
Operating instructions and Spare parts list

Gun control unit MultiStar CG10



Translation of the original operating instructions

Documentation MultiStar CG10

© Copyright 2016 Gema Switzerland GmbH

All rights reserved.

This publication is protected by copyright. Unauthorized copying is prohibited by law. No part of this publication may be reproduced, photocopied, translated, stored on a retrieval system or transmitted in any form or by any means for any purpose, neither as a whole nor partially, without the express written consent of Gema Switzerland GmbH.

Gema, EquiFlow, MagicCompact, MagicCylinder, OptiCenter, OptiFlex, OptiGun, OptiSelect and OptiStar are registered trademarks of Gema Switzerland GmbH.

ClassicLine, ClassicStandard, ClassicOpen, DVC (Digital Valve Control), GemaConnect, MagicControl, MagicPlus, MonoCyclone, MRS, MultiColor, MultiStar, OptiAir, OptiControl, OptiColor, OptiFeed, OptiFlow, OptiHopper, OptiMove, OptiSieve, OptiSpeeder, OptiSpray, PCC (Precise Charge Control), RobotGun, SIT (Smart Inline Technology) and SuperCorona are trademarks of Gema Switzerland GmbH.

All other product names are trademarks or registered trademarks of their respective holders.

Reference is made in this manual to different trademarks or registered trademarks. Such references do not mean that the manufacturers concerned approve of or are bound in any form by this manual. We have endeavored to retain the preferred spelling of the trademarks, and registered trademarks of the copyright holders.

To the best of our knowledge and belief, the information contained in this publication was correct and valid on the date of publication. Gema Switzerland GmbH makes no representations or warranties with respect to the contents or use of this publication, and reserves the right to revise this publication and make changes to its content without prior notice.

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

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

Printed in Switzerland

Gema Switzerland GmbH
Mövenstrasse 17
9015 St.Gallen
Switzerland

Phone: +41-71-313 83 00

Fax.: +41-71-313 83 83

E-mail: info@gema.eu.com

Table of contents

About these instructions	7
General information	7
Keeping the Manual	7
Safety symbols (pictograms).....	7
Software version	8
Presentation of the contents	8
Figure references in the text	8
Safety	9
Basic safety instructions	9
Product specific security regulations	9
Product description	11
Intended use	11
Reasonably foreseeable misuse	12
Technical Data	12
Connectable guns	12
Electrical data	12
Pneumatic data	13
Dimensions	13
Sound pressure level	13
Rating plate	13
Powder output (reference values).....	14
Air flow rates	14
Design and function	15
Overall view.....	15
Operating elements.....	16
Connections	19
Scope of delivery	20
Typical properties – Characteristics of the functions	21
Operating modes	21
Adjustable programs	21
Preset coating programs (Easy Mode only).....	22
Gun activation	22
Gun condition display.....	22
Keyboard lock	22
Alarm output.....	23
Background illumination.....	23
Correction factor for the powder output	23
Assembly / Connection	25
Assembly guide.....	25
Connection instructions.....	26
Start-up	27
Preparation for start-up	27
Basic conditions	27

System parameters	27
Entering the system parameters	27
CAN bus	32
General	32
Hardware	33
Determining user address (Node-ID) and Baud rate.....	34
Operation	35
Operation	35
Gun activation.....	35
Starting the individual adjustable programs	36
Selecting the preset coating programs (Easy Mode only).....	37
Setting powder output and powder cloud	37
Setting the electrode rinsing air	38
Gun release	39
Remote operation	40
Local operation in remote operating mode.....	40
Transfer to remote operating mode	40
System release in network operation	40
Correction values.....	41
Entering the correction values	41
Powder output/powder hose correction	42
Correction factor – diagram	44
Daily correction value C2.....	45
External powder output correction C3 (Easy Mode only).....	45
Setting the background illumination	45
Activate/deactivate the keyboard lock	45
Checking the software version	46
RAM Reset	46
Decommissioning / Storage	47
Shutdown.....	47
If in disuse for several days	47
Storage conditions	47
Hazard notes	47
Type of storage.....	47
Storage duration	47
Space requirements	47
Physical requirements	48
Maintenance during storage	48
Maintenance schedule.....	48
Maintenance works.....	48
Maintenance / Repairs	49
General information	49
Periodic checks	49
Repair work.....	49
Fault clearance	51
Error diagnosis of the software.....	51
General information	51
Help codes.....	51
Help codes list	54
Appearance of errors.....	54

Disposal	55
Introduction	55
Requirements on personnel carrying out the work	55
Disposal regulations.....	55
Materials.....	55
Disassembly of component groups.....	55
Spare parts list	57
Ordering spare parts	57
MultiStar CG10 Gun control unit.....	58
Front plate and power pack	59
Inside back plate	60
Connecting material	61

About these instructions

General information

This operating manual contains all important information which you require for the working with the MultiStar CG10. 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.

Software version

This document describes the operation of the control unit MultiStar CG10 with software version starting from 1.00.

See chapter "Checking the software version" on page 46.

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

The Gun control unit is designed exclusively for controlling the Gema powder coating guns (see also in chapter "Technical data").

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.



fig. 1

Reasonably foreseeable misuse

- Operation without the proper training
- Use with insufficient compressed air quality
- Use in connection with unauthorized coating devices or components

Technical Data

Connectable guns

MultiStar CG10(-X)	connectable
OptiGun GA03	yes
OptiGun GA02	yes

ATTENTION

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

Electrical data

MultiStar CG10(-X)	
Nominal input voltage	100-240 VAC
Frequency	50-60 Hz
Connected load	300 VA
Nominal output voltage (to the gun)	12 V
Nominal output current (to the gun)	1.2 A
Alarm output (potential-free relay)	max. 2 A / 250 VAC
Temperature range	0 °C - +40 °C (+32 °F - +104 °F)
Approvals	  0102 II (2) D PTB11 ATEX 5007

Pneumatic data

MultiStar CG10(-X)	
Compressed air connection	1/2" hose connection
Input pressure (must be set in the system parameter P2)	5.5 bar 6.0 bar 6.5 bar
Min. input pressure (while unit in operation)	5.5 bar / 80 psi
Compressed air consumption	6.5 Nm ³ /h per gun
Max. water vapor content of the compressed air	1.3 g/m ³
Max. oil vapor content of the compressed air	0.1 mg/m ³

Dimensions

MultiStar	CG10	CG10-X
Width	425 mm	425 mm
Depth	320 mm	320 mm
Height	178 mm	178 mm
Weight	approx. 13.2 kg	approx. 12.8 kg

Sound pressure level

MultiStar CG10(-X)	
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

MultiStar CG10	
Gema Switzerland GmbH CH-9015 St. Gallen	
Input voltage	100 - 240 VAC 50 / 60 Hz
Input power	300 VA
Max. ambient temp.	40 °C (104 °F)
Output	12 V 17 kHz 1.2 A
Corresponding Gun	GA03 OptiGun®
Approvals	 0102  II (2) D PTB 11 ATEX 5007 EN 50177 EN 50050-2

fig. 2

Powder output (reference values)

General conditions for the OptiFlow Injector

Powder type	Epoxy/polyester
Length of powder hose (m)	12
Powder hose Ø (mm)	11
Type of powder hose	POE with guide strips
Input pressure (bar)	6.0
Correction value C0	Powder output zeroing adjustment

Guide values for MultiStar CG10 with OptiFlow Injector IG06

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

Total air 		3 Nm ³ /h	4 Nm ³ /h	5 Nm ³ /h
		Powder output (g/min)		
Powder output  (%)	20	60	70	80
	40	115	140	160
	60	175	210	220
	80	220	260	270
	100	250	300	310

Air flow rates

MultiStar CG10(-X)	per gun
Total air flow rate	0-6.5 Nm ³ /h
Electrode rinsing air flow rate	0-3.0 Nm ³ /h



The total air consumption for the device is determined based on the 2 configured air values multiplied by number of guns.

- These values apply for a control pressure of 6.0 bar!



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

- Total air = 5 Nm³/h (conveying air + supplementary air)
- Electrode rinsing air = 0,1 Nm³/h (flat jet nozzle)

Design and function

The Control unit is an intelligent gun control, which permits to control completely up to 12 powder guns at the same time.

The gun control unit is composed of a main control unit (for the control of up to 6 guns) and an optional additional control unit, MultiStar Extend, (for the control of up to 6 additional guns). The application parameters (high voltage, electricity and powder output) can be programmed easily and quickly using a central entry and display field. The additional control unit is managed by the main control unit.

Overall view



fig. 3

- | | | | |
|---|---|---|---|
| 1 | Front plate with control and display elements | 3 | Additional unit MultiStar Extend CG10-X |
| 2 | Additional panel | 4 | Back panel with interfaces |

Operating elements

Displays



The desired and actual values are distributed across several levels.

- The "sel" key is used to switch between the levels.
- If no controls are used within 6 s, the device automatically returns to level 1.

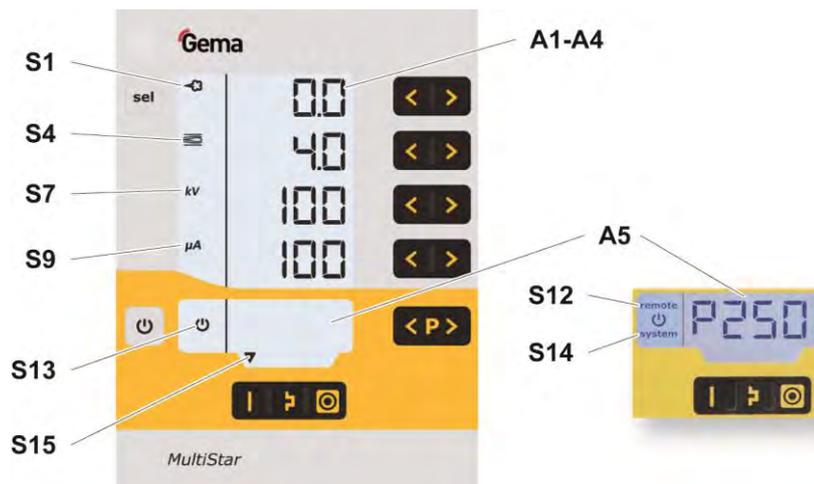


fig. 4: Displays, Level 1

Designation	Function
A1-A4	Display of actual values, desired values and system parameters - Flashes if the possible range is exceeded.
A5	Display of program numbers, error diagnosis codes and status information
S1	Powder output (display in %)
S4	Total air volume (display in Nm ³ /h)
S7	High voltage (display in kV)
S9	Spraying current (display in µA)
S12 remote	Remote operation mode, no local operation possible
S13	Gun release
S14 system	System release via plant signal
S15	Display of preset coating programs

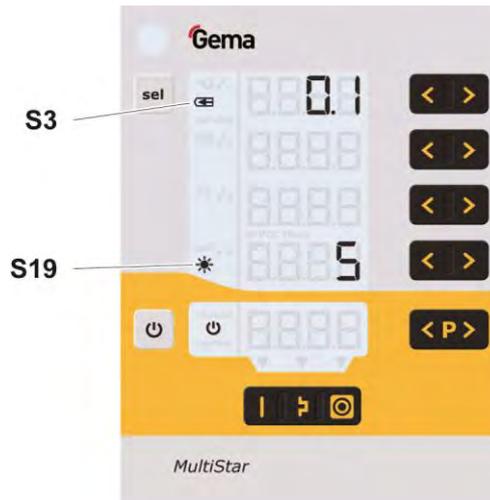


fig. 5: Displays and LEDs, Level 2

Designation	Function
S3	Electrode rinsing air (display in Nm ³ /h)
S19	Display illumination (0-8)



fig. 6: LEDs, Additional panel

Designation	Function
L21..L32	Gun LED: green, red or orange, the color depends on the condition of the corresponding gun

Input keys and switches

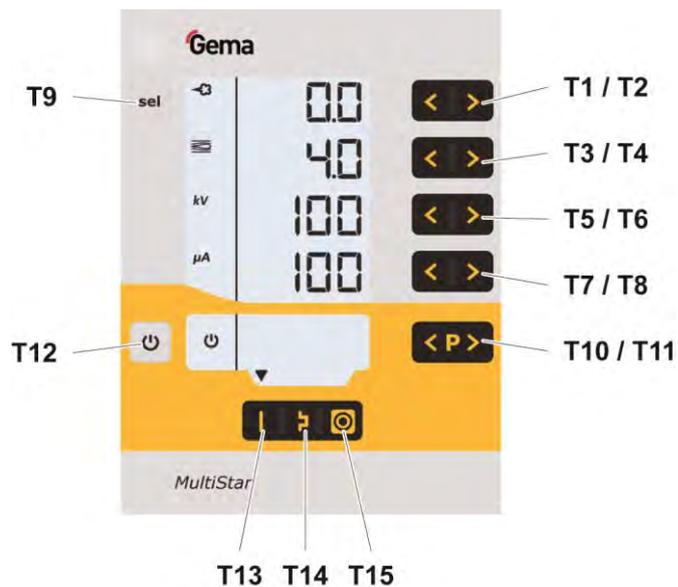
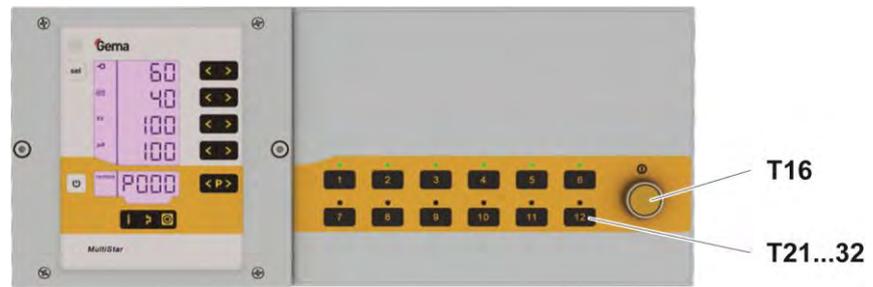


fig. 7: Input keys and switches

Designation	Function
T1-T8	Input keys for desired values and system parameters
T9 (Select)	Switch between display levels
T10-T11	Program change
T12	Gun release Switchover to system parameter mode (press for at least 5 secs.)
T13	Preset mode for flat parts
T14	Preset mode for complex parts with depressions
T15	Preset mode for overcoating parts already coated
T16	Power switch On/Off
T21..32	Gun selection keys

Connections

Compressed air hoses / cables



fig. 8: MultiStar CG10 / Extend Connections – Compressed air hoses / cables

Connection	Description
1.1 Main air IN	Compressed air connection
2.1 Power IN	Mains cable connection
Gun 1-12	Gun cable connection
2.3 Aux	CAN bus connection (IN)
2.4 Aux	CAN bus connection (OUT)
2.5 Ext	Communication cable connection
X	Cable lead-through: <ul style="list-style-type: none"> - Alarm output - Digital Input for individual gun triggering
	Electrode rinsing air connection
	Supplementary air connection
	Conveying air connection
	Grounding connection

Pin assignment

Power IN



2.1

Power IN connection

- | | |
|----|-----------------------------------|
| 1 | Neutral conductor (power supply) |
| 2 | Phase (100-240 VAC) |
| 3 | System input ON/OFF (100-240 VAC) |
| PE | PE grounding |

Gun



Gun connection

- | | |
|---|--------------|
| 1 | Ground |
| 2 | empty |
| 3 | empty |
| 4 | empty |
| 5 | empty |
| 6 | Oscillator |
| 7 | PE grounding |

Aux



2.3

CAN IN plug with 4 pins (2.3 Aux)

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

Aux



2.4

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
- Operating manual

Typical properties – Characteristics of the functions

Operating modes

The gun control unit has two operating modes:

- Easy Mode
- Advanced Mode.

Description	Operating mode	
	Easy Mode	Advanced Mode
Adjustment of powder and air volume with identical set values for all guns	X	
Individual adjustment of powder and air volume		X
Adjustment of high voltage and current with identical set values for all guns	X	X
250 individual programs available over Display Pilot	X	
20 individual programs available over Display Pilot		X
3 preset programs for Flat parts, Complex parts, Re-coating	X	
12 digital I/O's for individual gun triggering	X	X
Individual powder hose length correction	X	X
Help Codes for easy device diagnostic	X	X
Remote control via CAN bus	X	X

Adjustable programs

In this operating mode, 250 (20 in Advanced Mode) individually definable programs (P001-P250 / P01-P20) are available. These programs are automatically saved and can be recalled again as the application requires.



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



The settings defined in the 250 (20) programs and 3 preset coating programs are automatically stored, without confirmation.

Preset coating programs (Easy Mode only)

The gun control unit has three preset coating programs:



Application mode for flat parts

This application mode is suitable for the coating of simple, flat workpieces without larger cavities.



Application mode for complicated parts

This application mode is suitable for the coating of three-dimensional workpieces with complex shapes (e.g. profiles).



Application mode for recoating parts already coated

This application mode is suitable for the overcoating of workpieces which are already coated.

In this coating programs, current (μA) and high voltage (**kV**) are preset, while powder and air volumes can be set and stored for each coating program.

Gun activation

The guns can be individually activated or deactivated on the additional panel.

Gun condition display

On the additional panel, the LEDs on the buttons 1-12 display the condition of the respective gun:

	Easy Mode	Advanced Mode (gun selected)
Gun deactivated	LED off	flashing orange
Gun active, no defects	green	flashing green
Gun defective	red	red

Keyboard lock

The gun control unit has a keyboard lock to prevent modification of individual parameter values (kV, μA etc.). Following is not affected by the keyboard lock:

- Program selection
- Display of the desired values of the current program
- Display of the actual values
- Error acknowledgment

An active keyboard lock is indicated by a blinking of the **remote** display. (see also "Operation – Activate/deactivate the keyboard lock")



fig. 9

The keyboard lock status remains stored, when switching the equipment off and on. The keyboard lock is cancelled if a RAM reset is performed. On this gun control unit, an external interlocking by remote input can also take place.

Alarm output

The gun control unit has an alarm output which is carried out in the form of a potential-free relay.

Background illumination

Brightness

8 different brightness settings are available for the display. The setting remains in place when the machine is switched on/off.

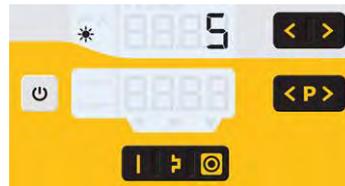


fig. 10

Auto Power Save mode

If no powder is being applied, then the background lighting turns off automatically 5 minutes after a button has been pressed last time.

Correction factor for the powder output

The gun control unit enables a zeroing out of the powder output. This allows for compensation to different powder hose lengths connecting to the gun.

The correction factor C0 can be selected such that no powder is output when the powder share is reduced to 0%. (see also "Operation – Setting correction factor for powder output")

Assembly / Connection

Assembly guide

The gun control unit is installed in an AS-control cabinet as standard.
Please contact Gema for other installation possibilities.

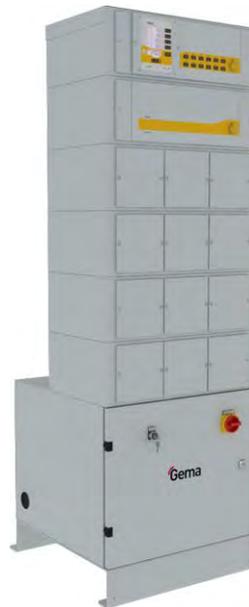


fig. 11: AS control cabinet

Connection instructions

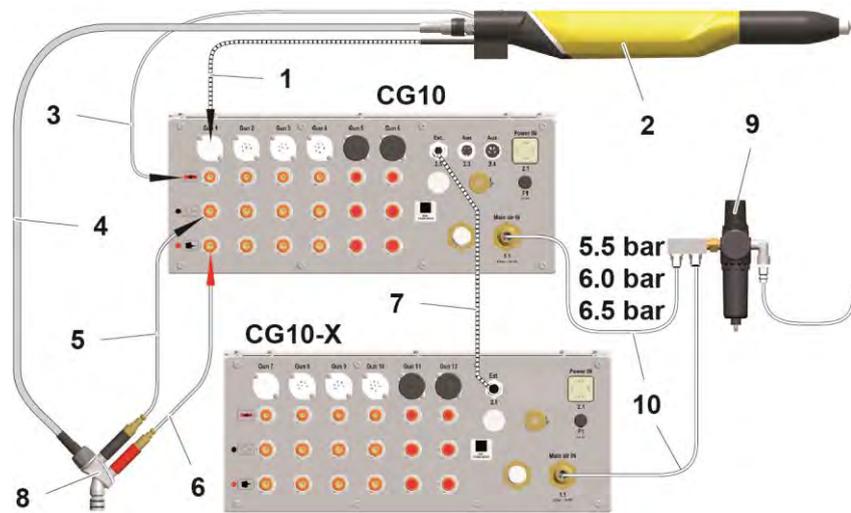


fig. 12: Connecting guide – overview

- | | |
|-------------------------------------|------------------------|
| 1 Gun cable | 6 Conveying air hose |
| 2 OptiGun GA03 automatic powder gun | 7 Signal cable |
| 3 Electrode rinsing air hose | 8 Injector |
| 4 Powder hose | 9 Maintenance unit |
| 5 Supplementary air hose | 10 Compressed air hose |



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!

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:

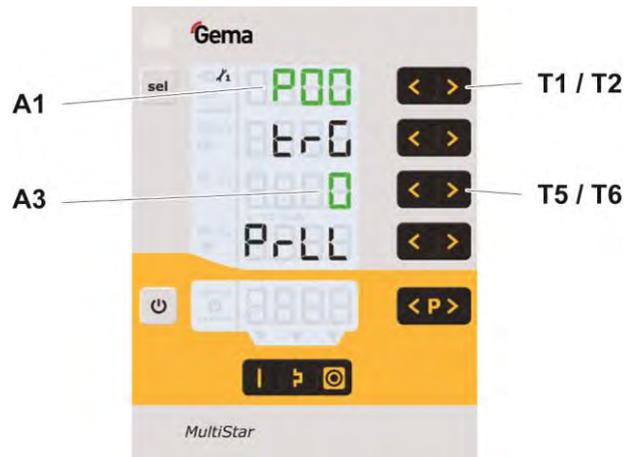
- Gun control unit correctly connected
- Gun correctly connected
- Corresponding power and compressed air supply available
- Powder preparation and powder quality

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. Turn on the gun control unit with the **ON** key
2. Hold  key down for 5 seconds
 - The display switches to the following level:



3. The system parameter number is shown in the display **A1** with a **P** placed in front
4. Set the corresponding system parameter value with the **T5** or **T6** key.
 - The value of the adjusted system parameter appears on corresponding display **A3**
5. Scroll to the next or previous system parameter with the **T1** or **T2** key



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

6. Select parameter values according to the following table

Abbreviations:

- PA** Powder output
- GL** Total air
- FL** Conveying air
- ZL** Supplementary air

No.	Description	Values	Display
P00	Trigger mode	0: Global Trigger (all guns parallel)	PrLL
		1: Individual Trigger (each gun separately)	SnGL
P01	Operating mode	0: Easy 1: Advanced	EASY AdV
P02	Inlet 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	Unit of measurement (air)	0: Nm³/h 1: scfm	nn3 scf
P04	Interface type	0: Deactivated 1: Automatic recognition	OFF Auto

No.	Description	Values	Display
P05	CAN Baud rate	0: 20 kbit/s	2 0
		1: 50 kbit/s	5 0
		2: 100 kbit/s	1 0 0
		3: 125 kbit/s	1 2 5
		4: 250 kbit/s	2 5 0
		5: 500 kbit/s	5 0 0
		6: 800 kbit/s	8 0 0
		7: 1 Mbit/s	1 0 0 0
P06	CAN Node ID	1-127	
P07	Air volume setting	0: Standard (PA / GL) 1: Food (FL / ZL)	Std Food
P10	Log level	0, 1, 2 , 3, 4, 5	LoG

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

7. Press  key to quit the system parameter mode.
The display switches to the standard level

System parameter P00



fig. 13: System parameter P00

This parameter determines whether all connected guns are activated simultaneously or individually.

- The system parameter P00 is set to **0** when device is starting.
- If the parameter is set to **1**, each individual gun can be controlled externally via digital inputs. If the signal is not on, the gun cannot be activated (triggered).

System parameter P01

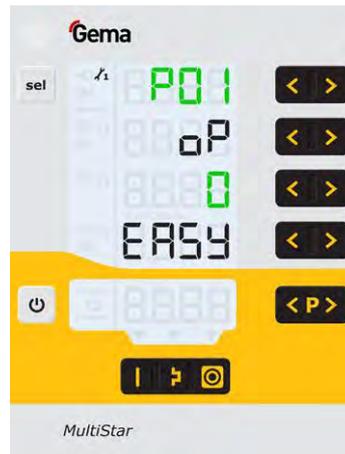


fig. 14:

This parameter controls the operating mode (Easy Mode or Advanced Mode).

- In Easy Mode, all guns have identical setpoints for power and air volume settings.
- In Advanced Mode, powder and air volume are set individually for each gun.

System parameter P03



fig. 15

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. These lines are displayed in **blue**.

System parameter P07

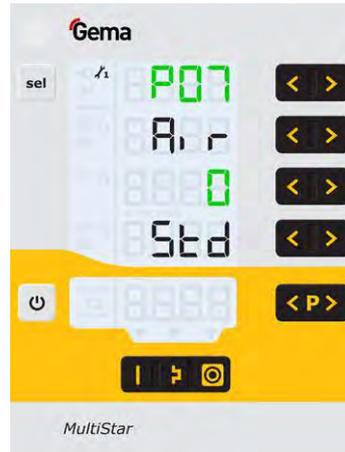


fig. 16

This parameter controls which air volume settings can be controlled by the user. If **P07 = 1**, conveying air (**FL**) and supplementary air (**ZL**) can be controlled separately.

The display looks as follows:

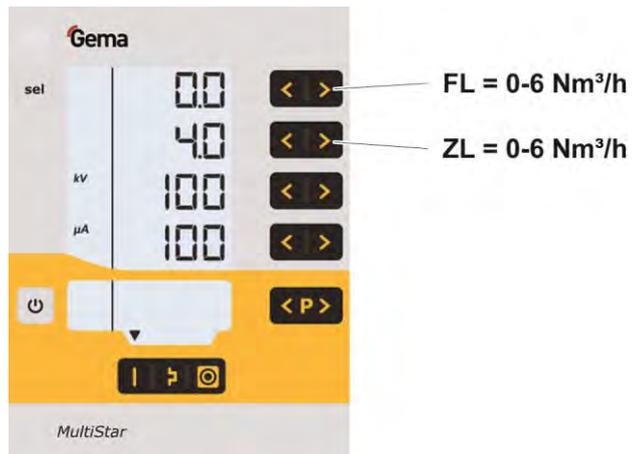


fig. 17

System parameter P10



fig. 18: 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.

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 MultiStar 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 MultiStar Control units can be operated in a network.

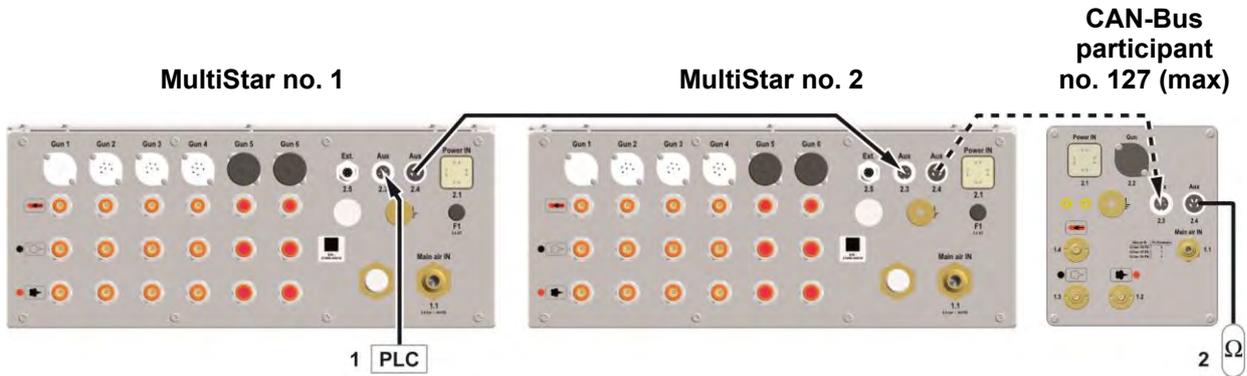


fig. 19: CAN bus – connections

- 1 PLC control with CAN bus
- 2 Terminal resistor

CAN bus cable – plug assignment

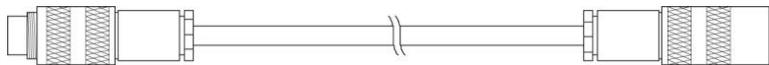


fig. 20: CAN bus cable

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

Determining user address (Node-ID) and Baud rate

Each Gun control unit, which operates in the CAN network, must have assigned an individual user address (Node-ID). The Baud rate setting enables the transmission speed setting. The Baud rate value can be set by editing the system parameter P05, and the Node ID value can 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 client. If longer cables are used, select a lower Baud rate.

Operation

Operation



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

Gun activation

The respective gun is activated or deactivated by holding a button on the additional panel for longer than 1 second. The LEDs L21...32 display the corresponding condition.

Only guns which are connected can be activated. For guns which are not connected, "GUN OFF" will be displayed whilst the button is being pressed.



fig. 21: Additional panel

Limited number of usable guns

Depending on device configuration, the number of simultaneously usable guns is limited.

Pressing T12 and T10 simultaneously displays the number of usable guns:



fig. 22: Number of usable guns

If the user activates a gun which is above the usable number, the display shows the text "no GUN Left".



A device-specific release code is required to activate additional guns.

- Please contact our local representative or local contract dealership!

Starting the individual adjustable programs

1. Turn on the gun control unit with the **ON** key



2. Press the  program key
3. Select desired program (001-250 / 01-20)



Program 250 active

4. Change coating parameters as required



Programs 001-250 (01-20) 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
	High voltage	80 kV
	Spray current	20 µA
	Electrode rinsing air	0.1 Nm ³ /h

Selecting the preset coating programs (Easy Mode only)

1. Turn on the gun control unit with the **ON** key
2. Press the corresponding application key.
The arrow above the desired button lights up.



The pre-defined application modes have preset values for high voltage and spray current:

Application mode		Preset μA	Preset kV
	flat parts	100	100
	complicated parts	22	100
	overcoat	10	100

3. The air values for total air, powder output and electrode rinsing air can be individually defined and are saved in the programs.

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.



In Advanced Mode (P01=1), separate setpoints can be used for the powder output volume, total air and electrode rinsing air for each gun.

- The values displayed correspond to the guns which were selected with the relevant button on the additional panel.



As a factory default value, a powder rate of 60% 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!

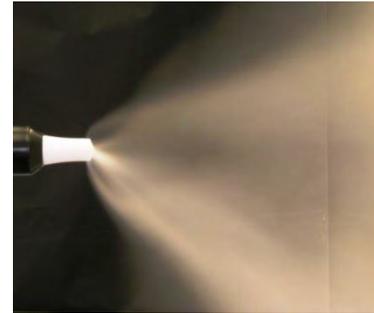
Setting the total air volume



1. Adjust the total air volume on the gun control unit with the **T3/T4** keys
 - Adjust the total air volume according to the corresponding coating requests



correct powder cloud



too little total air

Setting the powder output



much powder



little powder

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

- 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!

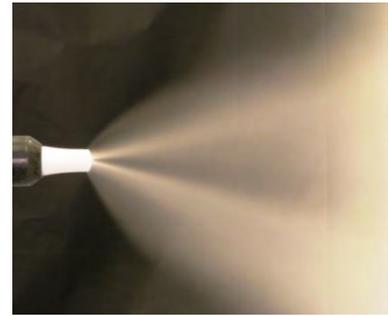
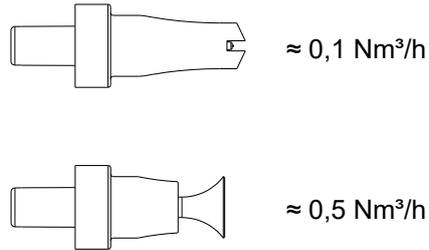
2. Check fluidization of the powder in the powder container
3. Point the gun into the booth, switch the gun on and visually check the powder output

Setting the electrode rinsing air

1. Press the  key.
The second display level will be shown.



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



too much electrode rinsing air

3. If in this display level is no operation for 3 seconds, the first display level is switched over independently.

Gun release

In order that the guns can spray powder, some system-relevant conditions must be complied, and no error may be present.

MultiStar CG10 without bus connection:

1. External release signal is present.

The corresponding symbol is displayed:



2. Press the  key:

The corresponding symbol is displayed:



3. Guns start to spray.
4. Press the  key again:
The relevant symbol goes out and the coating stops.

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:

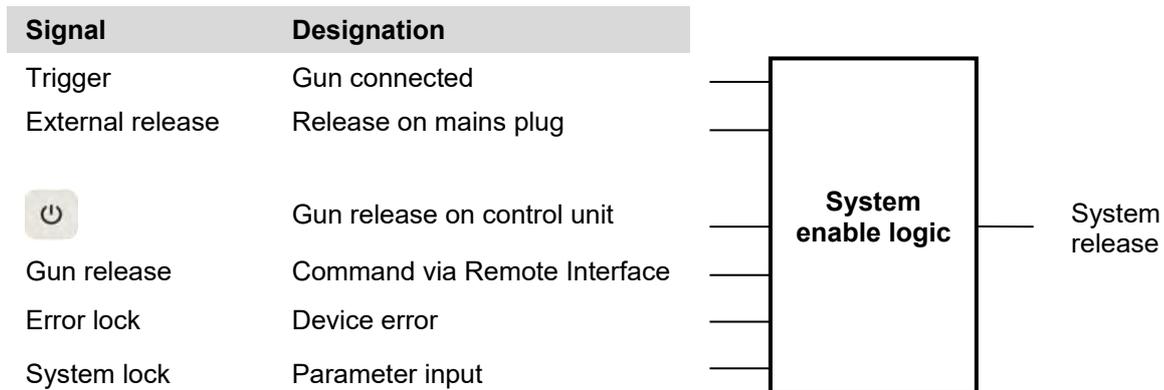
- Display of desired values of the current program
- Displaying the actual values
- Error acknowledgement

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 S12 (**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.



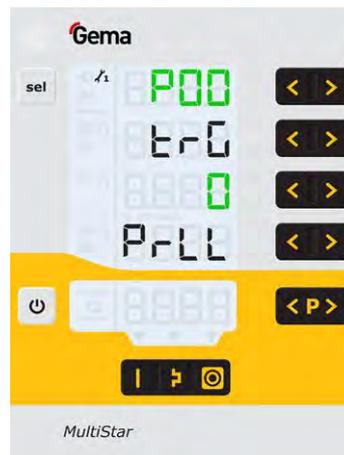
Correction values

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).

Entering the correction values

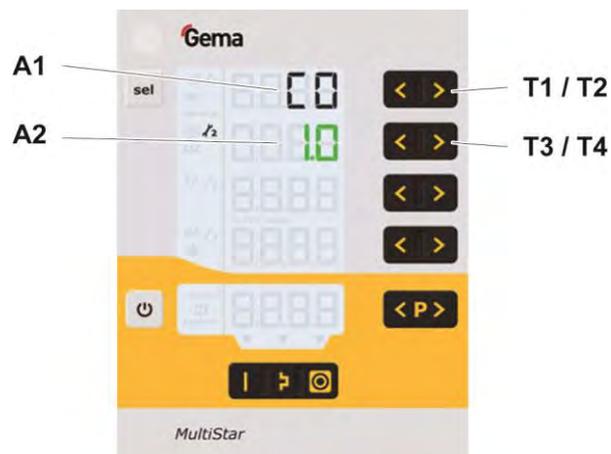
1. Hold  key down for 5 seconds

The display switches to the following level:



2. Press the  key

The display switches to the following level:



3. The correction factor number is shown in the display **A1** with a C placed in front
4. Set the corresponding correction value with the **T3** or **T4** key.
The value of the adjusted correction factor appears on corresponding display **A2**



The correction factors C0 and C1 can be set separately for each gun.

- The setpoint is displayed in green.
- The values shown apply to the guns which have been selected using the additional panel.
- For the correction factors C2 and C3, which apply to all guns, the setpoint is black.

5. On the additional panel, the LED for gun number 1 flashes orange



All corrections carried out apply only to the selected guns.

6. Browse to the next or previous correction factor with the **T1** or **T2** key
7. 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
C3	External powder output correction (%)	-50 .. 50	0

8. On the additional panel, select gun number 2. The relevant LED flashes orange.
9. Carry out the relevant corrections, see above
10. Press the  key
The display returns to the first standard display.

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) on the **A2** display. Set the powder output to **00** (%) on the **A1** display
2. To enter the system parameter mode, press the  key longer than 5 seconds.

3. Press the  key

The display switches to the correction factor level. The correction factor number is shown in the display **A1** with a **C** placed in front

4. Check the correction value for minimum powder output **C0** on the **A2** display, and set it to **1.8** (Nm³/h) with the **T3/T4** keys if necessary
5. Check the correction value for maximum powder output **C1** on the **A2** display, 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.

6. Put the measuring bag over the gun nozzle and fasten it. Switch on the gun for 60 seconds
7. 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
8. 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)
9. 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)
10. Repeat steps 6 and 7, until the powder output amounts to 10-15 g. Annotate the adjusted minimum powder output value **C0** in the table

Exit the system parameter mode by pressing the  key.

Powder hose correction – procedure

1. Set the powder output value to **80** (%) on the **A1** display
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)

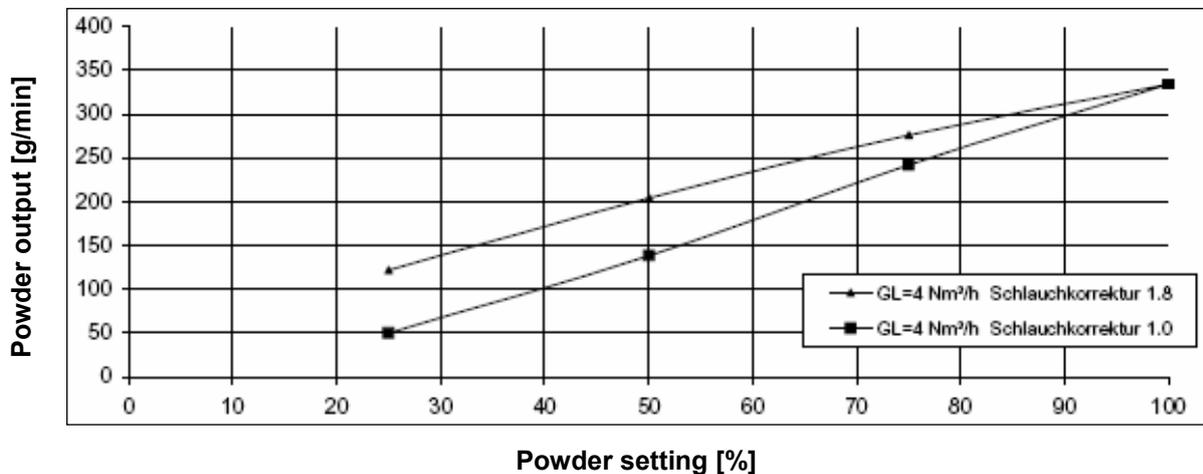


fig. 23: Correction factor – diagram



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!

External powder output correction C3 (Easy Mode only)

With the correction factor C3, the powder output can be altered. An active external control signal either increases or decreases the powder output by the value set in C3.

Setting the background illumination

1. Press the  key

The display switches to the following level:



2.       

Select the desired brightness

Activate/deactivate the keyboard lock

1. Hold  key pressed
2. Press the corresponding key:



- The keyboard lock will be activated. The **remote** display blinks.
3. The keyboard lock is cancelled by pressing the same key combination

Checking the software version

1. Press these two keys at the same time



- The status display is shown as long as the keys are held.

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 in the Program mode and Preset mode will be overwritten with factory default values. An active keyboard lock will be deactivated.



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

1. Switch off the device
2. Press the  key and hold it
3. Switch on the control unit, the **CLR** display blinks



4. Wait for approximately 5 seconds until **CLR** disappears
5. Release the  key
 - 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 by an authorized Gema service workshop. The repairs must only be performed by an authorized specialist.

Improper tampering can result in serious danger for user and equipment.

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
- CAN bus

Help codes

The error diagnosis codes (help codes) are shown in red on the **A5** 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 keys **T10** or **T11**.

The errors are displayed in the order of their appearance. The **T10** and **T11** keys cannot be used for other functions, as long as an error code is still shown.

For error codes which apply to a specific gun, e.g. cable break or throttle defect, LED L21..L32 will be illuminated red for the affected gun. If, for example, the defect H11 is present in guns 3 and 8, then the LEDs L23 and L28 will be illuminated. Upon acknowledgment, the defect of both guns is confirmed.

For error codes which are not related to a specific gun, for example a defect in the trigger valve, the error code appears on the display only.

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

Abbreviations:

MU	Main unit
AU	Additional unit
HV	High voltage
RLED	The affected gun is indicated by a red LED

Code	Description	Criteria	Remedy
Pneumatics:			
H105	Trigger valve MU	Solenoid coil current lower than preset limiting value	Contact a Gema service center
H205	Trigger valve AU	Valve defective, main board or cable defective	
H09	Powder output higher than 100% (RLED)	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
High voltage:			
H11	Gun error (RLED)	No vibrations in the oscillator, cable break, oscillator or gun is defective	Contact a Gema service center
H15	Gun error Overload (RLED)	Gun flow too large. Oscillator or gun defective. The affected guns are signaled with a red LED.	Contact Gema Service
H112	HV: Overvoltage MU	Measured HV > 105 kV	Contact a Gema service center
H212	HV: Overvoltage AU		
H113	Intermediate circuit voltage: Overvoltage MU	Intermediate circuit voltage too high	Contact a Gema service center
H213	Intermediate circuit voltage: Overvoltage AU		
Power supply:			
H21	Voltage supply error Mainboard MU	Mainboard defective Power pack defective or overloaded	Contact a Gema service center
H121	Voltage supply error Gun Controller MU	Gun Controller defective Power pack defective or overloaded	Contact a Gema service center
H221	Voltage supply error Gun Controller AU		
EEPROM (equipment memory):			
H24	EEPROM content invalid	EEPROM error	Contact a Gema service center
H25	Timeout during EEPROM writing	EEPROM error	Contact a Gema service center

Code	Description	Criteria	Remedy
H26	Values not correctly stored in EEPROM during switching off	EEPROM error	Contact a Gema service center
H27	EEPROM verification erroneous	EEPROM error	Contact a Gema service center
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
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 a Gema service center
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
Throttle motors:			
H60	Conveying air reference position not found (RLED)	Throttle motor or needle jammed, limit switch defective, error in motor throttle	Contact a Gema service center
H61	Supplementary air reference position not found (RLED)	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 (RLED)	Throttle motor or needle jammed, limit switch defective, error in motor throttle	Contact a Gema service center
H64	Conveying air throttle does not move (RLED)	Short circuit in limit switch, motor throttle defective	Contact a Gema service center
H65	Supplementary air throttle does not move (RLED)	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 (RLED)	Short circuit in limit switch, motor throttle defective	Contact a Gema service center
H68	Conveying air position lost (RLED)	Lost steps, limit switch defective, throttle motor defective	Contact a Gema service center
H69	Supplementary air position lost (RLED)	Lost steps, limit switch defective, throttle motor defective	Contact a Gema service center
H70	Electrode rinsing air position lost (RLED)	Lost steps, limit switch defective, throttle motor defective	Contact a Gema service center
Gun Controller			
190	Communication error MU	Disruption or damage to the connection between the additional panel print board and Gun Controller, invalid command parameter, command is not supported. etc.	Contact a Gema service center
290	Communication error AU		
194	Firmware Update necessary MU	The Gun Controller firmware is not up-to-date.	Update, contact Gema service
294	Firmware Update necessary AU		
192	Gun Controller MU does not react	No connection can be made with the Gun Controller. Reason: Additional device connected, but not activated.	Contact a Gema service center
292	Gun Controller AU does not react		

Help codes list

The last appeared eight 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 an error is only displayed for a short time, but after the acknowledgement it will disappear. In this case, it's recommended to switch off the control unit 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 powder coating equipment, please indicate the following specifications:

- Type and serial number of your powder coating equipment
- Order number, quantity and description *of* each spare part

Example:

- **Type** OptiGun GA03 automatic powder gun
Serial number 1234 5678
- **Order no.** 203 386, 1 piece, Clamp – Ø 18/15 mm

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

Wearing parts are always marked with a #.

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

Example:

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

ATTENTION

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 guarantee claims become invalid!

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

MultiStar CG10 Gun control unit

1	Main control unit MultiStar CG10 – complete	1011 601
2	Additional control unit MultiStar Extend CG10-X – complete	1011 602



fig. 24: MultiStar CG10

Front plate and power pack

	Front plate – complete (pos. 1-10)	1011 594
	Front plate with foil keyboard (pos. 5-8)	1011 593
1	MultiStar Mainboard – complete	1011 551
2	Spacer sleeve – Ø 3.1/6x15 mm	
3	Washer – Ø 3.2/7x0.5 mm	
4	Locknut – M3	
5	Front frame – complete (incl. pos. 5.1)	1011 592
6	Screw – M4x18 mm	1000 192
8	Membrane keypad	
7	Front plate gasket	1011 618
9	Spacer sleeve – Ø 3.6/7x5 mm	
10	Display	1007 044
11	PCB – complete	1012 671
12	Illuminated push button – complete	1012 840
13	Power pack – 24 VDC (please indicate the serial number)	1017 136
14	PCB Controller Board – complete	1011 554

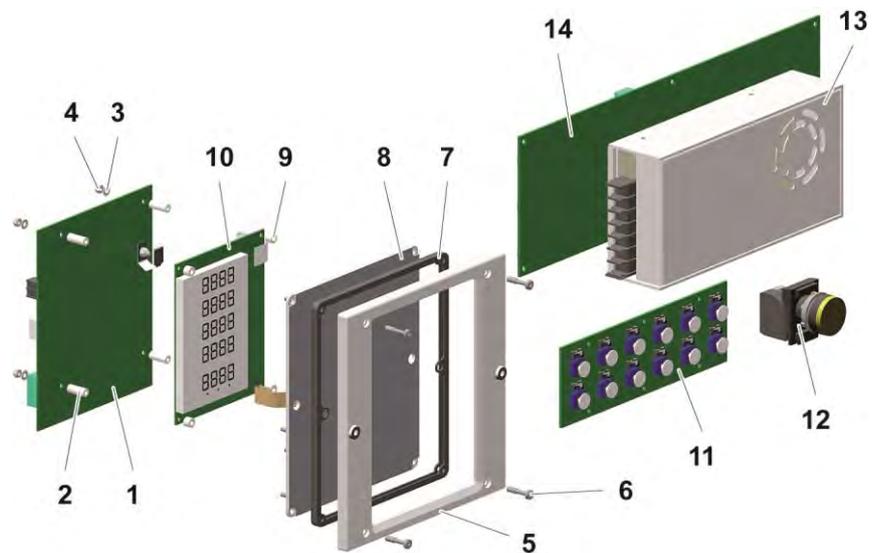


fig. 25: Front plate and power pack

Inside back plate

1	Adhesive seal strip	100 250*
2	CAN-Bus module – complete (basic unit only)	1009 068
3	Solenoid valve – 1/2", NW 13.5 mm, without pos. 4	1005 120
4	Valve coil – for pos. 3	1005 119
5	Motor throttle – complete	1000 064
6	Plastic tube – Ø 10/8 mm	103 250*
7	Silencer – 1/2"	1006 969
8	Plug – Ø 10 mm	1011 615
9	Gun connection – complete, with cable	1011 570
10	Fuse – 5 AT	200 166#

* Please indicate length

Wearing part

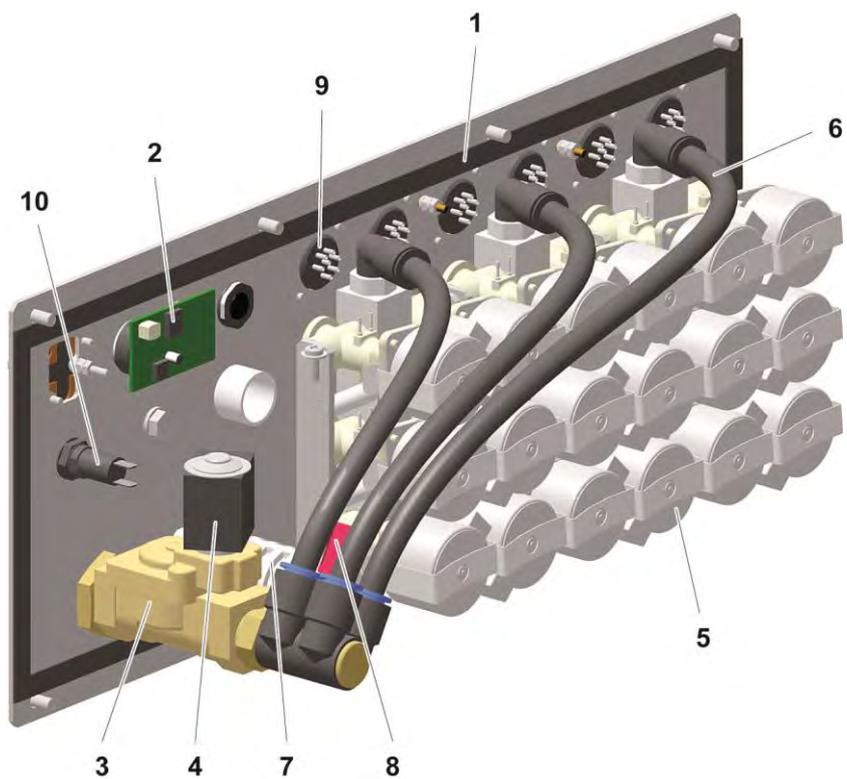


fig. 26: Inside back plate

Connecting material

1	Rinsing air hose – Ø 6/4 mm	103 144*
2	Supplementary air hose – Ø 8/6 mm (black)	103 756*
3	Conveying air hose – Ø 8/6 mm (red)	103 500*
4	Hose – Ø 26.6/16.4 mm	105 155*
5	Mains cable – see enclosed wiring diagram	
6	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
6.1	Bus terminal resistor (not shown)	387 606
7	Communication cable – 0,6 m	1011 607

* Please indicate length

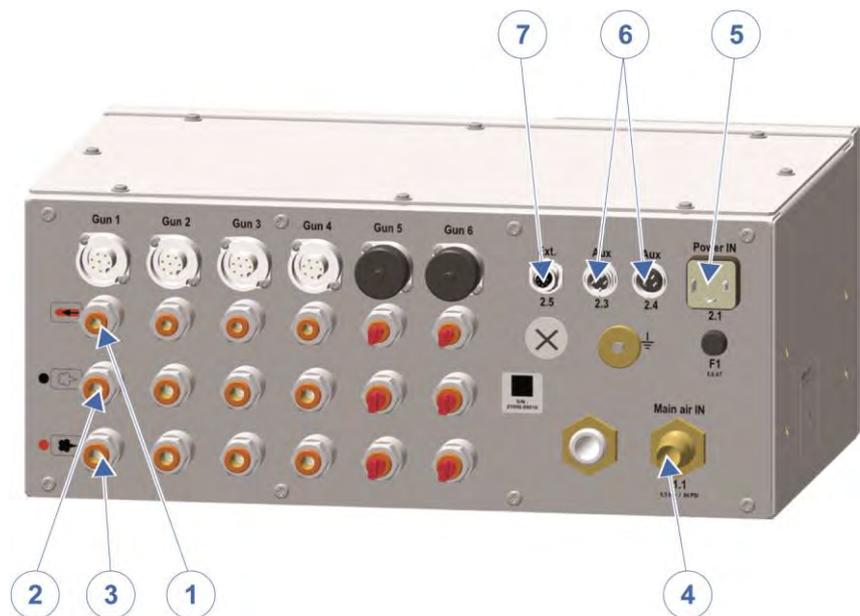


fig. 27

Index

A

About these instructions.....	7
Assembly.....	25

B

Basic safety instructions.....	9
--------------------------------	---

C

Connection.....	25
-----------------	----

D

Decommissioning.....	47
Disassembly of component groups.....	55
Disposal.....	55
Disposal regulations.....	55
Disuse for several days.....	47

F

Fault clearance.....	51
Figure references in the text.....	8

M

Maintenance.....	49
Maintenance during storage.....	48

O

Operating elements.....	16
Operation.....	35

P

Periodic checks.....	49
Pictograms.....	7
Presentation of the contents.....	8
Product description.....	11
Product specific security regulations.....	9

R

Release code.....	36
Repair work.....	49
Repairs.....	49

S

Safety.....	9
Safety symbols.....	7
Scope of delivery.....	20
Shutdown.....	47
Spare parts list.....	57
Start-up.....	27
Storage.....	47
Storage conditions.....	47

