Operating instructions and Spare parts list

System control
MagicControl 4.0 (CM40)

Translation of the original operating instructions
Documentation MagicControl 4.0 (CM40)

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About these instructions

General information

This operating manual contains all important information which you require for the working with the MagicControl 4.0 (CM40). 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.
Structure of Safety Notes
Every note consists of 4 elements:

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

SIGNAL WORD
Nature and source of the hazard!
Possible consequences of the danger
► Prevention of the danger

Software version
This document describes the operation of the control unit MagicControl 4.0 (CM40) with software version starting from CM40_1.4.
See chapter “Checking the software version” on page 63.

Presentation of the contents

Figure references in the text
Figure references are used as cross references in the descriptive text.
Example:
"The high voltage (H) created in the gun cascade is guided through the center electrode."
Safety

Basic safety instructions

– This product is built to the latest specification and conforms to the recognized technical safety regulations and is designed for the normal application of powder coating.

– Any other use is considered non-compliant. The manufacturer shall not be liable for damage resulting from such use; the user bears sole responsibility for such actions. If this product is to be used for other purposes or other substances outside of our guidelines then Gema Switzerland GmbH should be consulted.

– Start-up (i.e. the execution of intended operational tasks) is forbidden until it has been established that this product has been set up and wired according to the guidelines for machinery. The standard "Machine safety" must also be observed.

– Unauthorized modifications to the product exempt the manufacturer from any liability from resulting damage.

– The relevant accident prevention regulations, as well as other generally recognized safety regulations, occupational health and structural regulations are to be observed.

– Furthermore, the country-specific safety regulations also must be observed.

Product specific security regulations

– This product is a constituent part of the equipment and is therefore integrated in the system’s safety concept.

– If it is to be used in a manner outside the scope of the safety concept, then corresponding measures must be taken.

– The installation work to be done by the customer must be carried out according to local regulations.

– It must be ensured, that all components are earthed according to the local regulations before start-up.

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

Working without instructions

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

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

Intended use

This plant control unit is designed exclusively for monitoring, operating and controlling powder coating systems and associated components (see also the chapter entitled “Technical Data”).

The plant control is particularly suitable for the fully automatic coating of any parts.

Fig. 1

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

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

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

A summary of the directives and standards

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

The product is suitable for the intended purpose and can be used in the appropriate areas.
For further information, also refer to the enclosed Declaration of Conformity.

**European directives RL**

<table>
<thead>
<tr>
<th>EG-RL</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006/42/EU</td>
<td>Machinery</td>
</tr>
<tr>
<td>2014/34/EU</td>
<td>Equipment and Protective Systems in Potentially Explosive Atmospheres (ATEX)</td>
</tr>
<tr>
<td>2014/30/EU</td>
<td>Electromagnetic compatibility</td>
</tr>
</tbody>
</table>

**EN European standards**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 50177</td>
<td>Stationary electrostatic application equipment for ignitable liquid coating material - Safety requirements</td>
</tr>
<tr>
<td>EN 50050-2</td>
<td>Electrostatic equipment for areas where there is danger of explosion – electrostatic hand-held equipment Part 2: Electrostatic hand-held spraying equipment</td>
</tr>
<tr>
<td>IEC/EN 60950</td>
<td>Safety of information technology equipment</td>
</tr>
<tr>
<td>UL 61010-2-201</td>
<td>Industrial controls, section &quot;Requirements for the place of installation&quot;</td>
</tr>
<tr>
<td>DIN EN 60529</td>
<td>Degrees of protection provided by enclosures (IP Code)</td>
</tr>
<tr>
<td>NEMA 250-2003</td>
<td>Enclosures for electrical equipment (1000 Volts maximum)</td>
</tr>
<tr>
<td>DIN EN 60898-1:2006-03</td>
<td>Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations</td>
</tr>
<tr>
<td>EN 50178</td>
<td>Electronic equipment for use in power installations</td>
</tr>
<tr>
<td>IEC/EN 61131-2</td>
<td>Programmable controllers, Equipment requirements and tests</td>
</tr>
<tr>
<td>EN 12981</td>
<td>Coating plants – spray booths for application of organic powder coating material - Safety requirements</td>
</tr>
</tbody>
</table>

**Recognized safety-related regulations**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>764 / DGUV Information 209-052</td>
<td>Electrostatic coating Trade Union information concerning health and safety during work (BGI)</td>
</tr>
</tbody>
</table>
Reasonably foreseeable misuse

- Operation without the proper training
- Use in connection with unauthorized coating devices or components

Powder circuit

The control monitors and controls the powder circuit in coating plants. The powder circuit depends on the plant layout and configuration.

An overview of the effective powder circuit is shown in the enclosed wiring diagram.

fig. 2: Example of a powder coating plant

1  Booth
2  Cyclone separator
3  Screen
4  Powder recirculating
5  After filter
6  Waste container
7  OptiCenter
8  Automatic powder guns

Typical characteristics

- Powder coating in 2 operating modes
- Cleaning in cleaning mode
- User administration and language management
- Coating Program Data Management
- Configuration and parameter data management
- Alarm handling
- Diagnostic functions
- Operating data acquisition
- Control and regulation of height, length and width detection
- Storage of operating data (e.g.: running time of guns, axes, fans) on the SD cards
- Data exchange with higher-level plant controls (option)
- PC-based central control module for booths, gun controls, axes and powder supply
MagicControl CM40

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color Screen</td>
<td>15.6&quot;</td>
</tr>
<tr>
<td>SD card</td>
<td>1</td>
</tr>
<tr>
<td>Number of guns</td>
<td>55</td>
</tr>
<tr>
<td>Number of stations</td>
<td>10</td>
</tr>
<tr>
<td>Number of axes</td>
<td>24</td>
</tr>
<tr>
<td>Axis type</td>
<td>from ZA04</td>
</tr>
<tr>
<td></td>
<td>from XT09</td>
</tr>
</tbody>
</table>

Scope of delivery

- SD card
- Operating manual
## Technical Data

### System

<table>
<thead>
<tr>
<th>MagicControl CM40</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>ARM Cortex-A9 800 MHz</td>
</tr>
<tr>
<td>Internal memory</td>
<td>512 MB RAM, 1 GB SLC</td>
</tr>
<tr>
<td>Remanent memory</td>
<td>128 kB</td>
</tr>
</tbody>
</table>

### Electrical data

<table>
<thead>
<tr>
<th>MagicControl CM40</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage</td>
<td>24 VDC SELV, extra-low safety voltage</td>
</tr>
<tr>
<td>Voltage range</td>
<td>24 VDC acc. to DIN 19240 19.2 - 30.0 VDC effective</td>
</tr>
<tr>
<td>Reverse voltage protection</td>
<td>yes</td>
</tr>
<tr>
<td>Protection</td>
<td>yes (internal inaccessible melting fuse)</td>
</tr>
<tr>
<td>Electrical insulation</td>
<td>no</td>
</tr>
<tr>
<td>Current consumption</td>
<td>max. 21.6 W/24 VDC</td>
</tr>
<tr>
<td>Switch-on current max.</td>
<td>1 A²s</td>
</tr>
</tbody>
</table>

### Dimensions

<table>
<thead>
<tr>
<th>MagicControl CM40</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical dimensions</td>
<td>404 x 255 x 76 mm</td>
</tr>
<tr>
<td>Window</td>
<td>388 x 239 mm</td>
</tr>
</tbody>
</table>

### Display

<table>
<thead>
<tr>
<th>MagicControl CM40</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>Projected Capacitive Touch (PCT)</td>
</tr>
<tr>
<td>Screen diagonal</td>
<td>15.6&quot;</td>
</tr>
<tr>
<td>Resolution</td>
<td>1366 x 768 pixels (WXGA)</td>
</tr>
<tr>
<td>Number of colors</td>
<td>≈ 16.7 million (color depth 24 Bit)</td>
</tr>
<tr>
<td>Display surface</td>
<td>344 x 194 mm</td>
</tr>
<tr>
<td>Operation</td>
<td>Two-Finger Touch</td>
</tr>
<tr>
<td>Front screen</td>
<td>anti reflex coated, scratch-proof</td>
</tr>
</tbody>
</table>
### Connections

<table>
<thead>
<tr>
<th>MagicControl CM40</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet 1</td>
<td>RJ-45 socket, 8-pin, 2 LEDs (CAT5e/6), LAN1, 10/100 Mbps</td>
</tr>
<tr>
<td>Ethernet 2</td>
<td>RJ-45 socket, 8-pin, 2 LEDs (CAT5e/6), LAN1, 10/100 Mbps</td>
</tr>
<tr>
<td>USB host</td>
<td>USB 2.0, not galvanically isolated, plug type A, full power (500 mA)</td>
</tr>
<tr>
<td>USB device</td>
<td>USB 2.0, not galvanically isolated, plug type B</td>
</tr>
<tr>
<td>COM1</td>
<td>RS-232, not galvanically isolated, SUB-D connector 9-pin</td>
</tr>
<tr>
<td>COM2</td>
<td>RS-485, not galvanically isolated, SUB-D connector 9-pin</td>
</tr>
<tr>
<td>CAN</td>
<td>CAN1, not galvanically isolated, SUB-D connector 9-pin</td>
</tr>
<tr>
<td>SD card slot</td>
<td>SDSC or SDHC according to SDA specification 2.0</td>
</tr>
</tbody>
</table>

### Environmental conditions

<table>
<thead>
<tr>
<th>MagicControl CM40</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate</td>
<td>0-50 °C, 10-95% relative humidity, not condensing</td>
</tr>
</tbody>
</table>
| Vibration / shock / drop test | Vibration – IEC 60068-2-6  
Shock – IEC 60068-2-27  
Drop test – IEC 60068-2-31 |

### Rating plate

A rating place is attached to the back of the device for the purpose of identification. The rating place contains the following information:

- Type designation
- Version
- Required power supply
- Serial no.
- Arrangement of interfaces and operating elements

Fig. 3: Rating plate
Design and function

Operating and display elements

Fig. 4: Front and back

<table>
<thead>
<tr>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1 Display, touch sensor | Operating and display elements  
Acquisition of the actuation of the operating elements shown on the display.  
Operated by touch using fingers. |
| 2 SD card slot   | Slot for SD card                                                           |
| 3 CTRL button    | Exits the visualization program                                            |
## Connections and interfaces

**Fig. 5: Connections**

<table>
<thead>
<tr>
<th>Connection</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ethernet 1</td>
<td>RJ-45 socket, 8-pin, 2 LEDs (CAT5e/6), LAN1, 10/100 Mbps</td>
</tr>
<tr>
<td>2 Ethernet 2</td>
<td>RJ-45 socket, 8-pin, 2 LEDs (CAT5e/6), LAN1, 10/100 Mbps</td>
</tr>
<tr>
<td>3 USB host</td>
<td>USB 2.0, not galvanically isolated, plug type A, full power (500 mA)</td>
</tr>
<tr>
<td>4 USB device</td>
<td>USB 2.0, not galvanically isolated, plug type B</td>
</tr>
<tr>
<td>5 COM1</td>
<td>RS-232, not galvanically isolated, SUB-D connector 9-pin</td>
</tr>
<tr>
<td>6 COM2</td>
<td>RS-485, not galvanically isolated, SUB-D connector 9-pin</td>
</tr>
<tr>
<td>7 CAN</td>
<td>CAN1, not galvanically isolated, SUB-D connector 9-pin</td>
</tr>
<tr>
<td>8 Power supply</td>
<td>MSTB plug connector, 3-pin</td>
</tr>
<tr>
<td>9 SD card slot</td>
<td>SDSC or SDHC according to SDA specification 2.0</td>
</tr>
</tbody>
</table>
Symbols

fig. 6

1 Navigation bar
2 Plant overview
3 Information bar
4 - 7 Operating mode dependent bar
8 Login status bar

Function keys

The function keys are distributed on the user interface.

<table>
<thead>
<tr>
<th>Automatic operation mode</th>
<th>Cleaning operation mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual operation mode</td>
<td></td>
</tr>
<tr>
<td>Plant - OFF (Press and hold 2 seconds)</td>
<td>Main menu</td>
</tr>
<tr>
<td>Powder management</td>
<td>Cyclone</td>
</tr>
<tr>
<td>Guns ON/OFF (= powder)</td>
<td>Filter ON/OFF or High/Low frequency</td>
</tr>
<tr>
<td>Floor blow-off ON/OFF</td>
<td>Squeegee ON/OFF</td>
</tr>
<tr>
<td>Axes move to reference position</td>
<td>Guns-External cleaning ON/OFF</td>
</tr>
<tr>
<td>Safety grid (access release ON/OFF)</td>
<td>Axes ON/OFF</td>
</tr>
<tr>
<td></td>
<td>Reference axes Start/Cancel</td>
</tr>
</tbody>
</table>
Meaning of the colors

**System components**

- **Background color Grey**
  - = present, but not active

- **Border color Orange**
  - = active state
  - e.g. fan running, powder management system is ready

- **Border color Red**
  - = Error

**Guns and axes**

- **black/grey**
  - = present, but not active

- **orange**
  - = active state
  - e.g. gun sprays powder, axis running

- **red**
  - = Error
Operating modes

The plant can be operated in the 3 operating modes automatic (AUTO), manual (MAN) and cleaning (CLN). The operating modes are selected using the navigation bar on the operating panel.

Automatic operating mode (AUTO)

Predefined programs are processed in the operating mode AUTO. All axes and work processes are controlled by the program. The operating mode supports gap control.

Automatic operation is only possible if object recognition and a pulse generator are present.

- The guns and axes start automatically, based on the feedback from the object recognition
- Dynamic positioning of guns and axes by object recognition
- Coating process is interrupted when the conveyor stops
- Guns can be selected or deselected
- Object changes are carried out manually or automatically
- Daily correction of the powder output can be modified
- Status display of object recognition

Manual operating mode (MAN)

MAN is the manual operating mode for operating simple plants without gap control or object recognition and for testing and running-in the application.

- Guns and axes are individually controlled manually by the user
- Manual positioning of guns and axes by user
- Coating process is interrupted when the conveyor stops
- Guns can be selected or deselected
- Object change is carried out manually
- Daily correction of the powder output can be modified
- Status display of object recognition

Cleaning operating mode (CLN)

This operating mode allows the user to clean the booth and other plant components.

- Cleaning procedures for guns, axes and booth
- Cleaning procedures for powder management system are released

Utilization of this operating mode:

- After switching on the plant, if very high quality is required on initial coating application
Before every color change
Before switching off the plant

The higher the requirement for cleanliness, the higher the time expenditure will be.

The cleaning of the components is partially automated, however, some of them must be cleaned manually.

During cleaning, no objects may be present in the booth and no objects may enter the booth.

User levels and access

The plant control offers the possibility to define the access rights of the different users. Access is only possible after entering the appropriate password. Certain functions are available depending on the user level, which is defined in advance.

The software has 5 user levels as standard predefined by Gema:

- User level 0 (admin)
- User level 1 (Gema service)
- User level 2 (user 1)
- User level 3 (user 2)
- User level 4 (user 3)

These user levels are pre-programmed and cannot be changed.

The functions available depending on the user level are explained below.

<table>
<thead>
<tr>
<th>User level</th>
<th>Admin</th>
<th>Gema Service</th>
<th>user 1</th>
<th>user 2</th>
<th>user 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>User groups</td>
<td>Adminis</td>
<td>Service</td>
<td>Supervis</td>
<td>Operator</td>
<td>Painter</td>
</tr>
<tr>
<td>The panel can be used without any limitation</td>
<td>•</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Level for specialized Gema staff</td>
<td>•</td>
<td>•</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Configuration possible</td>
<td>•</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Plant parameters can be modified</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Correction values can be modified</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Sequence control programs can be modified</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Application parameters can be modified (axes, guns, pretravel/overtravel, daily correction)</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>–</td>
</tr>
<tr>
<td>The user can rename or copy the existing application data</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>–</td>
</tr>
<tr>
<td>The user can activate the existing application data</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>
If no user is logged on to the panel, operation is locked

<table>
<thead>
<tr>
<th>User</th>
<th>Admin</th>
<th>Gema Service</th>
<th>user 1</th>
<th>user 2</th>
<th>user 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>User level</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

This chapter describes all available statistics functions.
- Please note that your plant control may not be equipped with all the described functions.
- Optional equipment is marked by double asterisks**.
- For additional optional equipment, please contact your Gema sales representative.

With its integrated statistics, trend tools and monitoring of wear parts, the plant control offers the user the possibility to analyze important production information to support system optimizations.

System diagnosis

The system diagnosis provides the user with an overview of the remaining service life of the components, which enables the user to better plan for maintenance intervals and spare parts. This ensures optimum maintenance results by providing wear indicators for the most important application components.

- Display and reset of wear parts status
- Maintenance intervals
- Service life = standard values set at the factory can be adjusted by the customer
Machine data

Machine utilization statistics provide the user with an insight into the utilization and performance of the plant, powder consumption and the total area of the coated parts.

This screen displays the most important machine data such as total running times, procedures, and recorded coating area.

The software timer provides information on how long the plant control has been in operation and how long this control has been used.

**Fig. 8:**

For further information, see chapter "Machine data".

Batch management

Batch management is used to record the consumed powder, divided into production batches. The recorded consumption data is continuously updated and then displayed on the screen in tabular form. If a height light grid is present, in addition to the powder consumption, the coated side elevation area is also recorded.

**Basic**
- Display of powder consumption per batch
- Manual input of order-related data

For further information, see chapter "Batch Management (Basic Version)".

**Advanced**
- Display of powder consumption per batch
- Incl. one external scale with terminal
- Input of order-related data:
• Manual or automatic using an optional barcode reader

Fig. 9:

Fig. 10: Chronological listing of batches produced

Line management**

Enables the analysis and efficiency optimization of the powder coating equipment.

The most important production parameters are recorded and displayed in daily / weekly / monthly graphs.
Power control**

Real-time measurement and visualization of the power and/or compressed air consumption, as well as the temperature and humidity curve.

To use this functionality, appropriate measuring devices must be installed at the supply points of the plant.

Daily correction

The control offers the possibility to correct the powder output for all guns per station in percent.

The output values can be corrected without modifying the programmed values. The daily correction has the same effect on all guns and can be changed in the range of 50%..150%. This means that 50%..150% of the programmed powder quantity is conveyed without influencing the total air volume.
Fig. 13:
The day correction is used:

– In injector plants as compensation for wearing parts.
– In plants with always equal parts as correction factor of the powder mixture.
– For different colors as a correction of the application, without adjusting the basic program.
– To compensate for differences in ambient conditions (summer/winter).
Assembly / Connection

Mounting instructions

The plant control is installed either in a control cabinet or as a stand-alone unit on a stand. Please contact Gema for other installation possibilities.

Fig. 14: Possibilities of installation
Inserting the SD card

The SD card contains the actual operating system and all important application information. In order for the operating panel to function properly, the SD card must be inserted before the plant is started.

The slot for inserting the SD card is located on the side of the operating panel.

**ATTENTION**

Data loss

A voltage drop or removal of the SD card while it is being written to can lead to data loss or destruction of the SD card.

► Only insert the SD card into the operating panel with the power switched off.
► Avoid writing data on to the SD card when there is also a drop in voltage.
► Only remove the SD card from the operating panel with the power switched off.
► Before switching off, make sure that no software is writing data on to the SD card.

Inserting SD card

SD cards are protected against incorrect insertion.

1. Do not use force when inserting.
2. Push the SD card into the slot until it clicks into place.

Removing SD card

1. Push the SD card all the way into the SD card slot.
2. Pull the SD card out of the SD card slot.
3. Store the SD card in its packaging for protection.
Start-up

Preparation for start-up

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

– Gun control units, axes and all other system components correctly connected
– Guns correctly connected
– Corresponding power and compressed air supply available
– Powder preparation and powder quality

General information
The plant control is pre-parameterized, configured and tested at the Gema factory. This allows faster commissioning, since fewer parameters need to be set on site.

The application data in the laboratory report (if available) provides additional help, and can be used as the basic setting for guns and axes.

The control can be subsequently adjusted and extended.

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

Some of the configurations or settings can be made during operation, for everything else refer to the "Technical Manual".

Job-related object and process data are managed in the "Coating programs" menu and in the corresponding submenus.

Depending on the access level of the user who is logged on, parameters can be edited or only displayed. Some parameters are reserved exclusively for Gema Service.
-general

The plant control is a CAN master system. Together with CAN slave participants, it forms the network.

The wiring and topology of the CAN network is specified in the electrical diagram.

The following data can be accessed via the CAN network:
- 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 other parameters such as software version, daily correction, powder output correction etc.
Operation

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

Starting the plant

1. Turn the main switch to the **ON position**.
   - The plant control is started up to the start page.

   ![Start Page Image](image)

   *Fig. 15: Start page*

2. Touch the screen
   - The screen switches to the main page:
Fig. 16: Main page (not logged in)

3. Press the **Select** key to log in with your user name and password

Fig. 17: User selection

4. Select the desired user profile and confirm by pressing the ✓ key

5. Press the **Password** key

Fig. 18: Password input

6. Enter password and confirm by pressing **RET**
Fig. 19:

7. Press the key.
   - The following screen is displayed:

     ![Image of screen showing controls]

Fig. 20:

The following functions are available:
   - Modify and manage coating programs and application data
   - Operating data management (LM)*
   - Configuration and parameters*
   - Diagnostics*
   - Settings
   * with the exception of some functions that are only available when the after filter is running and the control units are switched on.

8. Turn the key switch to turn on the control voltage.
   - The indicator lamp lights up.
9. Press the key
   – Axes are referenced

10. Select operating mode:
    - Automatic operation mode
    - Manual operation mode
    - Cleaning

11. Put all other plant components, e.g. powder management system, into the correct operating mode (for more information, see the relevant operating manual)
    - If some plant components are not yet ready for operation, a message will be displayed.

---

**Automatic operation mode**

1. Press the key to select automatic operation mode

2. Press the symbol to load coating programs (for more information, see below)
fig. 22: Coating programs

1. Confirm program selection
2. Copy programs
3. Paste programs
4. Exit screen
5. Scroll bar
6. Delete entry in search field
7. Data search by alphanumeric entry
8. Data search by program number entry:
   - The topmost entry is set to the number searched for
9. Currently selected line
10. Currently loaded object that is available for editing

3. Select coating program and confirm selection

The plant control is now ready for production.

Plants with program change per station (internal or external)

For plants with internal or external program change, proceed as follows:

1. For external program changes, the number in the middle must be checked according to the plant specific solution
Fig. 23: Program change per station

- The plant is ready for production

2. For internal program changes, the number must be entered in the input field

- The plant is ready for production

**Gap control**

A pulse generator must be installed and be functioning for the displacement measurement.

In automatic mode, objects are detected by the existing object recognition and the control switches the guns and the axes on and off according to their configured functions.

If no parts pass through the object recognition, the motor power is throttled in automatic mode on plants with a controlled after filter (with frequency converter = FC). In ECO mode, the guns are also switched off.

**ECO mode is not exited until parts pass through the object recognition:**

- The motor is switched to the operating mode (operating power)
- The gun controls are switched on again

**Manual mode**

1. Press the key to select manual operation mode
2. Load the desired coating program (See chapter "Load coating programs" on page 48.)

The plant control is now ready for production.

3. Axes and guns can be switched on/off manually by the user.

Guns start independently from the conveyor

Axes and guns can be switched on/off both in automatic and manual mode independently of object recognition. If the conveyor stops, the coating procedure is interrupted.

The active conveyor can be simulated:
- In systems without pulse generator
- For testing purposes
- If the pulse generator is defective
- If the conveyor is not yet ready for operation.

**ATTENTION**

Collision or faulty coating!

By simulating an active conveyor, the control is given a physically active conveyor. This can result in an offset of the effective position which is entered in the control. This can lead to collision or faulty coating without due care and consideration.

► This function may only be used by trained personnel.

1. Press the key

   The key turns orange and the activated conveyor is simulated.

---

**Setting the daily correction**

The powder output is corrected in percent for all guns per station.

<table>
<thead>
<tr>
<th>Setting values/range</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 - 150%</td>
<td>100%</td>
</tr>
</tbody>
</table>
This means that the current powder output value is multiplied by the correction value.

The correction value is not saved and must be reset after each restart.

Example:
Powder output value PA% = 50
Daily correction value = 60 %
New powder output value = 50 x 0.6 = 30

**Fig. 25:**
1. Press the corresponding station key
   - If several stations are present, press + to enlarge the window
2. Enter desired value (max. 150, min. 50)
3. Press the RET key to confirm

### Cleaning operation mode

1. Press the key

The following page is displayed:
2. Close the booth doors (if available)
   - For automatic closing doors, press the arrow key
   - Otherwise close the doors manually

Fig. 26:
   - Axes move into the cleaning positions and the guns are cleaned from the outside

3. Put the powder management system into cleaning mode

4. Press the key
   - The outside cleaning of the guns is started and the key turns orange.
   - External cleaning of the gun can be repeated as often as required by pressing this key

5. Follow the cleaning steps of the respective powder management system (MagicCenter, OptiCenter or Powder Center)

6. After cleaning the inside of the hose, the guns and nozzles can be cleaned manually if necessary
7. Press the key to fully extend the guns from the booth.

8. Press the key to move the guns into the booth.

9. Continue to follow the cleaning steps of the powder management system

10. Open cabin doors and close flaps (if present)

11. Booth floor cleaning is still in progress

Fig. 27:

12. Select the operating mode and coat

or

13. End production and switch off the plant

**Safety grid function**

1. Press the key
   
   – The safety grid door is released:
     
     If the door is opened, the axes are disconnected from the power supply.

2. After the cleaning/maintenance work has been completed, press the key
   
   – The safety grid is locked again.

3. Press the key
   
   – Axes are ready for operation again.

4. Select the operating mode and coat

or

5. End production and switch off the plant
Working interruptions or coating breaks

If the coating process is interrupted for a longer period of time, the system should be brought into an economical state.

Switching off the plant

1. Clean the plant, See chapter “Cleaning operation mode” on page 40.

2. To exit **Cleaning mode**, press and hold the key for 2 seconds.

   ![Fig. 28](image)

   **Fig. 28:**

3. The display changes to this screen

   ![Fig. 29](image)

   **Fig. 29:**

4. Turn the key switch to 0 to turn off the control voltage.

   - The indicator lamp goes out.
5. Press and hold the key for a further 2 seconds

Fig. 30: Start page

6. Turn the main switch to the OFF position

---

Coating Data

Edit gun values, select or deselect

1. Press the key
   - The following page is displayed:
Fig. 31: Application data – Guns

1. Station
2. Gun activated/deactivated
3. Powder output
4. Total air
5. High voltage
6. Spray current
7. Electrode rinsing air
8. Pretravel = gun ON in front of the object
   (values values are set in the configuration menu)
9. Overtravel = gun OFF after the object
   (values values are set in the configuration menu)
10. Gun spays/does not spray powder
11. Program that is being edited
12. Access to gun parameters
13. Access to axes parameters
14. Access to all coating programs
15. Save changes
16. Exit current page without saving, any changes are discarded
17. Changes per station or all stations
18. Error description

2. Press the corresponding gun key (2)
   – The key turns orange and the gun is selected or activated
   – Only guns which are activated can be switched on.
3. Touch the corresponding input field to change the parameters of the respective gun

Edit axis values, select or deselect axes

1. Press the key
   The following page is displayed:
Fig. 32: Application data – Axes

1. Station
2. Axis activated/deactivated
4. Lower reversing point
5. Speed
7. Pretravel = axis ON in front of the object (values values are set in the configuration menu)
8. Overtravel = axis OFF after the object (values values are set in the configuration menu)
9. Reference axis
   - Manual operation mode: The symbol changes to ON/OFF after referencing.
   - Automatic operation mode:: The symbol is no longer visible after referencing.
10. Current position or error number
11. Current program
12. Access to gun parameters
13. Access to axes parameters
14. Access to all coating programs (object data administration)
15. Save changes
16. Exit current page without saving, any changes are discarded
17. Changes per station or all stations
18. Error description
19. Auto: Axis moves according to object recognition and spray distance
   Manual: Axis moves to the specified position

2. Press the corresponding axis key
The key turns orange and the axis is selected.
- Only selected axes can be started.

3. Press the   key
- Start axes

4. Press the   key
- Stop axes

5. Touch the input field to change the position of the respective axis

Coating programs

1. Press the   symbol to load coating programs

Fig. 33: Coating programs

① Confirm program selection
② Copy data
③ Insert data
④ Exit screen
⑤ Scroll bar
⑥ Delete entry in search field
⑦ Datasearch by alphanumeric entry
⑧ Data search by program number entry:
   - The topmost entry is set to the number searched for
⑨ Currently selected line
⑩ Currently loaded object that is available for editing
Load coating programs

1. Press the symbol

![Fig. 34](image)

2. Select coating program

3. Press the key
   - The selected program is loaded

Creating coating programs

If the error message “Program not available” is displayed when copying or loading coating programs, this means that no coating programs have been created and that the program must be created again.

1. Copy any existing program, preferably a related similar one, so that you do not have to make many changes
2. Insert
3. Load
4. Edit coating programs

Copy and insert coating programs

1. Select coating program

![Image](image)
2. Press the \[\text{key}\] – Data is copied to the clipboard
3. Select the coating program to which the data shall be copied from the clipboard

![Image](image1.jpg)

Fig. 35:

4. Press the \[\text{key}\]
5. The following security prompt is displayed: Would you like to overwrite the program?
6. Confirm – Data is copied to the current coating program

![Image](image2.jpg)

Fig. 36:

7. Naming a coating program

**Naming coating programs**

1. Touch the desired table entry.
   – The line is highlighted.

![Image](image3.jpg)

Only lines which are highlighted can be changed, clicking on
another line only moves the selection.

2. Touch the highlighted line again.
   - A keyboard opens to name the coating program.

![Fig. 38: Naming coating programs](image)

3. Enter object name
4. Press the RET key to confirm

### Search coating programs

**Search by name**

1. Press the search field (7)
   - A keyboard opens to search for coating programs by alphanumeric entry.

![fig. 39](image)

- Only coating programs that match the search are listed.

---

Pay attention to upper and lower case as well as spaces!
**Search by numbers**

1. Press the field (8)
   - A keyboard opens to search for coating programs by numerical input.
   - The number searched for is displayed at the top of the list.

**User administration**

**Status display**

The log-in status is displayed in the corresponding bar:
- User logged in
- User logged out

**Login**

The user can log in in two ways:
- When starting the plant (See chapter "Starting the plant" on page 33.)
- By clicking on the symbol in the log-in status bar, if another user has previously logged off

![Login interface]

**Fig. 40: Login**

1. Log in by user selection
2. Log in by entering user name
3. Enter user password
4. Confirm
5. Cancel
6. Log-in status:
   - User logged in
Log-in procedure

1. Press the Select key

Fig. 41: Log-in – Main page (not logged in)

2. The screen switches to the next page:

Fig. 42: Log-in – User selection

3. Select the desired user profile and confirm by pressing the key

Alternatively, the user can enter their name directly by pressing the User key.
4. Enter user name and confirm by pressing RET

5. Press the **Password** key

6. Enter password and confirm by pressing RET

7. Press the ✓ key.
   - The following screen is displayed:
Log-out
The user can log out in two ways:

– By switching off the plant (See chapter ”Switching off the plant” on page 43.)
– By pressing the symbol in the log-in status bar
  • User is logged off

Change user
The user change takes place by logging out and in.

User profile
Depending on user rights, individual functions and settings may not be accessible and are locked.

– See chapter ”Functions available at user level” on page 22.

Create user

1. Press the key
   The following page is displayed:
Press the key – The following page is displayed:

3. Press the key
   – The following page is displayed:

4. Press the "User" key
   – A keyboard opens to enter the name of the new user.
5. Enter user name
6. Press the RET key to confirm
7. Press the “Groups” key
   - A corresponding dialog opens.

8. Assign the desired user group to the new user from the list of available user groups:
   - Select the desired group using the arrow keys (<<, <, >, >>).
   - Press the MARK key: the selected group is marked with *
   - Press the RET key to confirm
9. Press the “New password” key
   - A keyboard opens to enter a password for the new user.
Fig. 52:

10. Enter password
11. Press the RET key to confirm
12. Press the “Confirm password” key
   – A keyboard opens and the password for the new user must be entered again.

Fig. 53:

13. Press the RET key to confirm
14. Press the ✓ key

The new user now appears in the list of available users and can be deleted or changed at any time.

Delete users

1. In the Settings menu, press the key
   – The following page is displayed:
2. Press the “User” key
   – A keyboard opens to enter the user name to be deleted.

3. Enter the user name to be deleted
4. Press the RET key to confirm

OR
5. Press the “···” key
   – A corresponding dialog opens.

6. Select the user to be deleted using the arrow keys (<<, <, >, >>).
7. Press the RET key to confirm

8. Press the ✓ key
   - The following page is displayed:

   ![Fig. 57: Change user password](image)

   **Change user password**

   1. In the Settings menu, press the ✓ key
      The following page is displayed:

   ![Fig. 58:](image)

   2. Press the “Password” key
      - A keyboard opens to enter the last password used.
Enter the last password used

Press the RET key to confirm

Press the “New password” key
  – A keyboard opens.

Enter the new password

Press the RET key to confirm

Press the “Confirm password” key
  – A keyboard opens and the new password must be entered again.

Press the RET key to confirm

Press the key

**Search users**

This function is used to display all created and active users.

Press the key

The following page is displayed:

Press the key
The following page is displayed:

![Diagram](image1)

**Fig. 61:**

3. Press the key

The following page is displayed:

![Diagram](image2)

**Fig. 62:**

**User language**

The user language is part of the user profile and can be changed to one of the pre-installed languages if required.

The selected language is loaded each time you log in.

1. Press the key

The following page is displayed:
Fig. 63:

2. Press the key
   – The following page is displayed:

Fig. 64:

3. Press the **LANGUAGE** key
   – The following page is displayed:

Fig. 65:

4. Select desired language
   – The change takes effect immediately and the control switches to the previous page
Checking the software version

1. Push the button

2. Push the button

3. Push the button
   - The following page with the actual software version is displayed:
System diagnosis

Introduction

Display

- Overview of wear parts service life
- Maintenance scheduling

Displayed states

- Green: Wear parts OK
- Orange: < 10% remaining service life
- Overdue part change, error message

Fig. 66: Main menu with overview of the maintenance status of the plant
Displayed values

Service life
An estimated service life of each part is set by Gema (basic setting). The service life can be adjusted by the customer in user level 2 (user1) to suit requirements.

Actual value
As soon as the guns are switched on, the actual value counter starts counting up.
10% before the set service life, the color of the actual value and the symbol on the main page changes to orange.
When the set time has expired, the color of the actual value and the symbol on the main page changes to red. A message appears on the main screen at the same time. The wear part should now be replaced.

Reset
As soon as the wear part is replaced, the actual value should be reset by pressing the reset key.

Last reset
When the reset key is pressed, the current date is entered under “Last reset”.

Electrode holder

By tapping the corresponding key or by changing pages (►) you can access the status overview of the electrode holders.

![Status overview of electrode holders]

**Fig. 67:**

Service life of the electrode holder per gun
Basic setting = 800 hours
Gun nozzle

By tapping the corresponding key or by changing pages (►) you can access the status overview of the gun nozzles.

### Pistolendüse

<table>
<thead>
<tr>
<th>Position</th>
<th>Life Use</th>
<th>Istwert</th>
<th>Reset</th>
<th>Last Reset</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 1</td>
<td>600</td>
<td>0:00</td>
<td>❌</td>
<td>28.11.2019</td>
</tr>
<tr>
<td>A 2</td>
<td>600</td>
<td>0:00</td>
<td>❌</td>
<td>28.11.2019</td>
</tr>
<tr>
<td>A 3</td>
<td>600</td>
<td>0:00</td>
<td>❌</td>
<td>28.11.2019</td>
</tr>
<tr>
<td>B 1</td>
<td>600</td>
<td>0:00</td>
<td>❌</td>
<td>28.11.2019</td>
</tr>
<tr>
<td>B 2</td>
<td>600</td>
<td>0:00</td>
<td>❌</td>
<td>28.11.2019</td>
</tr>
<tr>
<td>B 3</td>
<td>600</td>
<td>0:00</td>
<td>❌</td>
<td>28.11.2019</td>
</tr>
</tbody>
</table>

**Fig. 68:**

Service life of the gun nozzle per gun

Basic setting = 600 hours

---

Powder hose

By tapping the corresponding key or by changing pages (►) you can access the status overview of the powder hoses.

### Pulverschlauch

<table>
<thead>
<tr>
<th>Position</th>
<th>Life Use</th>
<th>Istwert</th>
<th>Reset</th>
<th>Last Reset</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 1</td>
<td>1500</td>
<td>10:51</td>
<td>❌</td>
<td>2.3.2020</td>
</tr>
<tr>
<td>A 2</td>
<td>1500</td>
<td>10:51</td>
<td>❌</td>
<td>2.3.2020</td>
</tr>
<tr>
<td>A 3</td>
<td>1500</td>
<td>10:26</td>
<td>❌</td>
<td>2.3.2020</td>
</tr>
<tr>
<td>A 4</td>
<td>1500</td>
<td>10:26</td>
<td>❌</td>
<td>2.3.2020</td>
</tr>
<tr>
<td>A 5</td>
<td>1500</td>
<td>10:26</td>
<td>❌</td>
<td>2.3.2020</td>
</tr>
<tr>
<td>A 6</td>
<td>1500</td>
<td>10:26</td>
<td>❌</td>
<td>2.3.2020</td>
</tr>
</tbody>
</table>

**Fig. 69:**

Service life of the powder hose per gun

Basic setting = 1500 hours

---

Injector

By tapping the corresponding key or by changing pages (►) you can access the status overview of the injectors.
Fig. 70:
Service life of the cartridge per injector
Basic setting = 100 hours

IN pinch valve application pump

By tapping the corresponding key or by changing pages (►) you can access the status overview of the IN pinch valves.

Fig. 71:
Service life of the IN pinch valve of the application pumps
Basic setting = 1000 hours

OUT pinch valve application pump

By tapping the corresponding key or by changing pages (►) you can access the status overview of the OUT pinch valves.

Fig. 72:
Service life of the OUT pinch valve of the application pumps
Basic setting = 1000 hours

**Application pump, filter**

By tapping the corresponding key or by changing pages (►) you can access the status overview of the filters.

<table>
<thead>
<tr>
<th>Filter</th>
<th>Lebensdauer</th>
<th>Istwert</th>
<th>Reset</th>
<th>Letzter Reset</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1500</td>
<td>0:00</td>
<td></td>
<td>27.6.2019</td>
</tr>
<tr>
<td>1</td>
<td>1500</td>
<td>0:00</td>
<td></td>
<td>27.6.2019</td>
</tr>
<tr>
<td>2</td>
<td>1500</td>
<td>0:00</td>
<td></td>
<td>27.6.2019</td>
</tr>
<tr>
<td>B</td>
<td>1500</td>
<td>0:00</td>
<td></td>
<td>27.6.2019</td>
</tr>
<tr>
<td>1</td>
<td>1500</td>
<td>0:00</td>
<td></td>
<td>27.6.2019</td>
</tr>
<tr>
<td>2</td>
<td>1500</td>
<td>0:00</td>
<td></td>
<td>27.6.2019</td>
</tr>
<tr>
<td>3</td>
<td>1500</td>
<td>0:00</td>
<td></td>
<td>27.6.2019</td>
</tr>
</tbody>
</table>

*Fig. 73:*

Service life of the filter elements of the application pumps

Basic setting = 1500 hours

**Application pump, pinch valve diagnostic**

By tapping the corresponding key or by changing pages (►) you can access the status overview of the “Pinch valve diagnostic”.

<table>
<thead>
<tr>
<th>Quetschventil Diagnose</th>
<th>Interval</th>
<th>Istwert</th>
<th>Reset</th>
<th>Letzter Reset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulvermanagement</td>
<td>1</td>
<td>4:00</td>
<td>0:00</td>
<td></td>
</tr>
</tbody>
</table>

*Fig. 74:*

**Interval**

An interval between 2 pinch valve diagnoses of 16.00 hours is entered by Gema as a basic value. The pinch valve diagnostic of the application pumps takes place automatically after the powder hose rinsing. When the time has expired without a color change, the following message appears:

**“Pinch valve diagnostic required”**

The interval can be adjusted by the customer in user level 2 (user1) to suit requirements.

**Reset**

Automatically executed after pinch valve diagnostic.

**Last reset**

The date is automatically updated.
System service

By tapping the corresponding key or by changing pages (►) you can access the status overview of the “System service”.

<table>
<thead>
<tr>
<th></th>
<th>Datum für nächsten Service</th>
<th>Tage bis Service</th>
<th>Reset</th>
<th>Letzter Reset</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Unterhalt</td>
<td>27.6.2020</td>
<td>134</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feuerbekämpfung</td>
<td>27.6.2020</td>
<td>134</td>
<td></td>
<td>14.2.2020</td>
</tr>
<tr>
<td>Aktion Service</td>
<td>27.6.2020</td>
<td>134</td>
<td></td>
<td>14.2.2020</td>
</tr>
<tr>
<td>Nachfrist</td>
<td>27.6.2020</td>
<td>134</td>
<td></td>
<td>14.2.2020</td>
</tr>
</tbody>
</table>

Fig. 75:

Depending on the service carried out on the plant, service can enter a future date here and confirm with the reset button. User Level 1 (GemaService) has access rights.

In addition the message “System service required” appears on the main screen.
Machine data

Description

The machine data are totalizers of individual machine components and are used to evaluate plant utilization.

This includes the total operating hours in the individual operating modes, conveyor movements, coating surfaces as well as gun and axis hours.

Fig. 76: Machine data main screen

Pressing the arrow key will take you to the overview of the operating hours of the guns and axes.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic</td>
<td>0:00 h</td>
</tr>
<tr>
<td>Hand</td>
<td>0:00 h</td>
</tr>
<tr>
<td>Reinigung</td>
<td>0:00 h</td>
</tr>
<tr>
<td>Anlage aus</td>
<td>159:44 h</td>
</tr>
<tr>
<td>Mode Reinigung</td>
<td>0:00 min</td>
</tr>
<tr>
<td>Anzahl Paddeste</td>
<td>0 X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mode</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning</td>
<td></td>
</tr>
<tr>
<td>Switch-off</td>
<td></td>
</tr>
</tbody>
</table>

Automatic: Time during which the CM40 is in automatic mode
Manual: Time during which the CM40 is in manual mode
Cleaning: Time during which the CM40 is in cleaning mode
Switch-off: Time during which the CM40 is in standby mode
### Machine data

**Cleaning mode average**  
Total cleaning time divided by number of color changes

**Number of color changes**  
Number of started color changes

**Piece counter**  
Number of objects detected by the object recognition (objects hanging on top of each other are counted as a single object)

**Coating area**  
Means the lateral object surface determined by the object recognition.  
- Only in conjunction with light grid

<table>
<thead>
<tr>
<th>Distance</th>
<th>Traveled conveyor distance after release of the coating system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time On</td>
<td>Conveyor running time (FL)</td>
</tr>
<tr>
<td>Stop</td>
<td>Conveyor standstill (FS)</td>
</tr>
<tr>
<td>In stop state</td>
<td>$100 \times FS / (FL + FS)$</td>
</tr>
<tr>
<td>Number of stops</td>
<td>Number of activated conveyor stops (by operator, conveyor system, system error)</td>
</tr>
<tr>
<td>After filter</td>
<td>After filter running time</td>
</tr>
<tr>
<td>Gun</td>
<td>Coating time (trigger time)</td>
</tr>
<tr>
<td>Axis</td>
<td>Axis running time</td>
</tr>
</tbody>
</table>

![Diagram](image)

**Fig. 77**: Gun and axis operating hours screen
Batch Management (Basic Version)

Introduction

Batch management is a standard component of the CM40 control unit and is used to record the consumed powder, divided into production batches. The recorded consumption data is continuously updated and then displayed on the screen in tabular form. If a height light grid is present, in addition to the powder consumption, the coated side elevation area is also recorded. In the basic version, batch management is operated manually.

Operation

The basic version of Batch Management allows you to log the most important information for each individual production batch in the simplest possible way. All information about the respective batch, the continuously added powder quantities as well as batch start and stop are entered manually in an input mask (Fig. 78). Batch management calculates the total time and powder consumption from the data entered and adds them to a report (Fig. 79).

![Input mask](image)

Fig. 78: Input mask
1. Input fields
2. Start/stop key
3. Display
4. Weight field
5. +/- keys

Information about the functional mode of the individual system components can be found in the respective enclosed documents.

1. Enter the relevant data in the four input fields to describe the production batch to be tracked: **Name, Object, Notes and Color code**.

2. Press the **Start** key to start recording.
   - The **Duration** in field 3 starts counting and is continuously updated.

3. In field 4 (weight field), enter the quantity of fresh powder supplied (e.g. 25 kg).

4. Press the **+** key to add the powder volume (weight field) to the current batch recording.
   - This step can be done once or with each additional supply of fresh powder (e.g. powder box). The **Powder consumption** is updated accordingly in field 3.

5. When the batch is finished, weigh or estimate the remaining or recovered powder. Enter the value in field 4 (weight field) and subtract it from the current batch recording using the **-** key.
   - The **Powder consumption** is updated accordingly in field 3.

6. Press the **Stop** key to stop the recording.
   - The corresponding data is updated and displayed in field 3.

7. Press the **Scroll** key to go to the overview page.
   - The recorded batch information is automatically transferred and chronologically listed when the **Stop** key is pressed. A maximum of a thousand lines per month can be displayed here. Use the **Scroll** key to switch to the input mask.

![Table showing batch information]

Fig. 79: Chronological listing of batches produced

Optionally, the saved Batch Management files can be copied to a computer or file server via an ftp://path – for more information refer to the document “Advanced Batch Management”.
Maintenance / Repairs

General information
The product was designed for a maintenance-free operation.

Periodic checks
The periodic checks include examining all connecting cables.
The corresponding parts should be replaced immediately if any damage to cables is discovered.
All plugs must be properly tightened.
If an error message or maintenance message occurs, the causes must be examined and remedied promptly.

Cleaning and maintenance
The operating panel is maintenance-free. However, the following work may be necessary:
– Cleaning the screen if it becomes dirty.
– Recalibrating the capacitive screen if it no longer responds correctly to touch.

Touch-sensitive screen
If dirty:

<table>
<thead>
<tr>
<th>ATTENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pointed, sharp objects or corrosive liquids can damage the screen</td>
</tr>
<tr>
<td>Cleaning the screen</td>
</tr>
<tr>
<td>▶ Do not use any pointed or sharp objects (e.g. knife).</td>
</tr>
<tr>
<td>▶ Do not use any aggressive or abrasive cleaning agent or solvent.</td>
</tr>
<tr>
<td>▶ Ensure liquids do not enter the operating panel (risk of short circuit) and no damage is caused to the operating panel</td>
</tr>
<tr>
<td>▶ Clean the touch screen surface carefully with a clean, soft, damp cloth.</td>
</tr>
</tbody>
</table>
Battery
The built-in battery for buffering the real-time clock is maintenance-free and designed for a buffer time with the power switched off while maintaining the ambient conditions of typically 10 years at 25 °C (77 °F).

Repairs
For repairs, please contact Gema Technical Support.

ATTENTION
Destruction of the operating panel
The operating panel may only be opened by the manufacturer or an authorized body.
► Operate the operating panel only with the housing completely closed.

Use appropriate packaging when transporting.

Storage and transport

ATTENTION
UV light
Plastics become brittle under the influence of UV light. This artificial aging reduces the service life of the operating panel.
► Protect the operating panel from direct sunlight or other sources of UV radiation.

ATTENTION
Risk of short-circuit
In the event of climatic fluctuations (ambient temperature or humidity), moisture may be deposited on or inside the operating panel. If the control panel is subjected to condensation, there is a risk of short-circuit.
► Never switch on the operating panel when condensation is present.
► If condensation is present and the operating panel has been exposed to climatic fluctuations, allow the operating panel to adjust to room temperature before commissioning.
► Do not expose the operating panel to direct heat radiation from heaters.

Observe the ambient conditions when transporting and storing the operating panel.

The maximum ambient temperature for storage and transport must not exceed the specified value:
Climatic ambient conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air pressure (operation)</td>
<td>795 - 1080 hPa</td>
</tr>
<tr>
<td></td>
<td>max. 2000 m ü. NHN</td>
</tr>
<tr>
<td>Temperature (operation)</td>
<td>± 0 – +50 °C (+32 – +122 °F)</td>
</tr>
<tr>
<td>Temperature (storage / transport)</td>
<td>-20 – + 60 °C (-4 – +140 °F)</td>
</tr>
<tr>
<td>Air humidity</td>
<td>Relative air humidity 10 - 95 %</td>
</tr>
<tr>
<td>Condensation</td>
<td>Non-condensing</td>
</tr>
</tbody>
</table>

Whilst the operating panel has a robust design, the built-in components are sensitive to excessive vibrations and/or shocks.

The operating panel must be protected from mechanical loads outside its intended use.

The operating panel may only be transported in the appropriate packaging and in the correct manner.

**Before recommissioning**

During storage and transport in cold weather, and in the event of extreme temperature differences, ensure that no moisture is deposited on or inside the unit (condensation).

If condensation is present, the unit may only be switched on after it is fully dry.

**SD card – data backup**

The contents of the SD card can be saved on another medium in order to be able to copy them back in case of card damage or data loss. Further information can be found in the "Technical Manual".

Some operating systems do not display individual files. This is often the case with “autoexec.bat” files, for example.

- When copying the data, make sure that all data is visible and copied.
- If in doubt, contact your IT department.

Inserting the SD card: See chapter "Inserting the SD card“ on page 30.

**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. Press the [ ] key
   The following page is displayed:

   ![Image](image1.png)

   Fig. 80:

2. Press the [ ] key
   The following page is displayed:

   ![Image](image2.png)

   Fig. 81:

3. Press the [ ] key
   The following page is displayed:
Fig. 82: Powder output/powder hose correction

1. Station
2. Gun (activated/deactivated)
3. Powder output
4. Total air
5. Minimum powder output
6. Powder hose correction
7. Changes per gun or all guns at the same time
8. Exit current page

4. Set the total air to 4.0 (Nm³/h) on the (4) display. Set the powder output to 0 (%) on the (3) display

5. Check the correction value for minimum powder output C0 on the (5) display, and set it to 1.8 (Nm³/h) if necessary

6. Check the correction value for maximum powder output C1 on the (6) 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.

7. Put the measuring bag over the gun nozzle and fasten it.
8. Press the gun key (2) to switch on the gun for 60 seconds
9. 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
10. If no powder is expelled from the gun, increase the minimum powder output value C0 (range 0.5-3.0 Nm³/h)
11. If too much powder is expelled from the gun, decrease the minimum powder output value C0 (range 0.5-3.0 Nm³/h)
12. Repeat steps 7 and 8, until the powder output amounts to 10-15 g. Annotate the adjusted minimum powder output value C0 in the table
**Powder hose correction – procedure**

1. Set the powder output value to 80 (%) on the (6) 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:

\[
C_1 (\%) = \frac{\text{smallest powder output}}{\text{measured powder output}} \times 100
\]

5. Annotate the calculated values \((C_1)\) 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 output/powder hose correction**

<table>
<thead>
<tr>
<th>Gun No.</th>
<th>Powder output correction C0 Before correction</th>
<th>After correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C0=1.8 Nm³/h</td>
<td>C0=1.7 Nm³/h</td>
</tr>
<tr>
<td></td>
<td>20 g</td>
<td>12 g</td>
</tr>
<tr>
<td>2</td>
<td>C0=1.8 Nm³/h</td>
<td>C0=1.8 Nm³/h</td>
</tr>
<tr>
<td></td>
<td>10 g</td>
<td>13 g</td>
</tr>
<tr>
<td>3</td>
<td>C0=1.8 Nm³/h</td>
<td>C0=2.6 Nm³/h</td>
</tr>
<tr>
<td></td>
<td>0 g</td>
<td>12 g</td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gun No.</th>
<th>Powder hose correction C1 Before correction</th>
<th>After correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C1=100 %</td>
<td>C1=100 %</td>
</tr>
<tr>
<td></td>
<td>200 g</td>
<td>200 g</td>
</tr>
<tr>
<td>2</td>
<td>C1=100 %</td>
<td>C1=80%</td>
</tr>
<tr>
<td></td>
<td>250 g</td>
<td>200 g</td>
</tr>
<tr>
<td>3</td>
<td>C1=100 %</td>
<td>C1=71%</td>
</tr>
<tr>
<td></td>
<td>280 g</td>
<td>200 g</td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Correction factor – diagram

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

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.

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.
Diagnostic

Description

The diagnosis page displays the status of the individual machine components.

It is possible to diagnose the following system components:

- **General**
  - States of guns, axes, light grids, object numbers, object length, number of objects

- **Powder guns**
  - Current application values, software version of the gun control units

- **Axes**
  - Swivel axes
    Standard axes are displayed under “General”

- **Inputs/outputs**
  - Current state of inputs/outputs, simulation of inputs/outputs

- **CAN bus**
  - Display of the active CAN bus users

- **Interface**
  - Display of the inputs/outputs of the interface to a customer controller

- **Application pump**
  - Display of the current pressure values of the application pumps
  - Activation of the pinch valve diagnostic of the application pumps
  - Switching the remote operation of the gun control units on/off

- **Exhaust air**
  - Display of the current pressure values of the after filter
  - “Running-in filter cartridges” function
Fig. 84: “General” diagnosis screen

This screen displays:

- Light grid segments
- Gun status
- Axis status and position
- Current object per station
- States of scanner zones
- Code disk information
**Current application values**

- Display of the actual values of the gun control units
- kV and μA = The current actual value is displayed

**Current pressure values APxx**

- D1 = Current pinch valve pressure
- D2 = Opening time of control solenoid valve for pinch valve pressure (leak-tightness control)
- D3 = System backpressure 1
- D4 = System backpressure 2
- D7 = Pressure drop per each pinch valve closing

**Software version**

The current software version of the OptiStar gun control units is displayed.

The firmware update for CG22 and CG24-CP from firmware version 0.21.0 and higher is done automatically.

**Firmware download status:**

Download is active.
This status indicates that download is not possible and the CGxx memory must be cleared (see also the CGxx operating manual).

Axes

This diagnosis page is used exclusively for swivel axes.

Swivel axes are a Gema product that is very rarely used. Swivel axes are used when a customer has coating objects that are tilted at a precisely defined angle. In this case one axis with a positive angle and one axis with a negative angle can be used. This means that the coating distance remains unchanged over the entire height of the object.

Fig. 87:
Inputs/outputs

Fig. 88: “Inputs/outputs” diagnosis screen

This is an important screen for the commissioning engineer!

The active inputs/outputs are displayed in orange. They refer to the inputs/outputs of WAGO PLC cards.

Inputs and outputs can be set in the GemaService user level.

**Example:**

If the wiring to an input is missing during start-up and therefore an error is displayed, it can be temporarily suppressed.

The same functionality is provided for all digital outputs.

When exiting the “Inputs/outputs” screen, the outputs are no longer overwritten. The inputs remain set as temporarily programmed.

This functionality is deactivated when the system is switched on again.
CAN bus

This screen displays the current CAN bus users in orange color.

By clicking on the question mark symbol you can display the CAN address overview.
### Standard interface

![Diagram of standard interface](Image)

**Fig. 90: “Interface” diagnosis screen**

This page is used to monitor the current information on the interface.

<table>
<thead>
<tr>
<th>Eingang</th>
<th>Ausgang</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lebenszeit</td>
<td>Lebenszeit</td>
</tr>
<tr>
<td>Warenlager im Stopper</td>
<td>Sammel Fehler</td>
</tr>
<tr>
<td>Warenlager Start</td>
<td>NOT-Halt</td>
</tr>
<tr>
<td>NOT-Halt</td>
<td>Fördereinabege</td>
</tr>
<tr>
<td>Reserve 1</td>
<td>Stoppeinabege</td>
</tr>
<tr>
<td>Reserve 2</td>
<td>Farbwechsel</td>
</tr>
<tr>
<td>Reserve 3</td>
<td>Minimum eine Piste spricht</td>
</tr>
<tr>
<td>Reserve 4</td>
<td>Bescheid Kugelvergabe</td>
</tr>
<tr>
<td>Programmnummer Stopper 1</td>
<td>Automatik</td>
</tr>
<tr>
<td>Programmnummer Stopper 2</td>
<td>Hand</td>
</tr>
<tr>
<td>Programmnummer Stopper 3</td>
<td>Reinigung</td>
</tr>
<tr>
<td>Programmnummer Stopper 4</td>
<td>Anlage aus</td>
</tr>
<tr>
<td>Farbnummer Stopper 1</td>
<td>Programmnummer</td>
</tr>
<tr>
<td>Farbnummer Stopper 2</td>
<td>Fördergeschwindigkeit</td>
</tr>
<tr>
<td>Farbnummer Stopper 3</td>
<td>0</td>
</tr>
<tr>
<td>Farbnummer Stopper 4</td>
<td>0</td>
</tr>
<tr>
<td>Warenlagernummer 1</td>
<td>0</td>
</tr>
<tr>
<td>Warenlagernummer 2</td>
<td>0</td>
</tr>
<tr>
<td>Warenlagernummer 3</td>
<td>0</td>
</tr>
<tr>
<td>Warenlagernummer 4</td>
<td>0</td>
</tr>
</tbody>
</table>
Pressing the “Start” key in the top line initiates the pinch valve diagnostic of all application pumps.

For all other “Start” keys, a pinch valve diagnostic of the corresponding application pump is triggered.

The diagnostic function is only enabled if the OC07(OC03) has been cleaned beforehand.
Exhaust air

Fig. 92: “Exhaust air” diagnosis screen

This page is used to observe the after filter differential pressures.
A detailed description can be found in the document “LF pressure monitoring”.
After filter pressure monitoring

MagicControl CM40

Introduction

In response to the requirements of the new **EN16985** standard, the filter cabinet and the monitoring of the after filters have been revised.

The EN 16985 standard requires redundant back pressure and differential pressure monitoring.

See **EN16985:2018(D)**

---

**Fig. 93: Locking of the technical ventilation with the interface to the application system**

1. Booth
2. PLC
3. Dynamic pressure indicator
4. Differential pressure monitor
5. Compressed air valve
Typical characteristics

- Filter monitoring (pressure switch) with two channels
- The following volume flows or fan Δp with two pressure switches each are monitored:
  - Volume flow operating point
  - Volume flow alarm
  - Volume flow ATEX: Stop powder
- Two additional differential pressure monitors transmit the pressure of the filter system to the CM40.
- There are no more pressure gages in or on the cabinet. Everything is displayed on the MagicControl CM40 screen.
- Only a main power supply is required as a power supply:
  - The ICS filter cabinet contains a fuse to protect the power supply
- Cartridge cleaning is no longer time-controlled, but pressure-controlled:
  - As soon as the cartridge resistance exceeds a pre-set value, the cleaning sequence begins, with all filter cartridges being cleaned at least every hour.
- Two different control cabinet types:
  - Star-delta control version: OptiControl ICS08
  - FC operation version: OptiControl ICS09

Description of the pressure switches

315 B2 differential pressure monitor fan Δp

- The differential pressure monitor measures the current differential pressure of the fan.
- The pressure is displayed on the CM40 control unit at fan Δp: Actual value 1.
- The pressure display at fan Δp shows this value.

315 B4 differential pressure monitor fan Δp

- The differential pressure monitor measures the current differential pressure of the fan.
- The pressure is displayed on the CM40 control unit at fan Δp: Actual value 2

316 B1 differential pressure monitor filter cartridges Δp

- The differential pressure monitor measures the actual differential pressure of the filter cartridges (filter resistance).
- The pressure is displayed on the CM40 control at filter cartridges Δp: Actual value.
### 316 B2 differential pressure monitor system pressure $\Delta p$

- The differential pressure monitor measures the current system pressure.
- It is a measurement against atmosphere.
- The pressure is displayed on the CM40 control at system pressure $\Delta p$: **Actual value**
- The displayed value is evaluated for future applications.

---

The system pressure $\Delta p$ is only displayed in Service Mode and only in conjunction with the filter control cabinet type ICS08 or ICS09.

### 315 B1 dynamic pressure monitor

- The dynamic pressure monitor is an electrical pressure switch.
- It is set to the **ATEX: Stop powder** switch-off point.

### 315 B3 dynamic pressure monitor (redundant)

- The dynamic pressure monitor is an electrical pressure switch.
- It is set to the **ATEX: Stop powder** switch-off point.

---

### Pressure switch overview

<table>
<thead>
<tr>
<th>Switch Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>316B2</td>
<td>Differential pressure monitor&lt;br&gt;<strong>System pressure $\Delta p$</strong>&lt;br&gt;(measurement against atmosphere)</td>
</tr>
<tr>
<td>316B1</td>
<td>Differential pressure monitor&lt;br&gt;<strong>Filter cartridge $\Delta p$</strong>&lt;br&gt;(filter resistance)</td>
</tr>
<tr>
<td>315B4</td>
<td>Differential pressure monitor (redundant)&lt;br&gt;<strong>$\Delta p$ fan</strong></td>
</tr>
<tr>
<td>315B3</td>
<td>Dynamic pressure monitor (redundant)&lt;br&gt;<strong>Electrical pressure switch</strong></td>
</tr>
<tr>
<td>315B2</td>
<td>Differential pressure monitor&lt;br&gt;<strong>$\Delta p$ fan</strong></td>
</tr>
<tr>
<td>315B1</td>
<td>Dynamic pressure monitor (measurement against atmosphere)&lt;br&gt;<strong>Electrical pressure switch</strong></td>
</tr>
</tbody>
</table>

Pressure switch is set to: Fan $\Delta p$<br>"**ATEX: Stop powder**"

---

*Fig. 94: Overview of all pressure switches with designations and intended use*
Display of the pressure values in MagicControl CM40

After logging in to User level 1, the Exhaust Air page can be opened.

Note:
The pressure values entered in the field $\Delta p$ fan

- Operating point 1
- Alarm 2
- ATEX: Stop powder 3

replace the setting parameters specified in the filter characteristics.

These 3 values are automatically calculated based on:

- After filter type
- Nominal exhaust air volume of the after filter
- Height above sea level, filter location
- Average ambient temperature of the filter at the installation site

### Configuration

#### 1503 After filter type

This parameter is used to select the after filter type

<table>
<thead>
<tr>
<th>ID no.</th>
<th>Setting values / range</th>
<th>Default</th>
<th>UL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1503</td>
<td>TAMA/MAHLE/HERDING</td>
<td>TAMA</td>
<td>g0</td>
</tr>
</tbody>
</table>

#### 1504 Volume flow

This parameter defines the nominal exhaust air volume. The value is used as a reference value in exhaust air monitoring.

<table>
<thead>
<tr>
<th>ID no.</th>
<th>Setting values / range</th>
<th>Default</th>
<th>UL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1504</td>
<td>12 – 32,000 Nm$^3$/h</td>
<td>0</td>
<td>g0</td>
</tr>
</tbody>
</table>

#### 1561 Meter above sea level

This parameter must be adjusted to the actual sea level of the installation location. The exhaust air is automatically adjusted depending on the sea level (workable from 1001 m above sea level).

For systems with separate exhaust systems at the manual coater platforms the value must be edited, because no fan pressure curve is available for this variant.

A higher sea level means thinner air and therefore a higher exhaust air setting is required.
After filter pressure monitoring

<table>
<thead>
<tr>
<th>ID no.</th>
<th>Setting values / range</th>
<th>Default</th>
<th>UL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1561</td>
<td>0 – 2000[m]</td>
<td>500[m]</td>
<td>g0</td>
</tr>
</tbody>
</table>

### 1562 Temperature

This parameter must be adjusted according to the ambient temperature in which the filter is installed. The exhaust air is automatically adjusted depending on the temperature.

A higher temperature means thinner air and therefore a higher exhaust air level is required.

<table>
<thead>
<tr>
<th>ID no.</th>
<th>Setting values / range</th>
<th>Default</th>
<th>UL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1562</td>
<td>5 – 40[ºC]</td>
<td>20[ºC]</td>
<td>g0</td>
</tr>
</tbody>
</table>
Adjustment instructions

ATEX: Stop powder

1. Adjust the throttle valve on the after filter so that the fan Δp displays the pressure value 3 “ATEX: Stop powder”.

2. Measure the actual air volume in the ducting with an anemometer.
   - If the air volume is correct, continue with step 3.
   - If the measured air volume flow does not correspond to the set value, the flap position on the after filter must be changed until the volume flow measured with the anemometer corresponds to the set value. (in this example 9600 m³/h)

3. Enter the actual value of the Δp ATEX: Stop powder manually under 6.

4. The electrical switching output in the two differential pressure switches (315B2 and 315B4) must now be calibrated to the exhaust air value “ATEX: Stop powder”.

Setting the switching output

This function is used to set the switching output to “switched through” for a defined pressure.

- Set air volume value to Δp ATEX: Stop powder at which point the electrical contact should change status. (NPN 4)
- Press the “S” key for 5 seconds until the LED flashes quickly (= value is stored)

The LED lights up as soon as the defined pressure is reached or exceeded.

Important:

The M = Mode key must not be pressed.

- The M key is used to adjust the zero point deviation

5. The electrical switching points of the dynamic pressure monitors (315B3 and 315B1) must also be set to the value Δp ATEX: Stop powder at the corresponding exhaust air volume.

Alarm

1. Adjust the throttle valve on the after filter so that the fan Δp shows the pressure value 2 “Alarm”.

2. Measure air volume in the ducting with an anemometer.
   - If the air volume is correct, continue with step 3.
   - If the measured air volume flow does not correspond to the set value, the flap position on the after filter must be changed until the volume flow measured with the anemometer corresponds to the set value. (in this example 10,800 m³/h)

3. Enter actual value of system pressure Δp “Alarm” manually under 5.
Operating point

1. Adjust the throttle valve on the after filter so that the fan $\Delta p$ shows the pressure value $1$ for “operating point”.
2. Measure air volume in the ducting with an anemometer.
   - If the air volume is correct, continue with step 3.
   - If the measured air volume flow does not correspond to the set value, the flap position on the after filter must be changed until the volume flow measured with the anemometer corresponds to the set value. (in this example 12,000 m³/h)
3. Enter actual value $\Delta p$ “operating point” under 4 manually.

Exhaust air measurement

For exhaust air measurement we recommend the Testo 405i hot wire anemometer, which is both economical and practical.

Measurement configuration

- Volume flow duct
- Tube type = **Round**
- Tube diameter (duct diameter) must be configured
  - The tube diameter is shown in the assembly drawing of the ducting.

---

**An incorrect diameter leads to an incorrect air volume result!**

- Measurement methods:
  - Single
  - Selective
  - **Time**

  We recommend the “Temporal” variant. With this variant, the exhaust air volume is measured over a defined time period. A measuring time of 60 seconds produces a precise result.

- Measurement direction = **Exhaust air**

**Measuring point**

In the ducting from the booth to the cyclone there is a pre-drilled measuring point in newly delivered plants. This is located below the elbow.
Measuring procedure

1. Run telescopic probe into the center of the tube
2. Take one or more measurements lasting 60 seconds.

Tests have shown that the measurement is most accurate if the measurement is only made in the center of the pipe.

3. The results are displayed in the Smart Probes app.
4. The results can be exported as a report in various formats.
Filter cartridges

Running-in filter
The running-in of the filter cartridges is described in the supplementary documents:
Running-in_instructions_cartridges_afterfilters-multicolor-en-V2
Running-in_instructions_cartridges_afterfilters-singlecolor-en-V2

Filter cartridge cleaning
Parameters for filter cleaning:
- “1571 Filter cartridge ∆p Start filter cleaning”
- “1572 Filter cartridge ∆p Stop filter cleaning”
When new, the differential pressure “Filter cartridge ∆p” is approximately 0.6 kPa.
This value is automatically applied after running-in the filter. The value can also be checked in the parameters “1571 Filter cartridge ∆p Start filter cleaning” and “1572 Filter cartridge ∆p Stop filter cleaning”.
The cleaning cycle through all filter cartridges is started:
- Hourly (system in coating mode) one complete pass as long as the pressure is lower than the value of parameter 1571.
- If the pressure rises above the value of parameter 1571, the filter cleaning is continued cyclically until the last stored differential pressure is reached again before the next cleaning cycle is triggered.
- If the last stored pressure is not reached after max. 4 complete cleaning cycles, the last stored pressure is increased by 0.05 kPa.
The pressure values are continuously recorded in the log file AfterFilterPressure.csv.

Filter cartridge aging
Due to the aging of the filter cartridges, the differential pressure of the filter cartridge ∆p and the differential pressure of the fan ∆p increases.

Procedure for filter cartridge aging
Goal:
The after filter should always be operated with the operating point differential pressure fan ∆p.
Procedure:
As soon as the alarm 15071 fan 1 minimum exhaust air appears, the operating point must be readjusted by opening the throttle valve until the display value on the CM40 display reaches the differential pressure “fan ∆p operating point”.
Filter cartridge replacement

The filter cartridges must be replaced at the latest when:
- the measured pressure “Δp Filter cartridge” exceeds 2 kPa
  • A pop-up window appears “Please replace filter cartridges”.
- the throttle valve on the fan is already completely open

Procedure for filter cartridge aging

1. Remove the aged filter cartridges
   - All of the filter cartridges must be replaced
2. Check pivot wing mechanism
3. Insert new filter cartridges
4. Run-in filter cartridges
   - The running-in of the filter cartridges is described in the supplementary documents:
     Running-in_instructions_cartridges_afterfilters-multicolor-en-V2
     Running-in_instructions_cartridges_afterfilters-singlecolor-en-V2

Operation

Once all settings have been made, the after filter can be operated in the “Fan Δp operating point” position.

Error messages

If the flow rate decreases during operation, an alarm message appears:

Alarm “15070 Fan 1 too much exhaust air” appears if the differential pressure of fan Δp has fallen below the set value “Fan Δp operating point” by 0.2 kPa.

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>15072 Fan 1 too little exhaust air</td>
<td>Differential pressure fan Δp has exceeded the setting value “Fan Δp Alarm”.</td>
<td>Increase the exhaust air volume again by opening the throttle valve until the “Fan Δp operating point” is reached again.</td>
</tr>
<tr>
<td>15071 Fan 1 minimum exhaust air reached</td>
<td>Differential pressure fan Δp has exceeded the setting value “Fan Δp ATEX: Stop powder”.</td>
<td></td>
</tr>
</tbody>
</table>

Simultaneously with the alarm message 15071, the 4 pressure monitors are also triggered:
- Differential pressure monitor (315B2) Fan Δp
- Differential pressure monitor (315B4) Fan Δp (redundant)
– Dynamic pressure monitor (315 B1)
– Dynamic pressure monitor (315 B3)

**Behavior when ATEX differential pressure is reached**
– After filter continues to run
– Gun control units switch off
– The “System” signal of the automatic and manual gun control units switches off.
– Main solenoid valve switches off
– Cleaning mode not possible
  • A pop-up window appears when the cleaning button is pressed.
Fault clearance

Main page error display

1. Touch information bar
   - The following screen is displayed:

*Fig. 98: Error display*

- ① Selected error message
- ② Error description
- ③ Error number
- ④ Display error history
- ⑤ Delete error history (keep pressed for 2 seconds)
- ⑥ Acknowledge error
- ⑦ Exit current page
- ⑧ Help codes list
## Faults

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control voltage indicator lamp does not light up</td>
<td>Safety circuit not OK</td>
<td>Check and correct any errors, see enclosed wiring diagram</td>
</tr>
<tr>
<td></td>
<td>Lamp defective</td>
<td>Replace</td>
</tr>
<tr>
<td>Axes cannot be referenced</td>
<td>The reference key is not displayed:</td>
<td>Check control voltage. On the diagnostics page, check which axes are not accessible via CAN bus (see also Operating Manual or the respective axis). Switch off the control voltage and switch it on again after 10 seconds, otherwise restart the plant.</td>
</tr>
<tr>
<td></td>
<td>– Axes are already referenced</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Not all axes are detected on the CAN bus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Control is in an undefined state</td>
<td></td>
</tr>
</tbody>
</table>
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.

Storage conditions

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

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

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

Space requirements
The space requirements correspond to the size of the product.
There are no special requirements concerning distance to neighboring equipment.

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

Maintenance schedule
No maintenance schedule is necessary.

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

Introduction

Requirements on personnel carrying out the work
The disposal of the product is to be carried out by the owner or operator. When disposing of components that are not manufactured by Gema, the instructions in the respective manufacturer’s documentation must be observed.

Disposal regulations

The product must be disassembled and disposed of properly at the end of its service life.
► When disposing of the product, the applicable local and regional laws, directives and environmental regulations must be complied with!

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

⚠️ WARNING
Risk of explosion: Lithium battery
If improperly handled, there is a risk of explosion due to the lithium battery installed in the operating panel.
► Ensure the operating panel is disposed of properly.

The recyclable materials should be taken to your local recycling center.
Operating panels that are no longer required must be disposed of properly in accordance with local regulations.
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!
## MagicControl CM40 – complete

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Micro Touch Panel MC 15.6” – complete (without pos. 2)</td>
<td>1015 320</td>
</tr>
<tr>
<td>2</td>
<td>SD card – 4 GB</td>
<td>on request</td>
</tr>
</tbody>
</table>

*Fig. 99: MagicControl CM40*
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