

Flat Suction Cup FEL

Technical Data Sheet

Note: The technical data sheet was originally written in German. The technical data sheet describes the basic functions of the device. It is intended to provide a quick start for experienced users. This data sheet makes no claim to be exhaustive. Store in a safe place for future reference. Subject to technical changes without notice. No responsibility is taken for printing or other types of errors.

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1 Warranty and Liability

J. Schmalz GmbH, as a supplier and manufacturer of vacuum technology, takes no responsibility for the function of the product described below in a specific process. The exact application parameters and the individual environment are decisive factors for selecting the right components.

The specifications for our products are based on our current technical knowledge and experience, as well as the available literature. We encourage you to test the products under the specific conditions that apply to your application purposes, and we would be glad to use our experience to assist you.

The packaging material, the goods that are packaged, the fill level, porosity, surface condition, center of gravity or the air content of the workpiece influence the entire handling process. Following functional testing, different gripper lengths, additional grippers, a higher suction rate or modifications to the configuration may be necessary.

Therefore, J. Schmalz GmbH accepts no liability and excludes all legal claims for damages. The products and the configurator are subject to technical changes or further development without notice.

We are not liable for any damage resulting from the use of non-original spare parts or accessories. The exclusive use of original spare parts is a prerequisite for the proper functioning of the gripper and for the validity of the warranty. Wearing parts are not covered by the warranty.

Responsibility of the Integrator

The integrator is obligated to perform a risk assessment for the environmental conditions at the installation location. The integrator is also responsible for third parties in the working area of the gripper. They must ensure that they have the appropriate qualifications and skills.

- Ensure that regular breaks are taken.
- Ensure that the gripper cannot be started up by unauthorized persons.
- During maintenance or repair work, ensure that the gripper cannot be operated.
- Clearly define the responsibilities for the various activities performed with the gripper.
- Ensure that these responsibilities are observed.
- When handling unknown loads, carry out tests where necessary to ensure safe operation:
The load must be sufficiently rigid that it cannot be damaged during handling.

2 Product Description

The system is used to load and unload transport magazines in display manufacture and to pack screens. For this purpose, the flat suction cup is vertically lowered into magazines. The gripper is only suitable for transporting very light loads horizontally. Neutral gases in accordance with EN 983 are approved as evacuation media. Neutral gases include air, nitrogen and inert gases. The device is not suitable for manual handling.

The system is mounted on the load suspension provided by the customer using the T-slots designated for this purpose. The customer also provides a control device.

The flat suction cup is supplied in basic versions for external vacuum supply.

Each gripper is individual thanks to its customized design. Thus, the grippers differ in terms of details such as the size of the suction surface, the arrangement and design of the suction cells in the sealing plate, the flow restrictors and the number of suction zones that can be switched on and off.

The following target groups are addressed in these instructions:

- Mechanical and electrical specialists who are responsible for installing, troubleshooting and maintaining the product.

The operator of the system must comply with country-specific regulations regarding the age, ability and training of the personnel.

Applicable for Germany:

A qualified employee is defined as an employee who has received technical training and has the knowledge and experience – including knowledge of applicable regulations – necessary to enable him or her to recognize possible dangers and implement the appropriate safety measures while performing tasks. Qualified personnel must observe the pertinent industry-specific rules and regulations.

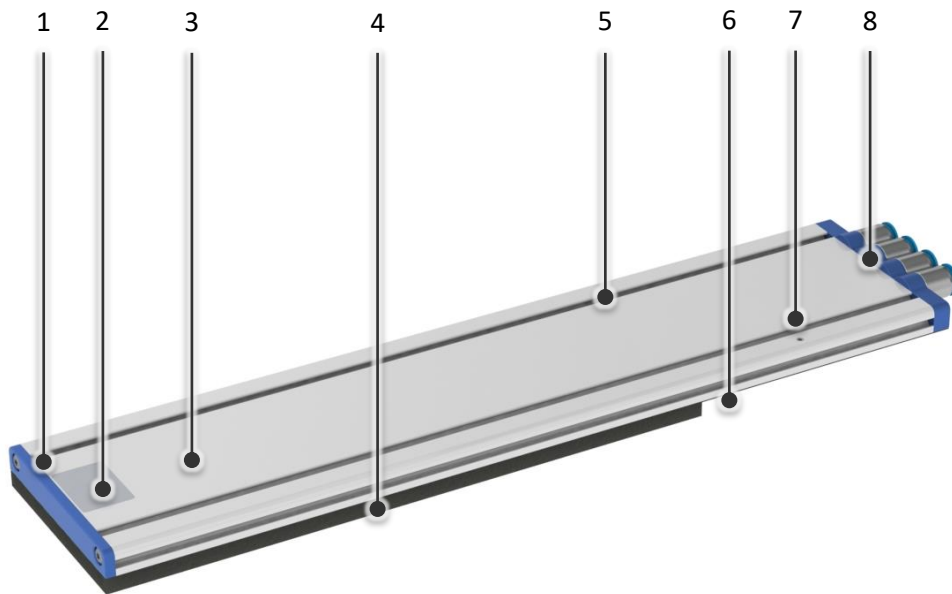
Non-intended use

Schmalz accepts no liability for damages caused by the use of the gripper for purposes other than those described under “Intended Use.”

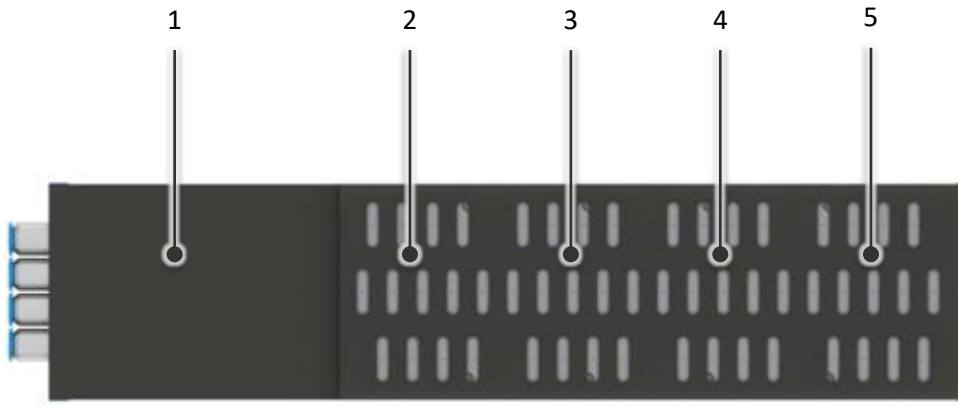
Non-intended use includes the following:

- Lifting people or animals
- Storing loads while picked up
- Supporting the lifting force by applying external forces
- Picking up building components, equipment or supporting surfaces
- Applying suction to bulk materials (e.g. granulates)
- Evacuating objects that are in danger of imploding
- Use in potentially explosive atmospheres
- Applying suction to building components or equipment

3 Design of Area Gripper



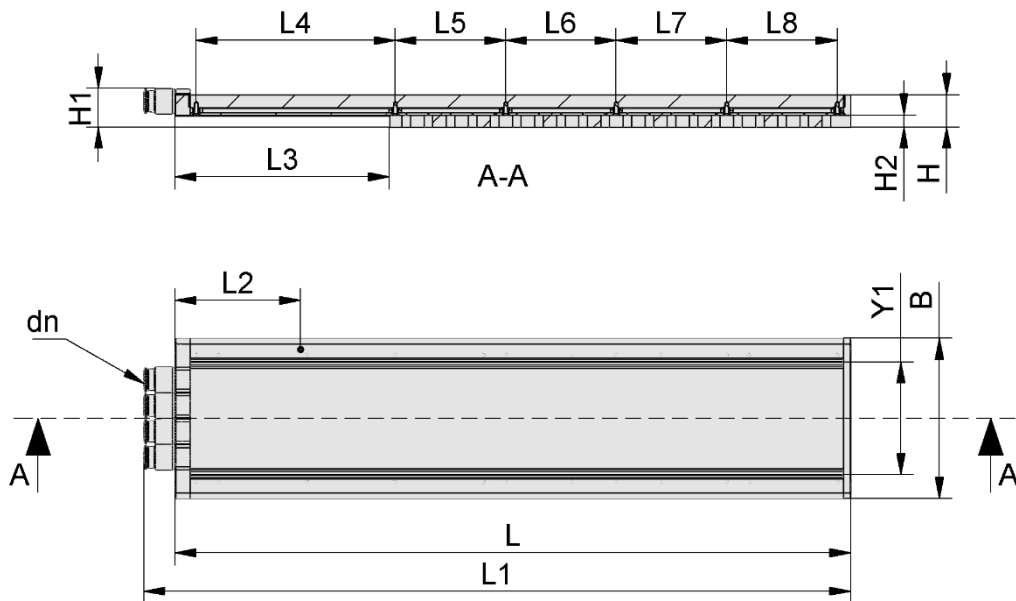
| | | | |
|---|--------------------------|---|---|
| 1 | Housing cover | 2 | Type plate |
| 3 | Gripper profile | 4 | Sealing plate for suction area/suction zone |
| 5 | T-slots | 6 | Protective plate for passive zone |
| 7 | Connection for grounding | 8 | Housing cover with vacuum connections |



| | | | |
|---|---|---|--------------------------------|
| 1 | Passive zone without suction cells (optional) | 2 | Zone 1 suction area |
| 3 | Zone 2 suction area (optional) | 4 | Zone 3 suction area (optional) |
| 5 | Zone 4 suction area (optional) | | |

The number and the grid of the suction zones is designed for the specific customer application. Up to four independently switchable zones and an additional passive range are possible.

4 Dimensions (Example)



| Part no. | B | H | H1 | H2 | L | L1 | L2 | L3 |
|----------------|-----|------|------|----|-----|-----|-----|-------|
| 10.01.46.00105 | 130 | 26.5 | 31.3 | 10 | 352 | 376 | 102 | 156.5 |
| 10.01.46.00114 | 130 | 26.5 | 31.3 | 10 | 352 | 376 | 102 | 156.5 |
| 10.01.46.00117 | 130 | 26.5 | 31.3 | 10 | 352 | 376 | 102 | 156.5 |
| 10.01.46.00121 | 130 | 26.5 | 31.3 | 10 | 352 | 376 | 102 | 156.5 |
| 10.01.46.00131 | 130 | 26.5 | 31.3 | 10 | 550 | 574 | 102 | 174.5 |
| 10.01.46.00134 | 130 | 26.5 | 31.3 | 10 | 550 | 574 | 102 | 174.5 |
| 10.01.46.00124 | 130 | 26.5 | 31.3 | 10 | 748 | 772 | 102 | 156.5 |
| 10.01.46.00128 | 130 | 26.5 | 31.3 | 10 | 748 | 772 | 102 | 156.5 |

| Part no. | L4 | L5 | L6 | L7 | L8 | Y1 | dn | Grid |
|----------------|-----|-----|-----|-----|-----|----|----|------|
| 10.01.46.00105 | 144 | 180 | - | - | - | 90 | 12 | 3R18 |
| 10.01.46.00114 | 144 | 90 | 90 | - | - | 90 | 12 | 3R18 |
| 10.01.46.00117 | 144 | 180 | - | - | - | 90 | 12 | 5R18 |
| 10.01.46.00121 | 144 | 90 | 90 | - | - | 90 | 12 | 5R18 |
| 10.01.46.00131 | 162 | 90 | 90 | 90 | 90 | 90 | 12 | 3R18 |
| 10.01.46.00134 | 162 | 90 | 90 | 90 | 90 | 90 | 12 | 5R18 |
| 10.01.46.00124 | 144 | 144 | 144 | 144 | 144 | 90 | 12 | 3R18 |
| 10.01.46.00128 | 144 | 144 | 144 | 144 | 144 | 90 | 12 | 5R18 |

Other gripper types are available on request. Gripper lengths of 352 to 748 mm are available.

5 Technical Data (Example)

The following section presents the technical data for sample grippers. The length data for the area gripper is available from Schmalz upon request. Sealing plates made from other materials are also available from Schmalz. To ensure proper functioning, we always recommend carrying out tests with original sample workpieces in advance. A designated member of our sales team will be happy to help.

| Parameter | Unit | 10.01.46.00105 | 10.01.46.00131 | 10.01.46.00128 |
|---|--------|----------------|----------------|----------------|
| Total flow rate at -300 mbar ¹ | l/min | 112 | 208 | 389 |
| Volume flow requirement per zone at -300 mbar ¹ | l/min | 112 | 52 | 97.3 |
| Number of suction points | pieces | 28 | 52 | 144 |
| Max. permissible vacuum ² | % | 95 | 95 | 95 |
| Permissible vertical lift capacity ³ | N | 1400 | 1400 | 1400 |
| Permissible horizontal lift capacity ³ | N | 62 | 62 | 62 |
| Theoretical suction force at 300 mbar ⁴ | N | 150 | 280 | 771 |
| Theoretical suction force per zone at 300 mbar ⁴ | N | 150 | 70 | 193 |
| Permitted temperature range | ° C | +5 to +50 | | |
| Sealing plate grid | | 3R18 | 3R18 | 5R18 |
| Weight | kg | 1.2 | 1.8 | 2.4 |

¹ The specified flow rate must be available at the connector at -300 mbar at minimum.

² Dependent on the vacuum generator but not above 95%

³ The permissible lift capacity must not be exceeded. Depending on the configuration, the gripper may not be able to reach or exceed this lift capacity.

⁴ The suction force data consists of theoretical values at -0.3 bar vacuum, the actual values may deviate – they are defined without safety factors.

6 Transportation and Storage

The system is shipped in a transport box made specifically for the system. The transport package must be opened carefully without damaging the product. Check the shipment for completeness and damage using the delivery documents. Damage due to faulty packaging or transport must be reported immediately to the carrier and J. Schmalz GmbH.

The system must be stored in its original packaging when not in use.

7 Installation Instructions

For safe installation, the following instructions must be observed:

- ✓ The machine must not be in a potentially explosive environment.
 - ✓ The ambient conditions must comply with the specifications contained in the technical data.
 - ✓ Sufficient space for maintenance work must be provided.
 - ✓ The gripper is designed to transport products vertically.
1. Ensure that the flow restrictors in the sheet metal panel are not covered and that the gripper can operate unimpeded.
 2. Ensure that the sealing plate of the gripper can operate freely.
 3. Use only the connectors, mounting holes and attachment materials that have been provided.

Sliding blocks on the top: M6 thread

Sliding blocks on the side: M4 thread

Note: the groove bars on the top side of the profile are asymmetrical, therefore the groove blocks can only be screwed in as shown.



Connection is usually on one side. We recommend a connection using the flange that we supply. Observe the maximum lift capacities!

4. Firmly connect and secure pneumatic cable connections to the vacuum generator and plug connections.
5. Tension or pressure must not be applied to the connections via the connection lines.
6. The line cross-section of the connection lines must have at least the same cross-section as the gripper connections over the entire length.
7. If the connection lines are very long, it is advisable to use larger line cross-sections to avoid loss of efficiency. Contact a Schmalz representative.


8 Start of Operations

Before the initial start of operations following installation, repair, servicing or maintenance work, you must check the following:

- ✓ All mechanical connectors are properly attached and secured.
- ✓ All screws and nuts are tightened to specified torques.
- ✓ The EMERGENCY STOP switch for the overall system is working.

9 Operation

Before each activation of the gripping system, the following measures must be taken:

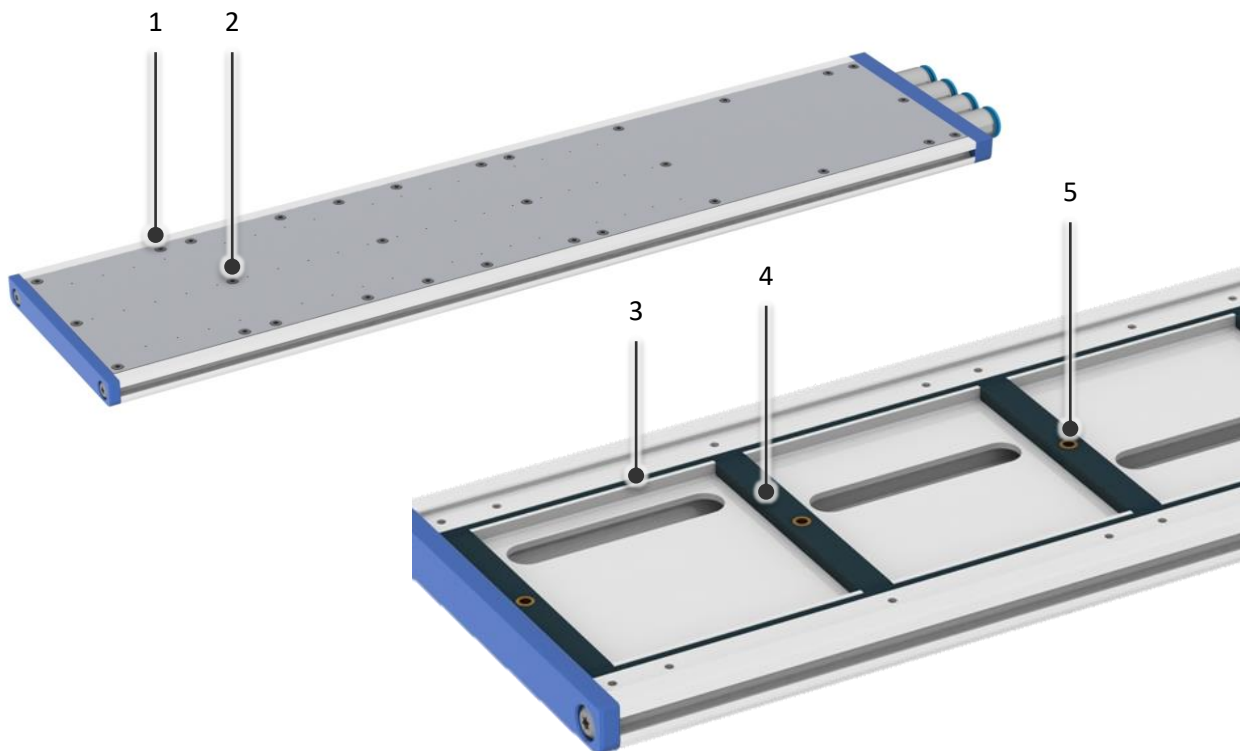
- Check the device for visible damage. Correct any faults or report them to the supervising personnel.
 - Ensure that no persons are present in the working area of the machine or system in order to prevent any hazard from switching on the machine.
-  If vacuum is not applied to all zones at the same time, the unused zones must be ventilated (compensation to the ambient atmospheric pressure required).

10 Troubleshooting

| Error | Possible cause | Solution |
|---|--|--|
| Vacuum level is not reached or vacuum is created too slowly | Leakage | Check the vacuum generator. |
| | Wear | Check hose connections (secure connection, no kinks, no defects) |
| | Contamination | Check seals / sealing plate and replace if necessary |
| | Incorrect installation | Check flow restrictors and clean if necessary |
| | Workpiece unsuitable | Clean the dust filter if necessary |
| | | Internal diameter of the compressed air / vacuum hoses too small (note when retrofitting the gripper) |
| | | Check all screw unions (plug-in screw unions, housing covers, etc.) |
| | | Product too air-permeable Surface too uneven We always recommend carrying out advance tests with the original products. Schmalz will be happy to assist you. |
| The load cannot be held | Vacuum level too low | See above for possible causes |
| | Suction force insufficient / workpiece too heavy | Increase vacuum or connect additional grippers if necessary Observe max. lift capacity |
| | Flow restrictors are dirty | Clean the gripper / flow restrictors |
| | Gripper contact force on the workpiece is too low | Press gripper down more firmly. Recommendation: On even surfaces, compress the sealing plate by 50% |
| | Too short retention time for the gripper on the product | Extend the retention time while picking up the product |
| | Too fast or jerky lifting of products | Optimize the motion and avoid peaks in acceleration |
| | The workpieces to be lifted are not suitable for the gripper (e.g. non-rigid/too narrow) | Use a different gripping system. Min. workpiece width of 23 mm (workpiece at a right angle to the gripper, grid 5R18) |
| | Flow restrictors are too small | With air-permeable workpieces, a larger flow restrictor may need to be used. |
| Sealing mat wears out very quickly | The suction cup is angled or makes a grinding noise when applied to the workpiece to be lifted | Set it down vertically on the workpiece |

11 Maintenance

1. Switch off the system. Switch off the vacuum and/or compressed air.
2. Check the sealing plates for wear, tears and leakage on a regular basis and replace them as necessary. The sealing plates must also be replaced if you notice that the vacuum is constantly dropping when handling the same parts. The foam may not be cleaned with a compressed-air gun. This would make the foam permeable to air in the places where compressed air was applied. If the sealing plate shows mechanical damage, it can be repaired up to a certain point using standard vulcanizing adhesive (e.g. adhesive for repairing the inner tubes of bicycles).
3. Remove any dirt on the exterior of the gripper with a cloth and soapy water (max. 60 °C), blow off with compressed air if necessary.
4. Operation of the area gripper can draw in dust from the environment. This dust can collect inside the gripper. The gripper must be cleaned regularly, depending on the amount of dust sucked in. To do so, remove the sealing plate, unscrew the sheet metal panel and the housing covers and blow out the gripper with compressed air. (Do not blow off the seals with compressed air.) In particular, check whether all flow restrictors in the sheet metal panel are free to pick up products optimally.
5. Check seals for integrity and replace them if necessary. Fully remove all adhesive residues when replacing them. Ensure that the new seals are seated correctly. Pay attention to the bushing in the separator, which is required to ensure that the gripper operates correctly.
6. The separators (4) must be replaced every 6 months.



1 Side fastening screws L = 8 mm

3 Sealing gasket

5 Sleeve

2 Middle fastening screws L = 10 mm

4 Separator

12 Spare and Wearing Parts, Accessories

12.1 Spare Parts

| Part no. | Designation | Suitable for |
|----------------|---|--------------|
| 10.01.46.00071 | Separator | All grippers |
| 10.01.46.00073 | Sleeve for separators | All grippers |
| 10.07.04.00166 | Sealing gasket | All grippers |
| 10.01.46.00043 | Sealing plate for housing lid | All grippers |
| 20.10.03.00008 | Pan-head self-tapping screw for housing cover | All grippers |

12.2 Wearing Parts

| Part no. | Designation | Suitable for parts |
|----------------|------------------------------------|--------------------|
| 10.01.46.00106 | Sealing plate O10 for suction area | 10.01.46.00105 |
| 10.01.46.00115 | Sealing plate O10 for suction area | 10.01.46.00114 |
| 10.01.46.00118 | Sealing plate O10 for suction area | 10.01.46.00117 |
| 10.01.46.00119 | Sealing plate O10 for suction area | 10.01.46.00121 |
| 10.01.46.00125 | Sealing plate O10 for suction area | 10.01.46.00124 |
| 10.01.46.00127 | Sealing plate O10 for suction area | 10.01.46.00128 |
| 10.01.46.00132 | Sealing plate O10 for suction area | 10.01.46.00131 |
| 10.01.46.00133 | Sealing plate O10 for suction area | 10.01.46.00134 |
| 10.01.46.00107 | Sealing plate for passive zone | L4 = 144 mm |
| 10.01.46.00100 | Sealing plate for passive zone | L4 = 162 mm |

12.3 Accessories

| Part no. | Designation | Contents |
|----------------|---|--|
| 10.01.46.00136 | Flange module for connecting to a section | Incl. 4x sliding block, locking washer, machine screw, M6x12 |
| 25.09.06.00153 | Sliding block for the slot on the side | |
| 25.09.06.00048 | Sliding block for the slot on the top | |

You can find more accessories in our Online Shop.