grounding cable to ground potential!

► Check ground connections with Ohm meter and ensure 0.1 Ohm or less!

The compressed air must be free of oil and water!

Close the unused connections with the provided dust protection caps!

Stand alone system integration with start/stop function (e.g. fresh powder system)

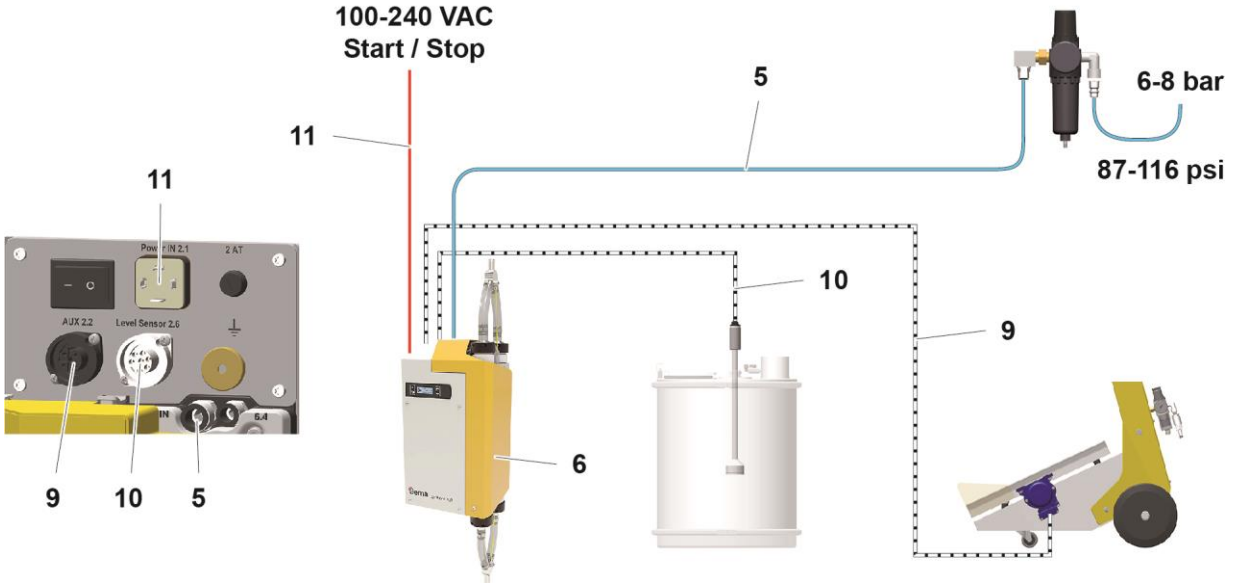


fig. 13: Connection instructions PP07-S – overview

5	Compressed air hose	10	Level sensor cable
6	Powder pump	11	Mains cable (start/stop signal)
9	Vibrator cable		

Connect grounding cable to ground potential!

► Check ground connections with Ohm meter and ensure 0.1 Ohm or less!

The compressed air must be free of oil and water!

Close the unused connections with the provided dust protection caps!

Start-up

Preparation for start-up

Basic conditions

When starting up the powder pump, the following basic conditions, which have an influence on the powder transport, must be considered:

– Correct hose layout

– Maximum length of the conveying distance

– Powder preparation and powder quality

– Corresponding power and compressed air supply (volume and quality) and signals available

Basic information

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

– The suction distance and the conveying distance should be kept as short as possible.

– At the suction point, ensure homogeneous fluidization so that no air pockets (craters) can be formed.

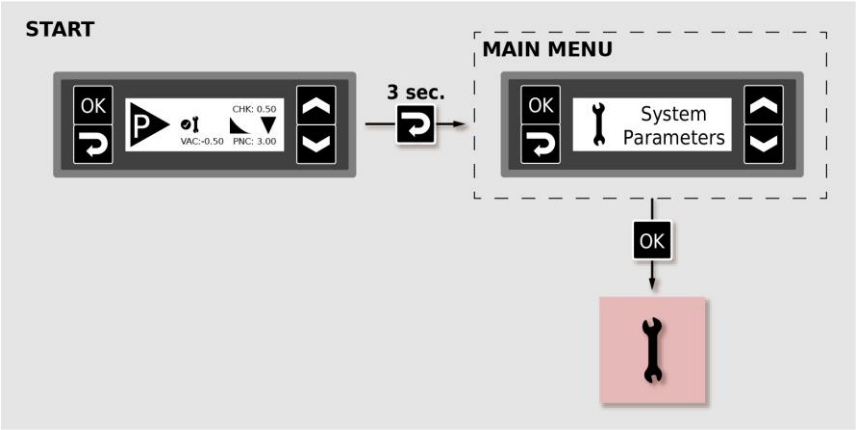
– When laying the hose, the minimum radius of the hose used must be complied with.

System parameters

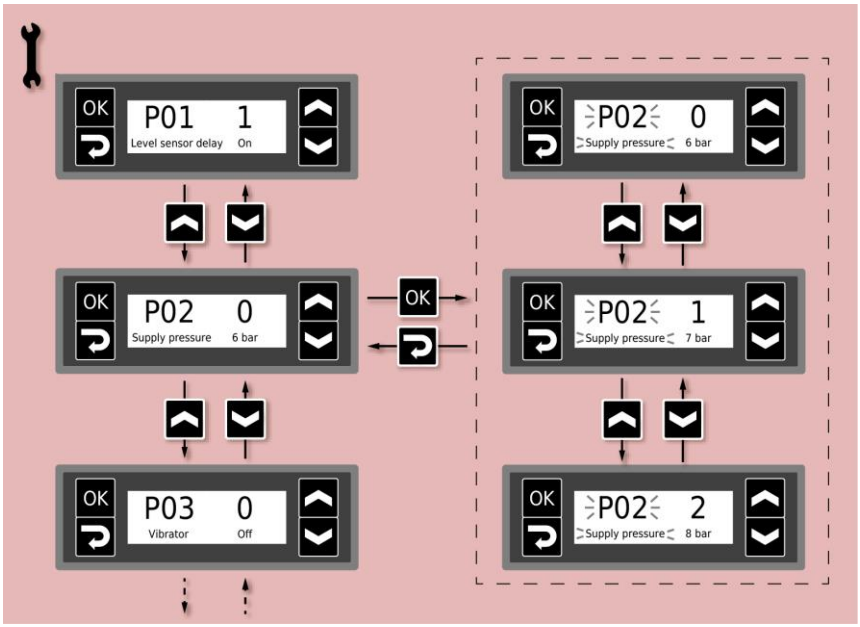
The powder pump is configured by using the system parameters. This configuration will be saved in the equipment memory. The parameters can be adjusted and requested manually or by remote interface (CAN).

Entering the system parameters

1. Switch on the powder pump
2. Hold ↵ key down for 3 seconds



3. Set the corresponding system parameter value with the ⌄ or ⌃ key.



4. Select parameter values according to the following table

No.	Description	Values	Display
P01	Level sensor delay	**0: Off** 1: On	**Off** On
P02	Inlet pressure	**0: P in = 6.0 bar** 1: P in = 7.0 bar 2: P in = 8.0 bar	**6.0 bar** 7.0 bar 8.0 bar
P03	Vibrator	0: Off **1: without added run time** 2: with 1 minute added run time	Off **On** On+

No.	Description	Values	Display
P05	CAN Baud rate	0: 20 kbit/s 1: 50 kbit/s 2: 100 kbit/s **3: 125 kbit/s** 4: 250 kbit/s 5: 500 kbit/s 6: 800 kbit/s 7: 1 Mbit/s	20k 50k 100k **125k** 250k 500k 800k 1M
P06	CAN Node ID	**1**-127	
P07	Conveying direction	**0: Forward** 1: Reverse	**Forward** Reverse
P08	Rinse direction	**0: In conveying direction** 1: Against conveying direction	**Normal** Inverse
P09	REMOTE rinsing program	**1** - 5	**R1** - R5
P10	MANUAL rinsing program	**1** - 2	**M1** - M2
P11	After-conveying Pre-conveying	0: Off **1: After-conveying ON** 2: Pre-conveying ON	Off **Post** Pre
P12	Interval operation	**0: Off** 1 : On	**On** Off
P13	Log level	0, 1, **2**, 3, 4, 5	**LOG**

Not relevant for CAN operation

Default values are marked by **bold** print.

5. Scroll to the next or previous system parameter with the ⌄ or ⌃ key

Selection is cyclical, i.e. after the last system parameter, the first starts again and vice versa.

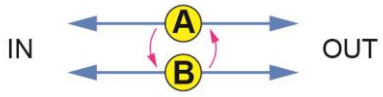
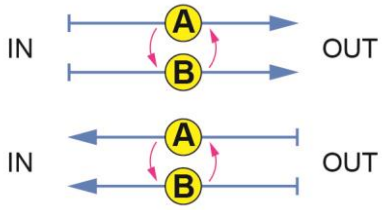
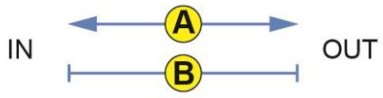
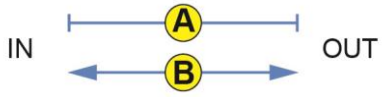
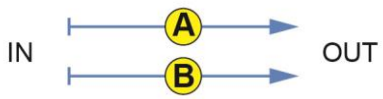
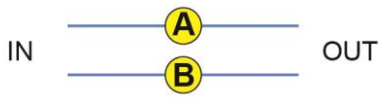
6. Press ↵ key to quit the system parameter mode.
   – The display switches to the **START** screen

System parameter P08 (cleaning direction)

This parameter can be used to set the cleaning direction in the opposite direction to the conveying direction. This only affects cleaning programs that clean in one direction (Remote R2 and Manual M1).

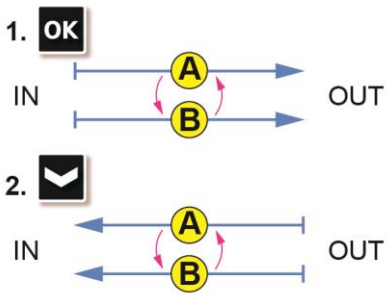
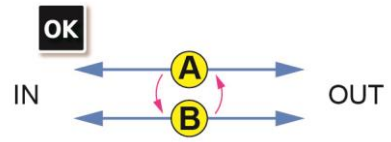
P09 system parameter (REMOTE cleaning program)

Automatic cleaning (cleaning program) is defined by the system parameters P09. The cleaning program is initiated with the corresponding signal.

Program R1	P09=1
	– Alternating cleaning of the powder chambers (5 s) – Start by signal Clean IN – Standard program for operation in the OptiCenter
Program R2	P09=2
	– Alternating cleaning of both powder chambers (0.5 s, 1 s, 2 s) – Alternating cleaning starts in the direction of the conveyance side – Start by signal Clean IN
Program R3	P09=3
	– Cleaning the powder chamber A – Start by signal Clean IN 100/100 ms
Program R4	P09=4
	– Cleaning the powder chamber B – Start by signal Clean IN 100/200 ms
Program R5	P09=5
	– Prevents the powder from blowing back from the OptiSpeeder/OptiHopper into the powder chambers – Start by signal Clean IN 100/300 ms
Program C1	P04=1
	– Freely programmable cleaning program for CAN bus

P10 system parameter (MANUAL cleaning program)

Manual cleaning (cleaning program) is defined by the system parameter P10. The cleaning program is initiated manually. For more information, see chapter "Manually starting/stopping the cleaning procedure and reversing the cleaning direction" on page 47.

Program M1	P10=1
	– Alternating cleaning of both powder chambers – Alternating cleaning starts in the direction of the conveyance side – Supply of external source of compressed air not permitted (e.g. compressed air gun)
Program M2	P10=2
	– Alternating cleaning of the powder chambers (1 s, 1 s) – Supply of external source of compressed air possible (e.g. compressed air gun)

System parameter P13

Program run log reports may be exported to an SD card for test purposes and troubleshooting.

If an SD card is inserted while the unit is switched on, the log messages are also recorded onto the SD card. The data is written to the MESSAGES.LOG file in the root directory. Once this file reaches a size of 32 MB, it is renamed as MESSAGES.1 and a new MESSAGES.LOG file is then created.

Parameter value	Level of detail of reports
0	no messages
1	few details
...	
5	all messages

▶ **Selecting a parameter value above 3 may affect timing response performance.**

CAN bus

General

The powder pump is a simple CANopen slave. It operates in a network with a central control unit (Master). Communication takes place exclusively between the Master and the Slaves.

The following functions are available via the CAN bus:

– Setting and reading the process parameters
– Setting and reading the system parameters
– Setting and reading the correction values
– Starting / stopping the conveying operation
– Selection of the conveying mode
– Starting / stopping cleaning programs
– Defining cleaning programs
– Reading the status information
– Sending error messages
– Reading the error list
– Error acknowledgment
– Initiating a memory reset
– Querying operating data and statistics
– Firmware update

Hardware

The powder pumps are connected via 4-pin CAN bus cables. The last bus client is fitted with a terminal plug with terminal resistor in order to terminate the network correctly. A maximum of up to 127 units can be operated in a network.

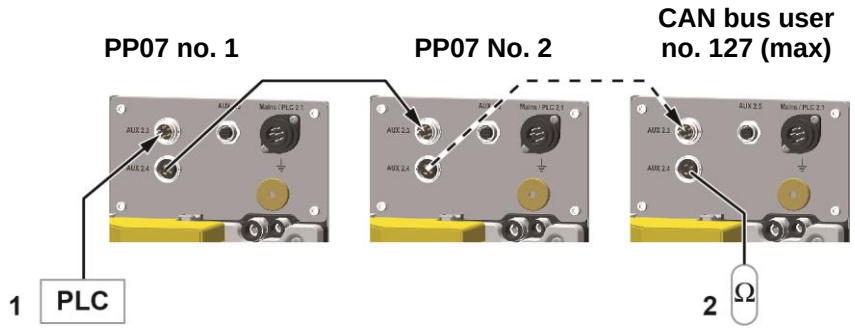


Fig. 14: CAN bus – connections

1 PLC control with CAN bus
2 Terminal resistor

CAN bus cable – plug assignment

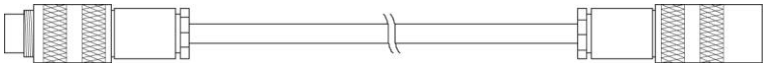


Fig. 15: CAN bus cable

Pin	Signal	Color
1	GND	white
2	+24 VDC	brown
3	CAN H	green
4	CAN L	yellow

Determining device address (Node-ID) and Baud rate

Each device (user), which operates on the CAN network, must have an individual user address (Node-ID) assigned. The Baud rate setting enables the transmission speed setting. The Baud rate value may be set by editing the system parameter P05, and the Node ID value may be set by editing the system parameter P06.

Node ID – system parameter P06

CAN Node ID 1-127

P06 value	CAN Node ID
1-127	1-127

Baud rate – system parameter P05

P05 value	Baud rate
0	20 kbit/s
1	50 kbit/s
2	100 kbit/s
3	**125 kbit/s**
4	250 kbit/s
5	500 kbit/s
6	800 kbit/s
7	1 Mbit/s

Default value of system parameter P05 = 3

The Baud rate is selected with 125 kbits as default. This setting permits a maximum cable length of approx. 500 m from the first to the last CAN bus user. If longer cables are used, select a lower Baud rate.

Operation

Operation

During the initial commissioning of the device, the functional check must be performed without powder!

Conveying parameters

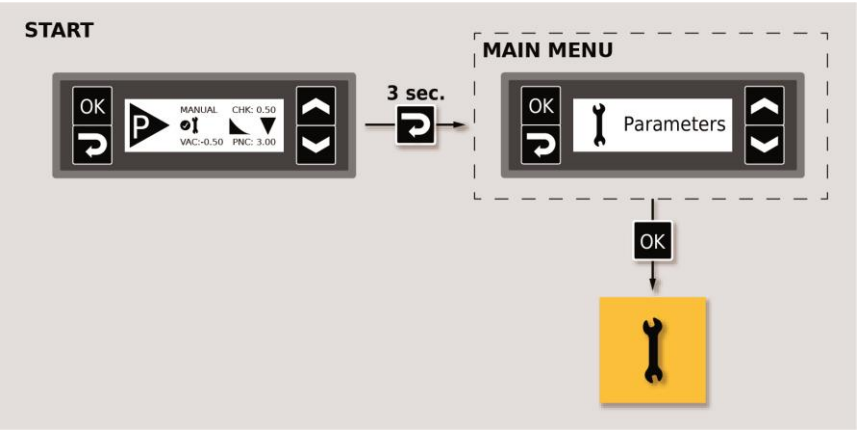
The powder pump has no programs, only 4 parameters are available for powder transport.

The parameters may be shown and set via the display. Changes via the display are stored in the EEPROM.

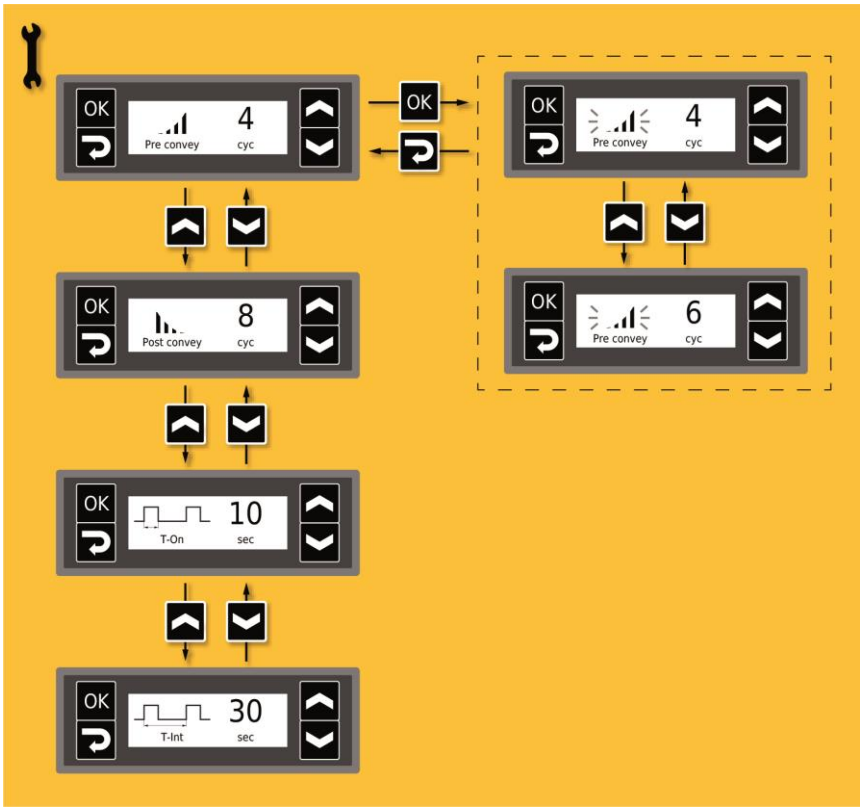
The parameters can be read and written via CAN bus.

The parameters for powder transport are set as follows:

1. Switch on the powder pump
2. Hold ↩ key down for 3 seconds



3. Set the corresponding value with the ⌄ or ⌃ key.



4. Select values according to the following table

Name / Icon	Description	Range	Default value
Pre convey	Pre-conveying duration (Cycles)	1 … 16	4
Post convey	After-conveying duration (Cycles)	4 … 32	8
T-On	Duty cycle interval operation (s)	1 … 999	10
T-Int	Period duration of interval operation (s)	10 … 999	30

After-conveying length

The after-conveying length is defined by the number of programmable cycles based on the hose length. The factory setting for the pump is 8 cycles.

8 cycles = for powder hoses over 2 m

16 cycles = for powder hoses over 25 m

Starting and stopping the conveying procedure

The conveying procedure is switched on and off either manually or by an external Control unit (see the corresponding operating manual).

Starting and stopping the cleaning procedure

The cleaning procedure is switched on and off either manually or by an external Control unit (see the corresponding operating manual).

For a better understanding of the interrelationships in powder coating, it is recommended to read the entire operating instruction of the control unit, to ensure familiarity of all control functions.

Interval operation

In interval mode, the conveying is carried out with interruptions. After the start of the conveying, the powder is conveyed during the duty cycle, then paused until the end of the period and then conveyed again. As noted, this is to improve the operational life.

1. Enable interval operation via system parameters, see chapter "System parameters" on page 35.
2. Set the length of the duty cycle and period duration, see chapter "Conveying parameters" on page 43.

If the pre-conveying is activated, it is executed once at start-up. It is no longer executed when it is restarted after the period has expired.

If a vibrator is used, it remains switched off during the pause in interval mode.

Manual operation

When installing or starting up the pump for the first time, it is recommended to carry out a function check without powder!

Switching on the powder pump

1. Switch on the powder pump with the ON/OFF switch.
   – The start screen is shown on the display. The powder pump is ready for operation.

Manually starting/stopping the conveying procedure

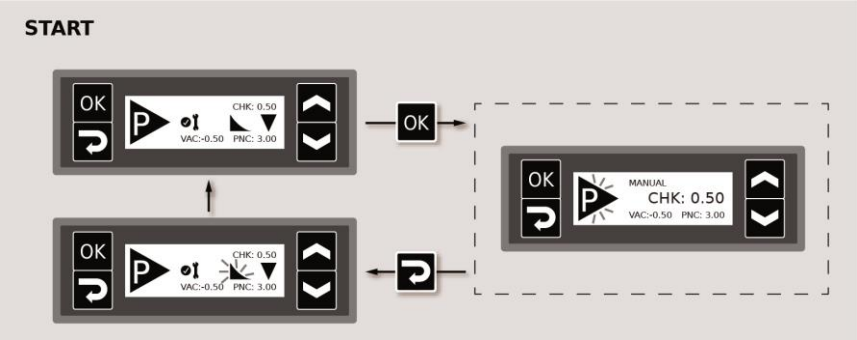


Fig. 16:

– The conveying procedure is started in the programmed conveying direction.
– The conveying direction displayed is factory-set. To change the conveying direction, see chapter "System parameters" on page 35.

– This symbol is only displayed when after-conveying is activated, see chapter "System parameters" on page 35.
– When after-conveying is activated, the hose is emptied as it exits the pump (See chapter "Typical properties – Characteristics of the functions" on page 22.).
– The symbol first flashes first, then lights up steady once the after-conveying procedure is finished. The number of flashing cycles is set in the conveying parameters – see chapter "Conveying parameters" on page 43.

Manually starting/stopping the cleaning procedure and reversing the cleaning direction

⚠ WARNING

Release of strong and pulsating compressed air containing powder.

If the pump is operated without the appropriate equipment (hearing protection, safety goggles and not in front of an appropriately dimensioned suction unit), the compressed air containing powder can cause hearing damage, eye damage as well as respiratory problems.

- ► The powder hoses on the suction and conveyance side must be mounted and held in the direction of an appropriately dimensioned suction unit (such as Gema Classic Open booth) (targeted discharge of the compressed air energy).
- ► Wear appropriate protective equipment.

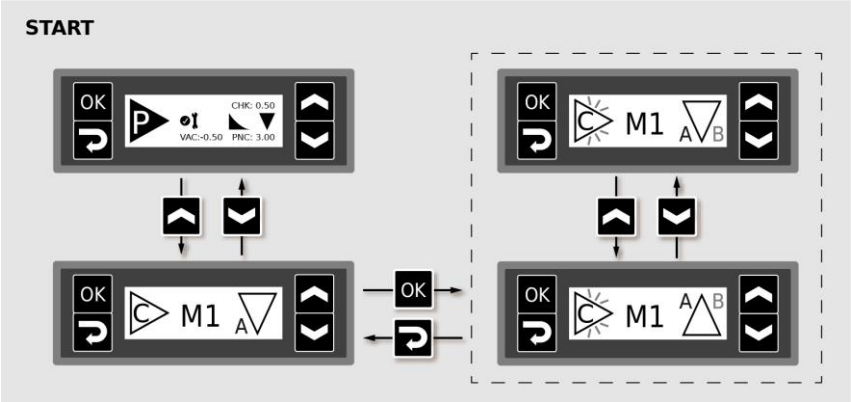


Fig. 17:

– The cleaning procedure starts in the programmed cleaning direction.

– The cleaning direction may be reversed at any time during the cleaning procedure.

– The factory-set cleaning direction may be changed – see chapter "System parameters" on page 35.

Correction values

The correction values are used to optimally adapt the powder pump to local conditions. The correction values are stored in the write protected memory. They may be set and requested manually or via the CAN bus.

ATTENTION

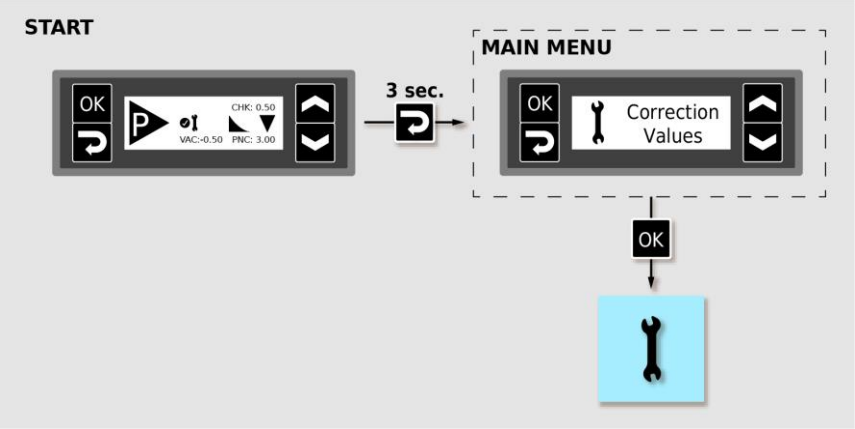
Incorrectly set correction values may lead to poor conveying results

The plant was optimally set by the Gema service engineer at the first start-up.

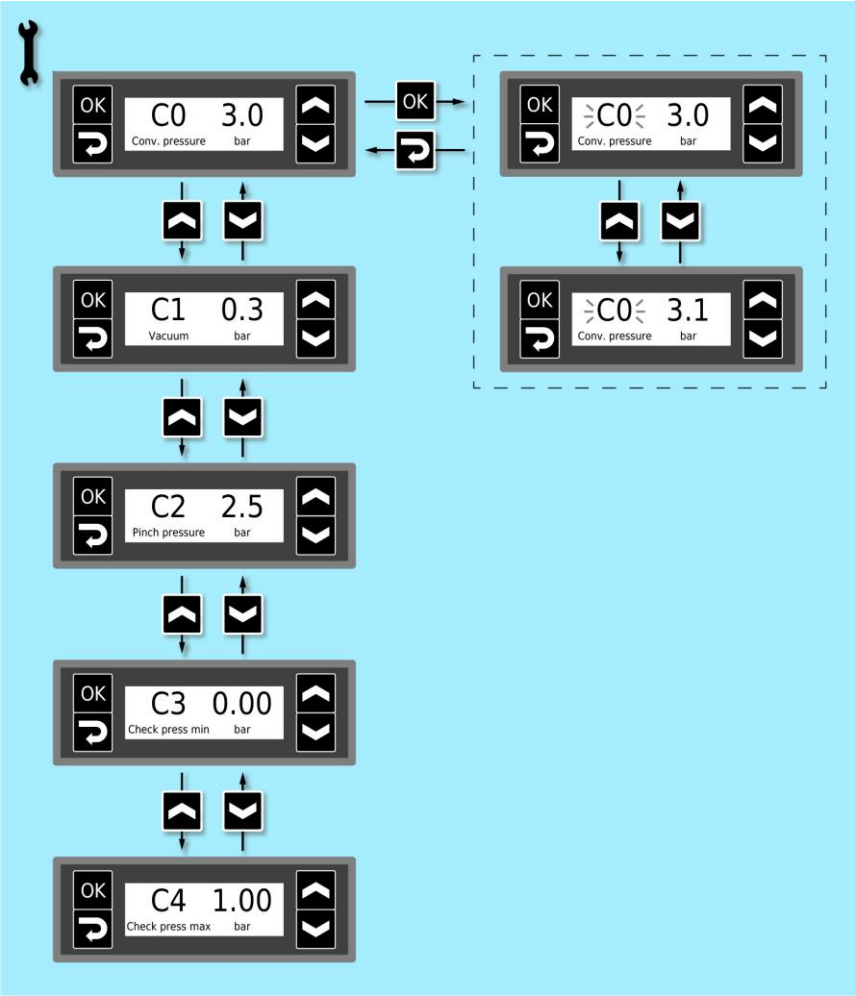
- ► Changes of correction values may only be made by Gema trained personnel.

Entering the correction values

1. Switch on the powder pump
2. Hold key down for 3 seconds



3. Set the corresponding correction value with the or key.



4. Select correction values according to the following table

Correction value	Description	Range	Default value
C0	Conveying pressure desired value (bar)	2.0 – 5.0	3.0
C1	Vacuum Suction power	1 – 4	3
C2	Pinch valve pressure desired value for pumping (bar)	2.5 – 4.0	3.5
C3	Pinch valve pressure desired value during cleaning (bar)	3.0 – 5.0	4.5
C4	Pressure monitoring limit value, no powder (bar)	0.0 – 0.45	0.0
C5	Pressure monitoring limit value, powder hose clogged (bar)	0.55 – 2.5	1.5

5. Scroll to the next or previous correction value with the ⌄ or ⌃ key

▶ **Selection is cyclical, i.e. after the last correction value, the first starts again and vice versa.**

6. Press ↩ key to quit the correction values mode.
   – The display switches to the **START** screen

Adjustment of the suction and conveying parameters

The adjustment is carried out using the correction values **C0** (conveying pressure) and **C1** (suction power).

Conveying pressure adjustment (C0)

Recommendation:

– Do not fall below 2 bar, this can lead to cloggings

– Do not exceed 5 bar, if possible

Conveying distance (m)	Setting (bar)
up to 2	2.0
2-8	3.0
8-16	3.5
more than 16	4.0

Suction power adjustment (C1)

Depending on the height difference

Recommendation:

Height difference (m)	Setting
0-1	2
2	2
3	3
4	4

Depending on the suction distance

Recommendation:

Suction distance (m)	Setting
2	2
6	4

Guide values for the adjustment of the suction and conveying parameters

Suction distance [m]	Conveying distance [m]	C0 Conveying pressure [bar]	C1 (VACUUM)	Hose emptying After-conveying activated
2	5	3	2	yes, recommended
2	25	4	3	yes, recommended
6	5	3	4	yes, recommended
6	25	4	4	yes, recommended
2	2	2	2	not necessary

Procedure monitoring (CHK)

The **CHK** (backpressure) indicator is used for process monitoring. If the powder hose clogs, then the pressure increases noticeably!

The value is shown on the local display. The corresponding signal is output at the connection **2.5** and can be used for further control tasks.

▶ **When the unit is operating properly, i.e., powder is supplied correctly to the pump in normal operation, a pressure peak between 0.3-1.0 bar should be generated!**

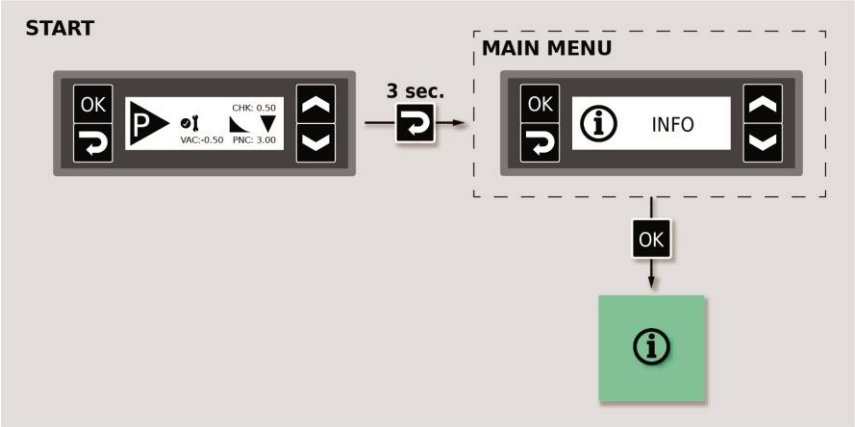
- During the pumping process, the maximum pressure is 1 bar!
- See guide values below!

Guide Values:

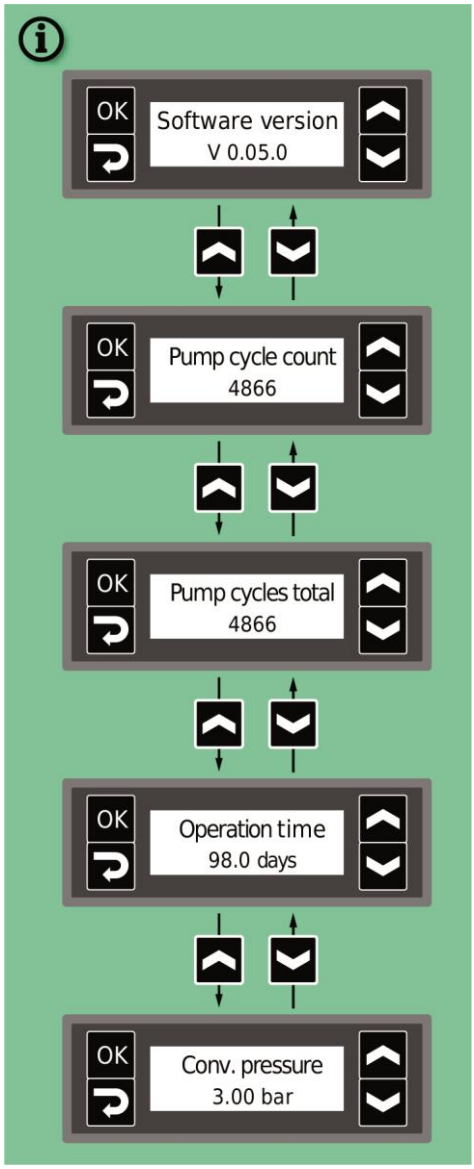
CHK display	
0 - 0,3 bar	No powder conveying
0,3 - 1 bar	Powder conveying normal
> 1 bar	Clogging / Fault

Checking the software version / INFO menu

1. Switch on the powder pump
2. Hold ↩ key down for 3 seconds



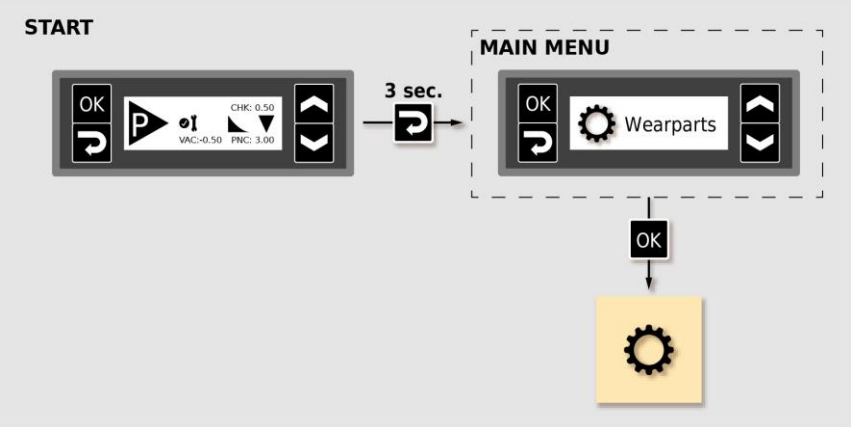
3. Press ▼ or ▲ to switch to the corresponding display



– The current software version and other information are displayed.

Monitoring of the wear parts

1. Switch on the powder pump
2. Hold ↩ key down for 3 seconds

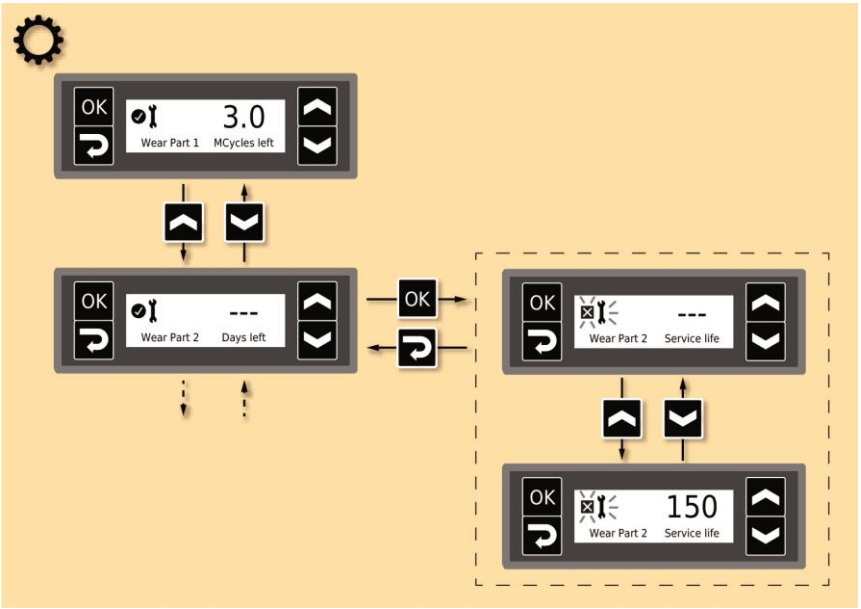


– Wear part number 1 (pinch valves) is displayed.

▶ **The displayed default value (pumping cycles) is activated ex works and may only be changed in consultation with Gema.**

– The high resolution number of pumping cycles is displayed in the **INFO** menu.

3. Select other wear parts with the ↓ or ↑ key and set the desired service life.
   – Monitoring is activated
   – During the first activation a value of --- is shown as the start value. If monitoring has already been activated at some earlier point, then the last stored value is displayed.



4. The count down timer is then activated and runs only during the pumping process

5. If the selected service life is exceeded, the symbol appears on the display. This does not affect the pumping process.

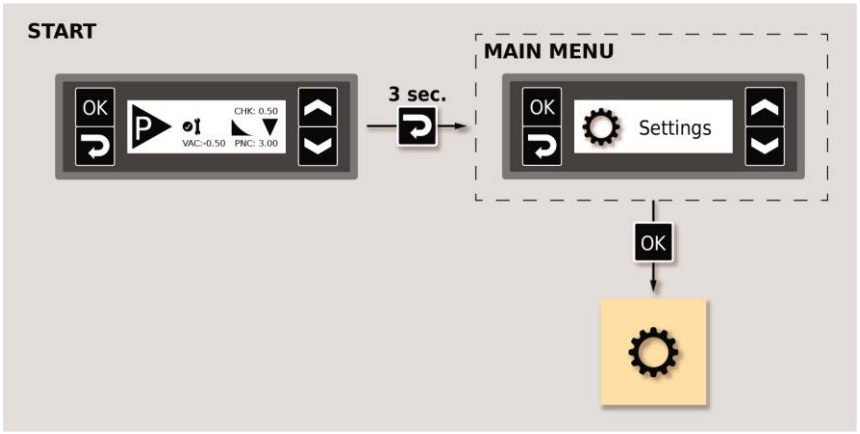
If the service life has expired and maintenance has become necessary, the corresponding wear part must be replaced and the respective service life must be reset (see chapter "Reset the service life" on page 62.).

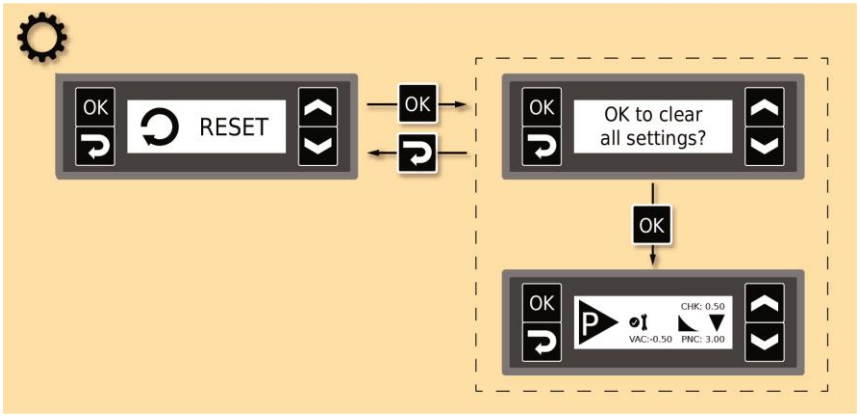
Memory Reset

The memory reset enables a restoration of factory settings of the powder pump. All parameters and correction values will be overwritten with factory default values.

By resetting the memory, the values for wear part monitoring remain unchanged!

1. Switch on the powder pump
2. Hold key down for 3 seconds





– All values are reset. The device must be set-up again.

Maintenance / Repairs

ATTENTION

Any unauthorized modifications and alterations to the product are not permitted for safety reasons and exclude the manufacturer's liability for any resulting damage!

Regular, careful cleaning and maintenance extends the service life of the product and ensures long-lasting, uniform coating quality!

– The parts to be replaced during maintenance work are available as spare parts. For further information, see chapter "Spare parts list".

General information

The product is designed to require a minimum of maintenance.

All parts that require maintenance are located in the powder chamber assembly, which is easy to dismantle. The main assembly with the valve and electrical equipment remains in place.

To avoid downtime, it is recommended to keep the following assembly in stock.

– See chapter "Powder chamber" on page 78.

Fig. 18:

Maintenance

Maintenance based on monitoring of the wear parts

The powder pump indicates it is time for maintenance by changing the maintenance indicator from  to  . If the recommended operating life is exceeded (e.g. pinch valve), the indicator changes to  .

Icon	Status	Condition/Action
	OK	–
	WARNING	below the warning limit – Maintenance recommended
	ALARM	below the remaining service life – Carry out maintenance

Maintenance schedule

The maintenance schedule is dependent on the frequency of the pump use.

The monitoring of the wear parts is linked to the internal pump cycle counter.

Up to 4 wear parts can be monitored. The service life of the components depends heavily on the service duration, the powder quality and the quality of the air supply.

To reduce unnecessary downtime, it is recommended that the pump be serviced once a year at a minimum, see below.

▶ **The specified intervals are based on operation of 8 hours per day.**

The following components or modules are subject to maintenance:

	Component	Activity	Tool	Interval
1	Pinch valves	Monitoring the icon by user  no action  Schedule maintenance  Carry out maintenance Reset service life	–	1 x weekly
1	Pinch valves	Pinch valve diagnosis by Gema Service OK = no action NOK = replace Carry out maintenance Reset service life	–	
2	Filter elements Relevant sealing elements Powder hose	Replace Reset service life	–	according to *
3	Pinch valves Filter elements Relevant sealing elements	Replace Reset service life	Maintenance set large	1 x annually
4	Protective filter elements	Check for powder contamination	–	1 x annually
5	Hose lines	Check for powder contamination and if firmly fitted	–	1 x annually
6	All electrical screw and clamp connections	Check if firmly fitted	–	1 x annually

* Monitoring of the wear parts

Usage-dependent maintenance

Planned maintenance

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.

Clean the powder pump by using the cleaning program. This cleans the filter elements and prevents any unwanted powder deposits in the powder pump and in the powder hoses.

Cleaning

Cleaning the powder pump (color change)

For the preparation of a color change, the pump has to be cleaned.

▶ **The cleaning procedure may be started and stopped either via external control unit or manually.**

– The Powder pump must be cleaned at least once per shift!

Periodic checks

The periodic checks include examining all connecting cables and hoses.

The corresponding parts should be replaced immediately if any damage to cables or hoses is discovered.

All plugs must be properly tightened.

Repair work

In the event of malfunctions or faults, the product must be checked and repaired at an authorized Gema service location. The repairs must only be performed by an authorized specialist.

Improper interventions can result in serious danger for user or the equipment and may result in loss of warranty!

Replacing the pinch valves and filter elements

Before dismantling/changing the pinch valves and filter elements, it is necessary to clean the powder pump in both directions by using the cleaning program!

Required spare parts

Maintenance set (small) / order no. 1020 444

For further information, see chapter "Spare parts list".

fig. 19

1 pinch valve
2 Filter element
3 O-ring

Required Tools

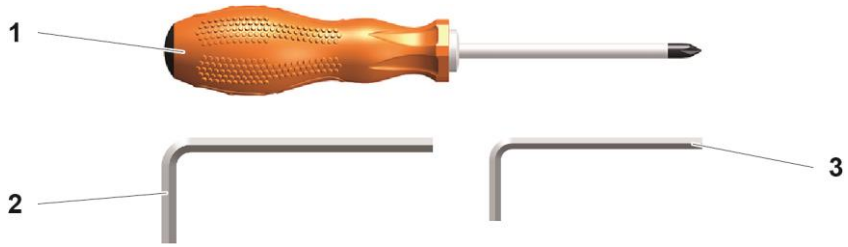
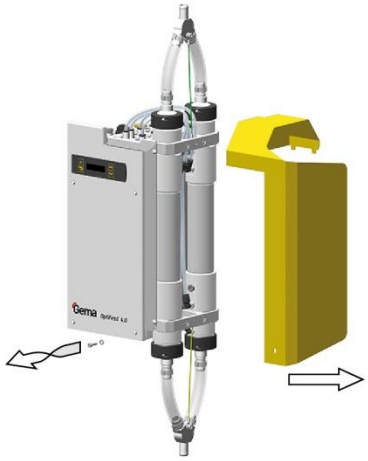


fig. 20

1 Phillips screwdriver PH1
2 Allen key size 5 mm
3 Allen key size 4 mm

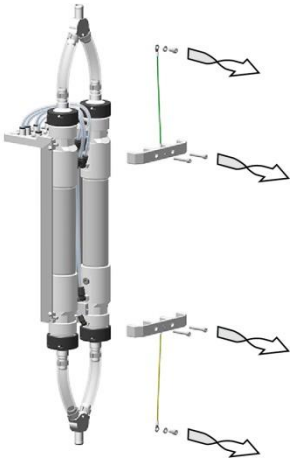
Pump disassembly

1.

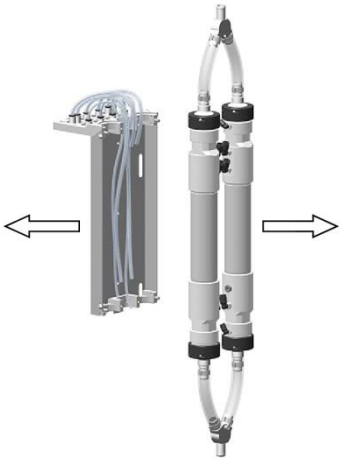


2.

3.

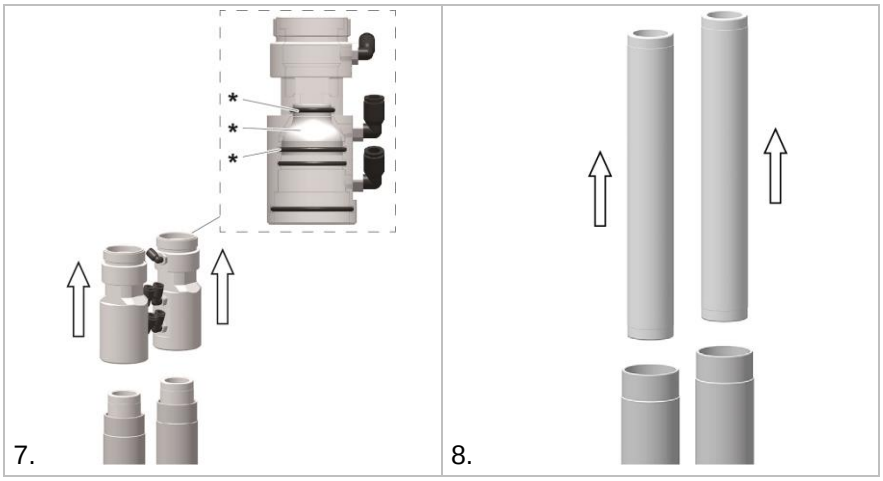


4.



5.

6.



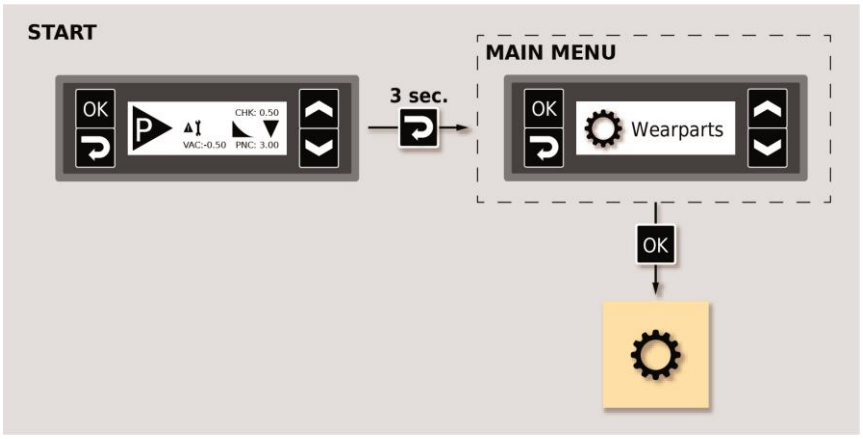
***** The end piece with the O-rings should not be removed because it is pressurized only.

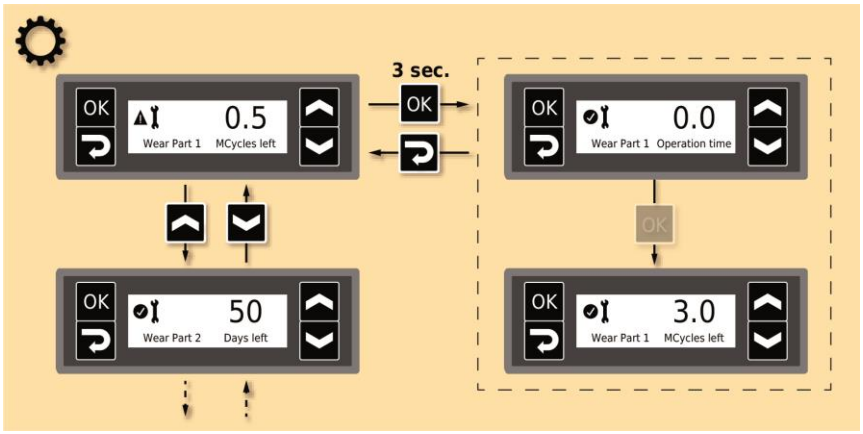
Reset the service life

After successful replacement of wear parts, the respective service life must be reset.

Example: Pinch Valves (Wear Part No. 1)

1. Hold key down for 3 seconds





2. If necessary, reset the service life of other wear parts
3. Setting the desired service life (in days)

Fault clearance

Software error diagnostics

General information

The correct function of the device is constantly monitored. If the equipment software determines a fault, an error message is indicated with a help code. Following is monitored:

- Power supply
- Pneumatic system
- Communication system

Help codes

The error diagnosis codes (help codes) are shown on the display.

The help codes are stored in an error list in the order of their appearance.

Each error in the list must be individually acknowledged with the OK key.

The errors are displayed in the order of their appearance.

Here is a list of all possible help codes for this powder pump:

Code	Description	Criteria	Remedy
Power supply:			
H20	Voltage supply error Mainboard	Mainboard defective	Contact Gema Service
H21	Supply undervoltage	Power pack defective or overloaded	Contact Gema Service
EEPROM (equipment memory):			
H24	EEPROM content invalid	EEPROM error	Contact Gema Service
H25	Timeout during EEPROM writing	EEPROM error	Contact Gema Service

Code	Description	Criteria	Remedy
H26	Values not correctly stored in EEPROM during switching off	EEPROM error	Contact Gema Service
H27	EEPROM verification erroneous	EEPROM error	Contact Gema Service
CAN bus:			
H40	Permanent CAN bus error	The CAN controller changes into BUS OFF condition. No power supply or cable is not connected.	Connect the cable, otherwise contact Gema service
H41	High error rate when transmitting/receiving	The CAN controller changes into ERROR_PASSIVE condition	Contact Gema Service
H42	Overflow on data reception	The message to be received has no more place in the receiver buffer. Messages are sent faster than they can be processed.	Contact Gema Service
H43	Overflow on transmission	The message to be sent has no more place in the transmission buffer. Messages are produced faster than they can be sent.	Contact Gema Service
H44	Master failed	Node Guarding message is missing longer than 2 seconds. Connection to master failed.	Check the connection to the Master, otherwise contact Gema service
H45	Parameter value outside the value range	The sent parameter value is outside the allowed value range	Check input values
H46	Invalid Node ID set	The Node ID is not between 1 and 127	Set Node ID to 127
H47	No CAN interface installed	CAN interface is selected in the system parameters, but no interface is installed	Contact Gema Service
H48	No ACK to “Boot Up Message” received	No CAN node is answering to the “Boot Up Message”	Check cabling connections between the users, otherwise contact Gema service
Display module:			
H50	Firmware update for display required	The firmware installed on the display is not supported	Replace or update display
Throttle motors:			
H60	Transport air reference position not found	Throttle motor or needle jammed, limit switch defective, error in motor throttle	Contact Gema Service
H61	Vacuum reference position not found	Throttle motor or needle jammed, limit switch defective, error in motor throttle	Contact Gema Service
H64	Transport air throttle does not move	Short circuit in limit switch, motor throttle defective	Contact Gema Service
H65	Vacuum throttle does not move	Short circuit in limit switch, motor throttle defective	Contact Gema Service

Code	Description	Criteria	Remedy
H68	Transport air throttle position lost	Lost steps, limit switch defective, throttle motor defective	Contact Gema Service
H69	Vacuum throttle position lost	Lost steps, limit switch defective, throttle motor defective	Contact Gema Service
Pneumatics:			
H80	Pressure regulator transport air	Actual transport air pressure out of tolerance	Check compressed air supply (insufficient air volume flow) Contact Gema Service
H81	Pressure regulator vacuum	Vacuum value out of tolerance	Contact Gema Service
H82	Pressure regulator PV air supply	Actual pressure PV supply out of tolerance	Contact Gema Service
H83	Backpressure too low	Backpressure in the powder hose less than C4	Refill the powder or check the trickling flow and fluidization
H84	Backpressure too high	Backpressure in the powder hose greater than C5	Clean or replace the powder hose Check the powder hose for kinks

Appearance of errors

It is possible that a help code is only displayed for a short time, but after the acknowledgment it will disappear. In this case, it's recommended to switch off the device and switch it on again (reset by restarting).

Troubleshooting guide

Prior to any troubleshooting measures, always check the parameters configured in the powder pump!

Incident	Causes	Corrective action
Powder pump does not convey	Compressed air supply failed or pressure too low	Check the compressed air source (ensure an air pressure of 6–8 bar), check the pressure gauge of the local pressure regulator
	No control signal	Check the control cable or control signals
	Powder not present	Refill powder
	No fluidization in the suction zone	Ensure the fluidization or set correctly
	Conveying hose is clogged	Empty powder hose over 6 m long with compressed air or manually (**warning** – powder will be expelled!)

Incident	Causes	Corrective action
	Suction hose is clogged	Run the cleaning program in conveying and in suction direction (**Warning** – powder will be expelled!)
Powder pump conveys irregularly or low powder flow	Powder is not fluidized well, pinholing in the powder container	Adjust the fluidization correctly
	Hose backpressure is greater than 1.0 bar	– Powder hose is clogged or bent (clean or replace it) – Filter elements (powder chamber/pinch valve hose) are clogged (clean or replace them)
	Service life of the pinch valve has expired (defective)	– Replace pinch valve and associated protective filter element – Blow off or replace contaminated hose connection
	Filter elements of the powder chamber tend to become clogged	Run the cleaning program, replace the filter elements
	Lifetime of the filter elements in the powder chamber expired (clogged)	Replace the filter elements
	Powder hoses tend to clog due to sintering	Clean or replace the powder hoses
	The conveying hose or suction hose is clogged	Empty the powder hose with compressed air or manually (**Warning** – powder will be expelled!)
	Conveying pressure desired value C0 incorrectly set	Set correctly (See chapter "Entering the correction values" on page 48.)
	Vacuum desired value C1 incorrectly set	Set correctly (See chapter "Entering the correction values" on page 48.)
	Pinch valve pressure desired value C2 incorrectly set	Set correctly (See chapter "Entering the correction values" on page 48.)
	Oil or water in the system	Do not use the pump before ensuring that oil or water will be separated before entering into the pump, otherwise contact Gema
Indicator on powder pump does not light up	No operating voltage	The corresponding voltage must be present at connection **2.1**: PP07 = +24 VDC; PP07-S = 110-240 VAC
	Indicator defective or incorrectly connected	Replace/connect correctly
	Main board is defective	Replace/send in for repair

Incident	Causes	Corrective action
	Power pack is defective (PP07-S)	Replace
	Fuse is defective (PP07-S)	Replace
	Main switch is defective (PP07-S)	Replace
Indicator flashes	The parameter memory test was erroneous	Reset to the default values: Press for 5 seconds Then set parameters, if necessary
Powder pump is not conveying, indicator P is not flashing	No **Pump on** control signal	A control signal must be applied at connection **2.1** PIN 2
Powder pump is not conveying, indicator P is flashing	If the LEDs on the valve connectors do not light up, the pump control or corresponding valve is defective	Replace pump control or send it in for repair
		Replace the defective valve

Decommissioning / Storage

Shutdown

1. End the coating procedure
2. Switch off the powder pump by pressing the ON/OFF switch, or by switching off on the external control unit.
   – The display will go dark.
3. Cut off the compressed air supply to the powder pump!

If in disuse for several days

1. Switch off the plant with the main switch
2. Clean the guns and the components for powder transport (see the corresponding operating manual)
3. Turn off the main compressed air supply

Storage conditions

Hazard notes

There is no danger to personnel or the environment if the unit is stored properly.

Type of storage

For safety reasons, the product should only be stored in a horizontal position

Storage duration

If the physical conditions are maintained, the unit can be stored indefinitely.

Space requirements

The space requirements correspond to the size of the product.

There are no special requirements concerning distance to neighboring equipment.

Physical requirements

Storage must be inside a dry building at a temperature between +5 and +50 °C. Do not expose to direct sunlight!

Maintenance during storage

Maintenance schedule

No maintenance schedule is necessary.

Maintenance works

During long-term storage, periodically perform a visual check.

Disposal

Introduction

Requirements on personnel carrying out the work

The disposal of the product is to be carried out by the owner or operator.

When disposing of components that are not manufactured by Gema, the instructions in the respective manufacturer's documentation must be observed.

Disposal regulations

The product must be disassembled and disposed of properly at the end of its service life.

- ► When disposing of the product, the applicable local and regional laws, directives and environmental regulations must be complied with!

Materials

The materials must be sorted according to material groups and taken to the appropriate collection points.

Disassembly of component groups

⚠ WARNING

Live components

Risk of fatal injury from electric shock if touched

- ► Only trained, authorized staff may open the electrical compartment
- ► Observe the safety symbols

1. Disconnect the mains supply and supply cables.
2. Remove all product covers.

The product is now prepared for disassembly.

Spare parts list

Ordering spare parts

When ordering spare parts for your product, please indicate the following specifications:

– Type and serial number of your product

– Order number, quantity and description of each spare part

Example:

– **Type** Powder pump OptiFeed 4.0 (PP07)

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 bulk stock is always marked with an *****.

The wearing parts are always marked with a #. marked.

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

Use of non-original Gema spare parts

When using the spare parts from other manufacturers the explosion protection is no longer guaranteed. If any damage is caused by this use all warrantee claims become invalid!

► Only original Gema spare parts should be used!

OptiFeed 4.0 (PP07/PP07-S)

	OptiFeed 4.0 powder pump (PP07) – complete (pos. 1-9)	1020 430
	OptiFeed 4.0 powder pump (PP07-S) – complete (pos. 1-6, 10-12)	1020 440
1	Powder chamber – complete (see corresponding spare parts list)	
2	Silencer – 1/2"	1006 969
3	Pneumatic group – complete (see corresponding spare parts list)	
4	Mainboard – complete	1020 104
5	Display module – complete	1016 629
6	Protective filter support – complete (see corresponding spare parts list)	
7	Protection cap for connector socket	265 446
8	Protection cap for plug	265 438
9	Plug screw – M12	1006 905
10	Power pack – complete	1020 107
11	Protection cap for connector socket	206 474
12	Fuse – 2 AT	221 872#

Wearing part

OptiFeed 4.0 (PP07) – spare parts

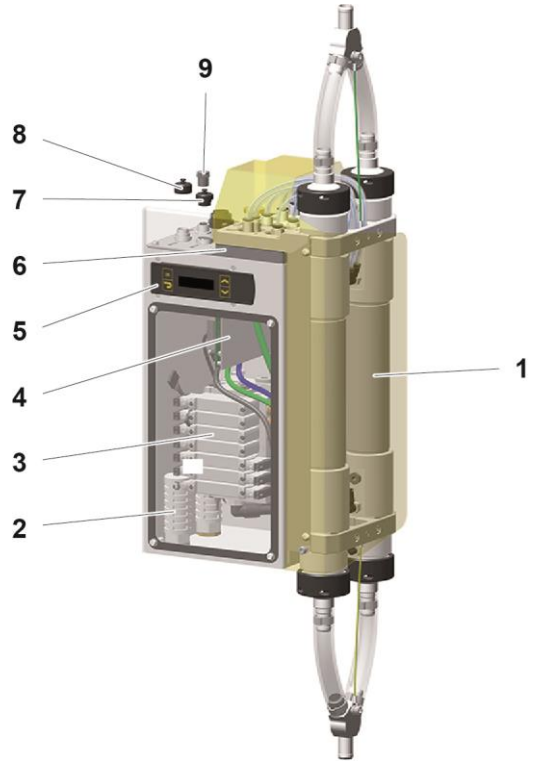


Fig. 21: PP07

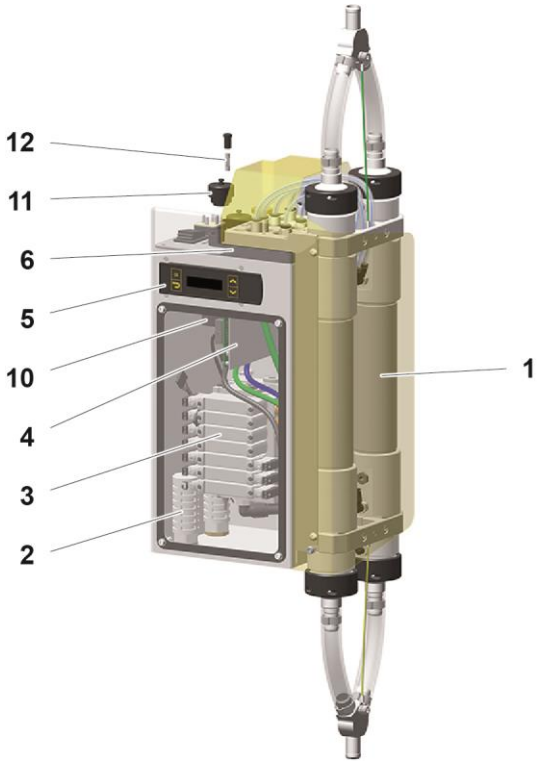


Fig. 22: PP07-S

Pneumatic group

1	Throttle valve – complete	1016 590
2	Screw – M3x10 mm	216 739
3	Solenoid valve – 5/2 AP, 24 V DC	1020 404
4	Solenoid valve – 2x3/2 AP, 24 V DC	1020 403
5	Solenoid valve – 5/3 AP, 24 V DC	1020 405
6	Silencer – M5	1020 410
7	Elbow joint – 1/4"-Ø 10 mm	1000 219
8	Elbow joint – 1/8"-Ø 8 mm	251 372
9	Cartridge (vacuum suction nozzle)	1020 409
10	Plug – 1/4"	263 834
11	Screw-in nipple – 1/8"-Ø 6 mm	240 095
12	Elbow joint – 1/8"-Ø 4 mm	1005 258
13	Plastic tube – Ø 8/6 mm	103 756*
14	Elbow joint – 1/8"-Ø 8 mm	252 182

Hose connections

Connection designation	Ø (mm)	Color	Order number
IN	10/8	black	103 250
6.4	8/6	black	103 756
A	8/6	blue	103 497
B	8/6	blue	103 497
F1	8/6	green	103 519
F2	8/6	green	103 519
1	6/4	green	1005 824
3	6/4	green	1005 824
PV	6/4	green	1005 824
2	6/4	blue	1005 825
4	6/4	blue	1005 825
TL	6/4	blue	1005 825
BP	6/4	black	103 144
Vacuum	4/2.7	black	104 469

***** Please indicate length # Wearing part

Pneumatic group

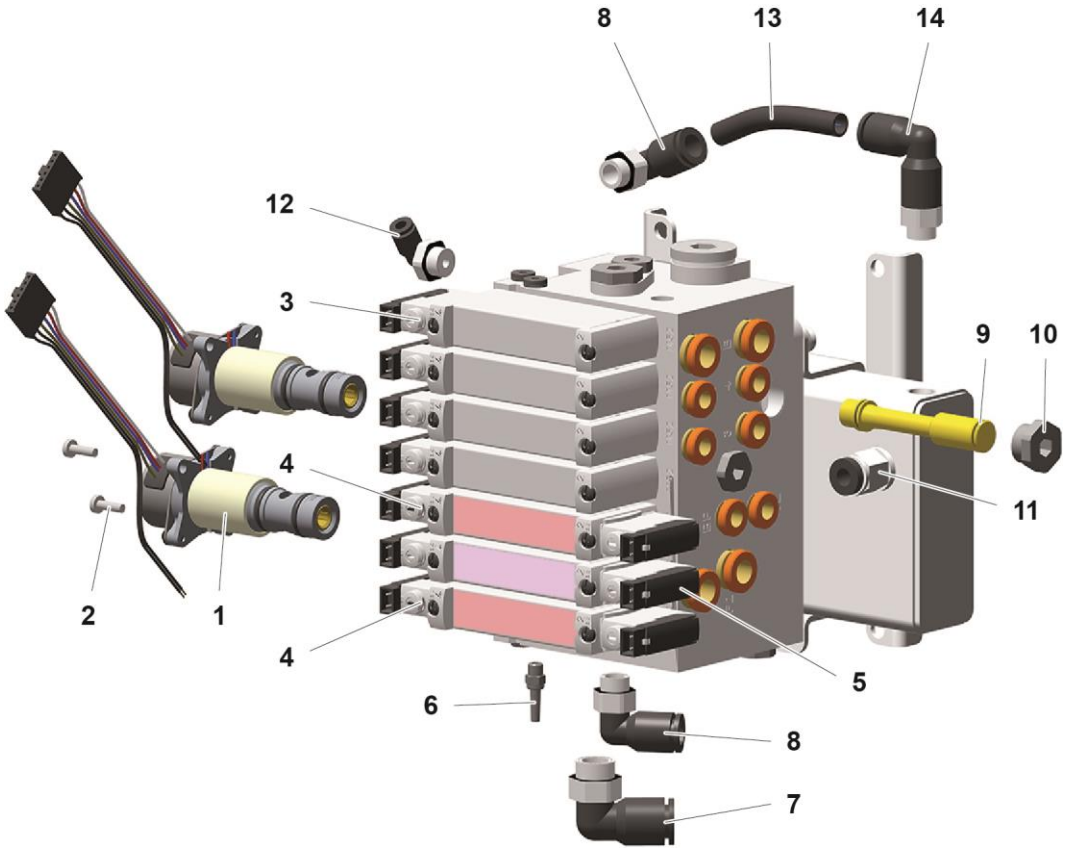


Fig. 23: OptiFeed 4.0 powder pump – pneumatic group

Thread size	Tightening torque [Nm]
M3 (8.8)	0.8
M4 (8.8)	1.8
M5 (8.8)	3.7
G1/8"	0.8
G1/4"	1.2

Powder chamber

	Powder chamber – complete (pos. 1–23)	**1019 460**
1	Y-piece	1006 962
2	Hose clamp – Ø 17–20 mm	1001 729
3	Powder hose – Ø 16/23 mm	1010 040*#
4	Threaded sleeve	1020 416
5	Tube connection (without pos. 6)	1020 413
6	O-ring – Ø 38x2 mm	1020 431#
7	Screw-in nipple – 1/8"-Ø 8 mm	240 087
8	Screw-in nipple – 1/8"-Ø 6 mm	240 095
9	Filter element (without pos. 10)	1019 465#
10	O-ring – Ø 39x3 mm	1020 433#
11	Bracket	1020 424
12	Allen cylinder screw – M5x35 mm	1005 185
13	Plug – 1/8"	263 826
14	Tube (without pos. 15)	1019 464
15	O-ring – Ø 48x3 mm	1020 432
16	Filter end piece (without pos. 10 and 17)	1019 466
17	O-ring – Ø 24x3 mm	1020 434
18	Elbow joint – 1/8"-Ø 8 mm	251 372
19	Elbow joint – 1/8"-Ø 6 mm	254 061
20	Pinch valve – complete	1020 805#
21	Grounding cable	1006 990
22	Allen cylinder screw – M6x10 mm	216 399
23	Shake proof washer – M6	216 054
30	Powder hose – Ø 16/23 mm	1010 040***#**
44	**Maintenance set (small), consisting of:**	**1020 444**
	Pos. 9: Filter element (2x)	1019 465#
	Pos. 10: O-ring – Ø 39x3 mm (4x)	1020 433#
	Pos. 20: Pinch valve – complete (4x)	1020 805#
45	**Maintenance set (large), consisting of:**	**1020 449**
	Pos. 6: O-ring – Ø 38x2 mm (4x)	1020 431#
	Pos. 9: Filter element (2x)	1019 465#
	Pos. 10: O-ring – Ø 39x3 mm (4x)	1020 433#
	Pos. 15: O-ring – Ø 48x3 mm (4x)	1020 432
	Pos. 20: Pinch valve – complete (4x)	1020 805#
	Pos. 6: Protective filter element – complete (6x) – see "Protective filter holder"	1019 470#

***** Please indicate length # Wearing part

Powder chamber – spare parts

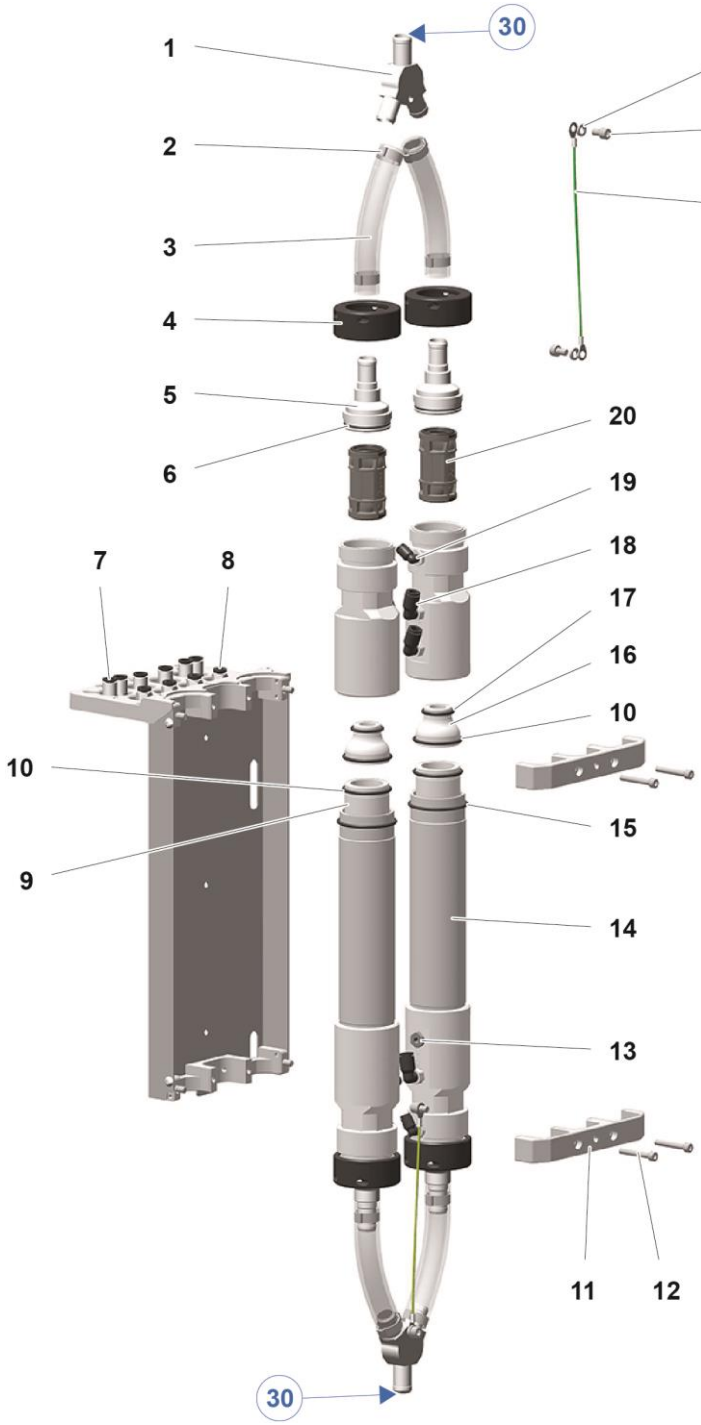


fig. 24

Thread size	Tightening torque [Nm]
M5 (8.8)	3.7
M6 (8.8)	6.2
G1/8"	0.8

Protective filter holder

1	Filter ring – complete	1020 436
2	Allen cylinder screw – M4x12 mm	1016 278
3	Washer – Ø 4.3/9x0.8 mm	215 791
4	Screw-in nipple – 1/8"-Ø 8 mm	240 087
5	Screw-in nipple – 1/8"-Ø 6 mm	240 095
6	Protective filter element – complete	1019 470#
7	Screw-in nipple – 1/4"-Ø 10 mm	266 990

Wearing part

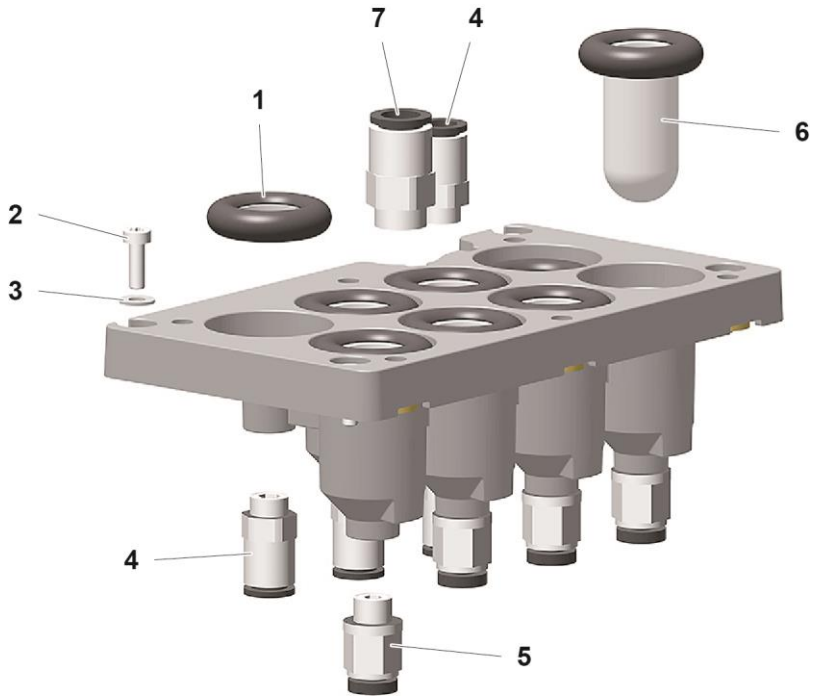


fig. 25: Filter holder

Connecting material

1	CAN bus cable – 0.5 m	1002 655
	CAN bus cable – 4.5 m	387 592
	CAN bus cable – 5.5 m	388 521
	CAN bus cable – 6.5 m	388 530
	CAN bus cable – 10.0 m	1010 407
	CAN bus cable – 20.0 m	389 560
1.1	Bus terminal resistor (not shown)	387 606
2	Signal cable (backpressure) – 1.5 m	1007 007
3	PLC connection cable – 5 m	1003 651
	PLC connection cable – 30 m	1004 112
4	Mains cable – CH	382 493
	Mains cable – Schuko	382 485
	Mains cable – USA	382 507
	Mains cable – GB	382 515
	Mains cable – AUS	382 523
	Mains cable – China	1000 993
4.1	Mains cable with ext. start/stop – 6 m	390 119
	Mains cable with ext. start/stop – 20 m	390 127
5	Vibrator cable (constituent part of vibrator)	
6	Connection cable (level sensor) – 6 m	1003 229
7	Plastic tube – Ø 10/8 mm, black	103 250*
8	Plastic tube – Ø 8/6 mm, black	103 756*

* Please indicate length

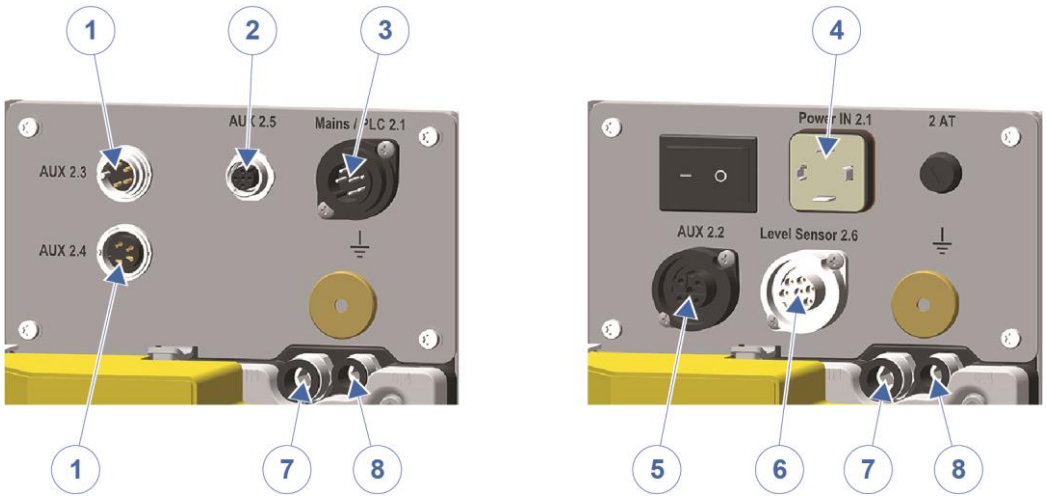


Fig. 26: Connecting material

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