En

Operating instructions and spare parts list

OptiStar CG07
Gun control unit

ITW Gema

Documentation OptiStar CG07 Gun control unit

Printed in Switzerland

ITW Gema AG
Mövenstrasse 17
9015 St. Gallen
Switzerland

Phone: +41-71-313 83 00
Fax.: +41-71-313 83 83

E-Mail: info@itwgema.ch
Homepage: www.itwgema.ch

Table of contents

General safety regulations 5

Safety symbols (pictograms) ... 5
Conformity of use ... 5
Technical safety regulations for stationary electrostatic powder spraying equipment ... 6
- General information ... 6
- Safety conscious working ... 7
- Individual safety regulations for the operating firm and/or operating personnel ... 7
- Notes on special types of hazard ... 8
- Safety requirements for electrostatic powder coating ... 9
- A summary of the rules and regulations ... 10

Product specific security measures ... 12

About this manual 13

General information ... 13
Software-Version ... 13

Function description 15

Field of application ... 15
- OptiFlex manual equipment ... 15

OptiStar CG07 Gun control unit ... 15
- Typical characteristics ... 15
- Basic functions ... 16
- Additional functions ... 16

Operating modes ... 16
- Predefined operating mode (Preset mode) ... 16
- Adjustable operating mode (Program mode) ... 16

Technical Data 17

OptiStar CG07 Gun control unit ... 17
- Connectable guns ... 17
- Electrical data ... 17
- Pneumatic data ... 18
- Dimensions ... 18
- Air flow rates ... 18

Operating and display elements 21

Displays and LEDs ... 21
Input keys and switches ... 22
General information ... 23
- Display of the programs ... 23
- Display of the values ... 23

Start-up and operation 25

Connections ... 25
Connecting guide ... 26
Pin assignment ... 27
Initial start-up ... 28
Setting the device type ... 28
Preparing the powder hopper/container ... 28
Switch on the booth ... 28
Daily start up ... 28
Select the operating mode ... 29
Setting powder output and powder cloud ... 29
Setting the electrode rinsing air ... 30
Setting the fluidizing ... 30
Powder coating ... 31
Remote control by gun ... 31
Shut-down ... 32
Saving programs ... 32
Technical explanations concerning high voltage and spraying current ... 33
Characteristic curves of Preset mode ... 33
Characteristic curve of Program mode ... 33

Additional options 35

System parameter P0 ... 35
Entering the system parameter ... 35
Exiting the system parameter mode ... 35
Status request ... 36
Keyboard lock ... 36
Operation with other guns and variations ... 36
Operation and configuration of the Tribo gun ... 36
Operation of the Tribo gun without adapter ... 36
Correction factor for powder output ... 37
Entering the correction factor ... 37
RAM Reset ... 37
Powder preparation ... 37
OptiFlex F (with fluidized powder container) ... 37
OptiFlex B (with powder box) ... 37
OptiFlex S (with stirrer container) ... 38
Manual equipment control without fluidization ... 38

Pneumatical diagram 39

OptiStar CG07 - Manual equipment control unit ... 39

Troubleshooting 41

Repairing the electrical part of the control unit ... 41
Replacing the fuse(s) ... 41
Replacing the power supply board ... 41
Replacing the front plate ... 42
Repairing the pneumatic part ... 42
Replacing the pneumatic part ... 42
Removing the pneumatic hoses ... 42
Fitting the pneumatic hoses ... 42
Error diagnosis of the software ... 43
General information ... 43
Error codes ... 43
Error list ... 44
Appearance of errors ... 45

Spare parts list 47

Ordering spare parts 47
OptiStar CG07Gun control unit - inside rear wall 48
OptiStar CG07Gun control unit - outside rear wall 49
OptiStar CG07 Gun control unit - power pack and housing 50
OptiStar CG07 Gun control unit - front plate 51

General safety regulations

This chapter sets out the fundamental safety regulations that must be followed by the user and third parties using the OptiStar CG07 Gun control unit.

These safety regulations must be read and understood before the OptiStar CG07 Gun control unit is used.

Safety symbols (pictograms)

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

DANGER!
Danger due to live electricity or moving parts. Possible consequences: Death or serious injury

WARNING!
Improper use of the equipment could damage the machine or cause it to malfunction. Possible consequences: minor injuries or damage to equipment

INFORMATION!
Useful tips and other information

Conformity of use

1. The OptiStar CG07 Gun control unit is built to the latest specification and conforms to the recognized technical safety regulations. It is designed for the normal application of powder coating.
2. Any other use is considered as non-conform. The manufacturer is not responsible for damage resulting from improper use of this equipment; the end-user alone is responsible. If the OptiStar CG07 Gun control unit is to be used for other purposes or other substances outside of our guidelines then ITW Gema AG should be consulted.
3. Observance of the operating, service and maintenance instructions specified by the manufacturer is also part of

conformity of use. The OptiStar CG07 Gun control unit should only be used, maintained and started up by trained personnel, who are informed about and are familiar with the possible hazards involved.

4. Start-up (i.e. the execution of a particular operation) is forbidden until it has been established that the OptiStar CG07 Gun control unit has been set up and wired according to the guidelines for machinery (98/37 EG). EN 60204-1 (machine safety) must also be observed.
5. Unauthorized modifications to OptiStar CG07 Gun control unit exempts the manufacturer from any liability from resulting damage.
6. The relevant accident prevention regulations, as well as other generally recognized safety regulations, occupational health and structural regulations are to be observed.
7. Furthermore the country-specific safety regulations must be observed.

Explosion protection	Protection type	Temperature class
CE 0102 Ex II (2) D	IP54	T6

Technical safety regulations for stationary electrostatic powder spraying equipment

General information

The powder spraying equipment from ITW Gema is designed with safety in mind and is built according to the latest technological specifications. This equipment can be dangerous if it is not used for its specified purpose. Consequently it should be noted that there exists a danger to life and limb of the user or third party, a danger of damage to the equipment and other machinery belonging to the user and a hazard to the efficient operation of the equipment.

1. The powder spraying equipment should only be started up and used once the operating instructions have been carefully studied. Improper use of the controlling device can lead to accidents, malfunction or damage to the control itself.
2. Before every start-up check the equipment for operational safety (regular servicing is essential)!
3. Safety regulations BGI 764 and VDE regulations DIN VDE 0147, Part 1, must be observed for safe operation.
4. Safety precautions specified by local legislation must be observed.
5. The plug must be disconnected before the machine is opened for repair.
6. The plug and socket connection between the powder spraying equipment and the mains network should only be taken out when the power is switched off.

7. The connecting cable between the controlling device and the spray gun must be set up so that it cannot be damaged during operation. Safety precautions specified by local legislation must be observed!
8. Only original ITW-Gema spare parts should be used, because the explosion protection will also be preserved that way. Damage caused by other parts is not covered by guarantee.
9. If ITW-Gema powder spraying equipment is used in conjunction with machinery from other manufacturers then their safety regulations must also be taken into account.
10. Before starting work familiarize yourself with all installations and operating elements, as well as with their functions! Familiarization during operation is too late!
11. Caution must be exercised when working with a powder/air mixture! A powder/air mixture in the right concentration is flammable! Smoking is forbidden in the entire plant area!
12. As a general rule for all powder spraying installations, persons with pacemakers should never enter high voltage areas or areas with electromagnetic fields. Persons with pacemakers should not enter areas with powder spraying installations!

WARNING!
We emphasize that the customer himself is responsible for the safe operation of equipment. ITW-Gema is in no way responsible for any resulting damages!

Safety conscious working

Each person responsible for the assembly, start-up, operation, service and repair of powder spraying equipment must have read and understood the operating instructions and the “Safety regulations”-chapter. The operator must ensure that the user has had the appropriate training for powder spraying equipment and is aware of the possible sources of danger.

The control devices for the spray guns must only be set up and used in zone 22. Only the spray gun should be used in zone 21.

The powder spraying equipment should only be used by trained and authorized personnel. This applies to modifications to the electrical equipment, which should only be carried out by a specialist.

The operating instructions and the necessary closing down procedures must be followed before any work is carried out concerning the set-up, start-up, operation, modification, operating conditions, mode of operation, servicing, inspection or repairs.

The powder spray equipment can be turned off by using the main switch or failing that, the emergency shut-down. Individual components can be turned off during operation by using the appropriate switches.

Individual safety regulations for the operating firm and/or operating personnel

1. Any operating method which will negatively influence the technical safety of the powder spraying equipment is to be avoided.

2. The operator should care about no non-authorized personnel works on the powder spraying equipment (e.g. this also includes using the equipment for non-conform work).
3. For dangerous materials, the employer has to provide an operating instructions manual for specifying the dangers arising for humans and environment by handling dangerous materials, as well as the necessary preventive measures and behavior rules. The operating instructions manual has to be written in an understandable form and in the language of the persons employed, and has to be announced in a suitable place in the working area.
4. The operator is under obligation to check the powder spraying equipment at least once every shift for signs of external damage, defects or changes (including the operating characteristics) which could influence safety and to report them immediately.
5. The operator is obliged to check that the powder spraying equipment is only operated when in satisfactory condition.
6. As far as it is necessary, the operating firm must ensure that the operating personnel wear protective clothing (e.g. facemasks).
7. The operating firm must guarantee cleanliness and an overview of the workplace with suitable instructions and checks in and around the powder spraying equipment.
8. No safety devices should be dismantled or put out of operation. If the dismantling of a safety device for set-up, repair or servicing is necessary, reassembly of the safety devices must take place immediately after the maintenance or repair work is finished. The powder spraying device must be turned off while servicing is carried out. The operator must train and commit the responsible personnel to this.
9. Activities such as checking powder fluidization or checking the high-voltage spray gun etc. must be carried out with the powder spraying equipment switched on.

Notes on special types of hazard

Power

It is necessary to refer once more to the danger of life from high-voltage current if the shut-down procedures are not observed. High voltage equipment must not be opened - the plug must first be taken out - otherwise there is danger of electric shock.

Powder

Powder/air mixtures can be ignited by sparks. There must be sufficient ventilation in the powder coating booth. Powder lying on the floor around the powder spraying device is a potentially dangerous source of slipping.

Static charges

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

Grounding/Earthing

All electricity conducting parts and machinery found in the workplace (according to DIN VDE 0745, part 102) must be earthed 1.5 meters either side and 2.5 meters around each booth opening. The earthing resistance must amount to maximally 1 MOhm. The resistance must be tested on a regular basis. The condition of the machinery surroundings as well as the suspension gear must ensure that the machinery remains earthed. If the earthing of the machinery includes the suspension arrangements, then these must constantly be kept clean in order to guarantee the necessary conductivity. The appropriate measuring devices must be kept ready in the workplace in order to check the earthing.

Compressed air

When there are longer pauses or stand-still times between working, the powder spraying equipment should be drained of compressed air. There is a danger of injury when pneumatic hoses are damaged and from the uncontrolled release and improper use of compressed air.

Crushing and cutting

During operation, moving parts may automatically start to move in the operating area. It must be ensured that only instructed and trained personnel go near these parts. The operator should ensure that barriers comply with the local security regulations.

Access under exceptional circumstances

The operating firm must ensure that local conditions are met when repairs are made to the electronic parts or when the equipment is restarted so that there are additional measures such as barriers to prevent unauthorized access.

Prohibition of unauthorized conversions and modifications to machines

All unauthorized conversions and modifications to electrostatic spraying equipment are forbidden for safety reasons.

The powder spraying equipment should not be used if damaged, the faulty part must be immediately replaced or repaired. Only original ITW-Gema replacement parts should be used. Damage caused by other parts is not covered by guarantee.

Repairs must only be carried out by specialists or in ITW-Gema workshops. Unauthorized conversions and modifications may lead to injury or damage to machinery. The ITW Gema AG guarantee would no longer be valid.

Safety requirements for electrostatic powder coating

1. This equipment is dangerous if the instructions in this operating manual are not followed.
2. All electrostatic conductive parts, in particular the machinery within 5 meters of the coating equipment, must be earthed.
3. The floor of the coating area must conduct electricity (normal concrete is generally conductive).

4. The operating personnel must wear electricity conducting footwear (e.g. leather soles).
5. The operating personnel should hold the gun with bare hands. If gloves are worn, these must also conduct electricity.
6. The supplied earthing cable (green/yellow) must be connected to the earthing screw of the electrostatic powder spraying hand appliance. The earthing cable must have a good metallic connection with the coating booth, the recovery unit and the conveyor chain and with the suspension arrangement of the objects.
7. The electricity and powder supply to the hand guns must be set up so that they are fully protected against heat and chemical damage.
8. The powder coating device may only be switched on once the booth has been started up. If the booth cuts out then the powder coating device must be switched off.
9. The earthing of all electricity conducting devices (e.g. hooks, conveyor chains) must be checked on a weekly basis. The earthing resistance must amount to maximally 1 MOhm.
10. The control device must be switched off if the hand gun is cleaned or the nozzle is changed.
11. When working with cleaning agents there may be a risk of hazardous fumes. The manufacturers instructions must be observed when using such cleaning agents.
12. The manufacturers instructions and the applicable environmental requirements must be observed when disposing of powder lacquer and cleaning agents.
13. If any part of the spray gun is damaged (broken parts, tears) or missing then it should not be used.
14. For your own safety, only use accessories and attachments listed in the operating instructions. The use of other parts can lead to risk of injury. Only original ITW-Gema replacement parts should be used.
15. Repairs must only be carried out by specialists and under no circumstances should they be carried out in the operating area. The former protection must not be reduced.
16. Conditions leading to dangerous levels of dust concentration in the powder spraying booths or in the powder spraying areas must be avoided. There must be sufficient technical ventilation available, to prevent a dust concentration of more than 50% of the lower explosion limit (UEG) (UEG = max. permissible powder/air concentration). If the UEG is not known then a value of 10 g/m³ should be used.

A summary of the rules and regulations

The following is a list of relevant rules and regulations which are to be observed:

Guidelines and regulations, German professional association

BGV A1	General regulations
BGV A2	Electrical equipment and material
BGI 764	Electrostatic coating
BGR 132	Guidelines for the avoidance of the dangers of ignition due to electrostatic charging (Guideline “Static Electricity”)
VDMA 24371	Guidelines for electrostatic coating with synthetic powder[1)] - Part 1 General requirements - Part 2 Examples of use

Leaflets

ZH 1/310	Leaflet for the use of tools in locations where there is danger of explosion [1)]

EN European standards

RL94/9/EC	The approximation of the laws of the Member States relating to apparatus and safety systems for their intended use in potentially explosive atmospheres
EN 292-1 EN 292-2	Machine safety [2)]
EN 50 014 to EN 50 020, identical: DIN VDE 0170/0171	Electrical equipment for locations where there is danger of explosion [3)]
EN 50 050	Electrical apparatus for potentially explosive atmospheres - Electrostatic hand-held spraying equipment [2)]
EN 50 053, part 2	Requirements for the selection, installation and use of electrostatic spraying equipment for flammable materials - Hand-held electrostatic powder spray guns [2)]
EN 50 177	Stationary electrostatic spraying equipment for flammable coating powder [2)]
PR EN 12981	Coating plants - Spray booths for application of organic powder coating material - Safety requirements
EN 60 529, identical: DIN 40050	IP-Type protection: contact, foreign bodies and water protection for electrical equipment [2)]
EN 60 204 identical: DIN VDE 0113	VDE regulations for the setting up of high-voltage electrical machine tools and processing machines with nominal voltages up to 1000 V [3)]

VDE (Association of German Engineers) Regulations

DIN VDE 0100	Regulations for setting-up high voltage equipment with nominal voltages up to 1000V [4)]
DIN VDE 0105	VDE regulations for the operation of high voltage equipment [4)]
part 1	General regulations
part 4	Supplementary definitions for stationary electrical spraying equipment
DIN VDE 0147 part 1	Setting up stationary electrostatic spraying equipment [4)]
DIN VDE 0165	Setting up electrical equipment in locations in areas with danger of explosion [4)]

*****Sources:

[1)] Carl Heymanns Verlag KG, Luxemburger Strasse 449, 5000 Köln 41, or from the appropriate employers association

[2)] Beuth Verlag GmbH, Burgrafenstrasse 4, 1000 Berlin 30

[3)] General secretariat, Rue Bréderode 2, B-1000 Bruxelles, or the appropriate national committee

[4)] VDE Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12

Product specific security measures

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

About this manual

General information

This operating manual contains all important information which you require for the working with the OptiStar CG07 Gun control unit. It will safely guide you through the start-up process and give you references and tips for the optimal use of your new powder coating system.

Information about the function mode of the individual system components - reciprocators, booths, powder gun controls, powder guns etc. - you will find in the corresponding enclosed documentations.

Software-Version

This document describes the operation of the OptiStar CG07 Gun control unit with software version 1.01!

Function description

Field of application

The OptiStar CG07 Gun control unit is designed exclusively for controlling the ITW Gema powder coating guns (see also in chapter "Technical Data").

Any other use beyond this is not intended. The manufacturer is not responsible for any damage resulting from this; the risk for this is assumed by the user alone.

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

OptiFlex manual equipment

Following OptiFlex manual equipment types are available:

- OptiFlex B (with powder box)
- OptiFlex F (with fluidized powder container)
- OptiFlex B (with stirrer container)

OptiStar CG07 Gun control unit

Typical characteristics

- The OptiStar CG07 Gun control unit is used for the electrostatic powder coating with OptiFlex manual equipment (fluidizing-, box- or stirrer device)
- The OptiStar CG07 Gun control unit allows the configuration of process parameters, system parameters, process data, status information and the correction value. The air volumes can be controlled centrally.
- The handling is simple and self-describing. The coating personnel can save individual settings and put in experience values.
- All settings for efficient powder coating can be operated simply and reproducibly. The inserted electronics permits the exact adjusting of the powder output and the adjusted values can be read on the digital displays.

- The OptiStar CG07 Gun control unit can be connected to all usual mains voltages (Attention when connecting the vibrating table - 100/110/220 VAC).

Basic functions

- Intuitive operation
- Setting and display of the values on two levels
- Saving/fetching of process parameters in the form of programs
- Remote control possibility at the powder gun

Additional functions

- Spraying current regulation with high voltage limitation
- Control of the air volumes
- Controlling of the stirrer and the vibrator
- Status indications and error diagnosis

Operating modes

The OptiStar CG07 Gun control unit can be operated with two operating modes. According to the selected application mode, the spraying voltage and the spraying current are automatically adjusted and limited.

Predefined operating mode (Preset mode)

The CG07 Gun control unit provides three predefined application modes (for flat parts, for complicated parts and for overcoating parts already coated).

On these application modes, current (**µA**) and high voltage (**kV**) are given, powder and air volumes can be adjusted. The air values are stored separately for each application mode.

Adjustable operating mode (Program mode)

In this operating mode, 20 individually definable programs (P01-P20) are available. This programs are saved automatically and can be recalled again.

The adjustments for current, high voltage, powder output, total air, electrode rinsing air and fluidizing air (if available) can be set freely.

Note:
The specified adjustments in the 20 programs and 3 application modes are saved automatically, without confirmation!

Technical Data

OptiStar CG07 Gun control unit

Connectable guns

OptiStar CG07 Gun control unit	connectable
OptiSelect GM02	yes
OptiGun GA02	yes
PG1/PG2-A	yes (no remote control)
TriboJet gun	yes, with adapter*

* The gun type must be adjusted (see therefore in chapter "Additional options").

Attention:
The OptiStar CG07 Gun control unit may be used only with the specified gun types!

Electrical data

OptiStar CG07 Gun control unit	
Nominal input voltage	100-240 VAC
Frequency	50-60 Hz
Input value (without vibrator)	40 VA
Nominal output voltage (to the gun)	max. 12 V
Nominal output current (to the gun)	max. 1 A
Vibrator connection and power (on AUX output)	110/220 VAC max. 100W
Protection type	IP 54
Temperature range	0°C to +40°C (+32 °F to +104 °F)
Approvals	(still in work)

Pneumatic data

OptiStar CG07 Gun control unit	
Compressed air connection (on control unit)	Elbow connection 8 mm
Compressed air main connection (on filter unit)	G1/4" - internal thread
Max. input pressure	10 bar / 145 psi
Min. input pressure (dynamically)	6 bar / 87 psi
Max. water vapor content of the compressed air	1,3 g/m³
Max. oil vapor content of the compressed air	0,1 mg/kg

Dimensions

OptiStar CG07 Gun control unit	
Width	248 mm
Depth	250 mm
Height	174 mm
Weight	5,2 kg

Air flow rates

The total air consists of conveying air and supplementary air, in relation to the selected powder quantity (in %). Hereby, the total air volume is maintained constant. For explanation, see the following examples with correction factor C0=1,8 and conveying air nozzle=1,4 mm:

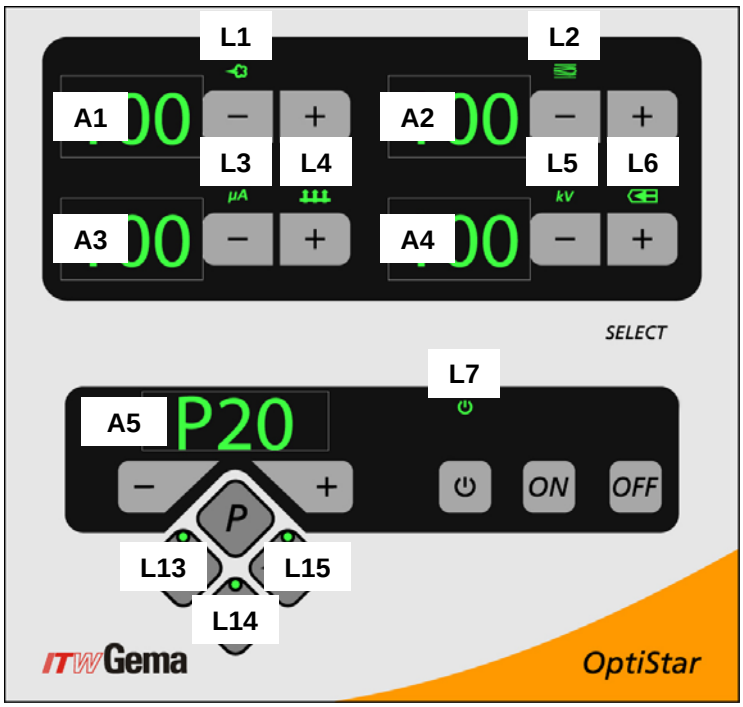
OptiStar CG07 Gun control unit			
Total air	**Powder quantity**	**Conveying air**	**Supplementary air**
6,5 Nm³/h	81 %	5,4 Nm³/h	1,1 Nm³/h
	40 %	3,7 Nm³/h	2,7 Nm³/h
	0 %	1,8 Nm³/h	4,6 Nm³/h
5,5 Nm³/h	100 %	5,4 Nm³/h	0 Nm³/h
	50 %	3,6 Nm³/h	1,8 Nm³/h
	0 %	1,8 Nm³/h	3,6 Nm³/h
4,0 Nm³/h	100 %	4,0 Nm³/h	0 Nm³/h
	50 %	2,8 Nm³/h	1,2 Nm³/h
	0 %	1,8 Nm³/h	2,2 Nm³/h

OptiStar CG07 Gun control unit	
Flow rate - fluidizing air OptiFlex B OptiFlex F OptiFlex S	 0-1,0 Nm³/h 0-5,0 Nm³/h 0-1,0 Nm³/h
Flow rate - electrode rinsing air	0-3,0 Nm³/h
Flow rate - conveying air	0-5,4 Nm³/h
Flow rate - supplementary air	0-4,5 Nm³/h

Note:
The total air consumption of the equipment consists, depending on the device type, of the 4 adjusted air values (without air mover air value on OptiFlex F).
These values are valid only for an internal control pressure of 5,5 bar (dynamically, 6 Nm³/h)!

Operating and display elements

Displays and LEDs

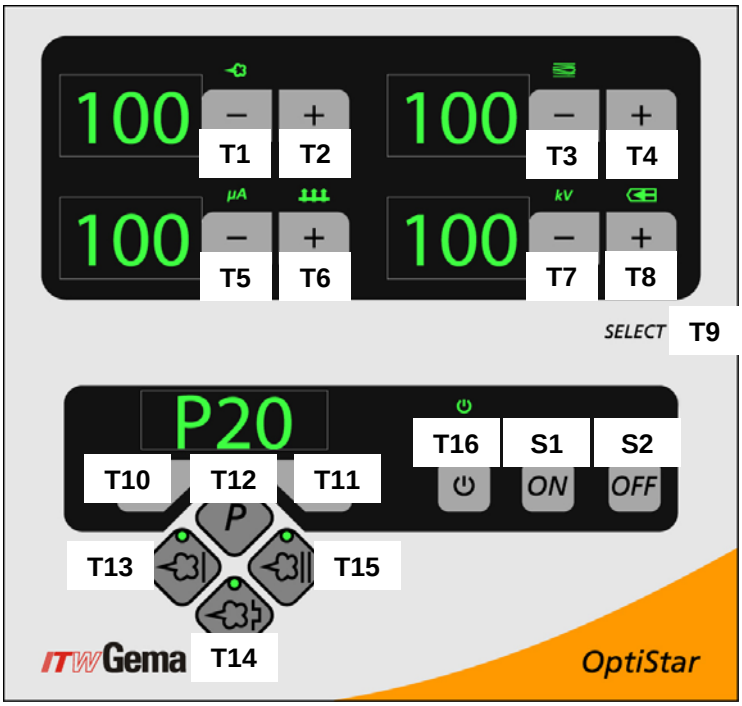


OptiStar CG07Gun control unit - displays and LEDs

Designation	Function
A1-A4	Display of actual / nominal values and system parameters
A5	Display of program numbers, error diagnosis codes and status information
L1	Powder output (display in %)
L2	Total air volume (display in Nm³/h)
L3	Spraying current (display in µA)
L4	Fluidizing (display in Nm³/h)
L5	High-voltage (display in kV)
L6	Electrode rinsing air (display in Nm³/h)
L7	Activation of vibration/fluidization
L13	Application mode for flat parts is activated

L14	Application mode for complicated parts is activated
L15	Application mode for overcoating parts already coated is activated

Input keys and switches



OptiStar CG07Gun control unit - input keys and switches

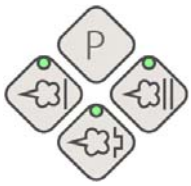
Designation	Function
T1-T8	Input keys for nominal values and system parameters
T9 (Select)	Selection of display levels
T10-T11	Program change
T12 (P)	Program selection for self-defined programs (max. 20)
T13	Application mode for flat parts (fixed)
T14	Application mode for complicated parts with depressions (fixed)
T15	Application mode for overcoating parts already coated (fixed)
T16	Switching on and off the fluidization Switching on and off the vibration and the fluidization (OptiFlex B) Switching on and off the fluidization (OptiFlex S) Switch to system parameter mode (press for at least 5 seconds)
S1/S2	Power switch On/Off

General information

Display of the programs

The number of the adjusted program is shown on display **A5**. A guiding **P** is placed in front of the two digit program number.

Display of the values



Display of the actual values

The actual values are shown on the displays **A1-A4**. By operating the keys **T1-T8** and **T12-T15**, the nominal values display will be switched over.

Display of the nominal values/setting values

The nominal values are shown on the displays **A1-A4**. If no operation takes place during 3 seconds, the actual values display will be switched over.

Edit and save the nominal values

The nominal values can be adjusted in steps by ± 1 with the keys **T1-T8**. Modified nominal values are saved automatically in the current program.

Change between program and application mode

Pressing the keys **T10** and **T11** in one of the three predefined application modes (Preset mode), causes the switchover in the program mode. These keys also allow the change of programs in the program mode.

The simultaneous operation of the **+** and **-** key on the back of the powder gun (OptiSelect gun type) causes the current change between the pre-defined and the adjustable operation mode (counterclockwise).

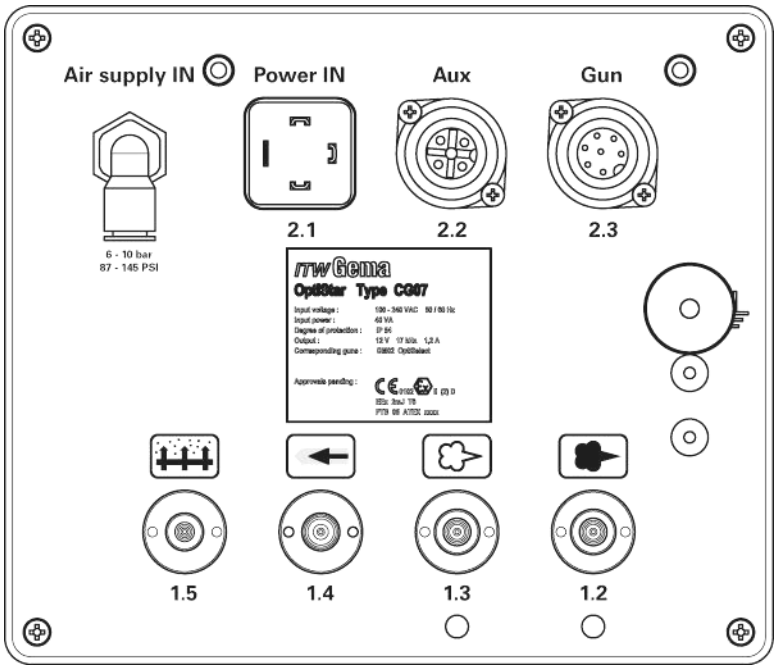
Retarded input of nominal values

To change from the actual value to the nominal value display without changing a nominal value at the same time, the corresponding keys must be touched lightly by changing into the nominal value display, until an adjustment takes place.

Example:
Touching lightly key **T1** in the actual value display, indicates the nominal values, holding longer this key, reduces also the powder output. This behavior does not apply to the program select keys, the program number is directly changed.

Start-up and operation

Connections



OptiStar CG07Gun control unit - connections on the rear wall

Connection	Description
1.1 Air Supply IN	Compressed air connection (6-10 bar / 87-145 PSI)
2.1 Power IN	Mains cable connection (100-240 VAC)
2.2 Aux	Vibration motor connection for OptiFlex B
2.3 Gun	Gun cable connection
1.5	Fluidizing air connection
1.4	Electrode rinsing air connection
1.3	Supplementary air connection
1.2	Conveying air connection
	Grounding connection

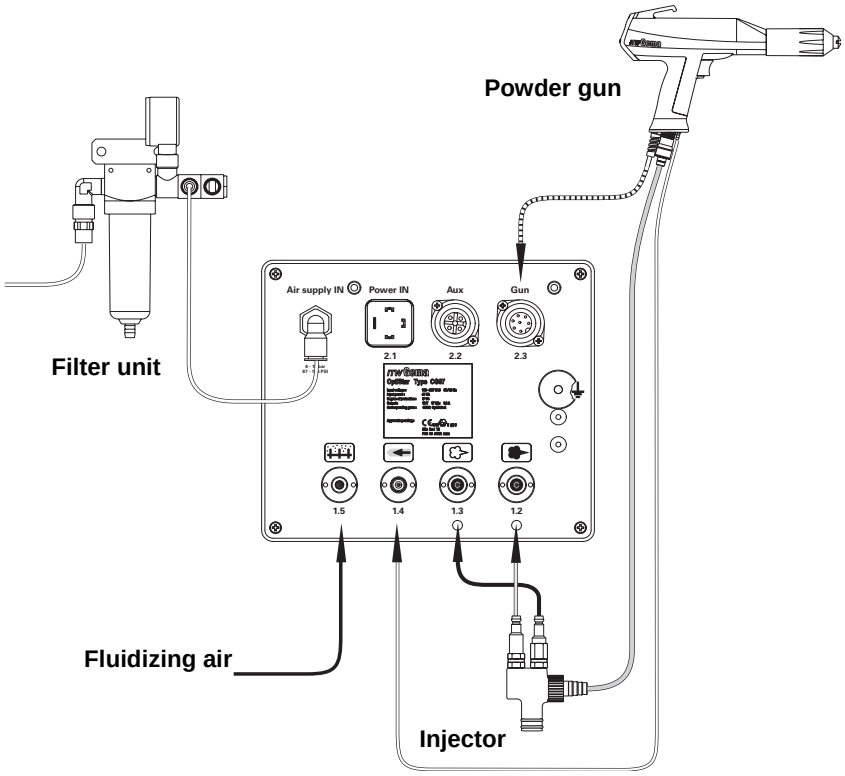
Connecting guide

1. Check the compressed air connection from filter unit to control unit. Connect the compressed air supply hose from the compressed air circuit directly to the filter unit main connection on the rear side of the equipment (connecting thread G 1/4").

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

2. Connect the black hose for fluidizing air (electrically conductive) to the output **1.5** on the rear side of the control unit
3. Connect the grounding connection cable to the control unit with the grounding screw, and the 5 m long grounding cable with the clamping clip to the booth or the suspension device
4. Connect the gun cable plug to the socket **2.3** on the rear side of the control unit
5. Connect the rinsing air hose to the electrode rinsing air output **1.4** and to the powder gun
6. Attach the injector, connect the powder hose to the injector and to the powder gun
7. Connect the red hose for conveying air to the corresponding output **1.2** on the rear side of the control unit and to the injector
8. Connect the black hose for supplementary air to the corresponding output **1.3** on the rear side of the control unit and to the injector (this hose is electrically conducting)
9. Connect the mains cable to the **2.1 Power IN** plug and fix it by screws

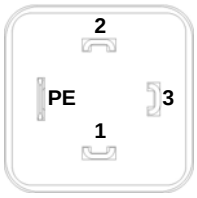
Note:
If no vibration motor (OptiFlex B) is connected, the 2.2 Aux output is to be locked closely with the provided protection cap!



Connecting guide - overview

Pin assignment

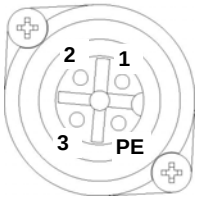
Power IN



Power IN connection

1	Neutral conductor (power supply)
2	Conductor (power supply)
3	Vibrator or stirrer output
PE	Ground PE

Aux



Aux connection

1	Vibrator output, conductor
2	Neutral conductor
3	
PE	Ground PE

Gun

Gun connection

1	Ground
2	Remote control 1 (GM02)
3	Masse
4	Trigger
5	Remote control 2 (GM02)
6	Oscillator
7	Ground PE

Initial start-up

Setting the device type

Adjust the corresponding device type (fluidizing, box or stirrer device) with the system parameter **P0** (see therefore in chapter "System parameter P0").

Note:
If the control unit is supplied as a component of an OptiFlex equipment, then the corresponding system parameter is set correctly by the factory!

Manual devices are subdivided into fluidizing, box or stirrer devices. These subtypes differ in the control of the vibrator output and the behavior of the fluidizing air.

Device type	AUX output function	Fluidizing air function
Fluidizing device (type F)	Always **Off** (no vibration)	Fluidizing air **On** (as soon as fluidization is switched on, or gun is operated for the first time)
Box device (type B)	Vibration **On** during triggering, wake for 1 minute	Fluidizing air switches parallel with main solenoid valve (trigger), has then however a wake for 1 minute
Stirrer device (type S)	Stirrer **On** during triggering	

Note:
The system parameter P0 of the manual device may not be set on 3 (CG06 Automatic equipment)!
A wrong parameterization leads to various malfunctions!

Preparing the powder hopper/container

Prepare the powder container or powder box according to manual equipment type (therefore, observe the operating instructions in the corresponding manuals).

Switch on the booth

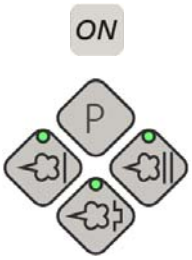
Switch on the powder coating booth according to its operating manual.

Daily start up

The daily start-up of the OptiStar CG07 Gun control unit takes place by following steps:

Select the operating mode

Here, select the predefined operation mode (Preset mode) with three given application modes, or the adjustable operation mode (Program mode) with 20 individually definable programs.

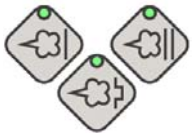


1. Switch on the gun control unit with the **ON** key
2. Select the corresponding operating mode with program key **T12** (for Program mode) or application keys **T13/T14/T15** (for Preset mode)

The predefined application modes dispose of preset values for high voltage and spraying current:

Presetting	Desired µA	Desired kV
Flat parts	100	80
Complicated parts	22	80
Overcoating	100	40

Calling the predefined operating mode (Preset mode)



Select the preset mode with the application keys **T13/T14/T15**. The LED of the corresponding application key illuminates. No program number will be shown on the display **A5**. The air values can be specified individually, they are stored in the 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 complicated shape (e.g. profiles).

Application mode for overcoating parts already coated

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

Exiting the Preset mode

Exit the Preset mode with the keys **T10**, **T11** or **T12**. The desired values of the program used before the Preset mode are read and adjusted by the equipment memory.

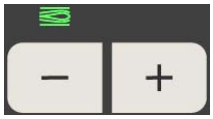
Calling the adjustable operating mode (Program mode)

Select this operating mode with the program key **T12**. Here, 20 individually adjustable programs can be defined and saved. The programs 1-20 were loaded with presettings by factory.

Setting powder output and powder cloud

The powder output is dependent on the selected powder amount (in %) and the adjusted total air volume.

Setting the total air volume



1. Adjust the total air volume with the keys **T3/T4** (see also the injector operating manual)
   - Adjust the total air volume according to the corresponding coating requests

Setting the powder output

1. Adjust the powder output volume (e.g. according to the desired coating thickness)
   - The selection takes place with the keys **T1/T2** on the control unit or with the **+/-** keys on the rear side of the powder gun (OptiSelect gun type). For the beginning, the standard adjustment of 60% is recommended. The total air volume is thereby kept constant automatically
2. Check the powder fluidizing
3. Point the gun into the booth, press the gun switch and check visually the powder output

Note:
As basic value, a powder rate of 60% and a total air amount of 4 Nm³/h are recommended. By inserting values, which the equipment cannot convert, the operator is made attentive by flashing of the appropriate display and a temporary error message!

Setting the electrode rinsing air

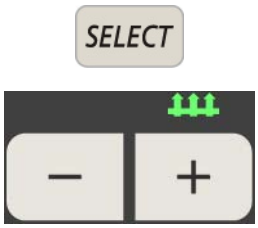
1. Adjust the correct electrode rinsing air according to the applied nozzles (deflector plate, flat jet nozzle)
   - Press key **T9** (**SELECT**)
     The second display level is switched over
   - Press keys **T7/T8**:
     Here, the corresponding air volume value is entered
   - If this display level is not operated for 3 seconds, the first display level is switched over independently

Note:
By using flat jet nozzles, the value amounts to approx. 0.2 Nm³/h, by using round jet nozzles with air-rinsed deflector plates, the value amounts to approx. 0.5 Nm³/h!

Setting the fluidizing

The fluidizing can be adjusted on the OptiFlex B, OptiFlex S and OptiFlex F manual device.

The powder fluidizing depends on the powder type, the air humidity and the ambient temperature. Fluidizing and vibration start by switching on the control unit.



Procedure:

1. Adjust the air mover by turning the air valve (OptiFlex F)
2. Open the powder container cover
3. Press key **T9** (**SELECT**)
   The second display level is switched over
4. Adjust the fluidizing air with the keys **T5/T6**
   - If this display level is not operated for 3 seconds, the first display level is switched over independently
   - The powder should "cook" just easily, but regularly and if necessary, stir with a rod into the powder
5. Close the cover again
6. According to the device type, stirrer, vibration and/or fluidizing can be switched on now

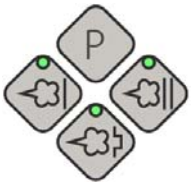
Powder coating

Attention:
Make sure first, that all electrically conductive parts within 5 m of the coating booth are grounded!

1. Take the gun into the hand and hold it into the coating booth, but do not yet direct it to the object to be coated
2. Select the operating mode:
   Select the operating mode with program key **T12** or application keys **T13/T14/T15**. The LED of the corresponding application key illuminates
3. Press the powder gun trigger
4. Coat the objects

Remote control by gun

Various functions can be remotely controlled with the **+** and **-** keys on the rear side of the powder gun (OptiSelect gun type):



- Modify the powder output (press the **+** or **-** key on the gun). The powder output will be correspondingly increased or decreased)
- Change application modes or program mode (press the **+** and **-** keys on the gun simultaneously). The change takes place counterclockwise. Check by observing the key LEDs on the control unit

Note:
By operating one of the keys, the nominal values display will be switched over!

Shut-down

The shut-down of the OptiStar CG07 Gun control unit takes place in following steps:

1. Let loose the powder gun trigger
2. Switch off the control unit
3. Switch off the Airmover (OptiFlex F)

Note:
The adjustments for high-voltage, powder output, electrode rinsing air and fluidizing remain stored!

If in disuse during several days

1. Remove the mains plug
2. Clean the coating equipment (see the corresponding operating manual)
3. Turn off the compressed air main supply

Saving programs

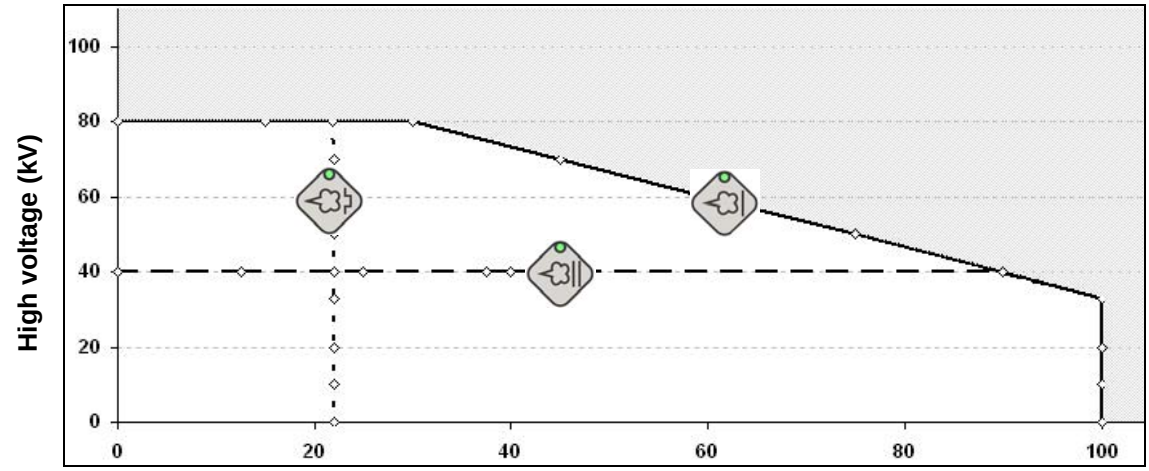
Note:
The specified adjustments in the programs 1-20 and in the 3 predefined application modes are saved automatically, without confirmation!

Technical explanations concerning high voltage and spraying current

Characteristic curves of Preset mode

The preset values for high voltage and spraying current in the predefined operation mode (Preset mode) are to be taken as reference points. The modification of these values has effects on the characteristic curve of the gun (see diagram). The operator can optimize the values within the brightly explained, possible ranges.

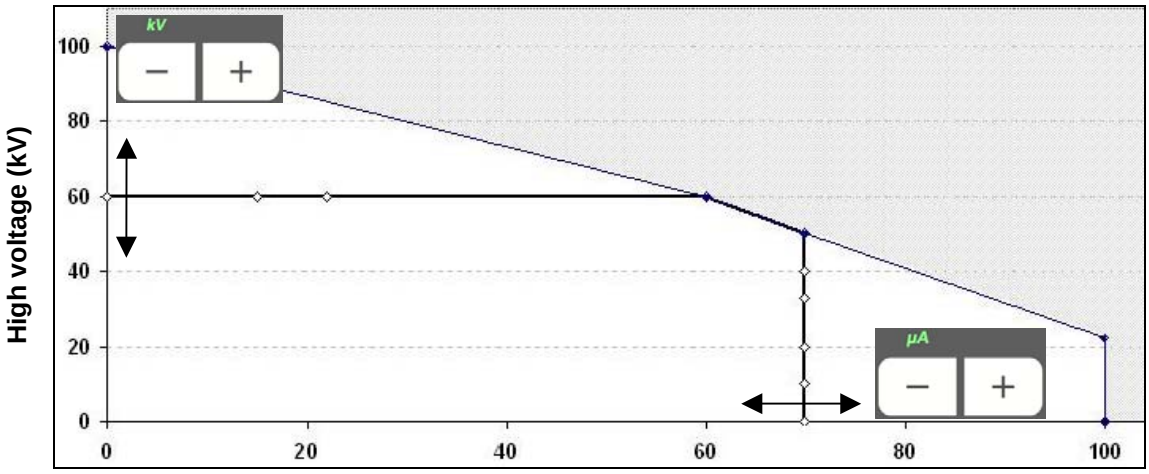
Characteristic curves of Preset mode



Characteristic curve of Program mode

In the adjustable operating mode (Program mode), the values for high voltage and spraying current are free adjustable. The user can optimize the values within the brightly explained, possible range (see diagram).

Characteristic curve of Program mode



Additional options

System parameter P0

Configure the OptiStar CG07 gun control unit with the system parameter **P0**, by defining the device type. This value will be saved in the equipment memory.

Entering the system parameter

1. To enter the system parameter mode, keep pressed the key **T16** longer than 5 seconds
2. The system parameter number is shown in the display **A1** with a **P** placed in front
3. Adjust the corresponding system parameter value (device type) with the keys **T5/T6**.
   The value of the adjusted system parameter appears on display **A3**

Name	Description	Values	Display
P0	Device type	0 - Fluidizing device (type F) 1 - Box device (Vibr.) (type B) 2 - Stirrer device (type S) 3 - Automatic device 4 - Man. equip. w/o fluidization	F B S A H-F

Notice:
The manual equipment without fluidization (H-F) is used in case of a OptiFlex 2-F double equipment is assembled, or a OptiFlex 1/2-S has no fluidizing plate.

Exiting the system parameter mode

Exit the system parameter mode with the key **T16**, and the actual values display is switched over. The modified values will be saved in the equipment memory.

If the equipment is switched off in the system control during the parameterization, no parameterized data are stored in the equipment memory.

Status request

The status information can be shown on display **A5** by key combinations of key **T12** with another key. Thereby, key **T12** must be pressed and held.

Status information	Key combination
Trigger hours counter (total time in hours of powder output). The display is set to **0** by first switch on	**T12** with **T10**
Software version	**T12** with **T11**

The status display is shown as long as a key is held.

Keyboard lock

The OptiStar CG07 Gun control unit contains a keyboard lock, which prevents an operation of the device. The powder gun can however be operated furthermore. Following is not affected by the keyboard lock:

- Display of nominal values of the current program
- Display of the actual values
- Error acknowledgement

The keyboard lock is activated and deactivated by pressing and holding key **T9** (**SELECT**) and then key **T11**, the LED **L11** (**REMOTE**) flashes.

The keyboard lock status remains stored, when switching the equipment off and on.

Operation with other guns and variations

Operation and configuration of the Tribo gun

Connect the Tribo gun to the OptiStar CG07 Gun control unit with the corresponding adapter. The Tribo gun can be configured by holding the keys **T7** and **T8** when switching on. The selected adjustment remains stored, when the device is switched off.

Operation of the Tribo gun without adapter

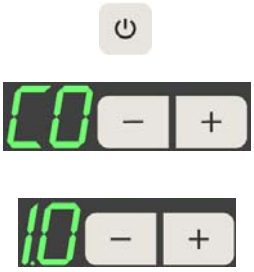
For continuous operation, the Tribo gun can be operated without corresponding adapter to the OptiStar CG06/CG07 Gun control unit (automatic and manual equipment). Therefore, the wiring in the Tribo gun plug must be modified. Connect the wire at Pin 5 to Pin 1.

Attention:
This activity must be absolutely carried out by a specialist. Inappropriate operation can lead to damage to the control unit. ITW Gema AG is in no way responsible for any resulting damages!

Correction factor for powder output

The OptiStar CG07 Gun control unit enables the powder output adaptation, when using different powder hose lengths to the gun. Therefore, the powder output correction factor is required.

Entering the correction factor



1. To enter the system parameter mode, keep pressed the key **T16** longer than 5 seconds
2. The correction factor number is shown in the display **A2** with a **C** placed in front
3. Adjust the corresponding correction factor value with the keys **T7/T8** (setting range 0,5-3,0). The default value for manual equipment is 1,0 and for automatic equipment 1,8. The value of the adjusted correction factor appears on display **A4**

RAM Reset

The RAM reset enables a restore of factory settings of the OptiStar CG07 gun control unit. The adjusted device type in system parameter **P0** remains stored thereby, and an active keyboard lock will be deactivated.

Execute the RAM reset by pressing the key **T16** and the **ON** switch for 5 seconds.

Powder preparation

The preparation of the coating powder for conveying takes place principally by fluidization and vibration or stirrer. Fluidization and vibration or stirrer are switched on and off with the key **T16**. Depending on the manual equipment type, additional functions are available.

The activated fluidization and vibration status is indicated by the **L7** LED on the display.

OptiFlex F (with fluidized powder container)

The fluidization is switched on by triggering. Thereby, the powder receives a liquid-similar consistency and can be conveyed by means of injector principle (see the injector operating manual). This manual equipment type has no vibration. By pressing the key **T16**, the fluidization is switched on and off.

The activated fluidization and vibration status is indicated by the **L7** LED on the display.

OptiFlex B (with powder box)

The fluidization and the vibration are switched on and off by triggering. The vibration causes the powder movement to the suction tube. By switching off, the wake of the fluidization is approx. 1 minute, the wake of the vibration approx. 3 minutes. By pressing the key **T16**, the fluidization and the vibration is switched on and off.

The activated fluidization and vibration status is indicated by the **L7** LED on the display.

OptiFlex S (with stirrer container)

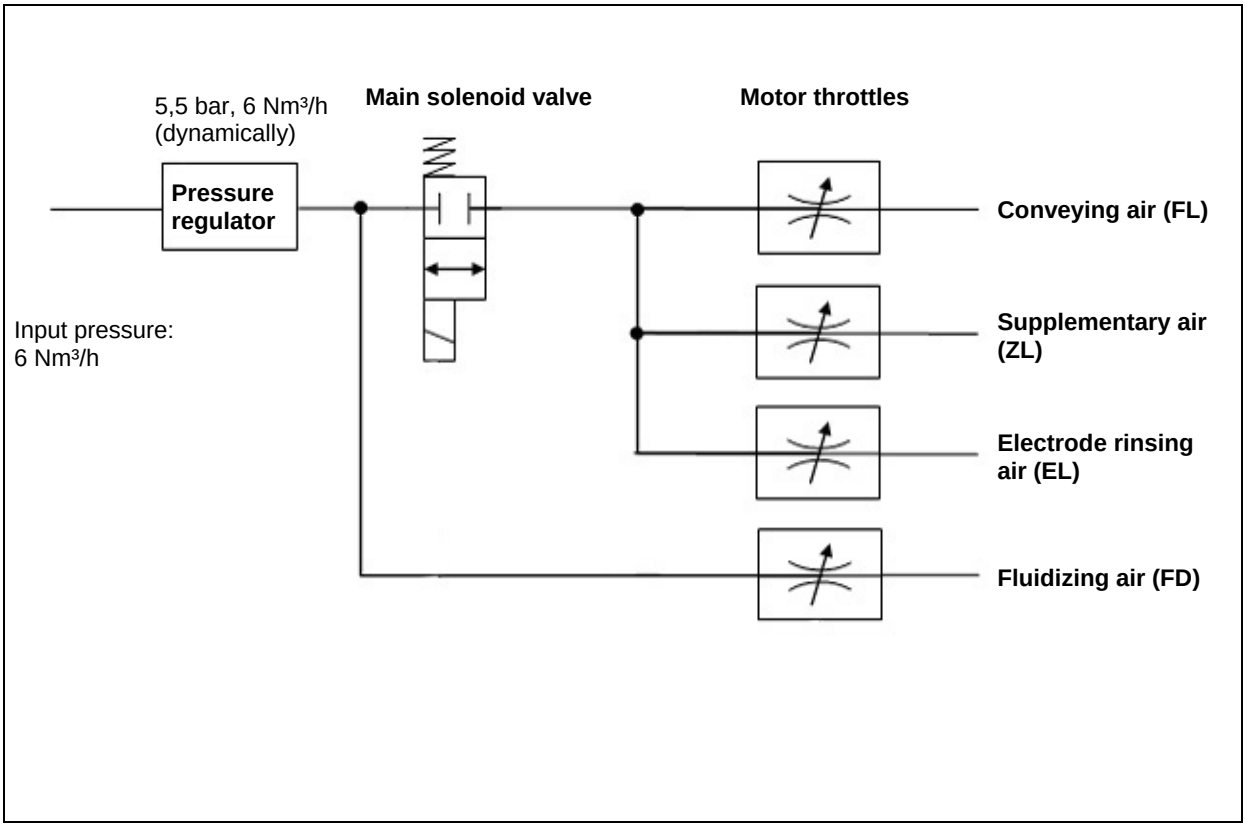
The fluidization and the stirrer are switched on and off by triggering. By switching off, the wake of the stirrer is approx. 20 seconds. By pressing the key **T16**, the fluidization is switched on and off.

Manual equipment control without fluidization

This is used in case of a stirrer equipment with no fluidization, or a double equipment has no fluidization on the second control unit.

Pneumatical diagram

OptiStar CG07 - Manual equipment control unit



OptiStar CG07 - manual equipment control unit

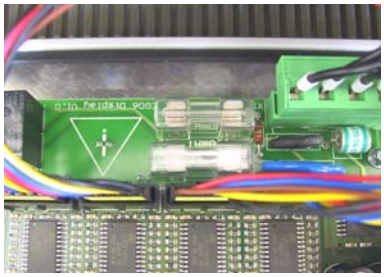
Troubleshooting

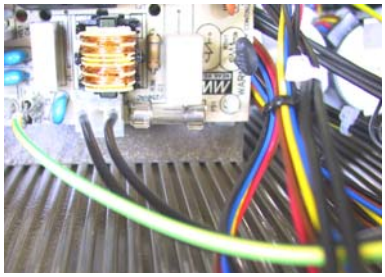
Repairing the electrical part of the control unit

Attention, danger!
Before starting the work on the control unit, disconnect the mains plug!

Replacing the fuse(s)

1. Loosen the screws on the front side of the housing
2. Hold the front plate with one hand, remove the fuse(s) (quick-acting) from the fuse holder and replace with a new one





Fuse(s)

3. Reattach the front plate
4. Reconnect the mains cable

Replacing the power supply board

1. Loosen the screws on the front side of the housing
2. Disconnect the plug on the defective board
3. Squeeze the spacers with a pointed pliers and remove the power supply board. Replace the defective spacers
4. Place the new board on the spacers and press it on, until it snap in on every spacer. Reconnect the plug
5. Reassemble the control unit in reverse order as described above and install it
6. Reconnect the mains cable

Replacing the front plate

1. Loosen the screws on the front side of the housing
2. Disconnect all plugs from the front plate
3. Replace the front plate
4. Reassemble the front plate and the control unit in reverse order as described and install it

Attention:
The motor plugs are to be put in according to the annotation!

5. Reconnect the mains cable

Note:
If there are any problems or uncertainties, please contact a ITW Gema service center!

Repairing the pneumatic part

Replacing the pneumatic part

1. Remove every electric and pneumatic connection on the rear side of the control unit (disconnect mains cable and remove compressed air supply)
2. Loosen the screws on the rear side of the housing
3. Remove the pneumatic hoses from the part to be replaced (see chapter "Removing the pneumatic hoses")
4. Dismantle the defective part and replace it
5. Reconnect the pneumatic hoses (see chapter "Fitting the pneumatic hoses")
6. Reassemble the control unit in reverse order as described and install it

Removing the pneumatic hoses

Before replacing a pneumatic part, all corresponding pneumatic hoses should always be disconnected first. This happens by pressing the ring on the quick release coupling of the hose. The hose can be pulled out easily.

Fitting the pneumatic hoses

In order to reconnect the pneumatic hoses, proceed as follows:

- Insert the hose in the quick release coupling up to the end stop. The hose is held firmly again.

Note:
If there are any problems or uncertainties, please contact a ITW Gema service center!

Error diagnosis of the software

General information

The correct function of the OptiStar CG07 Gun control unit is constantly monitored. If the equipment software determines a fault, an error message is indicated with an error code. Following is monitored:

- High voltage technology
- Air technology
- Power supply

Error codes

The error diagnosis codes (error codes) are shown in the display **A5**. The error 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 error codes are shown with the format **Hnn**, whereby **nn** is the numeric code, if necessary with a leading zero.

The errors are displayed in the order of their appearance. The keys **T10** and **T11** cannot be used for other functions, as long as an error code is shown on **A5**.

Here is the listing of the error codes of all possible malfunctioning of the OptiStar CG07 Gun control unit:

Code	Description	Criterion	Remedy
Pneumatics:			
H06	Trigger valve	Coil current smaller than limiting value Valve defective, main board or cable defective	Main solenoid valve error, connection cable from main solenoid valve to basic electronics is missing. Check main solenoid valve
H07	Supplementary air range outrun	The theoretical value for supplementary air runs out of the maximally possible flow. High total air with small powder quantity and small FLmin	Limit supplementary air to max. value
H08	Conveying air range outrun	The theoretical value for conveying air runs out of the maximally possible flow. High total air with large powder quantity and large FLmin	Limit conveying air to max. value
H09	Powder output higher than 100%	The powder output multiplied with the powder hose length factor and the daily correction value is larger 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 FLmin. Total air is smaller than FLmin	Limit conveying air to FLmin

Code	Description	Criterion	Remedy
High-voltage:			
H11	Gun error	No oscillation, cable broken, oscillator or gun defective	
Power supply:			
H20	Overvoltage +15V supply	Power pack defective or overloaded	Replace the power pack, if error is permanent
H21	Undervoltage +15V supply	Power pack defective or overloaded	Replace the power pack, if error is permanent
H22	Undervoltage -15V supply	Power pack defective or overloaded	Replace the power pack, if error is permanent
H23	Undervoltage +5V supply	Power pack defective or overloaded	Replace the power pack, if error is permanent
EEPROM (equipment memory):			
H24	EEPROM content invalid	EEPROM error	Load factory settings, initialize EEPROM
H25	Timeout during EEPROM writing	EEPROM error	
H26	Values not correctly stored in EEPROM during switching off	EEPROM error	
Motor throttles:			
H60	Conveying air reference position not found	Throttle blocked, limit switch defective, motor throttle error	Calibrate again (switch on and off), replace motor throttle, replace limit switch
H61	Supplementary air reference position not found	Throttle blocked, limit switch defective, motor throttle error	(see above)
H62	Electrode rinsing air reference position not found	Throttle blocked, limit switch defective, motor throttle error	(see above)
H63	Shaping air / fluidizing air reference position not found	Throttle blocked, limit switch defective, motor throttle error	(see above)
H64	Zero point signal is blocked	Short circuit in limit switch, motor throttle defective	(see above)
H65	Supplementary air throttle does not move	Short circuit in limit switch, motor throttle defective	(see above)
H66	Electrode rinsing air throttle does not move	Short circuit in limit switch, motor throttle defective	(see above)
H67	Shaping air / fluidizing air throttle does not move	Short circuit in limit switch, motor throttle defective	(see above)
H68	Conveying air position lost	Lost steps, limit switch defective, motor throttle defective	(see above)
H69	Supplementary air position lost	Lost steps, limit switch defective, motor throttle defective	(see above)
H70	Electrode rinsing air position lost	Lost steps, limit switch defective, motor throttle defective	(see above)
H71	Shaping air / fluidizing air position lost	Lost steps, limit switch defective, motor throttle defective	(see above)

Error 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. If the list is full, no more new entries are added.

Appearance of errors

It is possible that errors appear just shortly, but after the acknowledgement, it is again OK.

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** OptiStar CG07 Gun control unit,
  Serial number 1234 5678
- **Order no.** 203 386, 1 piece, Clamp - Ø 18/15 mm

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

The wear parts are always marked with a #.

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

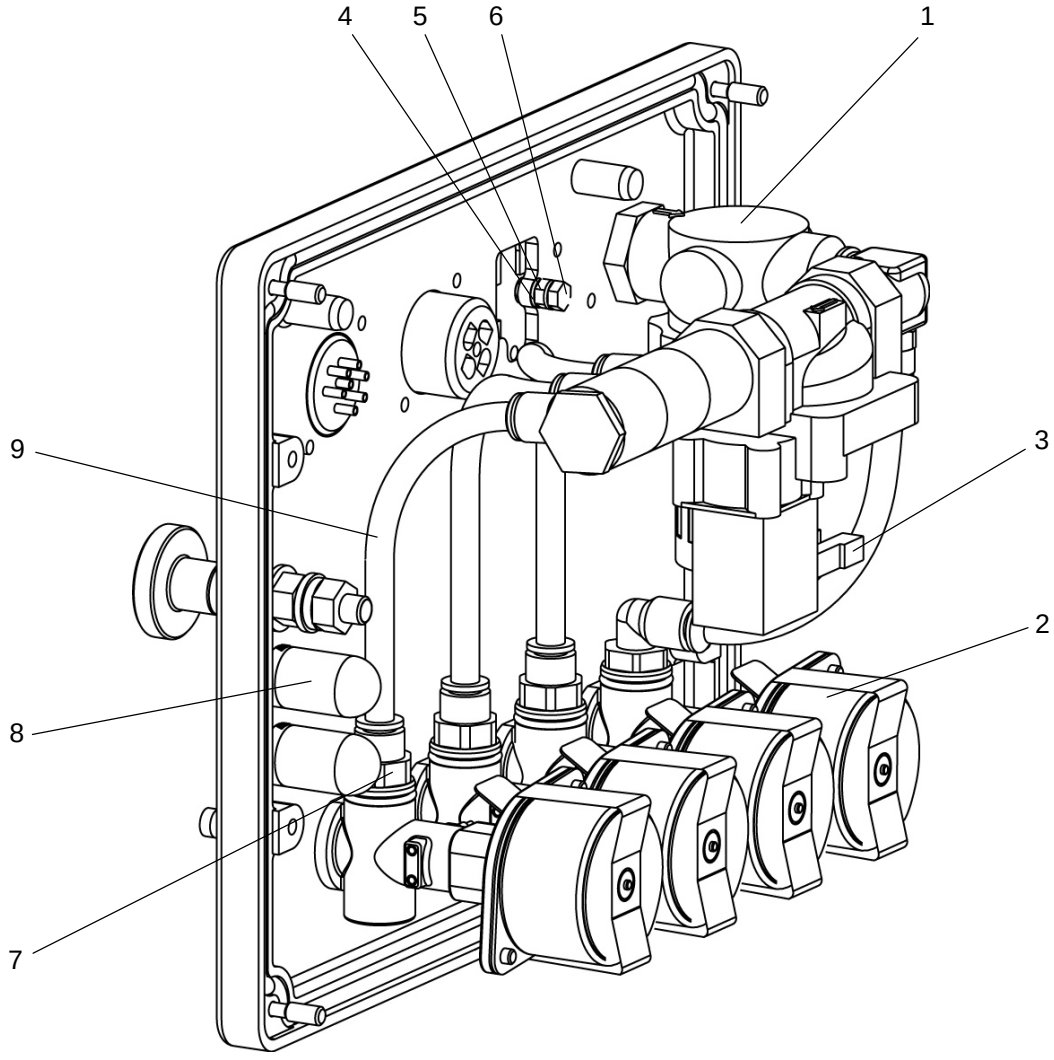
Example:

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

WARNING!
Only original ITW-Gema spare parts should be used, because the explosion protection will also be preserved that way. The use of spare parts from other manufacturers will invalidate the ITW Gema guarantee conditions!

OptiStar CG07Gun control unit - inside rear wall

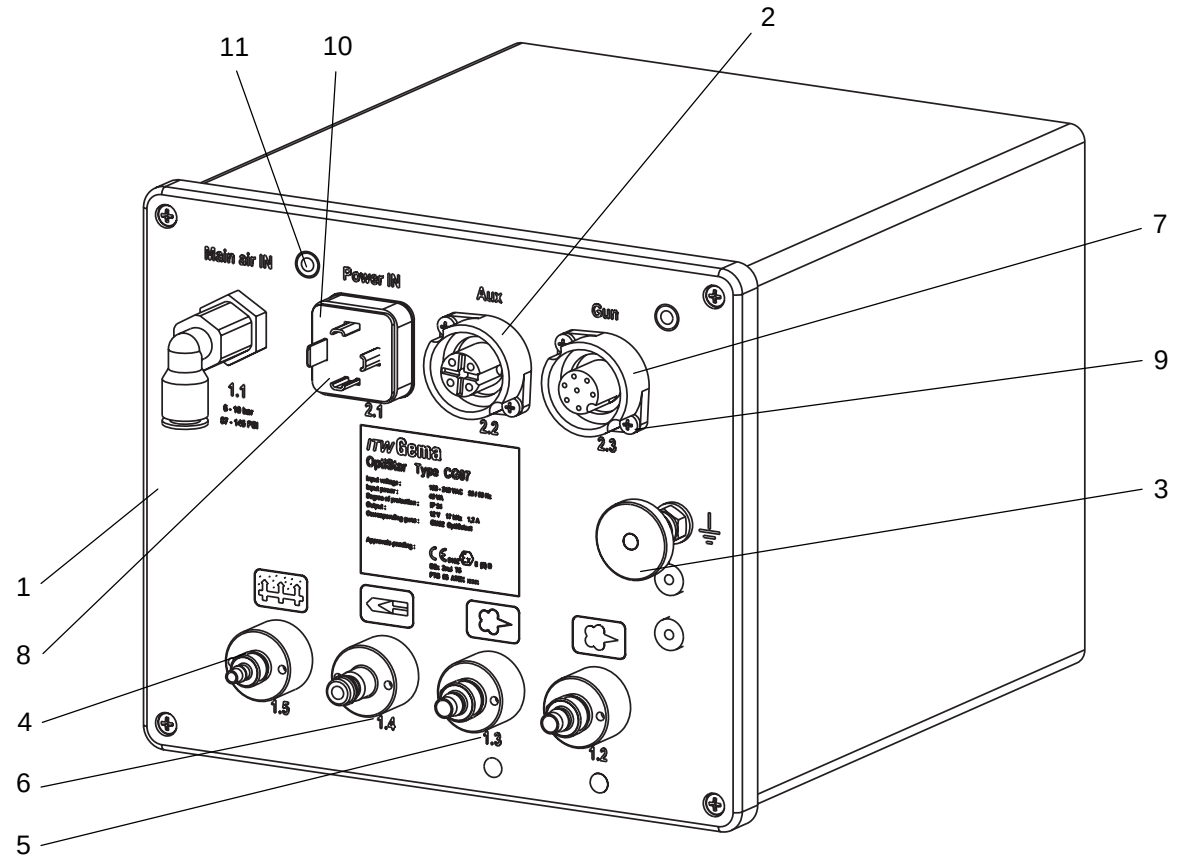
1	Pneumatic group - complete	1001 029
2	Motor throttle - completely assembled	1000 064
3	Valve cable - CG06/CG07	1001 410
4	Spring washer - M3 R	201 880
5	Hexagon nut - M3	202 142
6	Cylinder screw - M3x16 mm	221 074
7	Screw-in nipple - 1/8", Ø 6 mm, OR	262 315
8	Fluidizing pad - 1/8" A	237 264
9	Plastic hose - Ø 6/4 mm, black	1000 063



OptiStar CG07Gun control unit - inside rear wall

OptiStar CG07Gun control unit - outside rear wall

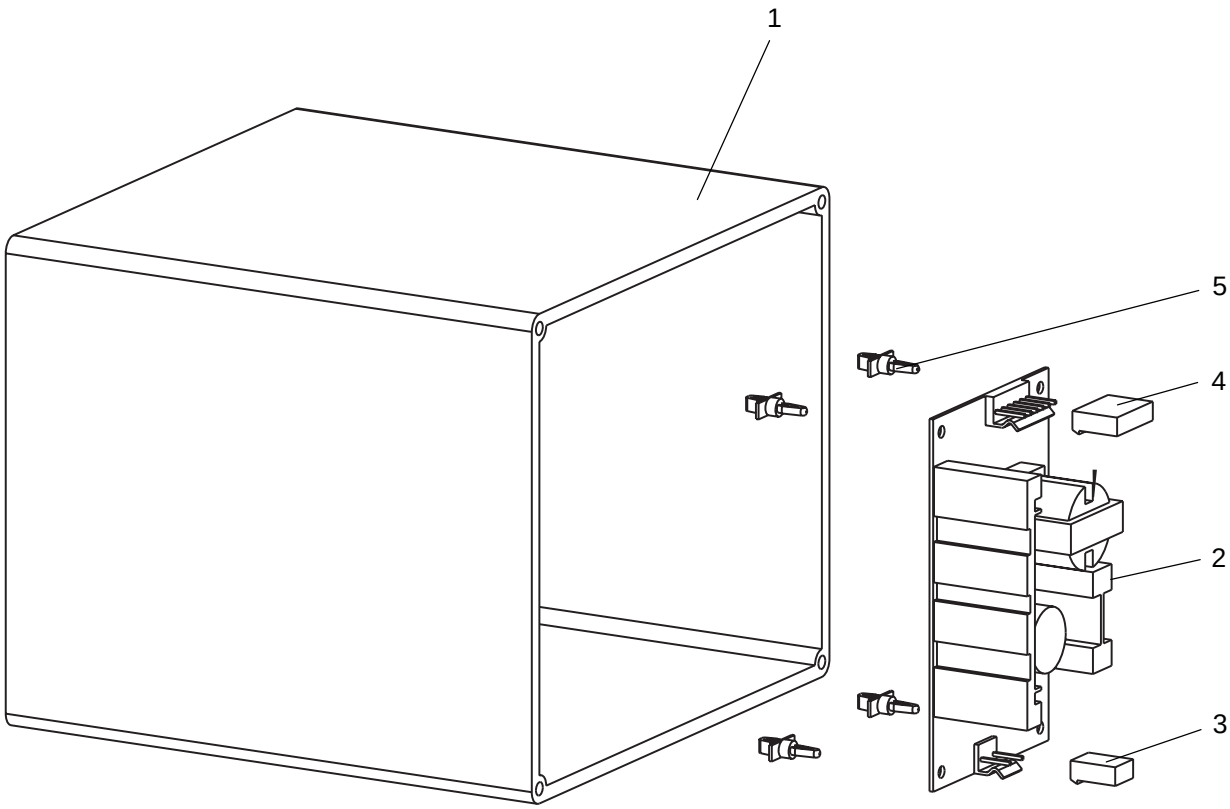
	TopTronic rear wall - complete	1000 063
1	Rear wall	1000 067
2	CG07 vibrator connection, assembled	1001 177
3	Grounding set - complete	1001 107
4	Hose connection - complete, Ø 6/4 mm	1001 520
5	Hose connection - complete, Ø 8/6 mm	1001 519
6	Rectus quick release connection - complete	1001 517
7	Gun connection CG06/CG07, assembled	1001 179
8	Mains connection CG06/CG07	1001 176
9	Cap screw - M3x8 mm	202 363
10	Cap screw - M3x12 mm	216 747
	Shock protection (is fixed on the rear wall, not shown)	1001 058
11	Fixing screws for shock protection (2 pieces) - M5x12 mm	216 348
12	Corona/Tribo adapter	1001 869
	Protection cap for output connector 2.2 Aux	
	Connecting cable (power supply) for 2 control units operation	



OptiStar CG07Gun control unit - outside rear wall

OptiStar CG07 Gun control unit - power pack and housing

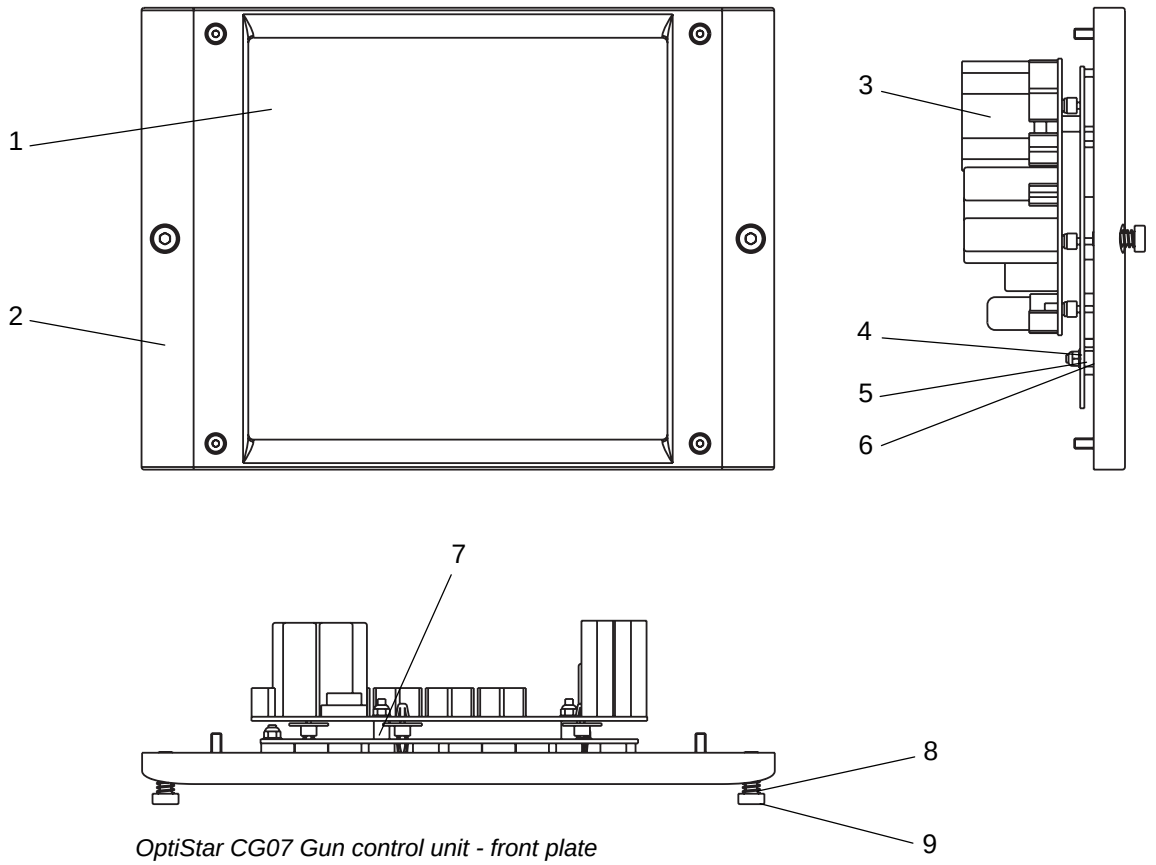
1	Housing - CG06/CG07 control unit	1001 435
2	Power pack - 15 VDC	374 059
3	Power pack connection cable, assembled	1000 388
4	Connection cable, assembled	1001 178
5	Distance piece - Ø 4/4,8/4,8 mm, PA	263 508



OptiStar CG07 Gun control unit - power pack and housing

OptiStar CG07 Gun control unit - front plate

	Front plate - complete	1000 395
1	Front plate with foil keyboard	1000 394
2	Front shield - complete	1000 528
3	OptiStar mainboard V1.0 - complete, with display	1000 875
4	Locknut - M3	262 498
5	Washer - Ø 3,2/7x0,5 mm	201 944
6	Spacer sleeve - Ø 3,2/6x6 mm	1000 590
7	Spacer sleeve - Ø 3,2/6x15 mm	261 548
8	Compression spring - 0,5x6,3x13,5 mm	230 251
9	Special screw	1000 400



OptiStar CG07 Gun control unit - front plate