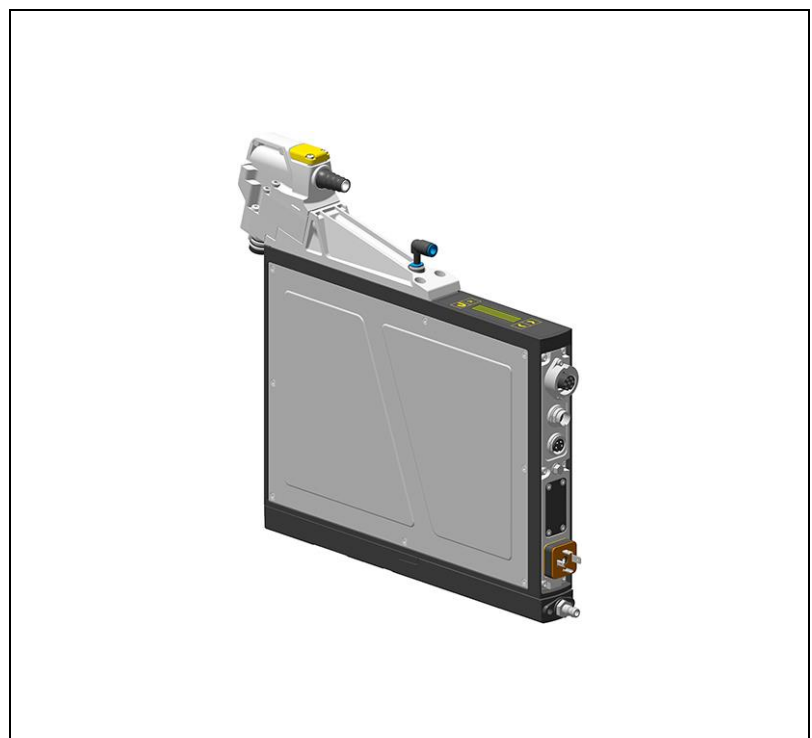

Operating instructions and Spare parts list

Gun control unit OptiStar All-in-One (CG22-C)



Translation of the original operating instructions

Documentation OptiStar All-in-One (CG22-C)

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About these instructions

General information

This operating manual contains all the important information which you require for the working with the OptiStar All-in-One (CG22-C). It will safely guide you through the start-up process and give you references and tips for the optimal use when working with 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

Software version

This document describes the operation of the product OptiStar All-in-One (CG22-C) with software version starting from 1.00.0.

See chapter "Checking the software version" on page 48.

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."*

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

This gun control unit is designed exclusively for controlling the Gema powder coating guns as well as for the powder transport by means of the integrated injector (see also in chapter "Technical data").

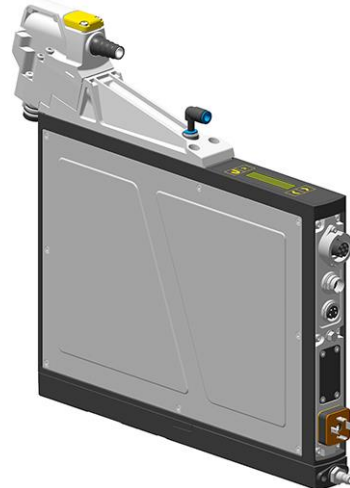


Fig. 1

Usually, this control unit is used in automatic plants in connection with the MagicControl 4.0 plant control. The actual operation as well as the error message display is done on the plant control, then.

Observance of the operating, service and maintenance instructions specified by the manufacturer is also part of conformity of 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 considered non-compliant. 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.

A summary of the directives and standards

This product was built according to the current state of the art. The product is subject to the European directives and complies with the following standards.

The product is suitable for the intended purpose and can be used in the appropriate areas.



For further information, also refer to the enclosed Declaration of Conformity.

European directives RL

EG-RL 2006/42/EU	Machinery
EG-RL 2014/34/EU	Equipment and Protective Systems in Potentially Explosive Atmospheres (ATEX)
EG-RL 2014/30/EU	Electromagnetic compatibility

EN European standards

EN 50177	Stationary electrostatic application equipment for ignitable liquid coating material - Safety requirements
EN 50050-2	Electrostatic equipment for areas where there is danger of explosion - electrostatic hand held equipment Part 2: Electrostatic hand-held spraying equipment
EN 16985	Spray booths for organic coating material - Safety requirements

Recognized safety-related regulations

764 / DGUV Information 209-052	Electrostatic coating Trade Union information concerning health and safety during work (BGI)
---	---

Reasonably foreseeable misuse

- Operation without the proper training
- Use with insufficient compressed air quality
- Use in connection with unauthorized coating devices or components
- Use of enameled powder
- Use of moist powder
- Incorrectly assembled individual parts

Technical Data

Versions

OptiStar	CAN bus
All-in-One CG22-C	yes

The equipment designation is indicated on the type plate.



Connectable guns

OptiStar All-in-One (CG22-C)	connectable
OptiGun type GA03	yes
OptiSelect Pro Type GM04	yes
OptiSelect type GM03	yes

ATTENTION

The gun control unit may only be used with the specified gun types!

Electrical data

OptiStar	
Nominal input voltage	100 - 240 VAC
Frequency	50 - 60 Hz
Fluctuations of the power supply	± 10 %
Overvoltage category	OVC II
Connected load	40 VA
Nominal output voltage (to the gun)	12 V
Nominal output current (to the gun)	1.2 A
Protection type	IP54
Max. surface temperature	85 °C (+185 °F)
Approvals	 0102  II 3 (2) D PTB17 ATEX 5002

Pneumatic data

OptiStar All-in-One (CG22-C)	
Compressed air connection	Quick coupling
Input pressure (must be set in the system parameter P2)	5.5 bar 6.0 bar 6.5 bar
Max. input pressure	7-8 bar / 101-116 psi
Min. input pressure (while unit in operation)	5.5 bar / 80 psi
Max. water vapor content of the compressed air	1.3 g/m ³ – ISO 8573-1 Class 3-4
Max. oil vapor content of the compressed air (oil/water)	0.1 mg/m ³ – ISO 8573-1 Class 2

Dimensions

OptiStar All-in-One (CG22-C)	
Width	390 mm
Depth	40 mm
Height	350 mm
Weight	approx. 4.9 kg



Powder output (reference values)

General conditions for the OptiFlow Injector

Powder type	Epoxy/polyester
Powder hose Ø (mm)	11
Type of powder hose	POE with guide strips
Input pressure OptiStar (bar)	5.5
Correction value C0	Powder output zeroing adjustment

Guide values for OptiStar with OptiFlow Injector

All values in these tables are guide values for new nozzle inserts. Differing environmental conditions, wear and different powder types can affect the table values.

Hose internal diameter (mm)		Ø 11					
Hose length (m)		6		12		18	
Total air volume  (Nm ³ /h)		3.5	5.5	3.5	5.5	3.5	5.5
Powder output (g/min)							
Powder output  (%)	20	90	105	65	75	45	60
	40	170	205	135	150	100	120
	60	235	280	185	215	145	170
	80	290	350	235	270	185	220
	100	340	405	280	320	220	260

Air flow rates

The total air consists of conveying air and supplementary air, in relation to the selected powder quantity (in %). As a result the total air volume is maintained constant.

OptiStar All-in-One (CG22-C)	
Conveying air flow rate	0-5.5 Nm ³ /h
Supplementary air flow rate	0-5.5 Nm ³ /h
Electrode rinsing air flow rate	0-5.0 Nm ³ /h

▶ **The total air consumption for the device is determined based on the configured air values.**

These values apply for a control pressure of 5.5 bar.

▶ **The max. total air consumption during the coating operation is < 5,5 Nm³/h:**

Total air = 5 Nm³/h (conveying air + supplementary air)

Electrode rinsing air = 0.1 Nm³/h (flat jet nozzle).

Environmental conditions

OptiStar All-in-One (CG22-C)	
Utilization	in the interior
Height	up to 2 000 m
Temperature range	+5 °C - +40 °C (+41 °F - +104 °F)
Max. surface temperature	+85 °C (+185 °F)
Maximum relative humidity	80 % for temperatures to 31 °C, linearly decreasing to 50 % relative humidity at 40 °C
Environment	not for wet environment
Degree of pollution of the intended environment	2 (in accordance with DIN EN 61010-1)

Sound pressure level

OptiStar All-in-One (CG22-C)	
Normal operation	< 60 dB(A)

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 is applicable only for this product itself and does not take into account external noise sources or cleaning impulses.

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

Rating plate



fig. 2

Compatibility and interactions

The gun control is used with following types of OptiCenter:

- **OptiCenter All-in-One** Type OC06

Design and function

Overall view

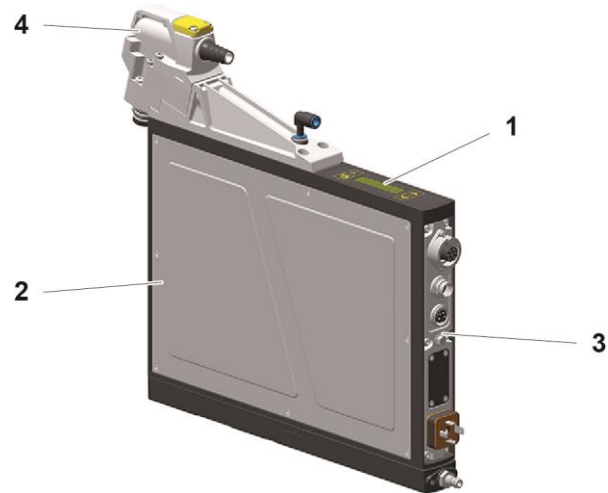


fig. 3

- | | | | |
|---|---|---|----------------------------|
| 1 | Front plate with control and display elements | 3 | Back panel with interfaces |
| 2 | Enclosure | 4 | Injector |

Operating elements

Displays

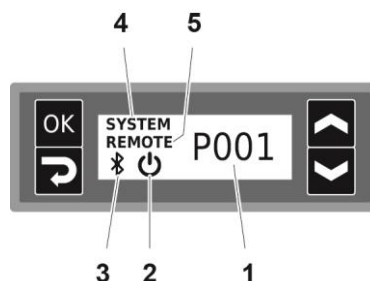


fig. 4: Display

Designation	Function
1	Display of program numbers, system parameters, error diagnosis codes, actual values, desired values <ul style="list-style-type: none"> – Powder output (display in %) – Total air volume (display in Nm³/h) – High voltage (display in kV) – Spraying current (display in μA) – Electrode rinsing air (display in Nm³/h)
2	Gun release
3	<ul style="list-style-type: none"> – Display of readiness for pairing the Bluetooth module with a mobile device (blinks) – Display of an active connection
4	System release via external release
5	Remote operation mode, no local operation possible <ul style="list-style-type: none"> – Remote operation mode is used as keyboard lock, reduced operation is possible







Input keys



fig. 5: Input keys

Designation	Function
1	Selection key <ul style="list-style-type: none"> – The displayed value is activated in order to be set – The displayed menu can be accessed
2	Back key <ul style="list-style-type: none"> – 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

Start display Programs	Menu level			
Application parameters	System parameters (System Parameters)	Correction values (Correction Values)	Settings (Settings)	Information (INFO)
Powder output 	P00-P12	C0, C1, C2, C4, C5	Pairing Bluetooth 	Software version (Software version)
Total air 			Rotate the display 	Trigger counter (Trigger time)
High voltage kV			RAM Reset 	
Spray current μA				
Electrode rinsing air 				

Connections

Compressed air hoses / cables

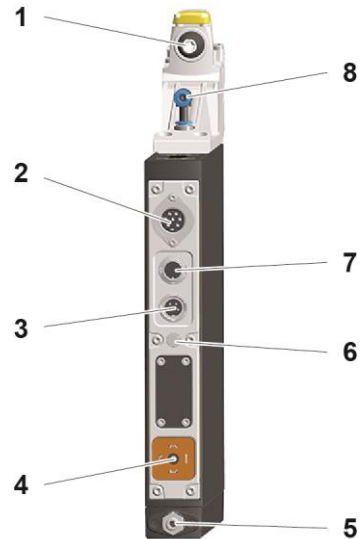


fig. 6: Connections

Connection	Description
1	Powder hose connection
2	Gun cable connection
3	CAN bus connection (OUT)
4	Mains cable connection
5	Compressed air connection
6	Grounding connection
7	CAN bus connection (IN)
8	Electrode rinsing air connection

Pin assignment



Power IN connection

1	Neutral conductor (power supply)
2	Phase (100-240 VAC)
3	External release (100-240 VAC)
PE	PE grounding



Gun connection

1	Ground
2	INTERCOM
3	Ground
4	Trigger
5	–
6	Oscillator
7	PE grounding



CAN IN plug with 4 pins (2.3 Aux)

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



CAN OUT socket with 4 pins (2.4 Aux)

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

Scope of delivery

- Mains cable
- Quick-start guide and operating manual

Typical properties – Characteristics of the functions

Adjustable operating mode (Program mode)

In this operating mode, 250 individually definable programs (P001-P250) are available. These programs are automatically saved and can be recalled again as the application requires.



fig. 7

The values for current, high voltage, powder output, total air and electrode rinsing air can be set as needed for a given application.

Precise Control of spraying Current (PCC Mode)

For coating components with both complex and simple geometries, a spraying current of below 10 μA can be selected to prevent unintended overcoating on the simpler surfaces. This is especially important in combination with high loading powders (such as metallic). The controller automatically switches into "PCC mode". This allows for very fast yet highly precise control.

Communication with the Gema electrostatic app

The control unit is prepared for communication* with the Gema electrostatic app.



The electrostatic app is optimized for mobile devices with a screen diagonal up to 15 cm (6").

The app enables customers to improve their productivity by providing the following areas:



Application

All important application parameters are clearly displayed on the mobile device and can be adapted immediately.



Line management

The coating productivity data can be retrieved at any time. Statistics and cost estimates of the order are generated automatically. Maintenance can be scheduled.



Setup


This configures the OptiStar control unit. The OptiStar can be controlled individually or as a participant in a group.

System information and diagnostic data can easily be retrieved and sent as e-mail.



Service

Enables direct access to the operating instructions of the system components and to the Gema website.

The secure connection between the control unit and the device can be established very easily with the help of the  key.

The prerequisite for this is that every control unit in the system already has its own Bluetooth ID number.

A description of the app can be found in a separate manual.

* Disabled in network operation

Rinsing mode

The rinsing mode is used to blow powder accumulations out of the powder hose, injector, and gun using compressed air.



The rinsing mode is activated via the CAN bus connection.

- See chapter "Rinsing mode" on page 47.
-

The actual rinsing procedure is started and stopped by the superordinated control unit.

Once the rinsing mode is quit, the unit automatically returns to the last program.

Correction values

The Gun control unit can be adapted with the correction values optimally to local conditions (e.g. the adjustment of different powder outputs in the plant).

Assembly / Connection

Assembly guide

The gun control unit is mounted into place using 2xM4 screws on the front side. Please contact Gema for other installation possibilities.

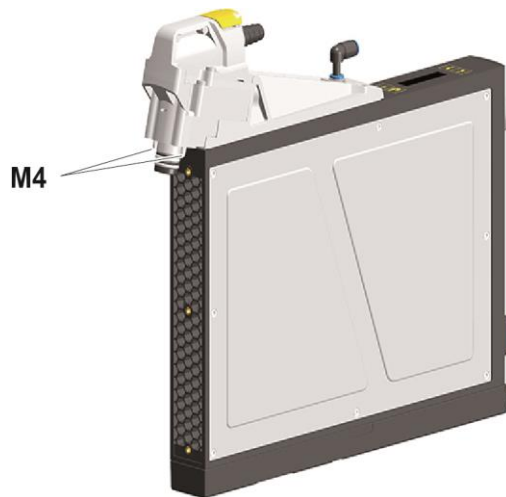


fig. 8

Connection instructions

The gun control unit is supplied ready for use by the manufacturer. Just a few cables and hoses must be connected. (See chapter "Pin assignment" on page 21.)

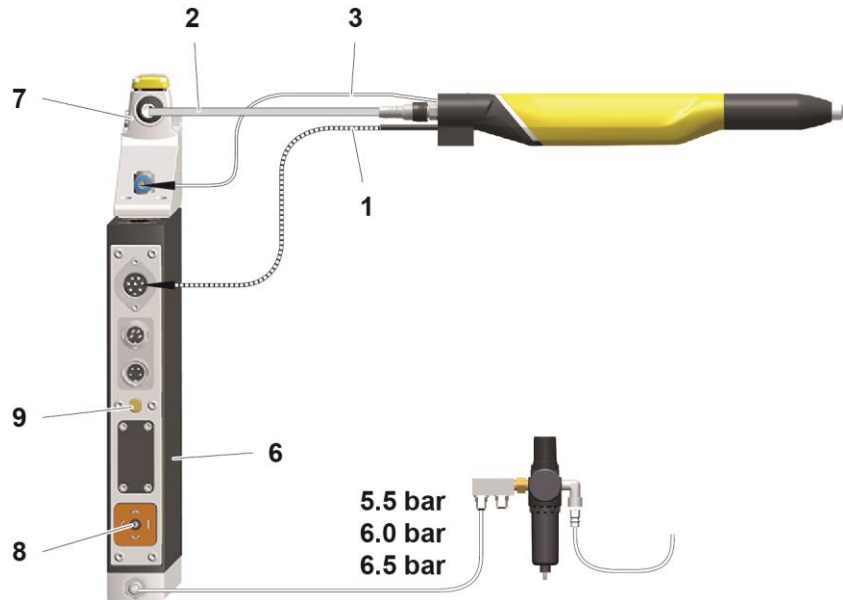


fig. 9: Connecting guide – overview

- | | | | |
|---|----------------------------|---|----------------------|
| 1 | Gun cable | 7 | Injector |
| 2 | Powder hose | 8 | Power supply |
| 3 | Electrode rinsing air hose | 9 | Grounding connection |
| 6 | OptiStar Control unit | | |



Connect grounding cable to the booth or the suspension arrangement!

- Check ground connections with Ohm meter and ensure 1 MOhm or less



The compressed air must be free of oil and water!



Close the unused connections with the provided dust protection caps!

Set-up

Usually, this control unit is used in automatic plants.

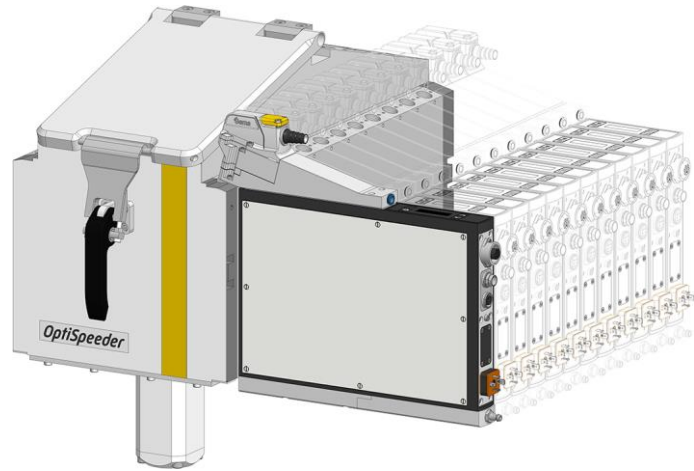


fig. 10: OptiStar All-in-One in OptiCenter

Start-up

Preparation for start-up



The gun control unit always starts up to the last configured settings.

Basic conditions


When starting up the gun control unit, the following general conditions impacting the coating results must be taken into consideration:

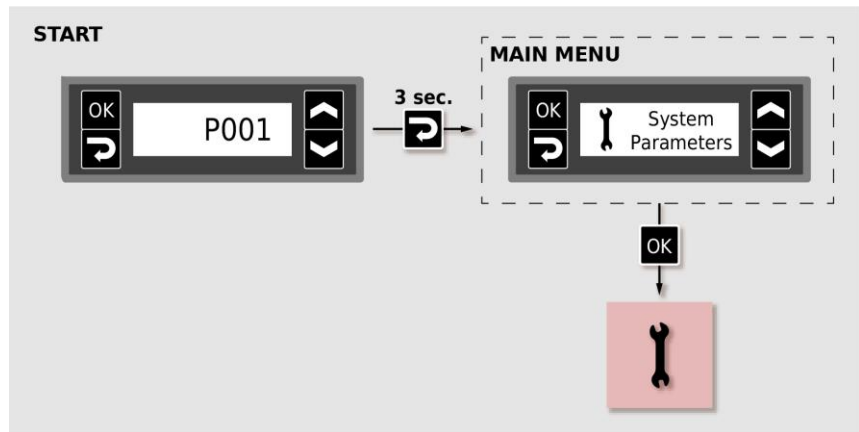
- Gun control unit correctly connected
- Gun correctly connected
- Corresponding power and compressed air supply available
- Powder preparation and powder quality

System parameters

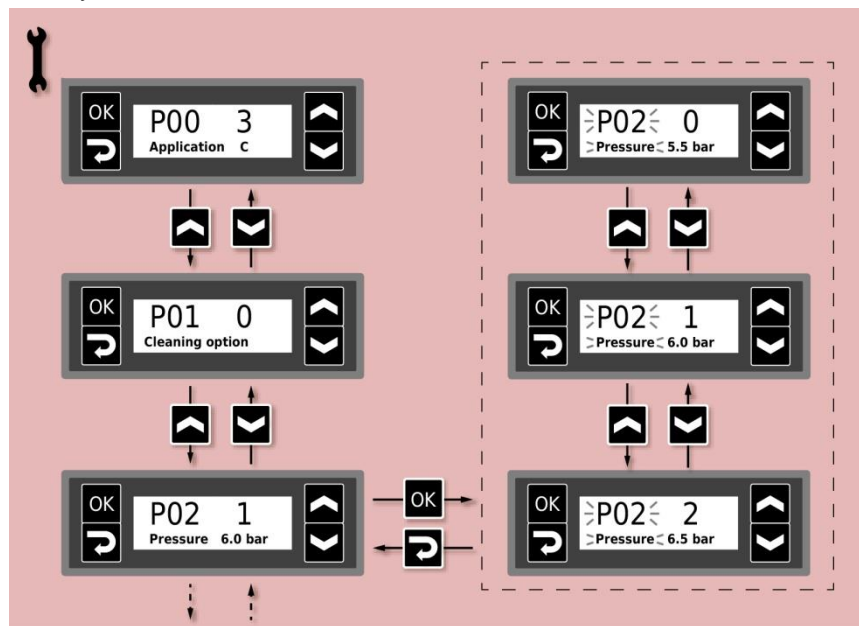
The Gun control unit is configured by using the system parameters. This configuration will be saved in the equipment memory. These values can be adjusted and requested manually or by remote interface (CAN).

Entering the system parameters

1. Switch on the gun control unit
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
P00 ¹⁾	Application (Device type)	3: Automatic device (CG22-C)	C
P02	Pressure (Input pressure)	0: P in = 5.5 bar 1: P in = 6 bar 2: P in = 6.5 bar	5.5 6.0 6.5
P03	Air unit (air measurement unit)	0: Nm³/h 1: scfm	m³/h SCFM
P04	Bus interface (Interface type)	0: Deactivated 1: Automatic recognition	OFF Auto

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	Air mode (Air volume setting)	0: Standard (PA / GL) 1: Advanced (FL / ZL)	Standard Advanced
P08	Remote change (Procedure when changing Local / Remote)	0: Gun release is reset 1: Gun release is not changed 2: Gun release always active	Turn gun off Keep gun state Always enabled
P10	Log level	0, 1, 2 , 3, 4, 5	
P11	BLE Devid (Bluetooth ID no.)	0: Bluetooth deactivated 1 - 255	
P12	Rmt Ctrl (Remote control)	0: Powder output +/- Cleaning activation 1 : Program change Cleaning activation	PA / Clean Prog / Clean


¹⁾ is not overwritten, if a Memory Reset is performed

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 P03 (measuring unit)

This parameter is used to determine the measuring unit for all airs (total air and electrode rinsing air). If the parameter is set to **1 (scfm)**, then all air values are shown in this measuring unit.

System parameter P10

The device can export log reports of the program run to an SD card for test purposes and for finding defects.

If an SD card is inserted during the switching on procedure, the log messages are also recorded onto the SD card. The data are recorded in 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



Real time timings can be impaired from a level of detail of 4.

System parameter P11 (Bluetooth ID no.)

The Bluetooth ID number is determined with this parameter. An individual Bluetooth ID number must be assigned to each pistol control unit that is to be accessed via the Gema electrostatic app.



This value is set to 0 in network operation.

- The Bluetooth function is disabled.



Pairing of the Bluetooth module with a mobile device

The first connection setup in which Bluetooth devices are coupled is also called pairing.

Following conditions have to prevail:

- the E app has already been downloaded and installed from an app distribution platform ( or ) (Keyword "**gema e-app**").
- ID number set in system parameter P11.
- Bluetooth activated on mobile device

To use Gema's E-app, proceed as follows:

1. Start the E-app
2. Keep the  key on the control unit pressed for two seconds
3. Press 
4. Select OptiStar
 - the control unit is now paired. The communication partners exchange key data so that they automatically recognize each other next time.

More information on how to use Gema's E-app can be found in a separate manual.

CAN bus

General

The control unit 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.

Following data can be accessed by CANopen:

- All desired values (process data)
- All actual values (process data)
- All control values
- All system parameters (except Baud rate and CAN address)
- All error messages
- All special parameters such as software version, daily correction, powder output correction etc.

Hardware

The OptiStar control units are connected to the central PLC control unit 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 Control units can be operated in a network.

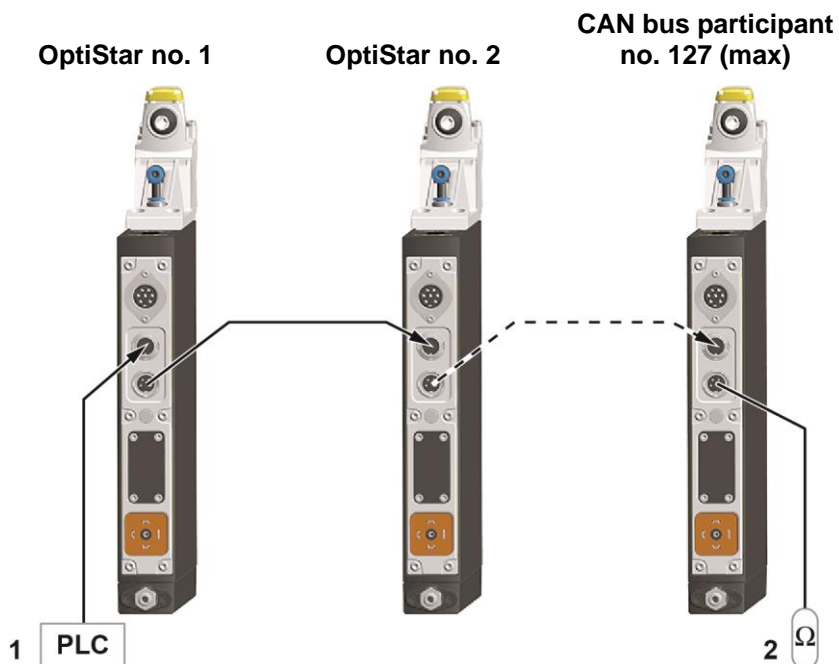


fig. 11: CAN bus – connections

- 1 PLC control with CAN bus
- 2 Terminal resistor

CAN bus cable – plug assignment



fig. 12: CAN bus cable

Pin	Signal	Color
1	GND	white
2	+24 VDC	black
3	CAN H	black
4	CAN L	black

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!

Starting the individual adjustable programs

1. Switch on the gun control unit






Program 001 active


2. Select the desired program number (001-250) using  or  key
3. Change the application parameters as required

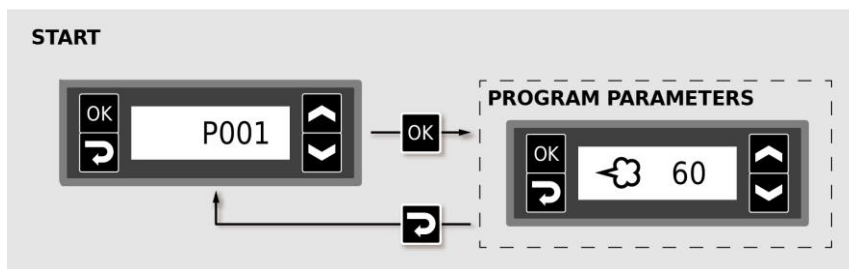


Programs 001-250 are preset at the factory but can be modified at any time, after which they are automatically stored.

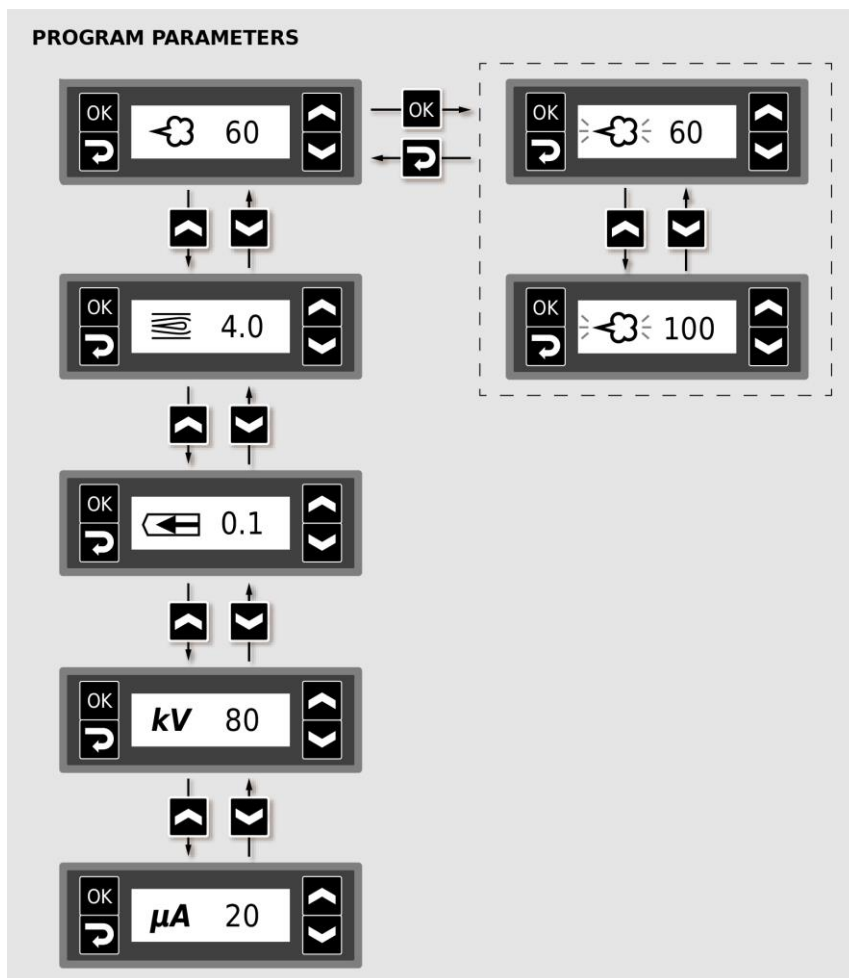
Description		Presetting
	Powder output	60 %
	Total air	4.0 Nm ³ /h
kV	High voltage	80 kV
μA	Spray current	20 μA
	Electrode rinsing air	0.1 Nm ³ /h

Change the application parameters

1. Switch on the gun control unit
2. Press the  key



3. Set the corresponding value with the or key.



4. Scroll to the next or previous parameter with the or key



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

5. Press key to quit the application parameter mode.
 – The display switches to the **START** screen


Setting powder output and powder cloud

The powder output depends on the selected powder output (in %), and the powder cloud on the selected total air volume.

▶ **As a factory default value, a powder rate of 50% and a total air volume of 4 Nm³/h are recommended.**

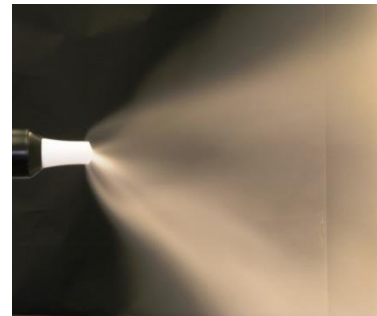
- If values are entered that the gun control unit cannot implement, then the operator is informed of this by a blinking in the relevant display and a temporary error message!

Setting the total air volume

1. Adjust the total air volume  according to the corresponding coating requests



correct powder cloud



too little total air

Setting the powder output

1. Adjust the powder output volume  (e.g. according to the desired coating thickness)



much powder




little powder

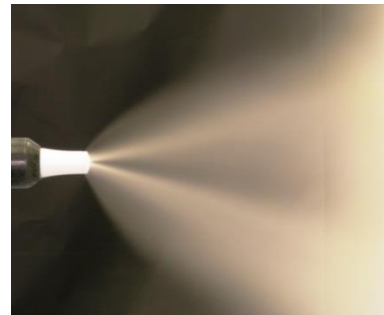
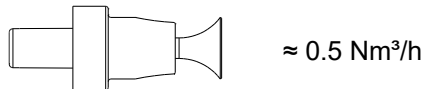
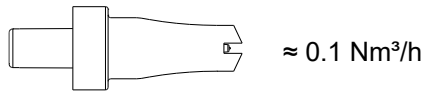
- Factory default setting of 50% is recommended for initial operation. The total air volume is thereby kept constant automatically by the control unit.

▶ **To achieve maximum efficiency, we recommend avoided an overly high powder volume where possible!**

2. Check fluidization of the powder in the powder container
3. Switch the gun on and visually check the powder output

Setting the electrode rinsing air

1. Adjust the correct electrode rinsing air  according to the applied nozzles (deflector plate, flat jet nozzle)



too much electrode rinsing air

Remote operation

There is the possibility to remotely control the device externally via CAN-Bus.

Local operation in remote operating mode

In remote operating mode, local operation is limited to:


- Display of the desired values of the current program
- Error acknowledgment

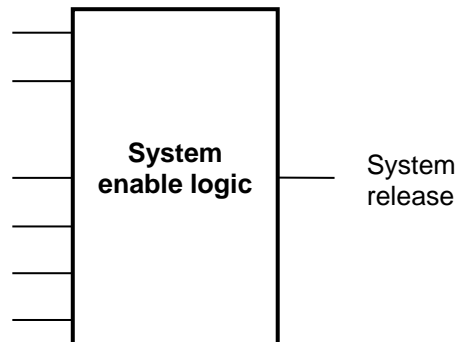
Transfer to remote operating mode

- During transfer from local to remote operating (and vice versa), the powder output will cease so that the device is in a defined mode after transfer.
- Remote operating mode is signaled by the symbol **REMOTE**.

System release in network operation

The system release logic starts and stops the powder conveying and high voltage. The release is determined due to the several internal and external signals.

Signal	Designation
Trigger	Gun connected
External release	Release on mains plug
Gun release 	Command via Remote Interface
Gun ON/OFF	Command via Remote Interface
Error lock	Device error
System lock	Parameter input



Correction values

With the correction values, the gun control unit can be adapted optimally to local conditions (e.g. the adjustment of different powder outputs in the plant).


ATTENTION

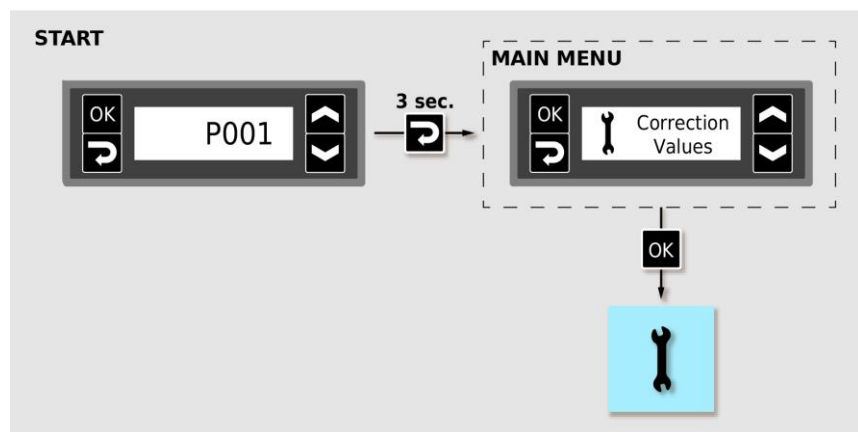
Incorrectly set correction values can lead to coating errors



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

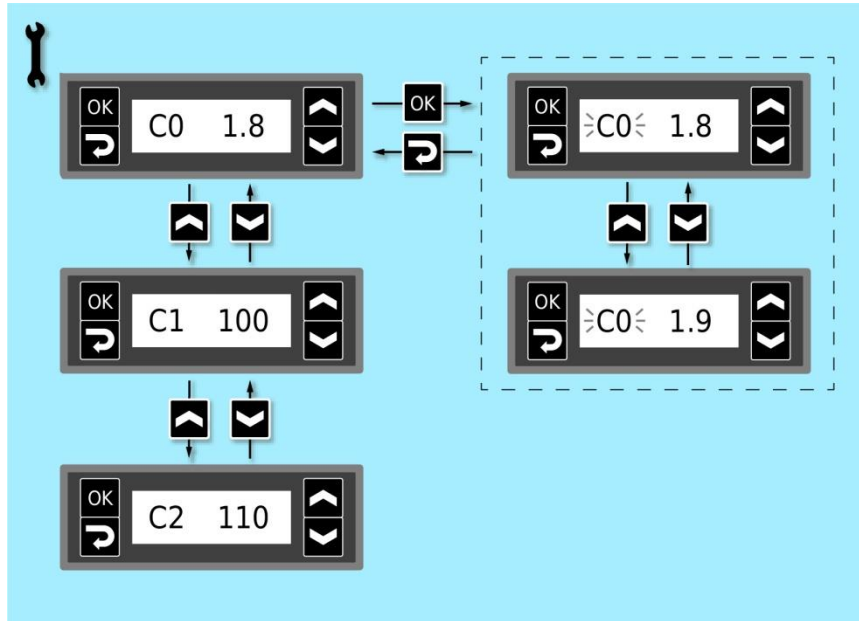
- ▶ Changes of correction values may only be made by Gema trained personnel.

Entering the correction values

1. Switch on the gun control unit
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

Corr. value	Description	Range	Default value
C0	Powder offset (Nm ³ /h)	0.5 -3.0	1.8
C1	Powder hose correction value (%)	40-100	100
C2	Daily correction value (%)	50-150	100
C4	Threshold value Suction section clogged (mbar)	-200...-5	-70
C5	Threshold value Powder hose clogged (mbar)	30...70	50

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

Powder output/powder hose correction









The settings in the following example are carried out for each gun individually!

Powder output corrections are made at the first start-up, after a service work, after the solution of application problems, or by using different hose diameters!

It is recommended to create a table with input fields (see "Example table for powder output/powder hose correction"), so that, if a possible system reset takes place, an access to these data can take place.


Powder output correction – procedure

1. Set the total air  to **4,0** (Nm³/h).
2. Set the powder output  to **00** (%)
3. Select the submenu **Correction Values** in the **MAIN MENU**
4. Press  or  for switching to the corresponding display
5. Check the correction value for minimum powder output **C0**, and set it to **1.8** (Nm³/h) with the  or  keys if necessary
6. . Check the correction value for maximum powder output **C1**, and set it to **100** (%) if necessary




For the next steps a measuring bag is necessary, for weighing the powder output.

- Do not forget to note the dead weight of the measuring bag.

7. Put the measuring bag over the gun nozzle and fasten it. Switch on the gun for 60 seconds
8. After this time has elapsed, switch off the gun, remove the measuring bag and weigh it. The powder output should be between 10-15 gr
9. If no powder is expelled from the gun, return to the system parameter mode and increase the minimum powder output value **C0** (range **0.5-3.0** Nm³/h)
10. If too much powder is expelled from the gun, return to the system parameter mode and decrease the minimum powder output value **C0** (range **0.5-3.0** Nm³/h)
11. Repeat steps 7 and 8, until the powder output amounts to 10-15 g. Annotate the adjusted minimum powder output value **C0** in the table
12. Press  key to quit the correction values mode.
The display switches to the **START** screen

Powder hose correction – procedure

1. Set the powder output  to **80** (%)
2. Put the measuring bag over the gun nozzle and fasten it. Switch on the gun for 60 seconds

3. Switch off the gun after 60 seconds, remove the measuring bag and weigh it
4. Annotate the powder output in **g/min** in the table

Calculate the powder output correction according to following formula:

$$C1 (\%) = \frac{\text{smallest powder output}}{\text{measured powder output}} \times 100$$

5. Annotate the calculated values (**C1**) for each individual gun in the table and enter the values to the control unit (therefore, repeat the steps 2 and 3)

Example table for powder offset and powder hose correction

Gun	Powder offset correction C0			
No.	Before correction		After correction	
1	C0=1.8 Nm ³ /h	20 g	C0=1.7 Nm³/h	12 g
2	C0=1.8 Nm ³ /h	10 g	C0=1.8 Nm³/h	13 g
3	C0=1.8 Nm ³ /h	0 g	C0=2.6 Nm³/h	12 g
etc.				

Gun	Powder hose correction C1			
No.	Before correction		After correction	
1	C1=100 %	200 g	C1=100 %	200 g
2	C1=100 %	250 g	C1=80%	200 g
3	C1=100 %	280 g	C1=71%	200 g
etc.				

Correction factor – diagram

Impact of the powder hose correction
(powder hose 11 mm x 12 m)

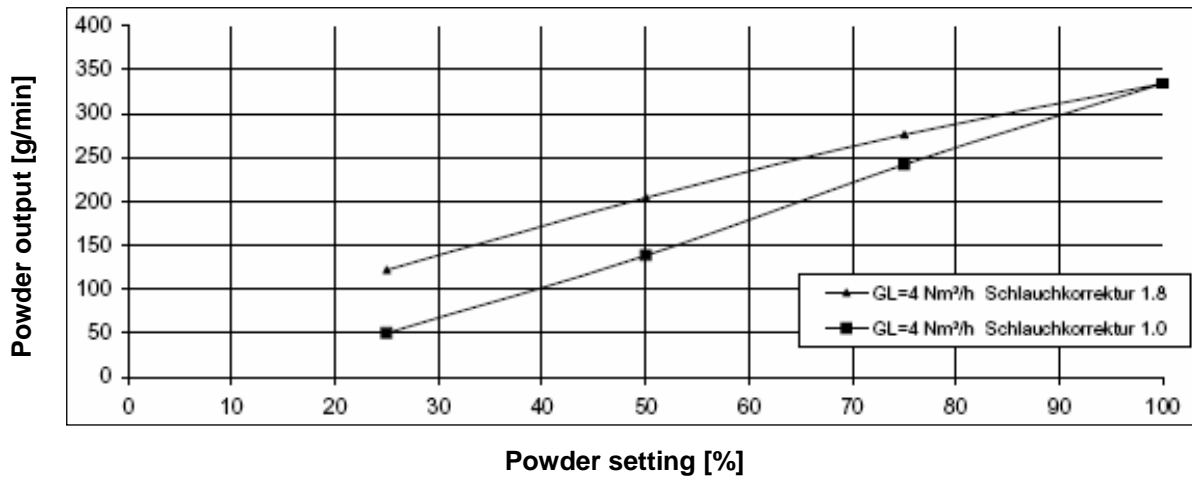


fig. 13: Correction factor – diagram



The hose length correction factor is chosen in such a way, that no powder is visible, if the powder portion is 0%, by increasing the value, the powder becomes visible then.

- This behavior depends on the hose length and the hose diameter.

Daily correction value C2

The daily correction value C2 can be used to allow higher or lower powder volumes!

Rinsing mode

The rinsing mode enables the blowing off of powder accumulations in the powder hose with preset air pressure and is activated via the CAN bus connection – see also the MagicControl 4.0 operating instructions.

This function is a two steps process to activate.

Activating the rinsing function

⚠ CAUTION

Release of pulsating and/or compressed air containing powder.

If the product 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 hose and the pneumatic hoses must be mounted.
- ▶ The gun must be 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.

The rinsing mode can only be activated from standby mode (application parameter menu display, no powder conveying). The prerequisite is, that all necessary release signals are present.

1. Select the desired rinsing function on the MagicControl 4.0

	Rinsing function
A	Powder hose cleaning with increasing air volume
B	Powder hose cleaning with constant air volume

2. During the “Powder hose cleaning with increasing air volume” mode, all airflows are increased step by step after starting the rinsing procedure, and then they remain at the maximum:

Time [s]		0	1	2	3	4...
Conveying air	[Nm ³ /h]	0	2	4	5.5	5.5
Supplementary air	[Nm ³ /h]	0	1.5	3.0	4.5	4.5
Electrode rinsing air	[Nm ³ /h]	0	1.0	2.0	3.0	3.0

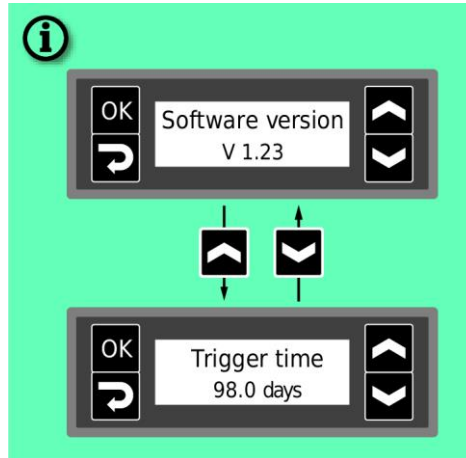
3. During the “Powder hose cleaning with constant air volume” mode, there is no airflow increasing step by step. The maximum values are set immediately.

The rinsing mode is exited:

- if the rinsing sequence has finished

Checking the software version

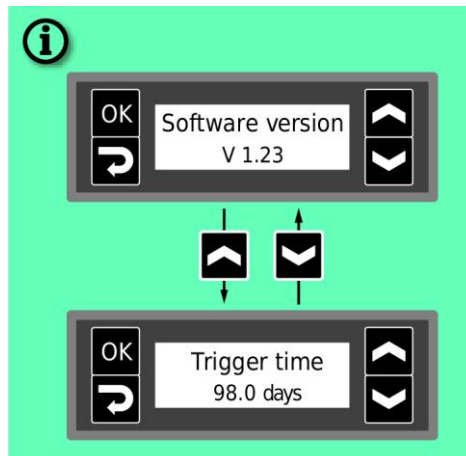
1. Select the submenu **INFO** in the **MAIN MENU**





- The actual software version is displayed.

Trigger counter

1. Select the submenu **INFO** in the **MAIN MENU**





2. Press  or  for switching to the next display
 - The trigger counter (total time in days of trigger time) is shown.
- The trigger counter can't be reset!

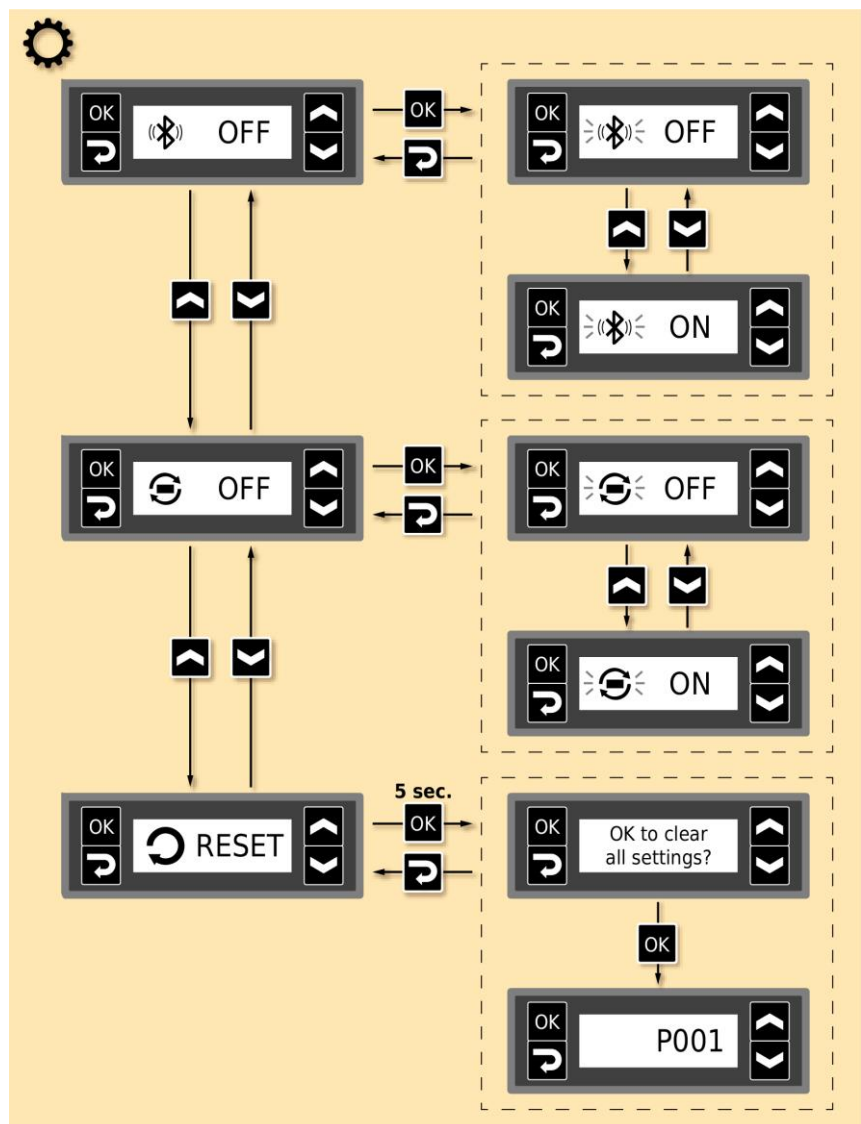
RAM Reset

The RAM reset enables a restore of factory settings of the gun control unit. All parameters (**except P00**) and correction values as well as all user-defined values will be overwritten with factory default values.



By resetting the RAM, all user-made settings will be set to factory default!

1. Select the submenu **Settings** in the **MAIN MENU**
2. Press  or  for switching to the corresponding display



- All values are reset. The control unit must be set-up again.

Decommissioning / Storage

Shutdown

1. End the coating procedure
2. Switch off the control unit



The adjustments for high voltage, powder output volume and electrode rinsing air remain stored.

If in disuse for several days

1. Switch off the plant with the main switch
2. Clean the gun and the components for powder conveying (see therefore the corresponding user manuals)
3. Turn off the compressed air main 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.

Maintenance / Repairs

General information

The product was designed for a maintenance-free operation.

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!

Fault clearance

Error diagnosis of the software

General information

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

- High voltage technology
- Pneumatic system
- Power supply

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 key **OK**.

The errors are displayed in the order of their appearance.

Here is a list of all possible help codes for this Gun control unit:

Code	Description	Criteria	Remedy
Pneumatics 1:			
H06	Trigger valve	Solenoid coil current lower than preset limiting value Valve defective, main board or cable defective	Contact a Gema service center
H07	Supplementary air volume too high (setting of supplementary air on the display)	The preset value for supplementary air is too high compared to the conveying air setting	Lower supplementary air value or increase value for conveying air to equalize air volumes to the injector, delete error code

Code	Description	Criteria	Remedy
H08	Conveying air volume too high (setting of powder share on the display)	The preset value for conveying air is too high compared to the supplementary air setting	Lower conveying air value or increase value for supplementary air to equalize air volumes to the injector, delete error code
H09	Powder output higher than 100%	The powder output multiplied by the powder hose length factor and daily correction value is greater than 100% Daily correction value too large	Reduce powder output Reduce daily correction value
H10	Conveying air range lower deviation	The theoretical value for conveying air falls below minimum Total air is smaller than minimum	Limit conveying air to its minimum value
High voltage:			
H11	Gun error	No vibrations in the oscillator, cable break, oscillator or gun is defective	Contact a Gema service center
H13	Gun Overload	Cable or cascade defective. The control unit is switched off.	Contact a Gema service center
Power supply:			
H20	Voltage supply error Mainboard	Mainboard defective	Contact a Gema service center
H21	Supply undervoltage	Power pack defective or overloaded	Contact a Gema service center
H22	Wrong internal system clock	Backup battery is empty	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
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 a Gema service center
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 a Gema service center

Code	Description	Criteria	Remedy
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 a Gema service center
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

Pneumatics 2:

H50	Suction section clogged	Negative pressure on suction side too high	Check the suction section, otherwise adjust the correction value C4
H51	Powder hose to the gun bent or clogged	No negative pressure on suction side present	Check the powder hose
H52	Pinch valve	Solenoid coil current lower than preset limiting value Valve defective, main board or cable defective	Contact a Gema service center
H53	Cleaning solenoid valve (suction side)	Solenoid coil current lower than preset limiting value Valve defective, main board or cable defective	Contact a Gema service center
H54	Cleaning solenoid valve (blow-off side)	Solenoid coil current lower than preset limiting value Valve defective, main board or cable defective	Contact a Gema service center

Throttle motors:

H60	Conveying air reference position not found	Throttle motor or needle jammed, limit switch defective, error in motor throttle	Contact a Gema service center
H61	Supplementary air reference position not found	Throttle motor or needle jammed, limit switch defective, error in motor throttle	Contact a Gema service center
H62	Electrode rinsing air reference position not found	Throttle motor or needle jammed, limit switch defective, error in motor throttle	Contact a Gema service center
H64	Conveying air throttle does not move	Short circuit in limit switch, motor throttle defective	Contact a Gema service center
H65	Supplementary air throttle does not move	Short circuit in limit switch, motor throttle defective	Contact a Gema service center

Code	Description	Criteria	Remedy
H66	Electrode rinsing air throttle does not move	Short circuit in limit switch, motor throttle defective	Contact a Gema service center
H68	Conveying air position lost	Lost steps, limit switch defective, throttle motor defective	Contact a Gema service center
H69	Supplementary air position lost	Lost steps, limit switch defective, throttle motor defective	Contact a Gema service center
H70	Electrode rinsing air position lost	Lost steps, limit switch defective, throttle motor defective	Contact a Gema service center
Communication mainboard-gun:			
H91	Communication error mainboard-gun	Gun, gun cable or Mainboard defective	Replace or contact Gema Service

Help codes list

The last appeared four errors are stored in a list by the software. If an error appears, which is already in the list, he will not be listed again.

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).

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** Gun control unit OptiStar All-in-One (CG22-C)
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 warranty claims become invalid!

- ▶ Only original Gema spare parts should be used!
-

OptiStar All-in-One (CG22-C) gun control unit

	OptiStar All-in-One (CG22-C) gun control unit – complete	1019 901
	OptiStar All-in-One (CG22-C) gun control unit – complete, without OptiFlow IG08 injector	1019 900
1	Powder conveying unit – complete, see corresponding spare parts list	1023 990
2	Valve block – complete, see corresponding spare parts list	
3	Countersunk screw – M4x8 mm	1016 664
4	Compressed air input unit – complete, see corresponding spare parts list	
5	Backplate – complete, see corresponding spare parts list	
6	PT-screw – 3x8 mm	1017 424
7	Display module – complete	1016 629
8	Mainboard with power supply	1016 142

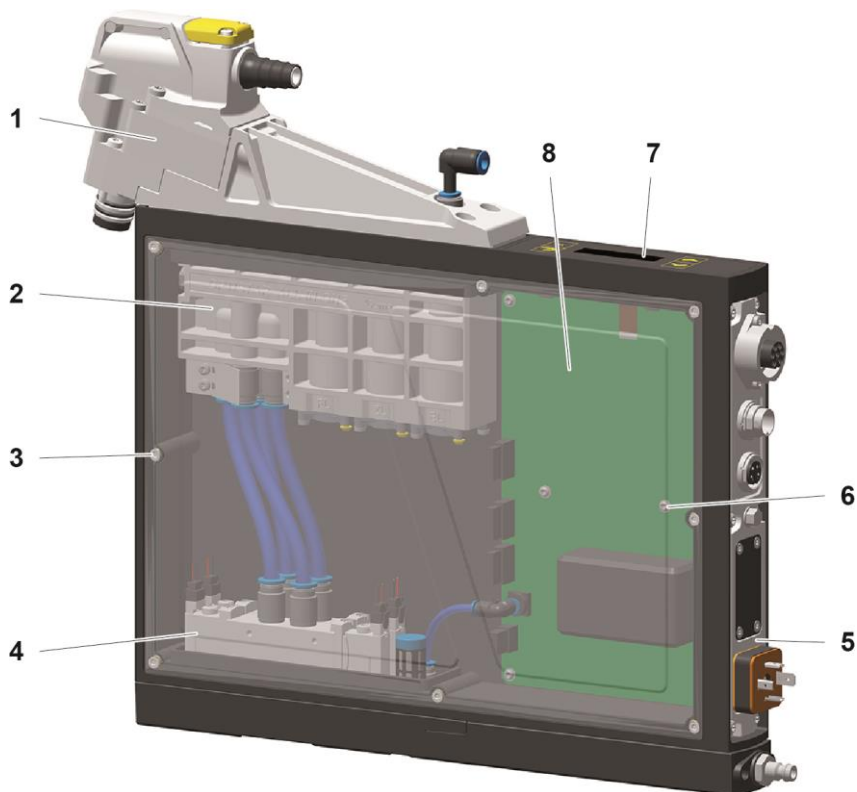


fig. 14

Item	Tightening torque [Nm]
3	0.85
6	1.6

Compressed air input unit

1	Push-in fitting – Ø 8 mm	1015 379
2	Plug connection	1016 148
3	Solenoid valve	1015 382
4	PT-screw – 4x16 mm	1018 919
6	Push-in fitting – Ø 4 mm	1016 793
7	Silencer – 1/8"	1016 606
8	Sensor hose	1020 097
10	Compressed air hose	1020 093

* Please indicate length

Wear part

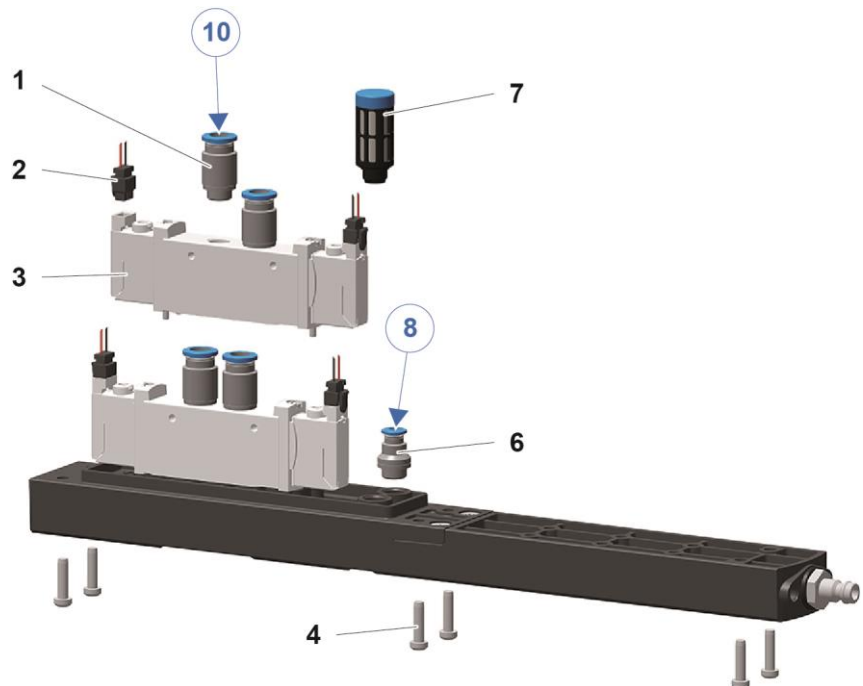


fig. 15:

Item	Tightening torque [Nm]
4	3.0

Powder conveying unit

	Injector IG08 – complete (without pos. 31)	1019 760
1	Screw – M3x6 mm	1014 812
2	Compression spring	1014 813
4	Release trigger	1014 810
5	Slide gate	1015 104
6	Cartridge – complete	1020 090#
7	Hose connection – complete (incl. pos. 7.1)	1014 806
7.1	O-ring – Ø 13x1.5 mm	1023 234
	Sensor module – complete (without pos. 32)	1019 750
10	Filter cover – complete (incl. O-ring)	1019 739
11	Filter tube	1018 908#
12	O-ring – Ø 8x1.5 mm	248 878
13	Gasket	1019 752
	Pinch valve module / IG08 link – complete (without pos. 32)	1019 740
15	Pinch valve hose – DN7.5	1018 610#
16	Screw – M4x14 mm	1020 755
17	O-ring – Ø 16x2 mm	1007 794#
18	Push-in fitting – Ø 6 mm	1019 747
19	Push-in connector – Ø 6 mm	1022 306
31	Screw – M4x14 mm	1020 755
32	Screw – M4x30 mm	1020 756

Powder conveying unit

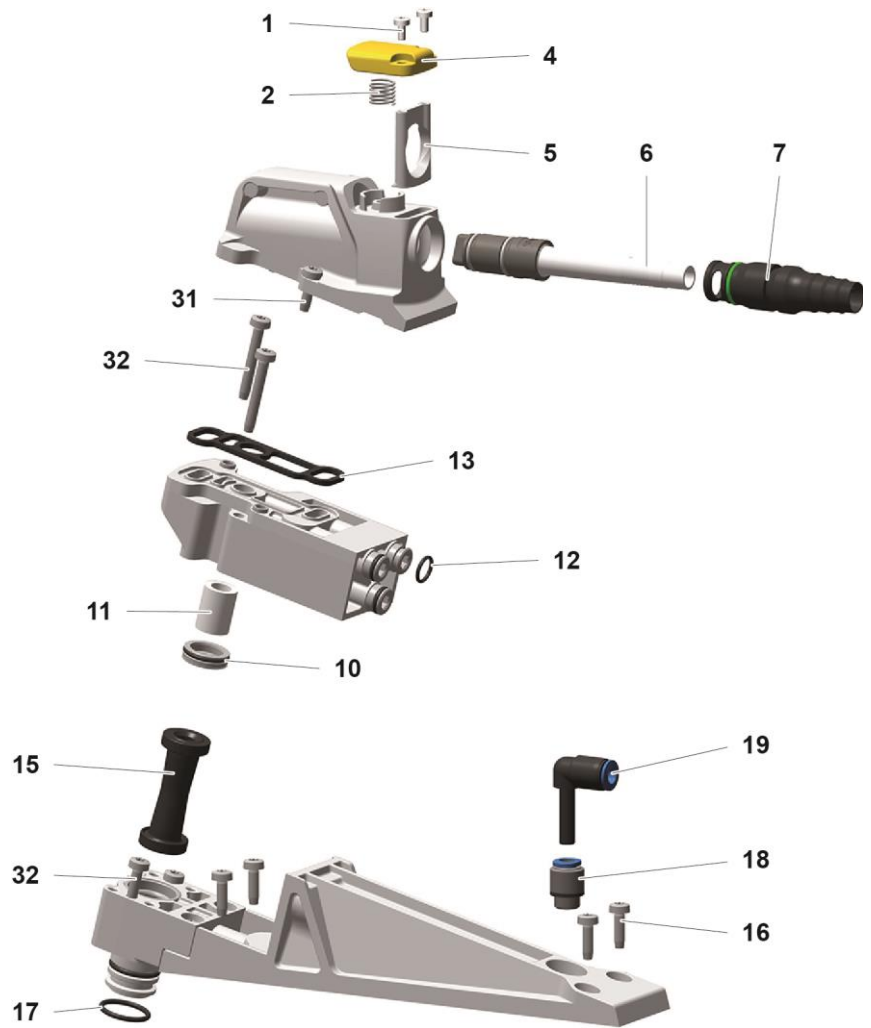


fig. 16:

Item	Tightening torque [Nm]
1	0.85
16	2.0
31	2.0
32	2.0

Valve block

1	Filter cartridge	1016 598#
2	Gasket	1019 402
3	PT-screw – 4x10 mm	1018 918
4	Push-in fitting – Ø 8 mm	1015 379
8	Throttle valve – complete	1016 590
9	Screw – M3x10 mm	1020 723
10	Compressed air hose	1020 093

* Please indicate length

Wear part

Valve block

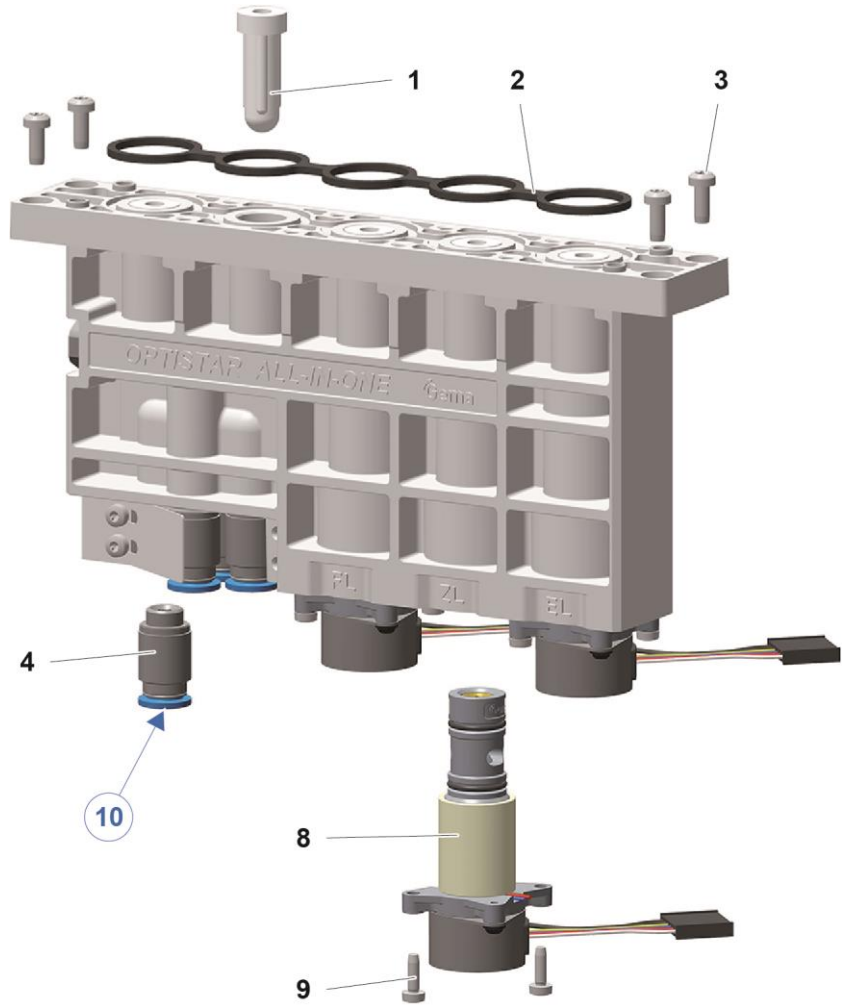


fig. 17:

Item	Tightening torque [Nm]
3	2.0
9	0.55

Connecting material

1	PT-screw – 4x10 mm	1018 918
2	Grounding screw	1020 725
3	Screw – M2.5x6 mm	1020 754
4	Gun cable – see also spare parts list of the gun	
5	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 – 6.0 m	388 530
5.1	Bus terminal resistor (not shown)	387 606
9	Mains cable – see enclosed wiring diagram	

* Please indicate length

Connecting material

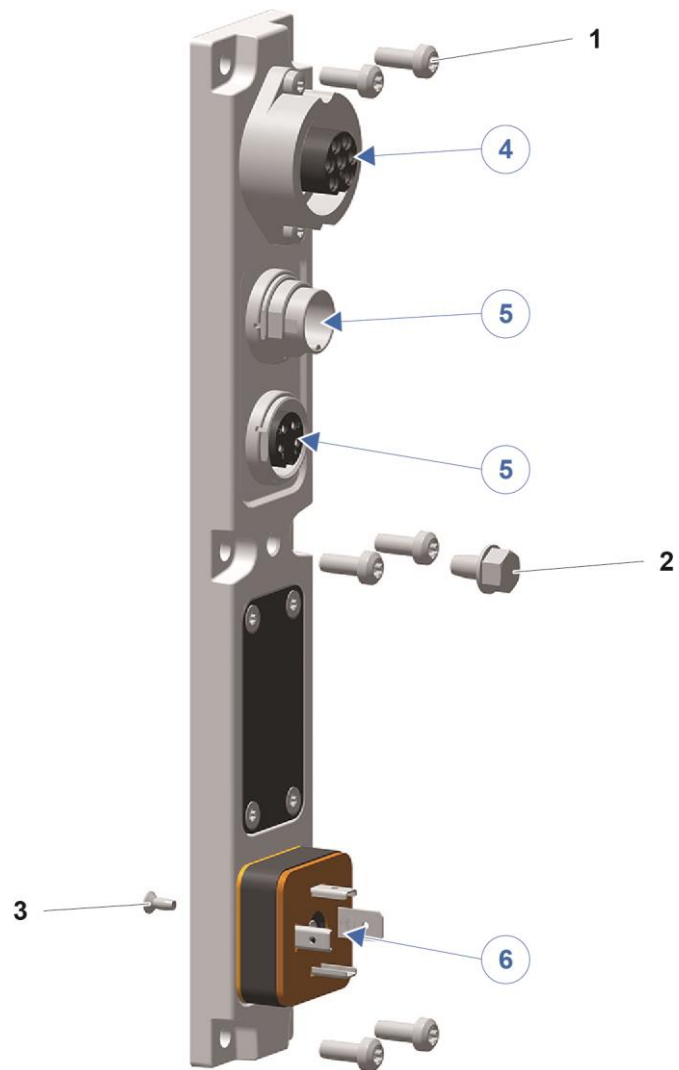


fig. 18

Item	Tightening torque [Nm]
1	2.0
3	0.35

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