



EN

Operating Instructions Vacuum area gripper FMHD

Note

These operating instructions were originally written in German and have been translated into English. Store in a safe place for future reference.

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1 Safety Instructions

1.1 Classification of Safety Instructions

Danger

This warning informs the user of a risk that will result in death or serious injury if it is not avoided.

 DANGER	
	Type and source of danger Consequence ▶ Remedial action

Warning

This warning informs the user of a risk that could result in death or serious injury if it is not avoided.

 WARNING	
	Type and source of danger Consequence ▶ Remedial action

Caution

This warning informs the user of a risk that could result in injury if it is not avoided.

 CAUTION	
	Type and source of danger Consequence ▶ Remedial action

Attention

This warning informs the user of a risk that could result in damage to property if it is not avoided.

ATTENTION	
	Type and source of danger Consequence ▶ Remedial action

General Notes

This symbol is used when important notes and information regarding the use of the machine/the system/the device are provided.

	Note/information
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1.2 Prohibition Signs

Explanation of the prohibition signs used in the operating instructions.

Icon	Description	Icon	Description
	Do not stand under suspended loads		

1.3 Warnings

Explanation of the warning symbols used in the operating instructions.

Icon	Description	Icon	Description
	Pollution warning		Crushing injury
	Suspended load		Hand injury warning
	Electrical voltage		General warning symbol
	Hearing damage		Warning of overpressure
	Electric shock		

1.4 Mandatory Symbols

Explanation of the mandatory symbols used in the operating instructions.

Icon	Description	Icon	Description
	Observe the instructions		Wear eye protection
	Use protective footwear		Activate prior to maintenance or repair
	Wear protective gloves		Wear a mask
	Use ear protectors		

1.5 General Safety Instructions

The system is state-of-the-art and operationally reliable. However, dangers may arise.

 WARNING	
	<p>Failure to comply with the general safety instructions</p> <p>Personal injuries and damage to the system</p> <ul style="list-style-type: none">▶ The operating instructions contain important information on using the system. Read the operating instructions thoroughly and keep them for later reference. ▶ The system must only be used by trained personnel who have read and understood the operating instructions. ▶ These operating instructions are specific to the items included in delivery from Schmalz. These operating instructions do not take into account any modifications to the system made by the customer. ▶ The system may only be connected and operations started once the operating instructions have been read and understood. ▶ Use only the connections, mounting holes and attachment materials that have been provided. ▶ Carry out mounting or removal only when the device is in a voltage-free and depressurized state. ▶ Only qualified specialist personnel, mechanics and electricians may perform the installation. Qualified specialist personnel are persons who have received technical training and have the knowledge and experience – including knowledge of applicable regulations – necessary to enable them to recognize possible dangers and implement the appropriate safety measures while per- ▶ General safety regulations, European standards and VDE guidelines must be observed and complied with. ▶ The gripper is to be used in combination with an automated handling system (gantry/robot). For this reason, you must also follow the safety regulations of the corresponding system. ▶ Personnel and animals are not permitted to sit or stand in the transport area. ▶ Transporting persons or animals is prohibited! ▶ No person may sit or stand in the danger zone while the machine or plant is in automatic mode. The system integrator must secure the area. ▶ It is not permitted to make changes to system components. ▶ The system may only be operated with the operating voltages specified for the corresponding components. ▶ Make sure that the workplace and surroundings are kept clean. ▶ Protect the components from damage of any kind.

 WARNING	
	<p>Failure to comply with the general safety instructions</p> <p>Personal injuries and damage to the system</p> <ul style="list-style-type: none"> ▶ Compressed air or a vacuum could cause closed containers to explode or implode. Check the products before use. ▶ Do not apply suction to any dangerous dusts, oil mists, vapors, aerosols, etc. ▶ Only use suitable and approved vacuum filters. ▶ Do not look into the exhaust air flow of the vacuum generator.

1.6 Intended Use

The system is used to lift and transport workpieces such as lumber, wooden components, furniture parts or similar materials that allow suction. 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. Operations using the device must take place in a secure area where no people are allowed to enter.

 WARNING	
	<p>Suspended loads</p> <p>Personal injuries and damage to the system</p> <ul style="list-style-type: none"> ▶ Never stand under suspended loads.

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 system can only be used when hung vertically. You must consult the manufacturer regarding tilted positions, as well as pivoting or tipping motions.

1.7 Note on the Type Plate

The type plate contains important information about the device. The type plate is firmly attached to the exterior of the device.

The type plate contains the following information:

- Product Key
- Year of manufacture
- Serial number
- Spare sealing plate product key
- Order number
- Part number
- Manufacturer's address

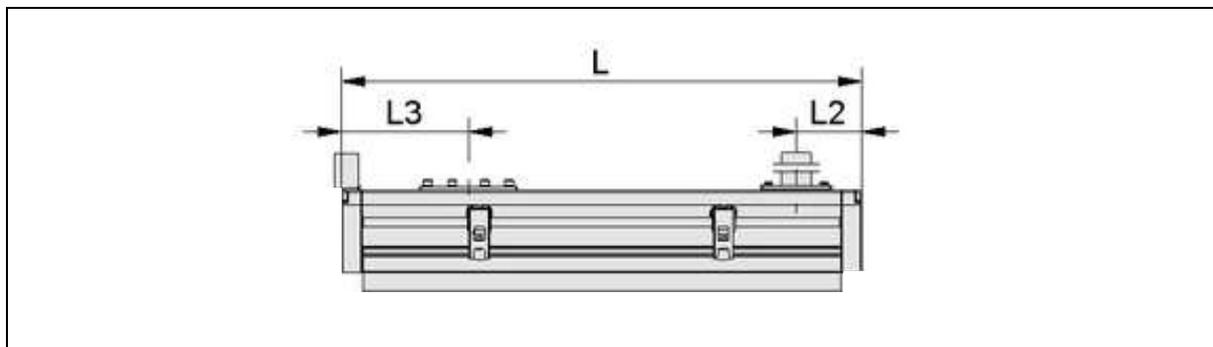
The product key and year of construction are important for identifying the device. They must always be specified when ordering replacement parts, making warranty claims or making other inquiries about the device.

1.8 Product key

The product key is comprised as follows:

Example:

FMHD	CV1	840	2R28	O20	C155L	P	A60F	126	V1	CA1
1	2	3	4	5	6	7	8	9	10	11



Field	Meaning	Available designs	Value in example
1	Type – Gripper type	FMHD	FMHD
2	Check valve – Flow restrictor	-	Standard
3	Length – Length “L”	From 350 mm to 1806 mm (14 mm grid)	840 mm
4	Grid – Grid	2R28 (two rows; cell distance: 28 mm)	2R28
5	Foam type – Foam type	Foam type specification – depending on the application	O20
6	Cylinder position – Cylinder position “L3”	From the left side of the housing	Left; 155 mm
7	Plate – Plate	Currently only PnP	PnP
8	Nozzle – Nozzle	Straight, angled, open, Cover plate	Angle = angled; Ø 60 mm, “Front” alignment
9	Nozzle position – Nozzle position “L2”	Variable	126 mm
10	Vacuum display – Vacuum display	Gauge, VSi	Gauge
11	Compressed air – Compressed air connection	Plug-in nipple 7.2, Plug-in screw union	Plug-in nipple 7.2

2 Product Description

2.1 Functional Principle

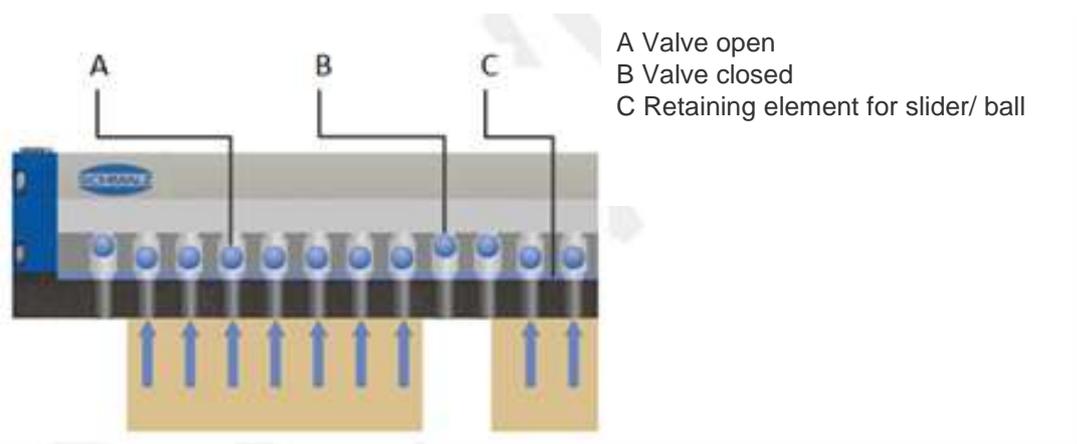
The system lifts the defined products using a vacuum and is designed to customer requirements. The system is a variable gripping system whose length and design can be adapted to customer requirements. It can be used to lift layers of boards, planks or similar workpieces of various sizes without adapting the suction area to the specific workpiece.

Each individual suction cell in the system is equipped with a check valve that automatically closes the suction cell when it is not in use.

The system achieves its maximum load-bearing capacity when the complete suction area is engaged with an airtight workpiece with a smooth surface.

The automated handling system to which the system was attached by the customer is responsible for motion in the various axes.

Description of Functions: Valve Technology SVK



There are valves with sliders or balls in the valve plate (see figure under Section 2.2 - G). If they are not covered by a workpiece in the moment that suction begins, they will close the valve. For this reason, suction may only be switched on after the gripper is placed onto the workpiece.

The closed valves (B) create an increased vacuum in the gripper which results in increased holding force on the opening valves. The sliders are held in position by a retaining element (C); the retaining element can be removed to make it easier to maintain the sliders.

Max. acceleration in vertical direction: 2 m/s².



Only switch on suction when the gripper is placed on the workpiece.
It is not possible to provide additional suction or pick up other products later.

2.2 Design Description

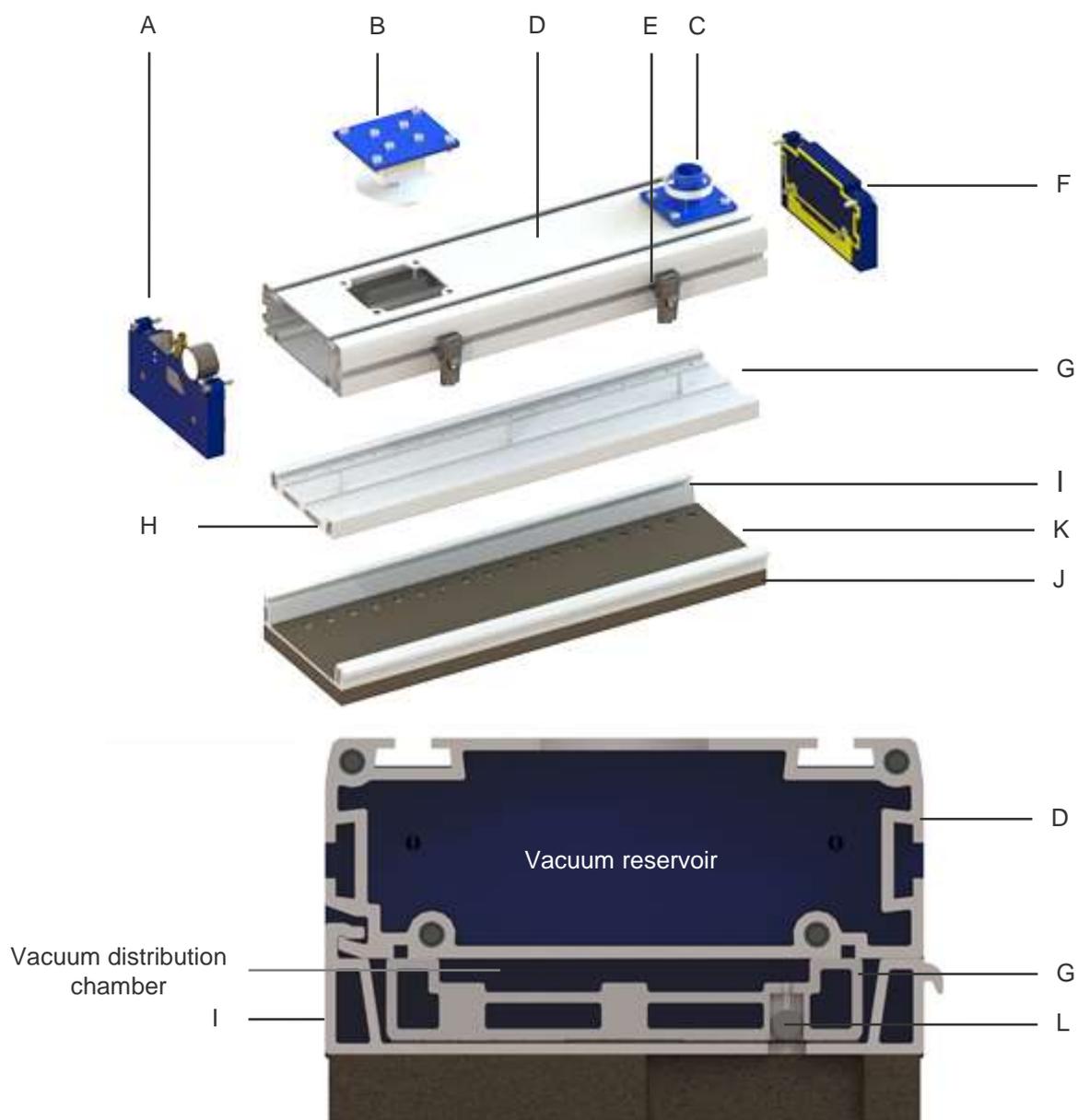


Diagram of the vacuum area gripper

A	End cover with function
B	Separating cylinder assembly unit
C	Connection pieces for external vacuum generation
D	Main body
E	T-slot with quick-release clamps
F	End cover without function
G	Valve section with adhesive front foil
H	Adhesive front foil
I	Quick-change section
J	Sealing plate
K	Sealing plate
L	Slider (spherical)

Main body:

A End cover (with function)

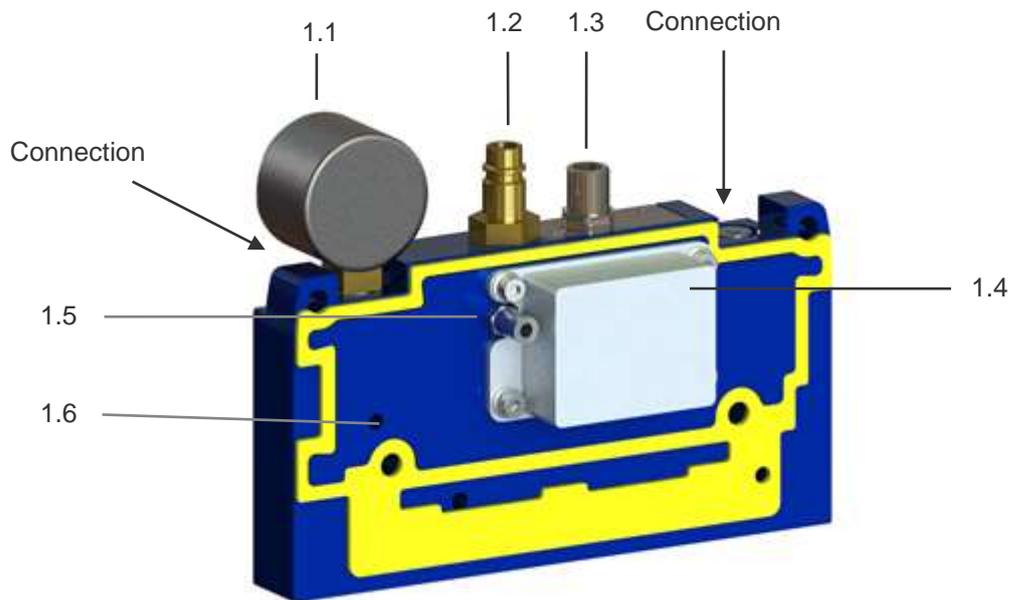
The end cover with function (A) has a 1/4" female thread for the compressed air connection and two 1/8" threads for additional connections. A vacuum gauge or vacuum switch can be attached to connection "A". A multi-pin connector for valve control is also attached here. Only the two 1/8" threads are integrated into the opposite end cover without function (F); a measuring device to display the vacuum in the vacuum reservoir can be attached to both threads.



Important!

Grub screws are attached to the bottom of the end cover with function and may not be removed. This will result in a malfunction.

Connection B currently does not have a function – do not remove the plugs.



A	End cover with function
1.1	Connection "A" – vacuum gauge (configurable – example illustration)
1.2	Compressed air connection (configurable – example illustration)
1.3	Multi-pole plug
1.4	Protective cap (under which there are two solenoid valves)
1.5	Compressed air connection for separating cylinders
1.6	Bore hole for vacuum measurement – inspect regularly for dirt

1.1 Vacuum gauge

Vacuum gauge with 1/8" connection.

1.2 Compressed air connection

The compressed air is connected via a 1/4" plug nipple DN7.2 with male thread. Recommended hose internal diameter min. 9 mm It can also be connected using a plug-in screw union. Hose external diameter: 12 mm.

1.3 Plug for connecting the control cable

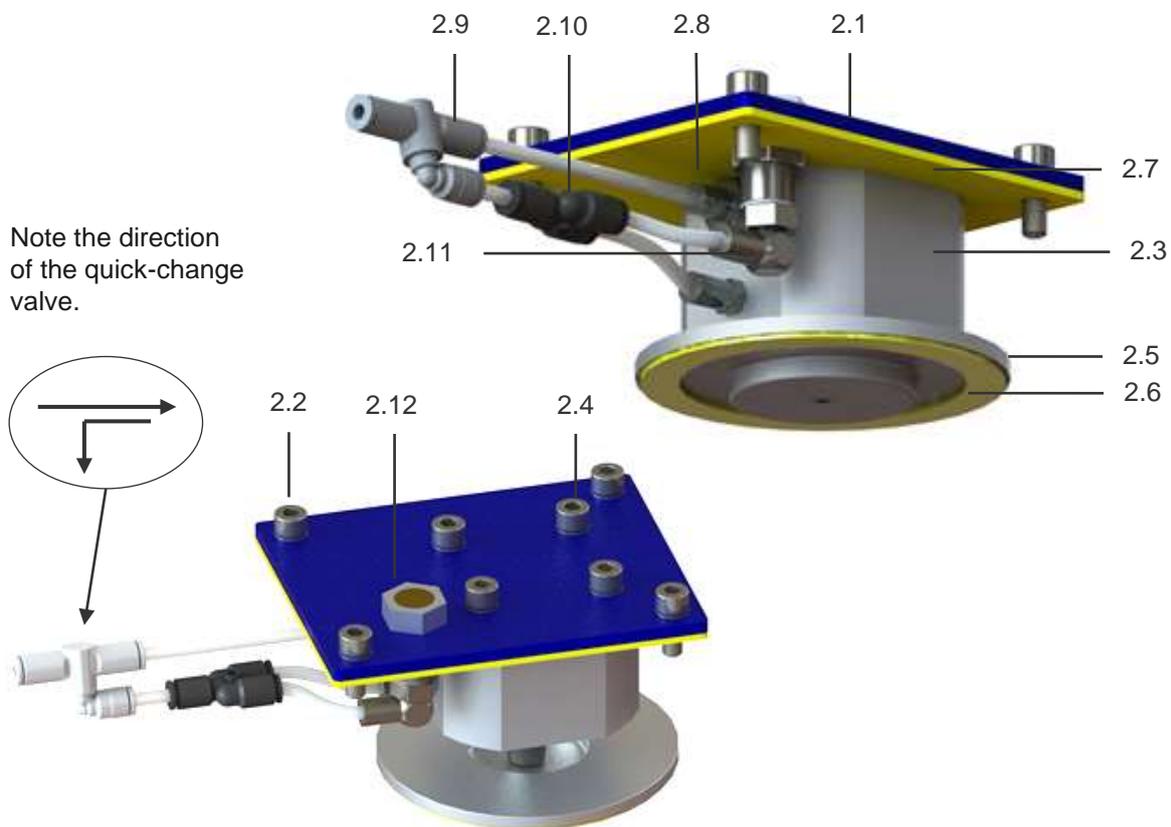
The integrated control valve “Cylinder ON/OFF” and “Blow off ON/OFF” are connected to the controller via the connection (M12).

1.4 Solenoid valves

The cylinder and the blow-off function is controlled via pneumatic valves. The valves are switched electrically (24V DC) using an external controller. Power consumption of the valves: 1 W.

B Separating cylinder assembly unit

The separating cylinder assembly unit is attached to the base section of the gripper via a mounting plate (2.1) and four screws (2.2). The separating cylinder (2.3) that is fastened on the base plate connects or separates storage chambers and valve chambers to/from one another. The separating cylinder is single-acting and is pneumatically operated. This unit can be easily removed from the gripper in order to check the seals or the contamination level of the gripper. To do so, the four screws (2.2) must be removed.



B	Separating cylinder assembly unit
2.1	Mounting plate
2.2	Screws for assembling the plate
2.3	Compact cylinder
2.4	Screws for assembling the cylinder
2.5	Sealing plate
2.6	Sealing plate sealing
2.7	Mounting plate sealing
2.8	Plug-in screw union (compressed air connection)
2.9	Quick exhaust valve (ensure that they are properly connected)
2.10	T section (exhaust)
2.11	Exhaust connection
2.12	Exhaust (filter)

C Connection pieces for external vacuum generation

The system can be operated using a blower or a pump. The system is generally connected to the external vacuum generation using a suitable vacuum hose.

D Main body FMHD

The main body consists of a length-adjustable extrusion-molded aluminum section. Configurable area grippers have a length between 350 mm and 1,806 mm. There are sealing gaskets on the right and left side of the bottom of the section; the sealing gaskets are glued in. The seal may only protrude minimally over the section, but it must also be at least flush with the section. Together with the seals on the end covers, this is how the “valve chamber” is sealed (see chapter 2.2.1).

E Sliding blocks

The t-slots are used for flexible mechanical attachment of the gripper using the sliding blocks. Suitable attachment kits are listed in the “Accessories” chapter. The t-slots on the side offer the option of connecting sensors and additional components.

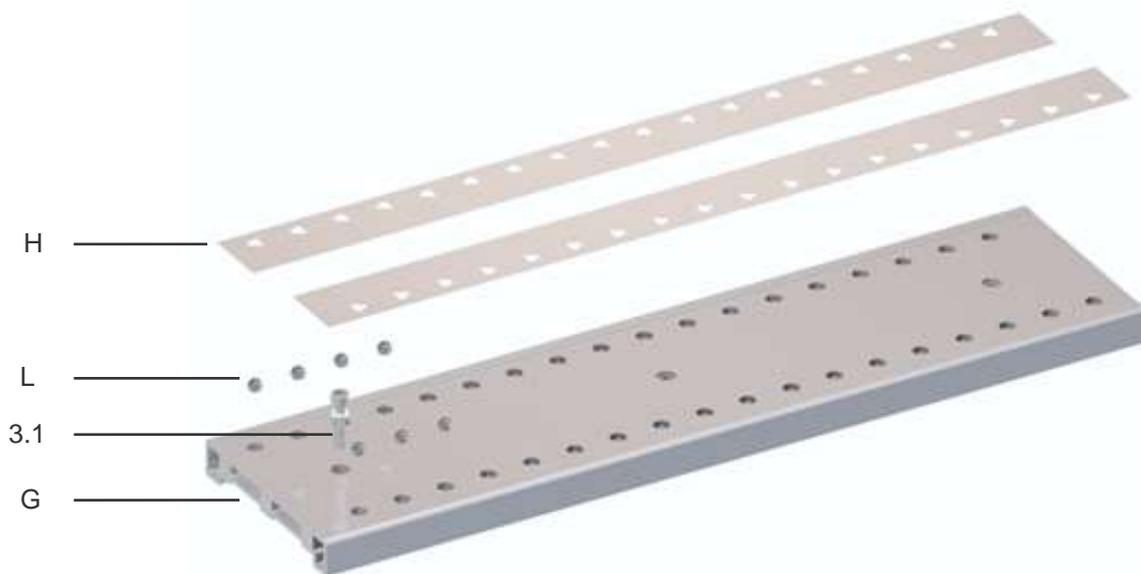
The quick-release clamps are fastened to the side t-slots using sliding blocks. Additional sensors can also be attached to the side t-slots.

F End cover without function

See also point 1.

G Valve plate – spare parts assembly

The valve section (G) is installed on the main body (D). The sliders/spheres (L) are inserted into the designated bore holes and secured there with an adhesive front foil (H). The entire unit can be unscrewed and removed in order to be cleaned if necessary. Without the valve section and its functional components, the gripper cannot be operated.



3	Valve plate – spare parts assembly
H	Masking film
L	Sliders/spheres
3.1	Screw with sealing ring for attachment of the section
G	Valve section

H Front foil/ masking film

Film strips with clover-shaped apertures are glued onto the bottom of the valve section to secure the sliders in their valves.

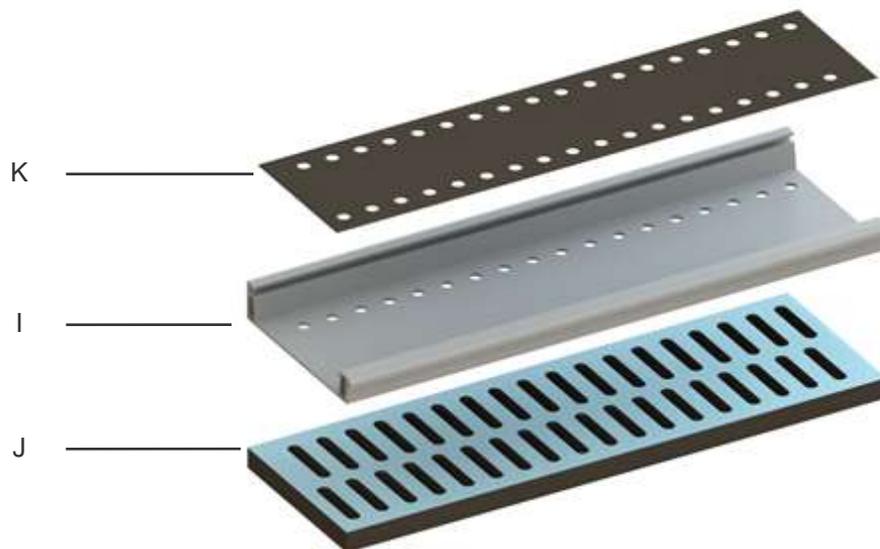
L Sliders

Spherical sliders are located in the valves. These sliders close the valves under which there is no workpiece. A spherical slider must be located in every valve.

I Quick-change section

The quick-change section (I) is suspended on one side in a designated slot on the base section and fixed on the other side with quick-release clamps. The sealing plate (J) is adhered onto the bottom of the quick-change section. The sealing plate can be replaced as necessary. The sealing plate can be made of different layers and materials. A 4 mm high sealing plate (K) is adhered on the top of the quick-change section; this sealing plate can also be replaced.

If the grippers are used in dirty environments or used to transport dirty/ wet workpieces, we recommend regularly removing and cleaning or drying the sealing plate. Downtime can be reduced by using a second identical quick-change plate while the first is being cleaned/ drying.



	Quick-change plate – replacement parts assembly
K	Sealing plate, 4 mm
I	Quick-change section
J	Sealing plate – configurable – various materials and combinations possible depending on the application

J Sealing plate

The sealing plate (J) is adhered to the quick-change section (I). The sealing plate is made of technical foam. The standard grid is equipped with two rows of suction cells that have a distance of 28 mm from one another (designation: 2R28). The sealing plate can be quickly replaced thanks to a special adhesive film. For details, see the “Assembly” section.

Note on foam properties:

The technical properties and appearance of foams may vary due to production conditions. The user is responsible for testing whether a foam is suitable for a specific application. We would be happy to assist you in placing your first order by performing grip tests at our premises if you provide us with your original workpieces.

As the foam height is also subject to tolerances, it is recommended that you adjust the height setting of the gripper every time that the foam is replaced (for safe application, a foam compression of at least

50% is recommended before the workpiece is picked up). This ensures that the gripper functions optimally and that the service life of the foam is not reduced.

This flexing makes the foam more permeable to air. When a high number of working cycles is reached, it may be necessary to replace the foam, even if there is no visible indication of wear.

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.

3 Technical Data

ATTENTION	
	<p>Non adherence to the performance limits of the gripper</p> <p>Malfunction and damage to the gripper and the attached Components.</p> <p>► Only operate the gripper within the specified performance limits</p>

Example Vacuum area gripper	Number of suction cells	Max. degree of evacuation ¹	Req. suction flow rate ² [l/min]	Measured suction force [N] ³	Weight [kg]
FMHD Valve type: CV1 Length: 1050 mm Grid: 2R28	70	90%	315	2,430	16.6
FMHD Valve type: CV1 Length: 1260 mm Grid: 2R28	85	90%	378	2,870	22.4

¹ At higher vacuum levels, a vacuum limiter valve must be used.

² At a vacuum of -0.3 bar, the vacuum generator must provide the specified suction flow rate (at the vacuum connection pieces of the FMHD).

³ Measured on a workpiece typical for the application (boards); vacuum: -0.3 bar

Compressed air consumption: approx. 30 l/min when blow-off is switched on

Perm. temperature range: +5 to +40° C

Customer-specific gripper data is available on request.



Vacuum in the gripper

For workpieces typical for the application (e.g. boards), a vacuum between 300 and 400 mbar is recommended.

A vacuum lower than 250 mbar is not recommended.

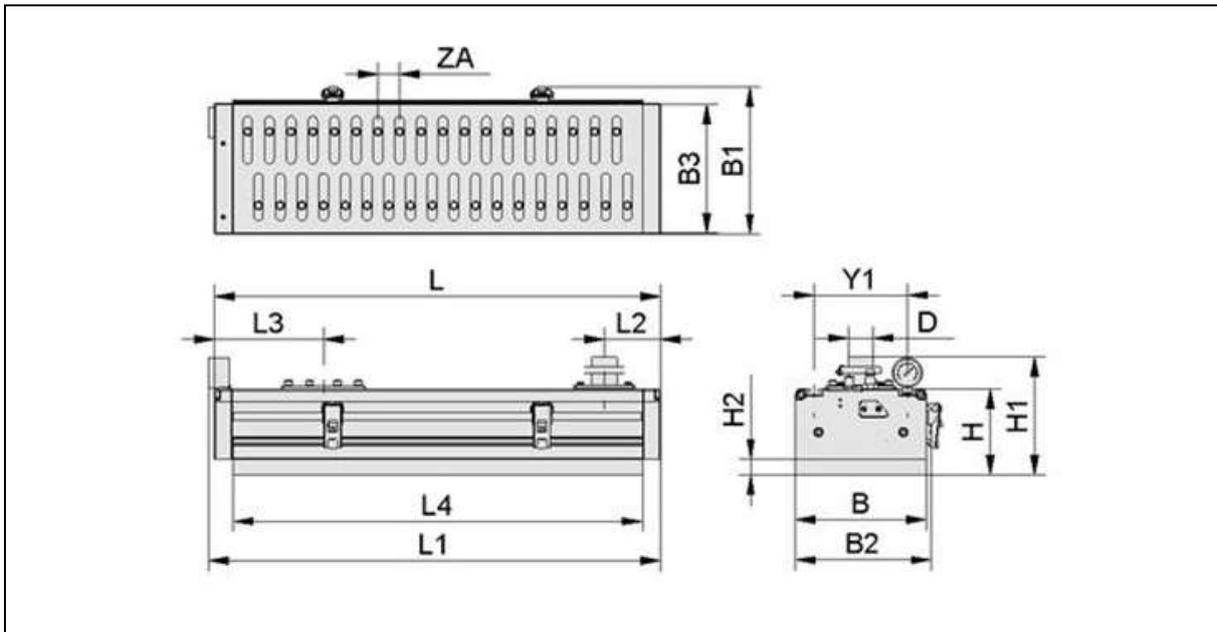


Permissible load

The maximum permissible load per gripper with lengths of 1,050 mm and 1,260 mm is 500 kg when the gripper is connected in accordance with the manufacturer's specifications.

The maximum permissible load is not the same as the suction force because the suction force varies based on the workpiece and vacuum.

Dimensions



Vacuum area gripper (product key)

FMHD-CV1-1050-2R28-O20-C152R-P-S60-126-V1-CA1

Dimensions

H	H1 ¹	H2 ²	L (variable)	L1 (variable)	L2 (variable)	L3 (variable)	D
111.6	158.6	20	1050	1057.8 ³	126	152	60
L4 (foam)	B	B1	B2	B3 (foam)	Y	ZA (grid)	
1004	170	191.3	175.5	168	120	28	

Gray-highlighted fields are fixed dimensions for all grippers.

¹ Depending on the hose connection used.

² Depending on the foam used.

³ Use of an analog gauge.

4 Transport and Assembly

ATTENTION	
	<p>Incorrect disposal of the system or individual components</p> <p>Environmental damage</p> <ul style="list-style-type: none">▶ Disposal according to national guidelines.
WARNING	
   	<p>Improper securing of the load</p> <p>Improper unloading and transport can result in personal injuries and damage to property. Moving loads can tip over, fall or crush people. When lifting transport units, parts can fall over, move or fall out. Danger to life and limb.</p> <ul style="list-style-type: none">▶ Only transport loads that are sufficiently secured against slipping.▶ Only transport/attach area grippers with corresponding lifting and attachment equipment▶ Ensure that all persons leave the hoist danger zone before the transport units are lifted.▶ Wear protective footwear and additional safety equipment if necessary.▶ Only trained personnel who have received safety instructions may unload and transport the product.

4.1 Delivery

4.1.1 Items Included in Delivery

For the exact items included in delivery, please refer to the order confirmation. The delivery documents list the shipping weight and dimensions. Note the system weight and dimensions when choosing suitable lifting equipment.

Note

The operating instructions are part of the system and must be kept with the system every time it is relocated.

4.1.2 Checking for Completeness

Using the enclosed delivery documents, check the entire shipment to ensure that it is complete. Also refer to our Terms and Conditions of Sale and Delivery.

4.1.3 Reporting Damage

After delivery of the shipment, damage due to faulty packaging or transport must be reported immediately to the carrier and J.Schmalz GmbH.

4.2 Packaging

The system is shipped in a transport box made specifically for the system.

4.3 Removing the System from the Transport Box

Open the transport box carefully. Remove the product from the transport box.

Attach a suitable lifting device to the system.

Now lift the system so that it is freely suspended after all other packaging elements are removed.

4.4 Storage

The system must be stored in its original packaging as long as it is not being used and is to be stored for any period of time.

ATTENTION

Incorrect storage of the system

Material damage to the system

- ▶ The system may only be stored as described in the operating instructions.

5 Start of Operations and Setup

5.1 Start of Operations

 CAUTION	
	<p>General notes on the start of operations Risk of injuries</p> <ul style="list-style-type: none"> ▶ The system integrator must secure the danger zone. ▶ The production system must be stopped in the area where the system is being set up ▶ The system may only be set up at the workplace in accordance with the operating instructions. ▶ The system must be disconnected and depressurized during setup. ▶ The production system must be secured to prevent activation during setup.
 	<p>Approach of a moving element to a fixed part/machinery mobility/moving elements</p> <p>Body parts could be crushed, sucked in or caught if the area gripper is abruptly attached to a workpiece or a surface or by moving parts</p> <ul style="list-style-type: none"> ▶ Do not place any body parts between the bottom of the gripper and a surface.
	<p>High pressure Placement/release of compressed air lines</p> <ul style="list-style-type: none"> ▶ The system integrator must secure the danger zone. ▶ Regularly inspect the gripper and perform regular maintenance in order to detect and replace porous compressed air lines in good time. Replace defective connectors.
	<p>Stored energy/vacuum</p> <p>Body parts could be crushed, cut, sucked in, caught or sliced if the area gripper is abruptly attached to a workpiece or a surface.</p> <ul style="list-style-type: none"> ▶ Do not place any body parts between the bottom of the gripper and a surface. ▶ Eyes can be sucked in; do not look into open vacuum openings.
	<p>Conductive parts/parts that have become live in an error state/short circuits Electric shock</p> <ul style="list-style-type: none"> ▶ Regularly inspect and perform maintenance on the gripper to detect and repair wear or faulty connections in good time.
	<p>Moisture</p> <p>Very wet workpieces can permanently impair the function of the gripper</p> <ul style="list-style-type: none"> ▶ Only grip dry workpieces if possible ▶ Regularly clean and, if necessary, dry the gripper

 CAUTION	
 	<p>Noise hazards due to the exhaust system or gas flowing at high speeds or worn parts</p> <p>Discomfort, tinnitus, stress, exhaustion due to constant/high noise levels</p> <ul style="list-style-type: none"> ▶ If possible, switch off vacuum generators and the blow-off function when not in use in order to reduce noise pollution. ▶ Wear personal protective equipment e.g. ear protectors ▶ If possible, position vacuum generators far enough away from machine operators; use additional silencers ▶ Regularly inspect and perform maintenance on the system in order to ensure that it works properly.
	<p>Careless use of personal protective equipment</p> <p>Danger to the operator</p> <ul style="list-style-type: none"> ▶ Adapt and wear appropriate personal protective equipment based on the task being performed.
	<p>Dust and fog</p> <p>Reduced visibility/difficulty breathing</p> <ul style="list-style-type: none"> ▶ Keep the environment clean wherever possible; avoid kicking up large amounts of dust

 WARNING	
	<p>System set-up by untrained personnel</p> <p>Serious personal injury</p> <ul style="list-style-type: none"> ▶ The system must only be set up by trained personnel who have read and understood the operating instructions.
	<p>Non-compliance with work safety instructions</p> <p>Personal injuries and damage to the system</p> <ul style="list-style-type: none"> ▶ The device may only be started up in a secure area which no people are allowed to enter. ▶ Never lift loads at an angle and never drag them. ▶ Do not tear off stuck loads. ▶ Only pick up and lift suitable loads (check inherent stability and surface density). ▶ Only set workpieces down on clear, even surfaces due to the danger of slipping. ▶ Do not release the load until it rests completely and safely on a secure surface. ▶ Do not come close to the load when releasing/depositing it and do not touch it.



DANGER



General safety notes on the start of operations

Danger to life and limb

- ▶ The system must only be set up by trained personnel who have read and understood the operating instructions.
- ▶ The system integrator must secure the danger zone.
- ▶ The production system must be stopped in the area where the system is being set up
- ▶ The system may only be set up at the workplace in accordance with the operating instructions.
- ▶ The system must be disconnected during setup.
- ▶ The production system must be secured to prevent activation during setup.

Acceleration/deceleration/kinetic energy

Danger to life and limb

- ▶ See general safety notes on the start of operations



Danger of falling objects/gravity:

Danger to life and limb

- ▶ See general safety notes on the start of operations
- ▶ Never stand under suspended loads.

Human error

Danger to life and limb

- ▶ Adhere to the operating instructions

5.2 Vacuum area gripper

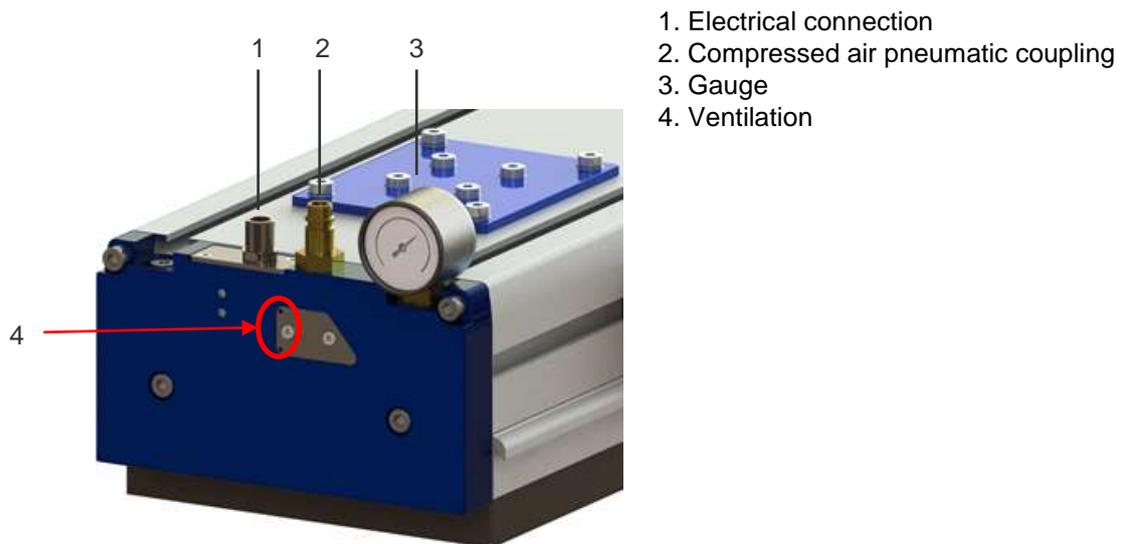
The system is mounted on the load suspension provided by the customer (e.g. a gantry crane or robot) using the T-slots designated for this purpose. The customer also provides a control device.

The suspension should be designed to allow the system to adapt flexibly to the workpieces when it is placed on them (e.g. spring-mounted or floating suspension).

The system must be attached securely, taking the weight of the system and its maximum load-bearing capacity into account.

We recommend fastening the area gripper via two connection points for every four sliding blocks (see Accessories).

5.3 Pneumatic Connection



The compressed air is connected using the quick-connect coupling, which is located on the sealing plate and is included in delivery. Requirements for the compressed air provided by the customer:

- Dry, filtered air according to ISO 8573-1:2010 [7:4:4]
- Constant operating pressure: 6 bar.

If you select a supply hose that is too small, the compressed air supplied to the pneumatic elements will not be enough for optimal operation.



Maximum overpressure

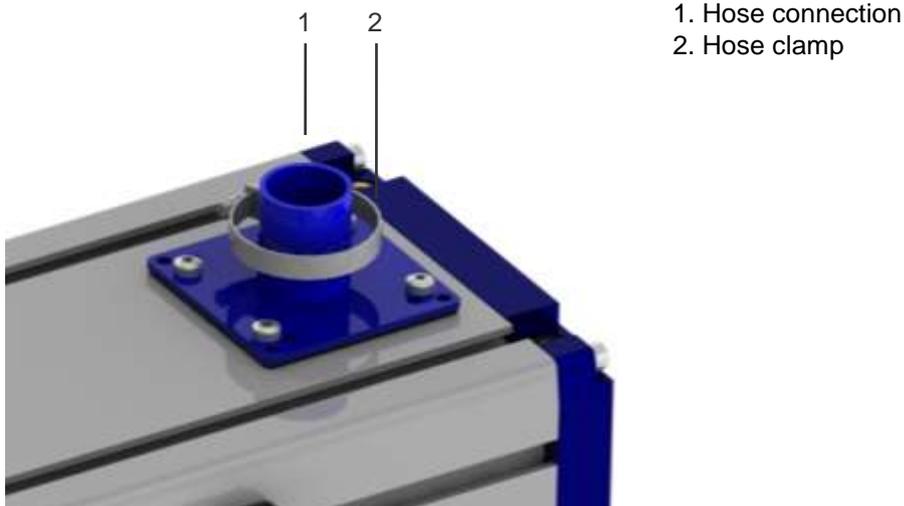
The maximum overpressure in the gripper (vacuum reservoir or valve chamber) must be limited to a maximum of 0.2 bar.



Ventilation

The opening for ventilating the valve may not be closed. In order to maintain the functionality of the gripper, the ventilation must always be operated with direct blow-off.

5.4 Vacuum Connection



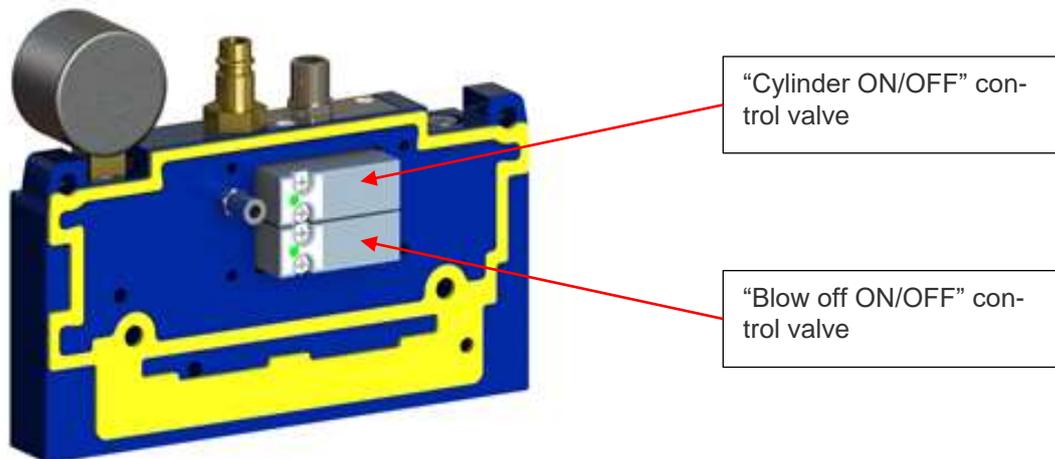
A hose that is suitable for vacuum applications must be connected at the installed hose connection and secured with a suitable hose clamp. The supply hose must have the same nominal diameter as the installed connection. The maximum recommended hose length is around 10 meters. A reduction of the internal hose diameter or the use of longer hoses could impair the functionality of the system.



Vacuum

Once vacuum is applied in a gripper, it immediately begins suction when the cylinder is open.

5.5 Solenoid Valves



View of the housing cover when the protective cap is removed

The solenoid valves control the separating cylinder as well as blow off. The customer is responsible for the control system. The pin assignments for control of the solenoid valves can be found in the pin assignment diagram (5.6.1).

⇒ For a detailed description of the functional sequence, see chapter 6.2.

5.6 Electrical Connection and LED Display

5.6.1 Electrical Connection

The connection for control of the solenoid valve made using an 4-pole M12 connector that is integrated into the end cover. 24V DC \pm 10%, max. power input: 2W, rated current: 0.1 A.

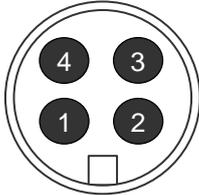
Standard = PNP switching.

The plug connectors must not be connected or disconnected when the system is live.

The power supply and signal inputs have a maximum line length of 30 meters.

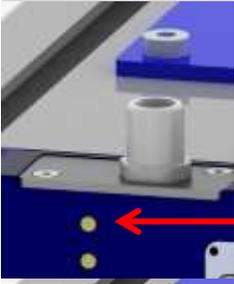
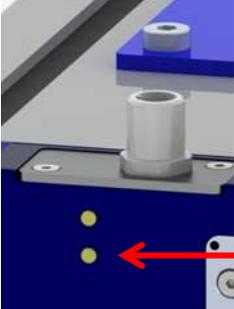
 DANGER	
 	<p>Inappropriate voltage supply Electric shock, destruction of the electrical components</p> <ul style="list-style-type: none"> ▶ Connection work may only be carried out by a qualified electrical specialist. ▶ The system must incorporate safe electrical cut-off of the power supply in compliance with EN60204 ▶ Do not connect or disconnect the plug connectors when voltage is applied. ▶ Only operate the system with protected extra-low voltage.

	<p>Observe the separate operating instructions when connecting the vacuum generator.</p>
---	--

Plug	Pin	Lead color	Function (PNP)
	1	Brown	Not used
	2	White	“Blow off ON” signal input (= deposit work-pieces)
	3	Blue	Ground
	4	Black	“Extend cylinder ON” signal input (= close and charge the vacuum reservoir)

ATTENTION	
	<p>Incorrectly connected screw union Malfunction</p> <ul style="list-style-type: none"> ▶ The multi-pole plug’s screw union must be sealed securely and correctly during installation of the customer’s cable.

5.6.2 LED Display

LED	Status	Valve status
 <p data-bbox="464 383 580 450">Cylinder extended</p>	<p data-bbox="724 327 916 360">LED illuminated</p> <p data-bbox="703 468 936 501">LED not illuminated</p>	<p data-bbox="1023 297 1402 394">“Extend cylinder ON” (Reservoir separated from valve chamber – no suction)</p> <p data-bbox="1110 454 1311 521">“Cylinder OFF” (suction applied)</p>
 <p data-bbox="472 696 572 730">Blow off</p>	<p data-bbox="724 611 916 645">LED illuminated</p> <p data-bbox="703 775 936 808">LED not illuminated</p>	<p data-bbox="1051 600 1370 667">“Blow-off ON” (depositing the workpiece)</p> <p data-bbox="1123 775 1299 808">“Blow-off OFF”</p>

6 Operation

6.1 General Notes

 CAUTION	
	<p>General notes on operation Risk of injuries</p> <ul style="list-style-type: none"> ▶ The system integrator must secure the danger zone. ▶ The system may only be operated at the workplace in accordance with the operating instructions.
	<p>Approach of a moving element to a fixed part/machinery mobility/moving elements</p> <p>Body parts could be crushed, sucked in or caught if the area gripper is abruptly attached to a workpiece or a surface or by moving parts</p> <ul style="list-style-type: none"> ▶ Do not place any body parts between the bottom of the gripper and a surface.
	<p>High pressure Placement/release of compressed air lines</p> <ul style="list-style-type: none"> ▶ The system integrator must secure the danger zone. ▶ Regularly inspect the gripper and perform regular maintenance in order to detect and replace porous compressed air lines in good time. Replace defective connectors.
	<p>Stored energy/vacuum</p> <p>Body parts could be crushed, cut, sucked in, caught or sliced if the area gripper is abruptly attached to a workpiece or a surface.</p> <ul style="list-style-type: none"> ▶ Do not place any body parts between the bottom of the gripper and a surface. ▶ Eyes can be sucked in; do not look into open vacuum openings.
	<p>Conductive parts/parts that have become live in an error state/short circuits Electric shock</p> <ul style="list-style-type: none"> ▶ Regularly inspect and perform maintenance on the gripper to detect and repair wear or faulty connections in good time.
	<p>Moisture</p> <p>Very wet workpieces can permanently impair the function of the gripper</p> <ul style="list-style-type: none"> ▶ Only grip dry workpieces if possible ▶ Regularly clean and, if necessary, dry the gripper

 CAUTION	
 	<p>Noise hazards due to the exhaust system or gas flowing at high speeds or worn parts</p> <p>Discomfort, tinnitus, stress, exhaustion due to constant/high noise levels</p> <ul style="list-style-type: none"> ▶ If possible, switch off vacuum generators and the blow-off function when not in use in order to reduce noise pollution. ▶ Wear personal protective equipment e.g. ear protectors ▶ If possible, position vacuum generators far enough away from machine operators; use additional silencers ▶ Regularly inspect and perform maintenance on the system in order to ensure that it works properly.
	<p>Careless use of personal protective equipment</p> <p>Danger to the operator</p> <ul style="list-style-type: none"> ▶ Adapt and wear appropriate personal protective equipment based on the task being performed.
	<p>Dust and fog</p> <p>Reduced visibility/difficulty breathing</p> <ul style="list-style-type: none"> ▶ Keep the environment clean wherever possible; avoid kicking up large amounts of dust

 WARNING	
	<p>System operation by untrained personnel</p> <p>Serious personal injury</p> <ul style="list-style-type: none"> ▶ The system may only be operated by trained personnel who have read and understood the operating instructions.
	<p>Non-compliance with work safety instructions</p> <p>Personal injuries and damage to the system</p> <ul style="list-style-type: none"> ▶ The device may only be started up in a secure area which no people are allowed to enter. ▶ Never lift loads at an angle and never drag them. ▶ Do not tear off stuck loads. ▶ Only pick up and lift suitable loads (check inherent stability and surface density). ▶ Only set workpieces down on clear, even surfaces due to the danger of slipping. ▶ Do not release the load until it rests completely and safely on a secure surface. ▶ Do not come close to the load when releasing/depositing it and do not touch it.

 DANGER	
 	<p>General Safety Notes on Operation</p> <p>Danger to life and limb</p> <ul style="list-style-type: none"> ▶ The system may only be operated by trained personnel who have read and understood the operating instructions. ▶ The system integrator must secure the danger zone. ▶ The system may only be operated at the workplace in accordance with the operating instructions.
	<p>Acceleration/deceleration/kinetic energy</p> <p>Danger to life and limb due to workpieces slinging away or the system traversing.</p> <ul style="list-style-type: none"> ▶ See general safety notes on the start of operations ▶ Maintain sufficient distance to the moving system/workpiece in order to avoid danger, even in the case of unforeseeable events (e.g. emergency stop)
 	<p>Danger of falling objects/gravity due to falling objects</p> <p>Danger to life and limb</p> <ul style="list-style-type: none"> ▶ See general safety notes on the start of operations ▶ Never stand under suspended loads. ▶ Do not place any body parts under the suspended load or the system. ▶ The system's maximum permitted load must not be exceeded.
	<p>Human error</p> <p>Danger to life and limb</p> <ul style="list-style-type: none"> ▶ Adhere to the operating instructions
	<p>Switching components that are not explosion-proof</p> <p>Risk of fire and explosion</p> <ul style="list-style-type: none"> ▶ The product must not be used in explosion risk areas.

Consult the manufacturer before operating it at higher or lower ambient temperatures.

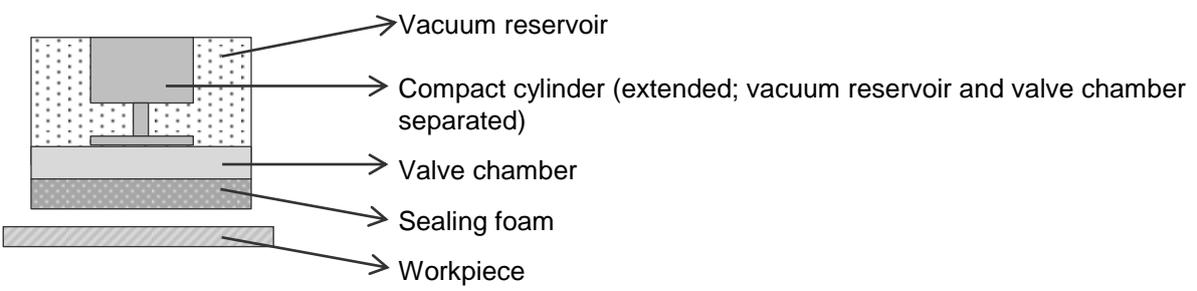
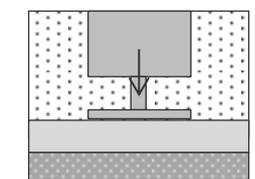
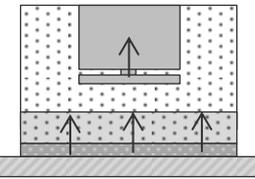
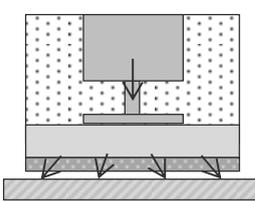
The system can only achieve its maximum load-bearing capacity if it is completely covered by an airtight workpiece. For the maximum permitted load, see the technical data.

6.2 Control

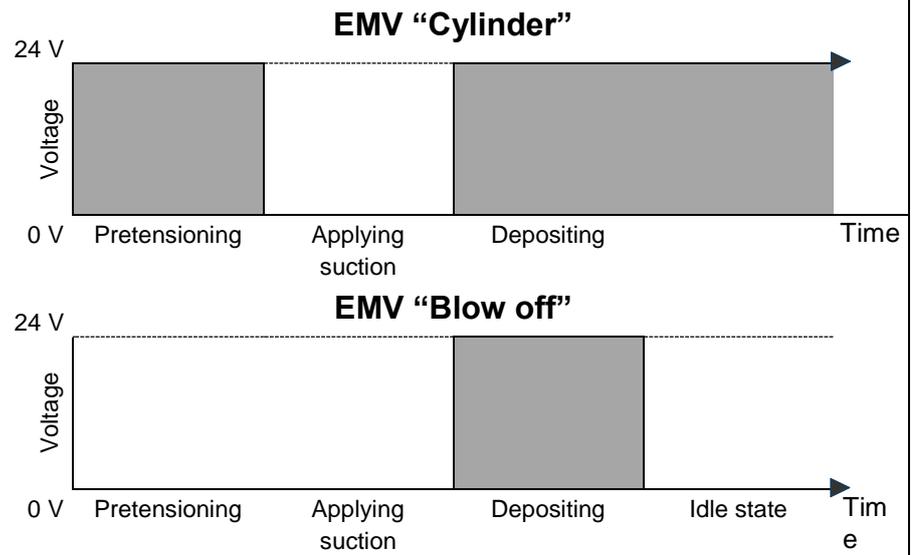


Optimized control

Only turn on the suction when workpieces are being lifted. Otherwise, additional dust from the environment is drawn in, which could shorten the necessary maintenance intervals.

<p><u>Simplified diagram of a gripper cross-section</u></p> 	
<p>Pretensioning</p> 	<p>Before the suction process starts, the vacuum reservoir integrated into the suction bar must be evacuated. The amount of time this process takes varies based on the suction bar type, vacuum generator capacity, and the length. Generally, this process is started approximately 0.5 to 5 seconds before picking up the load.</p> <p>⇒ Activating the solenoid valve I (separating cylinder/upper LED illuminated): The cylinder's piston rod extends and separates the suction chamber from the storage chamber. Vacuum is generated in the storage chamber when the vacuum generator is switched on.</p>
<p>Applying suction</p> 	<p>Once the sealing mat has been placed on the workpiece and is compressed, the system can start picking it up.</p> <p>⇒ Resetting the solenoid valve I (separating cylinder/upper LED not illuminated): The cylinder's piston rod is retracted and the load is picked up. The load can be transported.</p>
<p>Depositing</p> 	<p>Once the workpiece has been transported and set down, it must be deposited.</p> <p>⇒ Activating the solenoid valve I (separating cylinder/upper LED illuminated) The cylinder's piston rod extends and separates the suction chamber from the storage chamber.</p> <p>⇒ Activating the solenoid valve II (blow off/lower LED illuminated): The vacuum breaks down in the vacuum chamber and the workpiece is released from the sealing mat.</p>
<p>Caution:</p>	<p>The cylinder is retracted when no voltage is applied. In this way, the reservoir and suction chamber are connected.</p>

Functional diagram



7 Troubleshooting

 CAUTION	
	<p>General notes on troubleshooting</p> <p>Risk of injuries</p> <ul style="list-style-type: none"> ▶ The system integrator must secure the danger zone. ▶ The system may only be operated at the workplace in accordance with the operating instructions.
	<p>Approach of a moving element to a fixed part/machinery mobility/moving elements</p> <p>Body parts could be crushed, sucked in or caught if the area gripper is abruptly attached to a workpiece or a surface or by moving parts</p> <ul style="list-style-type: none"> ▶ Do not place any body parts between the bottom of the gripper and a surface.
	<p>High pressure</p> <p>Placement/release of compressed air lines</p> <ul style="list-style-type: none"> ▶ The system integrator must secure the danger zone. ▶ Regularly inspect the gripper and perform regular maintenance in order to detect and replace porous compressed air lines in good time. Replace defective connectors.
	<p>Stored energy/vacuum</p> <p>Body parts could be crushed, cut, sucked in, caught or sliced if the area gripper is abruptly attached to a workpiece or a surface.</p> <ul style="list-style-type: none"> ▶ Do not place any body parts between the bottom of the gripper and a surface. ▶ Eyes can be sucked in; do not look into open vacuum openings.
	<p>Conductive parts/parts that have become live in an error state/short circuits</p> <p>Electric shock</p> <ul style="list-style-type: none"> ▶ Regularly inspect and perform maintenance on the gripper to detect and repair wear or faulty connections in good time.
	<p>Moisture</p> <p>Very wet workpieces can permanently impair the function of the gripper</p> <ul style="list-style-type: none"> ▶ Only grip dry workpieces if possible ▶ Regularly clean and, if necessary, dry the gripper

 CAUTION	
 	<p>Noise hazards due to the exhaust system or gas flowing at high speeds or worn parts</p> <p>Discomfort, tinnitus, stress, exhaustion due to constant/high noise levels</p> <ul style="list-style-type: none"> ▶ If possible, switch off vacuum generators and the blow-off function when not in use in order to reduce noise pollution. ▶ Wear personal protective equipment e.g. ear protectors ▶ If possible, position vacuum generators far enough away from machine operators; use additional silencers ▶ Regularly inspect and perform maintenance on the system in order to ensure that it works properly.
	<p>Careless use of personal protective equipment</p> <p>Danger to the operator</p> <ul style="list-style-type: none"> ▶ Adapt and wear appropriate personal protective equipment based on the task being performed.
	<p>Dust and fog</p> <p>Reduced visibility/difficulty breathing</p> <ul style="list-style-type: none"> ▶ Keep the environment clean wherever possible; avoid kicking up large amounts of dust

 WARNING	
	<p>System operation by untrained personnel</p> <p>Serious personal injury</p> <ul style="list-style-type: none"> ▶ The system may only be operated by trained personnel who have read and understood the operating instructions.
	<p>Non-compliance with work safety instructions</p> <p>Personal injuries and damage to the system</p> <ul style="list-style-type: none"> ▶ The device may only be started up in a secure area which no people are allowed to enter. ▶ Never lift loads at an angle and never drag them. ▶ Do not tear off stuck loads. ▶ Only pick up and lift suitable loads (check inherent stability and surface density). ▶ Only set workpieces down on clear, even surfaces due to the danger of slipping. ▶ Do not release the load until it rests completely and safely on a secure surface. ▶ Do not come close to the load when releasing/depositing it and do not touch it.

Error	Possible cause	Solution
Vacuum level is not reach or vacuum is created too slowly	Leakage in hose line	Check hose connections
	Leakage or wear on the sealing plates/sealing	Check the sealing plates/sealing and replace if necessary
	The spacer sleeves between the main body and the valve section have been forgotten. The screws to the connection were screwed too tightly.	Reinstall the spacer sleeves. Tighten the screws with the correct tightening torque.
The load cannot be held	Vacuum level too low	See above for possible causes
	Suction force not suitable for load	Increase vacuum or connect additional grippers if necessary
	Check valves are dirty	Clean the valves; to do so, remove the valve plates and masking film
	The area gripper is not pressed firmly enough onto the workpiece to be lifted	Press the area gripper more firmly onto the surface. On even surfaces, we recommend that the foam compress by at least 50%.
	Too short retention time for the area gripper on the workpiece	Extend the retention time
	Too fast or jerky lifting of workpieces	Optimize the motion. Avoid acceleration peaks (especially when lifting the workpieces)
	The workpieces to be lifted are not suitable for the area grippers (e.g. non-rigid).	Use a different gripping system.
Sealing plate wears out very quickly	The area gripper is angled or makes a grinding noise when applied to the workpiece to be lifted	Set it down vertically on the workpiece
External vacuum generator works, but workpieces are not picked up	If present: The dust filter of the vacuum generator is dirty	Clean or replace dust filter
	The sealing mat is damaged/torn	Replace sealing mat
	Workpiece is too heavy	Workpiece is not suitable
	The sealing ring of the separating cylinder is damaged	Replace the sealing ring
	The suction bar's slider is clogged with chips or resin	For information on cleaning the sliders and check valves, see chapter 9.3
	L x W x H – proportions of the parts to be lifted are not correct	Workpiece is not suitable Minimum workpiece width: 50 mm.
	Vacuum is too high	Determine the maximum possible vacuum of the vacuum generator; check the system for leaks (hose connections, sealing, etc.); valves are dirty; the workpiece is too porous
	The sealing mat is not applied firmly enough	Press the area gripper more firmly onto the surface. On even surfaces, we recommend that the foam compress by at least around 50%.

Error	Possible cause	Solution
Pneumatic cylinder is not working	Cylinder is defective	Repair cylinder or replace if necessary
	Operating pressure is too low	Set the compressed air supply to 6 bar; check the supply lines (is the hose bent or disconnected?)
	Inspect the solenoid valve	Dirt; defective, control
Solenoid valve is not working	Electrical control is not working	Check the connections and replace valve if necessary
	Solenoid valve is defective	Repair or replace the solenoid valve



Recommendation

We recommend always performing tests with original sample workpieces. We would be happy to help you with testing.

8 Maintenance

8.1 General Maintenance Instructions

 CAUTION	
 	<p>General notes on maintenance</p> <p>Risk of injuries</p> <ul style="list-style-type: none"> ▶ The production system must be stopped in the area where the system is being maintained ▶ The system may only be maintained at the workplace in accordance with the operating instructions. ▶ The system must be disconnected and depressurized during maintenance work. ▶ The production system must be secured to prevent activation during maintenance work.
	<p>Machinery mobility/moving elements</p> <p>Risk of body parts being crushed, pulled in or caught by the moving parts of the gripper</p> <ul style="list-style-type: none"> ▶ Take care when operating the gripper and its assemblies when there is a risk of injury (e.g. fingers being crushed by the cylinder/sealing plate)
 	<p>Short-circuit</p> <p>Electric shock</p> <ul style="list-style-type: none"> ▶ The system must be disconnected during maintenance work.
	<p>Moisture</p> <p>Very wet workpieces can permanently impair the function of the gripper</p> <ul style="list-style-type: none"> ▶ Regularly clean and, if necessary, dry the gripper
	<p>Careless use of personal protective equipment</p> <p>Danger to the operator</p> <ul style="list-style-type: none"> ▶ Adapt and wear appropriate personal protective equipment based on the task being performed.
	<p>Dust and fog</p> <p>Reduced visibility/difficulty breathing</p> <ul style="list-style-type: none"> ▶ Keep the environment clean wherever possible; avoid kicking up large amounts of dust
	<p>Fume</p> <p>Irritation of the skin and mucous membranes due to cleaning agents</p> <ul style="list-style-type: none"> ▶ Observe the safety instructions for using the cleaner in question Use protective equipment if necessary.

WARNING



Risk of injury due to system maintenance by untrained personnel

Serious personal injury

- ▶ The system must only be set up by trained personnel who have read and understood the operating instructions.



DANGER



General safety notes on maintenance

Danger to life and limb

- ▶ The system integrator must secure the danger zone.
- ▶ The production system must be stopped in the area where the system is being maintained
- ▶ The system may only be maintained in accordance with the operating instructions.
- ▶ The system must be disconnected and depressurized during maintenance.
- ▶ The production system must be secured to prevent activation during maintenance work.

Human error

Danger to life and limb

- ▶ Adhere to the operating instructions



Remove any dirt on the exterior with a soft cloth and soap suds (max. 60 °C).
 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.

8.2 Maintenance Schedule

	Interval				
	Daily	Weekly	Month-ly	Every six months	Annual inspec-tion
Does the vacuum generator make strange noises when a full load is picked up?		X			
Has the dust filter been cleaned?		X			
Is the electrical installation still OK? Is the cable screw union secure?				X	
Are the vacuum hoses in good condition (not brittle, not kinked, no worn sections and no leaks)?			X		
Check that all the connections are secure, e.g. the screws, hose clamps, etc.				X	
Are the type plate and maximum load plate still attached to the device?					X
Are the operating instructions available and are the system operators familiar with them?					X
Check all load-bearing parts (e.g. suspension eyes) for deformation, wear, or other damage.			X		

Check the sealing mats for wear, tears and leaks. Replace if necessary.		X			
General condition of the device					X
Leak Test			X		
Check the storage/suction chambers and ball valves for dirt → They may only be cleaned by trained and instructed specialist personnel/the manufacturer – see chapter 9.9	<p>The interval depends on the application/ambient conditions.</p> <p>We recommend checking the contamination within the suction bar for the first time in the first month after start of operations.</p>				

8.3 External Vacuum Generator

See the relevant operating instructions.

8.4 Dust Filter

When using a dust filter, see the relevant operating instructions.

8.5 Cleaning Agents

Use cleaning solvents to clean the device (not petroleum ether or corrosive liquids. Petroleum ether or corrosive liquids destroy the vacuum hoses).

8.6 Quick-change Plate

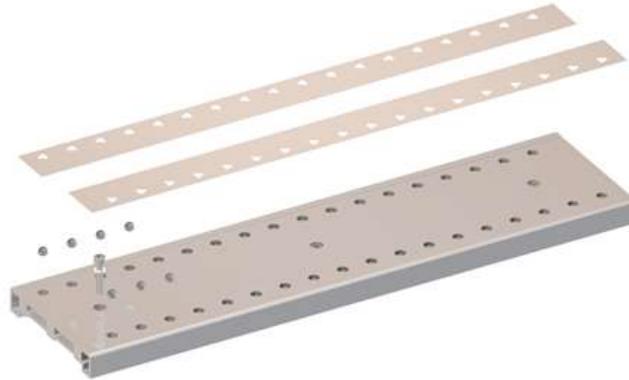
To make maintenance easier and replace the foam more quickly, the quick-change sealing plate is integrated into the gripper as standard. In order to reduce downtime, a second, identical plate can be made available during maintenance and used to replace the contaminated plate. See chapter 9.9



8.7 Valve Plate

For enhanced maintenance, the valve plate can be unscrewed and removed. This is where the valves are located. For cleaning purposes, the attached masking films can be removed so that the spherical bearings can be removed. In order to ensure that the area gripper continues to work optimally, the valves must be cleaned regularly, especially when exposed to resins. We recommend replacing the old masking film with a new masking film during cleaning. If necessary, heavily contaminated bearings can also be replaced. See chapter 9.9

Here the operator also has the option to make a second, identical plate available for exchange during maintenance.



8.8 Sealing Plate

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 achieved is constantly declining when handling the same parts.

Minimum recommended vacuum: 250 mbar when a workpiece is picked up.

For systems that are designed to require higher vacuum, the minimum vacuum must be adjusted accordingly when the sealing plates are replaced.



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).

Replacing the sealing plates

- In order to easily replace the sealing plates, the quick-change plate can be removed in accordance with the operating instructions. This means that it is not necessary to replace the sealing plate overhead.
- Remove the sealing plate from the quick-change system.
- Clean the surfaces. In order to maintain optimal hold of the new sealing plate, the surface must be free of dust, oil, oxides and adhesive residues.
- Remove the protective film from the adhesive strip of the new sealing plate.
- Press the sealing plate firmly onto the entire surface without any wrinkles (e.g. with a roller).
- The openings of the sealing plate and valves must be aligned.
- Processing temperature: a range of +10° C to +40° C is recommended for the object temperature and the ambient temperature.

Video



[www.schmalz.com/
replacing-sealing-
foam](http://www.schmalz.com/replacing-sealing-foam)



The sealing mat is asymmetrical. Observe the alignment.

8.9 Inspecting and Cleaning the Gripper

The gripper must be inspected and maintained regularly in order to ensure that it works optimally. To do so, observe chapter 8.1 General Maintenance Instructions.

Switch the compressed air, electricity and vacuum generator off in advance.

1. Check the cable and hose connections. Check for damaged areas, leakage, ensure that the screw unions are tight and that no screws are missing, etc.
2. Check that the attachment parts such as the housing cover, cylinder mounting plate and quick-release clamp are secured correctly. Check that the quick-release clamps are securely attached, intact, and easy to operate.
3. Open the quick-release clamp and remove the quick-change plate. The suspension device must be clean. For information on inspecting and replacing the sealing plate if necessary, see chapter 8.8. The quick-change section can be blown off with compressed air as a single component (without the sealing plate) or cleaned with the cleaning agent described above.

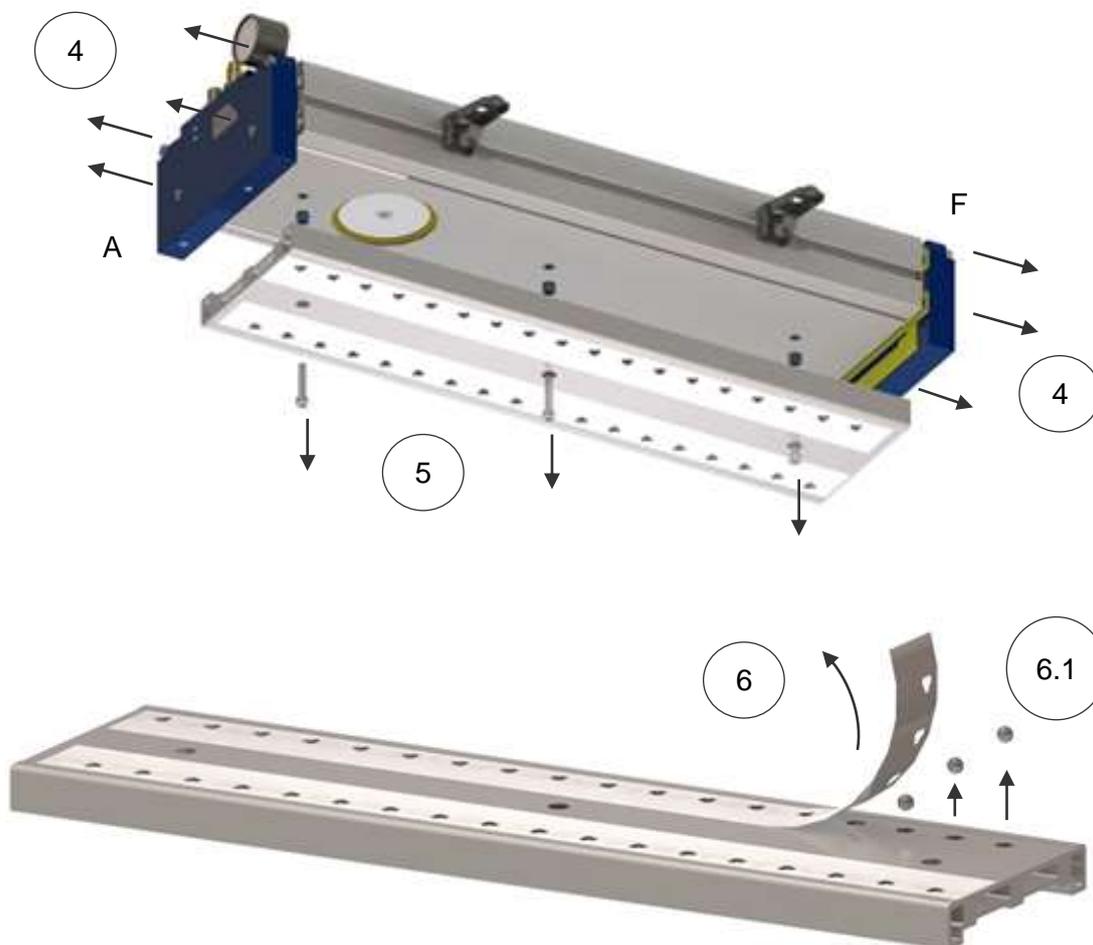
Video



www.schmalz.com/cleaning-the-fmhd

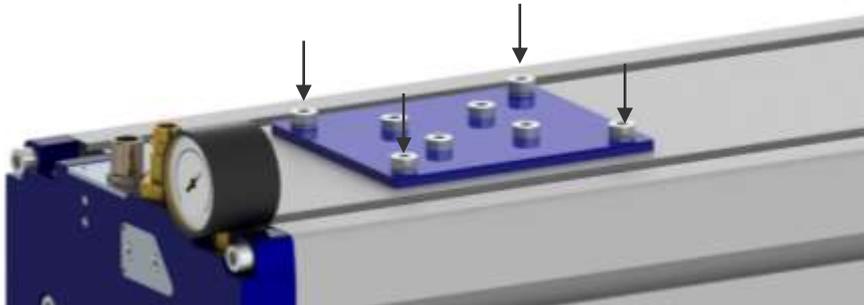


4. If it is heavily contaminated, the **valve plate** must also be cleaned. To do so, first unscrew the screws in the end covers (A+F) by a few millimeters so that the valve plate and the sealing does not damage the front sealing when you remove the valve plate.
5. Next, unscrew the screws of the valve plate (5). Start with the outer screws. The screws are secured against falling out with small sleeves (item no. 16 on the spare parts list). Ensure that the valve plate does not fall during disassembly.

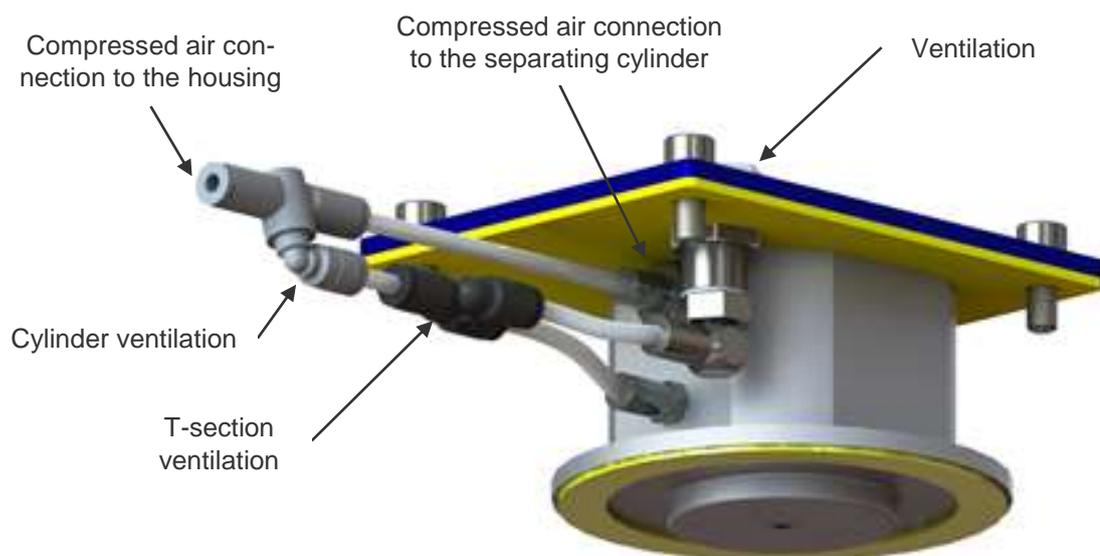


6. To clean the valves, carry out the following steps:
 - Remove the adhered masking film (H).
 - If the masking film is still in very good condition, it can be reused – the adhesive surface must be protected against dust/moisture.
 - Remove the spherical bearings, e.g. using a magnet (6.1).
 - Soak the contaminated bearings in a soap/detergent solution.
 - Blow out the valve section (G)/valves (without sliders) with compressed air or, if necessary, clean them with solvents (soak if necessary).
 - Dry all of the parts.
 - Insert the sliders/spheres back into the valves. Insert one slider into each valve to ensure that the valves work properly.
 - Reattach the masking film. Ensure that the openings of the clover shapes align with the valves.
 - Clean the base profile if necessary (see point 7).
 - Note the asymmetry of the valve plate and screw it back on to the base profile (D). To assemble the parts, carry out the steps for disassembly in the reverse order. Tightening torque of the screws: 10 Nm. The base and valve profiles must be flush to one another and may not be shifted relative to one another.
 - In the final step, screw the end cover on tightly, suspend the quick-change section and clamp it tightly. Tightening torque of the screws: 10 Nm.

7. To inspect the contamination level in the **base profile**, completely remove the end cover. You can blow out the gripper with compressed air. When removing the functional cover, ensure that the hose connection to the separating cylinder is disconnected.
8. To inspect that condition of the sealing on the sealing plate of the compact cylinder, unscrew the four outer screws of the mounting plate and remove the separating cylinder assembly unit (B) (note the hose). The sealing must be intact and free of tears. To do this, proceed as follows:
 - Remove the functional cover, disconnect the compressed air hose for controlling the separating cylinder.
 - Unscrew the four fastening screws of the cylinder mounting plate.
 - Remove the mounting plate from the system together with the cylinder.
 - Inspect the hoses, quick exhaust valve and T section and blow them out with compressed air if necessary.
 - See also chapter 2.2.1.
 - Check the sealing. Remove any defective sealing, adhesive residue or other contamination. The adhesive surfaces must be kept clean and dry before the new seal can be attached.
 - Attach the replacement seal.
 - Reinstall the cylinder, connect it to the pneumatic hose and quick-change valve, and reattach the mounting plate. Ensure that the pneumatic hose is not bent or positioned in a way that would impair the function of the separating cylinder.
 - Afterwards, perform a leak test.



Connecting the separating cylinder



8.10 Overview of the Tightening Torque of the Screws

Screw designation	Size	Torque
Housing cover screws (4)	M6x30 steel	10 Nm
Valve plate screws (5)	M6x30 stainless steel	10 Nm
Cylinder assembly fastening screw (8)	M6x16 steel	10 Nm

8.11 Checking the System for Leaks

The area gripper must be ready for operation in order to check the system for leaks. Close the separating cylinder and switch on the vacuum generator. The vacuum level can now be read at the gauge. The measured value should be up to 10% lower than the maximum reachable vacuum of the vacuum generator used.

Example: The vacuum generator reaches a maximum of -0.5 bar \rightarrow A vacuum of at least -0.45 bar must be displayed on the gauge.

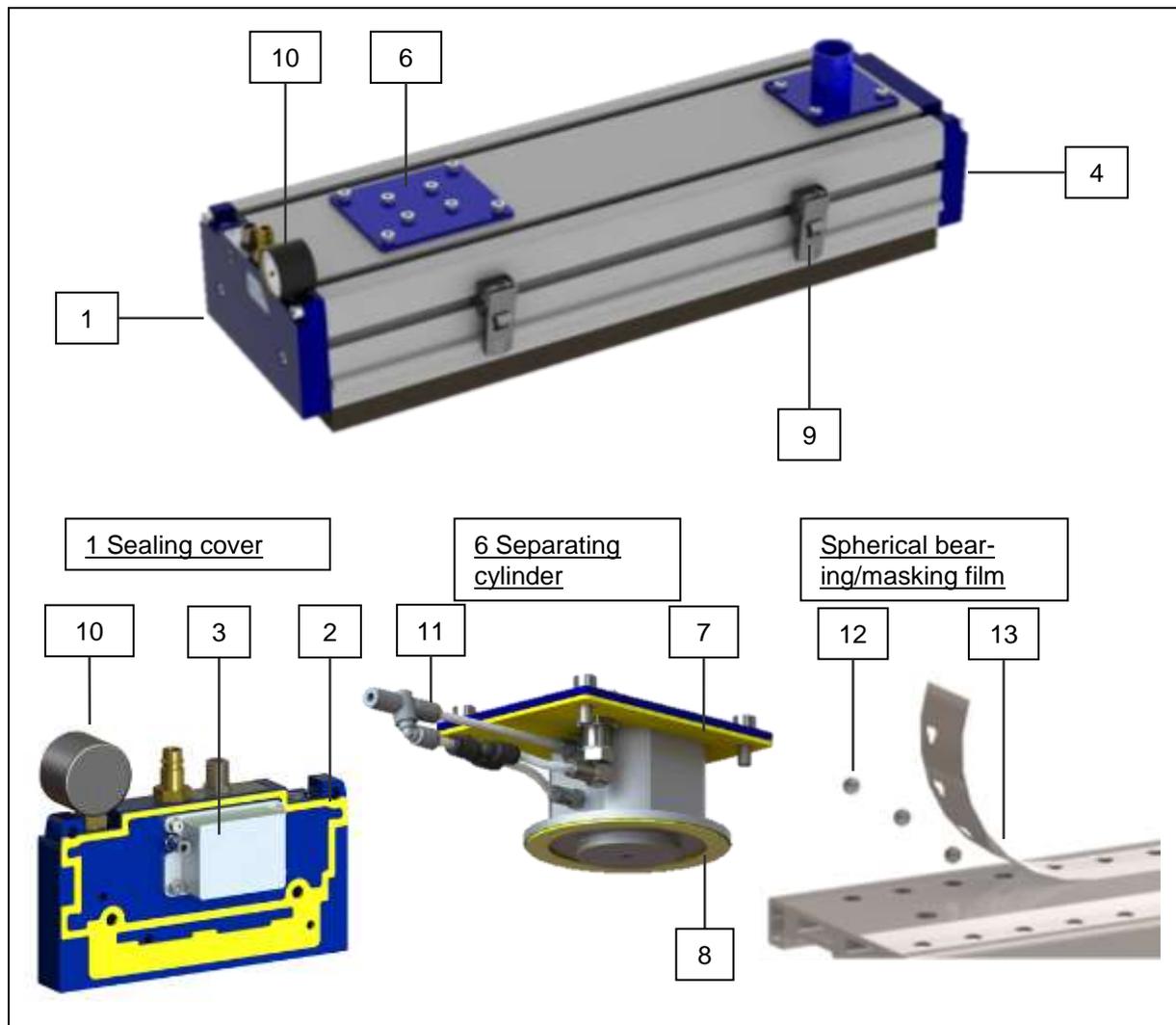
If the vacuum is not achieved, the system must be checked for leakage as follows.

1. Check the hose, hose connections, tubing and the cable screw union on the multi-pole plug for damage and leaks, and replace them as necessary.
2. Check that all the sections and all other functional components are properly assembled.
3. Check that the spacer sleeves are still in place between the valve plate and base section.
4. Check whether the vacuum filter is blocked or dirty; if necessary, clean the filter cartridge or replace it.
5. Check the seals on the covers and separating cylinder and replace if necessary.
6. Check that the vacuum generator is fully functional.

9 Spare and Wearing Parts

We guarantee this device pursuant to our General Terms and Conditions of Sale and Delivery. The same applies to spare parts, provided that these are original parts supplied by us. We are not liable for any damage resulting from the use of non-original spare parts or accessories. Wearing parts are not covered by the warranty.

ATTENTION	
	<p>Incorrect disposal of the system or individual components</p> <p>Environmental damage</p> <p>► Disposal according to national guidelines.</p>



Item	Quantity	Description	Part no.	Legend
1	1	Housing cover (assembled)	10.01.40.00021	S
2	1	Form seal (suitable for item 1)	10.01.40.00013	W
3**	1	Form seal for the protective cap	10.01.40.00080	W
4	1	Housing cover (assembled)	10.01.40.00024	S
5**	1	Form seal (suitable for item 4)	10.01.40.00014	W
6	1	Separating cylinder (assembled)	10.01.40.00161	S
7	1	Form seal of the separating cylinder	10.01.40.00150	W
8	1	Form seal of the wear plate cylinder Ø 88 mm	10.01.40.00017	W
9	*	Mounting kit	10.01.40.00023	S

10	1	Vacuum gauge (manometer)	10.01.40.00094	S
11	1	Quick exhaust valve	10.05.03.00321	S
12	*	Stainless-steel bearing	10.01.40.00102	S
13	1	Masking film (length: 3,000 mm, cut to size)	10.01.40.00108	W
14**	*	Sealing ring M6	10.07.08.00017	W
15**	*	Separating cylinder connection hose	On request	S
16**	*	Spacing sleeve with thread locking compound	10.01.40.00151	W

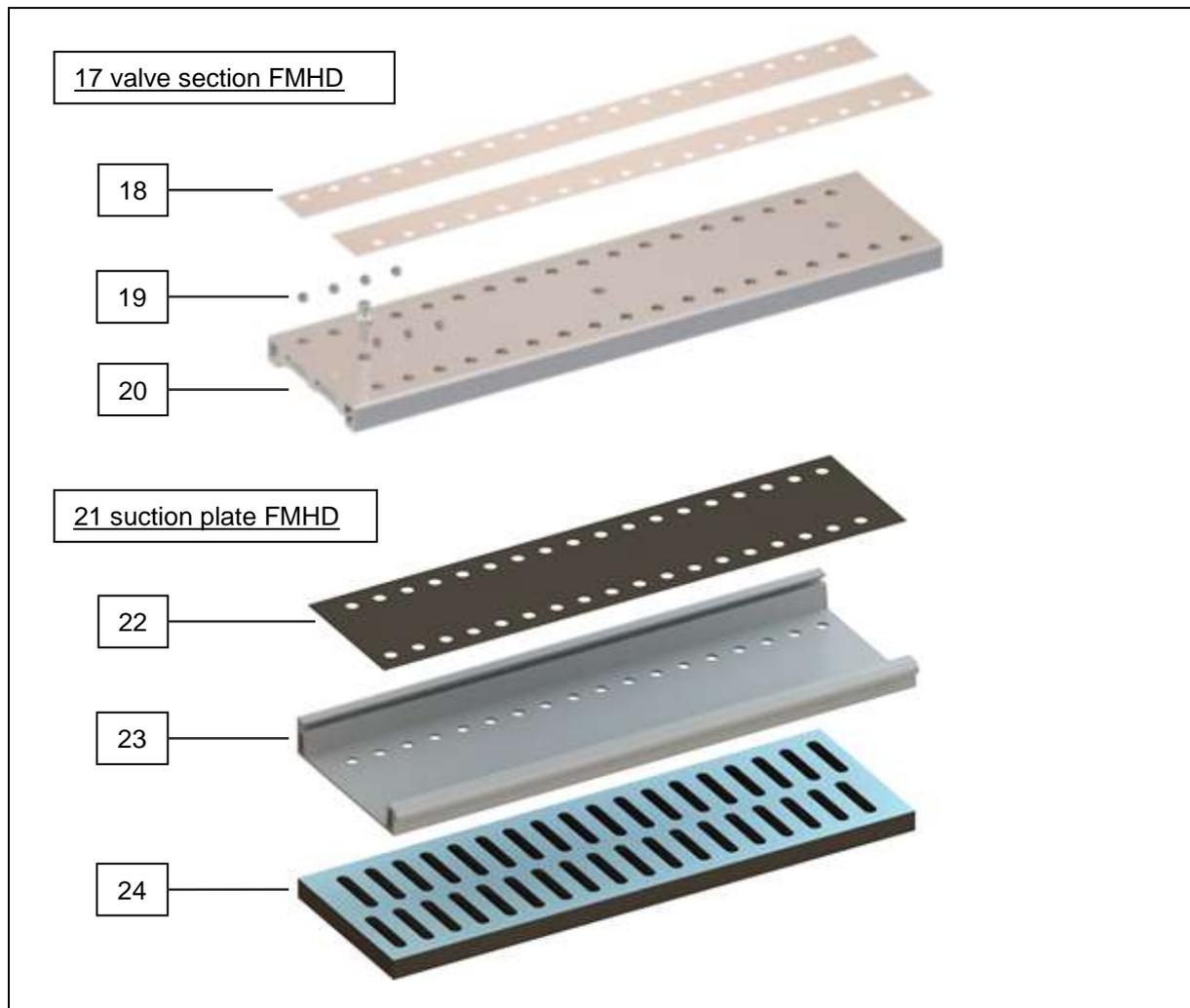
* Quantity depends on the length of the area gripper

** Items not shown

S= Spare part, W= Wearing part

Configurable spare part assemblies

To order a spare part assembly, keep the product key of your area gripper at hand. Item 24 (sealing plate) can be individually adapted to your application at any time. To do so, please contact our Technical Sales department.



Item	Quantity	Description	Part no.	Legend
17	1	Valve section (attached) comprised of items 18–20 (including mounting materials)	On request	S
18	1	Masking film	On request	W
19	*	Stainless-steel bearing	10.01.40.00102	S
20	1	Gripper section FMHD -M-	On request	S
21	1	Area gripper suction plate comprised of items 22-24	On request	S
22	1	Sealing plate (O04)	On request	S
23	1	Gripper section FMHD -U-	On request	S
24	1	Sealing plate	On request	W

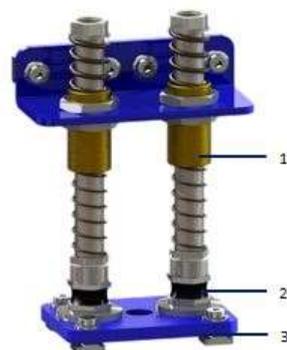
* Quantity depends on the length of the area gripper

10 Accessories

Rigid suspension FST STARR

Item	Description	Part no.
1	FST-STARR 25-2 (spring plunger, 25 mm stroke)	10.01.10.07012
1	FST-STARR 50-2 (spring plunger, 50mm stroke)	10.01.10.07013
1	FST-STARR 75-2 (spring plunger, 75mm stroke)	10.01.10.07014
2	FLK G1/2-IG G1/2-AG (Flexolink)	10.01.03.00175
2	FLK G1/2-IG G1/2-AG V (Flexolink, reinforced design)	10.01.03.00207
3	FLAN-PL	10.01.10.08805

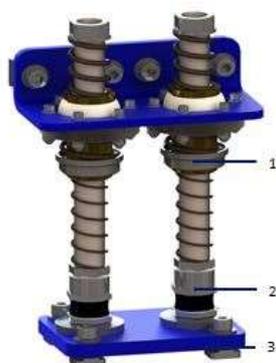
We recommend connecting the gripper to a combination of FST-STARR and FST-FLEX (fixed and floating bearings).



Rigid suspension FST-FLEX

Item	Description	Part no.
1	FST-FLEX 25-2 (spring plunger, 25 mm stroke)	10.01.10.07018
1	FST-FLEX 50-2 (spring plunger, 50mm stroke)	10.01.10.07019
1	FST-FLEX 75-2 (spring plunger, 75mm stroke)	10.01.10.07020
2	FLK G1/2-IG G1/2-AG (Flexolink)	10.01.03.00175
2	FLK G1/2-IG G1/2-AG V (Flexolink, reinforced design)	10.01.03.00207
3	FLAN-PL	10.01.10.08805

We recommend connecting the gripper to a combination of FST-STARR and FST FLEX (fixed and floating bearings).



Rigid suspension FST-C

Item	Description	Part no.
1	FST-C 100-HD1 (100 mm stroke)	10.01.20.01260
2*	MOD-FLAN 157x120x64.1	10.01.11.03187

* Similar to the figure



Vacuum distributor

Item	Description	Part no.
1	Vacuum distributor with three hose connectors (hose internal diameter: 60 mm)	10.01.10.02779
1	Vacuum distributor with four hose connectors (hose internal diameter: 60 mm)	10.01.10.03196
1	Vacuum distributor with five hose connectors (hose internal diameter: 60 mm)	10.01.10.03066

* Attachment via four sliding blocks M8 (20x20 mm)

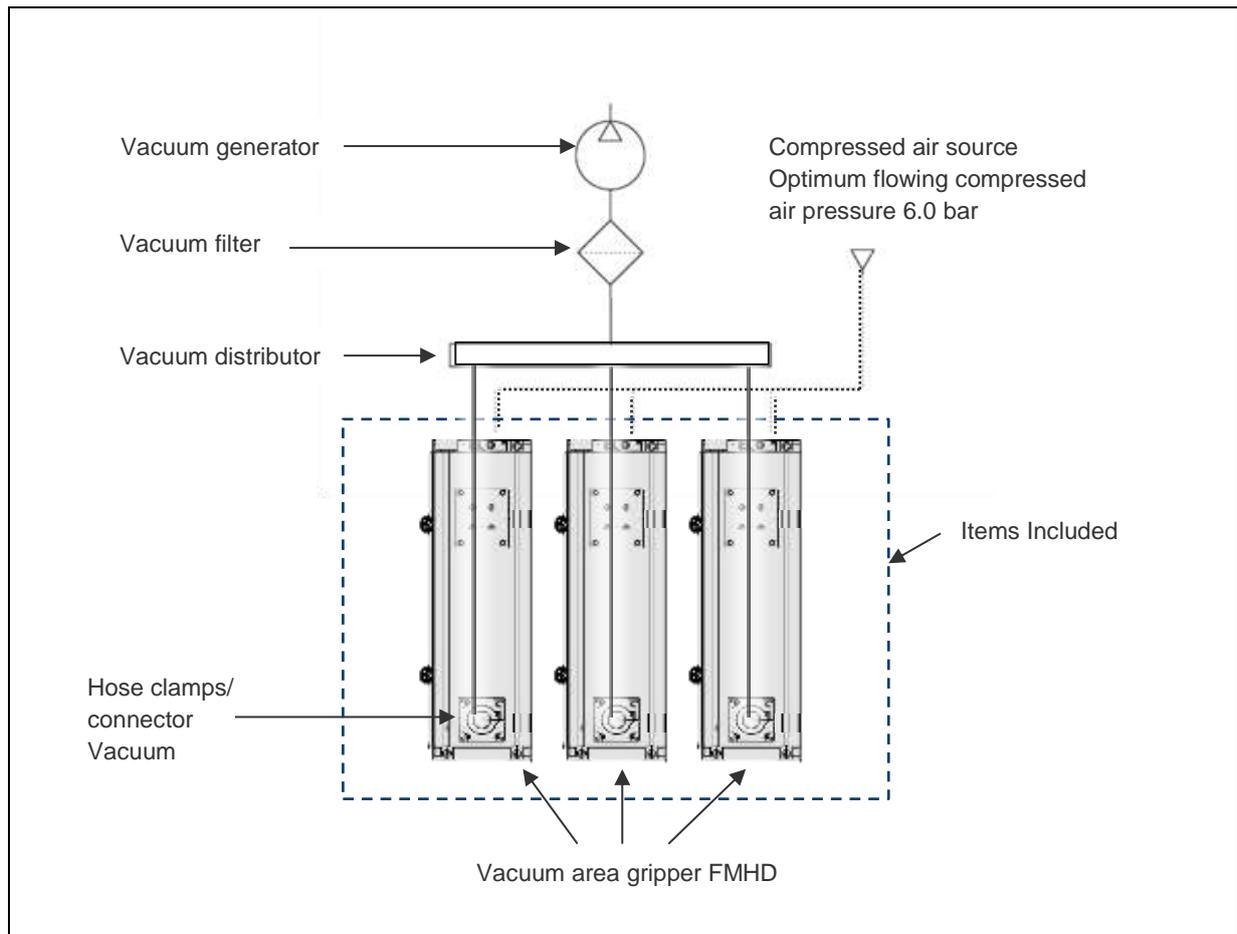


Additional accessories

Item	Description	Part no.
1	VSi V D M8-4 (vacuum switch)	10.06.02.00577
2	ASK B-M8-4 (connection cable)	10.06.02.00031
3	VS-MONT 84x21x34.5 VSi-V (vacuum switch assembled flat including plug and 5 m connection cable)	10.01.38.04053



11.2 Pneumatic Circuit Diagram FMHD – Parallel Circuit



12 Other Applicable Documents

EC declaration of incorporation FMHD

30.30.01.01665

Schmalz Services



Global contact

Our sales network of local field representatives, international subsidiaries and trade partners ensures quick and competent information and consultation in more than 50 countries worldwide.

 www.schmalz.com/salesnetwork



Online documentation

Conveniently download catalogs, operating instructions and CAD data and get comprehensive information about our products and services.

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“How to” videos

In short, easy-to-understand videos we explain the extensive features of our products. Take a look, it's worth it!

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