Documentation LM01 Level sensor

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# Table of contents

**General safety regulations** 3  
Safety symbols (pictograms) .............................................................. 3  
Conformity of use ............................................................................ 3  
Product specific security measures .................................................. 4  

**About this manual** 5  
General information ........................................................................ 5  

**LM01 Level sensor** 7  
Description of function ..................................................................... 7  
General information ......................................................................... 7  
Installation ........................................................................................ 7  
Grounding .......................................................................................... 7  
Repairs ............................................................................................... 7  

**Technical data** 9  
LM01 Level sensor ............................................................................ 9  
Electrical data .................................................................................. 9  
LM01 Level sensor wiring ................................................................. 9  
Pin allocation ..................................................................................... 9  

**Start-up** 11  
Preparation for start-up .................................................................... 11  
Function check .................................................................................. 11  
Installation ........................................................................................ 12  
Retrofitting into existing powder hoppers ......................................... 12  
Installation opening .......................................................................... 12  
Troubleshooting ................................................................................ 13  
Maintenance ...................................................................................... 13  

**Spare parts list** 15  
Ordering spare parts .......................................................................... 15  
LM01 Level sensor - spare parts list ................................................. 16  
LM01 Level sensor - spare parts ....................................................... 17
General safety regulations

This chapter sets out the fundamental safety regulations that must be followed by the user and third parties using the LM01 Level sensor. These safety regulations must be read and understood before the LM01 Level sensor is used.

Safety symbols (pictograms)

The following warnings with their meanings can be found in the 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 LM01 Level sensor 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 LM01 Level sensor is to be used for other purposes or other substances outside of our guidelines then Gema Switzerland GmbH should be consulted.

3. Observance of the operating, service and maintenance instructions specified by the manufacturer is also part of conformity of use. The LM01 Level sensor 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 LM01 Level sensor has been set up and wired according to the guidelines for machinery (2006/42 EG). EN 60204-1 (machine safety) must also be observed.

5. Unauthorized modifications to LM01 Level sensor 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.

<table>
<thead>
<tr>
<th>Explosion protection</th>
<th>Protection type</th>
<th>Temperature class</th>
</tr>
</thead>
<tbody>
<tr>
<td>0102 Ex II 2 D</td>
<td>IP54</td>
<td>T6 (zone 21)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T4 (zone 22)</td>
</tr>
</tbody>
</table>

**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

**Note:**
For further security information see the more detailed Gema Safety regulations!
About this manual

General information

This operating manual contains all the important information which you require for the working with the LM01 Level sensor. 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. - should be referenced to their corresponding documents.
LM01 Level sensor

Description of function

The LM01 Membrane level sensor operates according to the principle of a membrane switch. Thereby, the switch element (proximity switch) is completely separated from the material being monitored.

The level sensor is fitted vertically in the HF02 Powder Hopper, so that the powder pushes the membrane upwards when it is filled, and so that a level sensor signal is given. If the powder hopper is empty, the membrane sinks down and the level sensor signal releases retarded.

Note:
In the powder hopper may not exist an overpressure, because this can lead to an incorrect released level signal!

General information

Installation

The LM01 Level sensor is installed on the cover of the HF02 Powder Hopper. All work to be done by the customer must be carried out according to the local safety regulations.

Grounding

The cover must be completely grounded anytime. The grounding connection must be done by the customer.

Repairs

Repairs should only be carried out by trained personnel!
Technical data

LM01 Level sensor

**Electrical data**

<table>
<thead>
<tr>
<th>LM01 Level sensor</th>
<th>Retarded level sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage</td>
<td>20-28 VDC</td>
</tr>
<tr>
<td>Current consumption</td>
<td>200 mA</td>
</tr>
<tr>
<td>Level signal</td>
<td>24 VDC / 20 mA</td>
</tr>
<tr>
<td>Switching delay</td>
<td>approx. 3 sec.</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>+10°C - +40°C</td>
</tr>
<tr>
<td>Level sensor weight - compl.</td>
<td>0.7 kg</td>
</tr>
<tr>
<td>Min. density</td>
<td>200 g/dm³</td>
</tr>
<tr>
<td>Max. insertion depth</td>
<td>approx. 380 mm</td>
</tr>
<tr>
<td>Protection type</td>
<td>IP54</td>
</tr>
</tbody>
</table>

**LM01 Level sensor wiring**

<table>
<thead>
<tr>
<th>Color</th>
<th>Print pin no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>brown</td>
<td>X2 / +</td>
</tr>
<tr>
<td>black</td>
<td>X3 / signal</td>
</tr>
<tr>
<td>blue</td>
<td>X4 / -</td>
</tr>
</tbody>
</table>

**Pin allocation**

<table>
<thead>
<tr>
<th>LM01 Level sensor</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power supply GND</td>
</tr>
<tr>
<td>2</td>
<td>Power supply +24 VDC</td>
</tr>
<tr>
<td>3</td>
<td>* SIG_OUT (retarded)</td>
</tr>
<tr>
<td>4</td>
<td>(not connected)</td>
</tr>
<tr>
<td>5</td>
<td>SIG_OUT (retarded)</td>
</tr>
<tr>
<td>6</td>
<td>SIG_OUT</td>
</tr>
</tbody>
</table>

* 24 V Powder Hopper full
  0 V Powder Hopper empty
Start-up

Preparation for start-up

Before starting up the LM01 Level sensor, the following points must be observed:

- Observe the safety regulations!
- The level height can be adjusted with the cable lead-through on the fixing flange. The level should be first set provisionally and can then be corrected to the desired level during operation
- The retarded LM01 Level sensor has three LEDs. When the powder hopper is empty, the green LED must illuminate, the red and the orange LEDs are switched off

Function check

The function check of the retarded LM01 Level sensor can be done by the three LEDs:

Green LED:
- Power supply is present
- The level sensor is ready for operation

Red LED:
- Indicates an unretarded level signal
- The LED must illuminate immediately when the membrane is lifted for a short time
- The LED switches off immediately when the membrane drops

Orange LED:
- Indicates a retarded, debounced level signal
- The LED illuminates not until the membrane is lifted for approx. 3 seconds
- The LED switches off retarded, 3 seconds after the membrane drops
Installation

Retrofitting into existing powder hoppers

Parts required for retrofitting into existing powder hoppers

Installation opening

Installation opening
Troubleshooting

If the LEDs do not operate according to the description in the section "Function check", the complete LM01 Level sensor must be sent to an authorized Gema service center for repair.

Maintenance

The LM01 Level sensor does not require any particular maintenance. It is, however, necessary to check periodically for powder depositing on the membrane and to clean, if necessary.
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** LM01 Level sensor,
  **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 Gema spare parts should be used, because the hazardous location approval will be preserved that way! The use of spare parts from other manufacturers will invalidate the Gema guarantee conditions!
# LM01 Level sensor - spare parts list

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Housing with inspection glass</td>
<td>373 508</td>
</tr>
<tr>
<td>2</td>
<td>Inspection glass</td>
<td>367 222</td>
</tr>
<tr>
<td>3</td>
<td>Venting ring</td>
<td>373 613</td>
</tr>
<tr>
<td>4</td>
<td>Level sensor print - complete</td>
<td>364 258</td>
</tr>
<tr>
<td>5</td>
<td>Tube</td>
<td>382 035</td>
</tr>
<tr>
<td>6</td>
<td>Retaining disk</td>
<td>373 524</td>
</tr>
<tr>
<td>7</td>
<td>Sensor head</td>
<td>382 027</td>
</tr>
<tr>
<td>8</td>
<td>Fixing ring</td>
<td>381 985</td>
</tr>
<tr>
<td>9</td>
<td>Membrane</td>
<td>373 583</td>
</tr>
<tr>
<td>10</td>
<td>Retaining ring</td>
<td>373 559</td>
</tr>
<tr>
<td>11</td>
<td>Sealing ring</td>
<td>375 314</td>
</tr>
<tr>
<td>15</td>
<td>Proximity switch</td>
<td>262 927</td>
</tr>
<tr>
<td>16</td>
<td>Lead-through - PG29</td>
<td>204 340</td>
</tr>
</tbody>
</table>
LM01 Level sensor - spare parts

LM01 Level sensor - spare parts